4x4 HDMI Over CAT-5 Matrix

EXT-HDMI-CAT5-444

User Manual

www.gefen.com

1080P PROGRESSIVE HDMI HIGH DEFINITION MULTIMEDIA INTERFACE HDTV HD DVD Blu-ray Disc

ASKING FOR ASSISTANCE

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INTRODUCTION

Congratulations on your purchase of the 4x4 HDMI™ Over CAT5 Matrix. Your complete satisfaction is very important to us.

Gefen

Gefen delivers innovative, progressive computer and electronics add-on solutions that harness integration, extension, distribution and conversion technologies. Gefen's reliable, plug-and-play products supplement cross-platform computer systems, professional audio/video environments and HDTV systems of all sizes with hard-working solutions that are easy to implement and simple to operate.

The Gefen 4x4 HDMI™ Over CAT5 Matrix

The Gefen 4x4 HDMI™ CAT5 Matrix offers unprecedented flexibility and convenience by routing high definition audio/video from any of four HDMI™ video sources to any of 4 remote displays over inexpensive, standard CAT5 cabling.

Each remote display has a control box that allows the viewer to select any of the 4 video sources and control that source via an IR remote control as if the viewer was standing in the room where the source originates.

Full High-Resolution HDTV signals are supported up to a resolution of 1080p at a maximum distance of 150 feet and 1080i resolutions can be extended up to 300 feet. The Gefen 4x4 HDMI™ CAT5 Matrix works with HD-DVD players, TiVo systems, HT PCs, and satellite set-top boxes that connect to an HDMI™ display. Every source is accessible at all times by any display by selecting it with an IR remote.

How It Works

You simply connect up to 4 local video sources to the CAT5-Matrix's inputs. Then run each of your CAT5 cables from the Matrix to the destination displays. At each remote display, terminate the CAT5 cable run with a HDMI™ CAT5-MS Receiver device. Connect each Receiver to a display and you're all set.

OPERATION NOTES

READ THESE NOTES BEFORE INSTALLING OR OPERATING THE 4X4 HDMI™ OVER CAT5 MATRIX

- To use the extender functionality of the 4x4 HDMI™ Over CAT5 Matrix the supplied 1 foot HDMI jumper cables must be used to connect the HDMI output ports to the HDMI extension input ports. Please see page 11 for details
- Use two industry standard CAT-5, CAT-5e or CAT-6 cables to operate each of the 4x4 HDMI™ Over CAT5 Receivers. Gefen recommends CAT-6 cabling for maximum performance.
- For 1080i video, maximum extension is 300 feet (91 meters).
- For 1080p video, maximum extension is 150 feet (45 meters).
- IR repeater functionality is only from the receiving unit to the sending unit. IR data cannot be transmitted from the sending unit to the receiving unit.
- When a display connects to a source being viewed by other displays, a short flash may appear momentarily on the displays already viewing that source. This is normal operation as new handshakes for HDCP are being made.
- Local displays that are not using the extension functionality of the 4x4 HDMI™ Over CAT5 Matrix can only switch their viewing source via the RS-232 Serial Control Interface. Please see page 18 for a list of commands and instructions.

FEATURES

Features

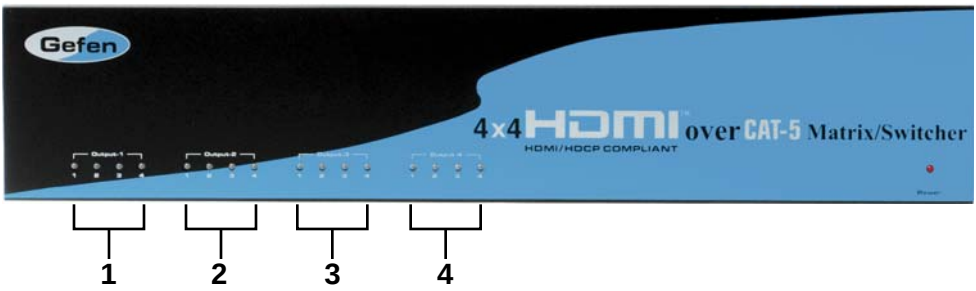
- Switches easily between any four HDMI™ sources
- Sends up to four video inputs to any four remote HDMI™ displays
- Maintains 1920 x 1200, 1080p, and 2k resolution video
- Extends video up to 300 feet over CAT-5 cable
- Discrete IR remote (included)
- Serial RS-232 remote port
- Rack ears included
- HDMI™ compliant
- HDCP compliant

