IQ Modular™
The most comprehensive range of infrastructure for your broadcast or media business
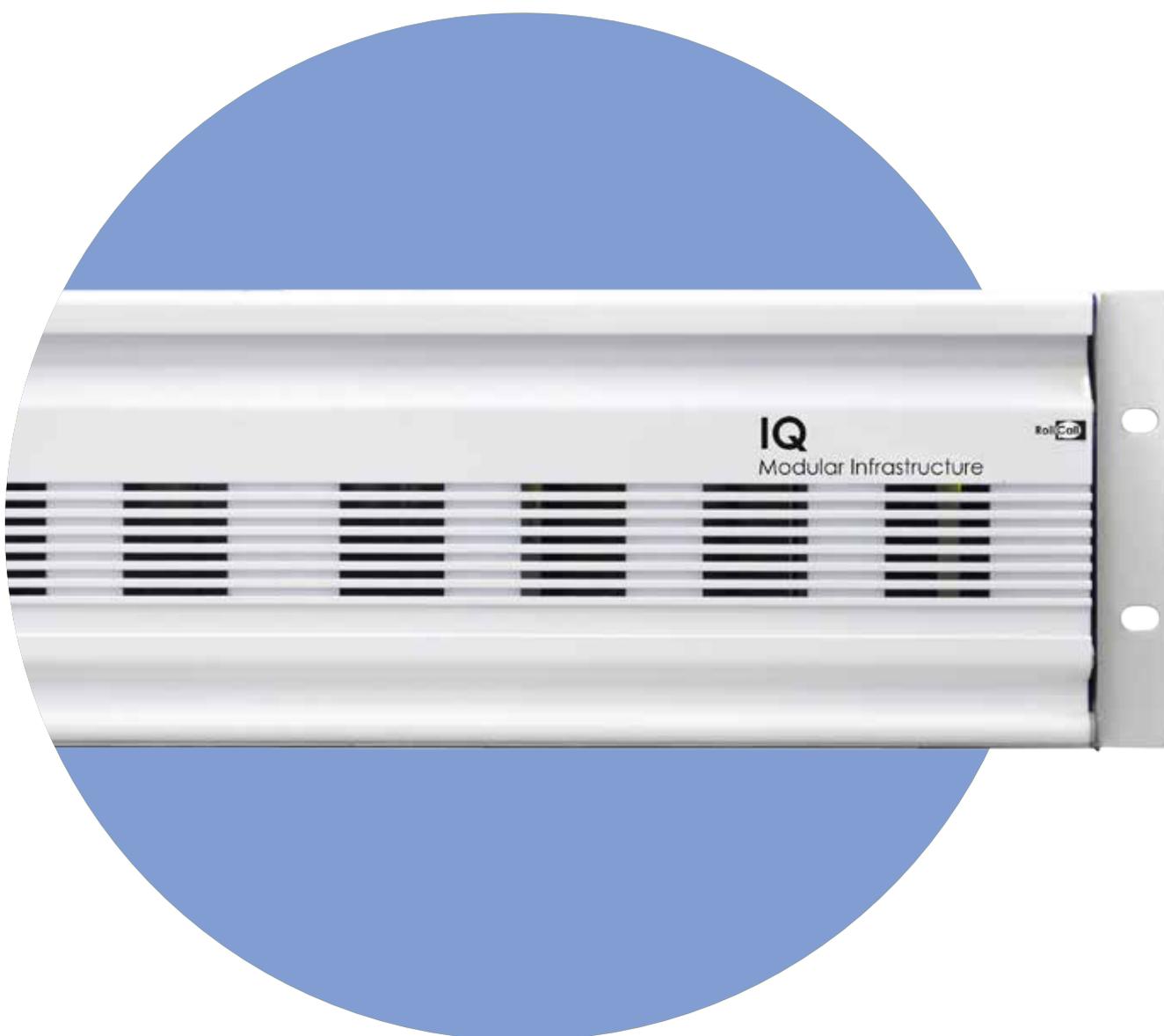
IQ Modular
SAM's IQ Modular technology is ideally placed to offer the future proof solution that you require. As the HD and UHD digital rollout gathers pace, customers are looking to protect their investments by ensuring they are capable of supporting not only the HD 1.5Gbps standards of today, but future progressive video formats such as 1080p50/59 3Gbps standards.

By introducing a broader range of 3G/HD/SD products based on the latest audio and video process interfacing technology IQ
Modular is ideally placed to offer the future proof solution that you require.

Plus the added choice of multi-channel fiber optic or integrated fiber solutions frees you from the limitations of copper infrastructure and enables you to work with coax and fiber in planning cost effective HD expansion and 3G signal delivery.

Including a host of video processing features such as format conversion, synchronization, agile input switching and metadata handling along with the comprehensive monitoring and control offered by RollCall, IQ provides a reliable, cost-effective base for all infrastructure requirements.

Audio is also comprehensively handled with standard features such as embedding, de-embedding, channel routing, downmixing and delay catered for alongside more advanced multi-channel functions such as Dolby E/D encoding or decoding, stereo to 5.1 surround sound upmixing and loudness control to CALM and EBU-R128 standards.

sam
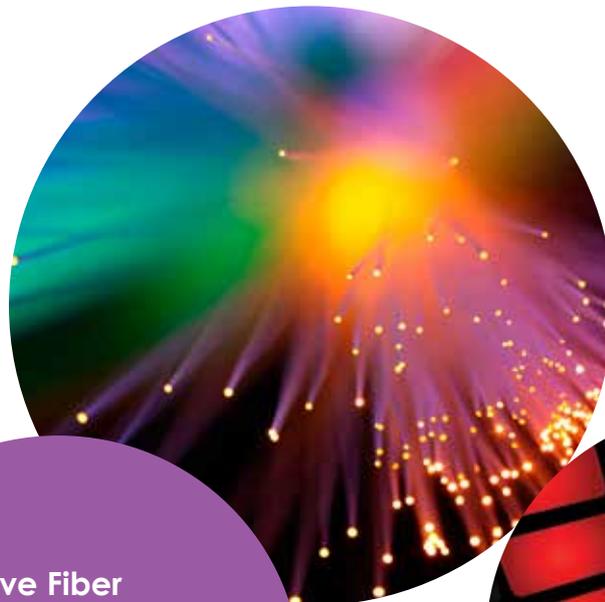
Extensive Fiber Solutions for Mixed Connectivity Environments Plus Unrivalled Audio Processing Capabilities

Designed to support the most demanding mission critical applications in the media and broadcast industry, and built on more than 20 years of engineering excellence the IQ Modular range from SAM comprises more than 400 modules which boast:

- Fully hot swappable, flexible architecture
- 3G & UHD-4K integration
- Advanced audio handling
- Integrated fiber
- Facility wide control, monitoring and QC
- 16 Modules in 3RU with full redundancy
- Over 250,000 modules in service globally

Range Overview

Capable of performing a wide range of video and audio processing tasks from synchronization, audio embedding / de-embedding through to high quality format conversion for HD/ SD-SDI signals, or Dolby Encoding / Decoding for audio signals the IQ Modular range offers you an expandable feature set with the versatility to adapt to your changing business demands.

Cross Compatible Architecture

Available in 1RU and 3RU the IQ Modular frames provide excellent product power density and enable complete redundancy from power, to cooling, to communications. All IQ Modular enclosures and modules are cross compatible, protecting your investment throughout the life of your media and broadcast infrastructure.

Built in Intelligence

All card settings are stored on-board the module, so once set up they can be used in any part of the system without further adjustment. SAMs RollMechanic application enables further set-up simplicity through it's use of cloning module settings to multiple modules of the same type in the system.

3G Ready

Not yet ready to go 3G but want to protect your investment? No problem all 3G compatible modules are available for the same price as their HD predecessors ensuring a seamless transition to 1080p operations when your schedule demands it.

Advanced Audio Processing

Audio is comprehensively handled with standard features - such as embedding, de-embedding, channel routing, downmixing and delay – alongside more advanced multi-channel functions such as Dolby E/D encoding or decoding, stereo to 5.1 surround sound upmixing, and loudness.

Integrated Fiber

In addition to a wide range of high density multi-channel 1080p / 3Gbps fiber modules the IQ Modular range also offers integrated fiber solutions freeing you from the limitations of copper infrastructure and enabling you to work with coax and fiber in planning cost effective HD expansion and 1080p / 3Gbps signal delivery.
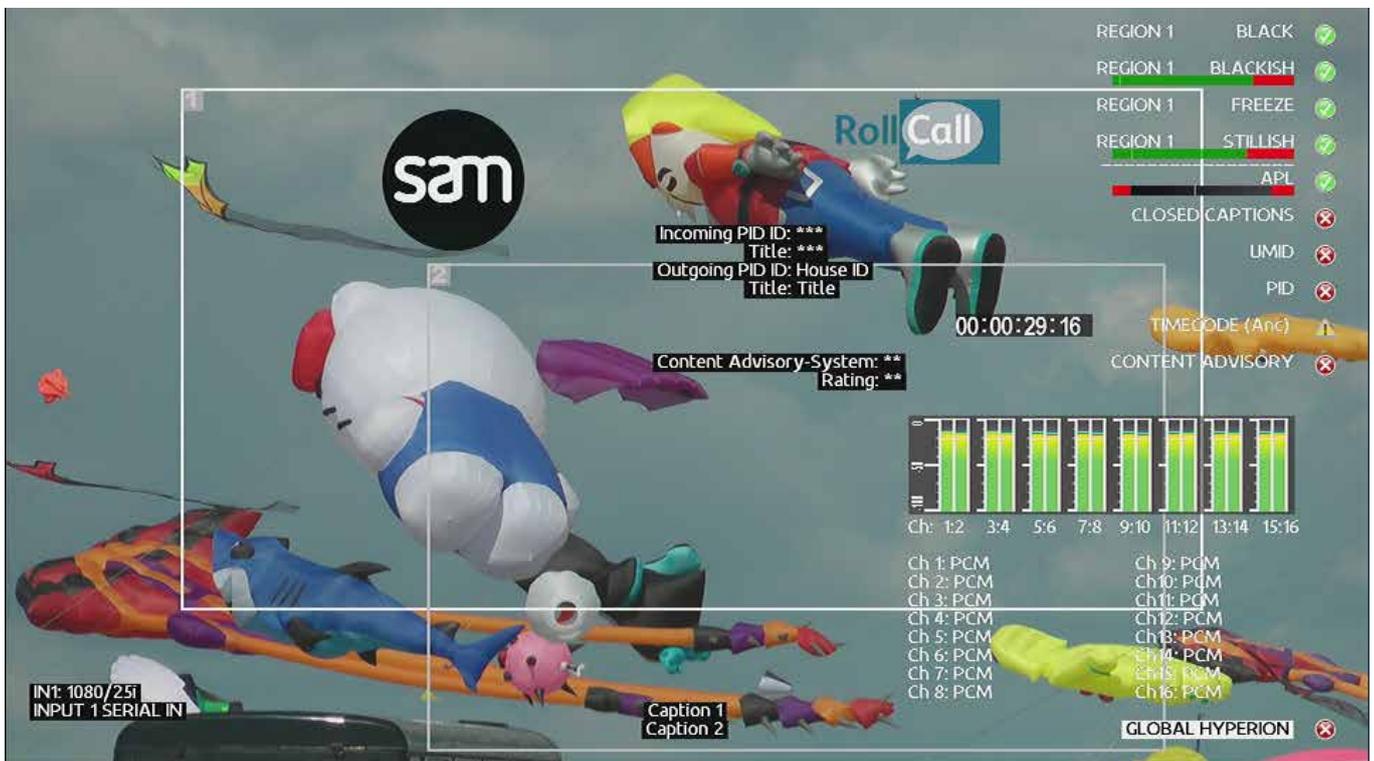
Advanced Control and Monitoring

Not only does the IQ Modular range include built in control and monitoring as standard, it is also the only modular solution on the market to offer full SNMP control and monitoring compliance on every module, delivering the most advanced control and monitoring solution across your entire media and broadcast workflow.

Automated QC

Hyperion is a new generation of monitoring and control designed to assist operators monitor content more efficiently and ensure contractual and legal obligations are met. Hyperion's content monitoring aspects of Stillish & Blackish are measuring whether the content is viewable and contains enough motion to be valid. These parameters combined with audiomonitoring and metadata validation provide an automated means of content QC allowing true monitoring by exception.

⌒ **Hyperion QC on screen monitoring display**

Contents

Contents

Contents

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IQ Applications

An elegant solution to modern day content workflow and control.

Addressing your needs:
SAM offers a range of over 400 IQ modules with different levels of functionality at price points to suit every application:

Multi-feature integration
These modules incorporate many common features on a single card. Resulting in the need for a reduced number of cards per installation as well as the benefits of the associated overhead savings.

Single function
Simple to operate, well featured with an excellent cost /performance ratio.

Cost sensitive
Offering basic functionality in either single channel format or dual channel for space constrained applications.

Advanced Audio Processing

Providing multi-channel audio signal processing and manipulation

The best HDTV broadcasts combine great picture quality with high resolution audio in order to bring those pictures to life. To this end, providing tools for repurposing content to maximize it's future value and potential is a key focus of the new IQ range of video and audio processing modules.

Based around a set of flexible audio routers, SAM uses proven technology developed by Linear Acoustic, a leader in this field, to enable audio upmixing and loudness control to ensure your HD transmissions contain the best high quality surround-sound at the correct levels.

Variations in loudness between programs and stations is a well known issue. Not only is the problem found during programs – the issue of loud commercials, where volume levels jump during commercial breaks, is a common complaint amongst digital television viewers and can even drive them away from a channel.

The solution is monitoring of channel output, however in today's cost-concious business environment there is little scope to provide appropriate levels of staffing to monitor and control audio levels manually. There exists a requirement for intelligent technologies that can address the issue as part of a wider scale transmission system.

In addition, there is the question of stereo versus multi-channel sound. Most SD programs contain stereo audio channels and so when upconverting this video content to HD, to provide the best viewing experience, the audio should also be converted (or upmixed) to provide a 5.1 surround sound mix.

Advanced Audio Processing

Ensure audio levels are within defined limits prior to upmixing to a surround-sound output.

IQUDC10
3G/HD/SD-SDI Up, Down & Cross Converter with Audio Processing

IQUDC10
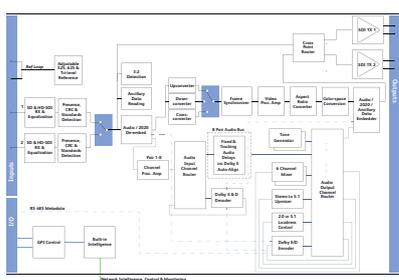
Application: Stereo loudness control and 5.1 upmixing

1. Input pair routed to internal bus
2. Into output side router
3. Routed to 2.0 loudness control & back to output router
4. Routed to 2.0 to 5.1 upmixer & back into output router
5. Routed to video embedder block

LINEAR ACOUSTIC® Audio processing from Linear Acoustic
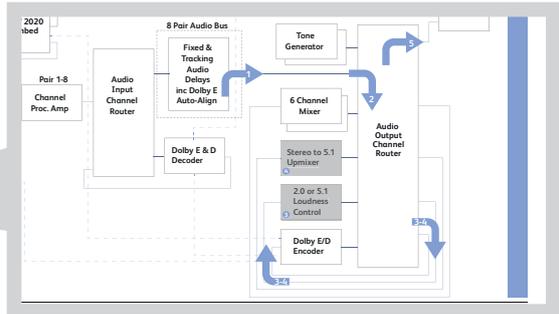
In this example we have an embedded feed that has a stereo audio source which we need to ensure remains below our house loudness limit, but as we are upconverting the feed to HD we want to transmit in 5.1 surround sound to give our viewers that high quality video and audio experience.

Using the IQUDC10 module, we can route the audio through the unit to the output side router, then round to the stereo loudness block where we can monitor and control the loudness level (loudness values can be monitored and reported over the RollCall network to a Centra monitoring system if required).

From the loudness block we can route the signal to the upmixing block where it will be detected as a stereo source and upmixed to surround sound 5.1 signals. This output can then be routed to the audio embedders for re-embedding into the video signal.

This is just one example of many applications where the IQUDC10 platform provides an effective solution. There are currently 12 products on the IQUDC10 platform including synchronizers, embedders, de-embedders and a host of format converters.

Signal Protection Solutions

Ensuring your valuable content stays on-air

Signal Path Protection

IQHIP10
HD/SD-SDI Hyperion
Intelligent Processor Module

SDI In → **IQHIP10** → SDI Main

Automatically detect content, metadata and signal anomolies using Hyperion intelligence to drive changeover rules for backup switching.

IQHCO31
HD/SD-SDI Synchronized
Change Over Switch

RollTrack

IQHCO31 → SDI

IQHIP10
HD/SD-SDI Hyperion
Intelligent Processor Module

SDI In → **IQHIP10** → SDI Backup

AES SDI

Monitoring

For a broadcaster or service provider keeping the content on-air regardless of any issues that may occur is of the utmost importance. Both customer satisfaction and revenue can depend on it and in some cases penalty charges may apply if content is offline for more than a certain amount of time. Ensuring that these critical signals are adequately protected becomes a fundamental part of every system design and SAM provides a range of products that not only meet these requirments but can take them to the next level.

This application shows how the IQHIP10 Hyperion content monitoring module can be used in conjunction with the IQHCO31 signal protection module to provide an increased level of signal quality assurance (QA) and an automated changeover trigger via background intelligence from RollTrack messaging.

The IQHCO31 module uses a powerful automated rules engine to monitor both the main and backup inputs for signal integrity.
It will perform either an instant or time delayed change over to the back up source should an error or failure occur in the main signal.

This delayed change over feature can be very important for customers who want to ignore glitches and only change over when a serious signal problem occurs. Timings can be independently set for failure and error conditions, meaning that the operator can change instantly on an input loss condition but delay if there are CRC errors, for example.

When combined with the IQHIP10 module much more subtle signal parameters such as video levels and motion, audio level and phase or type, and metadata values such as wide screen signalling, closed caption or timecode can be monitored. The IQHCO31 module can then be triggered by Rolltrack events to enable automated back up control. This function is included within the rules engine and so can run side-by-side with the on-board automated operation or GPI trigger inputs.

The IQHCO31 features a clean switching operation with independent input signal delays. This enables the operator to delay the back up path in order to allow for any extra processing on the main signal.

SDI and AES monitoring outputs are available to either monitor the main path selection, or to check the integrity and suitability of the back up chain.

A cost-effective basic switching version called IQHCO30 is also available for emergency switching applications.

Flexible Fiber Infrastructure

Ideally suited to multi-format workflows

As facilities are re-designed for HD workflows efforts are made to ensure that future standards and signal types can be catered for, such as 3Gbps SDI, Dolby compressed audio and 3D, and the additional metadata requirements that go along with these.

With HD and 3G signals, transport over standard copper cabling is limited to fairly short distances and so moving to a fiber based infrastructure provides an efficient way of alleviating these limitations both within a facility and for more remote operations.

This has resulted in the development of hybrid coax (copper) and fiber infrastructures along the broadcast signal chain leading to more demanding interfacing requirements. At SAM, this application area is a focus for our drive to integrate and include fiber optic signal handling in the IQ range.

To this end, the new IQ processing platforms have the option to add fiber interfacing with the inclusion of a sub-module that allows connection with a fiber SFP rear panel. This alleviates the need for a dedicated fiber conversion module and so saves infrastructure space and cost.

Integrated Fiber Transport

IQGBE40 Four Port 1Gb Ethernet Switch with Fiber Tx/Rx (1310nm)

IQGBE40

Tx/Rx

IQUDC30
3G/HD/SD-SDI Up, Down & Cross Converter with Synchronizer

IQUDC30

Tx
SDI

Control Network

IQOSY30
3G/HD/SD-SDI Frame Synchronizer with Fiber Optic Interfacing

2 x SDI In
1 x Rx

IQOSY30

Tx

MV-Series Multiviewer

Control

IQOTR32
3G/HD/SD-SDI Flexible Fiber Transceiver

Rx

SDI In

IQOTR32

Tx
SDI

SDI

Rx

SDI

Fiber Tx/Rx
SDI I/O
AES I/O

IQ provides the flexibility to mix both fiber and copper interfacing within video and audio signal processing operations.

An efficient way to overcome the distance limitations of copper cable when operating at HD and 3G data rates.

Both SDI, Network & optical signal handling allows for hybrid copper and fiber HD and C&M workflows to be implemented.

Compact single slot solutions enable a high packing density.

The first example of this is the IQOSY30 frame synchronizer. Based on the SAMs proven synchronizer technology, this module provides the same video and audio processing feature set with the additional flexibility of fiber inputs and/or outputs.

Intelligent re-profiling of the PCB has allowed this unit to retain it's single slot width whilst adding the new fiber interfacing functionality.

Another example is our new flexible fiber optic transceiver - the IQOTR32. Designed to fit around SDI routers, it enables the flexibility to provide either copper or fiber inputs to be switched to both copper and fiber outputs. This means that local signals can be sent over copper, to/from the existing router, whilst more remote areas can be reached or received over the fiber network.

For all these IQ modules, various types of fiber SFP plug-in can be installed in the rear panel to provide fiber transmitting, receiving, or both in order to provide our customers with maximum flexibility.

Multi-Channel Fiber Transport

Providing Compact and Efficient Signal Distribution

Continuing with the fiber theme, another popular application combines a number of signals into a single fiber for transmission between sites, or between buildings. SAM has a range of new IQ modules that will allow video signals to be converted into CWDM (complex wave division multiplexed) fiber signals that can include up to 16 channels in a single fiber.

Featuring transmitter, receiver and transceiver modules, there will be a number of converter and combiner modules to allow several levels of CWDM functionality from 9, 10 to 16 channels for both single and bi-directional transport of SDI signals.

Alternatively these modules can be fitted with fiber SFP plug-in transmitters of the same wavelength to enable multiple signal transport from a single card (up to 8 SDI streams per module) for applications where HD/3G signals need to move significant distances, for example between floors within a facility.

Multi-channel Fiber Transport

Combine multiple signal transport streams through a single fiber.

IQOTR44
3G/HD/SD-SDI CWDM
Fiber Tx/Rx (1470-1530nm)

IQCWM09
9 Channel Fiber Optic
CWDM Module

IQCWM09
9 Channel Fiber Optic
CWDM Module

IQOTR45
3G/HD/SD-SDI CWDM
Fiber Tx/Rx (1550-1610nm)
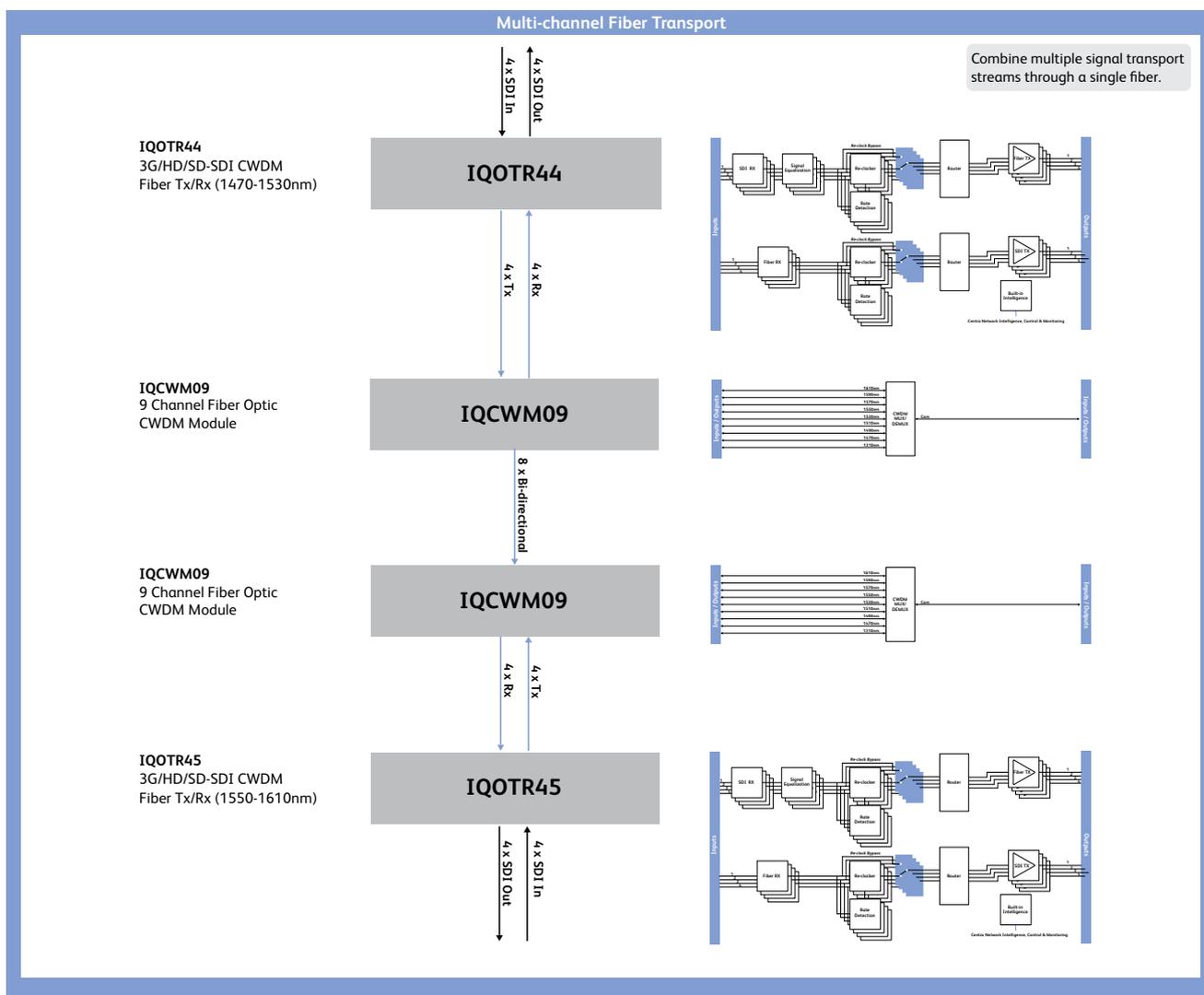
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Frames & Hardware

A key requirement for any modular system is the ease with which the desired combination of functions can be achieved. Limitations on how modules can be housed and restrictions on how they can be combined represent unnecessary problems for the system integrator. For this reason, the IQ Modular range has been designed to provide the maximum degree of flexibility and freedom from constraints.

IQH enclosures offer industry leading, high-density delivery of modular solutions. The enclosures are available in two sizes: 1U accepting up to four modules and 3U accepting up to 16 modules. Full SNMP control and monitoring of all RollCall enabled modules is included via Ethernet. Dual-redundant power supply options are available without any loss of capacity, and all enclosures feature integral cooling.

A passive 1U enclosure, IQH1P, housing up to 6 modules is also available for cost effective housing of passive fiber optic splitter and combiner modules.

Alongside the enclosures sits a wide range of configurable hardware control panel options including RollPod a fully user configurable control panel ideally suited to IQ Modular control and configuration in operational environments when interfacing to RollCall enabled equipment.

IQH3B

IQ 3U Modular Enclosure

IQH3B enclosures offer industry leading, high-density delivery of modular solutions. The 3U rack unit accepts up to 16 modules, and has dual redundant PSUs and cooling fans. Analog reference signals can be distibuted through the enclosures via 2 connections that can be independently selected by the installed modules. RollCall control and monitoring is included as standard using a Gateway control card that has it's own module style rear connector, thus providing a future proof upgrade path as communication standards evolve. Full SNMP control and monitoring functionality is also available over Ethernet.

Features

- 16 single or 8 double width modules (or any combination)
- Integrated web browser based RollCall configuration and control
- SNMP Control and Monitoring of ALL RollCall enabled IQ modules as standard
- Dual redundant network architecture over Ethernet and RollNet enables mission critical control applications to function even if a complete network failure occurs
- Plug-in gateway communications card to enable RollCall via RollNet, RS232/485/422 and RollCall over TCP/IP control, with support for upgradeable connectivity to handle future communication standards
- 2 x analog reference signal distribution for dual standard (Bi-Level or Tri-Level), dual video standard (SD or HD), and reference redundancy applications (Note: Only applicable to modules with -B order codes)
- Hot swappable redundant power supplies with PSU status reporting through GPIs on the Gateway control card rear panel
- Optimum use of rack space – frames do not require any additional ventilation spacing
- Dual redundant in-service removable fan unit
- Variable fan speed, dependent upon load and ambient temperature
- Full chassis monitoring, including Inlet and Outlet temperature, fan condition and module status
- Full CE and UL compliance

Order codes

IQH3B-S-0
Enclosure with Single PSU and Ethernet/SNMP Compatible RollCall Gateway Card. 16 module slots.

IQH3B-S-P
Enclosure with Dual Redundant PSU and Ethernet/SNMP Compatible RollCall Gateway Card. 16 module slots.

Accessory
IQH3B-PSU
Single PSU as cold spare or upgrade to Dual PSU configuration.

Accessory
IQH3B-FAN
Dual Fan unit for use as cold spare or replacement

Accessory
IQH3B-E-GATEW
Ethernet/SNMP compatible RollCall Gateway card for IQH3B enclosures.

Note: Although IQ modules are interchangeable between enclosures, their rear panels are enclosure specific. Code 'A or B' order codes may be used when installing modules in the IQH3B enclosure. Code 'A' order codes must be used when installing modules in the IQH3A enclosures.

IQH3B Http based frame status overview

IQH3B Web browser based Java RollCall control panel

IQH3B — IQ 3U Modular Enclosure

Technical Specification

Inputs, Outputs and Controls

Inputs/Outputs

RollCall remote control	BNC connector
RS422/485/232 remote control	9-pin D-type connector
RollCall/SNMP over TCP/IP	10/100 baseT Ethernet

Preset Controls

Unit address code set switches	2 Hex switches 0 to F
Communications mode switch	Select RS232, RS485 or RS422 interface

Additional Controls via RollCall Remote Control System

Full Control via web browser based Java RollCall control panel (available from chassis), any hardware RollCall control surface or standard RollCall Control Panel PC Application.

Specifications

Module complement	8 double width or 16 single width (or combinations of both) fitted vertically
Module card dimensions	100mm wide, 340mm long
Module rear panel dimensions	129mm high, 40.4mm (double width) 20mm (single width) wide

Power

Input voltage range	100-250 V 50/60 Hz
Input connector	IEC320 Fused 4 A(T)
Standby switch	Behind drop-down front panel
Power consumption	300 VA maximum
Modules power dissipation	210 W maximum
Output	+7.5 V and -7.5 V ±5%

Note that all modules have built-in power supply fuses.

CE Performance Information

Environment	Commercial and light industrial E2 immunity, controlled EMC E4 emissions
Peak mains inrush current following a 5 second mains interruption	10A

Reference

Analog Reference	2 x Analog Reference inputs Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level) SD bi-level – RS170A HD Tri-level – SMPTE 240M, 274M and 296M
Connector / Format	BNC/75 ohm panel jack on standard IQ connector panel
Analog Reference Return Loss	SD bi-level > 40 dB to 5.5 MHz HD tri-level > 35 dB to 30 MHz

Mechanical

Temperature range	0 to 45° C operating, -20 to +85° storage. A temperature and load sensitive cooling fan is fitted
Humidity range	10 to 85% (non condensing)
Case type	3U rack mounting aluminum case
Dimensions	483mm (445mm behind rack location bracket) x 490mm x 135mm (w, d, h)
Weight	Approximately 8.25 kg without modules. Approximately 15 kg fully populated

IQH3B Feature Table:

Feature	IQH3B
16 module capacity	✓
Hot swappable modules	✓
Dual PSUs	✓
Dual Cooling Fans	✓
Internal reference distribution	✓
Integrated control browser	✓
Hot swappable Gateway Card	✓
Full enclosure monitoring	✓
Module Power capacity	210W

Note:

Please refer to the IQH3B and respective IQ module Operators Manuals to determine the module power loading limits for your required configuration. The IQH3B Enclosure has 165 Power Rating (PR) units available. The Power Ratings of each module should be added together and the total should not exceed 165 units. Modules that do not specify a "Power Rating" should use the total power figure (W) as a power rating value.

IQH1A

IQ 1U Modular Enclosure

IQH1A enclosure offers high-density delivery of HD and SD modular solutions. The 1 rack unit enclosure accepts up to four 'A' style modules and is available with hot-swappable dual redundant PSUs for maximum reliability. The enclosure is fitted with RollCall control and monitoring as standard, including full SNMP control and monitoring functionality over Ethernet.

Features

- 4 single or 2 double width modules (or any combination)
- Capable of accepting all types of IQ Modules including HD-SDI, SD-SDI, AES and analog audio, analog video and fiber optics
- Dual Redundant power supplies (hot swappable) for high system availability
- Optimum use of rack space – frames do not require any additional ventilation spacing
- Plug-in RollCall enabled via gateway card with TCP/IP, RollNet, SNMP and RS232/422 connectivity
- In service replaceable cooling fans
- Chassis monitoring, including Inlet temperature, fan condition and module status
- Full CE and UL compliance

Order codes

IQH1A-S-P
Enclosure with Dual Redundant PSU & Ethernet/SNMP Compatible RollCall Gateway Card. 4 module slots.

Accessory
IQH1APSU
Single PSU as cold spare or upgrade to Dual PSU configuration.

Accessory
IQH1A-S-GATEW
Ethernet/SNMP compatible RollCall Gateway card for IQH1A enclosures.

Note: Although IQ modules are interchangeable between enclosures, their rear panels are enclosure specific. Code 'A or B' order codes may be used when installing modules in the IQH3B enclosure. Code 'A' order codes must be used when installing modules in the IQH3A enclosures.

⌢ **IQH1A** Http based frame status overview

⌢ **IQH1A** Web browser based Java RollCall control panel

IQH1A

IQ 1U Modular Enclosure

Technical Specification

Inputs, Outputs and Controls

Inputs/Outputs

RollCall remote control RS422/485/232	BNC connector
Remote control	9-pin D-type connector
RollCall/SNMP over TCP/IP	10/100 baseT Ethernet

Preset Controls

Unit address code set switches	2 Hex switches 0 to F
Communications mode switch	Select RS232, RS485 or RS422 interface

Additional Controls via RollCall Remote

Control System

Full Control via RollCall Control Panel PC Application.

Specifications

Number of Modules that May be Accommodated	
1U:	2 double width or 4 single width (or combinations of both) fitted horizontally
Module card dimensions	100 mm wide, 340mm long
Module rear connector	SD - 64 way HD/SD – 55 way Z pack + 6/9 coax inserts
Module rear panel dimensions	129mm wide (-A versions) 40.4mm (double width) 20mm (single width) high

CE Performance Information

Environment	Commercial and light industrial E2 immunity, controlled EMC E4 emissions
Peak mains inrush current following a 5 second mains interruption	16A

Power (each PSU)

Input voltage range	100 - 250 V 50/60 Hz
Input connector	IEC320 Fused T3.15AH
Input current	2.5 A
Enclosure power consumption	86.25 W maximum (±7.5 V supplies)
Outputs	+7.5 V and -7.5 V ±10% Fan Supply 11 V ±1 V 0.7 A typical

Note that all modules have built-in power supply fuses.

Mechanical

Temperature range	0 to 40° C operating, -30 to +75° storage. Cooling fan is fitted
Humidity range	10 to 85% (non condensing)
Case type	1U rack mounting aluminum case
Dimensions	483mm x 470mm x 44.4mm (w, d, h)
Depth behind rack ears excluding space for leads	450mm
Weight empty	6.45 Kg
Weight including modules	8.25 Kg

IQH1P

IQ 1U Passive Modular Enclosure

IQH1P accepts up to 6 single slot passive modules. Designed to offer cost effective mounting of IQ optical fiber modules, the IQH1P provides no power or control, but can be mounted in either diection in a 19'' rack.

Features

- 6 single or 3 double width modules (or combination)
- Full CE and UL compliance

Order codes

IQH1P
Passive 1U Enclosure with 6 module slots

IQ Modular Enclosures, General Information

How do I order the right modules for my enclosure?

Although IQ modules are interchangeable between enclosures, their rear panels are enclosure specific. Code 'A or B' order codes may be used when installing modules in the IQH3B enclosure however, code 'A' order codes must be used when installing modules in the IQH3A and IQH1A enclosures shown below. Non 'A' order codes relate to all other SAM IQ modular enclosures. Please take time to ensure that the compatible order code is selected to match the chosen enclosure.

'B' Style Enclosure

Rear panels with the suffix A or B may be fitted into the 'B' style enclosure as detailed below:
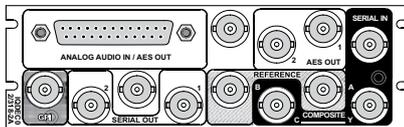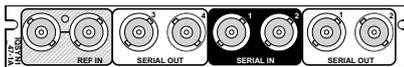
IQDEC0218–2A

IQSYN1047–1B3

IQH3B-S-0, IQH3B-S-P

'A' Style Enclosure

Rear panels with the suffix A may only be fitted into the 'A' style enclosure as detailed below:
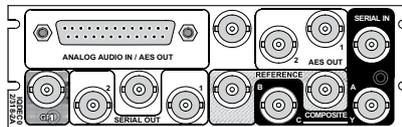
IQDEC0218–2A

IQH3A-S-0, IQH3A-S-P

IQH1A-S-P

IQH3A-E-0, IQH3A-E-P, IQH3A-0-0, IQH3A-0-P

All Other Enclosures

Rear panels without the suffix A may be fitted into all other SAM IQ Modular enclosures as detailed below:
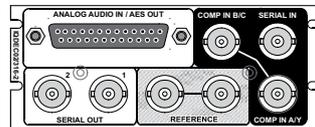
IQDEC0016–2

IQH1S-RC-0, IQH1U-RC-0, IQH1U-RC-AP, Kudos Plus Products

IQH3N-0, IQH3N-P

IQH3U-RC-0, IQH3U-RC-P

Please contact your local sales office to request a copy of **IQ Modular -1 and -2 Style Rear Panels** document for details of available modules.

RPAN

Router Control Panel

The RPAN provides button per source or global x-y control of routers over the RollCall network.

Features

- Single button per Source
- Single button per Destination (optional)
- Single button per Level (optional)
- 'In-button' LED tally including input signal status
- RollNet high speed connection
- Dual redundant power supply option

Why should you choose this product?

- Ideal for control of any RollCall compatible router products such as the SAM IQSRT00/10 or IQDMX series
- Triggering of any RollCall command that has a continuous value, for example control of embedded audio shuffling within a module
- Can control any serially interfaced router via an IQSPI00 serial interface module (available separately)

Order Code: RPAN8-1-1

Order Code: RPAN8-1-2

Order Code: RPAN8-8-1

Order Code: RPAN8-8-2
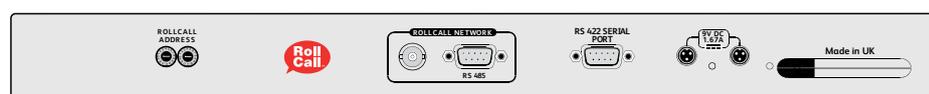
Option - RollPodPSU - RPAN PSU. Upgrade RPAN to dual redundant PSUs, or for use as a cold spare (RPAN is shipped with 1 PSU as standard).

Technical Specification

Features

Control Interface

RollNet coax	Via BNC connector
RollCall RS422	Via 9 way D type connector

Controls

Hard keys	Up to 18

Indicators

Hard keys	Multi colored (LED illuminated)

Controls via RollCall Remote Control System
Target router(s) configuration
Hard button LED brightness adjustable
Power and temperature monitoring

Specifications

Power	Via dual redundant mains operated external adapters
	Input 100-240V AC @ 47 to 63 Hz 1A max
	Output + 9V DC at 1.67 A
Power consumption	5.4VA max
Temperature range	0° to 40° C operating
Case type	1U rack mounting steel case
Dimensions	483 mm x 198 mm x 44.4 mm (w, d, h)
Weight approximately	1kg

RollPod 3U

Configurable Control Panel

The RollPod is a fully user configurable control panel for interfacing to RollCall enabled equipment. To enable straightforward development of user defined control panels the configuration software tool RollPod Designer enables design and download of user defined configurations to 1U and 3U RollPods, and RollPod code based SAM GPI module (IQGPI00\01).

Features

- Programmable control panel for SAM equipment
- Ideally suited to IQ Modular control and configuration in operational environments
- User customisable both locally and through downloaded configuration files
- Alternative custom configured (-C) version also available with enhanced functionality
- Up to 16 assignable push buttons
- Up to 4 shaft encoders
- 8 Soft buttons
- Message and parameter display
- Single control per RollCall function
- In button multi-color LED tally
- User definable 'In-button' labels
- RollCall connection via coaxial cable or Ethernet

Why should you choose this product?

- Configurable panel to enable control of any function of any unit connected to the RollCall network, for example proc. amp adjustment for video and audio parameters
- Can be supplied pre-configured to meet customers exact control requirements (-C version)
- Compact size enables three panels to be installed in a 19 inch x 3U rack, or single panels to be easily desk mounted
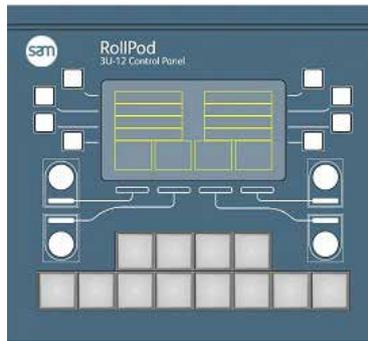
RollPod12 RollPod Configurable Control Panel, 4 shaft encoders and 12 buttons
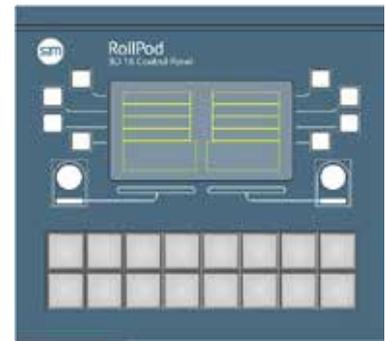
RollPod16 RollPod Configurable Control Panel, 2 shaft encoders and 16 buttons

The RollPod Designer GUI allows you to browse the RollCall network, select controllable devices then drag and drop the required functionality straight onto the relevant RollPod device from a simple software user interface allowing control of the functions on your SAM Equipment. RollPod Designer is provided with the free RollCall Lite download available from the SAM web-site.

RollPod 3U

Configurable Control Panel

Order information

Base Model
RollPod3U12E
RollPod Custom Configurable Control Panel, 4 shaft encoders and 12 buttons.

RollPod3U16E
RollPod Custom Configurable Control Panel, 2 shaft encoders and 16 buttons.

Option
RollPodPSU
RollPod/RPAN PSU, upgrade RollPod to dual redundant PSUs, or for use as a cold spare.

R-POD3RURACK
RollPod 3U Mounting Rack. Mounts up to 3 RollPods. Blanking plates included to screen the rack when one or two pods are fitted.

Technical Specification

Features

Control Interface

RollNet coaxial	Via BNC connector

Controls

Soft keys	8
Hard keys	12 (RollPod 12), 16 (RollPod 16)
Shaft encoders	4 (RollPod 12), 2 (RollPod 16)

Indicators

Hard keys	Multi colored
Soft keys	Button with LED indicator
Display	LCD Bitmap display

Controls via RollCall Remote Control System
Full configuration, e.g button assignment, target device setup.
LCD display brightness
LCD display contrast
Hard button LED brightness
Soft key LED brightness

Specifications

Power	Via mains operated external adapter Input 100-240V AC @ 47 to 63 Hz 1A max. Output + 9V DC at 1.67 A
Power consumption	7.2 W
Temperature range	0° to 40° C operating
Case type	Special metal case
Overall dimensions	140 mm x 130 mm x 70 mm (w,h,d)
Hole cutout dimensions	132 mm x 112 mm x 86 mm (w,h,d)
Weight	0.94 kg
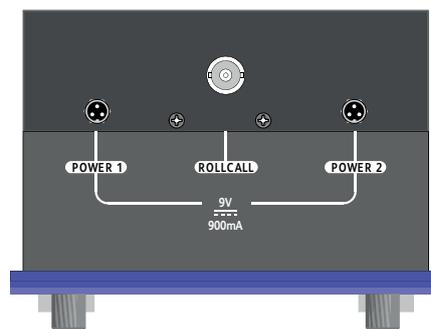
⌃ RollPod Configurable Control Panel, including single PSU

RollPod 1U

Configurable Control Panel

The RollPod 1U is a generic control panel for SAM equipment. These panels are ideally suited to the control of products with routing or any other parameter selections and on/off controls. Configurable either using the RollPod Designer software tool, or by SAM directly to the user's required specification the RollPod 1U enables a simple customizable control solution.

Features

- Generic control panel for SAM equipment
- Ideally suited to IQ Modular control and configuration
- SAM custom configured to user specification
- Up to 40 assignable push buttons
- Dual redundant power supply option
- 'In-button' multi-color LED tally
- User definable 'In-button' labels
- RollCall connection via coaxial cable, Ethernet and/or RS485

Why should you choose this product?

- Flexibie configuration gives the user the ability to use the RollPod 1U for many different applications, for example Router control, emerrgency switchover, card memory recall, logo on/off, and to control several SAM products simultaneously using a single control panel
- Can be supplied pre-configured to meet customers exact control requirements (-C version)
- 1U form-factor enables installation directly into a 19" rack or into a control desk. Several RollPods can be used in this way to provide extensive control of products throughout the networks

RollPod 1U-8 Control Panel

Order Code: RollPod-1U-8E

RollPod 1U-10 Control Panel

Order Code: RollPod-1U-10E

RollPod 1U-16 Control Panel

Order Code: RollPod-1U-16E

RollPod 1U-18 Control Panel

Order Code: RollPod-1U-18E

RollPod 1U-40 Control Panel

Order Code: RollPod-1U-40E

RollPod 1U   Configurable Control Panel

Order information

RollPod1U8E
Customized Operational
Configurable Control panel with 8
Hard buttons,
Single PSU.

RollPod1U10E
Customized Operational
Configurable Control panel with 10
Hard buttons,
Single PSU.

RollPod1U16E
Customized Operational
Configurable Control panel with 16
Hard buttons,
Single PSU.

RollPod1U18E
Customized Operational
Configurable Control panel with 18
Hard buttons,
Single PSU.

RollPod1U40E
Customized Operational
Configurable Control panel with 40
Hard buttons,
Single PSU.

Option
RollPod PSU, upgrade RollPod to dual
redundant PSUs, or for use as a cold
spare [RollPodPSU].

Technical Specification

Features

Control Interface

RollNet coax	Via BNC connector
RollNet RS485	Via 9-way D
RollCall RS422	Via 9 way D

Controls

Hard buttons	Up to 40

Indicators

Hard buttons	Multi colored (LED illuminated)

Controls via RollCall Remote Control System
Full configuration, e.g button assignment, target
device setup. Hard button LED brightness.

Remote monitoring	Temperature and PSU status

Specifications

Power	Via dual redundant mains operated external adapters Input 100-240 V AC @ 47 to 63 Hz 1 A max Output + 9 V DC at 1.67 A
Power consumption	5.4 W max
Temperature range	0° to 40° C operating
Case type	1U rack mounting steel case
Dimensions	483 mm x 198 mm x 44.4 mm (w,d,h)
Weight	Approximately 2.5 kg

RollPod Rear Panel View

IQSP100

Serial Port Interface with RollNet

The IQSP100 provides a programmable serial port interface for external devices and RollCall compatible products.

Features

- Enables control of products on the RollCall network via external serial events
- Interfaces external devices to RollCall i.e. tape machines, routers and disk stores
- Two RS232/RS422 user-configurable ports
- Two further RS422 serial ports
- Multiple actions from one serial message with RollTrack
- External serial events produce RollCall logging messages
- Windows software program for function set-up
- Note: Contact sales office for a list of currently available interfaces to 3rd party equipment

Why should you choose this module?

- Enables interfacing to external serial controlled devices
- Provides more flexible control integration either to or from modules in a RollCall network
- External serial panels could control events and commands within a RollCall network
- Can provide multiple actions from one input via the RollTrack mechanism, thus allowing for complex and interrelated functions to occur
- A RollCall based PC application will allow setting up of serial commands to RollCall commands and events

Order codes
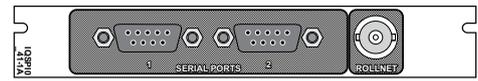
IQSPI0041-1A
Serial Port Interface. 2 x D9.
2 x Serial Ports, 1 x RollNet BNC.
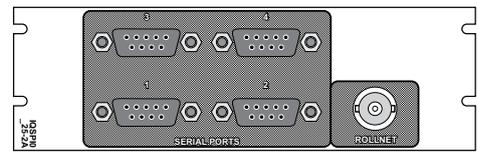
IQSPI0025-2A
Serial Port Interface. 4 x D9.
4 x Serial Ports, 1 x RollNet BNC.
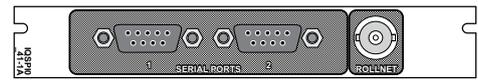
IQSPI9900-1A
Custom designed Serial Port Interface. 2 x D9.
2 x Serial Ports, 1 x RollNet BNC. Contact SAM sales office with requirments

CSPISOFT - Pre-written software interfaces for 3rd party equipment

ROLLDIF Custom Interface Development - Custom interface design for equipment types not already supported. Contact SAM sales office with requirments

For more details on enclosure types please refer to Frames and Hardware section.

Technical Specification

Inputs and Outputs

Serial Ports

Ports 1 and 2	RS232/422 selectable connection via 9 way D-Type
Ports 3 and 4	RS422 connection only via 9 way D-Type

Control Interface

RollCall	1 x RollNet Interface via BNC/75 ohm connector Format: 2.5 Mbit/s

Indicators

Data sent	For 4 interfaces
Data received	For 4 interfaces
RS232 mode	RollCall network activity and status

Specifications

All ports speed	1200 – 115200 bit/s

Power Consumption

Module power consumption	6 W Max (A Frames) 5.5 PR (B Frames)

EMC Performance Information

Environment	Commercial and light industrial E2
Peak mains inrush current following a 5 second mains interruption	No mains input
Performance information	No performance degradations or cable length limitations

IQGPI00-04

Configurable General Purpose Interface

The IQGPI00/01/03/04 is a configurable control module for external devices and all RollCall compatible products.

This module uses the latest SAM intelligent control software developed from the RollPod technology. This will allow the GPI to become a central controller for the most demanding network configuration. GPIs can be assigned to RollCall commands as before, but now with the aid of a PC program (RollPod Designer) the GPI can literally interact with the RollCall network environment, unleashing complex interactivity between external devices and/or other SAM products.

Features

- Control products on the RollCall Network via external events, or vice-versa.
- 11 off optically isolated I/O interfaces, plus 1 which is non-isolated (IQGPI01, 03, 04).
- Outputs from IQGPI03/4 can switch up to +/-48 V at currents up to +/-1 A
- 23 off GPI non-isolated unbalanced I/O interfaces (IQGPI00)
- Customisable solution allows programming of multiple events from a single trigger
- Outputs may drive Relays or LED's
- Direct connection to the RollCall™ network.
- 200mA 5V Power Supply available on connector

Why should you choose this module?

- Flexible bridging between RollCall and third party products to provide comprehensive control and tally solutions
- Multiple events to multiple units can be initiated from a single GPI trigger
- External GPI inputs can be configured to trigger multiple RollCall events to multiple units on the RollCall network
- Configuration via the RollPod Designer GUI allows you to browse the RollCall network, select controllable devices then drag and drop the required functionality straight onto the relevant RollPod device from a simple software user interface allowing control of the functions on your SAM Equipment. RollPod Designer is provided with the free RollCall Lite download available from the SAM web-site.

Order codes
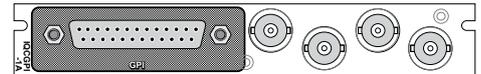
IQGPI0015-1A
Configurable General Purpose Interface.
1 x D25. 12 x Unbalanced GPI input or output ports, 1 x RollNet BNC.

IQGPI0115-1A
Configurable General Purpose Interface.
1 x D25. 12 x GPI input or output ports (11 Balanced, 1 Unbalanced), 1 x RollNet BNC.

IQGPI0315-1A
Configurable General Purpose Interface. 1 x D25. 12 x GPI High Power Output Ports (11 Balanced, 1 Unbalanced), 1 x RollNet BNC.

IQGPI0415-1A
Configurable General Purpose Interface. 1 x D25. 12 x GPI High Power Relay Output Ports (11 Balanced, 1 Unbalanced), 1 x RollNet BNC.

For more details on enclosure types please refer to Frames and Hardware section.
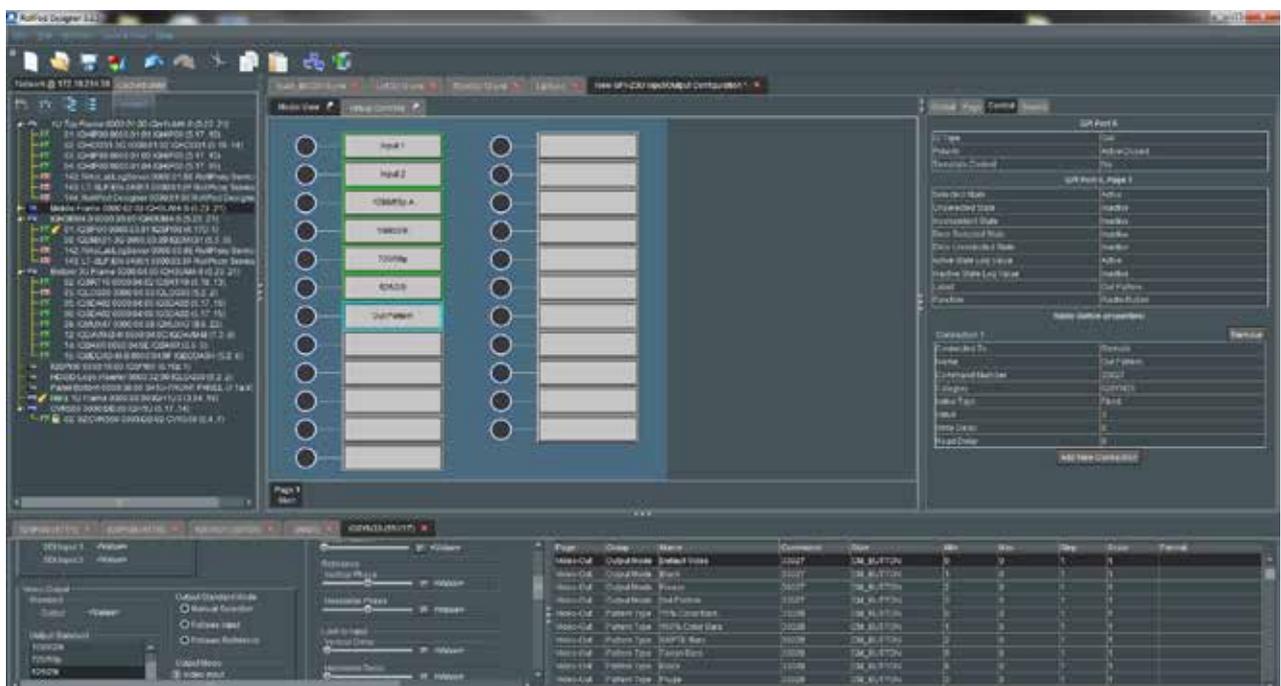
IQGPI00-04

Configurable General Purpose Interface

Technical Specification

Inputs and Outputs
GPI
User power supply

Indicators
Data received
PSU overload

Additional RollCall Functions
Configure GPI   GPI input triggers RollTrack output(s)
                 GPI input triggers RollCall logging messages
                 RollTrack input triggers GPI output, plus additional
                 RollTrack outputs

Specifications
Inputs/Outputs
IQGPI00
Connector/ format   25 way D-type, 12 unbalanced Optically Isolated
IQGPI01/03/04
Connector/ format   25 way D-type, 11 balanced Optically Isolated
Connector/ format   25 way D-type, 1 unbalanced Optically Isolated

Input Specification
Voltage limits   -5 V to +30 V
Logic 1   +2.5 V to +30 V

Output Specification
Maximum on current   50 mA (1 A - IQGPI03, IQGPI04)

Power Source
Voltage   5 V ± 0.5 V
Maximum current   100 mA
Maximum load   Short-circuit

Power Consumption
Module power
consumption   2.5 W Max (A Frames)
                  2.0 PR Max (B frames)
                  5 W Max (IQGPI03, IQGPI04)

EMC Performance Information
Environment   Commercial and light industrial E2
Peak mains inrush
current following a 5
second mains
interruption   No mains input
Performance
information   No performance degradations or cable length
                 limitations

RollUSB

RollCall USB Interface Unit

RollUSB is a network interface module enabling connection between a PC workstation and the RollNet high-speed 75 ohm co-axial network. The network connection, made with RG-62/ʋ cable via BNC T-connectors supports data rates up to 2.5Mbps. BNC-style 75 ohm terminators must be fitted at either end of a bus.

Features

- Enables control of SAM products from a PC with RollCall software and RollNet co-axial network
- Supported Operating Systems: Supported Operating Systems: Windows 7 (64-bit, 32-bit), XP, Vista, 2000
- Standard plug and play
- Send and receive RollNet data packets to and from the connected PC
- Operates with either USB 1.1 or 2.0 standard
- LEDs indicate USB status and port activity
- Powered by PC USB port
- Embedded micro-controller provides 128kB of receiver buffering

Order codes
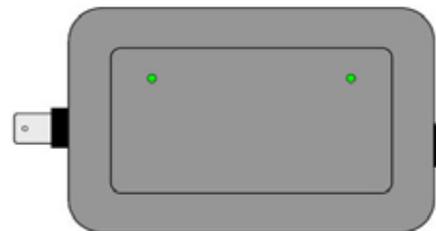
RollUSB
RollCall USB Interface Unit.

Network Management Solutions

Today, broadcast systems of any size are inherently complex, with many components, multi-format interconnectivity and sophisticated control requirements. Yet at the same time there are great pressures to reduce costs, leading to centralized multi-channel facilities with reduced headcount and potentially unmanned remote locations. These factors highlight that a robust centralized monitoring and control system is paramount to the successful management of a modern broadcast facility.

Rising to the Challenge
SAM, the leading provider of control and monitoring solutions for over 25 years, has addressed this issue with it's RollMap and RollCall suite of products.

RollMap and the successful RollCall product lines bring to the market place the only genuine system wide control AND monitoring solution capable of overseeing the four critical areas of:

  Configuration
  System monitoring
  System control
  Content monitoring

Control & Monitoring

Bringing Peace of Mind to Broadcast Operations

Get peace of mind with control and monitoring from SAM

Our Control and Monitoring solutions don't just provide comprehensive and efficient control of broadcast systems, but true, end-to-end, monitoring by exception.

When something goes wrong, you need to respond quickly. Our solutions provide for automated failure responses and a simple, drill-down point and click approach, for when operator intervention is required. The exceptionally fast response times afforded by SAM's control and monitoring solutions protect your revenue and maintain your customers viewing experience expectations.

Whether you are a small operation with a single channel, or a multi-national distribution center with 100s of channels, our end-to-end monitoring solutions can interface with any equipment, including third party devices, to ensure you stay on-air even when the unexpected happens.

RollCall - The heart of SAM's control and monitoring

The RollCall system provides control and monitoring for the SAM product range with the additional capability of monitoring third party equipment via SNMP, serial or GPI interfaces.

The addition of RollMap allows a customizable, graphical representation of systems, for both local facilities and geographically distributed sites. By representing broadcast systems in this way, our customers can centralize their monitoring operations - saving money, whilst at the same time giving them the detailed information they need, to respond to issues quickly as and when they occur.

Control & Monitoring

Applications Overview
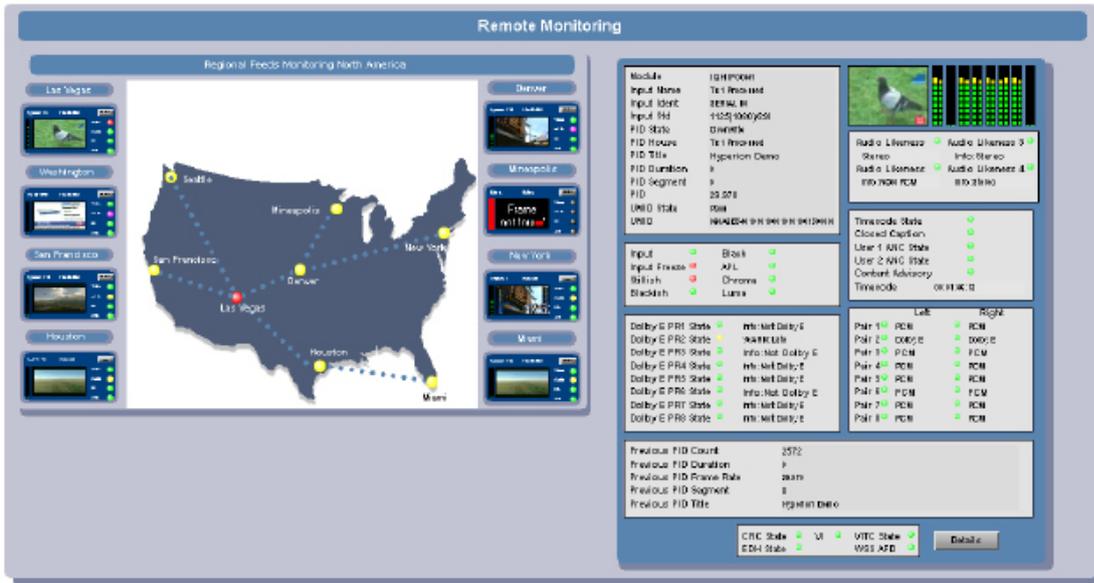
Remote system monitoring

SAM's control and monitoring solutions not only allow systems to be monitored remotely, but with the integration of customized, system specific graphics - the physical system configuration can be represented, giving the operators a comprehensive view of the real world system.

This graphical representation of both the geographic location and the physical equipment installation allows problems to be located quickly and easily.

Playout content monitoring

Our playout system monitoring analyzes the content of signals throughout the playout infrastructure, not just the signals presence. Bringing human intelligence to automated content monitoring, Hyperion is a valuable component of SAM's monitoring solutions.

Additionally, SAM's monitoring systems are not restricted to monitoring SAM products, but also third party equipment such as video servers, transmitters and IT infrastructure.
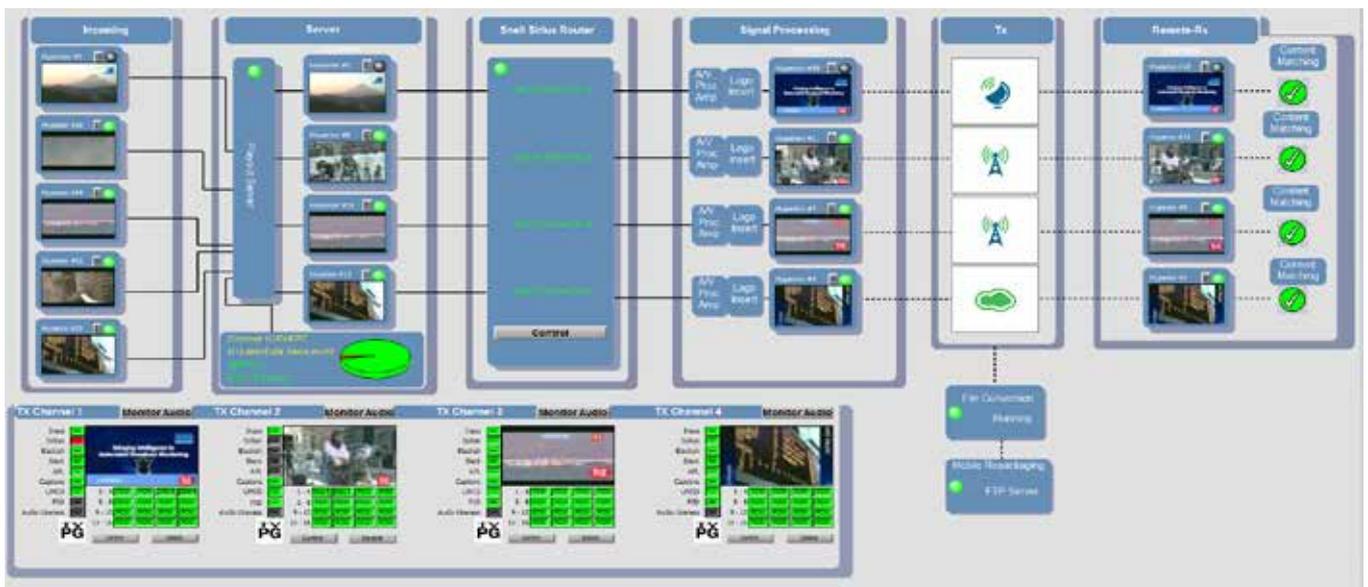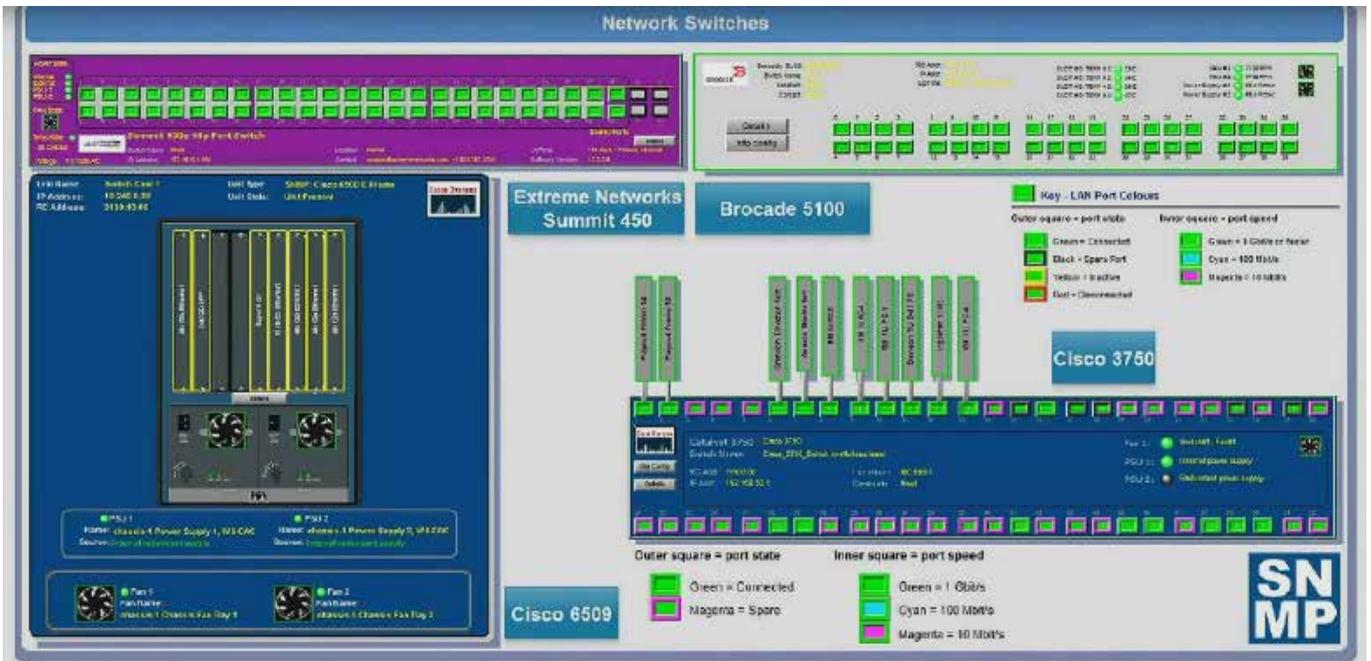
3rd Party equipment monitoring

SAM's monitoring solutions are not limited to broadcast equipment - or indeed SAM equipment. Making use of a variety of IP protocols, SNMP, RS422 and GPI, we can monitor anything!

Configuring and monitoring OB trucks

As well as monitoring fixed intallations, SAM's Control and Monitoring solutions can provide comprehensive monitoring for mobile operations, such as outside broadcast vehicles.

As with fixed installations, we can drill down to look in detail at particular equipment within the system, identifying issues quickly and effectively.

Control & Monitoring Applications Overview
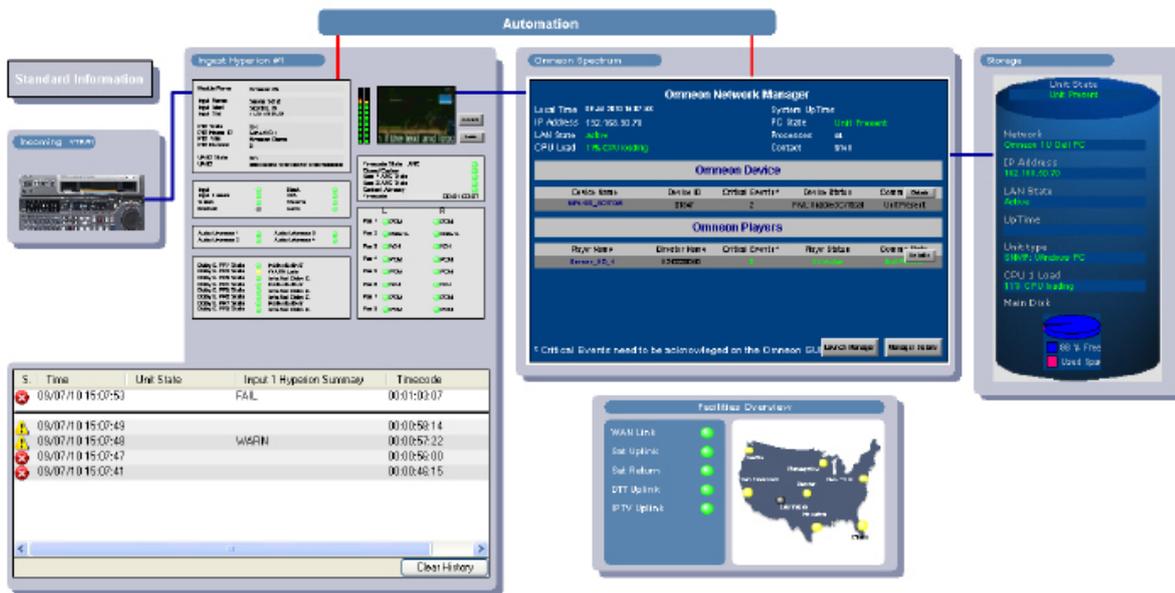
Monitoring of ingest process

When ingesting content, unless you have somebody watching the entire process, how do you know it worked?

Using Hyperion, the material being presented to the ingest process can be monitored automatically, with any issues being reported back, indexed with corresponding timecodes.

Other Monitoring views and examples

Below are some examples of monitoring various processes within a broadcast chain, showing the flexibility of the Control and Monitoring mechanism, in particular, the customized graphical representation.

RollMap

Infrastructure Management System for Broadcast Operations
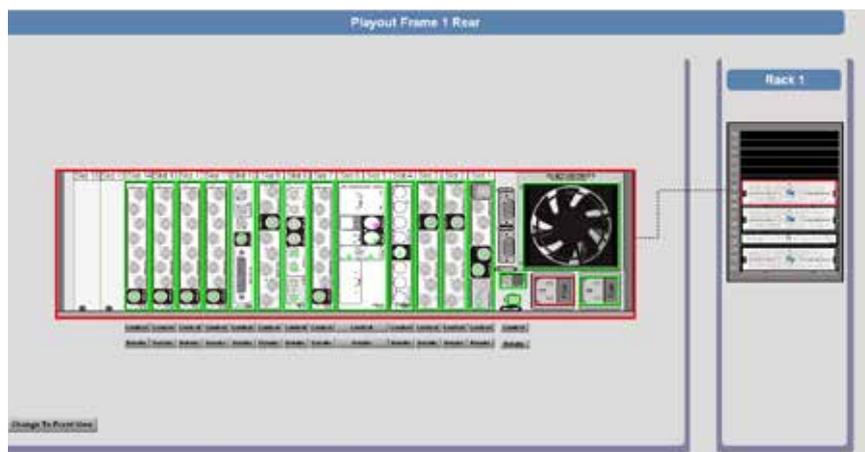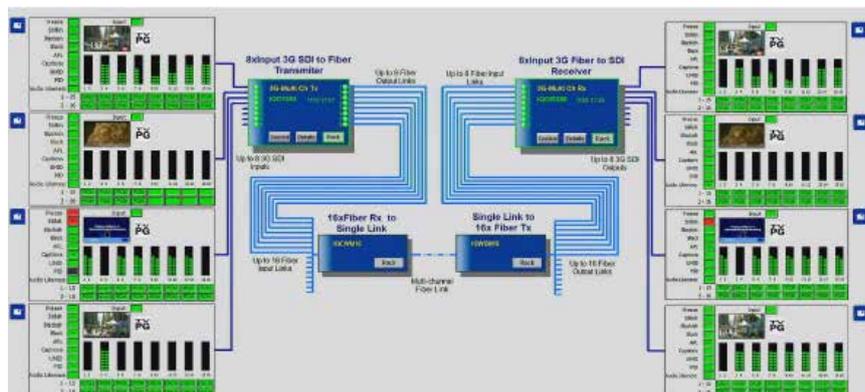
RollMap from SAM is the flagship control and monitoring product in the RollCall range. Its monitoring and control capability is as applicable to equipment monitoring in an outside broadcast truck as it is to centralized management of international play out facilities with locations spanning multiple continents.

RollMap is a complete management environment for anyone who needs to monitor their infrastructure investment and the assets that they deliver with it. The scale, richness of information, metadata and graphical appearance of the monitoring applications are totally configurable to user requirements. This means that RollMap can be deployed in different roles such as Commercial confidence monitoring, engineering systems management and control room environments, with each deployment tailored to suit the requirements of the operator. When used in conjunction with RollSNMP, true 'end to end' broadcast monitoring systems are possible in a manner tailored to the requirements of broadcast systems management.

Does this product suit your application?

- Suitable for an integrated monitoring environment tailored to broadcast requirements
- Local or remote site location
- Centralized monitoring and control access to your infrastructure
- Installation of RollCall enabled infrastructure
- Unified alarm reporting for all system elements
- Supports Microsoft Windows 7, Windows XP, Windows Server 2003 and 2008

Why should you choose this product?

- Streamline overheads required for successful system management
- Achieve superior reliability and uptime through RollMap's effective notification system
- Monitor your system from anywhere with true TCP/IP enabled monitoring and control capability
- Combined with IQ Modular and RollCall enabled products, RollMap and RollSNMP deliver the most powerful Infrastructure solution available
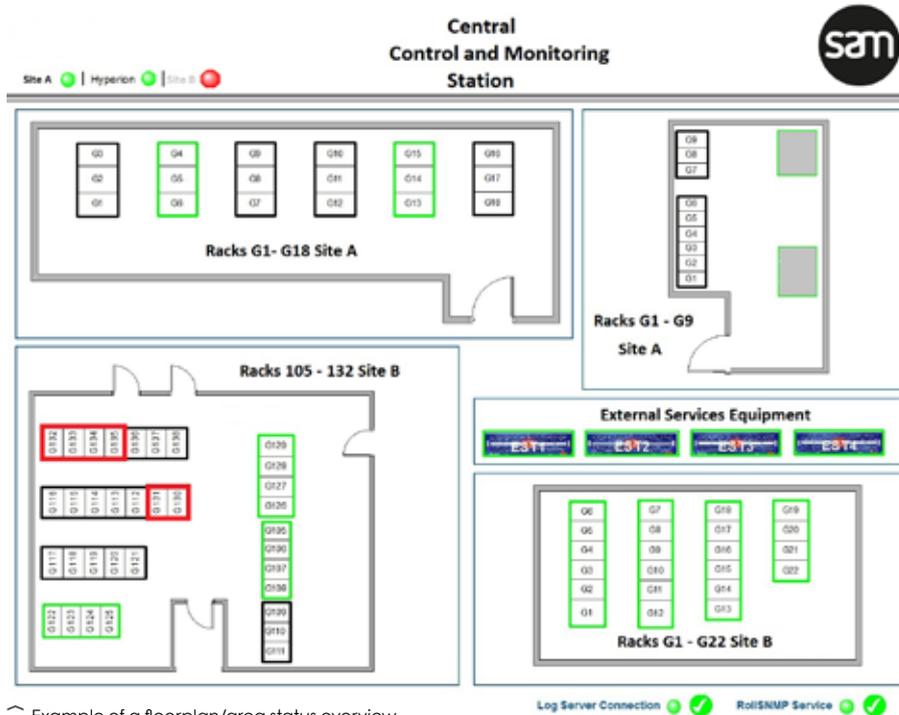
Example of a floorplan/area status overview

Today, broadcast systems of any size are inherently complex, with many components, multi-format interconnectivity and sophisticated control requirements. Yet at the same time there are great pressures to reduce costs leading to centralized multi-channel facilities with reduced manpower requirements and potentially unmanned remote locations. These factors highlight that a centralized monitoring and control system is paramount to the successful management of a modern broadcast facility.

With RollMap operation is simplicity itself. Utilizing a 'drill down' point and click interface, starting from high level views of a system such as geographical location or floor plan map, the operator can quickly navigate down to the level of functionality required. This makes even low level engineering management of the largest broadcast infrastructure systems available in a few mouse clicks.

Configurable Alarm status tabs offer 'at a glance' current status and system histories, and customizable network views compliment the graphical systems to ensure that the latest status information and control access are immediately available for your convenience.

RollMap

In the event of a system issue occurring, RollMap has a comprehensive alarm notification system that delivers critical alarms and informational updates in a number of ways. These include visual display, email, SNMP Traps, audio file playback and support for command line interfacing and GPI output via the IQGPI modular GPI/O interface range of cards, enabling RollMap to integrate effectively into external systems. A flexible acknowledgement and masking system ensure that spurious alarms are not generated for equipment that is out of service, for instance an incoming lines circuit that is not in use.

In order to expedite deployment of your Infrastructure management system, SAM provide a complete library of graphical monitoring components for RollMap, covering the entire IQ modular product range. This enables signal paths and frame views to be created in very little time by utilizing 'drag and drop' from the network view – simply pick a module, decide whether you want a signal path or a frame view and the correct component appears.

The RollMap component library is regularly updated to include new products and alternate graphical representations.

⌒ Example of a regional remote stations overview

System Requirements

Recommended system specification for RollMap Server and Client
1920 x 1080 or higher screen resolution
Quad-core CPU,
6Gb RAM or higher
Windows Server 2008

Minimum system spec for RollMap Client
Dual-core CPU
4Gb RAM
Windows 7
1280 x 1024 or higher screen resolution

Order Codes

RollMap is available in three different option packages.

ROLLMAP-10
Management of up to 10 RollCall enabled Enclosures, ideal for management of small systems.

Licences included
1 x Schematic Creation License and 2 x Schematic Viewing licenses.

ROLLMAP-30
Management of up to 30 RollCall enabled Enclosures, for medium sized Infrastructure systems.

Licences included
1 x Schematic Creation License and 5 x Schematic Viewing licenses.

Prerequisites
RollCall Middleware services are required.

Options
RollSNMP is an option with this product.

ROLLMAP-ENT
RollMap Enterprise Edition offers totally scaleable systems management of unlimited RollCall Enabled Enclosures. RollMap Enterprise edition includes RollCall Middleware Services, RollSNMP and RollMechanic providing the best option for customers that wish to implement an integrated monitoring environment for medium to large Infrastructure systems.

Licences included
2 x Schematic Creation License,
10 x Schematic Viewing Licences,
1 x RollCall Middleware Licences,
1 x RollSNMP Framework License and 1 x RollMechanic Licence.

ROLLMAP-VL
RollMap Schematic Viewing License - Additional schematic viewing license for existing RollMap customers. Available as a single, 10, 30 and unlimited seat license.

RollSNMP

Monitor SNMP Compliant Agents from other Vendors within RollMap

RollSNMP enables monitoring features available within RollMap to be applied to other vendors' SNMP hardware and software products[1], delivering a complete broadcast centric management environment encompassing video and audio signal paths, hardware enclosure status and fingertip access to control from a single location. Coupled with existing serial and GPI interfaces for legacy equipment, the promise of true 'end to end' monitoring and control systems is a reality with RollMap and RollSNMP.

Order information

ROLLSNMP
SNMP to RollLog translation service.

SNMPDEV
Production of a RollSNMP XML script and RollMap monitoring components for an SNMP enabled agent not currently featured in the RollSNMP Library.

Licence information
RollSNMP provides one licensed copy of the service application to be run in a system installation. This can monitor up to 100 individual SNMP agents. To monitor more than 100 devices please order multiple ROLLSNMP licenses.

Contact local sales office for information on existing SNMP device configurations.

Does this product suit your application?

- Requirement for an integrated monitoring environment tailored to broadcast requirements
- User of RollCall enabled infrastructure and RollMap with a requirement to integrate other vendors equipment into the monitoring chain
- Unified alarm reporting for all system elements
- Supports Microsoft Windows 7, Windows XP, Windows Server 2003 and 2008

Why should you choose this product?

- Integrated RollCall and SNMP monitoring tailored to the broadcast environment
- Configurable to specific customer requirements
- Monitor your system from anywhere with true TCP/IP enabled monitoring and control capability
- Combined with IQ Modular and RollCall enabled products, RollMap and RollSNMP deliver the most powerful Infrastructure solution available

RollSNMP Infrastructure

RollSNMP Server Monitoring

RollSNMP

Monitor SNMP Compliant Agents from other Vendors within RollMap

SNMP has been used successfully for some time in the IT domain to manage IP network infrastructures. But the tools that exist for monitoring SNMP hardware (agents) are tailored to this IP network environment and as such do not really suit the monitoring requirements of the broadcaster, where principally, the network is a data and control mechanism rather than the content carrier. The real requirement for today's broadcaster is in monitoring of the signal paths carrying the valuable content assets.

That's not to say that monitoring IP infrastructure is not important, as we move forward to file based content systems and move increasing volumes of metadata between devices, the requirement to monitor all aspects of the broadcast infrastructure chain, be they stream or file based is paramount.

This is where RollSNMP for RollMap comes in. RollMap provides the most powerful Infrastructure Management environment for a broadcast operation. Its ability to enable signal path issue diagnosis by mapping the interconnections between all the elements of your systems, as well as providing layout information mapped to the physical location of infrastructure, delivers benefits that no standard SNMP manager can provide.

The RollSNMP application supports pollable OIDs and traps from SNMP complaint devices and is supplied as a Windows service for Windows 7, Windows XP, Windows server 2003 and 2008. RollSNMP uses industry standard XML for configuration making it straightforward to implement and expand the capabilities of the monitoring system to include new SNMP devices (2).

A library of pre-written configurations and RollMap user components for existing SNMP agents is available for purchase. Configurations not catered for in the library can be scripted by the customer using XML, Alternatively SAM can undertake this work on the customers behalf.

[1] Other Vendor equipment requires SNMP support. The level of functionality available in RollMap for other vendor equipment is dependent on the features of their SNMP implementation.

[2] Knowledge of using and configuring SNMP devices and SNMP MIB walking tools is required.

RollSNMP PC Monitoring

RollSNMP Test and Measurement

System Requirements

Recommended system specification for RollSNMP Server
1920 x 1080 or higher screen resolution
Quad-core CPU,
6Gb RAM or higher
Windows Server 2008

Prerequisites
RollCall Middleware services are required as a minimum to utilize RollSNMP, with RollMap required for graphics support.

RollMIDSRV

RollCall Middleware Services - System Logging and Monitoring Services for RollCall

The RollCall Middleware services extend the capabilities of a RollCall control system by adding a range of back end services which enable secure TCP/IP access to your Infrastructure, real time and historic logging, remote monitoring and configurable alarming of your SAM infrastructure. This product also provides the core services required for implementing the RollMap and RollSNMP Infrastructure Management systems tools.

RollCall Middleware services include the RollCall control panel application (ROLLCALL) and can be used as a standalone monitoring environment or an enabling platform for the advanced system monitoring applications delivered by RollMap Infrastructure Management System and RollSNMP.

The Middleware Services feature

- Real time and historic logging of system events - RollCall LogServer provides a real time system status via an IP socket and also writes all events to disk for continuity purposes. Disk logs can be saved by date or timestamp. These disk logs can be utilized offline for trend analysis and system audits.

- TCP/IP connection sharing and security service - IPShare enables PC workstation access to equipment on the RollNet Network via TCP/IP. Access to the IPShare service can be restricted by IP Address or Hostname. IPShare is ideal for delivering Local and Wide area network access to products that do not feature direct Ethernet control capability.

- Real time visual status monitoring - RollView enables a simple 'traffic light' color scheme to indicate system status, with configurable alarm status 'tabs' to help you segment the reporting of your system into logical functions or physical locations. External notification alarms can be delivered from the monitoring application in a number of ways, including email, SMS, SNMP Trap, audio playback of .wav or mp3 files and GPI output via the IQGPI00-04 Modular GPI/O interface card.

- Full RollCall control and monitoring network aggregation using 'RollCall IP Proxy' – TCP/IP connection manager to enable connection and logging from multiple IP enabled RollCall products or discrete RollNet Networks.

- User configurable alarm masking for both unit and individual alarms to prevent the occurrence of false alarms.

RollMIDSRV

RollCall Middleware Services - System Logging and Monitoring Services for RollCall
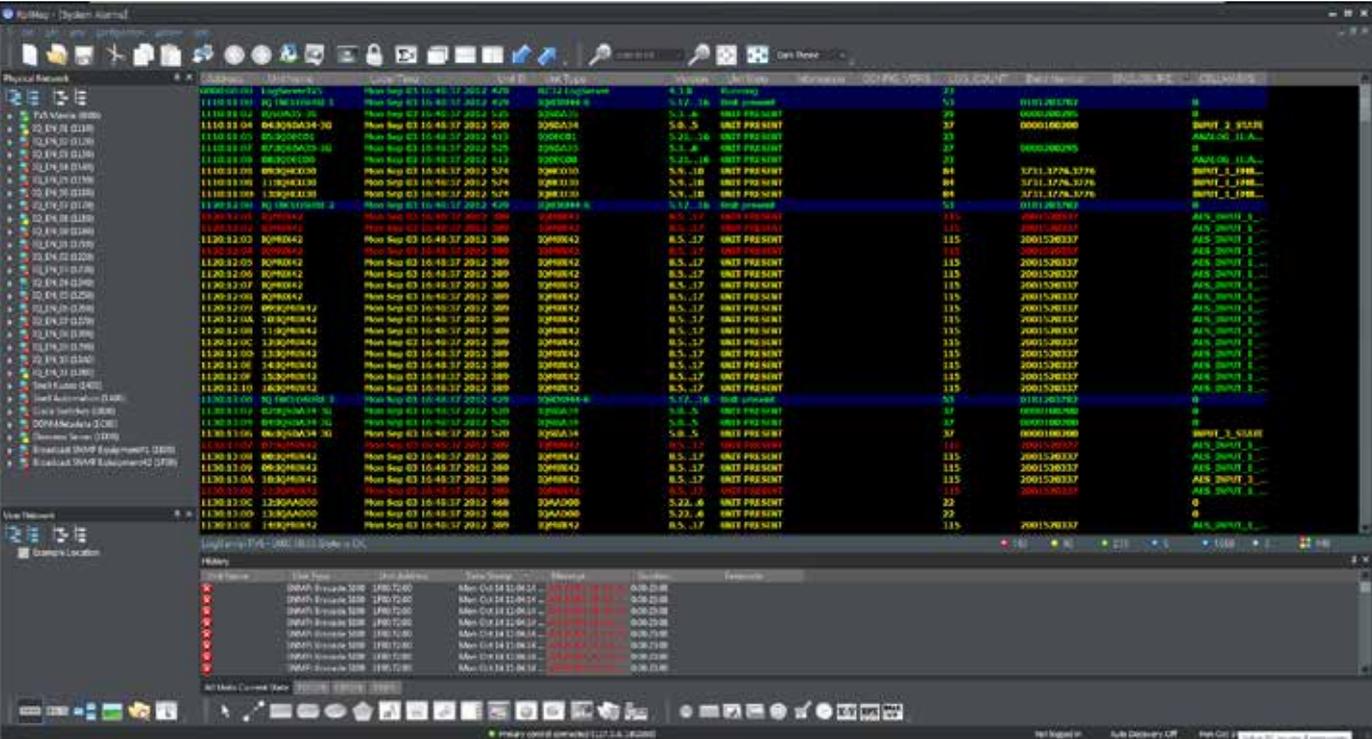
Does this Product suit your application?

- Monitor and report events across your system infrastructure including
  - Signal input condition
  - Environmental status
  - Power supply and card health status
- Flexible and configurable external alarm notification capability
- Rapid control and monitoring access via configurable tabs
- Secure access to equipment services by password or IP address guest lists
- Operates through Ethernet/TCP/IP network, RollNet Interface cards (RollPCI or RollUSB)
- Supports Microsoft Windows 7, Windows XP, Windows server 2003 and 2008

Why should you choose this product?

- Maximize system uptime with centralized monitoring and control
- Intelligent notification and alarming with RollView minimizes staffing requirements by increasing efficiency
- Configurable to specific customer requirements
- Monitor your system from anywhere with true TCP/IP enabled monitoring and control capability
- Middleware services provide the base for RollMap and RollSNMP Network Management Systems

Order Codes
RollCall Middleware Services
(ROLLMIDSRV)
RollCall Middleware Services for Windows

Licence information
The RollCall Middleware Services suite provides one licensed copy of each service application to be run in a system installation. There is no restriction on the number of copies of the RollCall Control Panel or RollView Monitoring application that are installed per system.

System Requirements

Recommended system specification for RollMIDSRV Server
1920 x 1080 or higher screen resolution
Quad-core CPU,
6Gb RAM or higher
Windows Server 2008

Minimum system spec for RollMIDSRV
Dual-core CPU
4Gb RAM
Windows 7
1280 x 1024 or higher screen resolution

RollCall

Control Panel - Windows PC Based Configuration and Control

The RollCall Control Panel is a PC application enabling remote configuration and control functionality for all RollCall enabled Infrastructure. Navigating and controlling your infrastructure is made simple using standard 'Windows Explorer' type operations that any user of Windows is familiar with. Whether you have a small control network or multiple geographically separate and potentially unmanned sites, RollCall Control Panel enables access to your entire infrastructure, anywhere, anytime. Included with RollCall control Panel are key features that ease systems installation and maintenance, such as the ability to access User Manuals for the entire IQ Modular product range at the touch of a button within RollCall. It is also possible to backup individual module configurations and apply software upgrades.

The RollCall Control Panel Package includes 'RollCall IP Proxy' - TCP/IP connection manager to enable concurrent connection to multiple IP enabled RollCall products. Connection to equipment can be achieved by Ethernet/TCP/IP, RollNet or RS422. Control of Non-Ethernet enabled RollCall products will require either IQCRSAD RS232 to 422 converter, or RollPCI / RollUSB to connect to the RollNet Network.

RollCall Control Panel is available free of charge to all users of SAM infrastructure products. It can be ordered on CD and it is also available for download from the Internet.

Licence information
There is no restriction on the number of copies installed per system of the RollCall Control Panel Application.

Recommended system spec for RollCall Client
Dual-core CPU
4Gb RAM
Windows 7
1280 x 1024 or higher screen resolution

Does this Product suit your application?

- Full remote control of RollCall compatible units from single or multiple PC workstations
- Access hardware configuration and control functions via simple GUI
- Fingertip access for all IQ modular product manuals within RollCall
- Multiple units can be controlled simultaneously for efficiency
- Save and restore configurations to entire RollCall systems from a single location
- Operates through Ethernet/TCP/IP network, RollNet Interface cards (RollPCI or RollUSB) or through an RS422 serial port
- Supports Microsoft Windows 7, Windows XP, Windows server 2003 and 2008

Why should you choose this product?

- Build and integrate your systems with greater efficiency by configuring and controlling from one PC workstation
- Ideal in central operations or engineering location to enable real time control of all RollCall connected systems
- Offers full remote control of all RollCall enabled products from a graphical environment
- Secure access by password or IP address guest lists

RollMechanic   RollCall Network Managment Tool
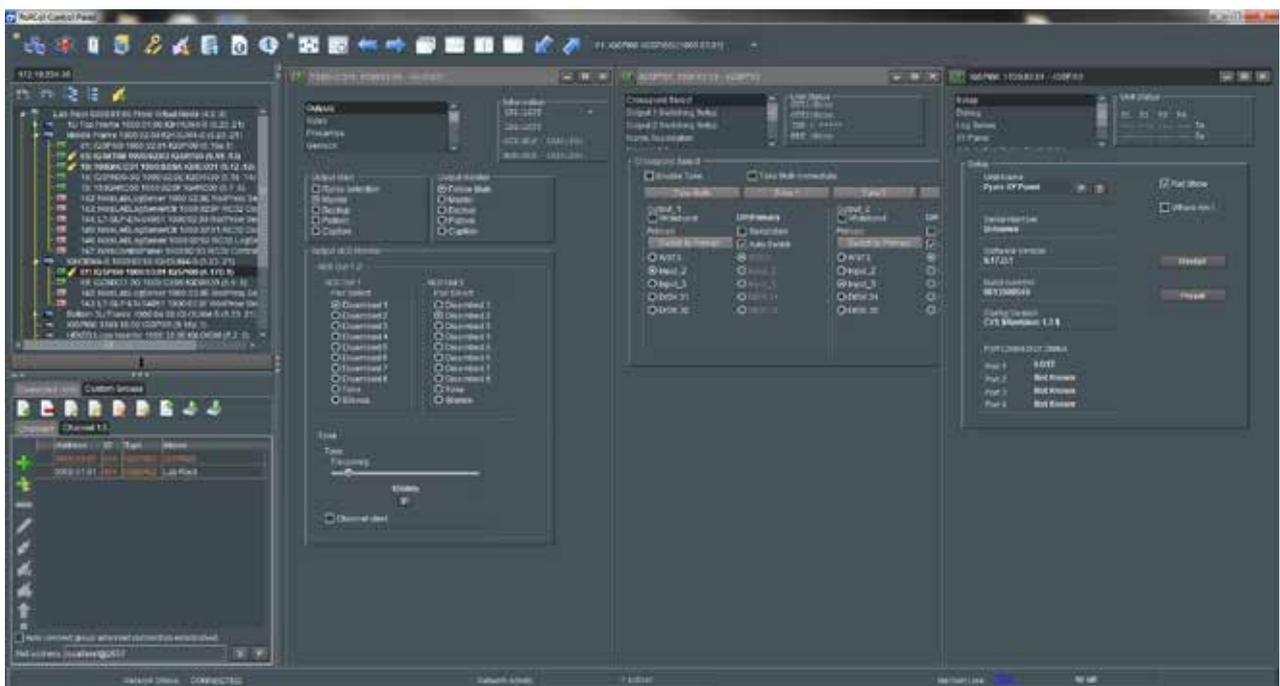
RollMechanic is a software application aimed at reducing the set up times for medium and large system installations and optimizing the maintenance of those systems once operational. Designed as an aid for engineering maintenance and installation personnel, RollMechanic builds on and extends the features of the free RollCall Control Panel by adding powerful automated batch functions. RollMechanic is capable of rapidly cloning a single device's settings to multiple devices on the network reducing the need to adjust each individual device's control parameters. Once your system is operational, RollMechanic can provide a rapid backup and restore facility for multiple stored settings, perform firmware upgrades, install feature licences as well as quickly producing a full system inventory and logging the history of RollMechanic operations.

Key features

- Backup feature allows settings from an entire system to be rapidly saved thus providing a known snapshot of system configuration at a point in time. Unit back up includes the current settings plus contents of user memories
- Multi-unit restore allows a whole 'mode of operation' to be rapidly recalled for a system or sub-system, for example an OB truck set up, or studio configuration. Can also be used to rollback a facility to a previously known snapshot
- Multiple unit cloning enables unit settings to be copied from one to multiple compatible devices
- Filtered unit cloning enable a selection of parameters to be copied from one unit to multiple compatible devices
- Firmware upgrade allows automated hands-off parallel installation of new features or bug fixes in to multiple devices through the network
- Licence management allows purchased product features to be enabled on multiple devices
- System Inventory reports complete list of units including comprehensive details such as unit serial number and software and hardware versions. Inventory reports are exportable to spreadsheet or text file
- Provides instant access to the relevant product manuals from either an online or local source

Why should you choose this product?

- Reduces system set-up time and avoids human error by facilitating cloning of one device's settings to many
- Reduces between-job reconfiguration time allowing better utilisation of critical resources such as OB trucks and studios
- Reduces system down-time by ensuring a complete backup of all device parameters is easily available, for example if a card needs to be replaced and brought in to operation
- Saves engineer time while performing important tasks such as upgrading firmware, or auditing installed devices
- Provides audit trail by logging all actions in a history database
- Compatible with SAM's IQ Modular and all SAM RollCall enabled product families

RollMechanic **RollCall Network Managment Tool**
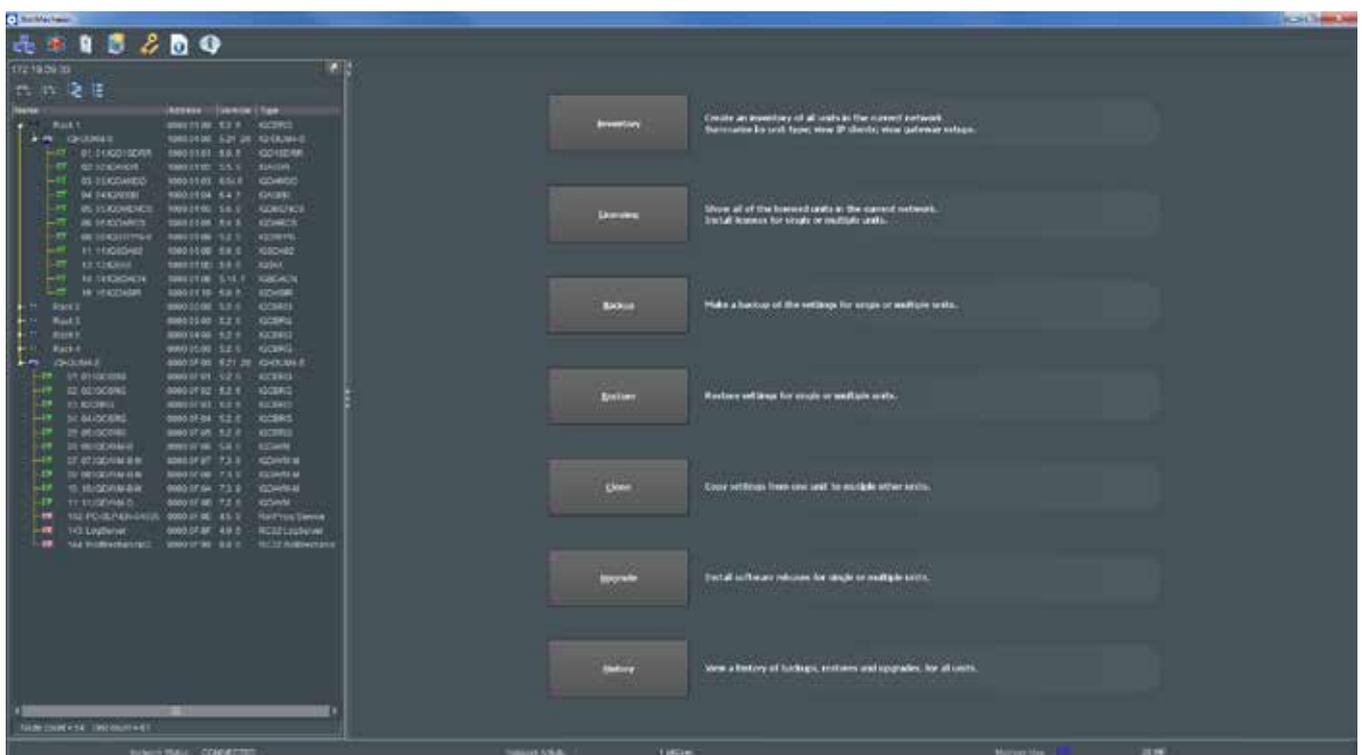
Order information

ROLLMECH - RollMechanic Network
Management tool (V2)

Licence information
Each RollMechanic application licence
allows one workstation install for system
installations, managing unlimited devices in
the system.

System Requirements
Operating System Requirements
Windows 32-bit or 64-bit operating system
(XP, Server 2003, Server 2008, Windows 7)Java
1.6 or later

**Recommended system spec for RollCall
Client**
Dual-core CPU
4Gb RAM
Windows 7
1280 x 1024 or higher screen resolution

Intelligent Monitoring

The best time to identify faults in a system is while they are still potential faults rather than immediate problems. If something does fail, it's best to be able to identify the source and nature of the fault rapidly and easily. This is particularly true in the digital domain, where poor quality can lead rapidly to a complete loss of pictures.

Building on their experience of modern broadcast monitoring requirements SAM has developed Hyperion and Media Biometrics, entirely new ways to monitor the integrity of content that passes through every stage of the broadcast infrastructure. Designed on the belief that opinion-based human intelligence is a more effective way to validate content quality than simply monitoring the technical parameters of a video signal, these technologies provide a set of intuitive processes that enable an in depth analysis of the video and audio data. For the first time, a broadcast monitoring system evaluates the content of a television signal rather than measure the absolute technical properties of the signal carrying that content.

Broadcasters working with Hyperion and Media Biometrics realize more sophisticated multi-channel content monitoring and significant new protections when airing premium, high-value television programs.

Included with Hyperion are additional tools to enable remote monitoring over IP via video thumbnails, time code logging for accurate event tracking and content identification from source to output using UMID metadata.

For Related Modules see:
IQDAVM in Analog/Digital Conversion

Bringing Human Intelligence to Automated Broadcast Monitoring

Hyperion represents a new generation of television monitoring and quality control. Its sophisticated capabilities enable far more efficient and cost effective content monitoring than has ever been available to the broadcast industry.

To manage the increasing complexity of their operating environment, broadcasters now rely on automated systems for ingest, playout and scheduling. These systems enable broadcasters to do more with less while operating their plant at greater efficiency.

Unfortunately there is one critical system that has not kept pace with these advances - Quality Control.

Effective quality control in a modern broadcast facility requires intelligent monitoring of a wide range of functions. These include not only the quality of the video images from ingest to transmission, but also other critical issues such as multichannel sound, multiple language racks, accuracy of content scheduling & delivery, and management of metadata including closed captions, subtitles and content advisory ratings.

To check the system-wide accuracy of all these parameters would require a dedicated person to monitor the audio and video quality of each channel at every stage in the broadcast workflow - an expensive proposition that can be justified only for extremely high value content.

And even with dedicated human monitoring, it is still extremely difficult for a single operator to cope with QC of multiple language tracks, multi-channel audio and the ever-increasing amounts of technical and operational metadata that tie automated systems together.

To meet the QC needs of the modern broadcast infrastructure, a more intelligent, intuitive, system-wide monitoring approach is required.

Limitations of Current QC Monitoring Techniques

Most current QC monitoring systems have two main drawbacks. They are deployed only at the end of the signal flow just before transmission and they are designed primarily to detect the rare absolute technical failure rather than subtle issues which occur more commonly.

These systems are designed to monitor content immediately prior to transmission, so every failure detected has the potential to result in lost revenue for the broadcaster.

A better solution would be an intelligent system-wide QC process that monitors content quality at every stage of the broadcast workflow, from ingest to transmission. Unfortunately, current systems can make such an implementation economically prohibitive.

At the transmission monitoring site, most quality control systems let an operator monitor multiple channels simultaneously through a combination of software alarms and large displays powered by multi-viewers. These systems focus on detecting absolute presence (or failure) of signals, such as sync loss, no audio or digital freeze.

While the detection of such catastrophic signal loss has proved useful, this type of monitoring is no substitute for the kind of opinion based, subjective evaluation humans can bring to quality assessment. For example, current automated systems might give a "green light" to the multichannel audio associated with picture content regardless of whether the soundtrack is in the correct language or even relevant to the content.

Even with dedicated human monitoring, the sheer amount of information in the multichannel environment can quickly overwhelm the senses. An operator can ensure that program content is being broadcast to air, but may easily fail to catch a subtle error - such as a language requirement - that can result in loss of revenue.

As the potential loss of revenue due to content delivery failure is so high, a better method is needed to monitor and evaluate content quality.

Hyperion

Bringing Human Intelligence to Automated Broadcast Monitoring
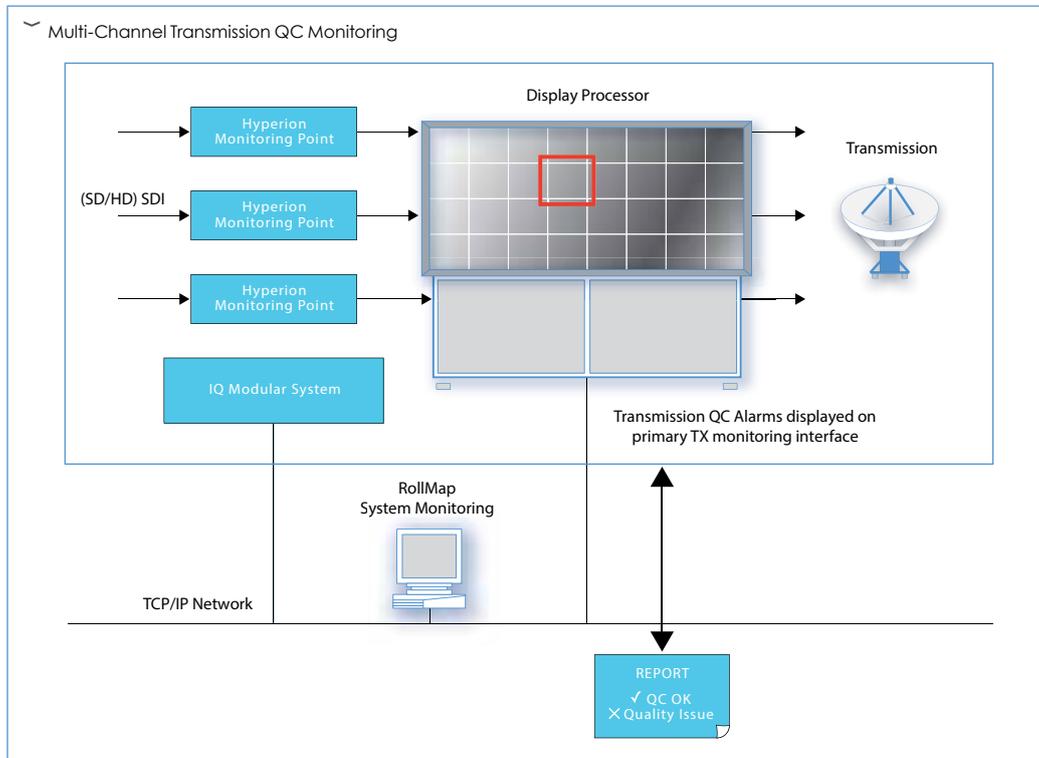
Hyperion - Automated Intelligence from Ingest to Transmission

To address this important challenge, SAM has developed Hyperion, an entirely new way to monitor the integrity of the content that passes through every stage of the broadcast infrastructure. Designed on the belief that opinion-based human intelligence is a more effective way to validate content quality than the simple monitoring of technical parameters of a video signal, Hyperion provides a set of intuitive processes that mimic the eyes and ears of a human observer. For the first time, a broadcast monitoring system evaluates the content of a television signal rather than measure the absolute technical properties of the signal carrying that content.

Hyperion is an integral part of a series of SAM products that are positioned at different points in the broadcast workflow. Therefore it can be deployed in a distributed system, making it possible for the first time to monitor content quality through the entire broadcast chain from ingest to transmission. By using the entire broadcast infrastructure to monitor quality, Hyperion can ensure that content failures never go on air.

By elevating the monitoring bar beyond a series of technical check points, the goal of Hyperion is to form an educated "opinion" as to whether content video, audio and metadata is meeting the quality standards to satisfy viewers as well as the contractual requirements necessary to generate revenue for the operator.

Fully programmable, Hyperion "opinions" can be tailored to the exact requirements of each installation. No other monitoring technology has ever even attempted to offer Hyperion's "intelligent" content evaluation.

At its core, Hyperion consists of a variety of detection algorithms that are designed to evaluate what is "normal" in various program types, according to the specifications of each customer installation. These algorithms interpret whether the content lacks value by matching its actual behavior with a pre-set profile of expected behavior.

The factors monitored in each profile, for example, may include the motion content of the video signal, the intensity of color or the amount of darkness. Unlike conventional monitoring systems, Hyperion detection works on "stillish" and not absolutely still pictures, or blackish and not absolutely black pictures. Hyperion assumes that if a picture is largely still then it is probably not valuable and probably not fulfilling its role of generating revenue. These alarms have configurable thresholds so that content does not alarm unnecessarily. Of course Hyperion also contains the technical and metadata monitoring required to validate signal integrity.
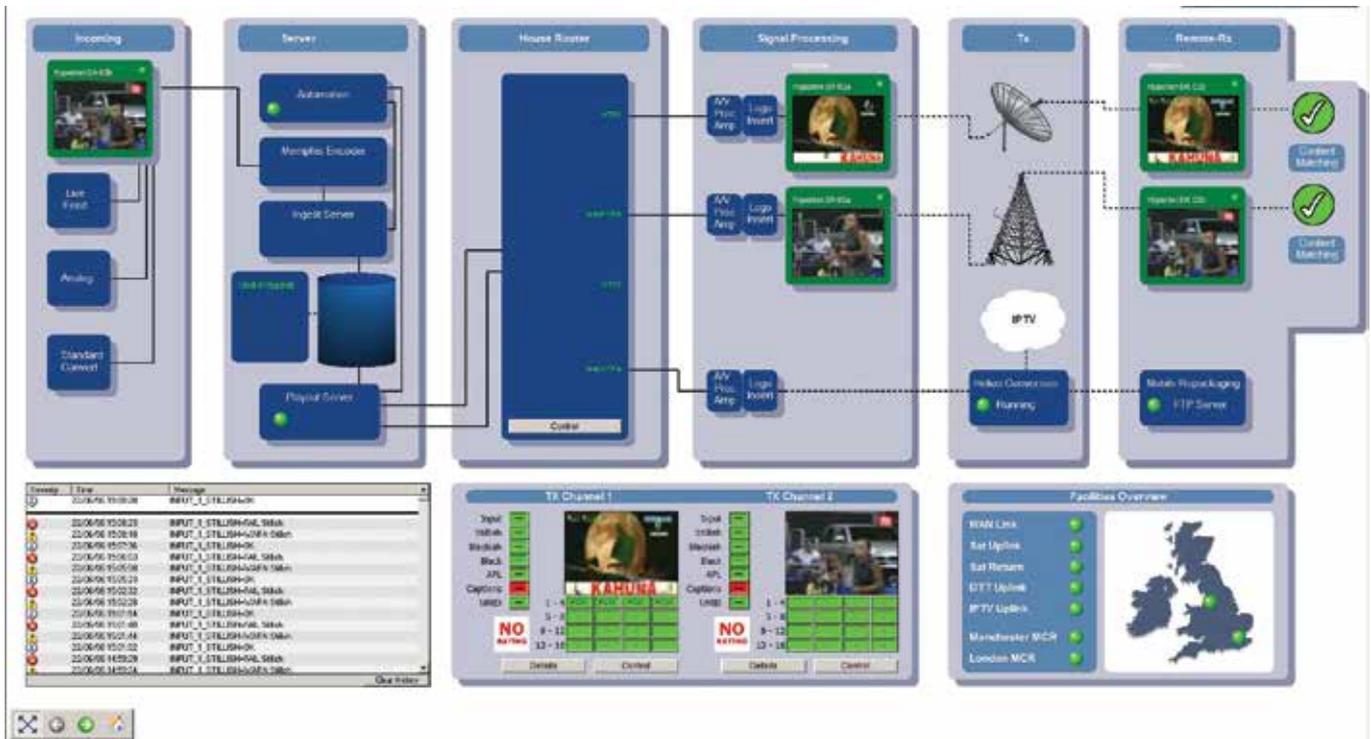
Hyperion

Transmission Center Main Playout Monitoring

Video "Thumbnails" and Metadata Tracking Ensure Schedule Integrity

Also included with Hyperion are tools to enable remote monitoring over IP and content identification from source to output. These tools work in conjunction with automation and scheduling systems to enable signals to be tracked and verified automatically by inserting and reading back SMPTE UMID and program ID metadata. Metadata tracking ensures that the content being broadcast is exactly what the programming schedule says it should be and can report back the total number of frames of each individual piece of content transmitted both locally and from remote locations such as head ends.

As an additional visual safeguard for remote content identification, delivery of video thumbnail images support the video, audio and metadata alarm information to provide a secondary level of confidence that content is correct at both internal and remote locations through the use of inexpensive IP network bandwidth.

Multiple Reporting Options

In the event of any problems, Hyperion can notify operators of trouble through a wide choice of alerts. It can operate through the SAM RollMap™ Infrastructure Management System and it can also integrate with a variety of third party multi-viewer systems such as the Barco Hydra and NG Display Wall processors. Also provided as standard is a full SNMP control and monitoring interface for third party integration of Hyperion enabled products.

Hyperion

Bringing Human Intelligence to Automated Broadcast Monitoring

Unmanned (Automated) Ingest / QC Application

Automated Real-Time QC

(SD/HD) SDI

Hyperion
Monitoring Point

IQ Modular System

Ingest
Encoder

Disk
Storage

QC OK / Not OK
alarms via RollSNMP
from IQ Modular System

Automation System

REPORT
✓ QC OK
✗ Quality Issue
? Manual review
needed

Real-Time Control

Distributed Intelligence

Because Hyperion technology is being integrated into SAM's IQ Modular™ products that process video, audio, metadata and other content, it will automatically be distributed throughout the broadcast plant where these products are installed. By using SAM infrastructure products to distribute Hyperion monitoring points in this way, customers can gain tremendous extra value throughout their operations. For example, Hyperion cards may be deployed into the ingest chain between source and Ingest Encoder to provide automated QC during the ingest process.

Transition to File-Based Operations

Not only is Hyperion a futuristic platform, it also provides a future-proof transition path for broadcast evolution. For example, it provides a metadata bridge between stream and file technologies, such as MXF, within the broadcast plant. This allows content to be tracked and monitored regardless of whether it exists in a stream or file domain. Over time, Hyperion will be implemented in all new SAM products, whether hardware or software based, thus providing a system-wide content monitoring capability with multiple monitoring points throughout the broadcast signal chain.

Hyperion represents a new generation of television monitoring and quality control. Its sophisticated capabilities enable far more efficient and cost effective content monitoring than has ever been available to the broadcast industry.

IQHIP10   3G/HD/SD-SDI Hyperion Intelligent Processor Module

The IQHIP10 is an advanced monitoring module with revolutionary Hyperion content QC capability. Hyperion is designed to continuously and automatically monitor signal content providing verification of whether legal and technical obligations are being met and to provide guidance as to whether the content is within the required parameters to be considered as valid. For video factors such as motion level within the content, as well as the amount of darkness and amount of picture color are monitored. Audio factors reported include Dolby D/E or PCM audio presence, likeness and level information such as Silent, Quiet, Loud and Overload.

Picture regions can be monitored to allow for animated logos and on-screen graphics such as News Tickers. Alarm thresholds can all be adjusted allowing profiles to be set by the user for different material types (genres).

Content may be tracked through the broadcast chain by the insertion and reading of SMPTE UMIDs or Internal House Number, title and duration metadata. This data can be used to track content, verify that the correct content is being transmitted and even frame count the duration of every piece of content to ensure contractual obligations are being met. For ingest applications timecode information can also be interpreted and stamped on any Hyperion alarms to enable efficient location of QC alarms.

For remote content identification, delivery of video thumbnail images and audio level monitoring provide a secondary manual level of confidence that content is correct at both internal and remote locations. All alarms from this product can be integrated into the major Video display wall processors to streamline alarm reporting and reported through RollMap Network Management system or via SNMP to other vendor Control and Monitoring systems.

Features

- Intelligent 3G/HD/SD-SDI processing module with integrated Hyperion QC monitoring
- Dedicated monitoring outputs with OSD for hyperion audio/video alarms and audio level meter information
- Automated content QC, suited to:
  - Multi-channel playout facilities and complimentary monitoring of high value content
  - Automated ingest processes including timecode logging for accurate location of Hyperion alarms
  - Remote location monitoring such as business continuity sites and unmanned teleport facilities
- Real Time content QC against genre profiles ensure any on air issues are identified with minimal potential impact on revenue, such as scheduling errors or dropped frames on commercial content
- Remote monitoring over TCP/IP via video Thumbnails
- Legal and Technical validation of signal including detection and reporting of closed captions, content advisory rating, XDS Program data
- Automated ingest QC significantly increases throughput efficiency over manual QC processes
- Standards supported:
  - 625/25i, 525/29i
  - 720/50p, 1080/25i
  - 720/59p, 1080/29i
  - 1080/50p, 1080/59p Level A
- Single SFP cage version suitable for fiber optic transmitter and receiver options, DIN or HD-BNC SDI input or outputs, and HDMI output option for local monitoring

Inputs & Outputs - IQH3A/1A/3B enclosures
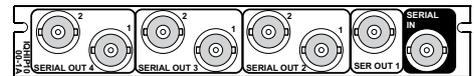
IQHIP1000-1A3, IQHIP1000-1B3
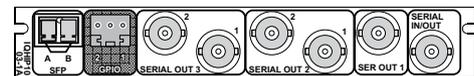
IQHIP1003-1A3, IQHIP1003-1B3
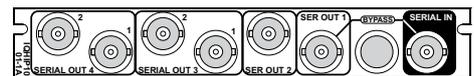
IQHIP1001-1A3, IQHIP1001-1B3

For more details on enclosure types please refer to datasheet IQH3B.

IQHIP10

3G/HD/SD-SDI Hyperion Intelligent Processor Module

Features cont…

Why should you choose this module?

- Sophisticated Hyperion content quality management tools allow true assessment of the value of the signal, not just presence, ideal for unmanned and lowmanning operations
- Reporting of all detected alarms via RollMap Infrastructure Management System or via SNMP to other vendor control and automation systems
- Hyperion alarm data integrates with all major Video display wall processors to streamline alarm reporting in playout facilities
- Fiber optic interfacing allows extended transmission distances for 3Gbps and HD SDI signals
- Full RollCall and SNMP compatibility allows easy integration with SAM or third party network management systems providing an all-inclusive monitoring and control solution
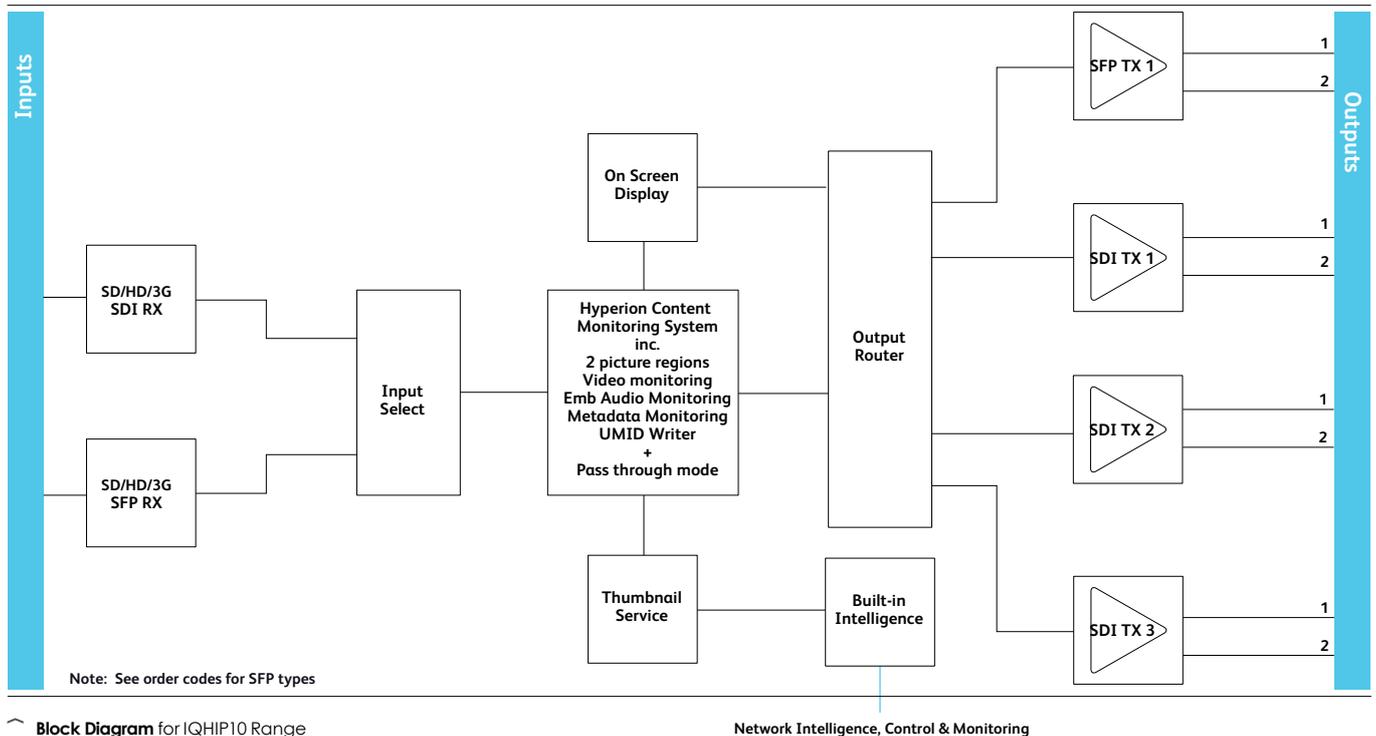
Block Diagram for IQHIP10 Range

Network Intelligence, Control & Monitoring

IQHIP10   3G/HD/SD-SDI Hyperion Intelligent Processor Module

Technical Specification

Inputs and Outputs

Signal Inputs

Electrical	3Gbit/s SDI, SMPTE 424M
	1.5Gbit/s HD-SDI, SMPTE 292M
	270 Mbit/s SDI, SMPTE 259M-C
Connector / format	BNC/ 75ohm panel jack on standard SAM connector panel
Input cable length	TBC

Fiber Signal Input

Inputs	1*
Optical	3 GBit/s HD-SDI, 1.485 GBit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format	LC singlemode
Standard	SMPTE 297-2006

Signal Outputs

Electrical	3Gbit/s SDI, SMPTE 424M
	1.5 Gbit/s HD-SDI, SMPTE 292M
	270 Mbit/s SDI, SMPTE 259M-C
Connector / format	BNC/ 75ohm panel jack on standard SAM connector panel HD / SD-SDI Outputs x 7 (1 selectable main or monitoring)
Return loss	>-15dB to 1.5GHz, better than -10dB to 3GHz

Fiber Signal Output

Optical	3 GBit/s HD-SDI, 1.485 Gbit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format	LC singlemode
Conforms to	SMPTE 297-2006
Outputs	Up to 2*

*Note: Optical I/O and control dependant on type of SFP module fitted

Controls

Indicators

Power	OK (Green)
CPU	OK (Flashing)
Content Status	
Summary	OK (Green)
	Warning (Yellow)
	Error (Red)

Functions

Pattern select	Black, 100% Color Bars, 75% Color Bars, SMPTE Bars, Tartan Bars, Pluge Ramp, H Sweep, Pulse and Bar, Burst
Monitor output select	Main/Monitoring (Output pair selectable)
On Screen Display	On/Off (Output pair selectable)
Video	Video Thumbnails over TCP/IP
	Motion Level (Stillish)
	Picture Darkness (Blackish)
	CRC/EDH Reporting
	Average Picture Level
	Luma High/Low
	Chroma High/Low
	Chroma/Luma Underflow
	Video Bit Depth
	Black
	Input Status
	Input Standard
	Freeze Detect

Audio	Audio Presence
	Audio Type Detection (PCM, Non-PCM, Dolby E, AC3, MPEG Audio (SMPTE 338M)
	Audio Bit Depth
	Audio Level Metering
	Audio Silence
	Audio Quiet
	Audio Loud
	Audio Overload
	Audio Out of Phase (Polarity)
	Audio Mono/Stereo Detectio
Metadata	SMPTE UMID (Insert, Report and Scrub)
	Program ID
	House Number Watermarking (Insert, Report and Scrub)
	Closed Captions Detection (CEA608, CEA708)
	Signaling detection (WSS, AFD (inc SMPTE 2016), VI)
	Content Advisory Rating (XDS, V-chip)
	ANC Timecode (720p, 1080i)
	VITC Timecode (525, 625)
	User Definable ANC Detectors
	Dolby E Guardband reporting
	Timecode Logging
On screen display	Picture Region Configuration On/Off
	Audio Level Meters
	Audio Presence and Type
	Content advisory system and rating
	2 x 19 character caption generators
	Timecode display
	Average picture level
User memories	16 x Save / Recall / Rename

Specifications

Electrical

Standards supported	1080/50p, 1080/59p, 1080/60p
	750(720)/60p, 1125(1080)/30
	750(720)/59p, 750(720)/50p,
	1125(1080)/29i, 1125(1080)/30p
	1125(1080)/29p, 1125(1080)/25i, 1125(1080)/25p,
	1125(1080)/24p
	1125(1080)/23p, 525(480)/29i,
	625(576)/25i

Power Consumption

IQHIP1000-1A3	12 W max (A frames)
IQHIP1000-1B3	11.5 PR (B frames)
IQHIP1001-1A3	13 W max (A frames)
IQHIP1001-1B3	12.5 PR (B frames)
IQHIP1003-1A3	13 W max (A frames)
IQHIP1003-1B3	12.5 PR (B frames)

IQHIP10

3G/HD/SD-SDI Hyperion Intelligent Processor Module

Ordering Information

Order codes for IQH3B enclosures

IQHIP1000-1B3

3G/HD/SD-SDI Hyperion Intelligent processing and content monitoring module. 7 SDI main or monitoring OSD outputs.

IQHIP1001-1B3

3G/HD/SD-SDI Hyperion Intelligent processing and content monitoring module with power fail relay input bypass. 6 SDI main or monitoring OSD outputs.

IQHIP1003-1B3

3G/HD/SD-SDI Hyperion Intelligent processing and content monitoring module. 1 SDI configurable input or output, 5 SDI main or monitoring OSD outputs. 1 SFP cage

Order codes for IQH3A/1A enclosures

IQHIP1000-1A3

3G/HD/SD-SDI Hyperion Intelligent processing and content monitoring module. 7 SDI main or monitoring OSD outputs.

IQHIP1001-1A3

3G/HD/SD-SDI Hyperion Intelligent processing and content monitoring module with power fail relay inpur bypass. 6 SDI main or monitoring OSD outputs.

IQHIP1003-1A3

3G/HD/SD-SDI Hyperion Intelligent processing and content monitoring module. 1 SDI configurable input or output, 5 SDI main or monitoring OSD outputs. 1 SFP cage

For more details on enclosure types please refer to datasheet IQH3B

Fiber SFP options

FC1-13T1 - Single 1310nm Tx

FC1-13T2 - Dual 1310nm Tx

FC1-15T1 - Single 1550nm Tx

FC1-15T2 - Dual 1550nm Tx

FC1-R1 - Single Rx

FC1-13TR - Transceiver 1310nm/Rx

FC1-HDBT2 - HD-BNC Dual Tx

FC1-HDBR2 - HD-BNC Dual Rx

FC1-HDMI2 - HDMI Tx with 2m cable

CWDM Tx - Wavelengths available on request

Note: Fiber SFP type must be ordered in addition to the module.

One of the biggest practical challenges of multi-channel broadcasting is keeping track of all the content. It is clearly economically impractical to have eyeballs on every channel and variants through a major installation like a master control room or a playout center.

The accepted solution is to monitor by exception. Assume everything is working perfectly, and only sound the alarm if something is detected to be at fault. This is a sound principle, and one on which complex plants in other industries work

The challenge with media is that the fault conditions are more subtle than a simple yes or no. Is it the right content? Is the video present but frozen? Is the audio present but silent? All these and many more are issues which need to be monitored, and which it is hard to do automatically.

These issues can be summarized under three broad headings:

- Is this the right content, or has something been routed incorrectly in the network
- Are the audio and video elements travelling along similar path lengths, or has their synchronization slipped
- Is there a change in quality?

While there have been technological solutions to this in the past, they have not been very successful, not least because they take a long time to register errors. Typically such systems can take as long as 90 seconds to lock up, by which time the complaints from viewers will already be flooding in.

There is a need for a new technology which can be used for automated content tracking – what we call **Media Assurance**. The core requirements might be summarized as:

- Both creating and detecting measurements in realtime
- Capable of accurately comparing and confirming content within seconds
- Independent of changes to resolution, framerate, and multiple encodings
- Non-destructive and invisible in operation
- Depending upon metadata which is very small, allowing it to be carried with the signal or over a separate network with effectively no increase in the payload
- Capable of meeting the three key requirements above and being extensible to other functionality as required

This is the background to the decision by SAM to develop a new form of content fingerprinting to meet all of these challenges and aspirations.

Media Biometrics
Media Biometrics is the name given to a unique signature technology developed by SAM, and now implemented in a number of its products.

The underlying principle is that the algorithms look at the media file – video and audio – in both spatial and temporal planes, the way that a human would perceive it. The resulting signature, because it contains the essence of the picture and sound, is therefore impervious to format, frame rate, aspect ratio and color shift processing.

This is absolutely central to the Media Assurance system: Media Biometrics can match content after any of the processes which typically take place in a delivery system, for instance. An original signal may be up- or down-converted, passed through a color legalizer, and compressed for transmission, but Media Biometrics will still recognize it as the same content.

Media Biometrics is also sensitive to small motion in the picture. Earlier attempts at detecting frozen video using signatures failed on some content: a one-to-one news interview, for example, didn't always have enough motion for the system to detect.

Despite this, the amount of data associated with Media Biometrics is tiny. The payload is measured in bytes per frame. A new signature is generated for each video frame, and the data is continuously streamed, meaning that the very small Media Biometrics stream can be handled over the same network, or across a business network associated with the media.

Although many of its uses will be found in video systems, Media Biometrics is also applicable to radio. The audio and video footprints are self-contained, allowing it to detect lip-sync errors. The system works equally well without a video component for broadcasters who also want to use it to track the health of radio channels.
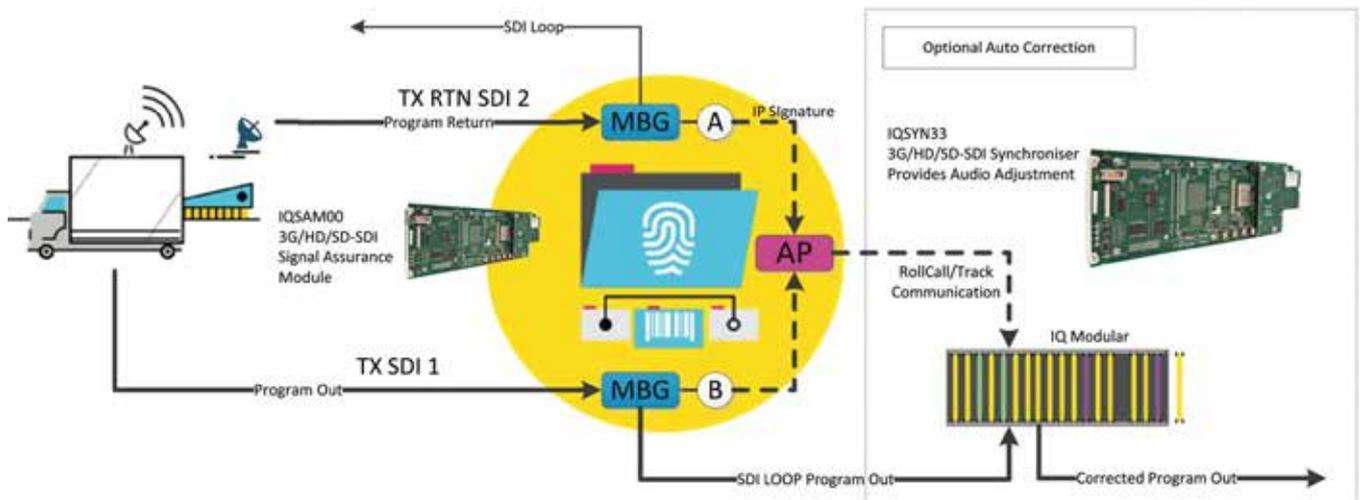
Media Biometrics

Media Biometrics deployed in a lip sync application for live production

Architecture

Media Biometrics is not a standalone product or system. It is designed to be embedded into key points of the architecture.

There are two elements to the system. The first is the MBG, or Media Biometric Generator. This, as its name suggests, creates the signature. It can be embedded in anything that generates content.

The SAM Kahuna production switcher, for example, has MBGs on all 64 of its outputs. The Sirius 800 routers have MBGs on each input to the embedded multi-viewer. Other products, which create a significant new version of content, can have embedded MBGs. The output is the reference signature.

The second part of the system is the AP, the Assurance Point. An AP compares the new signature to the reference signature and determines if they are the same. Because of the power of the correlation algorithms built into Media Biometrics, an AP will lock up to the stream of data within two seconds (plus signature-sending network delay), generating accurate reporting from that time.

As will be embedded in content-aware and schedule-aware processes, at critical points in the workflow. Signals may pass through many APs across the content chain. This gives an automated decision-making process which is very quick to respond and resilient to false triggers.

As well as being implemented in SAM products including IQ and ICE, APs can run as software on COTS (commercial off the shelf) hardware. A standard computer will support a large number of AP instances simultaneously.

Implementation

One way in which Media Biometrics can be used is within SAM's control and monitoring architecture. The RollCall system provides control and monitoring for the SAM product range, It also has a library of third party devices which can be monitored via SNMP, serial or GPI interfaces.

The addition of an AP to a RollCall monitoring point allows the health of the content to be checked anywhere downstream. This means the system reacts within seconds to conditions including:

- Absence of video or audio
- Incorrect audio or video
- Lip sync errors
- Audio mapping errors – Media Biometrics currently supports 32 audio channels
- Video still or audio silence
- Media match confirmation that two signals are the same

Where RollCall is used in conjunction with RollMap, to provide a graphical representation of systems, then multiple APs can be used to track the source of a problem.

RollMap is designed to plot and monitor both local facilities and geographically-distributed operations. Media Biometrics fits into this environment, and can identify problems at any location equipped with an AP. It can be used to monitor off-air in a remote site, for example, to ensure that only scheduled content is transmitted.

Media Biometrics
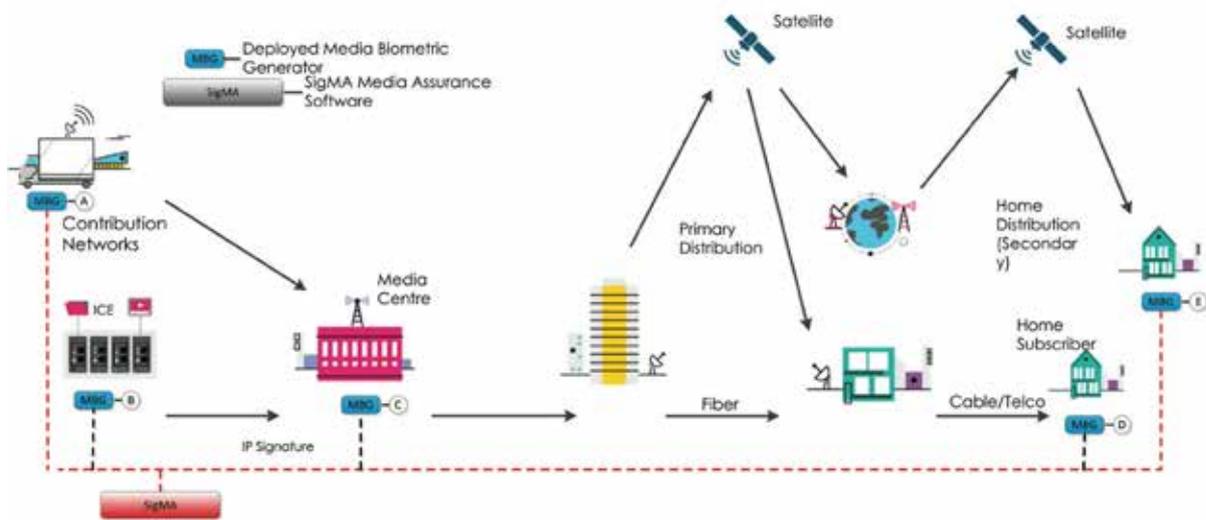
Media Biometrics deployed as part of a network wide media assurance system

The above example system consists of the following components:

MBG A
1x IQSAM00 modular card within the OB environment, (1x AP, 2x MBG)

MBG B
ICE Integrated MBG, Playout, (8x MBG)

MBG C
1x IQMBG80 modular Card, Master Control Processing, (8x MBG)

MBG D & E
2x IQMBG80 modular Card, Return feed monitoring, (16x MBG)

The number and type of SigMA Assurance Point (AP) licences is determined by the level of monitoring required at each stage of the workflow.

In this case it is deemed sufficient to provide one standard SigMA licence and one Professional SigMA licence per channel. The Standard AP is used to monitor the signal integrity post IQ Modular processing and the Professional licence prior to transmission for media Match and lip sync errors.

Roadmap
As currently implemented, Media Biometrics delivers intelligent content checking, this provides a significant advance in systems monitoring, helping broadcasters build resilient delivery systems and get closer to the economic goal of lights-out playout.

The core technology is capable of considerable extension, and SAM has a roadmap for further applications. Some of these will add further to the technical quality assurance portfolio, and some will add new commercial capabilities.

Quality matching – with extensions to the core signature generation process, while still staying with a compact payload, it will be practical to develop a metric for signal degradation, based on PSNR (peak signal to noise ratio, the most common error metric to compare image compression quality). With multiple APs, it will be possible to identify any process responsible for significant quality loss.

Absolute delay – rather than the relative delay between audio and video which can be measured for lip sync errors, future enhancements will allow the measurement of the absolute delay across the signal paths. Any change in the delay will be an indicator of problems with hardware or routing, which may be a precursor to a complete failure.

Intelligent diagnostics – while an operator can identify the source of a problem through the use of multiple APs, in future this could be automated with the system simply reporting to the operator the area of failure.

Media identification – due to Media Biometrics' small payload size and powerful correlation algorithms it would be practical to create a complete library of signatures for checking content against. This would have applications in rights management for example.

Schedule-aware media identification – taking the same concept a step further, by integrating playlists from automation systems such as Morpheus, Media Biometrics can be used to check that the right content is being transmitted. Checking that the right commercials are transmitted is particularly important where advertising is localized and a single channel may have many sub-regions.

Conclusion

The attractions of getting a signature from a video stream and using it to check that we have the same stream further down the pipeline are obvious. It is an excellent way to improve quality and to reduce operational costs.

The inescapable fact is that all previous efforts in this field have failed. They take too long to match – 90 seconds is not uncommon – or they cannot cope with some content, or the data payload is too large.

Media Biometrics succeeds in these three areas. Correlation takes around two seconds. The core technology is agnostic to anything that is likely to happen to a signal in the delivery chain, from minimal movement to color correction, from aspect ratio conversion to logo insertion. Finally, the payload is remarkably tiny.

It is implemented as part of a system or network-wide control and monitoring system, providing a service-oriented approach to quality and supervision. It extends the capabilities of monitoring by exception. It is cost-effective, and proven.

Media Biometrics is an important step towards fully automated multi- channel, multi-platform delivery, a step change in the quest for lights out broadcast operations.

For more information on Media Biometrics enabled products go to the SAM website

55

IQSAM00

3G/HD/SD-SDI Signal Assurance Module

The IQSAM00 provides a fast and efficient way to monitor video and audio confidence and timing at various points within an SDI system. In broadcast systems maintaining the association and timing between video and audio signals to avoid an objectionable viewer experience has always involved a lot of time consuming set up, testing and monitoring by broadcast engineers and staff, but now IQSAM00 can provide the monitoring confidence that everything is correct and remains correct during live operation. It does this by generating and comparing video and audio signatures from the SDI stream and reporting back the delay value and an accuracy confidence, all without the need for potentially intrusive metadata insertion, or watermarking.

IQIQSAM00 can operate as a purely SDI based module to compare two SDI streams (one 'known good' and one 'measured') in a 'probe' type application, or can transmit and receive fingerprints over IP for comparison with units at different locations within the facility or at a remote site. IQSAM00 can compare the signals quickly and reliably with typical confidence times of sub 5 seconds achieved for common applications and material types. Being fully compatible with SAM's RollMap graphical monitoring software means that signal confidence and delay values from across the system can be shown in a single display graphic providing system timing confidence 'at a glance'. Alternatively native SNMP support enables the IQSAM00 to be integrated with other network management systems used for 'in house' monitoring operations.

Features

- Compares two signals for video and audio identity confidence and timing differences with accuracy to 1ms
- Has the flexibility to operate as a local signal probe comparing 2 SDI inputs, or compare local SDI with remote signature information received via IP link using the SAM Media Biometrics technology
- Handles and can check the channel mapping of up to 16 channels of embedded audio present on the incoming SDI stream
- Either input can be routed to either output for signal chain transparency
- Measures both absolute video and audio delays and is robust to format conversion, ARC changes and IP compression
- Generates Media Biometric signatures from each input for analysis by other Media Biometrics enabled units
- Standards supported:
  - 3G-SDI to SMPTE 424M/425M level A compatible
  - HD-SDI to SMPTE292M/274M/296M
  - SD-SDI to SMPTE259M-C
  - Fiber to SMPTE 297-2006
- SFP cage enables I/O over fiber or additional SDI via HD-BNC
- 16 x user memories, save/recall/rename
- RollTrack delay values created to enable delay correction by other RollTrack enabled units
- RollCall control and monitoring compatible with standard logging and reporting features

Why should you choose this module?

- Quickly and reliably detects any video or audio routing and lipsync errors in the system and provides measurements and alerts to work in harmony with Network management systems
- Can be used to measure signals that have undergone format or ARC conversion, or for remote 'off-air' applications where the signal will have been compressed and decoded
- Providing delay values via SAM's RollTrack low level control system allows connected units to automatically adjust any unwanted audio delay errors, ideal for use in remote locations or low-staffing situations
- Full RollCall and SNMP compatibility allows easy integration with SAM, or third party, network management systems providing an all-inclusive monitoring and control solution

Inputs & Outputs - IQH3A/1A/3B enclosures

IQSAM0000-1A3, IQSAM0000-1B3
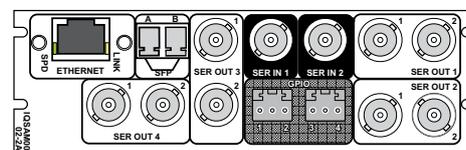
IQSAM0002-2A3, IQSAM0002-2B3
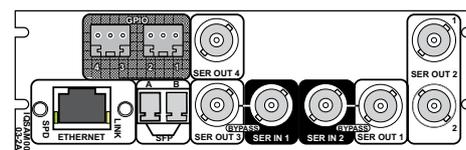
IQSAM0003-2A3, IQSAM0003-2B3

IQSAM00   3G/HD/SD-SDI Signal Assurance Module

Note: See order codes for SFP types
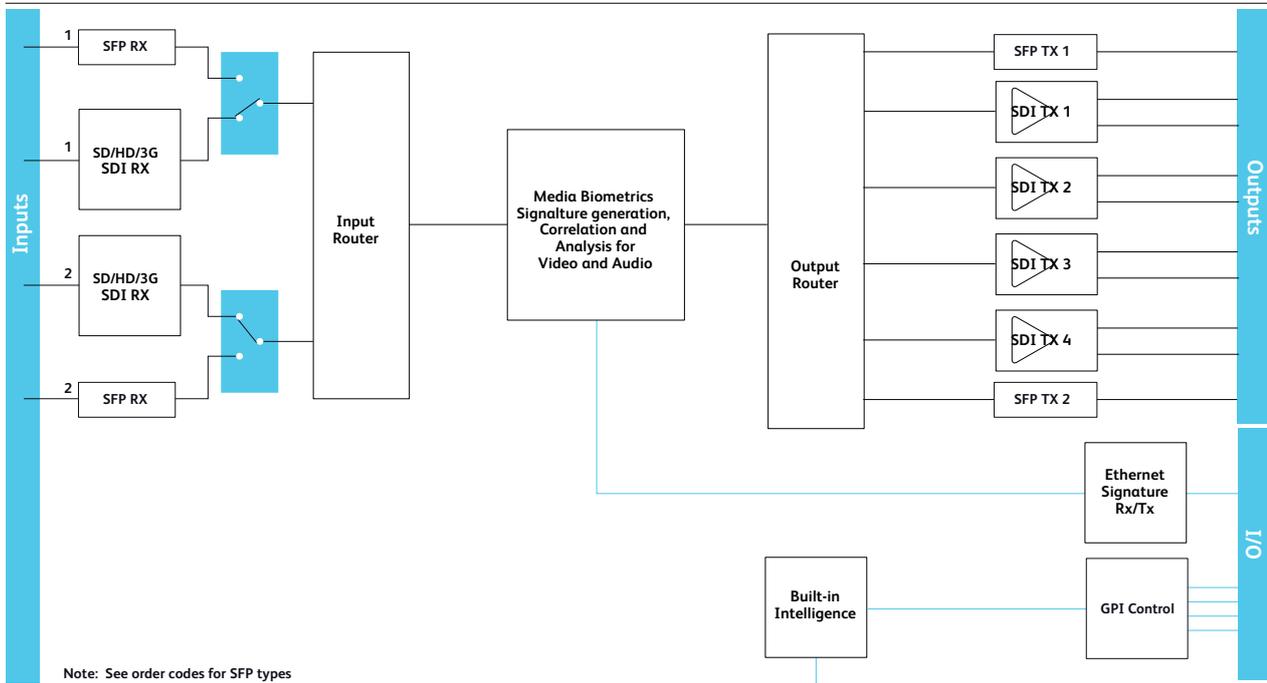
⌃ **Block Diagram** for IQSAM0002-2B3

Network Intelligence, Control & Monitoring

Technical Specification

Inputs and Outputs

Signal Inputs

SDI Inputs	2 x
Electrical	3Gbit/s SDI, SMPTE 424M (425M-level A)
	1.5Gbit/s HD-SDI, SMPTE 292M
	270 Mbit/s SDI, SMPTE 259M-C
Connector / format	BNC/ 75ohm panel jack on standard SAM
	connector panel
Input cable length	Up to 80m Belden 1694A @ 3Gbps
	Up to 150m Belden 1694A @ 1.5 Gbps
	Up to 250m Belden 1694A @ 270 Mbps

Fiber Signal Input

Inputs	2 x*
Optical	3 GBit/s HD-SDI, 1.485 GBit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format	LC singlemode
Standard	SMPTE 297-2006

Signal Outputs

SDI Output	Up to 8 pair selectable from input 1, 2
Electrical	3Gbit/s SDI, SMPTE 424M
	1.5 Gbit/s HD-SDI, SMPTE 292M
	270 Mbit/s SDI, SMPTE 259M-C
Connector / format	BNC/ 75ohm panel jack on standard SAM
	connector panel HD / SD-SDI Outputs x 7 (1 selectable main or monitoring)
Return loss	>-15dB to 1.5GHz, better than -10dB to 3GHz

Fiber Signal Output

Optical	3 GBit/s HD-SDI, 1.485 Gbit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format	LC singlemode
Conforms to	SMPTE 297-2006
Outputs	Up to 2*

*Note: Optical I/O and control dependant on type of SFP module fitted

Controls

Indicators

Power	OK (Green)
CPU	OK (Flashing)

Content Status

Summary	OK (Green)
	Warning (Yellow)
	Error (Red)

Functions

Monitor output select	Main/Monitoring (Output pair selectable)
Channel 1/2	Input & Output select
Audio alarm Threshold settings	

Detection Range

Detection range offset	0 - 10 seconds
Audio channel names	Channels 1 - 16 user configurable
Audio channel mapping	Channels 1 - 16 for input 1 to 2
User memories	16 x Save / Recall / Rename
Reporting & Logging	Input Loss; Input Line Standard; lipsync confidence, relative video and audio delays, absolute video and audio delays, audio timing alarms, embedded audio state, audio routing state
Information Window	Video Input Status, Audio Input Status,
RollTrack Index	Up to 16 RollTrack destinations
RollTrack Sources	Unused, Input state & Std, Video confidence, video delay, Audio delay (absolute & relative), audio timing warning, GPI/O state
Factory Default	Resets all module settings to factory specified default values and clears memories
Default Settings	Resets all module settings to factory specified defaults but does not clear memories
Restart	Software restart of the module

IQSAM00

3G/HD/SD-SDI Signal Assurance Module

Technical Specification

Module Information	"Reports following module information: Software version, Serial number, Build number, KOS version, Firmware version, PCB version	**Power Consumption** Module power consumption	14.5W Max (A frames) 14 PR (B Frames)

Specifications
Electrical

Standards supported — 1080/50p, 1080/59p, 1080/60p,750(720)/60p, 750(720)/59p, 750(720)/50p, 1125(1080)/29i, 1125(1080)/30p*, 1125(1080)/29p*, 1125(1080)/25i, 1125(1080)/25p*, 1125(1080)/24p*, 1125(1080)/23p*, 525(480)/29i, 625(576)/25i
* Note: Must be the same standard on both inputs

Ordering Information

Order codes for IQH3B enclosures

IQSAM0000-1B3
3G/HD/SD-SDI Signal Assurance Module. 2 SDI inputs, 2 SDI outputs, 1 SFP interface, 2 GPIs, Ethernet I/O.

IQSAM0002-2B3
3G/HD/SD-SDI Signal Assurance Module. 2 SDI inputs, 8 SDI outputs (group selectable), 1 SFP interface, 4 GPIs, Ethernet I/O.

IQSAM0003-2B3
3G/HD/SD-SDI Signal Assurance Module with dual relay input bypass. 2 SDI inputs, 5 SDI outputs (group selectable), 1 SFP interface, 4 GPIs, Ethernet I/O.

Order codes for IQH3A/1A enclosures

IQSAM0000-1A3
3G/HD/SD-SDI Signal Assurance Module. 2 SDI inputs, 2 SDI outputs, 1 SFP interface, 2 GPIs, Ethernet I/O.

IQSAM0002-2A3
3G/HD/SD-SDI Signal Assurance Module. 2 SDI inputs, 8 SDI outputs (group selectable), 1 SFP interface, 4 GPIs, Ethernet I/O.

IQSAM0003-2A3
3G/HD/SD-SDI Signal Assurance Module with dual relay input bypass. 2 SDI inputs, 5 SDI outputs (group selectable), 1 SFP interface, 4 GPIs, Ethernet I/O .

For more details on enclosure types please refer to datasheet IQH3B.

Fiber SFP options

FC1-13T1 - Single 1310nm Tx

FC1-13T2 - Dual 1310nm Tx

FC1-15T1 - Single 1550nm Tx

FC1-15T2 - Dual 1550nm Tx

FC1-R1 - Single Rx

FC1-13TR - Transceiver 1310nm/Rx

FC1-HDBT2 - HD-BNC Dual Tx

FC1-HDBR2 - HD-BNC Dual Rx

FC1-HDMI2 - HDMI Tx with 2m cable

CWDM Tx - Wavelengths available on request

Note: Fiber SFP type must be ordered in addition to the module.

IQSAM00
3G/HD/SD-SDI Signal Assurance Module

IQSAM00 Applications

This example shows an efficient way to monitor and correct video and audio timing where a known good signal is being wrapped around a router for additional processing such as down conversion or logo insertion.

IQSAM00 provides a fast and efficient way to monitor video and audio timing at various points within an SDI system. It does this by generating and comparing video and audio signatures from the SDI stream and reporting back the delay value and an accuracy confidence, all without the need for potentially intrusive metadata insertion, or watermarking.

Accurate to 1ms and a less than 5 second timing detection window enables IQSAM00 to send timing and confidence values to any network management or monitoring system via SNMP, or direct to any SAM RollCall enabled products.

Any timing issues can also be corrected by the IQSAM00 via it's built in audio correction option to provide delay adjustment.

Monitoring Station
SNMP timing data
Multiviewer
Corrected Program Output
SDI Post Processing
SDI
SDI + Correction
SDI
SDI
Known Good Feed
SDI
Known Good Feed
SDI
IQSAM00
3G/HD/SD-SDI Signal Assurance Module
Processing

11:09:18
CONTRIBUTION LINK
TX
FACILITY
TX HEADEND
HEADEND IRD MONITORING
HOME
Known Good Source
Video Content Match
Video Content Match
Audio Content Match
Audio Content Match
Audio/Video Lip Sync
Audio/Video Lip Sync

IQMBG80
Provisional Data

8 Channel 3G/HD/SD-SDI Media Biometrics Generator

The IQMBG80 generates media biometrics signatures containing vital video and audio information from up to 8 independent SDI inputs and transmits them over an Ethernet IP link.

SAM Media Biometrics takes the 'fingerprinting' concept a step further by using advanced techniques to both identify media and discover content errors regardless of the content and, in most cases, the processing that has been applied to the content.

IQMBG80 Media Biometrics generators are designed to provide a low barrier to entry for customers wishing to integrate the system into their existing workflows. Handling up to 8 SDI inputs in a space efficient single width modular form factor allows media biometrics signatures to be cost-effectively transmitted to either a Media Biometrics SigMA based system, or a downstream IQSAM00 module for analysis and error reporting.

Features

- Generates Media Biometric signatures from up to 8 SDI inputs and transmits them over IP link for analysis by other Media Biometrics enabled units
- Signatures contain video data and 16 channels of audio data, transmitted frame by frame
- Dedicated IP streaming output connection
- Standards supported:
  – 3G-SDI to SMPTE 424M/425M level A compatible
  – HD-SDI to SMPTE292M/274M/296M
  – SD-SDI to SMPTE259M-C
  – Ethernet IP to IEEE 802.3
- RollCall control and monitoring compatible with standard logging and reporting features

Why should you choose this module?

