Product Manual

QMOD-SDI1.5

QMOD™ HD Modulator-IPTV Encoder

April 22, 2014 Preliminary

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Overview

Employing a totally new HD encoding technology, the QMOD-SDI1.5 continues the QMODTM track record for quality and innovation, setting a new benchmark for features and performance. In addition to standard SDI resolutions, the QMOD-SDI can accept 3G SDI and 60/30 Hz feeds from prosumer SDI sources. Users can upgrade operation for full scaling and dual-channel operation by entering optional upgrade key codes.

Sources

- One HD-SDI input, 3G 1080p and 1080i/720p 59.94/60 Hz HD-SDI, and
  SD-SDI 480i widescreen/4:3 video; also accepts embedded 608/708 captioning and Dolby AC-3 and AES audio
- One Component input, 1080i, 720p, 480p, 480i video
- One Composite video input for encoding, captioning, or EAS use
- Stereo, optical and coax audio inputs

Encoding

- Creates a high-definition 720p/1080i MPEG-2 stream for broadcast
- Accepts pass-through AC-3 audio, converts stereo and PCM to stereo AC-3, can create dual-language audio for each program
- Includes captioning from Line 21 data on composite video inputs
- Flex encoding downscales 1080p to 1080i, allows use of 720p/1080p 60Hz sources, and compensates for 60/30 Hz sources such as consumer HD cameras
- QSDI-Scale upgrade key allows full video up- and down-conversion
- QSDI-Dual 2-channel upgrade key allows selection of inputs to create 2 HD channels

Output

- Delivers a fully agile QAM 64/256 digital cable channel 2-135
- Up to 270 HD Programs/Channels per system
- Streams IPTV from GigE Ethernet port
- Distributes channel over an on-site broadband cable system with adjustable output level to 29 dBmV, compatible with all cable format broadband systems

Operation

- Sets up with front-panel buttons and easy to use menus, including inputs, encoding, channel, and RF options.
- Onboard Web page for setup and monitoring, also accessible from front-panel USB port
- Control with IP Telnet commands
- Saves power and rack space using efficient design
- Includes compact switching power supply
- Mounts in optional 1RU single (RK1) or dual (RK2EZ) 19" rack kits
- Meets RoHS safety and California energy standards

Installation - Settings

There are 3 ways you can change the settings:

- **Front Panel.** Press the SETUP button use the Up/Down buttons to move through menus, Left/Right to change settings, then press SELECT to store the changes at each step.
    - Select a menu group (Quick, A, B, QMOD), then SELECT to view that group's menus
    - Press SETUP to move back to other menu groups
- **Ethernet**. Access the onboard Web pages. Helpful for remote access when system is fully integrated with site Ethernet.
- **USB-Web.** Access Web pages from front-panel USB port, simplest solution for full setup, requires no IP setup or connection, connect from the front of the equipment rack

Front Panel Menus

There are four groups of menus you can choose from:

- **Quick Setup** supplies just the few steps needed to output the source as a channel.
- **Program A** goes deeper in to all the options for the first source
- **Program B** does the same for the second source, if that option is enabled
- **Common** menus set the core values for the entire channel, such as IP address, level, cable plan, and other options

Quick Setup Menus

This series is designed for a quick setup for testing and integration.

Channel	Sets the physical channel, 2-135
RF Level	Sets the RF level for the channel **29 | 25 | 21 | 17 | 13 | 9**
Video A Input	Selects the video input for Program A **SDI | YPbPr | Video 1| Video 2**
Audio A Input	Selects the audio input for Program A **None | SDI G1 | SDI G2 | SDI G3 | SDI G4 | Optical | Coax | Analog 1|Analog 2**
Video B Input	Selects the video input for Program A **SDI | YPbPr | Video 1| Video 2**
Audio B Input	Selects the audio input for Program A **None | SDI G1 | SDI G2 | SDI G3 | SDI G4 | Optical | Coax | Analog 1|Analog 2**

At this point, you should be able to view the QMOD channels on a test TV.

