GefenToolBox 4x4 Matrix for HDMI® 1.3

GTB-MHDMI1.3-444

GTB-MHDMI1.3-444-BLK

User's Manual

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INTRODUCTION

Congratulations on your purchase of the GefenToolBox 4x4 Matrix for HDMI 1.3. Your complete satisfaction is very important to us.

About Gefen

We specialize in total integration for your home theater, while also focusing on going above and beyond customer expectations to ensure you get the most from your hardware. We invite you to explore our distinct product line. Please visit http://www.gefen.com for the latest offerings in High-Definition signal solutions or call us between the hours of 8:00 am and 5:00 pm Monday-Friday, Pacific Standard Time for assistance with your A/V needs. We'll be happy to assist you.

Why Gefen ToolBox?

The Gefen Toolbox line offers portable and easy-to-install solutions for common A/V system integration setups using HDMI connectivity. Gefen ToolBox products are wall-mountable and small in size. Gefen ToolBox products are easily transported in the field and are ready for immediate and simple installations in working environments. These products come finished in a glossy color to blend in with either a white wall or black cabinet.

The GefenToolBox 4x4 Matrix for HDMI 1.3

The GefenToolBox 4x4 Matrix for HDMI 1.3 routes HDMI at resolutions up to 1080p@60Hz and 1920x1200@60Hz supporting multichannel digital audio from any four Hi-Def sources to any four HDTV displays. The GefenToolBox 4x4 Matrix eliminates the need to disconnect and reconnect HDMI sources. It works with any HDMI source that needs to be connected to an HDTV display, supporting digital audio formats such as Dolby TrueHD and DTS HD Master Audio. Each source is accessible at all times from any display by selecting it with the included IR remote, the RS-232 port, or using the front-panel push buttons.

How It Works

Connect your Hi-Def A/V sources to the GefenToolBox 4x4 Matrix's inputs using the supplied HDMI cable. Connect up to 4 HDTV displays to the Matrix's four HDMI outputs also using the provided HDMI cables. Apply power to sources and to the displays. A/V Sources may now be routed to display devices by using the front panel buttons or the included IR remote control.

READ THESE NOTES BEFORE INSTALLING OR OPERATING THE GEFENTOOLBOX GEFENTOOLBOX 4X4 MATRIX FOR HDMI 1.3

- EDID contains the A/V capabilities of a display device in regards to video resolutions and audio formats supported. This information is used by the source device to determine the format of the A/V signal on the outputs. The GefenToolBox 4x4 Matrix for HDMI 1.3 incorporates advanced EDID management to ensure compatibility with all sources and display devices. Please see pages 14 - 17 for more details.

- The GefenToolBox 4x4 Matrix for HDMI 1.3 can detect the presence of Deep Color (12-bit signal) automatically and will disable Deep Color EDID features across all other outputs if any connected device or display is not capable of processing Deep Color. This automatic behavior ensures compatibility among all output devices in a mixed-device environment. This feature cannot be disabled.

- When powering the GefenToolBox 4x4 Matrix for HDMI 1.3 or if the EDID Mode is changed (see pages 4 - 5), the Matrix will undergo a momentary initialization sequence. This is normal operation and may take a few seconds.

FEATURES

HDMI 1.3 Features

- 225 MHz (up to 12 bit YUV 444 @ 1080p)
- Deep Color (x.v. Color)
- Dolby TrueHD & DTS-HD Master Audio
- Lip-Sync Pass-Through