- SAM's media biometrics technology quickly and easily detects any media errors in the system and provides measurements and alerts to work in harmony with Network management systems
- Full RollCall and SNMP compatibility allows easy integration with SAM, or third party, network management systems providing an all-inclusive monitoring and control solution

Inputs & Outputs - IQH3A/1A/3B enclosures

IQMBG8000-1A3, IQMBG8000-1B3
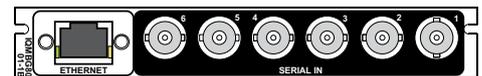
IQMBG8001-1A3, IQMBG8001-1B3
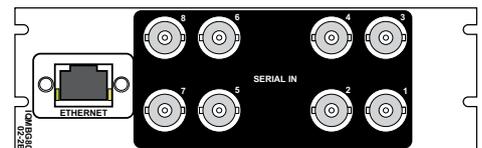
IQMBG8002-2A3, IQMBG8002-2B3
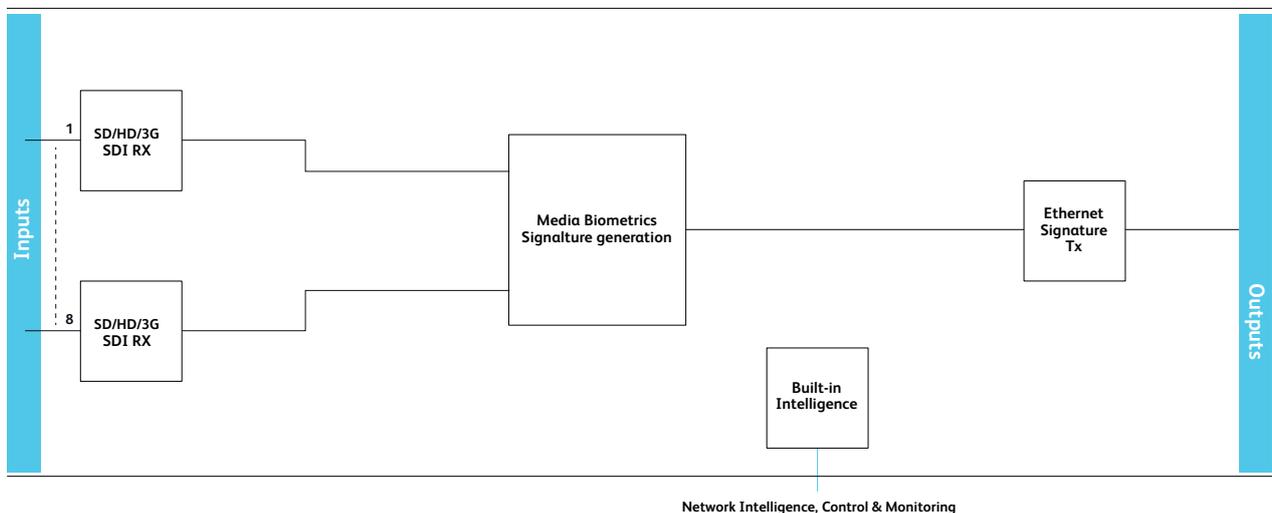
⌢ **Block Diagram** for IQMBG8000-1B3

IQMBG80
Provisional Data

8 Channel 3G/HD/SD-SDI Media Biometrics Generator

Technical Specification

Inputs and Outputs

Signal Inputs

SDI Inputs	8 x
Electrical	3Gbit/s SDI, SMPTE 424M (425M-level A)
	1.5Gbit/s HD-SDI, SMPTE 292M
	270 Mbit/s SDI, SMPTE 259M-C
Connector / format	HD-BNC/BNC 75ohm panel jack on standard SAM connector panel
Input cable length	Up to 80m Belden 1694A @ 3Gbps
	Up to 150m Belden 1694A @ 1.5 Gbps
	Up to 250m Belden 1694A @ 270 Mbps

Signal Outputs	
Ethernet Output	Up to 8 media biometric signatures
Electrical	10/100 baseT Ethernet to IEEE 802.3
Connector / format	RJ-45 panel jack on standard SAM connector panel

Controls
Indicators

Power	OK (Green)
CPU	OK (Flashing)
Content Status	
Summary	OK (Green)
	Warning (Yellow)
	Error (Red)
Link	Link Up (Green)
Rate	10Mbps (Yellow), 100Mbps (Green)

Functions

Reporting & Logging	Input Loss; Input Line Standard;
Information Window	Video Input Status,
RollTrack Index	Up to 16 RollTrack destinations
RollTrack Sources	Unused, Input state & Std
Factory Default	Resets all module settings to factory specified default values and clears memories
Default Settings	Resets all module settings to factory specified defaults but does not clear memories
Restart	Software restart of the module
Module Information	"Reports following module information: Software version, Serial number, Build number, KOS version, Firmware version, PCB version

Specifications
Electrical

Standards supported	1080/50p, 1080/59p, 1080/60p,750(720)/60p, 750(720)/59p, 750(720)/50p, 1125(1080)/29i, 1125(1080)/30p*, 1125(1080)/29p*, 1125(1080)/25i, 1125(1080)/25p*, 1125(1080)/24p*, 1125(1080)/23p*, 525(480)/29i, 625(576)/25i

Power Consumption

Module power consumption	TBC W Max (A frames)
	TBC PR (B Frames)

Ordering Information

Order codes for IQH3B enclosures

IQMBG8000-1B3
3G/HD/SD-SDI Media Biometrics Generator. 8 SDI inputs (HD-BNC), Ethernet Output.

IQMBG8001-1B3
3G/HD/SD-SDI Media Biometrics Generator. 6 SDI inputs (BNC), Ethernet Output.

IQMBG8002-2B3
3G/HD/SD-SDI Media Biometrics Generator. 8 SDI inputs (BNC), Ethernet Output.

Order codes for IQH3A/1A enclosures

IQMBG8000-1A3
3G/HD/SD-SDI Media Biometrics Generator. 8 SDI inputs (HD-BNC), Ethernet Output.

IQMBG8001-1A3
3G/HD/SD-SDI Media Biometrics Generator. 6 SDI inputs (BNC), Ethernet Output.

IQMBG8002-2A3
3G/HD/SD-SDI Media Biometrics Generator. 8 SDI inputs (BNC), Ethernet Output.

For more details on enclosure types please refer to datasheet IQH3B

IQQSM00

3G/HD/SD-SDI Quad Split Monitor

The IQQSM00 provides both SDI and HDMI monitoring outputs for up to four HD-SDI 3 Gbit/s, 1.5 Gbit/s or 270 Mbit/s SD-SDI inputs. Generated in a quad split format at resolutions up to 1920x1080 it enables convenient source monitoring on a single display with the option of feeding the SDI output into a router for remote monitoring applications. With inputs capable of handling a mix of formats and frame rates, the IQQSM00 comes in a space efficient modular package with the added benefit of user definable on-screen captions for easy image identification.

Features

- Easy to use, quad-split multi-viewer
- Output - Support for HDMI at resolutions up to 1920 x 1080, and SDI
- Genlock reference to provide phase aligned output
- 32 user definable memories for storing and recalling image identifiers etc.
- Standard quad-split display using equal image sizes, with single image zoom function
- Controllable borders and image identification via user definable caption, 1 per image
- Standards supported:
  – 3G-HD to SMPTE424M
  – HD-SDI to SMPTE292M
  – SD-SDI to SMPTE259M-C
- Rear panel connection via micro HDMI interface with adapter cables for standard HDMI connection
- RollCall monitoring allows all signal paths to be managed

Why should you choose this module?

- Enables convenient local monitoring up to four video signals in a quad split view on a single monitor
- Duplicate SDI output allows the quad split signal to be routed to other areas for remote monitoring applications

Order codes
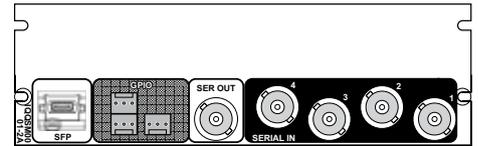
IQQSM0001-2B3, IQQSM0001-2A3
3G/HD/SD-SDI Quad Split Monitor. 4 SDI inputs, 1 SDI output, Up to 2 outputs via SFP, 6 GPIs, reference inputs via IQH3B frame reference*.

SFP options:

FC1-13T1 - Single 1310nm fiber Tx

FC1-13T2 - Dual 1310nm fiber Tx

FC1-HDBT2 - HD-BNC Dual Tx

FC1-HDMI2 - HDMI Tx with 2m cable

Note: SFP type must be ordered in addition to the module.

For more details on enclosure types please refer to Frames and Hardware section.

*Note: Frame reference only available with -B rear panels and IQH3B frame.
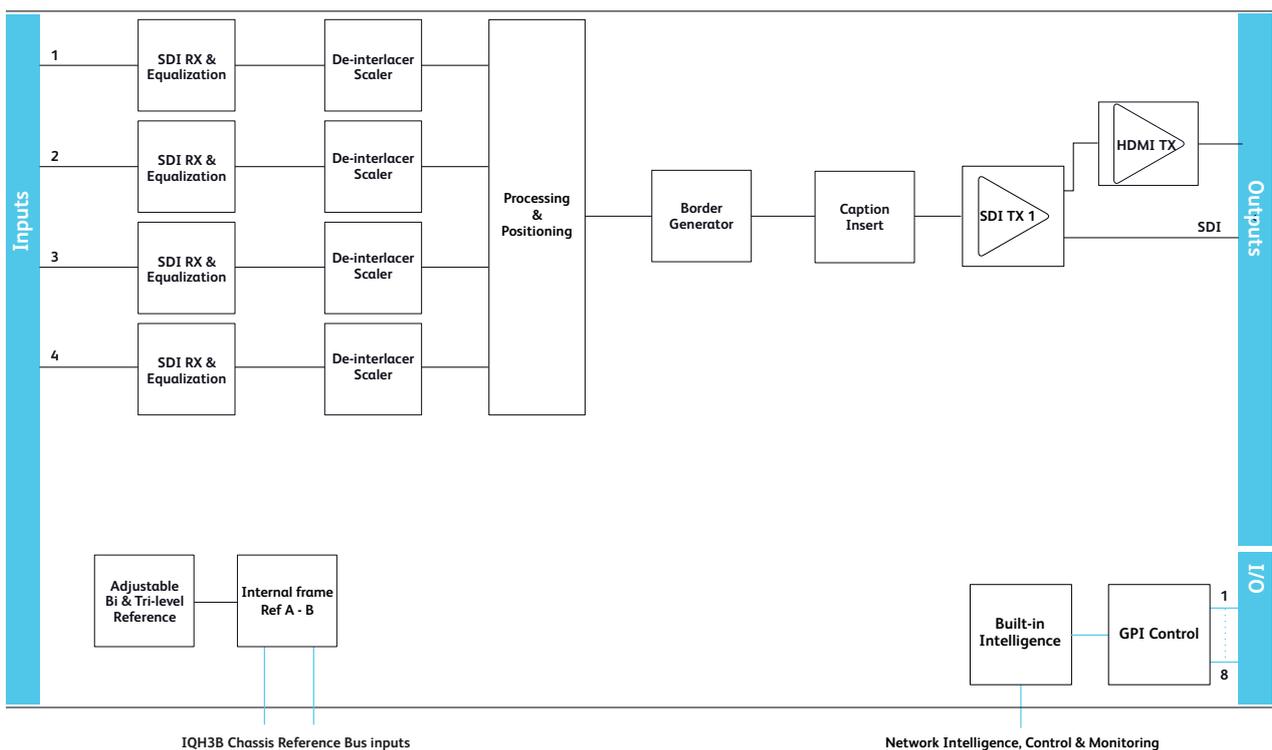
Block Diagram for IQQSM0001-2B3

IQQSM00   3G/HD/SD-SDI Quad Split Monitor

Technical Specification

Signal Inputs

SDI Inputs	4 x
Input Cable Length	Up to 80m Belden 1694A @ 3 Gbit/s
	Up to 140m Belden 1694A @ 1.5 Gbit/s
	Up to 350m Belden 1694A @ 270 Mbit/s

Signal Outputs

SDI Output	x 1

Fiber Signal Output

Outputs	x 2
Optical	3 GBit/s HD-SDI, 1.485 Gbit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format	LC singlemode
Conforms to	SMPTE 297-2006
	SMPTE 424M (HD level A/B)
	SMPTE 292M (HD)
	SMPTE 259M-C (SD)

Controls

Indicators

Power	OK (Green)
CPU	OK (Green flashing)
Status	OK (Green), Warning (Yellow), Error (Red)
Input 1-4	3G-OK (Blue), HD-OK (Green), SD-OK (Yellow), Loss (Red)
Reference	OK (Green – tri-level), OK (Yellow – bi-level), Loss (Red)

Video Controls

Input 1 - 4 Configuration	1, 2
Input status	Present, Loss, Unknown, Data Rate
Logging	
Optical Logging	
RollTrack controls	On/Off, Index, Source, Address, Command, Status, Sending
RollTrack Sources	Unused
	Input 1 - 4 Present
	Input 1 - 4 Rate Unknown
	Input 1 - 4 Error
	Input 1 - 4 Loss
	Input 1 - 4 3G
	Input 1 - 4 HD
	Input 1 - 4 SD

Other Controls

User memories	Name, save and recall 32 user memories

Specifications

Electrical	3Gbit/s SDI, SMPTE 424M
	1.5Gbit/s HD-SDI, SMPTE 292M
	270 Mbit/s SDI, SMPTE 259M-C / DVB-ASI
Connector / format	BNC/ 75ohm panel jack on standard SAM connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s)
	>-10dB (3Gbit/s)
Output jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz)
	3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)

Optical Tx

Wavelength	1310 nm
Spectral width (FWHM)	>1.5 nm (typ)
Output power	0 to -5 dBm typical (-2 dBm typical)
Rise and Fall Time	135 ps @ 3Gbit/s
	270 ps @ 1.5Gbit/s
	1.5 ns @ 270Mbit/s
Extinction ratio	>7.5:1 (typ)
Link distance	Up to 30 Km @ 270Mbit/s
	Up to 21 Km @ 1.5Gbit/s
	Up to 10 Km @ 3Gbit/s

Power Consumption

Module Power Consumption (inc. HDMI SFP)	
	25.5 PR (B Frames)
	28 W (A Frames)

IQASI82

Dual ASI Transport Stream Monitor and Switch

The IQASI82 monitors two ASI streams simultaneously for errors automatically switching from main and backup inputs depending on error criteria. Alarm management flexibility is provided by user defined criticality of alarms from TS Loss to PID monitoring and basic ETSI TR 101290 alarms.

External GPI I/O, RS232 and Relay ports can also control functionality, allowing upstream triggering and or automated control via a third party system.

IQASI82 can be used in conjunction with RollCall Network managmnet system for advanced alarm monitoring and control.

Features

- Simultaneously monitors two MPEG-2 DVB ASI Transport Streams (TS)
- Compliant with ETSI TR101290 specification and ATSC TS streams packet, burst and byte modes
- Multiple switching methods, including near-seamless (between co-timed Identical streams) and non-seamless switching, Manual or Automatic
- Transport stream monitoring and user selectable alarms, including:
  - Catastrophic failures such as no TS, loss of synchronisation or low signal level
  - User defined maximum and minimum data rates for each Transport Stream
  - Monitoring PIDs from a customer specified list up to a maximum of 64 (32 per input)
- Alarm monitoring and logging via RollCall interface or SNMP
- Relay Bypass for signal path protection
- RollCall control and monitoring compatible

Why should you choose this module?

- Each ASI Transport stream is independently monitored with MPEG-2, DVB and ATSC standards supported
- Near-seamless switching minimises disruption to the output stream by maintaining TS synchronisation when switching between sources
- Programmable TR101290 monitoring to match each transmission system specification
- 12 Configurable GPI ports (4 inputs, 8 Outputs), 2 relays and RS232 control provide flexible external interfacing options
- Full RollCall and SNMP compatibility allows easy integration with SAM, or third party, network management systems providing an all-inclusive monitoring and control solution

Order codes
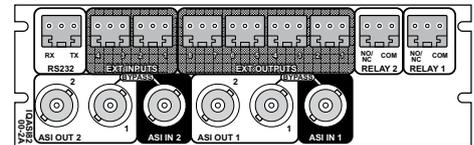
IQASI8200-2A, IQASI8200-2B

ASI Transport Stream Monitor and Switch. 2 ASI inputs, 4 ASI outputs, 12 GPIs, RS232 port, and 2 relay ports.

For more details on enclosure types please refer to Frames and Hardware section.

IQASI82

Dual ASI Transport Stream Monitor and Switch

Note: ⎯ ⎯ Indicates relay rear bypass panel
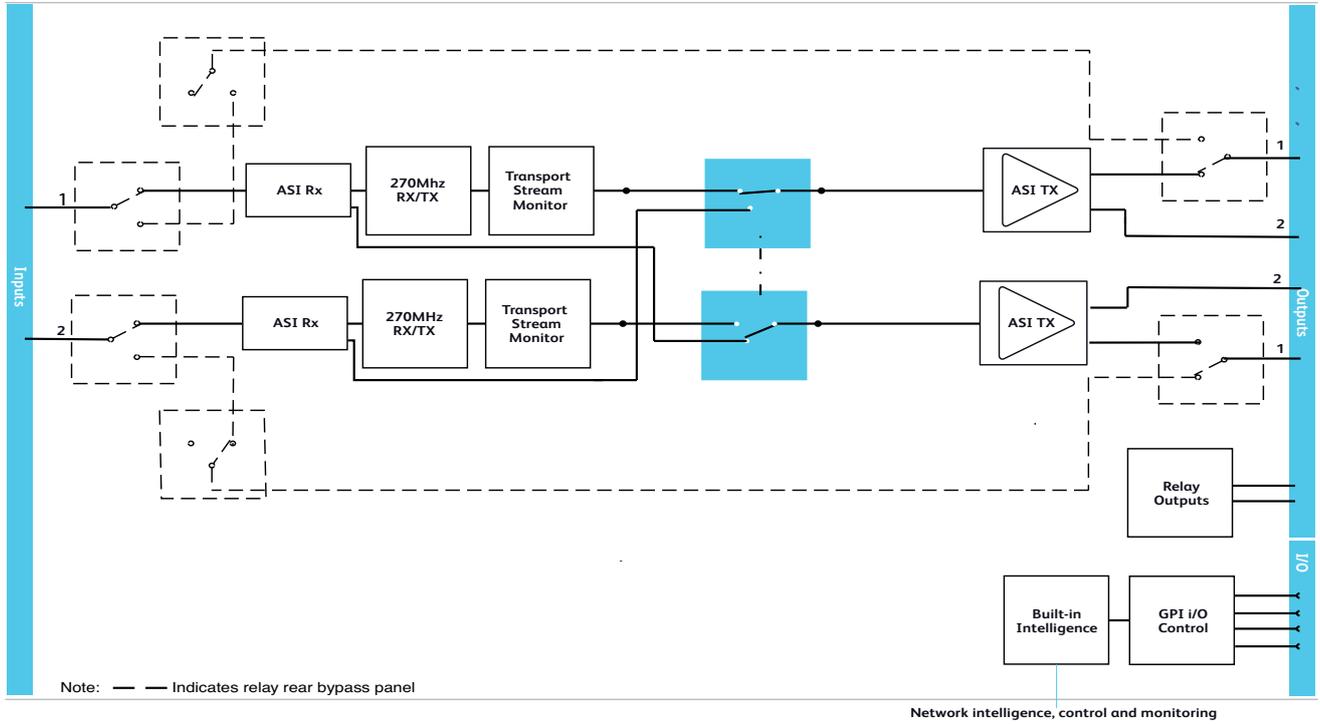
⌢ **Block Diagram** for IQASI8200-2A

Technical Specification

Inputs and Outputs
Signal Inputs

ASI 1	ASI (270 Mbit/s)
ASI 2	ASI (270 Mbit/s)
Standards	DVB-ASI, EN50083-9
Electrical	Transformer coupled 75R 800mV p-p

Signal Outputs

Serial data	4 ASI (270 MBit/s)

Control Interface

GPI	4
Electrical	Opto-isolated with an internal 5V pull-up through 470R, active low 8mA
Connector / Format	Standard SAM screw terminal
GPO	8
Electrical	Darlington driver with 0V common, max sink current 500mA switching up to 50V
Connector / Format	Standard SAM screw terminal

Indicators

Power	OK	(Green)
CPU	OK	(Green flashing)
Input Status	OK	(Green)
	Fail	(Red)
Remote	Green	Lit = selected
Local	Red	Lit = selected
Output source	Yellow	Lit = selected

RollCall Features

Status	Input and Output alarm statuses
Primary Config	ASI switch configuration
PID List	PID management
Alarm Outputs	Enable / disable
User memories	None
Logging	Input Status
	Input Alarms
	Output Alarms
	Output Status
	Misc
RollTrack Controls	On/off, Index, Source, Address, Command, Status, Sending
Setup	Versions, reset defaults, restart

Specifications

Electrical	ASI transport stream
Connector / Format	BNC
	Standard SAM screw terminal

Power Consumption

Module power consumption	6.5 W max (A frames)
	6.5 PR (B frames)

IQDBT105

DVB-T2 & DVB-T Monitoring Receiver

The IQDBT105 provides continuous off air terrestrial reception of DVB-T and DVB-T2 RF signals, to be used as part of a re-broadcast transmitter system, for example, or for direct monitoring of a transmitter. The IQDBT105 is able to monitor input RF modulation parameters, including Modulation Error Ratio, and also compare the input with a template of modulation parameters stored within the unit to provide an alarm on error conditions.

IQDBT105 can be used in conjunction with RollCall network management system for advanced alarm monitoring and control.

Features

- Receives DVB-T2 RF signals and converts to DVB-ASI output
- Monitors input level, Modulation Error Rate (MER) and lock status to ensure quality of service is maintained
- Able to monitor RF modulation parameters and compare with pre-defined templates to provide alarms on error conditions
- Seven fixed and eight programmable modulation parameter templates available
- Template parameters include: The FFT in use, Guard Interval, Constellation of PLP and L1 modulation, LDPC ratio of PLP and PAPR reduction in use
- Transport Stream Monitoring is included to monitor PAT conformance and PID presence against a user defined list of expected PIDs
- Excellent adjacent channel performance (+10dB), useful for difficult RF environments such as transmitter sites
- Receiver tuning and MER monitoring available via the RollCall Network Management system, with full access to templates and transport stream monitoring via on-board SNMP interface

Why should you choose this module?

- Ideal as an off-air receiver to provide DVB-T and T2 RF monitoring
- Provides output monitoring for DVB-T or DVB-T2 transmitter sites to check signal parameters and quality
- User defined PID matching allows transport streams to be monitored for payload and content problems
- Full RollCall and SNMP compatibility allows easy integration with SAM, or third party, network management systems providing an all-inclusive monitoring and control solution

Order codes
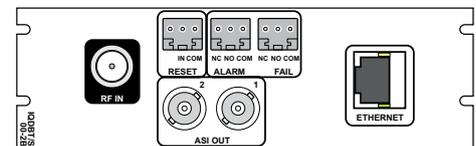
IQDBT10500-2B
DVB-T2 Terrestrial Receiver. 1 RF input, 2 ASI outputs

For more details on enclosure types please refer to Frames and Hardware section.

IQDBT105 DVB-T2 & DVB-T Monitoring Receiver

Inputs | Outputs | I/O

RF In

DVB-T/T2 COFDM Receiver Module

ASI TX

1

2

Signal Monitoring and Web Interface

Fail Relay

NO/NC
COM

Alarm Relay

NO/NC
COM

Ethernet Interface - RJ45

Built-in Intelligence

Front Panel RS232

Network intelligence, control and monitoring

⌒ **Block Diagram** for IQDBT10500-2B

Technical Specification

Inputs and Outputs
Signal Inputs

RF	DVB-T2 (Single PLP (mode A) and multi PLP (mode B) to EN 302 755)
	DVB-T (EN 300 744)
Return loss	6dB typical
Tuning range	178MHz to 858MHz
Input level	-20dBm to -80dBm
Tuning step	125kHz 7MHz channel, 166.7kHz 8MHz channel
Connector	F-type

DVB-T2 Features
Modulation

Guard interval	1/4, 19/128, 1/8, 1/32, 1/128, 19/256, 1/16
Code rate	1/2, 2/3, 3/4, 5/6, 7/8, 3/5, 4/5
Modulation	QPSK, 16QAM, 64QAM, 256QAM
FFT	1k, 2k, 4k, 8k, 16k, 32k
Modulation status (tested with template)	
	Selected PLP, Pilot pattern, Constellation, Guard interval, FFT, FEC, Rotation, PAPR, Extended carrier, L1 post signalling, No of T2 frames/superframe, Time interleaving blocks/frame, No of data symbols/T2 frame, FEC blocks/interleaving frame, FEC block length
Modulation status	PLP's present
Modulation ident	Cell ident, T2 system ident, network ident

Measurement and Alarms

Measured parameters	Input level (dBm), MER (dB), Lock status, Frequency (kHz), Frequency offset, Frequency error (kHz), TS bit rate, Pre LDPC BER, Pre BCH BER, LDPC error ratio, LDPC instantaneous iterations, LDPC error total/period, LDPC samples/period, LDPC mean error rate, Tuner temperature (°C)
Alarm parameters	TS sync loss, PAT repetition, PID presence against user defined list (up to 6 PIDs checked), Tuned, Alarm relay (summary), RF input level (upper and lower) RF input level, MER (lower), Frequency error (upper and lower), T2 template error, LDPC mean error (upper), LDPC warning (upper), LDPC interation (upper), Pre LDPC BER (lower), Pre BCH BER (lower), TS bit rate (upper and lower), Receiver lock, Tuner temperature (upper and lower)

DVB-T Features
Modulation

Guard interval	1/4, 1/8, 1/16, 1/32
Code rate	1/2, 2/3, 3/4, 5/6, 7/8
Modulation	QPSK, 16QAM, 64QAM
FFT	2k, 8k
Modulation status	Constellation, COFDM mode, Guard interval, Hierarchy, HP FEC, LP FEC

Measurement and Alarms

Measured parameters	Input level (dBm), MER (dB), Lock status, Frequency (kHz), Frequency offset, Frequency error (kHz), TS bit rate, BER pre viterbi, BER post viterbi, UCE, UCE total, Tuner temperature (°C)
Alarm parameters	TS sync loss, PAT repetition, PID presence against user, defined list (up to 6 PIDs checked), Tuned, Alarm relay (summary), RF input level, MER (lower), Frequency error (upper and lower), TS bit rate (upper and lower), BER pre viterbi, BER post viterbi, Receiver lock, Tuner temperature (upper and lower)

Signal Outputs

Serial data	2 ASI (270 MBit/s)

Power Consumption

Module power consumption	4.5 PR (IQH3B Frame)

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SD-HD Conversion

The SAM range of HD/SD-SDI converters offers top quality performance at every professional level. From format converters that include both analog and digital video and audio interfacing to just a straight down converter, IQ has a module to suit all applications.

For an extremely compact solution with performance and features that you would normally expect from a much larger product, the IQUDC31 offers market-leading value.

Now introducing a new UHD-4K Downconverter module able to integrate Quad-link 4K content with existing HD single-link workflows

For Related Modules see:
IQMDA00 in Distribution

IQMCC30

3G/HD/SD-SDI Motion Compensated Frame Rate Converter

The IQMCC30 provides multi-rate frame-rate and format conversion for 3Gbps SDI, and HD-SDI digital video signals. Using high quality motion compensated image processing the IQMCC30 delivers high quality conversion in a compact and affordable modular form-factor ideal for broadcasters, news agencies, and content providers needing to deliver premium content to domestic and international audiences.

IQMCC30 includes a frame synchronizer, capable of referencing to a SD bi-level or HD tri-level reference and a variable aspect ratio converter with reading and writing of WSS, VI and 2016 AFD signalling. Audio handling includes audio channel routing, delay adjustment and level controls. Video metadata such as timecode, SMPTE2020 Dolby, closed captions and teletext captions can also be passed through the module or processed according to the required output standard.

To allow the module to be further tailored to system requirements software options are available to provide noise reduction, side-bar keying and logo insertion, and versions are available with SFP cages enabling fiber conversion or additional electrical outputs on HD-BNCs.

Features

- Motion compensated SD/HD/3G frame rate conversion
- High quality up, down and cross conversion including conversion aperture control and clean cut mode
- Frame synchronizer with HD Tri-sync / SD Bi-Level Reference Input and input loss detection, and filmic field detection optimizes 3:2, 2:2 picture cadences
- Aspect ratio conversion including preset ARC maps relative to conversion modes, 32 ARC user memories, pan, tilt, size, and output crop adjustments
- Aspect ratio control (signaling reading and writing) using ETSI WSS and AFD Video Index signaling (RP186, SMPTE 2016)
- Video proc. features include: gain, offset, luma clipper, horizontal and vertical picture enhancement, and adjustable RGB gamut legalization
- Metadata support - Closed caption passing or processing for CEA608/708 and OP42/OP47/SMPTE2031 WST captions, and VITC or SMPTE12M timecode translation with output line adjustment (VITC)
- Additional processing options including; noise reduction (adaptive spatial and recursive), side-bar keying and logo insertion
- Processing for 16 channels of embedded audio present on the incoming SDI stream with no disturbance during video synchronizer frame wraps or drops
- Audio proc. features including: channel routing, gain, invert, delay (including tracking audio delay which seamlessly tracks the video delay) and eight internal tone generators
- Non-PCM processing features pair level routing and delay compensation. Dolby-E data is passed with a delay to match the video and with co-timed audio frame drop or repeat
- Dolby E support – Detection of PCM/non-PCM audio to SMPTE 337/338M, pair routing and Dolby E header re-alignment
- Integrated Fiber I/O support via SFP module
- 16 x user memories, 2 GPI/O ports, in-built test pattern generator and 19 character scrolling caption generator
- RollCall control and monitoring compatible with standard logging and reporting features, plus RollTrack triggers available for detected module states including: Input loss and reference loss

Why should you choose this module?

- Ideal for international program distribution, TV and video production and content repurposing for internet, TV and Blu-ray distribution
- Low cost and high density broadcast quality conversion solution, helping to re-define the economics of Broadcast infrastructure
- Full RollCall and SNMP compatibility allows easy integration with SAM or third party network management systems providing an all-inclusive monitoring and control solution

Inputs & Outputs - IQH3B enclosures
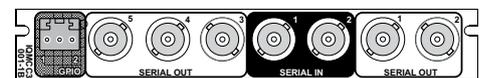
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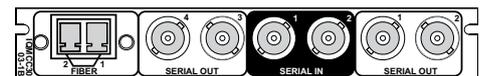
IQMCC3003-1B3
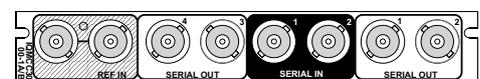
IQMCC3000-1B3
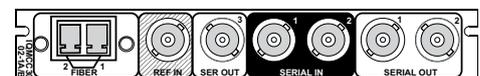
IQMCC3002-1B3

For more details on enclosure types please refer to datasheet IQH3B.

IQMCC30

3G/HD/SD-SDI Motion Compensated Frame Rate Converter

Note: Number of inputs and outputs depends on SFP and rear panel type
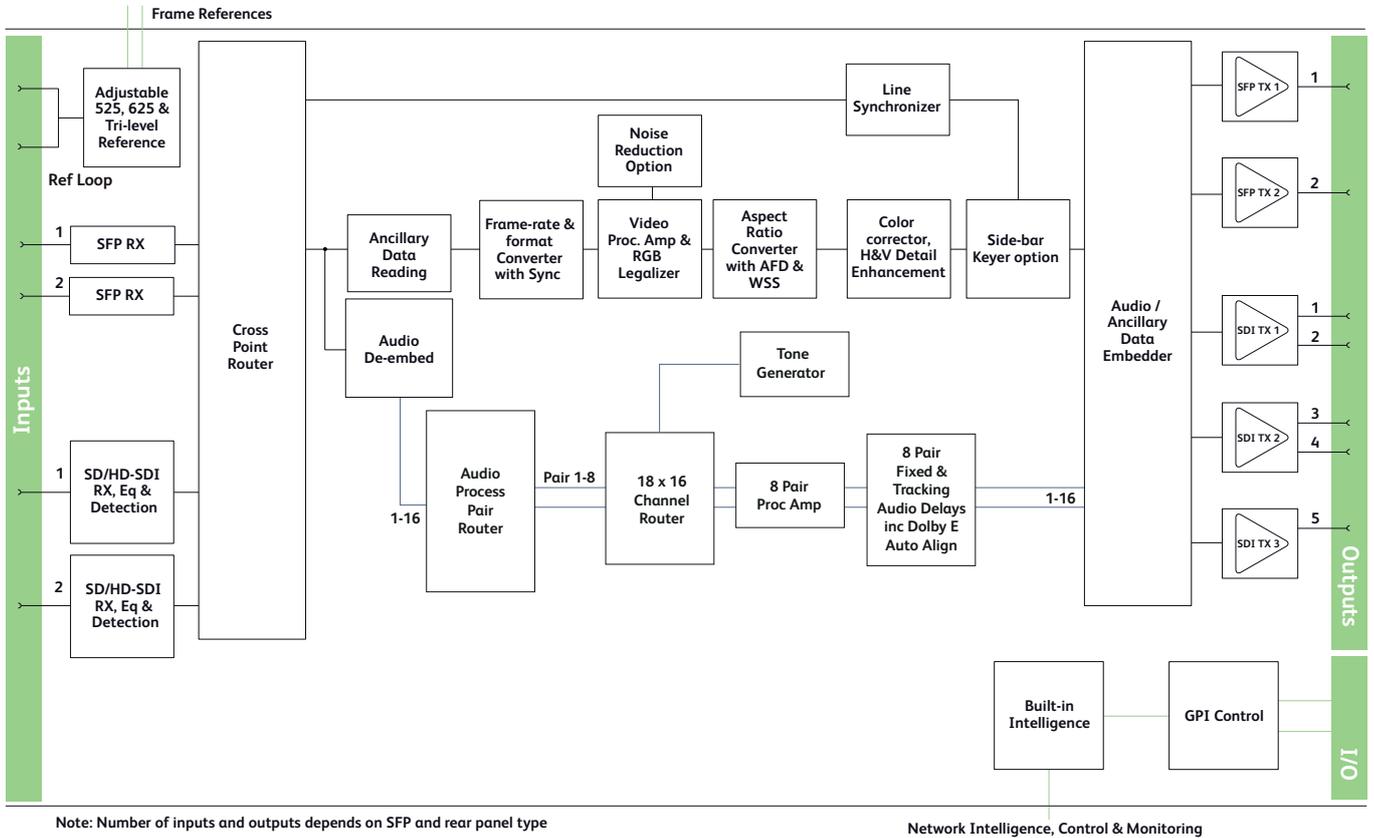
⌒ **Block Diagram** for IQMCC30 Range

Technical Specification

Inputs & Outputs

Video Signal Inputs

SDI Inputs	2x
Input Cable Length	Up to 80m Belden 1694A @ 3 Gbit/s
	Up to 120m Belden 1694A @ 1.5 Gbit/s
	100m typical (with output set to 1080p rates),
	Belden 1694A @ 270 Mbit/s
Input Standard (auto detect)	
	525, 625, 720 50/59.94p,
	1080 50/59.94i,
	1080 50/59.94p (Levels A and B),
	720/1080 23/24/25/29p,
	1080 23/24/25/29psf
Analog Reference	1 x Analog Reference with passive loop-through
	Black (HD tri-level and SD bi-level) and Black
	Burst (SD bi-level)
	SD bi-level – RS170A
	HD Tri-level – SMPTE 240M, 274M

Fiber Signal Input

Inputs	Up to 2
Optical	3 GBit/s HD-SDI, 1.485 GBit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format	LC singlemode
Standard	SMPTE 297-2006

Video Signal Outputs

SDI Outputs	up to 5
Output standard	525, 625, 720 50/59.94p,
	1080 50/59.94i,
	1080 50/59.94p (Levels A and B),
	720/1080 23/24/25/29p,
	1080 23/24/25/29psf

Fiber Signal Output

Optical	3 GBit/s HD-SDI, 1.485 Gbit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format	LC singlemode
Conforms to	SMPTE 297-2006
Outputs	Up to 2

*Note: Optical I/O and control dependant on type of SFP module fitted

Control Interface

GPI	2 x Closing contact I/O interface (ST) (rear panel dependant)

Technical Specification cont…

Conversion Functions

Modes	SD/HD/3Gb/s Motion Compensated Standards Conversion
	Up, down, and cross conversion
	Aspect ratio conversion synchronization
Conversion processing	Still process: Detects still images and applies an aperture with full (progressive) vertical frequency response
	Enhanced still: Adds field motion detection to still process. Prevents artifacts on moving repetitive patterns
Aspect ratio conversion (manual or auto)	AFD (SMPTE 2016), VI (RP186), WSS (L23)
SD input format	Normal 4:3, Anamorphic 16:9, Letterbox 14:9, Letterbox 16:9
SD output format	Normal 4:3, Anamorphic 16:9, Letterbox 14:9, Letterbox 16:9
Manual zoom	Zoom +/- 20%
Metadata	Closed caption CE608 <> CE708
	Timecode conversions
	Teletext subtitles WST/RDD8/SMPTE 2031 conversion

Audio Functions

Embedded audio	16-channel embedded audio processing
	PCM audio processing includes channel level gain and delay compensation, as well as channel level routing with L/R swap and phase invert feature
	Non-PCM processing features pair level routing and delay compensation. Dolby E data is passed with a delay to match the video and with co-timed audio frame drop or repeat
Embedded audio	Enable/Blank

Embedded Audio Routing

Processed pair 1-8	Disembed 1-8
Output Channels 1-16	Processed pair 1-8, Tone, Silence

Processed Audio Control

Invert Phase	Channels 1-16
Pair 1 to 8 Gain L/R	+18 dB to -18 dB in 0.1 dB steps
Pair 1-8 Manual Delay	-40 to +200 ms in 1 ms steps
Global Manual Delay	-40 to +200 ms in 1 ms steps

Dolby-E

Dolby-E Auto Alignment	+/- 10 line offset in 1 line steps

Tone

Frequency	100Hz to 10kHz in 100Hz steps

Processing Functions

Ancillary Data	Pass/Strip
Freeze	On/Off
Legalizer	700 mV, 721 mV, 735 mV, 746 mV, Off
Genlock	Reference lock, Input lock (same format), Follow input (same frame rate), Free run
Memories	16 user memories
Pattern	Off, Black, Ramp, Bars
Caption	On/Off, Scrolling
Edit Caption	19 characters available

Proc amp

Master Gain	-6 dB to +6 dB (0) in 0.1 dB steps
Black Level:	+100 to -100 mV (0) in 0.8 mV steps
Contrast:	-6 dB to +6 dB (0) in 0.2 dB steps
Saturation:	-6 dB to +6 dB (0) in 0.2 dB steps
Y Gamma:	0.4 to 1.7 (1) in 0.1 steps
YC Offset:	-20 to 20 (0) in 2 Luma pixel steps
	Note: Defaults shown in brackets

Enhancement

Nonlinear Enhancer	Frequency Band Selection: Low, Med, High
	Four preset enhancement modes: Low, Med, High, Super
	Manual enhancement mode with H Gain and H Noise rejection levels

Conversion Aperture

Vertical	Frequency Band Selection: Low, Med, High
	Five vertical preset enhancement levels: Soft 2, Soft 1, Normal, Sharp 1, Sharp 2
Horizontal	Five horizontal preset sharpness levels: Low 2, Low 1, Normal, High 1, High 2
	Five horizontal preset detail levels: Soft 2, Soft 1, Normal, Sharp 1, Sharp 2

Other Controls

GPI input Low/High Select	
	Black, Freeze, Pattern, User Memories 1-16
GPI Output Source	Black, Freeze, Pattern
User Memories	16 x Save, Recall, Rename
Memory Naming	User configurable naming of memories 1 – 16
RollTrack Index	Up to 50 RollTrack destinations
RollTrack Sources	Input Present Ch 1, Input Loss Ch 1, Reference OK & Loss
Information Window	Video Input Status, Reference Status
Factory Default	Resets all module settings to factory specified default values and clears memories
Default Settings	Resets all module settings to factory specified defaults but does not clear memories
Module Information	Reports following module information: Software version, Serial number, Rear Panel ID, Frame Slot

Specifications

Electrical	3Gbit/s SDI, SMPTE 424M 1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C
Connector / Format	BNC/ 75ohm panel jack on standard IQ connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s) >-10dB (3Gbit/s)
Output Jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz), 3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)
Reference Source	External – HD Tri-Level / SD Bi-level / Input Video syncs
Electrical	Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level)
	SD bi-level – RS170A
	HD Tr-level – SMPTE 240M and 274M
Connector / Format	BNC/75 ohm panel jack on standard IQ connector panel

Embedded audio handling	
	HD - 24-bit synchronous 48 kHz to SMPTE 299M, SD - 20-bit synchronous 48 kHz to SMPTE 272M-A

IQMCC30

3G/HD/SD-SDI Motion Compensated Frame Rate Converter

Optical Outputs (Tx) 1310 (1550) nm Tx

Wavelength	1310 (1550) nm
Spectral width (FWHM)	>1.5 (>1) nm (typ)
Output power	-2 (4) dBm Typical (±3 dBm)
Extinction ratio	>7.5:1 (typ)
Transmission distance	Up to 30 (50) Km max

Optical Rx

Input wavelength range	Min. 1260 nm, Max. 1620 nm
Optical power input range	> -0 dBm, < -20 dBm
Link distance	Up to 30 Km

Power Consumption

Module Power Consumption with Fiber

17.5PR Max

Ordering Information

Order codes for IQH3B enclosures

IQMCCC3000-1B3
Motion Compensated Frame Rate Converter. 2 SDI inputs, external reference loop & enclosure reference inputs, 4 SDI outputs

IQMCC3001-1B3
Motion Compensated Frame Rate Converter. 2 SDI inputs, 5 SDI outputs, 2 GPI/Os, reference inputs from enclosure

IQMCC3002-1B3
Motion Compensated Frame Rate Converter. 2 SDI inputs, external reference input & enclosure reference inputs, 3 SDI outputs, single SFP cage

IQMCC3003-1B3
Motion Compensated Frame Rate Converter. 2 SDI inputs, 4 SDI outputs, single SFP cage, reference inputs from enclosure

For more details on enclosure types please refer to datasheet IQH3B

Software Options

IQOPTM-NR - Software option to add noise reduction

IQOPTM-SBK - Software option to add side-bar keying

IQOPTM-LOG - Software option to add Logo insertion

Fiber SFP options

FC1-13T1 - Single 1310nm Tx

FC1-13T2 - Dual 1310nm Tx

FC1-15T1 - Single 1550nm Tx

FC1-15T2 - Dual 1550nm Tx

FC1-R1 - Single Rx

FC1-R2 - Dual Rx

FC1-13TR - Transceiver 1310nm/Rx

FC1-HDBT2 - HD-BNC Dual Tx

FC1-HDBR2 - HD-BNC Dual Rx

FC1-HDMI2 - HDMI Tx with 2m cable

CWDM Tx - Wavelengths available on request

Note: Fiber SFP type must be ordered in addition to the module.

IQUDC34

3G/HD/SD-SDI Universal Up, Down and Cross Converter

Having both analog and digital interfacing along with multi-rate format conversion for 3G/HD/SD-SDI digital video signals gives the IQUDC34 a high level of flexibility and ability to handle a wide range of interfacing applications. Whether its decoding composite signals and embedding the associated analog audio, or receiving HD-SDI and de-embedding to AES, or analog audio for monitoring IQUDC34 can adapt, and using high quality motion adaptive de-interlacing and flexible scaling technology ensures that the conversion performance is first class.

IQUDC34 includes a frame synchronizer, capable of referencing to a SD bi-level or HD tri-level reference and a variable aspect ratio converter with reading and writing of WSS, VI and 2016 AFD signalling. Audio handling includes audio channel routing, delay adjustment and level controls. Video metadata such as timecode, closed captions and teletext captions can also be passed through the module or processed according to the required output standard.

To allow the module to be further tailored to system requirements software options are available to provide noise reduction and side-bar keying, and versions are available with SFP cages enabling fiber conversion or additional electrical outputs on HD-BNCs.

Features

- Wide range of I/O including SDI, CVBS, AES audio, analog audio and integrated Fiber support via SFP module
- High quality up, down and cross conversion including conversion aperture control
- Frame synchronizer with HD Tri-sync / SD Bi-Level Reference Input and input loss detection
- Aspect ratio conversion including preset ARC maps relative to conversion modes, selectable pan, tilt, aspect, size, and output crop adjustments
- Aspect ratio control (signalling reading and writing) using ETSI WSS and AFD Video Index signaling (RP186, SMPTE 2016)
- Video proc. features include: gain, offset, hue, horizontal and vertical picture enhancement, and RGB gamut legalization
- Metadata support - Closed caption passing or processing for CEA608/708 and OP42/OP47/WST captions, VITC or SMPTE12M timecode translation, and Ancillary data bridge for 7 blocks of ANC data passing
- Additional processing options including; noise reduction (adaptive spatial and recursive), side-bar keying and linear or motion compensated frame rate conversion
- 8 AES audio I/O, balanced or unbalanced, two pairs of balanced analog audio inputs and outputs all available to/from any processed internal pair, and audio proc. features including: channel routing, gain, invert, delay and eight internal tone generators
- Processing for 16 channels of embedded audio present on the incoming SDI stream with no disturbance during video synchronizer frame wraps or drops
- Non-PCM processing features pair level routing and delay compensation. Dolby-E data is passed with a delay to match the video and with co-timed audio frame drop or repeat
- Dolby E support – Detection of PCM/non-PCM audio to SMPTE 337/338M, pair routing and Dolby E header re-alignment
- In-built test pattern generator and 19 character scrolling caption generator
- 16 x user memories and 2 GPI/O ports
- RollCall control and monitoring compatible with standard logging and reporting features
- RollTrack triggers available for detected module states including: Input loss and reference loss

Why should you choose this module?

- It's ability to work with a wide range of analog and digital inputs along with with high quality video conversion and frame synchronization makes the IQUDC34 an ideal interfacing module for mixed analog and digital systems
- Full RollCall and SNMP compatibility allows easy integration with SAM or third party network management systems providing an all-inclusive monitoring and control solution
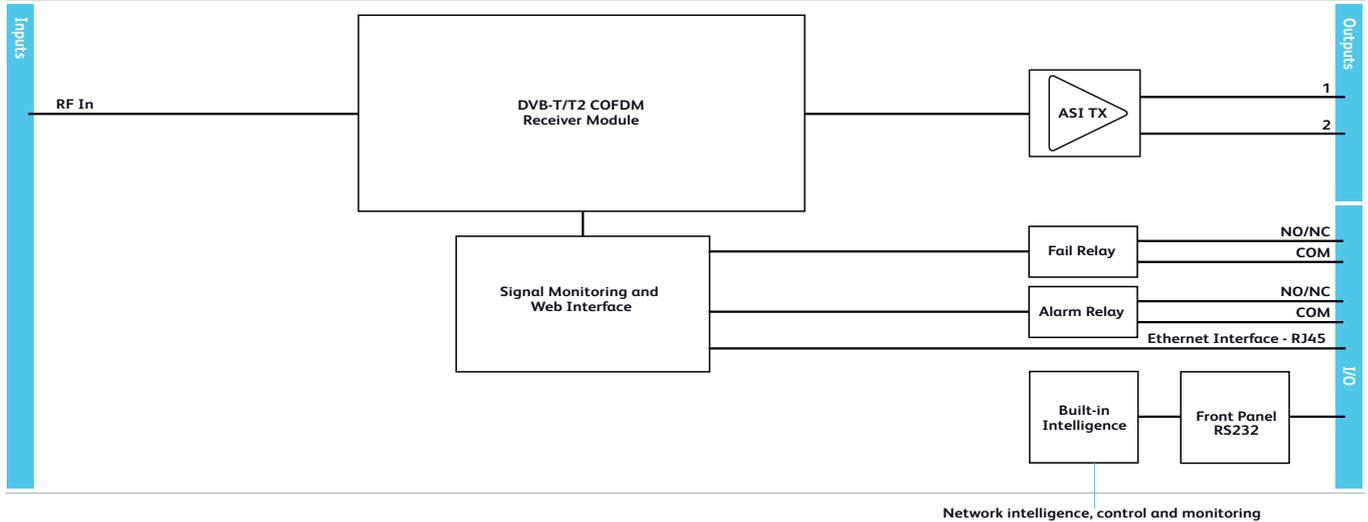
Inputs & Outputs - IQH3A/1A/3B enclosures
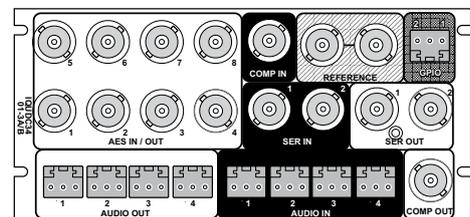
IQUDC3401-3A3, IQUDC3401-3B3
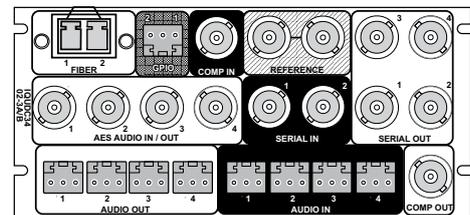
IQUDC3402-3A3, IQUDC3402-3B3

IQUDC3403-3A3, IQUDC3403-3B3

For more details on enclosure types please refer to datasheet IQH3B.

IQUDC34

3G/HD/SD-SDI Universal Up, Down and Cross Converter
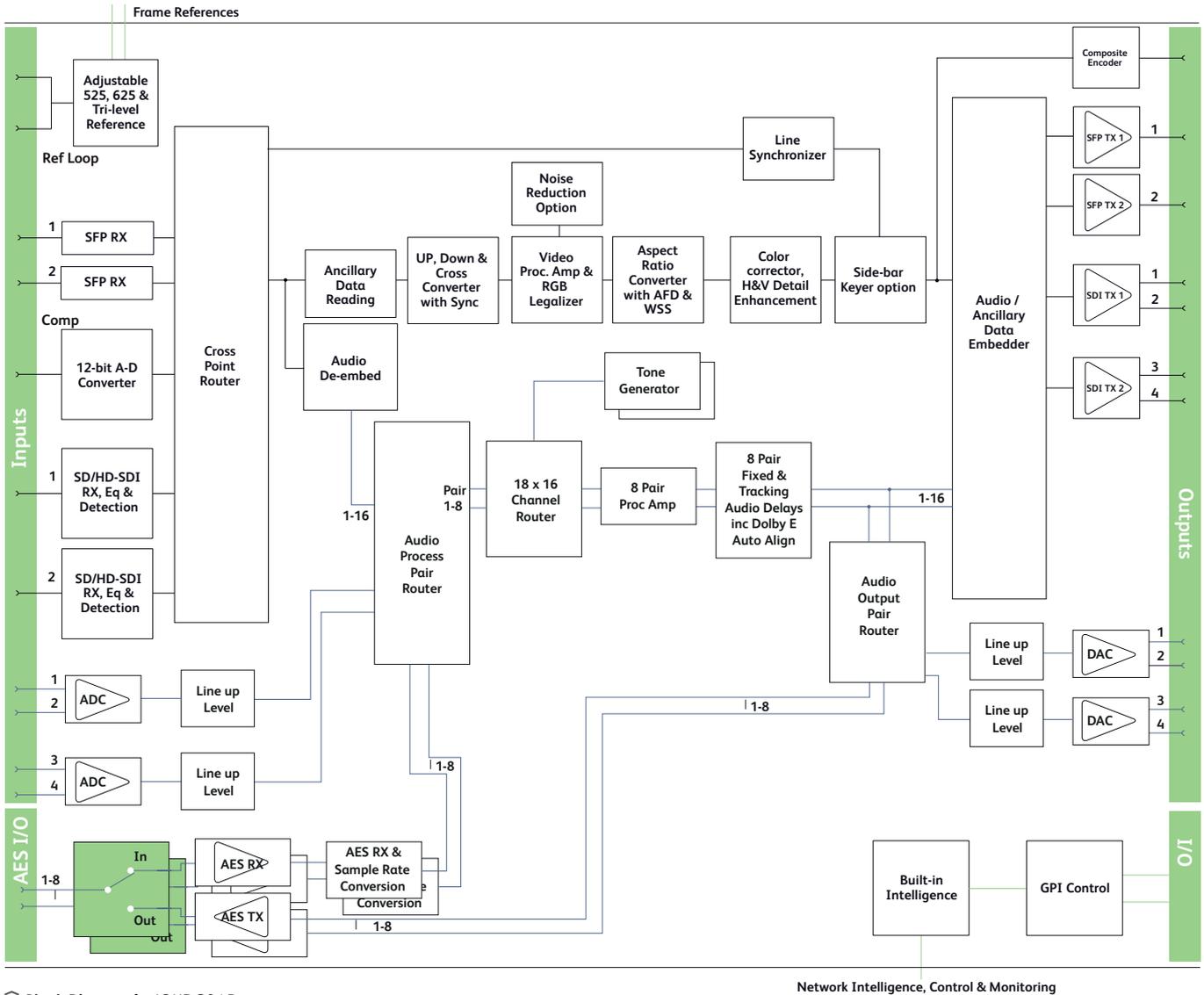
Block Diagram for IQUDC34 Range

Technical Specification

Inputs & Outputs

Video Signal Inputs

SDI Inputs	2x
Input Cable Length	Up to 80m Belden 1694A @ 3 Gbit/s
	Up to 120m Belden 1694A @ 1.5 Gbit/s
	100m typical (with output set to 1080p rates), Belden 1694A @ 270 Mbit/s
Input Standard (auto detect)	
	625(576)/25i, 525(480)/29i
	720 50/59p 1080 50/59i
	1080 50/59p level A/B
	1080 25/29psf
Analog Video inputs	1 x Composite; PAL, NTSC, NTSC-J, PAL-M, PAL-N, N4.4, SECAM with 12-bit resolution
Analog Reference	1 x Analog Reference with passive loop-through Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level)
	SD bi-level – RS170A
	HD Tri-level – SMPTE 240M, 274M

Map of input to output standards			Output							
			25		50		29.97		59.94	
			576i	1080i	720P	1080P	480i	1080i	720P	1080P
Input	25	576i	✔	✔	✔	✔	✕	✕	✕	✕
		1080i	✔	✔	✔	✔	✕	✕	✕	✕
	50	720P	✔	✔	✔	✔	✕	✕	✕	✕
		1080P	✔	✔	✔	✔	✕	✕	✕	✕
	29.97	480i	✕	✕	✕	✕	✔	✔	✔	✔
		1080i	✕	✕	✕	✕	✔	✔	✔	✔
	59.94	720P	✕	✕	✕	✕	✔	✔	✔	✔
		1080P	✕	✕	✕	✕	✔	✔	✔	✔

Format Conversion I/O Grid

Technical Specification cont…

Fiber Signal Input

Inputs	Up to 2*
Optical	3 GBit/s HD-SDI, 1.485 GBit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format	LC singlemode
Standard	SMPTE 297-2006

Video Signal Outputs

SDI Outputs	up to 4
Output standard	625(576)/25i, 525(480)/29i
	720 50/59p, 1080 50/59i
	1080 50/59p level A/B
Analog Video Outputs	1 x Composite; PAL, NTSC, NTSC-J, PAL-M, PAL-N with 12-bit resolution

Fiber Signal Output

Optical	3 GBit/s HD-SDI, 1.485 Gbit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format	LC singlemode
Conforms to	SMPTE 297-2006
Outputs	Up to 2*

*Note: Optical I/O and control dependant on type of SFP module fitted

Audio Signal Inputs/Outputs

AES/EBU I/O (software selectable)	
	8 Unbalanced (BNC)
	8 Balanced (25D Type)
Balanced analog audio inputs	
	4 channels (Screw terminal connectors (ST))
Balanced analog audio outputs	
	4 channels (ST)

Control Interface

GPI	2 x Closing contact I/O interface (ST) (rear panel dependant)

Conversion Functions

Modes	Up, down, and cross conversion
	Aspect ratio conversion synchronization
Conversion processing	Still process: Detects still images and applies an aperture with full (progressive) vertical frequency response
	Enhanced still: Adds field motion detection to still process. Prevents artifacts on moving repetitive patterns
Aspect ratio conversion (manual or auto)	AFD (SMPTE 2016), VI (RP186), WSS (L23)
SD input format	Normal 4:3, Anamorphic 16:9, Letterbox 14:9, Letterbox 16:9
SD output format	Normal 4:3, Anamorphic 16:9, Letterbox 14:9, Letterbox 16:9
Metadata	Closed caption CE608 <> CE708
	Timecode conversions
	Teletext subtitles WST/RDD8 conversion

Audio Functions

Embedded audio	16-channel embedded audio processing PCM audio processing includes channel level gain and delay compensation, as well as channel level routing with L/R swap and phase invert feature
	Non-PCM processing features pair level routing and delay compensation. Dolby E data is passed with a delay to match the video and with co-timed audio frame drop or repeat
Embedded audio	Enable/Blank

Analog Audio

Output Level adjustment	+12 dB to +24 dB (+18)
Input Headroom	+12 dB to +24 dB (+18)

Audio Routing

Processed pair 1-8	Disembed 1-8, AES 1-8, Analog 1-2
Embedded Output Channels 1-16	
	Processed pair 1-8, Tone, Silence
AES 1-8	Processed pair 1-8, Tone, Silence
Analog 1-2	Processed pair 1-8, Tone, Silence

Processed Audio Control

Invert Phase	Channels 1-16
Pair 1 to 8 Gain L/R	+18 dB to -18 dB in 0.1 dB steps
Pair 1-8 Manual Delay	-40 to +200 ms in 1 ms steps
Global Manual Delay	-40 to +200 ms in 1 ms steps

Dolby-E

Dolby-E Auto	
Alignment	+/- 10 line offset in 1 line steps

Tone

Frequency	100Hz to 10kHz in 100Hz steps

Processing Functions

Ancillary Data	Pass/Strip
Freeze	On/Off
Legalizer	On/Off
Genlock	Reference lock (Ext, Int A, Int B), Input lock (same format), Free run
Memories	16 user memories
Pattern	Off, Black, Ramp, Bars
Caption	On/Off, Scrolling
Edit Caption	19 characters available

Proc amp

Black Level:	+100 to -100 mV (0) in 0.8 mV steps
Contrast:	-6 dB to +6 dB (0) in 0.2 dB steps
Saturation:	-6 dB to +6 dB (0) in 0.2 dB steps
Y Gamma:	0.4 to 1.7 (1) in 0.1 steps
YC Offset:	-20 to 20 (0) in 2 Luma pixel steps
	Note: Defaults shown in brackets

Enhancement

Nonlinear Enhancer	Frequency Band Selection: Low, Med, High
	Four preset enhancement modes: Low, Med, High, Super
	Manual enhancement mode with H Gain and H Noise rejection levels

Conversion Aperture

Vertical	Frequency Band Selection: Low, Med, High
	Five vertical preset enhancement levels: Soft 2, Soft 1, Normal, Sharp 1, Sharp 2
Horizontal	Five horizontal preset sharpness levels: Low 2, Low 1, Normal, High 1, High 2
	Five horizontal preset detail levels: Soft 2, Soft 1, Normal, Sharp 1, Sharp 2

Other Controls

GPI input Low/High Select	
	Black, Freeze, Pattern, User Memories 1-16
GPI Output Source	Black, Freeze, Pattern
User Memories	16 x Save, Recall, Rename
Memory Naming	User configurable naming of memories 1 – 16
RollTrack Index	Up to 50 RollTrack destinations

IQUDC34   3G/HD/SD-SDI Universal Up, Down and Cross Converter

Technical Specification cont…

Optical Logging*	Tx Laser Bias High Warning
	Tx Power Low Warning
	Tx Power High Warning
	Input 1 (2) Rx Power High Warning
	Input 1 (2) Rx Power Low Warning
	Input 1 (2) Rx Power Measurement
RollTrack Sources	Unused, Input Present (1&2, CVBS, Fiber 1 & 2) , Input Loss (1&2, CVBS, Fiber 1 & 2), Reference OK & Loss
Information Window	Video Input Status, Reference Status
Factory Default	Resets all module settings to factory specified default values and clears memories
Default Settings	Resets all module settings to factory specified defaults but does not clear memories
Module Information	Reports following module information: Software version, Serial number, Rear Panel ID, Frame Slot , Licensed options

Specifications

Electrical	3Gbit/s SDI, SMPTE 424M 1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C
Connector / Format	BNC/ 75ohm panel jack on standard IQ connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s) >-10dB (3Gbit/s)
Output Jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz), 3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)
Reference Source	External – HD Tri-Level / SD Bi-level / Input Video syncs
Electrical	Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level) SD bi-level – RS170A HD Tr-level – SMPTE 240M and 274M
Connector / Format	BNC/75 ohm panel jack on standard IQ connector panel
Embedded audio handling	
	HD - 24-bit synchronous 48 kHz to SMPTE 299M, SD - 20-bit synchronous 48 kHz to SMPTE 272M-A

Digital Audio Input (Unbalanced)

Connector/Format	BNC
Sample Frequency	PCM: 25 – 96 kHz; Non-PCM: 48 kHz
Input Cable Length	>500 m of RG59 cable
Impedance	75 Ohms
Standard	AES3id

Digital Audio Input (Balanced)

Connector/Format	25Way-D
Sample Frequency	PCM: 25 – 96 kHz; Non-PCM: 48 kHz
Input Cable Length	>150 m of AES3 cable
Impedance	110 Ohms
Standard	AES3

Digital Audio Output (Unbalanced)

Connector/Format	BNC
Level	1 V p-p typical into 75 Ohms
Standard	AES3id

Digital Audio Output (Balanced)

Connector/Format	25Way-D
Level	3 V p-p typical into 110 Ohms
Standard	AES3

Analog Audio Input (Balanced)

Connector/Format	Screw Terminals (ST)
Analog Input Impedance	10 k Ohms
Frequency Response	20 Hz to 20 kHz (+/- 0.1 dB)
Distortion (THD+N)	Better than -97 dB at -1 dBFS / 1 kHz
Headroom	Adjustable +12 dBu to +24 dBu in 1dB steps

Analog Audio Outputs (Balanced)

Connector/Format	Screw Terminals (ST)
Frequency Response	20 Hz to 20 kHz (+/- 0.1 dB)
Output Level	Adjustable +12 dBu to +24 dBu in 1dB steps
Output Impedance	~25 Ohms
THD+N	Better than -97 dB at +23 dBu / 1 kHz

Optical 1310 nm Tx

Wavelength	1310 nm
Spectral width (FWHM)	>1.5 nm (typ)
Output power	0 to -5 dBm typical (-2 dBm typical)
Extinction ratio	>7.5:1 (typ)
Link distance	Up to 30 Km @ 270Mbit/s
	Up to 21 Km @ 1.5Gbit/s
	Up to 10 Km @ 3Gbit/s

Optical 1550 nm Tx

Wavelength	1550 nm
Spectral width (FWHM)	1 nm
Output power	4 to 0 dBm
Extinction ratio	>7.5:1 (typ)
Link distance	Up to 50 Km @ 270Mbit/s, 1.5Gbit/s or 3Gbit/s

Optical Rx

Input wavelength range	Min. 1260 nm, Max. 1620 nm
Optical power input range	> -0 dBm, < -20 dBm
Link distance	Up to 30 Km

Power Consumption

Module Power Consumption with Fiber	
	21.5W (A frames)
	21.5PR (B Frames)

IQUDC34
3G/HD/SD-SDI Universal Up, Down and Cross Converter

Ordering Information

Order codes for IQH3B enclosures

IQUDC3401-3B3
Universal up, down and cross converter. 2 SDI inputs, 1 composite input, 4 analog audio inputs, External & Frame reference inputs, 2 SDI outputs, 1 composite output, 8 unbalanced AES inputs or outputs, 4 analog audio outputs, 2 x GPI

IQUDC3402-3B3
Universal up, down and cross converter. 2 SDI inputs, 1 composite input, 4 analog audio inputs, External & Frame reference inputs, 4 SDI outputs, 1 composite output, 4 unbalanced AES inputs or outputs, 4 analog audio outputs, 2 x GPI, 1 Fiber SFP cage. Includes rear but not SFP module

IQUDC3403-3B3
Universal up, down and cross converter. 2 SDI inputs, 1 composite input, 4 analog audio inputs, External & Frame reference inputs, 4 SDI outputs, 1 composite output, 8 balanced AES inputs or outputs, 4 analog audio outputs, 2 x GPI, 1 Fiber SFP cage. Includes rear but not SFP module

Order codes for IQH3A/1A enclosures

IQUDC3401-3A3
Universal up, down and cross converter. 2 SDI inputs, 1 composite input, 4 analog audio inputs, reference loop, 2 SDI outputs, 1 composite output, 8 unbalanced AES inputs or outputs, 4 analog audio outputs, 2 x GPI

IQUDC3402-3A3
Universal up, down and cross converter. 2 SDI inputs, 1 composite input, 4 analog audio inputs, reference loop, 4 SDI outputs, 1 composite output, 4 unbalanced AES inputs or outputs, 4 analog audio outputs, 2 x GPI, 1 Fiber SFP cage. Includes rear but not SFP module

IQUDC3403-3A3
Universal up, down and cross converter. 2 SDI inputs, 1 composite input, 4 analog audio inputs, reference loop, 4 SDI outputs, 1 composite output, 8 balanced AES inputs or outputs, 4 analog audio outputs, 2 x GPI, 1 Fiber SFP cage. Includes rear but not SFP module

For more details on enclosure types please refer to datasheet IQH3B.

Software Options

IQOPTM-NR - Software option to add noise reduction

IQOPTM-SBK - Software option to add side-bar keying

IQOPTM-MC - Software option to upgrade with motion compensated frame rate conversion

IQOPTM-LC - Software option to upgrade with Linear frame rate conversion

SFP options

FC1-13T1 - Single 1310nm fiber Tx

FC1-13T2 - Dual 1310nm fiber Tx

FC1-15T1 - Single 1550nm fiber Tx

FC1-15T2 - Dual 1550nm fiber Tx

FC1-R1 - Single fiber Rx

FC1-R2 - Dual fiber Rx

FC1-13TR - Fiber transceiver 1310nmTx/Rx

FC1-HDBT2 - HD-BNC Dual Tx

FC1-HDBR2 - HD-BNC Dual Rx

Fiber CWDM Tx - Wavelengths available on request

Note: SFP type must be ordered in addition to the module.

IQQMD00

Quad-link-SDI Down Converter for Ultra HD Signals

The IQQMD00 provides conversion for Quad-link Ultra HD SDI inputs to SDI outputs in 1080p, 1080i, 720p or SD formats. This allows Ultra High Definition signals to be integrated into existing HD/SD-SDI workflows and monitored on standard 1920 x 1080 displays removing the need for expensive Ultra HD specific equipment and monitors. Drawing on SAMs's extensive experience in conversion technology the IQQMD00 uses high quality scaling and filtering technology to downconvert and align the quad-link input to provide a clean and sharp HD/SD output, ideal for monitoring and other signal distribution applications.

Features

- Custom scaling and filtering to provide seamless reconstruction of a quad-link UHD input for HD single link applications
- Standards supported:
  - 3G-SDI to SMPTE 424M/425M level A compatible
  - HD-SDI to SMPTE292M/274M/296M
  - SD-SDI to SMPTE259M-C
  - 4K-UHD Quad Link to both Quadrant based and SMPTE 2036 pixel interleave
- SFP cage enables output over HDMI, fiber or additional SDI via HD-BNC
- User definable caption generator for image identification
- 16 x user memories, save/recall/rename
- RollCall control and monitoring compatible
- Input loss detection – default output of black

Why should you choose this module?

- Down convert Ultra HD signals to 1080p, 720p, 1080i, 625/525 formats for monitoring on standard displays, or for routing into a standard HD/SD workflow
- Full RollCall and SNMP compatibility allows easy integration with SAM, or third party, network management systems providing an all-inclusive monitoring and control solution

Inputs & Outputs
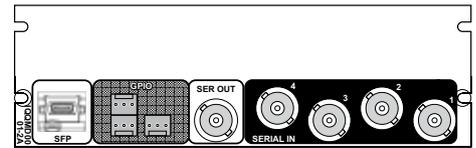
IQQMD0000-2B3, IQQMD0001-2A3

For more details on enclosure types please refer to datasheet IQH3B.
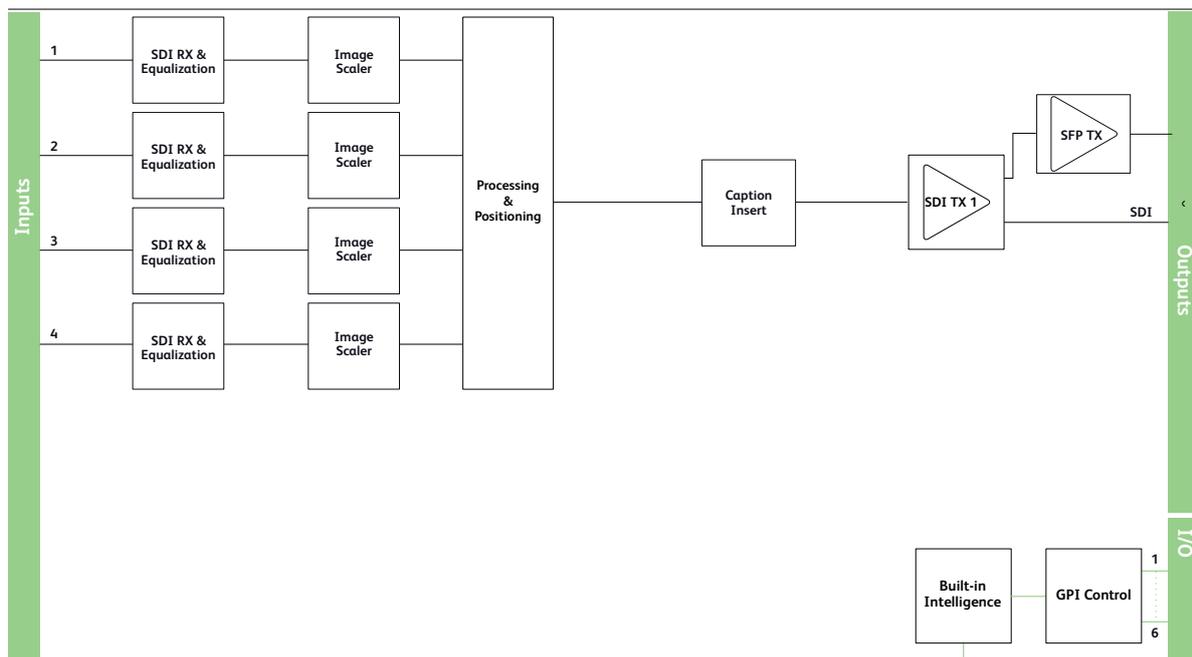
Block Diagram for IQQMD0000–2B3

IQQMD00

Quad-link-SDI Down Converter for Ultra HD Signals

Ordering Information

Order codes for IQH3B enclosures

IQQMD0000-2B3
3G/HD/SD-SDI Quad-link Monitoring downconverter. 4 SDI inputs, 1 SDI output, up to 2 SFP outputs, 6 GPIs.

Order codes for IQH3A/1A enclosures

IQQMD0001-2A3
3G/HD/SD-SDI Quad-link Monitoring downconverter. 4 SDI inputs, 1 SDI output, up to 2 SFP outputs, 6 GPIs.

For more details on enclosure types please refer to datasheet IQH3B

Fiber SFP options

FC1-13T1 - Single 1310nm Tx

FC1-13T2 - Dual 1310nm Tx

FC1-15T1 - Single 1550nm Tx

FC1-15T2 - Dual 1550nm Tx

FC1-HDBT2 - HD-BNC Dual Tx

FC1-HDMI2 - HDMI Tx with 2m cable

CWDM Tx - Wavelengths available on request

Note: Fiber SFP type must be ordered in addition to the module.

IQDNC30

3G/HD-SDI Down Converter with Frame Synchronizer

The IQDNC30 provides multi-rate down conversion for 3Gbps SDI, and HD-SDI digital video signals. Using high quality motion adaptive de-interlacing and flexible scaling technology the IQDNC30 is a broadcast quality conversion module able to handle applications such as downconversion to maintain SD output feeds.

IQDNC30 includes a frame synchronizer, capable of referencing to a SD bi-level or HD tri-level reference and a variable aspect ratio converter with frame accurate reading and writing of WSS, VI and 2016 AFD signalling. Audio handling includes audio channel routing, delay adjustment and level controls. Video metadata such as timecode, closed captions and teletext captions can also be passed through the module or processed according to the required output standard.

To allow the module to be further tailored to system requirements software options are available to provide noise reduction and side-bar keying, and versions are available with SFP cages enabling fiber conversion, or additional electrical outputs on HD-BNCs.

Features

- High quality down conversion for SDI video inputs including conversion aperture control
- Frame synchronizer with HD Tri-sync / SD Bi-Level Reference Input and input loss detection
- Aspect ratio conversion including preset ARC maps relative to conversion modes, selectable pan, tilt, aspect, size, and output crop adjustments
- Aspect ratio control (signalling reading and writing) using ETSI WSS and AFD Video Index signaling (RP186, SMPTE 2016)
- Video proc. features include: gain, offset, hue, horizontal and vertical picture enhancement, and RGB gamut legalization
- Metadata support - Closed caption passing or processing for CEA608/708 and OP42/OP47/WST captions, VITC or SMPTE12M timecode translation, and Ancillary data bridge for 7 blocks of ANC data passing
- In-built test pattern generator and 19 character scrolling caption generator
- Additional processing options including; noise reduction (adaptive spatial and recursive), side-bar keying and linear frame rate conversion
- Processing for 16 channels of embedded audio present on the incoming SDI stream with no disturbance during video synchronizer frame wraps or drops
- Audio proc. features including: channel routing, gain, invert, delay and tone generator
- Non-PCM processing features pair level routing and delay compensation. Dolby-E data is passed with a delay to match the video and with co-timed audio frame drop or repeat
- Dolby E support – Detection of PCM/non-PCM audio to SMPTE 337/338M, pair routing and Dolby E header re-alignment
- Integrated Fiber I/O support via SFP module
- 16 x user memories and 2 GPI/O ports
- RollCall control and monitoring compatible with standard logging and reporting features
- RollTrack triggers available for detected module states including: Input loss and reference loss

Why should you choose this module?

- High quality down conversion and frame synchronization allows multi-format working and provides integration with existing SD workflows
- Comprehensive audio processing functions allow complete control over embedded audio signals for applications where channel routing, gain control or delay is required
- Full RollCall and SNMP compatibility allows easy integration with SAM or third party network management systems providing an all-inclusive monitoring and control solution
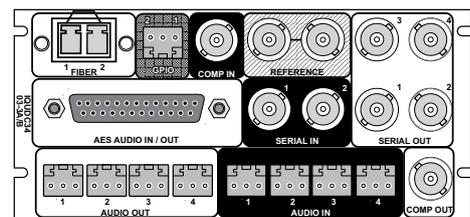
Inputs & Outputs - IQH3B enclosures

IQDNC3001-1B3

IQDNC3003-1B3

Inputs & Outputs - IQH3A/1A/3B enclosures
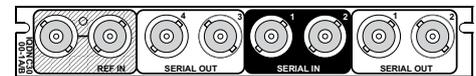
IQDNC3000-1A3, IQDNC3000-1B3

IQDNC3002-1A3, IQDNC3002-1B3

For more details on enclosure types please refer to datasheet IQH3B.

IQDNC30

3G/HD-SDI Down Converter with Frame Synchronizer

Frame References
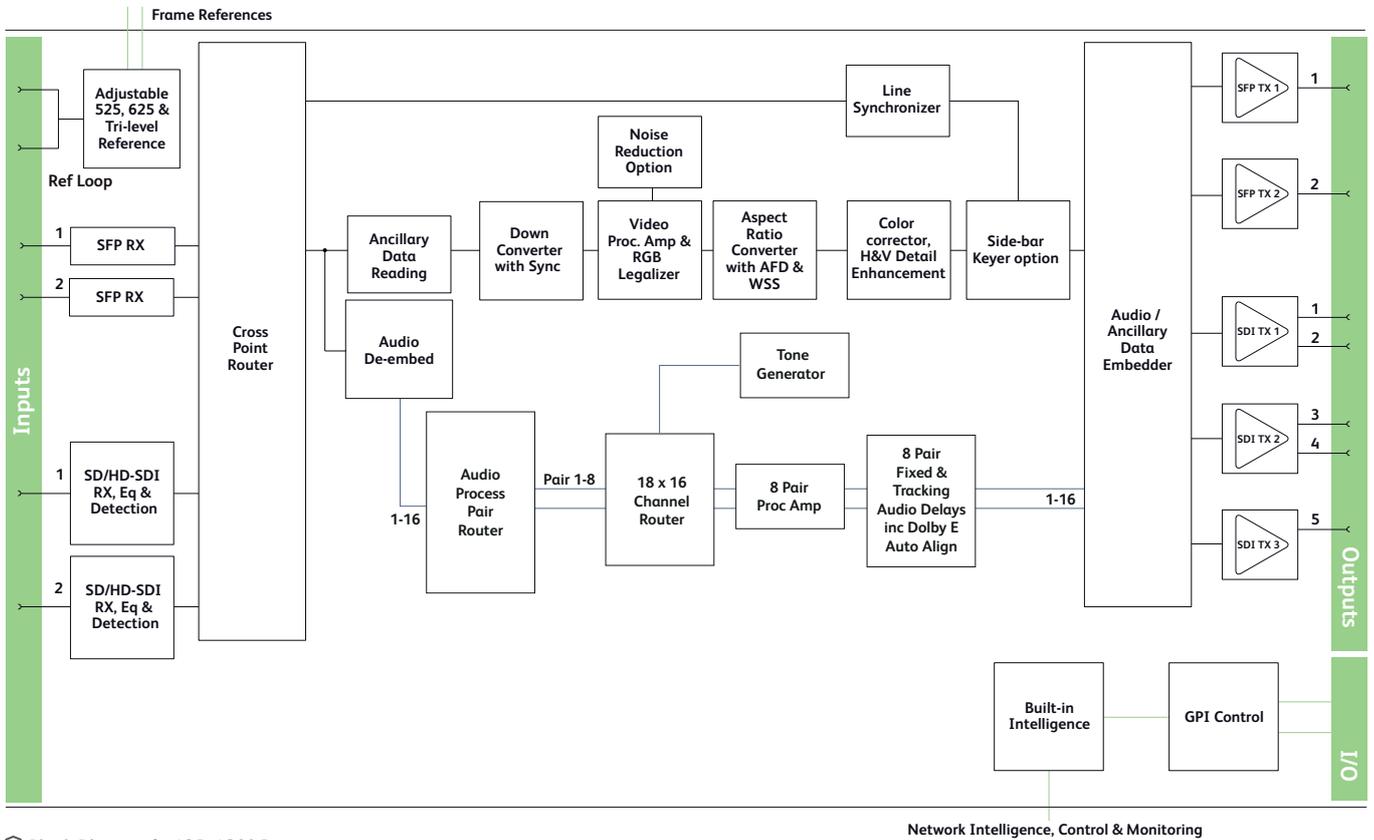
Block Diagram for IQDNC30 Range

Technical Specification

Inputs & Outputs

Video Signal Inputs

SDI Inputs	2x
Input Cable Length	Up to 80m Belden 1694A @ 3 Gbit/s
	Up to 120m Belden 1694A @ 1.5 Gbit/s
	100m typical (with output set to 1080p rates),
	Belden 1694A @ 270 Mbit/s
Input Standard (auto detect)	
	625(576)/25i, 525(480)/29i
	720 50/59p1080 50/59i
	1080 50/59p level A/B
	1080 25/29psf
Analog Reference	1 x Analog Reference with passive loop-through
	Black (HD tri-level and SD bi-level) and Black
	Burst (SD bi-level)
	SD bi-level – RS170A
	HD Tri-level – SMPTE 240M, 274M

Fiber Signal Input

Inputs	Up to 2
Optical	3 GBit/s HD-SDI, 1.485 GBit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format	LC singlemode
Standard	SMPTE 297-2006

Map of input to output standards		Output							
		25		50		29.97		59.94	
		576i	1080i	720P	1080P	480i	1080i	720P	1080P
Input	25 576i	✔	✕	✕	✕	✕	✕	✕	✕
	25 1080i	✔	✕	✕	✕	✕	✕	✕	✕
	50 720P	✔	✕	✕	✕	✕	✕	✕	✕
	50 1080P	✔	✕	✕	✕	✕	✕	✕	✕
	29.97 480i	✕	✕	✕	✕	✔	✕	✕	✕
	29.97 1080i	✕	✕	✕	✕	✔	✕	✕	✕
	59.94 720P	✕	✕	✕	✕	✔	✕	✕	✕
	59.94 1080P	✕	✕	✕	✕	✔	✕	✕	✕

Format Conversion I/O Grid

IQDNC30   3G/HD-SDI Down Converter with Frame Synchronizer

Technical Specification cont…

Video Signal Outputs

SDI Outputs	up to 5
Output standard	625(576)/25i, 525(480)/29i

Fiber Signal Output

Optical	270 Mbit/s SD-SDI
Connector / Format	LC singlemode
Conforms to	SMPTE 297-2006
Outputs	Up to 2

*Note: Optical I/O and control dependant on type of SFP module fitted

Control Interface

GPI	2 x Closing contact I/O interface (ST) (rear panel dependant)

Conversion Functions

Modes	Down conversion
	Aspect ratio conversion synchronization
Conversion processing	Still process: Detects still images and applies an aperture with full (progressive) vertical frequency response
	Enhanced still: Adds field motion detection to still process. Prevents artifacts on moving repetitive patterns
Aspect ratio conversion (manual or auto)	AFD (SMPTE 2016), VI (RP186), WSS (L23)
SD input format	Normal 4:3, Anamorphic 16:9, Letterbox 14:9, Letterbox 16:9
SD output format	Normal 4:3, Anamorphic 16:9, Letterbox 14:9, Letterbox 16:9
Metadata	Closed caption CE608 <> CE708
	Timecode conversions
	Teletext subtitles WST/RDD8 conversion

Audio Functions

Embedded audio	16-channel embedded audio processing
	PCM audio processing includes channel level gain and delay compensation, as well as channel level routing with L/R swap and phase invert feature
	Non-PCM processing features pair level routing and delay compensation. Dolby E data is passed with a delay to match the video and with co-timed audio frame drop or repeat
Embedded audio	Enable/Blank

Embedded Audio Routing

Processed pair 1-8	Disembed 1-8
Output Channels 1-16	Processed pair 1-8, Tone, Silence

Processed Audio Control

Invert Phase	Channels 1-16
Pair 1 to 8 Gain L/R	+18 dB to -18 dB in 0.1 dB steps
Pair 1-8 Manual Delay	-40 to +200 ms in 1 ms steps
Global Manual Delay	-40 to +200 ms in 1 ms steps

Dolby-E

Dolby-E Auto

Alignment	+/- 10 line offset in 1 line steps

Tone

Frequency	100Hz to 10kHz in 100Hz steps

Processing Functions

Ancillary Data	Pass/Strip
Freeze	On/Off
Legalizer	On/Off
Genlock	Reference lock, Input lock (same format), Free run
Pattern	Off, Black, Ramp, Bars
Caption	On/Off, Scrolling
Edit Caption	19 characters available

Proc amp	
Black Level:	+100 to -100 mV (0) in 0.8 mV steps
Contrast:	-6 dB to +6 dB (0) in 0.2 dB steps
Saturation:	-6 dB to +6 dB (0) in 0.2 dB steps
Y Gamma:	0.4 to 1.7 (1) in 0.1 steps
YC Offset:	-20 to 20 (0) in 2 Luma pixel steps
	Note: Defaults shown in brackets

Enhancement

Nonlinear Enhancer	Frequency Band Selection: Low, Med, High
	Four preset enhancement modes: Low, Med, High, Super
	Manual enhancement mode with H Gain and H Noise rejection levels

Conversion Aperture

Vertical	Frequency Band Selection: Low, Med, High
	Five vertical preset enhancement levels: Soft 2, Soft 1, Normal, Sharp 1, Sharp 2
Horizontal	Five horizontal preset sharpness levels: Low 2, Low 1, Normal, High 1, High 2
	Five horizontal preset detail levels: Soft 2, Soft 1, Normal, Sharp 1, Sharp 2

Other Controls

GPI input Low/High Select

	Black, Freeze, Pattern, User Memories 1-16
GPI Output Source	Black, Freeze, Pattern
User Memories	16 x Save, Recall, Rename
Memory Naming	User configurable naming of memories 1 – 16
RollTrack Index	Up to 50 RollTrack destinations
Optical Logging*	Tx Laser Bias High Warning
	Tx Power Low Warning
	Tx Power High Warning
Laser Wavelength	Input 1 (2) Rx Power High Warning
	Input 1 (2) Rx Power Low Warning
	Input 1 (2) Rx Power Measurement
RollTrack Sources	Unused, Input Present (1&2, Fiber 1 & 2) , Input Loss (1&2, Fiber 1 & 2), Reference OK & Loss
Information Window	Video Input Status, Reference Status
Factory Default	Resets all module settings to factory specified default values and clears memories
Default Settings	Resets all module settings to factory specified defaults but does not clear memories
Module Information	Reports following module information: Software version, Serial number, Rear Panel ID, Frame Slot

IQDNC30 — 3G/HD-SDI Down Converter with Frame Synchronizer

Specifications

Electrical	3Gbit/s SDI, SMPTE 424M 1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C
Connector / Format	BNC/ 75ohm panel jack on standard IQ connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s) >-10dB (3Gbit/s)
Output Jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz)
Reference Source	External – HD Tri-Level / SD Bi-level / Input Video syncs
Electrical	Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level) SD bi-level – RS170A HD Tr-level – SMPTE 240M and 274M
Connector / Format	BNC/75 ohm panel jack on standard IQ connector panel

Optical 1310 nm Tx

Wavelength	1310 nm
Spectral width (FWHM)	>1.5 nm (typ)
Output power	0 to -5 dBm typical (-2 dBm typical)
Extinction ratio	>7.5:1 (typ)

Optical Rx

Input wavelength range	Min. 1260 nm, Max. 1620 nm
Optical power input range	> -0 dBm, < -20 dBm
Link distance	Up to 30 Km

Embedded audio handling
HD - 24-bit synchronous 48 kHz to SMPTE 299M,
SD - 20-bit synchronous 48 kHz to SMPTE 272M-A

Power Consumption

Module Power Consumption with Fiber
13W (A frames)
13PR (B frames)

Ordering Information

Order codes for IQH3B enclosures

IQDNC3000-1B3
Down converter . 2 SDI inputs, external reference loop & enclosure reference inputs, 4 SDI outputs

IQDNC3001-1B3
Down converter . 2 SDI inputs, 5 SDI outputs, 2 GPI/Os, reference inputs from enclosure

IQDNC3002-1B3
Down converter . 2 SDI inputs, external reference input & enclosure reference inputs, 3 SDI outputs, single SFP cage

IQDNC3003-1B3
Down converter . 2 SDI inputs, 4 SDI outputs, single SFP cage, reference inputs from enclosure

Order codes for IQH3A/1A enclosures

IQDNC3000-1A3
Down converter . 2 SDI inputs, reference loop, 4 SDI outputs

IQDNC3002-1A3
Down converter . 2 SDI inputs, reference input, 3 SDI outputs, single SFP cage

For more details on enclosure types please refer to datasheet IQH3B.

Software Options

IQOPTM-NR - Software option to add noise reduction

IQOPTM-SBK - Software option to add side-bar keying

IQOPTM-UDC - Software option for upgrade to up, down and cross conversion

IQOPTM-LC - Software option to upgrade with Linear frame rate conversion

SFP options

FC1-13T1 - Single 1310nm fiber Tx

FC1-13T2 - Dual 1310nm fiber Tx

FC1-15T1 - Single 1550nm fiber Tx

FC1-15T2 - Dual 1550nm fiber Tx

FC1-R1 - Single fiber Rx

FC1-R2 - Dual fiber Rx

FC1-13TR - Fiber transceiver 1310nmTx/Rx

FC1-HDBT2 - HD-BNC Dual Tx

FC1-HDBR2 - HD-BNC Dual Rx

Fiber CWDM Tx - Wavelengths available on request

Note: SFP type must be ordered in addition to the module.

IQDNC00

3G/HD/SD-SDI Down Converter with Synchronizer

The IQDNC00 provides down conversion for 3Gbps SDI, and HD-SDI digital video signals. Using high quality motion adaptive de-interlacing and flexible scaling technology the IQDNC00 is a broadcast quality conversion module combining a large amount video and audio processing features to provide a highly integrated space efficient package.

IQDNC00 includes a frame synchronizer, capable of referencing to a SD bi-level or HD tri-level reference and a variable aspect ratio converter with reading and writing of WSS, VI and 2016 AFD signalling. Audio is also comprehensively handled with audio channel routing, delay adjustment and level controls. Video metadata such as timecode, SMPTE2020 Dolby, closed captions and teletext captions can also be passed through the module or processed according to the required output standard.

To allow the module to be further tailored to system requirements a series of hardware and software options is available to provide color correction for video, and advanced audio processing features such as Dolby E/D encoding or decoding, stereo to 5.1 upmixing and loudness processing using industry recognised technology from Linear Acoustic.

Features

- High quality downconversion for SDI video inputs
- Dual SDI inputs with auto switching on pre-defined input errors
- Frame synchronizer with HD Tri-sync / SD Bi-Level Reference Input, input loss detection and video delay up to 21 frames at 1080, 44 frames at 720 and 122 frames at 625
- Aspect ratio conversion including 9 preset ARC maps, up to 22 ARC memories, selectable border color and pan, tilt, size, and input crop adjustments
- Aspect ratio control (signalling reading and writing) using ETSI WSS and AFD Video Index signaling (RP186, SMPTE 2016)
- Video proc. features include: gain, offset, hue, horizontal picture enhancement, RGB gamut legalization and noise reduction
- Metadata support - Closed caption passing or processing for CEA608/708 and OP42/OP47/WST captions, and VITC or RP188 timecode translation
- In-built test pattern generator and 2 x 16 character caption generator
- Processed and reclocked signal paths allow the selected SDI input to be converted or passed through at the same format
- Processing for 16 channels of embedded audio present on the incoming SDI stream with no disturbance during video synchronizer frame wraps or drops
- Audio proc. features including: channel routing, gain, invert, fixed and tracking delays, mixing, synchronizer wrap/drop processing and eight internal tone generators
- Dolby E support – Optional Dolby E/D decoding or encoding with both RS485 and SMPTE2020 metadata support, plus detection of PCM/non-PCM audio to SMPTE 337/338M, pair routing and Dolby E header alignment
- Advanced audio processing options from Linear Acoustic for stereo upmixing to 5.1 surround sound and loudness level measurement and control
- 16 x user memories and 2 GPI/O ports
- RollCall control and monitoring compatible with standard logging and reporting features
- RollTrack triggers available for detected module states including: PCM/non-PCM audio, input loss/freeze and reference loss

Order codes

IQDNC0054-2A3, IQDNC0054-2B3
3G/HD/SD-SDI Downconverter. 2 SDI inputs, reference loop, 4 selectable main or bypassed SDI outputs, 2 GPI/Os

Hardware and Software Options

IQOPTA-DBD Hardware option to add a single Dolby E/D decoder

IQOPTA-DBE-D Hardware option to add a single Dolby D encoder

IQOPTA-DBE-E Hardware option to add a single Dolby E encoder

IQOPTA-LOUD51 Software option to add Linear Accoustic AeroMax 5.1 loudness processing

IQOPTA-LOUDA2 Software option to add first channel of Linear Accoustic AeroMax 2.0 loudness processing

IQOPTA-LOUDB2 Software option to add second channel of Linear Accoustic AeroMax 2.0 loudness processing

IQOPTA-UPMIX Software option to add Linear Acoustic UPMAX stereo to 5.1 upmixing

IQOPTA-CC Software option to add color correction

For more details on enclosure types please refer to Frames & Hardware section.

IQDNC00

3G/HD/SD-SDI Down Converter with Synchronizer

Why should you choose this module?

- High quality video conversion and frame synchronization allows fully flexible multi-format working and provides a future proof migration path as digital workflows evolve
- Comprehensive audio processing functions allow complete control over embedded audio signals for applications where channel routing or mixing is required
- Full RollCall and SNMP compatibility allows easy integration with SAM or third party network management systems providing an all-inclusive monitoring and control solution

Map of input to output standards		Output							
		25		50		29.97		59.94	
		576i	1080i	720P	1080P	480i	1080i	720P	1080P
25	576i	✔	✕	✕	✕	✕	✕	✕	✕
25	1080i	✔	✔	✕	✕	✕	✕	✕	✕
50	720P	✔	✕	✔	✕	✕	✕	✕	✕
50	1080P	✔	✕	✕	✔	✕	✕	✕	✕
29.97	480i	✕	✕	✕	✕	✔	✕	✕	✕
29.97	1080i	✕	✕	✕	✕	✔	✔	✕	✕
59.94	720P	✕	✕	✕	✕	✔	✕	✔	✕
59.94	1080P	✕	✕	✕	✕	✔	✕	✕	✔

⌒ Format Conversion I/O Grid

⌒ **Block Diagram** for IQDNC0054-2A3

Technical Specification

Inputs & Outputs

Video Signal Inputs

SDI Inputs	2x
Input Cable Length	Up to 80m Belden 1694A @ 3 Gbit/s
	Up to 180m Belden 1694A @ 1.5 Gbit/s
	>350m Belden 1694A @ 270 Mbit/s

Analog Reference	1 x Analog Reference with passive loop-through Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level)
	SD bi-level – RS170A
	HD Tri-level – SMPTE 240M, 274M and 296M

Video Signal Outputs

SDI Outputs	x 4

Control Interface

GPI	2 x Closing contact I/O interface (ST)

IQDNC00

3G/HD/SD-SDI Down Converter with Synchronizer

Technical Specification cont...

Controls

Genlock & Video Delay

Genlock Mode	Free-run, Lock to Reference, Lock to input
Genlock H-Phase	± 1 H in pixel clock steps
Genlock V-Phase	± 1 F in 1 line steps
Video H-Delay	0 – 1 Line in pixel clock steps
Video V-Delay	0 – 1 Frame in 1 line steps
Video Delay Frames	0 – 26 frames @ 1080 59p
	0 – 21 frames @ 1080 50p
	0 – 26 frames @ 1080 29i
	0 – 21 frames @ 1080 25i
	0 – 54 frames @ 720 59p
	0 – 44 frames @ 720 50p
	0 – 147 frames @ 525 29i
	0 – 122 frames @ 625 25i
Dolby E auto line select	Std, user select
Dolby E auto align	On/Off

Video Controls

Input Select	Input 1, Input 2
Input Backup Enable	On/Off
Priority	None, Master (input 1), Backup (input 2)
Change-over Parameters	Carrier Loss, Standard mismatch, CRC and ANC Error, Embedded audio loss
Change-over Time Delay	0s to 10s
Reversion Delay	0 to 100s
Down Conversion	1080p, 1080i, 720p, SD
Default Video Output Type	Pattern, Freeze, Black
Pattern Select	100% Color Bars, 75% Color Bars, SMPTE Bars, Tartan Bars, Black, Pluge, Ramp, H Sweep, Pulse & Bar, Multi-burst
Output Routing	Processed, Reclocked Bypass
Output Mode	Input, Black, Freeze, Pattern
Colorimetry	Auto, None, Rec601, BT709
H Enhance Frequency	Off, Low, Medium, High
H Enhance Presets	Low, Medium, High, Super, Custom
Borders	R/G/B 0-255 in steps of 1
Border Adjust	Left, Right, Top, Bottom
RGB Legalizer	700 mV, 721 mV, 735 mV, 746 mV
Black Level	±200 mV in steps of 1 mV
Hue Adjust	±180° in steps of 1°
Master Video Gain	+6 to -120 dB
Y-Gain	+6 to -120 dB
Cb/Cr Gain	+6 to -120 dB
Caption Enable	On/Off
Edit Caption	16 characters
Caption Adjust	X-Y Size & Position
Metadata support	Closed Captions CC608-708 (compatibility bytes), WST-OP47, VITC-ATC

Aspect Ratio Conversion

Signalling type	WSS (ETSI or AFD), VI (SMPTE or AFD), SMPTE 2016
Select from 9 standard preset conversions:	
	Full Frame
	Box 16:9 top > 16:9
	4:3 box 14:9 top > 16:9
	Box 16:9 > 16:9
	Box 4:3 > 4:3
	4:3 > box 16:9
	16:9 > box 4:3
	4:3 box 14:9 > 16:9
	16:9 box 14:9 > 4:3
Display Memories	32 User configurable ARC display memories
Size	60% to 150% in 0.1% steps.
Aspect	60% to 200% in 0.1% steps.
Pan / Tilt	±75% in 0.1% steps
Input crop	Left / Right / Top / Bottom

Audio Controls

Audio In - Embedded

Audio In-Disembed	Pairs 1-8
Channel 1 – 16 Mute	On/Off
Channel 1 – 16 Polarity Inv	On/Off
Channel 1 – 16 Gain	+12 dB to -80 dB in 0.1 dB steps
Pair 1 – 8 Stereo	Link channel pairs

Audio Out - Embedded

Group 1 -4 Enable	On/Off
Audio Out-embed	Pairs 1-8
Channel 1 – 16 Mute	On/Off
Channel 1 – 16 Gain	+12 dB to -80 dB in 0.1 dB steps
Pair 1 – 8 Stereo	Link channel pairs

Audio Routing

Input routing Bus 1-8	Disembed 1-8, Dolby Decoder 1-5*
Output routing embed 1-8	Bus 1-8, Mixers 1-4, Downmixer 1-2, silence, Tones 1-8, Upmix*/Loudness*, Dolby Encoder 1-5*

* indicates optional feature

Audio Setup Controls – Bus 1-8

Delay Add-In Bulk, RollTrack, current video	On/Off
Bulk Manual Delay	-520ms to +2s in 0.17ms steps
Coarse Manual Pair Delay	±1.995s in 1ms steps
Fine Manual Delay	±5ms in 0.02ms steps
Fast or smooth delay limit	5ms to 80ms
Silence Detect	-2dBFS to -128dBFS in steps of 1dB
Signal Overload Detect	-1dBFS to -127dBFS in steps of 1dB
Warning Timer	1 to 20 seconds in steps of 1 second
Tone Frequency 1-8	100Hz to 16kHz in 100Hz steps

Dolby Decoder

Decoder Source	Disembed 1-8
Detection Mode	Auto, dolby E, Dolby D, Mute
AES Channel Select	Channel 1, 2
PCM Latency	Single Frame, Minimum
Dolby D listening mode	Full, EX, 3 Stereo, Phantom, Stereo, Mono
Dolby D Dynamic Range	Line, RF, Bypass
Metadata Program	1, 2
Input Metadata	RS-485, SMPTE 2020

IQDNC00   3G/HD/SD-SDI Down Converter with Synchronizer

Technical Specification cont...

Dolby Encoder

Encoder Source	Bus 1-8, Upmix*/Loudness*, Silence
Metadata Source	Prog 1-8, Internal
Internal Metadata control	
	Program Descriptor, Dialog Norm, Audio Production information, Extended BSI1, BSI2, Internal Config, Bitstream Mode, RF Mode, Line Mode, Surround Mode, Mix Level (Surround, Centre, LtRt, LoRo), Internal Config setting (e.g. 5.1+2)
Mode	Encode, Pass through
Bit Depth	Dolby D - 32 bit, 16 bit
	Dolby E - 20 bit, 16 bit
SRC	Enable, Disable
Stream Number	0-6

Audio Mixers

Mixer Select	1-4, Downmix 1 -2
Source select	Bus 1-8, Silence, Tones 1-8
Source Gain	12dB to -80dB in 0.1dB steps
Mixer 1-4 invert	On/Off
Mixer 1-4, Downmix 1-2 Mute	
	On/Off
Downmix Configuration	LoRo, 4 level selections

Other Controls

GPI input High/Low Select	
	Input 1-2, Black, Freeze, Pattern, User Memories 1-16, ARC Display Memories 1-32
GPI Level Invert	High/Low
GPI Output Source	Current input OK, Input 1-2 OK, Input 1-2 Selected, Black, Freeze, Pattern, No User Memories Selected, User Memories 1-16, No ARC Display Memories Selected, ARC Display Memories 1-32
RS-485 Port	Output Dolby decoder, Output SMPTE 2020 Disembed, Input
SMPTE 2020 embedder	Dolby decoder, RS-485 Port, SMPTE 2020 Disembed
User Memories	Save/Recall/Rename
Memory Naming	User configurable naming of Memories 1 – 16
Information Window	Video Input Status, Audio Input Status, EDH/CRC & ANC Status
EDH/CRC Reset	Resets all EDH/CRC counts
RollTrack Index	Allows up to 70 destinations
RollTrack Sources	Unused, Video Delay, Audio Delay, Input Present (1-2), Input Loss (1-2), Output Std, Input selected (1-2), Output Black, Freeze or Pattern on, Output Black, Freeze or Pattern off, Output Caption on, Output Caption off, Embedded Audio (Pairs 1-8) PCM, Embedded Audio (Pairs 1-8) Non-PCM, Embedded Audio (Pairs 1-8) Loss, Reference OK & Loss, Dolby Decoder Input Type, Encoder active/pass-through, Dolby Metadata valid/missing
Factory Default	Resets all module settings to factory specified default values and clears memories
Default Settings	Resets all module settings to factory specified defaults but does not clear user memories
Restart	Software reset of module

Module Information	Reports: Product Name
	Software version, Serial number, Build number, KOS version, PCB version, Licensed Options
Input Names	19 Character editable name

Specifications

Electrical	3Gbit/s SDI, SMPTE 424M 1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C / DVB-ASI
Connector / Format	BNC/ 75ohm panel jack on standard IQ connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s) >-10dB (3Gbit/s)
Output Jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz), 3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)
Reference Source	External – HD Tri-Level / SD Bi-level / Input Video syncs
Electrical	Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level)
	SD bi-level – RS170A
	HD Tr-level – SMPTE 240M, 274M and 296M
Connector / Format	BNC/75 ohm panel jack on standard IQ connector panel
Analog Reference Return Loss	
	SD bi-level > 40 dB to 5.5 MHz, HD tri-level > 35 dB to 30 MHz
Video Standards	1125(1080)/50p, 1125(1080)/59p, 750(720)/50p, 750(720)/59p, 1125(1080)/25i, 1125(1080)/25p, 1125(1080)/25psf, 1125(1080)/29i, 625(576)/25i, 525(480)/29i
Embedded audio handling	
	HD - 24-bit synchronous 48 kHz to SMPTE 299M
	SD - 20-bit synchronous 48 kHz to SMPTE 272M-A

Power Consumption

Module Power Consumption	
	23.5 W Max (A Frames)
	22 PR (B Frames)
	Note: Dolby option adds 2.5W (PR)

IQDNC31

Dual Channel 3G/HD-SDI Down Converter with Frame Synchronizer

The IQDNC31 provides two channels of multi-rate down conversion for 3Gbps SDI, and HD-SDI digital video signals. Using high quality motion adaptive de-interlacing and flexible scaling technology the IQDNC31 is a broadcast quality conversion module ideal for space constrained applications requiring downconversion to maintain SD output feeds.

IQDNC31 includes frame synchronizers, capable of referencing to a SD bi-level or HD tri-level reference and independent variable aspect ratio converters with frame accurate reading and writing of WSS, VI and 2016 AFD signalling. Audio handling includes audio channel routing, delay adjustment and level controls. Video metadata such as timecode, closed captions and teletext captions can also be passed through the module or processed according to the required output standard.

To allow the module to be further tailored to system requirements software options are available to provide noise reduction and side-bar keying, and versions are available with SFP cages enabling fiber conversion, or additional electrical outputs on HD-BNCs.

Features

- High quality down conversion for SDI video inputs including conversion aperture control
- Frame synchronizer with HD Tri-sync / SD Bi-Level Reference Input and input loss detection
- Aspect ratio conversion including preset ARC maps relative to conversion modes, selectable pan, tilt, aspect, size, and output crop adjustments
- Aspect ratio control (signalling reading and writing) using ETSI WSS and AFD Video Index signaling (RP186, SMPTE 2016)
- Video proc. features include: gain, offset, hue, horizontal and vertical picture enhancement, and RGB gamut legalization
- Metadata support - Closed caption passing or processing for CEA608/708, and WST/OP42 and OP47 teletext captions, and VITC or SMPTE12M timecode translation
- In-built test pattern generator and 19 character scrolling caption generator
- Additional processing options including; noise reduction (adaptive spatial and recursive), side-bar keying and linear frame rate conversion
- Processing for 16 channels of embedded audio present on the incoming SDI stream with no disturbance during video synchronizer frame wraps or drops
- Audio proc. features including: channel routing, gain, invert, delay and tone generator
- Non-PCM processing features pair level routing and delay compensation. Dolby-E data is passed with a delay to match the video and with co-timed audio frame drop or repeat
- Dolby E support – Detection of PCM/non-PCM audio to SMPTE 337/338M, pair routing and Dolby E header re-alignment
- Integrated Fiber I/O support via SFP module
- 16 x user memories and 2 GPI/O ports
- RollCall control and monitoring compatible with standard logging and reporting features
- RollTrack triggers available for detected module states including: Input loss and reference loss

Why should you choose this module?

- With it's ability to provide two independent channels of down conversion, coupled with audio processing and metadata handling, IQDNC31 allows space efficient multi-format working in a cost effective package
- Comprehensive audio processing functions allow complete control over embedded audio signals for applications where channel routing, gain control or delay is required
- Full RollCall and SNMP compatibility allows easy integration with SAM or third party network management systems providing an all-inclusive monitoring and control solution

Inputs & Outputs - IQH3B enclosures

IQDNC3101-1B3
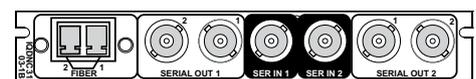
IQDNC3103-1B3
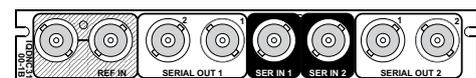
IQDNC3100-1B3
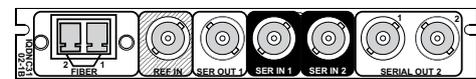
IQDNC3102-1B3

For more details on enclosure types please refer to datasheet IQH3B.

IQDNC31
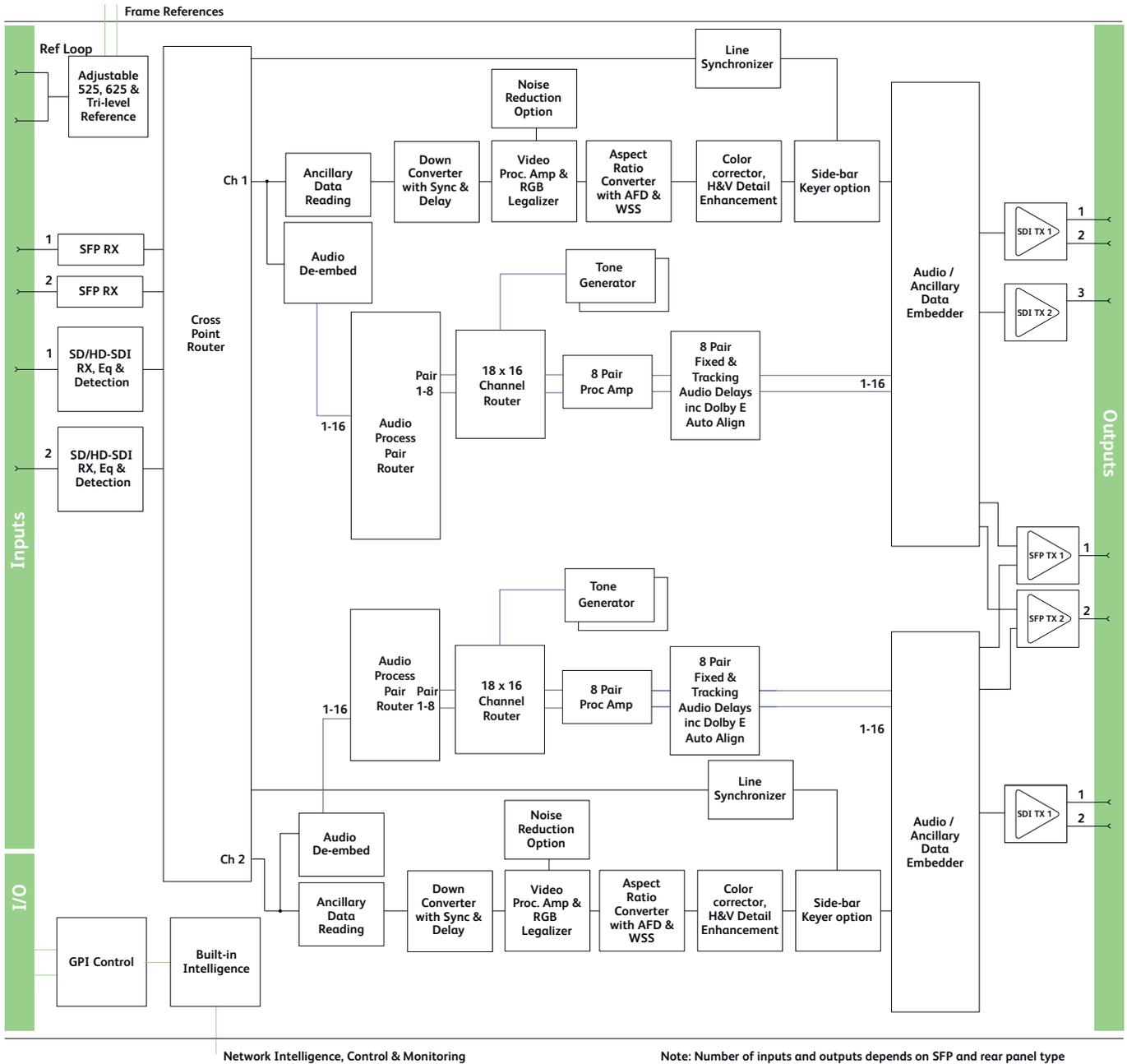
Block Diagram for IQDNC31 Range

Technical Specification

Inputs & Outputs

Video Signal Inputs

SDI Inputs	2x
Input Cable Length	Up to 80m Belden 1694A @ 3 Gbit/s
	Up to 120m Belden 1694A @ 1.5 Gbit/s
	100m typical (with output set to 1080p rates), Belden 1694A @ 270 Mbit/s
Input Standard (auto detect)	
	625(576)/25i, 525(480)/29i
	720 50/59p1080 50/59i
	1080 50/59p level A/B
	1080 25/29psf
Analog Reference	1 x Analog Reference with passive loop-through Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level)
	SD bi-level – RS170A
	HD Tri-level – SMPTE 240M, 274M

Note: Number of inputs and outputs depends on SFP and rear panel type

Map of input to output standards			Output							
			25		50		29.97		59.94	
			576i	1080i	720P	1080P	480i	1080i	720P	1080P
Input	25	576i	✔	✕	✕	✕	✕	✕	✕	✕
		1080i	✔	✕	✕	✕	✕	✕	✕	✕
	50	720P	✔	✕	✕	✕	✕	✕	✕	✕
		1080P	✔	✕	✕	✕	✕	✕	✕	✕
	29.97	480i	✕	✕	✕	✕	✔	✕	✕	✕
		1080i	✕	✕	✕	✕	✔	✕	✕	✕
	59.94	720P	✕	✕	✕	✕	✔	✕	✕	✕
		1080P	✕	✕	✕	✕	✔	✕	✕	✕

Format Conversion I/O Grid

IQDNC31

Technical Specification cont…

Fiber Signal Input

Inputs	Up to 2
Optical	3 GBit/s HD-SDI, 1.485 GBit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format	LC singlemode
Standard	SMPTE 297-2006

Video Signal Outputs

SDI Outputs	up to 5 (3 from Channel 1, 2 from Channel 2)
Output standard	625(576)/25i, 525(480)/29i

Fiber Signal Output

Optical	270 Mbit/s SD-SDI
Connector / Format	LC singlemode
Conforms to	SMPTE 297-2006
Outputs	Up to 2

*Note: Optical I/O and control dependant on type of SFP module fitted

Control Interface

GPI	2 x Closing contact I/O interface (ST) (rear panel dependant)

Conversion Functions (per channel)

Modes	Down conversion
	Aspect ratio conversion synchronization
Conversion processing	Still process: Detects still images and applies an aperture with full (progressive) vertical frequency response
	Enhanced still: Adds field motion detection to still process. Prevents artifacts on moving repetitive patterns
Aspect ratio conversion (manual or auto)	AFD (SMPTE 2016), VI (RP186), WSS (L23)
SD input format	Normal 4:3, Anamorphic 16:9, Letterbox 14:9, Letterbox 16:9
SD output format	Normal 4:3, Anamorphic 16:9, Letterbox 14:9, Letterbox 16:9
Metadata	Closed caption CE608 <> CE708
	Timecode conversions
	Teletext subtitles WST/RDD8 conversion

Audio Functions (per channel)

Embedded audio	16-channel embedded audio processing
	PCM audio processing includes channel level gain and delay compensation, as well as channel level routing with L/R swap and phase invert feature
	Non-PCM processing features pair level routing and delay compensation. Dolby E data is passed with a delay to match the video and with co-timed audio frame drop or repeat
Embedded audio	Enable/Blank

Embedded Audio Routing

Processed pair 1-8	Disembed 1-8
Output Channels 1-16	Processed pair 1-8, Tone, Silence

Processed Audio Control

Invert Phase	Channels 1-16
Pair 1 to 8 Gain L/R	+18 dB to -18 dB in 0.1 dB steps
Pair 1-8 Manual Delay	-40 to +200 ms in 1 ms steps
Global Manual Delay	-40 to +200 ms in 1 ms steps

Dolby-E

Dolby-E Auto

Alignment	+/- 10 line offset in 1 line steps

Tone

Frequency	100Hz to 10kHz in 100Hz steps

Processing Functions (per channel)

Ancillary Data	Pass/Strip
Freeze	On/Off
Legalizer	On/Off
Genlock	Reference lock, Input lock (same format), Free run
Pattern	Off, Black, Ramp, Bars
Caption	On/Off, Scrolling
Edit Caption	19 characters available

Proc amp

Black Level:	+100 to -100 mV (0) in 0.8 mV steps
Contrast:	-6 dB to +6 dB (0) in 0.2 dB steps
Saturation:	-6 dB to +6 dB (0) in 0.2 dB steps
Y Gamma:	0.4 to 1.7 (1) in 0.1 steps
YC Offset:	-20 to 20 (0) in 2 Luma pixel steps
	Note: Defaults shown in brackets

Enhancement

Nonlinear Enhancer	Frequency Band Selection: Low, Med, High
	Four preset enhancement modes: Low, Med, High, Super
	Manual enhancement mode with H Gain and H Noise rejection levels

Conversion Aperture

Vertical	Frequency Band Selection: Low, Med, High
	Five vertical preset enhancement levels: Soft 2, Soft 1, Normal, Sharp 1, Sharp 2
Horizontal	Five horizontal preset sharpness levels: Low 2, Low 1, Normal, High 1, High 2
	Five horizontal preset detail levels: Soft 2, Soft 1, Normal, Sharp 1, Sharp 2

Other Controls

GPI input Low/High Select

	Black, Freeze, Pattern, User Memories 1-16
GPI Output Source	Black, Freeze, Pattern
User Memories	16 x Save, Recall, Rename
Memory Naming	User configurable naming of memories 1 – 16
RollTrack Index	Up to 50 RollTrack destinations
Optical Logging*	Tx Laser Bias High Warning
	Tx Power Low Warning
	Tx Power High Warning
Laser Wavelength	Input 1 (2) Rx Power High Warning
	Input 1 (2) Rx Power Low Warning
	Input 1 (2) Rx Power Measurement
RollTrack Sources	Unused, Input Present (1&2, Fiber 1 & 2) , Input Loss (1&2, Fiber 1 & 2), Reference OK & Loss
Information Window	Video Input Status, Reference Status
Factory Default	Resets all module settings to factory specified default values and clears memories
Default Settings	Resets all module settings to factory specified defaults but does not clear memories
Module Information	Reports following module information: Software version, Serial number, Rear Panel ID, Frame Slot

IQDNC31   Dual Channel 3G/HD-SDI Down Converter with Frame Synchronizer

Technical Specification cont...

Specifications

Electrical	3Gbit/s SDI, SMPTE 424M 1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C
Connector / Format	BNC/ 75ohm panel jack on standard IQ connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s) >-10dB (3Gbit/s)
Output Jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz)
Reference Source	External – HD Tri-Level / SD Bi-level / Input Video syncs
Electrical	Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level)
	SD bi-level – RS170A
	HD Tr-level – SMPTE 240M and 274M
Connector / Format	BNC/75 ohm panel jack on standard IQ connector panel

Optical 1310 nm Tx

Wavelength	1310 nm
Spectral width (FWHM)	>1.5 nm (typ)
Output power	0 to -5 dBm typical (-2 dBm typical)
Extinction ratio	>7.5:1 (typ)

Optical Rx

Input wavelength range	Min. 1260 nm, Max. 1620 nm
Optical power input range	> -0 dBm, < -20 dBm
Link distance	Up to 30 Km

Embedded audio handling

    HD - 24-bit synchronous 48 kHz to SMPTE 299M,
    SD - 20-bit synchronous 48 kHz to SMPTE 272M-A

Power Consumption

Module Power Consumption with Fiber

    16PR (B frames)

Ordering Information

Order codes for IQH3B enclosures

IQDNC3100-1B3
Dual channel down converter. 2 SDI inputs, external reference loop & enclosure reference inputs, 4 SDI outputs

IQDNC3101-1B3
Dual channel down converter. 2 SDI inputs, 5 SDI outputs, 2 GPI/Os, reference inputs from enclosure

IQDNC3102-1B3
Dual channel down converter. 2 SDI inputs, external reference input & enclosure reference inputs, 3 SDI outputs, single SFP cage

IQDNC3103-1B3
Dual channel down converter. 2 SDI inputs, 4 SDI outputs, single SFP cage, reference inputs from enclosure

For more details on enclosure types please refer to datasheet IQH3B

Software Options

IQOPTM-2NR - Software option to add noise reduction on both processing channels

IQOPTM-2SBK - Software option to add side-bar keying on both processing channels

IQOPTM-2UDC - Software option for upgrade to up, down and cross conversion for both processing channels

IQOPTM-LC - Software option to upgrade with Linear frame rate conversion

SFP options

FC1-13T1 - Single 1310nm fiber Tx

FC1-13T2 - Dual 1310nm fiber Tx

FC1-15T1 - Single 1550nm fiber Tx

FC1-15T2 - Dual 1550nm fiber Tx

FC1-R1 - Single fiber Rx

FC1-R2 - Dual fiber Rx

FC1-13TR - Fiber transceiver 1310nmTx/Rx

FC1-HDBT2 - HD-BNC Dual Tx

FC1-HDBR2 - HD-BNC Dual Rx

Fiber CWDM Tx - Wavelengths available on request

Note: SFP type must be ordered in addition to the module.

IQDNC32   3G/HD/SD-SDI Down Converter with AES I/O

The IQDNC32 provides down conversion and AES embedding and de-embedding for 3G/HD-SDI signals. Using high quality motion adaptive de-interlacing and flexible scaling technology the IQDNC32 is a broadcast quality conversion module able to handle a wide variety of common applications such as downconversion to maintain SD output feeds.

IQDNC32 includes a frame synchronizer, capable of referencing to a SD bi-level or HD tri-level reference and a variable aspect ratio converter with reading and writing of WSS, VI and 2016 AFD signalling. Audio handling includes 8 user configurable AES inputs or outputs, audio channel routing, delay adjustment and level controls. Video metadata such as timecode, closed captions and teletext captions can also be passed through the module or processed according to the required output standard.

To allow the module to be further tailored to system requirements software options are available to provide noise reduction and side-bar keying, and versions are available with SFP cages enabling fiber conversion or additional electrical outputs on HD-BNCs.

Features

- High quality down conversion for SDI video inputs including conversion aperture control
- Frame synchronizer with HD Tri-sync / SD Bi-Level Reference Input and input loss detection
- Aspect ratio conversion including preset ARC maps relative to conversion modes, selectable pan, tilt, aspect, size, and output crop adjustments
- Aspect ratio control (signalling reading and writing) using ETSI WSS and AFD Video Index signaling (RP186, SMPTE 2016)
- Video proc. features include: gain, offset, hue, horizontal and vertical picture enhancement, and RGB gamut legalization
- Metadata support - Closed caption passing or processing for CEA608/708 and OP42/OP47/WST captions, VITC or SMPTE12M timecode translation, and Ancillary data bridge for 7 blocks of ANC data passing
- Additional processing options including; noise reduction (adaptive spatial and recursive), side-bar keying and linear frame rate conversion
- 8 AES audio I/O, balanced or unbalanced, available to/from any processed internal pair, and audio proc. features including: channel routing, gain, invert, delay and eight internal tone generators
- Processing for 16 channels of embedded audio present on the incoming SDI stream with no disturbance during video synchronizer frame wraps or drops
- Non-PCM processing features pair level routing and delay compensation. Dolby-E data is passed with a delay to match the video and with co-timed audio frame drop or repeat
- Dolby E support – Detection of PCM/non-PCM audio to SMPTE 337/338M, pair routing and Dolby E header re-alignment
- In-built test pattern generator and 19 character scrolling caption generator
- Integrated Fiber I/O support via SFP module
- 16 x user memories and 2 GPI/O ports
- RollCall control and monitoring compatible with standard logging and reporting features
- RollTrack triggers available for detected module states including: Input loss and reference loss

Why should you choose this module?

- High quality down conversion and frame synchronization allows multi-format working and provides integration with existing SD workflows
- Comprehensive audio I/O and processing allows complete control over audio signals for embedding and de-embedding, and where channel routing, gain control or delay is required
- Full RollCall and SNMP compatibility allows easy integration with SAM or third party network management systems providing an all-inclusive monitoring and control solution

Inputs & Outputs - IQH3A/1A/3B enclosures

IQDNC3200-2A3, IQDNC3200-2B3
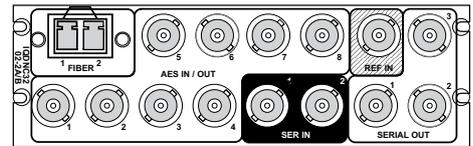
IQDNC3202-2A3, IQDNC3202-2B3
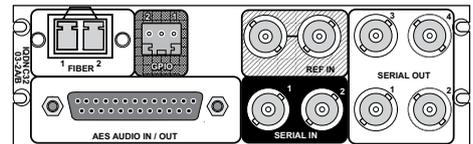
IQDNC3203-2A3, IQDNC3203-2B3

For more details on enclosure types please refer to datasheet IQH3B.

IQDNC32

3G/HD/SD-SDI Down Converter with AES I/O
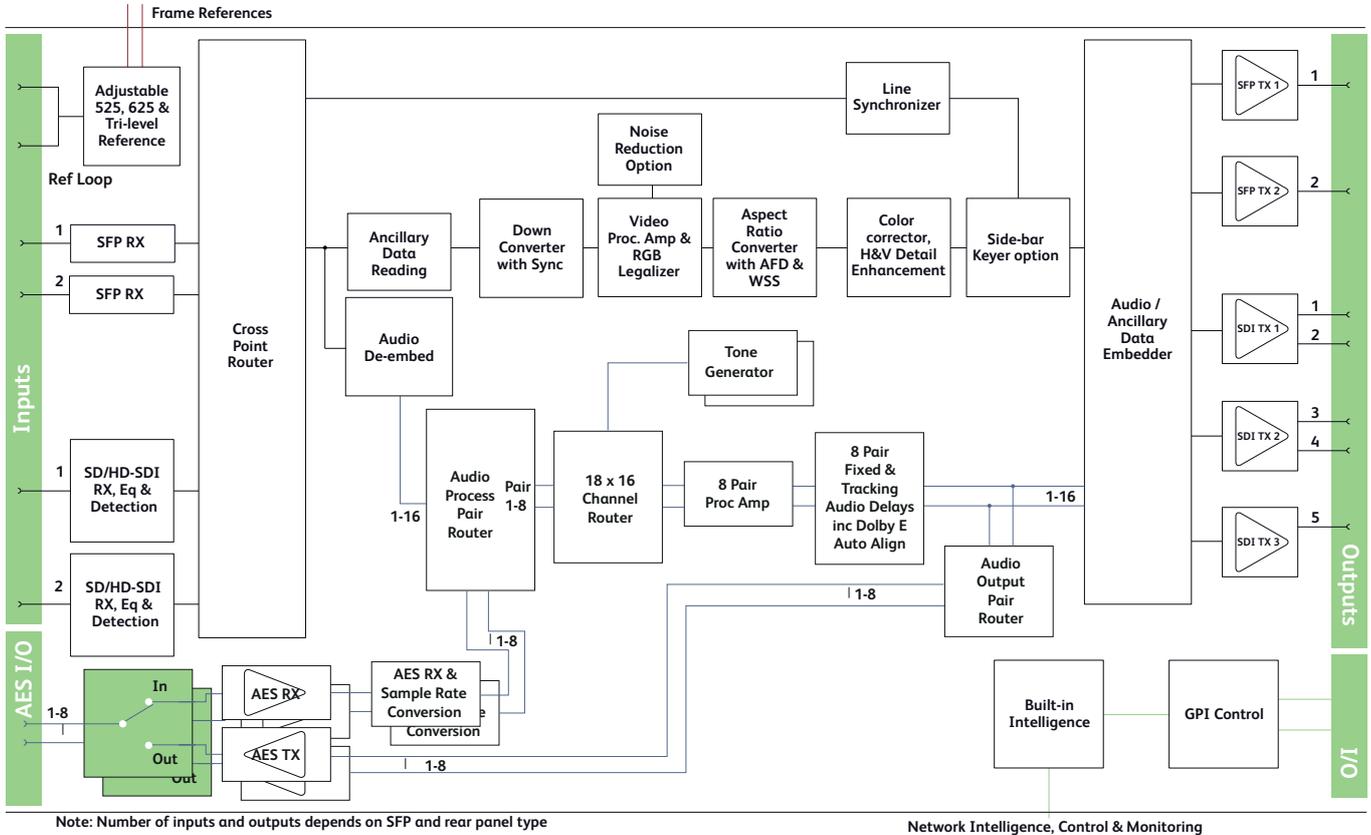
Block Diagram for IQDNC32 Range

Note: Number of inputs and outputs depends on SFP and rear panel type

Technical Specification

Inputs & Outputs

Video Signal Inputs

SDI Inputs	2x
Input Cable Length	Up to 80m Belden 1694A @ 3 Gbit/s
	Up to 120m Belden 1694A @ 1.5 Gbit/s
	100m typical (with output set to 1080p rates), Belden 1694A @ 270 Mbit/s
Input Standard (auto detect)	
	625(576)/25i, 525(480)/29i
	720 50/59p1080 50/59i
	1080 50/59p level A/B
	1080 25/29psf
Analog Reference	1 x Analog Reference with passive loop-through Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level)
	SD bi-level – RS170A
	HD Tri-level – SMPTE 240M, 274M

Fiber Signal Input

Inputs	Up to 2
Optical	3 GBit/s HD-SDI, 1.485 GBit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format	LC singlemode
Standard	SMPTE 297-2006

Video Signal Outputs

SDI Outputs	up to 4
Output standard	625(576)/25i, 525(480)/29i
	720 50/59p, 1080 50/59i
	1080 50/59p level A/B

Fiber Signal Output

Optical	3 GBit/s HD-SDI, 1.485 Gbit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format	LC singlemode
Conforms to	SMPTE 297-2006
Outputs	Up to 2

*Note: Optical I/O and control dependant on type of SFP module fitted

Map of input to output standards			Output							
			25		50		29.97		59.94	
			576i	1080i	720P	1080P	480i	1080i	720P	1080P
Input	25	576i	✔	✕	✕	✕	✕	✕	✕	✕
		1080i	✔	✕	✕	✕	✕	✕	✕	✕
	50	720P	✔	✕	✕	✕	✕	✕	✕	✕
		1080P	✔	✕	✕	✕	✕	✕	✕	✕
	29.97	480i	✕	✕	✕	✕	✔	✕	✕	✕
		1080i	✕	✕	✕	✕	✔	✕	✕	✕
	59.94	720P	✕	✕	✕	✕	✔	✕	✕	✕
		1080P	✕	✕	✕	✕	✔	✕	✕	✕

Format Conversion I/O Grid

IQDNC32 — 3G/HD/SD-SDI Down Converter with AES I/O

Technical Specification cont…

Audio Signal Inputs/Outputs
AES/EBU I/O (software selectable)

	8 Unbalanced (BNC)
	8 Balanced (25D Type)

Control Interface
GPI	2 x Closing contact I/O interface (ST) (rear panel dependant)

Conversion Functions
Modes	down conversion
	Aspect ratio conversion synchronization
Conversion processing	Still process: Detects still images and applies an aperture with full (progressive) vertical frequency response
	Enhanced still: Adds field motion detection to still process. Prevents artifacts on moving repetitive patterns
Aspect ratio conversion (manual or auto)	AFD (SMPTE 2016), VI (RP186), WSS (L23)
SD input format	Normal 4:3, Anamorphic 16:9, Letterbox 14:9, Letterbox 16:9
SD output format	Normal 4:3, Anamorphic 16:9, Letterbox 14:9, Letterbox 16:9
Metadata	Closed caption CE608 <> CE708
	Timecode conversions
	Teletext subtitles WST/RDD8 conversion

Audio Functions
Embedded audio	16-channel embedded audio processing
	PCM audio processing includes channel level gain and delay compensation, as well as channel level routing with L/R swap and phase invert feature
	Non-PCM processing features pair level routing and delay compensation. Dolby E data is passed with a delay to match the video and with co-timed audio frame drop or repeat
Embedded audio	Enable/Blank

Audio Routing
Processed pair 1-8	Disembed 1-8, AES 1-8, Analog 1-2
Embedded Output Channels 1-16	
	Processed pair 1-8, Tone, Silence
AES 1-8	Processed pair 1-8, Tone, Silence

Processed Audio Control
Invert Phase	Channels 1-16
Pair 1 to 8 Gain L/R	+18 dB to -18 dB in 0.1 dB steps
Pair 1-8 Manual Delay	-40 to +200 ms in 1 ms steps
Global Manual Delay	-40 to +200 ms in 1 ms steps

Dolby-E
Dolby-E Auto
Alignment	+/- 10 line offset in 1 line steps

Tone
Frequency	100Hz to 10kHz in 100Hz steps

Processing Functions
Ancillary Data	Pass/Strip
Freeze	On/Off
Legalizer	On/Off
Genlock	Reference lock (Ext, Int A, Int B), Input lock (same format), Free run
Memories	16 user memories
Pattern	Off, Black, Ramp, Bars
Caption	On/Off, Scrolling
Edit Caption	19 characters available

Proc amp
Black Level:	+100 to -100 mV (0) in 0.8 mV steps
Contrast:	-6 dB to +6 dB (0) in 0.2 dB steps
Saturation:	-6 dB to +6 dB (0) in 0.2 dB steps
Y Gamma:	0.4 to 1.7 (1) in 0.1 steps

YC Offset:	-20 to 20 (0) in 2 Luma pixel steps
	Note: Defaults shown in brackets

Enhancement
Nonlinear Enhancer	Frequency Band Selection: Low, Med, High
	Four preset enhancement modes: Low, Med, High, Super
	Manual enhancement mode with H Gain and H Noise rejection levels

Conversion Aperture
Vertical	Frequency Band Selection: Low, Med, High
	Five vertical preset enhancement levels: Soft 2, Soft 1, Normal, Sharp 1, Sharp 2
Horizontal	Five horizontal preset sharpness levels: Low 2, Low 1, Normal, High 1, High 2
	Five horizontal preset detail levels: Soft 2, Soft 1, Normal, Sharp 1, Sharp 2

Other Controls
GPI input Low/High Select	
	Black, Freeze, Pattern, User Memories 1-16
GPI Output Source	Black, Freeze, Pattern
User Memories	16 x Save, Recall, Rename
Memory Naming	User configurable naming of memories 1 – 16
RollTrack Index	Up to 50 RollTrack destinations
Optical Logging*	Tx Laser Bias High Warning
	Tx Power Low Warning
	Tx Power High Warning
Laser Wavelength	Input 1 (2) Rx Power High Warning
	Input 1 (2) Rx Power Low Warning
	Input 1 (2) Rx Power Measurement
RollTrack Sources	Unused, Input Present (1&2, Fiber 1 & 2) , Input Loss (1&2, Fiber 1 & 2), Reference OK & Loss
Information Window	Video Input Status, Reference Status
Factory Default	Resets all module settings to factory specified default values and clears memories
Default Settings	Resets all module settings to factory specified defaults but does not clear memories
Module Information	Reports following module information: Software version, Serial number, Rear Panel ID, Frame Slot

Specifications
Electrical	3Gbit/s SDI, SMPTE 424M 1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C
Connector / Format	BNC/ 75ohm panel jack on standard IQ connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s) >-10dB (3Gbit/s)
Output Jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz), 3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)
Reference Source	External – HD Tri-Level / SD Bi-level / Input Video syncs
Electrical	Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level)
	SD bi-level – RS170A
	HD Tr-level – SMPTE 240M and 274M
Connector / Format	BNC/75 ohm panel jack on standard IQ connector panel
Embedded audio handling	
	HD - 24-bit synchronous 48 kHz to SMPTE 299M, SD - 20-bit synchronous 48 kHz to SMPTE 272M-A

Digital Audio Input (Unbalanced)
Connector/Format	BNC
Sample Frequency	PCM: 25 – 96 kHz; Non-PCM: 48 kHz
Input Cable Length	>500 m of RG59 cable
Impedance	75 Ohms
Standard	AES3id

IQDNC32   3G/HD/SD-SDI Down Converter with AES I/O

Digital Audio Input (Balanced)
Connector/Format	25Way-D
Sample Frequency	PCM: 25 – 96 kHz; Non-PCM: 48 kHz
Input Cable Length	>150 m of AES3 cable
Impedance	110 Ohms
Standard	AES3

Digital Audio Output (Unbalanced)
Connector/Format	BNC
Level	1 V p-p typical into 75 Ohms
Standard	AES3id

Digital Audio Output (Balanced)
Connector/Format	25Way-D
Level	3 V p-p typical into 110 Ohms
Standard	AES3

Optical 1310 nm Tx
Wavelength	1310 nm
Spectral width (FWHM)	>1.5 nm (typ)
Output power	0 to -5 dBm typical (-2 dBm typical)
Extinction ratio	>7.5:1 (typ)
Link distance	Up to 30 Km @ 270Mbit/s
	Up to 21 Km @ 1.5Gbit/s
	Up to 10 Km @ 3Gbit/s

Optical 1550 nm Tx
Wavelength	1550 nm
Spectral width (FWHM)	1 nm
Output power	4 to 0 dBm
Extinction ratio	>7.5:1 (typ)
Link distance	Up to 50 Km @ 270Mbit/s, 1.5Gbit/s or 3Gbit/s

Optical Rx
Input wavelength range	Min. 1260 nm, Max. 1620 nm
Optical power input range	> -0 dBm, < -20 dBm
Link distance	Up to 30 Km

Power Consumption
Module Power Consumption with Fiber
	13W (A frames)
	13PR (B frames)

Ordering Information

Order codes for IQH3B enclosures

IQDNC3200-2B3
Down converter with AES I/O. 2 SDI inputs, External & Frame reference inputs, 4 SDI outputs, 8 unbalanced AES inputs or outputs

IQDNC3202-2B3
Down converter with AES I/O. 2 SDI inputs, External & Frame reference inputs, 3 SDI outputs, 8 unbalanced AES inputs or outputs, 1 Fiber SFP cage. Includes rear but not SFP module

IQDNC3203-2B3
Down converter with AES I/O. 2 SDI inputs, External & Frame reference inputs, 4 SDI outputs, 8 balanced AES inputs or outputs, 2 x GPI, 1 Fiber SFP cage. Includes rear but not SFP module

Order codes for IQH3A/1A enclosures

IQDNC3200-2A3
Down converter with AES I/O. 2 SDI inputs, reference loop, 4 SDI outputs, 8 unbalanced AES inputs or outputs

IQDNC3202-2A3
Down converter with AES I/O. 2 SDI inputs, reference input, 3 SDI outputs, 8 unbalanced AES inputs or outputs, 1 Fiber SFP cage. Includes rear but not SFP module

IQDNC3203-2A3
Down converter with AES I/O. 2 SDI inputs, reference loop, 4 SDI outputs, 8 balanced AES inputs or outputs, 2 x GPI, 1 Fiber SFP cage. Includes rear but not SFP module

For more details on enclosure types please refer to datasheet IQH3B

Software Options

IQOPTM-NR - Software option to add noise reduction

IQOPTM-SBK - Software option to add side-bar keying

IQOPTM-LC - Software option to upgrade with Linear frame rate conversion

IQOPTM-UDC - Software option for upgrade to up, down and cross conversion

SFP options

FC1-13T1 - Single 1310nm fiber Tx

FC1-13T2 - Dual 1310nm fiber Tx

FC1-15T1 - Single 1550nm fiber Tx

FC1-15T2 - Dual 1550nm fiber Tx

FC1-R1 - Single fiber Rx

FC1-R2 - Dual fiber Rx

FC1-13TR - Fiber transceiver 1310nmTx/Rx

FC1-HDBT2 - HD-BNC Dual Tx

FC1-HDBR2 - HD-BNC Dual Rx

Fiber CWDM Tx - Wavelengths available on request

Note: SFP type must be ordered in addition to the module.

IQDNC33

3G/HD/SD-SDI Dual Down Converter with AES I/O

The IQDNC33 provides two channels of down conversion and AES embedding and de-embedding for 3G/HD-SDI signals. Using high quality motion adaptive de-interlacing and flexible scaling technology the IQDNC33 is a broadcast quality conversion module able to handle a wide variety of common applications such as downconversion to maintain SD output feeds.

IQDNC33 includes frame synchronizers, capable of referencing to a SD bi-level or HD tri-level reference and a variable aspect ratio converter with reading and writing of WSS, VI and 2016 AFD signalling. Audio handling includes 8 user configurable AES inputs or outputs, shared between the video channels, plus audio channel routing, delay adjustment and level controls. Video metadata such as timecode, closed captions and teletext captions can also be passed through the module or processed according to the required output standard.

To allow the module to be further tailored to system requirements software options are available to provide noise reduction and side-bar keying, and versions are available with SFP cages enabling fiber conversion or additional electrical outputs on HD-BNCs.
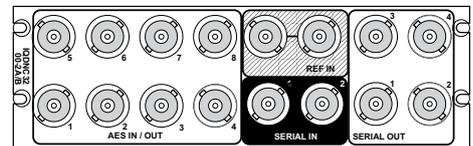
Features

- High quality down conversion including conversion aperture control
- Frame synchronizer with HD Tri-sync / SD Bi-Level Reference Input and input loss detection
- Aspect ratio conversion including preset ARC maps relative to conversion modes, selectable pan, tilt, aspect, size, and output crop adjustments
- Aspect ratio control (signalling reading and writing) using ETSI WSS and AFD Video Index signaling (RP186, SMPTE 2016)
- Video proc. features include: gain, offset, hue, horizontal and vertical picture enhancement, and RGB gamut legalization
- Metadata support - Closed caption passing or processing for CEA608/708 and OP42/OP47/WST captions, and VITC or SMPTE12M timecode translation
- Additional processing options including; noise reduction (adaptive spatial and recursive), side-bar keying and linear frame rate conversion
- 8 AES audio I/O, balanced or unbalanced, available to/from any processed internal pair, and audio proc. features including: channel routing, gain, invert, delay and eight internal tone generators
- Processing for 16 channels of embedded audio present on the incoming SDI stream with no disturbance during video synchronizer frame wraps or drops
- Non-PCM processing features pair level routing and delay compensation. Dolby-E data is passed with a delay to match the video and with co-timed audio frame drop or repeat
- Dolby E support – Detection of PCM/non-PCM audio to SMPTE 337/338M, pair routing and Dolby E header re-alignment
- In-built test pattern generator and 19 character scrolling caption generator
- Integrated Fiber I/O support via SFP module
- 16 x user memories and 2 GPI/O ports
- RollCall control and monitoring compatible with standard logging and reporting features
- RollTrack triggers available for detected module states including: Input loss and reference loss

Why should you choose this module?

- With it's ability to provide two independent channels of down conversion, AES audio interfacing and metadata handling, IQDNC33 allows efficient multi-format working in a compact and cost effective package
- Full RollCall and SNMP compatibility allows easy integration with SAM or third party network management systems providing an all-inclusive monitoring and control solution

Inputs & Outputs - IQH3A/1A/3B enclosures
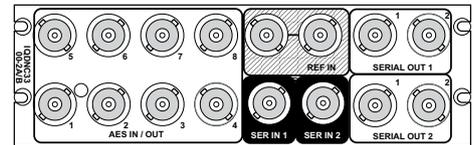
IQDNC3300-2A3, IQDNC3300-2B3
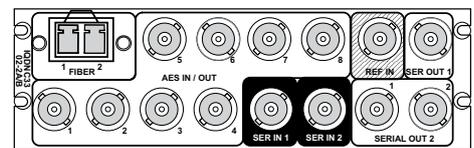
IQDNC3302-2A3, IQDNC3302-2B3
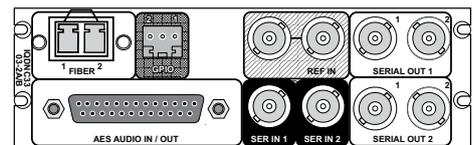
IQDNC3303-2A3, IQDNC3303-2B3

For more details on enclosure types please refer to datasheet IQH3B.

IQDNC33

3G/HD/SD-SDI Dual Down Converter with AES I/O

Frame References

Ref Loop

Inputs

Adjustable 525, 625 & Tri-level Reference

1 SFP RX
2 SFP RX

1 SD/HD-SDI RX, Eq & Detection
2 SD/HD-SDI RX, Eq & Detection

Cross Point Router

Ch 1

Ancillary Data Reading

Audio De-embed

Ch 2

Down Converter with Sync

Noise Reduction Option

Video Proc. Amp & RGB Legalizer

Aspect Ratio Converter with AFD & WSS

Color corrector, H&V Detail Enhancement

Line Synchronizer

Side-bar Keyer option

Tone Generator

Pair 1-8

18 x 16 Channel Router

8 Pair Proc Amp

8 Pair Fixed & Tracking Audio Delays inc Dolby E Auto Align

1-16

Audio Output Pair Router

Audio / Ancillary Data Embedder

SDI TX 1

1
2

1-16

Audio Process Pair Router

AES I/O

In

1-8

Out

Out

AES RX

AES TX

AES RX & Sample Rate Conversion
Conversion

1-8

1-8

1-8

Audio Output Pair Router

SFP TX 1

1

SFP TX 2

2

Generator

Audio Process Pair Pair Router 1-8

18 x 16 Channel Router

8 Pair Proc Amp

8 Pair Fixed & Tracking Audio Delays inc Dolby E Auto Align

1-16

Audio / Ancillary Data Embedder

1-16

Line Synchronizer

I/O

GPI Control

Built-in Intelligence

Audio De-embed

Ancillary Data Reading

Down Converter with Sync

Noise Reduction Option

Video Proc. Amp & RGB Legalizer

Aspect Ratio Converter with AFD & WSS

Color corrector, H&V Detail Enhancement

Side-bar Keyer option

SDI TX 2

1
2

Outputs

Network Intelligence, Control & Monitoring

Note: Number of inputs and outputs depends on SFP and rear panel type

⌒ **Block Diagram** for IQDNC33 Range

IQDNC33

3G/HD/SD-SDI Dual Down Converter with AES I/O

Technical Specification

Inputs & Outputs

Video Signal Inputs

SDI Inputs	2x
Input Cable Length	Up to 80m Belden 1694A @ 3 Gbit/s
	Up to 120m Belden 1694A @ 1.5 Gbit/s
	100m typical (with output set to 1080p rates), Belden 1694A @ 270 Mbit/s
Input Standard (auto detect)	
	625(576)/25i, 525(480)/29i
	720 50/59p1080 50/59i
	1080 50/59p level A/B
	1080 25/29psf
Analog Reference	1 x Analog Reference with passive loop-through Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level)
	SD bi-level – RS170A
	HD Tri-level – SMPTE 240M, 274M

Fiber Signal Input

Inputs	Up to 2
Optical	3 GBit/s HD-SDI, 1.485 GBit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format	LC singlemode
Standard	SMPTE 297-2006

Video Signal Outputs

SDI Outputs	up to 4
Output standard	625(576)/25i, 525(480)/29i
	720 50/59p, 1080 50/59i
	1080 50/59p level A/B

Fiber Signal Output

Optical	3 GBit/s HD-SDI, 1.485 Gbit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format	LC singlemode
Conforms to	SMPTE 297-2006
Outputs	Up to 2

*Note: Optical I/O and control dependant on type of SFP module fitted

Audio Signal Inputs/Outputs

AES/EBU I/O (software selectable)	
	8 Unbalanced (BNC)
	8 Balanced (25D Type)

Control Interface

GPI	2 x Closing contact I/O interface (ST) (rear panel dependant)

Conversion Functions (per channel)

Modes	Down conversion
	Aspect ratio conversion synchronization
Conversion processing	Still process: Detects still images and applies an aperture with full (progressive) vertical frequency response
	Enhanced still: Adds field motion detection to still process. Prevents artifacts on moving repetitive patterns
Aspect ratio conversion (manual or auto)	AFD (SMPTE 2016), VI (RP186), WSS (L23)
SD input format	Normal 4:3, Anamorphic 16:9, Letterbox 14:9, Letterbox 16:9
SD output format	Normal 4:3, Anamorphic 16:9, Letterbox 14:9, Letterbox 16:9

Map of input to output standards			Output							
			25		50		29.97		59.94	
			576i	1080i	720P	1080P	480i	1080i	720P	1080P
Input	25	576i	✔	✕	✕	✕	✕	✕	✕	✕
		1080i	✔	✕	✕	✕	✕	✕	✕	✕
	50	720P	✔	✕	✕	✕	✕	✕	✕	✕
		1080P	✔	✕	✕	✕	✕	✕	✕	✕
	29.97	480i	✕	✕	✕	✕	✔	✕	✕	✕
		1080i	✕	✕	✕	✕	✔	✕	✕	✕
	59.94	720P	✕	✕	✕	✕	✔	✕	✕	✕
		1080P	✕	✕	✕	✕	✔	✕	✕	✕

⌢ Format Conversion I/O Grid

Metadata	Closed caption CE608 <> CE708
	Timecode conversions
	Teletext subtitles WST/RDD8 conversion

Audio Functions

Embedded audio	16-channel embedded audio processing
	PCM audio processing includes channel level gain and delay compensation, as well as channel level routing with L/R swap and phase invert feature
	Non-PCM processing features pair level routing and delay compensation. Dolby E data is passed with a delay to match the video and with co-timed audio frame drop or repeat
Embedded audio	Enable/Blank

Audio Routing

Processed pair 1-8	Disembed 1-8, AES 1-8, Analog 1-2
Embedded Output Channels 1-16	
	Processed pair 1-8, Tone, Silence
AES 1-8	Processed pair 1-8, Tone, Silence

Processed Audio Control

Invert Phase	Channels 1-16
Pair 1 to 8 Gain L/R	+18 dB to -18 dB in 0.1 dB steps
Pair 1-8 Manual Delay	-40 to +200 ms in 1 ms steps
Global Manual Delay	-40 to +200 ms in 1 ms steps

Dolby-E

Dolby-E Auto Alignment	+/- 10 line offset in 1 line steps

Tone

Frequency	100Hz to 10kHz in 100Hz steps

Processing Functions (per channel)

Ancillary Data	Pass/Strip
Freeze	On/Off
Legalizer	On/Off
Genlock	Reference lock (Ext, Int A, Int B), Input lock (same format), Free run
Memories	16 user memories
Pattern	Off, Black, Ramp, Bars
Caption	On/Off, Scrolling
Edit Caption	19 characters available

IQDNC33

3G/HD/SD-SDI Dual Down Converter with AES I/O

Technical Specification cont…

Proc amp

Black Level:	+100 to -100 mV (0) in 0.8 mV steps
Contrast:	-6 dB to +6 dB (0) in 0.2 dB steps
Saturation:	-6 dB to +6 dB (0) in 0.2 dB steps
Y Gamma:	0.4 to 1.7 (1) in 0.1 steps
YC Offset:	-20 to 20 (0) in 2 Luma pixel steps
	Note: Defaults shown in brackets

Enhancement

Nonlinear Enhancer	Frequency Band Selection: Low, Med, High
	Four preset enhancement modes: Low, Med, High, Super
	Manual enhancement mode with H Gain and H Noise rejection levels

Conversion Aperture

Vertical	Frequency Band Selection: Low, Med, High
	Five vertical preset enhancement levels: Soft 2, Soft 1, Normal, Sharp 1, Sharp 2
Horizontal	Five horizontal preset sharpness levels: Low 2, Low 1, Normal, High 1, High 2
	Five horizontal preset detail levels: Soft 2, Soft 1, Normal, Sharp 1, Sharp 2

Other Controls

GPI input Low/High Select	
	Black, Freeze, Pattern, User Memories 1-16
GPI Output Source	Black, Freeze, Pattern
User Memories	16 x Save, Recall, Rename
Memory Naming	User configurable naming of memories 1 – 16
RollTrack Index	Up to 50 RollTrack destinations
Optical Logging*	Tx Laser Bias High Warning
	Tx Power Low Warning
	Tx Power High Warning
Laser Wavelength	Input 1 (2) Rx Power High Warning
	Input 1 (2) Rx Power Low Warning
	Input 1 (2) Rx Power Measurement
RollTrack Sources	Unused, Input Present (1&2, Fiber 1 & 2) , Input Loss (1&2, Fiber 1 & 2), Reference OK & Loss
Information Window	Video Input Status, Reference Status
Factory Default	Resets all module settings to factory specified default values and clears memories
Default Settings	Resets all module settings to factory specified defaults but does not clear memories
Module Information	Reports following module information: Software version, Serial number, Rear Panel ID, Frame Slot

Specifications

Electrical	3Gbit/s SDI, SMPTE 424M 1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C
Connector / Format	BNC/ 75ohm panel jack on standard IQ connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s) >-10dB (3Gbit/s)
Output Jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz), 3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)
Reference Source	External – HD Tri-Level / SD Bi-level / Input Video syncs
Electrical	Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level)
	SD bi-level – RS170A
	HD Tr-level – SMPTE 240M and 274M
Connector / Format	BNC/75 ohm panel jack on standard IQ connector panel
Embedded audio handling	
	HD - 24-bit synchronous 48 kHz to SMPTE 299M, SD - 20-bit synchronous 48 kHz to SMPTE 272M-A

Digital Audio Input (Unbalanced)

Connector/Format	BNC
Sample Frequency	PCM: 25 – 96 kHz; Non-PCM: 48 kHz
Input Cable Length	>500 m of RG59 cable
Impedance	75 Ohms
Standard	AES3id

Digital Audio Input (Balanced)

Connector/Format	25Way-D
Sample Frequency	PCM: 25 – 96 kHz; Non-PCM: 48 kHz
Input Cable Length	>150 m of AES3 cable
Impedance	110 Ohms
Standard	AES3

Digital Audio Output (Unbalanced)

Connector/Format	BNC
Level	1 V p-p typical into 75 Ohms
Standard	AES3id

Digital Audio Output (Balanced)

Connector/Format	25Way-D
Level	3 V p-p typical into 110 Ohms
Standard	AES3

Optical 1310 nm Tx

Wavelength	1310 nm
Spectral width (FWHM)	>1.5 nm (typ)
Output power	0 to -5 dBm typical (-2 dBm typical)
Extinction ratio	>7.5:1 (typ)
Link distance	Up to 30 Km @ 270Mbit/s
	Up to 21 Km @ 1.5Gbit/s
	Up to 10 Km @ 3Gbit/s

Optical 1550 nm Tx

Wavelength	1550 nm
Spectral width (FWHM)	1 nm
Output power	4 to 0 dBm
Extinction ratio	>7.5:1 (typ)
Link distance	Up to 50 Km @ 270Mbit/s, 1.5Gbit/s or 3Gbit/s

Optical Rx

Input wavelength range	Min. 1260 nm, Max. 1620 nm
Optical power input range	> -0 dBm, < -20 dBm
Link distance	Up to 30 Km

Power Consumption

Module Power Consumption with Fiber	
	18W (A frames)
	18PR (B frames)

IQDNC33 — 3G/HD/SD-SDI Dual Down Converter with AES I/O

Ordering Information

Order codes for IQH3B enclosures

IQDNC3300-2B3
Dual down converter with AES I/O. 2 SDI inputs, External & Frame reference inputs, 2 SDI outputs per channel, 8 shared unbalanced AES inputs or outputs

IQDNC3302-2B3
Dual down converter with AES I/O. 2 SDI inputs, External & Frame reference inputs, 1 SDI output for channel 1, 2 SDI outputs for channel 2, 8 shared unbalanced AES inputs or outputs, 1 Fiber SFP cage. Includes rear but not SFP module

IQDNC3303-2B3
Dual down converter with AES I/O. 2 SDI inputs, External & Frame reference inputs, 2 SDI outputs per channel, 8 shared balanced AES inputs or outputs, 2 x GPI, 1 Fiber SFP cage. Includes rear but not SFP module

Order codes for IQH3A/1A enclosures

IQDNC3300-2A3
Dual down converter with AES I/O. 2 SDI inputs, reference loop, 2 SDI outputs per channel, 8 shared unbalanced AES inputs or outputs

IQDNC3302-2A3
Dual down converter with AES I/O. 2 SDI inputs, reference input, 1 SDI output for channel 1, 2 SDI outputs for channel 2, 8 shared unbalanced AES inputs or outputs, 1 Fiber SFP cage. Includes rear but not SFP module

IQDNC3303-2A3
Dual down converter with AES I/O. 2 SDI inputs, reference loop, 2 SDI outputs per channel, 8 shared balanced AES inputs or outputs, 2 x GPI, 1 Fiber SFP cage. Includes rear but not SFP module

For more details on enclosure types please refer to datasheet IQH3B

Software Options

IQOPTM-2NR - Software option to add noise reduction on both channels

IQOPTM-2SBK - Software option to add side-bar keying on both channels

IQOPTM-2LC - Software option to upgrade with linear frame rate conversion on both channels

IQOPTM-UDC - Software option for upgrade to up, down and cross conversion

SFP options

FC1-13T1 - Single 1310nm fiber Tx

FC1-13T2 - Dual 1310nm fiber Tx

FC1-15T1 - Single 1550nm fiber Tx

FC1-15T2 - Dual 1550nm fiber Tx

FC1-R1 - Single fiber Rx

FC1-R2 - Dual fiber Rx

FC1-13TR - Fiber transceiver 1310nmTx/Rx

FC1-HDBT2 - HD-BNC Dual Tx

FC1-HDBR2 - HD-BNC Dual Rx

Fiber CWDM Tx - Wavelengths available on request

Note: SFP type must be ordered in addition to the module.

IQDNC34

Dual Channel 3G/HD-SDI Down Converter with Analog Outputs

The IQDNC34 provides two channels of multi-rate down conversion for 3Gbps SDI, and HD-SDI digital video signals along with both composite and analog audio outputs suitable for monitoring applications where space is of the essence.

IQDNC34 includes frame synchronizers, capable of referencing to a SD bi-level or HD tri-level reference and independent variable aspect ratio converters with frame accurate reading and writing of WSS, VI and 2016 AFD signalling. Audio handling includes audio channel routing, delay adjustment and level controls with audio monitoring outputs selectable from either video channel. Video metadata such as timecode, closed captions and teletext captions can also be passed through the module or processed according to the required output standard.

