

Crestron HD-DA-2-QUAD
Quad 1-to-2 HDMI™ Distribution Amplifier
Operations Guide



This document was prepared and written by the Technical Documentation department at:



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Regulatory Compliance

As of the date of manufacture, the HD-DA-2-QUAD has been tested and found to comply with specifications for CE marking and standards per EMC and Radiocommunications Compliance Labelling.



Federal Communications Commission (FCC) Compliance Statement

This device complies with part 15 of the FCC Rules. Operation is subject to the following conditions:

(1) This device may not cause harmful interference and (2) this device must accept any interference received, including interference that may cause undesired operation.

CAUTION: Changes or modifications not expressly approved by the manufacturer responsible for compliance could void the user's authority to operate the equipment.

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and receiver
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected
- Consult the dealer or an experienced radio/TV technician for help

Industry Canada (IC) Compliance Statement

This Class B digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.

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Quad 1-to-2 HDMI™ Distribution Amplifier: HD-DA-2-QUAD

Introduction

The HD-DA-2-QUAD is a single rack-space unit containing four independent 1-to-2 HDMI distribution amplifiers. It is designed for splitting up to four HDMI, DVI, or DisplayPort Multimode signals to feed separate displays or processors, and is ideal for adding “loop-thru” capability to the inputs of a Crestron® DVPHD Digital Video Processor. The HD-DA-2-QUAD supports HDMI with Deep Color and HDCP, handling 1080p60 HDTV and WUXGA computer resolutions, and multi-channel HD lossless audio.

Features and Functions

- Provides four independent HDMI splitters
- Enables audio "loop-thru" for DVPHD inputs
- Supports HDMI with Deep Color and 7.1 channel HD lossless audio
- Passes EDID, CEC, and HDCP
- Compatible with DVI and DisplayPort Multimode*
- Supports video resolutions up to WUXGA 1920x1200 and HD 1080p60
- Includes front panel input sync LEDs
- Manages HDCP digital rights management for connected devices
- Performs automatic AV signal format management via EDID
- Single-space 19-inch rack-mountable
- Includes external power supply
- No programming or control system required

Computer Compatibility

Besides handling every available HDTV format supported by HDMI, the HD-DA-2-QUAD also supports computer resolutions up to 1920 x 1200 WUXGA, and is compatible with DisplayPort Multimode and DVI computer signals using a simple adapter or dongle*.

* HDMI requires an appropriate adapter to accommodate a DVI or DisplayPort Multimode signal. Adapters not included.

EDID Format Management

Embedded in the HDMI signal there is data called EDID (Extended Display Identification Data), which is generated by a display or audio processor to inform the upstream source about its format and resolution capabilities. In response to this data, the source configures itself to send the best video resolution and audio format that both devices can support. However, when splitting the source's output to two disparate devices, formatting conflicts may arise.

The HD-DA-2-QUAD overcomes formatting conflicts by determining the optimal video resolution, frame rate, color depth, and audio format that all of the devices can handle.

HDCP Key Management

By supporting HDCP, the HD-DA-2-QUAD ensures compatibility with all current and future high-definition signals. HDCP (High-bandwidth Digital Content Protection) is the digital rights management method that television and movie studios use to protect their content from unauthorized duplication. To support HDCP protected content, all devices in the chain must be HDCP compliant.

To manage the HDCP handshaking between devices, the source device (e.g., a Blu-ray Disc™ player or HDTV receiver) issues “keys” to the devices downstream. Every HDMI source device has a limit to how many downstream devices it can support, determined by the number of HDCP keys it has available. But rarely is that limit advertised or specified by the manufacturer or service provider, so connect too many displays or processors and the source will simply stop outputting a signal without warning.

To prevent such surprises, using Crestron Toolbox™ software, the HD-DA-2-QUAD can test the HDCP limits of each HDMI source, allowing the installer to configure the system around any limitations, or substitute a different component.

