

# Gefen

®

## 4x1 DVI DL Switcher

**EXT-DVI-441DL**  
**User Manual**



[www.gefen.com](http://www.gefen.com)



## ASKING FOR ASSISTANCE

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# INTRODUCTION

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Congratulations on your purchase of the 4x1 DVI DL Switcher. 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 4x1 DVI DL Switcher**

The rack-mountable Gefen 4x1 DVI DL Switcher offers an economical solution by eliminating the need to purchase many displays for each DVI source in a studio or lab situation. A plug-and-play solution, the 4x1 DVI DL Switcher shares one dual-link display with up to four computers or other DVI video sources, saving space on your desktop. The source computer is selected using the included IR remote control or through RS-232 control.

## **How It Works**

The DVI monitor is connected to the switcher's output. Up to four DVI sources connect to the switcher's DVI inputs using included high quality DVI cables. The included power supply is connected to the switcher via the locking power plug and then to a power outlet. The currently selected computer's video signal appears on the shared monitor. Video sources are selected/switched using the RMT-4IR remote control, RS-232 control, or the input selector push button on the front panel of the switcher.

## **OPERATION NOTES**

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### **READ THESE NOTES BEFORE INSTALLING OR OPERATING THE GEFEN 4X1 DVI DL SWITCHER**

- The 4x1 DVI DL Switcher will take any of up to four (4) DVI dual-link or single-link resolution inputs and switch them, one at a time, to a DVI output device such as a display/monitor or projector. Resolutions can be up to 3840x2400.
- The 4x1 DVI DL Switcher is housed in a metal box for better RF shielding.
- By default, the EDID of the attached display is copied to all the local inputs. Make sure that the display is connected to the switcher before applying power.

# FEATURES

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## Features

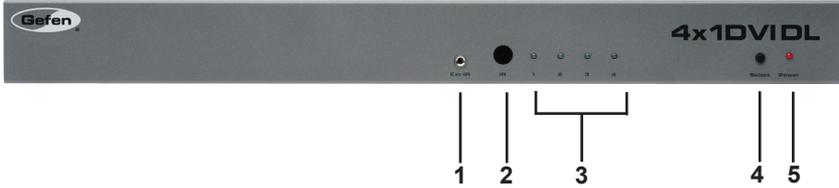
- Switches easily between any four DVI-SL or DVI DL sources
- Maintains highest resolution dual link DVI
- Supports 1080p Full HD at 120Hz and dual-link resolutions up to 3840 x 2400
- EDID Storage and programming for best source/display compatibility
- Extends the range of the video signal on the DVI outputs up to 50 feet
- Discrete IR remote control included
- Serial RS-232 port for switching input sources via automated control or PC
- Supports DDWG standards for DVI monitors
- Rack ears included

## Package Includes

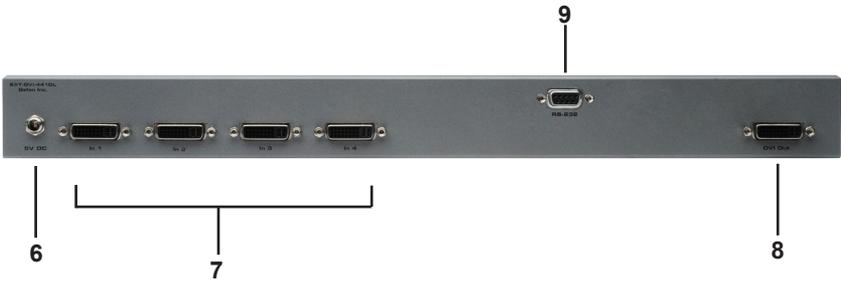
- (1) 4x1 DVI DL Switcher
- (4) 6-ft Dual Link DVI cables (M-M)
- (1) 5V DC Power Supply
- (1) User's Manual
- (1) IR remote control
- (1) Set of Rack Ears