To allow the module to be further tailored to system requirements software options are available to provide noise reduction and side-bar keying, and versions are available with SFP cages enabling fiber conversion, or additional electrical outputs on HD-BNCs.

Features

- High quality down conversion for SDI video inputs with composite 12-bit encoded and analog audio monitoring outputs
- Frame synchronizer with HD Tri-sync / SD Bi-Level Reference Input and input loss detection
- Aspect ratio conversion including preset ARC maps relative to conversion modes, selectable pan, tilt, aspect, size, and output crop adjustments
- Aspect ratio control (signalling reading and writing) using ETSI WSS and AFD Video Index signaling (RP186, SMPTE 2016)
- Video proc. features include: gain, offset, hue, horizontal and vertical picture enhancement, and RGB gamut legalization
- Metadata support - Closed caption passing or processing for CEA608/708, and WST/OP42 and OP47 teletext captions, and VITC or SMPTE12M timecode translation
- In-built test pattern generator
- Additional processing options including; noise reduction (adaptive spatial and recursive) and side-bar keying
- Processing for 16 channels of embedded audio present on the incoming SDI stream with no disturbance during video synchronizer frame wraps or drops
- Audio proc. features including: channel routing, gain, invert, delay and tone generator
- Non-PCM processing features pair level routing and delay compensation. Dolby-E data is passed with a delay to match the video and with co-timed audio frame drop or repeat
- Integrated SFP module supports Fiber or HD-BNC I/O, and HDMI output
- 16 x user memories
- RollCall control and monitoring compatible with standard logging and reporting features
- RollTrack triggers available for detected module states including: Input loss and reference loss

Why should you choose this module?

- Including composite video and analog audio outputs along with the SDI and embedded audio outputs enables the IQDNC34 to downconvert HD Signals for the main signal chain, and provide a monitoring output for built-in QC
- Comprehensive audio processing functions allow complete control over embedded audio signals for applications where channel routing, gain control or delay is required
- Full RollCall and SNMP compatibility allows easy integration with SAM or third party network management systems providing an all-inclusive monitoring and control solution

Inputs & Outputs - IQH3A/1A/3B enclosures

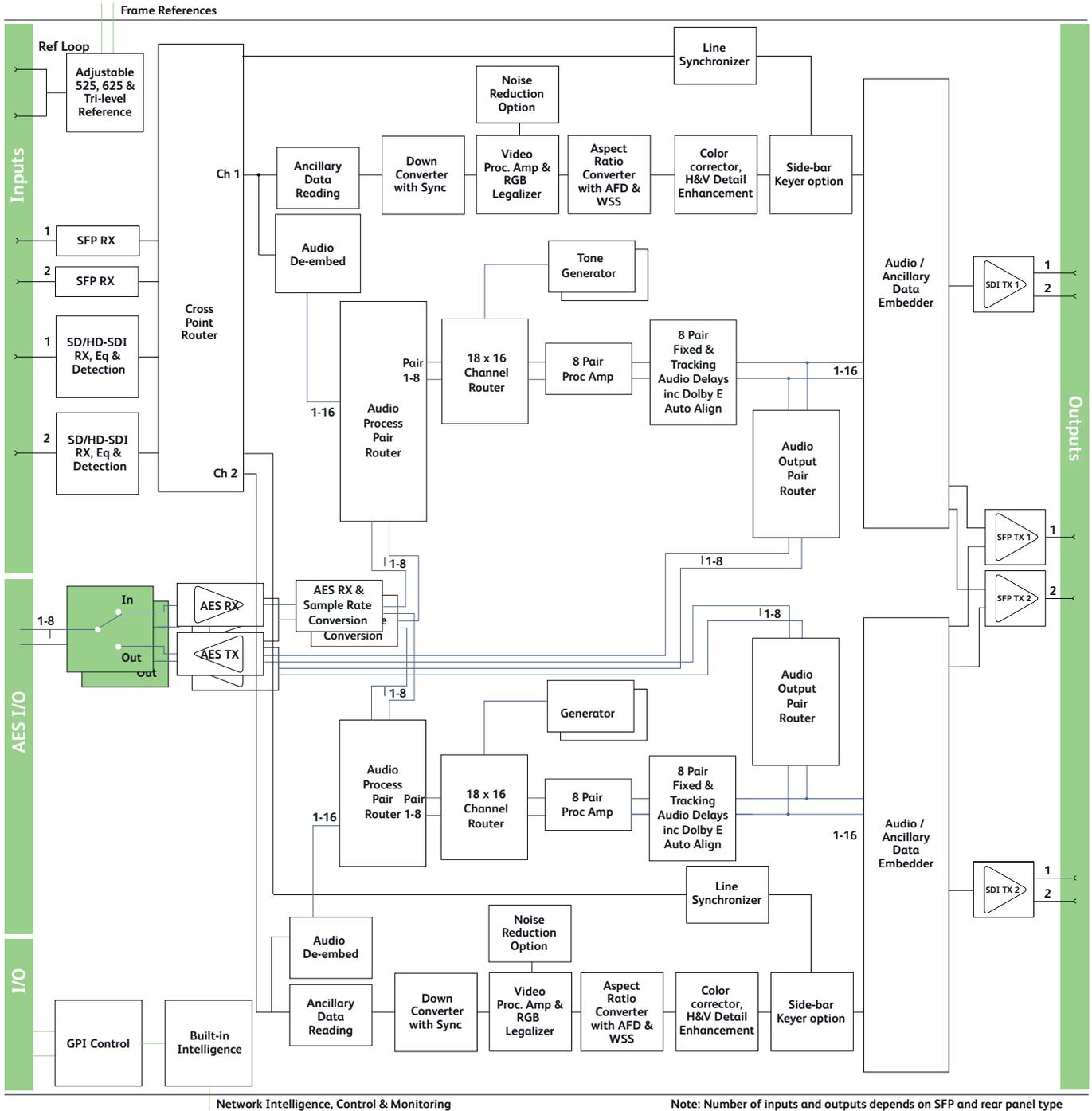IQDNC3400-1A3, IQDNC3400-1B3
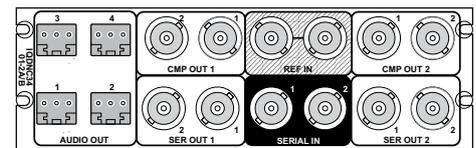
IQDNC3401-2A3, IQDNC3401-2B3
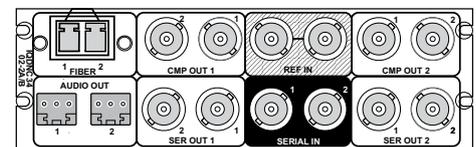
IQDNC3102-2A3, IQDNC3102-2B3

For more details on enclosure types please refer to datasheet IQH3B.

IQDNC34

Dual Channel 3G/HD-SDI Down Converter with Analog Outputs
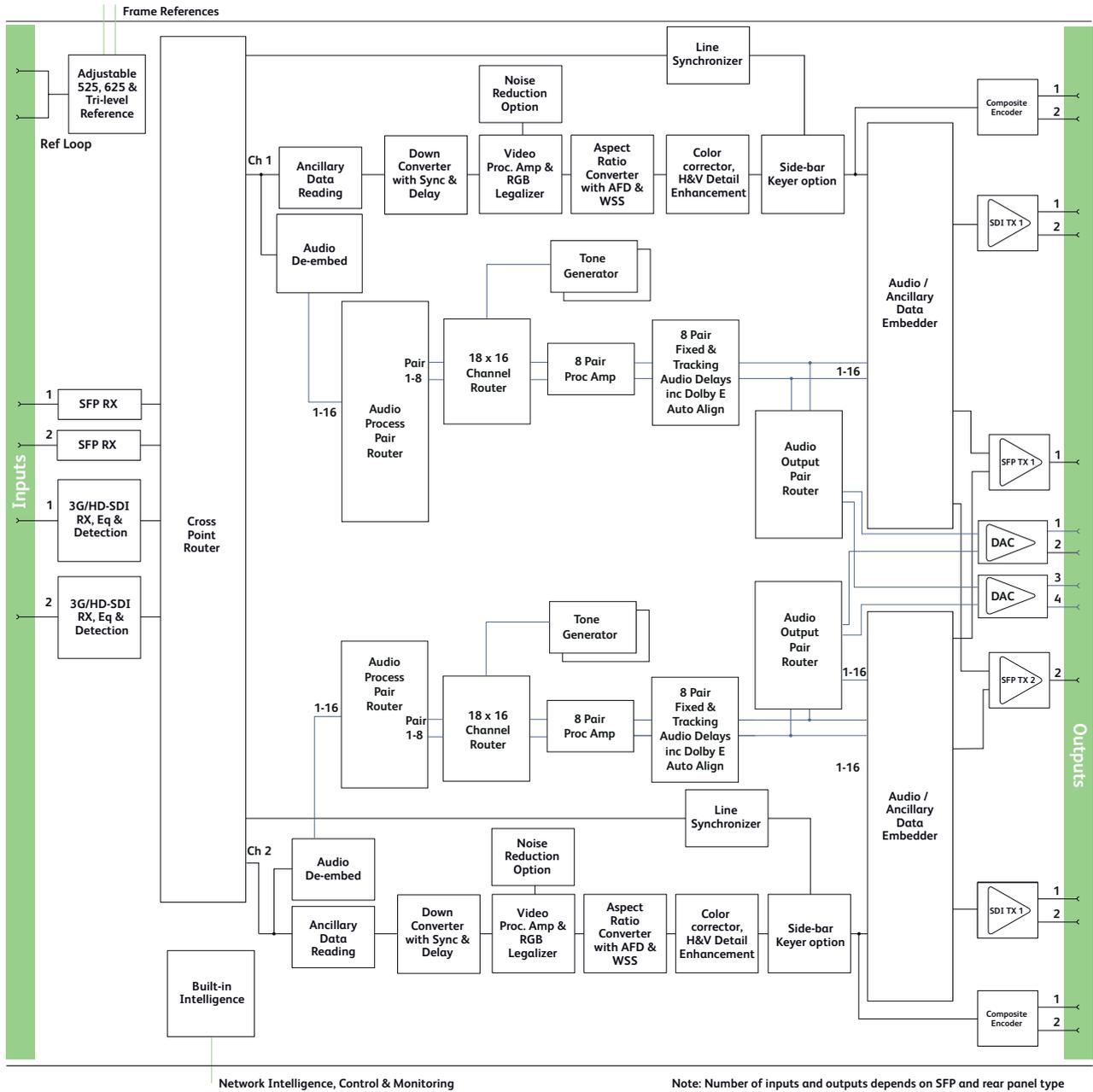
Block Diagram for IQDNC34 Range

Note: Number of inputs and outputs depends on SFP and rear panel type

Technical Specification

Inputs & Outputs

Video Signal Inputs

SDI Inputs	2x
Input Cable Length	Up to 80m Belden 1694A @ 3 Gbit/s
	Up to 120m Belden 1694A @ 1.5 Gbit/s
	100m typical (with output set to 1080p rates),
	Belden 1694A @ 270 Mbit/s
Input Standard (auto detect)	
	625(576)/25i, 525(480)/29i
	720 50/59p1080 50/59i
	1080 50/59p level A/B
	1080 25/29psf
Analog Reference	1 x Analog Reference with passive loop-through
	Black (HD tri-level and SD bi-level) and Black
	Burst (SD bi-level)
	SD bi-level – RS170A
	HD Tri-level – SMPTE 240M, 274M

Map of input to output standards			Output							
			25		50		29.97		59.94	
			576i	1080i	720P	1080P	480i	1080i	720P	1080P
Input	25	576i	✔	✕	✕	✕	✕	✕	✕	✕
		1080i	✔	✕	✕	✕	✕	✕	✕	✕
	50	720P	✔	✕	✕	✕	✕	✕	✕	✕
		1080P	✔	✕	✕	✕	✕	✕	✕	✕
	29.97	480i	✕	✕	✕	✕	✔	✕	✕	✕
		1080i	✕	✕	✕	✕	✔	✕	✕	✕
	59.94	720P	✕	✕	✕	✕	✔	✕	✕	✕
		1080P	✕	✕	✕	✕	✔	✕	✕	✕

Format Conversion I/O Grid

IQDNC34

Dual Channel 3G/HD-SDI Down Converter with Analog Outputs

Technical Specification cont…

Fiber Signal Input

Inputs	Up to 2
Optical	3 GBit/s HD-SDI, 1.485 GBit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format	LC singlemode
Standard	SMPTE 297-2006

Video Signal Outputs

SDI Outputs	Up to 5 (3 from Channel 1, 2 from Channel 2)
Output standard	625(576)/25i, 525(480)/29i
Composite Outputs	Up to 2 per channel
Output standard	625(576)/25i, 525(480)/29i

Audio Signal Outputs

Analog Audio Outputs	Up to 4 channels (selectable from either video channel)

Fiber Signal Output

Optical	270 Mbit/s SD-SDI
Connector / Format	LC singlemode
Conforms to	SMPTE 297-2006
Outputs	Up to 2

*Note: Optical I/O and control dependant on type of SFP module fitted

Control Interface

GPI	2 x Closing contact I/O interface (ST) (rear panel dependant)

Conversion Functions (per channel)

Modes	Down conversion
	Aspect ratio conversion synchronization
Conversion processing	Still process: Detects still images and applies an aperture with full (progressive) vertical frequency response
	Enhanced still: Adds field motion detection to still process. Prevents artifacts on moving repetitive patterns
Aspect ratio conversion (manual or auto)	AFD (SMPTE 2016), VI (RP186), WSS (L23)
SD input format	Normal 4:3, Anamorphic 16:9, Letterbox 14:9, Letterbox 16:9
SD output format	Normal 4:3, Anamorphic 16:9, Letterbox 14:9, Letterbox 16:9
Metadata	Closed caption CE608 <> CE708
	Timecode conversions
	Teletext subtitles WST/RDD8 conversion

Audio Functions

Analog audio	Four channels (two pairs) of analog outputs, separately assignable to any processing channel
Headroom	+24 dBu, balanced connection
Level adjustment	+12 dB to +24 dB (+18)

Analog Audio Routing

Output Pair1-2	Select from configured embedded audio output pairs (Ch1: 1-8, Ch2: 1-8)

Audio Functions (per channel)

Embedded audio	16-channel embedded audio processing PCM audio processing includes channel level gain and delay compensation, as well as channel level routing with L/R swap and phase invert feature
	Non-PCM processing features pair level routing and delay compensation. Dolby E data is passed with a delay to match the video and with co-timed audio frame drop or repeat
Embedded audio	Enable/Blank

Embedded Audio Routing

Processed pair 1-8	Disembed 1-8
Output Channels 1-16	Processed pair 1-8, Tone, Silence

Processed Audio Control

Invert Phase	Channels 1-16
Pair 1 to 8 Gain L/R	+18 dB to -18 dB in 0.1 dB steps
Pair 1-8 Manual Delay	-40 to +200 ms in 1 ms steps
Global Manual Delay	-40 to +200 ms in 1 ms steps

Tone

Frequency	100Hz to 10kHz in 100Hz steps

Processing Functions (per channel)

Ancillary Data	Pass/Strip
Freeze	On/Off
Legalizer	On/Off
Genlock	Reference lock, Input lock (same format), Free run
Pattern	Off, Black, Ramp, Bars

Proc amp

Black Level:	+100 to -100 mV (0) in 0.8 mV steps
Contrast:	-6 dB to +6 dB (0) in 0.2 dB steps
Saturation:	-6 dB to +6 dB (0) in 0.2 dB steps
Y Gamma:	0.4 to 1.7 (1) in 0.1 steps
YC Offset:	-20 to 20 (0) in 2 Luma pixel steps
	Note: Defaults shown in brackets

Enhancement

Nonlinear Enhancer	Frequency Band Selection: Low, Med, High
	Four preset enhancement modes: Low, Med, High, Super
	Manual enhancement mode with H Gain and H Noise rejection levels

Conversion Aperture

Vertical	Frequency Band Selection: Low, Med, High
	Five vertical preset enhancement levels: Soft 2, Soft 1, Normal, Sharp 1, Sharp 2
Horizontal	Five horizontal preset sharpness levels: Low 2, Low 1, Normal, High 1, High 2
	Five horizontal preset detail levels: Soft 2, Soft 1, Normal, Sharp 1, Sharp 2

Other Controls

GPI input Low/High Select	
	Black, Freeze, Pattern, User Memories 1-16
GPI Output Source	Black, Freeze, Pattern
User Memories	16 x Save, Recall, Rename
Memory Naming	User configurable naming of memories 1 – 16
RollTrack Index	Up to 50 RollTrack destinations
Optical Logging*	Tx Laser Bias High Warning
	Tx Power Low Warning
	Tx Power High Warning
Laser Wavelength	Input 1 (2) Rx Power High Warning
	Input 1 (2) Rx Power Low Warning
	Input 1 (2) Rx Power Measurement

IQDNC34 — Dual Channel 3G/HD-SDI Down Converter with Analog Outputs

Technical Specification cont…

RollTrack Sources	Unused, Input Present (1&2, Fiber 1 & 2) , Input Loss (1&2, Fiber 1 & 2), Reference OK & Loss
Information Window	Video Input Status, Reference Status
Factory Default	Resets all module settings to factory specified default values and clears memories
Default Settings	Resets all module settings to factory specified defaults but does not clear memories
Module Information	Reports following module information: Software version, Serial number, Rear Panel ID, Frame Slot

Specifications

Electrical	3Gbit/s SDI, SMPTE 424M 1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C
Connector / Format	BNC/ 75ohm panel jack on standard IQ connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s) >-10dB (3Gbit/s)
Output Jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz)
Reference Source	External – HD Tri-Level / SD Bi-level / Input Video syncs
Electrical	Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level) SD bi-level – RS170A HD Tr-level – SMPTE 240M and 274M
Connector / Format	BNC/75 ohm panel jack on standard IQ connector panel

Optical 1310 nm Tx

Wavelength	1310 nm
Spectral width (FWHM)	>1.5 nm (typ)
Output power	0 to -5 dBm typical (-2 dBm typical)
Extinction ratio	>7.5:1 (typ)

Optical Rx

Input wavelength range	Min. 1260 nm, Max. 1620 nm
Optical power input range	> -0 dBm, < -20 dBm
Link distance	Up to 30 Km

Embedded audio handling

HD - 24-bit synchronous 48 kHz to SMPTE 299M,
SD - 20-bit synchronous 48 kHz to SMPTE 272M-A

Power Consumption

Module Power Consumption
15.5 W Max (A Frames)
14.5 PR (B Frames)
Module Power Consumption with Fiber
16.5 W Max (A Frames)
15.5 PR (B Frames)

Order codes for IQH3B enclosures

IQDNC3400-1B3
Dual channel down converter with analog I/O. 2 SDI inputs, reference inputs from enclosure, 1 SDI outputs per channel, 1 composite output per channel, 2 analog audio outputs

IQDNC3401-2B3
Dual channel down converter with analog I/O. 2 SDI inputs, external reference loop & enclosure reference inputs, 2 SDI outputs per channel, 2 composite output per channel, 4 analog audio outputs

IQDNC3402-2B3
Dual channel down converter with analog I/O. 2 SDI inputs, external reference loop & enclosure reference inputs, 2 SDI outputs per channel, 2 composite output per channel, 4 analog audio outputs, single SFP cage

Order codes for IQH3A/1A enclosures

IQDNC3400-1A3
Dual channel down converter with analog I/O. 2 SDI inputs, 1 SDI outputs per channel, 1 composite output per channel, 2 analog audio outputs

IQDNC3401-2A3
Dual channel down converter with analog I/O. 2 SDI inputs, external reference loop, 2 SDI outputs per channel, 2 composite output per channel, 4 analog audio outputs

IQDNC3402-2A3
Dual channel down converter with analog I/O. 2 SDI inputs, external reference loop, 2 SDI outputs per channel, 2 composite output per channel, 4 analog audio outputs, single SFP cage

For more details on enclosure types please refer to datasheet IQH3B.

Software Options

IQOPTM-NR - Software option to add noise reduction

IQOPTM-SBK - Software option to add side-bar keying

IQOPTM-UDC - Software option for upgrade to up, down and cross conversion

SFP options

FC1-13T1 - Single 1310nm fiber Tx

FC1-13T2 - Dual 1310nm fiber Tx

FC1-15T1 - Single 1550nm fiber Tx

FC1-15T2 - Dual 1550nm fiber Tx

FC1-R1 - Single fiber Rx

FC1-R2 - Dual fiber Rx

FC1-13TR - Fiber transceiver 1310nmTx/Rx

FC1-HDBT2 - HD-BNC Dual Tx

FC1-HDBR2 - HD-BNC Dual Rx

Fiber CWDM Tx - Wavelengths available on request

Note: SFP type must be ordered in addition to the module.

IQDNC01

3G/HD/SD-SDI Down Converter with Analog Monitoring Outputs

The IQDNC01 provides down conversion for 3Gbps SDI, and HD-SDI digital video signals. Using high quality motion adaptive de-interlacing and flexible scaling technology the IQDNC01 is a high quality conversion module featuring analog monitoring outputs with comprehensive audio and video processing to provide an efficient monitoring and processing package. IQDNC01 includes a variable aspect ratio converter with reading and writing of WSS, VI and 2016 AFD signalling. Audio is also comprehensively handled with audio channel routing, delay adjustment and level controls. Video metadata such as timecode, SMPTE2020 Dolby, closed captions and teletext captions can also be passed through the module or processed according to the required output standard.

To allow the module to be further tailored to system requirements a series of hardware and software options is available to provide color correction for video, and advanced audio processing features such as Dolby E/D encoding or decoding, stereo to 5.1 upmixing and loudness processing using industry recognised technology from Linear Acoustic.

Features

- High quality down conversion for 3G/HD-SDI video inputs with additional Component, YC or composite outputs
- De-embed existing audio channels and output them as analog audio with 24-bit resolution
- Dual SDI inputs with auto switching on pre-defined input errors
- Aspect ratio conversion including 9 preset ARC maps, up to 22 ARC memories, selectable border color and pan, tilt, size, and input crop adjustments
- Aspect ratio control (signalling reading and writing) using ETSI WSS and AFD Video Index signaling (RP186, SMPTE 2016)
- Video proc. features include: gain, offset, hue, horizontal picture enhancement, RGB gamut legalization and noise reduction
- Metadata support - Closed caption passing or processing for CEA608/708 and OP42/OP47/WST captions, and VITC or RP188 timecode translation
- In-built test pattern generator and 2 x 16 character caption generator
- Processed and reclocked signal paths allow the selected SDI input to be converted or passed through at the same format
- Processing for 16 channels of embedded audio present on the incoming SDI stream
- Audio proc. features including: channel routing, gain, invert, fixed and tracking delays, mixing, and eight internal tone generators
- Dolby E support – Optional Dolby E/D decoding or encoding with both RS485 and SMPTE2020 metadata support, plus detection of PCM/non-PCM audio to SMPTE 337/338M, pair routing and Dolby E header alignment
- Advanced audio processing options from Linear Acoustic for stereo upmixing to 5.1 surround sound and loudness level measurement and control
- 16 x user memories and 2 GPI/O ports
- RollCall control and monitoring compatible with standard logging and reporting features
- RollTrack triggers available for detected module states including: PCM/non-PCM audio and input loss/freeze

Why should you choose this module?

- Analog video and audio outputs make this module ideal for local monitoring applications
- High quaility down conversion technology provides sharp SD outputs suitable for broadcast applications
- Comprehensive audio processing functions allow complete control over embedded audio feeds
- Full RollCall and SNMP compatibility allows easy integration with SAM or third party network management systems providing an all-inclusive monitoring and control solution

Order codes
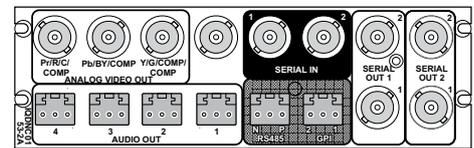
IQDNC0153-2A3, IQDNC0153-2B3
3G/HD/SD-SDI Down converter with analog outputs. 2 SDI inputs, 4 selectable main or bypassed SDI outputs, 1 component or 3 composite PAL/NTSC ouputs, 4 analog audio outputs, 2 GPI/O

Hardware and Software Options

IQOPTA-DBD Hardware option to add a single Dolby E/D decoder

IQOPTA-DBE-D Hardware option to add a single Dolby D encoder

IQOPTA-DBE-E Hardware option to add a single Dolby E encoder

IQOPTA-LOUD51 Software option to add Linear Accoustic AeroMax 5.1 loudness processing

IQOPTA-LOUDA2 Software option to add first channel of Linear Accoustic AeroMax 2.0 loudness processing

IQOPTA-LOUDB2 Software option to add second channel of Linear Accoustic AeroMax 2.0 loudness processing

IQOPTA-UPMIX Software option to add Linear Acoustic UPMAX stereo to 5.1 upmixing

IQOPTA-CC Software option to add color correction

For more details on enclosure types please refer to Frames & Hardware section.

IQDNC01 — 3G/HD/SD-SDI Down Converter with Analog Monitoring Outputs
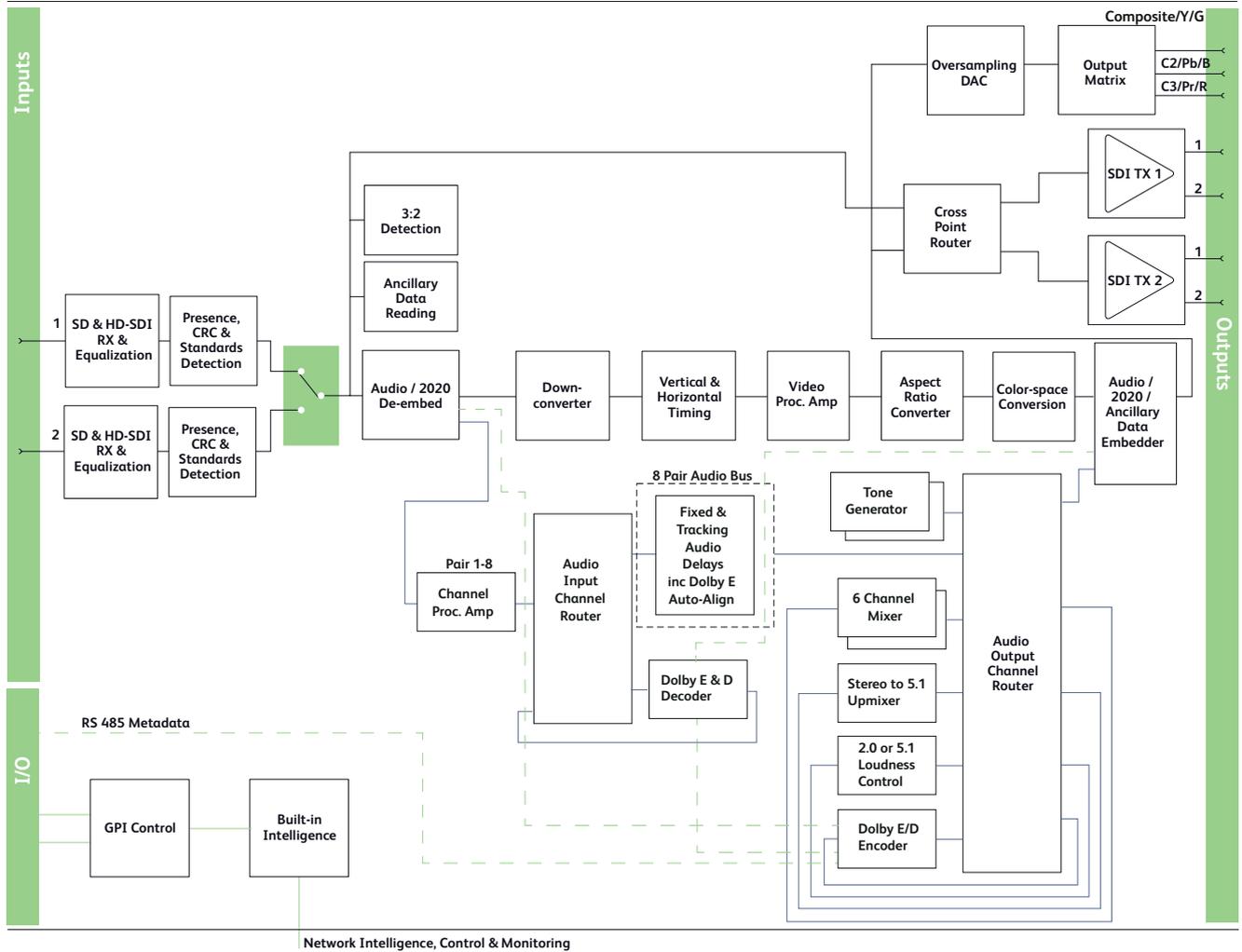
Block Diagram for IQDNC0153-2A3

Technical Specification

Inputs & Outputs

Video Signal Inputs

SDI Inputs	2x
Input Cable Length	Up to 80m Belden 1694A @ 3 Gbit/s
	Up to 180m Belden 1694A @ 1.5 Gbit/s
	>350m Belden 1694A @ 270 Mbit/s

Video Signal Outputs

SDI Outputs	x 4
Analog Outputs	x 3 composite outputs,
	x 1 YC,
	x 1 component output, YPbPr or GBR
Control Interface	
GPI	2 x Closing contact I/O interface (ST)

Controls

Video Delay

Video H-Delay	0 – 1 Line in pixel clock steps
Video V-Delay	0 – 1 Frame in 1 line steps

Map of input to output standards		Output							
		25		50		29.97		59.94	
		576i	1080i	720P	1080P	480i	1080i	720P	1080P
Input 25	576i	✔	✗	✗	✗	✗	✗	✗	✗
	1080i	✔	✔	✗	✗	✗	✗	✗	✗
50	720P	✔	✗	✔	✗	✗	✗	✗	✗
	1080P	✔	✗	✗	✔	✗	✗	✗	✗
29.97	480i	✗	✗	✗	✗	✔	✗	✗	✗
	1080i	✗	✗	✗	✗	✔	✔	✗	✗
59.94	720P	✗	✗	✗	✗	✔	✗	✔	✗
	1080P	✗	✗	✗	✗	✔	✗	✗	✔

Format Conversion I/O Grid

IQDNC01   3G/HD/SD-SDI Down Converter with Analog Monitoring Outputs

Technical Specification cont...

Video Delay Frames	0 – 26 frames @ 1080 59p
	0 – 21 frames @ 1080 50p
	0 – 26 frames @ 1080 29i
	0 – 21 frames @ 1080 25i
	0 – 54 frames @ 720 59p
	0 – 44 frames @ 720 50p
	0 – 147 frames @ 525 29i
	0 – 122 frames @ 625 25i
Dolby E auto line select	Std, user select
Dolby E auto align	On/Off

Video Controls

Input Select	Input 1, Input 2
Input Backup Enable	On/Off
Priority	None, Master (input 1), Backup (input 2)
Change-over Parameters	Carrier Loss, Standard mismatch, CRC and ANC Error, Embedded audio loss
Change-over Time Delay	0s to 10s
Reversion Delay	0 to 100s
Down Conversion	1080p, 1080i, 720p, SD
Default Video Output Type	Pattern, Freeze, Black
Pattern Select	100% Color Bars, 75% Color Bars, SMPTE Bars, Tartan Bars, Black, Pluge, Ramp, H Sweep, Pulse & Bar, Multi-burst
Output Routing	Processed, Reclocked Bypass
Analog Output Select	Composite, YC, YPbPr, GBR
Analog Output Standard	SMPTE, Betacam
NTSC Pedestal	On/Off
Output Mode	Input, Black, Freeze, Pattern
Colorimetry	Auto, None, Rec601, BT709
H Enhance Frequency	Off, Low, Medium, High
H Enhance Presets	Low, Medium, High, Super, Custom
Borders	R/G/B 0-255 in steps of 1
Border Adjust	Left, Right, Top, Bottom
RGB Legalizer	700 mV, 721 mV, 735 mV, 746 mV
Black Level	±200 mV in steps of 1 mV
Hue Adjust	±180° in steps of 1°
Master Video Gain	+6 to -120 dB
Y-Gain	+6 to -120 dB
Cb/Cr Gain	+6 to -120 dB
Caption Enable	On/Off
Edit Caption	16 characters
Caption Adjust	X-Y Size & Position
Metadata support	Closed Captions CC608-708 (compatibility bytes), WST-OP47, VITC-ATC

Aspect Ratio Conversion

Signalling type	WSS (ETSI or AFD), VI (SMPTE or AFD), SMPTE 2016

Select from 9 standard preset conversions:

Full Frame
Box 16:9 top > 16:9
4:3 box 14:9 top > 16:9
Box 16:9 > 16:9
Box 4:3 > 4:3
4:3 > box 16:9
16:9 > box 4:3
4:3 box 14:9 > 16:9
16:9 box 14:9 > 4:3

Display Memories	32 User configurable ARC display memories
Size	60% to 150% in 0.1% steps.
Aspect	60% to 200% in 0.1% steps.
Pan / Tilt	±75% in 0.1% steps
Input crop	Left / Right / Top / Bottom

Audio Controls

Audio In - Embedded

Audio In-Disembed	Pairs 1-8
Channel 1 – 16 Mute	On/Off
Channel 1 – 16 Polarity Inv	On/Off
Channel 1 – 16 Gain	+12 dB to -80 dB in 0.1 dB steps
Pair 1 – 8 Stereo	Link channel pairs

Audio Out - Embedded

Group 1 -4 Enable	On/Off
Audio Out-embed	Pairs 1-8
Channel 1 – 16 Mute	On/Off
Channel 1 – 16 Gain	+12 dB to -80 dB in 0.1 dB steps
Pair 1 – 8 Stereo	Link channel pairs

Audio Out - Analog

Channel 1 – 4 Mute	On/Off
Channel 1 – 4 Gain	+12 dB to -80 dB in 0.1 dB steps
Analog 1 – 2 Stereo	Link Channel Pairs

Audio Routing

Input routing Bus 1-8	Disembed 1-8, Dolby Decoder 1-5*
Output routing embed 1-8	Bus 1-8, Mixers 1-4, Downmixer 1-2, silence, Tones 1-8, Upmix*/Loudness*, Dolby Encoder 1-5*
Output routing Analog 1-2	Bus 1-8, Mixers 1-4, Downmixer 1-2, silence, Tones 1-8, Upmix*/Loudness*, Dolby Encoder 1-5*

* indicates optional feature

Audio Setup Controls – Bus 1-8

Delay Add-In Bulk, RollTrack, current video	On/Off
Bulk Manual Delay	-520ms to +2s in 0.17ms steps
Coarse Manual Pair Delay	±1.995s in 1ms steps
Fine Manual Delay	±5ms in 0.02ms steps
Fast or smooth delay limit	5ms to 80ms
Silence Detect	-2dBFS to -128dBFS in steps of 1dB
Signal Overload Detect	-1dBFS to -127dBFS in steps of 1dB
Warning Timer	1 to 20 seconds in steps of 1 second
Tone Frequency 1-8	100Hz to 16kHz in 100Hz steps
Analog Output Headroom	4dB to 24dB in 1dB steps
Analog Output Line Up Level	-20dBU to 20dBU in 1dB steps (with 4dB Headroom setting)

Dolby Decoder

Decoder Source	Disembed 1-8
Detection Mode	Auto, dolby E, Dolby D, Mute
AES Channel Select	Channel 1, 2
PCM Latency	Single Frame, Minimum
Dolby D listening mode	Full, EX, 3 Stereo, Phantom, Stereo, Mono
Dolby D Dynamic Range	Line, RF, Bypass
Metadata Program	1, 2
Input Metadata	RS-485, SMPTE 2020

IQDNC01

3G/HD/SD-SDI Down Converter with Analog Monitoring Outputs

Technical Specification cont...

Dolby Encoder

Encoder Source	Bus 1-8, Upmix*/Loudness*, Silence
Metadata Source	Prog 1-8, Internal
Internal Metadata control	
	Program Descriptor, Dialog Norm, Audio Production information, Extended BSI1, BSI2, Internal Config, Bitstream Mode, RF Mode, Line Mode, Surround Mode, Mix Level (Surround, Centre, LtRt, LoRo), Internal Config setting (e.g. 5.1+2)
Mode	Encode, Pass through
Bit Depth	Dolby D - 32 bit, 16 bit
	Dolby E - 20 bit, 16 bit
SRC	Enable, Disable
Stream Number	0-6

Audio Mixers

Mixer Select	1-4, Downmix 1 -2
Source select	Bus 1-8, Silence, Tones 1-8
Source Gain	12dB to -80dB in 0.1dB steps
Mixer 1-4 invert	On/Off
Mixer 1-4, Downmix 1-2 Mute	
	On/Off
Downmix Configuration	LoRo, 4 level selections

Other Controls

GPI input High/Low Select	
	Input 1-2, Black, Freeze, Pattern, User Memories 1-16, ARC Display Memories 1-32
GPI Level Invert	High/Low
GPI Output Source	Current input OK, Input 1-2 OK, Input 1-2 Selected, Black, Freeze, Pattern, No User Memories Selected, User Memories 1-16, No ARC Display Memories Selected, ARC Display Memories 1-32
RS-485 Port	Output Dolby decoder, Output SMPTE 2020 Disembed, Input
SMPTE 2020 embedder	Dolby decoder, RS-485 Port, SMPTE 2020 Disembed
User Memories	Save/Recall/Rename
Memory Naming	User configurable naming of Memories 1 – 16
Information Window	Video Input Status, Audio Input Status, EDH/CRC & ANC Status
EDH/CRC Reset	Resets all EDH/CRC counts
RollTrack Index	Allows up to 70 destinations
RollTrack Sources	Unused, Video Delay, Audio Delay, Input Present (1-2), Input Loss (1-2), Output Std, Input selected (1-2), Output Black, Freeze or Pattern on, Output Black, Freeze or Pattern off, Output Caption on, Output Caption off, Embedded Audio (Pairs 1-8) PCM, Embedded Audio (Pairs 1-8) Non-PCM, Embedded Audio (Pairs 1-8) Loss, Dolby Decoder Input Type, Encoder active/pass-through, Dolby Metadata valid/missing
Factory Default	Resets all module settings to factory specified default values and clears memories
Default Settings	Resets all module settings to factory specified defaults but does not clear user memories
Restart	Software reset of module
Module Information	Reports: Product Name
	Software version, Serial number, Build number, KOS version, PCB version, Licensed Options
Input Names	19 Character editable name

Specifications

Electrical	3Gbit/s SDI, SMPTE 424M 1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C / DVB-ASI
Connector / Format	BNC/ 75ohm panel jack on standard IQ connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s) >-10dB (3Gbit/s)
Output Jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz), 3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)
Video Standards	1125(1080)/50p, 1125(1080)/59p, 750(720)/50p, 750(720)/59p, 1125(1080)/25i, 1125(1080)/25p, 1125(1080)/25psf, 1125(1080)/29i, 625(576)/25i, 525(480)/29i
Embedded audio handling	
	HD - 24-bit synchronous 48 kHz to SMPTE 299M, SD - 20-bit synchronous 48 kHz to SMPTE 272M-A

Analog Audio Outputs

Output Level	Adjustable +12 dBu to +24 dBu
Output Impedance	~25 Ohms
THD+N	-97 dB at 18 dBu, typical at 1 kHz
Conversion	32-bit sampling @ 48kHz – 107 dB dynamic range typical

Power Consumption

Module Power Consumption	
	28 W Max (A Frames)
	25.5 PR (B Frames)

Note: Dolby option adds 2.5W (PR)

IQUPC30

SDI Upconverter with Frame Synchronizer

The IQUPC30 provides multi-rate up conversion for SD-SDI digital video signals. Using high quality motion adaptive de-interlacing and flexible scaling technology the IQUPC30 is a broadcast quality conversion module able to handle applications such as upconversion for SD content repurposing on HD channels.

IQUPC30 includes a frame synchronizer, capable of referencing to a SD bi-level or HD tri-level reference and a variable aspect ratio converter with reading and writing of WSS, VI and 2016 AFD signalling. Audio handling includes audio channel routing, delay adjustment and level controls. Video metadata such as timecode, closed captions and teletext captions can also be passed through the module or processed according to the required output standard.

To allow the module to be further tailored to system requirements software options are available to provide noise reduction and side-bar keying, and versions are available with SFP cages enabling fiber conversion or additional electrical outputs on HD-BNCs.

Features

- High quality up conversion for SDI video inputs including conversion aperture control
- Frame synchronizer with HD Tri-sync / SD Bi-Level Reference Input and input loss detection
- Aspect ratio conversion including preset ARC maps relative to conversion modes, selectable pan, tilt, aspect, size, and output crop adjustments
- Aspect ratio control (signalling reading and writing) using ETSI WSS and AFD Video Index signaling (RP186, SMPTE 2016)
- Video proc. features include: gain, offset, hue, horizontal and vertical picture enhancement, and RGB gamut legalization
- Metadata support - Closed caption passing or processing for CEA608/708 and OP42/OP47/WST captions, VITC or SMPTE12M

  timecode translation, and Ancillary data bridge for 7 blocks of ANC data passing
- In-built test pattern generator and 19 character scrolling caption generator
- Additional processing options including; noise reduction (adaptive spatial and recursive), side-bar keying and linear frame rate conversion
- Processing for 16 channels of embedded audio present on the incoming SDI stream with no disturbance during video synchronizer frame wraps or drops
- Audio proc. features including: channel routing, gain, invert, delay and tone generator
- Non-PCM processing features pair level routing and delay compensation. Dolby-E data is passed with a delay to match the video and with co-timed audio frame drop or repeat
- Dolby E support – Detection of PCM/non-PCM audio to SMPTE 337/338M, pair routing and Dolby E header re-alignment
- Integrated Fiber I/O support via SFP module
- 16 x user memories and 2 GPI/O ports
- RollCall control and monitoring compatible with standard logging and reporting features
- RollTrack triggers available for detected module states including: Input loss and reference loss

Why should you choose this module?

- High quality video conversion and frame synchronization allows fully flexible multi-format working and provides a future proof migration path as digital workflows evolve
- Comprehensive audio processing functions allow complete control over embedded audio signals for applications where channel routing, gain control or delay is required
- Full RollCall and SNMP compatibility allows easy integration with SAM or third party network management systems providing an all-inclusive monitoring and control solution

Inputs & Outputs - IQH3B enclosures

IQUPC3001-1B3

IQUPC3003-1B3

Inputs & Outputs - IQH3A/1A/3B enclosures

IQUPC3000-1A3, IQUPC3000-1B3
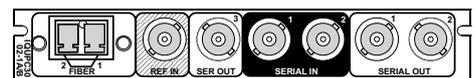
IQUPC3002-1A3, IQUPC3002-1B3

For more details on enclosure types please refer to datasheet IQH3B.

IQUPC30

SDI Upconverter with Frame Synchronizer

Frame References

Adjustable 525, 625 & Tri-level Reference

Ref Loop

Inputs

1 SFP RX

2 SFP RX

1 SD/HD-SDI RX, Eq & Detection

2 SD/HD-SDI RX, Eq & Detection

Cross Point Router

Ancillary Data Reading

Audio De-embed

1-16

Upconverter with Sync

Noise Reduction Option

Video Proc. Amp & RGB Legalizer

Aspect Ratio Converter with AFD & WSS

Color corrector, H&V Detail Enhancement

Line Synchronizer

Side-bar Keyer option

Audio Process Pair Router

Pair 1-8

Tone Generator

18 x 16 Channel Router

8 Pair Proc Amp

8 Pair Fixed & Tracking Audio Delays inc Dolby E Auto Align

1-16

Audio / Ancillary Data Embedder

SFP TX 1 — 1

SFP TX 2 — 2

SDI TX 1 — 1 / 2

SDI TX 2 — 3 / 4

SDI TX 3 — 5

Outputs

Built-in Intelligence

GPI Control

I/O

Note: Number of inputs and outputs depends on SFP and rear panel type

Network Intelligence, Control & Monitoring

Block Diagram for IQUPC30 Range

Technical Specification

Inputs & Outputs
Video Signal Inputs

SDI Inputs   2x
Input Cable Length   Up to 80m Belden 1694A @ 3 Gbit/s
                           Up to 120m Belden 1694A @ 1.5 Gbit/s
                           100m typical (with output set to 1080p rates),
                           Belden 1694A @ 270 Mbit/s
Input Standard (auto detect)
                           625(576)/25i, 525(480)/29i
Analog Reference   1 x Analog Reference with passive loop-through
                           Black (HD tri-level and SD bi-level) and Black
                           Burst (SD bi-level)
                           SD bi-level – RS170A
                           HD Tri-level – SMPTE 240M, 274M

Fiber Signal Input

Inputs   Up to 2
Optical   270 Mbit/s SD-SDI
Connector / Format   LC singlemode
Standard   SMPTE 297-2006

Map of input to output standards		Output							
		25		50		29.97		59.94	
		576i	1080i	720P	1080P	480i	1080i	720P	1080P
Input	25 576i	✔	✔	✔	✔	✘	✘	✘	✘
	25 1080i	✘	✘	✘	✘	✘	✘	✘	✘
	50 720P	✘	✘	✘	✘	✘	✘	✘	✘
	50 1080P	✘	✘	✘	✘	✘	✘	✘	✘
	29.97 480i	✘	✘	✘	✘	✔	✔	✔	✔
	29.97 1080i	✘	✘	✘	✘	✘	✘	✘	✘
	59.94 720P	✘	✘	✘	✘	✘	✘	✘	✘
	59.94 1080P	✘	✘	✘	✘	✘	✘	✘	✘

Format Conversion I/O Grid

IQUPC30 — SDI Upconverter with Frame Synchronizer

Technical Specification cont…

Video Signal Outputs

SDI Outputs	up to 5
Output standard	625(576)/25i, 525(480)/29i
	720 50/59p, 1080 50/59i
	1080 50/59p level A/B

Fiber Signal Output

Optical	3 GBit/s HD-SDI, 1.485 Gbit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format	LC singlemode
Conforms to	SMPTE 297-2006
Outputs	Up to 2

*Note: Optical I/O and control dependant on type of SFP module fitted

Control Interface

GPI	2 x Closing contact I/O interface (ST) (rear panel dependant)

Conversion Functions

Modes	Up conversion
	Aspect ratio conversion synchronization
Conversion processing	Still process: Detects still images and applies an aperture with full (progressive) vertical frequency response
	Enhanced still: Adds field motion detection to still process. Prevents artifacts on moving repetitive patterns
Aspect ratio conversion (manual or auto)	AFD (SMPTE 2016), VI (RP186), WSS (L23)
SD input format	Normal 4:3, Anamorphic 16:9, Letterbox 14:9, Letterbox 16:9
SD output format	Normal 4:3, Anamorphic 16:9, Letterbox 14:9, Letterbox 16:9
Metadata	Closed caption CE608 <> CE708
	Timecode conversions
	Teletext subtitles WST/RDD8 conversion

Audio Functions

Embedded audio	16-channel embedded audio processing
	PCM audio processing includes channel level gain and delay compensation, as well as channel level routing with L/R swap and phase invert feature
	Non-PCM processing features pair level routing and delay compensation. Dolby E data is passed with a delay to match the video and with co-timed audio frame drop or repeat
Embedded audio	Enable/Blank

Embedded Audio Routing

Processed pair 1-8	Disembed 1-8
Output Channels 1-16	Processed pair 1-8, Tone, Silence

Processed Audio Control

Invert Phase	Channels 1-16
Pair 1 to 8 Gain L/R	+18 dB to -18 dB in 0.1 dB steps
Pair 1-8 Manual Delay	-40 to +200 ms in 1 ms steps
Global Manual Delay	-40 to +200 ms in 1 ms steps

Dolby-E

Dolby-E Auto Alignment	+/- 10 line offset in 1 line steps

Tone

Frequency	100Hz to 10kHz in 100Hz steps

Processing Functions

Ancillary Data	Pass/Strip
Freeze	On/Off
Legalizer	On/Off
Genlock	Reference lock, Input lock (same format), Free run
Memories	16 user memories
Pattern	Off, Black, Ramp, Bars
Caption	On/Off, Scrolling
Edit Caption	19 characters available

Proc amp

Black Level:	+100 to -100 mV (0) in 0.8 mV steps
Contrast:	-6 dB to +6 dB (0) in 0.2 dB steps
Saturation:	-6 dB to +6 dB (0) in 0.2 dB steps
Y Gamma:	0.4 to 1.7 (1) in 0.1 steps
YC Offset:	-20 to 20 (0) in 2 Luma pixel steps
	Note: Defaults shown in brackets

Enhancement

Nonlinear Enhancer	Frequency Band Selection: Low, Med, High
	Four preset enhancement modes: Low, Med, High, Super
	Manual enhancement mode with H Gain and H Noise rejection levels

Conversion Aperture

Vertical	Frequency Band Selection: Low, Med, High
	Five vertical preset enhancement levels: Soft 2, Soft 1, Normal, Sharp 1, Sharp 2
Horizontal	Five horizontal preset sharpness levels: Low 2, Low 1, Normal, High 1, High 2
	Five horizontal preset detail levels: Soft 2, Soft 1, Normal, Sharp 1, Sharp 2

Other Controls
GPI input Low/High Select

	Black, Freeze, Pattern, User Memories 1-16
GPI Output Source	Black, Freeze, Pattern
User Memories	16 x Save, Recall, Rename
Memory Naming	User configurable naming of memories 1 – 16
RollTrack Index	Up to 50 RollTrack destinations
Optical Logging*	Tx Laser Bias High Warning
	Tx Power Low Warning
	Tx Power High Warning
Laser Wavelength	Input 1 (2) Rx Power High Warning
	Input 1 (2) Rx Power Low Warning
	Input 1 (2) Rx Power Measurement
RollTrack Sources	Unused, Input Present (1&2, Fiber 1 & 2) , Input Loss (1&2, Fiber 1 & 2), Reference OK & Loss
Information Window	Video Input Status, Reference Status
Factory Default	Resets all module settings to factory specified default values and clears memories
Default Settings	Resets all module settings to factory specified defaults but does not clear memories
Module Information	Reports following module information: Software version, Serial number, Rear Panel ID, Frame Slot

IQUPC30

SDI Upconverter with Frame Synchronizer

Technical Specification cont...

Specifications

Electrical	3Gbit/s SDI, SMPTE 424M 1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C
Connector / Format	BNC/ 75ohm panel jack on standard IQ connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s) >-10dB (3Gbit/s)
Output Jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz), 3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)
Reference Source	External – HD Tri-Level / SD Bi-level / Input Video syncs
Electrical	Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level) SD bi-level – RS170A HD Tr-level – SMPTE 240M and 274M
Connector / Format	BNC/75 ohm panel jack on standard IQ connector panel
Embedded audio handling	
	HD - 24-bit synchronous 48 kHz to SMPTE 299M, SD - 20-bit synchronous 48 kHz to SMPTE 272M-A

Optical 1310 nm Tx

Wavelength	1310 nm
Spectral width (FWHM)	>1.5 nm (typ)
Output power	0 to -5 dBm typical (-2 dBm typical)
Extinction ratio	>7.5:1 (typ)

Optical Rx

Input wavelength range	Min. 1260 nm, Max. 1620 nm
Optical power input range	> -0 dBm, < -20 dBm
Link distance	Up to 30 Km

Power Consumption

Module Power Consumption with Fiber

	13W (A frames)
	13PR (B frames)

Ordering Information

Order codes for IQH3B enclosures

IQUPC3000-1B3
Upconverter . 2 SDI inputs, external reference loop & enclosure reference inputs, 4 SDI outputs

IQUPC3001-1B3
Upconverter . 2 SDI inputs, 5 SDI outputs, 2 GPI/Os, reference inputs from enclosure

IQUPC3002-1B3
Upconverter . 2 SDI inputs, external reference input & enclosure reference inputs, 3 SDI outputs, single SFP cage

IQUPC3003-1B3
Upconverter . 2 SDI inputs, 4 SDI outputs, single SFP cage, reference inputs from enclosure

Order codes for IQH3A/1A enclosures

IQUPC3000-1A3
Upconverter . 2 SDI inputs, reference loop, 4 SDI outputs

IQUPC3002-1A3
Upconverter . 2 SDI inputs, reference input, 3 SDI outputs, single SFP cage

For more details on enclosure types please refer to datasheet IQH3B

Software Options

IQOPTM-NR - Software option to add noise reduction

IQOPTM-SBK - Software option to add side-bar keying

IQOPTM-UDC - Software option for upgrade to up, down and cross conversion

IQOPTM-LC - Software option to upgrade with Linear frame rate conversion

SFP options

FC1-13T1 - Single 1310nm fiber Tx

FC1-13T2 - Dual 1310nm fiber Tx

FC1-15T1 - Single 1550nm fiber Tx

FC1-15T2 - Dual 1550nm fiber Tx

FC1-R1 - Single fiber Rx

FC1-R2 - Dual fiber Rx

FC1-13TR - Fiber transceiver 1310nmTx/Rx

FC1-HDBT2 - HD-BNC Dual Tx

FC1-HDBR2 - HD-BNC Dual Rx

Fiber CWDM Tx - Wavelengths available on request

Note: SFP type must be ordered in addition to the module.

IQUPC00

HD/SD-SDI Up Converter with Synchronizer

The IQUPC00 provides same frame rate up conversion for digital video signals from SD to HD, or 3Gbps. Using high quality motion adaptive de-interlacing and flexible scaling technology the IQUPC00 is a broadcast quality conversion module combining a large amount video and audio processing features to provide a highly integrated space efficient package.

IQUPC00 includes a frame synchronizer, capable of referencing to a SD bi-level or HD tri-level reference and a variable aspect ratio converter with reading and writing of WSS, VI and 2016 AFD signalling. Audio is also comprehensively handled with audio channel routing, delay adjustment and level controls. Video metadata such as timecode, SMPTE2020 Dolby, closed captions and teletext captions can also be passed through the module or processed according to the required output standard.

To allow the module to be further tailored to system requirements a series of hardware and software options is available to provide color correction for video, and advanced audio processing features such as Dolby E/D encoding or decoding, stereo to 5.1 upmixing and loudness processing using industry recognised technology from Linear Acoustic.

Features

- High quality up conversion for SDI video inputs
- Dual SDI inputs with auto switching on pre-defined input errors
- Frame synchronizer with HD Tri-sync / SD Bi-Level Reference Input, input loss detection and video delay up to 21 frames at 1080, 44 frames at 720 and 122 frames at 625
- Aspect ratio conversion including 9 preset ARC maps, up to 22 ARC memories, selectable border color and pan, tilt, size, and input crop adjustments
- Aspect ratio control (signalling reading and writing) using ETSI WSS and AFD Video Index signaling (RP186, SMPTE 2016)
- Video proc. features include: gain, offset, hue, horizontal picture enhancement, RGB gamut legalization and noise reduction
- Metadata support - Closed caption passing or processing for CEA608/708 and OP42/OP47/WST captions, and VITC or RP188 timecode translation
- In-built test pattern generator and 2 x 16 character caption generator
- Processed and reclocked signal paths allow the selected SDI input to be converted or passed through at the same format
- Processing for 16 channels of embedded audio present on the incoming SDI stream with no disturbance during video synchronizer frame wraps or drops
- Audio proc. features including: channel routing, gain, invert, fixed and tracking delays, mixing, synchronizer wrap/drop processing and eight internal tone generators
- Dolby E support – Optional Dolby E/D decoding or encoding with both RS485 and SMPTE2020 metadata support, plus detection of PCM/non-PCM audio to SMPTE 337/338M, pair routing and Dolby E header alignment
- Advanced audio processing options from Linear Acoustic for stereo upmixing to 5.1 surround sound and loudness level measurement and control
- 16 x user memories and 2 GPI/O ports
- RollCall control and monitoring compatible with standard logging and reporting features
- RollTrack triggers available for detected module states including: PCM/non-PCM audio, input loss/freeze and reference loss
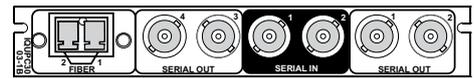
Why should you choose this module?

- High quality video conversion and frame synchronization allows fully flexible multi-format working and provides a future proof migration path as digital workflows evolve
- Comprehensive audio processing functions allow complete control over embedded audio signals for applications where channel routing or mixing is required
- Full RollCall and SNMP compatibility allows easy integration with SAM or third party network management systems providing an all-inclusive monitoring and control solution

Order codes

IQUPC0054-2A3, IQUPC0054-2B3
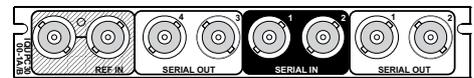Up converter with frame synchronizer. 2 SDI inputs, reference loop, 4 selectable main or bypassed SDI outputs, 2 GPI/Os

Hardware and Software Options

IQOPTA-DBD Hardware option to add a single Dolby E/D decoder

IQOPTA-DBE-D Hardware option to add a single Dolby D encoder

IQOPTA-DBE-E Hardware option to add a single Dolby E encoder

IQOPTA-LOUD51 Software option to add Linear Accoustic AeroMax 5.1 loudness processing

IQOPTA-LOUDA2 Software option to add first channel of Linear Accoustic AeroMax 2.0 loudness processing

IQOPTA-LOUDB2 Software option to add second channel of Linear Accoustic AeroMax 2.0 loudness processing

IQOPTA-UPMIX Software option to add Linear Acoustic UPMAX stereo to 5.1 upmixing

IQOPTA-CC Software option to add color correction

For more details on enclosure types please refer to Frames & Hardware section.

IQUPC00 — HD/SD-SDI Up Converter with Synchronizer
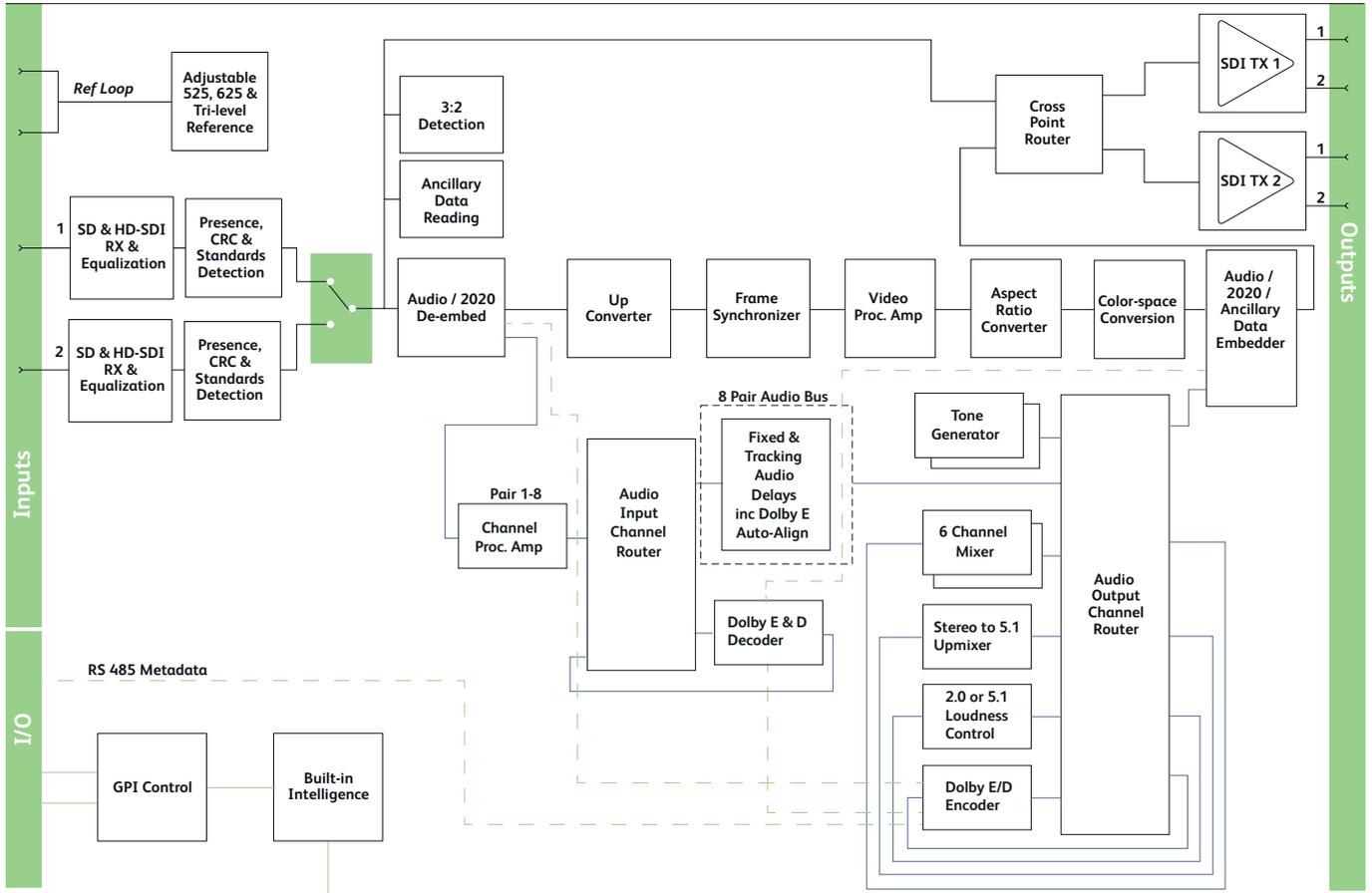
Block Diagram for IQUPC0054-2A3

Block diagram labels:
Ref Loop · Adjustable 525, 625 & Tri-level Reference · 3:2 Detection · Ancillary Data Reading · 1 SD & HD-SDI RX & Equalization · Presence, CRC & Standards Detection · 2 SD & HD-SDI RX & Equalization · Presence, CRC & Standards Detection · Audio / 2020 De-embed · Up Converter · Frame Synchronizer · Video Proc. Amp · Aspect Ratio Converter · Color-space Conversion · Audio / 2020 / Ancillary Data Embedder · Cross Point Router · SDI TX 1 · SDI TX 2 · Pair 1-8 · Channel Proc. Amp · Audio Input Channel Router · 8 Pair Audio Bus · Fixed & Tracking Audio Delays inc Dolby E Auto-Align · Tone Generator · 6 Channel Mixer · Stereo to 5.1 Upmixer · 2.0 or 5.1 Loudness Control · Dolby E/D Encoder · Audio Output Channel Router · Dolby E & D Decoder · RS 485 Metadata · GPI Control · Built-in Intelligence · Network Intelligence, Control & Monitoring · Inputs · I/O · Outputs

Technical Specification

Inputs & Outputs

Video Signal Inputs

SDI Inputs	2x
Input Cable Length	Up to 80m Belden 1694A @ 3 Gbit/s
	Up to 180m Belden 1694A @ 1.5 Gbit/s
	>350m Belden 1694A @ 270 Mbit/s
Analog Reference	1 x Analog Reference with passive loop-through
	Black (HD tri-level and SD bi-level) and Black
	Burst (SD bi-level)
	SD bi-level – RS170A
	HD Tri-level – SMPTE 240M, 274M and 296M

Video Signal Outputs

SDI Outputs	x 4

Control Interface

GPI	2 x Closing contact I/O interface (ST)

Controls

Genlock & Video Delay

Genlock Mode	Free-run, Lock to Reference, Lock to input
Genlock H-Phase	± 1 H in pixel clock steps
Genlock V-Phase	± 1 F in 1 line steps
Video H-Delay	0 – 1 Line in pixel clock steps
Video V-Delay	0 – 1 Frame in 1 line steps

Map of input to output standards			Output							
			25		50		29.97		59.94	
			576i	1080i	720P	1080P	480i	1080i	720P	1080P
Input	25	576i	✔	✔	✔	✔	✗	✗	✗	✗
		1080i	✗	✔	✗	✗	✗	✗	✗	✗
	50	720P	✗	✗	✔	✗	✗	✗	✗	✗
		1080P	✗	✗	✗	✔	✗	✗	✗	✗
	29.97	480i	✗	✗	✗	✗	✔	✔	✔	✔
		1080i	✗	✗	✗	✗	✗	✔	✗	✗
	59.94	720P	✗	✗	✗	✗	✗	✗	✔	✗
		1080P	✗	✗	✗	✗	✗	✗	✗	✔

Format Conversion I/O Grid

Technical Specification cont…

Video Delay Frames	0 – 26 frames @ 1080 59p
	0 – 21 frames @ 1080 50p
	0 – 26 frames @ 1080 29i
	0 – 21 frames @ 1080 25i
	0 – 54 frames @ 720 59p
	0 – 44 frames @ 720 50p
	0 – 147 frames @ 525 29i
	0 – 122 frames @ 625 25i
Dolby E auto line select	Std, user select
Dolby E auto align	On/Off

Video Controls

Input Select	Input 1, Input 2
Input Backup Enable	On/Off
Priority	None, Master (input 1), Backup (input 2)
Change-over Parameters	Carrier Loss, Standard mismatch, CRC and ANC Error, Embedded audio loss
Change-over Time Delay	0s to 10s
Reversion Delay	0 to 100s
Conversion	1080p, 1080i, 720p, SD
Default Video Output Type	Pattern, Freeze, Black
Pattern Select	100% Color Bars, 75% Color Bars, SMPTE Bars, Tartan Bars, Black, Pluge, Ramp, H Sweep, Pulse & Bar, Multi-burst
Output Routing	Processed, Reclocked Bypass
Output Mode	Input, Black, Freeze, Pattern
Colorimetry	Auto, None, Rec601, BT709
H Enhance Frequency	Off, Low, Medium, High
H Enhance Presets	Low, Medium, High, Super, Custom
Borders	R/G/B 0-255 in steps of 1
Border Adjust	Left, Right, Top, Bottom
RGB Legalizer	700 mV, 721 mV, 735 mV, 746 mV
Black Level	±200 mV in steps of 1 mV
Hue Adjust	±180° in steps of 1°
Master Video Gain	+6 to -120 dB
Y-Gain	+6 to -120 dB
Cb/Cr Gain	+6 to -120 dB
Caption Enable	On/Off
Edit Caption	16 characters
Caption Adjust	X-Y Size & Position
Metadata support	Closed Captions CC608-708 (compatibility bytes), WST-OP47, VITC-ATC

Aspect Ratio Conversion

Signalling type	WSS (ETSI or AFD), VI (SMPTE or AFD), SMPTE 2016

Select from 9 standard preset conversions:

	Full Frame
	Box 16:9 top > 16:9
	4:3 box 14:9 top > 16:9
	Box 16:9 > 16:9
	Box 4:3 > 4:3
	4:3 > box 16:9
	16:9 > box 4:3
	4:3 box 14:9 > 16:9
	16:9 box 14:9 > 4:3
Display Memories	32 User configurable ARC display memories
Size	60% to 150% in 0.1% steps.
Aspect	60% to 200% in 0.1% steps.
Pan / Tilt	±75% in 0.1% steps
Input crop	Left / Right / Top / Bottom

Audio Controls
Audio In - Embedded

Audio In-Disembed	Pairs 1-8
Channel 1 – 16 Mute	On/Off
Channel 1 – 16 Polarity Inv	On/Off
Channel 1 – 16 Gain	+12 dB to -80 dB in 0.1 dB steps
Pair 1 – 8 Stereo	Link channel pairs

Audio Out - Embedded

Group 1 -4 Enable	On/Off
Audio Out-embed	Pairs 1-8
Channel 1 – 16 Mute	On/Off
Channel 1 – 16 Gain	+12 dB to -80 dB in 0.1 dB steps
Pair 1 – 8 Stereo	Link channel pairs

Audio Routing

Input routing Bus 1-8	Disembed 1-8, Dolby Decoder 1-5*
Output routing embed 1-8	Bus 1-8, Mixers 1-4, Downmixer 1-2, silence, Tones 1-8, Upmix*/Loudness*, Dolby Encoder 1-5*

* indicates optional feature

Audio Setup Controls – Bus 1-8

Delay Add-In	Bulk, RollTrack, current video
	On/Off
Bulk Manual Delay	-520ms to +2s in 0.17ms steps
Coarse Manual Pair Delay	±1.995s in 1ms steps
Fine Manual Delay	±5ms in 0.02ms steps
Fast or smooth delay limit	5ms to 80ms
Silence Detect	-2dBFS to -128dBFS in steps of 1dB
Signal Overload Detect	-1dBFS to -127dBFS in steps of 1dB
Warning Timer	1 to 20 seconds in steps of 1 second
Tone Frequency 1-8	100Hz to 16kHz in 100Hz steps

Dolby Decoder

Decoder Source	Disembed 1-8
Detection Mode	Auto, dolby E, Dolby D, Mute
AES Channel Select	Channel 1, 2
PCM Latency	Single Frame, Minimum
Dolby D listening mode	Full, EX, 3 Stereo, Phantom, Stereo, Mono
Dolby D Dynamic Range	Line, RF, Bypass
Metadata Program	1, 2
Input Metadata	RS-485, SMPTE 2020

Dolby Encoder

Encoder Source	Bus 1-8, Upmix*/Loudness*, Silence
Metadata Source	Prog 1-8, Internal
Internal Metadata control	Program Descriptor, Dialog Norm, Audio Production information, Extended BSI1, BSI2, Internal Config, Bitstream Mode, RF Mode, Line Mode, Surround Mode, Mix Level (Surround, Centre, LtRt, LoRo), Internal Config setting (e.g. 5.1+2)
Mode	Encode, Pass through
Bit Depth	Dolby D - 32 bit, 16 bit
	Dolby E - 20 bit, 16 bit
SRC	Enable, Disable
Stream Number	0-6

IQUPC00   HD/SD-SDI Up Converter with Synchronizer

Technical Specification cont…

Audio Mixers

Mixer Select	1-4, Downmix 1 -2
Source select	Bus 1-8, Silence, Tones 1-8
Source Gain	12dB to -80dB in 0.1dB steps
Mixer 1-4 invert	On/Off
Mixer 1-4, Downmix 1-2 Mute	
	On/Off
Downmix Configuration	LoRo, 4 level selections

Other Controls

GPI input High/Low Select	
	Input 1-2, Black, Freeze, Pattern, User Memories 1-16, ARC Display Memories 1-32
GPI Level Invert	High/Low
GPI Output Source	Current input OK, Input 1-2 OK, Input 1-2 Selected, Black, Freeze, Pattern, No User Memories Selected, User Memories 1-16, No ARC Display Memories Selected, ARC Display Memories 1-32
RS-485 Port	Output Dolby decoder, Output SMPTE 2020 Disemb, Input
SMPTE 2020 embedder	Dolby decoder, RS-485 Port, SMPTE 2020 Disembed
User Memories	Save/Recall/Rename
Memory Naming	User configurable naming of Memories 1 – 16
Information Window	Video Input Status, Audio Input Status, EDH/CRC & ANC Status
EDH/CRC Reset	Resets all EDH/CRC counts
RollTrack Index	Allows up to 70 destinations
RollTrack Sources	Unused, Video Delay, Audio Delay, Input Present (1-2), Input Loss (1-2), Output Std, Input selected (1-2), Output Black, Freeze or Pattern on, Output Black, Freeze or Pattern off, Output Caption on, Output Caption off, Embedded Audio (Pairs 1-8) PCM, Embedded Audio (Pairs 1-8) Non-PCM, Embedded Audio (Pairs 1-8) Loss, Reference OK & Loss, Dolby Decoder Input Type, Encoder active/pass-through, Dolby Metadata valid/missing
Factory Default	Resets all module settings to factory specified default values and clears memories
Default Settings	Resets all module settings to factory specified defaults but does not clear user memories
Restart	Software reset of module
Module Information	Reports: Product Name Software version, Serial number, Build number, KOS version, PCB version, Licensed Options
Input Names	19 Character editable name

Specifications

Electrical	3Gbit/s SDI, SMPTE 424M 1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C / DVB-ASI
Connector / Format	BNC/ 75ohm panel jack on standard IQ connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s) >-10dB (3Gbit/s)
Output Jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz), 3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)
Reference Source	External – HD Tri-Level / SD Bi-level / Input Video syncs
Electrical	Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level) SD bi-level – RS170A HD Tr-level – SMPTE 240M, 274M and 296M
Connector / Format	BNC/75 ohm panel jack on standard IQ connector panel
Analog Reference Return Loss	
	SD bi-level > 40 dB to 5.5 MHz, HD tri-level > 35 dB to 30 MHz
Video Standards	1125(1080)/50p, 1125(1080)/59p, 750(720)/50p, 750(720)/59p, 1125(1080)/25i, 1125(1080)/25p, 1125(1080)/25psf, 1125(1080)/29i, 625(576)/25i, 525(480)/29i
Embedded audio handling	
	HD - 24-bit synchronous 48 kHz to SMPTE 299M, SD - 20-bit synchronous 48 kHz to SMPTE 272M-A

Power Consumption

Module Power Consumption	
	23.5 W Max (A Frames)
	22 PR (B Frames)
	Note: Dolby option adds 2.5W (PR)

IQUPC31

Dual Channel SDI Upconverter with Frame Synchronizer

The IQUPC31 provides two channels of multi-rate up conversion for SD-SDI digital video signals. Using high quality motion adaptive de-interlacing and flexible scaling technology the IQUPC31 is a broadcast quality conversion module ideal for space constrained installations, or for applications requiring simultaneous HD snd SD output feeds.

IQUPC31 includes frame synchronizers, capable of referencing to a SD bi-level or HD tri-level reference and independent variable aspect ratio converters with frame accurate reading and writing of WSS, VI and 2016 AFD signalling. Audio handling includes audio channel routing, delay adjustment and level controls. Video metadata such as timecode, closed captions and teletext captions can also be passed through the module or processed according to the required output standard.

To allow the module to be further tailored to system requirements software options are available to provide noise reduction and side-bar keying, and versions are available with SFP cages enabling fiber conversion, or additional electrical outputs on HD-BNCs.

Features

- High quality up conversion for SDI video inputs including conversion aperture control
- Frame synchronizer with HD Tri-sync / SD Bi-Level Reference Input and input loss detection
- Aspect ratio conversion including preset ARC maps relative to conversion modes, selectable pan, tilt, aspect, size, and output crop adjustments
- Aspect ratio control (signalling reading and writing) using ETSI WSS and AFD Video Index signaling (RP186, SMPTE 2016)
- Video proc. features include: gain, offset, hue, horizontal and vertical picture enhancement, and RGB gamut legalization
- Metadata support - Closed caption passing or processing for CEA608/708, and WST/OP42 and OP47 teletext captions, and VITC or SMPTE12M timecode translation
- In-built test pattern generator and 19 character scrolling caption generator
- Additional processing options including; noise reduction (adaptive spatial and recursive), side-bar keying and linear frame rate conversion
- Processing for 16 channels of embedded audio present on the incoming SDI stream with no disturbance during video synchronizer frame wraps or drops
- Audio proc. features including: channel routing, gain, invert, delay and tone generator
- Non-PCM processing features pair level routing and delay compensation. Dolby-E data is passed with a delay to match the video and with co-timed audio frame drop or repeat
- Dolby E support – Detection of PCM/non-PCM audio to SMPTE 337/338M, pair routing and Dolby E header re-alignment
- Integrated Fiber I/O support via SFP module
- 16 x user memories and 2 GPI/O ports
- RollCall control and monitoring compatible with standard logging and reporting features
- RollTrack triggers available for detected module states including: Input loss/freeze and reference loss

Why should you choose this module?

- With it's ability to provide outputs of different formats at independent aspect ratios, coupled with high quality video conversion and metadata handling, IQUPC31 allows fully flexible multi-format working in a compact and cost effective package
- Comprehensive audio processing functions allow complete control over embedded audio signals for applications where channel routing, gain control or delay is required
- Full RollCall and SNMP compatibility allows easy integration with SAM or third party network management systems providing an all-inclusive monitoring and control solution

Inputs & Outputs - IQH3B enclosures

IQUPC3101-1B3

IQUPC3103-1B3
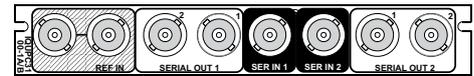
IQUPC3100-1B3
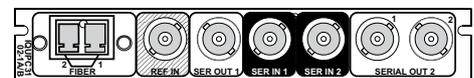
IQUPC3102-1B3

For more details on enclosure types please refer to datasheet IQH3B.

IQUPC31

Dual Channel SDI Upconverter with Frame Synchronizer

Frame References

Ref Loop

Adjustable 525, 625 & Tri-level Reference

SFP RX 1

SFP RX 2

SD/HD-SDI RX, Eq & Detection 1

SD/HD-SDI RX, Eq & Detection 2

Inputs

Cross Point Router

Ch 1

Ancillary Data Reading

Audio De-embed

Up Converter with Sync

Noise Reduction Option

Video Proc. Amp & RGB Legalizer

Aspect Ratio Converter with AFD & WSS

Color corrector, H&V Detail Enhancement

Side-bar Keyer option

Line Synchronizer

Tone Generator

Pair 1-8

1-16 Audio Process Pair Router

18 x 16 Channel Router

8 Pair Proc Amp

8 Pair Fixed & Tracking Audio Delays inc Dolby E Auto Align

1-16

Audio / Ancillary Data Embedder

SDI TX 1 — 1, 2

SDI TX 2 — 3

Tone Generator

Audio Process Pair Router 1-8

Pair 1-16

18 x 16 Channel Router

8 Pair Proc Amp

8 Pair Fixed & Tracking Audio Delays inc Dolby E Auto Align

1-16

SFP TX 1 — 1

SFP TX 2 — 2

Line Synchronizer

Ch 2

Audio De-embed

Ancillary Data Reading

Up Converter with Sync

Noise Reduction Option

Video Proc. Amp & RGB Legalizer

Aspect Ratio Converter with AFD & WSS

Color corrector, H&V Detail Enhancement

Side-bar Keyer option

Audio / Ancillary Data Embedder

SDI TX 1 — 1, 2

Outputs

I/O

GPI Control

Built-in Intelligence

Network Intelligence, Control & Monitoring

Note: Number of inputs and outputs depends on SFP and rear panel type

⌢ **Block Diagram** for IQUPC31 Range

Technical Specification

Inputs & Outputs
Video Signal Inputs

SDI Inputs	2x
Input Cable Length	Up to 80m Belden 1694A @ 3 Gbit/s
	Up to 120m Belden 1694A @ 1.5 Gbit/s
	100m typical (with output set to 1080p rates), Belden 1694A @ 270 Mbit/s
Input Standard (auto detect)	
	625(576)/25i, 525(480)/29i
Analog Reference	1 x Analog Reference with passive loop-through Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level)
	SD bi-level – RS170A
	HD Tri-level – SMPTE 240M, 274M

Map of input to output standards		Output							
		25		50		29.97		59.94	
		576i	1080i	720P	1080P	480i	1080i	720P	1080P
Input	25	576i	✔	✔	✔	✔	✕	✕	✕	✕
		1080i	✕	✕	✕	✕	✕	✕	✕	✕
	50	720P	✕	✕	✕	✕	✕	✕	✕	✕
		1080P	✕	✕	✕	✕	✕	✕	✕	✕
	29.97	480i	✕	✕	✕	✕	✔	✔	✔	✔
		1080i	✕	✕	✕	✕	✕	✕	✕	✕
	59.94	720P	✕	✕	✕	✕	✕	✕	✕	✕
		1080P	✕	✕	✕	✕	✕	✕	✕	✕

⌢ Format Conversion I/O Grid

IQUPC31

Dual Channel SDI Upconverter with Frame Synchronizer

Technical Specification cont…

Fiber Signal Input

Inputs	Up to 2
Optical	270 Mbit/s SD-SDI
Connector / Format	LC singlemode
Standard	SMPTE 297-2006

Video Signal Outputs

SDI Outputs	up to 5 (3 from Channel 1, 2 from Channel 2)
Output standard	625(576)/25i, 525(480)/29i
	720 50/59p, 1080 50/59i
	1080 50/59p level A/B

Fiber Signal Output

Optical	3 GBit/s HD-SDI, 1.485 Gbit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format	LC singlemode
Conforms to	SMPTE 297-2006
Outputs	Up to 2

*Note: Optical I/O and control dependant on type of SFP module fitted

Control Interface

GPI	2 x Closing contact I/O interface (ST) (rear panel dependant)

Conversion Functions (per channel)

Modes	Up conversion
	Aspect ratio conversion synchronization
Conversion processing	Still process: Detects still images and applies an aperture with full (progressive) vertical frequency response
	Enhanced still: Adds field motion detection to still process. Prevents artifacts on moving repetitive patterns
Aspect ratio conversion (manual or auto)	AFD (SMPTE 2016), VI (RP186), WSS (L23)
SD input format	Normal 4:3, Anamorphic 16:9, Letterbox 14:9, Letterbox 16:9
SD output format	Normal 4:3, Anamorphic 16:9, Letterbox 14:9, Letterbox 16:9
Metadata	Closed caption CE608 <> CE708
	Timecode conversions
	Teletext subtitles WST/RDD8 conversion

Audio Functions (per channel)

Embedded audio	16-channel embedded audio processing PCM audio processing includes channel level gain and delay compensation, as well as channel level routing with L/R swap and phase invert feature
	Non-PCM processing features pair level routing and delay compensation. Dolby E data is passed with a delay to match the video and with co-timed audio frame drop or repeat
Embedded audio	Enable/Blank

Embedded Audio Routing

Processed pair 1-8	Disembed 1-8
Output Channels 1-16	Processed pair 1-8, Tone, Silence

Processed Audio Control

Invert Phase	Channels 1-16
Pair 1 to 8 Gain L/R	+18 dB to -18 dB in 0.1 dB steps
Pair 1-8 Manual Delay	-40 to +200 ms in 1 ms steps
Global Manual Delay	-40 to +200 ms in 1 ms steps

Dolby-E

Dolby-E Auto Alignment	+/- 10 line offset in 1 line steps

Tone

Frequency	100Hz to 10kHz in 100Hz steps

Processing Functions (per channel)

Ancillary Data	Pass/Strip
Freeze	On/Off
Legalizer	On/Off
Genlock	Reference lock, Input lock (same format), Free run
Pattern	Off, Black, Ramp, Bars
Caption	On/Off, Scrolling
Edit Caption	19 characters available

Proc amp

Black Level:	+100 to -100 mV (0) in 0.8 mV steps
Contrast:	-6 dB to +6 dB (0) in 0.2 dB steps
Saturation:	-6 dB to +6 dB (0) in 0.2 dB steps
Y Gamma:	0.4 to 1.7 (1) in 0.1 steps
YC Offset:	-20 to 20 (0) in 2 Luma pixel steps
	Note: Defaults shown in brackets

Enhancement

Nonlinear Enhancer	Frequency Band Selection: Low, Med, High
	Four preset enhancement modes: Low, Med, High, Super
	Manual enhancement mode with H Gain and H Noise rejection levels

Conversion Aperture

Vertical	Frequency Band Selection: Low, Med, High
	Five vertical preset enhancement levels: Soft 2, Soft 1, Normal, Sharp 1, Sharp 2
Horizontal	Five horizontal preset sharpness levels: Low 2, Low 1, Normal, High 1, High 2
	Five horizontal preset detail levels: Soft 2, Soft 1, Normal, Sharp 1, Sharp 2

Other Controls

GPI input Low/High Select	
	Black, Freeze, Pattern, User Memories 1-16
GPI Output Source	Black, Freeze, Pattern
User Memories	16 x Save, Recall, Rename
Memory Naming	User configurable naming of memories 1 – 16
RollTrack Index	Up to 50 RollTrack destinations
Optical Logging*	Tx Laser Bias High Warning
	Tx Power Low Warning
	Tx Power High Warning
Laser Wavelength	Input 1 (2) Rx Power High Warning
	Input 1 (2) Rx Power Low Warning
	Input 1 (2) Rx Power Measurement
RollTrack Sources	Unused, Input Present (1&2, Fiber 1 & 2) , Input Loss (1&2, Fiber 1 & 2), Reference OK & Loss
Information Window	Video Input Status, Reference Status
Factory Default	Resets all module settings to factory specified default values and clears memories
Default Settings	Resets all module settings to factory specified defaults but does not clear memories
Module Information	Reports following module information: Software version, Serial number, Rear Panel ID, Frame Slot

IQUPC31

Dual Channel SDI Upconverter with Frame Synchronizer

Technical Specification cont…

Specifications

Electrical	3Gbit/s SDI, SMPTE 424M 1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C
Connector / Format	BNC/ 75ohm panel jack on standard IQ connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s) >-10dB (3Gbit/s)
Output Jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz), 3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)
Reference Source	External – HD Tri-Level / SD Bi-level / Input Video syncs
Electrical	Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level) SD bi-level – RS170A HD Tr-level – SMPTE 240M and 274M
Connector / Format	BNC/75 ohm panel jack on standard IQ connector panel

Optical 1310 nm Tx

Wavelength	1310 nm
Spectral width (FWHM)	>1.5 nm (typ)
Output power	0 to -5 dBm typical (-2 dBm typical)
Extinction ratio	>7.5:1 (typ)

Optical Rx

Input wavelength range	Min. 1260 nm, Max. 1620 nm
Optical power input range	> -0 dBm, < -20 dBm
Link distance	Up to 30 Km
Embedded audio handling	
	HD - 24-bit synchronous 48 kHz to SMPTE 299M, SD - 20-bit synchronous 48 kHz to SMPTE 272M-A

Power Consumption

Module Power Consumption with Fiber

16PR (B frames)

Ordering Information

Order codes for IQH3B enclosures

IQUPC3100-1B3
Dual channel up converter. 2 SDI inputs, external reference loop & enclosure reference inputs, 4 SDI outputs

IQUPC3101-1B3
Dual channel up converter. 2 SDI inputs, 5 SDI outputs, 2 GPI/Os, reference inputs from enclosure

IQUPC3102-1B3
Dual channel up converter. 2 SDI inputs, external reference input & enclosure reference inputs, 3 SDI outputs, single SFP cage

IQUPC3103-1B3
Dual channel up converter. 2 SDI inputs, 4 SDI outputs, single SFP cage, reference inputs from enclosure

For more details on enclosure types please refer to datasheet IQH3B.

Software Options

IQOPTM-2NR - Software option to add noise reduction on both processing channels

IQOPTM-2SBK - Software option to add side-bar keying on both processing channels

IQOPTM-2UDC - Software option for upgrade to up, down and cross conversion for both processing channels

IQOPTM-LC - Software option to upgrade with Linear frame rate conversion

SFP options

FC1-13T1 - Single 1310nm fiber Tx

FC1-13T2 - Dual 1310nm fiber Tx

FC1-15T1 - Single 1550nm fiber Tx

FC1-15T2 - Dual 1550nm fiber Tx

FC1-R1 - Single fiber Rx

FC1-R2 - Dual fiber Rx

FC1-13TR - Fiber transceiver 1310nmTx/Rx

FC1-HDBT2 - HD-BNC Dual Tx

FC1-HDBR2 - HD-BNC Dual Rx

Fiber CWDM Tx - Wavelengths available on request

Note: SFP type must be ordered in addition to the module.

IQUPC32 — 3G/HD/SD-SDI Up Converter with AES I/O

The IQUPC32 provides up conversion and AES embedding and de-embedding for HD/SD-SDI signals. Using high quality motion adaptive de-interlacing and flexible scaling technology the IQUPC32 is a broadcast quality conversion module able to handle a wide variety of common applications such as upconversion for SD content repurposing on HD channels.

IQUPC32 includes a frame synchronizer, capable of referencing to a SD bi-level or HD tri-level reference and a variable aspect ratio converter with reading and writing of WSS, VI and 2016 AFD signalling. Audio handling includes 8 user configurable AES inputs or outputs, audio channel routing, delay adjustment and level controls. Video metadata such as timecode, closed captions and teletext captions can also be passed through the module or processed according to the required output standard.

To allow the module to be further tailored to system requirements software options are available to provide noise reduction and side-bar keying, and versions are available with SFP cages enabling fiber conversion or additional electrical outputs on HD-BNCs.

Features

- High quality up conversion for SDI video inputs including conversion aperture control
- Frame synchronizer with HD Tri-sync / SD Bi-Level Reference Input and input loss detection
- Aspect ratio conversion including preset ARC maps relative to conversion modes, selectable pan, tilt, aspect, size, and output crop adjustments
- Aspect ratio control (signalling reading and writing) using ETSI WSS and AFD Video Index signaling (RP186, SMPTE 2016)
- Video proc. features include: gain, offset, hue, horizontal and vertical picture enhancement, and RGB gamut legalization
- Metadata support - Closed caption passing or processing for CEA608/708 and OP42/OP47/WST captions, VITC or SMPTE12M timecode translation, and Ancillary data bridge for 7 blocks of ANC data passing
- Additional processing options including; noise reduction (adaptive spatial and recursive), side-bar keying and linear frame rate conversion
- 8 AES audio I/O, balanced or unbalanced, available to/from any processed internal pair, and audio proc. features including: channel routing, gain, invert, delay and eight internal tone generators
- Processing for 16 channels of embedded audio present on the incoming SDI stream with no disturbance during video synchronizer frame wraps or drops
- Non-PCM processing features pair level routing and delay compensation. Dolby-E data is passed with a delay to match the video and with co-timed audio frame drop or repeat
- Dolby E support – Detection of PCM/non-PCM audio to SMPTE 337/338M, pair routing and Dolby E header re-alignment
- In-built test pattern generator and 19 character scrolling caption generator
- Integrated Fiber I/O support via SFP module
- 16 x user memories and 2 GPI/O ports
- RollCall control and monitoring compatible with standard logging and reporting features
- RollTrack triggers available for detected module states including: Input loss and reference loss

Why should you choose this module?

- High quality up conversion and frame synchronization allows multi-format working and provides integration with HD workflows
- Comprehensive audio I/O and processing allows complete control over audio signals for embedding and de-embedding, and where channel routing, gain control or delay is required
- Full RollCall and SNMP compatibility allows easy integration with SAM or third party network management systems providing an all-inclusive monitoring and control solution

Inputs & Outputs - IQH3A/1A/3B enclosures
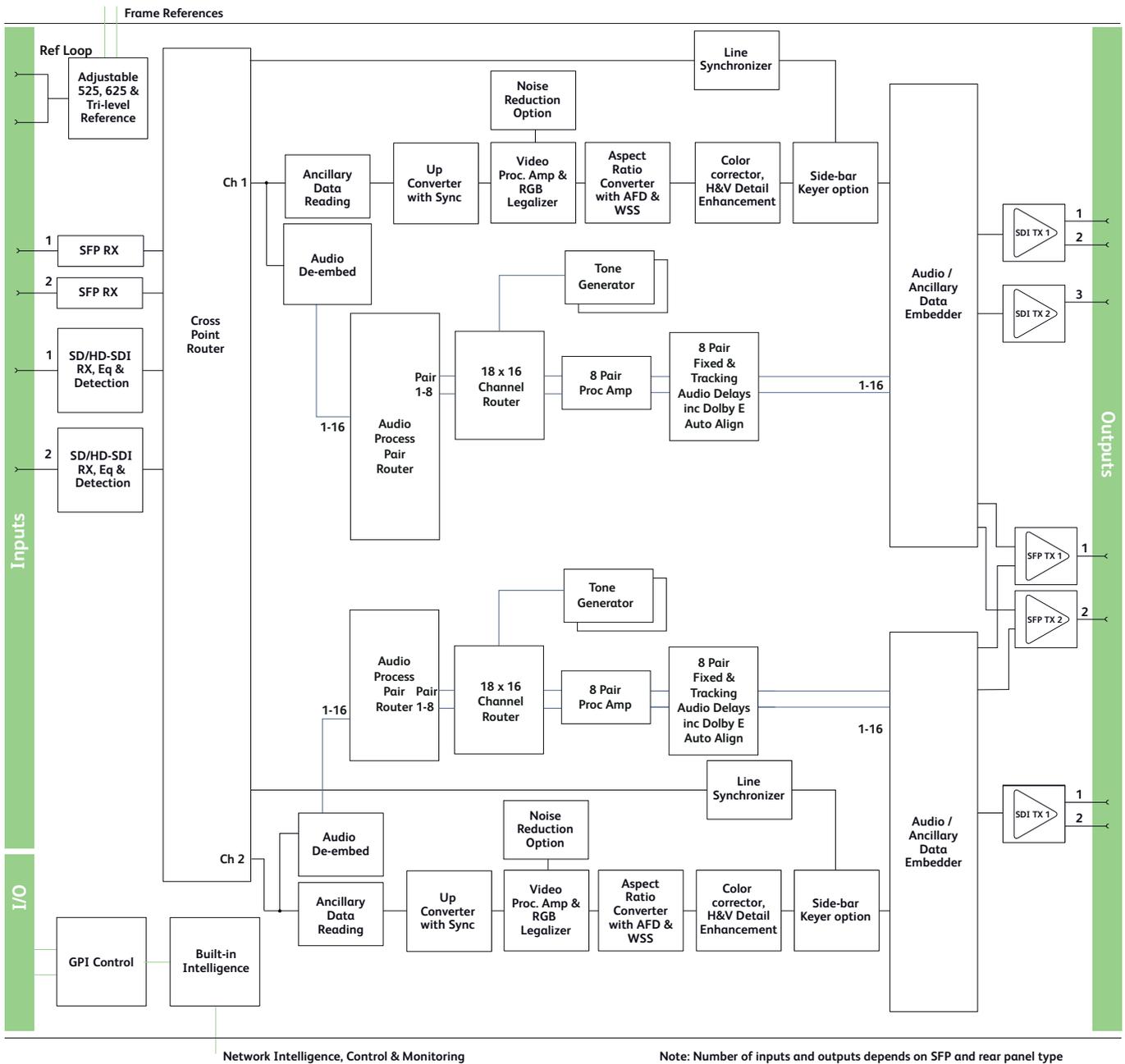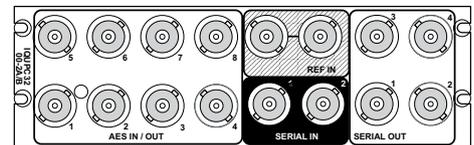

IQUPC3200-2A3, IQUPC3200-2B3
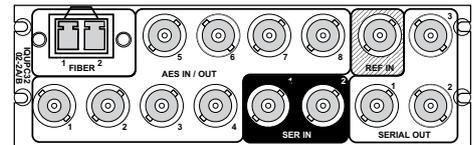
IQUPC3202-2A3, IQUPC3202-2B3
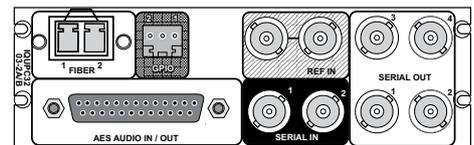
IQUPC3203-2A3, IQUPC3203-2B3

For more details on enclosure types please refer to datasheet IQH3B.

IQUPC32

3G/HD/SD-SDI Up Converter with AES I/O
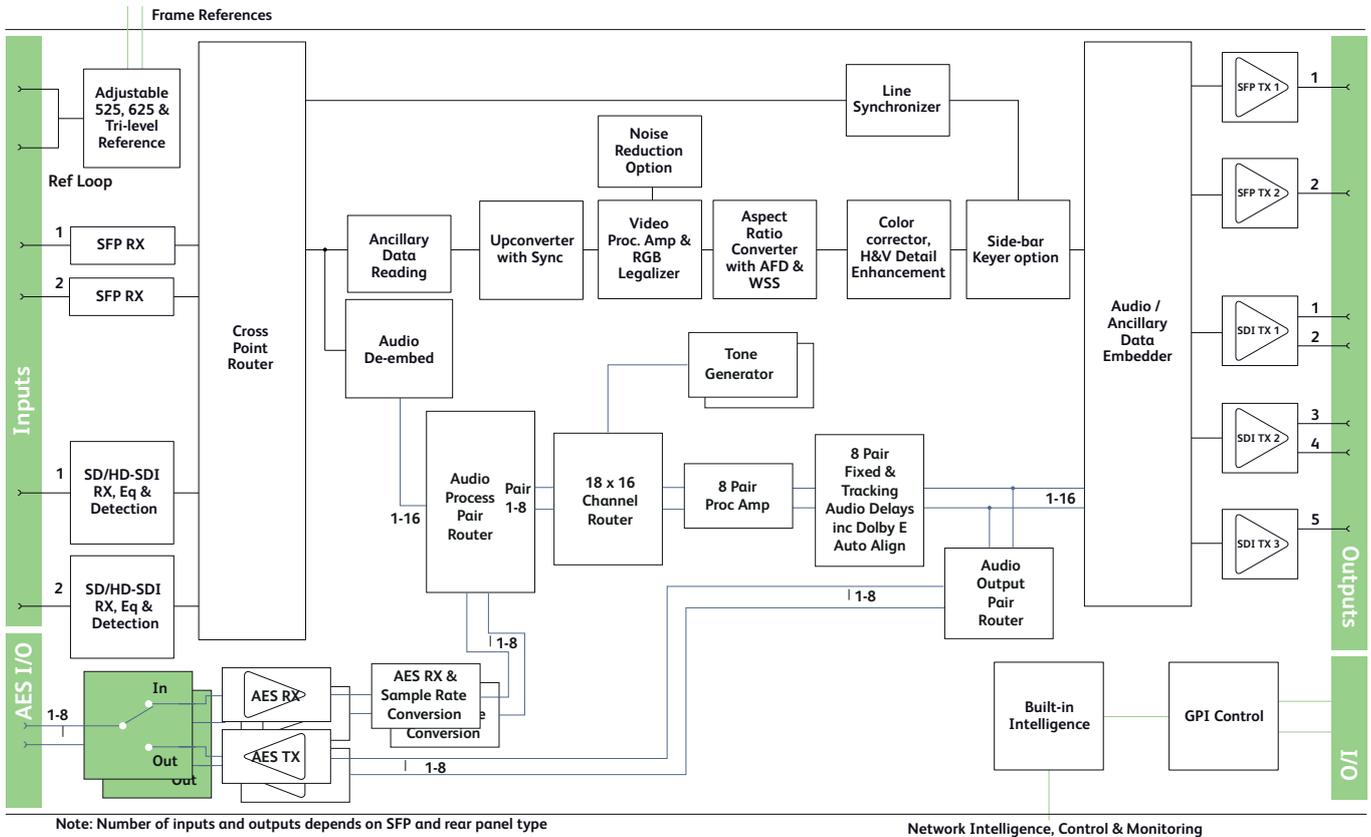
Block Diagram for IQUPC32 Range

Note: Number of inputs and outputs depends on SFP and rear panel type

Technical Specification

Inputs & Outputs

Video Signal Inputs

SDI Inputs	2x
Input Cable Length	Up to 80m Belden 1694A @ 3 Gbit/s
	Up to 120m Belden 1694A @ 1.5 Gbit/s
	100m typical (with output set to 1080p rates), Belden 1694A @ 270 Mbit/s

Input Standard (auto detect)
625(576)/25i, 525(480)/29i
720 50/59p1080 50/59i
1080 50/59p level A/B
1080 25/29psf

Analog Reference
1 x Analog Reference with passive loop-through
Black (HD tri-level and SD bi-level) and Black
Burst (SD bi-level)
SD bi-level – RS170A
HD Tri-level – SMPTE 240M, 274M

Fiber Signal Input

Inputs	Up to 2
Optical	3 GBit/s HD-SDI, 1.485 GBit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format	LC singlemode
Standard	SMPTE 297-2006

Video Signal Outputs

SDI Outputs	up to 4
Output standard	625(576)/25i, 525(480)/29i
	720 50/59p, 1080 50/59i
	1080 50/59p level A/B

Fiber Signal Output

Optical	3 GBit/s HD-SDI, 1.485 Gbit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format	LC singlemode
Conforms to	SMPTE 297-2006
Outputs	Up to 2

*Note: Optical I/O and control dependant on type of SFP module fitted

Map of input to output standards		Output							
		25		50		29.97		59.94	
		576i	1080i	720P	1080P	480i	1080i	720P	1080P
Input	25	576i	✔	✔	✔	✔	✗	✗	✗	✗
		1080i	✗	✗	✗	✗	✗	✗	✗	✗
	50	720P	✗	✗	✗	✗	✗	✗	✗	✗
		1080P	✗	✗	✗	✗	✗	✗	✗	✗
	29.97	480i	✗	✗	✗	✗	✔	✔	✔	✔
		1080i	✗	✗	✗	✗	✗	✗	✗	✗
	59.94	720P	✗	✗	✗	✗	✗	✗	✗	✗
		1080P	✗	✗	✗	✗	✗	✗	✗	✗

Format Conversion I/O Grid

IQUPC32

3G/HD/SD-SDI Up Converter with AES I/O

Technical Specification cont…

Audio Signal Inputs/Outputs
AES/EBU I/O (software selectable)
    8 Unbalanced (BNC)
    8 Balanced (25D Type)

Control Interface

GPI	2 x Closing contact I/O interface (ST) (rear panel dependant)

Conversion Functions

Modes	Up conversion
	Aspect ratio conversion synchronization
Conversion processing	Still process: Detects still images and applies an aperture with full (progressive) vertical frequency response
	Enhanced still: Adds field motion detection to still process. Prevents artifacts on moving repetitive patterns
Aspect ratio conversion (manual or auto)	AFD (SMPTE 2016), VI (RP186), WSS (L23)
SD input format	Normal 4:3, Anamorphic 16:9, Letterbox 14:9, Letterbox 16:9
SD output format	Normal 4:3, Anamorphic 16:9, Letterbox 14:9, Letterbox 16:9
Metadata	Closed caption CE608 <> CE708
	Timecode conversions
	Teletext subtitles WST/RDD8 conversion

Audio Functions

Embedded audio	16-channel embedded audio processing
	PCM audio processing includes channel level gain and delay compensation, as well as channel level routing with L/R swap and phase invert feature
	Non-PCM processing features pair level routing and delay compensation. Dolby E data is passed with a delay to match the video and with co-timed audio frame drop or repeat
Embedded audio	Enable/Blank

Audio Routing

Processed pair 1-8	Disembed 1-8, AES 1-8, Analog 1-2
Embedded Output Channels 1-16	
	Processed pair 1-8, Tone, Silence
AES 1-8	Processed pair 1-8, Tone, Silence

Processed Audio Control

Invert Phase	Channels 1-16
Pair 1 to 8 Gain L/R	+18 dB to -18 dB in 0.1 dB steps
Pair 1-8 Manual Delay	-40 to +200 ms in 1 ms steps
Global Manual Delay	-40 to +200 ms in 1 ms steps

Dolby-E

Dolby-E Auto Alignment	+/- 10 line offset in 1 line steps

Tone

Frequency	100Hz to 10kHz in 100Hz steps

Processing Functions

Ancillary Data	Pass/Strip
Freeze	On/Off
Legalizer	On/Off
Genlock	Reference lock (Ext, Int A, Int B), Input lock (same format), Free run
Memories	16 user memories
Pattern	Off, Black, Ramp, Bars
Caption	On/Off, Scrolling
Edit Caption	19 characters available

Proc amp

Black Level:	+100 to -100 mV (0) in 0.8 mV steps
Contrast:	-6 dB to +6 dB (0) in 0.2 dB steps
Saturation:	-6 dB to +6 dB (0) in 0.2 dB steps
Y Gamma:	0.4 to 1.7 (1) in 0.1 steps
YC Offset:	-20 to 20 (0) in 2 Luma pixel steps
	Note: Defaults shown in brackets

Enhancement

Nonlinear Enhancer	Frequency Band Selection: Low, Med, High
	Four preset enhancement modes: Low, Med, High, Super
	Manual enhancement mode with H Gain and H Noise rejection levels

Conversion Aperture

Vertical	Frequency Band Selection: Low, Med, High
	Five vertical preset enhancement levels: Soft 2, Soft 1, Normal, Sharp 1, Sharp 2
Horizontal	Five horizontal preset sharpness levels: Low 2, Low 1, Normal, High 1, High 2
	Five horizontal preset detail levels: Soft 2, Soft 1, Normal, Sharp 1, Sharp 2

Other Controls
GPI input Low/High Select
    Black, Freeze, Pattern, User Memories 1-16

GPI Output Source	Black, Freeze, Pattern
User Memories	16 x Save, Recall, Rename
Memory Naming	User configurable naming of memories 1 – 16
RollTrack Index	Up to 50 RollTrack destinations
Optical Logging*	Tx Laser Bias High Warning
	Tx Power Low Warning
	Tx Power High Warning
Laser Wavelength	Input 1 (2) Rx Power High Warning
	Input 1 (2) Rx Power Low Warning
	Input 1 (2) Rx Power Measurement
RollTrack Sources	Unused, Input Present (1&2, Fiber 1 & 2) , Input Loss (1&2, Fiber 1 & 2), Reference OK & Loss
Information Window	Video Input Status, Reference Status
Factory Default	Resets all module settings to factory specified default values and clears memories
Default Settings	Resets all module settings to factory specified defaults but does not clear memories
Module Information	Reports following module information: Software version, Serial number, Rear Panel ID, Frame Slot

Specifications

Electrical	3Gbit/s SDI, SMPTE 424M 1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C
Connector / Format	BNC/ 75ohm panel jack on standard IQ connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s) >-10dB (3Gbit/s)
Output Jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz), 3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)
Reference Source	External – HD Tri-Level / SD Bi-level / Input Video syncs
Electrical	Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level)
	SD bi-level – RS170A
	HD Tr-level – SMPTE 240M and 274M
Connector / Format	BNC/75 ohm panel jack on standard IQ connector panel
Embedded audio handling	
	HD - 24-bit synchronous 48 kHz to SMPTE 299M,
	SD - 20-bit synchronous 48 kHz to SMPTE 272M-A

IQUPC32

3G/HD/SD-SDI Up Converter with AES I/O

Digital Audio Input (Unbalanced)
Connector/Format	BNC
Sample Frequency	PCM: 25 – 96 kHz; Non-PCM: 48 kHz
Input Cable Length	>500 m of RG59 cable
Impedance	75 Ohms
Standard	AES3id

Digital Audio Input (Balanced)
Connector/Format	25Way-D
Sample Frequency	PCM: 25 – 96 kHz; Non-PCM: 48 kHz
Input Cable Length	>150 m of AES3 cable
Impedance	110 Ohms
Standard	AES3

Digital Audio Output (Unbalanced)
Connector/Format	BNC
Level	1 V p-p typical into 75 Ohms
Standard	AES3id

Digital Audio Output (Balanced)
Connector/Format	25Way-D
Level	3 V p-p typical into 110 Ohms
Standard	AES3

Optical 1310 nm Tx
Wavelength	1310 nm
Spectral width (FWHM)	>1.5 nm (typ)
Output power	0 to -5 dBm typical (-2 dBm typical)
Extinction ratio	>7.5:1 (typ)
Link distance	Up to 30 Km @ 270Mbit/s
	Up to 21 Km @ 1.5Gbit/s
	Up to 10 Km @ 3Gbit/s

Optical 1550 nm Tx
Wavelength	1550 nm
Spectral width (FWHM)	1 nm
Output power	4 to 0 dBm
Extinction ratio	>7.5:1 (typ)
Link distance	Up to 50 Km @ 270Mbit/s, 1.5Gbit/s or 3Gbit/s

Optical Rx
Input wavelength range	Min. 1260 nm, Max. 1620 nm
Optical power input range	> -0 dBm, < -20 dBm
Link distance	Up to 30 Km

Power Consumption
Module Power Consumption with Fiber
	13W (A frames)
	13PR (B frames)

Ordering Information

Order codes for IQH3B enclosures

IQUPC3200-2B3
Up converter with AES I/O. 2 SDI inputs, External & Frame reference inputs, 4 SDI outputs, 8 unbalanced AES inputs or outputs

IQUPC3202-2B3
Up converter with AES I/O. 2 SDI inputs, External & Frame reference inputs, 3 SDI outputs, 8 unbalanced AES inputs or outputs, 1 Fiber SFP cage. Includes rear but not SFP module

IQUPC3203-2B3
Up converter with AES I/O. 2 SDI inputs, External & Frame reference inputs, 4 SDI outputs, 8 balanced AES inputs or outputs, 2 x GPI, 1 Fiber SFP cage. Includes rear but not SFP module

Order codes for IQH3A/1A enclosures

IQUPC3200-2A3
Up converter with AES I/O. 2 SDI inputs, reference loop, 4 SDI outputs, 8 unbalanced AES inputs or outputs

IQUPC3202-2A3
Up converter with AES I/O. 2 SDI inputs, reference input, 3 SDI outputs, 8 unbalanced AES inputs or outputs, 1 Fiber SFP cage. Includes rear but not SFP module

IQUPC3203-2A3
Up converter with AES I/O. 2 SDI inputs, reference loop, 4 SDI outputs, 8 balanced AES inputs or outputs, 2 x GPI, 1 Fiber SFP cage. Includes rear but not SFP module

For more details on enclosure types please refer to datasheet IQH3B.

Software Options

IQOPTM-NR - Software option to add noise reduction

IQOPTM-SBK - Software option to add side-bar keying

IQOPTM-LC - Software option to upgrade with Linear frame rate conversion

IQOPTM-UDC - Software option for upgrade to up, down and cross conversion

SFP options

FC1-13T1 - Single 1310nm fiber Tx

FC1-13T2 - Dual 1310nm fiber Tx

FC1-15T1 - Single 1550nm fiber Tx

FC1-15T2 - Dual 1550nm fiber Tx

FC1-R1 - Single fiber Rx

FC1-R2 - Dual fiber Rx

FC1-13TR - Fiber transceiver 1310nmTx/Rx

FC1-HDBT2 - HD-BNC Dual Tx

FC1-HDBR2 - HD-BNC Dual Rx

Fiber CWDM Tx - Wavelengths available on request

Note: SFP type must be ordered in addition to the module.

IQUPC33

3G/HD/SD-SDI Dual Up Converter with AES I/O

The IQUPC33 provides two channels of up conversion and AES embedding and de-embedding for 3G/HD-SDI signals. Using high quality motion adaptive de-interlacing and flexible scaling technology the IQUPC33 is a broadcast quality conversion module ideal for space constrained installations, or for applications requiring simultaneous HD snd SD output feeds.

IQUPC33 includes frame synchronizers, capable of referencing to a SD bi-level or HD tri-level reference and a variable aspect ratio converter with reading and writing of WSS, VI and 2016 AFD signalling. Audio handling includes 8 user configurable AES inputs or outputs, shared between the video channels, plus audio channel routing, delay adjustment and level controls. Video metadata such as timecode, closed captions and teletext captions can also be passed through the module or processed according to the required output standard.

To allow the module to be further tailored to system requirements software options are available to provide noise reduction and side-bar keying, and versions are available with SFP cages enabling fiber conversion or additional electrical outputs on HD-BNCs.

Features

- High quality up conversion including conversion aperture control
- Frame synchronizer with HD Tri-sync / SD Bi-Level Reference Input and input loss detection
- Aspect ratio conversion including preset ARC maps relative to conversion modes, selectable pan, tilt, aspect, size, and output crop adjustments
- Aspect ratio control (signalling reading and writing) using ETSI WSS and AFD Video Index signaling (RP186, SMPTE 2016)
- Video proc. features include: gain, offset, hue, horizontal and vertical picture enhancement, and RGB gamut legalization
- Metadata support - Closed caption passing or processing for CEA608/708 and OP42/OP47/WST captions, and VITC or SMPTE12M timecode translation
- Additional processing options including; noise reduction (adaptive spatial and recursive), side-bar keying and linear frame rate conversion
- 8 AES audio I/O, balanced or unbalanced, available to/from any processed internal pair, and audio proc. features including: channel routing, gain, invert, delay and eight internal tone generators
- Processing for 16 channels of embedded audio present on the incoming SDI stream with no disturbance during video synchronizer frame wraps or drops
- Non-PCM processing features pair level routing and delay compensation. Dolby-E data is passed with a delay to match the video and with co-timed audio frame drop or repeat
- Dolby E support – Detection of PCM/non-PCM audio to SMPTE 337/338M, pair routing and Dolby E header re-alignment
- In-built test pattern generator and 19 character scrolling caption generator
- Integrated Fiber I/O support via SFP module
- 16 x user memories and 2 GPI/O ports
- RollCall control and monitoring compatible with standard logging and reporting features
- RollTrack triggers available for detected module states including: Input loss and reference loss

Why should you choose this module?

- With it's ability to provide outputs of different formats at independent aspect ratios, coupled with high quality video conversion, AES audio interfacing and metadata handling IQUPC33 allows efficient multi-format working in a compact and cost effective package
- Full RollCall and SNMP compatibility allows easy integration with SAM or third party network management systems providing an all-inclusive monitoring and control solution

Inputs & Outputs - IQH3A/1A/3B enclosures
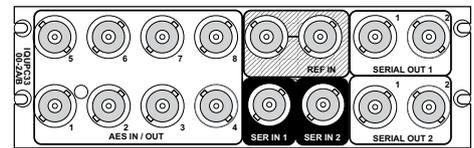
IQUPC3300-2A3, IQUPC3300-2B3
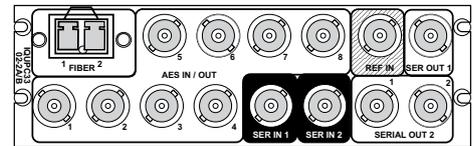
IQUPC3302-2A3, IQUPC3302-2B3
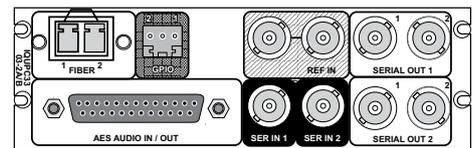
IQUPC3303-2A3, IQUPC3303-2B3

For more details on enclosure types please refer to datasheet IQH3B.

IQUPC33

3G/HD/SD-SDI Dual Up Converter with AES I/O
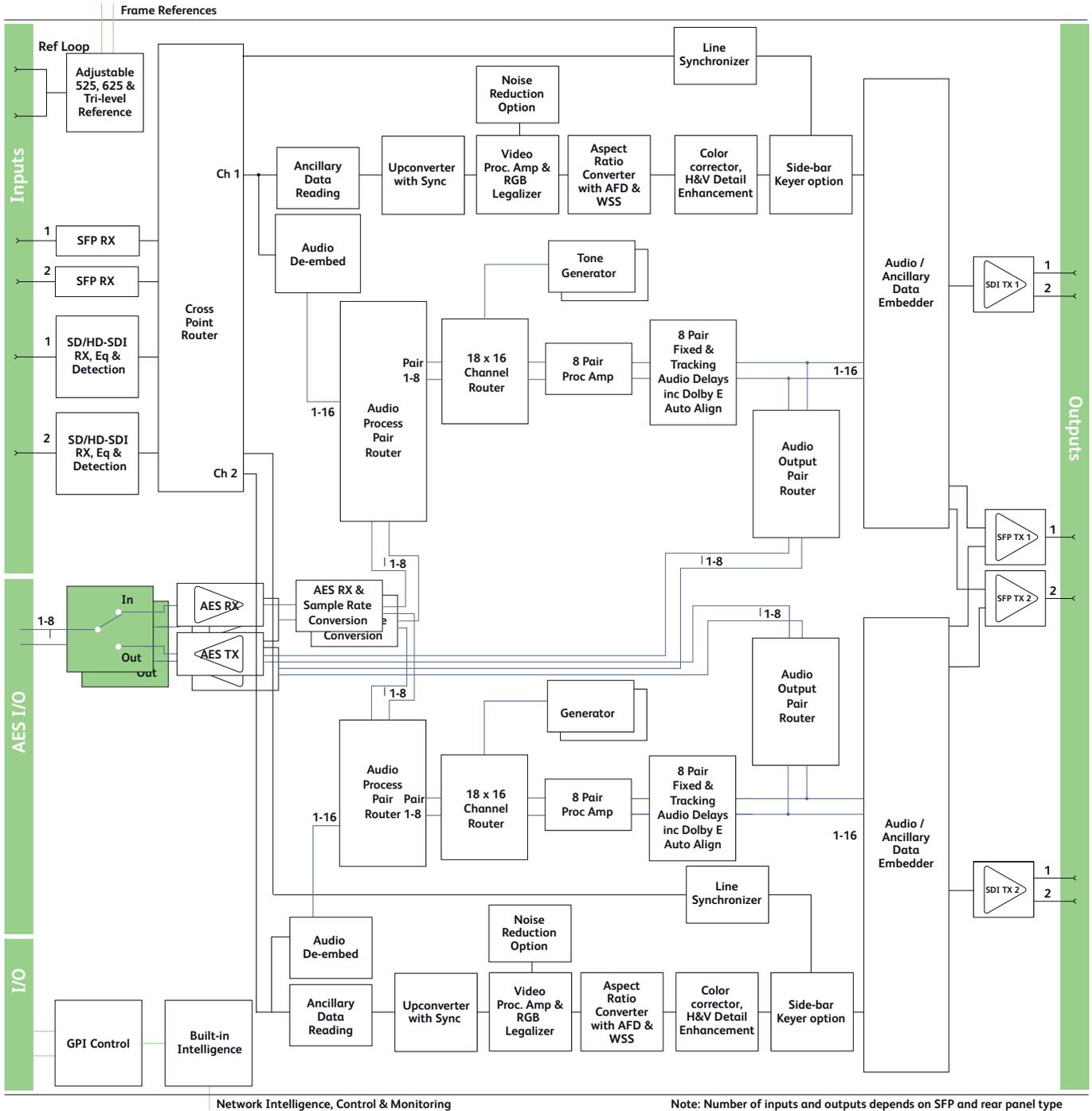
Block Diagram for IQUPC33 Range

IQUPC33

3G/HD/SD-SDI Dual Up Converter with AES I/O

Technical Specification

Inputs & Outputs

Video Signal Inputs

SDI Inputs	2x
Input Cable Length	Up to 80m Belden 1694A @ 3 Gbit/s
	Up to 120m Belden 1694A @ 1.5 Gbit/s
	100m typical (with output set to 1080p rates), Belden 1694A @ 270 Mbit/s
Input Standard (auto detect)	
	625(576)/25i, 525(480)/29i
	720 50/59p1080 50/59i
	1080 50/59p level A/B
	1080 25/29psf
Analog Reference	1 x Analog Reference with passive loop-through Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level)
	SD bi-level – RS170A
	HD Tri-level – SMPTE 240M, 274M

Fiber Signal Input

Inputs	Up to 2
Optical	3 GBit/s HD-SDI, 1.485 GBit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format	LC singlemode
Standard	SMPTE 297-2006

Video Signal Outputs

SDI Outputs	up to 4
Output standard	625(576)/25i, 525(480)/29i
	720 50/59p, 1080 50/59i
	1080 50/59p level A/B

Fiber Signal Output

Optical	3 GBit/s HD-SDI, 1.485 Gbit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format	LC singlemode
Conforms to	SMPTE 297-2006
Outputs	Up to 2

*Note: Optical I/O and control dependant on type of SFP module fitted

Audio Signal Inputs/Outputs

AES/EBU I/O (software selectable)	
	8 Unbalanced (BNC)
	8 Balanced (25D Type)

Control Interface

GPI	2 x Closing contact I/O interface (ST) (rear panel dependant)

Conversion Functions (per channel)

Modes	Up conversion
	Aspect ratio conversion synchronization
Conversion processing	Still process: Detects still images and applies an aperture with full (progressive) vertical frequency response
	Enhanced still: Adds field motion detection to still process. Prevents artifacts on moving repetitive patterns
Aspect ratio conversion (manual or auto)	AFD (SMPTE 2016), VI (RP186), WSS (L23)

Map of input to output standards			Output							
			25		50		29.97		59.94	
			576i	1080i	720P	1080P	480i	1080i	720P	1080P
Input	25	576i	✔	✔	✔	✔	✗	✗	✗	✗
		1080i	✗	✗	✗	✗	✗	✗	✗	✗
	50	720P	✗	✗	✗	✗	✗	✗	✗	✗
		1080P	✗	✗	✗	✗	✗	✗	✗	✗
	29.97	480i	✗	✗	✗	✗	✔	✔	✔	✔
		1080i	✗	✗	✗	✗	✗	✗	✗	✗
	59.94	720P	✗	✗	✗	✗	✗	✗	✗	✗
		1080P	✗	✗	✗	✗	✗	✗	✗	✗

⌒ Format Conversion I/O Grid

SD input format	Normal 4:3, Anamorphic 16:9, Letterbox 14:9, Letterbox 16:9
SD output format	Normal 4:3, Anamorphic 16:9, Letterbox 14:9, Letterbox 16:9
Metadata	Closed caption CE608 <> CE708
	Timecode conversions
	Teletext subtitles WST/RDD8 conversion

Audio Functions

Embedded audio	16-channel embedded audio processing PCM audio processing includes channel level gain and delay compensation, as well as channel level routing with L/R swap and phase invert feature
	Non-PCM processing features pair level routing and delay compensation. Dolby E data is passed with a delay to match the video and with co-timed audio frame drop or repeat
Embedded audio	Enable/Blank

Audio Routing

Processed pair 1-8	Disembed 1-8, AES 1-8, Analog 1-2
Embedded Output Channels 1-16	
	Processed pair 1-8, Tone, Silence
AES 1-8	Processed pair 1-8, Tone, Silence

Processed Audio Control

Invert Phase	Channels 1-16
Pair 1 to 8 Gain L/R	+18 dB to -18 dB in 0.1 dB steps
Pair 1-8 Manual Delay	-40 to +200 ms in 1 ms steps
Global Manual Delay	-40 to +200 ms in 1 ms steps

Dolby-E

Dolby-E Auto Alignment	+/- 10 line offset in 1 line steps

Tone

Frequency	100Hz to 10kHz in 100Hz steps

IQUPC33

3G/HD/SD-SDI Dual Up Converter with AES I/O

Technical Specification cont…

Processing Functions (per channel)

Ancillary Data	Pass/Strip
Freeze	On/Off
Legalizer	On/Off
Genlock	Reference lock (Ext, Int A, Int B), Input lock (same format), Free run
Memories	16 user memories
Pattern	Off, Black, Ramp, Bars
Caption	On/Off, Scrolling
Edit Caption	19 characters available

Proc amp

Black Level:	+100 to -100 mV (0) in 0.8 mV steps
Contrast:	-6 dB to +6 dB (0) in 0.2 dB steps
Saturation:	-6 dB to +6 dB (0) in 0.2 dB steps
Y Gamma:	0.4 to 1.7 (1) in 0.1 steps
YC Offset:	-20 to 20 (0) in 2 Luma pixel steps
	Note: Defaults shown in brackets

Enhancement

Nonlinear Enhancer	Frequency Band Selection: Low, Med, High
	Four preset enhancement modes: Low, Med, High, Super
	Manual enhancement mode with H Gain and H Noise rejection levels

Conversion Aperture

Vertical	Frequency Band Selection: Low, Med, High
	Five vertical preset enhancement levels: Soft 2, Soft 1, Normal, Sharp 1, Sharp 2
Horizontal	Five horizontal preset sharpness levels: Low 2, Low 1, Normal, High 1, High 2
	Five horizontal preset detail levels: Soft 2, Soft 1, Normal, Sharp 1, Sharp 2

Other Controls

GPI input Low/High Select	
	Black, Freeze, Pattern, User Memories 1-16
GPI Output Source	Black, Freeze, Pattern
User Memories	16 x Save, Recall, Rename
Memory Naming	User configurable naming of memories 1 – 16
RollTrack Index	Up to 50 RollTrack destinations
Optical Logging*	Tx Laser Bias High Warning
	Tx Power Low Warning
	Tx Power High Warning
Laser Wavelength	Input 1 (2) Rx Power High Warning
	Input 1 (2) Rx Power Low Warning
	Input 1 (2) Rx Power Measurement
RollTrack Sources	Unused, Input Present (1&2, Fiber 1 & 2) , Input Loss (1&2, Fiber 1 & 2), Reference OK & Loss
Information Window	Video Input Status, Reference Status
Factory Default	Resets all module settings to factory specified default values and clears memories
Default Settings	Resets all module settings to factory specified defaults but does not clear memories
Module Information	Reports following module information: Software version, Serial number, Rear Panel ID, Frame Slot

Specifications

Electrical	3Gbit/s SDI, SMPTE 424M 1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C
Connector / Format	BNC/ 75ohm panel jack on standard IQ connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s) >-10dB (3Gbit/s)
Output Jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz), 3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)
Reference Source	External – HD Tri-Level / SD Bi-level / Input Video syncs
Electrical	Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level)
	SD bi-level – RS170A
	HD Tr-level – SMPTE 240M and 274M
Connector / Format	BNC/75 ohm panel jack on standard IQ connector panel
Embedded audio handling	
	HD - 24-bit synchronous 48 kHz to SMPTE 299M, SD - 20-bit synchronous 48 kHz to SMPTE 272M-A

Digital Audio Input (Unbalanced)

Connector/Format	BNC
Sample Frequency	PCM: 25 – 96 kHz; Non-PCM: 48 kHz
Input Cable Length	>500 m of RG59 cable
Impedance	75 Ohms
Standard	AES3id

Digital Audio Input (Balanced)

Connector/Format	25Way-D
Sample Frequency	PCM: 25 – 96 kHz; Non-PCM: 48 kHz
Input Cable Length	>150 m of AES3 cable
Impedance	110 Ohms
Standard	AES3

Digital Audio Output (Unbalanced)

Connector/Format	BNC
Level	1 V p-p typical into 75 Ohms
Standard	AES3id

Digital Audio Output (Balanced)

Connector/Format	25Way-D
Level	3 V p-p typical into 110 Ohms
Standard	AES3

Optical 1310 nm Tx

Wavelength	1310 nm
Spectral width (FWHM)	>1.5 nm (typ)
Output power	0 to -5 dBm typical (-2 dBm typical)
Extinction ratio	>7.5:1 (typ)
Link distance	Up to 30 Km @ 270Mbit/s
	Up to 21 Km @ 1.5Gbit/s
	Up to 10 Km @ 3Gbit/s

Optical 1550 nm Tx

Wavelength	1550 nm
Spectral width (FWHM)	1 nm
Output power	4 to 0 dBm
Extinction ratio	>7.5:1 (typ)
Link distance	Up to 50 Km @ 270Mbit/s, 1.5Gbit/s or 3Gbit/s

Optical Rx

Input wavelength range	Min. 1260 nm, Max. 1620 nm
Optical power input range	> -0 dBm, < -20 dBm
Link distance	Up to 30 Km

Power Consumption

Module Power Consumption with Fiber	
	18W (A frames)
	18PR (B frames)

IQUPC33

3G/HD/SD-SDI Dual Up Converter with AES I/O

Ordering Information

Order codes for IQH3B enclosures

IQUPC3300-2B3
Dual up converter with AES I/O. 2 SDI inputs, External & Frame reference inputs, 2 SDI outputs per channel, 8 shared unbalanced AES inputs or outputs

IQUPC3302-2B3
Dual up converter with AES I/O. 2 SDI inputs, External & Frame reference inputs, 1 SDI output for channel 1, 2 SDI outputs for channel 2, 8 shared unbalanced AES inputs or outputs, 1 Fiber SFP cage. Includes rear but not SFP module

IQUPC3303-2B3
Dual up converter with AES I/O. 2 SDI inputs, External & Frame reference inputs, 2 SDI outputs per channel, 8 shared balanced AES inputs or outputs, 2 x GPI, 1 Fiber SFP cage. Includes rear but not SFP module

Order codes for IQH3A/1A enclosures

IQUPC3300-2A3
Dual up converter with AES I/O. 2 SDI inputs, reference loop, 2 SDI outputs per channel, 8 shared unbalanced AES inputs or outputs

IQUPC3302-2A3
Dual up converter with AES I/O. 2 SDI inputs, reference input, 1 SDI output for channel 1, 2 SDI outputs for channel 2, 8 shared unbalanced AES inputs or outputs, 1 Fiber SFP cage. Includes rear but not SFP module

IQUPC3303-2A3
Dual up converter with AES I/O. 2 SDI inputs, reference loop, 2 SDI outputs per channel, 8 shared balanced AES inputs or outputs, 2 x GPI, 1 Fiber SFP cage. Includes rear but not SFP module

For more details on enclosure types please refer to datasheet IQH3B

Software Options

IQOPTM-2NR - Software option to add noise reduction on both channels

IQOPTM-2SBK - Software option to add side-bar keying on both channels

IQOPTM-2LC - Software option to upgrade with linear frame rate conversion on both channels

IQOPTM-UDC - Software option for upgrade to up, down and cross conversion

SFP options

FC1-13T1 - Single 1310nm fiber Tx

FC1-13T2 - Dual 1310nm fiber Tx

FC1-15T1 - Single 1550nm fiber Tx

FC1-15T2 - Dual 1550nm fiber Tx

FC1-R1 - Single fiber Rx

FC1-R2 - Dual fiber Rx

FC1-13TR - Fiber transceiver 1310nmTx/Rx

FC1-HDBT2 - HD-BNC Dual Tx

FC1-HDBR2 - HD-BNC Dual Rx

Fiber CWDM Tx - Wavelengths available on request

Note: SFP type must be ordered in addition to the module.

IQUPC01

HD/SD-SDI Up Converter with Synchronizer and Analog Interfacing

The IQUPC01 provides up conversion for both analog video and digital SDI signals from SD to HD, or 3Gbps.

Using high quality motion adaptive de-interlacing and flexible scaling technology the IQUPC01 is a broadcast quality conversion module that includes 12-bit composite decoding and a component video ADC to allow legacy analog video standards to be repurposed along with their associated analog audio which can be embedded into the resulting SDI stream.

IQUPC01 includes a frame synchronizer, capable of referencing to a SD bi-level or HD tri-level reference and a variable aspect ratio converter with reading and writing of WSS, VI and 2016 AFD signalling. Audio is also comprehensively handled with audio channel routing, delay adjustment and level controls. Video metadata such as timecode, SMPTE2020 Dolby, closed captions and teletext captions can also be passed through the module or processed according to the required output standard.

To allow the module to be further tailored to system requirements a series of hardware and software options is available to provide color correction for video, and advanced audio processing features such as Dolby E/D encoding or decoding, stereo to 5.1 upmixing and loudness processing using industry recognised technology from Linear Acoustic.

Features

- High quality up conversion for SD-SDI and analog video inputs
- SD/HD component ADC with support for SMPTE 274M (1080i) or SMPTE 296M (720p) in HD, and SMPTE /EBU N10, MII, or BetaCam in SD
- 12-bit 3D PAL/NTSC composite decoding
- Dual SDI inputs with auto switching on pre-defined input errors
- Frame synchronizer with HD Tri-sync / SD Bi-Level Reference input, input loss detection and video delay up to 21 frames at 1080, 44 frames at 720 and 122 frames at 625
- Aspect ratio conversion including 9 preset ARC maps, up to 22 ARC memories, selectable border color and pan, tilt, size, and input crop adjustments
- Aspect ratio control (signalling reading and writing) using ETSI WSS and AFD Video Index signaling (RP186, SMPTE 2016)
- Video proc. features include: gain, offset, hue, horizontal picture enhancement, RGB gamut legalization and noise reduction
- Metadata support - Closed caption passing or processing for CEA608/708 and OP42/OP47/WST captions, and VITC or RP188 timecode translation
- In-built test pattern generator and 2 x 16 character caption generator
- Processed and reclocked signal paths allow the selected SDI input to be converted or passed through at the same format
- Embed analog audio onto 3G/HD/SD-SDI video streams with channel-level control
- Processing for 16 channels of embedded audio present on the incoming SDI stream with no disturbance during video synchronizer frame wraps or drops
- Audio proc. features including: channel routing, gain, invert, fixed and tracking delays, mixing, synchronizer wrap/drop processing and eight internal tone generators
- Dolby E support – Optional Dolby E/D decoding or encoding with both RS485 and SMPTE2020 metadata support, plus detection of PCM/non-PCM audio to SMPTE 337/338M, pair routing and Dolby E header alignment
- Advanced audio processing options from Linear Acoustic for stereo upmixing to 5.1 surround sound and loudness level measurement and control
- 16 x user memories and 2 GPI/O ports
- RollCall control and monitoring compatible with standard logging and reporting features
- RollTrack triggers available for detected module states including: PCM/non-PCM audio, input loss/freeze and reference loss

Order codes

IQUPC0153-2A3, IQUPC0153-2B3
Up converter with analog inputs. 2 SDI inputs, 1 composite/component input, 4 analog audio inputs, reference input, 4 selectable main or bypassed SDI outputs, 2 GPI/Os

Hardware and Software Options

IQOPTA-DBD Hardware option to add a single Dolby E/D decoder

IQOPTA-DBE-D Hardware option to add a single Dolby D encoder

IQOPTA-DBE-E Hardware option to add a single Dolby E encoder

IQOPTA-LOUD51 Software option to add Linear Accoustic AeroMax 5.1 loudness processing

IQOPTA-LOUDA2 Software option to add first channel of Linear Accoustic AeroMax 2.0 loudness processing

IQOPTA-LOUDB2 Software option to add second channel of Linear Accoustic AeroMax 2.0 loudness processing

IQOPTA-UPMIX Software option to add Linear Acoustic UPMAX stereo to 5.1 upmixing

IQOPTA-CC Software option to add color correction

For more details on enclosure types please refer to Frames & Hardware section.

IQUPC01

HD/SD-SDI Up Converter with Synchronizer and Analog Interfacing

Why should you choose this module?

- High quality video conversion and frame synchronization allows fully flexible multi-format working and provides a future proof migration path as digital workflows evolve
- Comprehensive audio processing functions allow complete control over embedded audio signals for applications where channel routing or mixing is required
- Full RollCall and SNMP compatibility allows easy integration with SAM or third party network management systems providing an all-inclusive monitoring and control solution

Map of input to output standards		Output							
		25		50		29.97		59.94	
		576i	1080i	720P	1080P	480i	1080i	720P	1080P
Input 25	576i	✔	✔	✔	✔	✗	✗	✗	✗
	1080i	✗	✔	✗	✗	✗	✗	✗	✗
Input 50	720P	✗	✗	✔	✗	✗	✗	✗	✗
	1080P	✗	✗	✗	✔	✗	✗	✗	✗
Input 29.97	480i	✗	✗	✗	✗	✔	✔	✔	✔
	1080i	✗	✗	✗	✗	✗	✔	✗	✗
Input 59.94	720P	✗	✗	✗	✗	✗	✗	✔	✗
	1080P	✗	✗	✗	✗	✗	✗	✗	✔

Format Conversion I/O Grid

Block Diagram for IQUPC0153-2A3   Network Intelligence, Control & Monitoring

Technical Specification

Inputs & Outputs
Video Signal Inputs

SDI Inputs	2x
Input Cable Length	Up to 80m Belden 1694A @ 3 Gbit/s
	Up to 180m Belden 1694A @ 1.5 Gbit/s
	>350m Belden 1694A @ 270 Mbit/s
Analog Video inputs	1 x Composite / YC / YPbPr / GBR

Analog Reference	1 x Analog Reference input
	Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level)
	SD bi-level – RS170A
	HD Tri-level – SMPTE 240M, 274M and 296M
Balanced analog audio	4 channels (25 Way D-Type)

Technical Specification cont…

Video Signal Outputs

SDI Outputs	x 4

Control Interface

GPI	2 x Closing contact I/O interface (ST)

Controls

Genlock & Video Delay

Genlock Mode	Free-run, Lock to Reference, Lock to input
Genlock H-Phase	± 1 H in pixel clock steps
Genlock V-Phase	± 1 F in 1 line steps
Video H-Delay	0 – 1 Line in pixel clock steps
Video V-Delay	0 – 1 Frame in 1 line steps
Video Delay Frames	0 – 26 frames @ 1080 59p
	0 – 21 frames @ 1080 50p
	0 – 26 frames @ 1080 29i
	0 – 21 frames @ 1080 25i
	0 – 54 frames @ 720 59p
	0 – 44 frames @ 720 50p
	0 – 147 frames @ 525 29i
	0 – 122 frames @ 625 25i
Dolby E auto line select	Std, user select
Dolby E auto align	On/Off

Video Controls

Input Select	Input 1, Input 2, Composite, YC, YPbPr, GBR
Input Backup Enable	On/Off
Priority	None, Master (input 1), Backup (input 2)
Change-over Parameters	Carrier Loss, Standard mismatch, CRC and ANC Error, Embedded audio loss
Change-over Time Delay	0s to 10s
Reversion Delay	0 to 100s
Conversion	1080p, 1080i, 720p, SD
Default Video Output Type	
	Pattern, Freeze, Black
Pattern Select	100% Color Bars, 75% Color Bars, SMPTE Bars, Tartan Bars, Black, Pluge, Ramp, H Sweep, Pulse & Bar, Multi-burst
Output Routing	Processed, Reclocked Bypass
Output Mode	Input, Black, Freeze, Pattern
Colorimetry	Auto, None, Rec601, BT709
H Enhance Frequency	Off, Low, Medium, High
H Enhance Presets	Low, Medium, High, Super, Custom
Borders	R/G/B 0-255 in steps of 1
Border Adjust	Left, Right, Top, Bottom
RGB Legalizer	700 mV, 721 mV, 735 mV, 746 mV
Black Level	±200 mV in steps of 1 mV
Hue Adjust	±180° in steps of 1°
Master Video Gain	+6 to -120 dB
Y-Gain	+6 to -120 dB
Cb/Cr Gain	+6 to -120 dB
Caption Enable	On/Off
Edit Caption	16 characters
Caption Adjust	X-Y Size & Position
Metadata support	Closed Captions CC608-708 (compatibility bytes), WST-OP47, VITC-ATC

Aspect Ratio Conversion

Signalling type	WSS (ETSI or AFD), VI (SMPTE or AFD), SMPTE 2016
Select from 9 standard preset conversions:	
	Full Frame
	Box 16:9 top > 16:9
	4:3 box 14:9 top > 16:9
	Box 16:9 > 16:9
	Box 4:3 > 4:3
	4:3 > box 16:9
	16:9 > box 4:3
	4:3 box 14:9 > 16:9
	16:9 box 14:9 > 4:3

Display Memories	32 User configurable ARC display memories
Size	60% to 150% in 0.1% steps.
Aspect	60% to 200% in 0.1% steps.
Pan / Tilt	±75% in 0.1% steps
Input crop	Left / Right / Top / Bottom

Audio Controls

Audio In - Embedded

Audio In-Disembed	Pairs 1-8
Channel 1 – 16 Mute	On/Off
Channel 1 – 16 Polarity Inv	
	On/Off
Channel 1 – 16 Gain	+12 dB to -80 dB in 0.1 dB steps
Pair 1 – 8 Stereo	Link channel pairs

Audio In - Analog

Channel 1 – 4 Mute	On/Off
Channel 1 – 4 Polarity Inv	
	On/Off
Channel 1 – 4 Gain	+12 dB to -80 dB in 0.1 dB steps
Analog 1 – 2 Stereo	Link Channel Pairs

Audio Out - Embedded

Group 1 -4 Enable	On/Off
Audio Out-embed	Pairs 1-8
Channel 1 – 16 Mute	On/Off
Channel 1 – 16 Gain	+12 dB to -80 dB in 0.1 dB steps
Pair 1 – 8 Stereo	Link channel pairs

Audio Routing

Input routing Bus 1-8	Disembed 1-8, 1-8 Analog, Dolby Decoder 1-5*
Output routing embed 1-8	
	Bus 1-8, Mixers 1-4, Downmixer 1-2, silence, Tones 1-8, Upmix*/Loudness*, Dolby Encoder 1-5*
* indicates optional feature	

Audio Setup Controls – Bus 1-8

Delay Add-In Bulk, RollTrack, current video	
	On/Off
Bulk Manual Delay	-520ms to +2s in 0.17ms steps
Coarse Manual Pair Delay	
	±1.995s in 1ms steps
Fine Manual Delay	±5ms in 0.02ms steps
Fast or smooth delay limit	
	5ms to 80ms
Silence Detect	-2dBFS to -128dBFS in steps of 1dB
Signal Overload Detect	-1dBFS to -127dBFS in steps of 1dB
Warning Timer	1 to 20 seconds in steps of 1 second
Tone Frequency 1-8	100Hz to 16kHz in 100Hz steps
Analog input Headroom	
	4dB to 24dB in 1dB steps
Analog input Line Up Level	
	-20dBU to 20dBU in 1dB steps (with 4dB Headroom setting)

Dolby Decoder

Decoder Source	Disembed 1-8
Detection Mode	Auto, dolby E, Dolby D, Mute
AES Channel Select	Channel 1, 2
PCM Latency	Single Frame, Minimum
Dolby D listening mode	Full, EX, 3 Stereo, Phantom, Stereo, Mono
Dolby D Dynamic Range	Line, RF, Bypass
Metadata Program	1, 2
Input Metadata	RS-485, SMPTE 2020

IQUPC01 HD/SD-SDI Up Converter with Synchronizer and Analog Interfacing

Technical Specification cont…

Dolby Encoder

Encoder Source	Bus 1-8, Upmix*/Loudness*, Silence
Metadata Source	Prog 1-8, Internal
Internal Metadata control	
	Program Descriptor, Dialog Norm, Audio Production information, Extended BSI1, BSI2, Internal Config, Bitstream Mode, RF Mode, Line Mode, Surround Mode, Mix Level (Surround, Centre, LtRt, LoRo), Internal Config setting (e.g. 5.1+2)
Mode	Encode, Pass through
Bit Depth	Dolby D - 32 bit, 16 bit
	Dolby E - 20 bit, 16 bit
SRC	Enable, Disable
Stream Number	0-6

Audio Mixers

Mixer Select	1-4, Downmix 1 -2
Source select	Bus 1-8, Silence, Tones 1-8
Source Gain	12dB to -80dB in 0.1dB steps
Mixer 1-4 invert	On/Off
Mixer 1-4, Downmix 1-2 Mute	
	On/Off
Downmix Configuration	LoRo, 4 level selections

Other Controls

GPI input High/Low Select	
	Input 1-2, Analog, Black, Freeze, Pattern, User Memories 1-16, ARC Display Memories 1-32
GPI Level Invert	High/Low
GPI Output Source	Current input OK, Input 1-2 OK, Input 1-2 Selected, Analog I/P OK, Analog Selected, Black, Freeze, Pattern, No User Memories Selected, User Memories 1-16, No ARC Display Memories Selected, ARC Display Memories 1-32
RS-485 Port	Output Dolby decoder, Output SMPTE 2020 Disembed, Input
SMPTE 2020 embedder	Dolby decoder, RS-485 Port, SMPTE 2020 Disembed
User Memories	Save/Recall/Rename
Memory Naming	User configurable naming of Memories 1 – 16
Information Window	Video Input Status, Audio Input Status, EDH/CRC & ANC Status
EDH/CRC Reset	Resets all EDH/CRC counts
RollTrack Index	Allows up to 70 destinations
RollTrack Sources	Unused, Video Delay, Audio Delay, Input Present (1-2, analog), Input Loss (1-2, analog), Output Std, Input selected (1-2, analog), Output Black, Freeze or Pattern on, Output Black, Freeze or Pattern off, Output Caption on, Output Caption off, Embedded Audio (Pairs 1-8) PCM, Embedded Audio (Pairs 1-8) Non-PCM, Embedded Audio (Pairs 1-8) Loss, Reference OK & Loss, Dolby Decoder Input Type, Encoder active/pass-through, Dolby Metadata valid/missing
Factory Default	Resets all module settings to factory specified default values and clears memories
Default Settings	Resets all module settings to factory specified defaults but does not clear user memories
Restart	Software reset of module
Module Information	Reports: Product Name
	Software version, Serial number, Build number, KOS version, PCB version, Licensed Options
Input Names	19 Character editable name

Specifications

Electrical	3Gbit/s SDI, SMPTE 424M 1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C / DVB-ASI
Connector / Format	BNC/ 75ohm panel jack on standard IQ connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s) >-10dB (3Gbit/s)
Output Jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz), 3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)
Reference Source	External – HD Tri-Level / SD Bi-level / Input Video syncs
Electrical	Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level)
	SD bi-level – RS170A
	HD Tr-level – SMPTE 240M, 274M and 296M
Connector / Format	BNC/75 ohm panel jack on standard IQ connector panel

Analog Reference Return Loss

	SD bi-level > 40 dB to 5.5 MHz, HD tri-level > 35 dB to 30 MHz
Video Standards	1125(1080)/50p, 1125(1080)/59p, 750(720)/50p, 750(720)/59p, 1125(1080)/25i, 1125(1080)/25p, 1125(1080)/25psf, 1125(1080)/29i, 625(576)/25i, 525(480)/29i

Embedded audio handling

	HD - 24-bit synchronous 48 kHz to SMPTE 299M, SD - 20-bit synchronous 48 kHz to SMPTE 272M-A

Analog Audio Input (Balanced)

Analog Input Impedance	
	10 k ohms
Frequency Response	20 Hz to 20 kHz (□0.1 dB)
Distortion (THD+N)	Better than -90 dB, 1kHz@ -1 dBFS
Dynamic range	> 106 dB
Audio delay	Equal to video delay + adjustable offset

Power Consumption

Module Power Consumption	
	25.5 W Max (A Frames)
	23.5 PR (B Frames)

Note: Dolby option adds 2.5W (PR)

IQUDC30 — 3G/HD/SD-SDI Up, Down and Cross Converter

The IQUDC30 provides multi-rate format conversion for 3Gbps SDI, and HD-SDI digital video signals. Using high quality motion adaptive de-interlacing and flexible scaling technology the IQUDC30 is a broadcast quality conversion module able to handle a wide variety of common applications such as up-conversion for SD content repurposing on HD channels, or downconversion to maintain SD output feeds.

IQUDC30 includes a frame synchronizer, capable of referencing to a SD bi-level or HD tri-level reference and a variable aspect ratio converter with reading and writing of WSS, VI and 2016 AFD signalling. Audio handling includes audio channel routing, delay adjustment and level controls. Video metadata such as timecode, SMPTE2020 Dolby, closed captions and teletext captions can also be passed through the module or processed according to the required output standard.

To allow the module to be further tailored to system requirements software options are available to provide noise reduction and side-bar keying, and versions are available with SFP cages enabling fiber conversion or additional electrical outputs on HD-BNCs.

Features

- High quality up, down and cross conversion for SDI video inputs including conversion aperture control
- Frame synchronizer with HD Tri-sync / SD Bi-Level Reference Input and input loss detection
- Aspect ratio conversion including preset ARC maps relative to conversion modes, selectable border color and pan, tilt, size, and input crop adjustments
- Aspect ratio control (signalling reading and writing) using ETSI WSS and AFD Video Index signaling (RP186, SMPTE 2016)
- Video proc. features include: gain, offset, hue, horizontal and vertical picture enhancement, and RGB gamut legalization
- Metadata support - Closed caption passing or processing for CEA608/708 and OP42/OP47/WST captions, VITC or SMPTE12M timecode translation, and Ancillary data bridge for 7 blocks of ANC data passing
- In-built test pattern generator and 19 character scrolling caption generator
- Additional processing options including; noise reduction (adaptive spatial and recursive), side-bar keying and linear frame rate conversion
- Processing for 16 channels of embedded audio present on the incoming SDI stream with no disturbance during video synchronizer frame wraps or drops
- Audio proc. features including: channel routing, gain, invert, delay and eight internal tone generators
- Non-PCM processing features pair level routing and delay compensation. Dolby-E data is passed with a delay to match the video and with co-timed audio frame drop or repeat
- Dolby E support – Detection of PCM/non-PCM audio to SMPTE 337/338M, pair routing and Dolby E header re-alignment
- Integrated Fiber I/O support via SFP module
- 16 x user memories and 2 GPI/O ports
- RollCall control and monitoring compatible with standard logging and reporting features
- RollTrack triggers available for detected module states including: Input loss and reference loss

Why should you choose this module?

- High quality video conversion and frame synchronization allows fully flexible multi-format working and provides a future proof migration path as digital workflows evolve
- Comprehensive audio processing functions allow complete control over embedded audio signals for applications where channel routing, gain control or delay is required
- Full RollCall and SNMP compatibility allows easy integration with SAM or third party network management systems providing an all-inclusive monitoring and control solution

Inputs & Outputs - IQH3B enclosures

IQUDC3001-1B3

IQUDC3003-1B3

Inputs & Outputs - IQH3A/1A/3B enclosures
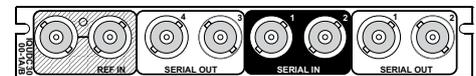
IQUDC3000-1A3, IQUDC3000-1B3

IQUDC3002-1A3, IQUDC3002-1B3

For more details on enclosure types please refer to datasheet IQH3B.

IQUDC30

3G/HD/SD-SDI Up, Down and Cross Converter
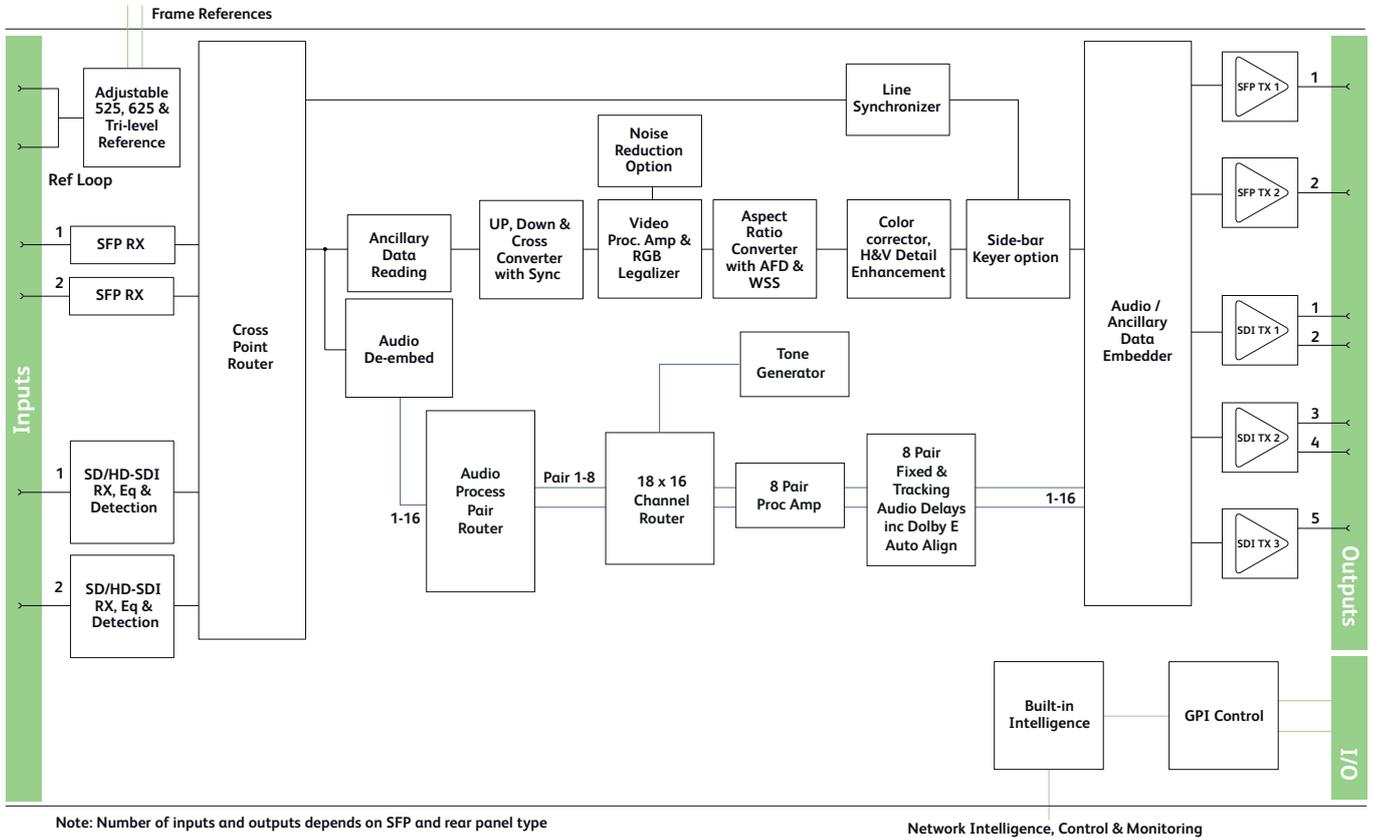
Block Diagram for IQUDC30 Range

Technical Specification

Inputs & Outputs
Video Signal Inputs

SDI Inputs	2x
Input Cable Length	Up to 80m Belden 1694A @ 3 Gbit/s
	Up to 120m Belden 1694A @ 1.5 Gbit/s
	100m typical (with output set to 1080p rates), Belden 1694A @ 270 Mbit/s
Input Standard (auto detect)	
	625(576)/25i, 525(480)/29i
	720 50/59p1080 50/59i
	1080 50/59p level A/B
	1080 25/29psf
Analog Reference	1 x Analog Reference with passive loop-through Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level)
	SD bi-level – RS170A
	HD Tri-level – SMPTE 240M, 274M

Fiber Signal Input

Inputs	Up to 2
Optical	3 GBit/s HD-SDI, 1.485 GBit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format	LC singlemode
Standard	SMPTE 297-2006

Map of input to output standards		Output							
		25		50		29.97		59.94	
		576i	1080i	720P	1080P	480i	1080i	720P	1080P
Input	25 576i	✔	✔	✔	✔	✘	✘	✘	✘
	25 1080i	✔	✔	✔	✔	✘	✘	✘	✘
	50 720P	✔	✔	✔	✔	✘	✘	✘	✘
	50 1080P	✔	✔	✔	✔	✘	✘	✘	✘
	29.97 480i	✘	✘	✘	✘	✔	✔	✔	✔
	29.97 1080i	✘	✘	✘	✘	✔	✔	✔	✔
	59.94 720P	✘	✘	✘	✘	✔	✔	✔	✔
	59.94 1080P	✘	✘	✘	✘	✔	✔	✔	✔

Format Conversion I/O Grid

IQUDC30 3G/HD/SD-SDI Up, Down and Cross Converter

Technical Specification cont…

Video Signal Outputs

SDI Outputs	up to 5
Output standard	625(576)/25i, 525(480)/29i
	720 50/59p, 1080 50/59i
	1080 50/59p level A/B

Fiber Signal Output

Optical	3 GBit/s HD-SDI, 1.485 Gbit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format	LC singlemode
Conforms to	SMPTE 297-2006
Outputs	Up to 2

*Note: Optical I/O and control dependant on type of SFP module fitted

Control Interface

GPI	2 x Closing contact I/O interface (ST) (rear panel dependant)

Conversion Functions

Modes	Up, down, and cross conversion
	Aspect ratio conversion synchronization
Conversion processing	Still process: Detects still images and applies an aperture with full (progressive) vertical frequency response
	Enhanced still: Adds field motion detection to still process. Prevents artifacts on moving repetitive patterns
Aspect ratio conversion (manual or auto)	AFD (SMPTE 2016), VI (RP186), WSS (L23)
SD input format	Normal 4:3, Anamorphic 16:9, Letterbox 14:9, Letterbox 16:9
SD output format	Normal 4:3, Anamorphic 16:9, Letterbox 14:9, Letterbox 16:9
Auto zoom	On/Off
Manual zoom	Zoom +/- 20%
Metadata	Closed caption CE608 <> CE708
	Timecode conversions
	Teletext subtitles WST/RDD8 conversion

Audio Functions

Embedded audio	16-channel embedded audio processing
	PCM audio processing includes channel level gain and delay compensation, as well as channel level routing with L/R swap and phase invert feature
	Non-PCM processing features pair level routing and delay compensation. Dolby E data is passed with a delay to match the video and with co-timed audio frame drop or repeat
Embedded audio	Enable/Blank

Embedded Audio Routing

Processed pair 1-8	Disemb 1-8
Output Channels 1-16	Processed pair 1-8, Tone, Silence

Processed Audio Control

Invert Phase	Channels 1-16
Pair 1 to 8 Gain L/R	+18 dB to -18 dB in 0.1 dB steps
Pair 1-8 Manual Delay	-40 to +200 ms in 1 ms steps
Global Manual Delay	-40 to +200 ms in 1 ms steps

Dolby-E

Dolby-E Auto Alignment	+/- 10 line offset in 1 line steps

Tone

Frequency	100Hz to 10kHz in 100Hz steps

Processing Functions

Ancillary Data	Pass/Strip
Freeze	On/Off
Legalizer	On/Off
Genlock	Reference lock, Input lock (same format), Follow input (same frame rate), Free run
Memories	16 user memories
Pattern	Off, Black, Ramp, Bars
Caption	On/Off, Scrolling
Edit Caption	19 characters available

Proc amp

Black Level:	+100 to -100 mV (0) in 0.8 mV steps
Contrast:	-6 dB to +6 dB (0) in 0.2 dB steps
Saturation:	-6 dB to +6 dB (0) in 0.2 dB steps
Y Gamma:	0.4 to 1.7 (1) in 0.1 steps
YC Offset:	-20 to 20 (0) in 2 Luma pixel steps
	Note: Defaults shown in brackets

Enhancement

Nonlinear Enhancer	Frequency Band Selection: Low, Med, High
	Four preset enhancement modes: Low, Med, High, Super
	Manual enhancement mode with H Gain and H Noise rejection levels

Conversion Aperture

Vertical	Frequency Band Selection: Low, Med, High
	Five vertical preset enhancement levels: Soft 2, Soft 1, Normal, Sharp 1, Sharp 2
Horizontal	Five horizontal preset sharpness levels: Low 2, Low 1, Normal, High 1, High 2
	Five horizontal preset detail levels: Soft 2, Soft 1, Normal, Sharp 1, Sharp 2

Other Controls

GPI input Low/High Select	
	Black, Freeze, Pattern, User Memories 1-16
GPI Output Source	Black, Freeze, Pattern
User Memories	16 x Save, Recall, Rename
Memory Naming	User configurable naming of memories 1 – 16
RollTrack Index	Up to 50 RollTrack destinations
Optical Logging*	Tx Laser Bias High Warning
	Tx Power Low Warning
	Tx Power High Warning
Laser Wavelength	Input 1 (2) Rx Power High Warning
	Input 1 (2) Rx Power Low Warning
	Input 1 (2) Rx Power Measurement
RollTrack Sources	Unused, Input Present (1&2, Fiber 1 & 2) , Input Loss (1&2, Fiber 1 & 2), Reference OK & Loss
Information Window	Video Input Status, Reference Status
Factory Default	Resets all module settings to factory specified default values and clears memories
Default Settings	Resets all module settings to factory specified defaults but does not clear memories
Module Information	Reports following module information: Software version, Serial number, Rear Panel ID, Frame Slot

IQUDC30

3G/HD/SD-SDI Up, Down and Cross Converter

Specifications

Electrical	3Gbit/s SDI, SMPTE 424M 1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C
Connector / Format	BNC/ 75ohm panel jack on standard IQ connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s) >-10dB (3Gbit/s)
Output Jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz), 3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)
Reference Source	External – HD Tri-Level / SD Bi-level / Input Video syncs
Electrical	Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level)
	SD bi-level – RS170A
	HD Tr-level – SMPTE 240M and 274M
Connector / Format	BNC/75 ohm panel jack on standard IQ connector panel
Embedded audio handling	
	HD - 24-bit synchronous 48 kHz to SMPTE 299M,
	SD - 20-bit synchronous 48 kHz to SMPTE 272M-A

Optical 1310 nm Tx

Wavelength	1310 nm
Spectral width (FWHM)	>1.5 nm (typ)
Output power	0 to -5 dBm typical (-2 dBm typical)
Extinction ratio	>7.5:1 (typ)

Optical Rx

Input wavelength range	Min. 1260 nm, Max. 1620 nm
Optical power input range	> -0 dBm, < -20 dBm
Link distance	Up to 30 Km

Power Consumption

Module Power Consumption with Fiber

	13W (A frames)
	13PR (B frames)

Ordering Information

Order codes for IQH3B enclosures

IQUDC3000-1B3
Up, down and cross converter . 2 SDI inputs, external reference loop & enclosure reference inputs, 4 SDI outputs

IQUDC3001-1B3
Up, down and cross converter . 2 SDI inputs, 5 SDI outputs, 2 GPI/Os, reference inputs from enclosure

IQUDC3002-1B3
Up, down and cross converter . 2 SDI inputs, external reference input & enclosure reference inputs, 3 SDI outputs, single SFP cage

IQUDC3003-1B3
Up, down and cross converter . 2 SDI inputs, 4 SDI outputs, single SFP cage, reference inputs from enclosure

Order codes for IQH3A/1A enclosures

IQUDC3000-1A3
Up, down and cross converter . 2 SDI inputs, reference loop, 4 SDI outputs

IQUDC3002-1A3
Up, down and cross converter . 2 SDI inputs, reference input, 3 SDI outputs, single SFP cage

For more details on enclosure types please refer to datasheet IQH3B.

