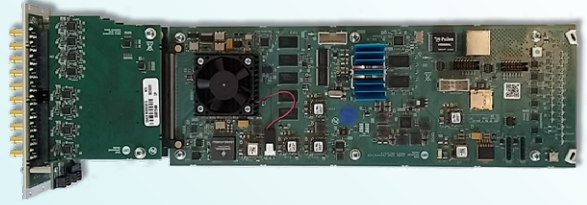


IQUCP25 Universal Compute Processor for 25 GbE IP Systems



The IQUCP25 is a user-configurable multichannel video/audio-over-IP transceiver developed for use within low-latency and high-bandwidth Ethernet IP networks using either SMPTE ST 2110 or SMPTE ST 2022-6 encapsulation standards, with 2x 25 GbE links (SMPTE ST 2022-7) providing “hitless” redundancy switching.

The IQUCP25 Universal Compute Processor can adopt different Software Cores to provide low-latency, high-bandwidth multichannel broadcast processing/routing for SDI, MADI and IP applications.

This flexible powerhouse can deliver up to 16 channels of 3G-SDI, four channels of UHD-SDI (12G or Quad-link) or 8 bidirectional MADI channels, while seamlessly integrating with Grass Valley’s broadcast-centric IP routing and management solution GV Orbit to offer, fast, clean and quiet switching.

IQUCP-EP is the Essence Processing core and acts as a high-performance, versatile gateway which can encapsulate or de-encapsulate to/from uncompressed

SMPTE ST 2110 and/or SMPTE 2022-6. Various modes of operation are available offering SDI to IP, IP to SDI or combinations of the two. UHD support is provided via Single Stream and/or Quad Stream for both SDI and SMPTE ST 2110, enabling a seamless transition from SDI<>IP for all system architectures. Multiple SMPTE ST 2110-30 audio flows per channel can be configured to support 1x16 channels, 2x8 channels or 4x4 channels embedding/de-embedding to/from SDI.

IQUCP-MD is the MADI Gateway core that provides a multichannel MADI to/from IP interface and has been developed to allow high-density audio integration into SMPTE ST 2110 production networks. It handles up to 16 MADI signals (8 in

& 8 out) over dual 10 GbE or 25 GbE IP links, with the option to provide MADI link redundancy. Up to 64 channels of uncompressed audio MADI can be transported using the SMPTE ST 2110-30 Level A, B and C. Multiple audio flows per MADI can be configured to support 1x64, 2x32 or 4x16 channels.

The IQUCP25 is fully compatible with Grass Valley’s new broadcast-centric SDI/IP routing and network management solution GV Orbit, designed to migrate broadcasters from a traditional baseband routing and control environment to a new hybrid SDI and IP workflows.

Key Features

General Features

- Handles up to 16 SDI signals over dual 25 GbE IP links (number of channels dependent on SDI signal format)
- SDI embed/de-embed of up to 4 audio flows per channel
- Multiple SDI standards and formats supported, including 12G Single-link & 2SI 1080p (3G) modes over Single-stream or Quad Stream SMPTE ST 2110
- Supports configuration of Ethernet links for maximum signal transport using both SFPs or for dual-link mode to provide link redundancy as per SMPTE ST 2022-7, and when operating as a receiver will dynamically adapt to any stream presented to it
- Supports IGMPv3 source-specific multicast, allowing transmission in multicast groups
- Supports frame-synchronized SDI inputs and outputs, with audio rate adaptation, referenced to either SMPTE ST 2059-2 PTP or via the IQH4B frame analog reference bus for blackburst/trilevel syncs
- Fast, clean and quiet switching via make-before-break or break-before-make
- Low delay mode and independent H & V offset available for each channel along with up to two frames of video, and up to 255 ms of audio delay

- Seamless integration with GV Orbit Control, Configuration & Monitoring software, including logging and reporting
- SMPTE ST 2022-7 Class A & D seamless protection switching
- SMPTE ST 2059-1 & -2 precision time protocol
- NMOS IS-04 discovery and registration with group hints tag support
- NMOS IS-05 device connection management
- In-band or out-of-band control of NMOS
- Support of DHCP, LLDP and DNS-SD for easy IP configuration
- Both FC-FEC (Fire Code) and RS-FEC (Reed Solomon IEEE) Forward Error Correction are supported
- Dual SFP28 Flexible Ethernet for 25 GbE SFP28 cage:
 - SFP-25G-SR for short-range multimode optical connections
 - SFP-25G-LR for long-range single-mode optical connections
 - 10GBASE-SR for short-range multimode optical connections supported for IQUCP-MD essence only
 - 10GBASE-LR for long-range single-mode optical connections supported for IQUCP-MD essence only