A QMOD Channel, or any QAM Channel. can include two video streams, called Programs. It's really one stream that contains both videos. The TV figures out which to play using the channel ID, typically something like channel IDs 2.1 and 2.2, 3.1 and 3.2 and so on. For marketing purposes we use the popular term "2-Channel" the general public understands, for integrators we use the more correct term "2 Programs".

Program A and Program B

This series of menus lets you drill down to all the possible options for either Program.

Audio 1 Input	Sets audio for the currently selected source. If you plan on switching sources in your application, select each video input, then select the associated audio. The audio will then automatically follow the selected video input. **None | SDI G1 | SDI G2 | SDI G3 | SDI G4 | Optical | Coax | Analog 1|Analog 2**
Audio 1 Format	Selects audio format for stereo PCM or analog audio. Incoming AC3 audio encoding will be passed through. **AC3 | MP12**
Audio 1 Lang	Displays metatext for audio channel language. **English | Spanish | Portuguese |French|German**
Audio 2 Input	Sets the source for the second audio track for the selected video input. **None | SDI G1 | SDI G2 | SDI G3 | SDI G4 | Optical | Coax | Analog 1|Analog 2**
Audio 2 Format	Selects audio format for stereo PCM or analog audio. Incoming AC3 audio encoding will be passed through. **AC3 | MP12**
Audio 2 Lang	Displays metatext for audio channel language. **English | Spanish | Portuguese |French|German**
Video Input	Select the video input **SDI | YPbPr | Video 1| Video 2**
Resolution	When the scaling option is active, you can specify the output resolution. When it's not, the output will be set by the input. **1080i | 720p | 480p | 480i**
Bitrate (Mbps)	Bitrate is adjustable in half steps from 10-25. Default rate will be 18 Mbps, and settings will be limited to 18 when 2-channel mode is enabled.
Chan Major ID	Major virtual channel ID for program. Default is 000, will automatically insert the physical channel number as the Major ID.
Chan Minor ID	Minor virtual channel ID. Default is 1, if set to 000, channel ID will only use the Major channel ID
Chan Name	Enters channel short name, up to 7 characters. QMOD A or QMOD B is default text. Press right or left arrow to start editing, use Up and Down arrows to select character.
No Vid Color	Sets background color displayed when no video is present **Orange | Purple (default) | Green**
Major ID	Major virtual channel ID for program. Default is 000, will automatically insert the physical channel number as the Major ID.
Minor ID	Minor virtual channel ID. Default is 1, if set to 000, channel ID will only use the Major channel ID
Name	Enters channel short name, up to 7 characters. "QMOD" is default text. Press right or left arrow to start editing, use Up and Down arrows to select character.
Sync Trig Level	May help how fine details are displayed **1-4**
Horiz Freq	Shows horizontal frequency of source
Vertical Freq	Shows vertical frequency of source
Lines	Shows number of lines in source video

Common

This series of menus sets global values for QMOD operation

Channel	Sets the physical channel, 2-135
QAM	Selects QAM 64 or QAM 256 (default). Fixed at 256 when 2-channel mode is enabled. Continuous Wave is often used to test the channel with a meter. **256 | 64 | CW**
Cable format	Standard cable frequencies (default) HRC – same as Standard, channels 5 and 6 slightly different IRC – All channel frequencies are different than the standard cable setting
QAM Type	Selects QAM 64 or QAM 256 (default). Fixed at 256 when 2-channel mode is enabled. Continuous Wave is often used to test the channel with a meter. **256 | 64 | CW**
RF Level	Sets the RF level of the channel. **29 | 25 | 21 | 17 | 13 | 9**
IP Mode	Selects Static (default) or DHCP IP modes • DHCP will select new address • IP Address will show change when you select DHCP • If you go back to Static, the address you defined in that mode will be set
IP Address	192.168.1.231 Left/Right steps through each group, click Up or Down arrow to step one at a time, hold down to move faster. Address also appears on LCD when QMOD restarts.
Gateway	255.255.255.000 Quad address – Left/Right steps through each group, click Up or Down arrow to step one at a time, hold down to move faster.
Subnet Mask	255.255.255.0 Subnet has a limited range of combinations, so this function is simplified Left/Right steps through each group, click Up or Down arrow for options
Telnet Port	2728 (default) IP port for Telnet communication – Click or hold Up or Down to set.
Output Stream	Select outputs for stream, IP menus only appear when selected. **RF |IP|RF+IP**
QMOD IP Port	Enter IP address for IPTV
UDP Mode	Selects UDP mode, sub menus change depending on mode **Unicast|Multicast**
DstMultiAddr	Enter IP address for multicast
Dest IP Addr	Enter IP address for unicast
Dest IP Port	Enter destination port for unicast or multicast
MAC/SN	Shows network MAC address Ex: 00:04:9F:14:30:40 (last 2 bytes is the serial number)
LCD Contrast	Contrast 1-15
LCD Bright	Display brightness 1-16
Temperature	Internal temperature
Fan Speed	Set fan speed in percent
Backlight	Display brightness 1-10
CVCT	Activates inclusion of virtual channel ID and short Name in the video stream. **On (default) | Off**
2nd Chan Key	Enter update key
Scaler Key	Enter update key
CVCT	Activates inclusion of virtual channel ID and short Name in the video stream. **On (default) | Off**
FW version	Firmware version