General Features

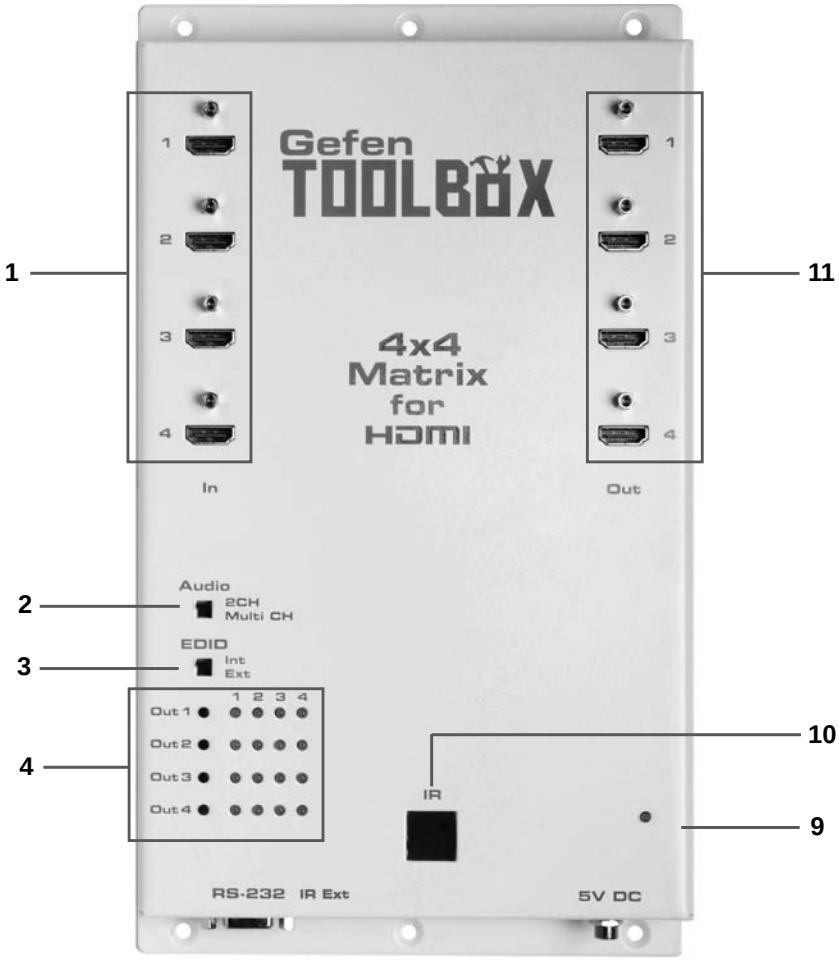
- Simultaneously displays any of four (4) Hi-Def sources on up to four (4) HDTV displays without signal loss.
- Maintains beautiful, sharp HDTV resolutions up to 1080p@60 Hz, 1920x1200 and 2K.
- EDID Detection/Adjustment for rapid integration of sources and display devices.
- Supports modern advanced digital audio formats including LPCM 7.1 audio, Dolby Digital Plus, Dolby TrueHD, and DTS-HD Master Audio.
- Supports the use of DVI sources and DVI output with an HDMI-to-DVI converter cable or adapter.
- Input and output cables can be as long as 15 feet when using 8-bit or 12-bit color. The extension distance on the inputs and outputs is dependent upon the quality of the cables used.
- This product is HDMI-compliant and HDCP-compliant.

Package Includes

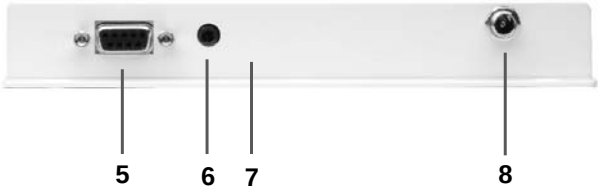
(1) GefenToolBox GefenToolBox 4x4 Matrix for HDMI 1.3
(8) 6-foot Locking HDMI Cables (M-M; 4 for inputs, 4 for outputs)
(1) 5V DC Locking Power Supply
(1) IR Remote Control
(1) User Manual

PANEL LAYOUT

Front Panel



Side Panel



PANEL DESCRIPTIONS

1 HDMI Input Ports 1-4
Connect HDMI-compliant source device(s) to any of these input ports.

2 Audio Channel Selection Switch
This switch will modify the EDID to specify the number of supported audio channels when using the INTERNAL EDID mode. This setting will not affect the EDID information when using the EXTERNAL EDID mode.

3 EDID Mode Selection Switch
This switch will control the type of EDID that will be sent to the source device. The options are EXTERNAL and INTERNAL. Please see page 15 for details.

4 Source Selectors (4) and Indicator LEDs (16)
The four (4) black buttons labeled “Out 1 - Out 4” select input sources 1 - 4 to be mapped to the outputs 1 - 4. Please see page 6 for more details on how to use these buttons.

5 RS-232 Serial Port
The Matrix may be switched remotely using serial communications with any office computer or a control automation device. Please see page 19 for details.

6 3.5mm IR Extender Port (For Optional IR Extension)
An optional IR Extender allows extension of the IR sensor up to a distance of 6 feet from the GefenToolBox 4x4 Matrix. Please see page 13 for details.