Essence Processing (EP) Features

- SMPTE ST 2110-20 video including UHD Single-stream
- SMPTE ST 2110-21 Wide/Narrow profile receivers and Narrow senders
- SMPTE ST 2110-30 PCM audio
- SMPTE ST 2110-40 metadata associated with SMPTE ST 2110-20 video stream
- SMPTE ST 2022-6 Transport of High Bit Rate Media Signals (HBRMT) (SDI) over IP Networks

MADI Essence (MD) Features

- Handles up to 16 MADI signals (8 in & 8 out) over dual 10/25 GbE IP links, with the option to provide MADI link redundancy
- Audio delay per IP output stream of up to 128 ms
- Uncompressed PCM audio transport using SMPTE ST 2110-30
- Audio tone generator available for MADI channels, with selectable tone frequencies of 1 kHz, 2 kHz, 4 kHz and 8 kHz
- Audio channel selection per IP stream from 1-64 channels, plus packet time selection of 125 µs, 250 µs, 500 µs, 1 ms and 4 ms
- Source/destination audio channel shuffling

Why should you choose this module?

- Re-purpose existing hardware modules for alternate tasks as network needs and requirements evolve
- Using a 25 GbE transport allows many more signals to be sent over a single fiber thereby reducing the required link count and minimizing dark fiber leasing cost
- Generate signal transport efficiency by running multiple SDI signals over a single Ethernet link and provide the link between existing SDI equipment and future IP network architectures
- Provides a flexible and cost-effective way to integrate MADI audio devices into Ethernet IP networks for efficient signal transport
- Using IGMPv3 source-specific multicast allows fast configuration of network routes and provides the basis for clean switching at the destination unit
- Full GV Orbit compatibility provides an all-inclusive remote configuration, control and monitoring solution
- Comprehensive SNMP support combined with compliance to IP Open Standards (AMWA NMOS) allows easy integration with third-party Network Management Systems

IQH4B Frame

4 RU



**10x IQUCP25 = 160 HD/3G-SDI Channels,
40 x UHD (12G-SDI) Channels or 80 Bidirectional
MADI Channels**

The IQUCP25 module is installed in the high-density IQH4B modular frame giving flexibility to configure up to 10 cards for a density of 160 HD/3G-SDI, 40 12G-SDI UHD channels or 80 bidirectional MADI channels in a 4 RU frame. The IQUCP25 can also be installed in the IQH3B 3 RU modular frame.

Specifications

Inputs and Outputs

Signal Inputs/Outputs

- MADI: BNCs 1-8 inputs, BNCs 9-16 outputs
 SDI: 16x bidirectional, see configuration table
 SDI Standards:
- SMPTE ST 259-C (270 Mb/s)
 - SMPTE ST 292 (1.485, 1.485/1.001 Gb/s)
 - SMPTE ST 424 (2.970, 2.970/1.001 Gb/s)
 - SMPTE ST 2082-1:2015 (BNCs 1, 2, 3 & 4)
- MADI Standards:
- AES10-2003

Supported Formats:

- SD: 480i59.94, 576i50
- HD: SMPTE ST 274: 1080p23.98, 1080p29.97, 1080i59.94, 1080i50
- HD: SMPTE ST 296: 720p59.94, 720p50 3G: SMPTE ST 425 level A (mapping 1)
- UHD: Quad Link 2SI 1080p (1.5G) SMPTE ST 274: 1080p23.98, 1080p29.97
- UHD: Quad Link 2SI 1080p (3G) SMPTE ST 425-5: 1080p59.94, 1080p50
- 12G: SMPTE ST 2082-10: 2160p59.94, 2160p50

Connector/format: HD-BNC/75Ω panel jack on standard connector panel

Ethernet Signal

SFP+ Optical: 2x 25 GbE Ethernet
 Conforms to: IEEE 802.3by – 25 GbE over fiber
 SFP+ connected cable: 2x 25 GbE Ethernet
 Conforms to: IEEE 802.3 – 25 GbE over twinaxial cables

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

Controls

Indicators

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

Power Consumption

Module power consumption: 34.5 PR (B Frames)