Web pages

The Web pages provide the same settings as the front-panel menus in simple Web forms (QMOD-HDMI1.5 pages shown as an example).

Quick Setup shows the basic setup options.

The **Program A** and **Program B** pages offer a full range of setup features for each program.
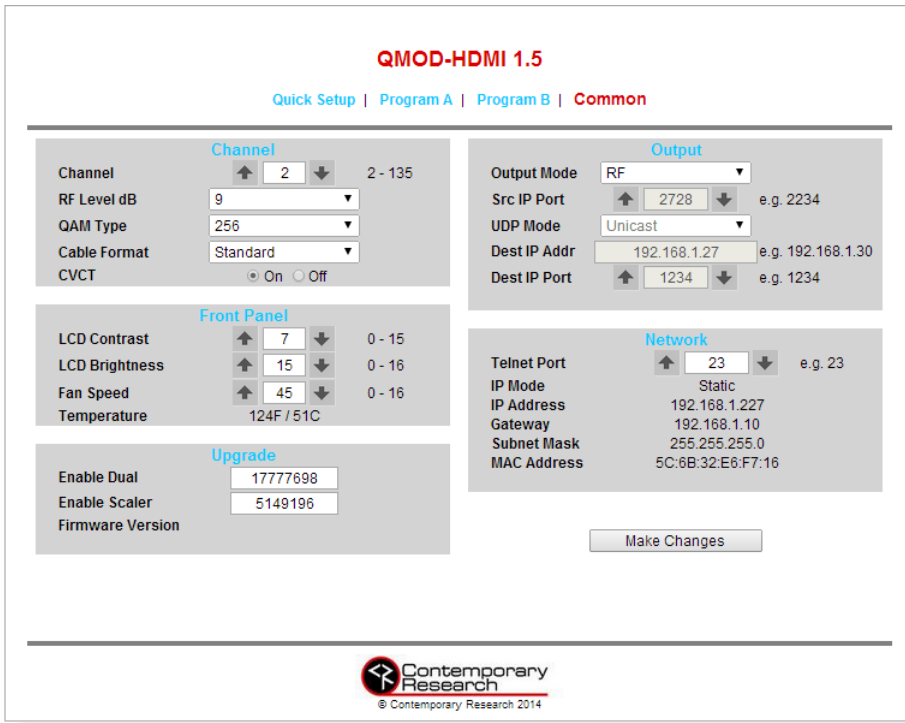
The **Common** pages change global values for the QMOD.

Web Pages via USB

When you don't have an Ethernet connection, you can view the pages through the front USB port.