Software Options

IQOPTM-NR - Software option to add noise reduction

IQOPTM-SBK - Software option to add side-bar keying

IQOPTM-LC - Software option to upgrade with Linear frame rate conversion

Fiber SFP options

FC1-13T1 - Single 1310nm Tx

FC1-13T2 - Dual 1310nm Tx

FC1-15T1 - Single 1550nm Tx

FC1-15T2 - Dual 1550nm Tx

FC1-R1 - Single Rx

FC1-R2 - Dual Rx

FC1-13TR - Transceiver 1310nm/Rx

FC1-HDBT2 - HD-BNC Dual Tx

FC1-HDBR2 - HD-BNC Dual Rx

FC1-HDMI2 - HDMI Tx with 2m cable

CWDM Tx - Wavelengths available on request

Note: Fiber SFP type must be ordered in addition to the module.

IQUDC10　3G/HD/SD-SDI Up, Down and Cross Converter with Synchronizer

The IQUDC10 provides multi-format conversion for 3Gbps SDI, and HD-SDI digital video signals. Using high quality motion adaptive de-interlacing and flexible scaling technology the IQUDC10 is a broadcast quality conversion module able to handle a wide variety of common applications such as up-conversion for SD content repurposing on HD channels, or downconversion to maintain SD output feeds.

IQUDC10 includes a frame synchronizer, capable of referencing to a SD bi-level or HD tri-level reference and a variable aspect ratio converter with reading and writing of WSS, VI and 2016 AFD signalling. Audio is also comprehensively handled with audio channel routing, delay adjustment and level controls. Video metadata such as timecode, SMPTE2020 Dolby, closed captions and teletext captions can also be passed through the module or processed according to the required output standard.

To allow the module to be further tailored to system requirements a series of hardware and software options is available to provide color correction for video, and advanced audio processing features such as Dolby E/D encoding or decoding, stereo to 5.1 upmixing and loudness processing using industry recognised technology from Linear Acoustic.

Features

- High quality up, down and cross conversion for SDI video inputs
- Dual SDI inputs with auto switching on pre-defined input errors
- Frame synchronizer with HD Tri-sync / SD Bi-Level Reference Input, input loss detection and video delay up to 21 frames at 1080, 44 frames at 720 and 122 frames at 625
- Aspect ratio conversion including 9 preset ARC maps, up to 22 ARC memories, selectable border color and pan, tilt, size, and input crop adjustments
- Aspect ratio control (signalling reading and writing) using ETSI WSS and AFD Video Index signaling (RP186, SMPTE 2016)
- Video proc. features include: gain, offset, hue, horizontal picture enhancement, RGB gamut legalization and noise reduction
- Metadata support - Closed caption passing or processing for CEA608/708 and OP42/OP47/WST captions, and VITC or RP188 timecode translation
- In-built test pattern generator and 2 x 16 character caption generator
- Processed and reclocked signal paths allow the selected SDI input to be converted or passed through at the same format
- Processing for 16 channels of embedded audio present on the incoming SDI stream with no disturbance during video synchronizer frame wraps or drops
- Audio proc. features including: channel routing, gain, invert, fixed and tracking delays, mixing, synchronizer wrap/drop processing and eight internal tone generators
- Dolby E support – Optional Dolby E/D decoding or encoding with both RS485 and SMPTE2020 metadata support, plus detection of PCM/non-PCM audio to SMPTE 337/338M, pair routing and Dolby E header alignment
- Advanced audio processing options from Linear Acoustic for stereo upmixing to 5.1 surround sound and loudness level measurement and control
- 16 x user memories and 2 GPI/O ports
- RollCall control and monitoring compatible with standard logging and reporting features
- RollTrack triggers available for detected module states including: PCM/non-PCM audio, input loss/freeze and reference loss

Why should you choose this module?

- High quality video conversion and frame synchronization allows fully flexible multi-format working and provides a future proof migration path as digital workflows evolve
- Comprehensive audio processing functions allow complete control over embedded audio signals for applications where channel routing or mixing is required
- Full RollCall and SNMP compatibility allows easy integration with SAM or third party network management systems providing an all-inclusive monitoring and control solution

Order codes

IQUDC1054-2A3, IQUDC1054-2B3
Up, down and cross converter . 2 SDI inputs, reference loop, 4 selectable main or bypassed SDI outputs, 2 GPI/Os

Hardware and Software Options

IQOPTA-DBD Hardware option to add a single Dolby E/D decoder

IQOPTA-DBE-D Hardware option to add a single Dolby D encoder

IQOPTA-DBE-E Hardware option to add a single Dolby E encoder

IQOPTA-LOUD51 Software option to add Linear Accoustic AeroMax 5.1 loudness processing

IQOPTA-LOUDA2 Software option to add first channel of Linear Accoustic AeroMax 2.0 loudness processing

IQOPTA-LOUDB2 Software option to add second channel of Linear Accoustic AeroMax 2.0 loudness processing

IQOPTA-UPMIX Software option to add Linear Acoustic UPMAX stereo to 5.1 upmixing

IQOPTA-CC Software option to add color correction

For more details on enclosure types please refer to Frames & Hardware section.

IQUDC10

3G/HD/SD-SDI Up, Down and Cross Converter with Synchronizer
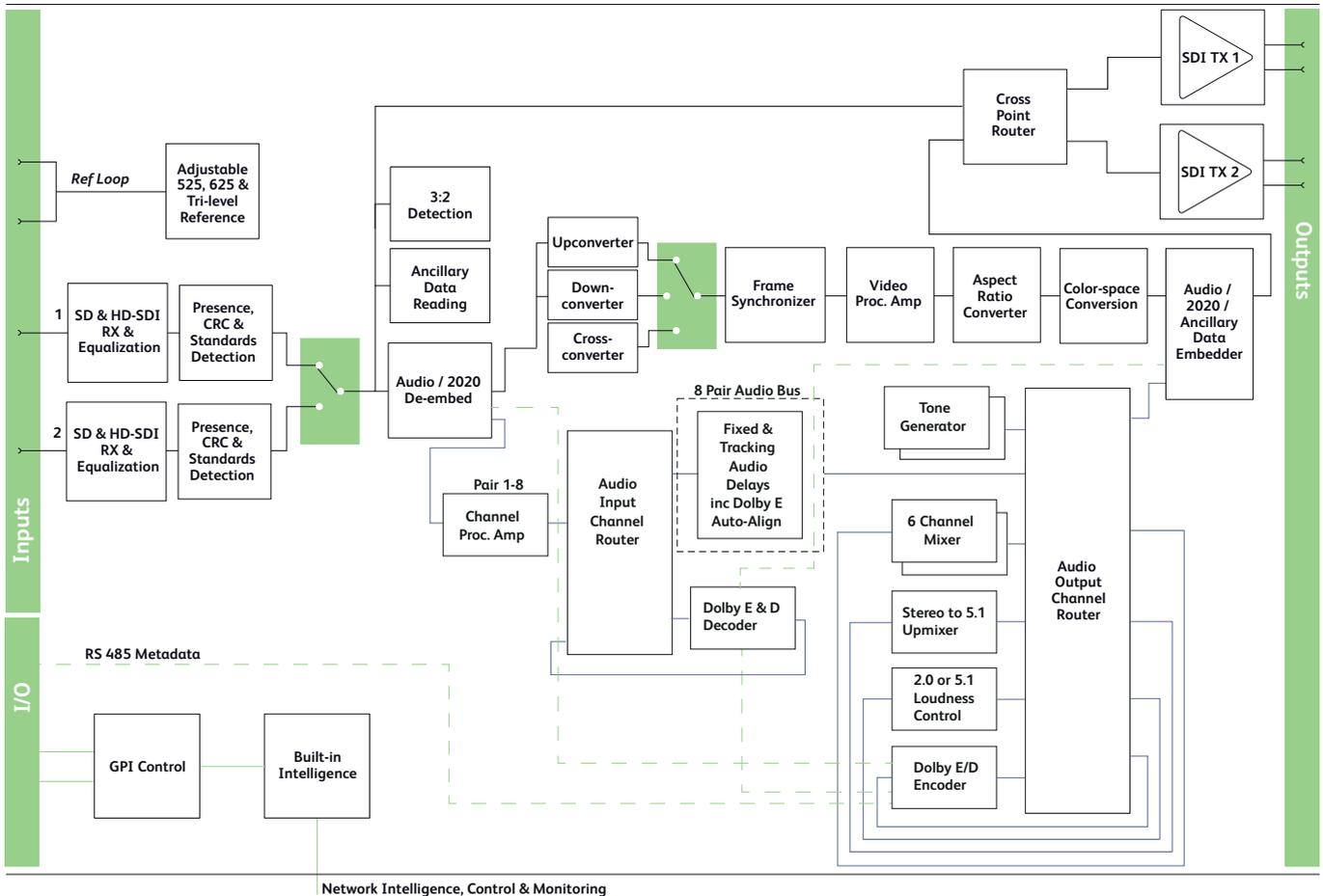
⌒ **Block Diagram** for IQUDC1054-2A3

Technical Specification

Inputs & Outputs

Video Signal Inputs

SDI Inputs	2x
Input Cable Length	Up to 80m Belden 1694A @ 3 Gbit/s
	Up to 180m Belden 1694A @ 1.5 Gbit/s
	>350m Belden 1694A @ 270 Mbit/s
Analog Reference	1 x Analog Reference with passive loop-through
	Black (HD tri-level and SD bi-level) and Black
	Burst (SD bi-level)
	SD bi-level – RS170A
	HD Tri-level – SMPTE 240M, 274M and 296M

Video Signal Outputs

SDI Outputs	x 4

Control Interface

GPI	2 x Closing contact I/O interface (ST)

Controls

Genlock & Video Delay

Genlock Mode	Free-run, Lock to Reference, Lock to input
Genlock H-Phase	± 1 H in pixel clock steps
Genlock V-Phase	± 1 F in 1 line steps
Video H-Delay	0 – 1 Line in pixel clock steps
Video V-Delay	0 – 1 Frame in 1 line steps

Map of input to output standards			Output							
			25		50		29.97		59.94	
			576i	1080i	720P	1080P	480i	1080i	720P	1080P
Input	25	576i	✔	✔	✔	✔	✕	✕	✕	✕
		1080i	✔	✔	✔	✔	✕	✕	✕	✕
	50	720P	✔	✔	✔	✔	✕	✕	✕	✕
		1080P	✔	✔	✔	✔	✕	✕	✕	✕
	29.97	480i	✕	✕	✕	✕	✔	✔	✔	✔
		1080i	✕	✕	✕	✕	✔	✔	✔	✔
	59.94	720P	✕	✕	✕	✕	✔	✔	✔	✔
		1080P	✕	✕	✕	✕	✔	✔	✔	✔

⌒ Format Conversion I/O Grid

IQUDC10

3G/HD/SD-SDI Up, Down and Cross Converter with Synchronizer

Technical Specification cont…

Video Delay Frames	0 – 26 frames @ 1080 59p
	0 – 21 frames @ 1080 50p
	0 – 26 frames @ 1080 29i
	0 – 21 frames @ 1080 25i
	0 – 54 frames @ 720 59p
	0 – 44 frames @ 720 50p
	0 – 147 frames @ 525 29i
	0 – 122 frames @ 625 25i
Dolby E auto line select	Std, user select
Dolby E auto align	On/Off

Video Controls

Input Select	Input 1, Input 2
Input Backup Enable	On/Off
Priority	None, Master (input 1), Backup (input 2)
Change-over Parameters	Carrier Loss, Standard mismatch, CRC and ANC Error, Embedded audio loss
Change-over Time Delay	0s to 10s
Reversion Delay	0 to 100s
Up, Down, Cross Conversion	
	1080p, 1080i, 720p, SD
Default Video Output Type	
	Pattern, Freeze, Black
Pattern Select	100% Color Bars, 75% Color Bars, SMPTE Bars, Tartan Bars, Black, Pluge, Ramp, H Sweep, Pulse & Bar, Multi-burst
Output Routing	Processed, Reclocked Bypass
Output Mode	Input, Black, Freeze, Pattern
Colorimetry	Auto, None, Rec601, BT709
H Enhance Frequency	Off, Low, Medium, High
H Enhance Presets	Low, Medium, High, Super, Custom
Borders	R/G/B 0-255 in steps of 1
Border Adjust	Left, Right, Top, Bottom
RGB Legalizer	700 mV, 721 mV, 735 mV, 746 mV
Black Level	±200 mV in steps of 1 mV
Hue Adjust	±180° in steps of 1°
Master Video Gain	+6 to -120 dB
Y-Gain	+6 to -120 dB
Cb/Cr Gain	+6 to -120 dB
Caption Enable	On/Off
Edit Caption	16 characters
Caption Adjust	X-Y Size & Position
Metadata support	Closed Captions CC608-708 (compatibility bytes), WST-OP47, VITC-ATC

Aspect Ratio Conversion

Signalling type	WSS (ETSI or AFD), VI (SMPTE or AFD), SMPTE 2016
Select from 9 standard preset conversions:	
	Full Frame
	Box 16:9 top > 16:9
	4:3 box 14:9 top > 16:9
	Box 16:9 > 16:9
	Box 4:3 > 4:3
	4:3 > box 16:9
	16:9 > box 4:3
	4:3 box 14:9 > 16:9
	16:9 box 14:9 > 4:3
Display Memories	32 User configurable ARC display memories
Size	60% to 150% in 0.1% steps.
Aspect	60% to 200% in 0.1% steps.
Pan / Tilt	±75% in 0.1% steps
Input crop	Left / Right / Top / Bottom

Audio Controls

Audio In - Embedded

Audio In-Disembed	Pairs 1-8
Channel 1 – 16 Mute	On/Off
Channel 1 – 16 Polarity Inv	
	On/Off
Channel 1 – 16 Gain	+12 dB to -80 dB in 0.1 dB steps
Pair 1 – 8 Stereo	Link channel pairs

Audio Out - Embedded

Group 1 -4 Enable	On/Off
Audio Out-embed	Pairs 1-8
Channel 1 – 16 Mute	On/Off
Channel 1 – 16 Gain	+12 dB to -80 dB in 0.1 dB steps
Pair 1 – 8 Stereo	Link channel pairs

Audio Routing

Input routing Bus 1-8	Disembed 1-8, Dolby Decoder 1-5*
Output routing embed 1-8	
	Bus 1-8, Mixers 1-4, Downmixer 1-2, silence, Tones 1-8, Upmix*/Loudness*, Dolby Encoder 1-5*

* indicates optional feature

Audio Setup Controls – Bus 1-8

Delay Add-In Bulk, RollTrack, current video	
	On/Off
Bulk Manual Delay	-520ms to +2s in 0.17ms steps
Coarse Manual Pair Delay	
	±1.995s in 1ms steps
Fine Manual Delay	±5ms in 0.02ms steps
Fast or smooth delay limit	
	5ms to 80ms
Silence Detect	-2dBFS to -128dBFS in steps of 1dB
Signal Overload Detect	-1dBFS to -127dBFS in steps of 1dB
Warning Timer	1 to 20 seconds in steps of 1 second
Tone Frequency 1-8	100Hz to 16kHz in 100Hz steps

Dolby Decoder

Decoder Source	Disembed 1-8
Detection Mode	Auto, dolby E, Dolby D, Mute
AES Channel Select	Channel 1, 2
PCM Latency	Single Frame, Minimum
Dolby D listening mode	Full, EX, 3 Stereo, Phantom, Stereo, Mono
Dolby D Dynamic Range	Line, RF, Bypass
Metadata Program	1, 2
Input Metadata	RS-485, SMPTE 2020

Dolby Encoder

Encoder Source	Bus 1-8, Upmix*/Loudness*, Silence
Metadata Source	Prog 1-8, Internal
Internal Metadata control	
	Program Descriptor, Dialog Norm, Audio Production information, Extended BSI, BSI2, Internal Config, Bitstream Mode, RF Mode, Line Mode, Surround Mode, Mix Level (Surround, Centre, LtRt, LoRo), Internal Config setting (e.g. 5.1+2)
Mode	Encode, Pass through
Bit Depth	Dolby D - 32 bit, 16 bit
	Dolby E - 20 bit, 16 bit
SRC	Enable, Disable
Stream Number	0-6

IQUDC10   3G/HD/SD-SDI Up, Down and Cross Converter with Synchronizer

Technical Specification cont…

Audio Mixers

Mixer Select	1-4, Downmix 1 -2
Source select	Bus 1-8, Silence, Tones 1-8
Source Gain	12dB to -80dB in 0.1dB steps
Mixer 1-4 invert	On/Off
Mixer 1-4, Downmix 1-2 Mute	
	On/Off
Downmix Configuration	LoRo, 4 level selections

Other Controls

GPI input High/Low Select	
	Input 1-2, Black, Freeze, Pattern, User Memories 1-16, ARC Display Memories 1-32
GPI Level Invert	High/Low
GPI Output Source	Current input OK, Input 1-2 OK, Input 1-2 Selected, Black, Freeze, Pattern, No User Memories Selected, User Memories 1-16, No ARC Display Memories Selected, ARC Display Memories 1-32
RS-485 Port	Output Dolby decoder, Output SMPTE 2020 Disembed, Input
SMPTE 2020 embedder	Dolby decoder, RS-485 Port, SMPTE 2020 Disembed
User Memories	Save/Recall/Rename
Memory Naming	User configurable naming of Memories 1 – 16
Information Window	Video Input Status, Audio Input Status, EDH/CRC & ANC Status
EDH/CRC Reset	Resets all EDH/CRC counts
RollTrack Index	Allows up to 70 destinations
RollTrack Sources	Unused, Video Delay, Audio Delay, Input Present (1-2), Input Loss (1-2), Output Std, Input selected (1-2), Output Black, Freeze or Pattern on, Output Black, Freeze or Pattern off, Output Caption on, Output Caption off, Embedded Audio (Pairs 1-8) PCM, Embedded Audio (Pairs 1-8) Non-PCM, Embedded Audio (Pairs 1-8) Loss, Reference OK & Loss, Dolby Decoder Input Type, Encoder active/pass-through, Dolby Metadata valid/missing
Factory Default	Resets all module settings to factory specified default values and clears memories
Default Settings	Resets all module settings to factory specified defaults but does not clear user memories
Restart	Software reset of module
Module Information	Reports: Product Name
	Software version, Serial number, Build number, KOS version, PCB version, Licensed Options
Input Names	19 Character editable name

Specifications

Electrical	3Gbit/s SDI, SMPTE 424M 1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C / DVB-ASI
Connector / Format	BNC/ 75ohm panel jack on standard IQ connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s) >-10dB (3Gbit/s)
Output Jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz), 3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)
Reference Source	External – HD Tri-Level / SD Bi-level / Input Video syncs
Electrical	Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level)
	SD bi-level – RS170A
	HD Tr-level – SMPTE 240M, 274M and 296M
Connector / Format	BNC/75 ohm panel jack on standard IQ connector panel
Analog Reference Return Loss	
	SD bi-level > 40 dB to 5.5 MHz, HD tri-level > 35 dB to 30 MHz
Video Standards	1125(1080)/50p, 1125(1080)/59p, 750(720)/50p, 750(720)/59p, 1125(1080)/25i, 1125(1080)/25p, 1125(1080)/25psf, 1125(1080)/29i, 625(576)/25i, 525(480)/29i
Embedded audio handling	
	HD - 24-bit synchronous 48 kHz to SMPTE 299M, SD - 20-bit synchronous 48 kHz to SMPTE 272M-A

Power Consumption

Module Power Consumption	
	23.5 W Max (A Frames)
	22 PR (B Frames)
	Note: Dolby option adds 2.5W (PR)

IQUDC12

3G/HD/SD-SDI Up, Down and Cross Converter with Sync and AES I/O

The IQUDC12 provides multi-format conversion and AES embedding and de-embedding for 3Gbps SDI, and HD-SDI digital video signals. Using high quality motion adaptive de-interlacing and flexible scaling technology the IQUDC12 is a broadcast quality conversion module able to handle a wide variety of common applications such as up-conversion for SD content repurposing on HD channels, or downconversion to maintain SD output feeds.

IQUDC12 includes a frame synchronizer, capable of referencing to a SD bi-level or HD tri-level reference and a variable aspect ratio converter with reading and writing of WSS, VI and 2016 AFD signalling. Both AES and embedded audio is also comprehensively handled with up to 8 AES inputs or outputs, audio channel routing, delay adjustment and level controls. Video metadata such as timecode, SMPTE2020 Dolby, closed captions and teletext captions can also be passed through the module or processed according to the required output standard.

To allow the module to be further tailored to system requirements a series of hardware and software options is available to provide color correction for video, and advanced audio processing features such as Dolby E/D encoding or decoding, stereo to 5.1 upmixing and loudness processing using industry recognised technology from Linear Acoustic.

Features

- High quality up, down and cross conversion for SDI video inputs
- Dual SDI inputs with auto switching on pre-defined input errors
- Frame synchronizer with HD Tri-sync / SD Bi-Level Reference input, input loss detection and video delay up to 21 frames at 1080, 44 frames at 720 and 122 frames at 625
- Aspect ratio conversion including 9 preset ARC maps, up to 22 ARC memories, selectable border color and pan, tilt, size, and input crop adjustments
- Aspect ratio control (signalling reading and writing) using ETSI WSS and AFD Video Index signaling (RP186, SMPTE 2016)
- Video proc. features include: gain, offset, hue, horizontal picture enhancement, RGB gamut legalization and noise reduction
- Metadata support - Closed caption passing or processing for CEA608/708 and OP42/OP47/WST captions, and VITC or RP188 timecode translation
- In-built test pattern generator and 2 x 16 character caption generator
- Processed and reclocked signal paths allow the selected SDI input to be converted or passed through at the same format
- Embed or de-embed AES audio to/from 3G/HD/SD-SDI video streams with channel-level control
- Processing for 16 channels of embedded audio present on the incoming SDI stream with no disturbance during video synchronizer frame wraps or drops
- Audio proc. features including: channel routing, gain, invert, fixed and tracking delays, mixing, synchronizer wrap/drop processing and eight internal tone generators
- Dolby E support – Optional Dolby E/D decoding or encoding with both RS485 and SMPTE2020 metadata support, plus detection of PCM/non-PCM audio to SMPTE 337/338M, pair routing and Dolby E header alignment
- Advanced audio processing options from Linear Acoustic for stereo upmixing to 5.1 surround sound and loudness level measurement and control
- 16 x user memories and 2 GPI/O ports
- RollCall control and monitoring compatible with RollTrack triggers, standard logging and reporting features

Why should you choose this module?

- High quality video conversion and frame synchronization allows fully flexible multi-format working and provides a future proof migration path as digital workflows evolve
- Comprehensive audio processing functions allow complete control over embedded audio signals for applications where channel routing or mixing is required
- Full RollCall and SNMP compatibility allows easy integration with SAM or third party network management systems providing an all-inclusive monitoring and control solution

Order codes
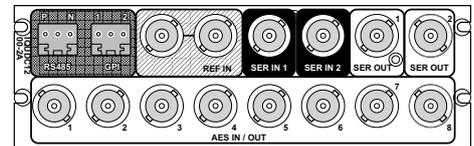
IQUDC1200-2A3, IQUDC1200-2B3
Up, down and cross converter with AES I/O . 2 SDI inputs, reference loop, 4 selectable main or bypassed SDI outputs, 8 unbalanced AES I/O, 2 GPI/Os
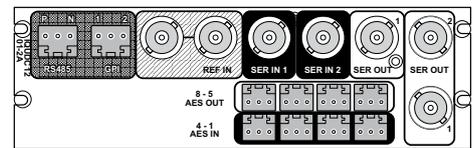
IQUDC1201-2A3, IQUDC1201-2B3
Up, down and cross converter with AES I/O . 2 SDI inputs, reference loop, 4 selectable main or bypassed SDI outputs, 4 balanced AES Inputs, 4 balanced AES outputs, 2 GPI/Os

Hardware* and Software Options

IQOPTA-DBD Hardware option to add a single channel of Dolby E/D decoding

IQOPTA-DBE-D Hardware option to add a single channel of Dolby D encoding

IQOPTA-DBE-E Hardware option to add a single channel of Dolby E encoding

IQOPTA-LOUD51 Software option to add Linear Accoustic AeroMax 5.1 loudness processing

IQOPTA-LOUDA2 Software option to add first channel of Linear Accoustic AeroMax 2.0 loudness processing

IQOPTA-LOUDB2 Software option to add second channel of Linear Accoustic AeroMax 2.0 loudness processing

IQOPTA-UPMIX Software option to add Linear Acoustic UPMAX stereo to 5.1 upmixing

IQOPTA-CC Software option to add color correction

For more details on enclosure types please refer to Frames & Hardware section.

*Note: Hardware options available for IQH3B frame only.

IQUDC12

3G/HD/SD-SDI Up, Down and Cross Converter with Sync and AES I/O
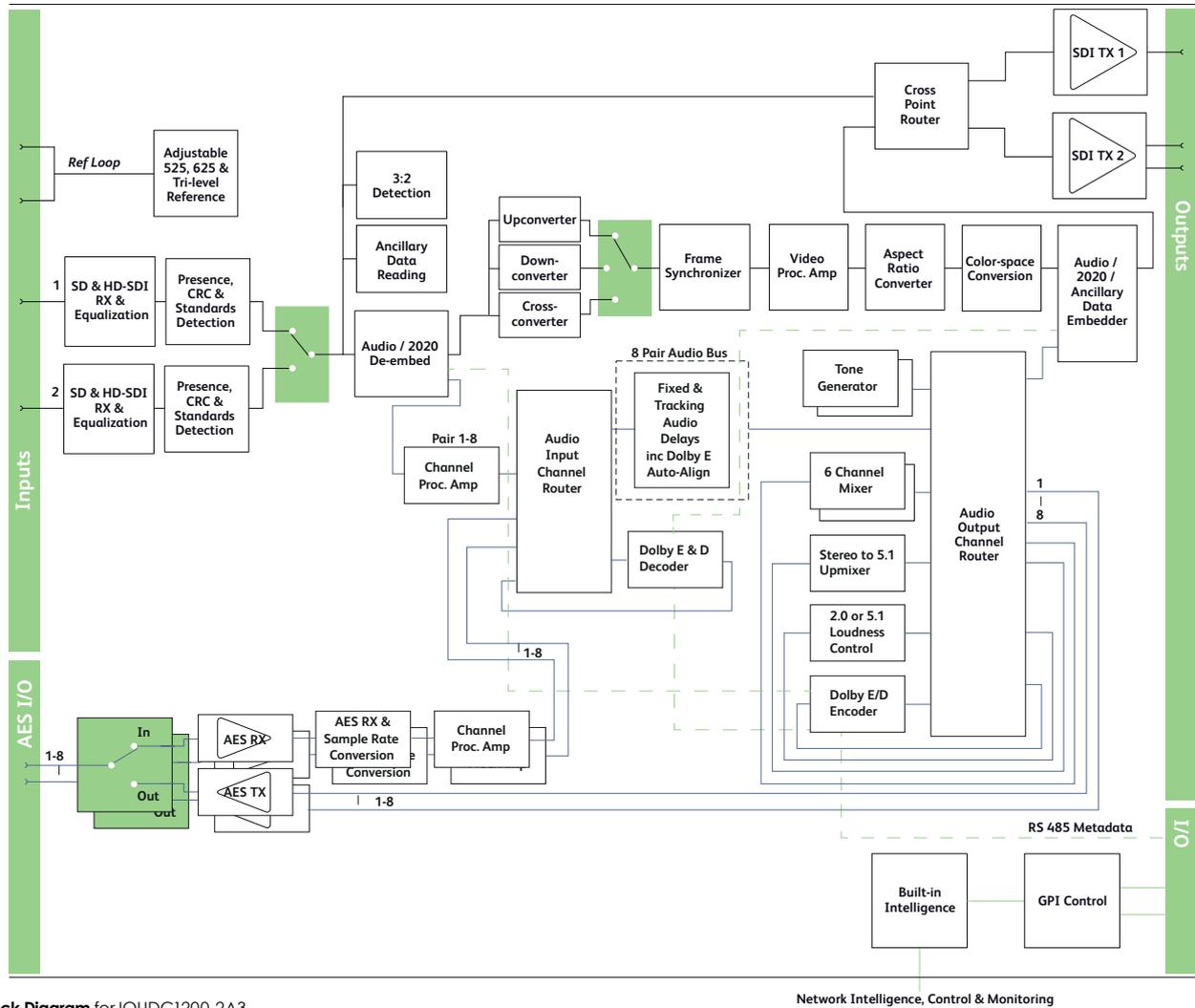
⌒ **Block Diagram** for IQUDC1200-2A3

Technical Specification

Inputs & Outputs

Video Signal Inputs

SDI Inputs	2x
Input Cable Length	Up to 80m Belden 1694A @ 3 Gbit/s
	Up to 180m Belden 1694A @ 1.5 Gbit/s
	>350m Belden 1694A @ 270 Mbit/s
Analog Reference	1 x Analog Reference with passive loop-through Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level)
	SD bi-level – RS170A
	HD Tri-level – SMPTE 240M, 274M and 296M

Video Signal Outputs

SDI Outputs	x 3

Audio Signal Inputs/Outputs (unbalanced AES)

AES/EBU, AC3, Dolby E Audio I/O (software selectable)

	8 Unbalanced (BNC)
Balanced audio inputs	
	4 AES (Screw terminal connectors (ST))
Balanced audio outputs	
	4 AES (ST)

Control Interface

GPI	2 x Closing contact I/O interface (ST)

Map of input to output standards			Output							
			25		50		29.97		59.94	
			576i	1080i	720P	1080P	480i	1080i	720P	1080P
Input	25	576i	✔	✔	✔	✔	✕	✕	✕	✕
		1080i	✔	✔	✔	✔	✕	✕	✕	✕
	50	720P	✔	✔	✔	✔	✕	✕	✕	✕
		1080P	✔	✔	✔	✔	✕	✕	✕	✕
	29.97	480i	✕	✕	✕	✕	✔	✔	✔	✔
		1080i	✕	✕	✕	✕	✔	✔	✔	✔
	59.94	720P	✕	✕	✕	✕	✔	✔	✔	✔
		1080P	✕	✕	✕	✕	✔	✔	✔	✔

⌒ Format Conversion I/O Grid

IQUDC12

3G/HD/SD-SDI Up, Down and Cross Converter with Sync and AES I/O

Technical Specification cont…

Controls

Genlock & Video Delay

Genlock Mode	Free-run, Lock to Reference, Lock to input
Genlock H-Phase	± 1 H in pixel clock steps
Genlock V-Phase	± 1 F in 1 line steps
Video H-Delay	0 – 1 Line in pixel clock steps
Video V-Delay	0 – 1 Frame in 1 line steps
Video Delay Frames	0 – 26 frames @ 1080 59p
	0 – 21 frames @ 1080 50p
	0 – 26 frames @ 1080 29i
	0 – 21 frames @ 1080 25i
	0 – 54 frames @ 720 59p
	0 – 44 frames @ 720 50p
	0 – 147 frames @ 525 29i
	0 – 122 frames @ 625 25i
Dolby E auto line select	Std, user select
Dolby E auto align	On/Off

Video Controls

Input Select	Input 1, Input 2
Input Backup Enable	On/Off
Priority	None, Master (input 1), Backup (input 2)
Change-over Parameters	Carrier Loss, Standard mismatch, CRC and ANC Error, Embedded audio loss
Change-over Time Delay	0s to 10s
Reversion Delay	0 to 100s
Up, Down, Cross Conversion	
	1080p, 1080i, 720p, SD
Default Video Output Type	
	Pattern, Freeze, Black
Pattern Select	100% Color Bars, 75% Color Bars, SMPTE Bars, Tartan Bars, Black, Pluge, Ramp, H Sweep, Pulse & Bar, Multi-burst
Output Routing	Processed, Reclocked Bypass
Output Mode	Input, Black, Freeze, Pattern
Colorimetry	Auto, None, Rec601, BT709
H Enhance Frequency	Off, Low, Medium, High
H Enhance Presets	Low, Medium, High, Super, Custom
Borders	R/G/B 0-255 in steps of 1
Border Adjust	Left, Right, Top, Bottom
RGB Legalizer	700 mV, 721 mV, 735 mV, 746 mV
Black Level	±200 mV in steps of 1 mV
Hue Adjust	±180° in steps of 1°
Master Video Gain	+6 to -120 dB
Y-Gain	+6 to -120 dB
Cb/Cr Gain	+6 to -120 dB
Caption Enable	On/Off
Edit Caption	16 characters
Caption Adjust	X-Y Size & Position
Metadata support	Closed Captions CC608-708 (compatibility bytes), WST-OP47, VITC-ATC

Aspect Ratio Conversion

Signalling type	WSS (ETSI or AFD), VI (SMPTE or AFD), SMPTE 2016
Select from 9 standard preset conversions:	
	Full Frame
	Box 16:9 top > 16:9
	4:3 box 14:9 top > 16:9
	Box 16:9 > 16:9
	Box 4:3 > 4:3
	4:3 > box 16:9
	16:9 > box 4:3
	4:3 box 14:9 > 16:9
	16:9 box 14:9 > 4:3
Display Memories	32 User configurable ARC display memories
Size	60% to 150% in 0.1% steps.
Aspect	60% to 200% in 0.1% steps.
Pan / Tilt	±75% in 0.1% steps
Input crop	Left / Right / Top / Bottom

Audio Controls

Audio In - Embedded

Audio In-Disembed	Pairs 1-8
Channel 1 – 16 Mute	On/Off
Channel 1 – 16 Polarity Inv	
	On/Off
Channel 1 – 16 Gain	+12 dB to -80 dB in 0.1 dB steps
Pair 1 – 8 Stereo	Link channel pairs

Audio Out - Embedded

Group 1 -4 Enable	On/Off
Audio Out-embed	Pairs 1-8
Channel 1 – 16 Mute	On/Off
Channel 1 – 16 Gain	+12 dB to -80 dB in 0.1 dB steps
Pair 1 – 8 Stereo	Link channel pairs

Audio In/Out - AES

AES 1 – 8 Select	Input/Output (unbalanced version only)
Channel 1 – 16 Mute	On/Off
Channel 1 – 16 Polarity Inv	
	On/Off (input only)
Channel 1 – 16 Gain	+12 dB to -80 dB in 0.1 dB steps
AES 1 – 8 Stereo	Link channel pairs

Audio Routing

Input routing Bus 1-8	Disembed 1-8, AES input 1-8, Dolby Decoder 1-5*
Output routing embed 1-8	
	Bus 1-8, Mixers 1-4, Downmixer 1-2, silence, Tones 1-8, Upmix*/Loudness*, Dolby Encoder 1-5*
Output routing AES 1-8	Bus 1-8, Mixers 1-4, Downmixer 1-2, silence, Tones 1-8, Upmix*/Loudness*, Dolby Encoder 1-5*

* indicates optional feature

Audio Setup Controls – Bus 1-8

Delay Add-In Bulk, RollTrack, current video	
	On/Off
Bulk Manual Delay	-520ms to +2s in 0.17ms steps
Coarse Manual Pair Delay	
	±1.995s in 1ms steps
Fine Manual Delay	±5ms in 0.02ms steps
Fast or smooth delay limit	
	5ms to 80ms
Silence Detect	-2dBFS to -128dBFS in steps of 1dB
Signal Overload Detect	-1dBFS to -127dBFS in steps of 1dB
Warning Timer	1 to 20 seconds in steps of 1 second
Tone Frequency 1-8	100Hz to 16kHz in 100Hz steps

Dolby Decoder

Decoder Source	Disembed 1-8
Detection Mode	Auto, dolby E, Dolby D, Mute
AES Channel Select	Channel 1, 2
PCM Latency	Single Frame, Minimum
Dolby D listening mode	Full, EX, 3 Stereo, Phantom, Stereo, Mono
Dolby D Dynamic Range	Line, RF, Bypass
Metadata Program	1, 2
Input Metadata	RS-485, SMPTE 2020

Dolby Encoder

Encoder Source	Bus 1-8, Upmix*/Loudness*, Silence
Metadata Source	Prog 1-8, Internal
Internal Metadata control	
	Program Descriptor, Dialog Norm, Audio Production information, Extended BSI1, BSI2, Internal Config, Bitstream Mode, RF Mode, Line Mode, Surround Mode, Mix Level (Surround, Centre, LtRt, LoRo), Internal Config setting (e.g. 5.1+2)
Mode	Encode, Pass through
Bit Depth	Dolby D - 32 bit, 16 bit
	Dolby E - 20 bit, 16 bit
SRC	Enable, Disable
Stream Number	0-6

IQUDC12

3G/HD/SD-SDI Up, Down and Cross Converter with Sync and AES I/O

Technical Specification cont…

Audio Mixers

Mixer Select	1-4, Downmix 1 -2
Source select	Bus 1-8, Silence, Tones 1-8
Source Gain	12dB to -80dB in 0.1dB steps
Mixer 1-4 invert	On/Off
Mixer 1-4, Downmix 1-2 Mute	
	On/Off
Downmix Configuration	LoRo, 4 level selections

Other Controls

GPI input High/Low Select	
	Input 1-2, Black, Freeze, Pattern, User Memories 1-16, ARC Display Memories 1-32
GPI Level Invert	High/Low
GPI Output Source	Current input OK, Input 1-2 OK, Input 1-2 Selected, Black, Freeze, Pattern, No User Memories Selected, User Memories 1-16, No ARC Display Memories Selected, ARC Display Memories 1-32
RS-485 Port	Output Dolby decoder, Output SMPTE 2020 Disembed, Input
SMPTE 2020 embedder	Dolby decoder, RS-485 Port, SMPTE 2020 Disembed
User Memories	Save/Recall/Rename
Memory Naming	User configurable naming of Memories 1 – 16
Information Window	Video Input Status, Audio Input Status, EDH/CRC & ANC Status
EDH/CRC Reset	Resets all EDH/CRC counts
RollTrack Index	Allows up to 70 destinations
RollTrack Sources	Unused, Video Delay, Audio Delay, Input Present (1-2), Input Loss (1-2), Output Std, Input selected (1-2), Output Black, Freeze or Pattern on, Output Black, Freeze or Pattern off, Output Caption on, Output Caption off, Embedded Audio (Pairs 1-8) PCM, Embedded Audio (Pairs 1-8) Non-PCM, Embedded Audio (Pairs 1-8) Loss, Reference OK & Loss, Dolby Decoder Input Type, Encoder active/pass-through, Dolby Metadata valid/missing
Factory Default	Resets all module settings to factory specified default values and clears memories
Default Settings	Resets all module settings to factory specified defaults but does not clear user memories
Restart	Software reset of module
Module Information	Reports: Product Name Software version, Serial number, Build number, KOS version, PCB version, Licensed Options
Input Names	19 Character editable name

Specifications

Electrical	3Gbit/s SDI, SMPTE 424M 1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C / DVB-ASI
Connector / Format	BNC/ 75ohm panel jack on standard IQ connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s) >-10dB (3Gbit/s)
Output Jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz), 3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)
Reference Source	External – HD Tri-Level / SD Bi-level / Input Video syncs
Electrical	Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level)
	SD bi-level – RS170A
	HD Tr-level – SMPTE 240M, 274M and 296M
Connector / Format	BNC/75 ohm panel jack on standard IQ connector panel
Analog Reference Return Loss	
	SD bi-level > 40 dB to 5.5 MHz, HD tri-level > 35 dB to 30 MHz
Video Standards	1125(1080)/50p, 1125(1080)/59p, 750(720)/50p, 750(720)/59p, 1125(1080)/25i, 1125(1080)/25p, 1125(1080)/25psf, 1125(1080)/29i, 625(576)/25i, 525(480)/29i
Embedded audio handling	
	HD - 24-bit synchronous 48 kHz to SMPTE 299M,
	SD - 20-bit synchronous 48 kHz to SMPTE 272M-A

Digital Audio Input (Unbalanced)

Connector/Format	BNC
Sample Frequency	25 – 96 kHz (48 kHz for Reference)
Input Cable Length	>500 m of RG59 cable
Impedance	75 Ohms
Output Sampling	48 kHz frame locked to 48 kHz AES/EBU Reference in AES lock mode

Digital Audio Output (Unbalanced)

Connector/Format	BNC
Level	1 V p-p typical into 75 Ohms
Standard	AES3-1992, SMPTE 272M A-1994, SMPTE 299M

Digital Audio Input (Balanced)

Connector/Format	ST
Sample Frequency	25 – 96 kHz (48 kHz for Reference)
Input Cable Length	>150 m of AES3 cable
Impedance	110 Ohms
Output Sampling	48 kHz frame locked to 48 kHz AES/EBU Reference in AES lock mode

Digital Audio Output (Balanced)

Connector/Format	25 W D
Level	3 V p-p typical into 110 Ohms
Standard	AES3, SMPTE 272M-A-1994, SMPTE 299M

Power Consumption

Module Power Consumption	
	34W (A frames)
	31PR (B Frames)
	Dolby options are only available for IQH3B frame and add 3.75 PR

IQUDC31

Dual Channel 3G/HD/SD-SDI Up, Down and Cross Converter

The IQUDC31 provides two channels of multi-rate format conversion for 3G/HD/SD-SDI digital video signals. Using high quality motion adaptive de-interlacing and flexible scaling technology the IQUDC31 is a broadcast quality conversion module ideal for space constrained installations, or for applications requiring simultaneous HD snd SD output feeds.

IQUDC31 includes frame synchronizers, capable of referencing to a SD bi-level or HD tri-level reference and independent variable aspect ratio converters with frame accurate reading and writing of WSS, VI and 2016 AFD signalling. Audio handling includes audio channel routing, delay adjustment and level controls. Video metadata such as timecode, closed captions and teletext captions can also be passed through the module or processed according to the required output standard.

To allow the module to be further tailored to system requirements software options are available to provide noise reduction and side-bar keying, and versions are available with SFP cages enabling fiber conversion, or additional electrical outputs on HD-BNCs.

Features

- High quality up, down and cross conversion for SDI video inputs including conversion aperture control
- Frame synchronizer with HD Tri-sync / SD Bi-Level Reference Input and input loss detection
- Aspect ratio conversion including preset ARC maps relative to conversion modes, selectable pan, tilt, aspect, size, and output crop adjustments
- Aspect ratio control (signalling reading and writing) using ETSI WSS and AFD Video Index signaling (RP186, SMPTE 2016)
- Video proc. features include: gain, offset, hue, horizontal and vertical picture enhancement, and RGB gamut legalization
- Metadata support - Closed caption passing or processing for CEA608/708, and WST/OP42 and OP47 teletext captions, and VITC or SMPTE12M timecode translation
- In-built test pattern generator and 19 character scrolling caption generator
- Additional processing options including; noise reduction (adaptive spatial and recursive), side-bar keying and linear frame rate conversion
- Processing for 16 channels of embedded audio present on the incoming SDI stream with no disturbance during video synchronizer frame wraps or drops
- Audio proc. features including: channel routing, gain, invert, delay and tone generator
- Non-PCM processing features pair level routing and delay compensation. Dolby-E data is passed with a delay to match the video and with co-timed audio frame drop or repeat
- Dolby E support – Detection of PCM/non-PCM audio to SMPTE 337/338M, pair routing and Dolby E header re-alignment
- Integrated Fiber I/O support via SFP module
- 16 x user memories and 2 GPI/O ports
- RollCall control and monitoring compatible with standard logging and reporting features
- RollTrack triggers available for detected module states including: Input loss and reference loss

Why should you choose this module?

- With it's ability to provide outputs of different formats at independent aspect ratios, coupled with high quality video conversion and metadata handling, IQUDC31 allows fully flexible multi-format working in a compact and cost effective package
- Comprehensive audio processing functions allow complete control over embedded audio signals for applications where channel routing, gain control or delay is required
- Full RollCall and SNMP compatibility allows easy integration with SAM or third party network management systems providing an all-inclusive monitoring and control solution

Inputs & Outputs - IQH3B enclosures

IQUDC3101-1B3
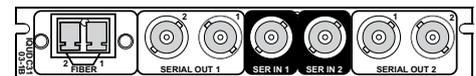
IQUDC3103-1B3
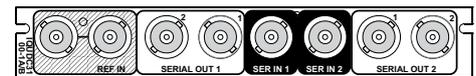
IQUDC3100-1B3
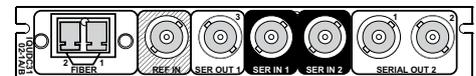
IQUDC3102-1B3

For more details on enclosure types please refer to datasheet IQH3B.

IQUDC31

Dual Channel 3G/HD/SD-SDI Up, Down and Cross Converter

Frame References

Ref Loop

Adjustable 525, 625 & Tri-level Reference

Inputs

- 1 SFP RX
- 2 SFP RX
- 1 SD/HD-SDI RX, Eq & Detection
- 2 SD/HD-SDI RX, Eq & Detection

Cross Point Router

Ch 1

Ancillary Data Reading

Audio De-embed

Line Synchronizer

Noise Reduction Option

UP, Down & Cross Converter with Sync

Video Proc. Amp & RGB Legalizer

Aspect Ratio Converter with AFD & WSS

Color corrector, H&V Detail Enhancement

Side-bar Keyer option

Tone Generator

Pair 1-8

18 x 16 Channel Router

8 Pair Proc Amp

8 Pair Fixed & Tracking Audio Delays inc Dolby E Auto Align

1-16

1-16

Audio Process Pair Router

Audio / Ancillary Data Embedder

Tone Generator

Audio Process Pair Router 1-8

18 x 16 Channel Router

8 Pair Proc Amp

8 Pair Fixed & Tracking Audio Delays inc Dolby E Auto Align

1-16

1-16

Line Synchronizer

Ch 2

Audio De-embed

Ancillary Data Reading

Noise Reduction Option

UP, Down & Cross Converter with Sync

Video Proc. Amp & RGB Legalizer

Aspect Ratio Converter with AFD & WSS

Color corrector, H&V Detail Enhancement

Side-bar Keyer option

Audio / Ancillary Data Embedder

I/O

GPI Control

Built-in Intelligence

Outputs

- SDI TX 1 — 1, 2
- SDI TX 2 — 3
- SFP TX 1 — 1
- SFP TX 2 — 2
- SDI TX 1 — 1, 2

Network Intelligence, Control & Monitoring

⌒ **Block Diagram** for IQUDC31 Range

Note: Number of inputs and outputs depends on SFP and rear panel type

Technical Specification

Inputs & Outputs
Video Signal Inputs

SDI Inputs	2x
Input Cable Length	Up to 80m Belden 1694A @ 3 Gbit/s
	Up to 120m Belden 1694A @ 1.5 Gbit/s
	100m typical (with output set to 1080p rates), Belden 1694A @ 270 Mbit/s
Input Standard (auto detect)	
	625(576)/25i, 525(480)/29i
	720 50/59p1080 50/59i
	1080 50/59p level A/B
	1080 25/29psf
Analog Reference	1 x Analog Reference with passive loop-through Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level)
	SD bi-level – RS170A
	HD Tri-level – SMPTE 240M, 274M

Map of input to output standards		Output							
		25		50		29.97		59.94	
		576i	1080i	720P	1080P	480i	1080i	720P	1080P
Input	25	576i	✔	✔	✔	✔	✕	✕	✕	✕
		1080i	✔	✔	✔	✔	✕	✕	✕	✕
	50	720P	✔	✔	✔	✔	✕	✕	✕	✕
		1080P	✔	✔	✔	✔	✕	✕	✕	✕
	29.97	480i	✕	✕	✕	✕	✔	✔	✔	✔
		1080i	✕	✕	✕	✕	✔	✔	✔	✔
	59.94	720P	✕	✕	✕	✕	✔	✔	✔	✔
		1080P	✕	✕	✕	✕	✔	✔	✔	✔

⌒ Format Conversion I/O Grid

IQUDC31

Dual Channel 3G/HD/SD-SDI Up, Down and Cross Converter

Technical Specification cont…

Fiber Signal Input

Inputs	Up to 2
Optical	3 GBit/s HD-SDI, 1.485 GBit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format	LC singlemode
Standard	SMPTE 297-2006

Video Signal Outputs

SDI Outputs	up to 5 (3 from Channel 1, 2 from Channel 2)
Output standard	625(576)/25i, 525(480)/29i
	720 50/59p, 1080 50/59i
	1080 50/59p level A/B

Fiber Signal Output

Optical	3 GBit/s HD-SDI, 1.485 Gbit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format	LC singlemode
Conforms to	SMPTE 297-2006
Outputs	Up to 2

*Note: Optical I/O and control dependant on type of SFP module fitted

Control Interface

GPI	2 x Closing contact I/O interface (ST) (rear panel dependant)

Conversion Functions (per channel)

Modes	Up, down, and cross conversion
	Aspect ratio conversion synchronization
Conversion processing	Still process: Detects still images and applies an aperture with full (progressive) vertical frequency response
	Enhanced still: Adds field motion detection to still process. Prevents artifacts on moving repetitive patterns
Aspect ratio conversion (manual or auto)	AFD (SMPTE 2016), VI (RP186), WSS (L23)
SD input format	Normal 4:3, Anamorphic 16:9, Letterbox 14:9, Letterbox 16:9
SD output format	Normal 4:3, Anamorphic 16:9, Letterbox 14:9, Letterbox 16:9
Metadata	Closed caption CE608 <> CE708
	Timecode conversions
	Teletext subtitles WST/RDD8 conversion

Audio Functions (per channel)

Embedded audio	16-channel embedded audio processing
	PCM audio processing includes channel level gain and delay compensation, as well as channel level routing with L/R swap and phase invert feature
	Non-PCM processing features pair level routing and delay compensation. Dolby E data is passed with a delay to match the video and with co-timed audio frame drop or repeat
Embedded audio	Enable/Blank

Embedded Audio Routing

Processed pair 1-8	Disembed 1-8
Output Channels 1-16	Processed pair 1-8, Tone, Silence

Processed Audio Control

Invert Phase	Channels 1-16
Pair 1 to 8 Gain L/R	+18 dB to -18 dB in 0.1 dB steps
Pair 1-8 Manual Delay	-40 to +200 ms in 1 ms steps
Global Manual Delay	-40 to +200 ms in 1 ms steps

Dolby-E

Dolby-E Auto Alignment	+/- 10 line offset in 1 line steps

Tone

Frequency	100Hz to 10kHz in 100Hz steps

Processing Functions (per channel)

Ancillary Data	Pass/Strip
Freeze	On/Off
Legalizer	On/Off
Genlock	Reference lock, Input lock (same format), Free run
Pattern	Off, Black, Ramp, Bars
Caption	On/Off, Scrolling
Edit Caption	19 characters available

Proc amp

Black Level:	+100 to -100 mV (0) in 0.8 mV steps
Contrast:	-6 dB to +6 dB (0) in 0.2 dB steps
Saturation:	-6 dB to +6 dB (0) in 0.2 dB steps
Y Gamma:	0.4 to 1.7 (1) in 0.1 steps
YC Offset:	-20 to 20 (0) in 2 Luma pixel steps
	Note: Defaults shown in brackets

Enhancement

Nonlinear Enhancer	Frequency Band Selection: Low, Med, High
	Four preset enhancement modes: Low, Med, High, Super
	Manual enhancement mode with H Gain and H Noise rejection levels

Conversion Aperture

Vertical	Frequency Band Selection: Low, Med, High
	Five vertical preset enhancement levels: Soft 2, Soft 1, Normal, Sharp 1, Sharp 2
Horizontal	Five horizontal preset sharpness levels: Low 2, Low 1, Normal, High 1, High 2
	Five horizontal preset detail levels: Soft 2, Soft 1, Normal, Sharp 1, Sharp 2

Other Controls

GPI input Low/High Select	
	Black, Freeze, Pattern, User Memories 1-16
GPI Output Source	Black, Freeze, Pattern
User Memories	16 x Save, Recall, Rename
Memory Naming	User configurable naming of memories 1 – 16
RollTrack Index	Up to 50 RollTrack destinations
Optical Logging*	Tx Laser Bias High Warning
	Tx Power Low Warning
	Tx Power High Warning
Laser Wavelength	Input 1 (2) Rx Power High Warning
	Input 1 (2) Rx Power Low Warning
	Input 1 (2) Rx Power Measurement
RollTrack Sources	Unused, Input Present (1&2, Fiber 1 & 2) , Input Loss (1&2, Fiber 1 & 2), Reference OK & Loss
Information Window	Video Input Status, Reference Status
Factory Default	Resets all module settings to factory specified default values and clears memories
Default Settings	Resets all module settings to factory specified defaults but does not clear memories
Module Information	Reports following module information: Software version, Serial number, Rear Panel ID, Frame Slot

IQUDC31

Dual Channel 3G/HD/SD-SDI Up, Down and Cross Converter

Technical Specification cont…

Specifications

Electrical	3Gbit/s SDI, SMPTE 424M 1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C
Connector / Format	BNC/ 75ohm panel jack on standard IQ connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s) >-10dB (3Gbit/s)
Output Jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz), 3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)
Reference Source	External – HD Tri-Level / SD Bi-level / Input Video syncs
Electrical	Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level) SD bi-level – RS170A HD Tr-level – SMPTE 240M and 274M
Connector / Format	BNC/75 ohm panel jack on standard IQ connector panel

Optical 1310 nm Tx

Wavelength	1310 nm
Spectral width (FWHM)	>1.5 nm (typ)
Output power	0 to -5 dBm typical (-2 dBm typical)
Extinction ratio	>7.5:1 (typ)

Optical Rx

Input wavelength range	Min. 1260 nm, Max. 1620 nm
Optical power input range	> -0 dBm, < -20 dBm
Link distance	Up to 30 Km

Embedded audio handling

HD - 24-bit synchronous 48 kHz to SMPTE 299M,
SD - 20-bit synchronous 48 kHz to SMPTE 272M-A

Power Consumption

Module Power Consumption with Fiber

16PR (B frames)

Ordering Information

Order codes for IQH3B enclosures

IQUDC3100-1B3
Dual channel up, down and cross converter. 2 SDI inputs, external reference loop & enclosure reference inputs, 4 SDI outputs

IQUDC3101-1B3
Dual channel up, down and cross converter. 2 SDI inputs, 5 SDI outputs, 2 GPI/Os, reference inputs from enclosure

IQUDC3102-1B3
Dual channel up, down and cross converter. 2 SDI inputs, external reference input & enclosure reference inputs, 3 SDI outputs, single SFP cage

IQUDC3103-1B3
Dual channel up, down and cross converter. 2 SDI inputs, 4 SDI outputs, single SFP cage, reference inputs from enclosure

For more details on enclosure types please refer to datasheet IQH3B

Software Options

IQOPTM-2NR - Software option to add noise reduction on both processing channels

IQOPTM-2SBK - Software option to add side-bar keying on both processing channels

IQOPTM-LC - Software option to upgrade with Linear frame rate conversion

SFP options

FC1-13T1 - Single 1310nm fiber Tx

FC1-13T2 - Dual 1310nm fiber Tx

FC1-15T1 - Single 1550nm fiber Tx

FC1-15T2 - Dual 1550nm fiber Tx

FC1-R1 - Single fiber Rx

FC1-R2 - Dual fiber Rx

FC1-13TR - Fiber transceiver 1310nmTx/Rx

FC1-HDBT2 - HD-BNC Dual Tx

FC1-HDBR2 - HD-BNC Dual Rx

Fiber CWDM Tx - Wavelengths available on request

Note: SFP type must be ordered in addition to the module.

IQUDC32

3G/HD/SD-SDI Up, Down and Cross Converter with AES I/O

The IQUDC32 provides multi-rate format conversion and AES embedding and de-embedding for 3G/HD/SD-SDI signals. Using high quality motion adaptive de-interlacing and flexible scaling technology the IQUDC32 is a broadcast quality conversion module able to handle a wide variety of common applications such as up-conversion for SD content repurposing on HD channels, or downconversion to maintain SD output feeds.

IQUDC32 includes a frame synchronizer, capable of referencing to a SD bi-level or HD tri-level reference and a variable aspect ratio converter with reading and writing of WSS, VI and 2016 AFD signalling. Audio handling includes 8 user configurable AES inputs or outputs, audio channel routing, delay adjustment and level controls. Video metadata such as timecode, closed captions and teletext captions can also be passed through the module or processed according to the required output standard.

To allow the module to be further tailored to system requirements software options are available to provide noise reduction and side-bar keying, and versions are available with SFP cages enabling fiber conversion or additional electrical outputs on HD-BNCs.

Features

- High quality up, down and cross conversion including conversion aperture control
- Frame synchronizer with HD Tri-sync / SD Bi-Level Reference Input and input loss detection
- Aspect ratio conversion including preset ARC maps relative to conversion modes, selectable pan, tilt, aspect, size, and output crop adjustments
- Aspect ratio control (signalling reading and writing) using ETSI WSS and AFD Video Index signaling (RP186, SMPTE 2016)
- Video proc. features include: gain, offset, hue, horizontal and vertical picture enhancement, and RGB gamut legalization
- Metadata support - Closed caption passing or processing for CEA608/708 and OP42/OP47/WST captions, VITC or SMPTE12M timecode translation, and Ancillary data bridge for 7 blocks of ANC data passing
- Additional processing options including; noise reduction (adaptive spatial and recursive), side-bar keying and linear frame rate conversion
- 8 AES audio I/O, balanced or unbalanced, available to/from any processed internal pair, and audio proc. features including: channel routing, gain, invert, delay and eight internal tone generators
- Processing for 16 channels of embedded audio present on the incoming SDI stream with no disturbance during video synchronizer frame wraps or drops
- Non-PCM processing features pair level routing and delay compensation. Dolby-E data is passed with a delay to match the video and with co-timed audio frame drop or repeat
- Dolby E support – Detection of PCM/non-PCM audio to SMPTE 337/338M, pair routing and Dolby E header re-alignment
- In-built test pattern generator and 19 character scrolling caption generator
- Integrated Fiber I/O support via SFP module
- 16 x user memories and 2 GPI/O ports

Why should you choose this module?

- High quality video conversion and frame synchronization allows fully flexible multi-format working and provides a future proof migration path as digital workflows evolve
- Comprehensive audio I/O and processing allows complete control over audio signals for embedding and de-embedding, and where channel routing, gain control or delay is required
- Full RollCall and SNMP compatibility allows easy integration with SAM or third party network management systems providing an all-inclusive monitoring and control solution

Inputs & Outputs - IQH3A/1A/3B enclosures
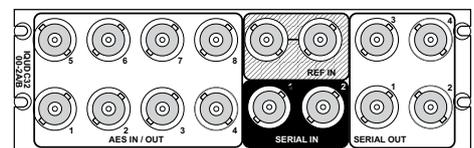
IQUDC3200-2A3, IQUDC3200-2B3
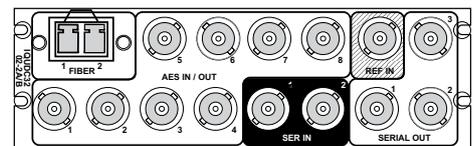
IQUDC3202-2A3, IQUDC3202-2B3
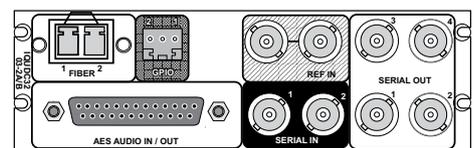
IQUDC3203-2A3, IQUDC3203-2B3

For more details on enclosure types please refer to datasheet IQH3B.

IQUDC32

3G/HD/SD-SDI Up, Down and Cross Converter with AES I/O

Frame References

Inputs

Adjustable 525, 625 & Tri-level Reference

Ref Loop

SFP RX — 1
SFP RX — 2

SD/HD-SDI RX, Eq & Detection — 1
SD/HD-SDI RX, Eq & Detection — 2

Cross Point Router

Ancillary Data Reading

Audio De-embed

Audio Process Pair Router — Pair 1-8 — 1-16

Line Synchronizer

Noise Reduction Option

UP, Down & Cross Converter with Sync

Video Proc. Amp & RGB Legalizer

Aspect Ratio Converter with AFD & WSS

Color corrector, H&V Detail Enhancement

Side-bar Keyer option

Tone Generator

18 x 16 Channel Router

8 Pair Proc Amp

8 Pair Fixed & Tracking Audio Delays inc Dolby E Auto Align — 1-16

Audio Output Pair Router — 1-8

Audio / Ancillary Data Embedder

SFP TX 1 — 1
SFP TX 2 — 2
SDI TX 1 — 1, 2
SDI TX 2 — 3, 4
SDI TX 3 — 5

Outputs

AES I/O

In — Out
1-8
AES RX
AES TX
AES RX & Sample Rate Conversion Conversion
1-8
1-8

Built-in Intelligence

GPI Control

I/O

Network Intelligence, Control & Monitoring

Note: Number of inputs and outputs depends on SFP and rear panel type

⌒ **Block Diagram** for IQUDC32 Range

Technical Specification

Inputs & Outputs

Video Signal Inputs

SDI Inputs	2x
Input Cable Length	Up to 80m Belden 1694A @ 3 Gbit/s
	Up to 120m Belden 1694A @ 1.5 Gbit/s
	100m typical (with output set to 1080p rates), Belden 1694A @ 270 Mbit/s
Input Standard (auto detect)	
	625(576)/25i, 525(480)/29i
	720 50/59p 1080 50/59i
	1080 50/59p level A/B
	1080 25/29psf
Analog Reference	1 x Analog Reference with passive loop-through Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level)
	SD bi-level – RS170A
	HD Tri-level – SMPTE 240M, 274M

Fiber Signal Input

Inputs	Up to 2
Optical	3 GBit/s HD-SDI, 1.485 GBit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format	LC singlemode
Standard	SMPTE 297-2006

Video Signal Outputs

SDI Outputs	up to 4
Output standard	625(576)/25i, 525(480)/29i
	720 50/59p, 1080 50/59i
	1080 50/59p level A/B

Fiber Signal Output

Optical	3 GBit/s HD-SDI, 1.485 Gbit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format	LC singlemode
Conforms to	SMPTE 297-2006
Outputs	Up to 2

*Note: Optical I/O and control dependant on type of SFP module fitted

Map of input to output standards			Output							
			25		50		29.97		59.94	
			576i	1080i	720P	1080P	480i	1080i	720P	1080P
Input	25	576i	✔	✔	✔	✔	✗	✗	✗	✗
		1080i	✔	✔	✔	✔	✗	✗	✗	✗
	50	720P	✔	✔	✔	✔	✗	✗	✗	✗
		1080P	✔	✔	✔	✔	✗	✗	✗	✗
	29.97	480i	✗	✗	✗	✗	✔	✔	✔	✔
		1080i	✗	✗	✗	✗	✔	✔	✔	✔
	59.94	720P	✗	✗	✗	✗	✔	✔	✔	✔
		1080P	✗	✗	✗	✗	✔	✔	✔	✔

⌒ Format Conversion I/O Grid

IQUDC32 — 3G/HD/SD-SDI Up, Down and Cross Converter with AES I/O

Technical Specification cont…

Audio Signal Inputs/Outputs

AES/EBU I/O (software selectable)
  - 8 Unbalanced (BNC)
  - 8 Balanced (25D Type)

Control Interface

GPI	2 x Closing contact I/O interface (ST) (rear panel dependant)

Conversion Functions

Modes	Up, down, and cross conversion
	Aspect ratio conversion synchronization
Conversion processing	Still process: Detects still images and applies an aperture with full (progressive) vertical frequency response
	Enhanced still: Adds field motion detection to still process. Prevents artifacts on moving repetitive patterns
Aspect ratio conversion (manual or auto)	AFD (SMPTE 2016), VI (RP186), WSS (L23)
SD input format	Normal 4:3, Anamorphic 16:9, Letterbox 14:9, Letterbox 16:9
SD output format	Normal 4:3, Anamorphic 16:9, Letterbox 14:9, Letterbox 16:9
Metadata	Closed caption CE608 <> CE708
	Timecode conversions
	Teletext subtitles WST/RDD8 conversion

Audio Functions

Embedded audio	16-channel embedded audio processing
	PCM audio processing includes channel level gain and delay compensation, as well as channel level routing with L/R swap and phase invert feature
	Non-PCM processing features pair level routing and delay compensation. Dolby E data is passed with a delay to match the video and with co-timed audio frame drop or repeat
Embedded audio	Enable/Blank

Audio Routing

Processed pair 1-8	Disembed 1-8, AES 1-8, Analog 1-2
Embedded Output Channels 1-16	
	Processed pair 1-8, Tone, Silence
AES 1-8	Processed pair 1-8, Tone, Silence

Processed Audio Control

Invert Phase	Channels 1-16
Pair 1 to 8 Gain L/R	+18 dB to -18 dB in 0.1 dB steps
Pair 1-8 Manual Delay	-40 to +200 ms in 1 ms steps
Global Manual Delay	-40 to +200 ms in 1 ms steps

Dolby-E

Dolby-E Auto Alignment	+/- 10 line offset in 1 line steps

Tone

Frequency	100Hz to 10kHz in 100Hz steps

Processing Functions

Ancillary Data	Pass/Strip
Freeze	On/Off
Legalizer	On/Off
Genlock	Reference lock (Ext, Int A, Int B), Input lock (same format), Free run
Memories	16 user memories
Pattern	Off, Black, Ramp, Bars
Caption	On/Off, Scrolling
Edit Caption	19 characters available

Proc amp

Black Level:	+100 to -100 mV (0) in 0.8 mV steps
Contrast:	-6 dB to +6 dB (0) in 0.2 dB steps
Saturation:	-6 dB to +6 dB (0) in 0.2 dB steps
Y Gamma:	0.4 to 1.7 (1) in 0.1 steps
YC Offset:	-20 to 20 (0) in 2 Luma pixel steps

Note: Defaults shown in brackets

Enhancement

Nonlinear Enhancer	Frequency Band Selection: Low, Med, High
	Four preset enhancement modes: Low, Med, High, Super
	Manual enhancement mode with H Gain and H Noise rejection levels

Conversion Aperture

Vertical	Frequency Band Selection: Low, Med, High
	Five vertical preset enhancement levels: Soft 2, Soft 1, Normal, Sharp 1, Sharp 2
Horizontal	Five horizontal preset sharpness levels: Low 2, Low 1, Normal, High 1, High 2
	Five horizontal preset detail levels: Soft 2, Soft 1, Normal, Sharp 1, Sharp 2

Other Controls

GPI input Low/High Select	
	Black, Freeze, Pattern, User Memories 1-16
GPI Output Source	Black, Freeze, Pattern
User Memories	16 x Save, Recall, Rename
Memory Naming	User configurable naming of memories 1 – 16
RollTrack Index	Up to 50 RollTrack destinations
Optical Logging*	Tx Laser Bias High Warning
	Tx Power Low Warning
	Tx Power High Warning
Laser Wavelength	Input 1 (2) Rx Power High Warning
	Input 1 (2) Rx Power Low Warning
	Input 1 (2) Rx Power Measurement
RollTrack Sources	Unused, Input Present (1&2, Fiber 1 & 2), Input Loss (1&2, Fiber 1 & 2), Reference OK & Loss
Information Window	Video Input Status, Reference Status
Factory Default	Resets all module settings to factory specified default values and clears memories
Default Settings	Resets all module settings to factory specified defaults but does not clear memories
Module Information	Reports following module information: Software version, Serial number, Rear Panel ID, Frame Slot

Specifications

Electrical	3Gbit/s SDI, SMPTE 424M 1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C
Connector / Format	BNC/ 75ohm panel jack on standard IQ connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s) >-10dB (3Gbit/s)
Output Jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz), 3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)
Reference Source	External – HD Tri-Level / SD Bi-level / Input Video syncs
Electrical	Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level)
	SD bi-level – RS170A
	HD Tr-level – SMPTE 240M and 274M
Connector / Format	BNC/75 ohm panel jack on standard IQ connector panel
Embedded audio handling	
	HD - 24-bit synchronous 48 kHz to SMPTE 299M,
	SD - 20-bit synchronous 48 kHz to SMPTE 272M-A

IQUDC32

3G/HD/SD-SDI Up, Down and Cross Converter with AES I/O

Digital Audio Input (Unbalanced)
Connector/Format	BNC
Sample Frequency	PCM: 25 – 96 kHz; Non-PCM: 48 kHz
Input Cable Length	>500 m of RG59 cable
Impedance	75 Ohms
Standard	AES3id

Digital Audio Input (Balanced)
Connector/Format	25Way-D
Sample Frequency	PCM: 25 – 96 kHz; Non-PCM: 48 kHz
Input Cable Length	>150 m of AES3 cable
Impedance	110 Ohms
Standard	AES3

Digital Audio Output (Unbalanced)
Connector/Format	BNC
Level	1 V p-p typical into 75 Ohms
Standard	AES3id

Digital Audio Output (Balanced)
Connector/Format	25Way-D
Level	3 V p-p typical into 110 Ohms
Standard	AES3

Optical 1310 nm Tx
Wavelength	1310 nm
Spectral width (FWHM)	>1.5 nm (typ)
Output power	0 to -5 dBm typical (-2 dBm typical)
Extinction ratio	>7.5:1 (typ)
Link distance	Up to 30 Km @ 270Mbit/s
	Up to 21 Km @ 1.5Gbit/s
	Up to 10 Km @ 3Gbit/s

Optical 1550 nm Tx
Wavelength	1550 nm
Spectral width (FWHM)	1 nm
Output power	4 to 0 dBm
Extinction ratio	>7.5:1 (typ)
Link distance	Up to 50 Km @ 270Mbit/s, 1.5Gbit/s or 3Gbit/s

Optical Rx
Input wavelength range	Min. 1260 nm, Max. 1620 nm
Optical power input range	> -0 dBm, < -20 dBm
Link distance	Up to 30 Km

Power Consumption
Module Power Consumption with Fiber
	13W (A frames)
	13PR (B frames)

Ordering Information

Order codes for IQH3B enclosures

IQUDC3200-2B3
Up, down and cross converter with AES I/O. 2 SDI inputs, External & Frame reference inputs, 4 SDI outputs, 8 unbalanced AES inputs or outputs

IQUDC3202-2B3
Up, down and cross converter with AES I/O. 2 SDI inputs, External & Frame reference inputs, 3 SDI outputs, 8 unbalanced AES inputs or outputs, 1 Fiber SFP cage. Includes rear but not SFP module

IQUDC3203-2B3
Up, down and cross converter with AES I/O. 2 SDI inputs, External & Frame reference inputs, 4 SDI outputs, 8 balanced AES inputs or outputs, 2 x GPI, 1 Fiber SFP cage. Includes rear but not SFP module

Order codes for IQH3A/1A enclosures

IQUDC3200-2A3
Up, down and cross converter with AES I/O. 2 SDI inputs, reference loop, 4 SDI outputs, 8 unbalanced AES inputs or outputs

IQUDC3202-2A3
Up, down and cross converter with AES I/O. 2 SDI inputs, reference input, 3 SDI outputs, 8 unbalanced AES inputs or outputs, 1 Fiber SFP cage. Includes rear but not SFP module

IQUDC3203-2A3
Up, down and cross converter with AES I/O. 2 SDI inputs, reference loop, 4 SDI outputs, 8 balanced AES inputs or outputs, 2 x GPI, 1 Fiber SFP cage. Includes rear but not SFP module

For more details on enclosure types please refer to datasheet IQH3B

Software Options

IQOPTM-NR - Software option to add noise reduction

IQOPTM-SBK - Software option to add side-bar keying

IQOPTM-LC - Software option to upgrade with Linear frame rate conversion

SFP options

FC1-13T1 - Single 1310nm fiber Tx

FC1-13T2 - Dual 1310nm fiber Tx

FC1-15T1 - Single 1550nm fiber Tx

FC1-15T2 - Dual 1550nm fiber Tx

FC1-R1 - Single fiber Rx

FC1-R2 - Dual fiber Rx

FC1-13TR - Fiber transceiver 1310nmTx/Rx

FC1-HDBT2 - HD-BNC Dual Tx

FC1-HDBR2 - HD-BNC Dual Rx

Fiber CWDM Tx - Wavelengths available on request

Note: SFP type must be ordered in addition to the module.

IQUDC33 — 3G/HD/SD-SDI Dual Up, Down and Cross Converter with AES I/O

The IQUDC33 provides two channels of multi-rate format conversion and AES embedding and de-embedding for 3G/HD/SD-SDI signals. Using high quality motion adaptive de-interlacing and flexible scaling technology the IQUDC33 is a broadcast quality conversion module able to handle a wide variety of common applications such as up-conversion for SD content repurposing on HD channels, or downconversion to maintain SD output feeds.

IQUDC33 includes frame synchronizers, capable of referencing to a SD bi-level or HD tri-level reference and a variable aspect ratio converter with reading and writing of WSS, VI and 2016 AFD signalling. Audio handling includes 8 user configurable AES inputs or outputs, shared between the video channels, plus audio channel routing, delay adjustment and level controls. Video metadata such as timecode, closed captions and teletext captions can also be passed through the module or processed according to the required output standard.

To allow the module to be further tailored to system requirements software options are available to provide noise reduction and side-bar keying, and versions are available with SFP cages enabling fiber conversion or additional electrical outputs on HD-BNCs.

Features

- High quality up, down and cross conversion including conversion aperture control
- Frame synchronizer with HD Tri-sync / SD Bi-Level Reference Input and input loss detection
- Aspect ratio conversion including preset ARC maps relative to conversion modes, selectable pan, tilt, aspect, size, and output crop adjustments
- Aspect ratio control (signalling reading and writing) using ETSI WSS and AFD Video Index signaling (RP186, SMPTE 2016)
- Video proc. features include: gain, offset, hue, horizontal and vertical picture enhancement, and RGB gamut legalization
- Metadata support - Closed caption passing or processing for CEA608/708 and OP42/OP47/WST captions, and VITC or SMPTE12M timecode translation
- Additional processing options including; noise reduction (adaptive spatial and recursive), side-bar keying and linear frame rate conversion
- 8 AES audio I/O, balanced or unbalanced, available to/from any processed internal pair, and audio proc. features including: channel routing, gain, invert, delay and eight internal tone generators
- Processing for 16 channels of embedded audio present on the incoming SDI stream with no disturbance during video synchronizer frame wraps or drops
- Non-PCM processing features pair level routing and delay compensation. Dolby-E data is passed with a delay to match the video and with co-timed audio frame drop or repeat
- Dolby E support – Detection of PCM/non-PCM audio to SMPTE 337/338M, pair routing and Dolby E header re-alignment
- In-built test pattern generator and 19 character scrolling caption generator
- Integrated Fiber I/O support via SFP module
- 16 x user memories and 2 GPI/O ports
- RollCall control and monitoring compatible with standard logging and reporting features
- RollTrack triggers available for detected module states including: Input loss and reference loss

Why should you choose this module?

- With it's ability to provide outputs of different formats at independent aspect ratios, coupled with high quality video conversion, AES audio interfacing and metadata handling, IQUDC33 allows efficient multi-format working in a compact and cost effective package
- Full RollCall and SNMP compatibility allows easy integration with SAM or third party network management systems providing an all-inclusive monitoring and control solution

Inputs & Outputs - IQH3A/1A/3B enclosures
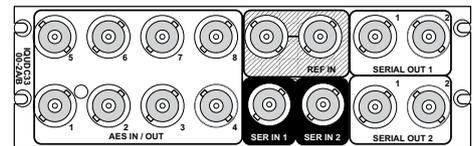
IQUDC3300-2A3, IQUDC3300-2B3
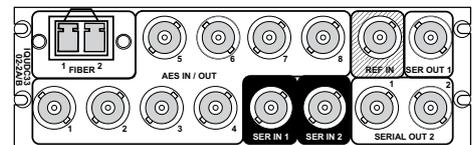
IQUDC3302-2A3, IQUDC3302-2B3
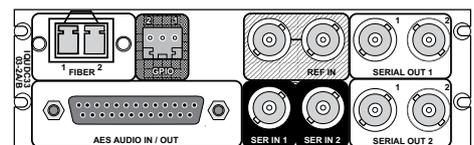
IQUDC3303-2A3, IQUDC3303-2B3

For more details on enclosure types please refer to datasheet IQH3B.

IQUDC33

3G/HD/SD-SDI Dual Up, Down and Cross Converter with AES I/O

Frame References

Inputs

Ref Loop

Adjustable 525, 625 & Tri-level Reference

1 SFP RX
2 SFP RX

1 SD/HD-SDI RX, Eq & Detection
2 SD/HD-SDI RX, Eq & Detection

Cross Point Router

Ch 1

Ancillary Data Reading

Audio De-embed

Line Synchronizer

Noise Reduction Option

UP, Down & Cross Converter with Sync

Video Proc. Amp & RGB Legalizer

Aspect Ratio Converter with AFD & WSS

Color corrector, H&V Detail Enhancement

Side-bar Keyer option

Tone Generator

Pair 1-8

18 x 16 Channel Router

8 Pair Proc Amp

8 Pair Fixed & Tracking Audio Delays inc Dolby E Auto Align

1-16

1-16

Audio Process Pair Router

Audio Output Pair Router

Audio / Ancillary Data Embedder

SDI TX 1
1
2

Ch 2

AES I/O

In
Out
Out

1-8

AES RX

AES TX

AES RX & Sample Rate Conversion

Sample Rate Conversion

1-8

1-8

1-8

1-8

Generator

Audio Output Pair Router

SFP TX 1
1

SFP TX 2
2

Audio Process Pair Pair Router 1-8

18 x 16 Channel Router

8 Pair Proc Amp

8 Pair Fixed & Tracking Audio Delays inc Dolby E Auto Align

1-16

1-16

Audio / Ancillary Data Embedder

I/O

Line Synchronizer

Audio De-embed

Noise Reduction Option

GPI Control

Built-in Intelligence

Ancillary Data Reading

UP, Down & Cross Converter with Sync

Video Proc. Amp & RGB Legalizer

Aspect Ratio Converter with AFD & WSS

Color corrector, H&V Detail Enhancement

Side-bar Keyer option

SDI TX 2
1
2

Outputs

Network Intelligence, Control & Monitoring

Note: Number of inputs and outputs depends on SFP and rear panel type

⌒ **Block Diagram** for IQUDC33 Range

IQUDC33 — 3G/HD/SD-SDI Dual Up, Down and Cross Converter with AES I/O

Technical Specification

Inputs & Outputs

Video Signal Inputs

SDI Inputs	2x
Input Cable Length	Up to 80m Belden 1694A @ 3 Gbit/s
	Up to 120m Belden 1694A @ 1.5 Gbit/s
	100m typical (with output set to 1080p rates), Belden 1694A @ 270 Mbit/s
Input Standard (auto detect)	
	625(576)/25i, 525(480)/29i
	720 50/59p1080 50/59i
	1080 50/59p level A/B
	1080 25/29psf
Analog Reference	1 x Analog Reference with passive loop-through Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level)
	SD bi-level – RS170A
	HD Tri-level – SMPTE 240M, 274M

Fiber Signal Input

Inputs	Up to 2
Optical	3 GBit/s HD-SDI, 1.485 GBit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format	LC singlemode
Standard	SMPTE 297-2006

Video Signal Outputs

SDI Outputs	up to 4
Output standard	625(576)/25i, 525(480)/29i
	720 50/59p, 1080 50/59i
	1080 50/59p level A/B

Fiber Signal Output

Optical	3 GBit/s HD-SDI, 1.485 Gbit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format	LC singlemode
Conforms to	SMPTE 297-2006
Outputs	Up to 2

*Note: Optical I/O and control dependant on type of SFP module fitted

Audio Signal Inputs/Outputs

AES/EBU I/O (software selectable)	
	8 Unbalanced (BNC)
	8 Balanced (25D Type)

Control Interface

GPI	2 x Closing contact I/O interface (ST) (rear panel dependant)

Conversion Functions (per channel)

Modes	Up, down, and cross conversion
	Aspect ratio conversion synchronization
Conversion processing	Still process: Detects still images and applies an aperture with full (progressive) vertical frequency response
	Enhanced still: Adds field motion detection to still process. Prevents artifacts on moving repetitive patterns
Aspect ratio conversion (manual or auto)	AFD (SMPTE 2016), VI (RP186), WSS (L23)

Map of input to output standards		Output							
		25		**50**		**29.97**		**59.94**	
		576i	1080i	720P	1080P	480i	1080i	720P	1080P
Input 25	576i	✔	✔	✔	✔	✗	✗	✗	✗
	1080i	✔	✔	✔	✔	✗	✗	✗	✗
50	720P	✔	✔	✔	✔	✗	✗	✗	✗
	1080P	✔	✔	✔	✔	✗	✗	✗	✗
29.97	480i	✗	✗	✗	✗	✔	✔	✔	✔
	1080i	✗	✗	✗	✗	✔	✔	✔	✔
59.94	720P	✗	✗	✗	✗	✔	✔	✔	✔
	1080P	✗	✗	✗	✗	✔	✔	✔	✔

⌒ Format Conversion I/O Grid

SD input format	Normal 4:3, Anamorphic 16:9, Letterbox 14:9, Letterbox 16:9
SD output format	Normal 4:3, Anamorphic 16:9, Letterbox 14:9, Letterbox 16:9
Metadata	Closed caption CE608 <> CE708
	Timecode conversions
	Teletext subtitles WST/RDD8 conversion

Audio Functions

Embedded audio	16-channel embedded audio processing PCM audio processing includes channel level gain and delay compensation, as well as channel level routing with L/R swap and phase invert feature
	Non-PCM processing features pair level routing and delay compensation. Dolby E data is passed with a delay to match the video and with co-timed audio frame drop or repeat
Embedded audio	Enable/Blank

Audio Routing

Processed pair 1-8	Disembed 1-8, AES 1-8, Analog 1-2
Embedded Output Channels 1-16	
	Processed pair 1-8, Tone, Silence
AES 1-8	Processed pair 1-8, Tone, Silence

Processed Audio Control

Invert Phase	Channels 1-16
Pair 1 to 8 Gain L/R	+18 dB to -18 dB in 0.1 dB steps
Pair 1-8 Manual Delay	-40 to +200 ms in 1 ms steps
Global Manual Delay	-40 to +200 ms in 1 ms steps

Dolby-E

Dolby-E Auto Alignment	+/- 10 line offset in 1 line steps

Tone

Frequency	100Hz to 10kHz in 100Hz steps

IQUDC33

3G/HD/SD-SDI Dual Up, Down and Cross Converter with AES I/O

Technical Specification cont…

Processing Functions (per channel)

Ancillary Data	Pass/Strip
Freeze	On/Off
Legalizer	On/Off
Genlock	Reference lock (Ext, Int A, Int B), Input lock (same format), Free run
Memories	16 user memories
Pattern	Off, Black, Ramp, Bars
Caption	On/Off, Scrolling
Edit Caption	19 characters available

Proc amp

Black Level:	+100 to -100 mV (0) in 0.8 mV steps
Contrast:	-6 dB to +6 dB (0) in 0.2 dB steps
Saturation:	-6 dB to +6 dB (0) in 0.2 dB steps
Y Gamma:	0.4 to 1.7 (1) in 0.1 steps
YC Offset:	-20 to 20 (0) in 2 Luma pixel steps
	Note: Defaults shown in brackets

Enhancement

Nonlinear Enhancer	Frequency Band Selection: Low, Med, High
	Four preset enhancement modes: Low, Med, High, Super
	Manual enhancement mode with H Gain and H Noise rejection levels

Conversion Aperture

Vertical	Frequency Band Selection: Low, Med, High
	Five vertical preset enhancement levels: Soft 2, Soft 1, Normal, Sharp 1, Sharp 2
Horizontal	Five horizontal preset sharpness levels: Low 2, Low 1, Normal, High 1, High 2
	Five horizontal preset detail levels: Soft 2, Soft 1, Normal, Sharp 1, Sharp 2

Other Controls

GPI input Low/High Select	
	Black, Freeze, Pattern, User Memories 1-16
GPI Output Source	Black, Freeze, Pattern
User Memories	16 x Save, Recall, Rename
Memory Naming	User configurable naming of memories 1 – 16
RollTrack Index	Up to 50 RollTrack destinations
Optical Logging*	Tx Laser Bias High Warning
	Tx Power Low Warning
	Tx Power High Warning
Laser Wavelength	Input 1 (2) Rx Power High Warning
	Input 1 (2) Rx Power Low Warning
	Input 1 (2) Rx Power Measurement
RollTrack Sources	Unused, Input Present (1&2, Fiber 1 & 2) , Input Loss (1&2, Fiber 1 & 2), Reference OK & Loss
Information Window	Video Input Status, Reference Status
Factory Default	Resets all module settings to factory specified default values and clears memories
Default Settings	Resets all module settings to factory specified defaults but does not clear memories
Module Information	Reports following module information: Software version, Serial number, Rear Panel ID, Frame Slot

Specifications

Electrical	3Gbit/s SDI, SMPTE 424M 1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C
Connector / Format	BNC/ 75ohm panel jack on standard IQ connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s) >-10dB (3Gbit/s)
Output Jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz), 3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)
Reference Source	External – HD Tri-Level / SD Bi-level / Input Video syncs
Electrical	Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level)
	SD bi-level – RS170A
	HD Tr-level – SMPTE 240M and 274M
Connector / Format	BNC/75 ohm panel jack on standard IQ connector panel
Embedded audio handling	
	HD - 24-bit synchronous 48 kHz to SMPTE 299M, SD - 20-bit synchronous 48 kHz to SMPTE 272M-A

Digital Audio Input (Unbalanced)

Connector/Format	BNC
Sample Frequency	PCM: 25 – 96 kHz; Non-PCM: 48 kHz
Input Cable Length	>500 m of RG59 cable
Impedance	75 Ohms
Standard	AES3id

Digital Audio Input (Balanced)

Connector/Format	25Way-D
Sample Frequency	PCM: 25 – 96 kHz; Non-PCM: 48 kHz
Input Cable Length	>150 m of AES3 cable
Impedance	110 Ohms
Standard	AES3

Digital Audio Output (Unbalanced)

Connector/Format	BNC
Level	1 V p-p typical into 75 Ohms
Standard	AES3id

Digital Audio Output (Balanced)

Connector/Format	25Way-D
Level	3 V p-p typical into 110 Ohms
Standard	AES3

Optical 1310 nm Tx

Wavelength	1310 nm
Spectral width (FWHM)	>1.5 nm (typ)
Output power	0 to -5 dBm typical (-2 dBm typical)
Extinction ratio	>7.5:1 (typ)
Link distance	Up to 30 Km @ 270Mbit/s
	Up to 21 Km @ 1.5Gbit/s
	Up to 10 Km @ 3Gbit/s

Optical 1550 nm Tx

Wavelength	1550 nm
Spectral width (FWHM)	1 nm
Output power	4 to 0 dBm
Extinction ratio	>7.5:1 (typ)
Link distance	Up to 50 Km @ 270Mbit/s, 1.5Gbit/s or 3Gbit/s

Optical Rx

Input wavelength range	Min. 1260 nm, Max. 1620 nm
Optical power input range	> -0 dBm, < -20 dBm
Link distance	Up to 30 Km

Power Consumption

Module Power Consumption with Fiber	
	18W (A frames)
	18PR (B frames)

IQUDC33

3G/HD/SD-SDI Dual Up, Down and Cross Converter with AES I/O

Ordering Information

Order codes for IQH3B enclosures

IQUDC3300-2B3
Dual up, down and cross converter with AES I/O. 2 SDI inputs, External & Frame reference inputs, 2 SDI outputs per channel, 8 shared unbalanced AES inputs or outputs

IQUDC3302-2B3
Dual up, down and cross converter with AES I/O. 2 SDI inputs, External & Frame reference inputs, 1 SDI output for channel 1, 2 SDI outputs for channel 2, 8 shared unbalanced AES inputs or outputs, 1 Fiber SFP cage. Includes rear but not SFP module

IQUDC3303-2B3
Dual up, down and cross converter with AES I/O. 2 SDI inputs, External & Frame reference inputs, 2 SDI outputs per channel, 8 shared balanced AES inputs or outputs, 2 x GPI, 1 Fiber SFP cage. Includes rear but not SFP module

Order codes for IQH3A/1A enclosures

IQUDC3300-2A3
Dual up, down and cross converter with AES I/O. 2 SDI inputs, reference loop, 2 SDI outputs per channel, 8 shared unbalanced AES inputs or outputs

IQUDC3302-2A3
Dual up, down and cross converter with AES I/O. 2 SDI inputs, reference input, 1 SDI output for channel 1, 2 SDI outputs for channel 2, 8 shared unbalanced AES inputs or outputs, 1 Fiber SFP cage. Includes rear but not SFP module

IQUDC3303-2A3
Dual up, down and cross converter with AES I/O. 2 SDI inputs, reference loop, 2 SDI outputs per channel, 8 shared balanced AES inputs or outputs, 2 x GPI, 1 Fiber SFP cage. Includes rear but not SFP module

For more details on enclosure types please refer to datasheet IQH3B

Software Options

IQOPTM-2NR - Software option to add noise reduction on both channels

IQOPTM-2SBK - Software option to add side-bar keying on both channels

IQOPTM-2LC - Software option to upgrade with linear frame rate conversion on both channels

SFP options

FC1-13T1 - Single 1310nm fiber Tx

FC1-13T2 - Dual 1310nm fiber Tx

FC1-15T1 - Single 1550nm fiber Tx

FC1-15T2 - Dual 1550nm fiber Tx

FC1-R1 - Single fiber Rx

FC1-R2 - Dual fiber Rx

FC1-13TR - Fiber transceiver 1310nmTx/Rx

FC1-HDBT2 - HD-BNC Dual Tx

FC1-HDBR2 - HD-BNC Dual Rx

Fiber CWDM Tx - Wavelengths available on request

Note: SFP type must be ordered in addition to the module.

Blank Page

Fiber

The high data rates associated with serial digital links impose their own constraints on the length of cable runs within a facility. Those members of the IQ Modular range that rely on SDI connections have inputs and outputs designed to allow the maximum length of copper cable without signal degradation. However, all copper cabling has its limitations, particularly on large sites, at high data rates or in areas susceptible to electromagnetic interference.

The solution for these most demanding circumstances is fiber optic interfacing. Compared with copper, fiber optic cabling offers secure communications over greatly increased distances with complete immunity from electromagnetic interference and ground loop problems.

The IQ Modular range has both stand-alone and integrated fiber units for single mode transmitter and receiver modules. All are designed for use with SDI signals at 3Gbit/s, 1.5Gbit/s HD and 270 Mbit/s SD data rates, signals are reclocked as standard.

For Related Modules see:
SD-HD Conversion Section
Synchronizers Section

IQGBE40/80 — Ethernet Fiber Converter with 4/8 Port Switch

The IQGBE40/80 is a range of Gigabit Fiber Media Converter modules with either a 4 or 8 port Ethernet switch occupying either a single or double slot in an IQ modular frame. The RJ45 copper ports are triple speed auto negotiating enabling connectivity to 10, 100 or 1000Base Ethernet devices using standard CAT5 orCAT6 cable assemblies. The fiber interface utilizes an SFP (Small Form factor Pluggable) fiber module receptacle cage compliant with the SFP MSA (Multi Source Agreement). It accepts a single 1000Base SFP Fiber Transceiver with 1310nm singlemode laser transmitter and medium sensitivity receiver. A copper SFP option is also available to make the unit a 4 or 8 port electrical switch if required.

The IQGBE40/80 may be used for direct links to other fiber enabled Ethernet devices or used as part of a system using WDM or CWDM techniques to transport multiple serial digital data streams over a single optical cable.

Features

- 4 or 8 port Ethernet switch including fiber optic I/O
- 10, 100 or 1000 Base Ethernet operation
- Low and high power 1310 nm output wavelengths available, plus copper RJ45 SFP option
- Conforms to IEEE 802.3 wired Ethernet and fibre channel FC-PI-2 Rev. 10.0 standards
- Provides typical fiber link distances of 10 to 55km
- Easily integrates into a CWDM system by using the 'express' channel of the IQCWM10 fiber combiner module
- Front and rear of card power and port status LEDs
- SFP status monitoring via RollCall

Why should you choose this module?

- Adds network based devices into fiber links between facilities or sites
- Include RollCall or other network data into existing video fiber links, when partnering with IQCWM10
- Full RollCall and SNMP compatibility allows easy integration with SAM, or third party, network management systems providing an all-inclusive monitoring and control solution

Order codes
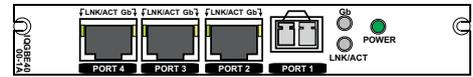
IQGBE4000-1A, IQGBE4000-1B
Ethernet fiber converter with 4 port switch.
3 copper Ethernet I/O, 1 Optical I/O.
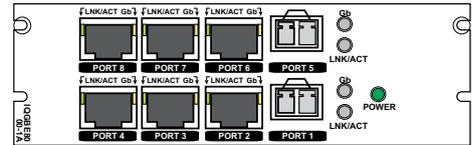
IQGBE8000-2A, IQGBE8000-2B
Ethernet fiber converter with 8 port switch.
6 copper Ethernet I/O, 2 Optical I/O.

SFP options

FC1-10KGB-13T - 1310nm SFP Transceiver, 10km typical on 9/125µm SMF

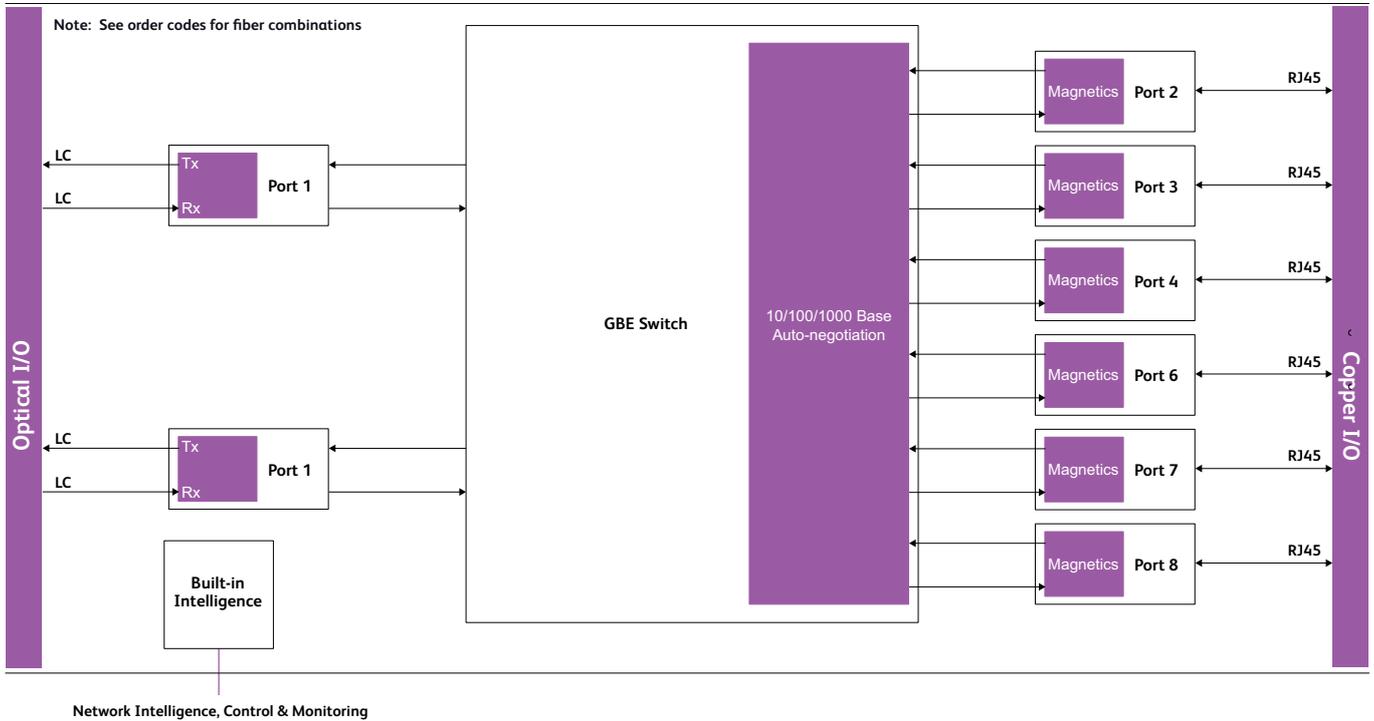**FC1-40KGB-13T** - 1310nm SFP Transceiver, 55km typical on 9/125µm SMF

FC1-GBE-CT5 - Copper Ethernet RJ-45 SFP Transceiver

Note: SFP type must be ordered in addition to the module.

For more details on enclosure types please refer to Frames and Hardware section.

IQGBE40/80

Ethernet Fiber Converter with 4/8 Port Switch

Note: See order codes for fiber combinations

[Optical I/O]

LC — Tx
LC — Rx — Port 1

LC — Tx
LC — Rx — Port 1

Built-in Intelligence

GBE Switch

10/100/1000 Base Auto-negotiation

Magnetics — Port 2 — RJ45
Magnetics — Port 3 — RJ45
Magnetics — Port 4 — RJ45
Magnetics — Port 6 — RJ45
Magnetics — Port 7 — RJ45
Magnetics — Port 8 — RJ45

[Copper I/O]

Network Intelligence, Control & Monitoring

⌒ **Block Diagram** for IQGBE8000-2A

Technical Specification

Inputs and Outputs
Signal Inputs and Outputs

Electrical Ethernet	3 (4 with copper SFP) IQGBE40 6 (up to 8 with copper SFPs) IQGBE80
Connector / format	RJ-45, CAT 5, 6, 7 Electrical Interfaces LC singlemode Optical Interfaces
Conforms to	IEEE 802.3 Electrical Interfaces FC-PI-2 Rev. 10.0 Optical Interfaces
Cable length	Up to 100m for 1000Base-T (Electrical Interfaces) Up to 55 km 1000Base-X, depending on SFP and cable (Optical Interfaces)

Controls
Indicators

Indicators	
Power	OK (Green)
CPU	OK (Green flashing)
Per Channel:	
Link	Link Up (Green)
Rate	10Mbps (Yellow), 100Mbps (Green), 1000Mbps (Blue)

RollCall Functions

Port Status	Link, Speed, and Connector type
Information Window	Port Status
Logging:	Port Logging, Name, Link Status, Speed
	SFP Logging, Type, Status, Connector, Vendor, Vendor Part Number, Serial Number, Rx Power State, Rx Power, Tx Power State, Tx Power, Wavelength, Laser Bias, Laser Bias State
RollTrack Index	Up to 16 RollTrack destinations
RollTrack controls	On/Off, Index, Source, Address, Command, Status, Sending
RollTrack Sources	Unused, Link Down, Link Up, Speed None/10Mbps/100Mbps/1Gbps, SFP 1/2 Not Fitted, SFP 1/2 Fitted, SFP 1/2 Signal LOST/OK, SFP 1/2 RX Pwr FAIL/OK, SFP 1/2 TX Pwr FAIL/OK, SFP 1/2 TX Bias FAIL/OK
Factory Default	Resets all module settings to factory specified default values
Module Information	Reports following module information: Software version, Serial number, Build number, KOS version, Firmware version, PCB version, Uptime, Rear ID, Rear Status, Power Usage

IQGBE40/80

Ethernet Fiber Converter with 4/8 Port Switch

Technical Specification

Specifications

1310 nm Standard Haul Transceiver (FGAN FC1-10KGB-13T)

Tx

Wavelength	1310 nm
Spectral width (FWHM)	3 nm
Output power	-9.5 dBm (min), -3 dBm max
Extinction ratio	9:1 (min)
Transmission distance	10 km* (at 0.55db/km loss, dispersion limited per FC-PI-2 Rev.10)

*actual transmission distances depend on type of fiber, data rate and receiver sensitivity as well as other system components.

Rx

Average Rx Sensitivity	-19 dBm (max)
Optical Center Wavelength	
	1265nm – 1600nm
LOS De Asser	-19 dBm
LOS Assert	-30 dBm
LOS Hysteresis	0.5 dB

1310 nm Long Haul Transceiver (FGAN FC1-40KGB-13T)

Tx

Wavelength	1310 nm
Spectral width (FWHM)	1 nm
Output power	0 dBm (min), +5 dBm max
Extinction ratio	9:1 (min)
Transmission distance	up to 55 km* (at 0.4db/km loss, dispersion limited per FC-PI Rev.13)

*actual transmission distances depend on type of fiber, data rate and receiver sensitivity as well as other system components.

Rx

Average Rx Sensitivity	-22 dBm (max)
Optical Center Wavelength	
	1270nm – 1600nm
LOS De Asser	-23 dBm
LOS Assert	-25 dBm
LOS Hysteresis	0.5 dB

Copper Interface Transceiver (FGAN FC1-GBE-CTS)
Standard IEEE 802.3 interface
Only operates at 1000Base-T

Power Consumption

Module power consumption	IQGBE40 - 4W Max
	IQGBE80 - 6.3W Max

Example Application - Using IQGBE to link communications between central and remote locations:

Central Equipment Area

RollCall Control & Monitoring

IQGBE80 Eight Port 1Gb Ethernet Switch with 2 x Fiber Tx/Rx (1310nm)

IP

IQH3B

IP

IQGBE80

IP

IQH3B

Remote Monitoring Location 1

IQGBE40

IP

Signal Sentri

Fiber Tx/Rx

IQGBE40 Four Port 1Gb Ethernet Switch with Fiber Tx/Rx (1310nm)

Fiber Tx/Rx

Remote Monitoring Location 2

IQGBE40

IP

Signal Sentri
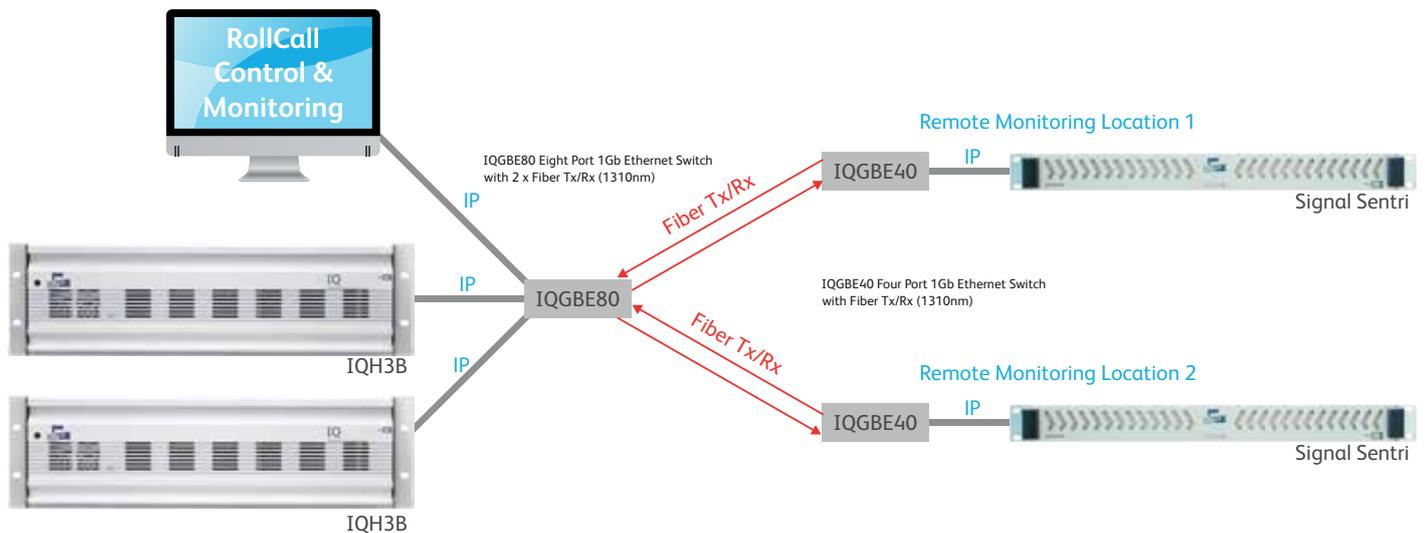
IQOSY10
3G/HD/SD-SDI Utility Frame Synchronizer with Fiber Interfacing

The IQOSY10 provides frame synchronization for HD-SDI at 3Gbit/s or 1.5 Gbit/s, or SD-SDI 270 Mbit/s with 16-channel embedded audio passing. Including 2 SDI inputs, and using a combination of fiber optic input and output SFP (Small Form-factor Pluggable) units the IQOSY10 enables increased connectivity distances for HD and 3Gbps SDI signals. A selection of electrical SFP units is also available providing up to 4 inputs and 3 outputs or conversely 2 inputs and 5 outputs, plus an HDMI output version (including adapter cable) to provide a built-in local monitoring output. A video proc. amp provides complete control over the video levels and up to 9 frames of video delay are available.

Features

- 3G/HD/SD-SDI synchronizer with up to 9 frames of video delay
- Standards supported:
  – 3G-SDI to SMPTE 424M/425M level A and B compatible
  – HD-SDI to SMPTE292M/274M/296M
  – SD-SDI to SMPTE259M-C
  – Fiber to SMPTE297-2006C
- Reference input capable of referencing to a bi-level or tri-level signal with auto detect functionality and selection from either external input directly or from internal IQH3B chassis reference bus
- Single mode fiber optic transmitter and receiver options at a 1310nm wavelength
- Agile, router switching tolerant synchronizer operation with precision genlock adjustment allowing you to time any SDI signal to pixel accuracy
- Independent HANC and VANC blanking control
- Input loss detection – default output of black/pattern/freeze
- Video controls including video gain, offset and hue
- In-built test pattern generator
- Input SDI, CRC, EDH and ANC data checking and reporting
- 16 x user memories, save/recall/rename
- RollCall control and monitoring compatible with standard, logging and reporting features

Why should you choose this module?

- An ideal lines input processor to re-align incoming signals to house reference when audio processing is not required
- Fiber optic interfacing allows extended transmission distances for 3Gbps and HD SDI signals
- Multiple inputs allow main and redundant feeds to terminate in a single synchronizer for increased resilience
- Full RollCall and SNMP compatibility allows easy integration with SAM, or third party, network management systems providing an all-inclusive monitoring and control solution

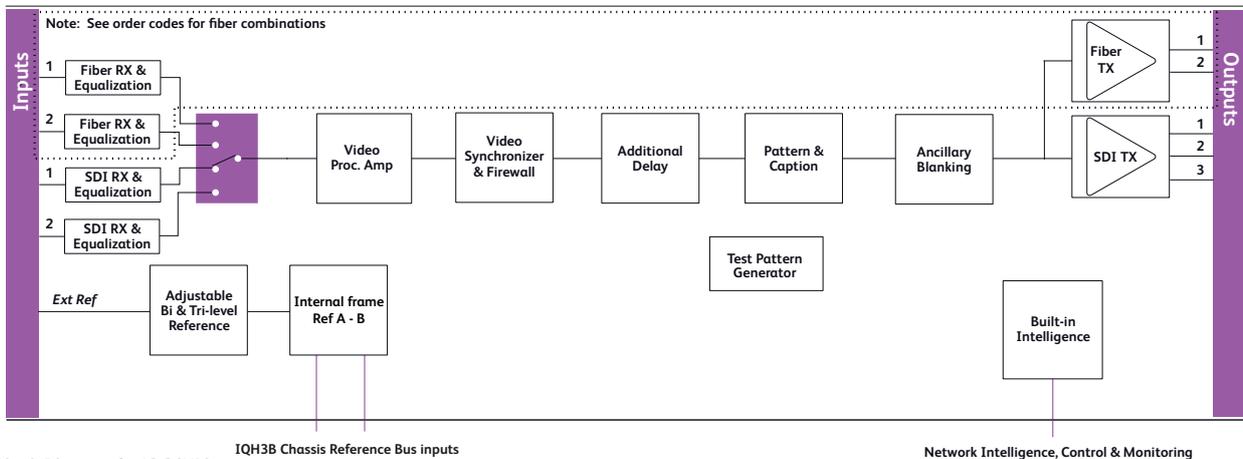## Inputs & Outputs - IQH3A/1A/3B enclosures
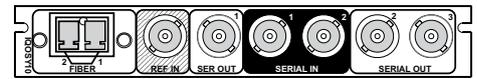
IQOSY10
3G/HD/SD-SDI Synchronizer with fiber interfacing, 2 SDI inputs, 3 SDI outputs, fiber TX/RX, External and internal frame reference selection.

For more details on enclosure types please refer to Frames and Hardware section.

IQOSY10

3G/HD/SD-SDI Utility Frame Synchronizer with Fiber Interfacing

Note: See order codes for fiber combinations

Inputs
- 1 Fiber RX & Equalization
- 2 Fiber RX & Equalization
- 1 SDI RX & Equalization
- 2 SDI RX & Equalization

Video Proc. Amp → Video Synchronizer & Firewall → Additional Delay → Pattern & Caption → Ancillary Blanking

Test Pattern Generator

Ext Ref → Adjustable Bi & Tri-level Reference → Internal frame Ref A - B

Built-in Intelligence

Fiber TX → 1 2 **Outputs**
SDI TX → 1 2 3

IQH3B Chassis Reference Bus inputs

Network Intelligence, Control & Monitoring

⌒ **Block Diagram** for IQOSY10

Technical Specification

Inputs and Outputs

Signal Inputs

SDI Inputs	2x
Input 1 Cable Length	Up to 70m Belden 1694A @ 3 Gbit/s
	Up to 160m Belden 1694A @ 1.5 Gbit/s
	>350m Belden 1694A @ 270 Mbit/s
Input 2 Cable Length	Up to 60m Belden 1694A @ 3 Gbit/s
	Up to 100m Belden 1694A @ 1.5 Gbit/s
	Up to 100m Belden 1694A @ 270 Mbit/s
Analog Reference	1 x Analog Reference with passive loop-through Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level)
	SD bi-level – RS170A
	HD Tri-level – SMPTE 240M, 274M and 296M

Fiber Signal Input

Inputs	Up to 2
Optical	3 GBit/s HD-SDI, 1.485 GBit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format	LC singlemode
Standard	SMPTE 297-2006

Signal Outputs

SDI Outputs	x 3

Fiber Signal Output

Optical	3 GBit/s HD-SDI, 1.485 Gbit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format	LC singlemode
Conforms to	SMPTE 297-2006
Outputs	Up to 2

*Note: Optical I/O and control dependant on type of SFP module fitted

Controls

Indicators

Power	OK (Green)
CPU running	OK (Green flashing)
FPGA running	OK (Green flashing)
Status	OK (Green)
	Warning (Yellow)
	Error (Red)
Input 1	OK (Green)
Input 2	OK (Green)
Rx 1	OK (Green)
Rx 2	OK (Green)
Reference lock	OK or Cross-locking (Green), Std error (Green flashing)

Controls

Genlock & Video Delay	
Genlock Mode	Free-run, Lock to Reference, Lock to input
Reference select mode	Module input reference or IQH3B frame reference A/B
Genlock H-Phase	± 0.5H in pixel clock steps
Genlock V-Phase	± 0.5F in 1 line steps
Video H-Delay	0 – 1 Line in pixel clock steps
Video V-Delay	0 – 1 Frame in 1 line steps
Video Delay Frames	0 - 9 F

Video Controls

Input Standard	1125(1080)/50P (A & B), 1125(1080)/59P (A & B), 1125(1080)/29i, 1125(1080)/25i, 750(720)/59P, 750(720)/50P, 525(480)/29i,625(576)/25i

Default Video Output

Type	Pattern, Freeze, Black
Default Video Output Standard	Last Known Good, 1125(1080)/50P (A & B), 1125(1080)/59P (A & B), 1125(1080)/29i, 1125(1080)/25i, 750(720)/59P, 750(720)/50P, 525(480)/29i, 625(576)/25i
Input Select	Input 1, Input 2, Rx1, Rx2
Manual Freeze	On/Off
Freeze	Field/Frame

3G/HD/SD-SDI Utility Frame Synchronizer with Fiber Interfacing

Technical Specification cont…

VANC Data	Blank VANC
SD VANC Data	Line blanking (23/336 in 625, 21,22, 283, 284 in 525)
HANC Data	Blank HANC (Removes all HANC data. Note audio removed when embedders disabled)
ProcAmp Enable	On/Off
Black Level	±100 mV in steps of 0.8 mV
Hue Adjust	±180° in steps of 1°
Master Video Gain	±6 dB in steps of 0.1 dB
Y-Gain	±6 dB in steps of 0.1 dB
Cb/Cr Gain	±6 dB in steps of 0.1 dB
Y/C Timing	±8 pixels in 2 pixel steps (SD)
	±16 pixels in 2 pixel steps (HD/3G)
Picture Position	±8 pixels in 2 pixel steps (SD)
	±16 pixels in 2 pixel steps (HD/3G)
Pattern On	On/Off
Pattern Select	75% Color Bars, Black
Caption On	On/Off
Edit Caption	19 characters available

Other Controls

User Memories	16 x Save, Recall, Rename
Memory Naming	User configurable naming of memories 1 – 16
RollTrack Index	Up to 70 RollTrack destinations
Optical Logging*	Tx Laser Bias High Warning
	Tx Power Low Warning
	Tx Power High Warning
Laser Wavelength	Input 1 (2) Rx Power High Warning
	Input 1 (2) Rx Power Low Warning
	Input 1 (2) Rx Power Measurement
RollTrack Sources	Unused, Input Present (1&2, Fiber 1 & 2) , Input Loss (1&2, Fiber 1 & 2) , Output 1 Rate/Std, Out 1 Selects (In1 & 2 & Rx1 & Rx2), Fiber Rx Power OK (1&2), Fiber Rx Power Fail (1&2), Fiber Tx Power OK (1&2), Fiber Tx Power Fail (1&2), Fiber Tx Bias OK (1&2), Fiber Tx Bias High (1&2), Output 1 Freeze, Output 1 Unfreeze, Output 1 Pattern On, Output 1 Pattern Off, Output 1 Black On, Output 1 Black Off, Output 1 Caption On, Output 1 Caption Off, Reference OK & Loss
Information Window	Video Input Status, Reference Status
Factory Default	Resets all module settings to factory specified default values and clears memories
Default Settings	Resets all module settings to factory specified defaults but does not clear memories
Restart	Software restart of the module
Module Information	Reports following module information: Software version, Serial number, Build number, KOS version, Firmware version, PCB version

Specifications

Electrical	3Gbit/s SDI, SMPTE 424M
	1.5Gbit/s HD-SDI, SMPTE 292M
	270 Mbit/s SDI, SMPTE 259M-C / DVB-ASI
Connector / Format	BNC/ 75ohm panel jack on standard IQ connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s)
	>-10dB (3Gbit/s)
Output Jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz)
	3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)
Reference Source	External – HD Tri-Level / SD bi-level / Input Video syncs
Electrical	Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level)
	SD bi-level – RS170A
	HD Tr-level – SMPTE 240M, 274M and 296M
Connector / Format	BNC/75 ohm panel jack on standard IQ connector panel

Analog Reference Return Loss	
	SD bi-level > 40 dB to 5.5 MHz
	HD tri-level > 35 dB to 30 MHz

Optical 1310 nm Tx

Wavelength	1310 nm
Spectral width (FWHM)	>1.5 nm (typ)
Output power	0 to -5 dBm typical (-2 dBm typical)
Extinction ratio	>7.5:1 (typ)

Optical Rx

Input wavelength range	Min. 1260 nm, Max. 1620 nm
Optical power input range	> -0 dBm, < -20 dBm
Link distance	Up to 30 Km

Video Standards	
	1125(1080)/50p (A & B), 1125(1080)/59p (A & B) 750(720)/50p, 750(720)/59p, 1125(1080)/25i, 1125(1080)/29i 625(576)/25i, 525(480)/29i
Minimum Delay (Reference lock or free run)	
	SD: 67us
	HD: 28us
	3G-A: 15us
	3G-B: 25us
Typical delay (Input lock)	
	SD: 70us
	HD: 38us
	3G-A: 19us
	3G-B: 40us
Synchronizer Hysteresis Window	
	5 µs
Embedded audio handling	HD - 24-bit synchronous 48 kHz to SMPTE 299M SD - 20-bit synchronous 48 kHz to SMPTE 272M-A
Embedded Audio Delay	Minimum (PCM) 2 ms
	Maximum (non-PCM)
	SD: 67us
	HD: 28us
	3G-A: 15us
	3G-B: 25us

Power Consumption

Module Power Consumption	9.5 W Max (A Frames)
	9.5 PR (B Frames)

IQOSY10

3G/HD/SD-SDI Utility Frame Synchronizer with Fiber Interfacing

Ordering Information

Order codes for IQH3B enclosures

IQOSY1099-1B3

3G/HD/SD-SDI Synchronizer with fiber interfacing,
2 SDI inputs, 3 SDI outputs, external and internal frame
reference selection, single fiber cage but no SFP fitted.

Fiber SFP options

FC1-13T1 - Single 1310nm Tx

FC1-13T2 - Dual 1310nm Tx

FC1-15T1 - Single 1550nm Tx

FC1-15T2 - Dual 1550nm Tx

FC1-R1 - Single Rx

FC1-R2 - Dual Rx

FC1-13TR - Transceiver 1310nm/Rx

FC1-HDBT2 - HD-BNC Dual Tx

FC1-HDBR2 - HD-BNC Dual Rx

FC1-HDMI2 - HDMI Tx with 2m cable

CWDM Tx - Wavelengths available on request

Note: Fiber SFP type must be ordered in addition to the module.

Order codes for IQH3A/1A enclosures

IQOSY1099-1A3

3G/HD/SD-SDI Synchronizer with fiber interfacing,
2 SDI inputs, 3 SDI outputs, reference input, single fiber cage
but no SFP fitted.

For more details on enclosure types please refer to
datasheet IQH3B.

IQOSY30

3G/HD/SD-SDI Frame Synchronizer with Fiber Interfacing

The IQOSY30 provides frame synchronization for HD-SDI at 3Gbit/s or 1.5 Gbit/s, or SD-SDI 270 Mbit/s with 16-channel embedded audio processing. Including 2 SDI inputs, and using a combination of fiber optic input and output SFP (Small Form-factor Pluggable) units the IQOSY30 enables increased connectivity distances for HD and 3Gbps SDI signals. A selection of electrical SFP units is also available providing up to 4 inputs and 2 outputs or conversely 2 inputs and 4 outputs, plus an HDMI output version (including adapter cable) to provide a built-in local monitoring output. A video proc. amp provides complete control over the video levels, and audio processing features include audio delay, gain, invert and channel level routing.

Features

- 3G/HD/SD-SDI synchronizer with up to 9 frames of video delay
- Handles 16 channels of embedded audio present on the incoming SDI stream with no disturbance during video synchronizer frame wraps or drops
- Standards supported:
  – 3G-SDI to SMPTE 424M/425M level A and B compatible
  – HD-SDI to SMPTE292M/274M/296M
  – SD-SDI to SMPTE259M-C
  – Fiber to SMPTE297-2006C
- Loop-though or reference input capable of referencing to a bi-level or tri-level signal with auto detect functionality, and selection from either external input directly or from internal IQH3B chassis reference bus
- Single mode fiber optic transmitter and receiver options at a 1310nm wavelength
- Agile, router switching tolerant synchronizer operation with precision genlock adjustment allowing you to time any SDI signal to pixel accuracy
- Firewall for video and processed PCM audio to provide a continuous un-interrupted output
- Channel level (Sub-frame) routing
- Audio proc. amp features including independent gain, invert and mute control
- Adjustable delay for selected audio channels
- Any group of embedded audio may be passed unchanged, processed or blanked
- Fully Dolby E compatible with embedded Dolby E support – pair routing and Dolby E reframing – Re-align Dolby E guard band with video frame boundary prior to synchronization
- Independent HANC and VANC blanking control
- Input loss detection – default output of black/pattern/freeze
- Video controls including video gain, offset and hue
- In-built test pattern generator and audio tone generator
- Input SDI, CRC, EDH and ANC data checking and reporting
- 16 x user memories, save/recall/rename
- RollCall control and monitoring compatible with standard, logging and reporting features

Why should you choose this module?

- Agile video synchronization and advanced embedded audio processing features, such as Dolby E synchronization, provide ideal solutions for today's complex system requirements
- An ideal lines input processor with full control of audio and video parameters, including proc. amp and delays
- Fiber optic interfacing allows extended transmission distances for 3Gbps and HD SDI signals
- Multiple inputs allow main and redundant feeds to terminate in a single synchronizer for increased resilience
- Full RollCall and SNMP compatibility allows easy integration with SAM, or third party, network management systems providing an all-inclusive monitoring and control solution

Inputs & Outputs - IQH3A/1A/3B enclosures
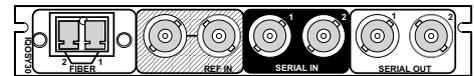
IQOSY30
HD/SD-SDI Synchronizer with fiber interfacing, 2 SDI inputs, 2 SDI outputs, fiber TX/RX, reference loop-through.

IQOSY30

3G/HD/SD-SDI Frame Synchronizer with Fiber Interfacing
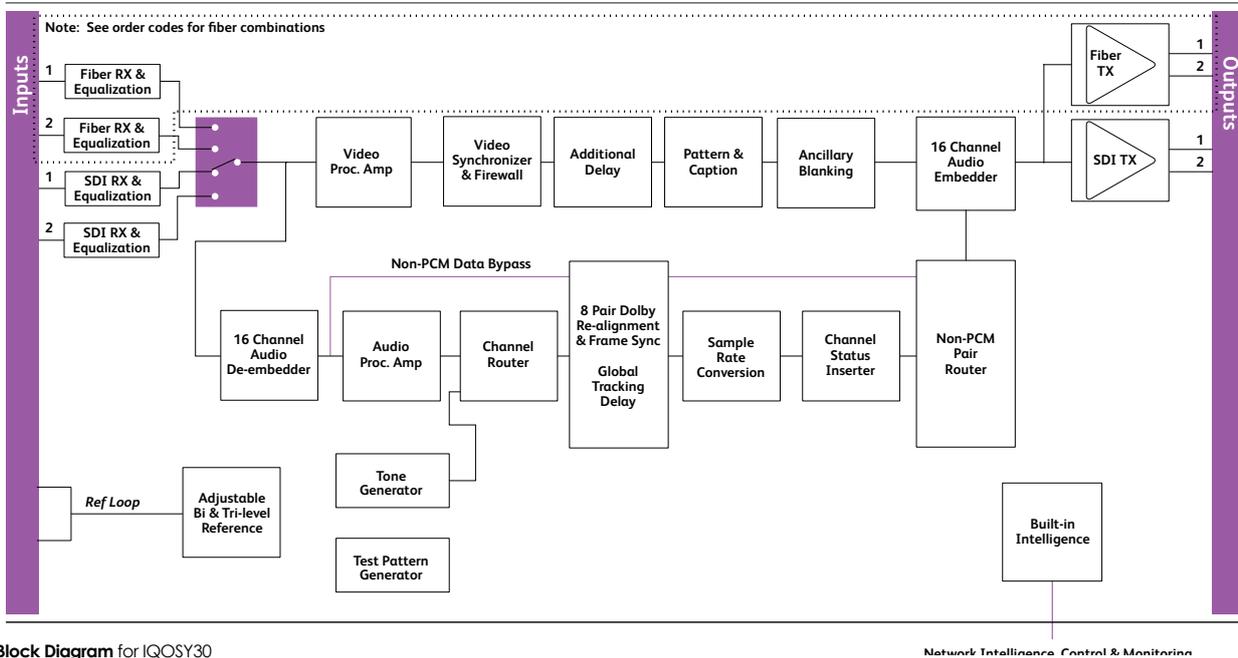
⌒ **Block Diagram** for IQOSY30

Network Intelligence, Control & Monitoring

Technical Specification

Inputs and Outputs

Signal Inputs

SDI Inputs	2x
Input 1 Cable Length	Up to 70m Belden 1694A @ 3 Gbit/s
	Up to 160m Belden 1694A @ 1.5 Gbit/s
	>350m Belden 1694A @ 270 Mbit/s
Input 2 Cable Length	Up to 60m Belden 1694A @ 3 Gbit/s
	Up to 100m Belden 1694A @ 1.5 Gbit/s
	Up to 100m Belden 1694A @ 270 Mbit/s
Analog Reference	1 x Analog Reference with passive loop-through Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level)
	SD bi-level – RS170A
	HD Tri-level – SMPTE 240M, 274M and 296M

Fiber Signal Input

Inputs	Up to 2
Optical	3 GBit/s HD-SDI, 1.485 GBit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format	LC singlemode
Standard	SMPTE 297-2006

Signal Outputs

SDI Outputs	x 2

Fiber Signal Output

Optical	3 GBit/s HD-SDI, 1.485 Gbit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format	LC singlemode
Conforms to	SMPTE 297-2006
Outputs	Up to 2

*Note: Optical I/O and control dependant on type of SFP module fitted

Controls

Indicators

Power	OK (Green)
CPU running	OK (Green flashing)
FPGA running	OK (Green flashing)
Status	OK (Green)
	Warning (Yellow)
	Error (Red)
Input 1	OK (Green)
Input 2	OK (Green)
Rx 1	OK (Green)
Rx 2	OK (Green)
Reference lock	OK or Cross-locking (Green), Std error (Green flashing)

Controls

Genlock & Video Delay

Genlock Mode	Free-run, Lock to Reference, Lock to input
Genlock H-Phase	± 0.5H in pixel clock steps
Genlock V-Phase	± 0.5F in 1 line steps
Video H-Delay	0 – 1 Line in pixel clock steps
Video V-Delay	0 – 1 Frame in 1 line steps
Video Delay Frames	0 - 9 F

Video Controls

Input Standard	1125(1080)/50P (A & B), 1125(1080)/59P (A & B), 1125(1080)/29i, 1125(1080)/25i, 750(720)/59P, 750(720)/50P, 525(480)/29i,625(576)/25i
Default Video Output Type	Pattern, Freeze, Black
Default Video Output Standard	Last Known Good, 1125(1080)/50P (A & B), 1125(1080)/59P (A & B), 1125(1080)/29i, 1125(1080)/25i, 750(720)/59P, 750(720)/50P, 525(480)/29i, 625(576)/25i
Input Select	Input 1, Input 2, Rx1, Rx2
Manual Freeze	On/Off
Freeze	Field/Frame
VANC Data	Blank VANC

IQOSY30

3G/HD/SD-SDI Frame Synchronizer with Fiber Interfacing

Technical Specification cont…

SD VANC Data	Line blanking (23/336 in 625, 21,22, 283, 284 in 525)
HANC Data	Blank HANC (Removes all HANC data. Note audio removed when embedders disabled)
ProcAmp Enable	On/Off
Black Level	±100 mV in steps of 0.8 mV
Hue Adjust	±180° in steps of 1°
Master Video Gain	±6 dB in steps of 0.1 dB
Y-Gain	±6 dB in steps of 0.1 dB
Cb/Cr Gain	±6 dB in steps of 0.1 dB
Y/C Timing	±8 pixels in 2 pixel steps (SD) ±16 pixels in 2 pixel steps (HD/3G)
Picture Position	±8 pixels in 2 pixel steps (SD) ±16 pixels in 2 pixel steps (HD/3G)
Pattern On	On/Off
Pattern Select	75% Color Bars, Black
Caption On	On/Off
Edit Caption	19 characters available

Audio Controls
Embedder Assignment

Group 1 to 4 Enable	On/Off
Pair 1 to 8 Source L / Non-PCM	De-embed 1-16, Tone, Silence
Pair 1 to 8 Source R	De-Embed 1-16, Tone, Silence
Pair 1 to 8 Stereo	Link channel pairs
Pair 1 to 8 Polarity L/R	On/Off
Pair 1 to 8 Gain L/R	+12 dB to -72 dB in 0.1 dB steps
Pair 1 to 8 Non-PCM	On/Off

Processed Audio Delay Control

Course Manual Delay	Up to 1.75s in 5ms steps
Fine Manual Delay	+/- 0.25s in 0.5ms steps
Variable Audio Delay Control Source	Internal, Manual

Dolby-E

Dolby-E Auto Alignment	On/Off

Tone

Frequency L/R	100Hz to 10kHz in 100Hz steps
Channel Ident	On/Off
HANC Data	Blank HANC (Removes all HANC data. Note audio removed when embedders disabled)

Audio Monitoring

Silence Detect	0 to -80dB in steps of 1dB
Signal Overload Detect	0 to -80dB in steps of 1dB
Warning Timer	1 to 20 seconds in steps of 1 second

Other Controls

User Memories	16 x Save, Recall, Rename
Memory Naming	User configurable naming of memories 1 – 16
RollTrack Index	Up to 70 RollTrack destinations
Optical Logging*	Tx Laser Bias High Warning Tx Power Low Warning Tx Power High Warning
Laser Wavelength	Input 1 (2) Rx Power High Warning Input 1 (2) Rx Power Low Warning Input 1 (2) Rx Power Measurement
RollTrack Sources	Unused, Input Present (1&2, Fiber 1 & 2) , Input Loss (1&2, Fiber 1 & 2) , Output 1 Rate/Std, Out 1 Selects (In1 2 & Rx1 & Rx2), Fiber Rx Power OK (1&2), Fiber Rx Power Fail (1&2), Fiber Tx Power OK (1&2), Fiber Tx Power Fail (1&2), Fiber Tx Bias OK (1&2), Fiber Tx Bias High (1&2), Output 1 Freeze, Output 1 Unfreeze, Output 1 Pattern On, Output 1 Pattern Off, Output 1 Black On, Output 1 Black Off, Output 1 Caption On, Output 1 Caption Off, Inp1 Embedded Audio (Pairs 1-8) PCM, Inp1 Embedded Audio (Pairs 1-8) Non-PCM, Inp1 Embedded Audio (Pairs 1-8) Loss, Inp1 Embedded Audio (Pairs 1-8) V Bit, Reference OK & Loss , Inp2 Embedded Audio (Pairs 1-8) PCM, Inp2 Embedded Audio (Pairs 1-8) Non-PCM, Inp2 Embedded Audio (Pairs 1-8) Loss, Inp2 Embedded Audio (Pairs 1-8) V Bit, Inp3 Embedded Audio (Pairs 1-8) PCM, Inp3 Embedded Audio (Pairs 1-8) Non-PCM, Inp3 Embedded Audio (Pairs 1-8) Loss, Inp3 Embedded Audio (Pairs 1-8) V Bit, Reference OK & Loss , Inp4 Embedded Audio (Pairs 1-8) PCM, Inp4 Embedded Audio (Pairs 1-8) Non-PCM, Inp4 Embedded Audio (Pairs 1-8) Loss, Inp4 Embedded Audio (Pairs 1-8) V Bit
Information Window	Video Input Status, Audio Input Status, Reference Status
Factory Default	Resets all module settings to factory specified default values and clears memories
Default Settings	Resets all module settings to factory specified defaults but does not clear memories
Restart	Software restart of the module
Module Information	Reports following module information: Software version, Serial number, Build number, KOS version, Firmware version, PCB version

Specifications

Electrical	3Gbit/s SDI, SMPTE 424M 1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C / DVB-ASI
Connector / Format	BNC/ 75ohm panel jack on standard IQ connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s) >-10dB (3Gbit/s)
Output Jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz) 3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)
Reference Source	External – HD Tri-Level / SD bi-level / Input Video syncs
Electrical	Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level) SD bi-level – RS170A HD Tr-level – SMPTE 240M, 274M and 296M
Connector / Format	BNC/75 ohm panel jack on standard IQ connector panel
Analog Reference Return Loss	SD bi-level > 40 dB to 5.5 MHz HD tri-level > 35 dB to 30 MHz

Optical 1310 nm Tx

Wavelength	1310 nm
Spectral width (FWHM)	>1.5 nm (typ)
Output power	0 to -5 dBm typical (-2 dBm typical)
Extinction ratio	>7.5:1 (typ)

Optical Rx

Input wavelength range	Min. 1260 nm, Max. 1620 nm
Optical power input range	> -0 dBm, < -20 dBm
Link distance	Up to 30 Km

IQOSY30

3G/HD/SD-SDI Frame Synchronizer with Fiber Interfacing

Technical Specification cont…

Video Standards

1125(1080)/50p (A & B), 1125(1080)/59p (A & B)
750(720)/50p, 750(720)/59p,
1125(1080)/25i, 1125(1080)/29i
625(576)/25i, 525(480)/29i

Minimum Delay (Reference lock or free run)

SD: 67us
HD: 28us
3G-A: 15us
3G-B: 25us

Typical delay (Input lock)

SD: 70us
HD: 38us
3G-A: 19us
3G-B: 40us

Synchronizer Hysteresis Window

5 μs

Embedded audio
handling

HD - 24-bit synchronous
48 kHz to SMPTE 299M
SD - 20-bit synchronous
48 kHz to SMPTE 272M-A

Embedded Audio
Delay

Minimum (PCM) 2 ms
Maximum (non-PCM)
SD: 67us
HD: 28us
3G-A: 15us
3G-B: 25us

Power Consumption
Module Power
Consumption

9.5 W Max (A Frames)
9.5 PR (B Frames)

Ordering Information

Order codes for IQH3B enclosures

IQOSY3099-1B3 3G/HD/SD-SDI Synchronizer with fiber interfacing, 2 SDI inputs, 2 SDI outputs, single fiber cage but no SFP fitted, External loop and internal frame reference selection.

Fiber SFP options

FC1-13T1 - Single 1310nm Tx

FC1-13T2 - Dual 1310nm Tx

FC1-15T1 - Single 1550nm Tx

FC1-15T2 - Dual 1550nm Tx

FC1-R1 - Single Rx

FC1-R2 - Dual Rx

FC1-13TR - Transceiver 1310nm/Rx

FC1-HDBT2 - HD-BNC Dual Tx

FC1-HDBR2 - HD-BNC Dual Rx

FC1-HDMI2 - HDMI Tx with 2m cable

CWDM Tx - Wavelengths available on request

Note: Fiber SFP type must be ordered in addition to the module.

Order codes for IQH3A/1A enclosures

IQOSY3099-1A3 3G/HD/SD-SDI Synchronizer with fiber interfacing, 2 SDI inputs, 2 SDI outputs, single fiber cage but no SFP fitted, reference loop-through.

For more details on enclosure types please refer to datasheet IQH3B.

IQOTR32

3G/HD/SD-SDI Flexible Fiber Optic Interfacing Module

The IQOTR32 is a user configurable fiber optic transceiver for bi-directional conversion of 3Gbps, HD and SD-SDI signals to 1310nm optical signals. Ideal for mixed coax and fiber workflows, the IQOTR32 allows the user to configure the inputs and outputs to match their infrastructure needs.

Features

- Single mode fiber optic receiver and transmitter for 3G/HD/SD-SDI signals
- Independent input selection for each channel, or all outputs follow input mode
- User selectable 3G/HD/SD-SDI outputs for fiber or coax inputs in accordance with SMPTE424M, SMPTE292M and SMPTE259M
- Input wavelength range 1260-1620 nm, output wavelength of 1310 nm
- 2 x GPI/O control interface

Why should you choose this module?

- Ideal for applications that require mixed coax and fiber interfacing, to integrate an existing router into a new 3G/HD operation for example
- Suitable for transporting 3G/HD-SDI signals over long distances either within the facility or between sites
- 2 x GPI control interface allows external control of input selection or status reporting
- Lower weight and higher density compared with copper cables
- Full RollCall and SNMP compatibility allows easy integration with SAM Centra, or third party, network management systems providing an all -inclusive monitoring and control solution
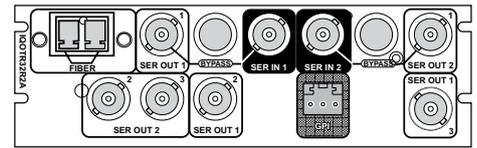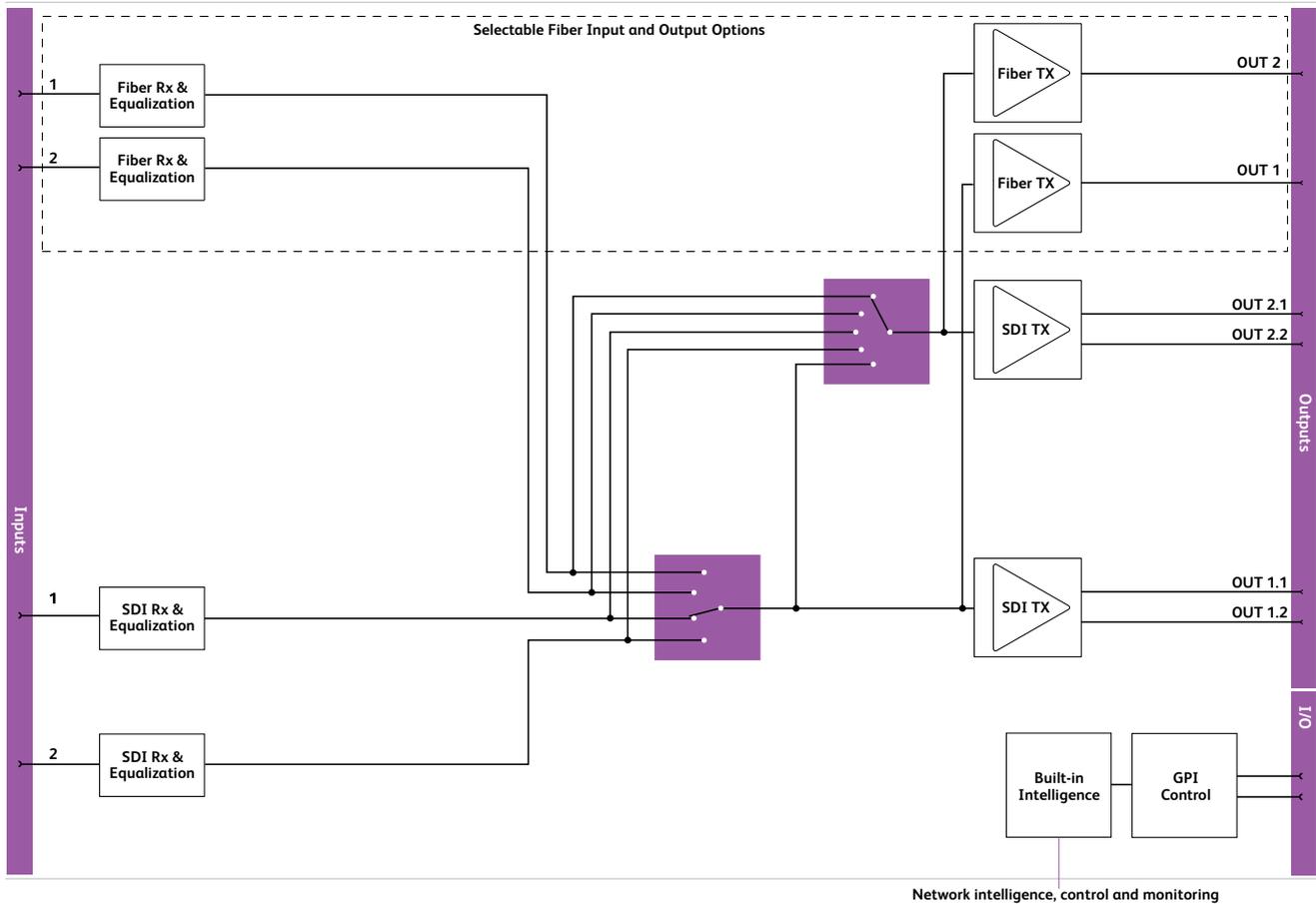
Inputs & Outputs - IQH3A/1A/3B enclosures
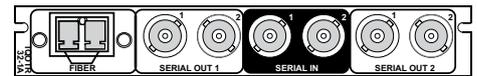
IQOTR3299-1B3, IQOTR3299-1A3
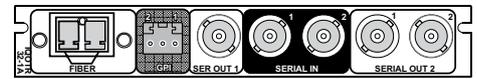
IQOTR32991B3G, IQOTR32991A3G

IQOTR32992B3R, IQOTR32992A3R

IQOTR32 — 3G/HD/SD-SDI Flexible Fiber Optic Interfacing Module

Block Diagram for IQOTR3299-1B3

Technical Specification

Inputs and Outputs

Signal Inputs

Electrical	3 GBit/s HD-SDI, 1.485 GBit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format	BNC/ 75 ohm panel jack
Conforms to:	SMPTE 424M (HD level A/B)
	SMPTE 292M (HD)
	SMPTE 259M-C (SD)
Inputs	2
Input 1 Cable Length	Up to 70m Belden 1694A @ 3 Gbit/s (40m with relay rear version)
	Up to 160m Belden 1694A @ 1.5 Gbit/s
	>350m Belden 1694A @ 270 Mbit/s
Input 2 Cable Length	Up to 60m Belden 1694A @ 3 Gbit/s (40m with relay rear version)
	Up to 100m Belden 1694A @ 1.5 Gbit/s
	Up to 100m Belden 1694A @ 270 Mbit/s

Fiber Signal Input

Inputs	Up to 2
Optical	3 GBit/s HD-SDI, 1.485 GBit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format	LC singlemode
Conforms to:	SMPTE 297-2006
	SMPTE 424M (HD level A/B)
	SMPTE 292M (HD)
	SMPTE 259M-C (SD)

Signal Outputs

Electrical	3 GBit/s HD-SDI, 1.485Gbit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format	BNC/ 75 ohm panel jack
Outputs	2 x 2 selectable reclocked
Conforms to:	SMPTE 424M (HD level A/B)
	SMPTE 292M (HD)
	SMPTE 259M-C (SD)

Fiber Signal Output

Optical	3 GBit/s HD-SDI, 1.485 Gbit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format	LC singlemode
Conforms to	SMPTE 297-2006
	SMPTE 424M (HD level A/B)
	SMPTE 292M (HD)
	SMPTE 259M-C (SD)
Outputs	Up to 2, selectable per Channel

Control Interface

GPI I/O	2 x closing contact via screw terminal connector (ST)

IQOTR32

3G/HD/SD-SDI Flexible Fiber Optic Interfacing Module

Technical Specification cont…

Controls

Indicators

Power	OK (Green)
CPU running	OK (Green flashing)
FPGA running	OK (Yellow flashing)
Status	OK (Green)
	Warning (Yellow)
	Error (Red)
Input 1	OK (Green)
Input 2	OK (Green)
Rx 1	OK (Green)

Controls

Video Controls

Output 1 Select	Serial 1, Serial 2, RX1, RX2
Output 2 Select	Serial 1, Serial 2, RX1, RX2, Follow Output 1 Selection
Laser Disable	On/Off

Other Controls

User Memories	16 x Save, Recall, Rename
GPI Inputs	Memory recall 1 to 16, Memory toggle
GPI Outputs	Input Present or Loss for SDI 1, 2, Fiber 1, 2
Memory Naming	User configurable naming of memories 1 – 16
Information Window	Video Input Status
RollTrack Index	Up to 70 RollTrack destinations
Optical Logging*	Tx Laser Bias High Warning
	Tx Power Low Warning
	Tx Power High Warning
Laser Wavelength	Input 1 (2) Rx Power High Warning
	Input 1 (2) Rx Power Low Warning
	Input 1 (2) Rx Power Measurement
RollTrack Sources	Unused, Input Present (1&2, Fiber 1 & 2) , Input Loss (1&2, Fiber 1 & 2) , Output Rate/Std (1&2), Out 1 Selects (In1 & 2 & Rx1 & Rx2), Out 2 Selects (In1 & 2 & Rx1 & Rx2), Fiber Rx Power OK (1&2), Fiber Rx Power Fail (1&2), Fiber Tx Power OK (1&2), Fiber Tx Power Fail (1&2), Fiber Tx Bias OK (1&2), Fiber Tx Bias High (1&2)
Factory Default	Resets all module settings to factory specified default values and clears memories
Default Settings	Resets all module settings to factory specified defaults but does not clear memories
Restart	Software restart of the module
Module Information	"Reports following module information: Software version, Serial number, Build number, KOS version, Firmware version, PCB version

Specifications

Electrical	3Gbit/s SDI, SMPTE 424M
	1.5Gbit/s HD-SDI, SMPTE 292M
	270 Mbit/s SDI, SMPTE 259M-C / DVB-ASI
Connector / Format	BNC/ 75ohm panel jack on standard IQ connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s)
	>-10dB (3Gbit/s)
Output Jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz)
	3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)

Optical 1310 nm Tx

Wavelength	1310 nm
Spectral width (FWHM)	>1.5 nm (typ)
Output power	0 to -5 dBm typical (-2 dBm typical)
Rise and Fall Time	135 ps @ 3Gbit/s
	270 ps @ 1.5Gbit/s
	1.5 ns @ 270Mbit/s
Extinction ratio	>7.5:1 (typ)
Optical Return Loss	-27 dB
Link distance	Up to 30 Km @ 270Mbit/s
	Up to 21 Km @ 1.5Gbit/s
	Up to 10 Km @ 3Gbit/s

Optical Rx

Input wavelength range	Min. 1260 nm, Max. 1620 nm
Input Sensitivity	-21 dBm
Optical power input range	> -0 dBm, < -20 dBm
Link distance	Up to 30 Km @ 270Mbit/s
	Up to 21 Km @ 1.5Gbit/s
	Up to 10 Km @ 3Gbit/s

Video Standards

1125(1080)/50p (A & B), 1125(1080)/59p (A & B)
750(720)/50p, 750(720)/59p,
1125(1080)/25i, 1125(1080)/29i
625(576)/25i, 525(480)/29i

Power Consumption

Module Power Consumption

8.8W Max (A Frames)
8.5 PR (B Frames)
9W (PR) Max with relay bypass

IQOTR32
3G/HD/SD-SDI Flexible Fiber Optic Interfacing Module

Ordering Information

Order codes for IQH3B enclosures

IQOTR32992B3R
Flexible dual channel fiber optic transceiver for 3G/HD/SD-SDI with relay input bypass. 2 x 3GHD/SD-SDI inputs, 6 x 3G/HD/SD-SDI outputs, single fiber cage but no SFP fitted.

IQOTR3299-1B3
Flexible dual channel fiber optic transceiver for 3G/HD/SD-SDI. 2 x 3GHD/SD-SDI inputs, 4 x 3G/HD/SD-SDI outputs, single fiber cage but no SFP fitted.

IQOTR32991B3G
Flexible dual channel fiber optic transceiver for 3G/HD/SD-SDI with GPIs. 2 x 3GHD/SD-SDI inputs, 3 x 3G/HD/SD-SDI outputs, 2 x GPI, single fiber cage but no SFP fitted.

Fiber SFP options

FC1-13T1 - Single 1310nm Tx

FC1-13T2 - Dual 1310nm Tx

FC1-15T1 - Single 1550nm Tx

FC1-15T2 - Dual 1550nm Tx

FC1-R1 - Single Rx

FC1-R2 - Dual Rx

FC1-13TR - Transceiver 1310nm/Rx

FC1-HDBT2 - HD-BNC Dual Tx

FC1-HDBR2 - HD-BNC Dual Rx

FC1-HDMI2 - HDMI Tx with 2m cable

CWDM Tx - Wavelengths available on request

Note: Fiber SFP type must be ordered in addition to the module.

Order codes for IQH3A/1A enclosures

IQOTR32992A3R
Flexible dual channel fiber optic transceiver for 3G/HD/SD-SDI with relay input bypass. 2 x 3GHD/SD-SDI inputs, 6 x 3G/HD/SD-SDI outputs, single fiber cage but no SFP fitted.

IQOTR3299-1A3
Flexible dual channel fiber optic transceiver for 3G/HD/SD-SDI. 2 x 3GHD/SD-SDI inputs, 4 x 3G/HD/SD-SDI outputs, single fiber cage but no SFP fitted.

IQOTR32991A3G
Flexible dual channel fiber optic transceiver for 3G/HD/SD-SDI with GPIs. 2 x 3GHD/SD-SDI inputs, 3 x 3G/HD/SD-SDI outputs, 2 x GPI, single fiber cage but no SFP fitted.

For more details on enclosure types please refer to datasheet IQH3B

IQFDA30

3G/HD/SD-SDI Re-clocking Distribution Amplifier with Fiber I/O

The IQFDA30 provides a HD-SDI 3 Gbit/s, 1.5 Gbit/s or 270 Mbit/s SD-SDI input with both SDI and Fiber optic outputs in a single width package. Its 80m 3G, 170m HD input equalization performance and non re-clocking distribution of wide-band signals make it ideal for all distribution applications. Fiber signals can also be received and distributed as SDI depending on the chosen SFP device type.

Features

- Intelligent 3Gbps SDI, HD-SDI and SD-SDI re-clocking distribution amplifier
- Will distribute DVB-ASI and other wide-band signals
- Equalizes up to 80m at 3 Gbit/s, 170m at 1.5 Gbit/s and 300m at 270 Mbit/s when using Belden 1694A cable
- Standards supported:
  – 3G-HD to SMPTE424M
  – HD-SDI to SMPTE292M
  – SD-SDI to SMPTE259M-C
  – DVB-ASI
  – SMPTE 297-2006
- 1310 nm, 1550 nm and CWDM Output wavelengths available
- RollCall monitoring allows all signal paths to be managed

Why should you choose this module?

- The IQFDA30 is an extremely space efficient hybrid distribution amplifier for mixed fiber and copper workflows
- Useful for critical installation thanks to outstanding input equalization capability

Order codes
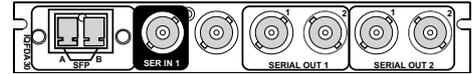
IQFDA3000-1A3, IQFDA3000-1B3
3G/HD/SD-SDI Re-clocking Distribution Amplifier with Fiber I/O. 1 SDI input, 1 optical input or 2 optical outputs, 4 SDI outputs.