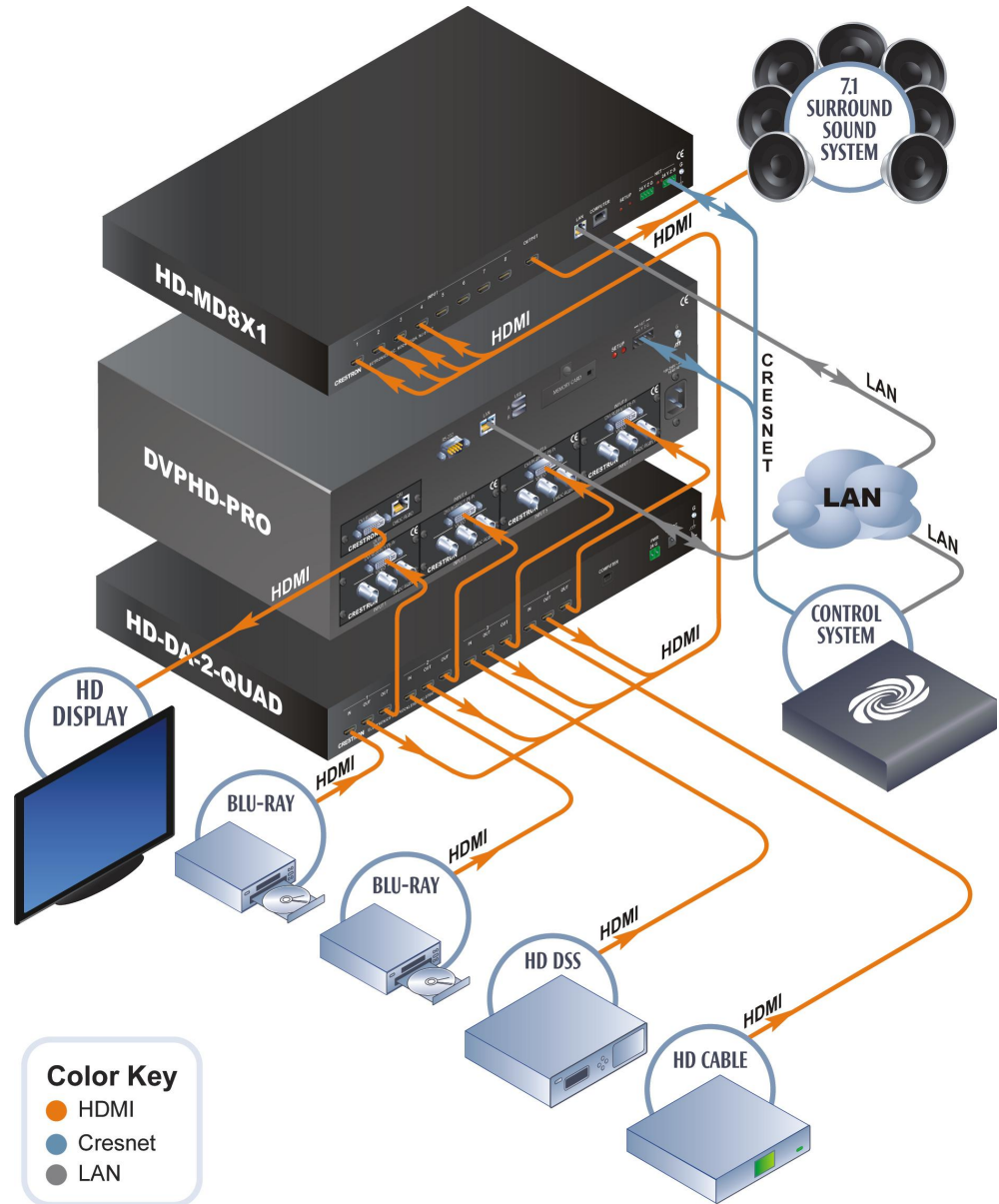
Sync Detect LEDs

To simplify operation and troubleshooting, the HD-DA-2-QUAD provides individual sync detection LEDs on its front panel, providing a clear indication when a valid digital signal is connected to any input.

Applications

The following diagram shows an HD-DA-2-QUAD in a residential application.

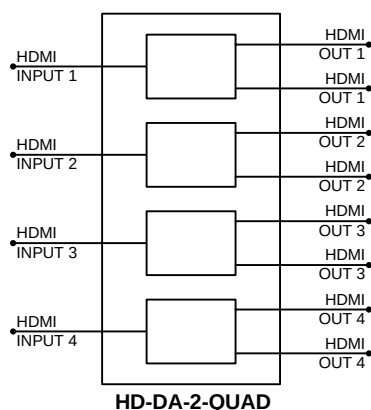
HD-DA-2-QUAD in a Residential Application



Internal Block Diagram

The following diagram represents the abilities of the HD-DA-2-QUAD.