Package Includes

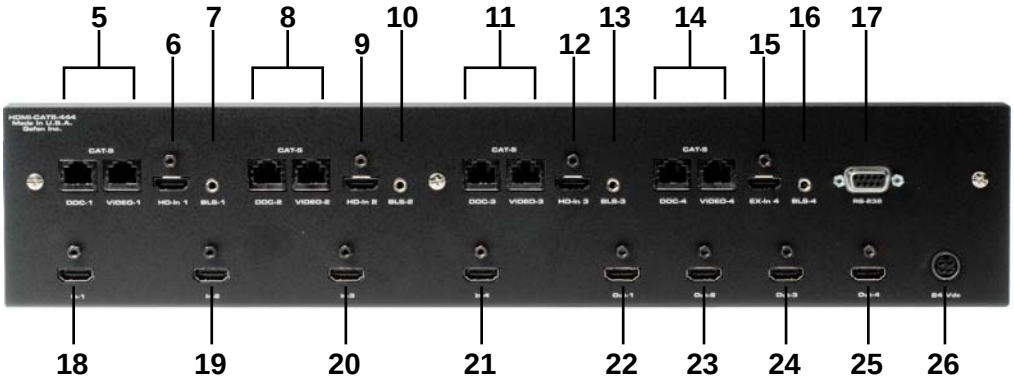
(1) 4x4 HDMI CAT5 Matrix
(4) HDMI over CAT-5 Receiver/Remote
(4) RMT-4 IR Remote Controls
(4) 1 Foot HDMI Cables
(4) 6 Foot HDMI Cables
(4) 5V DC Power Supplies
(1) 24V DC Power Supply
(1) Set of Rack Ears
(1) User's Manual

SENDER PANEL LAYOUT

Front Panel



Back Panel



SENDER PANEL DESCRIPTIONS

1 Selected Source LED For HDMI Output 1
The selected source for HDMI Output 1 will be indicated by an active LED.

2 Selected Source LED For HDMI Output 2
The selected source for HDMI Output 2 will be indicated by an active LED.

3 Selected Source LED For HDMI Output 3
The selected source for HDMI Output 3 will be indicated by an active LED.

4 Selected Source LED For HDMI Output 4
The selected source for HDMI Output 4 will be indicated by an active LED.

5 HDMI Output 1 CAT5 Extension Ports
DDC and video output ports for extension to remote receiver. Both cables must be connected for proper operation.

6 HDMI 1 Extension Input Port
For proper extension, the supplied 1 foot HDMI jumper cable must be attached between this port (6) and HDMI Output Port 1 (22).

7 HDMI 1 IR Blaster Port
Optional IR emitter (Part# EXT-2IREMIT) can be attached to relay IR commands from the remote receiver to the blaster for remote control of devices.

8 HDMI Output 2 CAT5 Extension Ports
DDC and video output ports for extension to remote receiver. Both cables must be connected for proper operation.

9 HDMI 2 Extension Input Port
For proper extension, the supplied 1 foot HDMI jumper cable must be attached between this port (9) and HDMI Output Port 2 (23).

10 HDMI 2 IR Blaster Port
Optional IR emitter (Part# EXT-2IREMIT) can be attached to relay IR commands from the remote receiver to the blaster for remote control of devices.

11 HDMI Output 3 CAT5 Extension Ports
DDC and video output ports for extension to remote receiver. Both cables must be connected for proper operation.