Fiber SFP options

FC1-13T1 with single fiber transmitter (1310nm)

FC1-13T2 with dual fiber transmitter (1310nm)

FC1-15T1 with single fiber transmitter (1550nm)
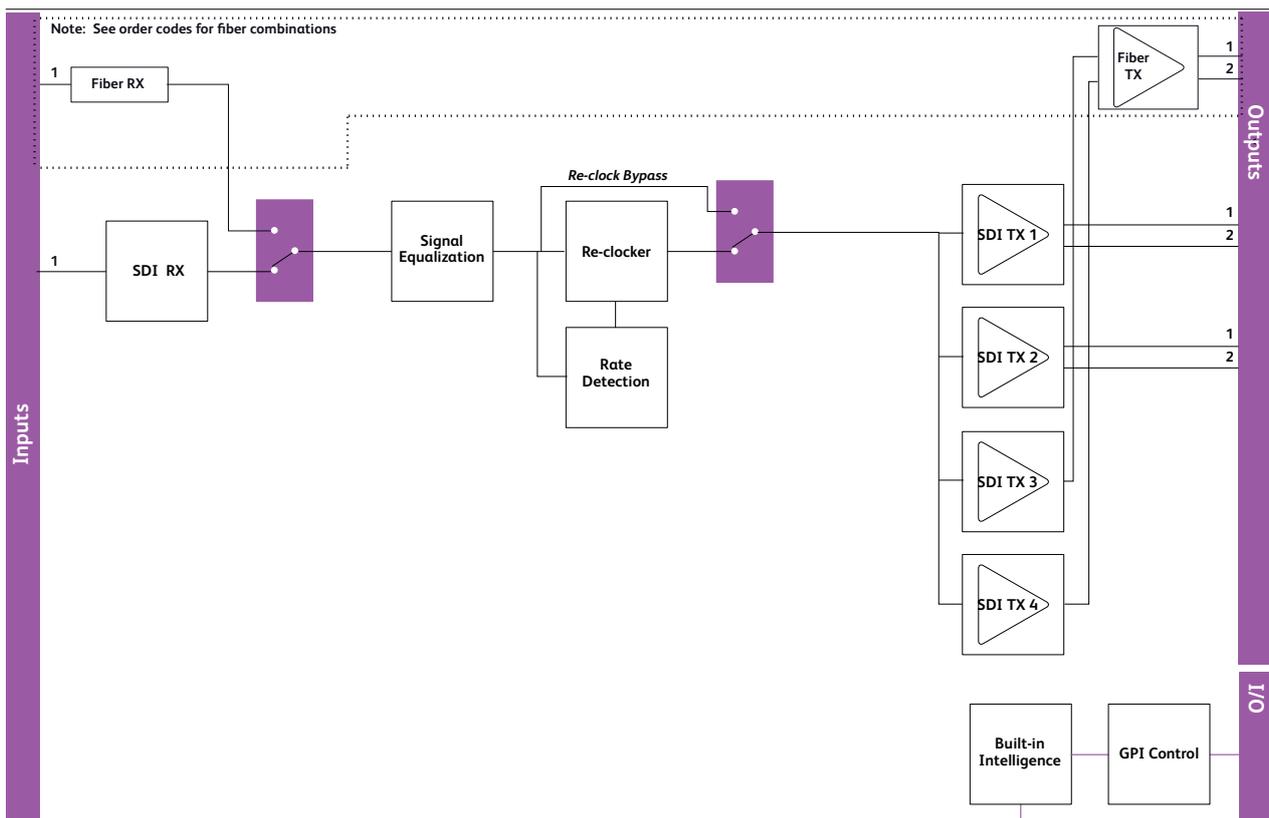
FC1-15T2 with dual fiber transmitter (1550nm)

FC1-R1 with single fiber receiver

FC1-13TR with single fiber transceiver (1310nm)

Note: Fiber SFP type must be ordered in addition to the module.

For more details on enclosure types please refer to Frames and Hardware section.

Block Diagram for IQFDA30-1A3

IQFDA30

3G/HD/SD-SDI Re-clocking Distribution Amplifier with Fiber I/O

Technical Specification

Inputs and Outputs
Signal Input

SDI input	1 x
Input cable length	Up to 80m Belden 1694A @ 3 Gbit/s
	Up to 170m Belden 1694A @ 1.5 Gbit/s
	Up to 300m Belden 1694A @ 270 Mbit/s

Fiber Signal Input

Inputs	1 x
Optical	3 GBit/s HD-SDI, 1.485 GBit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format	LC singlemode
Conforms to:	SMPTE 297-2006
	SMPTE 424M (HD level A/B)
	SMPTE 292M (HD)
	SMPTE 259M-C (SD)

Signal Outputs

SDI outputs	up to 4

Fiber Signal Output

Outputs	Up to 2
Optical	3 GBit/s HD-SDI, 1.485 Gbit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format	LC singlemode
Conforms to	SMPTE 297-2006
	SMPTE 424M (HD level A/B)
	SMPTE 292M (HD)
	SMPTE 259M-C (SD)

Controls
Indicators

Power	OK (Green)
CPU	OK (Green flashing)
Input 1	OK (Green), Bypass (Orange), Loss (Red)
SFP A	Selected (Green)

RollCall Functions
Video Controls

Input 1 Format Select	SDI, Rx
Laser Disable	On/Off
Input 1 select	Auto, 3G, HD, SD, DVB-ASI, Bypass (reclocking off), Output
Input status	Present, Loss/Unknown, Data Rate

Other Controls

User memories	Name, save and recall 16 user memories
Memory Naming	User configurable naming of memories 1 – 16
Information Window	Video Input Status
Logging	Input 1 Type
	Input 1 Data Rate
	Input 1 Present
	Input 1 Error
	Input 1 Loss
Optical Logging*	Tx Laser Bias High Warning
	Tx Power Low Warning
	Tx Power High Warning
Laser Wavelength	Input 1 Rx Power High Warning
	Input 1 Rx Power Low Warning
	Input 1 Rx Power Measurement
RollTrack Index	Up to 16 RollTrack destinations
RollTrack controls	On/Off, Index, Source, Address, Command, Status, Sending

RollTrack Sources	Unused, Input Present, Input Loss, Input Rate, Fiber Rx Power OK, Fiber Rx Power Fail, Fiber Tx Bias OK (1&2), Fiber Tx Bias High (1&2), Fiber Tx Bias Low (1&2)
Factory Default	Resets all module settings to factory specified default values and clears memories
Default Settings	Resets all module settings to factory specified defaults but does not clear memories
Restart	Software restart of the module
Module Information	"Reports following module information: Software version, Serial number, Build number, KOS version, Firmware version, PCB version

Specifications

Electrical	3Gbit/s SDI, SMPTE 424M
	1.5Gbit/s HD-SDI, SMPTE 292M
	270 Mbit/s SDI, SMPTE 259M-C / DVB-ASI
Connector / format	BNC/ 75ohm panel jack on standard SAM connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s)
	>-10dB (3Gbit/s)
Output jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz)
	3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)

Optical 1310 nm Tx

Wavelength	1310 nm
Spectral width (FWHM)	>1.5 nm (typ)
Output power	0 to -5 dBm typical (-2 dBm typical)
Rise and Fall Time	135 ps @ 3Gbit/s
	270 ps @ 1.5Gbit/s
	1.5 ns @ 270Mbit/s
Extinction ratio	>7.5:1 (typ)
Optical Return Loss	-27 dB
Link distance	Up to 30 Km @ 270Mbit/s
	Up to 21 Km @ 1.5Gbit/s
	Up to 10 Km @ 3Gbit/s

Optical Rx

Input wavelength range	Min. 1260 nm, Max. 1620 nm
Input Sensitivity	-21 dBm
Optical power input range	> -0 dBm, < -20 dBm
Link distance	Up to 30 Km @ 270Mbit/s
	Up to 21 Km @ 1.5Gbit/s
	Up to 10 Km @ 3Gbit/s

Power Consumption

Module power consumption	4 W Max (A Frames)
	4 PR Max (B Frames)

IQFDA31

Dual Channel 3G/HD/SD-SDI Re-clocking Distribution Amplifier with Fiber I/O

The IQFDA31 provides dual HD-SDI 3 Gbit/s, 1.5 Gbit/s or 270 Mbit/s SD-SDI inputs with both SDI and Fiber optic outputs in a single width package. Flexible routing of inputs to outputs allows the module to operate as single or dual channel mixing fiber and copper I/O. Input signal loss detection enables switching from a main to back-up feed automatically, providing emergency changeover functionality. Its 80m 3G, 170m HD input equalization performance and non re-clocking distribution of wide-band signals make it ideal for all distribution applications.

Features

- Dual channel Intelligent 3Gbps SDI, HD-SDI and SD-SDI re-clocking distribution amplifier
- Flexible selection of inputs allows single or dual channel operation
- Input signal monitoring allows auto-changeover functionality to provide emergency switching
- Will distribute DVB-ASI and other wide-band signals
- Equalizes up to 80m at 3 Gbit/s, 170m at 1.5 Gbit/s and 300m at 270 Mbit/s when using Belden 1694A cable
- Standards supported:
  – 3G-HD to SMPTE424M
  – HD-SDI to SMPTE292M
  – SD-SDI to SMPTE259M-C
  – DVB-ASI
  – SMPTE 297-2006
- 1310 nm, 1550 nm and CWDM Output wavelengths available
- RollCall monitoring allows all signal paths to be managed
- Extremely compact – up to 32 channels in 3RU - for use where space is at a premium

Why should you choose this module?

- The IQFDA31 is an extremely space efficient hybrid distribution amplifier for mixed fiber and copper workflows
- Useful for critical installation thanks to outstanding input equalization capability
- Can be used for current HD/SD systems that will later upgrade to 1080p50/60 operations

Order codes
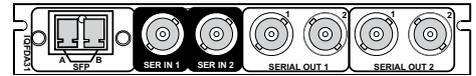
IQFDA3100-1A3, IQFDA3100-1B3
Dual Channel 3G/HD/SD-SDI Re-clocking Distribution Amplifier with Fiber I/O. 2 SDI inputs, 2 Optical input/outputs, 4 SDI outputs selectable per input.

Fiber SFP options

FC1-13T1 with single fiber transmitter (1310nm)

FC1-13T2 with dual fiber transmitter (1310nm)

FC1-15T1 with single fiber transmitter (1550nm)

FC1-15T2 with dual fiber transmitter (1550nm)

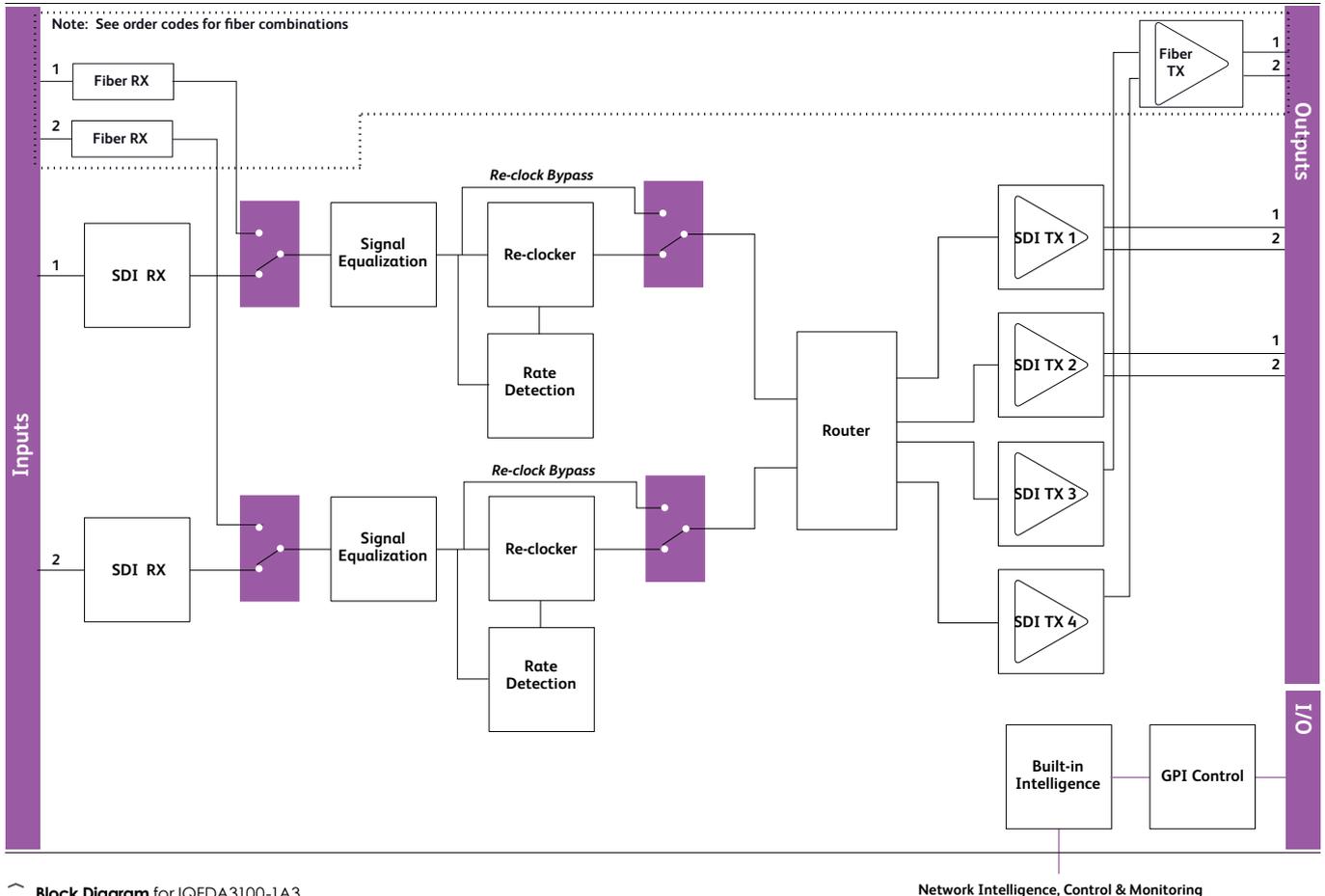**FC1-R1** with single fiber receiver

FC1-13TR with single fiber transceiver (1310nm)

Note: Fiber SFP type must be ordered in addition to the module.

For more details on enclosure types please refer to Frames and Hardware section.

IQFDA31

Dual Channel 3G/HD/SD-SDI Re-clocking Distribution Amplifier with Fiber I/O

Note: See order codes for fiber combinations

Inputs

- Fiber RX — 1
- Fiber RX — 2

- 1 — SDI RX
- 2 — SDI RX

Signal Equalization

Re-clock Bypass — Re-clocker — Rate Detection

Router

SDI TX 1 — 1, 2
SDI TX 2 — 1, 2
SDI TX 3
SDI TX 4

Fiber TX — 1, 2

Outputs

Built-in Intelligence — GPI Control

I/O

Network Intelligence, Control & Monitoring

⌢ **Block Diagram** for IQFDA3100-1A3

Technical Specification

Inputs and Outputs

Signal Input

SDI inputs	2 x
Input cable length	Up to 80m Belden 1694A
	@ 3 Gbit/s
	Up to 170m Belden 1694A
	@ 1.5 Gbit/s
	Up to 300m Belden 1694A
	@ 270 Mbit/s

Note: When using mixed HD and SD inputs it is recommended that cable lengths do not exceed the HD specification of 140m.

Fiber Signal Input

Inputs	Up to 2
Optical	3 GBit/s HD-SDI, 1.485 GBit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format	LC singlemode
Conforms to:	SMPTE 297-2006
	SMPTE 424M (HD level A/B)
	SMPTE 292M (HD)
	SMPTE 259M-C (SD)

Signal Outputs

SDI outputs	up to 12, Group selectable per input

Fiber Signal Output

Outputs	Up to 2, selectable per Channel
Optical	3 GBit/s HD-SDI, 1.485 Gbit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format	LC singlemode
Conforms to	SMPTE 297-2006
	SMPTE 424M (HD level A/B)
	SMPTE 292M (HD)
	SMPTE 259M-C (SD)

Control Interface

GPI	Up to 2 x GPI (I/O configurable)
Electrical	TTL compatible, active low driven
Connector / format	BNC/75 ohm panel jack on standard SAM connector panel

IQFDA31

Dual Channel 3G/HD/SD-SDI Re-clocking Distribution Amplifier with Fiber I/O

Technical Specification

Controls

Indicators

Power	OK (Green)
CPU	OK (Green flashing)
Input 1	OK (Green), Bypass (Orange), Loss (Red)
Input 2	OK (Green), Bypass (Orange), Loss (Red)
SFP A	Selected (Green)
SFP B	Selected (Green)

RollCall Functions

Video Controls

Input 1 Format Select	SDI, Rx
Input 2 Format Select	SDI, Rx
Output 1 Select	Serial 1, Serial 2
Output 2 Select	Serial 1, Serial 2
Output 3 Select	Serial 1, Serial 2
Output 4 Select	Serial 1, Serial 2
Laser Disable	On/Off
Input 1 (2) select	Auto, 3G, HD, SD, DVB-ASI, Bypass (reclocking off), Output
Input status	Present, Loss/Unknown, Data Rate

Other Controls

User memories	Name, save and recall 16 user memories
Memory Naming	User configurable naming of memories 1 – 16
GPI input	Activates on contact closure: - select config 1 or 2
GPI output	Produces an output for: Config 1 selected, Config 2 selected, Input 1 error, Input 2 error
Information Window	Video Input Status
Logging	Input 1 (2) Type
	Input 1 (2) Data Rate
	Input 1 (2) Present
	Input 1 (2) Error
	Input 1 (2) Loss
Optical Logging*	Tx Laser Bias High Warning
	Tx Power Low Warning
	Tx Power High Warning
Laser Wavelength	Input 1 (2) Rx Power High Warning
	Input 1 (2) Rx Power Low Warning
	Input 1 (2) Rx Power Measurement
RollTrack Index	Up to 16 RollTrack destinations
RollTrack controls	On/Off, Index, Source, Address, Command, Status, Sending
RollTrack Sources	Unused, Input Present (1&2, Fiber 1 & 2) , Input Loss (1&2, Fiber 1 & 2) , Output Rate/Std (1&2), Out 1 Selects (In1 & 2 & Rx1 & Rx2), Out 2 Selects (In1 & 2 & Rx1 & Rx2), Fiber Rx Power OK (1&2), Fiber Rx Power Fail (1&2), Fiber Tx Bias OK (1&2), Fiber Tx Bias High (1&2), Fiber Tx Bias Low (1&2)
Factory Default	Resets all module settings to factory specified default values and clears memories
Default Settings	Resets all module settings to factory specified defaults but does not clear memories
Restart	Software restart of the module
Module Information	"Reports following module information: Software version, Serial number, Build number, KOS version, Firmware version, PCB version

Specifications

Electrical	3Gbit/s SDI, SMPTE 424M
	1.5Gbit/s HD-SDI, SMPTE 292M
	270 Mbit/s SDI, SMPTE 259M-C / DVB-ASI
Connector / format	BNC/ 75ohm panel jack on standard SAM connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s)
	>-10dB (3Gbit/s)
Output jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz)
	3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)

Optical 1310 nm Tx

Wavelength	1310 nm
Spectral width (FWHM)	>1.5 nm (typ)
Output power	0 to -5 dBm typical (-2 dBm typical)
Rise and Fall Time	135 ps @ 3Gbit/s
	270 ps @ 1.5Gbit/s
	1.5 ns @ 270Mbit/s
Extinction ratio	>7.5:1 (typ)
Optical Return Loss	-27 dB
Link distance	Up to 30 Km @ 270Mbit/s
	Up to 21 Km @ 1.5Gbit/s
	Up to 10 Km @ 3Gbit/s

Optical Rx

Input wavelength range	Min. 1260 nm, Max. 1620 nm
Input Sensitivity	-21 dBm
Optical power input range	> -0 dBm, < -20 dBm
Link distance	Up to 30 Km @ 270Mbit/s
	Up to 21 Km @ 1.5Gbit/s
	Up to 10 Km @ 3Gbit/s

Power Consumption

Module power consumption	4 W Max (A Frames)
	4 PR Max (B Frames)

IQOTX80-84

3G/HD/SD-SDI Multi-Channel Fiber Transmitter

The IQOTX80-84 range converts eight 3G/HD/SD-SDI signals into single mode fiber optic signals. The unit is available in single or dual width versions with either HDBNC or BNC connectors with a range of fiber wavelength transmitters suitable for CWDM applications.
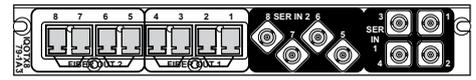
Features

- Multi-channel Single mode fiber optic Transmitter for 3G/HD/SD-SDI signals
- Output wavelengths from 1270nm to 1610nm suitable for CWDM applications
- Reclocking for 3 Gbit/s, 1.5 Gbit/s HD-SDI and 270 Mbit/s SDI signals, or asynchronous operation for other frequencies (input range 50 Mbit/s to 3 Gbit/s)

Why should you choose this module?

- Suitable for transporting 3G/HD-SDI signals over long distances either within the facility or between sites
- Lower weight and higher density compared with copper cables
- Full RollCall and SNMP compatibility allows easy integration with SAM Centra, or third party, network management systems providing an all-inclusive monitoring and control solution

Order codes

IQOTX8079-1A3 - HD-BNC & LC/PC Connectors
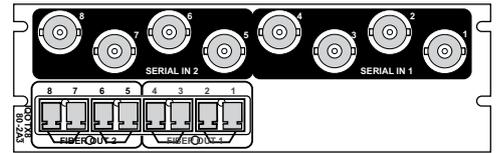
IQOTX8080-2A3 BNC & LC/PC Connectors

IQOTX8079-1A3, IQOTX8080-2A3, IQOTX8079-1B3, IQOTX8080-2B3 3G/HD/SD-SDI multi-channel fiber transmitter. 8 x 3G/HD/SD-SDI inputs, 8 x 1310nm optical outputs.
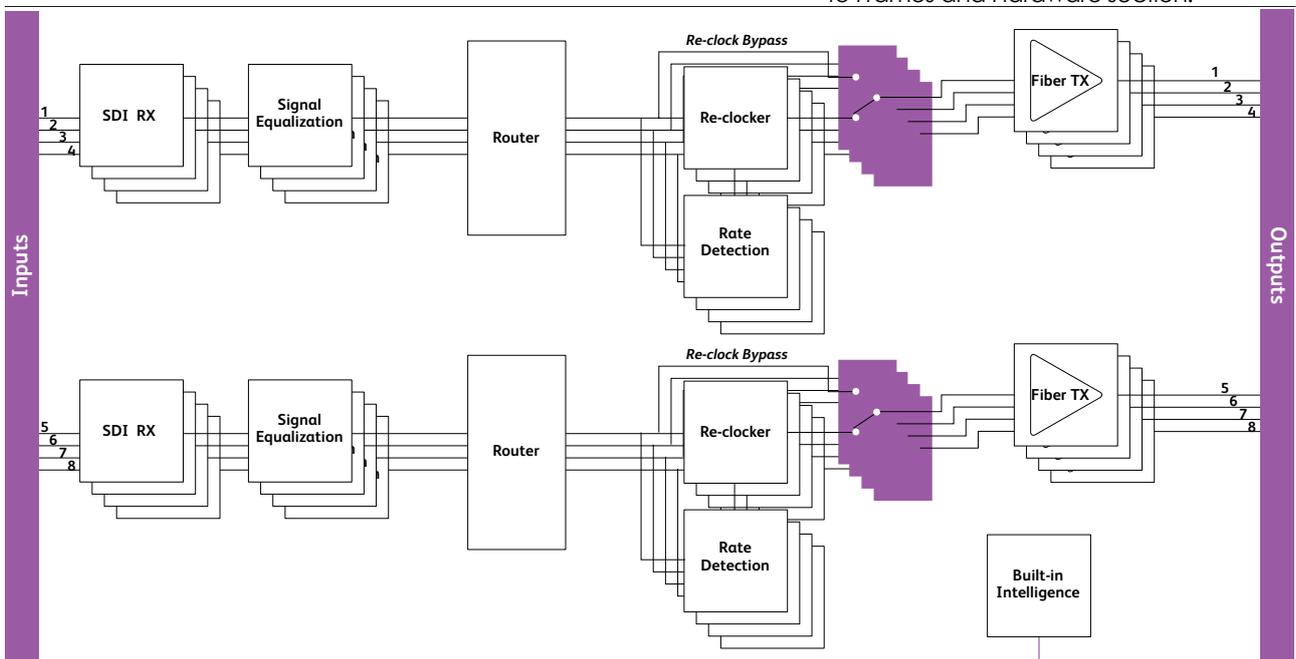
IQOTX8179-1A3, IQOTX8180-2A3, IQOTX8179-1B3, IQOTX8180-2B3 As IQOTX80 but fitted with 1550nm optical transmitters.

IQOTX8279-1A3, IQOTX8280-2A3, IQOTX8279-1B3, IQOTX8280-2B3 As IQOTX80 but fitted with 1270-1410nm CWDM optical transmitters.

IQOTX8379-1A3, IQOTX8380-2A3, IQOTX8379-1B3, IQOTX8380-2B3 As IQOTX80 but fitted with 1470-1610nm CWDM optical transmitters.

IQOTX8479-1A3, IQOTX8480-2A3, IQOTX8479-1B3, IQOTX8480-2B3 3G/HD/SD-SDI multi-channel fiber transmitter. 8 x 3G/HD/SD-SDI inputs, 4 x 1310nm and 4 x 1550nm optical outputs.

For more details on enclosure types please refer to Frames and Hardware section.

Block Diagram for IQOTX8080-2A3

IQOTX80-84   3G/HD/SD-SDI Multi-Channel Fiber Transmitter

Technical Specification

Inputs and Outputs

Signal Inputs

SDI Inputs	8 x
Input Cable Length	Up to 80m Belden 1694A @ 3 Gbit/s
	Up to 140m Belden 1694A @ 1.5 Gbit/s
	Inputs 1-3, up to 350m Belden 1694A @ 270 Mbit/s
	Inputs 4-8, up to 160m Belden 1694A @ 270 Mbit/s

Fiber Signal Output

Optical	3 GBit/s HD-SDI, 1.485 Gbit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format	LC singlemode
Conforms to	SMPTE 297-2006
	SMPTE 424M (HD level A/B)
	SMPTE 292M (HD)
	SMPTE 259M-C (SD)
Outputs	x 8

Controls

Indicators

Power	OK (Green)
CPU	OK (Green flashing)
Input 1-8	3G-OK (Blue), HD-OK (Green), SD-OK (Yellow), Bypass (Rate color flashing), Loss (Red)

Video Controls

Input 1 - 8 rate select	3G, HD, SD, other
Reclock bypass	On/Off
Output 1-4 select	Input 1 - 4
Output 5-8 select	Input 5 - 8
Laser Disable	On/Off/Input Error
Input 1 - 4 Configuration	1, 2
Input 5 - 8 Configuration	1, 2
Configuration Rules	Primary Input OK
	Primary Input Error
	Secondary Input Error
Mode	Use Config 1
	Use Config 2
	Use Rules
Delay for Rules Actions	OK Timer 0 - 5s
	Error Timer 0 - 5s
Input status	Present, Loss, Unknown, Data Rate
Logging	Input 1 - 8 Identifier
	Input 1 - 8 Name
	Input 1 - 8 Type
	Input 1 - 8 Data Rate
	Input 1 - 8 Present
	Input 1 - 8 Error
	Input 1 - 8 Loss
Optical Logging	Output 1 - 8 Tx Laser Bias High Warning
	Output 1 - 8 Tx Laser Bias Current
	Output 1 - 8 Tx Power Low Warning
	Output 1 - 8 Tx Power High Warning
	Output 1 - 8 Tx Power
	Output 1 - 8 Wavelength
	Output 1 - 8 SFP State
RollTrack controls	On/Off, Index, Source, Address, Command, Status, Sending

RollTrack Sources	Unused
	Input 1 - 8 Present
	Input 1 - 8 Rate Unknown
	Input 1 - 8 Error
	Input 1 - 8 Loss
	Input 1 - 8 3G
	Input 1 - 8 HD
	Input 1 - 8 SD
	Output 1 - 8 Tx Laser Bias High/Low Warning,

Other Controls

User memories	Name, save and recall 16 user memories

Specifications

Electrical	3Gbit/s SDI, SMPTE 424M
	1.5Gbit/s HD-SDI, SMPTE 292M
	270 Mbit/s SDI, SMPTE 259M-C / DVB-ASI
Connector / format	BNC/ 75ohm panel jack on standard SAM connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s)
	>-10dB (3Gbit/s)
Output jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz)
	3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)

Optical Tx

Wavelength	1310 nm
Spectral width (FWHM)	>1.5 nm (typ)
Output power	0 to -5 dBm typical (-2 dBm typical)
Rise and Fall Time	135 ps @ 3Gbit/s
	270 ps @ 1.5Gbit/s
	1.5 ns @ 270Mbit/s
Extinction ratio	>7.5:1 (typ)
Link distance	Up to 30 Km @ 270Mbit/s
	Up to 21 Km @ 1.5Gbit/s
	Up to 10 Km @ 3Gbit/s
Wavelength	1550 nm
Spectral width (FWHM)	1 nm
Output power	4 to 0 dBm
Rise and Fall Time	135 ps @ 3Gbit/s
	270 ps @ 1.5Gbit/s
	1.5 ns @ 270Mbit/s
Extinction ratio	>7.5:1 (typ)
Link distance	Up to 50 Km @ 270Mbit/s, 1.5Gbit/s or 3Gbit/s

CWDM

Wavelength	1270 - 1610 nm
Spectral width (FWHM)	1 nm
Output power	5 to 0 dBm (2.5 dBm Typ)
Rise and Fall Time	130 ps @ 3Gbit/s
	175 ps @ 1.5Gbit/s
	300 ps @ 270Mbit/s
Extinction ratio	>9 dB

Power Consumption

Module Power Consumption	
	9.5W Max (A Frames)
	8 PR (B Frames)

IQORX80

3G/HD/SD-SDI Multi-Channel Fiber Receiver

The IQORX80 converts eight single mode fiber optic signals to 3G/HD/SD-SDI signals. The unit is available in single or dual width versions with either DIN1.0/2.3, HDBNC or BNC connectors with a wide band receiver suitable for CWDM applications.

Features

- Multi-channel Single mode fiber optic receiver for 3G/HD/SD-SDI signals
- Input wavelengths from 1260nm to 1620nm suitable for CWDM applications

Why should you choose this module?

- Suitable for transporting 3G/HD-SDI signals over long distances either within the facility or between sites
- Lower weight and higher density compared with copper cables
- Full RollCall and SNMP compatibility allows easy integration with SAM Centra, or third party, network management systems providing an all-inclusive monitoring and control solution

Order codes
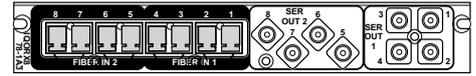
IQORX8079-1A3

IQORX8079-1A3, IQORX8079-1B3

3G/HD/SD-SDI multi-channel fiber receiver. 8 x optical inputs, 8 x 3G/HD/SD-SDI outputs (HD-BNC).
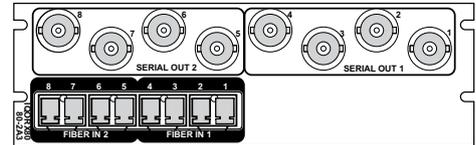
IQORX8080-2A3

IQORX8080-2A3, IQORX8080-2B3

3G/HD/SD-SDI multi-channel fiber receiver. 8 x optical inputs, 8 x 3G/HD/SD-SDI outputs (BNC).

For more details on enclosure types please refer to Frames and Hardware section.
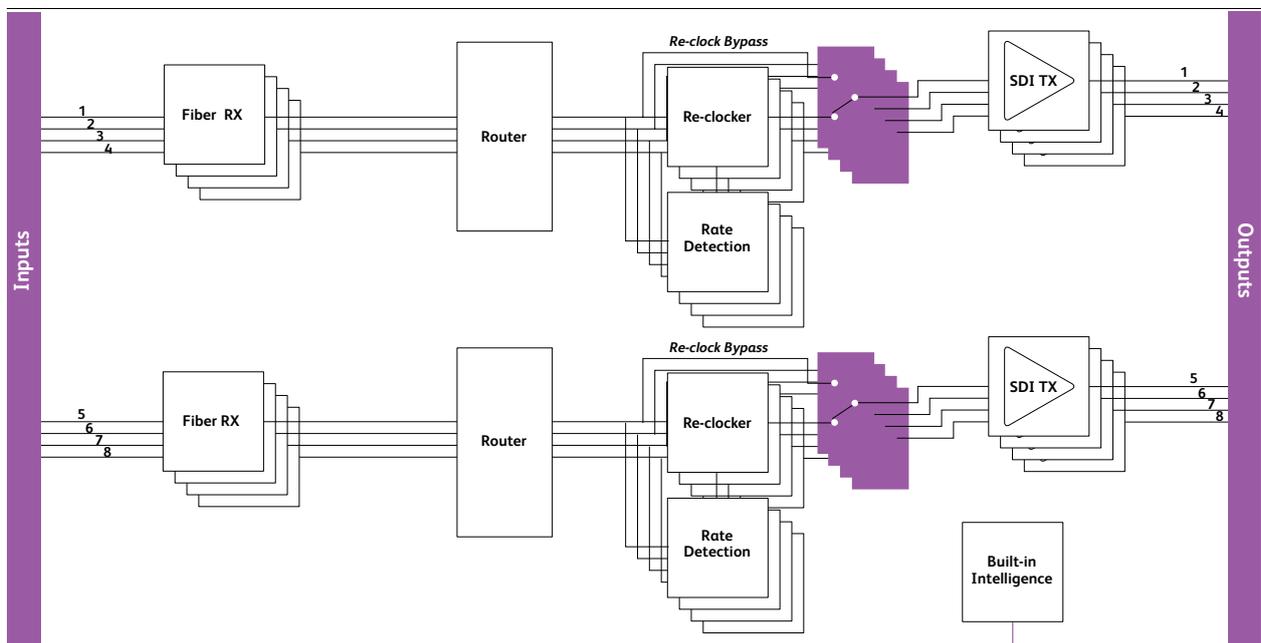
⌒ **Block Diagram** for IQORX8080-2A3

Network Intelligence, Control & Monitoring

IQORX80

3G/HD/SD-SDI Multi-Channel Fiber Receiver

Technical Specification

Inputs and Outputs

Fiber Signal Input

Inputs	Up to 8
Optical	3 GBit/s HD-SDI, 1.485 GBit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format	LC singlemode
Conforms to:	SMPTE 297-2006
	SMPTE 424M (HD level A/B)
	SMPTE 292M (HD)
	SMPTE 259M-C (SD)

Signal Outputs

SDI Outputs	x 8

Controls

Indicators	
Power	OK (Green)
CPU	OK (Green flashing)
Input 1-8	3G-OK (Blue), HD-OK (Green), SD-OK (Yellow), Bypass (Rate color flashing), Loss (Red)

Video Controls

Input 1 - 8 rate select	3G, HD, SD, other
Reclock bypass	On/Off
Output 1-4 select	Input 1 - 4
Output 5-8 select	Input 5 - 8
Output Mute	On/Off
Output Mute on I/P Error	On/Off
Input 1 - 4 Configuration	1, 2
Input 5 - 8 Configuration	1, 2
Configuration Rules	Primary Input OK
	Primary Input Error
	Secondary Input Error
Mode	Use Config 1
	Use Config 2
	Use Rules
Delay for Rules Actions	OK Timer 0 - 5s
	Error Timer 0 - 5s
Input status	Present, Loss, Unknown, Data Rate
Logging	Input 1 - 8 Identifier
	Input 1 - 8 Name
	Input 1 - 8 Type
	Input 1 - 8 Data Rate
	Input 1 - 8 Present
	Input 1 - 8 Error
	Input 1 - 8 Loss
Optical Logging	Input 1 - 8 Rx Power High Warning
	Input 1 - 8 Rx Power Low Warning
	Input 1 - 8 Rx Power Measurement
	Input SFP 1-8 State
RollTrack controls	On/Off, Index, Source, Address, Command, Status, Sending

RollTrack Sources	Unused
	Input 1 - 8 Present
	Input 1 - 8 Rate Unknown
	Input 1 - 8 Error
	Input 1 - 8 Loss
	Input 1 - 8 3G
	Input 1 - 8 HD
	Input 1 - 8 SD
	Input 1 - 8 Rx Power High Warning,
	Input 1 - 8 Rx Power Low Warning,

Other Controls

User memories	Name, save and recall 16 user memories

Specifications

Electrical	3Gbit/s SDI, SMPTE 424M
	1.5Gbit/s HD-SDI, SMPTE 292M
	270 Mbit/s SDI, SMPTE 259M-C / DVB-ASI
Connector / format	BNC/ 75ohm panel jack on standard SAM connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s)
	>-10dB (3Gbit/s)
Output jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz)
	3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)

Optical Rx

Input wavelength range	Min. 1260 nm, Max. 1620 nm
Input Sensitivity	-21 dBm
Optical power input range	> -0 dBm, < -20 dBm
Optical return loss	-27 dB
Link distance	Up to 30 Km @ 270Mbit/s
	Up to 21 Km @ 1.5Gbit/s
	Up to 10 Km @ 3Gbit/s

Power Consumption

Module Power Consumption	
	9.5W Max (A Frames)
	7.5 PR (B Frames)

IQOTR40-45

3G/HD/SD-SDI Multi-Channel Fiber Transceiver

The IQOTR40-45 range provides bi-directional conversion of four 3G/HD/SD-SDI signals to/from single mode fiber optic signals. The unit is available in single or dual width versions with either HDBNC or BNC connectors with a range of fiber wavelength transmitters suitable for CWDM applications.
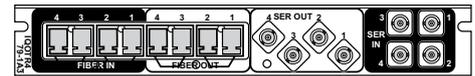
Features

- Multi-channel Single mode fiber optic receiver for 3G/HD/SD-SDI signals
- Input wavelengths from 1260nm to 1620nm suitable for CWDM applications
- Multi-channel Single mode fiber optic Transmitter for 3G/HD/SD-SDI signals
- Output wavelengths from 1270nm to 1610nm suitable for CWDM applications
- Reclocking for 3 Gbit/s, 1.5 Gbit/s HD-SDI and 270 Mbit/s SDI signals, or asynchronous operation for other frequencies (input range 50 Mbit/s to 3 Gbit/s)

Why should you choose this module?

- Suitable for transporting 3G/HD-SDI signals over long distances either within the facility or between sites
- Lower weight and higher density compared with copper cables
- Full RollCall and SNMP compatibility allows easy integration with SAM Centra, or third party, network management systems providing an all-inclusive monitoring and control solution

Order codes

IQOTR4079-1A3 - HD-BNC & LC/PC Connectors
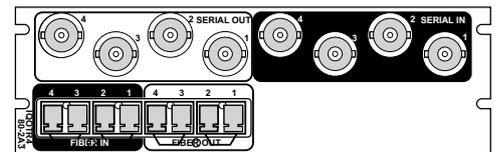
IQOTR4080-2A3 BNC & LC/PC Connectors

IQOTR4079-1A3, IQOTR4080-2A3, IQOTR4079-1B3, IQOTR4080-2B3 3G/HD/SD-SDI multi-channel fiber transceiver. 4 x 3G/HD/SD-SDI inputs, 4 x 1310nm optical outputs.

IQOTR4179-1A3, IQOTR4180-2A3, IQOTR4179-1B3, IQOTR4180-2B3 As IQOTR40 but fitted with 1550nm optical transmitters.
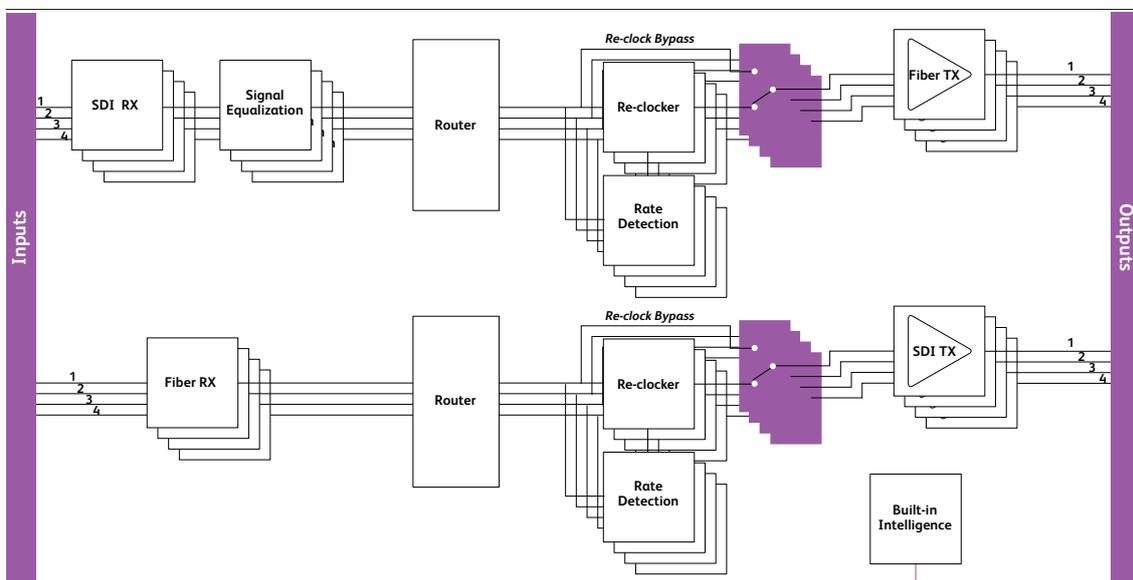
IQOTR4279-1A3, IQOTR4280-2A3, IQOTR4279-1B3, IQOTR4280-2B3 As IQOTR40 but fitted with 1270-1330nm CWDM optical transmitters.

IQOTR4379-1A3, IQOTR4380-2A3, IQOTR4379-1B3, IQOTR4380-2B3 As IQOTR40 but fitted with 1350-1410nm CWDM optical transmitters.

IQOTR4479-1A3, IQOTR4480-2A3, IQOTR4479-1B3, IQOTR4480-2B3 As IQOTR40 but fitted with 1470-1530nm CWDM optical transmitters.

IQOTR4579-1A3, IQOTR4580-2A3, IQOTR4579-1B3, IQOTR4580-2B3 As IQOTR40 but fitted with 1550-1610nm CWDM optical transmitters.

For more details on enclosure types please refer to Frames and Hardware section.

Block Diagram for IQOTR4080-2A3

Network Intelligence, Control & Monitoring

IQOTR40-45   3G/HD/SD-SDI Multi-Channel Fiber Transceiver

Technical Specification

Inputs and Outputs

Signal Inputs

SDI Inputs	4 x
Input Cable Length	Up to 80m Belden 1694A @ 3 Gbit/s
	Up to 140m Belden 1694A @ 1.5 Gbit/s
	Inputs 1-3, up to 350m Belden 1694A @ 270 Mbit/s
	Inputs 4-8, up to 160m Belden 1694A @ 270 Mbit/s

Signal Outputs

SDI Outputs	x 4

Fiber Signal Input

Inputs	Up to 4
Optical	3 GBit/s HD-SDI, 1.485 GBit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format	LC singlemode
Conforms to:	SMPTE 297-2006
	SMPTE 424M (HD level A/B)
	SMPTE 292M (HD)
	SMPTE 259M-C (SD)

Fiber Signal Output

Outputs	x 4
Optical	3 GBit/s HD-SDI, 1.485 Gbit/s HD-SDI or 270 Mbit/s SD-SDI
Connector / Format	LC singlemode
Conforms to	SMPTE 297-2006
	SMPTE 424M (HD level A/B)
	SMPTE 292M (HD)
	SMPTE 259M-C (SD)

Controls

Indicators

Power	OK (Green)
CPU	OK (Green flashing)
Input 1-8	3G-OK (Blue), HD-OK (Green), SD-OK (Yellow), Bypass (Rate color flashing), Loss (Red)

Video Controls

Input 1 - 8 rate select	3G, HD, SD, other
Reclock bypass	On/Off
Output 1-4 select	Input 1 - 4
Output 5-8 select	Input 5 - 8
Laser Disable (Tx)	On/Off/Input Error
Output Mute (Rx)	On/Off
Output Mute on I/P Error (Rx)	On/Off
Input 1 - 4 Configuration	1, 2
Input 5 - 8 Configuration	1, 2
Configuration Rules	Primary Input OK
	Primary Input Error
	Secondary Input Error
Mode	Use Config 1
	Use Config 2
	Use Rules
Delay for Rules Actions	OK Timer 0 - 5s
	Error Timer 0 - 5s
Input status	Present, Loss, Unknown, Data Rate
Logging	Input 1 - 8 Identifier
	Input 1 - 8 Name
	Input 1 - 8 Type
	Input 1 - 8 Data Rate
	Input 1 - 8 Present
	Input 1 - 8 Error
	Input 1 - 8 Loss

Optical Logging	Output 1 - 8 Tx Laser Bias High Warning
	Output 1 - 8 Tx Laser Bias Current
	Output 1 - 8 Tx Power Low Warning
	Output 1 - 8 Tx Power High Warning
	Output 1 - 8 Tx Power
	Output 1 - 8 Tx Wavelength
	Input 1 - 8 Rx Power High Warning
	Input 1 - 8 Rx Power Low Warning
	Input 1 - 8 Rx Power Measurement
	Input/Output 1 - 8 SFP State
RollTrack controls	On/Off, Index, Source, Address, Command, Status, Sending
RollTrack Sources	Unused
	Input 1 - 8 Present
	Input 1 - 8 Rate Unknown
	Input 1 - 8 Error
	Input 1 - 8 Loss
	Input 1 - 8 3G
	Input 1 - 8 HD
	Input 1 - 8 SD
	Output 1 - 8 Tx Laser Bias High/Low Warning
	Input 1 - 8 Rx Power High Warning
	Input 1 - 8 Rx Power Low Warning

Other Controls

User memories	Name, save and recall 16 user memories

Specifications

Electrical	3Gbit/s SDI, SMPTE 424M
	1.5Gbit/s HD-SDI, SMPTE 292M
	270 Mbit/s SDI, SMPTE 259M-C / DVB-ASI
Connector / format	BNC/ 75ohm panel jack on standard SAM connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s)
	>-10dB (3Gbit/s)
Output jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz)
	3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)

Optical Rx

Input wavelength range	Min. 1260 nm, Max. 1620 nm
Input Sensitivity	-21 dBm
Optical power input range	> -0 dBm, < -20 dBm
Optical return loss	-27 dB
Link distance	Up to 30 Km @ 270Mbit/s
	Up to 21 Km @ 1.5Gbit/s
	Up to 10 Km @ 3Gbit/s

Optical Tx

Wavelength	1310 nm
Spectral width (FWHM)	>1.5 nm (typ)
Output power	0 to -5 dBm typical (-2 dBm typical)
Rise and Fall Time	135 ps @ 3Gbit/s
	270 ps @ 1.5Gbit/s
	1.5 ns @ 270Mbit/s
Extinction ratio	>7.5:1 (typ)
Link distance	Up to 30 Km @ 270Mbit/s
	Up to 21 Km @ 1.5Gbit/s
	Up to 10 Km @ 3Gbit/s
Wavelength	1550 nm
Spectral width (FWHM)	1 nm
Output power	4 to 0 dBm
Rise and Fall Time	135 ps @ 3Gbit/s
	270 ps @ 1.5Gbit/s
	1.5 ns @ 270Mbit/s
Extinction ratio	>7.5:1 (typ)
Link distance	Up to 50 Km @ 270Mbit/s, 1.5Gbit/s or 3Gbit/s

Technical Specification cont...

CWDM

Wavelength	1270 - 1610 nm
Spectral width (FWHM)	1 nm
Output power	5 to 0 dBm (2.5 dBm Typ)
Rise and Fall Time	130 ps @ 3Gbit/s
	175 ps @ 1.5Gbit/s
	300 ps @ 270Mbit/s
Extinction ratio	>9 dB
Link distance	Up to 30 Km @ 270Mbit/s
	Up to 21 Km @ 1.5Gbit/s
	Up to 10 Km @ 3Gbit/s

Power Consumption

Module Power Consumption

9.5W Max (A Frames)

8 PR (B Frames)

IQCWM09-16

Fiber Optic Coarse Wave Division Multiplexing Module

The IQCWM09, IQCWM10 and IQCWM16 are optical Coarse Wave Division Multiplexer/Demultiplexer modules. Occupying just a single slot of an IQ modular frame, the CWDM optical blocks themselves are completely passive devices and there are no other active components on the fully assembled modules. Both types are intended for use with the IQOTX80, IQORX80 and IQOTR40 series Fiber Optical Conversion modules. Connection to all ports are made at the rear of the modules using standard LC receptacles.

The IQCWM09 features 10 bi-directional optical paths (9 dedicated wavelengths + Common). The wavelength range for eight of the nine channels extends from 1470nm to 1610nm with 20nm separation between each. The wavelength for the ninth channel (often referred to as the 'Express Channel') is 1310nm.

The IQCWM10 has the same features as the IQCWM09 plus an 'Express Port' that includes an Optical Circulator for implementing bi-directional full duplex data transmission (e.g. Ethernet) using a single (1310nm) optical path.

The IQCWM16 features 17 bi-directional optical paths (16 dedicated wavelengths + Common). The 16 dedicated wavelength paths are spilt into two groups which are separated from the 'Common' port by an optical splitting filter.

Wavelengths for the first group of eight channels extends from 1610nm to 1470nm and 1410nm to 1270nm for the second group.
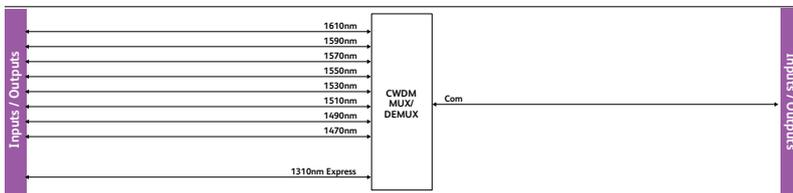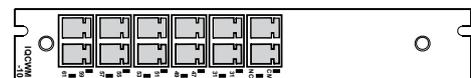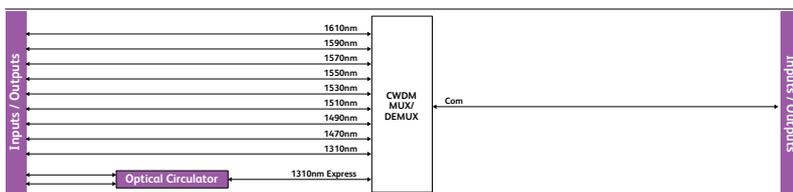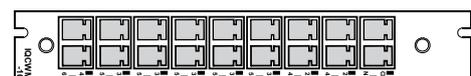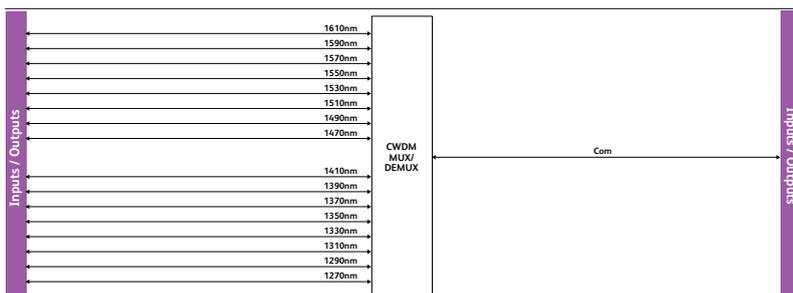
Order codes
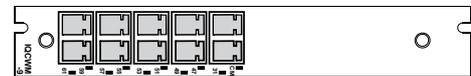
IQCWM0900-1A - LC/PC Connectors

IQCWM0900-1A 10 port Fiber CWDM module. 10 bi-directional fiber connections (LC/PC), Common plus 1310, 1470, 1490, 1510, 1530, 1550, 1570, 1590, 1610nm optical wavelengths, plus 1310nm express channel.

IQCWM1000-1A - LC/PC Connectors

IQCWM1000-1A 11 port Fiber CWDM module. 11 bi-directional fiber connections (LC/PC), 1310nm Optical circulator Channel, Common, 1310, 1470, 1490, 1510, 1530, 1550, 1570, 1590, 1610nm optical wavelengths.

IQCWM1600-1A - LC/PC Connectors

IQCWM1600-1A 17 port Fiber CWDM module. 17 bi-directional fiber connections (LC/PC), Common plus 1270, 1290, 1310, 1330, 1350, 1370, 1390, 1410, 1470, 1490, 1510, 1530, 1550, 1570, 1590, 1610nm optical wavelengths.

IQCWM09-16

Fiber Optic Coarse Wave Division Multiplexing Module

Technical Specification

Signal Inputs / Outputs
IQCWM09 Optical

	1 x Common
	1 x 1310 nm Express
	1 x 1470 nm
	1 x 1490 nm
	1 x 1510 nm
	1 x 1530 nm
	1 x 1550 nm
	1 x 1570 nm
	1 x 1590 nm
	1 x 1610 nm

IQCWM10 Optical

	1 x Common
	1 x Optical Circulator
	1 x 1310 nm
	1 x 1470 nm
	1 x 1490 nm
	1 x 1510 nm
	1 x 1530 nm
	1 x 1550 nm
	1 x 1570 nm
	1 x 1590 nm
	1 x 1610 nm

IQCWM16 Optical

	1 x Common
	1 x 1270 nm
	1 x 1290 nm
	1 x 1310 nm
	1 x 1330 nm
	1 x 1350 nm
	1 x 1370 nm
	1 x 1390 nm
	1 x 1410 nm
	1 x 1470 nm
	1 x 1490 nm
	1 x 1510 nm
	1 x 1530 nm
	1 x 1550 nm
	1 x 1570 nm
	1 x 1590 nm
	1 x 1610 nm

Connector / format   LC singlemode

Controls
Card Edge Controls
NONE

Card Edge Indicators
NONE

Specifications
IQCWM9/10
Connector Type	LC
Insertion Loss:	< 2.6dB
Channel Spacing:	20nm
Pass band @ 0.5dB	>=13nm
Isolation:	> 30dB
Directivity:	> 50dB
Return Loss:	> 45dB

IQCWM16
Connector Type	LC
Insertion Loss:	< 5dB
Channel Spacing:	20nm
Pass band @ 0.5dB	>=14nm
Isolation:	> 30dB
Directivity:	> 50dB
Return Loss:	> 45dB

Power Consumption
Module power
consumption   No power requirement as passive module
design

Note: This module can only be installed in
IQH3A, IQH3B, IQH1A or IQH1P enclosures. As
the card is fitted from the rear of the enclosure
at least 435 mm clearance is required behind
the enclosure installation.

IQPFS22/24 — Dual and Quad 1 x 2 Fiber Optic Splitter Modules

IQPFS22 and IQPFS24 provide optical 1 x 2 splitting, with either two or four channels per module respectively.

The IQ Passive Fiber modules complement the existing range of fiber optic modules and are designed to function alongside the electrical / fiber converters and CWDM functions available.

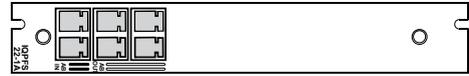These optical blocks are completely passive devices and there are no other active components present on these modules.

Features

- Wideband fiber connections (LC/PC), 1260nm-1650nm
- Single common fiber connection (LC/PC) carries all CWDM wavelengths
- Protocol transparent; can be used for network or video applications
- Will distribute DVB-ASI and other wide-band signals
- Supports all data rates for Ethernet (i.e. 10/100/1000/10GBASE) or video (i.e.1080p, HD and SD)
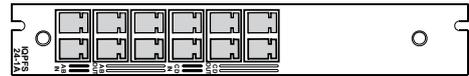- Can be located anywhere as passive operation requires no power

Why should you choose this module?

- Ideal for distributing fiber signals to multiple locations

Order codes

IQPFS22-1A Dual 1x2 Fiber Optic Splitter module. Each splitter contains 3 wideband (1260-1650nm) bi-directional fiber connections (LC/PC). A single common port plus the two split ports

IQPFS24-1A Quad 1x2 Fiber Optic Splitter module. Each splitter contains 3 wideband (1260-1650nm) bi-directional fiber connections (LC/PC). A single common port plus the two split ports.
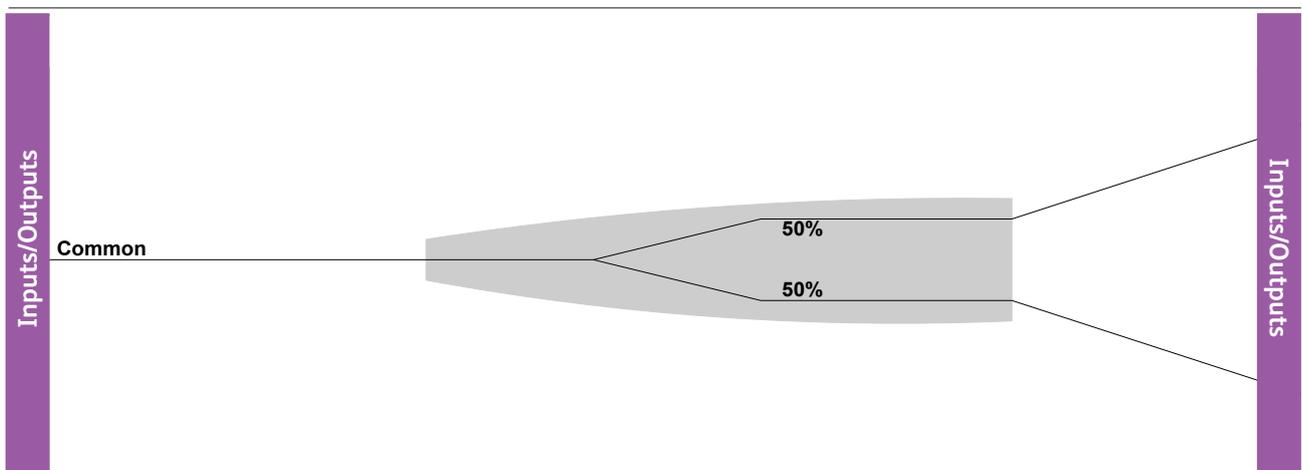
Example of IQPFS22/24 fiber splitter

IQPFS22/24

Dual and Quad 1 x 2 Fiber Optic Splitter Modules

Technical Specification

Inputs and Outputs

Signal Inputs / Outputs

IQPFS22 Optical

6 x 1260nm-1650nm

IQPFS24 Optical

12 x 1260nm-1650nm

Connector / format   LC singlemode

Controls

Card Edge Controls
NONE

Card Edge Indicators
NONE

Specifications

Connector Type	LC
Insertion Loss:	< 4.7dB
Return Loss:	> 55dB

Power Consumption

Module power
consumption   No power requirement as passive module design

Note: This module can only be installed in IQH3B/3A/1A/1P enclosures. As the card is fitted from the rear of the enclosure at least 435 mm clearance is required behind the enclosure installation.

IQPFS41-43

Single, Dual and Triple 1 x 4 Fiber Optic Splitter Modules

IQPFS41, IQPFS42 and IQPFS43 provide optical 1 x 4 splitting, with either one, two or three channels per module respectively.

The IQ Passive Fiber modules complement the existing range of fiber optic modules and are designed to function alongside the electrical / fiber converters and CWDM functions available.

These optical blocks are completely passive devices and there are no other active components present on these modules.

Features

- Wideband fiber connections (LC/PC), 1260nm-1650nm
- Single common fiber connection (LC/PC) carries all CWDM wavelengths
- Protocol transparent; can be used for network or video applications
- Will distribute DVB-ASI and other wide-band signals
- Supports all data rates for Ethernet (i.e. 10/100/1000/10GBASE) or video (i.e.1080p, HD and SD)
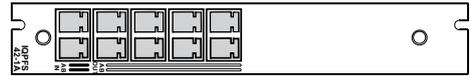- Can be located anywhere as passive operation requires no power

Why should you choose this module?

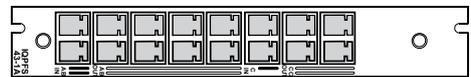- Ideal for distributing fiber signals to multiple locations

Order codes

IQPFS41-1A Single 1x4 Fiber Optic Splitter module. Each splitter contains 5 wideband (1260-1650nm) bi-directional fiber connections (LC/PC). A single common port plus the four split ports.

IQPFS42-1A Dual 1x4 Fiber Optic Splitter module. Each splitter contains 5 wideband (1260-1650nm) bi-directional fiber connections (LC/PC). A single common port plus the four split ports.

IQPFS43-1A Triple 1x4 Fiber Optic Splitter module. Each splitter contains 5 wideband (1260-1650nm) bi-directional fiber connections (LC/PC). A single common port plus the four split ports.
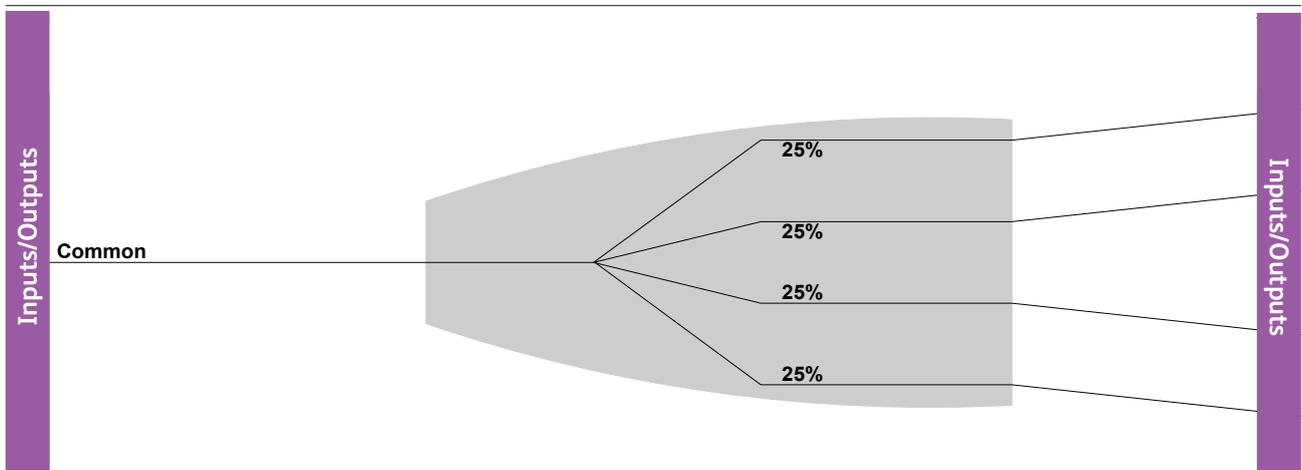
Example of IQPFS41/42/43 fiber splitter

IQPFS41-43

Single, Dual and Triple 1 x 4 Fiber Optic Splitter Modules

Technical Specification

Inputs and Outputs
Signal Inputs / Outputs
IQPFS41 Optical

5 x 1260nm-1650nm

IQPFS42 Optical

10 x 1260nm-1650nm

IQPFS43 Optical

15 x 1260nm-1650nm

Connector / format   LC singlemode

Controls
Card Edge Controls
NONE

Card Edge Indicators
NONE

Specifications
Connector Type   LC
Insertion Loss: < 8dB
Return Loss: > 55dB

Power Consumption
Module power
consumption   No power requirement as passive module design

Note: This module can only be installed in IQH3B/3A/1A/1P enclosures. As the card is fitted from the rear of the enclosure at least 435 mm clearance is required behind the enclosure installation.

IQPFC21-23

Single, Dual and Triple 2 x 2 Fiber Optic Coupler Modules

IQPFC21, IQPFC22 and IQPFC23 provide 2 x 2 optical coupling, with either one, two or three channels per module respectively.

The IQ Passive Fiber modules complement the existing range of fiber optic modules and are designed to function alongside the electrical / fiber converters and CWDM functions available.

These optical blocks are completely passive devices and there are no other active components present on these modules.

Features

- Wideband fiber connections (LC/PC), 1260nm-1620nm
- Single common fiber connection (LC/PC) carries all CWDM wavelengths
- Protocol transparent; can be used for network or video applications
- Will distribute DVB-ASI and other wide-band signals
- Supports all data rates for Ethernet (i.e. 10/100/1000/10GBASE) or video (i.e.1080p, HD and SD)
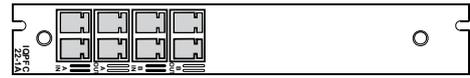- Can be located anywhere as passive operation requires no power

Why should you choose this module?

- Ideal for distributing fiber signals between multiple locations
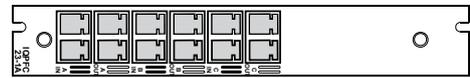
Order codes
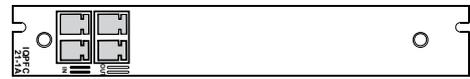
IQPFC21-1A Single 2x2 Fiber Optic coupler module. Each coupler contains 4 wideband (1260-1620nm) bi-directional fiber connections (LC/PC). Two ports either side of the coupler

IQPFC22-1A Dual 2x2 Fiber Optic coupler module. Each coupler contains 4 wideband (1260-1620nm) bi-directional fiber connections (LC/PC). Two ports either side of the coupler.
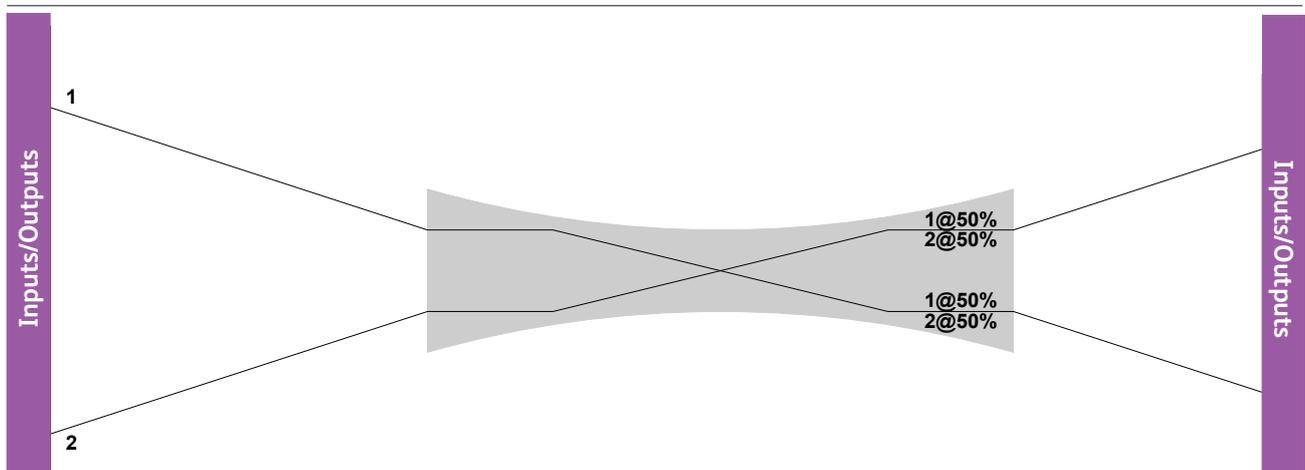

IQPFC23-1A Triple 2x2 Fiber Optic coupler module. Each coupler contains 4 wideband (1260-1620nm) bi-directional fiber connections (LC/PC). Two ports either side of the coupler.

Example of IQPFC21/22/23 fiber coupler

IQPFC21-23   Single, Dual and Triple 2 x 2 Fiber Optic Coupler Modules

Technical Specification

Inputs and Outputs
Signal Inputs / Outputs
IQPFC21 Optical
                        4 x 1260nm-1620nm

IQPFC22 Optical
                        8 x 1260nm-1620nm

IQPFC24 Optical
                        12 x 1260nm-1620nm

Connector / format   LC singlemode

Controls
Card Edge Controls
NONE

Card Edge Indicators
NONE

Specifications
Connector Type   LC
Insertion Loss: < 4.7dB
Return Loss: > 55dB

Power Consumption
Module power
consumption   No power requirement as passive module
                        design

                        Note: This module can only be installed in
                        IQH3B/3A/1A/1P enclosures. As the card is fitted
                        from the rear of the enclosure at least 435 mm
                        clearance is required behind the enclosure
                        installation.

Synchronizers

Facilities using externally-sourced contributions will have to ensure these are accurately synchronized, since such sources are not usually locked to the local reference and can therefore be unstable. IQ Modular synchronizers enable incoming signals to be accurately genlocked - easily and cost effectively.

Using broadcast quality 10-bit data paths throughout, the range offers a choice of SD/HD-SDI frame synchronizers with embedded audio passing, processing and channel shuffling capability. Synchronizers with audio embedding capability are also available making an ideal incoming lines solution for SDI and AES signals.

For Related Modules see:
SD-HD Conversion Section
IQMUX33 in Embedded Audio
IQDMX33 in Embedded Audio
IQOSY30 in Fiber

IQSYN33

3G/HD/SD-SDI Frame Synchronizer with Advanced Audio Processing

The IQSYN33 provides frame synchronization for SD, HD and 3Gbps digital video signals. Capable of handling 2 SDI inputs with auto-change over capability and referencing to a SD bi-level or HD tri-level reference, the IQSYN33 also includes audio processing features such as audio channel routing, mixing, delay and level adjustment.

To allow the module to be further tailored to system requirements a series of hardware and software options is available to provide color correction for video, and advanced audio processing features such as Dolby E/D encoding or decoding, stereo to 5.1 upmixing and loudness processing using industry recognised technology from Linear Acoustic.

Features

- Frame synchronizer with HD Tri-sync / SD Bi-Level Reference Input, input loss detection , ancillary data blanking and video delay up to 21 frames at 1080, 44 frames at 720 and 122 frames at 625
- Dual SDI inputs with auto switching on pre-defined input errors
- Video proc. features include: gain, offset, hue, horizontal picture enhancement and RGB gamut legalization
- Processing for 16 channels of embedded audio present on the incoming SDI stream with no disturbance during video synchronizer frame wraps or drops
- Audio proc. features including: channel routing, gain, invert, fixed and tracking delays, mixing and eight internal tone generators
- Dolby E support – Optional Dolby E/D decoding or encoding with both RS485 and SMPTE2020 metadata support, plus detection of PCM/non-PCM audio to SMPTE 337/338M, pair routing and Dolby E header alignment
- Advanced audio processing options from Linear Acoustic for stereo upmixing to 5.1 surround sound and loudness level measurement and control
- In-built test pattern generator and 2 x 16 character caption generator
- 16 x user memories and 2 GPI/O ports
- RollCall control and monitoring compatible with standard logging and reporting features
- RollTrack triggers available for detected module states including: PCM/non-PCM audio, input loss/freeze and reference loss

Why should you choose this module?

- Frame synchronization and advanced audio processing provides a powerful solution for embedded workflows
- Comprehensive audio processing functions allow complete control over embedded audio signals for applications where channel routing or mixing is required
- Full RollCall and SNMP compatibility allows easy integration with SAM or third party network management systems providing an all-inclusive monitoring and control solution

Order codes
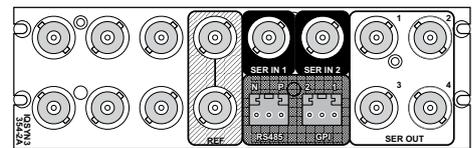
IQSYN3354-2A3, IQSYN3354-2B3
HD/SD-SDI Frame synchronizer with advanced audio processing. 2 SDI inputs, reference loop, 4 SDI outputs, 2 GPI/Os
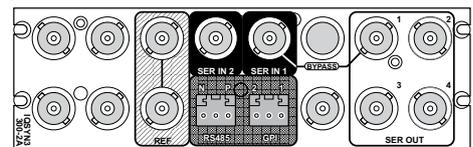
IQSYN3300-2A3, IQSYN3300-2B3
HD/SD-SDI Frame synchronizer with advanced audio processing. 2 SDI inputs, reference loop, 4 SDI outputs, 2 GPI/Os, relay input bypass

Hardware and Software Options

IQOPTA-DBD Hardware option to add a single Dolby E/D decoder

IQOPTA-DBE-D Hardware option to add a single Dolby D encoder

IQOPTA-DBE-E Hardware option to add a single Dolby E encoder

IQOPTA-LOUD51 Software option to add Linear Accoustic AeroMax 5.1 loudness processing

IQOPTA-LOUDA2 Software option to add first channel of Linear Accoustic AeroMax 2.0 loudness processing

IQOPTA-LOUDB2 Software option to add second channel of Linear Accoustic AeroMax 2.0 loudness processing

IQOPTA-UPMIX Software option to add Linear Acoustic UPMAX stereo to 5.1 upmixing

IQOPTA-CC Software option to add color correction

For more details on enclosure types please refer to Frames & Hardware section.

IQSYN33

3G/HD/SD-SDI Frame Synchronizer with Advanced Audio Processing

Block Diagram for IQSYN3354-2A3

Network Intelligence, Control & Monitoring

Technical Specification

Inputs & Outputs

Video Signal Inputs

SDI Inputs	2x
Input Cable Length	Up to 80m Belden 1694A @ 3 Gbit/s
	Up to 180m Belden 1694A @ 1.5 Gbit/s
	>350m Belden 1694A @ 270 Mbit/s
Analog Reference	1 x Analog Reference with passive loop-through
	Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level)
	SD bi-level – RS170A
	HD Tri-level – SMPTE 240M, 274M and 296M

Video Signal Outputs

SDI Outputs	x 4
Control Interface	
GPI	2 x Closing contact I/O interface (ST)

Controls

Genlock & Video Delay

Genlock Mode	Free-run, Lock to Reference, Lock to input
Genlock H-Phase	± 1 H in pixel clock steps
Genlock V-Phase	± 1 F in 1 line steps
Video H-Delay	0 – 1 Line in pixel clock steps
Video V-Delay	0 – 1 Frame in 1 line steps
Video Delay Frames	0 – 26 frames @ 1080 59p
	0 – 21 frames @ 1080 50p
	0 – 26 frames @ 1080 29i
	0 – 21 frames @ 1080 25i
	0 – 54 frames @ 720 59p
	0 – 44 frames @ 720 50p
	0 – 147 frames @ 525 29i
	0 – 122 frames @ 625 25i
Dolby E auto line select	Std, user select
Dolby E auto align	On/Off

Video Controls

Input Select	Input 1, Input 2
Input Backup Enable	On/Off
Priority	None, Master (input 1), Backup (input 2)
Change-over Parameters	Carrier Loss, Standard mismatch, CRC and ANC Error, Embedded audio loss
Change-over Time Delay	0s to 10s
Reversion Delay	0 to 100s
Default Video Output Type	
	Pattern, Freeze, Black
Pattern Select	100% Color Bars, 75% Color Bars, SMPTE Bars, Tartan Bars, Black, Pluge, Ramp, H Sweep, Pulse & Bar, Multi-burst
Output Mode	Input, Black, Freeze, Pattern
H Enhance Frequency	Off, Low, Medium, High
H Enhance Presets	Low, Medium, High, Super, Custom
RGB Legalizer	700 mV, 721 mV, 735 mV, 746 mV
Black Level	±200 mV in steps of 1 mV
Hue Adjust	±180° in steps of 1°
Master Video Gain	+6 to -120 dB
Y-Gain	+6 to -120 dB
Cb/Cr Gain	+6 to -120 dB
Caption Enable	On/Off
Edit Caption	16 characters
Caption Adjust	X-Y Size & Position

Audio Controls

Audio In - Embedded

Audio In-Disembed	Pairs 1-8
Channel 1 – 16 Mute	On/Off
Channel 1 – 16 Polarity Inv	
	On/Off

Technical Specification cont…

Channel 1 – 16 Gain	+12 dB to -80 dB in 0.1 dB steps
Pair 1 – 8 Stereo	Link channel pairs

Audio Out - Embedded

Group 1 -4 Enable	On/Off
Audio Out-embed	Pairs 1-8
Channel 1 – 16 Mute	On/Off
Channel 1 – 16 Gain	+12 dB to -80 dB in 0.1 dB steps
Pair 1 – 8 Stereo	Link channel pairs

Audio Routing

Input routing Bus 1-8	Disembed 1-8, Dolby Decoder 1-5*
Output routing embed 1-8	
	Bus 1-8, Mixers 1-4, Downmixer 1-2, silence, Tones 1-8, Upmix*/Loudness*, Dolby Encoder 1-5*
* indicates optional feature	

Audio Setup Controls – Bus 1-8

Delay Add-In Bulk, RollTrack, current video	
	On/Off
Bulk Manual Delay	-520ms to +2s in 0.17ms steps
Coarse Manual Pair Delay	
	±1.995s in 1ms steps
Fine Manual Delay	±5ms in 0.02ms steps
Fast or smooth delay limit	
	5ms to 80ms
Silence Detect	-2dBFS to -128dBFS in steps of 1dB
Signal Overload Detect	-1dBFS to -127dBFS in steps of 1dB
Warning Timer	1 to 20 seconds in steps of 1 second
Tone Frequency 1-8	100Hz to 16kHz in 100Hz steps

Dolby Decoder

Decoder Source	Disembed 1-8
Detection Mode	Auto, dolby E, Dolby D, Mute
AES Channel Select	Channel 1, 2
PCM Latency	Single Frame, Minimum
Dolby D listening mode	Full, EX, 3 Stereo, Phantom, Stereo, Mono
Dolby D Dynamic Range	Line, RF, Bypass
Metadata Program	1, 2
Input Metadata	RS-485, SMPTE 2020

Dolby Encoder

Encoder Source	Bus 1-8, Upmix*/Loudness*, Silence
Metadata Source	Prog 1-8, Internal
Internal Metadata control	
	Program Descriptor, Dialog Norm, Audio Production information, Extended BSI1, BSI2, Internal Config, Bitstream Mode, RF Mode, Line Mode, Surround Mode, Mix Level (Surround, Centre, LtRt, LoRo), Internal Config setting (e.g. 5.1+2)
Mode	Encode, Pass through
Bit Depth	Dolby D - 32 bit, 16 bit
	Dolby E - 20 bit, 16 bit
SRC	Enable, Disable
Stream Number	0-6

Audio Mixers

Mixer Select	1-4, Downmix 1 -2
Source select	Bus 1-8, Silence, Tones 1-8
Source Gain	12dB to -80dB in 0.1dB steps
Mixer 1-4 invert	On/Off
Mixer 1-4, Downmix 1-2 Mute	
	On/Off
Downmix Configuration	LoRo, 4 level selections

Other Controls

GPI input High/Low Select	
	Input 1-2, Black, Freeze, Pattern, User Memories 1-16,
GPI Level Invert	High/Low
GPI Output Source	Current input OK, Input 1-2 OK, Input 1-2 Selected, Black, Freeze, Pattern, No User Memories Selected, User Memories 1-16
RS-485 Port	Output Dolby decoder, Output SMPTE 2020 Disembed, Input
SMPTE 2020 embedder	Dolby decoder, RS-485 Port, SMPTE 2020 Disembed
User Memories	Save/Recall/Rename
Memory Naming	User configurable naming of Memories 1 – 16
Information Window	Video Input Status, Audio Input Status, EDH/CRC & ANC Status
EDH/CRC Reset	Resets all EDH/CRC counts
RollTrack Index	Allows up to 70 destinations
RollTrack Sources	Unused, Video Delay, Audio Delay, Input Present (1-2), Input Loss (1-2), Output Std, Input selected (1-2), Output Black, Freeze or Pattern on, Output Black, Freeze or Pattern off, Output Caption on, Output Caption off, Embedded Audio (Pairs 1-8) PCM, Embedded Audio (Pairs 1-8) Non-PCM, Embedded Audio (Pairs 1-8) Loss, Reference OK & Loss, Dolby Decoder Input Type, Encoder active/pass-through, Dolby Metadata valid/missing
Factory Default	Resets all module settings to factory specified default values and clears memories
Default Settings	Resets all module settings to factory specified defaults but does not clear user memories
Restart	Software reset of module
Module Information	Reports: Product Name
	Software version, Serial number, Build number, KOS version, PCB version, Licensed Options
Input Names	19 Character editable name

3G/HD/SD-SDI Frame Synchronizer with Advanced Audio Processing

Technical Specification cont…

Specifications

Electrical	3Gbit/s SDI, SMPTE 424M 1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C / DVB-ASI
Connector / Format	BNC/ 75ohm panel jack on standard IQ connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s) >-10dB (3Gbit/s)
Output Jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz), 3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)
Reference Source	External – HD Tri-Level / SD Bi-level / Input Video syncs
Electrical	Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level) SD bi-level – RS170A HD Tr-level – SMPTE 240M, 274M and 296M
Connector / Format	BNC/75 ohm panel jack on standard IQ connector panel
Analog Reference Return Loss	
	SD bi-level > 40 dB to 5.5 MHz, HD tri-level > 35 dB to 30 MHz
Video Standards	1125(1080)/50p, 1125(1080)/59p, 750(720)/50p, 750(720)/59p, 1125(1080)/25i, 1125(1080)/25p, 1125(1080)/25psf, 1125(1080)/29i, 625(576)/25i, 525(480)/29i
Embedded audio handling	
	HD - 24-bit synchronous 48 kHz to SMPTE 299M, SD - 20-bit synchronous 48 kHz to SMPTE 272M-A

Power Consumption

Module Power Consumption	
	19W Max (A Frames) 18 PR (B Frames)
	Note: Dolby option adds 2.5W (PR)

IQSYN30

3G/HD/SD-SDI Frame Synchronizer with Embedded Audio Processing

The IQSYN30 provides frame synchronization for HD-SDI at 3Gbit/s or 1.5 Gbit/s, or SD-SDI 270 Mbit/s with 16-channel embedded audio processing. Including 2 SDI inputs with clean-switching functionality, agile synchronization and flexible audio processing features the IQSYN30 is ideal for general incoming line applications. A video proc. amp provides complete control over the video levels, and audio processing features include Dolby E auto-alignment, audio delay, gain, invert and channel level routing.

Features

- 3G/HD/SD-SDI synchronizer with up to 9 frames of video delay
- Processing for 16 channels of embedded audio present on the incoming SDI stream
- Standards supported:
  - 3G-SDI to SMPTE 424M/425M level A & B compatible
  - HD-SDI to SMPTE292M/274M/296M
  - SD-SDI to SMPTE259M-C
- Loop-though reference capable of detecting and referencing to a bi-level or tri-level signal and selection from either external input directly or from internal IQH3B chassis reference bus
- Precision genlock adjustment allowing you to time any SDI signal accurately
- Agile, router switching tolerant synchronizer operation
- Firewall for video and processed PCM audio to provide a continuous uninterrupted output
- Audio proc-amp features including channel level (Sub-frame) routing, adjustable delay, independent gain, invert and mute control
- Any group of embedded audio may be passed unchanged, processed or blanked
- Embedded Dolby E support – pair routing and Dolby E header alignment
- Handles Dolby E and PCM audio present in the same group
- Able to pass all ancillary data with independent HANC and VANC blanking control
- Input loss detection – default output of black/pattern/freeze
- Can be used as a video delay, up to 9 frames
- Video proc. amp controls including video gain, offset and hue
- In-built test pattern generator and audio tone generator
- 16 x user memories, save/recall/rename
- RollCall control and monitoring compatible

Why should you choose this module?

- Agile video synchronization provides greater tolerance to mis-timed upstream SDI switching (up to +/- 5 lines), ensuring disturbance free picture output
- Flexible handling of input loss – pass through or switch to black/patterns/freeze - and integrated video/audio controls make the IQSYN30 an ideal processor for incoming lines applications
- Dual inputs allow main and redundant feeds to terminate in a single synchronizer
- Full RollCall and SNMP compatibility allows easy integration with SAM, or third party, network management systems providing an all-inclusive monitoring and control solution
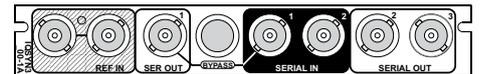
Order codes
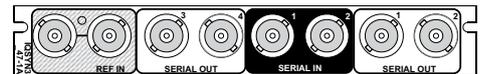
IQSYN3047-1A3
3G/HD/SD-SDI Synchronizer with Embedded Audio Processing. 2 inputs, 4 outputs, loop-through reference.

IQSYN3047-1B3
HD/SD-SDI Synchronizer with Embedded Audio Processing. 2 inputs, 4 outputs, External loop-through and internal frame reference selection

IQSYN3000-1A3
3G/HD/SD-SDI Synchronizer with Embedded Audio Processing and relay input bypass. 2 inputs, 4 outputs, loop-through reference.
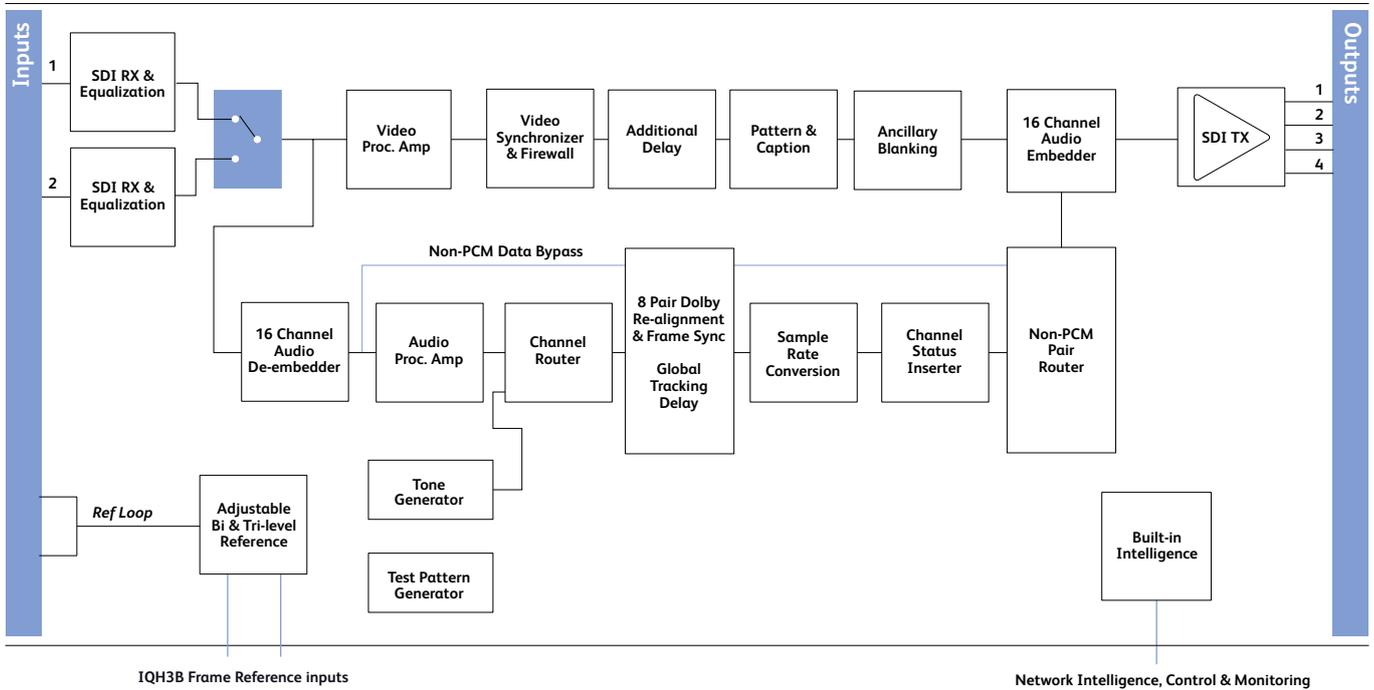
IQSYN3000-1B3
HD/SD-SDI Synchronizer with Embedded Audio Processing and relay input bypass. 2 inputs, 4 outputs, External loop-through and internal frame reference selection

For more details on enclosure types please refer to Frames and Hardware section.

IQSYN30

3G/HD/SD-SDI Frame Synchronizer with Embedded Audio Processing

Inputs

1 SDI RX & Equalization
2 SDI RX & Equalization

Video Proc. Amp → Video Synchronizer & Firewall → Additional Delay → Pattern & Caption → Ancillary Blanking → 16 Channel Audio Embedder → SDI TX

Outputs
1
2
3
4

Non-PCM Data Bypass

16 Channel Audio De-embedder → Audio Proc. Amp → Channel Router → 8 Pair Dolby Re-alignment & Frame Sync / Global Tracking Delay → Sample Rate Conversion → Channel Status Inserter → Non-PCM Pair Router

Ref Loop → Adjustable Bi & Tri-level Reference

Tone Generator

Test Pattern Generator

Built-in Intelligence

IQH3B Frame Reference inputs

Network Intelligence, Control & Monitoring

⌒ **Block Diagram** for IQSYN3047-1A3

Technical Specification

Inputs & Outputs

Signal Inputs

SDI Inputs	2x
Input 1 Cable Length	Up to 70m Belden 1694A @ 3 Gbit/s
	Up to 160m Belden 1694A @ 1.5 Gbit/s
	>350m Belden 1694A @ 270 Mbit/s
Input 2 Cable Length	Up to 60m Belden 1694A @ 3 Gbit/s
	Up to 100m Belden 1694A @ 1.5 Gbit/s
	Up to 100m Belden 1694A @ 270 Mbit/s
Analog Reference	1 x Analog Reference with passive loop-through Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level)
	SD bi-level – RS170A
	HD Tri-level – SMPTE 240M, 274M and 296M

Signal Outputs

SDI Outputs	x 4

Controls

Indicators

Power	OK (Green)
CPU running	OK (Green flashing)
FPGA running	OK (Green flashing)
Status	OK (Green)
	Warning (Yellow)
	Error (Red)
Input 1	OK (Green)
Input 2	OK (Green)
Reference lock	OK or Cross-locking (Green), Std error (Green flashing)

Controls

Genlock & Video Delay

Genlock Mode	Free-run, Lock to Reference, Lock to input
Genlock H-Phase	± 0.5H in pixel clock steps
Genlock V-Phase	± 0.5F in 1 line steps
Video H-Delay	0 – 1 Line in pixel clock steps
Video V-Delay	0 – 1 Frame in 1 line steps
Video Delay Frames	0 - 9 F

Video Controls

Input Standard	1125(1080)/50P (A & B),
	1125(1080)/59P (A & B),
	1125(1080)/29i, 1125(1080)/25i,
	750(720)/59P, 750(720)/50P,
	525(480)/29i,625(576)/25i
Default Video Output Type	Pattern, Freeze, Black
Default Video Output Standard	Last Known Good,
	1125(1080)/50P (A & B),
	1125(1080)/59P (A & B),
	1125(1080)/29i, 1125(1080)/25i,
	750(720)/59P, 750(720)/50P,
	525(480)/29i, 625(576)/25i
Input Select	Input 1, Input 2
Manual Freeze	On/Off
Freeze	Field/Frame
VANC Data	Blank VANC
SD VANC Data	Line blanking (23/336 in 625, 21,22, 283, 284 in 525)
HANC Data	Blank HANC (Removes all HANC data. Note audio removed when embedders disabled)
ProcAmp Enable	On/Off
Black Level	±100 mV in steps of 0.8 mV
Hue Adjust	±180° in steps of 1°
Master Video Gain	±6 dB in steps of 0.1 dB
Y-Gain	±6 dB in steps of 0.1 dB
Cb/Cr Gain	±6 dB in steps of 0.1 dB
Y/C Timing	±8 pixels in 2 pixel steps (SD)
	±16 pixels in 2 pixel steps (HD/3G)
Picture Position	±8 pixels in 2 pixel steps (SD)
	±16 pixels in 2 pixel steps (HD/3G)
Pattern On	On/Off
Pattern Select	75% Color Bars, Black
Caption On	On/Off
Edit Caption	19 characters available

IQSYN30

3G/HD/SD-SDI Frame Synchronizer with Embedded Audio Processing

Technical Specification cont...

Audio Controls

Embedder Assignment

Group 1 to 4 Enable	On/Off
Pair 1 to 8 Source L / Non-PCM	De-embed 1-16, Tone, Silence
Pair 1 to 8 Source R	De-Embed 1-16, Tone, Silence
Pair 1 to 8 Stereo	Link channel pairs
Pair 1 to 8 Polarity L/R	On/Off
Pair 1 to 8 Gain L/R	+12 dB to -72 dB in 0.1 dB steps
Pair 1 to 8 Non-PCM	On/Off

Processed Audio Delay Control

Course Manual Delay	Up to 1.75s in 5ms steps
Fine Manual Delay	+/- 0.25s in 0.5ms steps
Variable Audio Delay Control Source	Internal, Manual

Dolby-E

Dolby-E Auto Alignment	On/Off

Tone

Frequency L/R	100Hz to 10kHz in 100Hz steps
Channel Ident	On/Off
HANC Data	Blank HANC (Removes all HANC data. Note audio removed when embedders disabled)

Audio Monitoring

Silence Detect	0 to -80dB in steps of 1dB
Signal Overload Detect	0 to -80dB in steps of 1dB
Warning Timer	1 to 20 seconds in steps of 1 second

Other Controls

User Memories	16 x Save, Recall, Rename
Memory Naming	User configurable naming of memories 1 – 16
RollTrack Sources	Unused, Video Delay (1&2), Audio Delay (1&2), Input Present (1&2), Input Loss (1&2), Input Select (1&2), Output Rate/Std, Output Freeze, Output Unfreeze, Output Pattern On, Output Pattern Off, Output Black On, Output Black Off, Output Caption On, Output Caption Off, Inp1 Embedded Audio (Pairs 1-8) PCM, Inp1 Embedded Audio (Pairs 1-8) Non-PCM, Inp1 Embedded Audio (Pairs 1-8) Loss, Inp1 Embedded Audio (Pairs 1-8) V Bit, Reference OK & Loss, Inp2 Embedded Audio (Pairs 1-8) PCM, Inp2 Embedded Audio (Pairs 1-8) Non-PCM, Inp2 Embedded Audio (Pairs 1-8) Loss, Inp2 Embedded Audio (Pairs 1-8) V Bit.
Information Window	Video Input Status, Audio Input Status, Reference Status
Factory Default	Resets all module settings to factory specified default values and clears memories
Default Settings	Resets all module settings to factory specified defaults but does not clear memories

Restart	Software restart of the module
Module Information	Reports following module information: Software version, Serial number, Build number, KOS version, Firmware version, PCB version

Specifications

Electrical	3Gbit/s SDI, SMPTE 424M
	1.5Gbit/s HD-SDI, SMPTE 292M
	270 Mbit/s SDI, SMPTE 259M-C / DVB-ASI
Connector / Format	BNC/ 75ohm panel jack on standard IQ connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s)
	>-10dB (3Gbit/s)
Output Jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz)
	3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)
Reference Source	External – HD Tri-Level / SD bi-level / Input Video syncs
Electrical	Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level)
	SD bi-level – RS170A
	HD Tr-level – SMPTE 240M, 274M and 296M
Connector / Format	BNC/75 ohm panel jack on standard IQ connector panel
Analog Reference Return Loss	
	SD bi-level > 40 dB to 5.5 MHz
	HD tri-level > 35 dB to 30 MHz
Video Standards	
	1125(1080)/50p (A & B), 1125(1080)/59p (A & B)
	750(720)/50p, 750(720)/59p,
	1125(1080)/25i, 1125(1080)/29i
	625(576)/25i, 525(480)/29i
Minimum Delay (Reference lock or free run)	
	SD: 67us
	HD: 28us
	3G-A: 15us
	3G-B: 25us
Typical delay (Input lock)	
	SD: 70us
	HD: 38us
	3G-A: 19us
	3G-B: 40us
Synchronizer Hysteresis Window	
	5 µs
Embedded audio handling	HD - 24-bit synchronous
	48 kHz to SMPTE 299M
	SD - 20-bit synchronous
	48 kHz to SMPTE 272M-A
Embedded Audio Delay	Minimum (PCM) 2 ms
	Maximum (non-PCM)
	SD: 67us
	HD: 28us
	3G-A: 15us
	3G-B: 25us

Power Consumption

Module Power Consumption	8.5W Max (A Frames)
	8.5 PR (B Frames)

IQSYN10

3G/HD/SD-SDI Frame Synchronizer

The IQSYN10 provides frame synchronization for HD-SDI at 3Gbit/s or 1.5 Gbit/s, or SD-SDI 270 Mbit/s. Including 2 SDI inputs with clean-switching functionality, agile synchronization, video delay and a video proc. amp to provide complete control over the video levels.

Features

- 3G/HD/SD-SDI synchronizer with up to 9 frames of video delay
- Standards supported:
  - 3G-SDI to SMPTE 424M/425M level A & B compatible
  - HD-SDI to SMPTE292M/274M/296M
  - SD-SDI to SMPTE259M-C
- Loop-though reference capable of detecting and referencing to a bi-level or tri-level signal and selection from either external input directly or from internal IQH3B chassis reference bus
- Select either external input reference direct or from internal IQH3B chassis reference bus
- Precision genlock adjustment allowing you to time any SDI signal accurately
- Agile, router switching tolerant synchronizer operation
- Able to pass all ancillary data with independent HANC and VANC blanking control
- Input loss detection – default output of black/pattern/freeze
- Edit function for static/animated caption overlay on Video output
- Can be used as a video delay, up to 9 frames
- Video proc. amp controls including video gain, offset and hue, including Y/C picture position adjustment
- In-built test pattern generator and audio tone generator
- 16 x user memories, save/recall/rename
- RollCall control and monitoring compatible

Why should you choose this module?

- Agile video synchronization provides greater tolerance to mis-timed upstream SDI switching (up to +/- 5 lines), ensuring disturbance free picture output
- Flexible handling of input loss – pass through or switch to black/ patterns/freeze - and integrated video controls make the IQSYN10 an ideal synchronizer for incoming lines applications
- Dual inputs allow main and redundant feeds to terminate in a single synchronizer
- Full RollCall and SNMP compatibility allows easy integration with SAM, or third party, network management systems providing an all-inclusive monitoring and control solution

Order codes
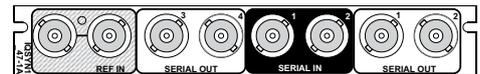
IQSYN1047-1A3
3G/HD/SD-SDI Synchronizer .2 inputs, 4 outputs, reference loop-through.

IQSYN1047-1B3
3G/HD/SD-SDI Synchronizer. 2 inputs, 4 outputs, External loop-through and internal frame reference selection.
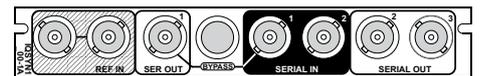
IQSYN1000-1A3
3G/HD/SD-SDI Synchronizer with relay input bypass .2 inputs, 4 outputs, reference loop-through.

IQSYN1000-1B3
3G/HD/SD-SDI Synchronizer with relay input bypass. 2 inputs, 4 outputs, External loop-through and internal frame reference selection.

For more details on enclosure types please refer to Frames & Hardware section

IQSYN10 · 3G/HD/SD-SDI Frame Synchronizer
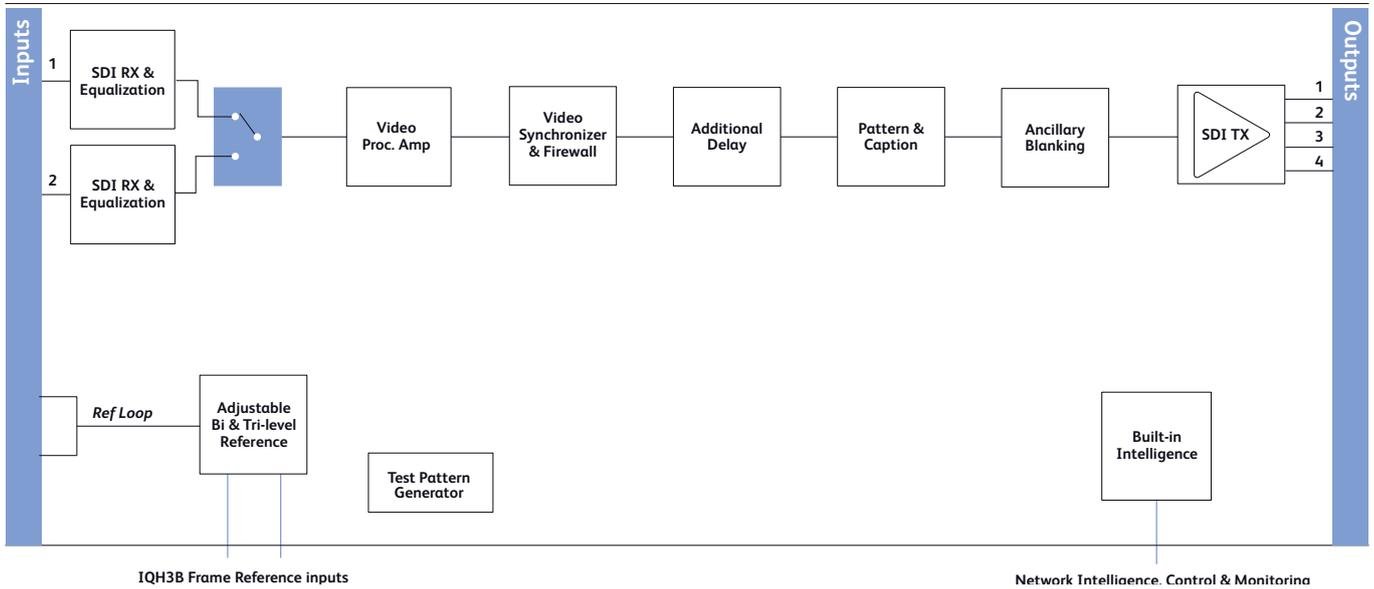
Block Diagram for IQSYN1047-1A3

IQH3B Frame Reference inputs

Network Intelligence, Control & Monitoring

Technical Specification

Inputs & Outputs

Signal Inputs

SDI Inputs	2x
Input 1 Cable Length	Up to 70m Belden 1694A @ 3 Gbit/s
	Up to 160m Belden 1694A @ 1.5 Gbit/s
	>350m Belden 1694A @ 270 Mbit/s
Input 2 Cable Length	Up to 60m Belden 1694A @ 3 Gbit/s
	Up to 100m Belden 1694A @ 1.5 Gbit/s
	Up to 100m Belden 1694A @ 270 Mbit/s

Signal Outputs

SDI Outputs	x 4

Controls

Indicators

Power	OK (Green)
CPU running	OK (Green flashing)
FPGA running	OK (Green flashing)
Status	OK (Green)
	Warning (Yellow)
	Error (Red)
Input 1	OK (Green)
Input 2	OK (Green)
Reference lock	OK or Cross-locking (Green), Std error (Green flashing)

Controls

Genlock & Video Delay

Genlock Mode	Free-run, Lock to Reference, Lock to input
Genlock H-Phase	±0.5H in pixel clock steps
Genlock V-Phase	±0.5F in 1 line steps
Video H-Delay	0 – 1 Line in pixel clock steps
Video V-Delay	0 – 1 Frame in 1 line steps
Video Delay Frames	0 - 9 F
Reference select mode	Module input reference or IQH3B Reference A or B

Video Controls

Input Standard	1125(1080)/50P (A & B), 1125(1080)/59P (A & B), 1125(1080)/29i, 1125(1080)/25i, 750(720)/59P, 750(720)/50P, 525(480)/29i,625(576)/25i

Default Video Output

Type	Pattern, Freeze, Black
Default Video Output Standard	Last Known Good, 1125(1080)/50P (A & B), 1125(1080)/59P (A & B), 1125(1080)/29i, 1125(1080)/25i, 750(720)/59P, 750(720)/50P, 525(480)/29i, 625(576)/25i
Input Select	Input 1, Input 2
Manual Freeze	On/Off
Freeze	Field/Frame
VANC Data	Blank VANC
SD VANC Data	Line blanking (23/336 in 625, 21,22, 283, 284 in 525)
HANC Data	Blank HANC (Removes all HANC data.
ProcAmp Enable	On/Off
Black Level	±100 mV in steps of 0.8 mV
Hue Adjust	±180° in steps of 1°
Master Video Gain	±6 dB in steps of 0.1 dB

Technical Specification cont…

Y-Gain	±6 dB in steps of 0.1 dB
Cb/Cr Gain	±6 dB in steps of 0.1 dB
Y/C Timing	±8 pixels in 2 pixel steps (SD)
	±16 pixels in 2 pixel steps (HD/3G)
Picture Position	±8 pixels in 2 pixel steps (SD)
	±16 pixels in 2 pixel steps (HD/3G)
Pattern On	On/Off
Pattern Select	75% Color Bars, Black
Caption On	On/Off
Edit Caption	19 characters available
Animated Caption	Slow,medium,fast
HANC Data	Blank HANC Removes all HANC data. Note this includes removal of embedded audio
VANC Data	Blank VANC

Other Controls

User Memories	16 x Save, Recall, Rename
Memory Naming	User configurable naming of memories 1 – 16
RollTrack Sources	Unused, Video Delay (1&2), , Input Present (1&2), Input Loss (1&2) , Input Select (1&2), Output Rate/Std, Output Freeze, Output Unfreeze, Output Pattern On, Output Pattern Off, Output Black On, Output Black Off, Output Caption On, Output Caption Off, Reference OK & Loss
Information Window	Video Input Status, Reference Statu
Factory Default	Resets all module settings to factory specified default values and clears memories
Default Settings	Resets all module settings to factory specified defaults but does not clear memories
Restart	Software restart of the module
Module Information	Reports following module information: Software version, Serial number, Build number, KOS version, Firmware version, PCB version

Specifications

Electrical	3Gbit/s SDI, SMPTE 424M
	1.5Gbit/s HD-SDI, SMPTE 292M
	270 Mbit/s SDI, SMPTE 259M-C / DVB-ASI
Connector / Format	BNC/ 75ohm panel jack on standard IQ connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s)
	>-10dB (3Gbit/s)
Output Jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz)
	3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)

Reference Source	External – HD Tri-Level / SD bi-level / Input Video syncs
Electrical	Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level)
	SD bi-level – RS170A
	HD Tr-level – SMPTE 240M, 274M and 296M
Connector / Format	BNC/75 ohm panel jack on standard IQ connector panel
Analog Reference Return Loss	
	SD bi-level > 40 dB to 5.5 MHz
	HD tri-level > 35 dB to 30 MHz
Video Standards	
	1125(1080)/50p (A & B), 1125(1080)/59p (A & B) 750(720)/50p, 750(720)/59p, 1125(1080)/25i, 1125(1080)/29i 625(576)/25i, 525(480)/29i
Minimum Delay (Reference lock or free run)	
	SD: 67us
	HD: 28us
	3G-A: 15us
	3G-B: 25us
Typical delay (Input lock)	
	SD: 70us
	HD: 38us
	3G-A: 19us
	3G-B: 40us
Synchronizer Hysteresis Window	
	5 µs

Power Consumption

Module Power Consumption	7.5W Max (A Frames)
	7.5 PR (B Frames)

IQSYN31

Dual 3G/HD/SD-SDI Frame Synchronizer with Embedded Audio Processing

The IQSYN31 provides frame synchronization for HD-SDI at 3Gbit/s or 1.5 Gbit/s, or SD-SDI 270 Mbit/s with 16-channel embedded audio processing. Enabling powerful processing features with a space efficient two channels per card the IQSYN31 is ideal for incoming line applications where space is at a premium. A video proc. amp provides complete control over the video levels, and audio processing features include Dolby E auto-alignment, audio delay, gain, invert and channel level routing.

Features

- Dual channel 3G/HD/SD-SDI synchronizer with up to 3 frames of video delay per channel
- Processing for 16 channels of embedded audio present on each incoming SDI stream
- Standards supported:
  - 3G-SDI to SMPTE 424M/425M level A & B compatible
  - HD-SDI to SMPTE292M/274M/296M
  - SD-SDI to SMPTE259M-C
- Loop-though reference capable of detecting and referencing to a bi-level or tri-level signal and selection from either external input directly or from internal IQH3B chassis reference bus
- Precision genlock adjustment allowing you to time any SDI signal accurately
- Agile, router switching tolerant synchronizer operation
- Firewall for video and processed PCM audio to provide a continuous uninterrupted output
- Audio proc-amp features including channel level (Sub-frame) routing, adjustable delay, independent gain, invert and mute control
- Any group of embedded audio may be passed unchanged, processed or blanked
- Embedded Dolby E support – pair routing and Dolby E header alignment
- Handles Dolby E and PCM audio present in the same group
- Able to pass all ancillary data with independent HANC and VANC blanking control
- Input loss detection – default output of black/pattern/freeze
- Can be used as a video delay, up to 3 frames per channel
- Video proc. amp controls including video gain, offset and hue
- In-built test pattern and tone generators for each channel
- 16 x user memories, save/recall/rename
- RollCall control and monitoring compatible

Why should you choose this module?

- Compact multi-channel synchronizer for lines in applications where space is at a premium, in OB environments for example
- Agile video synchronization provides greater tolerance to mis-timed upstream SDI switching (up to +/- 5 lines), ensuring disturbance free picture output
- Advanced embedded audio processing features, such as Dolby E synchronization, provide ideal solutions for today's complex system requirements
- Full RollCall and SNMP compatibility allows easy integration with SAM, or third party, network management systems providing an all-inclusive monitoring and control solution
- Available as an SD/HD version with simple software upgrade path to 3G, providing a cost effective future proof solution

Order codes
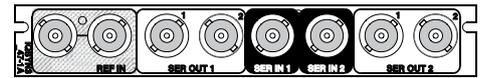
IQSYN3147-1A3
Dual channel 3G/HD/SD-SDI Synchronizer with Embedded Audio Processing. 2 outputs per input, reference loop-through.

IQSYN3147-1B3
Dual channel 3G/HD/SD-SDI Synchronizer with Embedded Audio Processing. 2 outputs per input, external loop-through and internal frame reference selection.

For more details on enclosure types please refer to Frames and Hardware section.

IQSYN31 — Dual 3G/HD/SD-SDI Frame Synchronizer with Embedded Audio Processing
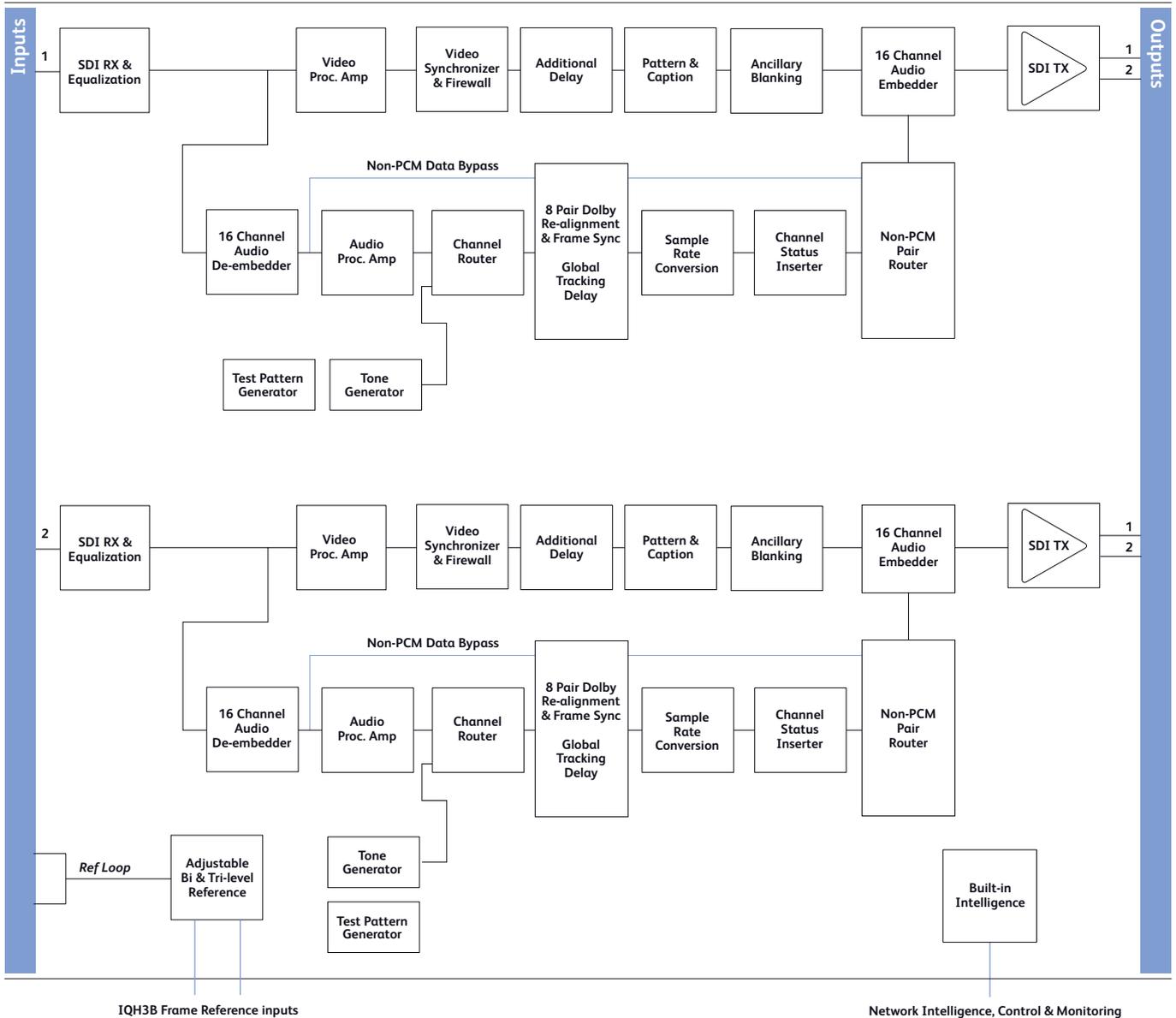
Block Diagram for IQSYN3147-1A3

Technical Specification

Inputs & Outputs

Signal Inputs

SDI Inputs	1 per Channel
Input 1 Cable Length	Up to 70m Belden 1694A @ 3 Gbit/s
	Up to 160m Belden 1694A @ 1.5 Gbit/s
	>350m Belden 1694A @ 270 Mbit/s
Input 2 Cable Length	Up to 60m Belden 1694A @ 3 Gbit/s
	Up to 100m Belden 1694A @ 1.5 Gbit/s
	Up to 200m Belden 1694A @ 270 Mbit/s
Analog Reference	1 x Analog Reference with passive loop-through Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level)
	SD bi-level – RS170A
	HD Tri-level – SMPTE 240M, 274M and 296M

Signal Outputs

SDI Outputs	x 2 per Channel

Controls

Indicators

Power	OK (Green)
CPU running	OK (Green flashing)
FPGA running	OK (Green flashing)
Status	OK (Green)
	Warning (Yellow)
	Error (Red)
Input 1	OK (Green)
Input 2	OK (Green)
Reference lock	OK or Cross-locking (Green), Std error (Green flashing)

IQSYN31

Dual 3G/HD/SD-SDI Frame Synchronizer with Embedded Audio Processing

Technical Specification cont…

Controls

Genlock & Video Delay

Genlock Mode	Free-run, Lock to Reference, Lock to input
Genlock H-Phase	± 0.5H in pixel clock steps
Genlock V-Phase	± 0.5F in 1 line steps
Video H-Delay	0 – 1 Line in pixel clock steps
Video V-Delay	0 – 1 Frame in 1 line steps
Video Delay Frames	0 - 3 F

Video Controls (per Channel)

Input Standard	1125(1080)/50P (A & B), 1125(1080)/59P (A & B), 1125(1080)/29i, 1125(1080)/25i, 750(720)/59P, 750(720)/50P, 525(480)/29i,625(576)/25i

Default Video Output

Type	Pattern, Freeze, Black
Default Video Output Standard	Last Known Good, 1125(1080)/50P (A & B), 1125(1080)/59P (A & B), 1125(1080)/29i, 1125(1080)/25i, 750(720)/59P, 750(720)/50P, 525(480)/29i, 625(576)/25i
Manual Freeze	On/Off
Freeze	Field/Frame
VANC Data	Blank VANC
SD VANC Data	Line blanking (23/336 in 625, 21,22, 283, 284 in 525)
HANC Data	Blank HANC (Removes all HANC data, including audio)
ProcAmp Enable	On/Off
Black Level	±100 mV in steps of 0.8 mV
Hue Adjust	±180° in steps of 1°
Master Video Gain	±6 dB in steps of 0.1 dB
Y-Gain	±6 dB in steps of 0.1 dB
Cb/Cr Gain	±6 dB in steps of 0.1 dB
Y/C Timing	±8 pixels in 2 pixel steps (SD) ±16 pixels in 2 pixel steps (HD/3G)
Picture Position	±8 pixels in 2 pixel steps (SD) ±16 pixels in 2 pixel steps (HD/3G)
Pattern On	On/Off
Pattern Select	75% Color Bars, Black
Caption On	On/Off
Edit Caption	19 characters available

Audio Controls (per Channel)

Embedder Assignment	
Group 1 to 4 Enable	On/Off
Pair 1 to 8 Source L / Non-PCM	Dis-embed 1_1 to 8_2, Tone, Silence
Pair 1 to 8 Source R	Dis-embed 1_1 to 8_2, Tone, Silence
Pair 1 to 8 Stereo	Link channel pairs
Pair 1 to 8 Polarity L/R	On/Off
Pair 1 to 8 Gain L/R	+12 dB to -72 dB in 0.1 dB steps
Pair 1 to 8 Non-PCM	On/Off

Processed Audio Delay Control

Course Manual Delay	Up to 1.75s in 5ms steps
Fine Manual Delay	+/- 0.25s in 0.5ms steps
Variable Audio Delay Control Source	Internal, Manual, RollTrack (14 to 17)

Dolby-E

Dolby-E Auto

Alignment	On/Off

Tone	
Frequency L/R	100Hz to 10kHz in 100Hz steps
Channel Ident	On/Off
HANC Data	Blank HANC (Removes all HANC data. Note audio removed when embedders disabled)

Audio Monitoring

Silence Detect	0 to -80dB in steps of 1dB
Signal Overload Detect	0 to -80dB in steps of 1dB
Warning Timer	1 to 20 seconds in steps of 1 second

Other Controls

User Memories	16 x Save, Recall, Rename
Memory Naming	User configurable naming of memories 1 – 16
RollTrack Sources	Unused, Video Delay (1&2), Audio Delay (1&2), Input Present (1&2) , Input Loss (1&2) , Input Select (1&2), Output Rate/Std (1&2),, Output Freeze(1&2), , Output Unfreeze(1&2), Output Pattern On(1&2), Output Pattern Off(1&2), Output Black On(1&2), Output Black Off(1&2), Output Caption On(1&2), Output Caption Off(1&2), Inp1 Embedded Audio (Pairs 1-8) PCM, Inp1 Embedded Audio (Pairs 1-8) Non-PCM, Inp1 Embedded Audio (Pairs 1-8) Loss, Inp1 Embedded Audio (Pairs 1-8) V Bit, Reference OK & Loss , Inp2 Embedded Audio (Pairs 1-8) PCM, Inp2 Embedded Audio (Pairs 1-8) Non-PCM, Inp2 Embedded Audio (Pairs 1-8) Loss, Inp2 Embedded Audio (Pairs 1-8) V Bit.
Information Window	Video Input Status, Audio Input Status, Reference Status
Factory Default	Resets all module settings to factory specified default values and clears memories
Default Settings	Resets all module settings to factory specified defaults but does not clear memories
Restart	Software restart of the module
Module Information	''Reports following module information: Software version, Serial number, Build number, KOS version, Firmware version, PCB version

IQSYN31

Dual 3G/HD/SD-SDI Frame Synchronizer with Embedded Audio Processing

Technical Specification cont…

Specifications

Electrical	3Gbit/s SDI, SMPTE 424M
	1.5Gbit/s HD-SDI, SMPTE 292M
	270 Mbit/s SDI, SMPTE 259M-C /DVB-ASI
Connector / Format	BNC/ 75ohm panel jack on standard IQ connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s)
	>-10dB (3Gbit/s)
Output Jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz)
	3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)
Reference Source	External – HD Tri-Level / SD Bilevel/ Input Video syncs
Electrical	Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level)
	SD bi-level – RS170A
	HD Tr-level – SMPTE 240M, 274M and 296M
Connector / Format	BNC/75 ohm panel jack on standard IQ connector panel
Analog Reference Return Loss	
	SD bi-level > 40 dB to 5.5 MHz
	HD tri-level > 35 dB to 30 MHz

Video Standards
1125(1080)/50p (A & B), 1125(1080)/59p (A & B)
750(720)/50p, 750(720)/59p,
1125(1080)/25i, 1125(1080)/29i
625(576)/25i, 525(480)/29i

Minimum Delay (Reference lock or free run)
SD: 67us
HD: 28us
3G-A: 15us
3G-B: 25us

Typical delay (Input lock)
SD: 70us
HD: 38us
3G-A: 19us
3G-B: 40us

Synchronizer Hysteresis Window
5 µs

Embedded audio handling
HD - 24-bit synchronous
48 kHz to SMPTE 299M
SD - 20-bit synchronous
48 kHz to SMPTE 272M-A

Embedded Audio Delay
Minimum (PCM) 2 ms
Maximum (non-PCM)
SD: 67us
HD: 28us
3G-A: 15us
3G-B: 25us

Power Consumption

Module Power Consumption
11W Max (A Frames)
10.5 PR (B Frames)

IQSYN11

3G/HD/SD-SDI Dual Channel Frame Synchronizer

The IQSYN11 provides frame synchronization for HD-SDI at 3Gbit/s or 1.5 Gbit/s, or SD-SDI 270 Mbit/s. Includes dual channel independent SDI input processing functionality and agile synchronization. A video proc amp provides complete control over the video levels. The IQSYN11 is a space efficient low cost solution that includes core functionality.

Features

- Dual channel 3G/HD/SD-SDI synchronizer providing two independant video path processing on one card with up to 3 frames of video delay per channel
- Standards supported:
  - 3G-SDI to SMPTE 424M/425M level A & B compatible
  - HD-SDI to SMPTE292M/274M/296M
  - SD-SDI to SMPTE259M-C
- Loop-though reference capable of detecting and referencing to a bi-level or tri-level signal and selection from either external input directly or from internal IQH3B chassis reference bus
- Select either external input reference direct or from internal IQH3B chassis reference bus
- Precision genlock adjustment allowing you to time any SDI signal accurately
- Agile, router switching tolerant synchronizer operation
- Able to pass all ancillary data with independent HANC and VANC blanking control
- Input loss detection – default output of black/pattern/freeze
- Edit function for static/animated caption overlay on Video output
- Can be used as a video delay, up to 3 frames per channel
- Video proc. amp controls including video gain, offset and hue, including Y/C picture position adjustment
- In-built test pattern generator and audio tone generator
- 16 x user memories, save/recall/rename
- RollCall control and monitoring compatible

Why should you choose this module?

- Agile video synchronization provides greater tolerance to mis-timed upstream SDI switching (up to +/- 5 lines), ensuring disturbance free picture output
- Dual channel, flexible handling of input loss – pass through or switch to black/patterns/freeze - and integrated video controls make the IQSYN11 an ideal synchronizer for incoming lines applications
- Full RollCall and SNMP compatibility allows easy integration with SAM, or third party, network management systems providing an all-inclusive monitoring and control solution

Order codes
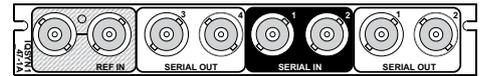
IQSYN1147-1A3
3G/HD/SD-SDI Synchronizer. 2 inputs, 4 outputs, reference loop-through.

IQSYN1147-1B3
3G/HD/SD-SDI Synchronizer. 2 inputs, 4 outputs, external loop-through and internal frame reference selection

For more details on enclosure types please refer to Frames / enclosures section.

IQSYN11

3G/HD/SD-SDI Dual Channel Frame Synchronizer

Inputs

| 1 → | SDI RX & Equalization | → | Video Proc. Amp | → | Video Synchronizer & Firewall | → | Additional Delay | → | Pattern & Caption | → | Ancillary Blanking | → | SDI TX | → 1 / 2 |

| 2 → | SDI RX & Equalization | → | Video Proc. Amp | → | Video Synchronizer & Firewall | → | Additional Delay | → | Pattern & Caption | → | Ancillary Blanking | → | SDI TX | → 1 / 2 |

Ref Loop — Adjustable Bi & Tri-level Reference

Test Pattern Generator

Internal frame Ref A - B

Built-in Intelligence

Outputs

⌃ **Block Diagram** for IQSYN1147-1A

IQH3B Chassis Reference Bus inputs

Network Intelligence, Control & Monitoring

Technical Specification

Inputs & Outputs

Signal Inputs

SDI Inputs	1 per Channel
Input 1 Cable Length	Up to 70m Belden 1694A @ 3 Gbit/s
	Up to 160m Belden 1694A @ 1.5 Gbit/s
	>350m Belden 1694A @ 270 Mbit/s
Input 2 Cable Length	Up to 60m Belden 1694A @ 3 Gbit/s
	Up to 100m Belden 1694A @ 1.5 Gbit/s
	Up to 200m Belden 1694A @ 270 Mbit/s
Analog Reference	1 x Analog Reference with passive loop-through Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level)
	SD bi-level – RS170A
	HD Tri-level – SMPTE 240M,
	274M and 296M

Signal Outputs

SDI Outputs	x 2 per Channel

Controls

Indicators

Power	OK (Green)
CPU running	OK (Green flashing)
FPGA running	OK (Green flashing)
Status	OK (Green)
	Warning (Yellow)
	Error (Red)
Input 1	OK (Green)
Input 2	OK (Green)
Reference lock	OK or Cross-locking (Green), Std error (Green flashing)

Controls

Genlock & Video Delay

Genlock Mode	Free-run, Lock to Reference, Lock to input
Genlock H-Phase	± 0.5H in pixel clock steps
Genlock V-Phase	± 0.5F in 1 line steps
Video H-Delay	0 – 1 Line in pixel clock steps
Video V-Delay	0 – 1 Frame in 1 line steps
Video Delay Frames	0 - 3 F
Reference select mode	Module input reference or IQH3B Reference A or B

Video Controls (per channel)

Input Standard	1125(1080)/50P (A & B),
	1125(1080)/59P (A & B),
	1125(1080)/29i, 1125(1080)/25i,
	750(720)/59P, 750(720)/50P,
	525(480)/29i,625(576)/25i
Default Video Output Type	Pattern, Freeze, Black
Default Video Output Standard	Last Known Good,
	1125(1080)/50P (A & B),
	1125(1080)/59P (A & B),
	1125(1080)/29i, 1125(1080)/25i,
	750(720)/59P, 750(720)/50P,
	525(480)/29i, 625(576)/25i
Input Select	Input 1, Input 2
Manual Freeze	On/Off
Freeze	Field/Frame
VANC Data	Blank VANC
SD VANC Data	Line blanking (23/336 in 625, 21,22, 283, 284 in 525)
HANC Data	Blank HANC (Removes all HANC data.
ProcAmp Enable	On/Off
Black Level	±100 mV in steps of 0.8 mV
Hue Adjust	±180° in steps of 1°
Master Video Gain	±6 dB in steps of 0.1 dB

IQSYN11   3G/HD/SD-SDI Dual Channel Frame Synchronizer

Technical Specification cont…

Y-Gain	±6 dB in steps of 0.1 dB
Cb/Cr Gain	±6 dB in steps of 0.1 dB
Y/C Timing	±8 pixels in 2 pixel steps (SD)
	±16 pixels in 2 pixel steps (HD/3G)
Picture Position	±8 pixels in 2 pixel steps (SD)
	±16 pixels in 2 pixel steps (HD/3G)
Pattern On	On/Off
Pattern Select	75% Color Bars, Black
Caption On	On/Off
Edit Caption	19 characters available
Animated Caption	Slow,medium,fast
HANC Data	Blank HANC Removes all HANC data. Note this includes removal of embedded audio
VANC Data	Blank VANC

Other Controls

User Memories	16 x Save, Recall, Rename
Memory Naming	User configurable naming of memories 1 – 16
Information Window	Video Input Status, Reference Statu
Factory Default	Resets all module settings to factory specified default values and clears memories
Default Settings	Resets all module settings to factory specified defaults but does not clear memories
Restart	Software restart of the module
Module Information	Reports following module information: Software version, Serial number, Build number, KOS version, Firmware version, PCB version

Specifications

Electrical	3Gbit/s SDI, SMPTE 424M
	1.5Gbit/s HD-SDI, SMPTE 292M
	270 Mbit/s SDI, SMPTE 259M-C / DVB-ASI
Connector / Format	BNC/ 75ohm panel jack on standard IQ connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s)
	>-10dB (3Gbit/s)
Output Jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz)
	3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)
Reference Source	External – HD Tri-Level / SD bi-level / Input Video syncs
Electrical	Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level)
	SD bi-level – RS170A
	HD Tr-level – SMPTE 240M, 274M and 296M
Connector / Format	BNC/75 ohm panel jack on standard IQ connector panel
Analog Reference Return Loss	
	SD bi-level > 40 dB to 5.5 MHz
	HD tri-level > 35 dB to 30 MHz
Video Standards	
	1125(1080)/50p (A & B), 1125(1080)/59p (A & B)
	750(720)/50p, 750(720)/59p,
	1125(1080)/25i, 1125(1080)/29i
	625(576)/25i, 525(480)/29i
Minimum Delay (Reference lock or free run)	
	SD: 67us
	HD: 28us
	3G-A: 15us
	3G-B: 25us
Typical delay (Input lock)	
	SD: 70us
	HD: 38us
	3G-A: 19us
	3G-B: 40us
Synchronizer Hysteresis Window	
	5 µs

Power Consumption

Module Power Consumption	8.5W Max (A Frames)
	8.5 PR (B Frames)

IQSYN00

SDI Frame Synchronizer with Embedded Audio Processing

A powerful SDI video synchronizer with advanced embedded audio handling and gamut legalizer. Video and audio proc. amp capability makes this module ideal for SD lines-in applications. All audio manipulation is at the channel-level suiting discreet surround and multi-lingual use. Its firewall capability ensures continuous audio and video output even when the input signal fails. A dual SDI input allows this synchronizer to take signals from either of two paths. This can be used for handling main and redundant feeds, or it can be used with a composite decoder such as the IQDEC02 to provide analog and digital alternative inputs.

Features

- SDI synchronizer with tracking audio delay
- Sophisticated color Gamut legalizer
- Separate Cb and CbCr gain adjustment
- Separate Cb and Cr offset adjustment
- Hue adjustment
- Firewall for video and processed PCM audio to provide a continuous output
- Transparent to Dolby E / non-PCM audio
- Handles up to 24 bit embedded audio present on the incoming SDI stream, and processes audio for re-insertion at 20 bits
- Eight channel audio processor with channel level manipulation
- Channel level (Sub-frame) routing
- 4 off 4 channel assignable audio mixers
- Video proc. amp (gain, saturation, black level)
- Audio proc. amp and delay
- Flexible audio delay including common fixed delay and tracking delay
- Tracking audio delay of up to 0.5s which seamlessly tracks the video delay or external RollTrack / GPI inputs
- Second input allows split operation, with video taken from one input and embedded audio from the other
- Up to 3 frames of video delay in delay mode
- RollCall control and monitoring compatible

Why should you choose this module?

- For all general SDI synchronization tasks including embedded audio handling
- An ideal lines input processor with full control of audio and video parameters, including proc. amp and delays
- To ensure the signal remains within the confines of the RGB gamut space a sophisticated legalizer operates on both luminance and chrominance to give the closest legal color under all conditions
- Allows an SDI router to provide split audio and video operation by taking video from one input and embedded audio from the other

Order codes
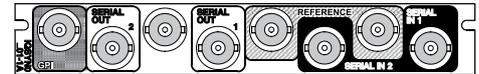
IQSYN0001–1A
SDI frame synchronizer with embedded audio processing. 2 SDI inputs, 2 SDI outputs, analog reference loop-through.

For more details on enclosure types please refer to Frames and Hardware Section.

IQSYN00

SDI Frame Synchronizer with Embedded Audio Processing
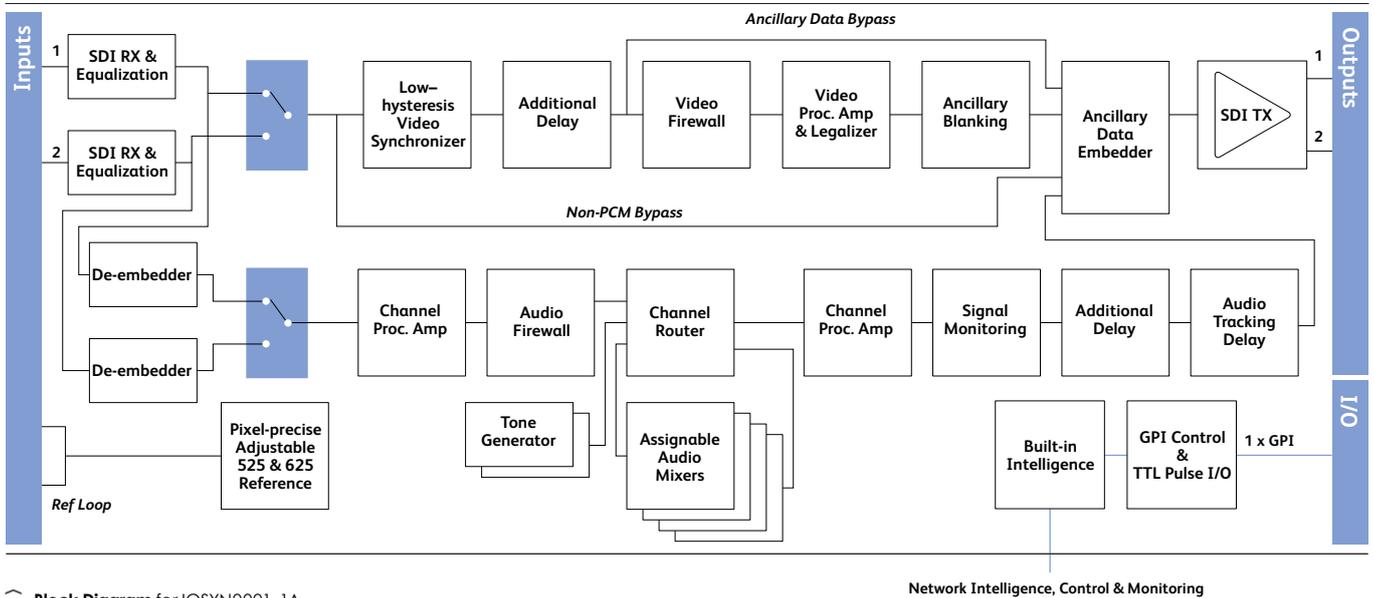
Block Diagram for IQSYN0001–1A

Technical Specification

Inputs and Outputs

Signal Inputs

Digital video	Up to 2 x SDI (BNC)
Standards	SMPTE 259M-C-1997, SMPTE 272M-A-1994
Video reference	Composite video (BNC)

Signal Outputs

Digital video	SDI x 2
Standards	SMPTE 259M-C-1997, SMPTE 272M-A-1994

Control Interface	
GPI	1 x Closing contact I/O interface

Card Edge and RollCall Controls

Card Edge Controls

NONE

Card Edge Indicators

SDI input loss	Loss = Off, Good = Green
SDI input error	Yellow (Unused input not at current operating standard)

Reference loss

CPU running / power	One green LED, flashing = OK

RollCall Functions

Audio Controls

Audio extraction select	SDI input 1/2/Follow Video Control
Set headroom	4 to 24 dB in 1 dB steps
Set audio detector thresholds	High and low levels, time delay
Input side control proc. – audio gain and polarity	Independent Gain, Mute, Polarity control over de-embedded channels. ±18 dB in 0.1 dB steps
Channel routing	Output channels routed from SDI 8 embedded channels from any group, test tone and silence
Output side control proc. – gain and polarity	Independent Gain, Mute, and Polarity control over embedded output channels. ±18 dB in 0.1 dB steps
Lock	Control to select the clock source from the output side of the synchronizer – Video, Input 1, internal
Global delay offset	Up to +1.5s in 1 ms steps, common to all processed audio
Variable audio delay control source	Up to 0.5s from RollTrack + GPI + video synchronizer
Tone frequency, amplitude and ident	2 channel tone generator. 100 Hz to 15 kHz in 100 Hz steps

Tone Setup

Frequency	100 Hz to 15 kHz in 100 Hz steps
Channel ident	0.5s interruption every 2s

IQSYN00

SDI Frame Synchronizer with Embedded Audio Processing

Technical Specification cont…

Video Controls

Select primary input	1/2
RGB legalizer	On/ Off
Black level	±100 mV in 0.8 mV steps
Hue adjust	±180°
Cb gain offset	±1 dB in 0.1dB steps
Cb offset	±50 mV in 1 mV steps
Cr offset	±50 mV in 1 mV steps
Y min/max clipper value	-50 mV to +50 mV and 635 mV to 765 mV in 1 mV steps
C min/max clipper value	±300 mV to ±398 mV in 1 mV steps
Y/C timing	±592 ns in 148 ns steps
Picture position	±592 ns in 148 ns steps
Luminance gain	±6 dB
Chrominance gain	±6 dB
Genlock mode	Free-run / Genlock / Primary SDI (delay mode)
Genlock H phase	±32 µs in 37 ns steps
Genlock V phase	±262/312 lines in 1 line steps
Video horizontal delay	+1 Line in 37 ns steps
Video vertical delay	+1 Frame in 1 line steps
Video delay frames	0 to +2 frames

Other Controls

Pass vertical data	On / Off (lines selectable 7/11 to 23/21 and 320/274 to 335/283)
Preset unit	Returns initial settings to default
Pattern select	100% Bars / 75% Bars / Multiburst / Black / Animated Bars / Pulse + Bar
User memories	Name, clear, save and read 8 user memories
Default video output	Pattern / freeze/ run through
Default audio output	Silence
Caption output	On / Off
Caption generator	Programmable up to 19 characters
GPI/O set-up	May be attached to any memory function / polarity

Reporting * also Logged

EDH (for selected input)	*EDH Error / *Error-Time / *EDH Error-Seconds
No SDI	*No input present
No reference	*No reference present
Reference error	Standard different to selected input
Input ancillary error	ANC Error / ANC Error-Seconds
Input error	Unused input not at current operating standard
Report embedded audio data	Report audio data pairs on input and output SDI
Audio silence, high level, low level, overflow	For processed audio channels only

RollTrack Input

Delay	Audio delay – Fixed, RollTrack + fixed, Internal Sync + Fixed

RollTrack Output

Delay	Current video/audio delay
Reference state	Ref Lost, Ref Present, Ref error [error: different standard to input – input has precedence]
Input state	Selected Input: Input Present, Input Missing, Standard 525, Standard 625 Input 1: Input Present, Input Missing, Standard 525, Standard 625 Input 2: Input Present, Input Missing, Standard 525, Standard 625 GPI 1 Low, High, Inactive
Embedded audio state	De-embed 1-8 Lost/Present

Specifications

Video internal processing	4:2:2 with 10 bit data paths
Serial input return loss	Better than 15 dB to 270 MHz
Maximum input cable length	>200 m (PSF1/2 or equiv. cable)
Serial output level	800 mV ±5%
Output overshoot	<70 mV
Output return loss	Better than -15 dB to 270 MHz
Output jitter	<0.2 UI (with 10 Hz High pass filter selected on 601 monitor)
Reference return loss	Better than -35 dB to 5.8 MHz
Reference input level	1 Vp-p ± 3 dB
Minimum delay	6 µs
Synchronize hysteresis window	0.5 - 1 µs
Delay (synchronize mode)	Sync delay +0, 1 or 2 Frames
Delay (delay mode)	6 µs - 3 Frames +5.5 µs

Power Consumption

Module power consumption	7 W max (A Frames) 6 PR (B Frames)

IQMUX10/12

8 Channel Digital Audio Embedder with Synchronizer

A powerful SDI video synchronizer with 4 x AES/EBU stream embedder and advanced embedded audio handling. Ideal as a general digital ingest module where any digital audio source signal can be catered for, even combinations of embedded and external digital audio. All audio manipulation is at the channel-level suiting discreet surround and multi-lingual use. Its firewall capability ensures errors or interruptions in the input signal are not passed through to the output. In addition to its tracking audio delay, it also has a bulk audio delay feature. To complete the delay flexibility, it has a built-in video delay that can be used to adjust to match external audio processing delays, such as that from a Dolby E encoder. A dual SDI input allows the unit to take signals from either of two paths. This can be used for handling main and redundant feeds, or it can be used with a composite decoder such as the IQDEC02 to provide analog and digital alternative inputs. The second input also allows split operation, with video taken from one input and embedded audio from the other.

As a further function, this module can be used to provide separate audio and video routing in an embedded SDI environment. In this way, two levels of a SDI router feed separately the video and audio to a single destination. In this case however, the normal mode of operation can be supplemented by a small AES router allowing a few destinations at a time to have a mix capability between multiple audio sources.

Features

- SDI synchronizer with tracking audio delay
- Combine AES and embedded source channels
- Handles 4 AES streams or any eight embedded input channels to total eight output channels
- Handles up to 24 bit embedded audio present on the incoming SDI stream or AES inputs, and embeds/de-embeds to 20 bits
- Channel-level (Sub-frame) routing
- 4 off 4 channel assignable audio mixers
- Flexible audio delay including per pair fixed delay, common fixed delay and tracking delay
- Firewall for video and processed PCM audio to provide a continuous output
- Variable audio delay of up to 0.5s which seamlessly tracks the video delay or external RollTrack / GPI inputs
- Video proc. amp (gain, saturation, black level)
- Up to 3 frames of video delay
- RollCall control and monitoring compatible

Why should you choose this module?

- Provides a complete synchronizing solution for SDI video and 4 streams of AES audio
- Allows the use of mixed AES and embedded audio where both must be accommodated or combinations may be required
- A complete AV solution for incoming lines with firewall, proc. amp, audio shuffling and delay

Order codes
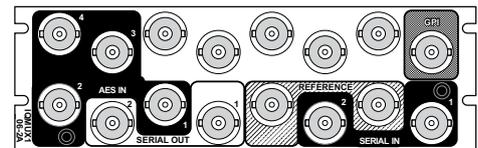
IQMUX1006-2A
SDI and 8 channel AES embedder synchronizer with extended video delay. Unbalanced AES connection. 2 SDI inputs, 4 AES inputs, 2 SDI outputs, analog reference loop-through, 1 GPI.
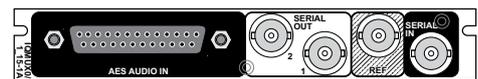
IQMUX1215-1A
SDI and 8 channel AES embedder synchronizer with extended video delay. Balanced AES connection. 1 SDI input, 4 AES inputs, 2 SDI outputs, analog reference.
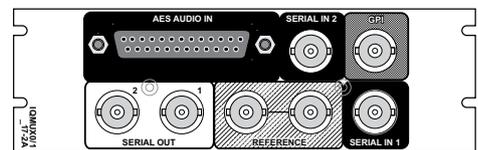
IQMUX1217-2A
SDI and 8 channel AES embedder synchronizer with extended video delay. Balanced AES connection. 2 SDI inputs, 4 AES inputs, 2 SDI outputs, analog reference loop-through, 1 GPI.

For more details on enclosure types please refer to Frames and Hardware Section.

IQMUX10/12

8 Channel Digital Audio Embedder with Synchronizer
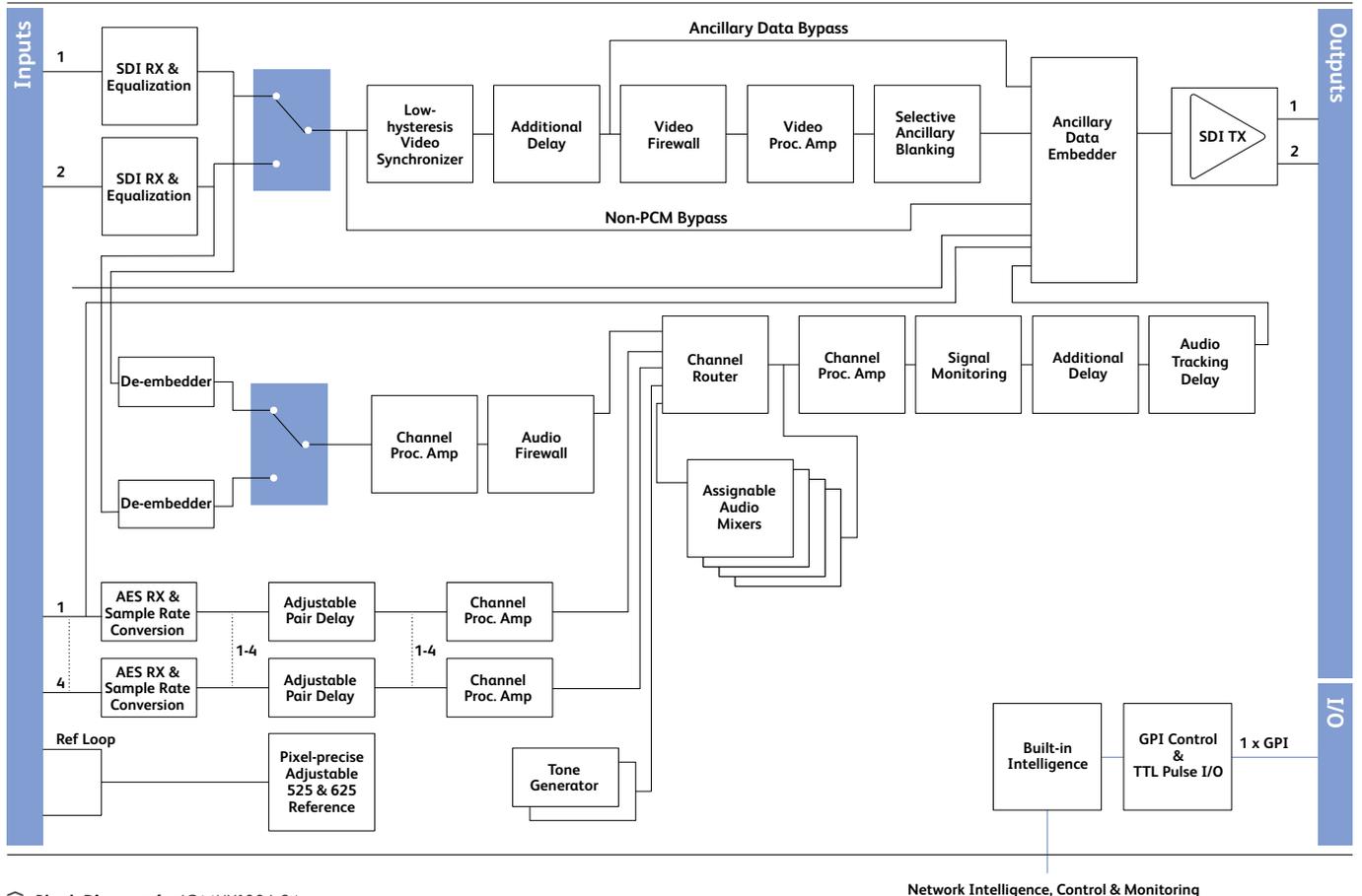
Block Diagram for IQMUX1006-2A

Network Intelligence, Control & Monitoring

Technical Specification

Inputs and Outputs

Signal Inputs

Digital video	2 x SDI (BNC)
Video reference	Composite video (BNC)
Unbalanced digital audio	4 x AES/EBU (BNC)
Balanced digital audio	4 x AES/EBU (25Way D-Type)
Standards	SMPTE 259M-C-1997, SMPTE 272M-A-1994, AES3-1992

Signal Outputs

Digital video	SDI x 2
Standards	SMPTE 259M-C-1997, SMPTE 272M-A-1994

Control Interface	
GPI	1 x Closing contact I/O interface (BNC, Double Width only)

Card Edge and RollCall Controls

Card Edge Controls

NONE

Card Edge Indicators

SDI input loss	Loss = Off, Good = Green
SDI input error	Yellow = Unused input not at current operating standard
AES input present	1 x LED per pair

Reference Loss

CPU running / power	One green LED, flashing = OK

RollCall Functions

Audio Controls

Audio extraction select	SDI input 1/2/Follow Video Control
Set headroom	4 to 24 dB in 1 dB steps
Set audio detector thresholds	High and low levels, time delay
External input audio delay	Up to 1.5s additional delay in 1 ms steps
Input side control proc. - audio gain and polarity	Independent Gain, Mute, Polarity control over de-embedded and input channels. +18 dB to –18 dB in 0.1 dB steps
Channel routing	Output channels routed from AES pairs 1 to 4, test tone and silence, SDI 8 embedded channels from any group
Output side control proc. - gain and polarity	Independent Gain, Mute, and Polarity control over embedded output channels. +18 dB to –18 dB in 0.1 dB steps
Lock	ontrol to select the clock source from the output side of the synchronizer – Video, AES reference, Input 1, internal
Global delay offset	Up to +1.5s in 1 ms steps, common to all processed audio
Variable audio delay control source	Up to 0.5s from RollTrack + GPI + video synchronizer
Tone frequency, amplitude and ident	2-channel tone generator. 100 Hz to 10 kHz in 100 Hz steps

IQMUX10/12

8 Channel Digital Audio Embedder with Synchronizer

Technical Specification

Tone Setup

Frequency	100 Hz to 10 kHz in 100 Hz steps
Channel ident	0.5s interruption every 2s

Video Controls

Select primary input	1/2
Black level	±100 mV in 0.8 mV steps
Y/C timing	±592 ns in 148 ns steps
Picture position	±592 ns in 148 ns steps
Luminance gain	±6 dB
Chrominance gain	±6 dB
Genlock mode	Free-run / Genlock / Primary SDI (delay mode)
Genlock H phase	±32 µs in 74 ns steps
Genlock V phase	±262/312 lines in 1 line steps
Video delay	+0 to +2 frames

Other Controls

Pass vertical data	On/Off (lines selectable 7/11 to 23/21 and 320/274 to 335/283)
Preset unit	Returns all settings to default
Pattern select	100%/75% Bars, Multiburst, Black, Animated Bars
User memories	Name, clear, save and read 8 user memories
Default video output	Pattern / freeze/ run through
Default audio output	Silence
Caption output	On/Off (default and pattern output only)
Caption generator	Programmable up to 19 characters
GPI/O set-up	May be attached to any memory function/ polarity

Reporting (* also Logged)

EDH (for selected input)	*Presence, *Error-Time, *Error- Seconds
No SDI	*No input present
No reference	*No reference present
Reference error	Standard different to selected input
Input ancillary error	ANC error, ANC error-seconds
Input error	Unused input not at current operating standard
Report embedded audio Data	Report audio data pairs on input and output SDI
Audio silence, high level, low level, overflow	For processed audio channels only

RollTrack Input

Delay	Audio delay – Fixed, RollTrack + fixed, Internal Sync + Fixed

RollTrack Output

Delay	Current video/audio delay
Input state	Selected Input: Input Present, Input Missing, Std 525, Std 625
	Input 1: Input Present, Input Missing, Std 525, Std 625
	Input 2: Input Present, Input Missing, Std 525, Std 625
Reference state	Ref Lost, Ref Present, Ref error [error: different standard to input – input has precedence
Embedded audio state	Pair present
External AES audio state	Pair present

Specifications

Video internal

Processing	4:2:2 with 10 bit data paths
Serial input return loss	Better than 15 dB to 270 MHz
Maximum input cable length	>200 m (PSF1/2 or equiv. cable)
Serial output level	800 mV ±5%
Output overshoot	<70 mV
Output return loss	Better than 15 dB to 270 MHz
Output jitter	<0.2 UI (with 10 Hz High pass filter selected on 601 monitor)
Reference return loss	Better than -35 dB to 5.8 MHz
Reference input level	1 V p-p ± 3 dB
Minimum delay	6 µs
Synchronize hysteresis window	0.5 - 1 µs
Delay (synchronize mode)	Sync delay + 0, 1 or 2 Frames
Delay (delay mode)	6 µs - 3 Frames + 5.5 µs
THD+N	<-117 dB @ 700 Hz (24 bits) AES to AES

Digital Audio Input (Balanced)

Connector / format	25 W D
Sample frequency	25 – 55 kHz, 48 kHz for Ref
Input cable length	>150 m of AES3 cable
Impedance	110 Ohms

Digital Audio Input (Unbalanced)

Connector / format	BNC
Sample frequency	25 – 55 kHz, 48 kHz for Ref
Input cable length	>500 m of RG59 cable
Impedance	75 Ohms
Output sampling	48 kHz frame locked to 48 kHz AES/EBU Reference in AES lock mode Digital Audio Output (Balanced)

Power Consumption

Module power consumption	9 W max (A Frames)
	8 PR (B Frames)

IQDMX10/12

SDI Synchronizer and 8 Channel AES De-embedder

A powerful SDI video synchronizer with 4 x AES/EBU stream de-embedder and advanced embedded audio handling. All audio manipulation is at the channel-level suiting discreet surround and multi-lingual use. In addition to its tracking audio delay, it also has a bulk audio delay feature. To complete the delay flexibility, it has a built-in video delay that can be used to adjust to match external audio processing such as that from a Dolby E encoder. Its firewall capability ensures continuous audio and video output even when the input signal fails. A dual SDI input allows this synchronizer to take signals from either of two paths thus allowing split operation, with video taken from one input and embedded audio from the other.

Features

- SDI synchronizer and 8 channel AES de-embedder
- Can de-embed AES/EBU, AC3 and Dolby E digital audio data
- Handles up to 24 bit embedded audio present on the incoming SDI stream, and de-embeds / embeds to 20 bits
- Flexible audio delay including common fixed delay and tracking delay
- A further audio delay of up to 0.5s which seamlessly tracks the video delay or external RollTrack / GPI inputs
- Firewall for video and processed PCM audio to provide a continuous output
- Transparent to Dolby E / non-PCM audio
- Eight channel audio processor with channel level manipulation
- Channel level (Sub-frame) routing
- 4 off 4 channel audio mixers
- Video proc. amp (gain, saturation, black level)
- Video test pattern generator, 2 channel audio tone generator
- Up to 3 frames of video delay in delay mode
- RollCall control and monitoring compatible

Why should you choose this module?

- This module provides a comprehensive solution for taking asynchronous SDI input feeds and providing AES audio alongside synchronous video
- Superb for a lines input role, with proc. amps on both audio and video signals
- Can be used as a general video synchronizer with audio monitoring
- Video delay feature allows this module to be used where a Dolby E decoder, for example, is to be placed downstream of the AES outputs

Order codes
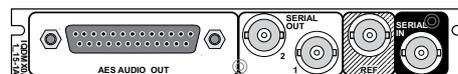
IQDMX1215-1A
SDI and 8 channel AES de-embedder synchronizer with extended video delay. Balanced AES connection. 1 SDI input, 4 AES outputs, 2 SDI outputs, analog reference.
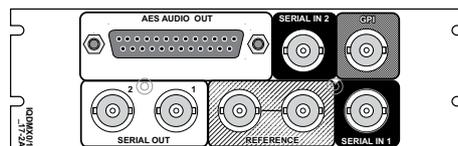
IQDMX1217-2A
SDI and 8 channel AES de-embedder synchronizer with extended video delay. Balanced AES connection. 2 SDI inputs, 4 AES outputs, 2 SDI outputs, analog reference loop-through, 1 GPI.
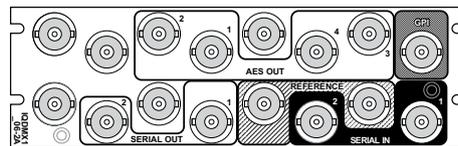
IQDMX1006-2A
SDI and 8 channel AES de-embedder synchronizer with extended video delay. Unbalanced AES connection. 2 SDI inputs, 4 AES outputs, 2 SDI outputs, analog reference loop-through, 1 GPI.