7 USB Service Port
Mini-USB service port used for upgrading the GTB-HDMI1.3-442 firmware.

8 5V DC Locking Power Receptacle
Connect the included 5V DC power supply here and at a free wall outlet. Only use the power supply supplied. Screw the locking power tip into the socket until it fits snugly without overtightening.

9 Power Indicator LED (Red)
This LED will glow red once the included 5V DC power supply has been properly connected to the unit and an AC power source.

10 IR Window
Receives IR commands from the included IR remote (EXT-RMT-16IR), shown on page 8.

11 HDMI Output Ports 1-4
Connect HDMI-compliant display device(s) to any of these output ports.

How to Connect the GefenToolBox 4x4 Matrix for HDMI 1.3

1. Use one of the provided HDMI cables to connect the source device to the HDMI input port of the GefenToolBox 4x4 Matrix for HDMI 1.3.

2. Use additional HDMI cables to connect up to 4 HDMI cables to the four (4) displays.

3. Connect the included 5V DC locking power supply to the power receptacle on the Matrix.

4. Connect the other end of the power supply to an available power outlet.

How to Operate the GefenToolBox 4x4 Matrix for HDMI 1.3

The top panel of the GefenToolBox 4x4 Matrix for HDMI 1.3 contains a set of LED indicators, displaying which input (source) is routed to which output (display). This allows for easy management and viewing of all input and output routing states.

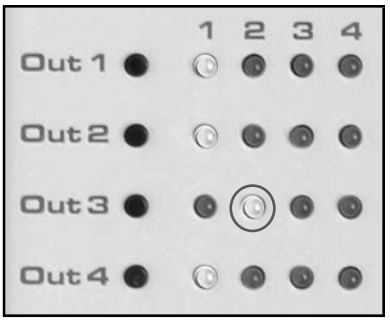
There are four (4) rows of LED indicators on the front panel. To the left of the LED indicators are four push buttons: Out 1, Out 2, Out 3, and Out 4. The numbers along the top of the LED matrix represent the currently selected Input (source): 1, 2, 3, or 4.

Example 1: Routing Input (source) 2 to Ouput (display) 3

1. Ensure that an HDMI cable is connected from the source to HDMI In 2 and an HDMI cable is connected from the display to HDMI Out 3 on the Matrix.

2. Press Out 3 Button on the row of black buttons running vertically until the LED under Input 2 is bright blue. If the LED does not immediately appear under Input 2, continue depressing the Out 3 button until the LED under Input 2 turns bright blue (Fig 1.1).

Fig 1.1



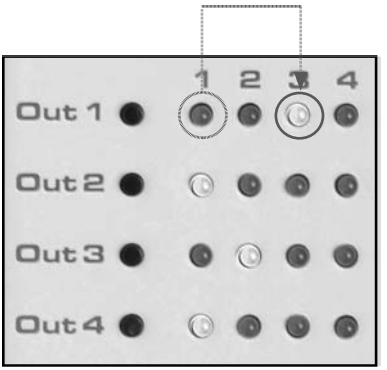
3. Once the LED under Input 2 turns bright blue, a picture will be displayed on the display connected to Out 3 on the Matrix.

Note that in ***Fig 1.1***, Out 1, Out 2, and Out 4 have also been routed. In this case, the displays connected to HDMI Out 1, HDMI Out 2, and HDMI Out 3 are receiving video from the source connected to HDMI In 1.

Example 2: Routing Input (source) 3 to Output (display) 1

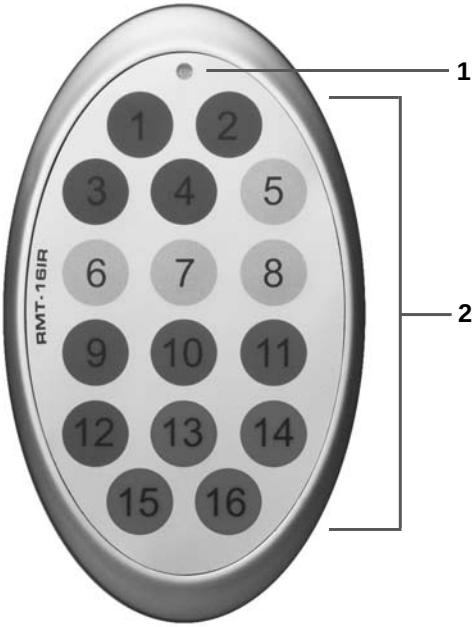
Using ***Fig 1.1*** as a starting point, press the Out 1 button two (2) times. The LED matrix should now appear as follows:

Fig 1.2



LED 3 turns bright blue on the row labeled Out 1, indicating that Output (display) 1 is connected to the source on HDMI In 3.