Internal Block Diagram of the HD-DA-2-QUAD



Specifications

Specifications for the HD-DA-2-QUAD are listed in the following table.

HD-DA-2-QUAD Specifications

SPECIFICATION	DETAILS
Video	
Signal Types	HDMI, DVI*, DisplayPort Multimode*
Formats	HDMI with Deep Color, DVI*, HDCP content protection support
Input Resolutions	
HDMI, Progressive	640x480@60Hz, 720x480@60Hz (480p), 720x576@50Hz (576p), 800x600@60Hz, 848x480@60Hz, 852x480@60Hz, 854x480@60Hz, 1024x768@60Hz, 1024x852@60Hz, 1024x1024@60Hz, 1280x720@50Hz (720p50), 1280x720@60Hz (720p60), 1280x768@60Hz, 1280x800@60Hz, 1280x960@60Hz, 1280x1024@60Hz, 1360x768@60Hz, 1365x1024@60Hz, 1366x768@60Hz, 1400x1050@60Hz, 1440x900@60Hz, 1600x900@60Hz, 1600x1200@60Hz, 1680x1050@60Hz, 1920x1080@24Hz (1080p24), 1920x1080@25Hz (1080p25), 1920x1080@50Hz (1080p50), 1920x1080@60Hz (1080p60), 1920x1200@60Hz, 2048x1080@24Hz, 2048x1152@60Hz, plus any other resolution allowed by HDMI
HDMI, Interlaced	720x480@30Hz (480i), 720x576@25Hz (576i), 1920x1080@25Hz (1080i25), 1920x1080@30Hz (1080i30), plus any other resolution allowed by HDMI
Output Resolutions	Matched to inputs

(Continued on following page)

HD-DA-2-QUAD Specifications (Continued)

SPECIFICATION	DETAILS
Audio Signal Types Formats	HDMI supporting HD lossless multi-channel up to 7.1, DisplayPort Multimode* Dolby® TrueHD 7.1, Dolby Digital Plus 7.1, Dolby Digital AC3 5.1, Dolby Digital EX 5.1, DTS-HD Master Audio™ 7.1, DTS-HD High Res 7.1, DTS 5.1, DTS-ES Matrix 5.1, DTS-ES Discrete 6.1, DTS 96/24 5.1, 8ch PCM, 6ch PCM, 2ch PCM
Power 24 VDC Power Consumption Cresnet Power Usage	1 Amp @ 24 Volts DC, PW-2420RU power supply included 27 Watts (1.13 Amps @ 24 Volts DC) NOTE: May be powered by 24V DC power pack or Cresnet network power, not both
Environmental Temperature Humidity Heat Dissipation	32° to 104° F (0° to 40° C) 10% to 90% RH (non-condensing) 92 BTU/Hr
Enclosure Chassis Faceplate Mounting	Metal, convection-cooled, vented top and sides Metal with polycarbonate label overlay Freestanding or 1U 19-inch rack-mountable (adhesive feet and rack ears included)
Dimensions Height Width Depth	1.70 in (44 mm) without feet 1.80 in (46 mm) with feet 19.0 in (483 mm) with ears; 17.03 in (433 mm) without ears 10.02 in (255 mm)
Weight	4.1 lbs (1.9 kg)

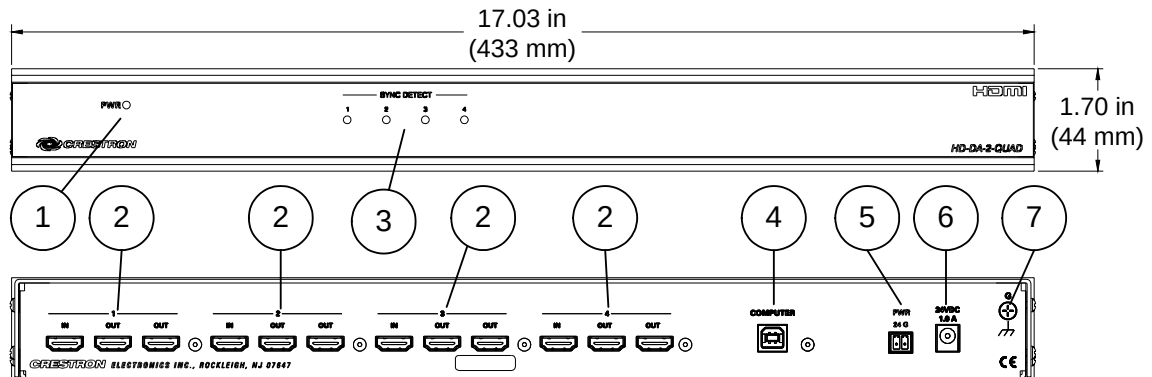
* HDMI requires an appropriate adapter to accommodate a DVI or DisplayPort Multimode signal. Adapters not included.