IQUCP25-EP Configurations

SD/HD/3G Mode of Operation

| | SDI > IP | IP > SDI | Format | Capabilities |
|-------|----------|----------|-------------------------------|---|
| UCP25 | 8 | 0 | 480i59.94, 576i50 | 1x SDI Frame Sync, 1x 2022-6, 1x 2110-20/30(x4)/40 |
| | 16 | 0 | 720p50/59.94 1080i50/59.94 | 1x SDI, 1x 2022-6, 1x 2110-20/30(x4)/40 |
| | 8 | 8 | 1080p23.98/25/29.97/50/59.94 | |
| | 4 | 12 | | |
| | 0 | 16 | | |
| | 12 | 4 | | RS-FEC: 1x SDI, 1x 2022-6, 1x 2110-20(RX)/30(x4)/40, 1x SDI, 1x 2022-6(RX), 1x 2110-20/30(x4)/40 FC-FEC: 1x SDI, 1x 2022-6, 1x2 110-20/30(x4)/40 |

UHD/12G Mode of Operation

| | | | | |
|---------|---|---|---|--|
| UCP2500 | 2 | 2 | 720p50/59.94 1080i50/59.94 1080p23.98/25/29.97/50/59.94 | 1x SDI, 1x 2110-20/30(x4)/40 |
| | 2 | 2 | 2160p50/59.94 | 4x SDI (Quad Link 3G 2SI), 1x 2110-20/30(x4)/40 |
| | 2 | 2 | 2160p23.98,25/29.97 | 4x SDI (Quad Link HD 2SI), 1x 2110-20/30(x4)/40 |
| UCP2504 | 2 | 2 | 720p50/59.94 1080i50/59.94 1080p23.98/25/29.97/50/59.94 | 1x SDI, 1x 2110-20/30(x4)/40 |
| | 2 | 2 | 2160p50/59.94 | 4x SDI (Quad Link 3G 2SI), 1x 2110-20/30(x4)/40 1x SDI (12G), 1x 2110-20/30(x4)/40 1x SDI (12G), Quad Stream 2110-20/30(x4)/40 |
| | 2 | 2 | 2160p23.98,25/29.97 | 4x SDI (Quad Link HD 2SI), 1x 2110-20/30(x4)/40 |

IQUCP25-EP UHD Modes

| Outputs | | UHD Single Stream | | UHD Quad Stream (2SI) | | | UHD Quad Stream (SDQS) | | |
|------------------------|---------------------|-------------------|---------------------|-----------------------|--------------------|---------------------|------------------------|--------------------|---------------------|
| | | 1x 12G SDI | 1x SMPTE ST 2110-20 | 4x 3G SDI | 4x SMPTE ST 2022-6 | 4x SMPTE ST 2110-20 | 4x 3G SDI | 4x SMPTE ST 2022-6 | 4x SMPTE ST 2110-20 |
| UHD Single Stream | 1x 12G SDI | | ● | | ● | ● | | | |
| | 1x SMPTE ST 2110-20 | ● | | ● | | | | | |
| UHD Quad Stream (2SI) | 4x 3G SDI | | ● | | ● | ● | | | |
| | 4x SMPTE ST 2022-6 | ● | | ● | | | | | |
| | 4x SMPTE ST 2110-20 | ● | | ● | | | | | |
| UHD Quad Stream (SDQS) | 4x 3G SDI | | | | | | | ● | ● |
| | 4x SMPTE ST 2022-6 | | | | | | ● | | |
| | 4x SMPTE ST 2110-20 | | | | | | ● | | |