12 HDMI 3 Extension Input Port
For proper extension, the supplied 1 foot HDMI jumper cable must be attached between this port (12) and HDMI Output Port 2 (24).

13 HDMI 3 IR Blaster Port
Optional IR emitter (Part# EXT-2IREMIT) can be attached to relay IR commands from the remote receiver to the blaster for remote control of devices.

14 HDMI Output 4 CAT5 Extension Ports
DDC and video output ports for extension to remote receiver. Both cables must be connected for proper operation.

15 HDMI 1 Extension Input Port
For proper extension, the supplied 1 foot HDMI jumper cable must be attached between this port (15) and HDMI Output Port 2 (24).

16 HDMI 4 IR Blaster Port
Optional IR emitter (Part# EXT-2IREMIT) can be attached to relay IR commands from the remote receiver to the blaster for remote control of devices.

17 RS-232 Serial Control Port
Switching can be controlled via the RS-232 port. Please see page 18 for details on the available commands and pin-outs.

18 HDMI Input 1
Connect a source device to this input.

19 HDMI Input 2
Connect a source device to this input.

20 HDMI Input 3
Connect a source device to this input.

21 HDMI Input 4
Connect a source device to this input.

22 HDMI Output 1
Connect a display to this output port. If using the built-in extension functionality, connect this output port (22) to the HDMI 1 extension input port (6) using the supplied 1 foot HDMI jumper cable.

23 HDMI Output 2
Connect a display to this output port. If using the built-in extension functionality, connect this output port (23) to the HDMI 2 extension input port (9) using the supplied 1 foot HDMI jumper cable.

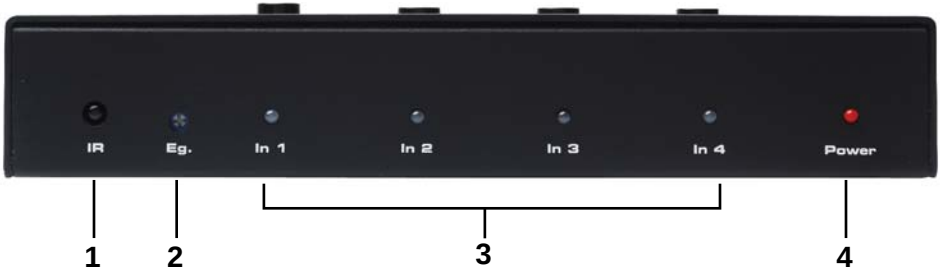
24 HDMI Output 3
Connect a display to this output port. If using the built-in extension functionality, connect this output port (24) to the HDMI 3 extension input port (12) using the supplied 1 foot HDMI jumper cable.

25 HDMI Output 4
Connect a display to this output port. If using the built-in extension functionality, connect this output port (25) to the HDMI 4 extension input port (15) using the supplied 1 foot HDMI jumper cable.

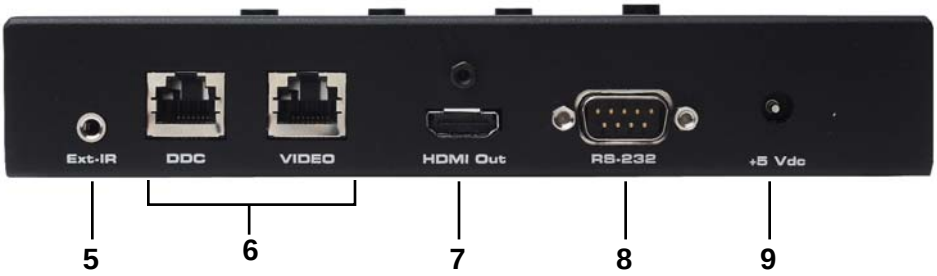
26 24V DC Power Input
Connect the supplied 24V DC Power supply to this input.

RECEIVER PANEL LAYOUT

Front Panel



Back Panel



Top Panel

RECEIVER PANEL DESCRIPTIONS

1 IR Relay Receiver

This receiver will receive commands from the included IR remote control and from other commercial IR remote controls and relay it back to the optional IR blaster. This is intended for remote control of devices connected to the 4x4 HDMI™ Over CAT5 Matrix from the extended location.