Physical Description

This section provides information on the connections, controls and indicators available on your HD-DA-2-QUAD.

HD-DA-2-QUAD Physical View (Front)



HD-DA-2-QUAD Physical View (Rear)*HD-DA-2-QUAD Overall Dimensions*

NOTE: Depth of the unit is 10.02 inches (255 mm)

Connectors, Controls & Indicators

#	CONNECTORS*, CONTROLS & INDICATORS	DESCRIPTION
1	PWR LED	(1) Green LED, indicates 24 Volts DC power supplied from Cresnet or external power supply
2	IN-OUT 1-4 IN OUT OUT	(12) 19-pin Type A HDMI female HDMI digital video/audio connectors; Each channel consists of (1) input and (2) outputs
3	SYNC DETECT 1-4 SYNC DETECT 1 2 3 4	(4) red LEDs indicate a stable video signal on the corresponding input
4	COMPUTER COMPUTER	(1) USB Type B female USB 1.1 computer console port (6 ft cable included)
5	PWR PWR 2 0	(1) 2-pin 3.5mm detachable terminal block; 24 Volt DC power input
6	24VDC 1.0A 24VDC 1.0A	(1) 2.1mm barrel DC power jack; 24 Volt DC power input (PW-2420RU power supply included)
7	GROUND G	(1) 6-32 screw, chassis ground lug

* Interface connector for the **PWR** port is provided with the unit.

Setup

Installation

Ventilation

The HD-DA-2-QUAD should be used in a well-ventilated area. The venting holes should not be obstructed under any circumstances.

To prevent overheating, do not operate this product in an area that exceeds the environmental temperature range listed in the table of specifications. Consider using forced air ventilation and/or incrementing the spacing between units to reduce overheating. Consideration must be given if installed in a closed or multi-unit rack assembly since the operating ambient temperature of the environment may be greater than the room ambient temperature. Contact with thermal insulating materials should be avoided on all sides of the unit.

Rack Mounting

The HD-DA-2-QUAD can be mounted in a rack or stacked with other equipment. Two “ears” are provided with the HD-DA-2-QUAD so that the unit can be rack mounted. These ears must be installed prior to mounting. Complete the following procedure to attach the ears to the unit. The only tool required is a #2 Phillips screwdriver.

WARNING: To prevent bodily injury when mounting or servicing this unit in a rack, take special precautions to ensure that the system remains stable. The following guidelines are provided to ensure your safety:

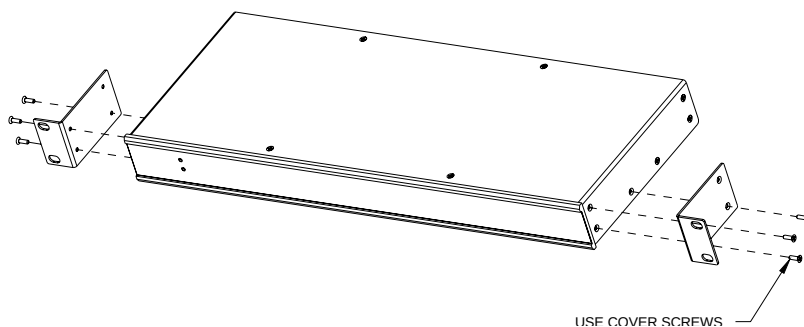
- When mounting this unit in a partially filled rack, load the rack from the bottom to the top with the heaviest component at the bottom of the rack.
- If the rack is provided with stabilizing devices, install the stabilizers before mounting or servicing the unit in the rack.

NOTE: If rack mounting is not required, rubber feet are provided for tabletop mounting or stacking. Apply the feet near the corner edges on the underside of the unit.

NOTE: Reliable earthing of rack-mounted equipment should be maintained. Particular attention should be given to supply connections other than direct connections to the branch circuit (e.g. use of power strips).