# PANEL LAYOUT

## Front Panel



## Back Panel



## PANEL DESCRIPTIONS

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- 1 External IR Port**  
For connection of external IR extension device such as the Gefen IR Extender (part # EXT-RMT-EXTIR).
- 2 IR Receiver**  
Receives IR signal from the handheld Infrared remote control unit included with the product.
- 3 DVI Signal Status LEDs 1-4**  
Provide visual confirmation of the currently selected DVI input signal out of the four DVI input ports.
- 4 DVI Input Selector**  
Push-button switch cycles the next DVI input 1-4 in a forward sequence starting again at 1.
- 5 Power Indicator LED**  
Indicates when the 4x1 DVI DL Switcher is receiving 5V DC power from its included AC power supply.
- 6 5V Locking Power Receptacle**  
Supplies power to the 4x1 DVI DL Switcher from the included external 5V DC power supply. The 5V power supply has a locking power tip which screws into this receptacle.
- 7 DVI Input Ports 1-4**  
DVI video sources one through four attach to the 4x1 DVI DL Switcher.
- 8 DVI Output Port**  
This DVI output port is connected to the display device (Monitor, Projector).
- 9 RS-232 Serial Communications Interface**  
Provided for external control of the 4x1 DVI DL Switcher.

# CONNECTING AND OPERATING THE 4X1 DVI DL SWITCHER

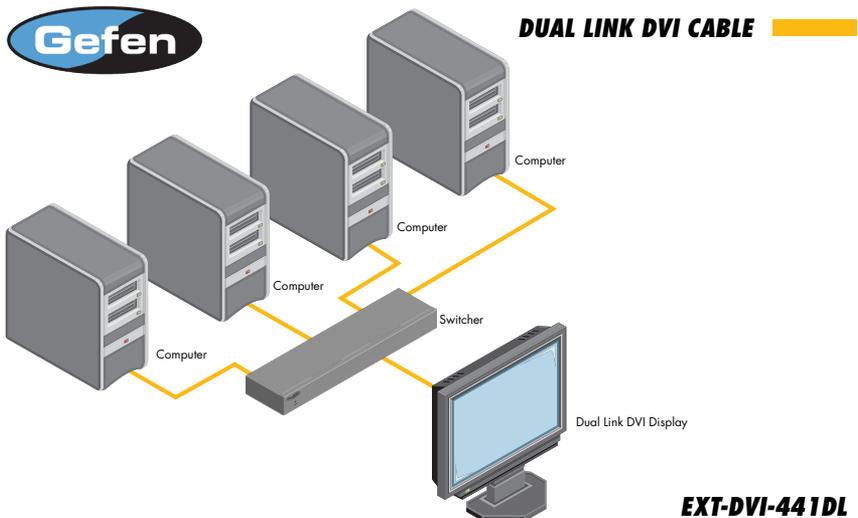
## How to Connect the 4x1 DVI DL Switcher to your devices:

1. Connect user supplied DVI cables from the DVI sources into the 4x1 DVI Switcher's Inputs.
2. Connect the cable from your display (monitor or projector) into the DVI Out of the 4x1 DVI DL Switcher.
3. Connect the 5V power supply, then plug it into the wall. Turn on the DVI display or projector first, then the video sources (computers). Turn on the 4x1 DVI DL Switcher by screwing its 5V DC power supply tip into the receptacle in the rear of the chassis.

**Note:** The Switcher retrieves device resolution and video timing capability information called EDID from the display and feeds it to all connected input sources. This mode of operation is called LOCAL EDID mode. It allows a much faster setup time and improved operational stability since input sources do not need to individually collect and store EDID on their own.

If some sources do not display correctly, you can individually configure each input source and/or program custom EDIDs (such as standard compatible resolutions) into the Switcher, or alternately set each input source to directly read EDID from the display device (with the Local EDID Mode turned OFF). These procedures are covered in detail on pages 10-11 along with EDID concepts in general.

## Wiring Diagram for the 4x1 DVI DL Switcher



## 4X1 DVI DL SWITCHER REMOTE DESCRIPTION

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The RMT-4IR remote control will allow the user to select which of 4 DVI sources will be displayed. Please use the information below when selecting the desired source for output to a display or other DVI video receiving device.

RMT-4IR Button	DVI Source
1	1
2	2
3	3
4	4

## 4X1 DVI DL SWITCHER REMOTE INSTALLATION

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To use the RMT-4IR 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 Inline 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.



Empty Battery Slot

IR Code Dip Switches

# 4X1 REMOTE CONTROL AND SWITCHER CONFIGURATION

## How to Resolve IR Code Conflicts

In the event that IR commands from other remote controls conflict with the supplied RMT-4IR remote control, changing the remote control channel will alleviate this issue. The RMT-4IR remote control and the 4x1 DVI DL Switcher both have banks of DIP (Dual Inline Package) Switches for configuring the remote channel that the units use to communicate. These settings must exactly match each other for proper operation.