2 Equalization Trim Pot

When the receiver is set to manual equalization (see page 14), this will control the amount of EQ compensation applied to the video signal for fine tuning the HDMI video quality.

3 HDMI Input LED

The currently selected input source for the receiver will be indicated by an active LED.

4 Power LED

This LED will be active when the included 5V DC power supply is connected.

5 IR Extension Port

If the receiver is in a location where the IR receiver is not in direct line of sight of he remote controller, an optional IR Receiver Extension (Part# EXT-RMT-EXTIR) can be connected to this port.

6 CAT5 Input Ports

DDC and video CAT5 cables from the 4x4 HDMI™ Over CAT5 Matrix sending unit.

7 HDMI Output Port

Connect the display to this output port.

8 RS-232 Serial Control Port

Switching can be controlled via the RS-232 port. Please see page 18 for details on the available commands and pin-outs.

9 5V DC Power Supply Input

Insert the supplied 5V DC power supply into this port.

10 Input Selector Buttons

HDMI input sources can be directly selected by using these push buttons.

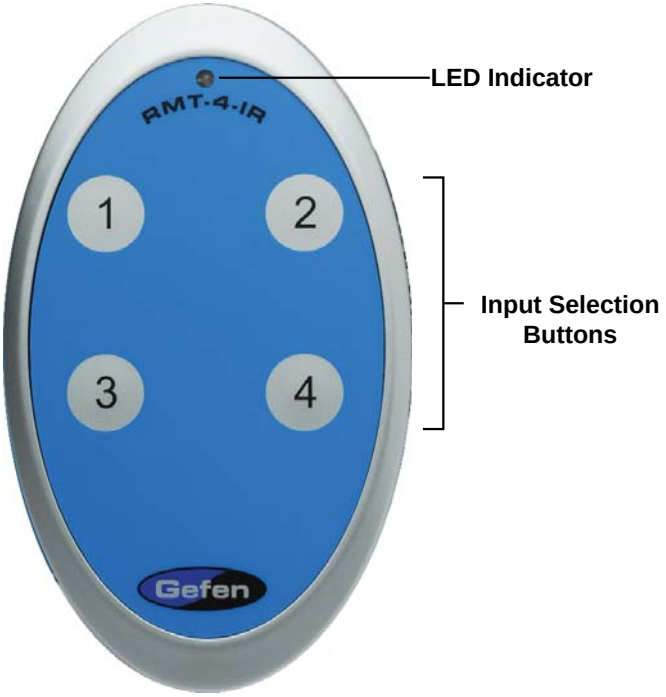
Button A selects HDMI Input 1

Button B selects HDMI Input 2

Button C selects HDMI Input 3

Button D selects HDMI Input 4

RMT-4IR REMOTE DESCRIPTION



Pressing on each numbered selection buttons will switch the receiver to the corresponding HDMI Input source. The LED will blink each time a button press is detected.

Removing the battery cover will reveal the internal Dip Switches that relate to the IR Code Channel. Please see page 14 for details.

CONNECTING AND OPERATING THE 4X4 HDMI™ OVER CAT5 MATRIX

How to Connect the 4x4 HDMI™ Over CAT5 Matrix

1. Connect your sources (up to four) to the 4x4 HDMI™ Over CAT5 Matrix using the supplied HDMI cables.

2. If using the extension functionality of the 4x4 HDMI™ Over CAT5 Matrix, please connect the HDMI output ports to the HDMI extension input ports using the supplied 1 foot jumper cables. Please see the diagram on the next page for extension input port connection instructions.

NOTE: All of the extension input ports are available for use but are not required for operation. The HDMI output ports can be used to directly connect a local display, or can be used in conjunction with the jumper cable to access the extension functionality of the 4x4 HDMI™ Over CAT5 Matrix.