In ***Fig. 1.2***, the current state of the matrix is: Display 1 is connected to HDMI 2, Display 2 is connected to Source 1, Display 2 is connected to Source 2, and Display 4 is connected to Source 1. Note that both Display 2 and Display 4 are connected to the same source.



1 ***LED Button Press Indicator***
This LED will activate momentarily upon each button press. This visual indicator is to inform the user that a command has been sent by the IR remote control.

2 ***Display and Source Selection Buttons***
These buttons will be used to send display and source selections to the GefenToolBox 4x4 Matrix for HDMI 1.3.

Routing Sources to Displays

Issuing a routing command is a simple process. There are a total of 8 buttons on the RMT-16IR. Each set of four (4) buttons are grouped by color for easy navigation. The first set of four buttons (1 - 4) represent Output 1. The second set of four buttons (5 - 8) represent Output 2. The individual buttons within a color, represent the Inputs that are available for each Output.

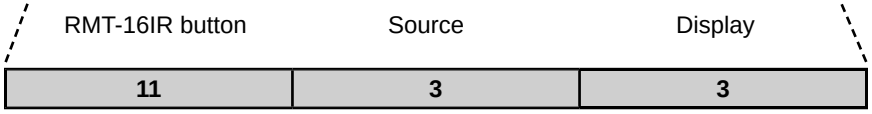
For example, to route the source connected to HDMI In 3 to the display connected to HDMI Out 2, press button 7 on the RMT-16IR. Button 7 represents Input (source) 3 for Output (display) 2.

RMT-16IR REMOTE DESCRIPTION

The RMT-16IR remote control will allow the user to select which source will be routed to which output. Each of the four (4) outputs are assigned a group of four buttons which correspond to the four source inputs. Please use the information below when selecting the desired source for each display.

Table of IR Remote Commands
for the GefenToolBox 4x4 Matrix for HDMI 1.3

RMT-16IR Button	Source	Display
1	1	1
2	2	1
3	3	1
4	4	1
5	1	2
6	2	2
7	3	2
8	4	2
9	1	3
10	2	3
11	3	3
12	4	3
13	1	4
14	2	4
15	3	4
16	4	4

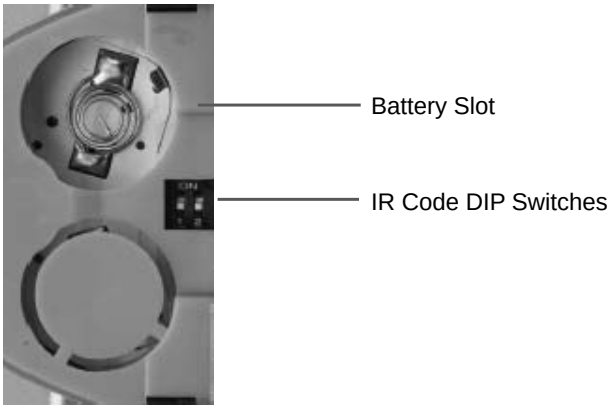


Example: In the above example, if button 11 on the RMT-16IR is pressed, the source connected to HDMI In 3 will be routed to the Display connected to HDMI Out 3.

Installing the RMT-16IR Battery

To use the RMT-16IR remote, remove the battery cover on the back of the remote to reveal the battery compartment. Insert the included battery into the open battery slot. The positive (+) side should be facing up. Ensure that both DIP (Dual In-line Package) switches are in the OFF position. Replace the battery cover.

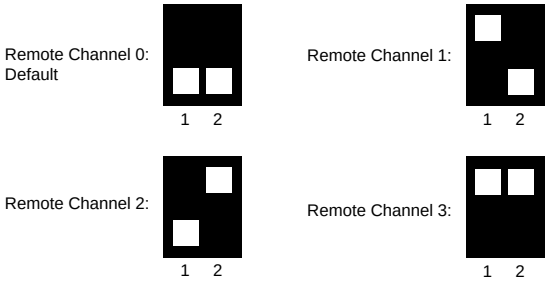
The remote ships with 2 batteries. One battery is needed for operation and the other battery is complimentary.