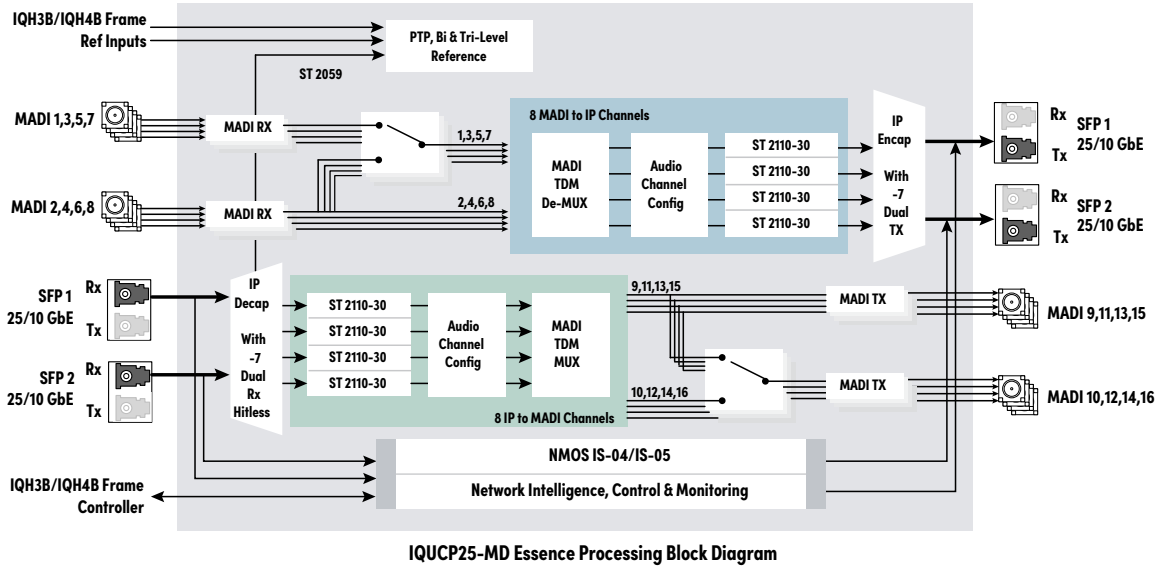
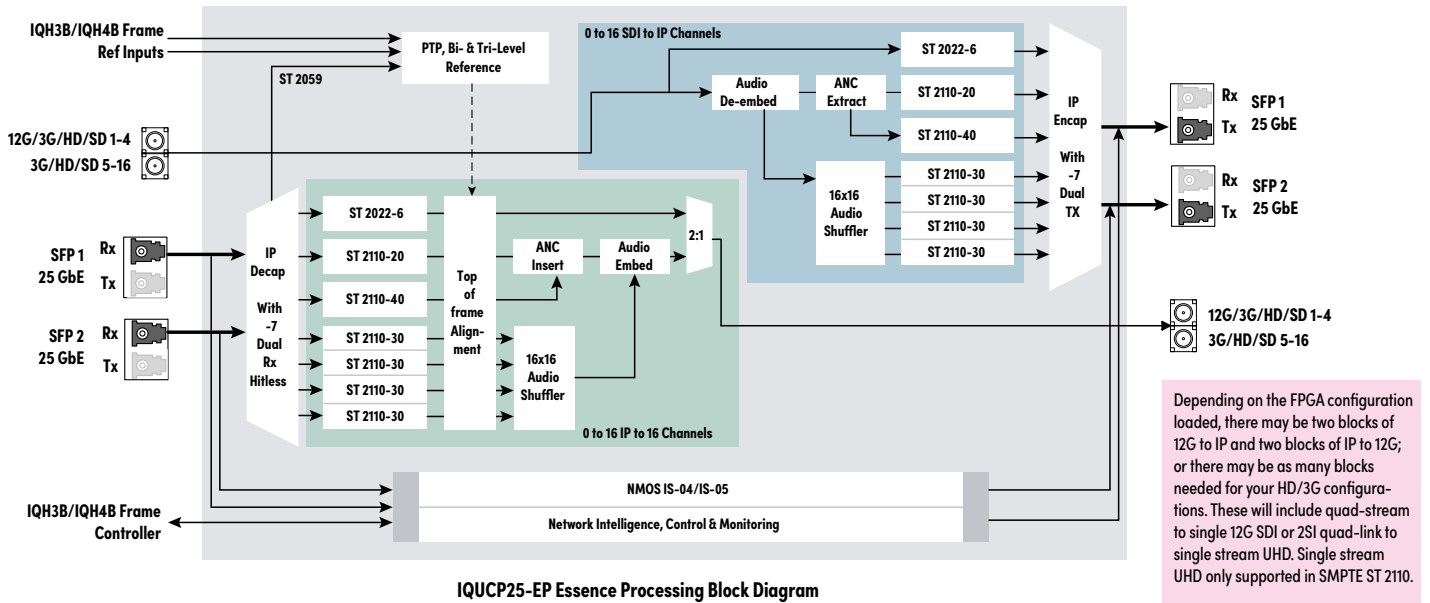
| Mode | Formats | Density | Max Channels | Channel Order | SD/HD/3G | BNC Location |
|------------|----------|---------|--------------|---------------|-------------|------------------------------|
| 1:1 / 4:4* | SD – 3G | High | 16x 3G | 1-16 | 1-16 | 1-16 / 1-4, 5-8, 9-12, 13-16 |
| 1:1 | SD – UHD | Low | 4x UHD | 1, 5, 9, 13 | 1, 5, 9, 13 | 1, 2, 3, 4 |
| 1:4** | SD – UHD | Low | 4x UHD | 1, 5, 9, 13 | 1, 5, 9, 13 | 1, 2, 3, 4 |
| 4:1* | SD – UHD | Low | 4x UHD | 1, 5, 9, 13 | 1, 5, 9, 13 | 1-4, 5-8, 9-12, 13-16 |