IQDMX10/12

SDI Synchronizer and 8 Channel AES De-embedder
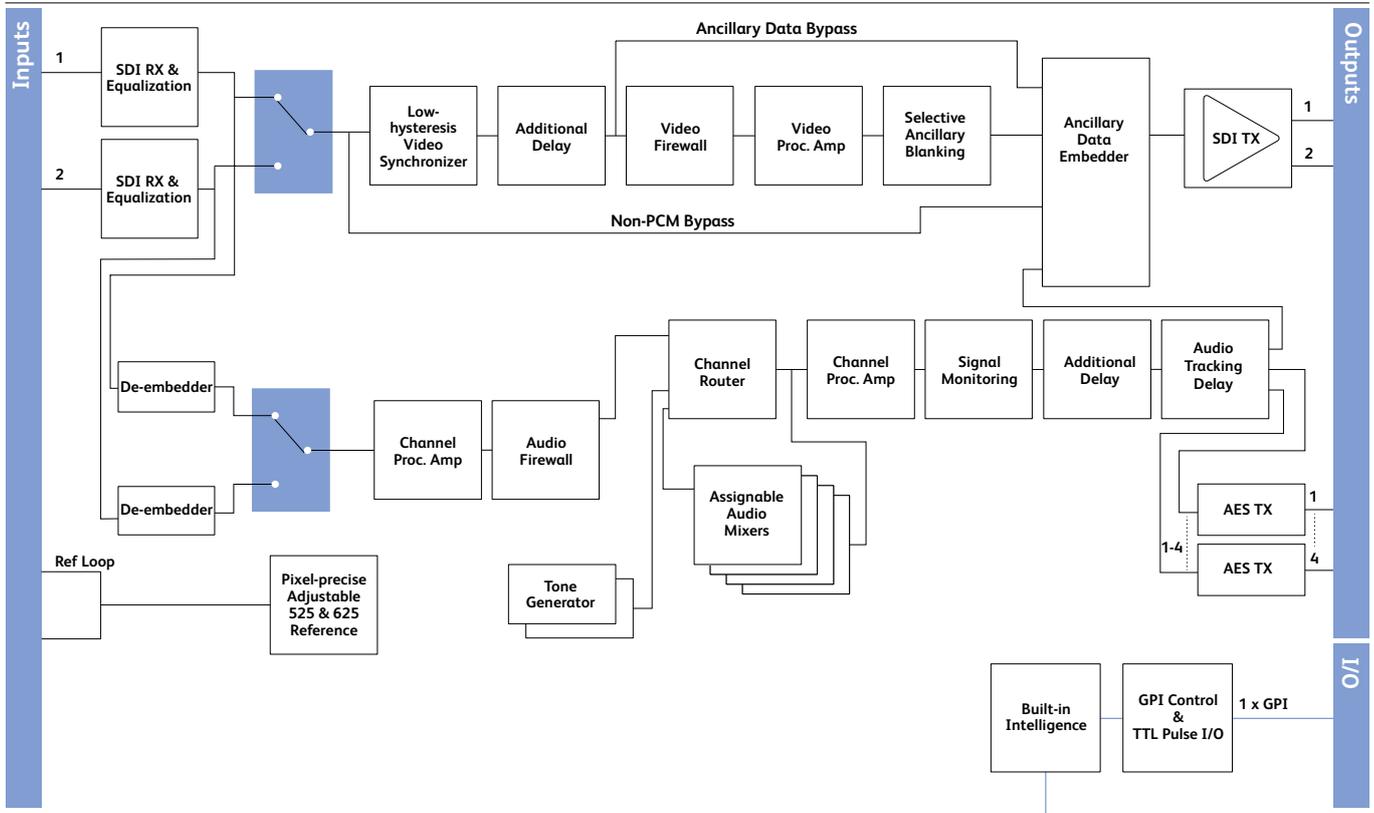
⌒ **Block Diagram** for IQDMX1006-2A

Network Intelligence, Control & Monitoring

Technical Specification

Inputs and Outputs

Signal Inputs
Digital video	2 x SDI (BNC)
Video reference	Composite video (BNC)
Standards	SMPTE 259M-C-1997, SMPTE 272M-A-1994

Signal Outputs
Digital video	SDI x 2
Unbalanced digital audio	4 x AES/EBU (BNC)
Balanced digital audio	4 x AES/EBU (25Way D-Type)
Standards	SMPTE 259M-C-1997, SMPTE 272M-A-1994, AES3-1992

Control Interface	
GPI	1 x Closing contact I/O interface (BNC)

Card Edge and RollCall Controls

Card Edge Controls
NONE

Card Edge Indicators
SDI input loss	Loss = Off, Good = Green
SDI input error	Yellow = Unused input not at current operating standard

Reference Loss
CPU running / power	One green LED, flashing = OK

RollCall Functions

Audio Controls
Audio extraction select	SDI input 1/2/Follow Video Control
Set headroom	4 to 24 dB in 1 dB steps
Set audio detector thresholds	High and low levels, time delay
Input side control proc. - audio gain and polarity	Independent Gain, Mute, Polarity control over de-embedded audio. +18 dB to –18 dB in 0.1 dB steps.
Channel routing	Output channels routed from test tone, silence or SDI 8 embedded channels from any group
Output side control proc. - gain and polarity	Independent Gain, Mute, and Polarity control over embedded and AES output channels. +18 dB to –18 dB in 0.1 dB steps
Lock	Control to select the clock source from the output side of the synchronizer – Video, Input 1, internal
Global delay offset	Up to +1.5s in 1 ms steps, common to all processed audio
Variable audio delay control source	Up to 0.5s from RollTrack + GPI + video synchronizer
Tone frequency, amplitude and ident	2-channel tone generator. 100 Hz to 10 kHz in 100 Hz steps

Tone Setup
Frequency	100 Hz to 10 kHz in 100 Hz steps
Channel ident	0.5s interruption every 2s

IQDMX10/12

SDI Synchronizer and 8 Channel AES De-embedder

Video Controls

Select primary input	1/2
Black level	±100 mV in 0.8 mV steps
Y/C timing	±592 ns in 148 ns steps
Picture position	±592 ns in 148 ns steps
Luminance gain	±6 dB
Chrominance gain	±6 dB
Genlock mode	Free-run / Genlock / Primary SDI (delay mode)
Genlock H phase	±32 µs in 74 ns steps
Genlock V phase	±262/312 lines in 1 line steps
Video horizontal delay	+1 Line in 37 ns steps
Video vertical delay	+1 Frame in 1 line steps
Video delay frames	0 to +2 frames

Other Controls

Pass vertical data	On/Off (lines selectable 7/11 to 23/21 and 320/274 to 335/283)
Preset unit	Returns all settings to default
Pattern select	100%/75% Bars, Multiburst, Black, Animated Bars
User memories	Name, clear, save and read 8 user memories
Default video output	Pattern / freeze / run through
Default audio output	Silence
Caption output	On/Off (default and pattern output only)
Caption generator	Programmable up to 19 characters
GPI/O set-up	May be attached to any memory function / polarity

Reporting (* also Logged)

EDH (for selected input)	*Presence, *Error-Time, *Error- Seconds
No SDI	*No input present
No reference	*No reference present
Reference error	Standard different to selected input
Input ancillary error	ANC error, ANC error-seconds
Input error	Unused input not at current operating standard
Report embedded audio data	Report audio data pairs on input and output SDI
Audio silence, high level, low level, overflow	For processed audio channels only
RollTrack Input Delay	Audio delay – Fixed, RollTrack + fixed, Internal Sync + Fixed
RollTrack Output Delay	Current video/audio delay
Input state	Selected Input: Input Present, Input Missing, Standard 525, Standard 625 Input 1: Input Present, Input Missing, Standard 525, Standard 625 Input 2: Input Present, Input Missing, Standard 525, Standard 625 GPI 1 Low, High, Inactive
Reference state	Ref Lost, Ref Present, Ref error [error: different standard to input – input has precedence
Embedded audio state	De-embed 1-8 Lost/Present

Specifications

Video internal processing	4:2:2 with 10 bit data paths
Serial input return loss	Better than 15 dB to 270 MHz
Maximum input cable length	>200 m (PSF1/2 or equiv. cable)
Serial output level	800 mV ±5%
Output overshoot	<70 mV
Output return loss	Better than 15 dB to 270 MHz
Output jitter	<0.2 UI (with 10 Hz High pass filter selected on 601 monitor)
Reference return loss	Better than -35 dB to 5.8 MHz
Reference input level	1 V p-p ±3 dB
Minimum delay	6 µs
Synchronize hysteresis window	0.5 - 1 µs
Delay (synchronize mode)	Sync delay + 0, 1 or 2 Frames
Delay	6 µs - 3 Frames + 5.5 µs
THD+ N	<-117 dB @ 700 Hz (24 bits) AES to AES

Digital Audio Output (Balanced)

Connector / format	25 W D
Level	3 V p-p typical into 110 Ohms

Digital Audio Output (Unbalanced)

Connector / format	BNC
Level	1 V p-p typical into 75 Ohms

Power Consumption

Module power consumption	9 W max (A Frames) 8 PR (B Frames)

IQDMX20

Frame Synchronizer with 4 Channel Analog Audio De-embedder

The IQDMX20 is a synchronizer/de-embedder with analog audio outputs. This module provides a more enhanced product featuring audio and video synchronization in addition to de-embedding.

Features

- SDI synchronizer and 4 channel analog audio de-embedder
- Flexible audio delay including common fixed delay and tracking delay
- A further audio delay of up to 0.5s which seamlessly tracks the video delay or external RollTrack / GPI inputs
- Firewall for video and processed PCM audio to provide a continuous output
- Transparent to Dolby E / non-PCM audio
- Handles up to 24 bit embedded audio present on the incoming SDI stream, and embeds/de-embeds to 20 bits
- Eight channel audio processor with channel level manipulation
- Channel level (Sub-frame) routing
- 4 off 4 channel audio mixers
- Video proc. amp (gain, saturation, black level)
- Video test pattern generator, 2 channel audio tone generator
- Up to 3 frames of video delay in delay mode
- RollCall control and monitoring compatible

Why should you choose this module?

- This module provides a comprehensive solution for taking asynchronous SDI input feeds and providing analog audio alongside synchronous video
- Superb for a lines input role, with proc. amps on both audio and video signals

Order codes
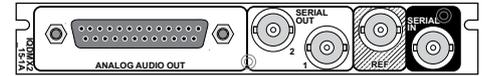
IQDMX2015-1A

SDI and 4 channel analog audio de-embedder with synchronizer and extended video delay. Balanced analog audio connection. 1 SDI input, 4 analog outputs, 2 SDI outputs, analog reference.
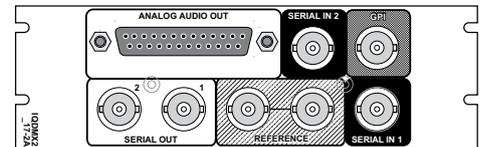
IQDMX2017-2A

SDI and 4 channel analog audio de-embedder with synchronizer and extended video delay. Balanced analog audio connection. 2 SDI inputs, 4 analog outputs, 2 SDI outputs, analog reference, 1 GPI.

For more details on enclosure types please refer to Frames and Hardware Section.
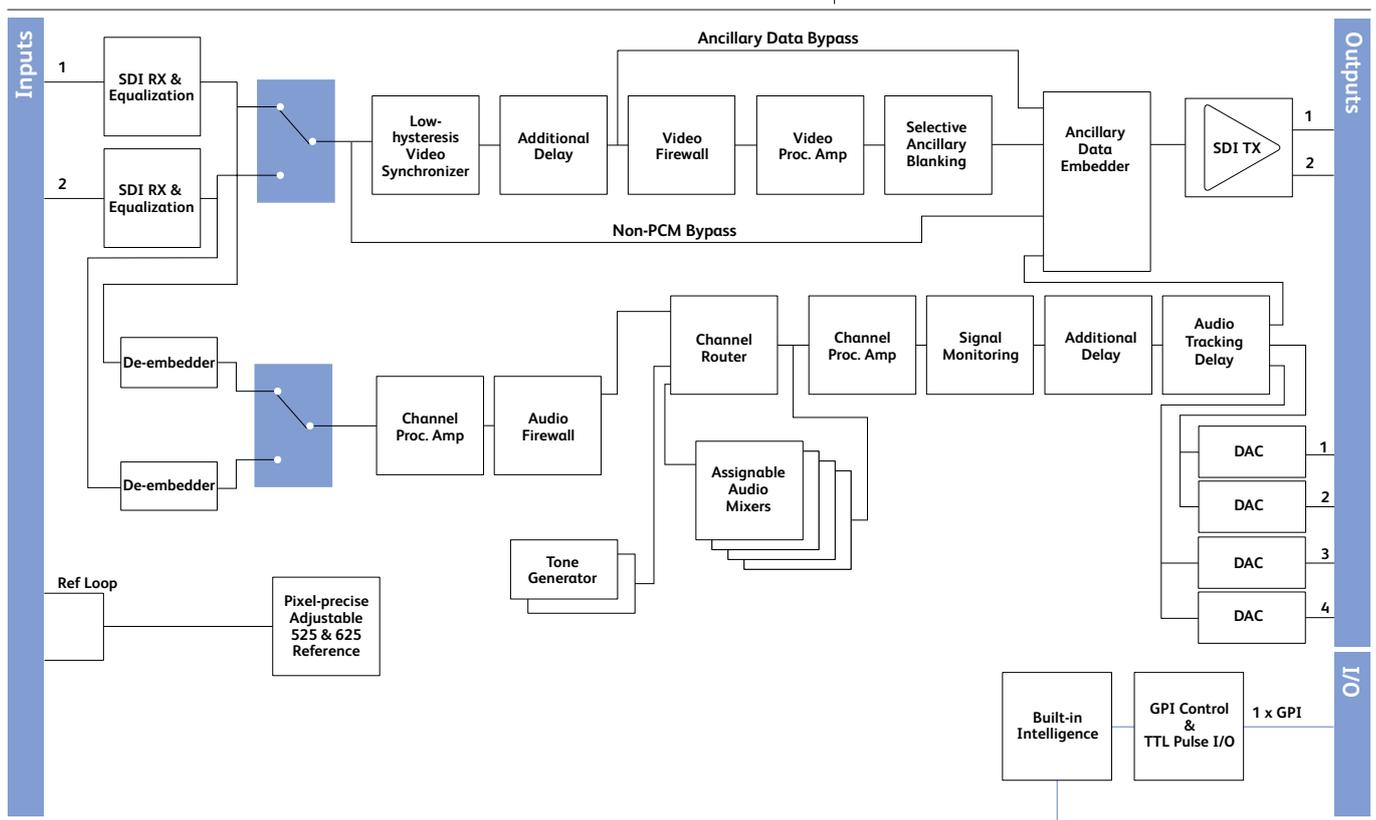
Block Diagram for IQDMX2017-2A

IQDMX20

Frame Synchronizer with 4 Channel Analog Audio De-embedder

Technical Specification

Inputs and Outputs

Signal Inputs

Digital video	2 x SDI (BNC) (1 x SDI – single width versions)
Video reference	Composite video (BNC)

Signal Outputs

Digital video	SDI x 2
Balanced analog audio	4 channels (25 Way D-Type)
Control Interface	
GPI	1 x Closing contact I/O interface (BNC)

Card Edge and RollCall Controls

Card Edge Controls

NONE

Card Edge Indicators

SDI input loss	Loss = Off, Good = Green
SDI input error	Yellow = Unused input not at current operating standard

Reference Loss

CPU running / power	One green LED, flashing = OK

RollCall Functions
Audio Controls

Audio extraction select	SDI input 1/2/Follow Video Control
Set line up level	+20 to –20 dBu in 1 dB steps
Set headroom	4 to 24 dB in 1 dB steps
Set audio detector thresholds	High and low levels, time delay
Input side control proc. - audio gain and polarity	Independent Gain, Mute, Polarity control over de-embedded audio. +18 dB to –18 dB in 0.1 dB steps
Channel routing	Output channels routed from test tone, silence or SDI 8 embedded channels from any group
Output side control proc. - gain and polarity	Independent Gain, Mute, and Polarity control over embedded and AES output channels. +18 dB to –18 dB in 0.1 dB steps
Lock	Control to select the clock source from the output side of the synchronizer – Video, selected Input, internal
Global delay offset	Up to +1.5s in 1 ms steps, common to all processed audio
Variable audio delay control source	Up to 0.5s from RollTrack + GPI + video synchronizer
Tone frequency, amplitude and ident	2-channel tone generator. 100 Hz to 15 kHz in 100 Hz steps

Tone Setup

Frequency	100 Hz to 15 kHz in 100 Hz steps
Channel ident	0.5s interruption every 2s

Video Controls

Select primary input	1/2
Black level	±100 mV in 0.8 mV steps
Y/C timing	±592 ns in 148 ns steps
Picture position	±592 ns in 148 ns steps
Luminance gain	±6 dB
Chrominance gain	±6 dB
Genlock mode	Free-run / Genlock / Primary SDI (delay mode)
Genlock H phase	±32 µs in 74 ns steps
Genlock V phase	±262/312 lines in 1 line steps
Video horizontal delay	+1 Line in 37 ns steps
Video vertical delay	+1 Frame in 1 line steps
Video delay frames	0 to +2 frames

Other Controls

Pass vertical data	On/Off (lines selectable 7/11 to 23/21 & 320/274 to 335/283)
Preset unit	Returns all settings to default
Pattern select	100%/75% Bars, Multiburst, Black, Animated Bars
User memories	Name, clear, save and read 8 user memories
Default video output	Pattern / freeze/ run through
Default audio output	Silence
Caption output	On/Off (default and pattern output only)
Caption generator	Programmable up to 19 characters
GPI/O set-up	May be attached to any memory function/ polarity

Reporting (* also Logged)

EDH (for selected input)	*Presence, *Error-Time, *Error- Seconds
No SDI	*No input present
No reference	*No reference present
Reference error	Standard different to selected input
Input ancillary error	ANC error, ANC error-seconds
Input error	Unused input not at current operating standard
Report embedded audio data	Report audio data pairs on input and output SDI
Audio silence, high level, low level, overflow	For processed audio channels only

RollTrack Input

Delay	Audio delay – Fixed, RollTrack + fixed, Internal Sync + Fixed

RollTrack Output

Delay	Current video/audio delay
Input state	Selected Input: Input Present, Input Missing, Standard 525, Standard 625
	Input 1: Input Present, Input Missing, Standard 525, Standard 625
	Input 2: Input Present, Input Missing, Standard 525, Standard 625
Reference state	Ref Lost, Ref Present, Ref error [error: different standard to input – input has precedence
Embedded audio state	Pair present

IQDMX20

Technical Specification cont…

Specifications

Video internal

Processing	4:2:2 with 10 bit data paths
Serial input return loss	Better than 15 dB to 270 MHz
Maximum input cable length	>200 m (PSF1/2 or equiv. cable)
Serial output level	800 mV ±5%
Output overshoot	<70 mV
Output return loss	Better than 15 dB to 270 MHz
Output jitter	<0.2 UI (with 10 Hz High pass filter selected on 601 monitor)
Reference return loss	Better than -35 dB to 5.8 MHz
Reference input level	1 V p-p ± 3 dB
Minimum delay	6 µs
Synchronize hysteresis window	0.5 - 1 µs
Delay (synchronize mode)	Sync delay + 0, 1 or 2 Frames
Delay (delay mode)	6 µs - 3 Frames + 5.5 µs
THD+N	<-117 dB @ 700 Hz (24 bits) AES to AES

Analog Audio Outputs

Output impedance	~25 Ohms
THD+N	-92 dB @ 23 dBu typical at 1 kHz
Conversion	Min 20-bit – 105 dB dynamic range
Sampling	48 kHz Synchronous to D1 video stream

Power Consumption

Module power consumption	9.5 W (A Frames)
	8 PR (B Frames)

Embedded Audio

Many operations require audio information to be combined with its corresponding video information into a single signal. Many other operations and equipment require that they be kept separate. IQ Modular offers an extensive choice of embedders and de-embedders for use with SDI signals.

The range of embedded audio modules encompasses different numbers of input channels, is capable of dealing with existing audio, and offers the choice of AES/EBU digital or analog audio formats. The IQMUX33 and IQDMX33 modules can even handle a combination of AES/EBU and analog signals.

For Related Modules see:
IQDBD00/01 in Audio Processing
IQDBE00-03 in Audio Processing
IQUPC01 in SD-HD Conversion
IQUPC32 in SD-HD Conversion
IQUPC33 in SD-HD Conversion
IQUDC32 in SD-HD Conversion
IQUDC33 in SD-HD Conversion
IQDNC01 in SD-HD Conversion
IQDNC32 in SD-HD Conversion
IQDNC33 in SD-HD Conversion
IQUDC34 in SD-HD Conversion

IQMUX33

3G/HD/SD-SDI Embedder and Frame Synchronizer with AES/EBU and Analog Audio Inputs

The IQMUX33 provides 16 channel AES and analog audio embedding for 3Gbps SDI, HD-SDI or SD-SDI signals. Ideal for lines in applications features include a frame synchronizer capable of locking to a SD bi-level or HD-tri-level reference and up to 8 AES and 4 analog audio inputs for discreet audio handling. Audio processing features include gain, invert, delay, mixing and channel level routing.

To allow the module to be further tailored to system requirements a series of hardware and software options is available to provide color correction for video, and advanced audio processing features such as Dolby E/D encoding or decoding, stereo to 5.1 upmixing and loudness processing using industry recognised technology from Linear Acoustic.

Features

- Frame synchronizer with HD Tri-sync / SD Bi-Level Reference Input, input loss detection , ancillary data blanking and video delay up to 21 frames at 1080, 44 frames at 720 and 122 frames at 625
- Embed analog and unbalanced AES audio onto 3G/HD/SD-SDI video streams with channel-level control (24-bit HD, 20-bit SD embedded resolution)
- Video proc. features include: gain, offset and hue
- Processing for 16 channels of embedded audio present on the incoming SDI stream with no disturbance during video synchronizer frame wraps or drops
- Audio proc. features including: channel routing, gain, invert, fixed and tracking delays, mixing and eight internal tone generators
- Dolby E support – Optional Dolby E/D decoding or encoding with both RS485 and SMPTE2020 metadata support, plus detection of PCM/non-PCM audio to SMPTE 337/338M, pair routing and Dolby E header alignment
- Advanced audio processing options from Linear Acoustic for stereo upmixing to 5.1 surround sound and loudness level measurement and control
- In-built test pattern generator and 2 x 16 character caption generator
- 16 x user memories and 2 GPI/O ports
- RollCall control and monitoring compatible with standard logging and reporting features
- RollTrack triggers available for detected module states including: PCM/non-PCM audio, input loss/freeze and reference loss

Why should you choose this module?

- Frame synchronization and flexible embedding provides the ideal solution applications where separate video and audio signals need to be combined for embedded workflows
- Comprehensive audio processing functions allow complete control over external and embedded audio signals for applications where audio manipulation is essential
- Full RollCall and SNMP compatibility allows easy integration with SAM or third party network management systems providing an all-inclusive monitoring and control solution

Order codes
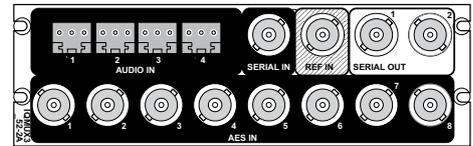
IQMUX3352-2A3, IQMUX3352-2B3
3G/HD/SD-SDI 16 channel AES and analog audio embedder with synchronizer . 1 SDI input, reference input, 8 unbalanced AES inputs, 4 analog audio inputs, 2 SDI outputs
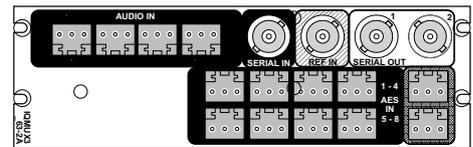
IQMUX3363-2A3, IQMUX3363-2B3
3G/HD/SD-SDI 16 channel AES and analog audio embedder with synchronizer . 1 SDI input, reference input, 8 balanced AES inputs, 4 analog audio inputs, 2 SDI outputs

Hardware and Software Options

IQOPTA-DBD Hardware option to add a single Dolby E/D decoder

IQOPTA-DBE-D Hardware option to add a single Dolby D encoder

IQOPTA-DBE-E Hardware option to add a single Dolby E encoder

IQOPTA-LOUD51 Software option to add Linear Accoustic AeroMax 5.1 loudness processing

IQOPTA-LOUDA2 Software option to add first channel of Linear Accoustic AeroMax 2.0 loudness processing

IQOPTA-LOUDB2 Software option to add second channel of Linear Accoustic AeroMax 2.0 loudness processing

IQOPTA-UPMIX Software option to add Linear Acoustic UPMAX stereo to 5.1 upmixing

For more details on enclosure types please refer to Frames & Hardware section.

IQMUX33

3G/HD/SD-SDI Embedder and Frame Synchronizer with AES/EBU and Analog Audio Inputs
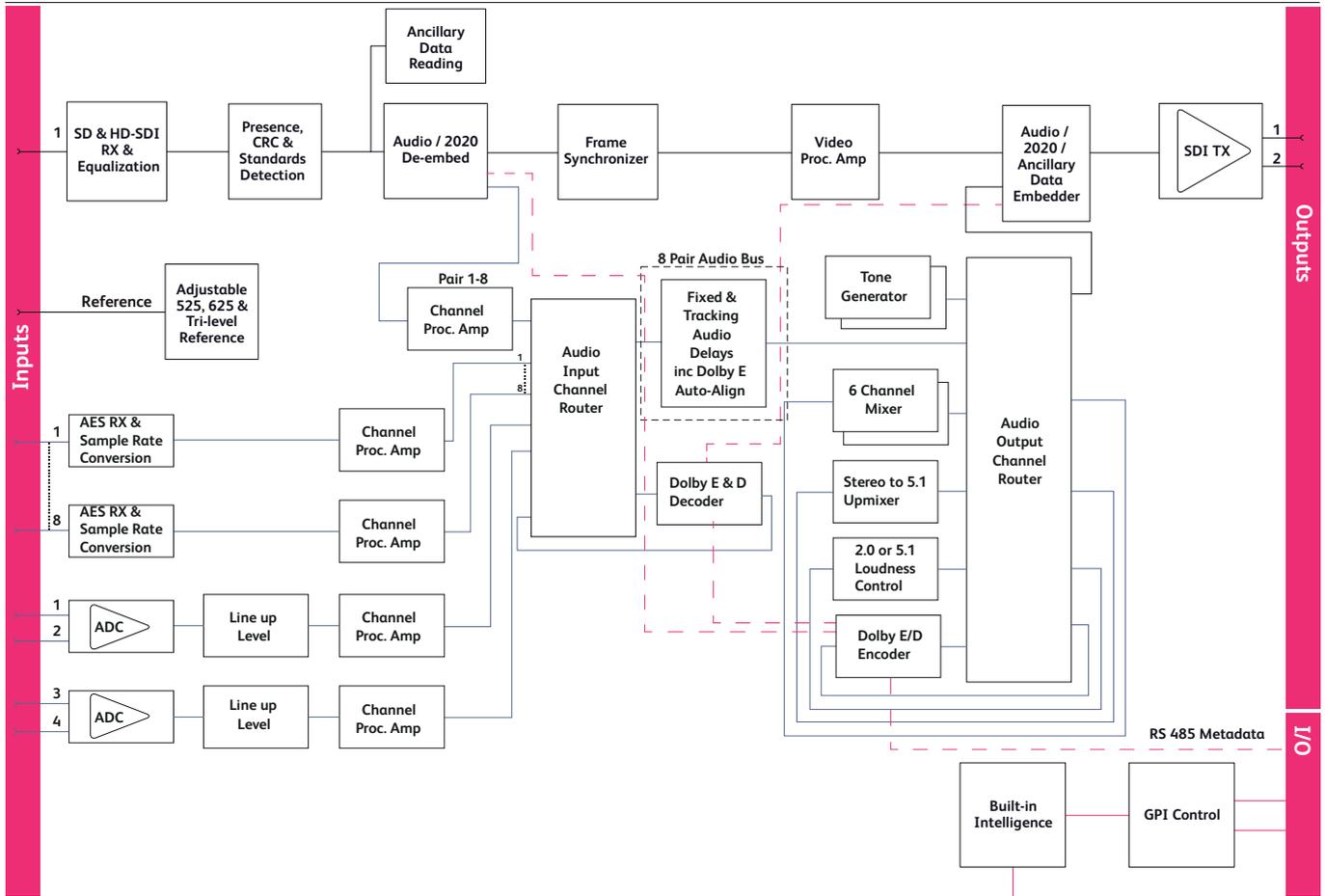
⌒ **Block Diagram** for IQMUX3363-2A3

Network Intelligence, Control & Monitoring

Technical Specification

Inputs & Outputs

Video Signal Inputs

SDI Input	1x
Input Cable Length	Up to 80m Belden 1694A @ 3 Gbit/s
	Up to 180m Belden 1694A @ 1.5 Gbit/s
	>350m Belden 1694A @ 270 Mbit/s
Analog Reference	1 x Analog Reference input
	Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level)
	SD bi-level – RS170A
	HD Tri-level – SMPTE 240M, 274M and 296M

Video Signal Outputs

SDI Outputs	x 2

Audio Signal Inputs

AES/EBU, AC3, Dolby E Audio

	8 Unbalanced (BNC), or
	8 Balanced (Screw terminal connectors (ST))
Balanced analog audio inputs	
	4 channels (Screw terminal connectors (ST))

Controls

Genlock & Video Delay

Genlock Mode	Free-run, Lock to Reference, Lock to input
Genlock H-Phase	± 1 H in pixel clock steps
Genlock V-Phase	± 1 F in 1 line steps
Video H-Delay	0 – 1 Line in pixel clock steps
Video V-Delay	0 – 1 Frame in 1 line steps
Video Delay Frames	0 – 26 frames @ 1080 59p
	0 – 21 frames @ 1080 50p
	0 – 26 frames @ 1080 29i
	0 – 21 frames @ 1080 25i
	0 – 54 frames @ 720 59p
	0 – 44 frames @ 720 50p
	0 – 147 frames @ 525 29i
	0 – 122 frames @ 625 25i
Dolby E auto line select	Std, user select
Dolby E auto align	On/Off

Video Controls

Default Video Output Type	
	Pattern, Freeze, Black
Pattern Select	100% Color Bars, 75% Color Bars, SMPTE Bars, Tartan Bars, Black, Pluge, Ramp, H Sweep, Pulse & Bar, Multi-burst
Output Mode	Input, Black, Freeze, Pattern
Black Level	±200 mV in steps of 1 mV
Hue Adjust	±180° in steps of 1°
Master Video Gain	+6 to -120 dB

Technical Specification cont…

Y-Gain	+6 to -120 dB
Cb/Cr Gain	+6 to -120 dB
Caption Enable	On/Off
Edit Caption	16 characters
Caption Adjust	X-Y Size & Position

Audio Controls

Audio In - Embedded	
Audio In-Disembed	Pairs 1-8
Channel 1 – 16 Mute	On/Off
Channel 1 – 16 Polarity Inv	
	On/Off
Channel 1 – 16 Gain	+12 dB to -80 dB in 0.1 dB steps
Pair 1 – 8 Stereo	Link channel pairs

Audio Out - Embedded

Group 1 -4 Enable	On/Off
Audio Out-embed	Pairs 1-8
Channel 1 – 16 Mute	On/Off
Channel 1 – 16 Gain	+12 dB to -80 dB in 0.1 dB steps
Pair 1 – 8 Stereo	Link channel pairs

Audio In - AES

Channel 1 – 16 Mute	On/Off
Channel 1 – 16 Polarity Inv	
	On/Off
Channel 1 – 16 Gain	+12 dB to -80 dB in 0.1 dB steps
AES 1 – 8 Stereo	Link channel pairs

Audio In - Analog

Channel 1 – 4 Mute	On/Off
Channel 1 – 4 Polarity Inv	
	On/Off
Channel 1 – 4 Gain	+12 dB to -80 dB in 0.1 dB steps
Analog 1 – 2 Stereo	Link Channel Pairs

Audio Routing

Input routing Bus 1-8	Disembed 1-8, AES input 1-8, Analog 1-2, Dolby Decoder 1-5*
Output routing embed 1-8	
	Bus 1-8, Mixers 1-4, Downmixer 1-2, silence, Tones 1-8, Upmix*/Loudness*, Dolby Encoder 1-5*

* indicates optional feature

Audio Setup Controls – Bus 1-8

Delay Add-In Bulk, RollTrack, current video	
	On/Off
Bulk Manual Delay	-520ms to +2s in 0.17ms steps
Coarse Manual Pair Delay	
	±1.995s in 1ms steps
Fine Manual Delay	±5ms in 0.02ms steps
Fast or smooth delay limit	
	5ms to 80ms
Silence Detect	-2dBFS to -128dBFS in steps of 1dB
Signal Overload Detect	-1dBFS to -127dBFS in steps of 1dB
Warning Timer	1 to 20 seconds in steps of 1 second
Tone Frequency 1-8	100Hz to 16kHz in 100Hz steps
Analog input Headroom	
	4dB to 24dB in 1dB steps
Analog input Line Up Level	
	-20dBU to 20dBU in 1dB steps (with 4dB Headroom setting)

Dolby Decoder

Decoder Source	Disembed 1-8
Detection Mode	Auto, dolby E, Dolby D, Mute
AES Channel Select	Channel 1, 2
PCM Latency	Single Frame, Minimum
Dolby D listening mode	Full, EX, 3 Stereo, Phantom, Stereo, Mono
Dolby D Dynamic Range	Line, RF, Bypass
Metadata Program	1, 2
Input Metadata	RS-485, SMPTE 2020

Dolby Encoder

Encoder Source	Bus 1-8, Upmix*/Loudness*, Silence
Metadata Source	Prog 1-8, Internal
Internal Metadata control	
	Program Descriptor, Dialog Norm, Audio Production information, Extended BSI1, BSI2, Internal Config, Bitstream Mode, RF Mode, Line Mode, Surround Mode, Mix Level (Surround, Centre, LtRt, LoRo), Internal Config setting (e.g. 5.1+2)
Mode	Encode, Pass through
Bit Depth	Dolby D - 32 bit, 16 bit
	Dolby E - 20 bit, 16 bit
SRC	Enable, Disable
Stream Number	0-6

Audio Mixers

Mixer Select	1-4, Downmix 1 -2
Source select	Bus 1-8, Silence, Tones 1-8
Source Gain	12dB to -80dB in 0.1dB steps
Mixer 1-4 invert	On/Off
Mixer 1-4, Downmix 1-2 Mute	
	On/Off
Downmix Configuration	LoRo, 4 level selections

Other Controls

GPI input High/Low Select	
	Input 1-2, Black, Freeze, Pattern, User Memories 1-16,
GPI Level Invert	High/Low
GPI Output Source	Current input OK, Input 1-2 OK, Input 1-2 Selected, Black, Freeze, Pattern, No User Memories Selected, User Memories 1-16
RS-485 Port	Output Dolby decoder, Output SMPTE 2020 Disembed, Input
SMPTE 2020 embedder	Dolby decoder, RS-485 Port, SMPTE 2020 Disembed
User Memories	Save/Recall/Rename
Memory Naming	User configurable naming of Memories 1 – 16
Information Window	Video Input Status, Audio Input Status, EDH/CRC & ANC Status
EDH/CRC Reset	Resets all EDH/CRC counts
RollTrack Index	Allows up to 70 destinations
RollTrack Sources	Unused, Video Delay, Audio Delay, Input Present (1-2), Input Loss (1-2), Output Std, Input selected (1-2), Output Black, Freeze or Pattern on, Output Black, Freeze or Pattern off, Output Caption on, Output Caption off, Embedded Audio (Pairs 1-8) PCM, Embedded Audio (Pairs 1-8) Non-PCM, Embedded Audio (Pairs 1-8) Loss, AES Audio (Pairs 1-8) PCM, Data, Dolby E, Loss, Reference OK & Loss, Dolby Decoder Input Type, Encoder active/pass-through, Dolby Metadata valid/missing
Factory Default	Resets all module settings to factory specified default values and clears memories
Default Settings	Resets all module settings to factory specified defaults but does not clear user memories
Restart	Software reset of module

Technical Specification cont...

Module Information	Reports: Product Name
	Software version, Serial number, Build number, KOS version, PCB version, Licensed Options
Input Names	19 Character editable name

Specifications

Electrical	3Gbit/s SDI, SMPTE 424M 1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C / DVB-ASI
Connector / Format	BNC/ 75ohm panel jack on standard IQ connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s) >-10dB (3Gbit/s)
Output Jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz), 3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)
Reference Source	External – HD Tri-Level / SD Bi-level / Input Video syncs
Electrical	Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level)
	SD bi-level – RS170A
	HD Tr-level – SMPTE 240M, 274M and 296M
Connector / Format	BNC/75 ohm panel jack on standard IQ connector panel
Analog Reference Return Loss	
	SD bi-level > 40 dB to 5.5 MHz, HD tri-level > 35 dB to 30 MHz
Video Standards	1125(1080)/50p, 1125(1080)/59p, 750(720)/50p, 750(720)/59p, 1125(1080)/25i, 1125(1080)/25p, 1125(1080)/25psf, 1125(1080)/29i, 625(576)/25i, 525(480)/29i
Embedded audio handling	
	HD - 24-bit synchronous 48 kHz to SMPTE 299M, SD - 20-bit synchronous 48 kHz to SMPTE 272M-A

Digital Audio Input (Unbalanced)

Connector/Format	BNC
Sample Frequency	25 – 96 kHz (48 kHz for Reference)
Input Cable Length	>500 m of RG59 cable
Impedance	75 Ohms
Output Sampling	48 kHz frame locked to 48 kHz AES/EBU Reference in AES lock mode

Digital Audio Input (Balanced)

Connector/Format	ST
Sample Frequency	25 – 96 kHz (48 kHz for Reference)
Input Cable Length	>150 m of AES3 cable
Impedance	110 Ohms
Output Sampling	48 kHz frame locked to 48 kHz AES/EBU Reference in AES lock mode

Analog Audio Input (Balanced)

Analog Input Impedance	
	10 k ohms
Frequency Response	20 Hz to 20 kHz (0.1 dB)
Distortion (THD+N)	Better than -90 dB, 1kHz@ -1 dBFS
Dynamic range	> 106 dB
Audio delay	Equal to video delay + adjustable offset

Power Consumption

Module Power Consumption	
	20.W Max (A Frames)
	18.5 PR (B Frames)
	Note: Dolby option adds 2.5W (PR)

IQMUX30

3G/HD/SD-SDI Embedder for 8 AES/EBU Audio Streams

The IQMUX30 provides 16 channel digital audio embedding for 3Gbps SDI, HD-SDI 1.5 Gbit/s or SD-SDI 270 Mbit/s signals. Audio processing features include audio delay, gain, invert and channel level routing, whilst video delay and a video proc. amp are also included in the feature set. Ideal as a general digital ingest module where any digital audio source signal can be catered for, even combinations of embedded and external digital audio.

Features

- 16 channel 3G/HD/SD-SDI embedder capable of embedding asynchronous or synchronous AES inputs
- Standards supported:
  - 3G-SDI to SMPTE 424M/425M level A & B compatible
  - HD-SDI to SMPTE292M/274M/296M
  - SD-SDI to SMPTE259M-C
- Handles up to 16 channels of embedded audio present on the incoming SDI stream
- Channel level (Sub-frame) routing
- Audio proc-amp features including independent gain, invert and mute control
- Embedding continues on loss of SDI input (silence)
- Auto mute on AES input error
- Adjustable delay for selected audio channels
- Any group of embedded audio may be passed unchanged, processed or blanked
- Embedded Dolby E support – pair routing, delay and Dolby E header alignment
- PCM and non-PCM detection and reporting
- Handles Dolby E and PCM audio present in the same group
- Independent HANC and VANC blanking control
- Input loss detection – default output of black/pattern/freeze
- Up to 9 frames of video delay and 2 seconds of audio delay
- Transparent to all ancillary data inc. VANC metadata
- Video controls including video gain and offset
- In-built test pattern generator and audio tone generator
- 2 SDI inputs and up to 4 active HD/SD-SDI outputs
- 16 x user memories, save/recall/rename
- RollCall control and monitoring compatible

Why should you choose this module?

- Ideal as a general embedder for stereo, multichannel or Dolby E AES audio applications
- Suitable for multi-lingual audio applications thanks to channel-level control and up to sixteen channel operation
- Full RollCall and SNMP compatibility allows easy integration with SAM, or third party, network management systems providing an all-inclusive monitoring and control solution

Order codes
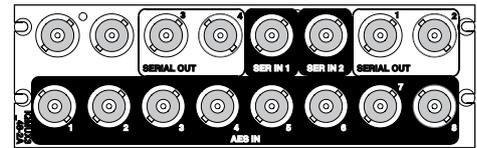
IQMUX3048-2A3, IQMUX3048-2B3
3G/HD/SD-SDI 16 channel AES Embedder. 4 SDI outputs, 8 Unbalanced AES inputs

IQMUX3049-1A3, IQMUX3049-1B3
3G/HD/SD-SDI 16 channel AES Embedder. 2 SDI outputs, 8 Balanced AES inputs

For more details on enclosure types please refer to Frames and Hardware section.

IQMUX30

3G/HD/SD-SDI Embedder for 8 AES/EBU Audio Streams
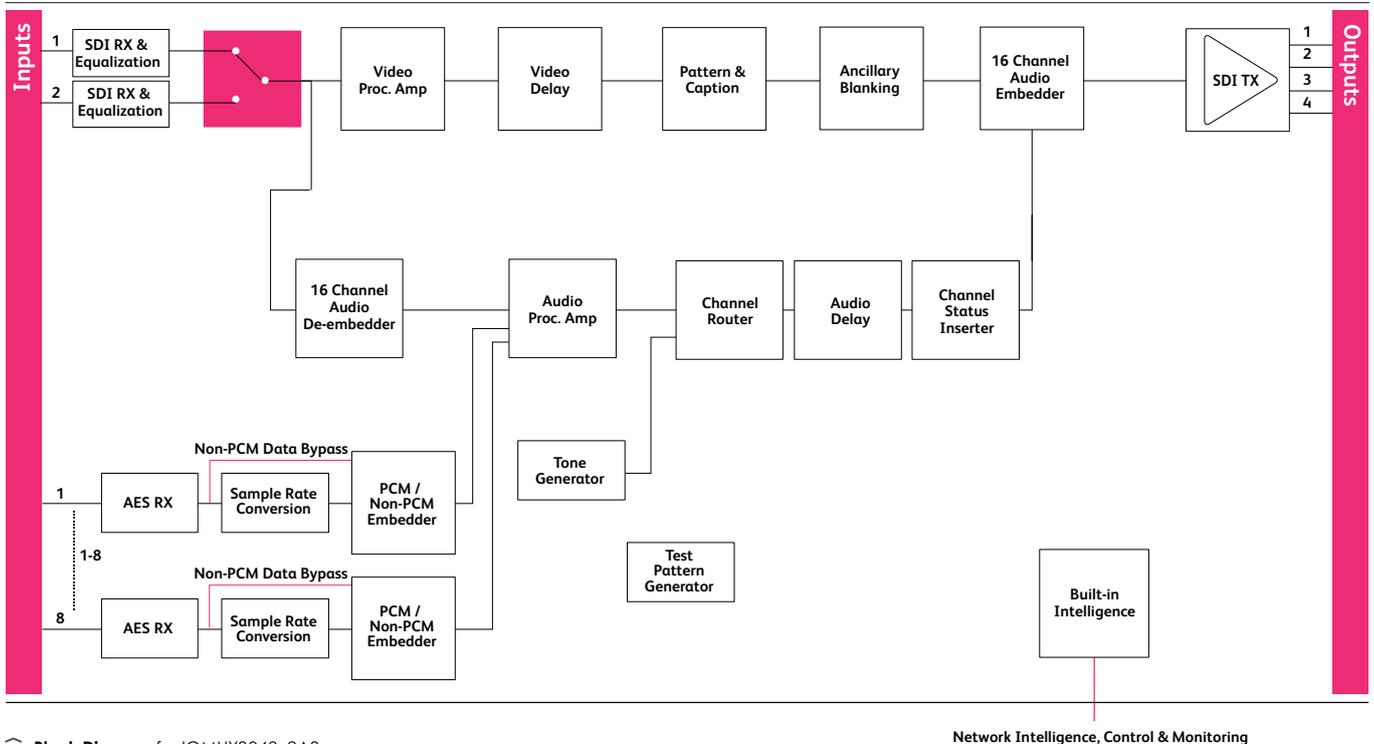
⌒ **Block Diagram** for IQMUX3048–2A3

Network Intelligence, Control & Monitoring

Technical Specification

Inputs and Outputs
Signal Inputs

SDI Inputs	2x
Input 1 Cable Length	Up to 70m Belden 1694A @ 3 Gbit/s
	Up to 160m Belden 1694A @ 1.5 Gbit/s
	>350m Belden 1694A @ 270 Mbit/s
Input 2 Cable Length	Up to 60m Belden 1694A @ 3 Gbit/s
	Up to 100m Belden 1694A @ 1.5 Gbit/s
	Up to 100m Belden 1694A @ 270 Mbit/s
Unbalanced digital audio	8 x AES/EBU, AC3, Dolby E (BNC)
Balanced digital audio	8 x AES/EBU, AC3, Dolby E (25 Way D-Type)

Signal Outputs

SDI Outputs	x 2 (4)

Controls
Video Controls

Input Standard	1125(1080)/50P (A & B), 1125(1080)/59P (A & B), 1125(1080)/29i, 1125(1080)/25i, 750(720)/59P, 750(720)/50P, 525(480)/29i,625(576)/25i
Default Video Output Type .	Pattern, Freeze, Black

Default Video Output

Standard	Last Known Good, 1125(1080)/50P (A & B), 1125(1080)/59P (A & B), 1125(1080)/29i, 1125(1080)/25i, 750(720)/59P, 750(720)/50P, 525(480)/29i, 625(576)/25i
Input Select	Input 1, Input 2
Manual Freeze	On/Off
Freeze	Field/Frame
Video Delay Frames	0 - 9 F
VANC Data	Blank VANC
SD VANC Data	Line blanking (6 controls)
ProcAmp Enable	On/Off
Black Level	±100 mV in steps of 0.8 mV
Hue Adjust	±180° in steps of 1°
Master Video Gain	±6 dB in steps of 0.1 dB
Y-Gain	±6 dB in steps of 0.1 dB
Cb/Cr Gain	±6 dB in steps of 0.1 dB
Y/C Timing	±8 pixels in 2 pixel steps (SD) ±16 pixels in 2 pixel steps (HD/3G)
Picture Position	±8 pixels in 2 pixel steps (SD) ±16 pixels in 2 pixel steps (HD/3G)
Pattern On	On/Off
Pattern Select	75% Color Bars, Black
Caption On	On/Off
Edit Caption	19 characters available

IQMUX30 3G/HD/SD-SDI Embedder for 8 AES/EBU Audio Streams

Technical Specification cont…

Audio Controls

Embedder Assignment

Group 1 to 4 Enable	On/Off
Pair 1 to 8 Source L / Non-PCM	
	Dis-embed 1_1 to 8_2, AES 1 to 8, Tone, Silence
Pair 1 to 8 Source R	Dis-embed 1_1 to 8_2, AES 1 to 8, Tone, Silence
Pair 1 to 8 Stereo	Link channel pairs
Pair 1 to 8 Polarity L/R	On/Off
Pair 1 to 8 Gain L/R	+12 dB to -72 dB in 0.1 dB steps
Pair 1 to 8 Non-PCM	On/Off

Processed Audio Delay Control

Course Manual Delay	Up to 1.75s in 5ms steps
Fine Manual Delay	+/- 0.25s in 0.5ms steps

Dolby-E

Dolby-E Auto Alignment	On/Off

Tone

Frequency L/R	100Hz to 10kHz in 100Hz steps
Channel Ident	On/Off
HANC Data	Blank HANC (Removes all HANC data. Note audio removed when embedders disabled)

Audio Monitoring

Silence Detect	0 to -80dB in steps of 1dB
Signal Overload Detect	0 to -80dB in steps of 1dB
Warning Timer	1 to 20 seconds in steps of 1 second

Other Controls

User Memories	16 x Save, Recall, Rename
Memory Naming	User configurable naming of memories 1 – 16
RollTrack Sources	Unused, Video Delay, Input Present, Input1 Select, Input2 Select, Input Loss, Output525, Output 625, Output 720p, Output 1080i, Output 1080p, Output Freeze, Output Unfreeze, Output Pattern on, Output pattern off, Output Caption on, Output Caption off, AES (Pairs 1-8) PCM, AES (Pairs 1-8) Data, AES (Pairs 1-8) DolbyE, AES (Pairs 1-8) V bit, AES (Pairs 1-8) Loss, Disemb (Pairs 1-8) PCM, Disemb (Pairs 1-8) Data, Disemb (Pairs 1-8) DolbyE, Disemb (Pairs 1-8) V bit, Disemb (Pairs 1-8) Loss
Information Window	Video Input Status, Audio Input Status
Factory Default	Resets all module settings to factory specified default values and clears memories
Default Settings	Resets all module settings to factory specified defaults but does not clear memories
Restart	Software restart of the module
Module Information	"Reports following module information: Software version, Serial number, Build number, KOS version, Firmware version, PCB version

Specifications

Electrical	3Gbit/s SDI, SMPTE 424M
	1.5Gbit/s HD-SDI, SMPTE 292M
	270 Mbit/s SDI, SMPTE 259M-C /DVB-ASI
Connector / Format	BNC/ 75ohm panel jack on standard IQ connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s)
	>-10dB (3Gbit/s)
Output Jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz)
	3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)
Video Standards	
	1125(1080)/50p (A & B), 1125(1080)/59p (A & B) 750(720)/50p, 750(720)/59p, 1125(1080)/25i, 1125(1080)/29i 625(576)/25i, 525(480)/29i
Typical Video Delay	SD: 70us
	HD: 38us
	3G-A: 19us
	3G-B: 40us
Embedded audio handling	HD - 24-bit synchronous 48 kHz to SMPTE 299M
	SD - 20-bit synchronous 48 kHz to SMPTE 272M-A
Embedded Audio Delay	Minimum (PCM) 2 ms
	Maximum (non-PCM)
	SD: 67us
	HD: 28us
	3G-A: 15us
	3G-B: 25us

Digital Audio Input (Balanced)

Connector/Format	25 W D
Sample Frequency	25 – 96 kHz (48 kHz for Reference)
Input Cable Length	>150 m of AES3 cable
Impedance	110 Ohms
Standard	AES3, SMPTE 272M-A-1994, SMPTE 299M

Digital Audio Input (Unbalanced)

Connector/Format	BNC
Sample Frequency	25 – 96 kHz (48 kHz for Reference)
Input Cable Length	>500 m of RG59 cable
Impedance	75 Ohms
Standard	AES3id, SMPTE 272M-A-1994, SMPTE 299M
Output Sampling	48 kHz frame locked

Power Consumption

Module Power Consumption	9W Max (A Frames)
	8 PR (B Frames)

IQMUX31

3G/HD/SD-SDI Embedder for 4 AES/EBU Audio Streams

The IQMUX31 provides 8 channel digital audio embedding for 3Gbps SDI, HD-SDI 1.5 Gbit/s or SD-SDI 270 Mbit/s signals. Audio processing features include audio delay, gain, invert and channel level routing, whilst video delay and a video proc. amp are also included in the feature set. Ideal as a small scale digital ingest module where any digital audio source signal can be catered for, even combinations of embedded and external digital audio.

Features

- 8 channel 3G/HD/SD-SDI embedder capable of embedding asynchronous or synchronous AES inputs
- Standards supported:
  - 3G-SDI to SMPTE 424M/425M level A & B compatible
  - HD-SDI to SMPTE292M/274M/296M
  - SD-SDI to SMPTE259M-C
- Handles up to 16 channels of embedded audio present on the incoming SDI stream
- Channel level (Sub-frame) routing
- Audio proc-amp features including independent gain, invert and mute control
- Embedding continues on loss of SDI input (silence)
- Auto mute on AES input error
- Adjustable delay for selected audio channels
- Any group of embedded audio may be passed unchanged, processed or blanked
- Embedded Dolby E support – pair routing, delay and Dolby E header alignment
- PCM and non-PCM detection and reporting
- Handles Dolby E and PCM audio present in the same group
- Independent HANC and VANC blanking control
- Input loss detection – default output of black/pattern/freeze
- Up to 9 frames of video delay and 2 seconds of audio delay
- Transparent to all ancillary data inc. VANC metadata
- Input loss detection – input pass through or black/pattern/freeze
- Video controls including video gain and offset
- In-built test pattern generator and audio tone generator
- 2 SDI inputs and 2 active HD/SD-SDI outputs
- 16 x user memories, save/recall/rename
- RollCall control and monitoring compatible

Why should you choose this module?

- Ideal as a general embedder for stereo, multichannel or Dolby E AES audio applications
- Full RollCall and SNMP compatibility allows easy integration with SAM, or third party, network management systems providing an all-inclusive monitoring and control solution
- Available as an SD/HD version with simple software upgrade path to 3G, providing a cost effective future proof solution

Order codes

IQMUX3147-1A3, IQMUX3147-1B3
3G/HD/SD-SDI 8 channel AES Embedder.
2 SDI outputs, 4 Unbalanced AES inputs

IQMUX3149-1A3, IQMUX3149-1B3
3G/HD/SD-SDI 8 channel AES Embedder.
2 SDI outputs, 4 Balanced AES inputs

For more details on enclosure types please refer to Frames and Hardware section.

IQMUX31

3G/HD/SD-SDI Embedder for 4 AES/EBU Audio Streams
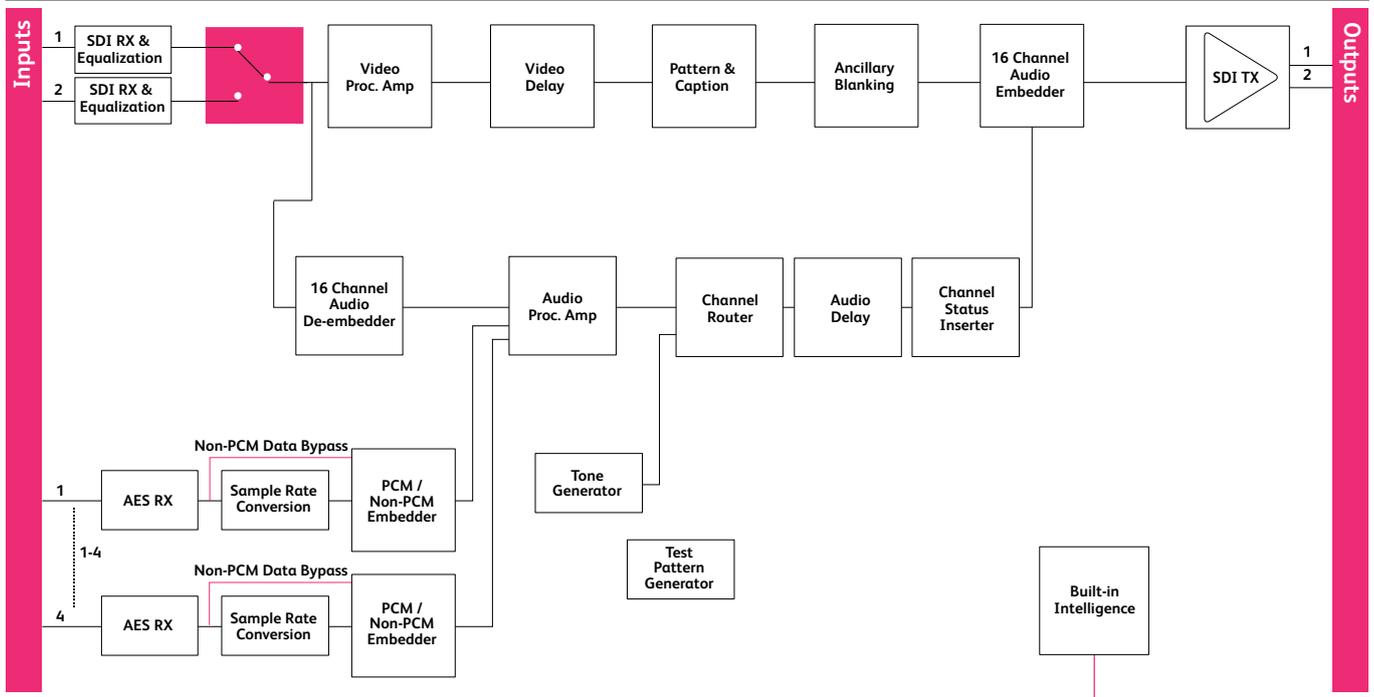
⌒ **Block Diagram** for IQMUX3149–1A3

Technical Specification

Inputs and Outputs

Signal Inputs

SDI Inputs	2x
Input 1 Cable Length	Up to 70m Belden 1694A @ 3 Gbit/s
	Up to 160m Belden 1694A @ 1.5 Gbit/s
	>350m Belden 1694A @ 270 Mbit/s
Input 2 Cable Length	Up to 60m Belden 1694A @ 3 Gbit/s
	Up to 100m Belden 1694A @ 1.5 Gbit/s
	Up to 100m Belden 1694A @ 270 Mbit/s
Unbalanced digital audio	4 x AES/EBU, AC3, Dolby E (BNC)
Balanced digital audio	4 x AES/EBU, AC3, Dolby E (25 Way D-Type)

Signal Outputs

SDI Outputs	x 2

Controls

Indicators

Power	OK (Green)
CPU running	OK (Green flashing)
FPGA running	OK (Yellow flashing)
Status	OK (Green)
	Warning (Yellow)
	Error (Red)
Input 1	OK (Green)
Input 2	OK (Green)

Controls

Video Controls

Input Standard	1125(1080)/50P (A & B), 1125(1080)/59P (A & B), 1125(1080)/29i, 1125(1080)/25i, 750(720)/59P, 750(720)/50P, 525(480)/29i,625(576)/25i
Default Video Output Type .	Pattern, Freeze, Black
Default Video Output Standard	Last Known Good, 1125(1080)/50P (A & B), 1125(1080)/59P (A & B), 1125(1080)/29i, 1125(1080)/25i, 750(720)/59P, 750(720)/50P, 525(480)/29i, 625(576)/25i
Input Select	Input 1, Input 2
Manual Freeze	On/Off
Freeze	Field/Frame
Video Delay Frames	0 - 9 F
VANC Data	Blank VANC
SD VANC Data	Line blanking (6 controls)
ProcAmp Enable	On/Off
Black Level	±100 mV in steps of 0.8 mV
Hue Adjust	±180° in steps of 1°
Master Video Gain	±6 dB in steps of 0.1 dB
Y-Gain	±6 dB in steps of 0.1 dB
Cb/Cr Gain	±6 dB in steps of 0.1 dB
Y/C Timing	±8 pixels in 2 pixel steps (SD) ±16 pixels in 2 pixel steps (HD/3G)
Picture Position	±8 pixels in 2 pixel steps (SD) ±16 pixels in 2 pixel steps (HD/3G)

IQMUX31

3G/HD/SD-SDI Embedder for 4 AES/EBU Audio Streams

Technical Specification cont…

Pattern On	On/Off
Pattern Select	75% Color Bars, Black
Caption On	On/Off
Edit Caption	19 characters available

Audio Controls
Embedder Assignment

Group 1 to 4 Enable	On/Off
Pair 1 to 8 Source L / Non-PCM	Dis-embed 1_1 to 8_2, AES 1 to 4, Tone, Silence
Pair 1 to 8 Source R	Dis-embed 1_1 to 8_2, AES 1 to 4, Tone, Silence
Pair 1 to 8 Stereo	Link channel pairs
Pair 1 to 8 Polarity L/R	On/Off
Pair 1 to 8 Gain L/R	+12 dB to -72 dB in 0.1 dB steps
Pair 1 to 8 Non-PCM	On/Off

Processed Audio Delay Control

Course Manual Delay	Up to 1.75s in 5ms steps
Fine Manual Delay	+/- 0.25s in 0.5ms steps

Dolby-E

Dolby-E Auto Alignment	On/Off

Tone

Frequency L/R	100Hz to 10kHz in 100Hz steps
Channel Ident	On/Off
HANC Data	Blank HANC (Removes all HANC data. Note audio removed when embedders disabled)

Audio Monitoring

Silence Detect	0 to -80dB in steps of 1dB
Signal Overload Detect	0 to -80dB in steps of 1dB
Warning Timer	1 to 20 seconds in steps of 1 second

Other Controls

User Memories	16 x Save, Recall, Rename
Memory Naming	User configurable naming of memories 1 – 16
RollTrack Sources	Unused, Video Delay, Input Present, Input1 Select, Input2 Select, Input Loss, Output525, Output 625, Output 720p, Output 1080i, Output 1080p, Output Freeze, Output Unfreeze, Output Pattern on, Output pattern off, Output Caption on, Output Caption off, AES (Pairs 1-4) PCM, AES (Pairs 1-4) Data, AES (Pairs 1-4) DolbyE, AES (Pairs 1-4) V bit, AES (Pairs 1-4) Loss, Disemb (Pairs 1-8) PCM, Disemb (Pairs 1-8) Data, Disemb (Pairs 1-8) DolbyE, Disemb (Pairs 1-8) V bit, Disemb (Pairs 1-8) Loss Information Window Video Input Status, Audio Input Status
Factory Default	Resets all module settings to factory specified default values and clears memories
Default Settings	Resets all module settings to factory specified defaults but does not clear memories
Restart	Software restart of the module
Module Information	"Reports following module information: Software version, Serial number, Build number, KOS version, Firmware version, PCB version

Specifications

Electrical	3Gbit/s SDI, SMPTE 424M 1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C / DVB-ASI
Connector / Format	BNC/ 75ohm panel jack on standard IQ connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s) >-10dB (3Gbit/s)
Output Jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz) 3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)

Video Standards

	1125(1080)/50p (A & B), 1125(1080)/59p (A & B) 750(720)/50p, 750(720)/59p, 1125(1080)/25i, 1125(1080)/29i 625(576)/25i, 525(480)/29i
Typical Video Delay	SD: 70us HD: 38us 3G-A: 19us 3G-B: 40us
Embedded audio handling	HD - 24-bit synchronous 48 kHz to SMPTE 299M SD - 20-bit synchronous 48 kHz to SMPTE 272M-A
Embedded Audio Delay	Minimum (PCM) 2 ms Maximum (non-PCM) SD: 67us HD: 28us 3G-A: 15us 3G-B: 25us

Digital Audio Input (Balanced)

Connector/Format	25 W D
Sample Frequency	25 – 96 kHz (48 kHz for Reference)
Input Cable Length	>150 m of AES3 cable
Impedance	110 Ohms
Standard	AES3, SMPTE 272M-A-1994, SMPTE 299M

Digital Audio Input (Unbalanced)

Connector/Format	BNC
Sample Frequency	25 – 96 kHz (48 kHz for Reference)
Input Cable Length	>500 m of RG59 cable
Impedance	75 Ohms
Standard	AES3id, SMPTE 272M-A-1994, SMPTE 299M
Output Sampling	48 kHz frame locked

Power Consumption

Module Power Consumption	9W Max (A Frames) 8 PR (B Frames)

IQMUX32

Dual 3G/HD/SD-SDI Embedder for 4 AES/EBU Audio Streams

The IQMUX32 is a dual 8 channel digital audio embedder for 3Gbps SDI, HD-SDI 1.5 Gbit/s or SD-SDI 270 Mbit/s signals. Audio processing features include audio delay, gain, invert and channel level routing, whilst video delay and a video proc. amp are also included in the feature set.

Features

- Dual 8 channel 3G/HD/SD-SDI embedder capable of embedding asynchronous or synchronous AES inputs
- Standards supported:
  - 3G-SDI to SMPTE 424M/425M level A & B compatible
  - HD-SDI to SMPTE292M/274M/296M
  - SD-SDI to SMPTE259M-C
- Handles up to 16 channels of embedded audio present on each SDI stream
- Channel level (Sub-frame) routing
- Audio proc-amp features including independent gain, invert and mute control
- Embedding continues on loss of SDI input (silence)
- Auto mute on AES input error
- Adjustable delay for selected audio channels
- Any group of embedded audio may be passed unchanged, processed or blanked
- Embedded Dolby E support – pair routing and delay
- PCM and non-PCM detection and reporting
- Handles Dolby E and PCM audio present in the same group
- Able to pass all ancillary data without corruption inc. VANC metadata
- Independent HANC and VANC blanking control
- Input loss detection – default output of black/pattern/freeze
- Up to 3 frames of video delay and 2 seconds of audio delay per channel
- Video controls including video gain and offset
- In-built test pattern and tone generators for each channel
- Up to 2 active HD/SD-SDI outputs per channel
- 16 x user memories, save/recall/rename
- RollCall control and monitoring compatible

Why should I choose this module?

- Compact multi-channel embedder for AES audio applications where space is at a premium, in OB environments for example
- Comprehensive AV solution for incoming lines with audio firewall, proc. amp, shuffling, and delay
- Full RollCall and SNMP compatibility allows easy integration with SAM, or third party, network management systems providing an all-inclusive monitoring and control solution

Order codes
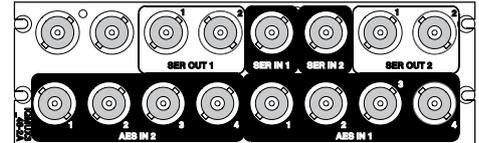
IQMUX3248-2A3, IQMUX3248-2B3
3G/HD/SD-SDI Dual 8 channel AES Embedder. 2 SDI outputs per input, 4 Unbalanced AES inputs per channel.

IQMUX3249-1A3, IQMUX3249-1B3
3G/HD/SD-SDI Dual 8 channel AES Embedder. 1 SDI output per input, 4 Balanced AES inputs per channel.

For more details on enclosure types please refer to Frames and Hardware section.

IQMUX32

Dual 3G/HD/SD-SDI Embedder for 4 AES/EBU Audio Streams

Inputs

Outputs

Input 1 path:
- SDI RX & Equalization
- Video Proc. Amp
- Video Delay
- Pattern & Caption
- Ancillary Blanking
- 16 Channel Audio Embedder
- SDI TX (Outputs 1, 2)

- 16 Channel Audio De-embedder
- Audio Proc. Amp
- Channel Router
- Audio Delay
- Channel Status Inserter
- Tone Generator
- Test Pattern Generator

AES inputs 1-4 (Input 1):
- AES RX (1)
- Non-PCM Data Bypass
- Sample Rate Conversion
- PCM / Non-PCM Embedder
- AES RX (4)
- Non-PCM Data Bypass
- Sample Rate Conversion
- PCM / Non-PCM Embedder

Input 2 path:
- SDI RX & Equalization
- Video Proc. Amp
- Video Delay
- Pattern & Caption
- Ancillary Blanking
- 16 Channel Audio Multiplexer
- SDI TX (Outputs 1, 2)

- 16 Channel Audio De-embedder
- Audio Proc. Amp
- Channel Router
- Audio Delay
- Channel Status Inserter
- Tone Generator
- Test Pattern Generator

AES inputs 1-4 (Input 2):
- AES RX (1)
- Non-PCM Data Bypass
- Sample Rate Conversion
- PCM / Non-PCM Embedder
- AES RX (4)
- Non-PCM Data Bypass
- Sample Rate Conversion
- PCM / Non-PCM Embedder

- Built-in Intelligence

Network Intelligence, Control & Monitoring

Block Diagram for IQMUX3248–2A3

IQMUX32

Dual 3G/HD/SD-SDI Embedder for 4 AES/EBU Audio Streams

Technical Specification

Inputs & Outputs

Signal Inputs

SDI Inputs	1 per Channel
Input 1 Cable Length	Up to 70m Belden 1694A @ 3 Gbit/s
	Up to 160m Belden 1694A @ 1.5 Gbit/s
	>350m Belden 1694A @ 270 Mbit/s
Input 2 Cable Length	Up to 60m Belden 1694A @ 3 Gbit/s
	Up to 100m Belden 1694A @ 1.5 Gbit/s
	Up to 200m Belden 1694A @ 270 Mbit/s
Unbalanced digital audio	4 x AES/EBU, AC3, Dolby E (BNC)
Balanced digital audio	4 x AES/EBU, AC3, Dolby E (25 Way D-Type)

Signal Outputs

SDI Outputs	x 2 per Channel

Controls

Indicators

Power	OK (Green)
CPU running	OK (Green flashing)
FPGA running	OK (Yellow flashing)
Status	OK (Green)
	Warning (Yellow)
	Error (Red)
Input 1	OK (Green)
Input 2	OK (Green)

Controls

Video Controls

Input Standard	1125(1080)/50P (A & B), 1125(1080)/59P (A & B), 1125(1080)/29i, 1125(1080)/25i, 750(720)/59P, 750(720)/50P, 525(480)/29i,625(576)/25i
Default Video Output Type.	Pattern, Freeze, Black
Default Video Output Standard	Last Known Good,
Default Video Output Type.	Pattern, Freeze, Black
Default Video Output Standard	Last Known Good, 1125(1080)/50P (A & B), 1125(1080)/59P (A & B), 1125(1080)/29i, 1125(1080)/25i, 750(720)/59P, 750(720)/50P, 525(480)/29i, 625(576)/25i
Manual Freeze	On/Off
Freeze	Field/Frame
Video Delay Frames	0 - 3 F
VANC Data	Blank VANC
SD VANC Data	Line blanking (6 controls)
ProcAmp Enable	On/Off
Black Level	±100 mV in steps of 0.8 mV
Hue Adjust	±180° in steps of 1°
Master Video Gain	±6 dB in steps of 0.1 dB
Y-Gain	±6 dB in steps of 0.1 dB
Cb/Cr Gain	±6 dB in steps of 0.1 dB
Y/C Timing	±8 pixels in 2 pixel steps (SD) ±16 pixels in 2 pixel steps (HD/3G)
Picture Position	±8 pixels in 2 pixel steps (SD) ±16 pixels in 2 pixel steps (HD/3G)
Pattern On	On/Off
Pattern Select	75% Color Bars, Black
Caption On	On/Off
Edit Caption	19 characters available

Audio Controls

Embedder Assignment

Group 1 to 4 Enable	On/Off
Pair 1 to 8 Source L / Non-PCM	Dis-embed 1_1 to 8_2, AES 1 to 4, Tone, Silence
Pair 1 to 8 Source R	Dis-embed 1_1 to 8_2, AES 1 to 4, Tone, Silence
Pair 1 to 8 Stereo	Link channel pairs
Pair 1 to 8 Polarity L/R	On/Off
Pair 1 to 8 Gain L/R	+12 dB to -72 dB in 0.1 dB steps
Pair 1 to 8 Non-PCM	On/Off

Processed Audio Delay Control

Course Manual Delay	Up to 1.75s in 5ms steps
Fine Manual Delay	+/- 0.25s in 0.5ms steps

Tone

Frequency L/R	100Hz to 10kHz in 100Hz steps
Channel Ident	On/Off
HANC Data	Blank HANC (Removes all HANC data. Note audio removed when embedders disabled)

Audio Monitoring

Silence Detect	0 to -80dB in steps of 1dB
Signal Overload Detect	0 to -80dB in steps of 1dB
Warning Timer	1 to 20 seconds in steps of 1 second

Other Controls

User Memories	16 x Save, Recall, Rename
Memory Naming	User configurable naming of memories 1 – 16
RollTrack Sources	Unused, Video Delay (1&2), Input Present (1&2), Input Loss (1&2), Output525 (1&2), Output 625 (1&2), Output 720p (1&2), Output 1080i (1&2), Output 1080p (1&2), Output Freeze (1&2), Output Unfreeze (1&2), Output Pattern on (1&2), Output pattern off (1&2), Output Caption on (1&2), Output Caption off (1&2), AES (Pairs 1-4) PCM (1&2), AES (Pairs 1-4) Data (1&2), AES (Pairs 1-4) DolbyE (1&2), AES (Pairs 1-4) V bit (1&2), AES (Pairs 1-4) Loss (1&2), Disemb (Pairs 1-8) PCM (1&2), Disemb (Pairs 1-8) Data (1&2), Disemb (Pairs 1-8) DolbyE (1&2), Disemb (Pairs 1-8) V bit (1&2), Disemb (Pairs 1-8) Loss (1&2)
Information Window	Video Input Status, Audio Input Status
Factory Default	Resets all module settings to factory specified default values and clears memories
Default Settings	Resets all module settings to factory specified defaults but does not clear memories
Restart	Software restart of the module
Module Information	"Reports following module information: Software version, Serial number, Build number, KOS version, Firmware version, PCB version

IQMUX32

Dual 3G/HD/SD-SDI Embedder for 4 AES/EBU Audio Streams

Technical Specification cont…

Specifications

Electrical	3Gbit/s SDI, SMPTE 424M
	1.5Gbit/s HD-SDI, SMPTE 292M
	270 Mbit/s SDI, SMPTE 259M-C /DVB-ASI
Connector / Format	BNC/ 75ohm panel jack on standard IQ connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s)
	>-10dB (3Gbit/s)
Output Jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz)
	3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)
Video Standards	
	1125(1080)/50p (A & B), 1125(1080)/59p (A & B)
	750(720)/50p, 750(720)/59p,
	1125(1080)/25i, 1125(1080)/29i
	625(576)/25i, 525(480)/29i
Typical Video Delay	SD: 70us
	HD: 38us
	3G-A: 19us
	3G-B: 40us
Embedded audio handling	HD - 24-bit synchronous
	48 kHz to SMPTE 299M
	SD - 20-bit synchronous
	48 kHz to SMPTE 272M-A
Embedded Audio Delay	Minimum (PCM) 2 ms
	Maximum (non-PCM)
	SD: 67us
	HD: 28us
	3G-A: 15us
	3G-B: 25us

Digital Audio Input (Balanced)

Connector/Format	25 W D
Sample Frequency	25 – 96 kHz (48 kHz for Reference)
Input Cable Length	>150 m of AES3 cable
Impedance	110 Ohms

Digital Audio Input (Unbalanced)

Connector/Format	BNC
Sample Frequency	25 – 96 kHz (48 kHz for Reference)
Input Cable Length	>500 m of RG59 cable
Impedance	75 Ohms
Standard	AES3-1992, SMPTE 272M-A-1994, SMPTE 299M
Output Sampling	48 kHz frame locked

Power Consumption

Module Power Consumption	11W Max (A Frames)
	10 PR (B Frames)

IQMUX34

3G/HD/SD-SDI Embedder for 8 Analog Audio Channels

The IQMUX34 provides 8 channel analog audio embedding for 3Gbps SDI, HD-SDI 1.5 Gbit/s or SD-SDI 270 Mbit/s signals. Audio processing features include audio delay, gain, invert and channel level routing, whilst video delay and a video proc. amp are also included in the feature set. Ideal as a general analog audio ingest module for incorporating local audio feeds.

Features

- 8 channel 3G/HD/SD-SDI embedder for analog audio inputs
- Standards supported:
  - 3G-SDI to SMPTE 424M/425M level A & B compatible
  - HD-SDI to SMPTE292M/274M/296M
  - SD-SDI to SMPTE259M-C
- Handles up to 16 channels of embedded audio present on the incoming SDI stream
- Features include independent gain, invert, mute controls, channel level (Sub-frame) routing, and adjustable delay for selected audio channels
- Embedding continues on loss of SDI input (silence)
- Any group of embedded audio may be passed unchanged, processed or blanked
- Embedded Dolby E support – pair routing and delay
- Up to 9 frames of video delay and 2 seconds of audio delay
- Video controls including video gain, offset, HANC and VANC blanking control
- Input loss detection – default output of black/pattern
- Transparent to all ancillary data inc. VANC metadata
- In-built test pattern generator and audio tone generator
- 16 x user memories, save/recall/rename
- Rollcall control and monitoring compatible

Why should you choose this module?

- Ideal as a general embedder for analog audio applications
- Full RollCall and SNMP compatibility allows easy integration with SAM, or third party, network management systems providing an all-inclusive monitoring and control solution

Order codes

IQMUX3449-1A3, IQMUX3449-1B3

3G/HD/SD-SDI 8 channel Analog Audio Embedder. 2 SDI outputs, 8 Balanced analog audio inputs

For more details on enclosure types please refer to datasheet IQH3B.
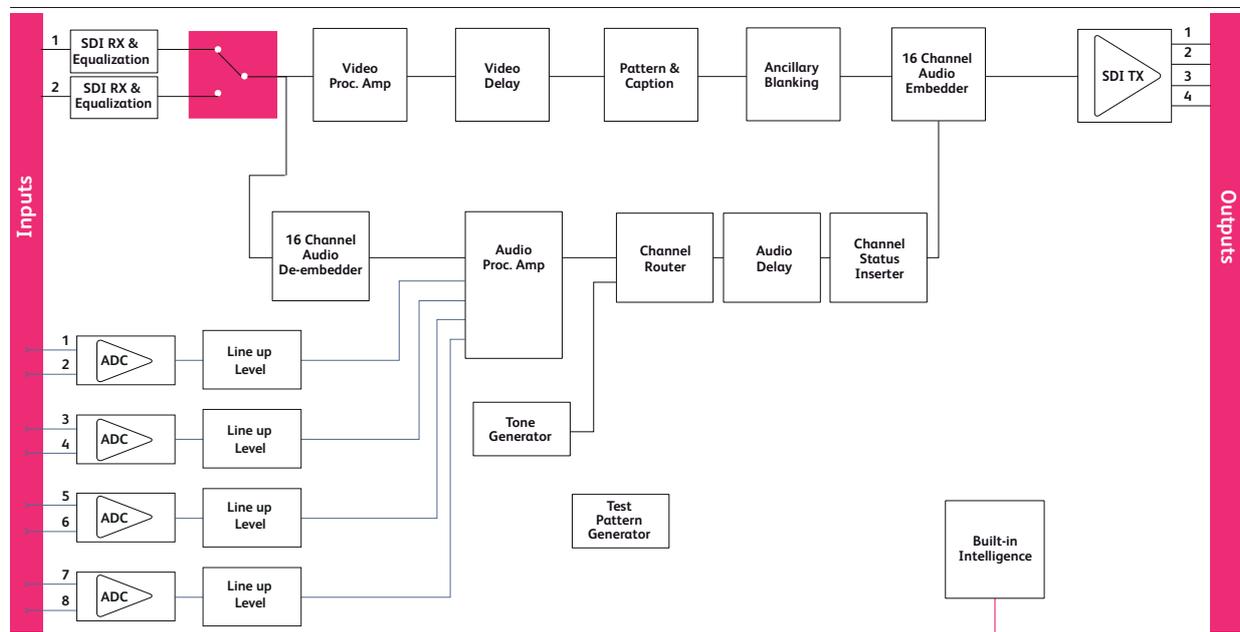
Block Diagram for IQMUX3449–1A3

Network Intelligence, Control & Monitoring

242

IQMUX34   3G/HD/SD-SDI Embedder for 8 Analog Audio Channels

Technical Specification

Inputs and Outputs

Signal Inputs

SDI Inputs	2x
Input 1 Cable Length	Up to 70m Belden 1694A @ 3 Gbit/s
	Up to 160m Belden 1694A @ 1.5 Gbit/s
	>350m Belden 1694A @ 270 Mbit/s
Input 2 Cable Length	Up to 60m Belden 1694A @ 3 Gbit/s
	Up to 100m Belden 1694A @ 1.5 Gbit/s
	Up to 100m Belden 1694A @ 270 Mbit/s

Audio Signal Inputs

Balanced analog audio inputs	
	8 channels (25 Way D-Type)

Signal Outputs

SDI Outputs	x 2

Controls

Video Controls

Input Standard	1125(1080)/50P (A & B), 1125(1080)/59P (A & B), 1125(1080)/29i, 1125(1080)/25i, 750(720)/59P, 750(720)/50P, 525(480)/29i,625(576)/25i
Default Video Output Type .	Pattern, Freeze, Black
Default Video Output Standard	Last Known Good, 1125(1080)/50P (A & B), 1125(1080)/59P (A & B), 1125(1080)/29i, 1125(1080)/25i, 750(720)/59P, 750(720)/50P, 525(480)/29i, 625(576)/25i
Video Select	Input 1, Input 2
Audio Select	Video Input 1, Video Input 2, Follow Video
Manual Freeze	On/Off
Freeze	Field/Frame
Video Delay Frames	0 - 9 F
VANC Data	Blank VANC
SD VANC Data	Line blanking (6 controls)
ProcAmp Enable	On/Off
Black Level	±100 mV in steps of 0.8 mV
Hue Adjust	±180° in steps of 1°
Master Video Gain	±6 dB in steps of 0.1 dB
Y-Gain	±6 dB in steps of 0.1 dB
Cb/Cr Gain	±6 dB in steps of 0.1 dB
Y/C Timing	±8 pixels in 2 pixel steps (SD)
	±16 pixels in 2 pixel steps (HD/3G)
Picture Position	±8 pixels in 2 pixel steps (SD)
	±16 pixels in 2 pixel steps (HD/3G)
Pattern On	On/Off
Pattern Select	75% Color Bars, Black
Caption On	On/Off
Edit Caption	19 characters available

Audio Controls

Embedder Assignment

Group 1 to 4 Enable	On/Off
Pair 1 to 8 Source L	
	Dis-embed 1_1 to 8_2, Analog 1 to 8, Tone, Silence
Pair 1 to 8 Source R	Dis-embed 1_1 to 8_2, Analog 1 to 8, Tone, Silence
Pair 1 to 8 Stereo	Link channel pairs
Pair 1 to 8 Polarity L/R	On/Off
Pair 1 to 8 Gain L/R	+12 dB to -72 dB in 0.1 dB steps
Pair 1 to 8 Non-PCM	On/Off

Processed Audio Delay Control

Course Manual Delay	Up to 1.75s in 5ms steps
Fine Manual Delay	+/- 0.25s in 0.5ms steps

Tone

Frequency L/R	100Hz to 10kHz in 100Hz steps
Channel Ident	On/Off
HANC Data	Blank HANC (Removes all HANC data. Note audio removed when embedders disabled)

Audio Monitoring

Silence Detect	0 to -80dB in steps of 1dB
Signal Overload Detect	0 to -80dB in steps of 1dB
Warning Timer	1 to 20 seconds in steps of 1 second

Audio Setup Controls

Analog Headroom Level	+12 dBU to +24dBU

Note: Headroom level specified at 0 dBFS line up level

Other Controls

User Memories	16 x Save, Recall, Rename
Memory Naming	User configurable naming of memories 1 – 16
RollTrack Sources	Unused, Video Delay, Input Present, Input1 Select, Input2 Select, Input Loss, Output525, Output 625, Output 720p, Output 1080i, Output 1080p, Output Freeze, Output Unfreeze, Output Pattern on, Output pattern off, Output Caption on, Output Caption off, Disemb (Pairs 1-8) PCM, Disemb (Pairs 1-8) Data, Disemb (Pairs 1-8) DolbyE, Disemb (Pairs 1-8) V bit, Disemb (Pairs 1-8) Loss
Information Window	Video Input Status, Audio Input Status
Factory Default	Resets all module settings to factory specified default values and clears memories
Default Settings	Resets all module settings to factory specified defaults but does not clear memories
Restart	Software restart of the module
Module Information	"Reports following module information: Software version, Serial number, Build number, KOS version, Firmware version, PCB version

IQMUX34

3G/HD/SD-SDI Embedder for 8 Analog Audio Channels

Technical Specification cont…

Specifications

Electrical	3Gbit/s SDI, SMPTE 424M
	1.5Gbit/s HD-SDI, SMPTE 292M
	270 Mbit/s SDI, SMPTE 259M-C /DVB-ASI
Connector / Format	BNC/ 75ohm panel jack on
	standard IQ connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s)
	>-10dB (3Gbit/s)
Output Jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz)
	3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)
Video Standards	
	1125(1080)/50p (A & B), 1125(1080)/59p (A & B)
	750(720)/50p, 750(720)/59p,
	1125(1080)/25i, 1125(1080)/29i
	625(576)/25i, 525(480)/29i
Typical Video Delay	SD: 70us
	HD: 38us
	3G-A: 19us
	3G-B: 40us
Embedded audio handling	HD - 24-bit synchronous
	48 kHz to SMPTE 299M
	SD - 20-bit synchronous 48 kHz to SMPTE 272M-A
Embedded Audio Delay	Minimum (PCM) 2 ms
	Maximum (non-PCM)
	SD: 67us
	HD: 28us
	3G-A: 15us
	3G-B: 25us

Analog Audio Input (Balanced)

Analog Input Impedance	
	40 k ohms
Distortion (THD+N)	-100dB @ +24dBu 800Hz
Frequency Response	20Hz-20KHz +0.05dB
Dynamic range	114 dB typical

Power Consumption

Module Power Consumption	9 W (A Frames)
	9 PR (B Frames)

IQMUX60/61

Universal Audio Embedder

The IQMUX60/61 is a flexible 4-channel analog and AES audio embedder with advanced embedded audio handling. When used with a composite decoder such as the IQDEC02 it provides a powerful analog video and audio ingest solution. The built in audio firewall capability ensures errors or interruptions in the input signal are not passed through to the output. A dual SDI input allows the unit to take signals from either of two paths. The second input also allows split operation, with video taken from one input and embedded audio from the other.

Features

- Combine external analog, AES and embedded audio source channels
- Handles 4 analog audio channels, 4 AES audio channels, or any eight embedded input channels to total eight output channels
- Handles up to 24 bit embedded audio present on the incoming SDI stream, and embeds/de-embeds to 20 bits
- Firewall for processed PCM audio to provide a continuous output
- Channel-level (Sub-frame) routing
- 4 off 4 channel assignable audio mixers
- Flexible audio delay including per pair fixed delay, common fixed delay and tracking delay
- Variable audio delay of up to 0.5s which seamlessly tracks the video delay or external RollTrack / GPI inputs
- Up to 3 frames of video delay
- Video proc. amp (gain, saturation, black level)
- RollCall control and monitoring compatible

Why should you choose this module?

- Allows the use of mixed analog, AES and embedded audio where all must be accommodated or combinations may be required
- When used with the IQDEC02 decoder provides a complete analog AV solution for incoming lines with firewall, proc. amp, audio shuffling and delay

Order codes
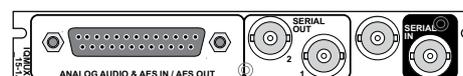
IQMUX6115-1A
Universal audio embedder. Balanced audio connection. 1 SDI input, 4 analog audio inputs, 2 AES/EBU inputs, 2 SDI outputs, 2 AES/EBU outputs.
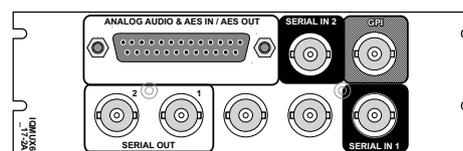
IQMUX6117–2A
Universal audio embedder. Balanced audio connection. 2 SDI inputs, 4 analog audio inputs, 2 AES/EBU inputs, 2 SDI outputs, 2 AES/EBU outputs, 1 GPI.
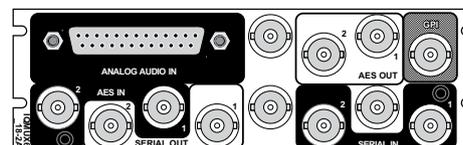
IQMUX6018–2A
Universal audio embedder. 2 SDI inputs, 4 balanced analog audio inputs, 2 unbalanced AES/EBU inputs, 2 SDI outputs, 2 unbalanced AES/EBU outputs, 1 GPI.

For more details on enclosure types please refer to Frames and Hardware Section.

IQMUX60/61 Universal Audio Embedder
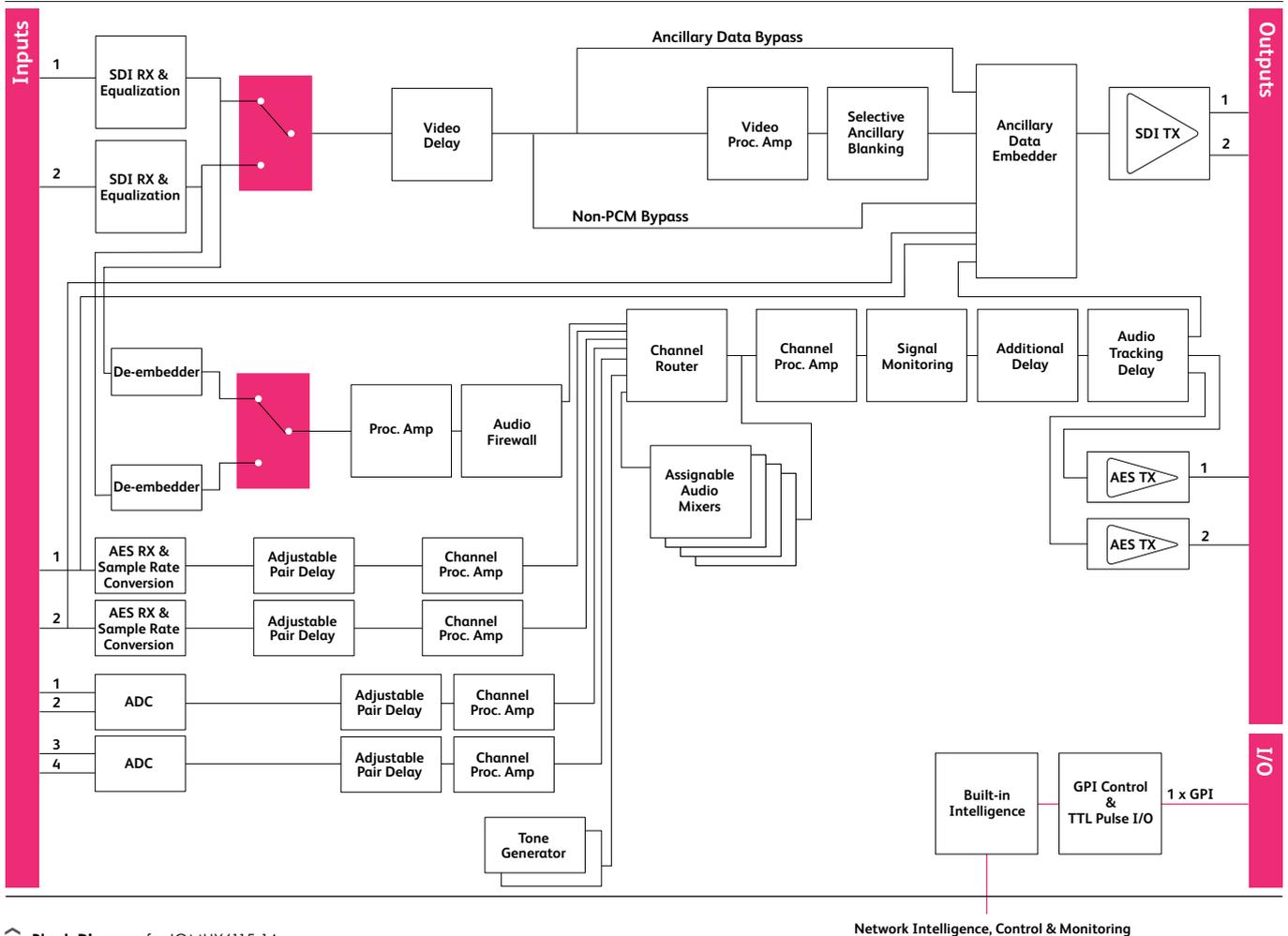
Block Diagram for IQMUX6115-1A

Technical Specification

Inputs and Outputs

Video Signal Inputs

Digital video	2 x SDI (BNC)
Analog audio	4 Channels (2 Stereo Pairs) (25 Way D-Type)
Unbalanced digital audio	2 x AES/EBU (BNC)
Balanced digital audio	2 x AES/EBU (25 Way D-Type)
Standards	SMPTE 259M-C-1997, SMPTE 272M-A-1994, AES3 - 1992

Signal Outputs

Digital video	SDI x 2
Standards	SMPTE 259M-C-1997, SMPTE 272M-A-1994
Unbalanced digital audio	2 x AES/EBU, AC3, Dolby E (BNC)
Balanced digital audio	2 x AES/EBU, AC3, Dolby E (25 Way D-Type)

Control Interface

GPI	1 x Closing contact I/O interface (BNC, Double Width only)

Card Edge and RollCall Controls

Card Edge Controls

NONE

Card Edge Indicators

SDI input loss	Loss = Off, Good = Green
SDI input error	Yellow = Unused input not at current operating standard
AES input present	1 x LED per pair
CPU running / power	One green LED, flashing = OK

RollCall Functions

Audio Controls

Audio extraction select	SDI input 1/2/Follow Video Control
Set line up level	+20 to –20 dBu in 1 dB steps
Set headroom	4 to 24 dB in 1 dB steps
Set audio detector thresholds	High and low levels, time delay
External input audio delay	Up to 1.5s additional delay in 1 ms steps

IQMUX60/61   Universal Audio Embedder

Technical Specification cont…

Input side control proc.	
-audio gain and polarity	Independent Gain, Mute, Polarity control over de-embedded and input channels. +18 dB to –18 dB in 0.1 dB steps
Channel routing	Output channels routed from AES pairs 1 and 2, analog pairs 1 and 2, test tone and silence, SDI 8 embedded channels from any group
Output side control proc.	
- gain and polarity	Independent Gain, Mute, and Polarity control over embedded output channels. +18 dB to –18 dB in 0.1 dB steps
Global delay offset	Up to +1.5s in 1 ms steps, common to all processed audio
Variable audio delay control source	Up to 0.5s from RollTrack + GPI + video synchronizer
Tone frequency, amplitude and ident	2-channel tone generator. 100 Hz to 15 kHz in 100 Hz steps

Tone Setup

Frequency	100 Hz to 15 kHz in 100 Hz steps
Channel ident	0.5s interruption every 2s

Video Controls

Select primary input	1/2
Black level	±100 mV in 0.8 mV steps
Y/C timing	±592 ns in 148 ns steps
Picture position	±592 ns in 148 ns steps
Luminance gain	±6 dB
Chrominance gain	±6 dB
Genlock H phase	±32 µs in 74 ns steps
Genlock V phase	±262/312 lines in 1 line steps
Video delay	+0 to +2 frames

Other Controls

Pass vertical data	On/Off (lines selectable 7/11 to 23/21 and 320/274 to 335/283)
Preset unit	Returns all settings to default
Pattern select	100%/75% Bars, Multiburst, Black, Animated Bars
User memories	Name, clear, save and read 8 user memories
Default video output	Pattern / freeze / run through
Default audio output	Silence
Caption output	On/Off (default and pattern output only)
Caption generator	Programmable up to 19 characters
GPI/O set-up	May be attached to any memory function/ polarity

Reporting (* also Logged)

EDH (for selected input)	*Presence, *Error-Time, *Error- Seconds
No SDI	*No input present
Input ancillary error	ANC error, ANC error-seconds
Input error	Unused input not at current operating standard
Report embedded audio data	Report audio data pairs on input and output SDI

Audio silence, high level, low level, overflow	For processed audio channels only

RollTrack Input

Delay	Audio delay – Fixed, RollTrack + fixed

RollTrack Output

Delay	Current video/audio delay
Input state	Selected Input: Input Present, Input Missing, Standard 525, Standard 625
	Input 1: Input Present, Input Missing, Standard 525, Standard 625
	Input 2: Input Present, Input Missing, Standard 525, Standard 625
Embedded audio state	Pair present
External audio state	Pair present

Specifications

Video internal processing	4:2:2 with 10 bit data paths
Serial input return loss	Better than 15 dB to 270 MHz
Maximum input cable length	>200 m (PSF1/2 or equiv. cable)
Serial output level	800 mV ±5%
Output overshoot	<70 mV
Output return loss	Better than 15 dB to 270 MHz
Output jitter	<0.2 UI (with 10 Hz High pass filter selected on 601 monitor)
Minimum delay	6 µs
Delay	6 µs - 3 Frames + 5.5 µs

Analog Audio Input (Balanced)

Analog input impedance	10 k ohms
Frequency response	20 Hz to 20 kHz (±0.1 dB)
Distortion (THD+N)	Better than -90 dB, 1kHz@ - 1 dBFS
Dynamic range	>106 dB
Audio delay	Equal to video delay + adjustable offset

Digital Audio Input (Balanced)

Connector / format	25 W D
Sample frequency	25 – 96 kHz (48 kHz for Reference)
Input cable length	>150 m of AES3 cable
Impedance	110 Ohms

Digital Audio Input (Unbalanced)

Connector / format	BNC
Sample frequency	25 – 96 kHz (48 kHz for Reference)
Input cable length	>500 m of RG59 cable
Impedance	75 Ohms
Output sampling	48 kHz frame locked to 48 kHz AES/EBU Reference in AES lock mode

Digital Audio Output (Balanced)

Connector / format	25 W D
Level	3 V p-p typical into 110 Ohms

Digital Audio Output (Unbalanced)

Connector / format	BNC
Level	1 V p-p typical into 75 Ohms

Power Consumption

Module power consumption	9 W max (A Frames) - 8 PR (B Frames)

IQDMX33

3G/HD/SD-SDI De-embedder and Frame Synchronizer with AES/EBU and Analog Audio Outputs

The IQDMX33 provides 16 channel digital audio de-embedding for 3Gbps SDI, HD-SDI or SD-SDI signals. Audio outputs are available as AES or analog formats selectable from any of the 16 embedded audio channels. Audio processing features include gain, invert and channel level routing.

To allow the module to be further tailored to system requirements a series of hardware and software options is available to provide color correction for video, and advanced audio processing features such as Dolby E/D encoding or decoding, stereo to 5.1 upmixing and loudness processing using industry recognised technology from Linear Acoustic.

Features

- Frame synchronizer with HD Tri-sync / SD Bi-Level Reference Input, input loss detection , ancillary data blanking and video delay up to 21 frames at 1080, 44 frames at 720 and 122 frames at 625
- De-embed analog and AES audio from 3G/HD/SD-SDI video streams with channel-level control
- Video proc. features include: gain, offset and hue
- Processing for 16 channels of embedded audio present on the incoming SDI stream with no disturbance during video synchronizer frame wraps or drops
- Audio proc. features including: channel routing, gain, invert, fixed and tracking delays, mixing and eight internal tone generators
- Dolby E support – Optional Dolby E/D decoding or encoding with both RS485 and SMPTE2020 metadata support, plus detection of PCM/non-PCM audio to SMPTE 337/338M, pair routing and Dolby E header alignment
- Advanced audio processing options from Linear Acoustic for stereo upmixing to 5.1 surround sound and loudness level measurement and control
- In-built test pattern generator and 2 x 16 character caption generator
- 16 x user memories and 2 GPI/O ports
- RollCall control and monitoring compatible with standard logging and reporting features
- RollTrack triggers available for detected module states including: PCM/non-PCM audio, input loss/freeze and reference loss

Why should you choose this module?

- Frame synchronization and flexible de-embedding provides the ideal solution for incoming lines applications where video and audio are required to be separate through the plant
- Comprehensive audio processing functions allow complete control over external and embedded audio signals for applications where audio manipulation is essential
- Full RollCall and SNMP compatibility allows easy integration with SAM or third party network management systems providing an all-inclusive monitoring and control solution

Order codes
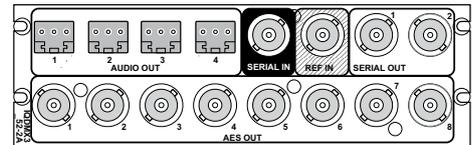
IQDMX3352-2A3, IQDMX3352-2B3
3G/HD/SD-SDI 16 channel AES and analog audio de-embedder with synchronizer . 1 SDI input, reference input, 8 unbalanced AES outputs, 4 analog audio outputs, 2 SDI outputs
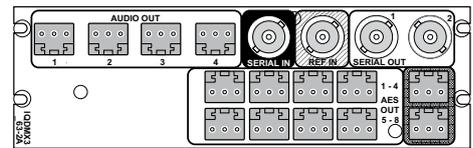
IQDMX3363-2A3, IQDMX3363-2B3
3G/HD/SD-SDI 16 channel AES and analog audio de-embedder with synchronizer . 1 SDI input, reference input, 8 balanced AES outputs, 4 analog audio outputs, 2 SDI outputs

Hardware and Software Options

IQOPTA-DBD Hardware option to add a single Dolby E/D decoder

IQOPTA-DBE-D Hardware option to add a single Dolby D encoder

IQOPTA-DBE-E Hardware option to add a single Dolby E encoder

IQOPTA-LOUD51 Software option to add Linear Accoustic AeroMax 5.1 loudness processing

IQOPTA-LOUDA2 Software option to add first channel of Linear Accoustic AeroMax 2.0 loudness processing

IQOPTA-LOUDB2 Software option to add second channel of Linear Accoustic AeroMax 2.0 loudness processing

IQOPTA-UPMIX Software option to add Linear Acoustic UPMAX stereo to 5.1 upmixing

For more details on enclosure types please refer to Frames & Hardware section.

IQDMX33

3G/HD/SD-SDI De-embedder and Frame Synchronizer with AES/EBU and Analog Audio Outputs

^ **Block Diagram** for IQDMX3363-2A3

Technical Specification

Inputs & Outputs

Video Signal Inputs

SDI Input	1x
Input Cable Length	Up to 80m Belden 1694A @ 3 Gbit/s
	Up to 180m Belden 1694A @ 1.5 Gbit/s
	>350m Belden 1694A @ 270 Mbit/s
Analog Reference	1 x Analog Reference input
	Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level)
	SD bi-level – RS170A
	HD Tri-level – SMPTE 240M, 274M and 296M

Video Signal Outputs

SDI Outputs	x 2
Audio Signal Outputs	
AES/EBU, AC3, Dolby E Audio	
	8 Unbalanced (BNC), or
	8 Balanced (Screw terminal connectors (ST))
Balanced analog audio Outputs	
	4 channels (Screw terminal connectors (ST))

Controls

Genlock & Video Delay

Genlock Mode	Free-run, Lock to Reference, Lock to input
Genlock H-Phase	± 1 H in pixel clock steps
Genlock V-Phase	± 1 F in 1 line steps
Video H-Delay	0 – 1 Line in pixel clock steps
Video Delay Frames	0 – 26 frames @ 1080 59p
	0 – 21 frames @ 1080 50p
	0 – 26 frames @ 1080 29i
	0 – 21 frames @ 1080 25i
	0 – 54 frames @ 720 59p
	0 – 44 frames @ 720 50p
	0 – 147 frames @ 525 29i
	0 – 122 frames @ 625 25i
Dolby E auto line select	Std, user select
Dolby E auto align	On/Off

Video Controls

Default Video Output Type	
	Pattern, Freeze, Black
Pattern Select	100% Color Bars, 75% Color Bars, SMPTE Bars, Tartan Bars, Black, Pluge, Ramp, H Sweep, Pulse & Bar, Multi-burst
Output Mode	Input, Black, Freeze, Pattern
Black Level	±200 mV in steps of 1 mV
Hue Adjust	±180° in steps of 1°
Master Video Gain	+6 to -120 dB
Y-Gain	+6 to -120 dB
Cb/Cr Gain	+6 to -120 dB
Caption Enable	On/Off
Edit Caption	16 characters
Caption Adjust	X-Y Size & Position

IQDMX33

3G/HD/SD-SDI De-embedder and Frame Synchronizer with AES/EBU and Analog Audio Outputs

Technical Specification cont…

Audio Controls

Audio In - Embedded

Audio In-Disembed	Pairs 1-8
Channel 1 – 16 Mute	On/Off
Channel 1 – 16 Polarity Inv	
	On/Off
Channel 1 – 16 Gain	+12 dB to -80 dB in 0.1 dB steps
Pair 1 – 8 Stereo	Link channel pairs

Audio Out - Embedded

Group 1 -4 Enable	On/Off
Audio Out-embed	Pairs 1-8
Channel 1 – 16 Mute	On/Off
Channel 1 – 16 Gain	+12 dB to -80 dB in 0.1 dB steps
Pair 1 – 8 Stereo	Link channel pairs

Audio Out - Analog

Channel 1 – 4 Mute	On/Off
Channel 1 – 4 Gain	+12 dB to -80 dB in 0.1 dB steps
Analog 1 – 2 Stereo	Link Channel Pairs

Audio Routing

Input routing Bus 1-8	Disembed 1-8, Dolby Decoder 1-5*
Output routing embed 1-8	
	Bus 1-8, Mixers 1-4, Downmixer 1-2, silence, Tones 1-8, Upmix*/Loudness*, Dolby Encoder 1-5*
Output routing AES 1-8	Bus 1-8, Mixers 1-4, Downmixer 1-2, silence, Tones 1-8, Upmix*/Loudness*, Dolby Encoder 1-5*
Output routing Analog 1-2	
	Bus 1-8, Mixers 1-4, Downmixer 1-2, silence, Tones 1-8, Upmix*/Loudness*, Dolby Encoder 1-5*

* indicates optional feature

Audio Setup Controls – Bus 1-8

Delay Add-In Bulk, RollTrack, current video	
	On/Off
Bulk Manual Delay	-520ms to +2s in 0.17ms steps
Coarse Manual Pair Delay	
	±1.995s in 1ms steps
Fine Manual Delay	±5ms in 0.02ms steps
Fast or smooth delay limit	
	5ms to 80ms
Silence Detect	-2dBFS to -128dBFS in steps of 1dB
Signal Overload Detect	-1dBFS to -127dBFS in steps of 1dB
Warning Timer	1 to 20 seconds in steps of 1 second
Tone Frequency 1-8	100Hz to 16kHz in 100Hz steps
Analog output Headroom	
	4dB to 24dB in 1dB steps
Analog output Line Up Level	
	-20dBU to 20dBU in 1dB steps (with 4dB Headroom setting)

Audio Mixers

Mixer Select	1-4, Downmix 1 -2
Source select	Bus 1-8, Silence, Tones 1-8
Source Gain	12dB to -80dB in 0.1dB steps
Mixer 1-4 invert	On/Off
Mixer 1-4, Downmix 1-2 Mute	
	On/Off
Downmix Configuration	LoRo, 4 level selections

Other Controls

GPI input High/Low Select	
	Input 1-2, Black, Freeze, Pattern, User Memories 1-16,
GPI Level Invert	High/Low
GPI Output Source	Current input OK, Input 1-2 OK, Input 1-2 Selected, Black, Freeze, Pattern, No User Memories Selected, User Memories 1-16
RS-485 Port	Output Dolby decoder, Output SMPTE 2020 Disembed, Input
SMPTE 2020 embedder	Dolby decoder, RS-485 Port, SMPTE 2020 Disembed
User Memories	Save/Recall/Rename
Memory Naming	User configurable naming of Memories 1 – 16
Information Window	Video Input Status, Audio Input Status, EDH/CRC & ANC Status
EDH/CRC Reset	Resets all EDH/CRC counts
RollTrack Index	Allows up to 70 destinations
RollTrack Sources	Unused, Video Delay, Audio Delay, Input Present (1-2), Input Loss (1-2), Output Std, Input selected (1-2), Output Black, Freeze or Pattern on, Output Black, Freeze or Pattern off, Output Caption on, Output Caption off, Embedded Audio (Pairs 1-8) PCM, Embedded Audio (Pairs 1-8) Non-PCM, Embedded Audio (Pairs 1-8) Loss, AES Audio (Pairs 1-8) PCM, Data, Dolby E, Loss, Reference OK & Loss, Dolby Decoder Input Type, Encoder active/pass-through, Dolby Metadata valid/missing
Factory Default	Resets all module settings to factory specified default values and clears memories
Default Settings	Resets all module settings to factory specified defaults but does not clear user memories
Restart	Software reset of module
Module Information	Reports: Product Name Software version, Serial number, Build number, KOS version, PCB version, Licensed Options
Input Names	19 Character editable name

IQDMX33

3G/HD/SD-SDI De-embedder and Frame Synchronizer with AES/EBU and Analog Audio Outputs

Technical Specification cont…

Specifications

Electrical	3Gbit/s SDI, SMPTE 424M 1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C / DVB-ASI
Connector / Format	BNC/ 75ohm panel jack on standard IQ connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s) >-10dB (3Gbit/s)
Output Jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz), 3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)
Reference Source	External – HD Tri-Level / SD Bi-level / Input Video syncs
Electrical	Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level) SD bi-level – RS170A HD Tr-level – SMPTE 240M, 274M and 296M
Connector / Format	BNC/75 ohm panel jack on standard IQ connector panel
Analog Reference Return Loss	SD bi-level > 40 dB to 5.5 MHz, HD tri-level > 35 dB to 30 MHz
Video Standards	1125(1080)/50p, 1125(1080)/59p, 750(720)/50p, 750(720)/59p, 1125(1080)/25i, 1125(1080)/25p, 1125(1080)/25psf, 1125(1080)/29i, 625(576)/25i, 525(480)/29i
Embedded audio handling	HD - 24-bit synchronous 48 kHz to SMPTE 299M, SD - 20-bit synchronous 48 kHz to SMPTE 272M-A

Digital Audio Output (Unbalanced)

Connector/Format	BNC
Level	1 V p-p typical into 75 Ohms
Standard	AES3-1992, SMPTE 272M A-1994, SMPTE 299M

Digital Audio Output (Balanced)

Connector/Format	25 W D
Level	3 V p-p typical into 110 Ohms
Standard	AES3, SMPTE 272M-A-1994, SMPTE 299M

Analog Audio Outputs

Output Level	Adjustable +12 dBu to +24 dBu
Output Impedance	~25 Ohms
THD+N	-97 dB at 18 dBu, typical at 1 kHz
Conversion	32-bit sampling @ 48kHz – 107 dB dynamic range typical

Power Consumption

Module Power Consumption	
	22.5 W Max (A Frames)
	21 PR (B Frames)
	Note: Dolby option adds 2.5W (PR)

IQDMX30

3G/HD/SD-SDI De-embedder for 8 AES/EBU Audio Streams

The IQDMX30 provides 16 channel digital audio de-embedding for 3Gbps SDI, HD-SDI 1.5 Gbit/s or SD-SDI 270 Mbit/s signals. Audio processing features include gain, invert and channel level routing, whilst a video proc. amp is also included in the feature set.

Features

- 16 channel 3G/HD/SD-SDI de-embedder with 8 balanced or unbalanced AES outputs
- Handles up to 16 channels of embedded audio present on the incoming SDI stream
- Standards supported:
  - 3G-SDI to SMPTE 424M/425M level A & B compatible
  - HD-SDI to SMPTE292M/274M/296M
    SD-SDI to SMPTE259M-C
- Channel level (Sub-frame) routing
- Audio proc-amp features including independent gain, invert, mute controls and adjustable delay for selected audio channels
- Any group of embedded audio may be passed unchanged, processed or blanked
- Embedded Dolby E support – pair routing, delay and Dolby E header alignment
- Handles Dolby E and PCM audio present in the same group with detection and reporting
- Able to pass all ancillary data without corruption inc. VANC metadata
- Independent HANC and VANC blanking control
- Input loss detection – default output of black/pattern/freeze
- Up to 9 frames of video delay and 2 seconds of audio delay
- Video controls including video gain and offset
- In-built test pattern generator and audio tone generator
- 16 x user memories, save/recall/rename
- RollCall control and monitoring compatible

Why should you choose this module?

- Ideal as a general de-embedder for AES audio applications
- Video delay feature allows this module to be used where a Dolby E decoder, for example, is to be placed downstream of the AES outputs
- Full RollCall and SNMP compatibility allows easy integration with SAM, or third party, network management systems providing an all-inclusive monitoring and control solution

Order codes

IQDMX3048-2A3, IQDMX3048-2B3
3G/HD/SD-SDI 16 channel AES De-embedder.
4 SDI outputs, 8 Unbalanced AES outputs

IQDMX3049-1A3, IQDMX3049-1B3
3G/HD/SD-SDI 16 channel AES De-embedder.
2 SDI outputs, 8 Balanced AES outputs

For more details on enclosure types please refer to Frames and Hardware section.

IQDMX30   3G/HD/SD-SDI De-embedder for 8 AES/EBU Audio Streams

Block Diagram for IQDMX3048-2A3

Network Intelligence, Control & Monitoring

Technical Specification

Inputs and Outputs

Signal Inputs

SDI Inputs	2x
Input 1 Cable Length	Up to 70m Belden 1694A @ 3 Gbit/s
	Up to 160m Belden 1694A @ 1.5 Gbit/s
	>350m Belden 1694A @ 270 Mbit/s
Input 2 Cable Length	Up to 60m Belden 1694A @ 3 Gbit/s
	Up to 100m Belden 1694A @ 1.5 Gbit/s
	Up to 100m Belden 1694A @ 270 Mbit/s
Signal Outputs	
SDI Outputs	x 2 (4)
Unbalanced digital audio	8 x AES/EBU, AC3, Dolby E (BNC)
Balanced digital audio	8 x AES/EBU, AC3, Dolby E (2 5 Way D-Type)

Controls

Indicators

Power	OK (Green)
CPU running	OK (Green flashing)
FPGA running	OK (Green flashing)
Status	OK (Green)
	Warning (Yellow)
	Error (Red)
Input 1	OK (Green)
Input 2	OK (Green)

Controls

Video Controls

Input Standard	1125(1080)/50P (A & B), 1125(1080)/59P (A & B), 1125(1080)/29i, 1125(1080)/25i, 750(720)/59P, 750(720)/50P, 525(480)/29i,625(576)/25i

Default Video Output Type.	Pattern, Freeze, Black
Default Video Output Standard	Last Known Good, 1125(1080)/50P (A & B), 1125(1080)/59P (A & B), 1125(1080)/29i, 1125(1080)/25i, 750(720)/59P, 750(720)/50P, 525(480)/29i, 625(576)/25i
Input Select	Input 1, Input 2
Manual Freeze	On/Off
Freeze	Field/Frame
Video Delay Frames	0 - 9 F
VANC Data	Blank VANC
SD VANC Data	Line blanking (6 controls)
ProcAmp Enable	On/Off
Black Level	±100 mV in steps of 0.8 mV
Hue Adjust	±180° in steps of 1°
Master Video Gain	±6 dB in steps of 0.1 dB
Y-Gain	±6 dB in steps of 0.1 dB
Cb/Cr Gain	±6 dB in steps of 0.1 dB
Y/C Timing	±8 pixels in 2 pixel steps (SD)
	±16 pixels in 2 pixel steps (HD/3G)
Picture Position	±8 pixels in 2 pixel steps (SD)
	±16 pixels in 2 pixel steps (HD/3G)
Pattern On	On/Off
Pattern Select	75% Color Bars, Black
Caption On	On/Off
Edit Caption	19 characters available

IQDMX30　3G/HD/SD-SDI De-embedder for 8 AES/EBU Audio Streams

Technical Specification cont…

Audio Controls

Embedder Assignment

Group 1 to 4 Enable	On/Off
Pair 1 to 8 Source L / Non-PCM	
	Dis-embed 1_1 to 8_2, Tone, Silence
Pair 1 to 8 Source R	Dis-embed 1_1 to 8_2, Tone, Silence
Pair 1 to 8 Stereo	Link channel pairs
Pair 1 to 8 Polarity L/R	On/Off
Pair 1 to 8 Gain L/R	+12 dB to -72 dB in 0.1 dB steps
Pair 1 to 8 Non-PCM	On/Off

AES Assignment

AES 1 to 8 Source L / Non-PCM	
	Dis-embed 1_1 to 8_2, Tone, Silence
AES 1 to 8 Source R	Dis-embed 1_1 to 8_2, Tone, Silence
AES 1 to 8 Stereo	Link channel pairs
AES 1 to 8 Polarity L/R	On/Off
AES 1 to 8 Gain L/R	+12 dB to -72 dB in 0.1 dB steps
AES 1 to 8 Non-PCM	On/Off

Processed Audio Delay Control

Course Manual Delay	Up to 1.75s in 5ms steps
Fine Manual Delay	+/- 0.25s in 0.5ms steps

Dolby-E

Dolby-E Auto

Alignment	On/Off

Tone

Frequency L/R	100Hz to 10kHz in 100Hz steps
Channel Ident	On/Off
HANC Data	Blank HANC (Removes all HANC data. Note audio removed when embedders disabled)
Audio Monitoring	
Silence Detect	0 to -80dB in steps of 1dB
Signal Overload Detect	0 to -80dB in steps of 1dB
Warning Timer	1 to 20 seconds in steps of 1 second

Other Controls

User Memories	16 x Save, Recall, Rename
Memory Naming	User configurable naming of memories 1 – 16
RollTrack Sources	Unused, Video Delay, Input Present, Input1 Select, Input2 Select, Input Loss, Output525, Output 625, Output 720p, Output 1080i, Output 1080p, Output Freeze, Output Unfreeze, Output Pattern on, Output pattern off, Output Caption on, Output Caption off, Disemb (Pairs 1-8) PCM, Disemb (Pairs 1-8) Data, Disemb (Pairs 1-8) DolbyE, Disemb (Pairs 1-8) V bit, Disemb (Pairs 1-8) Loss
Information Window	Video Input Status, Audio Input Status
Factory Default	Resets all module settings to factory specified default values and clears memories

Default Settings	Resets all module settings to factory specified defaults but does not clear memories
Restart	Software restart of the module
Module Information	"Reports following module information: Software version, Serial number, Build number, KOS version, Firmware version, PCB version

Specifications

Electrical	3Gbit/s SDI, SMPTE 424M
	1.5Gbit/s HD-SDI, SMPTE 292M
	270 Mbit/s SDI, SMPTE 259M-C /DVB-ASI
Connector / Format	BNC/ 75ohm panel jack on standard IQconnector panel
Return loss	>-15dB (270Mbit/s, 1.5bit/s)
	>-10dB (3Gbit/s)
Output Jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz)
	3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)
Video Standards	
	1125(1080)/50p (A & B), 1125(1080)/59p (A & B) 750(720)/50p, 750(720)/59p, 1125(1080)/25i, 1125(1080)/29i 625(576)/25i, 525(480)/29i
Typical Video Delay	SD: 70us
	HD: 38us
	3G-A: 19us
	3G-B: 40us
Embedded audio handling.	HD - 24-bit synchronous 48 kHz to SMPTE 299M
	SD - 20-bit synchronous 48 kHz to SMPTE 272M-A
Embedded Audio Delay	Minimum (PCM) 2 ms
	Maximum (non-PCM)
	SD: 67us
	HD: 28us
	3G-A: 15us
	3G-B: 25us

Digital Audio Output (Balanced)

Connector/Format	25 W D
Level	3 V p-p typical into 110 Ohms
Standard	AES3, SMPTE 272M-A-1994, SMPTE 299M

Digital Audio Output (Unbalanced)

Connector/Format	BNC
Level	1 V p-p typical into 75 Ohms
Standard	AES3id, SMPTE 272M-A-1994, SMPTE 299M

Power Consumption

Module Power Consumption	9.5W Max (A Frames)
	8.5 PR (B Frames)

IQDMX31   3G/HD/SD-SDI De-embedder for 4 AES/EBU Audio Streams

The IQDMX31 provides 8 channel digital audio de-embedding for 3Gbps SDI, HD-SDI 1.5 Gbit/s or SD-SDI 270 Mbit/s signals. Audio processing features include gain, invert, delay and channel level routing, whilst a video proc. amp is also included in the feature set.

Features

- 8 channel 3G/HD/SD-SDI de-embedder with 4 balanced or unbalanced AES outputs
- Handles up to 16 channels of embedded audio present on the incoming SDI stream
- Standards supported:
  - 3G-SDI to SMPTE 424M/425M level A & B compatible
  - HD-SDI to SMPTE292M/274M/296M
  - SD-SDI to SMPTE259M-C
- Channel level (Sub-frame) routing
- Audio proc-amp features including independent gain, invert, mute controls and adjustable delay for selected audio channels
- Any group of embedded audio may be passed unchanged, processed or blanked
- Embedded Dolby E support – pair routing, delay and Dolby E header alignment
- Handles Dolby E and PCM audio present in the same group with detection and reporting
- Able to pass all ancillary data without corruption inc. VANC metadata
- Independent HANC and VANC blanking control
- Input loss detection – default output of black/pattern/freeze
- Up to 9 frames of video delay and 2 seconds of audio delay
- Video controls including video gain and offset
- In-built test pattern generator and audio tone generator
- 2 SDI inputs and 2 active HD/SD-SDI outputs
- 16 x user memories, save/recall/rename
- RollCall control and monitoring compatible

Why should you choose this module?

- Ideal as a general de-embedder for AES audio applications
- Video delay feature allows this module to be used where a Dolby E decoder, for example, is to be placed downstream of the AES outputs
- Full RollCall and SNMP compatibility allows easy integration with SAM, or third party, network management systems providing an all-inclusive monitoring and control solution
- Available as an SD/HD version with simple software upgrade path to 3G, providing a cost effective future proof solution

Order codes

IQDMX3147-1A3, IQDMX3147-1B3
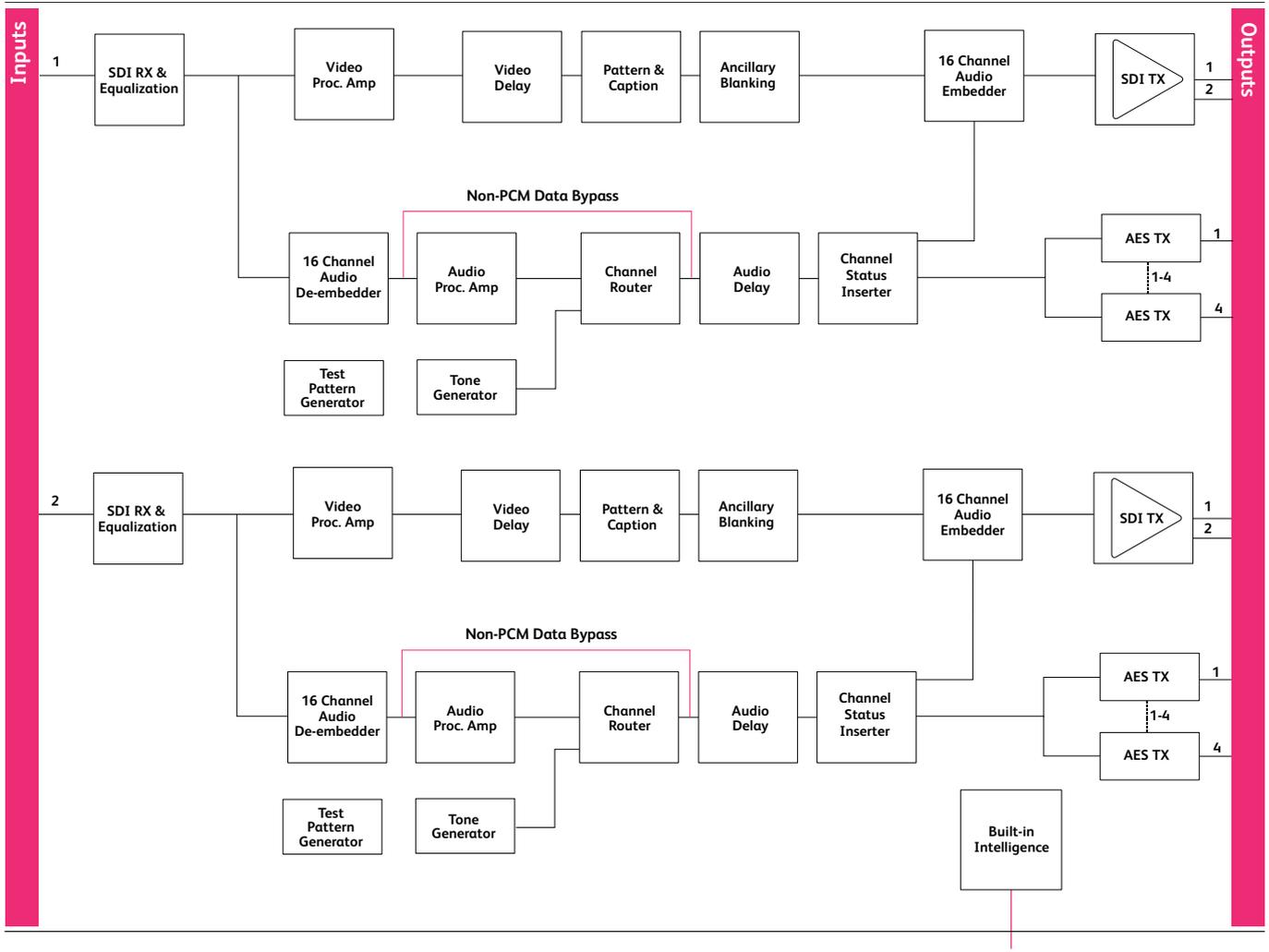3G/HD/SD-SDI 8 channel AES De-embedder. 2 outputs, 4 Unbalanced AES outputs.

IQDMX3149-1A3, IQDMX3149-1B3
3G/HD/SD-SDI 8 channel AES De-embedder. 2 outputs, 4 Balanced AES outputs.

For more details on enclosure types please refer to Frames and Hardware section.

IQDMX31

3G/HD/SD-SDI De-embedder for 4 AES/EBU Audio Streams
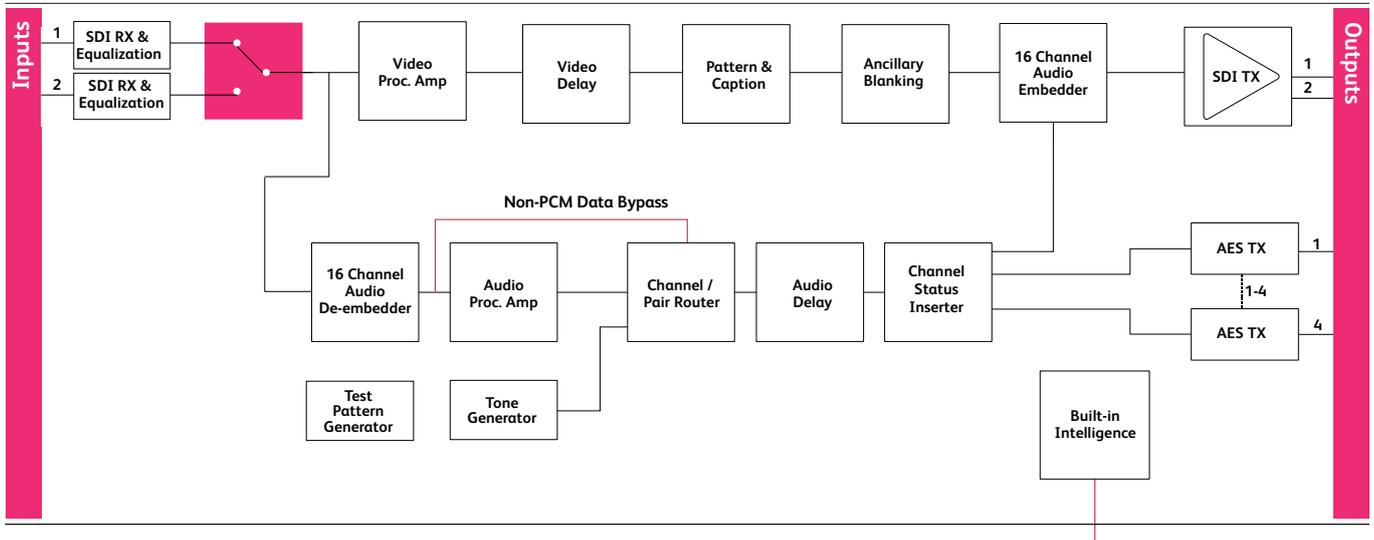
˄ **Block Diagram** for IQDMX3149-1A3

Technical Specification

Inputs & Outputs

Signal Inputs

SDI Inputs	2x
Input 1 Cable Length	Up to 70m Belden 1694A @ 3 Gbit/s
	Up to 160m Belden 1694A @ 1.5 Gbit/s
	>350m Belden 1694A @ 270 Mbit/s
Input 2 Cable Length	Up to 60m Belden 1694A @ 3 Gbit/s
	Up to 100m Belden 1694A @ 1.5 Gbit/s
	Up to 100m Belden 1694A @ 270 Mbit/s

Signal Outputs

SDI Outputs	x 2
Unbalanced digital audio	4 x AES/EBU, AC3, Dolby E (BNC)
Balanced digital audio	4 x AES/EBU, AC3, Dolby E (25 Way D-Type)

Controls

Indicators

Power	OK (Green)
CPU running	OK (Green flashing)
FPGA running	OK (Green flashing)
Status	OK (Green)
	Warning (Yellow)
	Error (Red)
Input 1	OK (Green)
Input 2	OK (Green)

Controls

Video Controls

Input Standard	1125(1080)/50P (A & B), 1125(1080)/59P (A & B), 1125(1080)/29i, 1125(1080)/25i, 750(720)/59P, 750(720)/50P, 525(480)/29i,625(576)/25i
Default Video Output Type .	Pattern, Freeze, Black
Default Video Output Standard	Last Known Good, 1125(1080)/50P (A & B), 1125(1080)/59P (A & B), 1125(1080)/29i, 1125(1080)/25i, 750(720)/59P, 750(720)/50P, 525(480)/29i, 625(576)/25i
Input Select	Input 1, Input 2
Manual Freeze	On/Off
Freeze	Field/Frame
Video Delay Frames	0 - 9 F
VANC Data	Blank VANC
SD VANC Data	Line blanking (6 controls)
ProcAmp Enable	On/Off
Black Level	±100 mV in steps of 0.8 mV
Hue Adjust	±180° in steps of 1°
Master Video Gain	±6 dB in steps of 0.1 dB
Y-Gain	±6 dB in steps of 0.1 dB
Cb/Cr Gain	±6 dB in steps of 0.1 dB
Y/C Timing	±8 pixels in 2 pixel steps (SD) ±16 pixels in 2 pixel steps (HD/3G)
Picture Position	±8 pixels in 2 pixel steps (SD) ±16 pixels in 2 pixel steps (HD/3G)
Pattern On	On/Off
Pattern Select	75% Color Bars, Black
Caption On	On/Off
Edit Caption	19 characters available

IQDMX31   3G/HD/SD-SDI De-embedder for 4 AES/EBU Audio Streams

Technical Specification cont…

Audio Controls
Embedder Assignment

Group 1 to 4 Enable	On/Off
Pair 1 to 8 Source L / Non-PCM	Dis-embed 1_1 to 8_2, Tone, Silence
Pair 1 to 8 Source R	Dis-embed 1_1 to 8_2, Tone, Silence
Pair 1 to 8 Stereo	Link channel pairs
Pair 1 to 8 Polarity L/R	On/Off
Pair 1 to 8 Gain L/R	+12 dB to -72 dB in 0.1 dB steps
Pair 1 to 8 Non-PCM	On/Off

AES Assignment

AES 1 to 4 Source L / Non-PCM	Dis-embed 1_1 to 8_2, Tone, Silence
AES 1 to 4 Source R	Dis-embed 1_1 to 8_2, Tone, Silence
AES 1 to 4 Stereo	Link channel pairs
AES 1 to 4 Polarity L/R	On/Off
AES 1 to 4 Gain L/R	+12 dB to -72 dB in 0.1 dB steps
AES 1 to 4 Non-PCM	On/Off
Processed Audio Delay Control	
Course Manual Delay	Up to 1.75s in 5ms steps
Fine Manual Delay	+/- 0.25s in 0.5ms steps

Tone

Frequency L/R	100Hz to 10kHz in 100Hz steps
Channel Ident	On/Off
HANC Data	Blank HANC (Removes all HANC data. Note audio removed when embedders disabled)

Dolby-E

Dolby-E Auto Alignment	On/Off

Audio Monitoring

Silence Detect	0 to -80dB in steps of 1dB
Signal Overload Detect	0 to -80dB in steps of 1dB
Warning Timer	1 to 20 seconds in steps of 1 second

Other Controls

User Memories	16 x Save, Recall, Rename
Memory Naming	User configurable naming of memories 1 – 16
RollTrack Sources	Unused, Video Delay, Input Present, Input1 Select, Input2 Select, Input Loss, Output525, Output 625, Output 720p, Output 1080i, Output 1080p, Output Freeze, Output Unfreeze, Output Pattern on, Output pattern off, Output Caption on, Output Caption off, Disemb (Pairs 1-8) PCM, Disemb (Pairs 1-8) Data, Disemb (Pairs 1-8) DolbyE, Disemb (Pairs 1-8) V bit, Disemb (Pairs 1-8) Loss
Information Window	Video Input Status, Audio Input Status
Factory Default	Resets all module settings to factory specified default values and clears memories

Default Settings	Resets all module settings to factory specified defaults but does not clear memories
Restart	Software restart of the module
Module Information	"Reports following module information: Software version, Serial number, Build number, KOS version, Firmware version, PCB version

Specifications

Electrical	3Gbit/s SDI, SMPTE 424M
	1.5Gbit/s HD-SDI, SMPTE 292M
	270 Mbit/s SDI, SMPTE 259M-C / DVB-ASI
Connector / Format	BNC/ 75ohm panel jack on standard IQ connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s)
	>-10dB (3Gbit/s)
Output Jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz)
	3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)
Video Standards	
	1125(1080)/50p (A & B), 1125(1080)/59p (A & B)
	750(720)/50p, 750(720)/59p,
	1125(1080)/25i, 1125(1080)/29i
	625(576)/25i, 525(480)/29i
Typical Video Delay	SD: 70us
	HD: 38us
	3G-A: 19us
	3G-B: 40us
Embedded audio handling.	HD - 24-bit synchronous 48 kHz to SMPTE 299M
	SD - 20-bit synchronous 48 kHz to SMPTE 272M-A
Embedded Audio Delay	Minimum (PCM) 2 ms
	Maximum (non-PCM)
	SD: 67us
	HD: 28us
	3G-A: 15us
	3G-B: 25us

Digital Audio Output (Balanced)

Connector/Format	25 W D
Level	3 V p-p typical into 110 Ohms
Standard	AES3, SMPTE 272M-A-1994, SMPTE 299M

Digital Audio Output (Unbalanced)

Connector/Format	BNC
Level	1 V p-p typical into 75 Ohms
Standard	AES3id, SMPTE 272M-A-1994, SMPTE 299M

Power Consumption

Module Power Consumption	9.5W Max (A Frames)
	8.5 PR (B Frames)

IQDMX32 — Dual 3G/HD/SD-SDI De-embedder for 4 AES/EBU Audio Streams

The IQDMX32 is a dual 8 channel digital audio de-embedder for 3Gbps SDI, HD-SDI 1.5 Gbit/s or SDSDI 270 Mbit/s signals. Audio processing features include gain, invert, delay and channel level routing, whilst a video proc. amp is also included in the feature set.

Features

- Dual 8 channel 3G/HD/SD-SDI de-embedder with 4 balanced or unbalanced AES outputs per channel
- Handles up to 16 channels of embedded audio present on each SDI input
- Standards supported:
    - 3G-SDI to SMPTE 424M/425M level A & B compatible
    - HD-SDI to SMPTE292M/274M/296M
    - SD-SDI to SMPTE259M-C
- Channel level (Sub-frame) routing
- Audio proc-amp features including independent gain, invert and mute control
- Adjustable delay for selected audio channels
- Any group of embedded audio may be passed unchanged, processed or blanked
- Embedded Dolby E support – pair routing and delay
- PCM and non-PCM detection and reporting
- Handles Dolby E and PCM audio present in the same group
- Able to pass all ancillary data without corruption inc. VANC metadata
- Independent HANC and VANC blanking control
- Input loss detection – default output of black/pattern/freeze
- Up to 3 frames of video delay and 2 seconds of audio delay per channel
- Video controls including video gain and offset
- In-built test pattern and tone generators for each channel
- Up to 2 active HD/SD-SDI outputs per channel
- 16 x user memories per channel, save/recall/rename
- RollCall control and monitoring compatible

Why should you choose this module?

- Compact multi-channel de-embedder for AES audio applications where space is at a premium, in OB environments for example
- Video delay feature allows this module to be used where a Dolby E decoder, for example, is to be placed downstream of the AES outputs
- Full RollCall and SNMP compatibility allows easy integration with SAM, or third party, network management systems providing an all-inclusive monitoring and control solution

Order codes
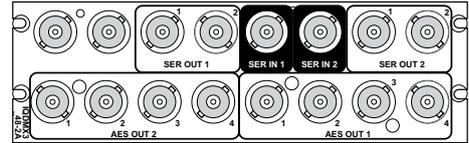
IQDMX3248-2A3, IQDMX3248-2B3
3G/HD/SD-SDI Dual 8 channel AES De-embedder. 2 outputs per input, 4 Unbalanced AES outputs per input.

IQDMX3249-1A3, IQDMX3249-1B3
3G/HD/SD-SDI Dual 8 channel AES De-embedder. 1 output per input, 4 Balanced AES outputs per input.

For more details on enclosure types please refer to Frames and Hardware section.

IQDMX32 — Dual 3G/HD/SD-SDI De-embedder for 4 AES/EBU Audio Streams

Inputs

Outputs

1 → SDI RX & Equalization → Video Proc. Amp → Video Delay → Pattern & Caption → Ancillary Blanking → 16 Channel Audio Embedder → SDI TX → 1, 2

Non-PCM Data Bypass

16 Channel Audio De-embedder → Audio Proc. Amp → Channel Router → Audio Delay → Channel Status Inserter → AES TX (1), 1-4, AES TX (4)

Test Pattern Generator — Tone Generator

2 → SDI RX & Equalization → Video Proc. Amp → Video Delay → Pattern & Caption → Ancillary Blanking → 16 Channel Audio Embedder → SDI TX → 1, 2

Non-PCM Data Bypass

16 Channel Audio De-embedder → Audio Proc. Amp → Channel Router → Audio Delay → Channel Status Inserter → AES TX (1), 1-4, AES TX (4)

Test Pattern Generator — Tone Generator

Built-in Intelligence

Network Intelligence, Control & Monitoring

Block Diagram for IQDMX3248-2A3

Technical Specification

Inputs & Outputs

Signal Inputs

SDI Inputs	1 per Channel
Input 1 Cable Length	Up to 70m Belden 1694A @ 3 Gbit/s
	Up to 160m Belden 1694A @ 1.5 Gbit/s
	>350m Belden 1694A @ 270 Mbit/s
Input 2 Cable Length	Up to 60m Belden 1694A @ 3 Gbit/s
	Up to 100m Belden 1694A @ 1.5 Gbit/s
	Up to 200m Belden 1694A @ 270 Mbit/s
Signal Outputs	
SDI Outputs	x 2 per Channel
Unbalanced digital audio	4 x AES/EBU, AC3, Dolby E (BNC)
Balanced digital audio	4 x AES/EBU, AC3, Dolby E (25 Way D-Type)

Controls

Indicators

Power	OK (Green)
CPU running	OK (Green flashing)
FPGA running	OK (Yellow flashing)
Status	OK (Green)
	Warning (Yellow)
	Error (Red)
Input 1	OK (Green)
Input 2	OK (Green)

Controls

Video Controls

Input Standard	1125(1080)/50P (A & B),
	1125(1080)/59P (A & B),
	1125(1080)/29i, 1125(1080)/25i,
	750(720)/59P, 750(720)/50P,
	525(480)/29i,625(576)/25i

IQDMX32

Dual 3G/HD/SD-SDI De-embedder for 4 AES/EBU Audio Streams

Technical Specification cont...

Default Video Output Type.	Pattern, Freeze, Black
Default Video Output Standard	Last Known Good,
Default Video Output Type	Pattern, Freeze, Black
Default Video Output Standard	Last Known Good, 1125(1080)/50P (A & B), 1125(1080)/59P (A & B), 1125(1080)/29i, 1125(1080)/25i, 750(720)/59P, 750(720)/50P, 525(480)/29i, 625(576)/25i
Manual Freeze	On/Off
Freeze	Field/Frame
Video Delay Frames	0 - 3 F
VANC Data	Blank VANC
SD VANC Data	Line blanking (6 controls)
ProcAmp Enable	On/Off
Black Level	±100 mV in steps of 0.8 mV
Hue Adjust	±180° in steps of 1°
Master Video Gain	±6 dB in steps of 0.1 dB
Y-Gain	±6 dB in steps of 0.1 dB
Cb/Cr Gain	±6 dB in steps of 0.1 dB
Y/C Timing	±8 pixels in 2 pixel steps (SD) ±16 pixels in 2 pixel steps (HD/3G)
Picture Position	±8 pixels in 2 pixel steps (SD) ±16 pixels in 2 pixel steps (HD/3G)
Pattern On	On/Off
Pattern Select	75% Color Bars, Black
Caption On	On/Off
Edit Caption	19 characters available

Audio Controls
Embedder Assignment

Group 1 to 4 Enable	On/Off
Pair 1 to 8 Source L / Non-PCM	
	Dis-embed 1_1 to 8_2, Tone, Silence
Pair 1 to 8 Source R	Dis-embed 1_1 to 8_2, Tone, Silence
Pair 1 to 8 Stereo	Link channel pairs
Pair 1 to 8 Polarity L/R	On/Off
Pair 1 to 8 Gain L/R	+12 dB to -72 dB in 0.1 dB steps
Pair 1 to 8 Non-PCM	On/Off

AES Assignment

AES 1 to 4 Source L / Non-PCM	
	Dis-embed 1_1 to 8_2, Tone, Silence
AES 1 to 4 Source R	Dis-embed 1_1 to 8_2, Tone, Silence
AES 1 to 4 Stereo	Link channel pairs
AES 1 to 4 Polarity L/R	On/Off
AES 1 to 4 Gain L/R	+12 dB to -72 dB in 0.1 dB steps
AES 1 to 4 Non-PCM	On/Off

Processed Audio Delay Control

Course Manual Delay	Up to 1.75s in 5ms steps
Fine Manual Delay	+/- 0.25s in 0.5ms steps

Tone

Frequency L/R	100Hz to 10kHz in 100Hz steps
Channel Ident	On/Off
HANC Data	Blank HANC (Removes all HANC data. Note audio removed when embedders disabled)

Audio Monitoring

Silence Detect	0 to -80dB in steps of 1dB
Signal Overload Detect	0 to -80dB in steps of 1dB
Warning Timer	1 to 20 seconds in steps of 1 second

Other Controls

User Memories	16 x Save, Recall, Rename
Memory Naming	User configurable naming of memories 1 – 16
RollTrack Sources	Unused, Video Delay (1&2), Input Present (1&2), Input1 Select, (1&2) Input2 Select (1&2), Input Loss (1&2), Output525 (1&2), Output 625 (1&2), Output 720p (1&2), Output 1080i (1&2), Output 1080p (1&2), Output Freeze (1&2), Output Unfreeze (1&2), Output Pattern on (1&2), Output pattern off (1&2), Output Caption on (1&2), Output Caption off (1&2), Disemb (Pairs 1-8) PCM (1&2), Disemb (Pairs 1-8) Data (1&2), Disemb (Pairs 1-8) DolbyE (1&2), Disemb (Pairs 1-8) V bit (1&2), Disemb (Pairs 1-8) Loss (1&2)
Information Window	Video Input Status, Audio Input Status
Factory Default	Resets all module settings to factory specified default values and clears memories
Default Settings	Resets all module settings to factory specified defaults but does not clear memories
Restart	Software restart of the module
Module Information	"Reports following module information: Software version, Serial number, Build number, KOS version, Firmware version, PCB version

IQDMX32

Dual 3G/HD/SD-SDI De-embedder for 4 AES/EBU Audio Streams

Technical Specification cont…

Specifications

Electrical	3Gbit/s SDI, SMPTE 424M
	1.5bit/s HD-SDI, SMPTE 292M
	270 Mbit/s SDI, SMPTE 259M-C /DVB-ASI
Connector / Format	BNC/ 75ohm panel jack on
	standard IQ connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s)
	>-10dB (3Gbit/s)
Output Jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI
	(1KHz)
	3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI
	(100KHz)
Video Standards	
	1125(1080)/50p (A & B), 1125(1080)/59p (A & B)
	750(720)/50p, 750(720)/59p,
	1125(1080)/25i, 1125(1080)/29i
	625(576)/25i, 525(480)/29i
Typical Video Delay	SD: 70us
	HD: 38us
	3G-A: 19us
	3G-B: 40us
Embedded audio handling.	HD - 24-bit synchronous 48 kHz to SMPTE 299M
	SD - 20-bit synchronous 48 kHz to SMPTE 272M-A
Embedded Audio Delay	Minimum (PCM) 2 ms
	Maximum (non-PCM)
	SD: 67us
	HD: 28us
	3G-A: 15us
	3G-B: 25us

Digital Audio Output (Balanced)

Connector/Format	25 W D
Level	3 V p-p typical into 110 Ohms
Standard	AES3, SMPTE 272M-A-1994,
	SMPTE 299M

Digital Audio Output (Unbalanced)

Connector/Format	BNC
Level	1 V p-p typical into 75 Ohms
Standard	AES3id, SMPTE 272M-A-1994,
	SMPTE 299M

Power Consumption

Module Power Consumption	12W Max (A Frames)
	11 PR (B Frames)

IQDMX34

3G/HD/SD-SDI De-embedder for 8 Analog Audio Channels

The IQDMX34 provides 8 channel analog audio de-embedding for 3Gbps SDI, HD-SDI 1.5 Gbit/s or SD-SDI 270 Mbit/s signals. Audio processing features include gain, invert and channel level routing, whilst a video proc. amp is also included in the feature set.

Features

- 3G/HD/SD-SDI de-embedder with 8 balanced analog outputs selectable from any of the 16 channels of embedded audio present on the incoming SDI stream
- Standards supported:
  - 3G-SDI to SMPTE 424M/425M level A & B compatible
  - HD-SDI to SMPTE292M/274M/296M
  - SD-SDI to SMPTE259M-C
- Features include independent gain, invert, mute controls, channel level (Sub-frame) routing, and adjustable delay for selected audio channels
- Any group of embedded audio may be passed unchanged, processed or blanked
- Embedded Dolby E support – pair routing and delay
- Up to 9 frames of video delay and 2 seconds of audio delay
- Able to pass all ancillary data without corruption inc. VANC metadata
- Independent HANC and VANC blanking control
- Input loss detection – default output of black/pattern/freeze
- Video controls including video gain and offset
- In-built test pattern generator and audio tone generator
- 16 x user memories, save/recall/rename
- RollCall control and monitoring compatible

Why should you choose this module?

- Ideal as a general de-embedder for analog audio monitoring applications
- Full RollCall and SNMP compatibility allows easy integration with SAM, or third party, network management systems providing an all-inclusive monitoring and control solution

Order codes

IQDMX3449-1A3, IQDMX3449-1B3
3G/HD/SD-SDI 8 channel Analog Audio De-embedder. 2 SDI outputs, 8 Balanced Analog outputs

For more details on enclosure types please refer to datasheet IQH3B.
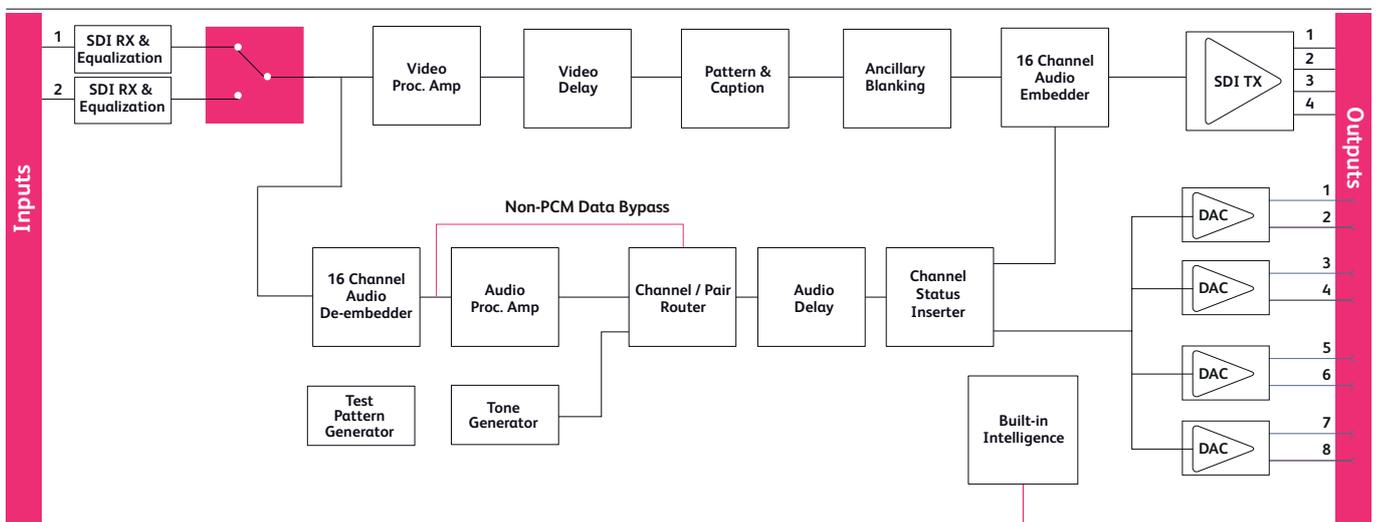
Block Diagram for IQDMX3449-1A3

IQDMX34

3G/HD/SD-SDI De-embedder for 8 Analog Audio Channels

Technical Specification

Inputs and Outputs

Signal Inputs

SDI Inputs	2x
Input 1 Cable Length	Up to 70m Belden 1694A @ 3 Gbit/s
	Up to 160m Belden 1694A @ 1.5 Gbit/s
	>350m Belden 1694A @ 270 Mbit/s
Input 2 Cable Length	Up to 60m Belden 1694A @ 3 Gbit/s
	Up to 100m Belden 1694A @ 1.5 Gbit/s
	Up to 100m Belden 1694A @ 270 Mbit/s

Signal Outputs

SDI Outputs	x 2
Audio Signal Outputs	
Balanced analog audio Outputs	
	8 channels (25 Way D-Type)

Controls

Indicators

Power	OK (Green)
CPU running	OK (Green flashing)
FPGA running	OK (Green flashing)
Status	OK (Green)
	Warning (Yellow)
	Error (Red)
Input 1	OK (Green)
Input 2	OK (Green)

Controls

Video Controls	
Input Standard	1125(1080)/50P (A & B), 1125(1080)/59P (A & B), 1125(1080)/29i, 1125(1080)/25i, 750(720)/59P, 750(720)/50P, 525(480)/29i,625(576)/25i
Default Video Output Type.	Pattern, Freeze, Black
Default Video Output Standard	Last Known Good, 1125(1080)/50P (A & B), 1125(1080)/59P (A & B), 1125(1080)/29i, 1125(1080)/25i, 750(720)/59P, 750(720)/50P, 525(480)/29i, 625(576)/25i
Video Select	Input 1, Input 2
Audio Select	Video Input 1, Video Input 2, Follow Video
Manual Freeze	On/Off
Freeze	Field/Frame
Video Delay Frames	0 - 9 F
VANC Data	Blank VANC
SD VANC Data	Line blanking (6 controls)
ProcAmp Enable	On/Off
Black Level	±100 mV in steps of 0.8 mV
Hue Adjust	±180° in steps of 1°
Master Video Gain	±6 dB in steps of 0.1 dB
Y-Gain	±6 dB in steps of 0.1 dB
Cb/Cr Gain	±6 dB in steps of 0.1 dB
Y/C Timing	±8 pixels in 2 pixel steps (SD) ±16 pixels in 2 pixel steps (HD/3G)
Picture Position	±8 pixels in 2 pixel steps (SD) ±16 pixels in 2 pixel steps (HD/3G)
Pattern On	On/Off
Pattern Select	75% Color Bars, Black
Caption On	On/Off
Edit Caption	19 characters available

Audio Controls

Embedder Assignment

Group 1 to 4 Enable	On/Off
Pair 1 to 8 Source L / Non-PCM	
	Dis-embed 1_1 to 8_2, Tone, Silence
Pair 1 to 8 Source R	Dis-embed 1_1 to 8_2, Tone, Silence
Pair 1 to 8 Stereo	Link channel pairs
Pair 1 to 8 Polarity L/R	On/Off
Pair 1 to 8 Gain L/R	+12 dB to -72 dB in 0.1 dB steps
Pair 1 to 8 Non-PCM	On/Off

Analog Output Assignment

Channel 1 to 8 Source	Dis-embed 1_1 to 8_2, Tone, Silence
Channel 1 to 8 Stereo	Link channel pairs
Channel 1 to 8 Polarity	On/Off
Channel 1 to 8 Gain	+12 dB to -72 dB in 0.1 dB steps

Audio Setup Controls

Analog Output Level	+12 dBU to +24dBU
Note: Output level specified at 0 dBFS line up level	

Processed Audio Delay Control

Course Manual Delay	Up to 1.75s in 5ms steps
Fine Manual Delay	+/- 0.25s in 0.5ms steps

Tone

Frequency L/R	100Hz to 10kHz in 100Hz steps
Channel Ident	On/Off
HANC Data	Blank HANC (Removes all HANC data. Note audio removed when embedders disabled)

Audio Monitoring

Silence Detect	0 to -80dB in steps of 1dB
Signal Overload Detect	0 to -80dB in steps of 1dB
Warning Timer	1 to 20 seconds in steps of 1 second

Other Controls

User Memories	16 x Save, Recall, Rename
Memory Naming	User configurable naming of memories 1 – 16
RollTrack Sources	Unused, Video Delay, Input Present, Input1 Select, Input2 Select, Input Loss, Output525, Output 625, Output 720p, Output 1080i, Output 1080p, Output Freeze, Output Unfreeze, Output Pattern on, Output pattern off, Output Caption on, Output Caption off, Disemb (Pairs 1-8) PCM, Disemb (Pairs 1-8) Data, Disemb (Pairs 1-8) DolbyE, Disemb (Pairs 1-8) V bit, Disemb (Pairs 1-8) Loss
Information Window	Video Input Status, Audio Input Status
Factory Default	Resets all module settings to factory specified default values and clears memories
Default Settings	Resets all module settings to factory specified defaults but does not clear memories
Restart	Software restart of the module
Module Information	"Reports following module information: Software version, Serial number, Build number, KOS version, Firmware version, PCB version

IQDMX34 3G/HD/SD-SDI De-embedder for 8 Analog Audio Channels

Technical Specification cont…

Specifications

Electrical	3Gbit/s SDI, SMPTE 424M
	1.5Gbit/s HD-SDI, SMPTE 292M
	270 Mbit/s SDI, SMPTE 259M-C /DVB-ASI
Connector / Format	BNC/ 75ohm panel jack on
	standard IQconnector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s)
	>-10dB (3Gbit/s)
Output Jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz)
	3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)
Video Standards	
	1125(1080)/50p (A & B), 1125(1080)/59p (A & B)
	750(720)/50p, 750(720)/59p,
	1125(1080)/25i, 1125(1080)/29i
	625(576)/25i, 525(480)/29i
Typical Video Delay	SD: 70us
	HD: 38us
	3G-A: 19us
	3G-B: 40us
Embedded audio handling.	HD - 24-bit synchronous
	48 kHz to SMPTE 299M
	SD - 20-bit synchronous
	48 kHz to SMPTE 272M-A
Embedded Audio Delay	Minimum (PCM) 2 ms
	Maximum (non-PCM)
	SD: 67us
	HD: 28us
	3G-A: 15us
	3G-B: 25us

Analog Audio Outputs

Output Level	Adjustable +12 dBu to +24 dBu
Output Impedance	~25 Ohms
Dynamic Range	114 dB typical
THD+N	-93dB @ +23dBu 800Hz typical
Frequency Response	20Hz-20KHz +0.05dB
Conversion	24-bit sampling @ 48kHz

Power Consumption

Module Power Consumption	9.5W (A Frames)
	9.5PR (B Frames)

IQBRK30

3G/HD/SD-SDI Re-embedder for 4 AES/EBU Audio Streams

The IQBRK30 provides 8 channel digital audio de-embedding and re-embedding for 3Gbps SDI, HD-SDI 1.5 Gbit/s or SD-SDI 270 Mbit/s signals. Able to select any of the 16 embedded channels, audio processing features include audio delay, gain, invert and channel level routing, whilst video delay and a video proc. amp are also included in the feature set. Ideal for breaking out embedded audio to AES only devices for processing then re ingesting the resulting feeds back into the SDI domain.