Resolving IR Code Conflicts

In the event that IR commands from other remote controls conflict with the supplied RMT-16IR remote control, changing the remote channel will alleviate this issue. The RMT-16IR remote control has a bank of DIP (Dual In-line Package) switches for setting the remote IR channel.

The DIP Switch bank on the RMT-16IR is located underneath the battery cover.



Left: Picture of the opened rear battery compartment of the RMT-16IR remote showing the exposed DIP Switch bank between the battery chambers.

It is important that the IR channel selected on the remote, match the IR channel on the GefenToolBox 4x4 Matrix for HDMI 1.3 for proper operation. For example, if you set both DIP switches on the remote to the down position (toward the “1” and “2”), IR channel 0, you must set the GefenToolBox 4x4 Matrix for HDMI 1.3 to use IR channel 0.

Please refer to page 12 on how to change the IR channel on the GefenToolBox 4x4 Matrix for HDMI 1.3.

CHANGING THE IR CHANNEL

How To Change The IR Channel

Use the following procedure to set the proper IR channel on the Matrix.

1 Press and hold the Out 1 button for 5 seconds to enter IR channel selection mode. The bank of blue LED indicators will now display the currently selected IR channel.

2 Press the Out 1 button to cycle through each IR channel. The currently selected IR channel will by indicated by a flashing blue LED. IMPORTANT: The selected IR channel **must** be the same as the IR channel set on the IR Remote (see page 11). Refer to the table below for setting the IR channel.

3 Once the proper IR channel has been selected, press and hold the Out 1 button for 5 seconds to confirm and exit IR channel selection mode. The currently selected input source will now be indicated.

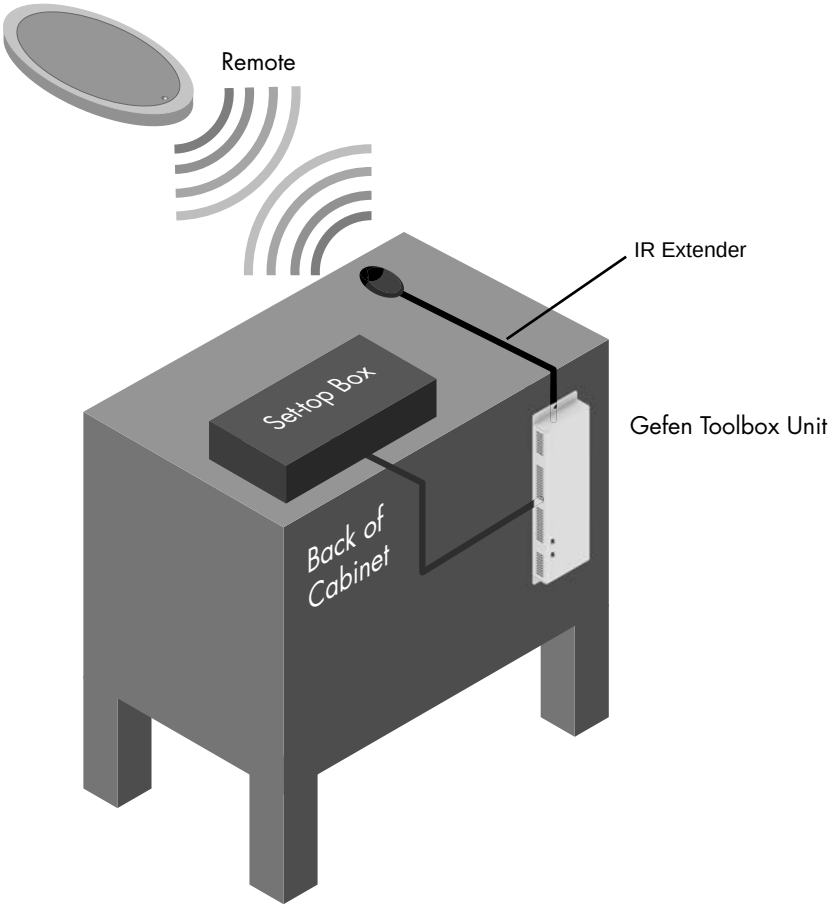
IR Channel Table

Input LED	IR Channel
1	0
2	1
3	2
4	3

Using The IR Extender

An optional IR Extender (Gefen Part No. EXT-RMT-EXTIR) can be used to extend the IR capabilities of the GefenToolBox 4x4 Matrix for HDMI 1.3. One such application allows the Matrix to be hidden within or behind a cabinet (see illustration below).