3. Connect any local displays to the 4x4 HDMI™ Over CAT5 Matrix HDMI output ports using user supplied HDMI cables.

4. Connect both DDC and Video CAT-5e cables for each extension that is going to be used.

5. Connect both DDC and video CAT-5e cables, at the end of each cable run, to a 4x4 HDMI™ Over CAT5 Receiver.

6. Connect the remote display(s) to each 4x4 HDMI™ Over CAT5 Receiver using a user supplied HDMI cable.

7. Connect the included 5V DC power supply to each of the 4x4 HDMI™ Over CAT5 Receivers.

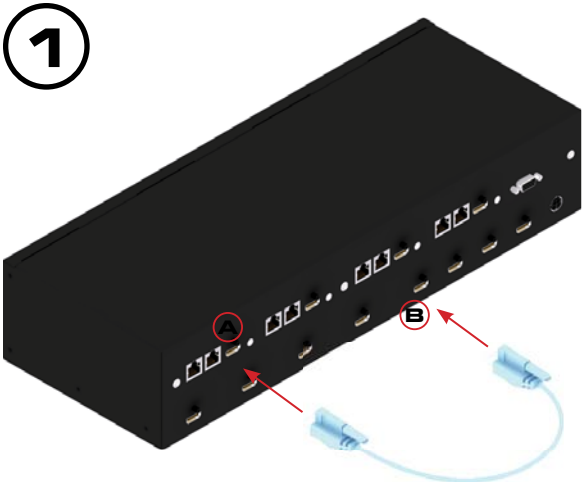
8. Connect the included 24V DC power supply the 4x4 HDMI™ Over CAT5 Matrix.

9. Power on all of the displays, then the sources.

4X4 HDMI™ OVER CAT5 MATRIX JUMPER DIAGRAM

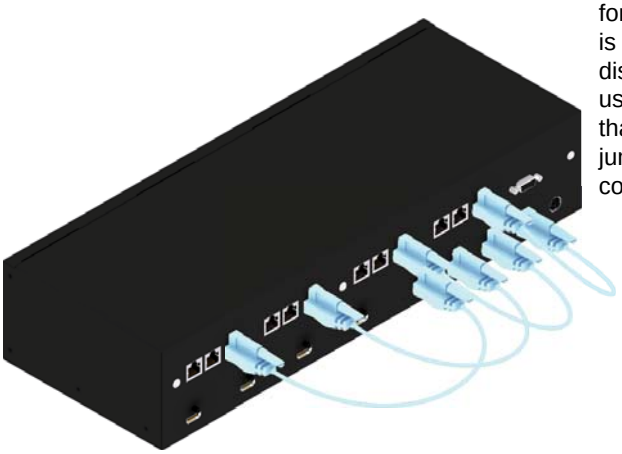
The 4x4 HDMI™ Over CAT5 Matrix uses a jumper cable system to link the matrix and extension portions together. These jumper cables are included. Please us the diagram below to setup extension functionality of the 4x4 HDMI™ Over CAT5 Matrix.

1



This example shows the jumper connection between HDMI output port 1 (B) and HDMI extension input port 1 (A).

2



When all jumpers are connected, extension for each HDMI output is possible. If a local display is going to be used, simply do not use that HDMI output port's jumper and extension connection.

OPERATING THE 4X4 HDMI™ OVER CAT5 RECEIVER

To use the 4x4 HDMI™ Over CAT5 Receiver, the following connections must be made:

1. A HDMI jumper cable is connected between the HDMI output port and the HDMI extension input port.

2. The DDC and Video CAT-5e cable must be connected between the 4x4 HDMI™ Over CAT5 Matrix and the 4x4 HDMI™ Over CAT5 Receiver.

3. A HDMI display is connected to the 4x4 HDMI™ Over CAT5 Receiver.

4. The included power supply is connected to the 4x4 HDMI™ Over CAT5 Receiver.

Once these connections are properly made, the 4x4 HDMI™ Over CAT5 Receiver can be used to select which HDMI source will be viewed on the connected display. To select a HDMI source the direct input buttons located on the top panel of the 4x4 HDMI™ Over CAT5 Receiver.