To install the ears:

1. There are screws that secure each side of the HD-DA-2-QUAD top cover. Using a #2 Phillips screwdriver, remove the three screws closest to the front panel from one side of the unit. Refer to the diagram following step 3 for a detailed view.
2. Position a rack ear so that its mounting holes align with the holes vacated by the screws in step 1.
3. Secure the ear to the unit with three screws from step 1, as shown in the following diagram.

Ear Attachment for Rack Mounting (this image shows a 1RU device)

- Repeat procedure (steps 1 through 3) to attach the remaining ear to the opposite side.

Stacking

Four “feet” are provided with the HD-DA-2-QUAD so that if the unit is not rack mounted, the rubber feet can provide stability when the unit is placed on a flat surface or stacked. These feet should be attached prior to the hookup procedure.

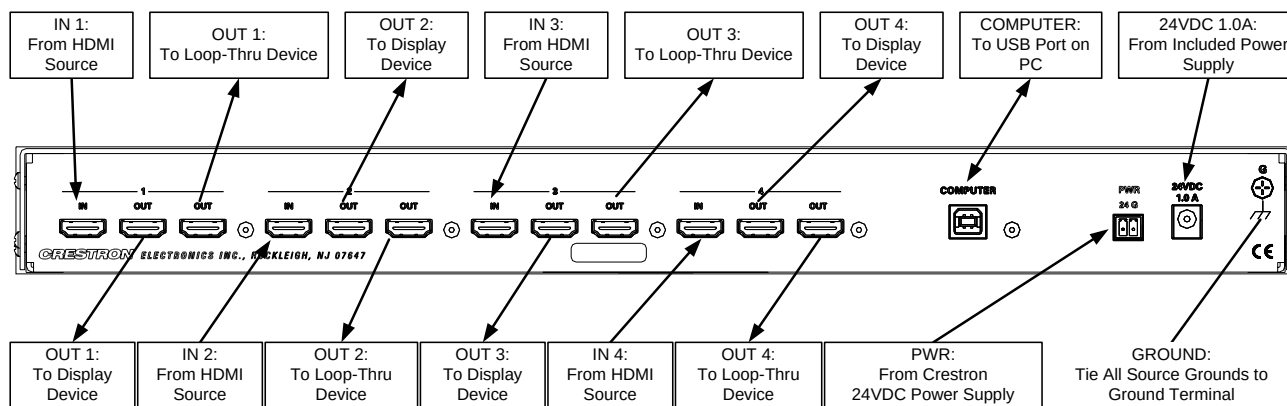
NOTE: No more than two HD-DA-2-QUAD units should be stacked.

Hardware Hookup

Make the necessary connections as called out in the illustration that follows this paragraph. Apply power after all connections have been made.

When making connections to the HD-DA-2-QUAD, note the following:

- The HD-DA-2-QUAD may be powered by the included 24V DC power pack or Cresnet network power, not both.
- The CEC signal is only carried on ports that are connected to display devices.