Simply connect the IR extender to the IR extender port (see page 4).



Understanding EDID

The GefenToolBox 4x4 Matrix for HDMI 1.3 features automatic and manual EDID adjustments to maximize compatibility of all attached devices. First, it is necessary to understand EDID and what it is used for.

EDID. What is it and what is it used for?

Under normal circumstances, source devices will require information about a connected display device to assess what video resolutions and other features are compatible with the output device. This required information is called the EDID (Extended Display Information Data). Almost all types of output devices/displays (computer monitor, HDTV, A/V receiver) will transmit EDID to a connected source. The source will then read this EDID file and make the necessary adjustments to the output signal to ensure that only compatible resolutions/ features are generated in the output signal.

Why is EDID so important with the GefenToolBox 4x4 Matrix for HDMI 1.3?

The GefenToolBox 4x4 Matrix for HDMI 1.3 uses complex technology that routes multiple input signals to multiple outputs. The source devices will require EDID to read. Multiple devices/displays can be connected to the input and output ports on the Matrix, each with their own EDID. Management of EDID is key to ensure that maximum compatibility is maintained between all devices.

What options do I have to manage the EDID in the GefenToolBox 4x4 Matrix for HDMI 1.3?

It is important to understand that the EDID contains much more than just listings of supported video resolutions and audio formats. However, resolutions and audio formats are the two key types of information that a user will need to understand how to use these EDID management functions.

Common problems that a user may encounter while using the Matrix can be:

1. Video may not be visible on all output devices/displays.

2. Audio may not be heard on all output devices/displays.

These symptoms usually arise from video resolution / audio format incompatibilities between the devices / displays connected to the outputs.

The GefenToolBox 4x4 Matrix for HDMI 1.3 can use one of two methods to acquire and retransmit an EDID to the A/V source device relaying information about the output devices that are connected to it, thus ensuring compatibility.

EDID Mode Selection

- **EXTERNAL MODE:**

  To use this mode, set the EDID Mode Switch on the front panel to the **EXT** position. In External EDID mode, the Matrix retrieves EDID data directly from each connected A/V display device. The EDID data is then compiled and a new EDID is created based on the highest-supported video resolution and audio capabilities common to all displays. The new EDID is sent back to the source device.

  If insufficient EDID data is available from external display devices or EDID-related problems are encountered, Internal EDID Mode should be used to provide a single compatible EDID for all connected devices.

- **INTERNAL MODE:**

  Internal EDID mode uses a preset EDID that is stored in the GefenToolBox 4x4 Matrix for HDMI 1.3 from the factory. To use this mode, set the EDID Mode Switch on the front panel to the INT position. All resolutions and audio formats specified in this EDID will be passed to the source device. Many common resolutions and audio formats are supported. For a complete listing of the resolutions and audio formats listed in this EDID please see page 17.

  NOTE: All other HDMI capable devices/displays connected to the output ports MUST be compatible with at least one resolution/audio format specified in this EDID. It is recommended to set, on the source device, a common resolution and audio format shared by all attached devices/displays. This is to ensure a compatible signal is outputted to all connected devices/displays.

Audio Channel Selection

The GefenToolBox 4x4 Matrix for HDMI 1.3 features a switch that will modify the supported audio formats listed in the pre-programmed EDID. This feature is useful for limiting the output of the source device to either 2 or multi-channel audio formats.

NOTE: This selector switch will only affect the pre-programmed EDID in the INTERNAL (INT) EDID Mode.

The GefenToolBox 4x4 Matrix for HDMI 1.3 can use either of the following settings for audio format support:

1. 2 Channel: This setting will limit the audio formats listed in the pre-programmed EDID to 2 channel LPCM. For a full listing of the audio formats in this mode please see page 17.

   To use this mode, set the Audio Selection Switch on the front panel to the *2 CH* position.

   This mode is useful in scenarios where all output devices/displays are HDTV monitors that only support 2 channel LPCM. This setting will ensure that all connected devices will receive and produce sound.