Features

- 8 channel 3G/HD/SD-SDI re-embedder capable of embedding and de-embedding up to 4 AES signals
- Standards supported:
    - 3G-SDI to SMPTE 424M/425M level A & B compatible
    - HD-SDI to SMPTE292M/274M/296M
    - SD-SDI to SMPTE259M-C
- Handles up to 16 channels of embedded audio present on the incoming SDI stream
- Channel level (Sub-frame) routing
- Audio proc-amp features including independent gain, invert and mute control
- Embedding continues on loss of SDI input (silence)
- Auto mute on AES input error
- Adjustable delay for selected audio channels
- Any group of embedded audio may be passed unchanged, processed or blanked
- Embedded Dolby E support – pair routing, delay and Dolby E header alignment
- PCM and non-PCM detection and reporting
- Handles Dolby E and PCM audio present in the same group
- Independent HANC and VANC blanking control
- Input loss detection – default output of black/pattern/freeze
- Up to 9 frames of video delay and 2 seconds of audio delay
- Transparent to all ancillary data inc. VANC metadata
- Input loss detection – default output of black/pattern/freeze
- Video controls including video gain and offset
- In-built test pattern generator and audio tone generator
- 2 SDI inputs and up to 4 active HD/SD-SDIoutputs
- 16 x user memories, save/recall/rename
- RollCall control and monitoring compatible

Why should you choose this module?

- Ideal as a re-embedder for stereo, multichannel or Dolby E AES audio applications
- Suitable for multi-lingual audio applications thanks to channel-level control and up to sixteen channel operation
- Full RollCall and SNMP compatibility allows easy integration with SAM, or third party, network management systems providing an all-inclusive monitoring and control solution

Order codes
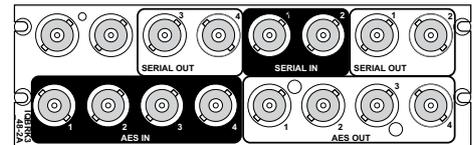
IQBRK3048-2A3, IQBRK3048-2B3
3G/HD/SD-SDI 16 channel AES Re-embedder. 4 SDI outputs, 4 Unbalanced AES inputs, 4 Unbalanced AES outputs

IQBRK3049-1A3, IQBRK3049-1B3
3G/HD/SD-SDI 16 channel AES Re-embedder. 2 SDI outputs, 4 Balanced AES inputs, 4 Balanced AES outputs

For more details on enclosure types please refer to Frames and Hardware section.

IQBRK30
3G/HD/SD-SDI Re-embedder for 4 AES/EBU Audio Streams
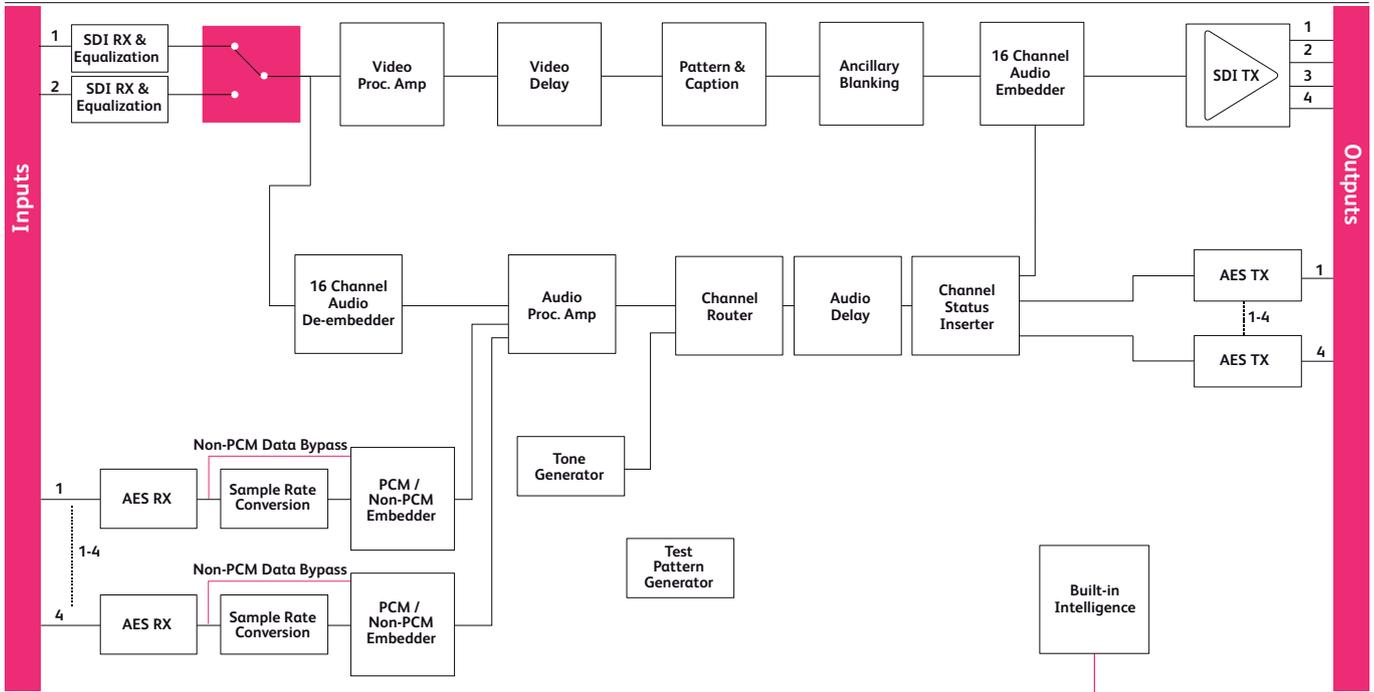
Block Diagram for IQBRK3048–2A3

Technical Specification

Inputs and Outputs
Signal Inputs

SDI Inputs	2x
Input 1 Cable Length	Up to 70m Belden 1694A @ 3 Gbit/s
	Up to 160m Belden 1694A @ 1.5 Gbit/s
	>350m Belden 1694A @ 270 Mbit/s
Input 2 Cable Length	Up to 60m Belden 1694A @ 3 Gbit/s
	Up to 100m Belden 1694A @ 1.5 Gbit/s
	Up to 100m Belden 1694A @ 270 Mbit/s
Unbalanced digital audio	8 x AES/EBU, AC3, Dolby E (BNC)
Balanced digital audio	8 x AES/EBU, AC3, Dolby E (25 Way D-Type)

Signal Outputs

SDI Outputs	x 2 (4)
Unbalanced digital audio	4 x AES/EBU, AC3, Dolby E (BNC)
Balanced digital audio	4 x AES/EBU, AC3, Dolby E (25 Way D-Type

Controls
Video Controls

Input Standard	1125(1080)/50P (A & B), 1125(1080)/59P (A & B), 1125(1080)/29i, 1125(1080)/25i, 750(720)/59P, 750(720)/50P, 525(480)/29i,625(576)/25i

Default Video Output Type .	Pattern, Freeze, Black
Default Video Output Standard	Last Known Good, 1125(1080)/50P (A & B), 1125(1080)/59P (A & B), 1125(1080)/29i, 1125(1080)/25i, 750(720)/59P, 750(720)/50P, 525(480)/29i, 625(576)/25i
Video Select	Input 1, Input 2
Audio Select	Video Input 1, Video Input 2, Follow Video
Manual Freeze	On/Off
Freeze	Field/Frame
Video Delay Frames	0 - 9 F
VANC Data	Blank VANC
SD VANC Data	Line blanking (6 controls)
ProcAmp Enable	On/Off
Black Level	±100 mV in steps of 0.8 mV
Hue Adjust	±180° in steps of 1°
Master Video Gain	±6 dB in steps of 0.1 dB
Y-Gain	±6 dB in steps of 0.1 dB
Cb/Cr Gain	±6 dB in steps of 0.1 dB
Y/C Timing	±8 pixels in 2 pixel steps (SD) ±16 pixels in 2 pixel steps (HD/3G)
Picture Position	±8 pixels in 2 pixel steps (SD) ±16 pixels in 2 pixel steps (HD/3G)
Pattern On	On/Off
Pattern Select	75% Color Bars, Black
Caption On	On/Off
Edit Caption	19 characters available

IQBRK30

3G/HD/SD-SDI Re-embedder for 4 AES/EBU Audio Streams

Technical Specification cont…

Audio Controls

Embedder Assignment

Group 1 to 4 Enable	On/Off
Pair 1 to 8 Source L / Non-PCM	
	Dis-embed 1_1 to 8_2, AES 1 to 8, Tone, Silence
Pair 1 to 8 Source R	Dis-embed 1_1 to 8_2, AES 1 to 8, Tone, Silence
Pair 1 to 8 Stereo	Link channel pairs
Pair 1 to 8 Polarity L/R	On/Off
Pair 1 to 8 Gain L/R	+12 dB to -72 dB in 0.1 dB steps
Pair 1 to 8 Non-PCM	On/Off

AES Assignment

AES 1 to 4 Source L / Non-PCM	Dis-embed 1_1 to 8_2, Tone, Silence
AES 1 to 4 Source R	Dis-embed 1_1 to 8_2, Tone, Silence
AES 1 to 4 Stereo	Link channel pairs
AES 1 to 4 Polarity L/R	On/Off
AES 1 to 4 Gain L/R	+12 dB to -72 dB in 0.1 dB steps
AES 1 to 4 Non-PCM	On/Off

Processed Audio Delay Control

Course Manual Delay	Up to 1.75s in 5ms steps
Fine Manual Delay	+/- 0.25s in 0.5ms steps

Dolby-E

Dolby-E Auto

Alignment	On/Off
Tone	
Frequency L/R	100Hz to 10kHz in 100Hz steps
Channel Ident	On/Off
HANC Data	Blank HANC (Removes all HANC data. Note audio removed when embedders disabled)
Audio Monitoring	
Silence Detect	0 to -80dB in steps of 1dB
Signal Overload Detect	0 to -80dB in steps of 1dB
Warning Timer	1 to 20 seconds in steps of 1 second

Other Controls

User Memories	16 x Save, Recall, Rename
Memory Naming	User configurable naming of memories 1 – 16
RollTrack Sources	Unused, Video Delay, Input Present, Input1 Select, Input2 Select, Input Loss, Output525, Output 625, Output 720p, Output 1080i, Output 1080p, Output Freeze, Output Unfreeze, Output Pattern on, Output pattern off, Output Caption on, Output Caption off, AES (Pairs 1-8) PCM, AES (Pairs 1-8) Data, AES (Pairs 1-8) DolbyE, AES (Pairs 1-8) V bit, AES (Pairs 1-8) Loss, Disemb (Pairs 1-8) PCM, Disemb (Pairs 1-8) Data, Disemb (Pairs 1-8) DolbyE, Disemb (Pairs 1-8) V bit, Disemb (Pairs 1-8) Loss
Information Window	Video Input Status, Audio Input Status
Factory Default	Resets all module settings to factory specified default values and clears memories
Default Settings	Resets all module settings to factory specified defaults but does not clear memories
Restart	Software restart of the module
Module Information	"Reports following module information: Software version, Serial number, Build number, KOS version, Firmware version, PCB version

Specifications

Electrical	3Gbit/s SDI, SMPTE 424M
	1.5Gbit/s HD-SDI, SMPTE 292M
	270 Mbit/s SDI, SMPTE 259M-C /DVB-ASI
Connector / Format	BNC/ 75ohm panel jack on standard IQ connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s)
	>-10dB (3Gbit/s)
Output Jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz)
	3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)
Video Standards	
	1125(1080)/50p (A & B), 1125(1080)/59p (A & B)
	750(720)/50p, 750(720)/59p,
	1125(1080)/25i, 1125(1080)/29i
	625(576)/25i, 525(480)/29i
Typical Video Delay	SD: 70us
	HD: 38us
	3G-A: 19us
	3G-B: 40us
Embedded audio handling	HD - 24-bit synchronous 48 kHz to SMPTE 299M
	SD - 20-bit synchronous 48 kHz to SMPTE 272M-A
Embedded Audio Delay	Minimum (PCM) 2 ms
	Maximum (non-PCM)
	SD: 67us
	HD: 28us
	3G-A: 15us
	3G-B: 25us

Digital Audio Input (Balanced)

Connector/Format	25 W D
Sample Frequency	25 – 96 kHz (48 kHz for Reference)
Input Cable Length	>150 m of AES3 cable
Impedance	110 Ohms
Standard	AES3, SMPTE 272M-A-1994, SMPTE 299M

Digital Audio Input (Unbalanced)

Connector/Format	BNC
Sample Frequency	25 – 96 kHz (48 kHz for Reference)
Input Cable Length	>500 m of RG59 cable
Impedance	75 Ohms
Standard	AES3id, SMPTE 272M-A-1994, SMPTE 299M
Output Sampling	48 kHz frame locked

Digital Audio Output (Balanced)

Connector/Format	25 W D
Level	3 V p-p typical into 110 Ohms
Standard	AES3, SMPTE 272M-A-1994, SMPTE 299M

Digital Audio Output (Unbalanced)

Connector/Format	BNC
Level	1 V p-p typical into 75 Ohms
Standard	AES3id, SMPTE 272M-A-1994, SMPTE 299M

Power Consumption

Module Power Consumption	8.5 W Max (A Frames)
	8.5 PR (B Frames)

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Distribution

Even within comparatively simple systems, a single video feed will often need to be supplied to a number of different functions. IQ Modular offers a comprehensive series of analog and digital video distribution amplifiers, offering a range of functions and up to 15 outputs from a single input signal.

Digital versions can now operate at 3Gbit/s rates for 1080p applications as well as 1.5 Gbit/s HDSDI, 270 Mbit/s SDI or MPEG-ASI. They can be specified with a reclocking capability to minimize jitter in the ongoing picture. They also feature input equalization to allow the use of long cable runs.

Separate audio signals, whether analog or digital, form a significant element of most facilities' systems. The IQ Modular range provides a choice of audio distribution amplifiers suitable for use with either the AES/EBU digital format or with analog signals.

For Related Modules see:
IQHIP10 in Intelligent Monitoring
IQFDA30 in Fiber
IQFDA31 in Fiber
IQOTX80-84 in Fiber
IQORX80 in Fiber
IQOTR40-45 in Fiber

IQMDA00 HD/SD-SDI Monitoring Down Converter & Distribution Amplifier

The IQMDA00 is an HD/SD-SDI distribution amplifier and HD-SDI monitoring downconverter. This module takes HD-SDI streams and produces four re-clocked HD-SDI outputs. It also converts the input signal to same frame-rate SD-SDI outputs for monitoring. Output options include 4 x HD-SDI and 3 x SD-SDI. One group of audio can also be carried through from the HD inputs to the SD outputs. This module can also be used to distribute SD-SDI signals to SMPTE 259M-C, providing 7 outputs from one input.

Features

- An HD-SDI monitoring downconverter to allow compact low-cost, low-power monitoring solutions for HD environments
- Standards supported:
  – HD-SDI to SMPTE292M
  – SD-SDI to SMPTE259M-C
- A distribution amplifier for HD-SDI signals with SD-SDI monitoring capability
- A distribution amplifier for SD-SDI signals with 7 x SD-SDI outputs
- Audio capability means that a complete Audio/Video monitoring solution is possible
- Supports one output group of embedded audio channels with input audio group selection
- Monitoring output aspect ratio may be set to letterbox, anamorphic or center cut out picture modes
- Signal loss detection
- Maintains the input frame-rate for the output signal
- RollCall remote control and monitoring compatible

Why should you choose this module?

- Extremely compact solution for downconversion of HD picture sources for monitoring on SD equipment with embedded audio
- Allows low cost SD video monitors with SDI inputs to be used to monitor HD signals
- Allows HD sources to be recorded on SD recording equipment for monitoring or viewing at a future time
- Combined audio and video support means that SD monitoring systems can be used for HD feeds including their audio content
- SD/HD input flexibility allows distribution of SDSDI signals or distribution and downconversion of HD-SDI signals without the need for separate hardware
- Will pass SD signals to allow monitoring of either HD or SD signals fed via a single connector

Order codes
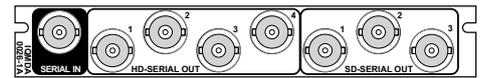
IQMDA0026-1A
HD/SD-SDI DA and HD-SDI Monitoring Downconverter. 4 HD-SDI and 3 SD-SDI outputs.

For more details on enclosure types please refer to Frames and Hardware section.
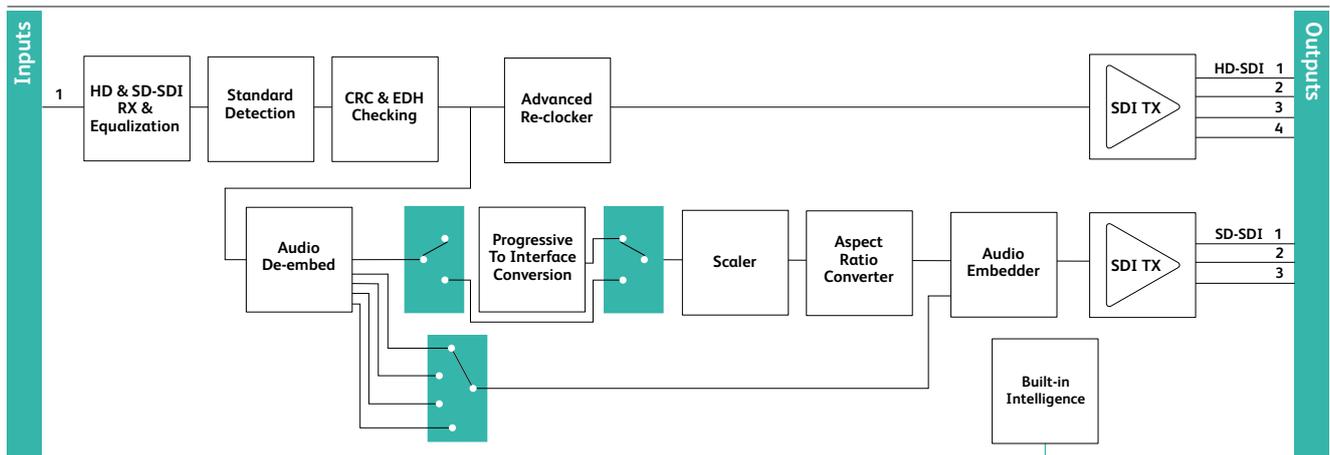
^ **Block Diagram** for IQMDA0026-1A

Network Intelligence, Control & Monitoring

IQMDA00 — HD/SD-SDI Monitoring Down Converter & Distribution Amplifier

Technical Specification

Inputs and Outputs

Signal Inputs

Electrical	1.5 Gbit/s HD-SDI, SMPTE 292M
	270 Mbit/s SDI, SMPTE 259M-C
Connector / format	BNC/ 75 Ohm panel jack on standard SAM connector panel
Input cable length	Up to 140 m Belden 1694A @ 1.5 Gbit/s
	Up to 350 m Belden 1694A @ 270 Mbit/s
Return loss	>-15 dB

Distribution Outputs

Electrical	1.5 Gbit/s HD-SDI, SMPTE 292M
	270 Mbit/s SDI, SMPTE 259M-C
Connector / format	BNC/ 75 Ohm panel jack on standard SAM connector panel
Outputs	4
Return loss	>-15 dB

Downconverter Outputs

Electrical	270 Mb/s SD-SDI SMPTE 259M-C including one group of embedded audio
Connector / format	BNC/ 75ohm panel jack on standard SAM connector panel
Outputs	3
Output return loss	>-15 dB

Card Edge and RollCall Controls

Indicators

Power	OK
CPU	OK
Status	OK (Green), Warning (Yellow), Error (Red)

Available Conversions

Input	Output
1125(1080)/29.97i or sF	525(483)/29.97i
1125(1080)/25i or sF	625(576)/25i
750(720)/59.94P	525(483)/29.97i
750(720)/50P	625(576)/25i
625(576)/25i	625(576)/25i
525(483)/29.97i	525(483)/29.97i

RollCall Control

Control	SD Output standard (including auto)
Aspect ratio for monitoring outputs	Letterbox, anamorphic, center cut out
User memories	16 x Save / Recall / Rename
Input audio group selection	Groups 1 to 4
Reporting	Input format(including unknown), input loss, CRC error
Logging	Input Status
	Input Standard
	Convert
	CRC/EDH
	CRC/EDH total
RollTrack controls	On/Off, Index, Source, Address, Command, Status, Sending
RollTrack outputs	Unused
	SD Output Video Delay
	Input Present
	Input Loss

Specifications

Input processing	10 bit
Under / over shoot	<10%
Linearity	±1 LSB
S/N	>65 dB
Color space	Transmission matrix conversion from SMPTE274 to ITUR-601
Y/C delay	<10 ns
SD output delay	1 output Frame
	625(576)/25i = 40 ms
	525(483)/29.97i = 33 ms
	No conversion = 0 ms
	With SD inputs = 1.2 µs
Horizontal response (anamorphic)	±0.2 dB to 5.4 MHz, > 45 dB stop band attenuation
Vertical response	>40 dB stop band attenuation

Power Consumption

Module power consumption	8.5 W Max (A Frames)
	8 PR (B Frames)

IQSDA35

Dual Channel 3G/HD/SD-SDI Reclocking Distribution Amplifier with selectable outputs

The IQSDA35 provides dual channel distribution for HD-SDI 3 Gbit/s, 1.5 Gbit/s or 270 Mbit/s SD-SDI signals with flexible routing of inputs to outputs. Input signal loss detection enables switching from a main to back-up feed automatically, providing emergency changeover functionality. Flexible output selection enables the IQSDA35 to be used either as a single channel DA with 12 outputs, or in dual channel mode with 6 outputs per input. An HD/SD-SDI version is available for HD/SD only applications, with an option to upgrade firmware for 3Gbps operation when required.

Features

- Single or dual channel 3Gbps SDI, HD-SDI and SD-SDI re-clocking distribution amplifier
- Flexible selection of inputs allows single or dual channel operation
- Input signal monitoring allows auto-changeover functionality to provide emergency switching
- Equalizes up to 70m at 3 Gbit/s, 140m at 1.5 Gbit/s and 350m at 270 Mbit/s when using Belden 1694A cable
- Standards supported:
  – 3G-HD to SMPTE424M
  – HD-SDI to SMPTE292M
  – SD-SDI to SMPTE259M-C
- Emergency input bypass option enables the SDI input signal to be passed through to SDI output 1 in the event of frame power failure or module removal
- RollCall monitoring allows all signal paths to be managed

Why should you choose this module?

- Outputs can be grouped for selection from either input allowing flexibility for expansion or changes in distribution requirements
- Input loss detection enables automatic switching between inputs to provide emergency back-up changeover functionality
- Can be used for current HD/SD systems that will later upgrade to 1080p50/60 workflows
- Emergency input to output bypass option allows added protection for critical signal paths or 24/7 operations

## Order codes
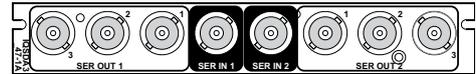
IQSDA3547-1A3, IQSDA3547-1B3
Dual Channel 3G/HD/SD-SDI Distribution Amplifier with selectable outputs. 2 inputs, 6 outputs selectable per input.
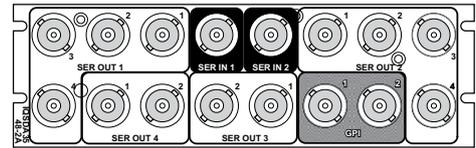
IQSDA3548-2A3, IQSDA3548-2B3
Dual Channel 3G/HD/SD-SDI Distribution Amplifier with selectable outputs. 2 inputs, 12 outputs selectable per input.

IQSDA3571-1A3, IQSDA3571-1B3
Dual Channel 3G/HD/SD-SDI Distribution Amplifier with selectable outputs and relay bypass. 2 inputs, 4 outputs selectable per input.
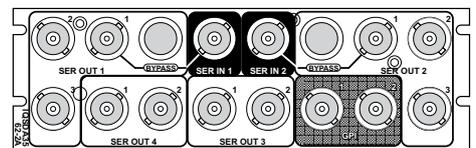
IQSDA3562-2A3, IQSDA3562-2B3
Dual Channel 3G/HD/SD-SDI Distribution Amplifier with selectable outputs and relay bypass. 2 inputs, 10 outputs selectable per input.

For more details on enclosure types please refer to Frames and Hardware section.

IQSDA35

Dual Channel 3G/HD/SD-SDI Reclocking Distribution Amplifier with selectable outputs
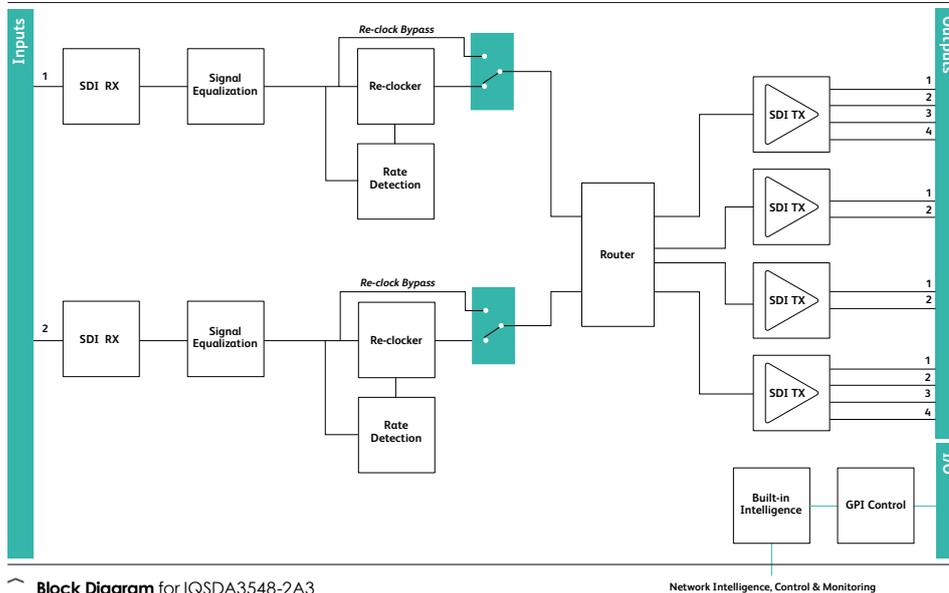
⌒ **Block Diagram** for IQSDA3548-2A3

Network Intelligence, Control & Monitoring

Technical Specification

Inputs and Outputs

Signal Input

SDI input	2 x
Input cable length	Up to 70m Belden 1694A @ 3 Gbit/s
	Up to 140m Belden 1694A @ 1.5 Gbit/s
	Up to 350m Belden 1694A @ 270 Mbit/s

Note: When using mixed HD and SD inputs it is recommended that cable lengths do not exceed the HD specification of 140m.

Signal Outputs

SDI outputs	x 12 Group selectable per input
ASI Compatible Outputs	
	IQSDA3547-1A/B - Serial Out 1/1, Serial out 2/1, 2/2
	IQSDA3548-2A/B - Serial out 1/1, 1/4, Serial out 2/1, 2/2, Serial out 3/1, Serial out 4/2
	IQSDA3557-1A/B - Serial out 2/1
	IQSDA3562-2A/B - Serial out 1/4, Serial out 2/2, Serial out 3/1, Serial out 4/2

Control Interface

GPI	Up to 2 x GPI (I/O configurable)
Electrical	TTL compatible, active low driven
Connector / format	BNC/75 ohm panel jack on standard SAM connector panel

Controls

Indicators

Power	OK (Green)
CPU	OK (Green flashing)
Input 1	OK (Green), Bypass (Orange), Loss (Red)
Input 2	OK (Green), Bypass (Orange), Loss (Red)

RollCall Functions

Input 1 (2) rate select	3G, HD, SD, other
Reclock bypass	On/Off
Output 1 select	Input 1, 2
Output 2 select	Input 1, 2
Output 3 select	Input 1, 2
Output 4 select	Input 1, 2
Input status	Present, Loss, Unknown, Data Rate

Logging	Input 1 (2) Type
	Input 1 (2) Data Rate
	Input 1 (2) Present
	Input 1 (2) Error
	Input 1 (2) Loss
RollTrack controls	On/Off, Index, Source, Address, Command, Status, Sending
RollTrack outputs	Unused
	Input 1 (2) Present
	Input 1 (2) Rate Unknown
	Input 1 (2) Error
	Input 1 (2) Loss
	Input 1 (2) 3G
	Input 1 (2) HD
	Input 1 (2) SD

Other Controls

GPI input	Activates on contact closure: - select config 1 or 2
GPI output	Produces an output for: Config 1 selected, Config 2 selected, Input 1 error, Input 2 error
User memories	Name, save and recall 16 user memories

Specifications

Electrical	3Gbit/s SDI, SMPTE 424M
	1.5Gbit/s HD-SDI, SMPTE 292M
	270 Mbit/s SDI, SMPTE 259M-C / DVB-ASI
Connector / format	BNC/ 75ohm panel jack on standard SAM connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s)
	>-10dB (3Gbit/s)
Output jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz)
	3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)

Power Consumption

Module power consumption	4 W max (A Frames)
	4 PR (B Frames)
with relay rear	5W (PR) max

IQSDA30

Dual Channel 3G/HD/SD-SDI Re-clocking Distribution Amplifier with RollCall

The IQSDA30 provides dual inputs with 3 outputs per input for distribution of HD-SDI 3 Gbit/s, 1.5 Gbit/s or 270 Mbit/s SD-SDI signals in a single width package. Its 80m 3G, 180m HD input equalization performance and non re-clocking distribution of wide-band signals make it ideal for all distribution applications. For HD/SD only applications a HD/SD-SDI version is available, with an option to upgrade firmware for 3Gbps operation when required.

Features

- Dual channel Intelligent 3Gbps SDI, HD-SDI and SD-SDI re-clocking distribution amplifier
- Will distribute DVB-ASI and other wide-band signals
- Equalizes up to 80m at 3 Gbit/s, 180m at 1.5 Gbit/s and more than 350m at 270 Mbit/s when using Belden 1694A cable
- Standards supported:
  – 3G-HD to SMPTE424M
  – HD-SDI to SMPTE292M
  – SD-SDI to SMPTE259M-C
  – DVB-ASI
- RollCall monitoring allows all signal paths to be managed
- Extremely compact – up to 32 channels in 3RU - for use where space is at a premium

Why should you choose this module?

- The IQSDA30 is extremely space efficient providing an incredible density of HD/SD-SDI outputs and distribution channels at 32 per rack unit and 10.6 per rack unit respectively
- Useful for critical installation thanks to outstanding input equalization capability
- Can be used for current HD/SD systems that will later upgrade to 1080p50/60 workflows

Order codes

IQSDA3047-1A3, IQSDA3047-1B3
Dual Channel 3G/HD/SD-SDI
Re-clocking Distribution Amplifier.
2 inputs, 3 outputs per input.
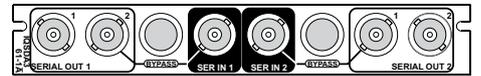
IQSDA3061-1A3, IQSDA3061-1B3
Dual Channel 3G/HD/SD-SDI
Re-clocking Distribution Amplifier with relay input bypass.
2 inputs, 2 outputs per input.

For more details on enclosure types please refer to Frames and Hardware section.
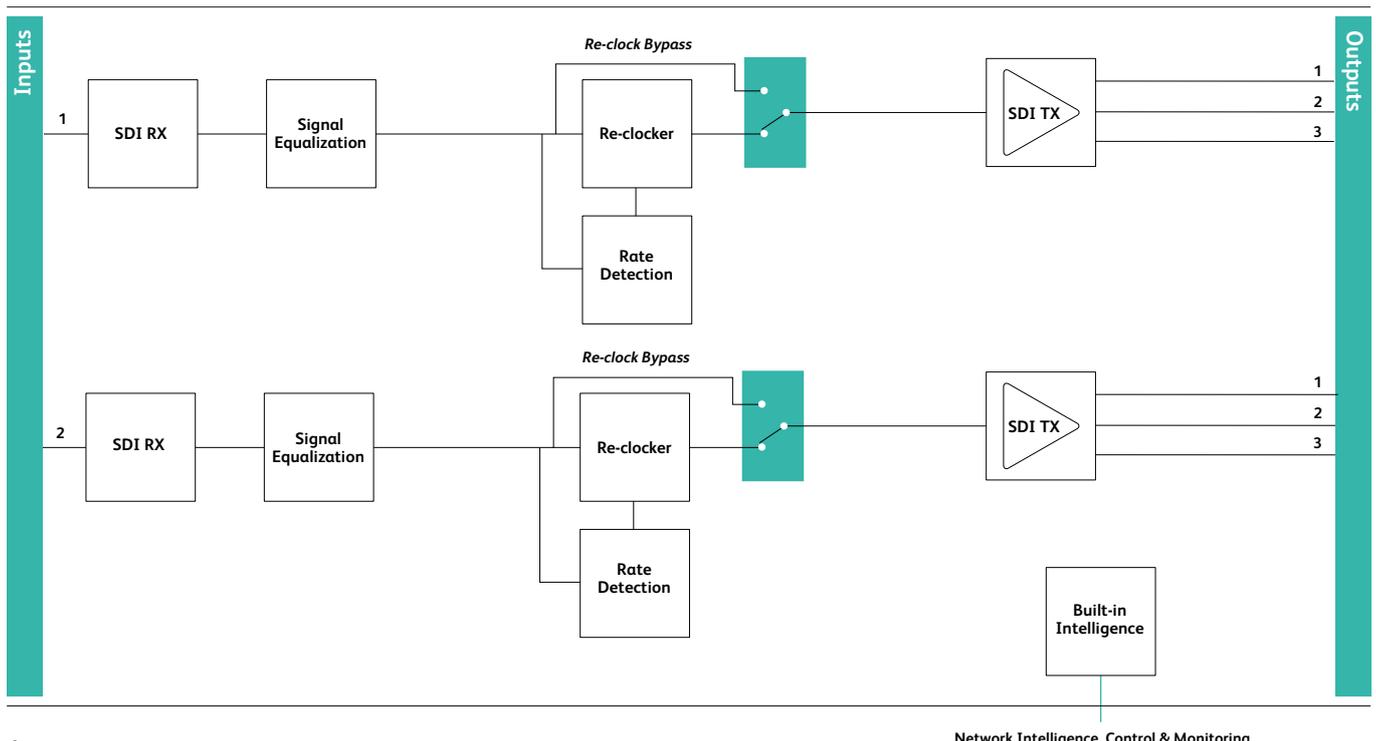
Block Diagram for IQSDA3047-1A3

IQSDA30

Dual Channel 3G/HD/SD-SDI Re-clocking Distribution Amplifier with RollCall

Technical Specification

Inputs and Outputs

Signal Input

SDI inputs	2 x
Input cable length	Up to 80m Belden 1694A @ 3 Gbit/s
	Up to 180m Belden 1694A @ 1.5 Gbit/s
	>350m Belden 1694A @ 270 Mbit/s

Signal Outputs

SDI outputs	x 3 per input

Controls

Indicators

|	
Power	OK (Green)
CPU	OK (Green flashing)
Input 1	OK (Green), Bypass (Orange), Loss (Red)
Input 2	OK (Green), Bypass (Orange), Loss (Red)

RollCall Functions

Input 1 (2) select	Auto, 3G, HD, SD, DVB-ASI, Bypass (reclocking off)
Input status	Present, Loss/Unknown, Data Rate
Logging	Input 1 (2) Type
	Input 1 (2) Data Rate
	Input 1 (2) Present
	Input 1 (2) Error
	Input 1 (2) Loss
RollTrack controls	On/Off, Index, Source, Address, Command, Status, Sending
RollTrack outputs	Unused
	Input 1 (2) Present
	Input 1 (2) Rate Unknown
	Input 1 (2) Loss
	Input 1(2) 3G
	Input 1(2) HD
	Input 1(2) SD

Other Controls

User memories	Name, save and recall 16 user memories

Specifications

Electrical	3Gbit/s SDI, SMPTE 424M
	1.5Gbit/s HD-SDI, SMPTE 292M
	270 Mbit/s SDI, SMPTE 259M-C / DVB-ASI
Connector / format	BNC/ 75ohm panel jack on standard SAM connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s)
	>-10dB (3Gbit/s)
Output jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz)
	3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)

Power Consumption

Module power consumption	3 W Max (A frames)
	4 W Max with relay rear (A frames)
	3 PR Max (B Frames)
	3 PR Max with relay rear (B frames)

IQSDA32

3G/HD/SD-SDI Re-clocking Distribution Amplifier with RollCall

The IQSDA32 is a distribution amplifier for HD-SDI 3 Gbit/s, 1.5 Gbit/s or 270 Mbit/s SD-SDI signals providing 7 equalized and re-clocked outputs of the input in a single width package. Its 80m 3G, 180m HD input equalization performance and non re-clocking distribution of wide-band signals make it ideal for all distribution applications. For HD/SD only applications a HD/SD-SDI version is available, with an option to upgrade firmware for 3Gbps operation when required.

Features

- Intelligent 3Gbps SDI, HD-SDI and SD-SDI re-clocking distribution amplifier
- Will distribute DVB-ASI and other wide-band signals
- Equalizes up to 80m at 3 Gbit/s, 180m at 1.5 Gbit/s and more than 350m at 270 Mbit/s when using Belden 1694A cable
- Standards supported:
  - 3G-HD to SMPTE424M
  - HD-SDI to SMPTE292M
  - SD-SDI to SMPTE259M-C
  - DVB-ASI
- Emergency input bypass option enables the SDI input signal to be passed through to SDI output 2 in the event of frame power failure or module removal
- RollCall monitoring allows all signal paths to be managed

Why should you choose this module?

- Space efficient design with 7 outputs of the input in single width, allowing 16 modules in 3RU or 4 in 1RU
- Useful for critical installation thanks to outstanding input equalization capability
- Operation at SMPTE 424M data rates allows future proof system design
- Emergency input to output bypass option allows added protection for critical signal paths or 24/7 operations

Order codes

IQSDA3247-1A3, IQSDA3247-1B3
3G/HD/SD-SDI Re-clocking Distribution Amplifier. 1 input, 7 outputs.

IQSDA3261-1A3, IQSDA3261-1B3
3G/HD/SD-SDI Re-clocking Distribution Amplifier with Relay Bypass. 1 input, 6 outputs.

For more details on enclosure types please refer to Frames and Hardware section.
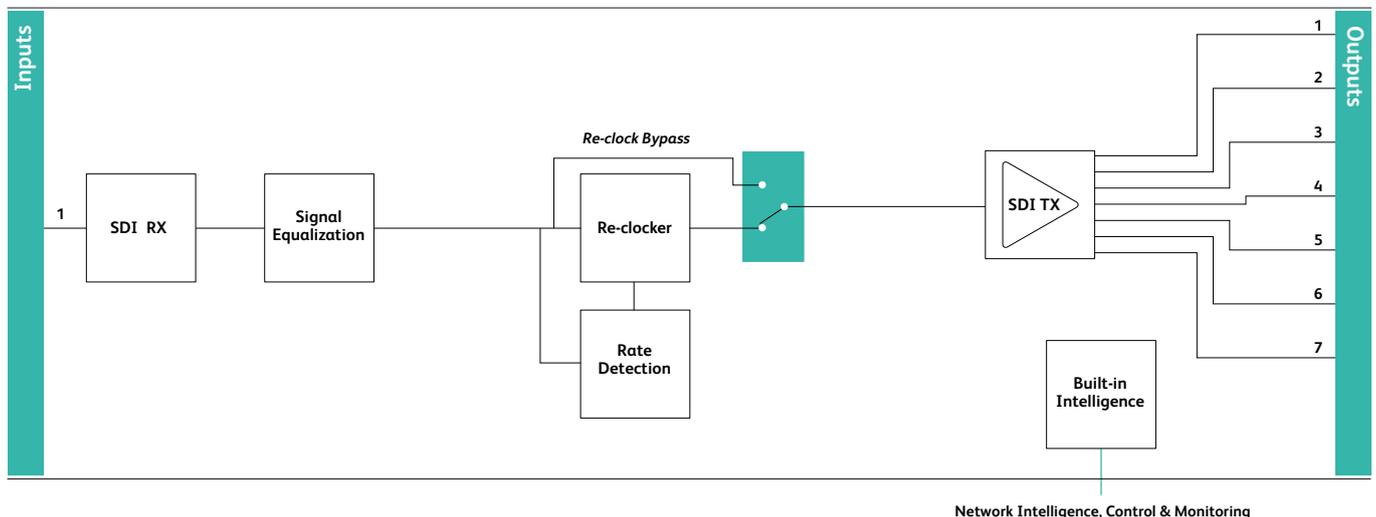
⌒ **Block Diagram** for IQSDA3247–1A3

IQSDA32

3G/HD/SD-SDI Re-clocking Distribution Amplifier with RollCall

Technical Specification

Inputs and Outputs

Signal Input

SDI input	1 x
Input cable length	Up to 80m Belden 1694A @ 3 Gbit/s
	Up to 180m Belden 1694A @ 1.5 Gbit/s
	>350m Belden 1694A @ 270 Mbit/s

Signal Outputs	
SDI outputs	x 7 (1, 3, 5, 7 DVB-ASI compatible)

Controls

Indicators

Power	OK (Green)
CPU	OK (Green flashing)
Input	OK (Green), Bypass (Orange),
	Loss (Red)

RollCall Functions

Input select	Auto, 3G, HD, SD, DVB-ASI,
	Bypass (reclocking off)
Input status	Present, Loss/Unknown,
	Data Rate
Logging	Input Type
	Input Data Rate
	Input Present
	Input Error
	Input Loss
RollTrack controls	On/Off, Index, Source, Address, Command,
	Status, Sending
RollTrack outputs	Unused
	Input Present
	Input Rate Unknown
	Input Loss
	Input 3G
	Input HD
	Input SD

Other Controls

User memories	Name, save and recall 16 user memories

Specifications

Electrical	3Gbit/s SDI, SMPTE 424M
	1.5Gbit/s HD-SDI, SMPTE 292M
	270 Mbit/s SDI, SMPTE 259M-C / DVB-ASI
Connector / format	BNC/ 75ohm panel jack on standard SAM
	connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s)
	>-10dB (3Gbit/s)
Output jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz), 3G/HD-SDI 1.0
	UI (10Hz) / 0.2 UI (100KHz)

Power Consumption

Module power	
consumption	3 W max (A Frames)
	3 PR (B Frames)
With Relay Rear	3.5W max

IQSDA31 — Dual Channel 3G/HD/SD-SDI Equalizing Distribution Amplifier

The IQSDA31 provides dual inputs with 3 outputs per input for distribution of HD-SDI 3 Gbit/s and 1.5 Gbit/s or 270 Mbit/s SD-SDI signals in a single width package.

Features

- Dual channel 3G-HD, HD-SDI, SD-SDI and wide-band distribution amplifier
- Equalizes SDI signals from 270 Mbit/s up to 3 Gbit/s
- Extremely compact – up to 32 channels in 3RU - for use where space is at a premium

Why should you choose this module?

- The IQSDA31 is extremely space efficient providing an incredible density of HD/SD-SDI outputs and distribution channels at 32 per rack unit and 10.6 per rack unit respectively
- Suitable for local fan out distribution applications

Order codes
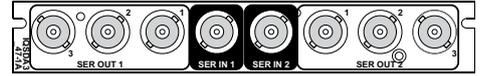
IQSDA3147-1A3, IQSDA3147-1B3
Dual Channel 3G/HD/SD-SDI Equalizing Distribution Amplifier. 2 inputs, 3 outputs per input.
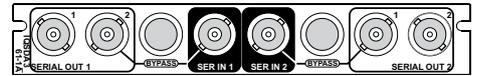
IQSDA3161-1A3, IQSDA3161-1B3
Dual Channel 3G/HD/SD-SDI Equalizing Distribution Amplifier with relay input bypass. 2 inputs, 2 outputs per input.
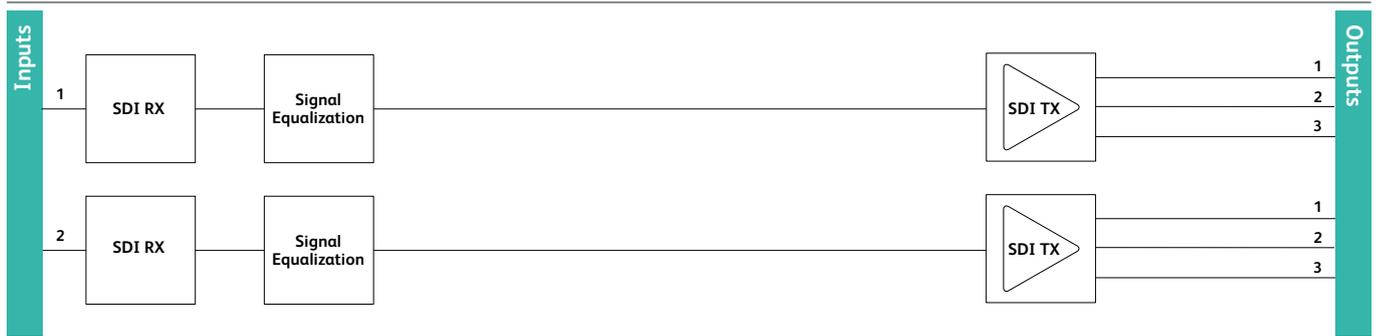
Block Diagram for IQSDA3147-1A3

Technical Specification

Inputs and Outputs

Signal Input

SDI inputs	2 x
Input cable length	Up to 250m Belden 1694A @ 270 Mbit/s
	Up to 100m Belden 1694A @ 1.5 Gbit/s
	Recommended for local fan out distribution only at 3 Gbit/s

Signal Outputs

SDI outputs	x 3 per input

Controls

Indicators

Power	OK (Green)

Card Edge Controls

Slew rate switch	SD/HD

RollCall Functions
N/A

Specifications

Electrical	1.5Gbit/s HD-SDI, SMPTE 292M
	270 Mbit/s SDI, SMPTE 259M-C
Connector / format	BNC/ 75ohm panel jack on standard SAM connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s)
	>-10dB (3Gbit/s)

Power Consumption

Module power consumption	3 W Max (A frames)
	4 W Max with relay rear (A frames)
	3 PR Max (B Frames)
	3 PR Max with relay rear (B frames)

IQSDA33

3G/HD/SD-SDI Fan-out Distribution Amplifier

The IQSDA33 is a fan-out distribution amplifier for HD-SDI 3 Gbit/s, 1.5 Gbit/s or 270 Mbit/s SD-SDI signals providing 7 equalized outputs of the input in a single width package.

Features

- 3G-HD, HD-SDI, SD-SDI and wide-band distribution amplifier
- Equalizes SDI signals from 270 Mbit/s up to 3 Gbit/s

Why should you choose this module?

- Space efficient design with 7 outputs of the input in single width, allowing 16 modules in 3RU or 4 in 1RU
- Suitable for local fan out distribution applications

Order codes

IQSDA3347-1A3, IQSDA3347-1B3
HD/SD-SDI Fan-out Distribution Amplifier.
1 input, 7 outputs.

For more details on enclosure types please refer to Frames and Hardware section.
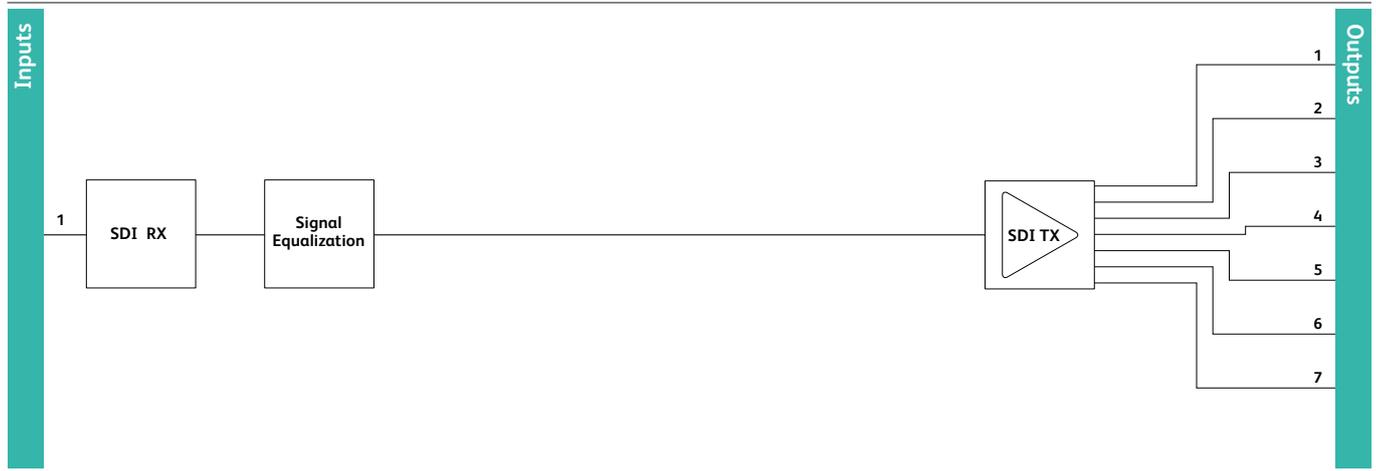
⌒ **Block Diagram** for IQSDA3347-1A3

Technical Specification

Inputs and Outputs

Signal Input

HD / SD-SDI input	1 x
Input cable length	Up to 250m Belden 1694A @ 270 Mbit/s
	Up to 100m Belden 1694A @ 1.5 Gbit/s
	Recommended for local fan out distribution only at 3 Gbit/s

Signal Outputs

HD / SD-SDI outputs	x 7

Controls

Indicators

Power	OK (Green)

Card Edge Controls	
Slew rate switch	SD/HD

RollCall Functions	
N/A	

Specifications

Electrical	1.5Gbit/s HD-SDI, SMPTE 292M
	270 Mbit/s SDI, SMPTE 259M-C
Connector / format	BNC/ 75ohm panel jack on standard SAM connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s)
	>-10dB (3Gbit/s)

Power Consumption

Module power consumption	3 W Max (A Frames)
	3 PR (B Frames)

IQSDA34

Triple Channel 3G/HD/SD-SDI Reclocking Distribution Amplifier with RollCall

The IQSDA34 provides three inputs with 4 outputs per input for distribution of 1080p 3 Gbit/s SDI, HD-SDI 1.5 Gbit/s or 270 Mbit/s SD-SDI signals in a double width package. Its 70m 3G, 140m HD-SDI input equalization performance and non re-clocking distribution of wide-band signals makes it ideal for all current distribution applications.

Features

- Triple channel Intelligent 3G-SDI, HD-SDI and SD-SDI re-clocking distribution amplifier
- Equalizes up to 70m at 3 Gbit/s, 140m at 1.5 Gbit/s and 350m at 270 Mbit/s when using Belden 1694A cable
- Standards supported:
  - 1080p SDI to SMPTE424M
  - HD-SDI to SMPTE292M
  - SD-SDI to SMPTE259M-C
- Switchable option to connect channels together producing 1 input to 12 outputs, or 2 inputs with 8 and 4 outputs respectively
- RollCall monitoring allows all signal paths to be managed

Why should you choose this module?

- The IQSDA34 is extremely space efficient providing 4 outputs per input and a density of 24 channels in 3U
- Operation at SMPTE 424M data rates allows future proof system design
- Flexible output switching allows the module to adapt should distribution requirements change

Order codes
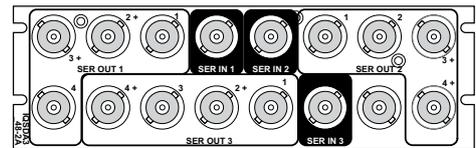
IQSDA3448-2A3, IQSDA3448-2B3
Triple Channel 3G/HD/SD-SDI Reclocking Distribution Amplifier. 3 inputs, 4 outputs per input.
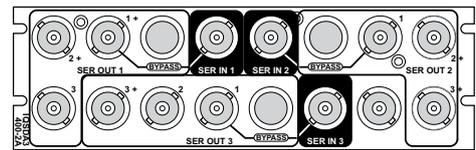
IQSDA3400-2A3, IQSDA3400-2B3
Triple Channel 3G/HD/SD-SDI Reclocking Distribution Amplifier with relay input bypass. 3 inputs, 3 outputs per input.

For more details on enclosure types please refer to Frames and Hardware Section.
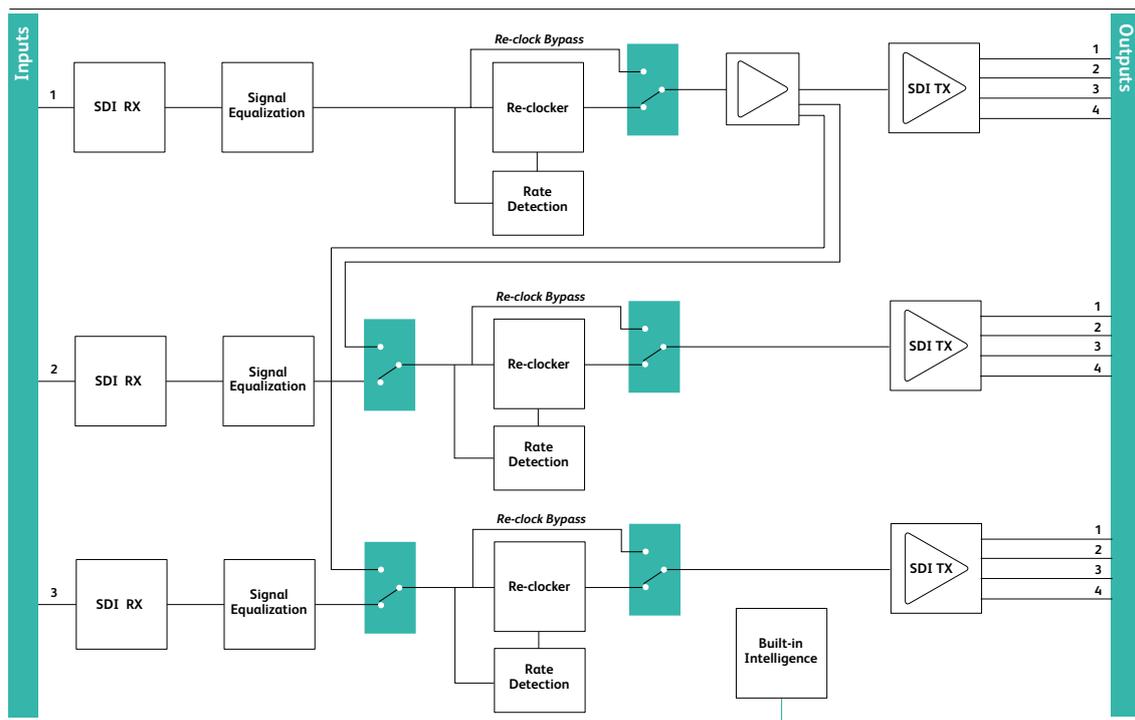
Block Diagram for IQSDA3448-2A3

Network Intelligence, Control & Monitoring

IQSDA34

Triple Channel 3G/HD/SD-SDI Reclocking Distribution Amplifier with RollCall

Technical Specification

Inputs and Outputs

Signal Input

SDI input	3 x
Input cable length	Up to 70m Belden 1694A @ 3 Gbit/s
	Up to 140m Belden 1694A @ 1.5 Gbit/s
	Up to 350m Belden 1694A @ 270 Mbit/s

Note: When using mixed HD and SD inputs it is recommended that cable lengths do not exceed the HD specification of 140m.

Signal Outputs

SDI outputs	x 4 per input
ASI Compatible Outputs	
	IQSDA3448-2A/B - Serial out 1/2, 1/3, Serial out 2/3, 2/4, Serial out 3/2, 3/4
	IQSDA3400-2A/B - Serial out 1/1, 1/2, Serial out 2/2, 2/3, Serial out 3/3

Controls

Indicators

Power	OK (Green)
CPU	OK (Green flashing)
Input 1	OK (Green), Bypass (Orange), Loss (Red)
Input 2	OK (Green), Bypass (Orange), Loss (Red)
Input 3	OK (Green), Bypass (Orange), Loss (Red)

RollCall Functions

Input 1 (2) select	Auto, 3G, HD, SD, DVB-ASI, Bypass (reclocking off)
Input status	Present, Loss/Unknown, Data Rate
Logging	Input 1 (2, 3) Type
	Input 1 (2, 3) Data Rate
	Input 1 (2, 3) Present
	Input 1 (2, 3) Error
	Input 1 (2, 3) Loss
RollTrack controls	On/Off, Index, Source, Address, Command, Status, Sending
RollTrack outputs	Unused
	Input 1 (2, 3) Present
	Input 1 (2, 3) Rate Unknown
	Input 1 (2, 3) Loss
	Input 1 (2, 3) 3G
	Input 1 (2, 3) HD
	Input 1 (2, 3) SD

Other Controls

User memories	Name, save and recall 16 user memories

Specifications

Electrical	3Gbit/s SDI, SMPTE 424M
	1.5Gbit/s HD-SDI, SMPTE 292M
	270 Mbit/s SDI, SMPTE 259M-C / DVB-ASI
Connector / format	BNC/ 75ohm panel jack on standard SAM connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s)
	>-10dB (3Gbit/s)
Output jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz)
	3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)

Power Consumption

Module power consumption:

IQSDA3448-2A3	5W Max (A frames)
IQSDA3448-2B3	5 PR Max (B Frames)
IQSDA3400-2A3	6W Max (A frames)
IQSDA3400-2B3	5 PR Max (B Frames)

IQSDA10/11

Reclocking SD-SDI Distribution Amplifier

The IQSDA10/11 provides up to fifteen re-clocked equalized outputs operating with 270 Mbit/s SDI signals, or seven non-inverting outputs suitable for 270 Mbit/s DVB-ASI signals. Dual channel version available with three outputs per input.

Features

- Performs equalization and re-clocking of serial 4:2:2 and DVB-ASI signals
- Provides up to 15 buffered outputs for SDI signals and 7 for DVB-ASI signals
- Input equalizer and re-clocking allows for use as a line receiver/distribution amplifier
- Input signal loss indicator
- Single and dual channel versions available
- RollCall remote control and monitoring

Why should you choose this module?

- Re-clocking distribution amplifier ensures there are no jitter problems in the system
- Dual channel version ideal for monitoring or space constrained applications
- Input equalization ensure maximum cable lengths can be used
- Can be used in either serial 4:2:2 or DVB-ASI systems
- Fan-out can be either 7 or 15, depending on the chosen module version
- RollCall remote control and monitoring

Order codes

IQSDA1001-1A
Reclocking SDI/DVB-ASI DA with RollCall control and monitoring. 1 SDI/DVB-ASI input, 7 SDI/DVB-ASI outputs.

IQSDA1101-1A
Reclocking SDI DA with RollCall control and monitoring. 2 SDI/DVB-ASI inputs, 3 SDI/DVB-ASI outputs per input.
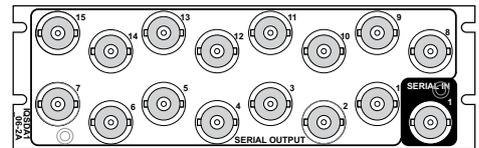
IQSDA1006-2A
Reclocking SDI DA with RollCall control and monitoring. 1 SDI input, 15 SDI outputs (outputs 1-7 DVB-ASI compatible).
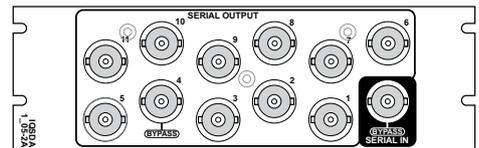
IQSDA1005-2A
Reclocking SDI DA with RollCall control and monitoring. 1 SDI input, 10 SDI outputs, relay bypass for input to output 4.

For more details on enclosure types please refer to Frames and Hardware Section.

IQSDA10/11

Reclocking SD-SDI Distribution Amplifier
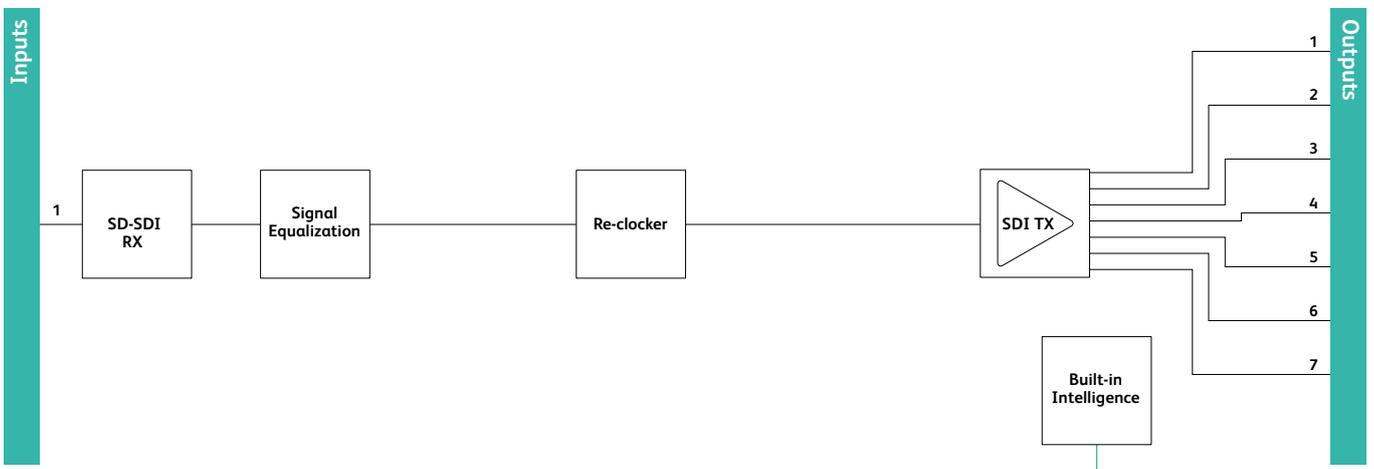
Inputs

Outputs

1	SD-SDI RX	Signal Equalization	Re-clocker	SDI TX	1

Built-in Intelligence

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⌢ **Block Diagram** for IQSDA1001–1A

Inputs

Outputs

Built-in Intelligence

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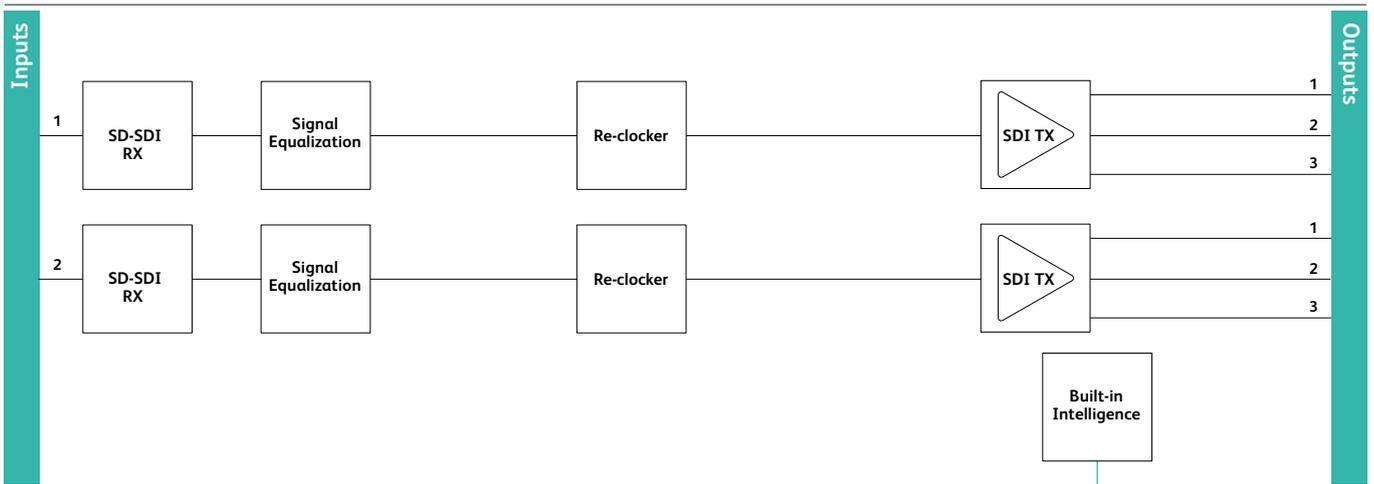
⌢ **Block Diagram** for IQSDA1101–1A

IQSDA10/11

Reclocking SD-SDI Distribution Amplifier

Technical Specification

Inputs and Outputs

Signal Inputs

Standards	SMPTE 259M-C-1997, DVB-ASI
Connector / format	BNC/75ohm panel jack on standard SAM connector panel

Signal Outputs

Serial digital	IQSDA1001-1A: 7 SDI/DVB-ASI, IQSDA1006-2A: 15 SDI (1-7 DVB-ASI compatible), IQSDA1005-2A: 11 SDI (1-5 DVB-ASI compatible), relay bypass on output 4, IQSDA1000-1: 5 SDI/DVB-ASI, IQSDA1002-2: 11 SDI (1-5 DVB-ASI compatible), IQSDA1101-1A: 3 SDI/DVB-ASI per input
Standards	SMPTE 259M-C-1997, DVB-ASI
Connector / format	BNC/75ohm panel jack on standard SAM connector panel

Note: Do not cascade more than 5 modules when using relay bypass rear panel version.

Card Edge and RollCall Controls

Functions Available via RollCall Only

Input status	Present, Loss
Logging	Input status
RollTrack controls	On/Off, Index, Source, Address, Command, Status, Sending
RollTrack outputs (1-16)	Unused Input OK Input Lost

Indicators

Status	OK (Green), Warning (Yellow), Error (Red)

Specifications

Input return loss	Better than 15 dB to 270 MHz
Maximum input cable length	220 m (up to 150m combined input and output cable length, relay bypass version)
Output return loss	Better than 15 dB to 270 MHz
Insertion delay	20 ns nominal
SDI output level	800 mV nominal

Power Consumption

Module power consumption	IQSDA10 - 3.5 W (A Frames) 3 PR (B Frames) IQSDA10 relay bypass - 4.25 W (PR)
	IQSDA11 - 4 W (A Frames) IQSDA11 -4 PR (B Frames)

IQVDA00/01

Analog Video Distribution Amplifier with RollCall Control

The IQVDA00 provides up to 14 equalized analog video outputs. Features include; adjustable gain and equalization, and full remote control and status reporting.

Features

- Up to 14 high quality outputs
- Balanced loop-through input
- Terminating input option on single width rear panel allows extra output
- 35 MHz bandwidth
- Adjustable gain and equalization
- Equalization for RG59U/Belden 8263 or PSF1/2/Belden 8281 (link selectable)
- Full RollCall remote control and signal identification
- Sync and burst level warnings
- Automatic gain control (AGC) with respect to sync height
- Automatic equalization (ACC) with respect to burst height

Why should you choose this module?

- Ideal distribution amplifier where input cable configuration is likely to change, such as OB trucks
- Remote control of gain and equalization
- Equalization for 3 different cable types, up to 300 meters for Belden 1694A
- Automatic gain and equalization control mode available
- Sync and burst level warnings provided for low level signals
- 35 MHz bandwidth allows it to be used with HDTV component signals
- Differential input for excellent common mode rejection

Order codes
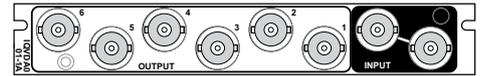
IQVDA0001-1A
Analog Video DA with RollCall. Loop-through input, 6 outputs.
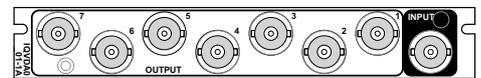
IQVDA0101-1A
Analog Video DA with RollCall. Terminating input, 7 outputs.
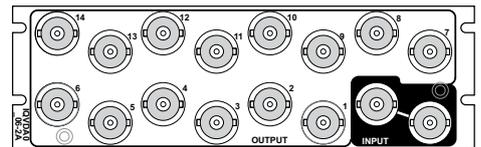
IQVDA0006-2A
Analog Video DA with RollCall. Loop-through input, 14 outputs.

For more details on enclosure types please refer to Frames and Hardware section.

Block Diagram for IQVDA0001–1A

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Block Diagram for IQVDA0101–1A

Network Intelligence, Control & Monitoring

IQVDA00/01 Analog Video Distribution Amplifier with RollCall Control
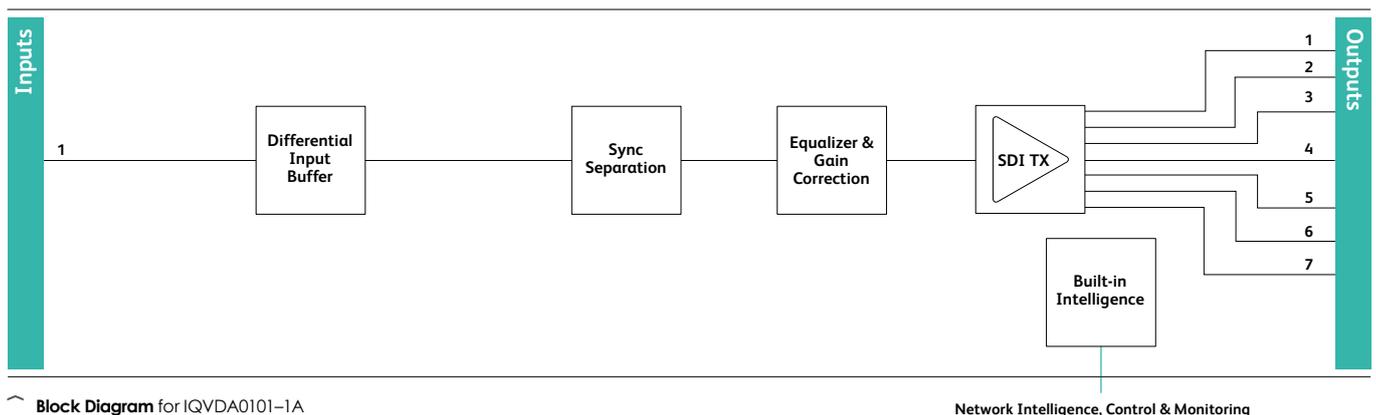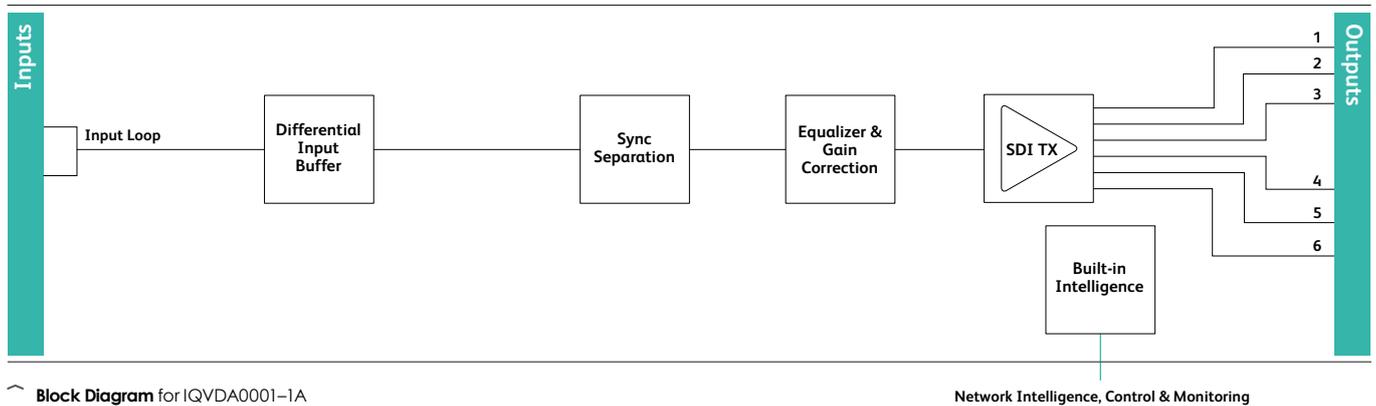
Technical Specification

Inputs and Outputs

Signal Input

Video	1 Balanced loop-through (terminating input option for single width rear panel)

Signal Outputs

Video	Up to 14 Unbalanced Outputs

Controls

Controls via RollCall

Gain	±4 dB in steps of 0.05 dB

Typical Equalizer Performance

Belden 1694A

0-300 m	+0.1 dB to 10 MHz
0-300 m	+0.2 dB to 30 MHz

Belden 8281 (PSF1/2)

0-300 m	+0.1 dB to 10 MHz
0-300 m	+0.1 dB; -0.4 dB to 30 MHz

Belden 1855A

0-200 m	+0.1 dB to 10 MHz
200-300 m	+0.1 dB; -1.5 dB to 10 MHz

RG59B/U

0-100 m	+0.1 dB to 15 MHz
100-300 m	+0.1 dB; -1.5 dB to 15 MHz

NK 0.6/2.8

0-150 m	+0.1 dB to 15 MHz
0-150 m	+0.1 dB; -0.5 dB to 30 MHz
AGC	[On/Off] - All recognized SD Sources
ACC	[On/Off] - Composite Sources Only
Signal identification	Line standard - PAL, NTSC, 625 MONO, 525 MONO, 1080p24, 1080i50, 1080i60, 720p50, 720p60, 720p25, 720p30, UNKNOWN
Selectable clamp	Off, On (Back Porch) and Sync tip
Signal level	Sync and Burst amplitude ±10%
Logging	Signal Level Warning, Line Standard, Burst level warning

Indicators

Power	OK
CPU	OK
Status	OK (Green), Warning (Yellow), Error (Red)

Specifications

Frequency Response

(Without equalization)	10 kHz - 10 MHz ± 0.1 dB
	10 MHz - 30 MHz ± 0.2 dB
	35 MHz <-1 dB
Differential gain	Unity Gain - Better than 0.2%
Differential phase	Unity Gain - Better than 0.2°
Signal/noise ratio	10 kHz – 7 MHz - Better than -66 dB (Unweighted)
Linearity	Better than 0.1%
50 Hz tilt K50Hz	Better than 0.1%
Output D.C.	<90 mV
Output return loss	Better than 40 dB to 5.5 MHz, 35 dB to 30 MHz
Maximum output level	2.4 V pk to pk @ 30 MHz into 75 ohms
Insertion delay	20 ns
Y C gain/ delay inequality	<1%, < 1 ns
K2T, KPB	Better than 0.1%
Max. input level	+6 dB
CMRR	Better than 60 dB at 50 Hz, 40 dB 50 Hz to 8 MHz
Input return loss (powered)	Better than 40 dB to 5.5 MHz, 35 dB to 30 MHz
Input return loss (un powered)	Better than 33 dB to 30 MHz
Input impedance	>22 k ohms
Headroom	+6 dB
Output impedance	75 ohms ±1%
Gain	Unity ±1% as supplied
Clamp rejection	8 dB typical at 50 Hz

Power Consumption

Module power consumption	3W Max (A Frames)
	2 PR (B Frames)

Mechanical

Complies with Restriction of Hazardous Substances in Electrical and Electronic Equipment (RoHS) Directive (2002/95/EC).

EMC Performance Information

Environment	Commercial and light industrial E2
Peak mains inrush current following a 5 second mains interruption	No mains input
Performance nformation	Immunity to conducted common-mode RF interference (EN 55103 2 immunity phenomenon I6): Interference is just visible on critical picture material when a video input or output is subjected to modulated RF at a level of 3 V

IQVDA02/03

Analog Video Distribution Amplifier

The IQVDA02/03 provide up to 14 equalized analog video outputs.

Features

- Up to 14 high quality outputs
- Balanced loop-through input
- Terminating input option allows extra output
- 35 MHz bandwidth
- Equalizer, better than ±0.1 dB to 15 MHz with 100 m RG59 cable

Why should you choose this module?

- Ideal budget distribution amplifier for analog video applications
- Maintenance of video quality ensured by the 35 MHz frequency response
- Equalizer ensures the flat response (±0.1 dB) to 15 MHz necessary for quality distribution

Order codes
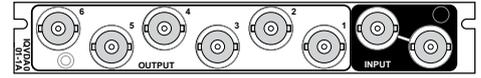
IQVDA0201-1A
Analog Video DA. Loop-through input, 6 outputs.
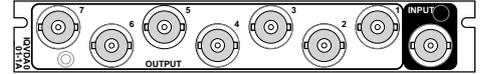
IQVDA0301-1A
Analog Video DA. Terminating input, 7 outputs.
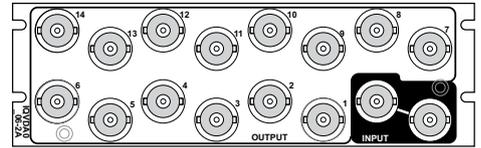
IQVDA0206-2A
Analog Video DA. Loop-through input, 14 outputs.

For more details on enclosure types please refer to Frames and Hardware section.
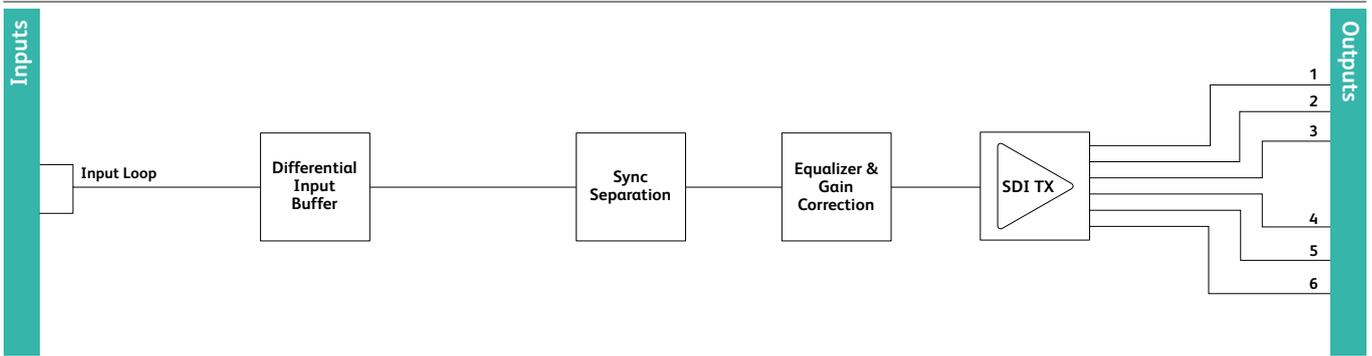
⌒ **Block Diagram** for IQVDA0201–1A
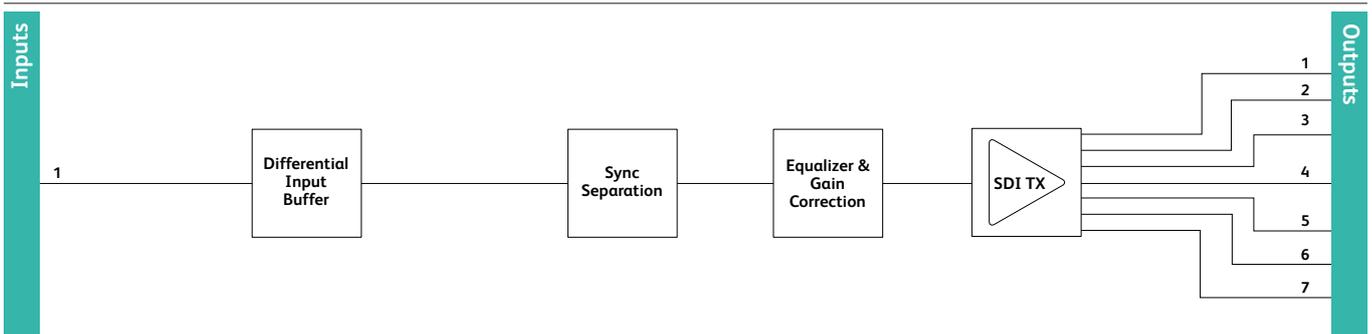
⌒ **Block Diagram** for IQVDA0301–1A

IQVDA02/03   Analog Video Distribution Amplifier

Technical Specification

Signal Input

Video	1 Balanced loop-through (terminating input option)

Signal Outputs

Video	Up to 14 Unbalanced Outputs

Card Edge and RollCall controls

Control Ranges

Gain	+6 dB to -4 dB typical
Equalization	Equalizes up to 100 m of RG59 to 15 MHz ±0.1 dB

Indicators	
Power	OK
Sync detect	OK (Green)

Specifications

Frequency response	0-100 m RG59U (or equivalent)
	15 MHz ±0.1 dB
	typ. -0.33 dB at 20 MHz
	typ. -3 dB at 36 MHz
Differential gain	Better than 0.1%
Differential phase	Better than 0.1°
Signal/noise ratio	Better than 75 dB rms. (unified weighting filter)
50 Hz tilt K50 Hz	Better than 0.5%
Output D.C	±45 mV max. ±10 mV typical
Insertion delay	17 ns
Max. input level	+6 dB
CMRR	Better than 55 dB at 50 Hz
	Better than 45 dB at 250 Hz
Input return loss	Better than 50 dB at LF
	Better than 40 dB at 5 MHz
	Better than 36 dB at 10 MHz
Headroom	+6 dB
Output impedance	75 ohms ±1%
Output isolation	Better than 38 dB to 5 MHz
	Better than 36 dB to 10 MHz
Output return loss	Better than 36 dB to 5 MHz
	Better than 33 dB at 10 MHz
Gain	Unity ±1% as supplied

Power Consumption

Module power consumption	3 W Max (A Frames)
	2 PR (B Frames)

IQAES00

Single/Dual Stream AES/EBU Distribution Amplifier

The IQAES00 digital audio distribution amplifier can receive digital audio from up to 500 m of RG59B cable for unbalanced inputs, or up to 150 m of AES approved cable for balanced inputs. The unit can be configured to provide up to 10 re-clocked outputs for a single input or up to 5 outputs per input for 2 inputs. Digital audio sample rates of 32, 44.1, 48 and 96 kHz can be automatically detected, however any input sample rates between 32 and 96 kHz may be applied.

Features

- Can receive digital audio from up to 150 m of AES cable (balanced inputs) or 500 m of RG59B or equivalent cable (unbalanced inputs)
- Automatic detection of 32, 44.1, 48 and 96 kHz sample rates
- Configurable for 1 input to 10 re-clocked outputs, or 2 inputs to 5 re-clocked outputs per input (dependant on rear panel type)
- Balanced and unbalanced I/O available simultaneously
- Channel status monitoring
- RollCall reporting of input lock, Non-PCM audio and PCM audio, sampling frequency (32, 44.1, 48, 96 kHz and unknown), consumer mode, channel mode, channel status – CRC error and byte 1

Why should you choose this module?

- High quality distribution amplifiers for AES/EBU digital audio
- Operates with all normal professional sampling rates, 32, 44.1, 48 and 96 kHz
- Simultaneous balanced and unbalanced output configuration enables use as an AES format conversion module
- Status monitoring and input lock reporting through RollCall remote control, provides error checking

Order codes
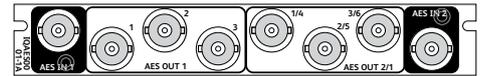
IQAES0001-1A
Single/Dual stream AES DA. Unbalanced AES. Configurable for 1 input to 6 outputs or 2 inputs to 3 outputs per input.
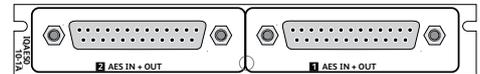
IQAES0010-1A
Single/Dual stream AES DA. Balanced D-type AES audio connections. Configurable for 1 input to 10 outputs or 2 inputs to 5 outputs per input.
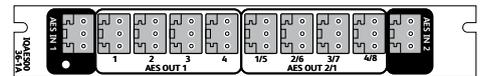
IQAES0036-1A
Single/Dual stream AES DA. Balanced screwterminal AES audio connections. Configurable for 1 input to 8 outputs or 2 inputs to 4 outputs per input.

For more details on enclosure types please refer to Frames and Hardware section.

IQAES00 — Single/Dual Stream AES/EBU Distribution Amplifier

Note: See rear panel information for full details of output combinations.
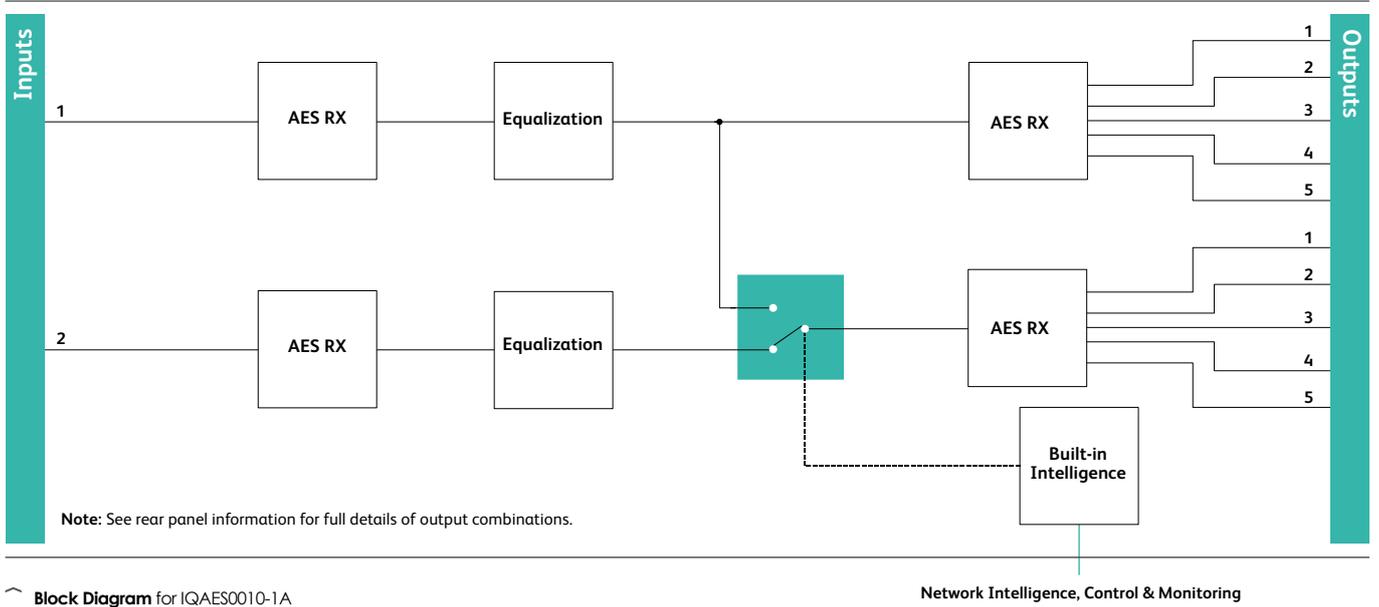
⌒ **Block Diagram** for IQAES0010-1A

Network Intelligence, Control & Monitoring

Technical Specification

Inputs and Outputs

Signal Inputs

Digital audio input	1/2 x AES/EBU
Standards (balanced)	AES3–1992
Standards (unbalanced)	AES3–1992, SPDIF, SMPTE 276M

Signal Outputs

Digital audio	AES/EBU, up to 10
	Note: See rear panel details for output options
Standards (balanced)	AES3–1992
Standards (unbalanced)	AES3–1992, SPDIF, SMPTE 276M

Card Edge and RollCall Controls

Card Edge Controls (also available via RollCall)
Indicators

Power up or CPU fault	Good = Off/Fault = Red
CPU running but input 1 not detected (both inputs or input 1 when in single channel mode)	Input detected = Off/Not Detected = Yellow
CPU running but input 2 not detected (both inputs or input 1 when in single channel mode)	Input detected = Off/Not detected = Yellow
Normal operation with input detected (either input or input 1 when in single channel mode)	Input not detected = Off/Input detected = Green

Functions available via RollCall only

Input mode	Single/Dual
PCM/non-PCM	PCM/non-PCM decision masks
Restart unit	

Reporting (* also Logged)

Input 1 lock detect	*No input present
Input 2 lock detect	*No input present
Input 1 channel status monitor	*Display's Channel Status information (Byte 1 bits 0-3)
Input 2 channel status monitor	*Display's Channel Status information (Byte 1 bits 0-3)
Input 1 channel status warning	CRC error (broken framing) – Pro mode only
Input 2 channel status warning	CRC error (broken framing) – Pro mode only
Channel mode	[unknown; 2-channel; 1-channel; primary/secondary; stereo] – Pro mode only
Input 1 sample rate	*Unknown, 32, 44.1, 48, 96 kHz detection
Input 2 sample rate	*Unknown, 32, 44.1, 48, 96 kHz detection
Input 1 type	*PCM, *Non-PCM
Input 2 type	*PCM, *Non-PCM
RollTrack controls	On/Off, Index, Source, Address, Command, Status, Sending
RollTrack outputs (0-15)	Unused
	Input 1 missing
	Input 1 OK
	Input 1 CS Mode
	Input 1 PCM
	Input 1 non-PCM
	Input 1 SR Unknown
	Input 1 32k, 44.1k, 48k, 96k
	Input 2 missing
	Input 2 OK
	Input 2 CS Mode
	Input 2 PCM
	Input 2 non-PCM
	Input 2 SR Unknown
	Input 2 32k, 44.1k, 48k, 96k

IQAES00

Single/Dual Stream AES/EBU Distribution Amplifier

Technical Specification cont…

Specifications

Input impedance	Balanced 110 ohm
	Unbalanced 75 ohm
Sampling frequency range	32 – 96 kHz
Cable length	Balanced, >150 m of AES3 Cable
	Unbalanced, up to 500 m of RG59 or Equivalent
Output impedance	Balanced 110 ohm
	Unbalanced 75 ohm
Output signal level	Balanced 3 V pk to pk min
	Unbalanced 1 V ±0.1 V pk to pk

Performance

Group delay	@ 48 kHz TBD
Jitter rejection	0.006 UI
Re-clocking	Yes

Power Consumption

Module power consumption	3W Max (A Frames)
	2.5 PR (B frames)

IQADA00

Single/Dual Channel Analog Audio Distribution Amplifier

The IQADA00 provides dual analog inputs with up to five outputs per input, or a single analog input with up to ten outputs.

Features

- Configurable for 1 input to 10 outputs, or 2 inputs to 5 outputs per input (dependant on rear panel type)
- Very low THD+N
- Output gain remotely adjustable from +24 dB to -24 dB with fine control
- +24 dBu headroom

Why should you choose this module?

- Ideal stereo distribution amplifier for large analog audio applications
- Maintenance of audio quality ensured by very low THD+N and 24 dBu input headroom
- Up to 10 balanced transformerless outputs

Order codes
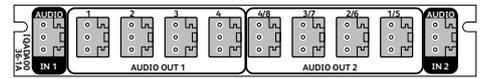
IQADA0036-1A
Single/Dual Channel Analog DA. Balanced Screw-terminal Audio Connections. Configurable for 1 input to 8 outputs or 2 inputs to 4 outputs per input.
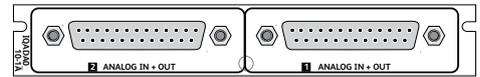
IQADA0010-1A
Single/Dual Channel Analog DA. Balanced D-type Audio Connections. Configurable for 1 input to 10 outputs or 2 inputs to 5 outputs per input.

For more details on enclosure types please refer to Frames and Hardware section.
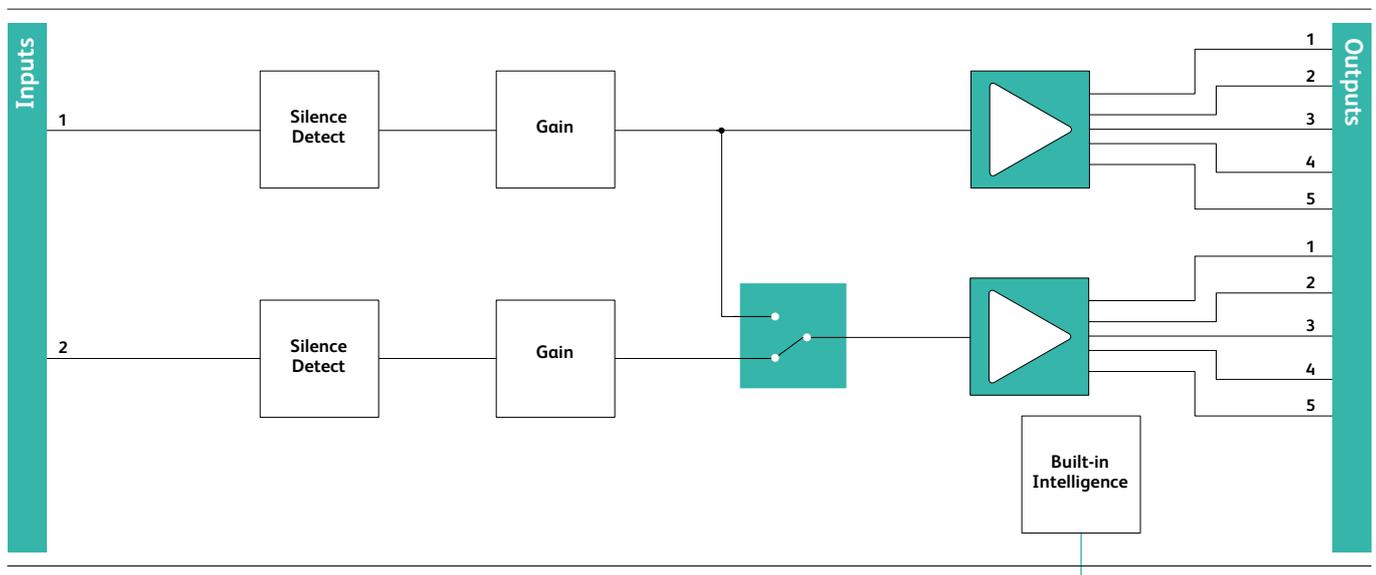
Block Diagram for IQADA0010-1A

Network Intelligence, Control & Monitoring

IQADA00   Single/Dual Channel Analog Audio Distribution Amplifier

Technical Specification

Inputs and Outputs

Signal Inputs

Analog	2 channels balanced via screw-terminal or D-type connector

Signal Outputs

Analog	4 (5) per input channel balanced via screw-terminal (or D-type connector) Note: Configurable for 1 input to 8 (10) output operation

Card Edge and RollCall Controls

Indicators

Power up or CPU fault	Good = Off/Fault = Red
CPU running but input 1 not detected (both inputs or primary input when in single channel mode)	Input detected = Off/Not Detected = Yellow
CPU running but input 2 not detected (both inputs or primary input when in single channel mode)	Input detected = Off/Not detected = Yellow
Normal operation with input detected (either input or primary input when in single channel mode)	Input not detected = Off/Input detected = Green

Controls

Mode	Single, Dual channel
Fine gain adjustment	±0.5 dB additional to the coarse gain level, separately adjustable for each input

Functions Available via RollCall

Gain (separate L and R)	+24 dB to -24 dB in 0.5 dB steps
Silence detect	Level adjustable, - 15 to -25 dBu in 1 dB steps
Warning timer	1 to 60s (for silence detection)

Reporting (* also Logged)

Silence detected	*Silence Detected (L and R)
RollTrack controls	On/Off, Index, Source, Address, Command, Status, Sending
RollTrack	Unused Input 1Present Input 1 Silent Input 2 Present Input 2 Silent Input 2 Silent

Specifications

Analog input / output level	Headroom set to: +24 dBu (17.5 V pk to pk) Gain at Unity
Analog input impedance	10 k Ohms (600 Ohm Option)
Analog output impedance	Balanced <50 ohms
Total harmonic distortion + noise	<-86 dBu (0.005%) at 700 Hz, 24 dBu input and 0 dB gain
Noise floor	<–90 dBu 0 dB gain (20 Hz to 20 kHz)
Gain accuracy	<±0.2 dB @ 0 dB
Gain error (channel 1 to channel 2)	<±0.2 dB @ 0 dB
Common mode rejection	<-60 dB (20 Hz to 20 kHz)
Frequency response	+0.1 dBu to -0.3 dBu (20 Hz to 20 kHz with reference to 1 kHz)
Channel 1 to 2 cross talk	<-90 dB
Headroom (in and out)	24 dBu

Power Consumption

Module power consumption	6.5 W (A Frames) 3.5 Pr (B Frames)

IQADA01

Analog Audio Distribution Amplifier - 2 x 7 Outputs

The IQADA01 provides dual analog inputs with up to seven outputs per input, or a single analog input with up to 14 outputs.

Features

- Configurable for 1 input to 14 outputs, or 2 inputs to 7 outputs per input
- Very low THD+N
- Output gain remotely adjustable from +24 dB to -24 dB with fine control
- +24 dBu headroom

Why should you choose this module?

- Ideal stereo distribution amplifier for large analog audio applications
- Maintenance of audio quality ensured by very low THD+N and 24 dBu input headroom
- Up to 14 balanced transformerless outputs

Order codes
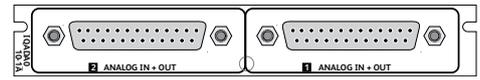
IQADA0110-1A

Single/Dual Channel Analog DA. Balanced D-type Audio Connections. Configurable for 1 input to 14 outputs or 2 inputs to 7 outputs per input.

For more details on enclosure types please refer to Frames and Hardware section.
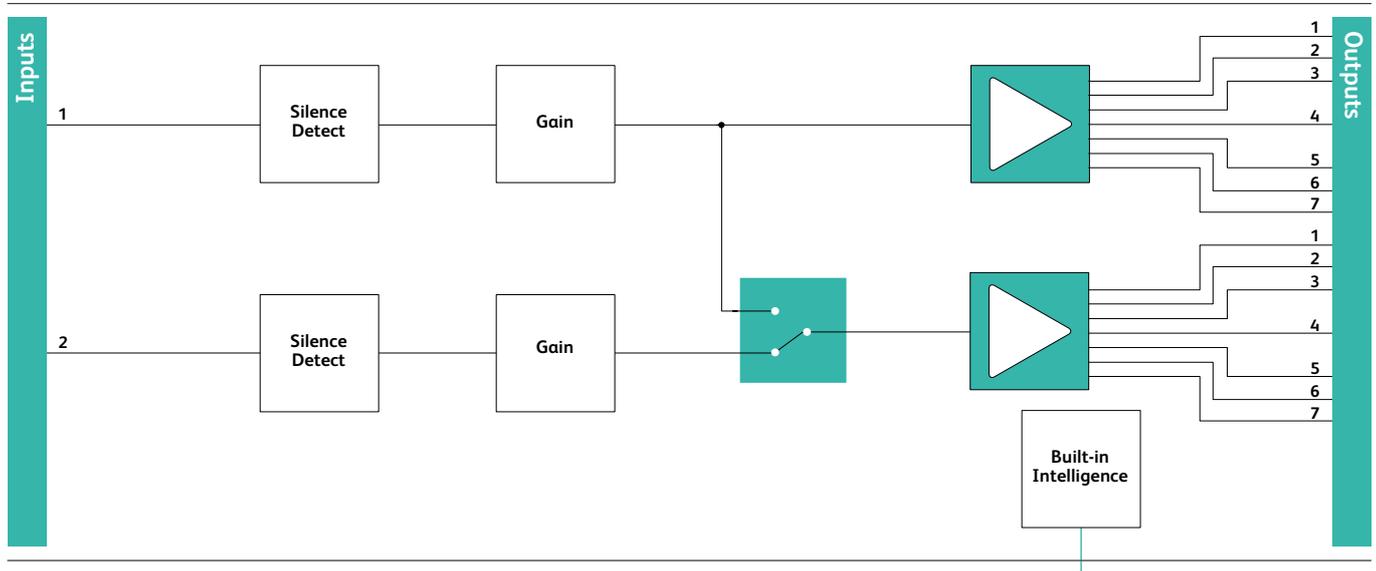
⌒ **Block Diagram** for IQADA0110-1A

Network Intelligence, Control & Monitoring

IQADA01 — Analog Audio Distribution Amplifier - 2 x 7 Outputs

Technical Specification

Inputs and Outputs

Signal Inputs

Analog	2 channels balanced via 25 way Dtype connector

Signal Outputs

Analog	7 per input channel balanced via 25 way D-type connector Note: Configurable for 1 input to 14 output operation

Card Edge and RollCall Controls

Indicators

Power up or CPU fault	Good = Off/Fault = Red
CPU running but input 1 not detected (both inputs or primary input when in single channel mode)	Input detected = Off/Not Detected = Yellow
CPU running but input 2 not detected (both inputs or primary input when in single channel mode)	Input detected = Off/Not detected = Yellow
Normal operation with input detected (either input or primary input when in single channel mode)	Input not detected = Off/Input detected = Green

Controls

Mode	Single, Dual channel
Fine gain adjustment	±0.5 dB additional to the coarse gain level, separately adjustable for each input

Functions Available via RollCall

Gain (separate L and R)	+24 dB to -24 dB in 0.5 dB steps
Silence detect	Level adjustable, - 15 to -25 dBu in 1 dB steps
Warning timer	1 to 60s (for silence detection)

Reporting (* also Logged)

Silence detected	*Silence Detected (L and R)
RollTrack controls	On/Off, Index, Source, Address, Command, Status, Sending
RollTrack	Unused Input 1 Present Input 1 Silent Input 2 Present Input 2 Silent

Specifications

Analog input/output

level	Headroom set to: +24 dBu (17.5 V pk to pk) Gain at Unity
Analog input Impedance	10 k Ohms (600 Ohm Option)
analog output Impedance	Balanced <50 ohms
Total harmonic distortion + noise	<-94 dBu (0.002%) at 700 Hz, 24 dBu input and 0 dB gain
Gain accuracy gain error (channel 1 to channel 2)	<±0.2 dB @ 0 dB <±0.2 dB @ 0 dB
Common mode rejection	<-70 dB (20 Hz to 20 kHz)
Frequency response	±0.1 dB(20 Hz to 20 kHz with reference to 1 kHz)
Channel 1 to 2 cross talk	<-110 dB at 1 kHz
Headroom (in and out)	24 dBu (Note: a maximum of 3 outputs can be driven at 24 dBu when using 600 Ohm terminations)

Power Consumption

Module power consumption	6.5 W Max (A Frames) 4.5 PR (B Frames)

IQADBBG

Multi-standard Analog Black Burst Generator with Genlock

The IQADBBG generates up to 8 precision black burst outputs in multiple standards.

Features

- Multi-Standard Black Burst Generator
- PAL/NTSC/PAL-M,/PAL-N,/SECAM
- Up to 8 composite outputs
- Full genlock with 0° ScH Output
- Genlock phase controls with 0.1° resolution
- Up to 2 line genlock offset
- 10-bit oversampled DAC
- Pattern generator
- VITS insertion
- SECAM Dr, Db locking to PAL switch

Why should you choose this module?

- 8 x composite reference outputs
- Full genlock with 0° ScH Output
- Up to 2 line genlock offset
- 10-bit oversampled DAC

Order codes
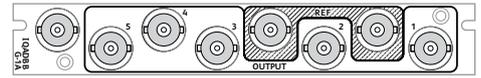
IQADBBG-1A
Genlockable Black Burst Generator PAL/NTSC.
5 outputs.

For more details on enclosure types please refer to Frames and Hardware section.

Inputs → Reference Video → SPG → Encoder → Outputs 1 2 3 4 5 6 7 8

Built-in Intelligence
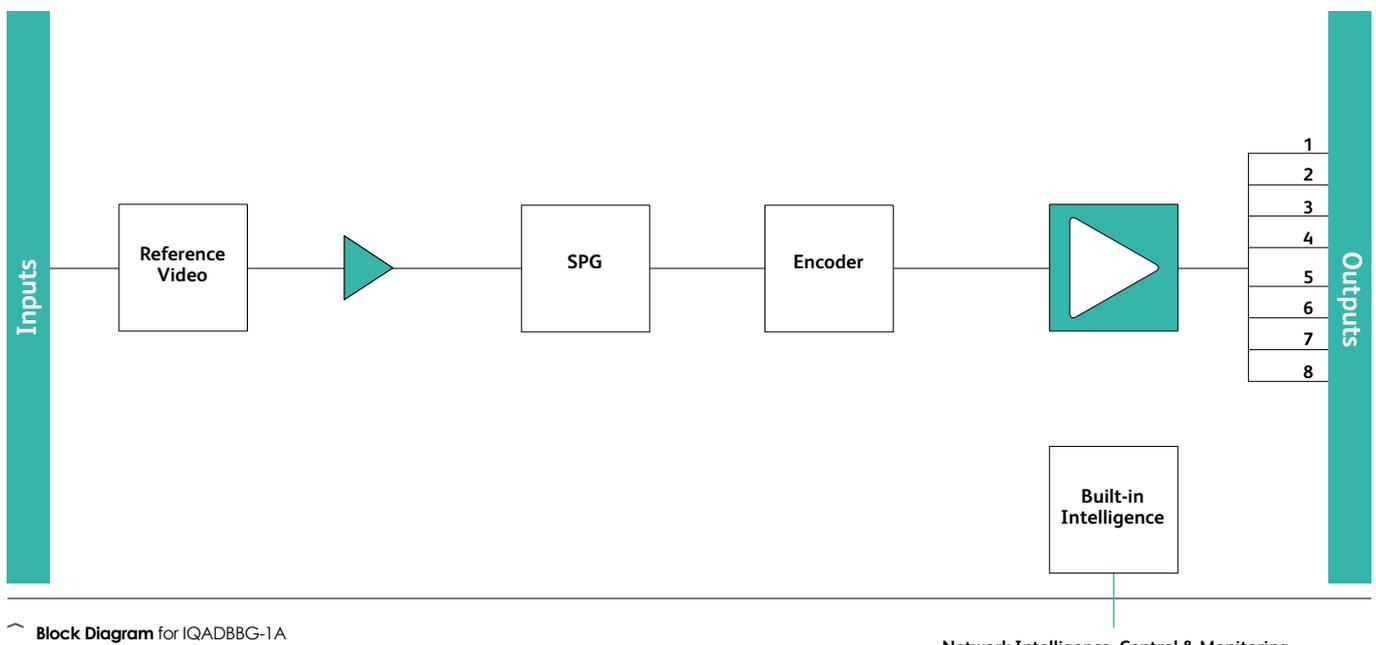
⌒ **Block Diagram** for IQADBBG-1A

Network Intelligence, Control & Monitoring

IQADBBG

Multi-standard Analog Black Burst Generator with Genlock

Technical Specification

Inputs and Outputs

Signal Inputs

Reference input	Composite or black burst

Signal Outputs

Analog composite	Up to 8 encoded

Card Edge and RollCall Controls

Card Edge Controls (also available via RollCall)

Standard	PAL/ NTSC/PAL-M PAL-N/SECAM
Test pattern select	Black, Color bars, various test lines
VITS insert	On/Off
Genlock mode	Internal lock/Subcarrier lock
Genlock H-Phase offset	±1.9 lines
NTSC pedestal	On/Off
SECAM color ident signal (bottles)	On/Off
SECAM chroma carrier	On/Off
Level adjust	±0.5 dB
Preset unit	Returns all controls to preset condition
Indicators	
Power supplies	OK
No reference	
ScH error	Reference ScH error >~20°

Specifications

Signal Inputs

Reference input	
Standard	PAL/ NTSC/PAL-M PAL-N/SECAM
Composite or black burst reference level	Standard level ±3 dB

Signal Outputs

Output level error	<1% as supplied
Output return loss	Better than -35 dB to 5.8 MHz
ScH phase	0° ±2°
SECAM FoR, FoB	Standard ±0.7 kHz
DB DR deviations	Standard ±2 kHz
Free run stability	±10 ppm typical

Power Consumption

Module power consumption	5.5 W Max (A Frames)
	5 PR (A Frames)

Blank Page

Video Processing

Keyers & logo inserters

In order to enable images or logos to be added prior to transmission the range also includes both HD and SD-SDI linear keyers and logo inserters. The keyers feature both linear and luma keying and automatic fade up/down capability. As well as operating with the RollCall control and monitoring system the keyers can interface with external systems using RS-422 control. When combined with SAM's Kahuna switcher this allows seamless integration via the Kahuna control GUI enabling direct keying control and reporting.

The logo inserters can add customer configured logos at any point in the active picture region of the SDI stream. Logo operation can be controlled via RollCall template, GPI or RollTrack triggers, and logos can be efficiently downloaded over the RollCall network via a PC application and stored in non-volatile memory.

For Related Modules see:
SD-HD Conversion Section
IQSYN33 in Synchronizers

IQDLY30

3G/HD/SD-SDI Video Delay Module

The IQDLY30 module provides extended video delay in 3G/HD/SD-SDI systems for applications such as adding profanity delay or matching delays in virtual studios. IQDLY30 provides up to 6.5s of 3G-SDI delay, 13s of HD-SDI delay and 37s of SD-SDI delay and transparently passes all associated ancillary data including embedded audio and metadata.

Features

- Delay 3G/HD/SD-SDI video signals by up to:
  - 6.5s for 3G-SDI
  - 13s for HD-SDI
  - 37s for SD-SDI
- Delay control in frames, lines and pixels, with optional frame synchronizer
- Passes entire video stream including embedded audio and ancillary data
- Embedded audio, and ancillary data is delayed to match the video
- Input loss detection – default output of black or freeze
- 4 GPIOs, each configurable as a general purpose input or output
- 16 x user memories, save/recall/rename
- RollCall control and monitoring compatible

Why should you choose this module?

- Provides flexible delay adjustment for multi-format SDI signals
- May be used to match long system delays elsewhere such as: Profanity delays, Virtual studio graphics, MPEG encoders/decoders, Audio processing, Multi-channel audio compression, Signal re-entry on master control inputs, HD radio links
- Full RollCall and SNMP compatibility allows easy integration with SAM, or third party, network management systems providing an all-inclusive monitoring and control solution

Order codes
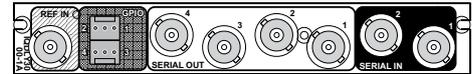
IQDLY3000-1A3
3G/HD/SD-SDI Video Delay Module,
2 SDI inputs, 4 SDI outputs, 4 GPIs, Ref input (with Synchronizer option).

IQDLY3000-1B3
3G/HD/SD-SDI Video Delay Module,
2 SDI inputs, 4 SDI outputs, 4 GPIs, External & Frame reference inputs (with Synchronizer option).

Software Options

IQOPTK-SYN

Frame synchronizer option for IQDLY30

For more details on enclosure types please refer to Frames and Hardware section.

Block Diagram for IQDLY30

IQDLY30   3G/HD/SD-SDI Video Delay Module

Technical Specification

Inputs and Outputs

Signal Inputs

SDI Inputs	2x
Input Cable Length	Up to 100m Belden 1694A @ 3 Gbit/s
	Up to 190m Belden 1694A @ 1.5 Gbit/s
	>350m Belden 1694A @ 270 Mbit/s
Analog Reference	1 x Analog Reference input
	Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level)
	SD bi-level – RS170A
	HD Tri-level – SMPTE 240M, 274M and 296M

Signal Outputs

SDI Outputs	x 4

Control Interface	
GPI	4 x Closing contact I/O interface (ST)

Controls

Indicators

Power	OK (Green)
CPU	OK (Green flashing)
Status	OK (Green), Warning (Yellow), Error (Red)
Input 1-2	3G-OK (Blue), HD-OK (Green), SD-OK (Yellow), Loss (Red)
Reference	OK (Green – tri-level), OK (Yellow – bi-level), Loss (Red)

Genlock & Video Delay

Genlock Mode	Free-run, Lock to Reference, Lock to input
Genlock H-Phase	± 1H in pixel clock steps
Genlock V-Phase	± 1F in 1 line steps
Video H-Delay	0 – 1 Line in pixel clock steps
Video V-Delay	0 – 1 Frame in 1 line steps
Video Bulk Delay	
1125(1080)/50P (level A)	0 - 342 Frames, 6.84 sec
1125(1080)/59P (level A)	0 - 400 Frames, 6.67 sec
1125(1080)/25i	0 - 343 Frames, 13.72 sec
1125(1080)/29i	0 - 401 Frames, 13.38 sec
750(720)/50P	0 - 680 Frames, 13.60 sec
750(720)/59P	0 - 838 Frames, 13.98 sec
525(480)/29i	0 - 1112 Frames, 37.10 sec
625(576)/25i	0 - 933 Frames, 37.32 sec
Video Standards	1125(1080)/50P (level A),
	1125(1080)/59P (level A),
	1125(1080)/25i,
	1125(1080)/29i,
	750(720)/50P,
	750(720)/59P,
	525(480)/29i,
	625(576)/25i

Default Video Output

Type	Freeze, Black

Default Video Output

Standard	Last Known Good, 1125(1080)/50P (level A), 1125(1080)/59P (level A), 1125(1080)/25i, 1125(1080)/29i, 750(720)/50P, 750(720)/59P, 525(480)/29i, 625(576)/25i

Other Controls

User Memories	16 x Save, Recall, Rename
Memory Naming	User configurable naming of memories 1 – 16
Information Window	Video Input Status, Reference (Genlock) Info, Reference Input Status
Factory Default	Resets all module settings to factory specified default values and clears memories.
Default Settings	Resets all module settings to factory specified defaults but does not clear memories.
Restart	Software restart of the module
Module Information	Reports following module information: Software version, Serial number, Build number, KOS version, Firmware versions, PCB versions

Specifications

Electrical	3Gbit/s SDI, SMPTE 424M
	1.5Gbit/s HD-SDI, SMPTE 292M
	270 Mbit/s SDI, SMPTE 259M-C / DVB-ASI
Connector / Format	BNC/ 75ohm panel jack on standard IQ connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s)
	>-10dB (3Gbit/s)
Output Jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz)
	HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)
	3G-SDI 2.0 UI (10Hz) / 0.2 UI (100KHz)
Reference Source	External – HD Tri-Level / SD bi-level / Input Video syncs
Electrical	Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level)
	SD bi-level – RS170A
	HD Tr-level – SMPTE 240M, 274M and 296M
Connector / Format	BNC/75 ohm panel jack on standard IQ connector panel
Analog Reference Return Loss	
	SD bi-level > 40 dB to 5.5 MHz
	HD tri-level > 30 dB to 30 MHz

Synchronizer

Minimum delay	2us (to 7us, dependent upon hysteresis state)
Synchroniser hysteresis window	5us
Embedded Audio Delay	
	Same delay as for the video data
Ancillary Data Delay	Same delay as for the video data

Power Consumption

Module Power Consumption	
	17.5 W Max (A Frames)
	17.5 PR (B Frames)

IQLOG00

HD/SD-SDI Logo Inserter

The IQLOG00 provides logo insertion for HD-SDI 1.5 Gbit/s or SD-SDI 270 Mbit/s signals. The unit is capable of adding up to 2 x HD or 4 x SD static 10-bit color logos into the SDI stream at any point within 4:2:2 boundaries of the active picture. Up to 2.6M pixels of logo storage is available. Logo control is via RollCall template, GPI or RollTrack triggers, and logos can be efficiently downloaded over the RollCall network via a PC application and stored in non-volatile memory.

Features

- Serial digital logo insertion for HD/SD-SDI signals
- Ability to insert 2 logos into an HD-SDI signal or 4 logos into an SD-SDI signal
- Control of horizontal and vertical logo positioning - at any point within 4:2:2 boundaries of the active picture
- Logo storage capacity of 2.6M pixels
- User defined logos can be loaded over a PC network with direct support for TGA, TIFF or BMP based files
- Video and alpha-channel processing at 10 bits to 4:2:2:4 resolution
- Totally transparent to ancillary data
- Smooth fade with dedicated manual or automatic (GPI) fade control
- Standards/formats supported:
  – 720/50p, 1080/50i, 576/50i
  – 720/59p, 1080/59i, 480/59i
- In-built test pattern generator
- User defined input failure logo
- Input loss detection – input pass through, black, pattern or logo
- Input SDI, EDH and ANC data checking, reporting and insertion
- 4 active HD/SD-SDI outputs
- 2 x GPIs for control of logo on/off
- 32 x user memories
- 60 x logo memories
- GPI recall of user and logo memories
- RollCall control and monitoring compatible

Why should you choose this module?

- Adds multiple static HD or SD sized, full 10-bit, color logos at any point in the active picture region of the SDI stream (within 4:2:2 boundaries)
- Control of logo position, fade/cut, available from RollCall control templates to enable maximum operational flexibility
- Logo memory store/recall available for rapid changes between program logos
- Logo importer application available from the SAM web site to enable customer logos to be downloaded from a PC to the module via the RollCall network

Order codes
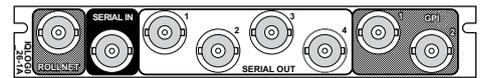
IQLOG0026-1A
HD-SDI and SD-SDI Logo Inserter.
4 outputs, 2 GPIs.
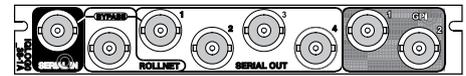
IQLOG0038-1A
HD-SDI and SD-SDI Logo Inserter with relay input bypass. 4 outputs, 2 GPIs

For more details on enclosure types please refer to Frames and Hardware section.

IQLOG00

HD/SD-SDI Logo Inserter
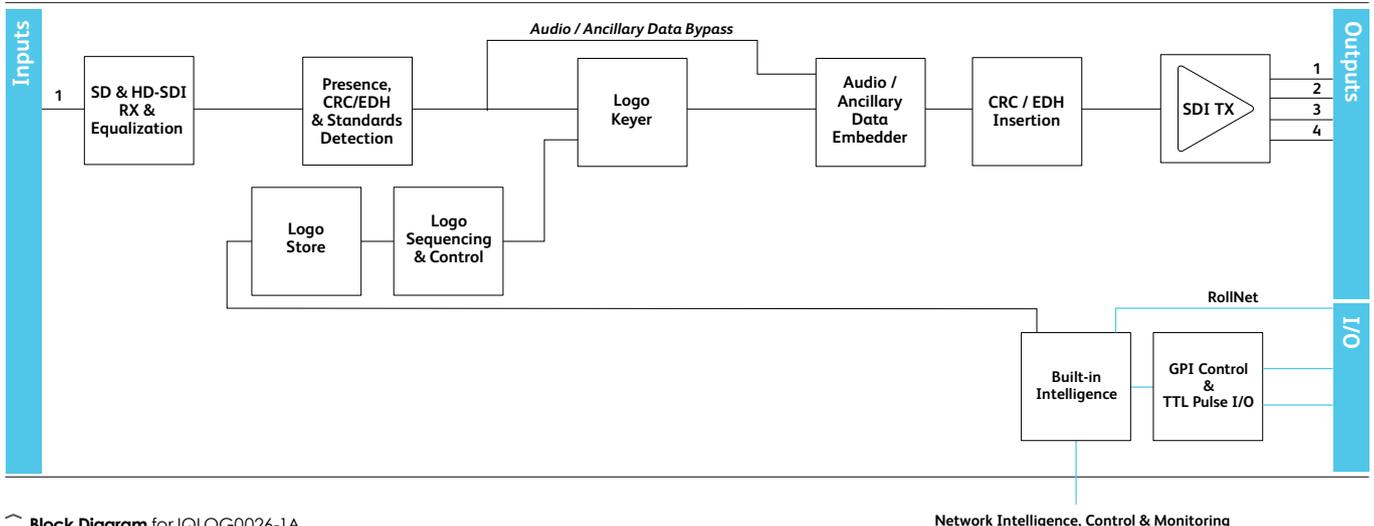
Block Diagram for IQLOG0026-1A

Technical Specification

Inputs and Outputs
Signal Inputs

Inputs	1 x HD/SD Serial Digital
Electrical	1.5 Gbit/s HD-SDI, SMPTE 292M/296M 270 Mbit/s SDI, SMPTE 259M-C
Connector / format	BNC/75 ohm panel jack on standard SAM connector panel
Input cable length	Up to 140m Belden 1694A @ 1.5 Gbit/s (40m input cable length and 35cm output cable length, relay bypass version. Belden 1694A @ 1.5 Gbit/s) Up to 350m Belden 1694A @ 270 Mbit/s

Note: Specified cable lengths are a guide only. Exact cable length performance will depend on the quality of the cable used, the SDI video rate and the system setup. It is advisable not to cascade modules using the relay rear version although it may be possible if the interconnecting cable lengths are kept to an absolute minimum.

Return loss	>15 dB 100 KHz - 1.5 GHz
Relay bypass versions;	
Input return loss	>-8dB (when not in BYPASS mode)
Output return loss	>-8dB (when not in BYPASS mode)

Signal Outputs

Outputs	4 x HD/SD Serial Digital
Electrical	1.5 Gbit/s HD-SDI, SMPTE 292M/296M 270 Mbit/s SDI, SMPTE 259M-C
Connector / format	BNC/75 ohm panel jack on standard SAM connector panel
Return loss	>15 dB 100K to 1.5 GHz

Control Interface

GPI	2 x GPI Format: TTL compatible Connector: BNC/75 ohm panel jack on standard SAM connector panel

RollCall	1 x RollNet Interface Format: 2.5 Mbit/s Connector: BNC/75 ohm panel jack on standard SAM connector panel

Important Information
Please note that in order to support the IQLOG00 module and provide the ability to download Logos it is essential to have an ethernet connection to the system. This can be achieved through a RollPCI or RollUSB RollNet adapter in a PC, or with an Ethernet style RollCall Gateway card installed in any IQH3A or IQH1A frame connected on the same RollNet network as the IQLOGxx card. This is now fitted as standard into all new IQH3A-S frames, but customers adding IQLOG00 modules to existing frames must check both the type of 3U frame and version of gateway card installed. Compatible frames will have one of the following part numbers: IQH3A-E-0, IQH3A-E-P, IQH3A-S-0 and IQH3A-S-P.

Compatible gateway card part numbers are: RCIF3U2Y (software version 3.5 or later) or RCIF3U2B/2C (software version 5.2 or later).

Card Edge and RollCall Controls
Indicators

Power	OK (Green)
CPU running	OK (Green flashing)
FPGA running	OK (Yellow flashing)
Status	OK (Green), Warning (Yellow), Error (Red)
Input	Active (Green)
SDI error	Error (Red)

IQLOG00 — HD/SD-SDI Logo Inserter

Technical Specification cont…

Controls

Video Controls

Input loss detect	No Input or Invalid Standard
Input standards list	1125(1080)/29i
	1125(1080)/25i
	750(720)/59p
	750(720)/50p
	525(480)/29i
	625(576)/25i
CRC/EDH checking	Yes
Output standard	Manual Select / Follows Input
Default video output	Pattern/ Black / Input / Logo
Pattern	Enable / H-Scroll
Pattern type	100% Color Bars, 75% Color Bars SMPTE Bars, Tartan Bars, Pluge Ramp, H Sweep, Pulse and Bar, Burst

Logo Controls (*for each Logo)

*Fade	Fade In/ Fade Out (unit fades in/out to/from maximum transparency value in user defined fade times)
*Cut	Cut In/ Cut Out (unit cuts in/out to/from maximum transparency value instantly) Note: Overrides fade in/out function
*Logo fade in time	0.00 seconds to 60.00 seconds in 0.01 s steps
*Logo fade out time	0.00 seconds to 60.00 seconds in 0.01 s steps
*Logo transparency	0% (maximum visibility) to 100% (not visible) in 1% steps
*Stop	Pauses the fade action
*Fade state indicator	0 to 100%
Logo selection filters	All Logos / HD Logos / SD Logos / HD 720 / HD 1080 / SD PAL / SD NTSC
*Logo H position	–100.000% to +200.000% in 0.01 Steps. Also adjustable by direct numerical entry in pixels
*Logo V position	–100.000% to +200.000% in 0.01 Steps. Also adjustable by direct numerical entry in lines
Logo memory	Recall / Save / Rename 60 locations

Other Controls

GPI configuration	Unused / Input / Output
GPI trigger	Edge
GPI input	Pattern, Black, Display Logo 1 to 4, Logo and User Channel Memories
GPI output	Input OK / Pattern / Black / Logo1-4 Displayed / Logo 1-4 CRC Error / Any Logo CRC Error
User memories	32 x Save / Recall / Rename
Factory defaults	Returns all settings to factory defaults

RollCall Features

Video input logging	Input Type, Status, Std., Errors, Error Secs, ANC Errors, ANC Error Secs
Audio state logging	Input Embedded 1-8 State
Audio type logging	Input Embedded 1-8 Type
Output logging	State, Type, Standard
Logo logging	Logo 1-4 State, Logo 1-4 Name, Logo 1-4 CRC Errors, Logo CRC Errors
Misc logging	Serial No., OS Version, Build No., Hardware version, Firmware Version, Up Time
Log server	Disable / Name / Any
RollTrack controls	Source, Address, Command, Status, Sending
RollTrack sources	(Internal or detected device states that trigger the sending of RollTracks) Unused, Input Present, Input Loss, De-embed 1-8 Present, De-embed 1-8 Lost, GPI 1-2 High, GPI 1-2 Low, GPI 1-2 InActive, Logo 1-4 Displayed
Setup	Product, Software version, Build No, KOS Version, Serial No., Firmware No., PCB No., Factory Default, Restart, Unit Name, Logo Memory Management
Diagnostics	Select Test, Diagnostic Errors, Stop Tests, Test Id:, Last Error
Logo download	Note: The logo download software supports the following files: TGA (with embedded key), BMP, RGB (SGI), TIFF, JPEG, PNG (with embedded key), GIF, PPM, PBM, PGM and PCX

User Status Monitoring

Information window	Selects the information to be displayed in the Unit Status Window: Video Status/Standard Wide Screen Signalling Status/Type Embedded Audio Status/Type
Unit status window	Provides real-time updated information for the parameters selected by the Information Window

Specifications

Video standards	1125(1080)/29i
	1125(1080)/25i
	750(720)/59p
	750(720)/50p
	525(480)/29i
	625(576)/25i
Video delay	<5 us
Logo limits	Maximum Logo file storage capacity of 2.6 M Pixels
Channel status information	Handled and checked

Power Consumption

Module power consumption	8.5 W Max (A Frames)
	7 PR (B Frames)
	8.9 W Max - relay bypass version

IQDSK00

HD/SD-SDI Linear Keyer

The IQDSK00 provides a simple and straightforward linear or luma keying capability for HD/SD-SDI video streams. The unit provides a dedicated program output along with selectable preview/program outputs which include a clean feed option. Being transparent to ancillary data allows the IQDSK00 to pass any embedded audio or metadata and this combined with a short signal delay makes the module suitable for all operational environments. As well as operating with the RollCall control and monitoring system the IQDSK00 can interface with external systems using RS-422 control. When combined with SAM Kahuna switcher this allows seamless integration via the Kahuna control GUI enabling direct keying control and reporting.

Features

- Background, Fill, and Key Inputs
- Linear and Luma Key Modes
- Dedicated Program output, and two independently selectable preview or program outputs
- 2 independently selectable preview outputs showing preview, program, program pre-fade, Background (clean feed), Fill, Key, Matte, pattern and Processed Key signals
- Fade to black on Program Output with adjustable duration
- Self-key capability using fill input to provide key signal
- Matte generation and capture
- Dissolve/Cut Mix mode
- Key opacity control (0-50%)
- Maintains valid output with background input fail, with option of switching to Fill input or Matte source
- Internal Processing to at least 12-bit accuracy
- Ancillary data can be passed from the Background input, Fill input or blanked
- Relay input bypass option - background to program output 1
- 2 GPIs and 1 GPI/O which can operate as a Tally output
- Remote trigger of Fade Up/Down action using GPI control
- External keyer control via RS422 interface on double width versions
- SMPTE 424M compatible hardware for future proof upgrade path
- RollCall remote control and monitoring

Why should you choose this module?

- Linear and luma key modes provides keying for a variety of sources
- External control via RS422 interface enables direct keyer control from production switchers like SAM Kahuna
- Key layer cut or fade operation for the program output enables flexibility for instant or timed transitions
- Selectable clean feed (Background) output for editing and archive purposes
- Emergency input to output bypass option allows added protection for critical signal paths or 24/7 operations

Order codes
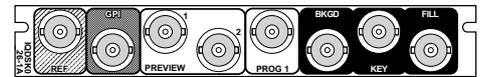
IQDSK0026-1A
HD/SD-SDI Linear Keyer. 1 program, 2 selectable preview SDI outputs.
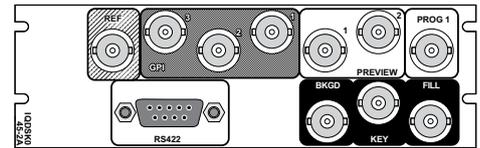
IQDSK0045-2A
HD/SD-SDI Linear Keyer. 1 program, 2 selectable preview SDI outputs, external control interface via RS-422.
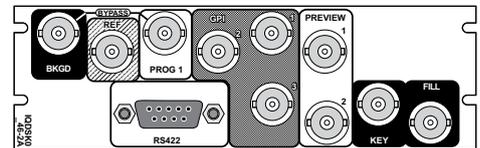
IQDSK0046-2A
HD/SD-SDI Linear Keyer. 1 program, 2 selectable preview SDI outputs, external control interface via RS-422, relay bypass for background input to program output.

For more details on enclosure types please refer to Frames and Hardware section.

IQDSK00

HD/SD-SDI Linear Keyer
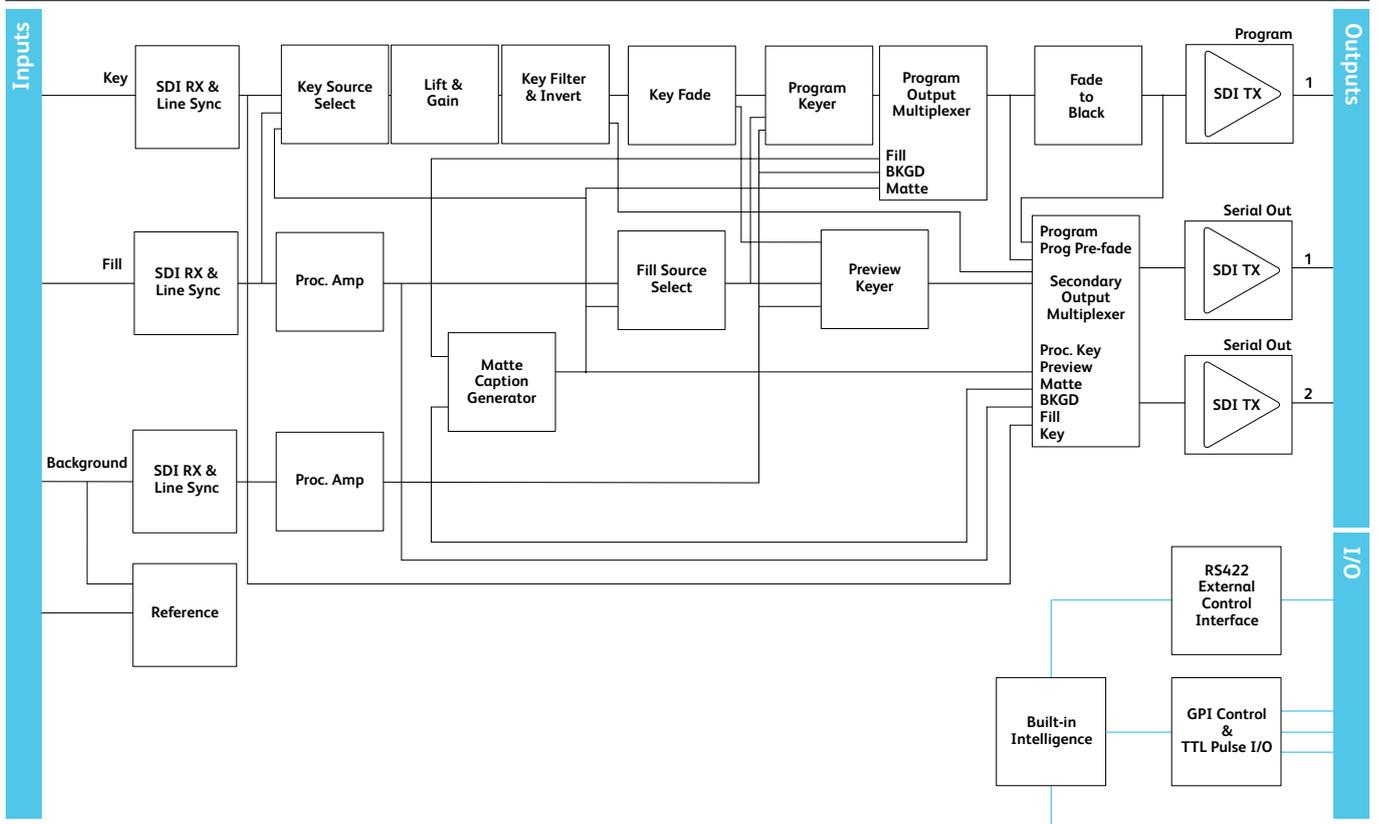
⌢ **Block Diagram** for IQDSK0045-2A

Network Intelligence, Control & Monitoring

Technical Specification

Inputs and Outputs

Signal Inputs
Serial digital
Background (bkgd)	1 x BNC Terminated in 75 Ohms
Serial digital key (key)	1 x BNC Terminated in 75 Ohms
Serial digital fill (fill)	1 x BNC Terminated in 75 Ohms
Standards	1.5 Gbit/s HD-SDI, SMPTE 292M/296M 270 Mbit/s SDI, SMPTE 259M-C
Analog reference (ref)	1 x BNC Terminated in 75 Ohms
Standards	HD Tri-sync / SD Bi-sync, SMPTE 274M, RS170A

Signal Outputs
Serial digital (prog 1)	1 x SDI Program
Serial digital (preview 1, 2)	2 x SDI Preview (independently selectable)
Standards	1.5 Gbit/s HD-SDI, SMPTE 292M/296M 270 Mbit/s SDI, SMPTE 259M-C

Control
GPI	2 closing contact style inputs+1 I/O via BNC
RS422 remote control	9 pin D type connector

Controls

Controls
Bkgd / fill luma gain adjust	±6 dB in 0.1 dB steps
Bkgd / fill chroma gain adjust	±6 dB in 0.1 dB steps
Bkgd / fill black level adjust	±100 mV in 0.8 mV steps
Fill picture position	Approx. +600ns in 148ns (SD) or 27ns (HD) steps
Key picture position	Approx. +600ns in 74ns (SD) or 13.5ns (HD) steps
Key gain	0 – 13.686 (0x0000 - 0xFFFF)
Key lift	-10% - +110% (0x800 - 0x7ff) in 0.1% steps
Program fade to black	On / Off (selecting 'on' fades to black, off returns to program setting)
Program fade to black time	0 – 2047 Frames (0x0000 - 0x0800) in steps of 1 field (preset to 100)
Default program output	Fill, Matte, Color Bars, Black
Preview output 1 and 2 select	Independent selection for each output of: Preview, Program, Program prefade, Bkgd I/P, Fill I/P, Key I/P, Processed Key, Matte, Black, Color Bars
Genlock mode	Analog Reference / Background Input (Note: Fill and Key inputs can be up to 1 line earlier, but not later than the background input in this mode)

IQDSK00

HD/SD-SDI Linear Keyer

Technical Specification cont…

Reference default	On Ref. loss use background input. If background input not valid use fill input, otherwise free-run
Genlock H phase	±1H, adjustable in 13.5 ns steps for HD, or ±0.5H, in 37ns steps for SD
Ancillary data select	Background Input / Fill Input
Ancillary data blanking	Blank for HANC and/or VANC (Program output, Preview selection: Program, Program pre-fade, Background only)
Pattern generator	On/Off – EBU Color Bars (Preview Out Only)

Keyer Controls

Keyer control	RollCall/RS422
Keyer mode	Linear, Luma
Key source	Key Input / Matte / Fill Input (Self-Key)
Fill source	Fill Input / Matte
Key invert	Off / On
Keyer enable	Off / On (cut or fade on/off the keyer)
Fade enable	Off / On (fade function enabled when ON)
Keyer fade time	0 – 2047 Frames (0x0000 - 0x0800) 1 field (preset to 100)
Mix enable	Off / On (dissolve or cut to the set mix level) Note: Keyer/Mix enable priority. Cannot both be selected at the same time. Selecting one of these functions will de-select the other if already enabled
Mix level	0 – 100% in 1% steps (100% = Full Key) (Preset to 50%)
Key opacity	Key fade level 50% to 100% (100% = Key full-on)
Memory	16 x Store / Name / Recall
GPI/O function*	GPI – Programmable to recall any memory (and toggle between 2 selectable memories)
GPO (output closed when true)	Key Tally On, Key Fade Up, Key Fade Down, Full Key (100% mix) enabled, Bkgd Lost, Fill Lost and Key Lost

* Note: GPI's functional whether Keyer control selected to RollCall or RS422.

Preset unit	Returns all settings to factory defaults

Matte Controls

Matte select	Single Color (default)/ Frame Store
Frame store capture source	Background Input (default)/ Fill Input
Frame capture	Activates capture from selected input
Frame store status	Captured = frame stored, Empty = not stored
Matte hue	0 – 360° (preset - 0°)
Matte saturation	0 - 100% (preset 0%)
Matte luminance	0 - 100% (preset 0%)

Indicators

Power	OK (Green)
CPU running	OK (Green flashing)
FPGA running	OK (Green flashing)
Status	OK (Green), Warning (Yellow), Error (Red)
Background input	OK (Green)
Key input	OK (Green)
Fill input	OK (Green)

Additional Controls via RollCall Remote Control System

Logging	Input Status*
	Input Standard*
	Reference Status
	ANC Error (Bkgd, Fill)
	EDH Error*, Error-Time*,
	EDH Error-Seconds*
	CRC Error*, Error-Time*,
	CRC Error-Seconds*
	* Background, Key and Fill

IQDSK00   HD/SD-SDI Linear Keyer

Technical Specification cont…

Specifications

Input cable length	Up to 140 m Belden 1694A @ 1.5 Gbit/s (40m input cable length and 35m output cable length, relay bypass version. Belden 1694A @ 1.5 Gbit/s) Up to 350 m Belden 1694A @ 270 Mbit/s

Note: Specified cable lengths are a guide only. Exact cable length performance will depend on the quality of the cable used, the SDI video rate and the system setup. It is advisable not to cascade modules using the relay rear version although it may be possible if the interconnecting cable lengths are kept to an absolute minimum.

Serial output level	800 mV ±10%
Output overshoot	<70 mV
Output return loss	Better than -15 dB
Output jitter	HD LF< 1 UI, HF< 0.2 UI SD < 0.2 UI
Minimum delay (when locked to background input)	HD - 3Ìs SD - 5Ìs
Input return loss	Better than -15 dB

Relay bypass versions

Input return loss	>-8dB (When not in BYPASS mode)
Output return loss	>-8dB (When not in BYPASS mode)

Reference Input

Electrical	Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level) SD bi-level – RS170A HD tri-level – SMPTE 240M, 274M and 296M
Connector / format	BNC/75 ohm panel jack on standard SAM connector panel
Analog reference return loss	SD bi-level <-40 dB to 5.5 MHz HD tri-level <-35 dB to 30 MHz

Video Standards

1125(1080)/29i, 1125(1080)/25i
750(720)/59p, 750(720)/50p,
525(480)/29i, 625(576)/25i
1125(1080)/30i, 1125(1080)/30p
1125(1080)/29p, 1125(1080)/25p
1125(1080)/24p, 1125(1080)/23p
750(720)/60p,
Note: All inputs must be the same standard.

EMC Performance Information

Environment	Commercial and light industrial E2
Peak mains inrush current following a 5 second mains interruption	No Mains Input
Performance information	No performance degradations or cable length limitations

Power Consumption

Module power consumption	8.5 W Max (A Frames) 8 PR (B Fames)
	9 W max (PR) – Relay Bypass Version

Audio Processing

The increasing use of digital technology has created new ways of processing audio signals - ways that were not needed or not possible in the analog domain.

IQ Modular audio processing modules provide a wide range of functions to meet the diverse requirements of the digital facility.

The IQ audio processing modules provide a broad range of functions including synchronization, routing, embedded audio processing, and sample rate conversion.

All modules can be controlled by the SAM RollCall or RollMap control and monitoring systems and, where appropriate, support RollTrack to ensure accurate synchronization of audio to its associated video signal.

Since RollTrack operates through the internal RollCall remote control network, this powerful function has no need for further external connections.

For Related Modules see:
Embedded Audio Section
IQUDC34 in SD-HD Conversion

IQDBD00/01 — HD/SD-SDI 16 Channel AES/EBU Re-embedder with Dolby E/D Decoder

The IQDBD00 provides an integrated Dolby E/D decoding and re-embedding solution for HD-SDI 1.5 Gbit/s or SD-SDI 270 Mbit/s signals. As well as providing embedding or de-embedding for up to 16 PCM audio channels, eight AES/EBU streams, it can de-embed and decode Dolby E data to output as AES or re-embed into the video stream. Dolby E features include automatic Dolby E/D alignment with the video signal, and metadata decoding and output to RS485. PCM audio processing features include tracking audio delay, gain, phase invert, mixing, Dolby E/D pair routing and separate channel level routing. Video features include proc. amp controls and up to 12 frames of delay.

Features

- Embed unbalanced or balanced AES audio onto HD/SD-SDI video streams with channel level control
- De-embed existing audio channels and output them to unbalanced or balanced AES
- Decode Dolby E or D compressed audio and either output to AES or re-embed into the HD/SD-SDI stream
- Associated Dolby E metadata is output in RS485 format
- Standards supported:
  – HD-SDI to SMPTE292M/274M/296M
  – SD-SDI to SMPTE259M-C
- Channel-level control allows up to 16 individual embedded audio channels to be swapped-over or swapped out
- 4 off 4 channel assignable audio mixers
- Audio proc. amp and delay
- Audio delay channels include selectable fixed delay and tracking delays selectable for any pair
- Tracking audio delay which seamlessly tracks the video delay or external RollTrack inputs
- Dolby E support – pair routing and automatic realignment and synchronization to the video frame boundary
- Any group of embedded audio may be passed unchanged if not selected for processing
- Video delay feature, up to 12 frames
- Video controls including video gain and offset
- 16 x user memories
- Independent horizontal and vertical ancillary data blanking
- Input SDI, CRC, EDH and ANC data checking and reporting
- In-built test pattern generator
- Input loss detection – input pass through or black/pattern/freeze
- Naming of audio output channels for easy identification

Why should you choose this module?

- Powerful audio processing module to decode Dolby E audio signals for content and level monitoring
- Metadata output allows downstream Dolby Encoders to repurpose the audio signals correctly
- Adjustable video delay to match Dolby E decoder delay
- Advanced Dolby E alignment functions enable accurate timing to be maintained throughout the signal path
- Suitable for synchronous or asynchronous embedding and de-embedding applications using AES audio
- Suitable for multi-lingual audio applications thanks to channel-level control and up to sixteen channel operation

Order codes
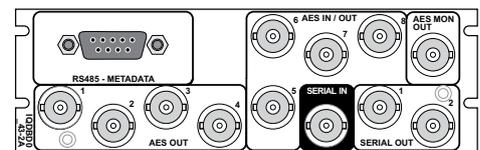
IQDBD0043-2A
HD/SD-SDI 16 Channel de-embedder with Dolby E decoder. 2 HD/SD-SDI outputs, 4 AES/EBU unbalanced outputs, 4 AES/EBU unbalanced configurable input/outputs, 1 AES/EBU unbalanced monitor output, Dolby E Metadata output.
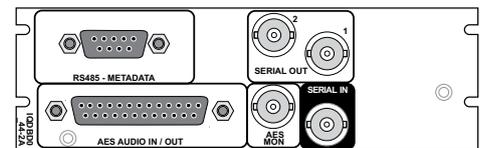
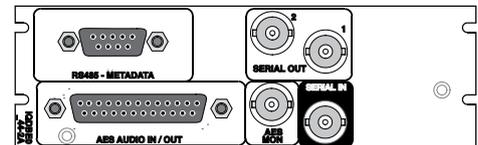### IQDBD0144-2A
HD/SD-SDI 16 Channel de-embedder with Dolby E decoder. 2 HD/SD-SDI outputs, 4 AES/EBU balanced outputs, 4 AES/EBU balanced configurable input/outputs, 1 AES/EBU unbalanced monitor output, Dolby E Metadata output.

For more details on enclosure types please refer to Frames and Hardware section.

IQDBD00/01

HD/SD-SDI 16 Channel AES/EBU Re-embedder with Dolby E/D Decoder

Inputs

1 → SDI RX & Equalization → Signal Loss & CRC Detection → De-embedder → Presence, CRC & Standards Detection → Video & ANC Delay → Selective Ancillary Blanking → Embedder → SDI TX → 1, 2 **Outputs**

Dolby E / D Decoder → Dolby E Metadata

Dolby E Pair / Decoded PCM

4 Delay Processors

8 Delay Processors for Embedded Signals

1-8 Pairs

Dolby E Auto Alignment

Channel Router

Dolby E Auto Alignment

Synchronizing Sample Rate Converters

4 Delay Processors for AES Signals

AES Router Pairs 5-8

Tone Generator

Assignable Audio Mixers

Built-in Intelligence

Proc. Amp 1 – 8

AES TX → AES Monitor

AES TX → AES 1-4

AES TX → AES 5-8

AES RX

Out / In

I/O

Block Diagram for IQDBD0043-2A

Network Intelligence, Control & Monitoring

Technical Specification

Inputs and Outputs

Video Signal Inputs

Digital video	1 x Serial Digital Input
Electrical	1.5 Gbit/s HD-SDI, SMPTE 292M, SMPTE 299M
	270 Mbit/s SDI, SMPTE 259M-C
Connector / format	BNC/ 75 ohm panel jack on standard SAM connector panel
Input cable length	Up to 140 m Belden 1694A @ 1.5 Gbit/s
	Up to 350 m Belden 1694A @ 270 Mbit/s
Return loss	>-15 dB

Video Signal Outputs

Digital video	2 x Serial Digital Outputs
Electrical	1.5 Gbit/s HD-SDI, SMPTE 292M
	270 Mbit/s SDI, SMPTE 259M-C
Connector / format	BNC/ 75 ohm panel jack on standard SAM connector panel

Audio Signal Inputs/Outputs

Unbalanced AES/EBU

AES audio I/O (software selectable)	4 Unbalanced
AES audio outputs	4 Unbalanced
AES audio monitor output	1 Unbalanced
Connector / format	BNC/ 75 ohm panel jack

Balanced AES/EBU

AES audio I/O (software selectable)	4 Balanced
AES audio outputs	4 Balanced
Connector / format	25 Way D-Type / 110 ohm panel mounted
AES audio monitor output	1 Unbalanced
Connector / format	BNC/ 75 ohm panel jack

IQDBD00/01

HD/SD-SDI 16 Channel AES/EBU Re-embedder with Dolby E/D Decoder

Technical Specification cont...

RS422 Metadata

Connector	9 Way D-Type panel mounted

Controls

Indicators

Power	OK (Green)
CPU	OK (Green flashing)
FPGA	OK (Orange flashing)
Status	OK (Green), Warning (Orange), Error (Red)
Lock	OK (Green)
SDI error	Error (Red)

RollCall Features

Audio Controls	
Embedded audio types	PCM (to AES3)/Data (SMPTE 337M inc. Dolby E)/ Mixed (Passes any channel status information present)
Channel routing	Output channels routed from Dolby E decoder, AES inputs 5 to 8, SDI 16 embedded channels from any group, test tone and silence
Embedder priority	Normal distribution/Audio Prioritized
Embedded group	Pass/Blank/Embed
Channel Status Handling and Checking	
Dolby E auto line selection	Define Dolby E embed line for each video standard
Dolby E decoder routing	Channels routed from AES inputs 5 to 8, SDI 16 embedded channels from any group
Output side control proc. - gain and polarity	Independent Gain, Mute, and Polarity control over embedded output channels. +12 dB to -66 dB in 0.1 dB steps
Channel 1 Delay sources	
Coarse manual delay 1 and 2	Up to +2 s in 0.25 ms steps, common to any selected pairs.
Fine manual delay 1 and 2	Up to ±0.25 ms in 5 µs steps, common to any selected pairs
Dolby E delay (alignment)	Auto/Manual
Variable audio delay control source	Up to 0.5 s from RollTrack + Video Delay
Channel 2 Delay sources	
Coarse manual delay 1 and 2	Up to +2 s in 0.25 ms steps, common to any selected pairs
Fine manual delay 1 and 2	Up to +0.25 ms in 5 µs steps, common to any selected pairs
Dolby E delay (alignment)	Auto/Manual
Variable audio delay control source	Up to 0.5 s from RollTrack + Video Delay

Tone Setup

Frequency	1 kHz, 2 kHz, 4 kHz, mute @ –20 dBFS or –18 dBFS

Video Controls

Output standard	Select, Follow Input
Standards list	Select video standards for automatic follow
Black level	±200 mV in steps of 1 mV
Master video gain	±6 dB in steps of 0.1 dB.
Y gain	±6 dB in steps of 0.1 dB.
Cb/Cr gain	±6 dB in steps of 0.1 dB.
Pattern select	Black, 100% Color Bars, 75% Color Bars, SMPTE Bars, Tartan Bars, Pluge Ramp, H Sweep, Pulse & Bar, Burst
Blank ancillary data	Blank All, Blank HANC, Pass All, Pass when Output Standard equals Input Standard
VBI line blank	Individual lines for each video standard
Manual freeze	On/Off
Freeze	Field/Frame
Video channel control	Y On/Off, C On/Off
Default video output	Pattern / freeze/ black / run through
Metadata Controls	
TBA	

Other Controls

User memories	16 x Save / Recall / Rename
Input / output names	User configurable naming of the input and output AES/EBU, embedded audio and mixer channels

RollCall Features

Logging	Video Status
	Embedded Audio Status
	O/P Audio Status
	O/P Audio Level Status
	O/P Dolby E Status
	AES Input Status
	AES Output Status
	Embedded audio output status, level and type (pairs 1-8)
	Embedded Dolby E output timing status (pairs 1-8)
	Misc
RollTrack controls	Source, Address, Command, Status, Sending
RollTrack sources	Unused, Video Delay, Input Present, Input Loss, Output Freeze, Output Unfreeze, Embedded Audio (Pairs 1-8) AES Audio (Pairs 5-8)

IQDBD00/01

Technical Specification cont...

Specifications

Video Standards
750(720)/59p, 750(720)/50p,
1125(1080)/29i, 1125(1080)/25i
525(480)/29i, 625(576)/25i

Horizontal Timing	0 to 1 output line in steps of 1 pixel
Delay adjustment	Horizontal and Vertical timing
Vertical timing	0 to 1 output frame in steps of 1 line
Minimum delay	HD – 15 µs
	SD – 42 µs
Video delay	HD - 1120 pixels to 11 Frames + 820 pixels SD - 570 pixels to 11 Frames + 420 pixels
Internal audio processing	32 channels @ 24-bit
Embedded audio handling	HD - 24-bit synchronous 48 kHz to SMPTE 299M
	SD - 20-bit synchronous 48 kHz to SMPTE 272M-A
Audio resolution	Inputs: 32 kHz/ 44.1 kHz/48 kHz synchronous or asynchronous to video stream. Outputs: 48kHz synchronous to the video stream. Up to 24-bit, (20 MSBs embedded in SD-SDI stream)
Audio delay	Minimum: 0.75 ms for data signals and embedded input pairs; 3 ms for AES pairs Maximum 2.5 s

Power Consumption

Module power consumption	18.5 W Max (A frames)
	17 PR (B Frames)

IQDBE00-03

HD/SD-SDI 16 Channel AES/EBU Re-embedder with Dolby E/D Encoder

The IQDBE00 provides an integrated Dolby E/D encoding and re-embedding solution for HD-SDI 1.5 Gbit/s or SD-SDI 270 Mbit/s signals. As well as providing embedding or de-embedding for up to 16 PCM audio channels, eight AES/EBU streams, it can de-embed multi-channel PCM audio and encode as Dolby E/D data to output as AES or re-embed into the video stream. Additional Dolby features include automatic Dolby E alignment with the video signal, and metadata input from RS485 to steer the encoder. Other audio processing features include PCM tracking audio delay, gain, phase invert, mixing, channel level routing and Dolby E pair routing. Video features include proc. amp controls and up to 12 frames of delay.

Features

- Encode multi-channel audio to Dolby E/D compressed audio and either output to AES or re-embed into the HD/SD-SDI stream
- Associated Dolby metadata can be accommodated via RS485 input
- Embed unbalanced or balanced AES audio onto HD/SD-SDI video streams with channel-level control
- De-embed existing audio channels and output them to unbalanced or balanced AES
- Standards supported:
  – HD-SDI to SMPTE292M/274M/296M
  – SD-SDI to SMPTE259M-C
- Channel-level control allows up to 16 individual embedded audio channels to be swapped-over or swapped out
- 4 off 4 channel assignable audio mixers
- Audio proc. amp and delay
- Audio delay channels include selectable fixed delay and tracking delays selectable for any pair
- Tracking audio delay which seamlessly tracks the video delay or external RollTrack inputs
- Dolby E support – pair routing and automatic re-alignment and synchronization to the video frame boundary
- Any group of embedded audio may be passed unchanged if not selected for processing
- Video delay feature, up to 12 frames
- Video controls including video gain and offset
- 16 x user memories
- Independent horizontal and vertical ancillary data blanking
- Input SDI, CRC, EDH and ANC data checking and reporting
- In-built test pattern generator
- Input loss detection – input pass through or black/pattern/freeze
- Naming of audio output channels for easy identification

Why should you choose this module?

- Powerful audio processing module to encode multi-channel audio into Dolby E/D for distribution throughout the broadcast facility or final transmission
- Metadata input allows the encoder to repurpose any previously coded audio signals correctly
- Adjustable video delay to match Dolby E/D encoder delay
- Advanced Dolby E alignment functions enable accurate timing to be maintained throughout the signal path
- Suitable for synchronous or asynchronous embedding and de-embedding applications using AES audio
- Suitable for multi-lingual audio applications thanks to channel-level control and up to sixteen channel operation

Order codes
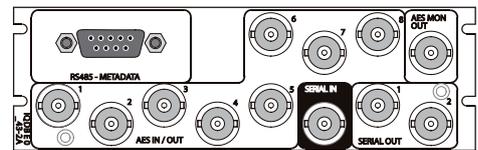
IQDBE0043-2A
HD/SD-SDI 16 Channel de-embedder with Dolby E encoder. 2 HD/SD-SDI outputs, 8 AES/EBU unbalanced configurable input/outputs, 1 AES/EBU unbalanced monitor output, Dolby E Metadata input.