The DIP Switch bank on the RMT-4IR is located underneath the battery cover. DIP Switch banks for the 4x1 DVI DL Switcher are located on the underside of the unit beneath a black piece of metallic tape. One DIP switch bank (4-switch) is for the adjustment of remote control frequencies and switch behavior. The other DIP switch (8-switch) is reserved for Gefen use only. DIP Switches 1 and 2 on the RMT-4IR directly correspond to DIP Switches 1 and 2 on the 4x1 DVI DL Switcher. Only switches 1 and 2 (of 4 in that bank) are used for IR Code settings.



Remote Channel 1:  
Default



Remote Channel 2:



Remote Channel 3:



Remote Channel 4:



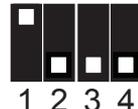
**Left:** Picture of the opened rear battery compartment of the RMT4-IR remote showing the exposed DIP Switch bank between the battery chambers.

### 4x1 DVI DL Switcher

Remote Channel 1:  
Default



Remote Channel 2:



Remote Channel 3:



Remote Channel 4:



### **What is EDID and what is it used for?**

Under normal circumstances, an audio/video source device (digital or analog) will require information about a connected device/display to assess what resolutions and features (capabilities) are possible. The source device can then tailor its output to create resolutions and/or features that are compatible with the attached device/display. This capability information is called EDID (Extended Display Identification Data). A source device can only accept and read one EDID data structure/record from a connected source device/display. Likewise, the source device can output only one video resolution to a connected device/display.

### **The importance of EDID with regards to the 4x1 DVI DL Switcher**

The 4x1 DVI DL/SL Switcher handles multiple sources/inputs. Each connected source device must correctly read one EDID data structure in order to address its display device correctly. EDID management is carefully handled by the 4x1 DVI DL Switcher to insure that EDID is recorded and retransmitted properly, otherwise display of the input sources might not occur correctly (or at all).

### **Managing EDID with the 4x1 DVI DL Switcher**

The 4x1 DVI DL Switcher uses 2 modes for routing EDID. They are:

1. When the local EDID Mode is ON, (factory default setting) the Switcher copies the EDID of the connected display to the local memory location as they are selected. Each device must fully “boot up” before you can select the next input. The connected device derives EDID information from the local memory location.
2. When the local EDID Mode is OFF, each time a new source device is selected, the Switcher connects EDID from the attached display to the currently selected input source.

Both modes are described in greater detail on the opposite page.

NOTE: The 4x1 DVI DL Switcher also features an EDID Lock Mode, allowing the EDID to be stored. See the following page for details.

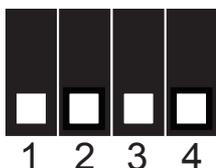
### **How do I change EDID modes in the 4x1 DVI DL Switcher?**

There is a bank of 4 DIP (Dual Inline Package) switches located on the main circuit board of the Switcher underneath a small piece of silver grey tape on the underside of the Switcher. When the sticker is removed, there will be two DIP switch banks visible, one with 4 switches and one with 8 switches. The 8-switch DIP switch bank is not used here (it is used for the DL (dual link) feature covered later on page 12.)

# EDID MODES

## EDID Modes

The diagram below illustrates the 4-position DIP switch bank (containing 4 small white toggle switches as shown). The functions of the switches are as follows:



DIP SWITCH	Function
1	IR Channel
2	IR Channel
3	EDID Mode
4	EDID Lock Mode

Use DIP switch 3 to set the desired EDID mode. (UP is On)

### How to set the two EDID Modes:

#### 1. Local EDID Mode ON (Switch 3 = OFF, FACTORY DEFAULT SETTING)

- During power-on, the connected display's EDID is copied to all four local EDID storage locations at once. EDID stored in local memory is then passed to all input sources.
- The EDID stored in the local locations can be overwritten with another EDID from the following locations:
  - Built-in EDID memory bank (up to 7 EDID records can be stored)
  - EDID collected directly from the input display upon power-up.