2. Multi-Channel: This setting will enable all common audio formats in the pre-programmed EDID. For a full listing of the audio formats in this mode please see page 17.

   To use this mode, set the Audio Selection Switch on the front panel to the *Multi CH* position.

   This mode is useful in scenarios where the output devices/displays are varying devices (i.e. HDTV display and audio receivers). Please note that sound may not be heard from all output devices/displays if a shared common audio format is not used by the source device.

Internal EDID Specification

Video Data Block	Audio Data Block	xvYCC
1080p@60Hz 1080p@50Hz 1080i@60Hz (native) 1080i@50Hz	2-channel: LPCM 2CH Multi-channel: LPCM 2CH LPCM 8CH AC-3 6CH DTS 7CH Dolby Digital+ 8CH Dolby TrueHD 8CH DTS-HD 8CH MAT(MLP) 8CH	xvYCC 709 xvYCC 601

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

This feature allows for easy integration into automated systems capable of transmitting RS-232 commands. Please use the settings below to configure the RS-232 port of the user's system.

Transmitting the appropriate numeric ASCII character will simulate key-presses on the EXT-RMT-16IR remote control.

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

RS-232 Settings

Bits per second 19200

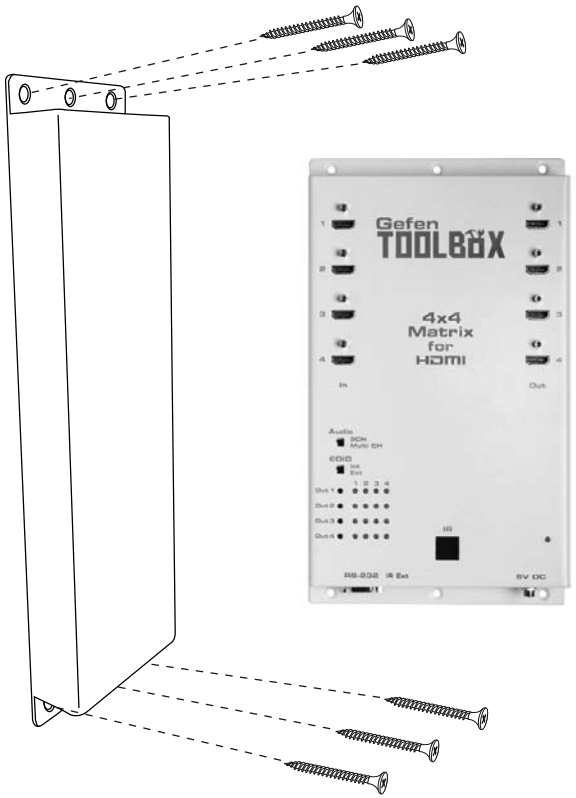
Data bits 8

Parity ..... None

Stop bits 1

Flow Control ..... None

WALL MOUNTING INSTRUCTIONS



The GefenToolBox 4x4 Matrix for HDMI 1.3 should be mounted vertically in a wall or cabinet with wood/drywall screws as shown in the diagram above. There should be an inch or two of clearance between the edges of the unit and any walls or vertical surfaces to allow for enough clearance for insertion and retraction of cables at the HDMI connectors.

For installation on a drywall surface, use a #6 drywall screw. It is recommended when installing on a drywall surface that studs be used to secure the Matrix should undue stress be applied when connecting and disconnecting HDMI cables.

SPECIFICATIONS

Video Bandwidth	225 MHz
Pixel Clock	165 MHz
Maximum Video Resolution	1080p@60Hz, 1920x1200@60Hz with 12-bit Deep Color
Input Video Signal	2V p-p
Input DDC Signal	5V p-p (TTL)
HDMI Connector	type A 19-pin female; (4) input, (4) output
LED Indicators (source mapping)	(16) blue
LED Indicator (power)	(1) red
RS-232 Interface	DB9 serial (F)
IR Extender	3.5 mm Mini-Stereo
Power Supply	5V DC
Power Consumption	20W (max)
Dimensions	6½" W x 11¾" H x 1" D
Operating Temperature	0 - 40 °C
Shipping Weight	6 lbs.
Available Colors	Ivory or Black
Compliance	US/EU Standards, HDMI 1.3, HDMI 1.2, HDCP 1.1, DVI 1.0
Certifications	UL (power supply), RoHS, CE