IQDBE0243-2A
HD/SD-SDI 16 Channel de-embedder with Dolby D encoder. 2 HD/SD-SDI outputs, 8 AES/EBU unbalanced configurable input/outputs, 1 AES/EBU unbalanced monitor output, Dolby E Metadata input.

IQDBE0144-2A
HD/SD-SDI 16 Channel de-embedder with Dolby E encoder. 2 HD/SD-SDI outputs, 8 AES/EBU balanced configurable input/outputs, 1 AES/EBU unbalanced monitor output, Dolby E Metadata input.

IQDBE0344-2A
HD/SD-SDI 16 Channel de-embedder with Dolby D encoder. 2 HD/SD-SDI outputs, 8 AES/EBU balanced configurable input/outputs, 1 AES/EBU unbalanced monitor output, Dolby E Metadata input.

For more details on enclosure types please refer to Frames and Hardware Section.

IQDBE00-03

HD/SD-SDI 16 Channel AES/EBU Re-embedder with Dolby E/D Encoder
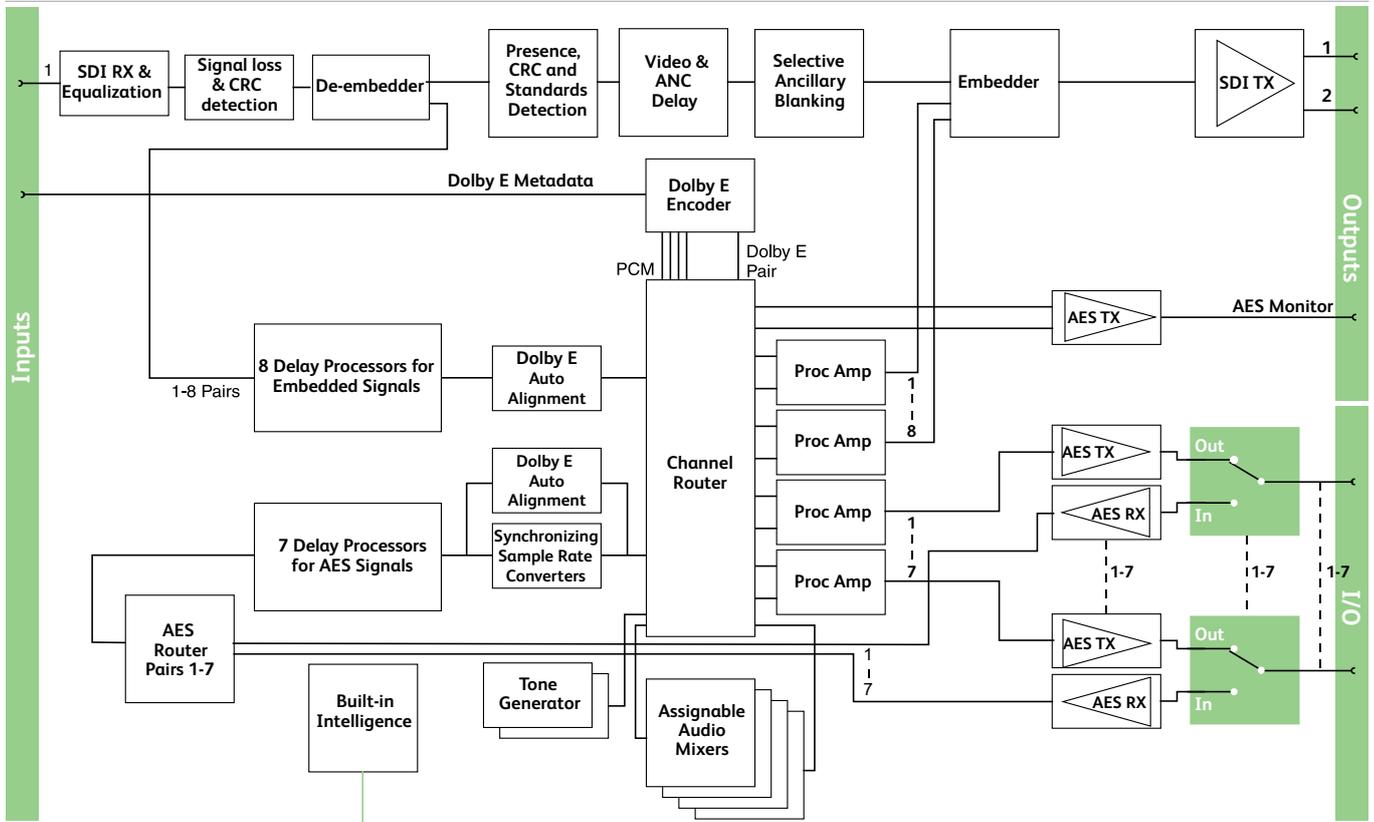
Block Diagram for IQDBE0043-2A

Technical Specification

Inputs & Outputs

Video Signal Inputs

Digital Video	1 x Serial Digital Input
Electrical	1.5 Gbit/s HD-SDI, SMPTE 292M, SMPTE 299M 270 Mbit/s SDI, SMPTE 259M-C
Connector / Format	BNC/ 75 ohm panel jack on standard S&W connector panel
Input Cable Length	Up to 140 m Belden 1694A @ 1.5 Gbit/s Up to 350 m Belden 1694A @ 270 Mbit/s
Return loss	> -15 dB

Video Signal Outputs

Digital Video	2 x Serial Digital Outputs
Electrical	1.5 Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C
Connector / Format	BNC/ 75 ohm panel jack on standard S&W connector panel

Audio Signal Inputs/Outputs

Unbalanced AES/EBU
AES Audio I/O (software selectable)

	4 Unbalanced
AES Audio Outputs	4 Unbalanced

AES Audio Monitor

Output	1 Unbalanced
Connector / Format	BNC/ 75 ohm panel jack

Balanced AES/EBU
AES Audio I/O (software selectable)

	4 Balanced
AES Audio Outputs	4 Balanced
Connector / Format	25 Way D-Type / 110 ohm panel mounted

AES Audio Monitor

Output	1 Unbalanced
Connector / Format	BNC/ 75 ohm panel jack

RS422 Metadata

Connector	9 Way D-Type panel mounted

Controls

Indicators

Power	OK (Green)
CPU	OK (Green flashing)
FPGA	OK (Orange flashing)
Status	OK (Green)
	Warning (Orange)
	Error (Red)
Lock	OK (Green)
SDI Error	Error (Red)

RollCall Features
Audio Controls

Embedded Audio Types	PCM (to AES3)/ Data (SMPTE 337M inc. Dolby E)/ Mixed (Passes any channel status information present)
Channel routing	Output channels routed from Dolby E encoder, AES inputs 1 to 7, SDI 16 embedded channels from any group, test tone and silence
Embedder Priority	Normal distribution/Audio Prioritized
Embedded Group	Pass/Blank/Embed

IQDBE00-03

HD/SD-SDI 16 Channel AES/EBU Re-embedder with Dolby E/D Encoder

Technical Specification cont...

Channel Status handling and checking
Dolby E Auto Line selection
Define Dolby embed line for each video standard
Dolby Encoder routing
    channels routed from AES inputs 1 to 7, SDI 16 embedded channels from any group

Output side control proc. - gain and polarity
    Independent Gain, Mute, & Polarity control over embedded output channels. +12 dB to 66 dB in 0.1 dB steps

Channel 1 Delay sources

Coarse Manual delay 1 & 2
    Up to +2 s in 0.25 ms steps, common to any selected pairs.

Fine Manual delay 1 & 2   Up to ±0.25 ms in 5 µs steps, common to any selected pairs.

Dolby delay (alignment) Auto/Manual

Variable audio delay control source
    Up to 0.5 s from RollTrack + Video Delay

Channel 2 Delay sources

Coarse Manual delay 1 & 2
    Up to +2 s in 0.25 ms steps, common to any selected pairs.

Fine Manual delay 1 & 2   Up to +0.25 ms in 5 □s steps, common to any selected pairs.

Dolby E delay (alignment) Auto/Manual

Variable audio delay control source
    Up to 0.5 s from RollTrack + Video Delay

Tone Setup:

Frequency	1 kHz, 2 kHz, 4 kHz, mute @ –20 dBFS or –18 dBFS

Video Controls

Output Standard	Select, Follow Input
Standards List	Select video standards for automatic follow
Black Level	±200 mV in steps of 1 mV
Master Video Gain	±6 dB in steps of 0.1 dB.
Y Gain	±6 dB in steps of 0.1 dB.
Cb/Cr Gain	±6 dB in steps of 0.1 dB.
Pattern Select	Black, 100% Color Bars, 75% Color Bars, SMPTE Bars, Tartan Bars, Pluge Ramp, H Sweep, Pulse & Bar, Burst
Blank Ancillary Data	Blank All, Blank HANC, Pass All, Pass when Output Standard equals Input Standard
VBI Line Blank	Individual lines for each video standard
Manual Freeze	On/Off
Freeze	Field/Frame
Video Channel Control	Y On/Off, C On/Off
Default Video Output	Pattern / freeze/ black / run through

Metadata Controls

Metadata Source	Internal/External
Reversion Mode	Last used (Valid)/Internal

Metadata Program

Select	1-8
Dialog Norm	-31 dB to -1 dB
User Presets	Definable 1-4
Program Configuration	Selectable standard presets
Stereo Downmix mode	LtRt, LoRo
Extended Metadata settings	BSI1 & BSI2
Program Description	User definable 2 x 19 Character

Other Controls

User Memories	16 x Save / Recall / Rename
Input/Output Names	User configurable naming of the input and output AES/EBU, embedded audio and mixer channels

RollCall Features

Logging	Video Status
	Embedded Audio Status
	O/P Audio Status
	O/P Audio Level Status
	O/P Dolby E Status
	AES Input Status
	AES Output Status
	Embedded audio output status, level & type (pairs 1-8)
	Embedded Dolby E output timing status (pairs 1-8)
	Dolby Encoder Status
	Misc
RollTrack Controls	Source, Address, Command, Status, Sending.
RollTrack Sources	Unused, Video Delay,
	Input Present, Input Loss, Output Freeze, Output Unfreeze, Embedded Audio (Pairs 1-8)
	AES Audio (Pairs 1-7)

Specifications

Video Standards

750(720)/59p, 750(720)/50p,
1125(1080)/29i, 1125(1080)/25i
525(480)/29i, 625(576)/25i

Horizontal Timing	0 to 1 output line in steps of 1 pixel.
Delay Adjustment	Horizontal and Vertical timing
Vertical Timing	0 to 1 output frame in steps of 1 line.
Minimum Delay	HD – 15 µs
	SD – 42 µs
Video Delay	HD - 1120 pixels to 11 Frames + 820 pixels
	SD - 570 pixels to 11 Frames + 420 pixels
Internal audio processing	
	32 channels @ 24-bit
Embedded audio handling	HD - 24-bit synchronous 48 kHz to SMPTE 299M
	SD - 20-bit synchronous 48 kHz to SMPTE 272M-A
Audio Resolution	Inputs: 32 kHz/ 44.1 kHz/48 kHz synchronous or asynchronous to video stream. Outputs: 48kHz synchronous to the video stream. Up to 24 bit, (20 MSBs embedded in SD-SDI stream).
Audio Delay	Minimum: 0.75 ms for data signals and embedded input pairs; 3 ms for AES pairs Maximum 2.5 s

Power Consumption

Module Power Consumption	18.5 W Max(A Frames)
	17 PR (B Frames)

IQEAS00

3G/HD/SD-SDI Embedded Audio Shuffler and Processor

The IQEAS00 provides embedded audio channel shuffling or HD-SDI at 3Gbit/s or 1.5 Gbit/s, or SD-SDI 270 Mbit/s with 16-channel embedded audio processing. Including 2 SDI inputs with input format detection the IQEAS00 also has a video proc. amp providing complete control over the video levels, and audio processing features including Dolby E auto-alignment, audio delay, gain, and invert.

Features

- 3G/HD/SD-SDI multi-format working with processing for 16 channels of embedded audio present on the incoming SDI stream
- Standards supported:
  - 3G-SDI to SMPTE 424M/425M level A & B compatible
  - HD-SDI to SMPTE292M/274M/296M
  - SD-SDI to SMPTE259M-C
- Audio proc-amp features including channel level (Sub-frame) routing, adjustable delay, independent gain, invert and mute control
- Any group of embedded audio may be passed unchanged, processed or blanked
- Embedded Dolby E support – pair routing, delay and Dolby E header alignment
- Able to pass all ancillary data with independent HANC and VANC blanking control
- Input loss detection – default output of black/pattern/freeze
- Can be used as a video delay, up to 9 frames
- Video proc. amp controls including video gain, offset and hue
- In-built test pattern generator and audio tone generator
- 16 x user memories, save/recall/rename
- RollCall control and monitoring compatible

Why should you choose this module?

- Cost effective module for shuffling incoming audio feeds to align with in-house channel mapping and provide everyday processing functions
- Full RollCall and SNMP compatibility allows easy integration with SAM, or third party, network management systems providing an all-inclusive monitoring and control solution

Order codes
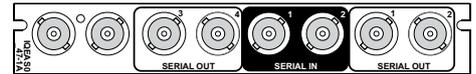
IQEAS0047-1A3, IQEAS0047-1B3
3G/HD/SD-SDI Embedded Audio shuffler and Processor. 2 inputs, 4 outputs

For more details on enclosure types please refer to Frames and Hardware section.
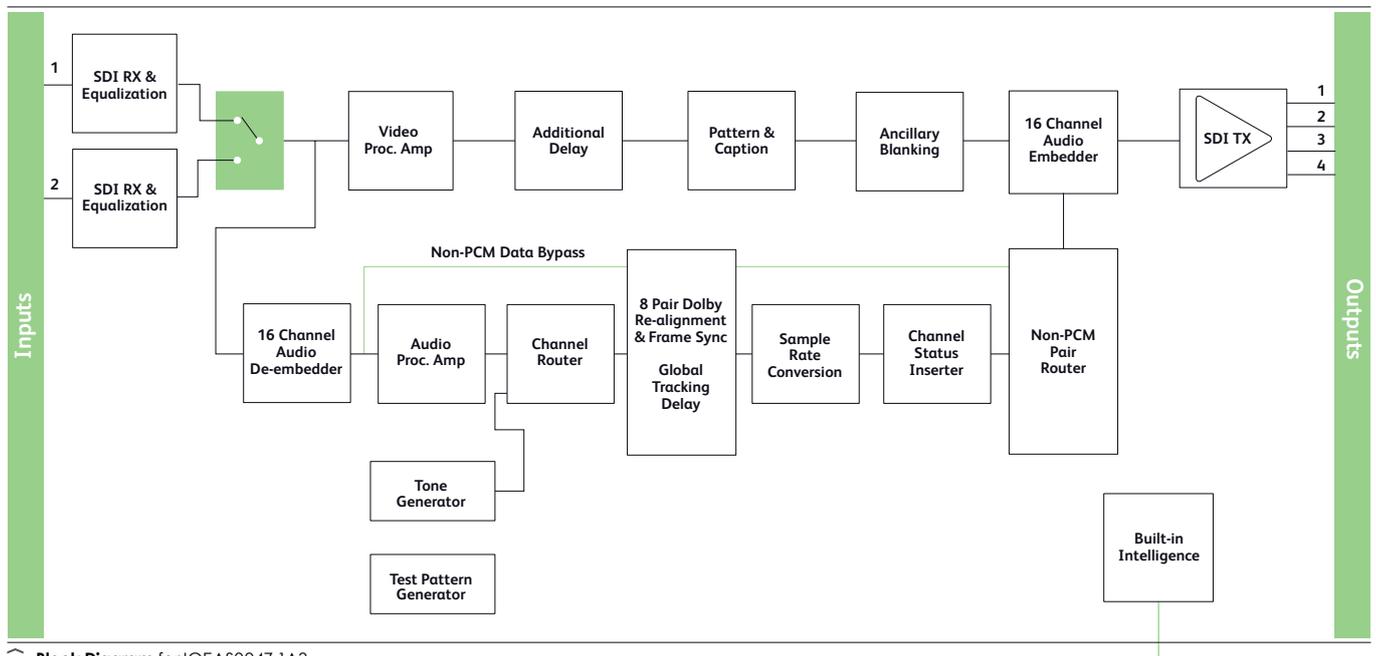
⌒ **Block Diagram** for IQEAS0047-1A3

IQEAS00

3G/HD/SD-SDI Embedded Audio Shuffler and Processor

Technical Specification

Inputs & Outputs

Signal Inputs

SDI Inputs	2x
Input 1 Cable Length	Up to 70m Belden 1694A @ 3 Gbit/s
	Up to 160m Belden 1694A @ 1.5 Gbit/s
	>350m Belden 1694A @ 270 Mbit/s
Input 2 Cable Length	Up to 60m Belden 1694A @ 3 Gbit/s
	Up to 100m Belden 1694A @ 1.5 Gbit/s
	Up to 100m Belden 1694A @ 270 Mbit/s

Signal Outputs

SDI Outputs	x 4

Controls

Indicators

Power	OK (Green)
CPU running	OK (Green flashing)
FPGA running	OK (Green flashing)
Status	OK (Green)
	Warning (Yellow)
	Error (Red)
Input 1	OK (Green)
Input 2	OK (Green)

Controls

Video Delay	
Video H-Delay	0 – 1 Line in pixel clock steps
Video V-Delay	0 – 1 Frame in 1 line steps
Video Delay Frames	0 - 9 F

Video Controls

Input Standard	1125(1080)/50P (A & B),
	1125(1080)/59P (A & B),
	1125(1080)/29i, 1125(1080)/25i,
	750(720)/59P, 750(720)/50P,
	525(480)/29i,625(576)/25i
Default Video Output Type	Pattern, Freeze, Black
Default Video Output Standard	Last Known Good,
	1125(1080)/50P (A & B),
	1125(1080)/59P (A & B),
	1125(1080)/29i, 1125(1080)/25i,
	750(720)/59P, 750(720)/50P,
	525(480)/29i, 625(576)/25i
Video Select	Input 1, Input 2
Audio Select	Video Input 1, Video Input 2, Follow Video
Manual Freeze	On/Off
Freeze	Field/Frame
VANC Data	Blank VANC
SD VANC Data	Line blanking (23/336 in 625,
	21,22, 283, 284 in 525)
HANC Data	Blank HANC (Removes all HANC data. Note audio removed when embedders disabled)
ProcAmp Enable	On/Off
Black Level	±100 mV in steps of 0.8 mV
Hue Adjust	±180° in steps of 1°
Master Video Gain	±6 dB in steps of 0.1 dB
Y-Gain	±6 dB in steps of 0.1 dB
Cb/Cr Gain	±6 dB in steps of 0.1 dB
Y/C Timing	±8 pixels in 2 pixel steps (SD)
	±16 pixels in 2 pixel steps (HD/3G)
Picture Position	±8 pixels in 2 pixel steps (SD)
	±16 pixels in 2 pixel steps (HD/3G)
Pattern On	On/Off
Pattern Select	75% Color Bars, Black
Caption On	On/Off
Edit Caption	19 characters available

Audio Controls

Embedder Assignment

Group 1 to 4 Enable	On/Off
Pair 1 to 8 Source L / Non-PCM	De-embed 1-16, Tone, Silence
Pair 1 to 8 Source R	De-Embed 1-16, Tone, Silence
Pair 1 to 8 Stereo	Link channel pairs
Pair 1 to 8 Polarity L/R	On/Off
Pair 1 to 8 Gain L/R	+12 dB to -72 dB in 0.1 dB steps
Pair 1 to 8 Non-PCM	On/Off

Processed Audio Delay Control

Course Manual Delay	Up to 1.75s in 5ms steps
Fine Manual Delay	+/- 0.25s in 0.5ms steps
Variable Audio Delay	
Control Source	Internal, Manual

Dolby-E

Dolby-E Auto Alignment	On/Off

Tone

Frequency L/R	100Hz to 10kHz in 100Hz steps
Channel Ident	On/Off
HANC Data	Blank HANC (Removes all HANC data. Note audio removed when embedders disabled)

Audio Monitoring

Silence Detect	0 to -80dB in steps of 1dB
Signal Overload Detect	0 to -80dB in steps of 1dB
Warning Timer	1 to 20 seconds in steps of 1 second

Other Controls

User Memories	16 x Save, Recall, Rename
Memory Naming	User configurable naming of memories 1 – 16
RollTrack Sources	Unused, Video Delay (1&2), Audio Delay (1&2) , Input Present (1&2) , Input Loss (1&2) , Input Select (1&2), Output Rate/Std, Output Freeze, Output Unfreeze, Output Pattern On, Output Pattern Off, Output Black On, Output Black Off, Output Caption On, Output Caption Off, Inp1 Embedded Audio (Pairs 1-8) PCM, Inp1 Embedded Audio (Pairs 1-8) Non-PCM, Inp1 Embedded Audio (Pairs 1-8) Loss, Inp1 Embedded Audio (Pairs 1-8) V Bit, Inp2 Embedded Audio (Pairs 1-8) PCM, Inp2 Embedded Audio (Pairs 1-8) Non-PCM, Inp2 Embedded Audio (Pairs 1-8) Loss, Inp2 Embedded Audio (Pairs 1-8) V Bit.
Information Window	Video Input Status, Audio Input Status
Factory Default	Resets all module settings to factory specified default values and clears memories
Default Settings	Resets all module settings to factory specified defaults but does not clear memories
Restart	Software restart of the module

IQEAS00 3G/HD/SD-SDI Embedded Audio Shuffler and Processor

Technical Specification cont…

Module Information	Reports following module information: Software version, Serial number, Build number, KOS version, Firmware version, PCB version

Specifications

Electrical	3Gbit/s SDI, SMPTE 424M 1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C / DVB-ASI
Connector / Format	BNC/ 75ohm panel jack on standard IQ connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s) >-10dB (3Gbit/s)
Output Jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz) 3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)
Video Standards	1125(1080)/50p (A & B), 1125(1080)/59p (A & B) 750(720)/50p, 750(720)/59p, 1125(1080)/25i, 1125(1080)/29i 625(576)/25i, 525(480)/29i
Typical delay (Input lock)	SD: 70us HD: 38us 3G-A: 19us 3G-B: 40us
Embedded audio handling	HD - 24-bit synchronous 48 kHz to SMPTE 299M SD - 20-bit synchronous 48 kHz to SMPTE 272M-A
Embedded Audio Delay	Minimum (PCM) 2 ms Maximum (non-PCM) SD: 67us HD: 28us 3G-A: 15us 3G-B: 25us

Power Consumption

Module Power Consumption	8.5W Max (A Frames) 8.5 PR (B Frames)

IQDLY20/21

AES and Analog Audio Delay and Shuffler Module

The IQDLY20/21 provides two channels of analog audio and four channels of AES audio with up to 3 seconds of preset delay, and 0.5 seconds of tracking audio delay. The availability of both analog and AES inputs and outputs also enables it to be used as a two-channel audio ADC and DAC.

Features

- 4 x balanced or unbalanced AES paths
- Synchronizes AES inputs
- Proc. amp control of audio channels
- Flexible preset and tracking delay
- Channel-level shuffling
- 4 off assignable 4 input mixers
- References to video or AES signals
- Professional standard 48kHz operation, sample rate converts non-48kHz signals
- Firewall for processed PCM audio to provide a continuous output regardless of input
- Passes non-PCM AES signals including Dolby E
- Pair-level Dolby E routing

Why should you choose this module?

- A complete AES solution in one module for all common 48kHz audio signal tasks
- Firewall function makes this an ideal first unit in a signal chain
- Channel-level manipulation and mixing allows detailed control of audio material
- Tracking capability allows the audio to follow a video synchronizer

Order codes
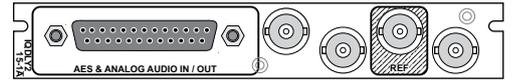
IQDLY2115–1A
AES and Analog Audio Delay. Balanced Audio connection via 25 way D type. 2 Analog inputs, 2 AES inputs, 2 Analog outputs, 2 AES outputs.
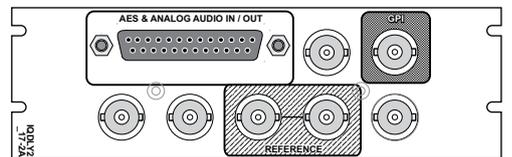
IQDLY2117–2A
AES and Analog Audio Delay. Balanced Audio connection via 25 way D type. 2 Analog inputs,
2 AES inputs, 2 Analog outputs, 2 AES outputs and 1 x GPI.
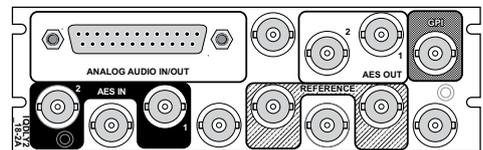
IQDLY2018–2A
AES and Analog Audio Delay. Balanced Audio connection via 25 way D type, Unbalanced AES connection via BNC. 2 Analog inputs, 2 AES inputs, 2 Analog outputs, 2 AES outputs and 1 x GPI.

For more details on enclosure types please refer to Frames and Hardware section.

IQDLY20/21

AES and Analog Audio Delay and Shuffler Module
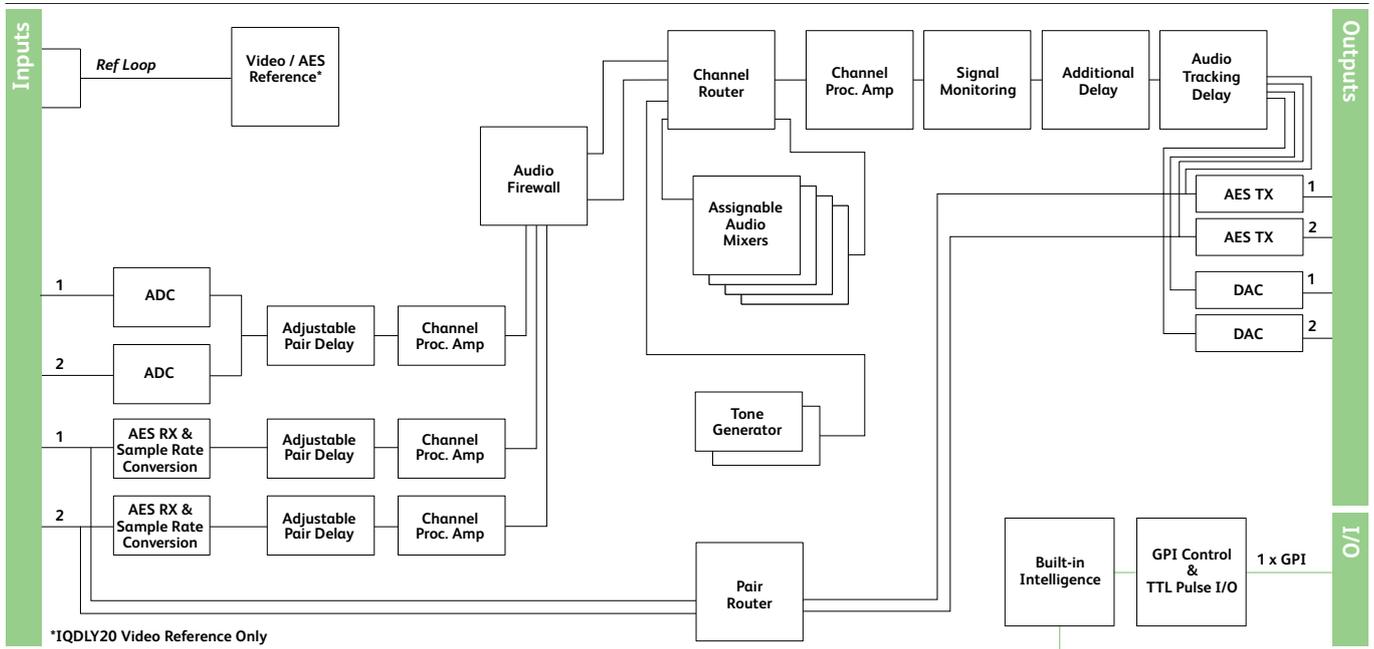
Block Diagram for IQDLY2117–2A

*IQDLY20 Video Reference Only

Network Intelligence, Control & Monitoring

Technical Specification

Inputs and Outputs

Signal Inputs

Unbalanced digital audio	2 x AES/EBU, AC3, Dolby E (BNC)
Balanced digital audio	2 x AES/EBU, AC3, Dolby E (25 Way D-Type)
Analog	2 Channels (1 Stereo Pair)
Reference	IQDLY21: Composite video / AES/EBU (BNC)
	IQDLY20: Composite video (BNC)

Signal Outputs

Unbalanced digital audio	2 x AES/EBU, AC3, Dolby E (BNC)
Balanced digital audio	2 x AES/EBU, AC3, Dolby E (25 Way D-Type)
Analog	2 Channels (1 Stereo Pair)

Control Interface

GPI	1 x Closing contact I/O interface (BNC)

Card Edge and RollCall Controls

Card Edge Controls
NONE

Card Edge Indicators	
AES input present	1 x LED per pair Reference Present
CPU running / power	One green LED, flashing = OK

RollCall Functions

Audio Controls

Set line up level	+20 to –20 dBu in 1 dB steps
Set headroom	4 to 24 dB in 1 dB steps
Set audio detector thresholds	High and low levels, time delay
Input audio delay	Up to 1.5s additional delay in 1 ms steps
Input side control proc. - audio gain and polarity	Independent Gain, Mute, Polarity control input channels. +18 dB to –18 dB in 0.1 dB steps
Channel routing	Output channels routed from Analog inputs 1-2, AES pairs 1 to 4, test tone and silence
Output side control proc. - gain and polarity	Independent Gain, Mute, and Polarity control over output channels. +18 dB to –18 dB in 0.1 dB steps
Global delay offset	Up to +1.5s in 1 ms steps, common to all processed audio
Variable audio delay control source	Up to 0.5s from RollTrack + GPI
Tone frequency, amplitude and ident	2 channel tone generator. 100 Hz to 15 kHz in 100 Hz steps

IQDLY20/21   AES and Analog Audio Delay and Shuffler Module

Technical Specification

Tone Setup

Frequency	100 Hz to 15 kHz in 100 Hz steps
Channel ident	0.5s interruption every 2s

Other Controls

User memories	Name, clear, save and read 8 user memories
Default audio output	Silence
GPI/O set-up	May be attached to any memory function/ polarity

Reporting (* also Logged)

Audio silence, high level, low level, overflow	For processed audio channels only

Audio Delay Setup

Delay	Audio delay - Fixed, RollTrack + fixed, GPI + Fixed

RollTrack Output

Delay	Current audio delay
Reference state	Present, Error, Loss
External audio state	Pair present
AES 1-2	Loss, Present
GPI	Low, High, Inactive

Specifications

Noise floor	Better than -100 dBFs (20 Hz to 20 kHz)
Channel amplitude matching	Better than ±0.15 dBu
Output level accuracy	Better than ±0.2 dBu
Flatness	Better than +0.1 dBu to -0.3 dBu (20 Hz to 20 kHz with reference to 1 kHz)

Digital Audio Input (Balanced)

Connector / format	25 W D
Sample frequency	25 – 96 kHz (48 kHz for Reference)
Input cable length	>150 m of AES3 cable
Impedance	110 Ohms

Digital Audio Input (Unbalanced)

Connector / format	BNC
Sample frequency	25 – 96 kHz (48 kHz for Reference)
Input cable length	>500 m of RG59 cable
Impedance	75 Ohms
Output sampling	48 kHz frame locked to 48 kHz AES/EBU Reference in AES lock mode

Digital Audio Output (Balanced)

Connector / format	25 W D
Level	3 V p-p typical into 110 Ohms

Digital Audio Output (Unbalanced)

Connector / format	BNC

Analog to Digital Audio

Analog input impedance	10 k Ohms
Frequency response	20 Hz to 20 kHz (+/- 0.1 dB)
Distortion (THD+N)	Better than -90 dB, 1kHz@ - 1 dBFS
Dynamic range	>106 dB
Audio delay	Equal to video delay + adjustable offset

Digital to Analog Audio

Analog output impedance	50 Ohms
Frequency response	20 Hz to 20 kHz (+/- 0.1 dB)
Distortion (THD+N)	Better than -92 dB at 23 dBu, 1kHz@ -1 dBFS
Dynamic range	>106 dB

Power Consumption

Module power consumption	9 W Max (A Frames) 8 PR (B Frames)

Analog/Digital Conversion

IQ Modular offers a comprehensive range of both video and audio conversion modules to provide the optimum balance of price to performance for all system requirements. Analog formats include both SD and HD component, and composite PAL, NTSC and YC.

For Related Modules see:
IQUDC34 in SD-HD Conversion
IQDLY20/21 in Audio Processing
IQDNC01 in SD-HD Conversion
IQDNC34 in SD-HD Conversion
IQUPC01 in SD-HD Conversion

IQDEC02

Golden Gate Decoder, Synchronizer, Audio Embedder with Noise Reduction and Auxiliary SDI Input – 12 bit

The IQDEC02 provides a complete analog front-end with 12-bit composite decoding, synchronization and analog audio ingest in one compact module. Powerful advanced 3-D decoding algorithms employing updated patented Golden Gate technology extract more original information from the analog picture source than other decoders. This makes the IQDEC02 an ideal choice for the transition from analog to digital or, when paired with an upconverter, from analog to HD. The IQDEC02 handles most composite analog signal formats including PAL, NTSC and SECAM. The full frame synchronizer with horizontal and vertical phasing controls allows the output to be timed to your house or studio reference. In addition to its excellent video performance, the IQDEC02 can digitize up to 4 channels of analog audio for both embedding into the SDI stream and outputting as two AES streams. What is more, an auxiliary SDI input is included so that the IQDEC02 can be easily integrated into mixed analog/digital environments. Proc. amp controls and a powerful built-in noise reducer complete the specification. Noise reduction is targeted at preserving the original content while eliminating the objectionable artifacts of analog working, and the algorithms are tuned to ensure optimum quality and lowest bit-rates if the signal is subsequently compressed.

Features

- 12-bit multi-standard decoder with frame synchronizer and analog audio embedder
- Adaptive Golden Gate spatio-temporal frame comb decoding
- Input standards – PAL*, NTSC*, NTSC-J, N4.43, PAL60, PALN*, PALM* or SECAM*
- *Auto detection of input standards
- Minimal delay through the unit - <7 lines (lock to input, decoder and noise reducer in minimum delay mode)
- Firewall for video and processed PCM audio to provide a continuous valid output
- Motion adaptive recursive noise reducer with automatic noise floor measurement
- Horizontal and vertical enhancer
- VHS mode: Rugged sync and clock recovery ensures reliable operation for VHS playback and other noisy or unstable inputs
- Y/C input (Not 15-1A), composite and SDI inputs available
- SECAM adaptive notch and chroma median filters
- Selectable default output on loss of input - Frame freeze, pattern or input pass
- Selectable VBI pass through (pass flat or blank for each VITS line)
- Adjustment of video gain, black level, chroma gain, NTSC hue, horizontal Y/C timing and picture position
- A total of 4 channels of embedded audio can be processed, 2 pairs selectable from any of the four groups
- 4 x assignable 8 channel audio mixers
- Flexible audio delay features including tracking delay to keep audio and video in perfect sync
- Full audio proc. amp including - gain, mute, polarity invert, and channel routing

Why should you choose this module?

- A complete analog ingest solution for both video and audio in a compact module making system integration easy
- Proc. amp and noise reduction provides complete signal conditioning solution in one package for connecting operational areas
- Analog and SDI inputs allow mixed working or a future-proof upgrade without changing modules
- 12-bit Golden Gate decoding technology and powerful compression-friendly noise reduction means maximum picture quality and minimum MPEG bit usage

Order codes
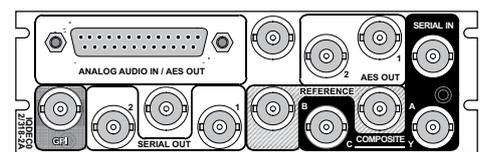
IQDEC0218–2A
12 bit golden gate decoder with synchronizer, analog audio embedder and noise reduction. 2 composite, 1 Y/C and 1 SDI inputs, 2 SDI outputs, 4 analog audio inputs, 2 AES outputs (balanced, on 25D, and unbalanced on 25D and BNC).
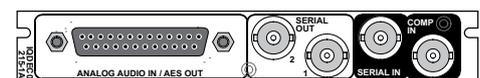
IQDEC0215–2A
12 bit golden gate decoder, analog audio embedder with noise reduction. Single composite and SDI inputs, 2 SDI outputs, 4 analog audio inputs, 2 AES outputs (balanced and unbalanced on 25D).

For more details on enclosure types please refer to Frames and Hardware Section.

IQDEC02

Golden Gate Decoder, Synchronizer, Audio Embedder with Noise Reduction and Auxiliary SDI Input – 12 bit
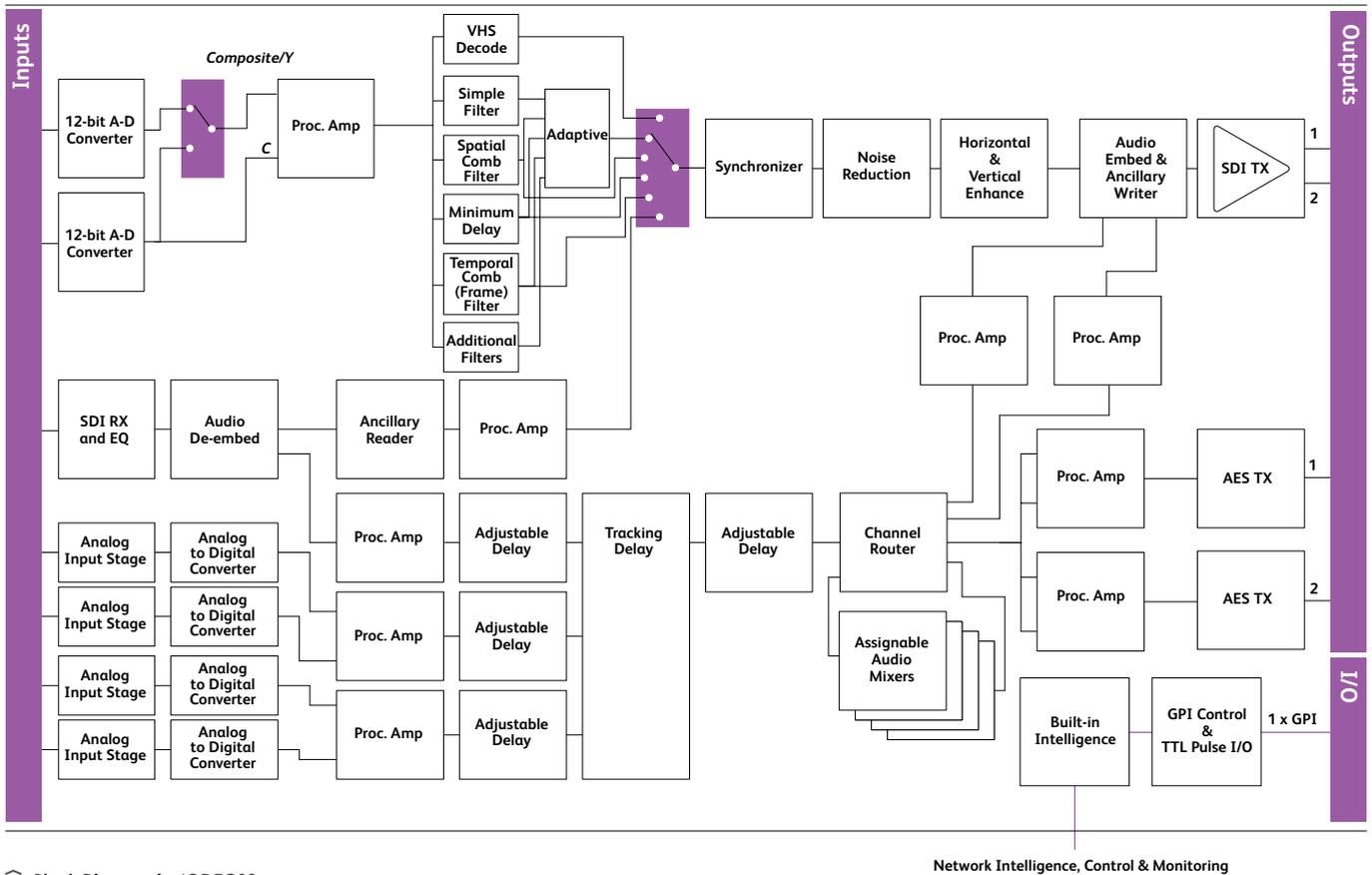
Block Diagram for IQDEC02

Technical Specification

Inputs and Outputs

Signal Inputs
Composite video	2 via BNC connectors, isolated
Y-C	1 via BNC connectors
Serial digital	1 via BNC connectors
Analog audio	4 Channels (2 Stereo Pairs) via 25D connector
Standards	PAL/NTSC/NTSC-J/PAL-M/PAL-N/SECAM/N4.43
Reference	1 analog loop through via BNC connectors

Signal Outputs
Serial digital	2 x SDI via BNC connectors
AES audio	2 pairs (4 channels) balanced and unbalanced via 25D and unbalanced via BNC connectors (note; compatible with PCM embedded audio sources only)
Standards	SMPTE 259M-C-1997, SMPTE 272M-A-1994, AES3-1992

Card Edge and RollCall Controls

Control Interface
GPI/O	Closing contact input/output via BNC connector

Card Edge Indicators
CPU running/power	Flashing = OK
Analog video present	Lost = Off, Good = On (Green)
SDI present	Lost = Off, Good = On (Green)
Analog video error	Good = Off, Error = On (Yellow)
SDI error	Good = Off, Error = On (Yellow)
Reference present	Lost = Off, Good = On (Green)
Reference error	Good = Off, Error = On (Yellow)

Functions Available via RollCall Only

Audio Controls
Line up tone level	-24 dBu to +10 dBu in 0.5 dB steps
Headroom	+4 to +24 dB in 0.5 dB steps (subject to a max input level of +24 dBu)

IQDEC02

Golden Gate Decoder, Synchronizer, Audio Embedder with Noise Reduction and Auxiliary SDI Input – 12 bit

Technical Specification cont…

Set audio monitor thresholds	High and low levels, time delay
External input audio delay	Up to 1.5 s additional delay in 1ms steps
Input side control proc	Independent Gain, Mute, Polarity and Mono control over deembedded and analog input channels
Digital input gain	±18 dB
Analog input gain	±34 dB (subject to Line up and Headroom levels)
Channel routing	Output channels routed from analog pair 1, analog pair 2, test tone, SDI and audio mixers
Channel mixing	Mixer channels routed from analog pair 1, analog pair 2, test tone and SDI
Output side control proc	Independent Gain, Mute, Polarity and Mono control over embedded and AES output channels
Digital output gain	±18 dB
Global delay offset	Up to +2.5 s in 1ms steps, common to all processed audio
Variable audio delay control source	Up to 1 s from RollTrack + GPI + video synchronizer
Audio level slew rate	Instant, fast, medium, slow
Validity bit	Clear or set
Tone frequency, amplitude and ident	2-channel tone generator
Tone frequency	100 Hz to 15 kHz in 100 Hz steps
Tone channel ident	0.5 s interruption every 2 s

Video Controls

Input select	Composite A / B, YC, SDI
Composite input standard	Auto [PAL, NTSC, PALM, PALN, SECAM] / Manual [PAL, NTSC, NTSC-J, PALM, PALN, SECAM, N4.43]
SDI input standard	Auto / Manual [525 / 625]
Freeze	Off / On
Luma gain	±6 dB
Chroma gain	±6 dB
Black level	±120 mV
NTSC hue	±45°
Y/C timing	+592 ns in 148 ns steps
Picture position	±592 ns in 148 ns steps
Blanking	Left, right, top, bottom, color
Noise reducer mode and noise measurement	Auto / Manual noise measurement Normal / Minimum delay
Noise threshold	Auto Bias [±7] / Manual [0 to 15]
Noise reducer strength	Luma [0 to 31], Chroma [0 to 31]
H enhance	Off / [On – low, medium, high]
H enhance frequency	2.25 MHz or 3.375 MHz
V enhance	Off / [On – low, medium, high]
Decoder mode	Simple, Studio, VHS/Unstable
SECAM notch	Adaptive/Controllable
SECAM luma bandwidth	Wide/Medium/Narrow
SECAM bottles	Auto/On/Off
Color killer	Chroma ON / Chroma OFF / Auto [QAM standards: Chroma off = chroma mute + Y notch SECAM: Chroma off = chroma mute only]
Genlock H phase	± ½ line in 1 pixel steps
Genlock V phase	±262/312 lines in 1 line steps
Genlock mode	Free-run / Lock to reference / Lock to input (minimum delay)
H delay	1 line in 1 pixel steps
V delay	524/624 lines in 1 line steps

Additional video delay	0, 1 or 2 frames of delay
NTSC lines 11 to 20 and 274 to 282	Blank, pass as VBI, decode VBI
NTSC line 22, 283 and 285	Blank, pass as data, pass as picture
NTSC line 21 and 284	Blank, pass as data, pass as picture, pass as closed captions
PAL lines 7 to 22 & 320 to 335	Blank, pass as VBI, decode VBI
PAL line 23	Blank, pass as WSS, pass as picture
Horizontal ancillary blank	Off / On

Other Controls

Pattern enable	Off / On
Pattern select	Black / EBU Color Bars / 100% Color Bars / Ramp / Multi-Burst / Pulse and Bar / Animated Bar
Caption enable	Off / On
Caption generator	Programmable up to 19 characters
GPI action	Memories 1 to 8 / Pattern / Freeze / Audio delay
GPI polarity	High / Low
GPO action	Input loss / Standard / Video delay
GPO polarity	High / Low
User memories	Name, clear, save and recall 8 user memories
Default video output	Pass Video / Freeze / Pattern / Pattern and Caption
Default audio output	Silence
Preset unit	Returns all settings to default

Reporting * also Logged

Input status	*Input present, *Input line standard, *Composite color standard
Input error	One or more inputs have unselected line standard
Reference status	*Ref present, *Ref standard
Reference error	Standard different to selected input
EDH	*Presence / *Error-Minute / *Error– Hour
Input ancillary error	Bad checksums, invalid formatting of HANC
Embedded audio status	*Input audio pair present, *Input audio pair non-PCM
Audio bus monitor	*Silence, *High Level, *Low Level, *Overflow for processed audio channels
Analog audio input monitor	*Silence, *High Level, *Low Level, *Overflow for analog audio input channels

IQDEC02

Golden Gate Decoder, Synchronizer, Audio Embedder with Noise Reduction and Auxiliary SDI Input – 12 bit

Technical Specification cont…

RollTrack Input

Delay	Audio delay – Fixed, RollTrack + Fixed, Internal Sync ± Fixed

RollTrack Output

Delay	Current video / audio delay
Input state	Present / line standard
Reference state	Present / error
Embedded audio status	Input audio pair present

Specifications
Video Specifications

Video internal processing	4:2:2 with 10 bit data paths
Frequency response (studio mode)	
Y	5.75 MHz ±0.1dB
PbPr	1.5 MHz -3dB
Frequency response (VHS mode)	
Y	5 MHz +0.2 dB, -0.5 dB
PbPr	1.5MHz -3dB typ
Composite input return loss	Better than 35 dB to 5 MHz
Composite level / impedance	1 V pk-pk typ. Into 75 Ohm
Serial input return loss	Better than 15 dB from 100 kHz to 270 MHz
Maximum serial input cable length	>200 m (PSF1/2 or equiv. cable)
Serial output level	800 mV ±5%
Output overshoot	<70 mV
Output return loss	Better than 15 dB to 270 MHz
Output jitter	<0.2 UI (with 10 Hz High pass filter selected on 601 monitor)
Reference return loss	Better than 35 dB to 5.8 MHz
Reference input level	1 Vp-p ± 3 dB
Sync level	0.3 V ± 6 dB into 10k Ohms

Delay Through the Unit

Decoder delay	<2 lines (Line Comb) <1 frame + 1 line (Frame Comb)
Synchronizer delay	16 µs (Lock to Input) 1 frame + 16 µs (Lock to Reference)
Additional processing delay	<100 µs
Noise reducer delay	<1 frame (Normal)
	<3 lines (Minimum Delay)
Total minimum delay	<7 lines
Total maximum delay	>5 frames (including optional video delay)

Audio Specifications

Input impedance	>30 K Ohms, balanced, line to line
	>15 K Ohms line to earth (600 Ohm link selectable)
Max input level	+24 dBu, balanced
Frequency response	+0.1/-0.25 dB, 20 Hz – 20 kHz wrt 1 kHz
THD+N	<-94 dB typical at –1 dBFS, 1 kHz,
	22 Hz - 20 kHz, 'A' weighted, unity gain
Sampling	24 bits @ 48 kHz,
Dynamic range	>100 dB wrt –1 dBFS, 20 Hz to 20 kHz, 'A' weighted
CMMR	>50 dB typical at 60 Hz
Cross talk	<-100 dB, 20-20 kHz, +24 dBu, channel to channel
Channel gain mismatch	<±0.2 dB
Max output level	0 dBFS
Output sampling	48 kHz

Power Consumption

Module power consumption	13 W Max (A frames)
	11 PR (B Frames)

IQDEC04

Golden Gate Decoder, Synchronizer with Noise Reduction – 12 bit

The IQDEC04 provides 12 bit composite decoding, synchronization and noise reduction in one compact module. Advanced 3-D decoding algorithms are what make the IQDEC04 so powerful for these applications. Employing updated patented Golden Gate technology they will extract more original information from the analog picture source than other decoders. This makes the IQDEC04 an ideal choice for the transition from analog to digital or, when paired with an upconverter, from analog to HD. The IQDEC04 handles most composite analog signal formats including PAL, NTSC and SECAM. The full frame synchronizer with horizontal and vertical phasing controls allows the output to be timed to your house or studio reference. Proc. amp controls and a powerful built-in noise reducer complete the specification. Noise reduction is targeted at preserving the original content while eliminating the objectionable artifacts of analog working, and the algorithms are tuned to ensure optimum quality and lowest bit rates if the signal is subsequently compressed.

Features

- 12-bit multi-standard decoder with frame synchronizer
- Adaptive Golden Gate spatio-temporal frame comb decoding
- Input standards – PAL*, NTSC*, NTSC-J, N4.43, PAL60, PALN*, PALM* or SECAM*
- *Auto detection of input standards
- Minimal delay through the unit - <7 lines (lock to input, decoder and noise reducer in minimum delay mode)
- Firewall for video to provide a continuous valid output
- Motion adaptive recursive noise reducer with automatic noise floor measurement
- Horizontal and vertical enhancer
- VHS mode: Rugged sync and clock recovery ensures reliable operation for VHS playback and other noisy or unstable inputs
- Y/C and composite inputs available
- SECAM adaptive notch and chroma median filters
- Selectable default output on loss of input - Frame freeze, pattern or input pass
- Selectable VBI pass through (pass flat or blank for each VITS line)
- Adjustment of video gain, black level, chroma gain, NTSC hue, horizontal Y/C timing and picture position

Why should you choose this module?

- 12-bit Golden Gate decoding technology means maximum picture quality and minimum MPEG bit usage

Order codes
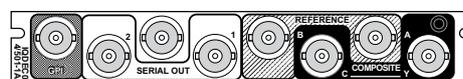
IQDEC0401–1A
12 bit Golden Gate decoder with synchronizer and noise reduction. 2 composite, 1 Y/C inputs, 2 SDI outputs.

For more details on enclosure types please refer to Frames and Hardware Section.

IQDEC04

Golden Gate Decoder, Synchronizer with Noise Reduction – 12 bit
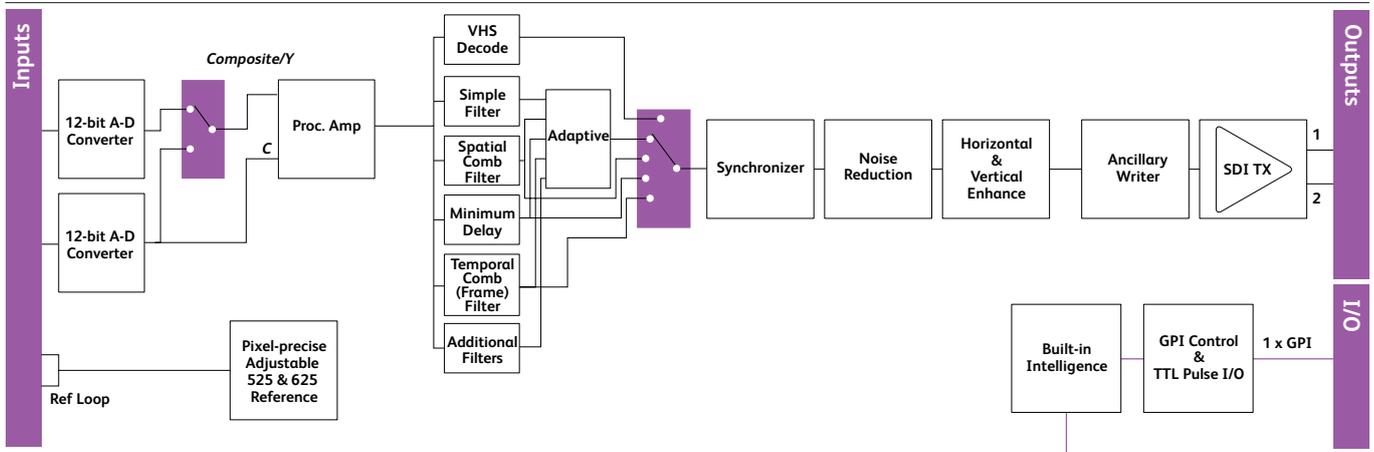
⌒ **Block Diagram** for IQDEC04

Network Intelligence, Control & Monitoring

Technical Specification

Inputs and Outputs
Signal Inputs
Composite video	2 via BNC connectors, isolated
Y-C	1 via BNC connectors
Standards	PAL/NTSC/NTSC-J/PAL-M/PAL-N/SECAM/N4.43
Reference	1 analog loop through via BNC connectors

Signal Outputs
Serial digital	2 x SDI via BNC connectors
Standards	SMPTE 259M-C-1997, SMPTE 272M-A-1994

Card Edge and RollCall Controls
Control Interface
GPI/O	Closing contact input/output via BNC connector

Card Edge Controls
NONE

Card Edge Indicators
CPU running/power	Flashing = OK
Analog video present	Lost = Off, Good = On (Green)
Analog video error	Good = Off, Error = On (Yellow)
Reference present	Lost = Off, Good = On (Green)
Reference error	Good = Off, Error = On (Yellow)

Functions Available via RollCall Only
Video Controls
Input select	Composite A / B, YC
Composite input standard	Auto [PAL, NTSC, PALM, PALN, SECAM] / Manual [PAL, NTSC, NTSC-J, PALM, PALN, SECAM, N4.43]
Freeze	Off / On
Luma gain	±6 dB
Chroma gain	±6 dB
Black level	±120 mV
NTSC hue	±45°
Y/C timing	+592 ns in 148 ns steps
Picture position	±592 ns in 148 ns steps
Blanking	Left, right, top, bottom, color
Noise reducer mode and noise measurement	Auto / Manual noise measurement, Normal / Minimum delay
Noise threshold	Auto Bias [±7] / Manual [0 to 15]

Noise reducer strength	Luma [0 to 31], Chroma [0 to 31]
H enhance	Off / [On – low, medium, high]
H enhance frequency	2.25 MHz or 3.375 MHz
V enhance	Off / [On – low, medium, high]
Decoder mode	Simple, Studio, VHS/Unstable
SECAM notch	Adaptive/Controllable
SECAM luma bandwidth	Wide/Medium/Narrow
SECAM bottles	Auto/On/Off
Color killer	Chroma ON / Chroma OFF / Auto [QAM standards: Chroma off = chroma mute + Y notch SECAM: Chroma off = chroma mute only]
Genlock H phase	± ½ line in 1 pixel steps
Genlock V phase	±262/312 lines in 1 line steps
Genlock mode	Free-run / Lock to reference / Lock to input (minimum delay)
H delay	1 line in 1 pixel steps
V delay	524/624 lines in 1 line steps
Additional video delay	0, 1 or 2 frames of delay
NTSC lines 11 to 20 and 274 to 282	Blank, pass as VBI, decode VBI
NTSC line 22, 283 and 285	Blank, pass as data, pass as picture
NTSC line 21 and 284	Blank, pass as data, pass as picture, pass as closed captions
PAL lines 7 to 22 & 320 to 335	Blank, pass as VBI, decode VBI
PAL line 23	Blank, pass as WSS, pass as picture

Other Controls
Pattern enable	Off / On
Pattern select	Black / EBU Color Bars / 100% Color Bars / Ramp / Multi-Burst / Pulse and Bar / Animated Bar
Caption enable	Off / On
Caption generator	Programmable up to 19 characters
GPI action	Memories 1 to 8 / Pattern / Freeze
GPI polarity	High / Low
GPO action	Input loss / Standard / Video delay
GPO polarity	High / Low
User memories	Name, clear, save and recall 8 user memories
Default video output	Pass Video / Freeze / Pattern / Pattern and Caption
Preset unit	Returns all settings to default

IQDEC04

Golden Gate Decoder, Synchronizer with Noise Reduction – 12 bit

Technical Specification cont…

Reporting * also Logged

Input status	*Input present, *Input line standard, *Composite color standard
Input error	One or more inputs have unselected line standard
Reference status	*Ref present, *Ref standard
Reference error	Standard different to selected input

RollTrack Output

Delay	Current video delay
Input state	Present / line standard
Reference state	Present / error

Specifications

Video Specifications

Video internal processing	4:2:2 with 10 bit data paths
Frequency response (studio mode)	
Y	5.75 MHz ±0.1dB
PbPr	1.5 MHz -3dB
Frequency response (VHS mode)	
Y	5 MHz +0.2 dB, -0.5 dB
PbPr	1.5MHz -3dB typ
Composite input return loss	Better than 35 dB to 5 MHz
Composite level / impedance	1 V pk-pk typ. Into 75 Ohm
Serial output level	800 mV ±5%
Output overshoot	<70 mV
Output return loss	Better than 15 dB to 270 MHz
Output jitter	<0.2 UI (with 10 Hz High pass filter selected on 601 monitor)
Reference return loss	Better than 35 dB to 5.8 MHz
Reference input level	1 Vp-p ± 3 dB
Sync level	0.3 V ± 6 dB into 10k Ohms
Delay Through the Unit	
Decoder delay	<2 lines (Line Comb), <1 frame + 1 line (Frame Comb)
Synchronizer delay	16 μs (Lock to Input), 1 frame + 16 μs (Lock to Reference)
Additional processing delay	<100 μs
Noise reducer delay	<1 frame (Normal), <3 lines (Minimum Delay)
Total minimum delay	<7 lines
Total maximum delay	>5 frames (including optional video delay)

Power Consumption

Module power consumption	8 W Max (A frames)
	7 PR (B Frames)

IQDMSES

Multi-standard (PAL/PAL-N/ PAL-M/NTSC/SECAM) Encoder with Synchronizer - 12 bit

The IQDMSES provides full broadcast quality serial 4:2:2 to composite analog encoding.
Full genlock and gamut limiter as standard. A 12-bit over-sampled DAC ensures highest quality reconstruction.

Features

- PAL/NTSC/NTSC-J/PAL-M/PAL-N/SECAM broadcast quality encoding
- 12-bit over-sampled, DAC with 601 quality reconstruction
- Full genlock and minimum delay operation
- Full Frame Synchronizer
- Gamut limiting using optimal hue and intensity modification
- Internal pattern and VITS generation
- Pass or blank vertical interval data
- NTSC pedestal control
- Tolerant of SMPTE RP168 serial switching
- Selectable SECAM Bottles
- SECAM Genlock to PAL switch or SECAM
- SECAM dynamic notch
- Up to 5 x composite outputs
- Up to 2 x serial 4:2:2 reclocked outputs
- EDH checking on SDI input
- RollCall compatible
- RollTrack link to tracking audio delays

Why should you choose this module?

- Broadcast quality encoding for PAL/NTSC/NTSC-J/PAL-M/PAL/SECAM broadcast applications
- Full genlock and minimum delay functions ensure accurate timing of composite video
- Vertical interval data can be passed or blanked as required by the downstream system
- RollCall ensures the control capability required by any systems
- 12-bit oversampling DAC ensures optimum analog quality
- Gamut limiting using optimal hue and intensity modification

Order codes

IQDMSES-1A-S
12-bit PAL, PAL-N, PAL-M, NTSC, SECAM Encoder with synchronizer.
3 composite outputs and 2 SDI outputs.
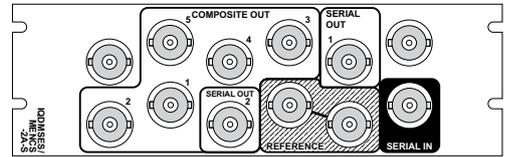
IQDMSES-2A-S
12-bit PAL, PAL-N, PAL-M, NTSC, SECAM Encoder with synchronizer. 5 composite outputs and 2 SDI outputs.

For more details on enclosure types please refer to Frames and Hardware section.

IQDMSES

Multi-standard (PAL/PAL-N/ PAL-M/NTSC/SECAM) Encoder with Synchronizer - 12 bit
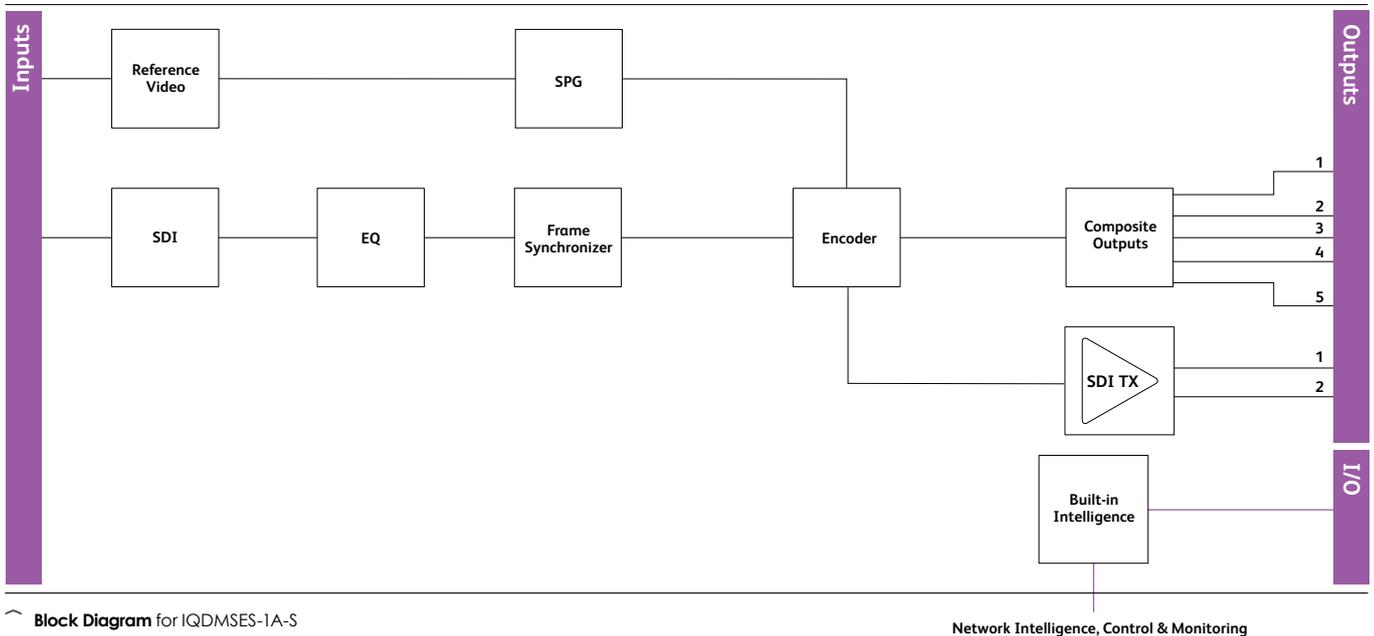
Block Diagram for IQDMSES-1A-S

Network Intelligence, Control & Monitoring

Technical Specification

Inputs and Outputs

Signal Inputs

Serial digital	1 x Equalized SDI
Standards	SMPTE 259M-C-1997
Reference input	Composite or black burst

Signal Outputs

Serial digital	Up to 2 x reclocked SDI
Standards	SMPTE 259M-C-1997
Composite	Up to 5 x encoded outputs
Standards	PAL/NTSC//NTSC-J/PAL-M/PAL-N/SECAM

Card Edge and RollCall Controls

Card Edge Controls (also available via RollCall)

Standard	PAL/NTSC//NTSC-J/PAL-M/PAL-N/SECAM
Test pattern select	Black, Color bars, various test lines
VITS insert	On/Off
Vertical data	Pass/Strip
Genlock mode	Internal (Min Delay) lock/ Zero ScH Lock
Genlock H-phase offset	±1.9 lines
Genlock SC phase offset	360°
SECAM notch	On/Off
SECAM carrier	On/Off
SECAM pre-filter	ON/OFF
NTSC pedestal	On/Off
Blanking width	Normal/Legal minimum to CCIR 624
RGB limiter	On/Off
Gain	±0.5 dB
Preset unit	On
EDH	Present : error second : error hour

Indicators

Power supplies	OK, No Input, No Reference
ScH error	Output or Reference ScH error
Synchronizer delay	Flashes if >1 ms
EDH	Present, Second Error, Hour Error

Functions Available via RollCall Only

Logging	Input change/EDHScH Error
EDH monitor	Show/Reset Statistics
RollTrack compatible	

Specifications

Reference input standard	525/625 (same standard as D1 input)
Composite or black burst reference level	Standard level ±3 dB
Serial input return loss	Better than -15 dB to 270 MHz
Serial output return loss	Better than -15 dB to 270 MHz
Composite encoding	12-bit
Y frequency response	5.5 MHz ± 0.05 dB
U/I and V/Q frequency response	<-3 dB @ 1.3 MHz >20 dB at 4.0 MHz
Differential gain	Better than 0.5%
Differential phase	Better than 0.2°
ScH phase	0° ±2°
Composite output return loss	Better than 35 dB to 5.8 MHz
Delay (minimum delay mode)	<4 µs

Power Consumption

Module power consumption	7.5 W Max (A frames) - 6.5 PR (B Frames)

EMC Performance Information

Environment	Commercial and light industrial E2 Peak Mains Inrush Current following a 5 second mains interruption No mains input
Performance information	No performance degradations or cable length limitations

IQDAVM

Video and Audio Monitoring Encoder

The IQDAVM accepts a serial 4:2:2 input to provide up to four equalized and re-clocked outputs, three monitoring composite outputs and four embedded audio analog outputs. On-screen audio 'confidence' displays of four embedded audio channels are provided on the -M version.

Features

- Up to four re-clocked serial 4:2:2 outputs
- Three monitoring composite PAL/NTSC/PAL-N outputs
- Four analog audio outputs or 2 stereo pairs
- Balanced audio output level adjustable +12 dBu to +24 dBu for 0 dB FS input (-D version)
- Unbalanced audio output level adjustable 1 Volt pk-pk to 4.5 Volts pk-pk into >50 k ohm, for 0 dB FS input (-B version)
- Audio selection from any embedded channel pair
- 20-bit digital-to-analog audio conversion, -95 dB THD+N typical (Full Scale)
- Audio polarity invert
- Embedded audio presence indication
- On screen display of audio level and status (-M versions only)
- Non-audio ancillary data presence indication
- EDH error detection and reporting
- Test signal generator (Color Bars/Black and – 20 dBFS Tone/Silence)
- Automatic 525/625 line detection and no valid signal indication
- Card edge and RollCall remote control

Why should you choose this module?

- The on-screen monitoring function of the four audio channels is via familiar bar-graph displays. By using a combination of color bands and text a large amount of information may be conveniently viewed via the composite video monitoring output
- Balanced audio output level adjustable +12 dBu to +24 dBu for 0 dB FS input (-D version)
- Unbalanced audio output level adjustable 1 Volt pk-pk to 5 Volts pk-pk in to 1 k ohm, for 0 dB FS input (-B version)
- 20-bit digital-to-analog conversion, -95 dB THD+N typical (Full Scale)

Order codes
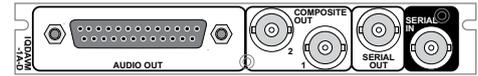
IQDAVM-1A-D-M
Audio and Video Monitoring Encoder with on-screen display. Balanced Audio.
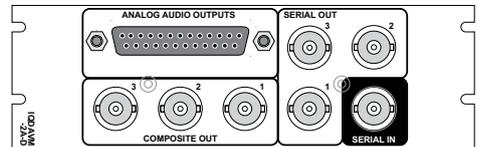
IQDAVM-2A-D-M
Audio and Video Monitoring Encoder with on-screen display. Balanced Audio.
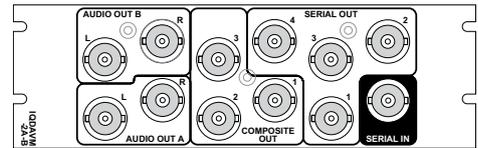
IQDAVM-2A-B
Audio and Video Monitoring Encoder. Unbalanced Audio.

For more details on enclosure types please refer to Frames and Hardware section..
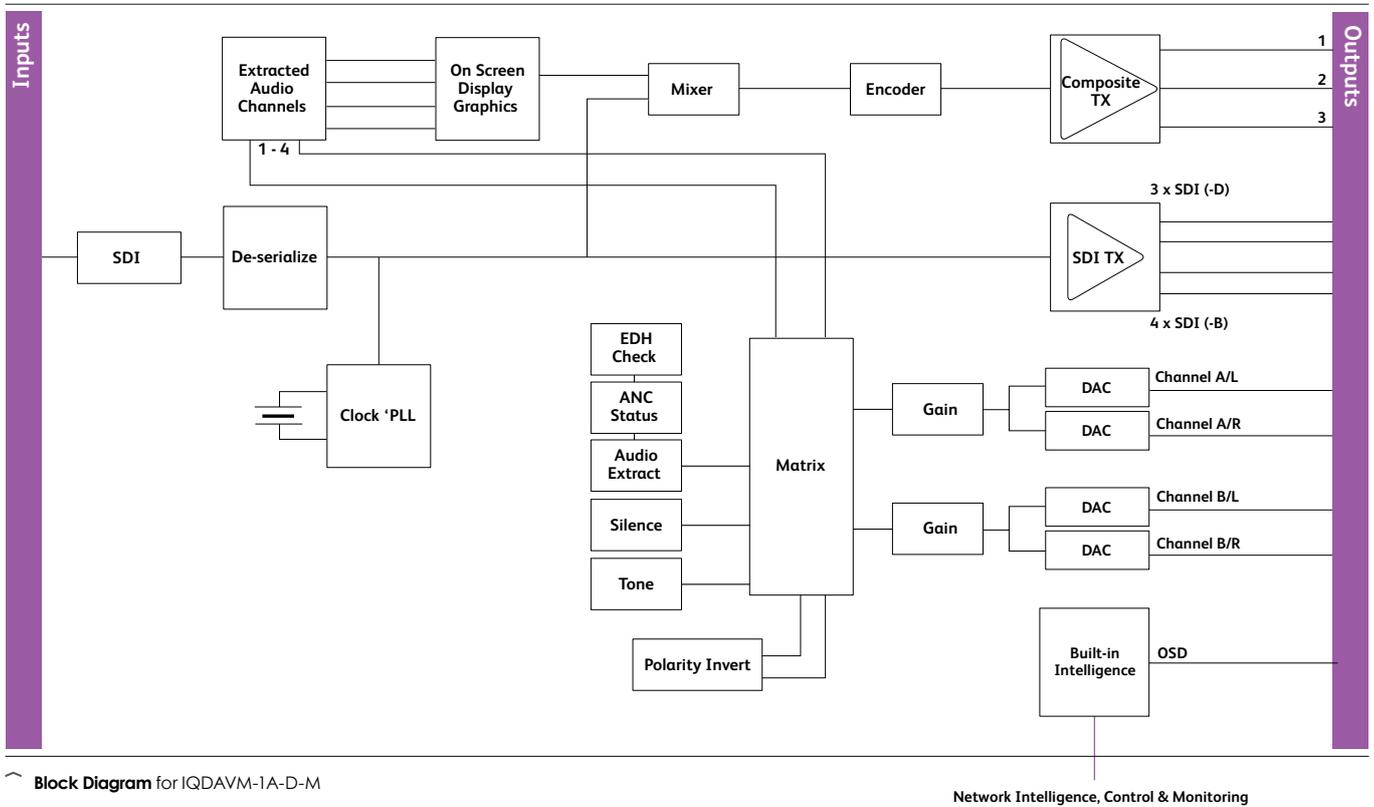
IQDAVM

Video and Audio Monitoring Encoder

Block Diagram for IQDAVM-1A-D-M

Network Intelligence, Control & Monitoring

Technical Specification

Inputs and Outputs

Signal Inputs

Serial digital	1 x SDI via BNC connector
Standards	SMPTE 259M-C-1997
	SMPTE 272M-A-1994

Signal Outputs

Serial digital	4 (-B version) 3 (-D version) x SDI via BNC connectors
Standards	SMPTE 259M-C-1997
	SMPTE 272M-A-1994
Composite video	3 at standard level via BNC connectors
Standards	PAL/NTSC/PAL-N
Analog audio	2 Stereo pairs Balanced via 25 way (-D version, broadcast level) or unbalanced via BNC (-B versions, low level)

IQDAVM Video and Audio Monitoring Encoder

Technical Specification cont…

Card Edge and RollCall Controls

Card Edge Controls (also available via RollCall)

OSD audio monitoring	On/Off (-M versions only)
OSD text	On/Off (-M versions only)
Pattern	Color Bars Pattern On, off
Standard	Line standard = 625: PAL/PAL-N
	Line standard = 525: NTSC
Pedestal	On/Off (NTSC Only)
Local	Local/Remote Control
EDH reset	Resets error flags
Audio channel select	Any Embedded Channel Pair

Indicators

Power	O.K.
Input	Loss
Audio presence	On selected pairs
EDH	Present; Error-Minute: Error-Hour

Functions Available via RollCall Only

Headroom (-D)	Adjustable from +12 to +24 dB
Level (-B)	Adjustable from 1.0 V to 4.5 V pk-pk
Analog output gain A/B	Adjustable ±6 dB in 0.2 dB steps

Display Information

Default pattern selection	Color Bars or black (Default used on input loss)
Default audio selection	Tone or silence (Default used on extraction fail or input loss)
Polarity	Invert polarity of extracted audio pair
Logging	Input Loss; Input Line Standard; EDH error. Presence of extracted audio, low-level audio and silence
Standard detection	Auto 525/625 line rate detection
Audio gain control	Independent for each output pair
Chroma bandwidth	1.6 MHz or 2 MHz
Pedestal	On, off (NTSC only)
Non-audio HANC data	Presence indication

Specifications

SDI input return loss	Better than –15 dB at 270 MHz
Input cable length	>200 m of PSF1/2
SDI output return loss	Better than –15 dB at 270 MHz
Composite video output	1 V pk-pk into 75 ohm (EBU Bars)
Internal processing	8-bit composite encoding with 9-bit oversampled DAC's

Video Signal

Luminance frequency response	0 – 4 MHz +0.1 dB, -0.5 dB
Chrominance frequency response	1.6 MHz or 2 MHz (selectable) – 6 dB
Video signal/noise ratio	Better than – 68 dB (weighted – flat field)
	Better than –62 dB (weighted – ramp)
Differential phase	<2°
Differential gain	<1 %
Processing delay	Approx. 2 µs

Audio Signal

THD+N at 24 dBu	Better than -80 dB (0 dBFS, 1 kHz)
Linear freq. response	+0.1 dB , - 0.3 dB (20 Hz to 20 kHz w.r.t. 1kHz)
Conversion	20-bit
Sampling	48 kHz Synchronous to D1 video stream
Dynamic range	Better than 100 dB (Balanced)
Dynamic range	Better than 98 dB (Unbalanced)
Output level (balanced)	Level Adjustable +12 dBu to +24 dBu, ±5%
Output level (unbalanced)	Adjustable 1 V pk-pk to 4.5 V pk-pk into >50 k ohm, for 0 dB FS input, ±5%
Output impedance (balanced)	25 ohm Nominal
Output impedance (unbalanced)	75 ohm Nominal

Power Consumption

Module power consumption	8.5 W max (A frames) (balanced versions)
	6.5 PR (B frames) (balanced versions)
	8.5 W max (A Frames) (unbalanced versions)
	6.5 PR (B Frames) (unbalanced versions

IQDSDES

Monitoring Encoder and Distribution Amplifier

The IQDSDES provides up to six re-clocked and equalized serial 4:2:2 outputs, and up to five outputs for monitoring of composite video.

Features

- Single channel SDI re-clocker and encoder
- Up to 6 re-clocked serial component outputs
- Up to 5 composite PAL/NTSC/NTSC-J/PAL-N/N4.43/PAL-M outputs
- EDH error detection and reporting
- Test signal generation (color bars)
- Black, Bars or Muted output in event of input loss
- Automatic 525/625 line detection and no valid signal indication
- Sends RollTrack commands for input loss or error
- Full RollCall remote control and card edge control

Why should you choose this module?

- Re-clocking DA ensures there are no jitter problems in the system
- Composite analog outputs to enable the digital video to be viewed on conventional monitors
- Full EDH capability enables diagnosis of failures
- Simple indication, black or no output, of problems with SDI data

Order codes
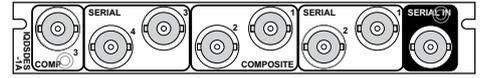
IQDSDES-1A
Monitoring Encoder PAL/NTSC.
3 x composite and 4 x SDI outputs.
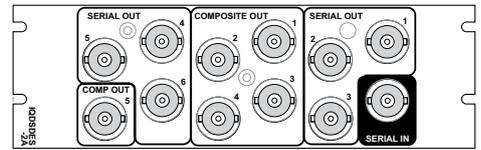
IQDSDES-2A
Monitoring Encoder PAL/NTSC.
5 x composite and 6 x SDI outputs.

For more details on enclosure types please refer to Frames and Hardware Section.
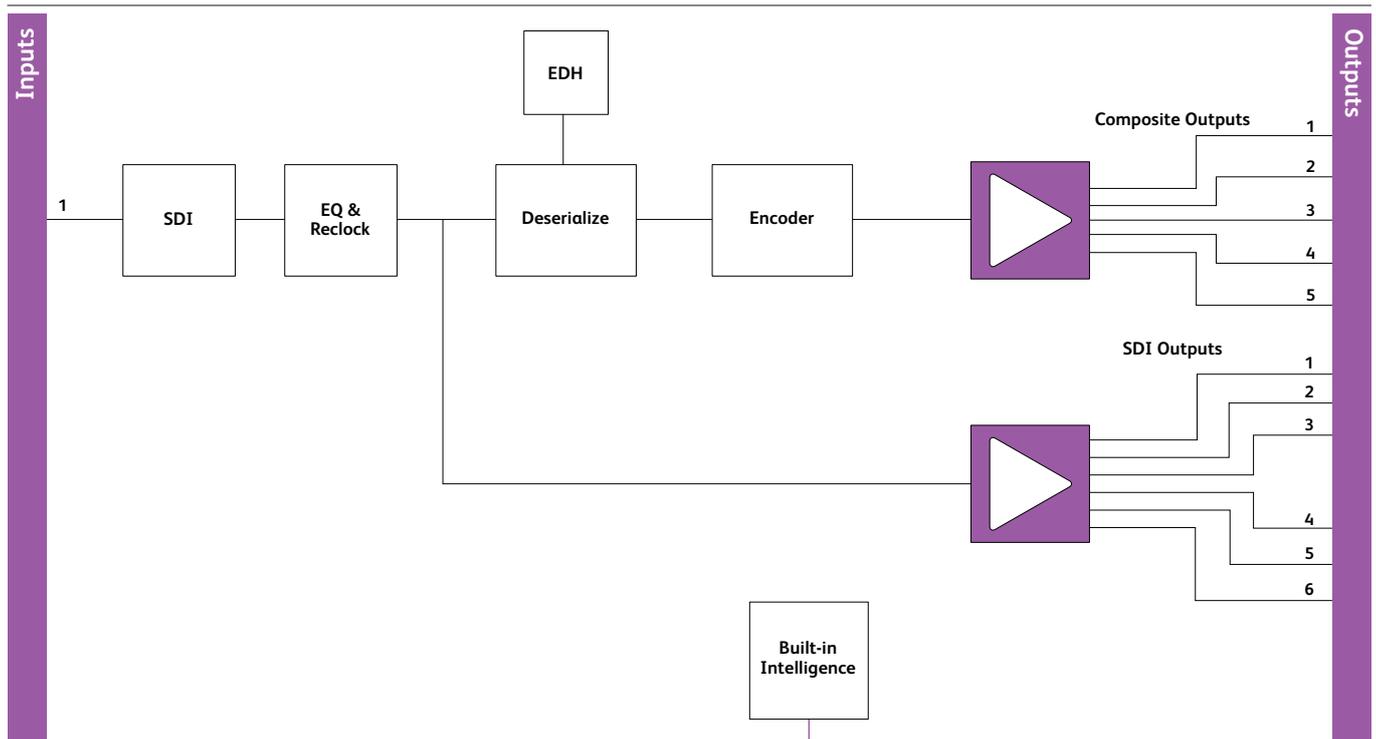
⌐ **Block Diagram** for IQDSDES-2A

Network Intelligence, Control & Monitoring

IQDSDES

Monitoring Encoder and Distribution Amplifier

Technical Specification

Inputs and Outputs

Signal Inputs

Serial digital	1 x SDI Via BNC Connector
Standards	SMPTE 259M-C-1997

Signal Outputs

Serial digital	Up to 6 x SDI via BNC Connectors
Standards	SMPTE 259M-C-1997
Composite video	Up to 5 composite encoded via BNC Connectors
Standards	PAL/NTSC//NTSC-J/PAL-M/PAL-N/N4.43

Card Edge and RollCall Controls

Indicators

Power OK	+ve and -ve supplies
Input Loss	
EDH	Present; Error-Minute: Error-Hour

Card Edge Controls (also available via RollCall)

Pattern enable	Enables pattern on output
EDH reset	Resets EDH Flags

Functions Available via RollCall™ Only

Logging	Input Loss; Input Line Standard; [EDH error]
RollTrack	Input Loss or Input error
Default output	Color bars, black or mute
Force standard	PAL / NTSC / NTSC-J / PAL-M / PAL-N / N4.43
VBI pass	Passes vertical interval lines
Chroma bandwidth	1.6 MHz or 2 MHz (default = 1.6 MHz)

Specifications

Input return loss	Better than 15dB to 270 MHz
Serial output return loss	Better than 15dB to 270 MHz
Y frequency response	0-4 MHz + 0.1dB, -0.4dB
U and V frequency response	1.6 MHz or 2 MHz (selectable) – 6 dB
Differential gain	Better than 1%
Differential phase	Better than 2°
Composite output return loss	Better than 36 dB to 5.5 MHz
Signal / noise ratio	Better than – 68 dB (weighted – flat field)
	Better than –62 dB (weighted – ramp)
2T pulse-shape k- rating	Better than 1%
Processing delay	~2.25 μs
Output D.C	<50 mV

Power Consumption

Module power consumption	8 W Max (A Frames)
	6 PR (B Frames)

EMC Performance Information

Environment	Commercial and light industrial E2
Peak mains inrush current following a 5 second mains interruption	No mains input
Performance information	Immunity to conducted common-mode RF interference (EN 55103-2 immunity phenomenon I6): When the serial input is subjected to modulated RF interference at a level of 3 V, up to 20 mV pk-pk of interference may be present at the composite outputs

IQAAD00

4 Channel Audio Analog to Digital Converter

The IQAAD00 converts two analog stereo pairs, or four analog mono channels into two AES/EBU digital audio streams. Each analog input is sampled at 48 kHz with 24-bit resolution. Sampling can be free-running, locked to a reference video signal or 48KHz AES/EBU digital audio stream. Video standard is automatically determined. The IQAAD00 also provides proc. amp control, channel routing and mixing, up to 0.5s of tracking audio delay and additional fixed delay of up to 3s adjustable in 1 ms steps.

Features

- Converts four analog audio channels into two AES/EBU digital audio streams
- Firewall for processed PCM audio to provide a continuous output
- Channel-level (Sub-frame) routing
- 4 off 4 channel assignable audio mixers
- Flexible audio delay including per pair fixed delay, common fixed delay and tracking delay
- Variable audio delay of up to 0.5s which seamlessly tracks an external video delay via RollTrack / GPI inputs
- Audio proc. amp (gain, mute, polarity)
- RollCall control and monitoring compatible

Why should you choose this module?

- Converts four analog audio channels into two AES/EBU digital audio streams, useful in multi-lingual systems
- Will lock to video and AES/EBU digital audio references
- Balanced or unbalanced output configurations enables use in all environments
- A comprehensive audio conversion solution with firewall, proc. amp, audio shuffling and delay

Order codes
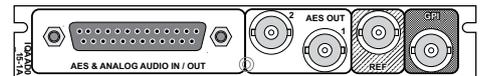
IQAAD0015-1A

Analog Audio ADC. 4 balanced analog audio inputs, 2 balanced and unbalanced AES/EBU outputs, 1 GPI.

For more details on enclosure types please refer to Frames and Hardware section.
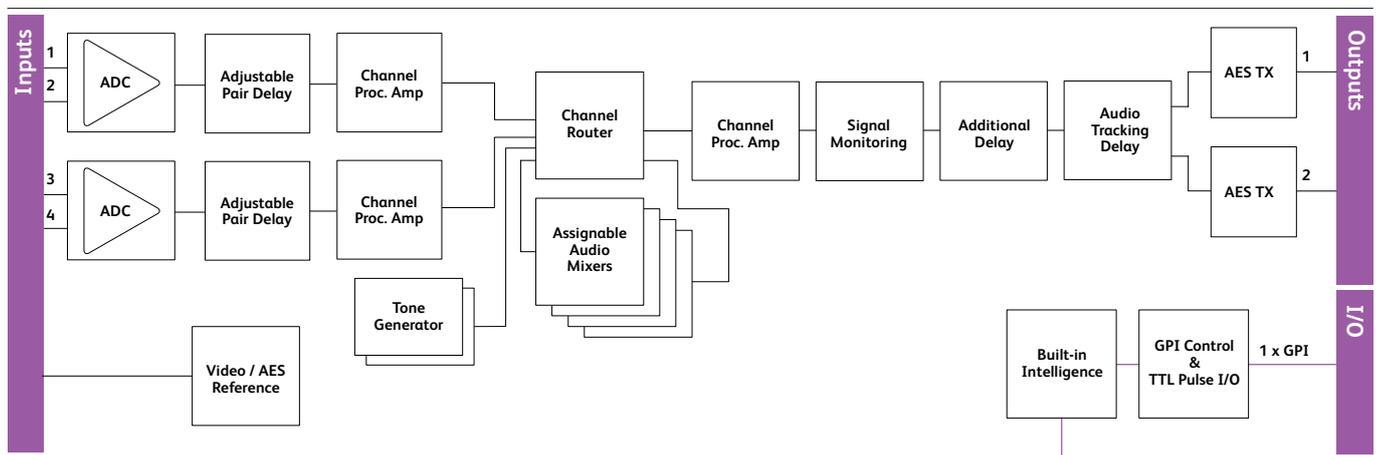
⌒ **Block Diagram** for IQAAD0015-1A

IQAAD00

4 Channel Audio Analog to Digital Converter

Technical Specification

Inputs and Outputs

Signal Inputs

Analog audio	4 Channels (2 Stereo Pairs)
Video / AES reference	Composite video / AES/EBU (BNC)

Signal Outputs

Unbalanced digital audio	2 x AES/EBU (BNC)
Balanced digital audio	2 x AES/EBU (25 Way D-Type)
Standards	AES3 - 1992

Control Interface

GPI	1 x Closing contact I/O interface (BNC)

Card Edge and RollCall Controls

Card Edge Controls

NONE

Card Edge Indicators

Reference Present	
CPU running / Power	One green LED, flashing = OK

RollCall Functions

Audio Controls

Set line up level	+20 to –20 dBu in 1 dB steps
Set headroom	4 to 24 dB in 1 dB steps
Set audio detector thresholds	High/low levels, silence, overload, time delay
Audio input delay	Up to 1.5s additional delay in 1 ms steps
Input side control proc. - audio gain and polarity	Independent Gain, Mute, Polarity control over input channels. +18 dB to –18 dB in 0.1 dB steps
Channel routing	Output channels routed from analog pairs 1 and 2, test tone and silence
Output side control proc. - gain and polarity	Independent Gain, Mute, and Polarity control over output channels. +18 dB to –18 dB in 0.1 dB steps
Global delay offset	Up to +1.5 s in 1 ms steps, common to all processed audio
Variable audio delay control source	Up to 0.5 s from RollTrack + GPI
Tone frequency, amplitude and ident	2 channel tone generator. 100 Hz to 15 kHz in 100 Hz steps

Tone Setup

Frequency	100 Hz to 15 kHz in 100 Hz steps
Channel ident	0.5 s interruption every 2 s

Other Controls

Preset unit	Returns settings to factory defaults
User memories	Name, clear, save and read 8 user memories
GPI/O set-up	May be attached to any memory function/ polarity
Reference select	Free Run, AES/EBU or Video PAL/NTSC

Reporting (* also Logged)

Audio silence, high level, low level, overflow	For processed audio channels only
No reference	*No reference present
Reference error	AES reference sample rate not 48 kHz

RollTrack Input

Delay	RollTrack + fixed

RollTrack Output

Delay	Current audio delay
Reference state	Ref Lost, Ref Present, Ref error [error: AES reference sample rate not 48 kHz]
GPI	High, Low, Inactive

Specifications

Analog Audio Input (Balanced)

Analog input impedance	10 k ohms
Frequency response	20 Hz to 20 kHz (±0.1 dB)
Distortion (THD+N)	Better than -95 dB, 1kHz@ - 1 dBFS
Dynamic range	>106 dB
Max input level	+24 dBu

Digital Audio Output (Balanced)

Connector / format	25 W D
Level	3 V p-p typical into 110 Ohms

Digital Audio Output (Unbalanced)

Connector / format	BNC
Level	1 V p-p typical into 75 Ohms

Reference

Reference return loss	Better than -35 dB to 5.8 MHz
Reference input level	1 V p-p ± 3 dB
Analog reference input Standard	48 kHz AES/EBU, 625/525 line

Power Consumption

Module power consumption	6.5 W max (A Frames) 5 PR (B Frames)

IQDAA00

4 Channel Digital to Analog Audio Converter

The IQDAA00 converts two AES/EBU digital audio streams into two analog stereo pairs, or four analog mono channels. The AES streams are converted to analog with 24-bit resolution, and the IQDAA00 also provides proc. amp control, channel routing and mixing, up to 0.5s of tracking audio delay and additional fixed delay of up to 3s adjustable in 1 ms steps.

Features

- Converts two AES/EBU digital audio streams into four analog audio channels
- Channel-level (Sub-frame) routing
- 4 off 4 channel assignable audio mixers
- Flexible audio delay including per pair fixed delay, common fixed delay and tracking delay
- Variable audio delay of up to 0.5s which seamlessly tracks an external video delay via RollTrack / GPI input
- Audio proc. amp (gain, mute, polarity)
- RollCall control and monitoring compatible

Why should you choose this module?

- Converts two AES/EBU digital audio streams into four analog audio channels, useful for monitoring multi-lingual systems
- Balanced or unbalanced input configurations enables use in all environments
- A comprehensive audio conversion solution with proc. amp, audio shuffling and delay

Order codes

IQDAA0015-1A
Analog Audio DAC. 2 unbalanced/balanced AES/EBU inputs, 4 balanced analog audio outputs, 1 GPI.

For more details on enclosure types please refer to Frames and Hardware section.
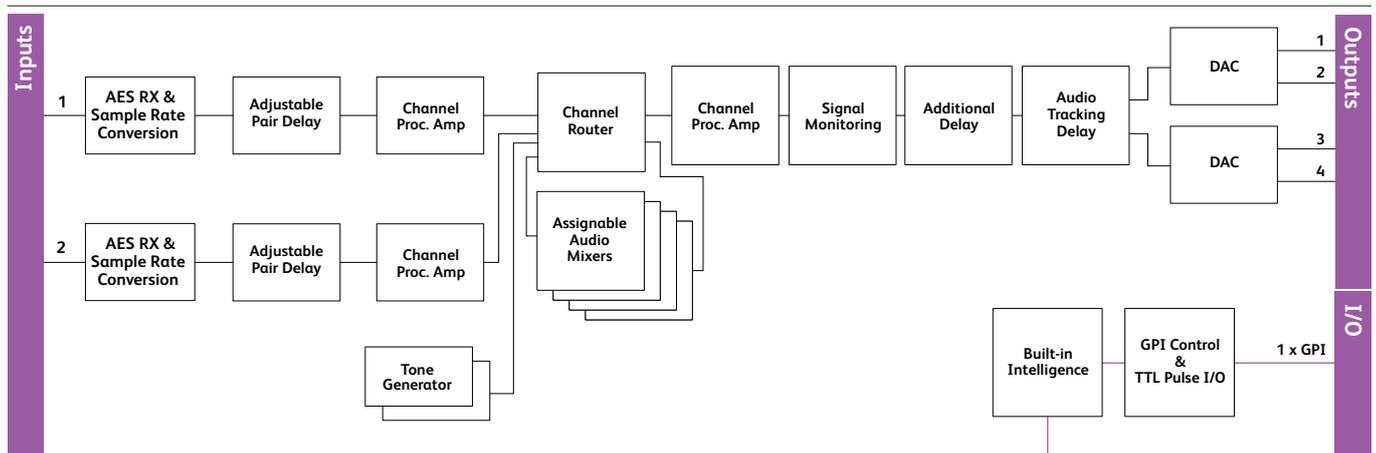
⌒ **Block Diagram** for IQDAA0015-1A

IQDAA00   4 Channel Digital to Analog Audio Converter

Technical Specification

Inputs and Outputs

Signal Inputs

Unbalanced digital audio	2 x AES/EBU (BNC)
Balanced digital audio	2 x AES/EBU (25 Way D-Type)
Standards	AES3 - 1992

Signal Outputs

Analog audio	4 Channels (2 Stereo Pairs) (25Way D-Type)

Control Interface

GPI	1 x Closing contact I/O interface

Card Edge and RollCall Controls

Card Edge Controls

NONE

Card Edge Indicators

Input present	1 x LED per pair
CPU running / power	One green LED, flashing = OK

RollCall Functions

Audio Controls

Set line up level	+20 to –20 dBu in 1 dB steps
Set headroom	4 to 24 dB in 1 dB steps
Set audio detector thresholds	High/low levels, silence, overload, time delay
Audio input delay	Up to 1.5 s additional delay in 1 ms steps
Input side control proc. - audio gain and polarity	Independent Gain, Mute, Polarity control over input channels. +18 dB to –18 dB in 0.1 dB steps
Channel routing	Output channels routed from AES pairs 1 and 2, test tone and silence
Output side control proc. - gain and polarity	Independent Gain, Mute, and Polarity control over output channels. +18 dB to –18 dB in 0.1 dB steps
Global delay offset	Up to +1.5s in 1 ms steps, common to all processed audio
Variable audio delay control source	Up to 0.5s from RollTrack + GPI
Tone frequency, amplitude and ident	2 channel tone generator. 100 Hz to 15 kHz in 100 Hz steps

Tone Setup

Frequency	00 Hz to 15 kHz in 100 Hz steps
Channel ident	0.5s interruption every 2s

Other Controls

Preset unit	Returns settings to factory defaults
User memories	Name, clear, save and read 8 user memories
GPI/O set-up	May be attached to any memory function/polarity

Reporting (* also Logged)

Audio silence, high level, low level, overflow	For processed audio channelsonly
Input AES audio state	Pair present

RollTrack Input

Delay	RollTrack + fixed

RollTrack Output

Delay	Current audio delay
Audio state	PCM, Non-PCM, LOST
GPI	High, Low, Inactive

Specifications

Digital Audio Input (Balanced)

Connector / format	25 W D
Sample frequency	25 – 96 kHz
Input cable length	>150 m of AES3 cable
Impedance	110 Ω

Digital Audio Input (Unbalanced)

Connector / format	BNC
Sample frequency	25 – 96 kHz
Input cable length	>500 m of RG59 cable
Impedance	75 Ω

Analog Audio Outputs

Output impedance	~25 Ohms
THD+N	-92 dB @ 23 dBu typical, at 1 kHz
Conversion	24-bit – Min 105 dB dynamic range
Sampling	48 kHz

Power Consumption

Module power consumption	8.5 W max (A Frames)
	6.5 PR (B Frames)

Blank Page

Routing

The IQ Modular range has the capability to switch between multiple sources in HD or SD SDI and AES audio. Functions include up to 8x8 crosspoint routing, intelligent change-over switching and GPI remote control.

Control can be via card edge, a 1U active front panel, a PC running RollCall or RollMap network management software or a third party automation system. In addition they can be controlled from the RPAN or RollPod 1U router control panels.

For Related Modules see:
IQSDA35 in Distribution
IQOTR32 in Fiber
IQDLY00 in Audio Processing

IQHCO30

The IQHCO30 provides back up protection for SDI signal paths based on input monitoring detection of signal errors resulting in automatic change-over to a back up feed on error state detection. A powerful rules engine is available to provide logical conditions for auto-switching, whilst GPI (or RollTrack) inputs can force the unit to switch independent of signal state. Additional features include monitoring of the unselected input for video and audio signal confidence with group selectable AES audio monitoring.

Features

- 3Gbps SDI, HD-SDI and SD-SDI operation
- Auto change-over from either input on pre-defined error conditions
- User definable change-over delay
- Input signal monitoring including SDI lock, EDH/CRC error, Freeze detection, Black detection, embedded audio loss and standard mismatch
- AES monitoring outputs for embedded audio signal monitoring
- Selectable SDI monitoring outputs enable either input to be monitored independent of the main signal selection
- In-built test pattern generator and AES audio tone generator
- 16 x user memories, save/recall/rename
- Input signal relay bypass versions available (options for either basic input 1 to output 1, or follow input select bypass)
- RollCall monitoring allows all signal paths to be managed

Why should you choose this module?

- Ideal for multi-format workflows where signal redundancy is an essential requirement
- Flexible control interfacing including fully automatic, RollCall and GPI operation
- RollCall integration ensures real time alarm reporting of potential failure conditions

Order codes
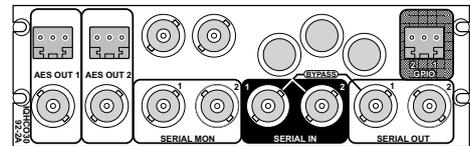
IQHCO3092-2A3, IQHCO3092-2B3
3G/HD/SD-SDI signal protection module with input follow relay bypass. 2 inputs, 2 main outputs, 2 monitoring outputs, 2 AES outputs, 2 GPI/O
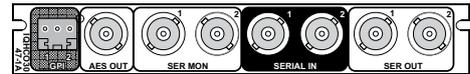
IQHCO3047-1A3, IQHCO3047-1B3
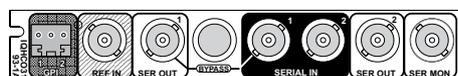3G/HD/SD-SDI signal protection module. 2 inputs, 2 main outputs, 2 monitoring outputs, 2 GPI/O
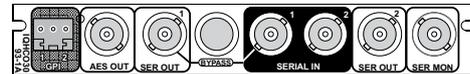
IQHCO3093-1A3, IQHCO3093-1B3
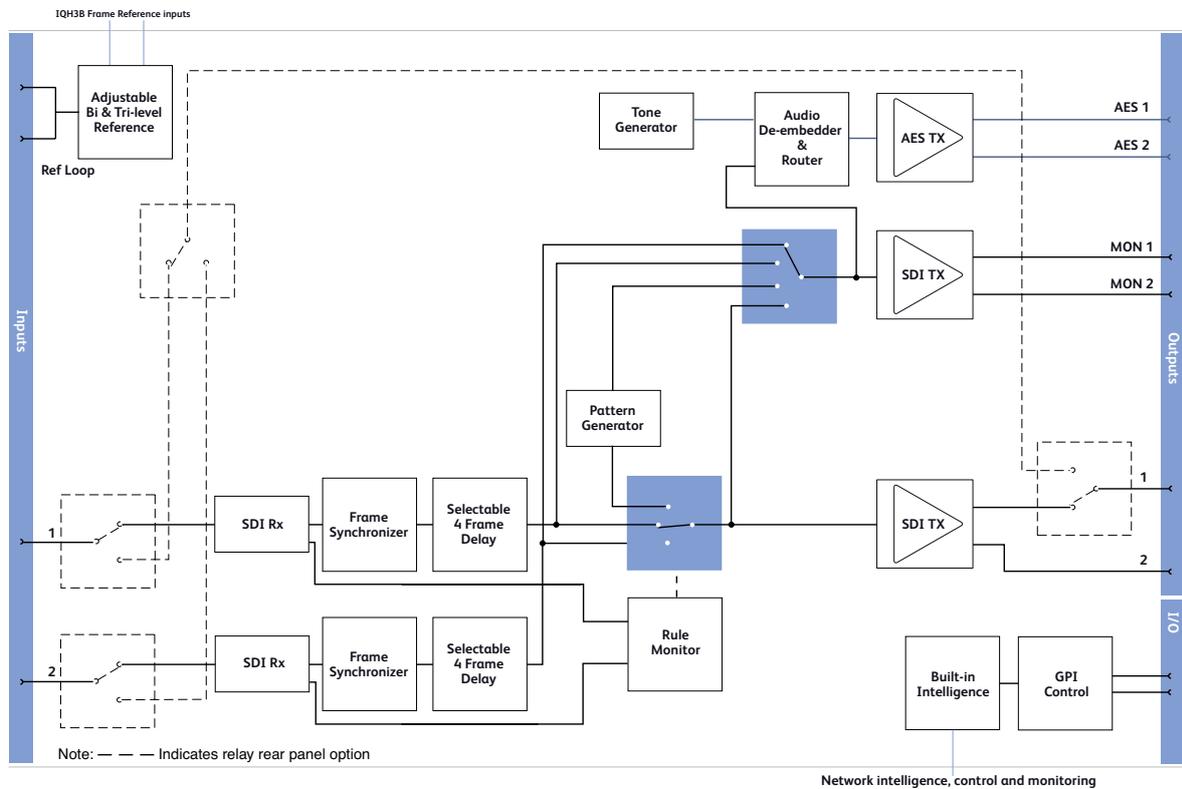3G/HD/SD-SDI signal protection module with relay bypass. 2 inputs, 2 main outputs, 1 monitoring output, 2 GPI/O

For more details on enclosure types please refer to Frames and Hardware section.

IQHCO30   3G/HD/SD-SDI Signal Protection Module

Note: — — — Indicates relay rear panel option

Block Diagram for IQHCO30 range

Technical Specification

Inputs and Outputs

Signal Inputs

Primary switch	2 x SDI via BNC connectors
Input 1 Cable Length	Up to 70m Belden 1694A @ 3 Gbit/s
	Up to 160m Belden 1694A @ 1.5 Gbit/s
	>350m Belden 1694A @ 270 Mbit/s
Input 2 Cable Length	Up to 60m Belden 1694A @ 3 Gbit/s
	Up to 100m Belden 1694A @ 1.5 Gbit/s
	Up to 100m Belden 1694A @ 270 Mbit/s

Signal Outputs

Primary switch	2 x SDI via BNC connector
Monitoring switch	2 x SDI via BNC connector
AES audio	2 x AES/EBU (BNC & ST)

Control Interface

GPI I/O	2 x closing contact via BNC

Controls

Indicators

Power O.K.
CPU Running
Input Loss 1
Input Loss 2

RollCall Controls

Input Standard	1125(1080)/50P, 1125(1080)/59P, 1125(1080)/29i,
	1125(1080)/25i, 750(720)/59P, 750(720)/50P,
	525(480)/29i,625(576)/25i
Default Video Output Type	
	Pattern, Black
Default Video Output Standard	
	Last Known Good, 1125(1080)/50P,
	1125(1080)/59P, 1125(1080)/29i, 1125(1080)/25i,

	750(720)/59P, 750(720)/50P, 525(480)/29i,
	625(576)/25i
Main Output switch	Rules selection, Master input, Backup input,
	Pattern, Caption
Monitor Output switch	Follow Main, Master input, Backup input,
	Pattern, Caption
Switch rules	Logical combinations of warnings, GPI and
	RollTrack triggers
Change-over Parameters	No SDI Lock, Standard mismatch, CRC (EDH)
	Error, Video freeze, Video black, Embedded
	audio loss, embedded audio quiet, audio
	overload, pair type detection (Dolby E, Data,
	PCM)
Switch delay	Video 0.1 to 10 s from trigger condition(s)
	Audio 0 to 120s from trigger condition(s)
	Audio type 0 to 10s from trigger condtion(s)
Internal Rules Preset Priorities	
	Master, Backup, None
GPI Rules Preset Priorities	
	Master, Backup, None
RollTrack Rules Preset Priorities	
	Master, Backup, None
AES output Pair select	Any pair from video monitor output Groups 1-4,
	Tone, silence
GPI/O program	TALLY any input state or warning or set as trigger
Pattern Select	Color Bars, Black
Edit Caption	19 characters available
Reporting & Logging	Input Loss; Input Line Standard; EDH error; Audio
	& data presence, change over status, main
	video output

IQHCO30   3G/HD/SD-SDI Signal Protection Module

Technical Specification

AES Tone Setup

Frequency L/R	100Hz to10kHz in 100Hz steps
Channel Ident	On/Off

Audio Monitoring

Silence Detect	0 to -80dB in steps of 1dB
Signal Overload Detect	0 to -80dB in steps of 1dB

Other Controls

User Memories	16 x Save, Recall, Rename
Memory Naming	User configurable naming of memories 1 – 16
Information Window	Video Input Status, Audio Input Status, Rules status
RollTrack Index	Up to 70 RollTrack destinations
RollTrack Sources	Unused, Main output selection, Backup output selection, Input Std
Factory Default	Resets all module settings to factory specified default values and clears memories
Default Settings	Resets all module settings to factory specified defaults but does not clear memories
Restart	Software restart of the module
Module Information	"Reports following module information: Software version, Serial number, Build number, KOS version, Firmware version, PCB version

Specifications

Electrical	3Gbit/s SDI, SMPTE 424M, 1.5Gbit/s HD-SDI, SMPTE 292M, 270 Mbit/s SDI, SMPTE 259M-C
Connector / Format	BNC/ 75ohm panel jack on standard IQ connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s) >-10dB (3Gbit/s)
Output Jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz) 3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)
GPI I/O (x4) Characteristics	Closing Contact Type with Internal Source Input Threshold Voltage 1 V typical

Video Standards
1125(1080)/50p (A & B), 1125(1080)/59p (A & B)
750(720)/50p, 750(720)/59p,
1125(1080)/25i, 1125(1080)/29i
625(576)/25i, 525(480)/29i

Digital Audio Output (Balanced)

Connector/Format	Screw Terminal (ST)
Level	3 V p-p typical into 110 Ohms
Standard	AES3, SMPTE 272M A-1994, SMPTE 299M

Digital Audio Output (Unbalanced)

Connector/Format	BNC
Level	1 V p-p typical into 75 Ohms
Standard	AES3-1992, SMPTE 272M A-1994, SMPTE 299M

Power Consumption

Module Power Consumption
IQHCO3047-1A/B3, IQHCO3076-2A/B3

	8 W Max (A Frames)
	8 PR Max (B Frames)

Relay Rear Versions

IQHC03092-2A/B3	9 W Max (A Frames)
	8 PR Max (B Frames)
IQHCO3093-1A/B3	8.5 W Max (A Frames)
	8 PR Max (B Frames)

IQHCO31

3G/HD/SD-SDI Synchronized Signal Protection Module

The IQHCO31 provides back up protection for SDI signal paths with a clean switching feature. Based on input monitoring detection of signal errors an automatic change-over to a back up feed can be initiated on error state detection. A powerful rules engine is available to provide logical conditions for auto-switching, whilst GPI (or RollTrack) inputs can force the unit to switch independent of signal state. Additional features include monitoring of the unselected input for video and audio signal confidence with group selectable AES audio monitoring.

Features

- 3Gbps SDI, HD-SDI and SD-SDI operation
- Auto change-over from either input on pre-defined error conditions with user definable change-over delay
- Input signal monitoring including SDI lock, EDH/CRC error, Freeze detection, Black detection, embedded audio loss and standard mismatch
- Agile frame synchronizer per input with independently adjustable 3 frames of video delay and Proc. amp controls
- Loop-though reference capable of detecting and referencing to a bi-level or tri-level signal, with selection from either external input directly or from the internal IQH3B chassis reference bus
- Selectable SDI and AES monitoring outputs enable either input to be monitored independent of the main signal selection
- Embedded Dolby E support - Handles Dolby E, or data, and PCM audio present in the same group
- In-built test pattern generator and AES audio tone generator
- 16 x user memories, save/recall/rename
- Input signal relay bypass versions available (options for either basic input 1 to output 1, or follow input select bypass)
- RollCall monitoring allows all signal paths to be managed

Why should you choose this module?

- Ideal for multi-format workflows where signal redundancy is an essential requirement
- Flexible control interfacing including fully automatic, RollCall and GPI operation
- RollCall integration ensures real time alarm reporting of potential failure conditions

Order codes
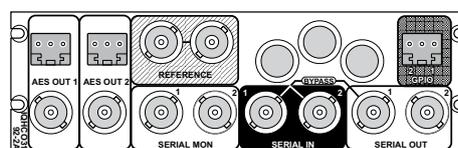
IQHCO3192-2A3
3G/HD/SD-SDI synchronized signal protection module with input follow relay bypass. 2 inputs, ref loop, 2 main outputs, 2 monitoring outputs, 2 AES outputs, 2 GPI/O

IQHCO3192-2B3
3G/HD/SD-SDI synchronized signal protection module with input follow relay bypass. 2 inputs, external ref loop and Frame ref input, 2 main outputs, 2 monitoring outputs, 2 AES outputs, 2 GPI/O
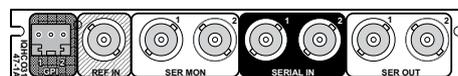
IQHCO3147-1A3
3G/HD/SD-SDI synchronized signal protection module. 2 inputs, ref input, 2 main outputs, 2 monitoring outputs, 2 GPI/O

IQHCO3147-1B3
3G/HD/SD-SDI synchronized signal protection module. 2 inputs, external and Frame ref input, 2 main outputs, 2 monitoring outputs, 2 GPI/O

IQHCO3193-1A3
3G/HD/SD-SDI synchronized signal protection module with relay bypass. 2 inputs, ref input, 2 main outputs, 1 monitoring output, 2 GPI/O

IQHCO3193-1B3
3G/HD/SD-SDI synchronized signal protection module with relay bypass. 2 inputs, external and Frame ref input, 2 main outputs, 1 monitoring output, 2 GPI/O

For more details on enclosure types please refer to Frames and Hardware section.

IQHCO31   3G/HD/SD-SDI Synchronized Signal Protection Module

Block Diagram for IQHCO30 range

Technical Specification

Inputs and Outputs

Signal Inputs

Primary switch	2 x SDI via BNC connectors
Input 1 Cable Length	Up to 70m Belden 1694A @ 3 Gbit/s
	Up to 160m Belden 1694A @ 1.5 Gbit/s
	>350m Belden 1694A @ 270 Mbit/s
Input 2 Cable Length	Up to 60m Belden 1694A @ 3 Gbit/s
	Up to 100m Belden 1694A @ 1.5 Gbit/s
	Up to 100m Belden 1694A @ 270 Mbit/s
Analog Reference	1 x Analog Reference with passive loop-through
	Black (HD tri-level and SD bi-level) and Black
	Burst (SD bi-level), SD bi-level – RS170A,
	HD Tri-level – SMPTE 240M, 274M and 296M

Signal Outputs

Primary switch	2 x SDI via BNC connector
Monitoring switch	2 x SDI via BNC connector
AES audio	2 x AES/EBU (BNC & ST)

Control Interface

GPI I/O	2 x closing contact via Screw Terminal
	connectors

Controls

Indicators

Power O.K.	
CPU Running	
Input Loss 1	
Input Loss 2	
Reference lock	OK or Cross-locking (Green), Std error (Green
	flashing)

RollCall Controls

Genlock Mode	Free-run, Lock to Reference
Genlock H-Phase	± 0.5H in pixel clock steps
Genlock V-Phase	± 0.5F in 1 line steps
Video Delay Frames	0 - 3 F

Input Standard	1125(1080)/50P, 1125(1080)/59P, 1125(1080)/29i,
	1125(1080)/25i, 750(720)/59P, 750(720)/50P,
	525(480)/29i,625(576)/25i
Default Video Output Type	
	Pattern, Black, Freeze
Default Video Output Standard	
	Last Known Good, 1125(1080)/50P,
	1125(1080)/59P, 1125(1080)/29i, 1125(1080)/25i,
	750(720)/59P, 750(720)/50P, 525(480)/29i,
	625(576)/25i
Main Output switch	Rules selection, Master input, Backup input,
	Pattern, Caption
Monitor Output switch	Follow Main, Master input, Backup input,
	Pattern, Caption
Switch rules	Logical combinations of warnings, GPI and
	RollTrack triggers
Change-over Parameters	No SDI Lock, Standard mismatch, CRC (EDH)
	Error, Video freeze, Video black, Embedded
	audio loss, embedded audio quiet, audio
	overload, pair type detection (Dolby E, Data,
	PCM)
Switch delay	Video 0.1 to 10 s from trigger condition(s)
	Audio 0 to 120s from trigger condition(s)
	Audio type 0 to 10s from trigger condtion(s)
Internal Rules Preset Priorities	
	Master, Backup, None
GPI Rules Preset Priorities	
	Master, Backup, None
RollTrack Rules Preset Priorities	
	Master, Backup, None
AES output Pair select	Any pair from video monitor output Groups 1-4,
	Tone, silence
Embedded group Enable	Master Group 1-4 select
	Backup Group 1-4 select
Audio delay sources	Internal, manual, RollTrack
Audio delay	Course 0-1.75s in 5ms steps
	Fine +/- 250ms in 0.5ms steps

IQHCO31

3G/HD/SD-SDI Synchronized Signal Protection Module

Technical Specification

Controls

GPI/O program	TALLY any input state or warning or set as trigger
Manual Freeze	On/Off
Freeze	Field/Frame
VANC Data	Blank VANC
SD VANC Data	Line blanking (6 controls)
HANC Data	Blank HANC (Removes all HANC data, including audio)
ProcAmp Enable	On/Off
Black Level	±100 mV in steps of 0.8 mV
Hue Adjust	±180° in steps of 1°
Master Video Gain	±6 dB in steps of 0.1 dB
Y-Gain	±6 dB in steps of 0.1 dB
Cb/Cr Gain	±6 dB in steps of 0.1 dB
Y/C Timing	±8 pixels in 2 pixel steps (SD)
	±16 pixels in 2 pixel steps (HD/3G)
Picture Position	±8 pixels in 2 pixel steps (SD)
	±16 pixels in 2 pixel steps (HD/3G)
Pattern Select	Color Bars, Black
Edit Caption	19 characters available
Reporting & Logging	Input Loss; Input Line Standard; EDH error; Audio & data presence, change over status, reference logging, main video output

AES Tone Setup

Frequency L/R	100Hz to10kHz in 100Hz steps
Channel Ident	On/Off

Audio Monitoring

Silence Detect	0 to -80dB in steps of 1dB
Signal Overload Detect	0 to -80dB in steps of 1dB

Other Controls

User Memories	16 x Save, Recall, Rename
Memory Naming	User configurable naming of memories 1 – 16
Information Window	Video Input Status, Audio Input Status, Reference ststus, Rules status
RollTrack Index	Up to 70 RollTrack destinations
RollTrack Sources	Unused, Video Delay, Audio delay, Main output selection, Backup output selection, Input Std, Reference OK & Loss
Factory Default	Resets all module settings to factory specified default values and clears memories
Default Settings	Resets all module settings to factory specified defaults but does not clear memories
Restart	Software restart of the module
Module Information	"Reports following module information: Software version, Serial number, Build number, KOS version, Firmware version, PCB version

Specifications

Electrical	3Gbit/s SDI, SMPTE 424M, 1.5Gbit/s HD-SDI, SMPTE 292M, 270 Mbit/s SDI, SMPTE 259M-C
Connector / Format	BNC/ 75ohm panel jack on standard IQ connector panel
Return loss	>-15dB (270Mbit/s, 1.5Gbit/s)
	>-10dB (3Gbit/s)
Output Jitter	SD-SDI 0.2 UI (10Hz) / 0.2 UI (1KHz)
	3G/HD-SDI 1.0 UI (10Hz) / 0.2 UI (100KHz)
Reference Source	External – HD Tri-Level / SD Bi-level / Input Video syncs
Electrical	Black (HD tri-level and SD bi-level) and Black Burst (SD bi-level)

	SD bi-level – RS170A
	HD Tr-level – SMPTE 240M, 274M and 296M
Connector / Format	BNC/75 ohm panel jack on standard IQ connector panel
Analog Reference Return Loss	
	SD bi-level > 40 dB to 5.5 MHz
	HD tri-level > 35 dB to 30 MHz
GPI I/O (x4) Characteristics	
	Closing Contact Type with Internal Source
	Input Threshold Voltage 1 V typical
Video Standards	
	1125(1080)/50p (A & B), 1125(1080)/59p (A & B)
	750(720)/50p, 750(720)/59p,
	1125(1080)/25i, 1125(1080)/29i
	625(576)/25i, 525(480)/29i
Minimum Delay (Reference lock or free run)	
	SD: 67us
	HD: 28us
	3G-A: 15us
	3G-B: 25us
Synchronizer Hysteresis Window	
	5us
Embedded Audio Delay	Minimum (PCM) 2 ms
	Maximum (non-PCM)
	SD: 67us
	HD: 28us
	3G-A: 15us
	3G-B: 25us

Digital Audio Output (Balanced)

Connector/Format	Screw Terminal (ST)
Level	3 V p-p typical into 110 Ohms
Standard	AES3, SMPTE 272M A-1994, SMPTE 299M

Digital Audio Output (Unbalanced)

Connector/Format	BNC
Level	1 V p-p typical into 75 Ohms
Standard	AES3-1992, SMPTE 272M A-1994, SMPTE 299M

Power Consumption

IQHCO3147-1A/B3, IQHCO3176-2A/B3

	12 W Max (A Frames)
	12 PR Max (B Frames)

Relay Rear Versions

IQHC03192-2A/B3	13.5 W Max (A Frames)
	12.5 PR Max (B Frames)
IQHCO3193-1A/B3	13 W Max (A Frames)
	12.5 PR Max (B Frames)

IQASI25

ASI Transport Stream Switch and DA

The IQASI25 is a cost effective ASI-switched Distribution Amplifier that continuously monitors two MPEG-2 DVB ASI transport streams (TS) and routes the preferred input to the 5 identical outputs. It monitors various critical parameters within the transport stream and their status will effect switching and alarms. It is compliant to the ETSI TR 101290 specification for Digital Video Broadcasting and supports both DVB and ATSC transport streams in Packet, Byte & Burst modes. Automatic operation is configurable by the user and the switch may also be externally controlled via the RollCall control and monitoring system or external GPI's.

Features

- Monitors two ASI inputs for loss of carrier signal, loss of TS sync and loss of PAT with automatic input switching on error
- Designed to minimise switching and prevent unnecessary disruption of the TS.
- Remains on an input until that input fails. If the alternate input has also failed, no switch occurs.
- If both inputs return to a good state, the switch remains static on the selected input
- Manual switch to force the module to Input 1 or 2
- 2 configurable GPIO ports (2 in or 2 out or one of each)
- LED indicators to show if Input 1 absent, input 2 absent and if outputs are derived from input 1 or input 2
- RollCall control and monitoring compatible

Why should you choose this module?

- Cost effective ASI switched distribution amplifier able to automatically switch on critical error detection
- Flexible automatic or manual control for application specific scenarios
- Full RollCall compatibility allows easy integration with SAM network management systems providing an all-inclusive monitoring and control solution

Order codes
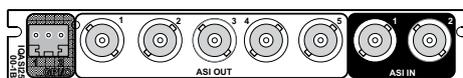
IQASI2500-1B

ASI Transport Stream Switch & DA. 2 ASI inputs, 5 ASI outputs, 2 GPI/Os.

For more details on enclosure types please refer to Frames and Hardware section.
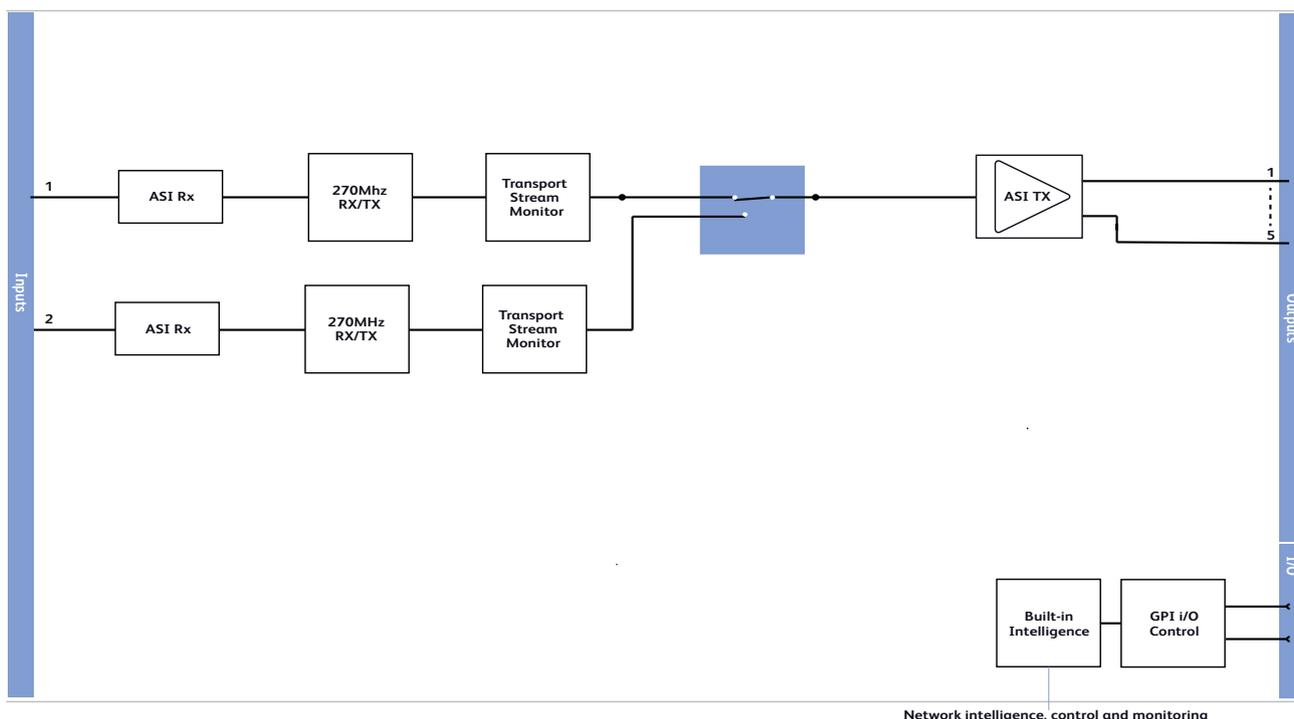
︶ **Block Diagram** for IQASI2500-1B

IQASI25

ASI Transport Stream Switch and DA

Technical Specification

Inputs and Outputs

Signal Inputs

ASI 1	ASI (270 Mbit/s)
ASI 2	ASI (270 Mbit/s)
Standards	DVB-ASI, EN50083-9
Electrical	Transformer coupled 75R 800mV p-p
Input Cable Length	100m (Image 1000HD)

Signal Outputs

Serial data	5 ASI (270 MBit/s)

Control Interface

GPI	2 (shared connector)
Connector / Format	Standard SAM screw terminal
GPI	Opto input 2.2KΩ to +5V, (1.6mA to ground)
GPO	Relay rated 1A @ 30V DC switching to ground

Indicators

Power	OK	(Green)
CPU	OK	(Green flashing)
Input Status	OK	(Green)
	Fail	(Red)
Auto	Green	Lit = selected
Output source 1	Yellow	Lit = selected
Output source 2	Yellow	Lit = selected

RollCall Features

Status	Input and Output alarm statuses
Input	Input select: Auto, forced our GPI based
GPIO	GPIO configuration
User memories	16 User configurable
Logging	Input Status
	Input Alarms
	Output Status
	Misc
RollTrack Controls	On/off, Index, Source, Address, Command, Status, Sending
Setup	Versions, reset defaults, restart

Specifications

Electrical	ASI transport stream
Connector / Format	BNC
	Standard SAM screw terminal

Power Consumption

Module power consumption	4.5 W max (A frames)
	4.5 PR (B frames)

IQDCO

SDI Changeover Switch

The IQDCO is a passive changeover switch with SDI video presence detection.

Features

- Passive SDI changeover switch
- Detection of carrier, SDI lock, line standard, EDH and embedded audio /data presence
- Automatic switch over on programmable condition(s)
- Continuity (A input) maintained with power loss or module removal
- Three programmable GPI/O's for control or tally
- Programmable switch over time delay
- RollCall remote and card edge control
- RollCall fault logging
- Can be linked to trigger other changeover modules via RollTrack

Why should you choose this module?

- Ideal for conditions where switch over needs to be fully programmable. For example, carrier loss, the absence of embedded audio or any logical combination of conditions may trigger switchover
- Continuity (A input) maintained with power loss or module removal
- Three programmable GPI/O's for control or tally
- Programmable switch over time delay

Order codes
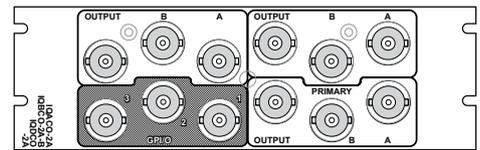
IQDCO-2A
SDI Video changeover switch.
1 primary, 2 secondary switches.

For more details on enclosure types please refer to Frames and Hardware Section.
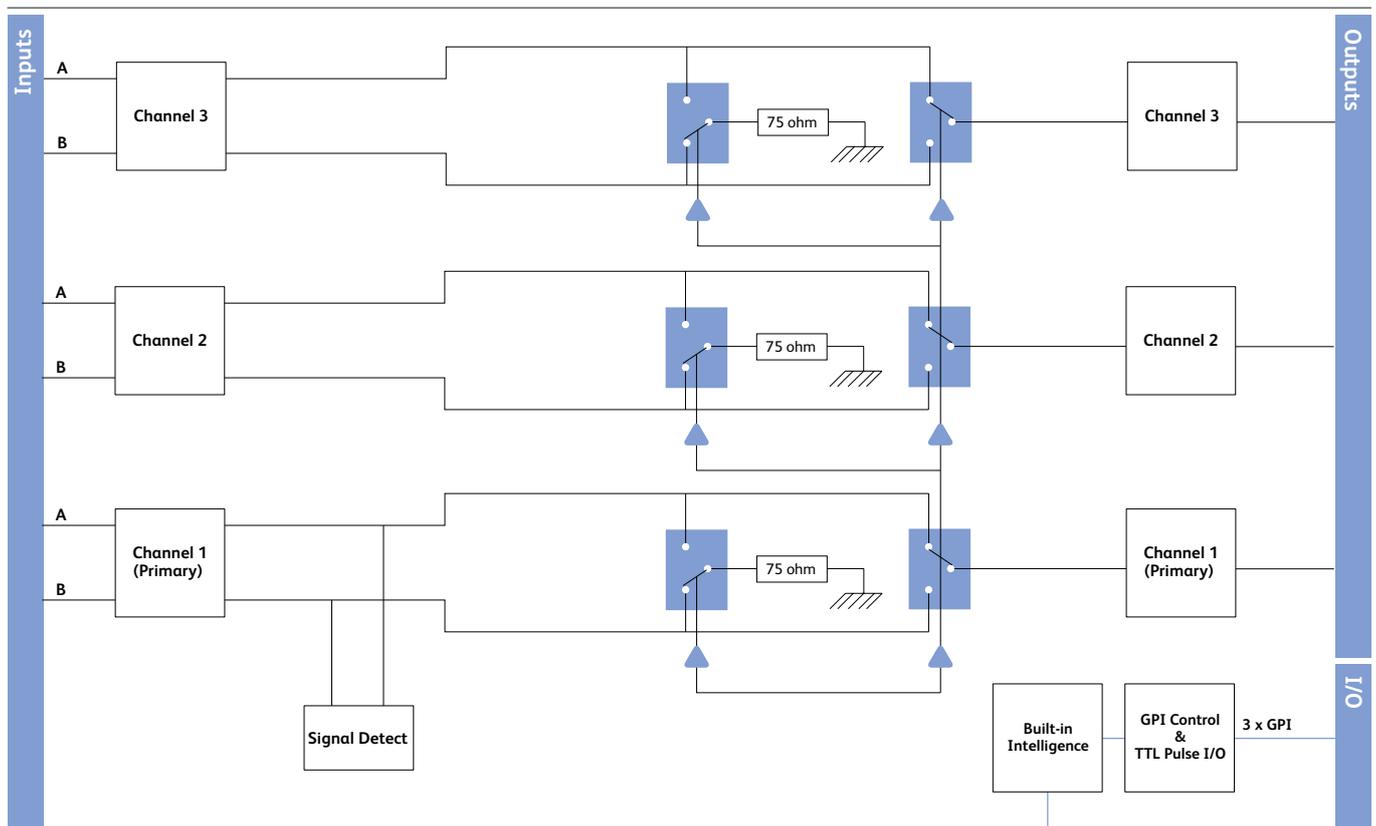
⌒ **Block Diagram** for IQDCO-2A

IQDCO

SDI Changeover Switch

Technical Specification

Inputs and Outputs

Signal Inputs

Primary switch	2 x SDI via BNC connectors
Standards	SMPTE 259M-C-1997
Secondary switch	2 per channel (2 channels) via BNC

Signal Outputs

Primary switch	1 x SDI via BNC connector
Standards	SMPTE 259M-C-1997
Secondary switch	1 per channel (2 channels) via BNC
GPI I/O	3 x closing contact via BNC

Card Edge and RollCall Controls

Card Edge Controls (also available via RollCall)

Switch mode	Manual / Auto
Manual switch	A / B
EDH Reset	Resets error flags (both inputs)
Local	Selects default mode (cancels any RollCall programmed conditions)

Indicators

Power OK	
Input Loss A	
Input Loss B	
Audio presence A	At least one channel of embedded audio detected
Audio presence B	At least one channel of embedded audio detected
EDH A	Present; Error-Minute: Error-Hour
EDH B	Present; Error-Minute: Error-Hour

Functions Available via RollCall Only

Switch rules	Any logical combination of warnings and GPI triggers
GPI/O program	TALLY any input state or warning or set as trigger
Switch delay	0 to 10 s from trigger condition(s)
Reporting and logging	Input Loss; Input Line Standard; EDH error; Audio and data presence

Specifications

Signal Inputs

Primary SDI (x 2)

Input return loss	Better than 15 dB to 270 MHz (Output terminated)
Maximum cable length	>100 m PSF1/2 or equivalent Cable length is defined as input cable length + output cable length.

Secondary (2 Channels)

Input return loss	Better than –38 dB @ 5 MHz Note that the secondary switches are not guaranteed to work with 270 Mbit SDI signals, but may do so in some installations

Signal Outputs (Passive)

Primary

Output return loss	Better than 15 dB to 270 MHz (Inputs A and B terminated)

Secondary (2 Channels)

Output return loss	Better than –38 dB @ 5 MHz
GPI I/O (x 3)	
characteristics	Closing Contact Type
	Output Sink Current 100 mA
	Input Source Current 1 mA typical
	Input Threshold Voltage 1 V typical

Power Consumption

Module power consumption	4 W Max (A frames)
	3.5 PR (B Frames

IQACO

Analog Video Changeover Switch

The IQACO is a passive changeover switch with composite video presence detection. Both inputs are monitored for sync presence, sync amplitude and line standard. The condition for switch over may be programmed to be sync loss or video standard change.

Features

- Passive composite / pulse changeover switch
- Automatic switch over on programmable condition(s)
- Detection of sync presence, sync amplitude and line standard
- Continuity (A input) maintained with power loss or module removal
- Three programmable GPI/O's for control or tally
- Programmable switch over time delay
- RollCall remote and card edge control
- RollCall fault logging

Why should you choose this module?

- Switch over on programmable condition(s) for fully automatic operation
- Fault detection triggers the unit to switch over to the alternative input and creates an alarm trigger to flag the problem
- All fault or warning conditions can be reported and logged over RollCall

Order codes
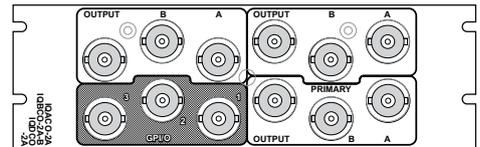
IQACO-2A

Analog Video Changeover Switch.
1 primary, 2 secondary switches.

For more details on enclosure types please refer to Frames and Hardware Section.

⌒ **Block Diagram** for IQACO-2A

IQACO

Analog Video Changeover Switch
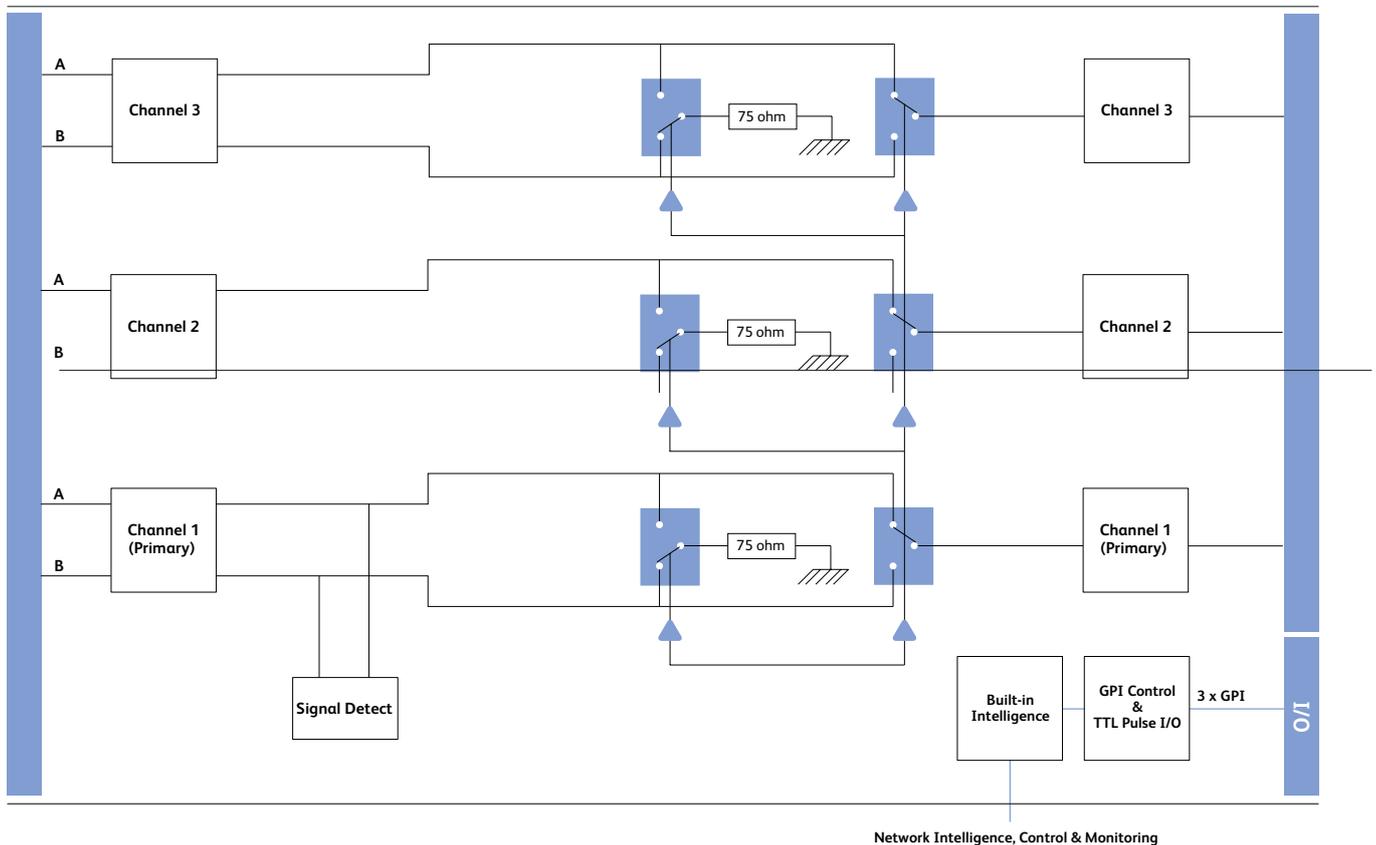
Technical Specification

Inputs and Outputs

Signal Inputs

Primary analog	2 per channel (1 channel) Composite/Black Burst video via BNC
Secondary analog	2 per channel (2 channels) For low data rate signals via BNC

Signal Outputs

Primary analog	1 per channel (1 channel) via BNC
Secondary analog	1 per channel (2 channels) via BNC
GPI I/O	3 x closing contact via BNC

Card Edge and RollCall Controls

Card Edge Controls (also available via RollCall)

Switch mode	Manual / Auto
Manual switch	A / B
Local	Selects default mode (cancels any RollCall programmed conditions)

Indicators

Power	OK
Input loss A	
Input loss B	
Input standard A	525/625
Input standard B	525/625
Low sync A	
Low sync B	

Functions Available via RollCall Only

Switch condition	Any logical combination of warnings and GPI triggers
GPI/O program	Tally any input state or warning or set as trigger
Switch delay	0 to 10s from trigger condition(s)
Reporting and logging	Input Loss; Input Line Standard; Low Sync Level

Specifications

Analog input level	Standard levels ±6 dB
Input return loss (primary)	Better than 35 dB to 6 MHz (Output terminated)
Input return loss (secondary)	Better than 35 dB to 5 MHz (Output terminated)
Output return loss (primary)	Better than 35 dB to 6 MHz (Inputs A and B terminated)
Output return loss (secondary)	Better than 35 dB to 5 MHz (Inputs A and B terminated)
GPI I/O characteristics	Closing Contact Type Output Sink Current 100 mA Input Source Current 1 mA typical Input Threshold Voltage 1 V typical

Power Consumption

Module power consumption	1 W Max (A Frames) 1 PR (B Frames)

IQSRT00   HD/SD-SDI 5 x 2 Router

The IQSRT00 is a five input router/switcher for HD-SDI 1.5 Gbit/s, SD-SDI/DVB-ASI 270 Mbit/s and wide-band signals. This module provides a mixed HD/SD solution and includes both a bonus input and a bonus output when compared with the common 4 x 1 specification. Dual outputs and using just one slot in a 3RU enclosure mean that very powerful routing solutions can be built in a very compact space. Ideal as a comprehensive local HD/SD router, a range of RPAN control panels are available for easy construction of comprehensive control environments.

Features

- HD/SD-SDI router with SMPTE RP168 switching when timed to an external reference
- Standards supported:
  – HD-SDI to SMPTE292M
  – SD-SDI to SMPTE259M-C
  – DVB-ASI
- Choice of SD bi-level or HD tri-level reference switching
- Can be used to select between inputs of different standards
- Handles HD-SDI or SD-SDI/ASI sources with re-clocking
- Handles other wide-band signals without re-clocking
- Comprehensive button per cross-point, or multi-destination control from RPAN router control panel
- Optional RS-422 control with separate IQSPl00 module

Why should you choose this module?

- Very high density HD/SD-SDI routing, with over 53 cross-points per rack unit
- Second output for preview, monitoring, redundant path feeds and other purposes
- Will work with the RPAN control panels for simple network-connected routing installations
- HD and SD capable for mixed operation or to provide a future upgrade path
- Can be combined with other IQ Modular routers for mixed-format multi-level routing
- Can be used with HD and SD inputs simultaneously, with one output feeding HD and the other SD, ideal for wrapping around up and down converters

Order codes
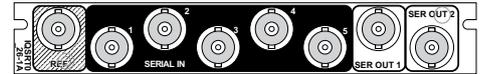
IQSRT0026-1A

HD/SD-SDI 5 x 2 Router. 2 HD/SD-SDI outputs.

For more details on enclosure types please refer to Frames and Hardware section.

IQSRT00   HD/SD-SDI 5 x 2 Router
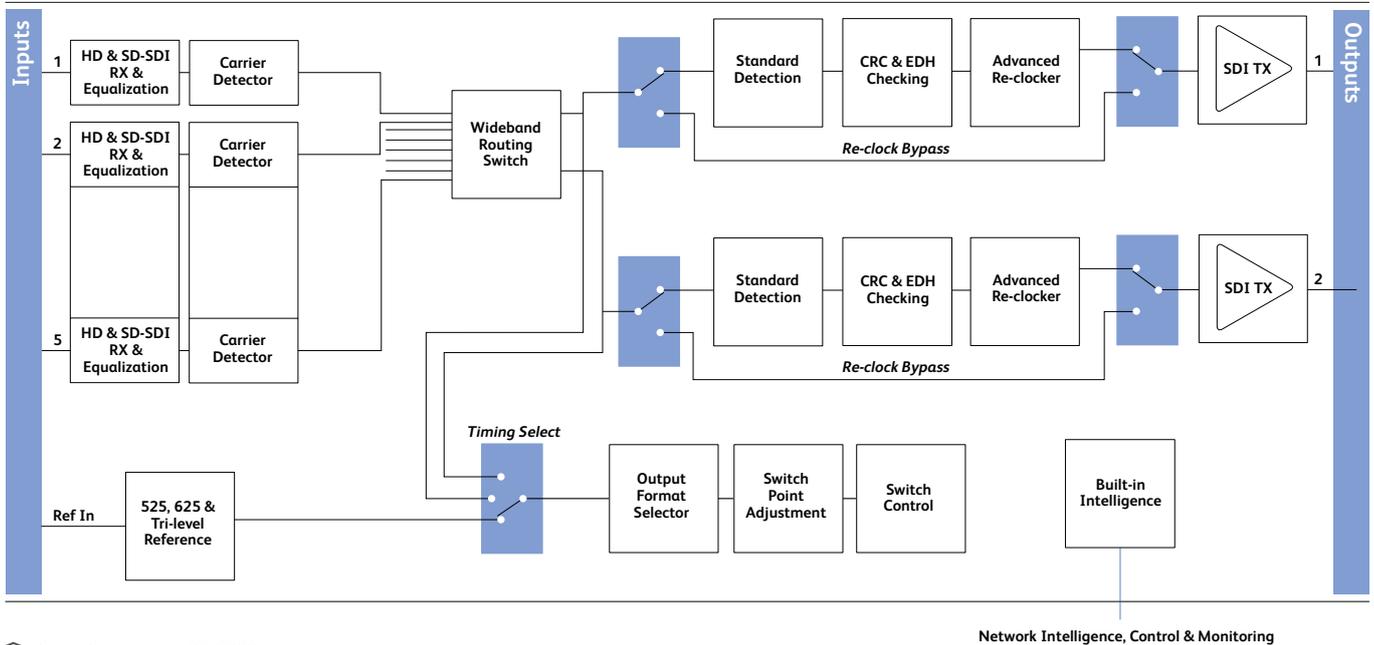
⌒ **Block Diagram** for IQSRT0026–1A

Network Intelligence, Control & Monitoring

Technical Specification

Inputs and Outputs

Signal Input

Inputs	5 x Serial Digital Input(s)
Electrical	1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C/DVB-ASI
Input cable length	Up to 140m Belden 1694A @ 1.5 Gbit/s
	Up to 350m Belden 1694A @ 270 Mbit/s
Analog reference	1 x Analog Reference to SMPTE240/ 274M and RS170A
Connector / format	BNC/ 75ohm panel jack on standard SAM connector panel
Return loss	>–15dB

Signal Outputs

Outputs	2 x Serial Digital Outputs
Electrical	1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C/DVB-ASI
Connector / format	BNC/ 75ohm panel jack on standard SAM connector panel
Return loss	>–15dB

Controls

Indicators

Power	OK
CPU	OK
Status	OK (Green), Warning (Yellow), Error (Red)

RollCall Features

Router control	Switching control of input to output channels
Router configuration	Displays current router channel allocation

Channel renaming	Labelling of all input and output channels
User memories	16 x Save / Recall / Rename
Logging	Input Status (1-5)
	CRC/EDH Error
	Input Standard
	Ref Status
	Output 1/2 standard
RollTrack controls	On/Off, Index, Source, Address, Command, Status, Sending
RollTrack outputs	Input present - 1 to 5
	Output 1 Tallies
	Output 2 Tallies
	Reference OK
	Input Loss - 1 to 5
	Unused

Specifications

Inputs

Reference source	External – HD Tri-Level / SD Bi-level / Output Video syncs

Power Consumption

Module power consumption	9W Max (A Frames) 8.5 PR (B Frames)

IQSRT10   HD/SD-SDI 8 x 2 Router

The IQSRT10 is an eight input router/switcher for HD-SDI 1.5Gbit/s, SD-SDI 270Mbit/s, DVB-ASI and wide-band signals. This module offers a complete routing solution in a tiny package with GPI control, true tallies and 16 HD cross-points. By offering a full eight inputs and two outputs many local HD/SD routing requirements can be solved. The two feeds can be used as two independent destinations. Examples include main and redundant feeds, or main and preset outputs or even as a main and a preview output. The inclusion of true tallies in straight-forward tally per cross-point form enhances the robustness of compact low-cost routing solution over simpler dumb modular solutions.

Features

- HD/SD-SDI router with SMPTE RP168 switching when timed to an external reference
- Standards supported:
  - HD-SDI to SMPTE292M
  - SD-SDI to SMPTE259M-C
  - DVB-ASI
- Can be used to select between inputs of different standards
- Sixteen true tallies, providing feedback for all inputs on both outputs
- Two outputs of each destination
- Choice of SD bi-level or HD tri-level reference switching
- Handles HD-SDI or SD-SDI/ASI sources with re-clocking
- Handles other wide-band signals without re-clocking
- Comprehensive button per cross-point, or multi-destination control from RPAN router control panel, or from GPIs
- Optional RS-422 control with separate IQSPI00 module

Why should you choose this module?

- Very easy to control for creating simple solutions with built in GPIs and a choice of other control methods
- Suitable for critical applications such as main feed change-over with true tallies and duplicate outputs in an enclosure with dual redundant PSUs
- Second output for preview, monitoring, redundant path feeds and other purposes
- Can be combined with other IQ Modular routers for mixed-format multi-level routing
- Can be used with HD and SD inputs simultaneously, with one output feeding HD and the other SD, ideal for wrapping around up and down converters

Order codes
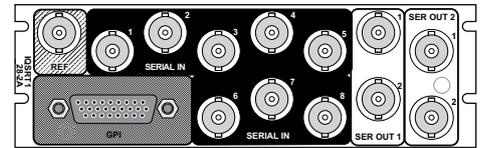
IQSRT1028-2A
HD/SD-SDI 8 x 2 Router.
2 x 2 HD/SD-SDI outputs.

For more details on enclosure types please refer to Frames and Hardware section.

IQSRT10   HD/SD-SDI 8 x 2 Router
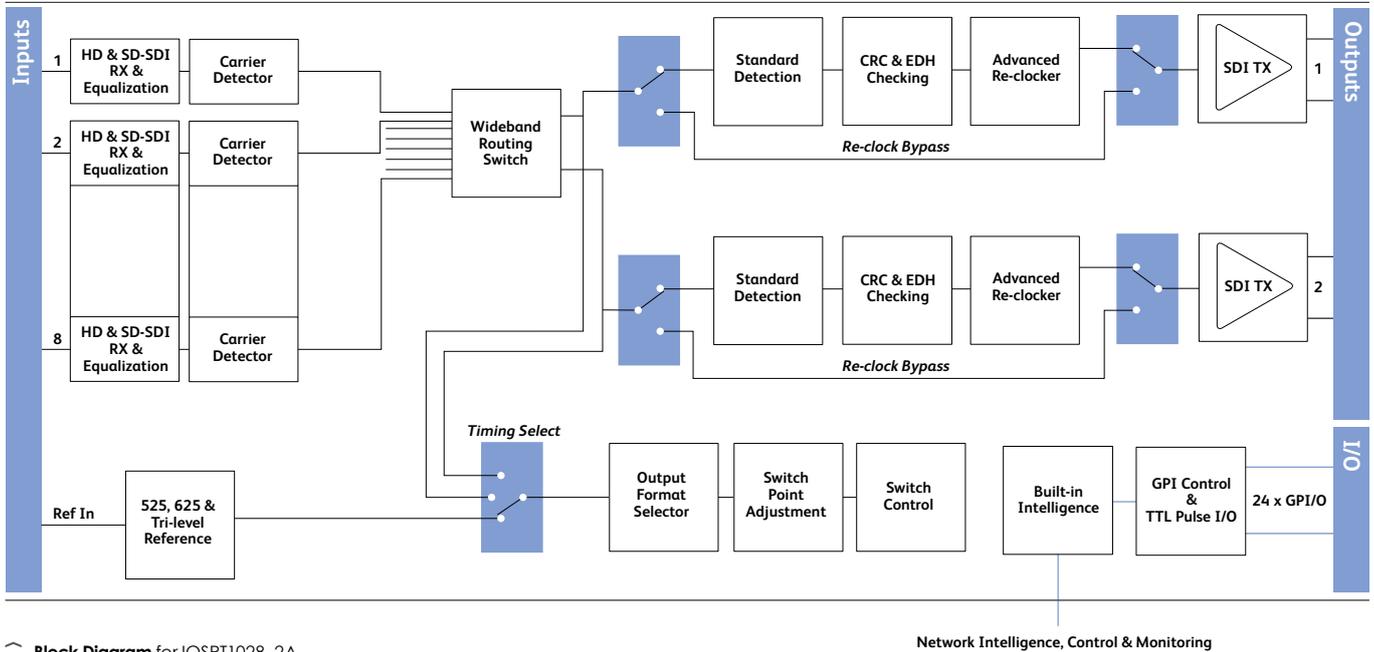
⌢ **Block Diagram** for IQSRT1028–2A

Technical Specification

Inputs and Outputs
Signal Input

Inputs	8 x Serial Digital Input(s)
Electrical	1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C/DVB-ASI
Input cable length	Up to 140m Belden 1694A @ 1.5 Gbit/s
	Up to 350m Belden 1694A @ 270 Mbit/s
Analog reference	1 x Analog Reference to SMPTE240/274M and RS170A
Connector / format	BNC/75ohm panel jack on standard SAM connector panel
Return loss	>–15dB

Signal Outputs

Outputs	2 x 2 Serial Digital Outputs
Electrical	1.5Gbit/s HD-SDI, SMPTE 292M 270 Mbit/s SDI, SMPTE 259M-C/DVB-ASI
Connector / format	BNC/75ohm panel jack on standard SAM connector panel
Return loss	>–15dB

Controls
Indicators

Power	OK
CPU	OK
Status	OK (Green), Warning (Yellow), Error (Red)

GPI Control
24 programmable

GPI/Os	8 Tallies Output 1
	8 Tallies Output 2
	8 Router Selection

RollCall Features

Router control	Switching control of input to output channels
Router configuration	Displays current router channel allocation
Channel renaming	Labelling of all input channels
User memories	16 x Save / Recall / Rename
Logging	Input Status (1-8)
	CRC/EDH Error
	Input Standard
	Ref Status
	Output 1/2 standard
RollTrack controls	On/Off, Index, Source, Address, Command, Status, Sending
RollTrack outputs	Input present - 1 to 8
	Output 1 Tallies
	Output 2 Tallies
	Reference OK
	Input Loss - 1 to 8
	Unused

Specifications
Inputs

Reference source	External – HD Tri-Level / SD Bi-level / Output Video syncs

Power Consumption

Module power consumption	11 W Max (A Frames)
	10.5 PR (B Frames)

SAM offers high quality, technologically advanced yet cost effective solutions

IQ Modular
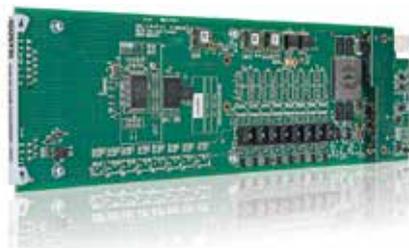
Loudness monitoring and control

Variations in loudness between programs and stations is a well known issue. Not only is the problem found during programs – the issue of loud commercials, where volume levels jump during commercial breaks, is a common complaint amongst digital television viewers and can even drive them away from a channel.

The solution is monitoring of channel output, however in today's cost-concious business environment there is little scope to provide appropriate levels of staffing to monitor and control audio levels manually. There exists a requirement for intelligent technologies that can address the issue as part of a wider scale transmission system.

IQ has a range of modules with built in loudness measurement and control for either stereo or 5.1 surround sound audio.

Using proven technology developed by Linear Acoustic, a leader in this field, IQ ensures your HD transmissions to contain high quality sound at the correct levels without the need for additional equipment and expense.

LĪ LINEAR ACOUSTIC®

Audio processing from
Linear Acoustic

Intelligent monitoring

Building on their experience of modern broadcast monitoring requirements SAM has developed Hyperion and Media Biometrics, entirely new ways to monitor the integrity of content that passes through every stage of the broadcast infrastructure. Designed on the belief that opinion-based human intelligence is a more effective way to validate content quality than simply monitoring the technical parameters of a video signal, Hyperion and Media Biometrics provides a set of intuitive processes that enable an in depth analysis of the video and audio data.

- They evaluate the content of a television signal as well as measuring the absolute technical properties of the signal carrying that content.

- They enable more sophisticated multi-channel content monitoring and significant new protections when airing premium, high-value television programs. Included with Hyperion are additional tools including

- Remote monitoring over IP via low bit rate video thumbnails

- Timecode logging for accurate event tracking

- Content identification from source to output using UMID metadata. In addition all IQ modules with RollCall capability contain standard monitoring parameters to aid total system monitoring.

Signal path protection

IQ signal protection modules employ dual synchronizers to enable re-timing of input signals and provides clean switch to/from backup feed.

Key benefits include;

- Rules based change-over with detection on both video and embedded audio parameters

- Change-over externally controllable via GPI and RollTrack messages from other modules, including Hyperion content analyzers

- Main, backup or follow selections for monitor outputs provide flexibility and enables preview of backup channel

- Full 16 channel audio passing around the synchronizers, delayed to match the video

- Auto PCM and Dolby detect to remove SRCs as required

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Index

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