Button A selects HDMI Input 1

Button B selects HDMI Input 2

Button C selects HDMI Input 3

Button D selects HDMI Input 4

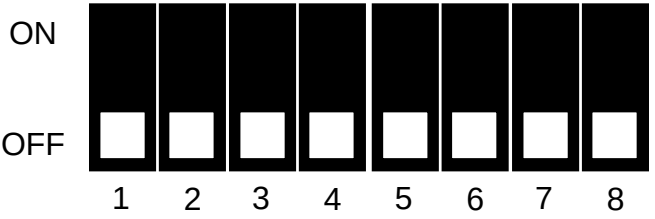
Switching can also be done using the included IR remote control or via the RS-232 serial control interface.

NOTE: Switching of HDMI sources is limited to the one display that is connected to a particular 4x4 HDMI™ Over CAT5 Receiver. For example, it is not possible to switch a HDMI source on a display connected to HDMI output 2 with the remote at the display location of HDMI output 1. Switching of any local displays that are not being extended or are not using a 4x4 HDMI™ Over CAT5 Receiver is limited to the RS-232 serial control interface from the 4x4 HDMI™ Over CAT5 Matrix.

IR Blaster Functionality

To control HDMI sources from the remote location, a optional IR blaster (Part# EXT-2IREMIT) can be attached for each 4x4 HDMI™ Over CAT5 Receiver on the 4x4 HDMI™ Over CAT5 Matrix. IR remote control commands can then be relayed from each receiver to the device(s) connected to the blaster from the 4x4 HDMI™ Over CAT5 Matrix.

The 4x4 HDMI™ Over CAT5 Receiver contains a bank of 8 DIP SWITCHES. These swiches are located underneath each unit. Peeling back the black metallic sticker on the bottom of the 4x4 HDMI™ Over CAT5 Receiver will reveal the DIP SWITCH bank. These service switches are used for a number of configuration options. By default, all Dip Switches are in the OFF position. Each setting is outlined below.



Switch 1 **Auto Equalization**

Switch 2 **IR Remote Channel Configuration**

Switch 3 **IR Remote Channel Configuration**

Switch 4 **Boost Setting**

Switch 5 **Boost Setting**

Switch 6 **Not Used**

Switch 7 **Not Used**

Switch 8 **Pre-Empahsis**

Auto Equalization & Boost Setting

Auto equalization is enabled by default. This setting will compensate for variances in cable skew and will help eliminate the video noise that is associated with it. This feature will work reliably up to 130ft. Longer CAT-5e runs should have this feature disabled. It is important to understand that the Boost Setting and Equalization are used in conjunction with each other. The Auto-EQ feature will only function when the unit has no boost applied.

To manually equalize the video signal, turn Dip Switch 1 to the ON position. This will disable the auto equalization function and will allow the user to manually equalize the signal. From here, the Boost Settings and Equalization can be manipulated to tune-in an optimal video signal. Once Auto-EQ has been disabled, follow the steps on the next page.

1. Insert a small flat head tool into the trim pot on the receiver unit.

2. Turn the trim pot in a clockwise fashion until it comes to a stop. Do not force the trim pot beyond this point. Doing so may break the trim pot.

3. Slowly turn the trim pot counter-clockwise in millimeter increments until the image stabilizes and all video noise disappears.

4. Carefully remove the adjustment tool.

NOTE: If your cable run is beyond 130 feet, or the following steps do not produce any video, it may be necessary to increase the boost from the sending unit. Use the chart below to increase the boost by changing the sender dip switches. Once a new boost setting is set, repeat steps 1 through 4 from above.