#### 2. Local EDID Mode OFF (Switch 3 = ON)

- The DDC signal of the connected display is routed directly to each input source. Each time a new source device is selected, EDID is transmitted from the attached display to the currently selected input source. (This mode will successfully pass HDCP signals.)

#### 3. EDID Lock Mode (DIP Switch 4 = ON)

- Locks the last stored EDID, even if the unit is power-cycled. To store a new EDID, do the following:
  1. Power-down the Switcher and set DIP Switch 4 to the OFF position.
  2. Connect the display to the DVI output port then power-on the Switcher.
  3. Set DIP Switch 4 to the ON position to lock the EDID.

## DL (DUAL LINK) ONLY MODES

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### **DL (Dual Link) Only Modes**

The 8-position DIP switch bank located on the underside of the 4x1 DVI DL Switcher can be used to set each individual input to work in a Dual Link Only mode. These modes should only be enabled if issues occur when using Dual Link sources and displays in the default mode.

DIP SWITCH	Function	DIP SWITCH	Function
1	Input 1 Mode	5	N/A
2	Input 2 Mode	6	N/A
3	Input 3 Mode	7	N/A
4	Input 4 Mode	8	N/A

### **DL (Dual Link) and SL (Single Link) Mode (Switch=OFF) DEFAULT**

- This setting can be set individually for each input. This mode will allow the connection of both Dual Link and Single Link displays.

### **DL (Dual Link) Only Mode (Switch=ON)**

- This setting can be set individually for each input. This mode should be enabled if issues with the default occur with Dual Link displays.

## RS-232 SERIAL CONTROL INTERFACE

### **What features are available via the RS-232 serial communications port?**

The 4x1 DVI DL Switcher can accept commands through the RS-232 serial communications port located on the rear panel. The current RS-232 control features are the ability to switch/route inputs to outputs without the RMT-4IR remote control.

### **How do I use these features?**

These features were initially intended for utilization by custom installers in automated setups. However, these features can be tested by using any Windows PC with a terminal emulation program. The next few pages will show you how.

### **What pins are used for communication with the 4x1 DVI DL Switcher?**

Only pins 2 (Receive), 3 (Transmit), and 5 (Ground) are used for communication. A null-modem adapter should not be used with this Switcher.



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

### **What are the RS-232 communications port settings?**

Bits per second .....	19200
Data bits .....	8
Parity .....	None
Stop bits .....	1
Flow Control .....	None

# RS-232 SERIAL CONTROL COMMANDS

---

## RS-232 Features

RS-232 remote functions are used to control of this product's features. Features include input to output routing, EDID storage, EDID management, etc.

## Functions Syntax

The syntax for each function is always the same:

#Character as the start flag → Function name → Space ( \_ ) as function name end flag → Parameter 1 → Space → Parameter n → Carriage Return ( \r ) →

Sample:

#FunctionName\_param1\_param2\_param3\_param4...\r

Syntax is NOT case sensitive.

## EDID Management

Function	Description
#EDIDDSTOLO	Read downstream EDID and stores into all inputs
#EDIDDSTOBA	Read downstream EDID and stores in EDID Bank
#EDIDBATOLO	Read from EDID bank and store into all local inputs
#DDCTODS	Route input DDC to downstream EDID (pass-through mode)
#DDCTOLO	Routes input DDC to local EDID
#DEF	Sets unit to default factory settings
#LOEDIDTOBA	Load EDID from serial port and store in EDID bank
#LOEDIDTOLO	Loads EDID from serial port and store in any input
#PRBAEDID	Reads EDID from EDID bank and sends to serial port
#PRDSEDID	Reads downstream EDID and sends it to serial port
#PRLOEDID	Reads local input EDID and sends it to serial port

## #EDIDDSTOLO Function

The #EDIDDSTOLO function reads the downstream EDID and stores into all local inputs.

### Syntax:

```
#EDIDDSTOLO
```

### Parameters:

None

## #EDIDDSTOBA Function

The #EDIDDSTOBA function reads the downstream EDID and stores it to a specified EDID bank.

### Syntax:

```
#EDIDDSTOBA param1
```

### Parameters:

<i>param1</i>	EDID bank offset	[1 - 7]
---------------	------------------	---------

## #EDIDBATOLO Function

The #EDIDBATOLO function reads an EDID from an EDID bank and stores it in all inputs.