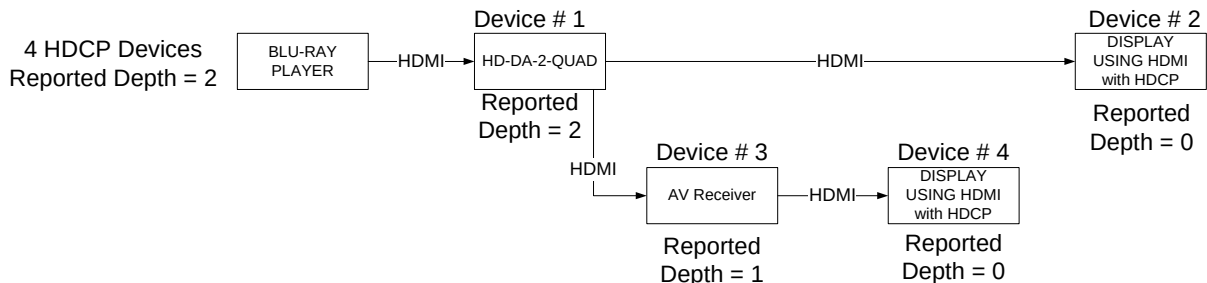
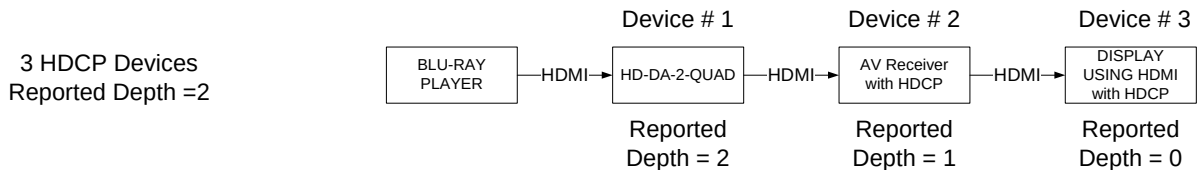
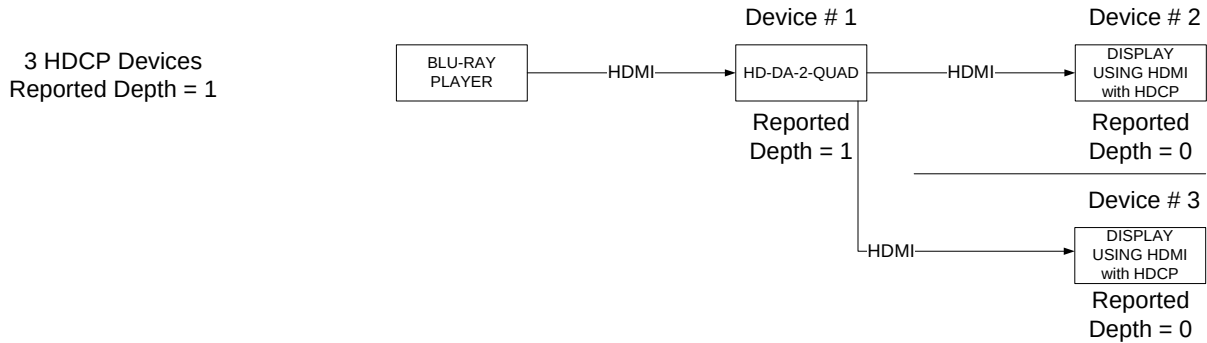
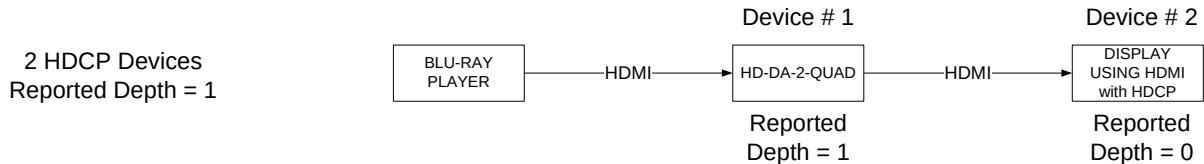
Hardware Connections for the HD-DA-2-QUAD

NOTE: Ensure the unit is properly grounded by connecting the chassis ground lug to an earth ground (building steel).

HDCP Signal Path

Sources using HDCP limit the number of display devices it can transmit to while simultaneously limiting the depth of devices in the signal path. Too many devices or greater-than-allowed depth in a signal path (from source to display) may create problems with displaying of audio and video content. The HDCP specification states that the maximum depth of devices between source and display is six. Some examples are shown in the following diagram.

Examples of Reported HDCP Devices and Reported HDCP Depth



Using Crestron Toolbox, the HD-DA-2-QUAD can test HDMI sources and displays for limitations due to HDCP keys. The number of HDCP keys specify the number of display devices that can be connected to a source over HDMI using HDCP authentication. For more information, refer to the Crestron Toolbox help file.

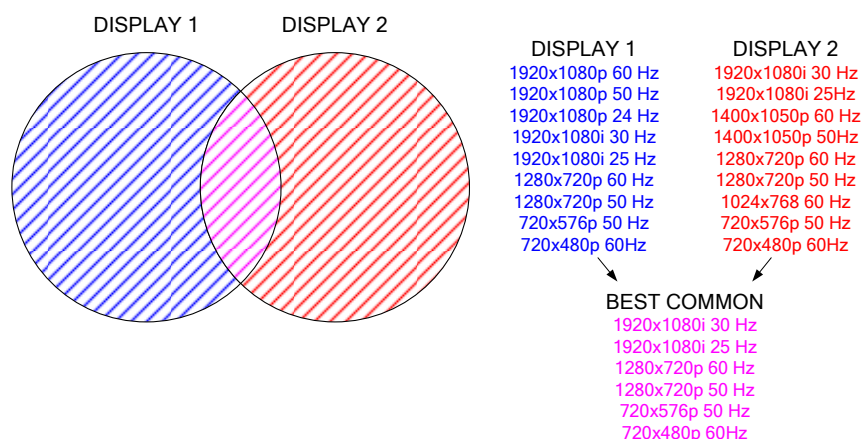
EDID

EDID is a piece of data that HDMI receivers use to indicate their capabilities to the HDMI sources.