- Connect a USB cable from the QMOD to your Windows PC, unit will auto-install
- Go to Control Panel – Network and Internet – Change Adapter Settings
- Right-click the **USB Ethernet/RNDIS Gadget**
- Select **Internet Protocol Version 4**, select **Properties** and enter this info:
  - IP Address: 192.168.277.228
  - Subnet Mask: 225.225.225.0
  - All else blank
- Enter 192.168.227.227 in your browser to see the QMOD Web pages

Installation - Sources

Process

- Connect source(s) to appropriate inputs
- Perform Quick Setup from front panel to test operation and channel
- Use USB Web pages or front panel menus to compete the setup
- The front panel LEDs will light if 2-channel or scaling options are enabled

SDI

- Source can be 1080p 60/59.94 Hz, 1080i 60/59.94 Hz, 720p 60/59.94 Hz, or 480i 29.97 Hz
- QMOD will sync to SDI resolution and display format on front panel display
- 1080p 3G SDI will be formatted as 1080i (there is no 1080p format in QAM presently)
- If the resolution is not one of the above, the display will state "Incorrect SIG"
- If the QMOD can't connect to the SDI feed, display will read "No Signal". If there is a signal, the connection can often be made using an SDI re-clocking device.

Component

- The YPbPr signal can be 1080i 29.97/30 Hz, 720p 59.94/60 Hz, or 480p/480i 29.97/30 Hz
- If the source has captioning data, that can be included by connecting the Composite out to the Video/CC input

Video/CC

- The Video/CC input can be used to create an SD digital channel, or to feed Line 21 captioning data

Audio Inputs

- SDI audio can be assigned to four groups of embedded audio, Dolby audio is passed through, stereo AES is processed as AC-3 stereo in the program
- The Coax, Optical and analog Stereo inputs can be assigned to any input
- When using 2 language tracks, the first will be AC-3, the second MPEG1 Layer 2 stereo

Ethernet

- The IP and Telnet ports are assigned via front panel or Web menus
- Streaming options can be set locally or remotely

EAS

- EAS (Emergency Alert System) operation is triggered by a latching input on the SW and Ground pins, a 5-12 VDC level on the V+ and Ground pins
- The assigned EAS inputs, usually Video and Stereo, will broadcast on both programs when active
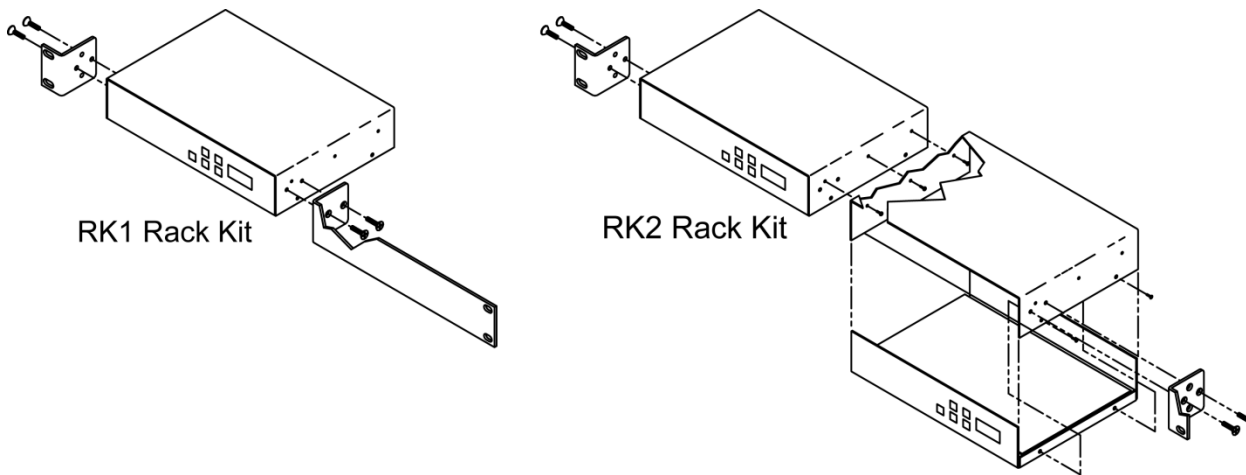
Rack Mounting

Three options are available for rack-mounting QMOD modulators.
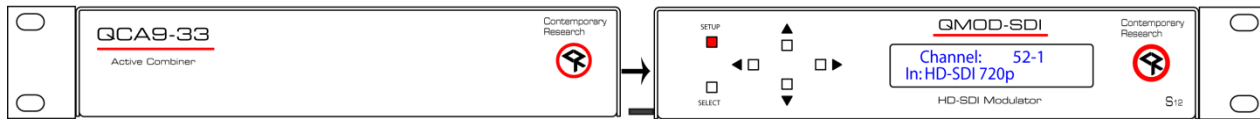
RK2 Dual Rack Kit with Tie Bar Mounting

New QMOD and QCA enclosures have a slot in the bottom middle of the case. This will accept a tie bar that will lock the two enclosures together without taking the cases apart .