### Syntax:

```
#EDIDBATOLO param1
```

### Parameters:

<i>param1</i>	EDID bank offset	[1 - 7]
---------------	------------------	---------

### **#DDCTODS Function**

The #DDCTODS function routes the input DDC to the downstream EDID (pass-through mode).

Syntax:

#DDCTODS

Parameters:

None

### **#DDCTOLO Function**

The #DDCTOLO function routes the input DDC to the local EDID.

Syntax:

#DDCTOLO

Parameters:

None

### **#DEF Function**

The #DEF function set the Switcher to the factory default settings.

Syntax:

#DEF

Parameters:

None

## RS-232 SERIAL CONTROL COMMANDS

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### #LOEDIDTOBA Function

The #LOEDIDTOBA function loads the specified EDID file and stores it in a specified EDID bank.

#### Syntax:

#LOEDIDTOBA param1 param2 param3

#### Parameters:

*param1* Echo mode [0 - 1]

Value	Meaning
0	Semi echo mode
1	Full echo mode

*param2* EDID size [1 - 2]

Value	Meaning
1	128 byte EDID
2	256 byte EDID

*param3* EDID bank offset [1 - 7]

## RS-232 SERIAL CONTROL COMMANDS

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### #LOEDIDTOLO Function

The #LOEDIDTOLO function loads the specified EDID file to a specified local input.

#### Syntax:

```
#LOEDIDTOLO param1 param2
```

#### Parameters:

*param1* Echo mode [0 - 1]

Value	Meaning
0	Semi echo mode
1	Full echo mode

*param2* EDID size [1 - 2]

Value	Meaning
1	128 byte EDID
2	256 byte EDID

### #PRBAEDID Function

The #PRBAEDID function reads the EDID file from the specified bank and sends it to the serial port.

#### Syntax:

```
#PRBAEDID param1 param2
```

#### Parameters:

*param1* EDID bank offset [1 - 7]

*param2* File type [0 - 1]

Value	Meaning
0	.BIN file
1	.TXT file

## RS-232 SERIAL CONTROL COMMANDS

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### #PRDSEDID Function

The #PRDSEDID function reads the downstream EDID and sends it to the serial port.

#### Syntax:

#PRDSEDID param1

#### Parameters:

*param1*

File type [0 - 1]

Value	Meaning
0	.BIN file
1	.TXT file

### #PRLOEDID Function

The #PRLOEDID function reads the local EDID and spools it to the serial port.

#### Syntax:

#PRLOEDID param1

#### Parameters:

*param1*

File type [0 - 1]

Value	Meaning
0	.BIN file
1	.TXT file

## RS-232 SERIAL CONTROL COMMANDS

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### Commands

Simplified syntax was used for command implementation for faster operation with the device: # character – isn't needed, the command name is reduced to 1 letter. The commands are not case-sensitive.

Command	Description
<i>P</i>	Displays the function menu
<i>1</i>	Switch to Input 1
<i>2</i>	Switch to Input 2
<i>3</i>	Switch to Input 3
<i>4</i>	Switch to Input 4

The ASCII character table below indicates which Switcher input will be routed to the output Display when the corresponding ASCII (numeric) character is typed.