* 4:4 can be managed in quad groups using Link Control. In this mode, max. channels is reduced to 4.

** Quad groups occupy 4 channels, single stream (SDI or IP) will occupy master (1, 5, 9, 13) with slave controls/logging.

Bandwidth Considerations

| Rx IP Format | Video Format | Max IP Rx Channels (static routing) | MBB Routing | BBM Routing |
|--------------------|--------------|-------------------------------------|---|------------------------|
| 1x SMPTE ST 2110 | 1080p50 | 16 | Max Rx reduced by 1 for each simultaneous MBB route | No loss of Rx channels |
| 1x SMPTE ST 2110 | 1080p59 | 13 | | |
| 1x SMPTE ST 2022-6 | 1080p50 | 14 | | |
| 1x SMPTE ST 2022-6 | 1080p59 | 12 | | |
| 1x SMPTE ST 2110 | 2160p50 | 4 | | |
| 1x SMPTE ST 2110 | 2160p59 | 4 | | |



Ordering

Order codes for IQH enclosures*

IQUCP2504-2B3

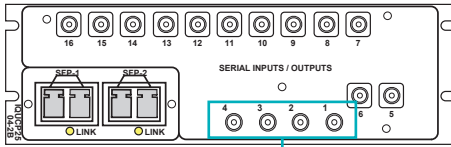
IQUCP25 Universal Compute Processor. Hybrid SDI/MADI & IP, 4x SDI I/O up to 12G and 12x SDI I/O up to 3G or 8 MADI input and 8 MADI outputs, 2x 25 GbE or 2x 10 GbE ports. Suitable for IQH4B frames

Note: at least one processing license must also be ordered

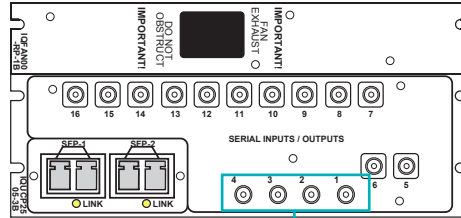
IQUCP2505-3B3

IQUCP25 Universal Compute Processor. Hybrid SDI/MADI & IP, 4x SDI I/O up to 12G and 12x SDI I/O up to 3G or 8 MADI input and 8 MADI outputs, 2x 25 GbE or 2x 10 GbE ports.

Note: at least one processing license must also be ordered (Includes IQFAN00-RP for additional cooling in IQH3B frame)



These BNCs support MADI & SD/HD/3G/12G-SDI,
all other BNCs support MADI & SD/HD/3G-SDI



Software Defined Core Licenses

IQUCP-EP

Essence processing license for SDI to/from IP with synchronization and audio rate adaptation

IQUCP-MD

Essence processing license for MADI to/from IP for IQUCP25 with 25G or 10G SFPs

SFP Options

FCS-25GE-SR

25GBASE-SR short range SFP for MMF

FCS-25GE-LR

25GBASE-LR long range SFP for SMF

FCS-10GE-SR

10GBASE-SR short range SFP for MMF (multimode fiber) supported for IQUCP-MD essence only

FCS-10GE-LR

10GBASE-LR long range SFP for SMF (single-mode fiber) supported for IQUCP-MD essence only

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

* Although IQ modules are interchangeable between enclosures, their rear panels are enclosure specific. Order codes 'A' or 'B' may be used when installing modules in a 'B' enclosure. However, order code 'A' must be used when installing modules in an 'A' enclosure. Please take time to ensure that the compatible order code is selected to match the chosen enclosure.

This product may be protected by one or more patents. For further information, please visit: www.grassvalley.com/patents

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