1. Check that your enclosures have the tie bar slot.
2. Slide the included tie bar into the side of one unit and attach with the included screws.
3. Slide the other unit into the tie bar, and attach the screws
4. Add the rack mounts to the sides.

RK1 Rack Kit   RK2 Rack Kit

RK1 Single Unit Rack Mount

Attach the long and short rack ears to the side and towards the front of the unit with the four (4) supplied 8-32 by ¼" (black) countersunk screws.

RK2 Style – Locking Cases together

1. Remove top cover of the first unit by removing the ten (10) black screws.
2. Attach cover of first unit to the side of the second with three (3) supplied 4-40 by 1/4" (silver colored) panhead screws and split lock washers. Note that only one side of the second unit has the (3) built in nuts to accept the screws above.
3. Reinstall the bottom/chassis of the first unit underneath its cover and attach with just eight (8) of the screws removed in step 1.
4. Attach short rack ears to the side and towards the front of each unit with the four (4) supplied 8-32 by 1/4" (black) countersunk screws.

Specifications

Physical	8.5" [216mm] wide x 1.73" [62mm] height (1RU) x 6.0" [153mm] deep
	1.5 lbs [0.68kg]
	+32° to 122° F operating temperature, convection cooled
	Rack mounting for one or two units side-by-side optional (RK1, RK2EZ)
Front Panel	Select and directional buttons for menu setup
	Menu LCD, Blue with 2 lines of 20 white characters each
Encoding	MPEG2 Profile:MP@HL for HD, MP@ML for SD
	1080i, 720p, 480p, and 480i resolution
	Up to 2 programs in MPEG2 transport stream for QAM and IPTV
	Video Encoding bitrate 10-25 Mbps in half-step settings
	AC-3 (Pass-through or stereo) or MPEG1, Layer 2 audio
	MTS Dual-language capability, 2nd language will be MPEG1
	Full scaling for video up- and down-conversion with optional upgrade key
	Dual-channel operation with optional upgrade key
Modulation	Switchable 64/256 QAM, J83 Annex B, Interleaving Modes (128,1)
	MER 38 dB typical
Compliance	FCC Class B, ROHS, meets California standards
Power	2.1mm coaxial jack (inside center conductor positive)
	1.1A maximum, 11.5 to 13.5 VDC, 12 VDC typical
Rear Panel	
EAS	3 GPI Pins for latching control, SW for closure, V+ 5-12 VDC, Ground
SDI Input	BNC Female
	SD-SDI @ 270Mb/s, HD-SDI @ 1.485Gb/s, 3G SDI @ 2.970Gb/s
	Coax cable auto-equalizer for SD up to 460m, HD up to 230m (RG6)
	Resolutions 1080p at 59.94Hz, 1080i/720p at 59.94/60Hz, or SD 480i at 29.97Hz
	Video Format YCbCr 4:2:2
	Accepts SDI embedded Stereo/AC-3 48KHz audio
	Widescreen option for 480i
Video Inputs	**Component**: RCA Y, Pb, Pr (1080i/720p/480p/480i) , 59.94/29.97 Hz
	NTSC Video: RCA female (480i), 29.97 Hz, supplies line 21 Captioning
Audio Inputs	**Digital SPDIF**: Coax and TOSlink optical output, PCM 48K sample rate
	Analog L and R: 2 stereo RCA female jacks
	Inputs assignable to video inputs
RF Out	'F', female, 75 ohm impedance
	Agile, channels 2-135 (48-860 MHz), standard, HRC, or IRC spacing
	6 MHz bandwidth fits any open channel without interference to adjacent channels
	1 KHz resolution, +/- 30 ppm accuracy, +/- 35 ppm stability
	29 dBmV typical output power, attenuated in 5 steps, approx 4 dB
Includes	PS12-1 Switching power supply, 1A 12 VDC, fits in typical AC power strips
	PS12-4Y 4A power supply with Y cable to drive 2-4 QMODs (free at time of order)
Options	RK1 Single Rack Kit , RK2EZ Dual Rack Kit

Safety Instructions

Read before operating equipment.