The HD-DA-2-QUAD distributes HDMI signals from each input channel to two corresponding HDMI outputs. According to the HDMI standard, HDMI sources are expected to only deliver audio and video formats that are supported by the destination. To do this, the HD-DA-2-QUAD reads the EDID information from devices connected to the outputs and determines the video resolutions and audio format to send to the input to program EDID on the inputs.

Using Crestron Toolbox' DMTool utility, the HD-DA-2-QUAD is configured using the "Best Common" algorithm to determine what EDID information is sent to each source.

Best Common



Only resolutions that are available in all of the displays that are connected will be transmitted to the source. This ensures that any video signal coming in from the source will be able to be shown on all displays. If certain resolutions are only available on a subset of the displays, they will be omitted.

"Best Common" can be modified to use information from just a subset of displays by deselecting them in Crestron Toolbox.

By managing which displays are used for the EDID calculations, you can maximize the resolution of each source while ensuring that the source can be shown on each display where it is needed.

The EDID calculations also affect audio formats. Each HDMI receiver sends its supported audio formats to the source in the following format:

<Format> <Maximum # of channels> <sampling freq supported>

For example, a 5.1channel audio processor may have the following audio EDID information:

- Linear PCM, 2ch, 32/44.1/48kHz
- AC3, 6ch, 32/44.1/48kHz
- DTS, 6ch, 32/44.1/48kHz

Under “Best Common”, the same rules apply to audio as video.

For more information, refer to the Crestron Toolbox help file.

Uploading and Upgrading

Crestron recommends using the latest programming software and that each device contains the latest firmware to take advantage of the most recently released features. However, before attempting to upload or upgrade it is necessary to establish communication. Once communication has been established, files (for example, firmware) can be transferred to the control system (and/or device). Finally, program checks can be performed (such as changing the device ID or creating an IP table) to ensure proper functioning.

Establishing Communication

Use Crestron Toolbox for communicating with the HD-DA-2-QUAD; refer to the Crestron Toolbox help file for details. There is a single method of communication: USB communication.

USB Communication



The **COMPUTER** port on the HD-DA-2-QUAD connects to the USB port on the PC via the included Type A to Type B USB cable:

1. Use the Address Book in Crestron Toolbox to create an entry using the expected communication protocol (USB). When multiple USB devices are connected, identify the HD-DA-2-QUAD by entering “HD-DA-2-QUAD” in the *Model* textbox, the unit’s serial number in the *Serial* textbox or the unit’s hostname in the *Hostname* textbox. The hostname can be found in the “System Info” window in the section marked *Ethernet* however, communications must be established in order to see this information in the “System Info” window.
2. Display the HD-DA-2-QUAD’s “System Info” window (click the  icon); communications are confirmed when the device information is displayed.

Firmware

Firmware files are distributed from Crestron to dealers. Firmware upgrades are available from the Crestron website as new features are developed after product releases. Firmware is upgraded via the Crestron Toolbox. For details on uploading and upgrading, refer to the Crestron Toolbox help file.

Check the Crestron website to find the latest firmware. (New users may be required to register to obtain access to certain areas of the site, including the FTP site.)

Upgrade HD-DA-2-QUAD firmware via Crestron Toolbox.

1. Establish communication with the HD-DA-2-QUAD and display the “System Info” window.
2. Select **Functions | Firmware...** to upgrade the HD-DA-2-QUAD firmware.

Program Checks

Using Crestron Toolbox, display the “System Info window (click the  icon) and select the **Functions** menu to display actions that can be performed on the HD-DA-2-QUAD.

DMTool

In the Crestron Toolbox Address Book, select the HD-DA-2-QUAD. Then use the DMTool to configure EDID, HDCP or to troubleshoot AV on the HD-DA-2-QUAD. Refer to the help file for additional information.