ASCII	Input	Binary
1	1	0011 0001
2	2	0011 0010
3	3	0011 0011
4	4	0011 0100

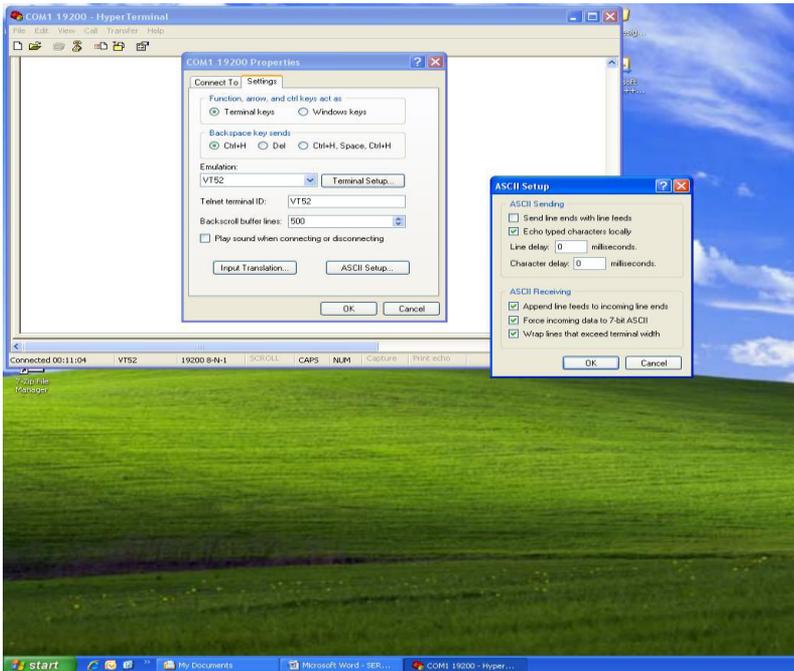
# RS-232 SERIAL CONTROL COMMANDS

## 2. USING SHORT-CUT CHARACTERS TO CHANGE SETTINGS

### 2.1 HYPERTERMINAL™ SETTINGS in Microsoft Windows™

First, please setup correct communications by performing these commands (as shown on the screen shot immediately below):

**File->Properties->Setting->ASCII Setup**



Also, please be sure to unmark the check box that says “Send line ends with line feeds.”

### 2.2 EXAMPLE -- CHANGE THE ROUTED SOURCE

Now you are ready to route Display input sources.

At the Hyperterminal cursor prompt, type the numeral key of the input to switch to, followed by the ENTER key.

Wait until you see the message “Function Done” on the Display. At this point the Display should show the correct Source corresponding to the numeral that was typed.

## RACK MOUNT INSTALLATION

Rack mount ears are provided for installation of this unit into a 1U rack mount space.

1. Locate the side screws on the unit.
2. Remove the front 2 screws that are located closest to the front of the unit.
3. Using the removed screws, screw the rack mounting bracket into the unit.
4. Repeat the procedure on the opposite side of the unit.



## SPECIFICATIONS

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Video Amplifier Bandwidth:.....	2 x 165 MHz
Input Video Signal:.....	1.2 Volts p-p
Input DDC Signal:.....	5 Volts p-p (TTL)
Single Link Max. Resolution:.....	1920 x 1200
Dual Link Max. Resolution:.....	3840 x 2400
DVI Connector:.....	DVI-I 29-pin female (digital only)
Power Supply:.....	5V DC
Power Consumption:.....	5 Watts (min.) / 25 Watts (max.)
Dimensions:.....	17.1" W x 1.8" H x 4.4" D
Rackmountable:.....	1U Rack Space
Shipping Weight:.....	12 lbs.

## WARRANTY

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Gefen warrants the equipment it manufactures to be free from defects in material and workmanship.

If equipment fails because of such defects and Gefen is notified within two (2) years from the date of shipment, Gefen will, at its option, repair or replace the equipment, provided that the equipment has not been subjected to mechanical, electrical, or other abuse or modifications. Equipment that fails under conditions other than those covered will be repaired at the current price of parts and labor in effect at the time of repair. Such repairs are warranted for ninety (90) days from the day of reshipment to the Buyer.

This warranty is in lieu of all other warranties expressed or implied, including without limitation, any implied warranty or merchantability or fitness for any particular purpose, all of which are expressly disclaimed.

1. Proof of sale may be required in order to claim warranty.
2. Customers outside the US are responsible for shipping charges to and from Gefen.
3. Copper cables are limited to a 30 day warranty and cables must be in their original condition.

The information in this manual has been carefully checked and is believed to be accurate. However, Gefen assumes no responsibility for any inaccuracies that may be contained in this manual. In no event will Gefen be liable for direct, indirect, special, incidental, or consequential damages resulting from any defect or omission in this manual, even if advised of the possibility of such damages. The technical information contained herein regarding the features and specifications is subject to change without notice.

For the latest warranty coverage information, refer to the Warranty and Return Policy under the Support section of the Gefen Web site at [www.gefen.com](http://www.gefen.com).

## PRODUCT REGISTRATION

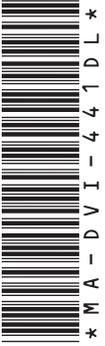
**Please register your product online by visiting the Register Product page under the Support section of the Gefen Web site.**





## NOTES

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**www.gefen.com support@gefen.com**



This product uses UL listed power supplies.