1. **Cleaning** - Unplug this product from the wall outlet before cleaning. Do not use liquid cleaners or aerosol cleaners. Use a damp cloth for cleaning.

2. **Power Sources** - Use supplied or equivalent UL/CSA approved low voltage DC plug-in transformer.

3. **Outdoor Antenna Grounding** - If you connect an outside antenna or cable system to the product, be sure the antenna or cable system is grounded so as to provide some protection against voltage surges and built-up static charges. Section 810 of the National Electrical Code, ANSI/NFPA No. 70, provides information with respect to proper grounding of the mast and supporting structure, grounding of the lead-in wire to an antenna discharge unit, size of grounding conductors, location of antenna discharge unit, connection to grounding electrodes, and requirements for the grounding electrode.

4. **Lightning** - Avoid installation or reconfiguration of wiring during lightning activity.

5. **Power Lines** - Do not locate an outside antenna system near overhead power lines or other electric light or power circuits or where it can fall into such power lines or circuits. When installing an outside antenna system, refrain from touching such power lines or circuits, as contact with them might be fatal.

6. **Overloading** - Do not overload wall outlets and extension cords as this can result in a risk of fire or electric shock.

7. **Object and Liquid Entry** - Never push objects of any kind into this product through openings as they may touch dangerous voltage points or short out parts, resulting in a fire or electric shock. Never spill liquid of any kind on the product.

8. **Servicing** - Do not attempt to service this product yourself as opening or removing covers may expose you to dangerous voltage or other hazards. Refer all servicing to qualified service personnel.

9. **Damage Requiring Service** - Unplug this product from the wall outlet and refer servicing to qualified service personnel under the following conditions:
    *   When the power supply cord or plug is damaged.
    *   If liquid spills or objects fall into the product.
    *   If the product is exposed to rain or water.
    *   If the product does not operate normally by following the operating instructions. Adjust only those controls that are covered by the operating instructions. An improper adjustment of other controls may result in damage and will often require extensive work by a qualified technician to restore the product to its normal operation.
    *   If the video product is dropped or the cabinet is damaged.
    *   When the video product exhibits a distinct change in performance, this indicates a need for service.

Limited Warranty and Disclaimer

Contemporary Research Corporation (CR) warrants this product to be free from defects in material and workmanship under normal use for a period of two years from the date of purchase from CR. Should such a defect occur CR will repair or replace, at their option, the defective product at no cost for parts or labor.

This warranty extends to product purchased directly from CR or an Authorized CR Dealer. Consumers should inquire from selling dealer as to the nature and extent of the dealer's warranty, if any.

All warranty claims must be shipped pre-paid to the factory. Call or fax to obtain a Return Material Authorization (RMA) number.

CR is not liable for any damages caused by any of its products or for the failure of any products to perform, including any lost profits, lost savings, incidental damages, or consequential damages. CR is not responsible for any claim made by a third party or made for you by a third party. This limitation of liability applies whether damages are sought, or a claim is made, under this warranty or as a tort claim (including negligence and strict product liability), a contract claim, or any other claim. This limitation of liability cannot be waived or amended by any person. This limitation of liability will be effective even if CR or an authorized representative of CR has been advised of the possibility of any such damages.

Some states do not allow a limitation of how long an implied warranty lasts. Some states do not allow the limitation or exclusion of incidental or consequential damages for consumer products. In such states, the limitation or exclusion of the Limited Warranty may not apply to you. This Limited Warranty gives you specific legal rights. You may also have other rights that may vary from state to state. You are advised to consult applicable state laws for a full determination of your rights.

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