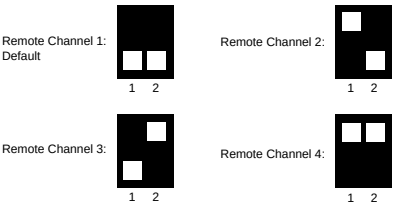
Equalization Setting	
Setting	**Switch 1**
Manual EQ	ON
Auto EQ (Default)	OFF

Boost Setting		
Setting	**Switch 4**	**Switch 5**
No Boost (Default)	OFF	OFF
Medium Boost	OFF	ON
High Boost	ON	OFF
Very Low Boost	ON	ON

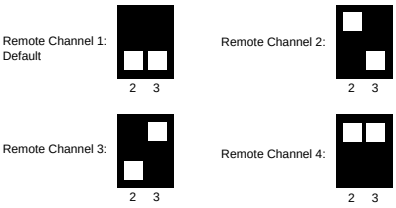
IR Remote Channel Configuration

Dip Switches 2 and 3 relate to the IR remote control channel that is used by the 4x4 HDMI™ Over CAT5 Receiver and RMT-4IR remote control. Dip Switch 2 and 3 on the 4x4 HDMI™ Over CAT5 Receiver must match Dip Switch 1 and 2 on the RMT-4IR remote control. Each 4x4 HDMI™ Over CAT5 Receiver and remote pair, should be set to a different channel so that no two units do receive conflicting IR commands. Please view the table below to set the channel on each of the 4x4 HDMI™ Over CAT5 Receiver units and IR remote controls. The remote channel for the RMT-4IR is located underneath the battery cover.

RMT-4IR REMOTE CONTROL



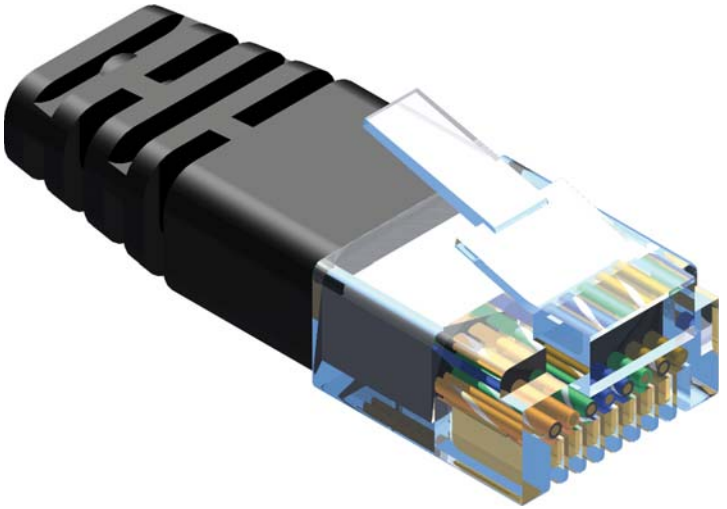
4x4 HDMI™ Over CAT5 Receiver



Pre-Emphasis

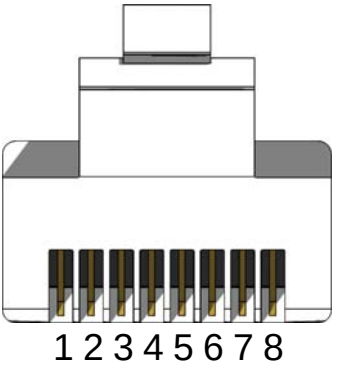
Pre-Emphasis is used to help extend a signal travel over a distance of cable. When a HDMI cable connected to a display on a 4x4 HDMI™ Over CAT5 is over a long cable, it is recommended that Pre-Emphasis be enabled. To enable Pre-Emphasis, turn Dip Switch 8 to the ON position.

NETWORK CABLE WIRING DIAGRAM



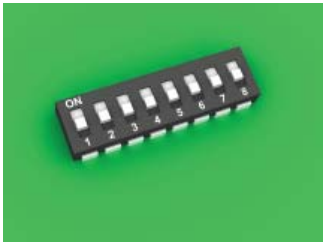
Gefen has specifically engineered their products to work with the TIA/EIA-568-B specification. Please adhere to the table below when field terminating cable for use with Gefen products. Failure to do so may produce unexpected results and reduced performance.