DMTool



Problem Solving

Troubleshooting

The following table provides corrective action for possible trouble situations. If further assistance is required, please contact a Crestron customer service representative.

HD-DA-2-QUAD Troubleshooting

TROUBLE	POSSIBLE CAUSE(S)	CORRECTIVE ACTION
Device does not function.	Device is not receiving power from a Crestron power source.	Use the provided Crestron power source. Verify connections.
	Device is not receiving sufficient power.	Use the Crestron Power Calculator to help calculate how much power is needed for the system.
SYNC DETECT LED does not illuminate.	HD-DA-2-QUAD is not receiving a video signal.	Verify that source is transmitting a signal.
Loss of functionality due to electrostatic discharge.	Improper grounding.	Check that all ground connections have been made properly.

Further Inquiries

If you cannot locate specific information or have questions after reviewing this guide, please take advantage of Crestron's award winning customer service team by calling Crestron at 1-888-CRESTRON [1-888-273-7876].

You can also log onto the online help section of the Crestron website (www.crestron.com/onlinehelp) to ask questions about Crestron products. First-time users will need to establish a user account to fully benefit from all available features.

Future Updates

As Crestron improves functions, adds new features and extends the capabilities of the HD-DA-2-QUAD, additional information may be made available as manual updates. These updates are solely electronic and serve as intermediary supplements prior to the release of a complete technical documentation revision.

Check the Crestron website periodically for manual update availability and its relevance. Updates are identified as an “Addendum” in the Download column.

Return and Warranty Policies

Merchandise Returns / Repair Service

1. No merchandise may be returned for credit, exchange or service without prior authorization from CRESTRON. To obtain warranty service for CRESTRON products, contact an authorized CRESTRON dealer. Only authorized CRESTRON dealers may contact the factory and request an RMA (Return Merchandise Authorization) number. Enclose a note specifying the nature of the problem, name and phone number of contact person, RMA number and return address.
2. Products may be returned for credit, exchange or service with a CRESTRON Return Merchandise Authorization (RMA) number. Authorized returns must be shipped freight prepaid to CRESTRON, 6 Volvo Drive, Rockleigh, N.J. or its authorized subsidiaries, with RMA number clearly marked on the outside of all cartons. Shipments arriving freight collect or without an RMA number shall be subject to refusal. CRESTRON reserves the right in its sole and absolute discretion to charge a 15% restocking fee plus shipping costs on any products returned with an RMA.
3. Return freight charges following repair of items under warranty shall be paid by CRESTRON, shipping by standard ground carrier. In the event repairs are found to be non-warranty, return freight costs shall be paid by the purchaser.

CRESTRON Limited Warranty

CRESTRON ELECTRONICS, Inc. warrants its products to be free from manufacturing defects in materials and workmanship under normal use for a period of three (3) years from the date of purchase from CRESTRON, with the following exceptions: disk drives and any other moving or rotating mechanical parts, pan/tilt heads and power supplies are covered for a period of one (1) year; touchscreen display and overlay components are covered for 90 days; batteries and incandescent lamps are not covered.

This warranty extends to products purchased directly from CRESTRON or an authorized CRESTRON dealer. Purchasers should inquire of the dealer regarding the nature and extent of the dealer's warranty, if any.

CRESTRON shall not be liable to honor the terms of this warranty if the product has been used in any application other than that for which it was intended or if it has been subjected to misuse, accidental damage, modification or improper installation procedures. Furthermore, this warranty does not cover any product that has had the serial number altered, defaced or removed.

This warranty shall be the sole and exclusive remedy to the original purchaser. In no event shall CRESTRON be liable for incidental or consequential damages of any kind (property or economic damages inclusive) arising from the sale or use of this equipment. CRESTRON is not liable for any claim made by a third party or made by the purchaser for a third party.

CRESTRON shall, at its option, repair or replace any product found defective, without charge for parts or labor. Repaired or replaced equipment and parts supplied under this warranty shall be covered only by the unexpired portion of the warranty.

Except as expressly set forth in this warranty, CRESTRON makes no other warranties, expressed or implied, nor authorizes any other party to offer any warranty, including any implied warranties of merchantability or fitness for a particular purpose. Any implied warranties that may be imposed by law are limited to the terms of this limited warranty. This warranty statement supersedes all previous warranties.

Trademark Information

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change without notice.