Pin	Color
1	Orange / White
2	Orange
3	Green / White
4	Blue
5	Blue / White
6	Green
7	Brown / White
8	Brown



CAT-5, CAT-5e, and CAT-6 cabling comes in stranded and solid core types. Gefen recommends using solid core cabling. CAT-6 cable is also recommended for best results.

Each cable run must be one continuous run from one end to the other. No splices or use of punch down blocks.



Dip Switch EDID Guide

Extended display identification data (EDID) is a data structure provided by a display to describe its capabilities to any source that asks for it. The EDID includes manufacturer name, product type, timings supported by the display, display size, luminance data, (for digital displays only) pixel mapping data, supported audio channels and formats. This information is used by the source to cater its output to resolutions and audio formats that are supported by the display.

Additional EDID modes are available and configured using a combination of dip switches 1, 2, and 5. Please refer below for the different EDID modes.

To access the Dip Switches, remove all screws from the bottom and sides of the Gefen unit. Remove the hex screw heads from each side of the RS-232 port and above each HDMI connector. Carefully slide the unit apart. The 8 Bank of Dip Switches are located on the main PCB. Once adjustments are complete, slide the unit back together and replace all removed screws.

EDID Mode 0 (Switch 1=OFF Switch2=OFF Switch5=ON)
-EDID is copied from the first HDMI port

EDID Mode 1 (Switch 1=ON Switch2=OFF Switch5=ON)
-Same as Mode 0 and adds basic audio support

EDID Mode 2 (Switch 1=OFF Switch2=ON Switch5=ON)
-Same as Mode 0 and adds full audio support

EDID Mode 3 (Switch 1=ON Switch2=ON Switch5=OFF)
-EDID is generated based on the common video and audio features of all of the connected devices

EDID Mode 4 (Switch 1=OFF Switch2=ON Switch5=OFF)
-Same as Mode 3 and adds basic audio support

EDID Mode 5 (Switch 1=ON Switch2=OFF Switch5=OFF)
-Same as Mode 3 and adds full audio support

EDID Mode 6 (Switch 1=OFF Switch2=OFF Switch5=OFF) **DEFAULT**
-EDID is generated based on the common video features of all of the connected devices and the combined audio features of all of the connected devices

Only Pins 2 (RX), 3 (TX), and 5 (Ground) are used on the RS-232 serial interface

Binary Table

ASCII	Corresponding RMT16-IR Button	Binary	ASCII	Corresponding RMT16-IR Button	Binary
1	1	0011 0001	9	9	0011 1001
2	2	0011 0010	a	10	0110 0001
3	3	0011 0011	b	11	0110 0010
4	4	0011 0100	c	12	0110 0011
5	5	0011 0101	d	13	0110 0100
6	6	0011 0110	e	14	0110 0101
7	7	0011 0111	f	15	0110 0110
8	8	0011 1000	g	16	0110 0111

Additional control of the EDID modes are possible using the RS-232 interface. For any of these modes to be successfully written to the EEPROM, all Dip Switches must be in the OFF position.

ASCII	EDID Mode
m0	0
m1	1
m2	2
m3	3
m4	4
m5	5
m6	6

OK is printed out on screen when a mode has successfully been changed.

RS232 Settings

Bits per second 19200

Data bits 8

Parity ..... None

Stop bits 1

Flow Control ..... None

SPECIFICATIONS

Video Amplifier Bandwidth ..... 165 MHz

Input Video Signal ..... 1.2 Volts p-p

Input DDC Signal ..... 5 Volts p-p (TTL)

Single Link Range ..... 1080p/1920 x 1200

HDMI Connector ..... Type A 19 Pin Female

Link Connector ..... RJ-45 Shielded

Remote Control Port ..... RS232 female, mini-stereo

Sender Power Supply ..... 24V DC

Receiver Power Supply .....5V DC

Power Consumption ..... 60 Watts (max)

Sender Dimensions ..... 17”W x 3.5”H x 5.875”D

Receiver Dimensions .....

Shipping Weight ..... 16 lbs.