



## User Guide

DVI-4521b      HDMI 2x1 Switcher  
DVI-4541b      HDMI 4x1 Switcher



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## 1.0 INTRODUCTION

Thank you for purchasing this DVI Gear product. The DVI-4521b and DVI-4541b HDMI Switchers provide selection of either 2 or 4 sources for display on an HDMI compliant device without signal degradation or loss of encryption. This product supports many HDMI v1.3 features including Deep Color with 10-bit and 12-bit color depth and lossless digital formats such as Dolby TrueHD, Dolby Digital Plus, and DTS-HD Master Audio. Both models include Infrared Remote and RS232 Control capabilities. HDMI I/O ports are provided with a locking point to secure the cable connection.

Our professional digital distribution products have been serving the industry for over ten (10) years. DVI Gear offers a full line of high-quality Digital Matrix Routers, Switchers, Splitters, Video Scalers, Up/Down/Cross Converters, Format Converters, Analog-Digital Converters, as well as a wide range of long-reach Digital Cables, Extenders, and Optical Transmission systems.

### 1.1 Liability Statement

Every effort has been made to ensure that this product is problem free. DVI Gear cannot be held liable for the use of this hardware or for any direct or indirect consequential damages arising from its use. It is the user's responsibility to assure that this product is suitable for their requirements and that it is installed correctly.

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## 1.2 Features

The DVI-4521b and DVI-4541b HDMI Switchers have many unique features:

- HDMI v1.3, HDCP 1.1 and DVI 1.0 compliant
- Supports 10-bit and 12-bit Deep Color
- Supports a wide range of PC and HDTV resolutions
- Supports long input cables with built-in Signal Enhancement feature
- Support lossless digital audio formats: Dolby Digital, Dolby Digital Plus, True-HD, and DTS-HD
- Includes Infrared Remote Control and RS232 Control
- Locking DC power supply connector for added security
- Optional Rack Mount Kit is available

## 1.3 Getting the Best Results

There are many factors that can influence the performance and quality of HDMI signal distribution systems. Following some basic guidelines will help ensure the best possible performance from this product.

- **Display Device** – The picture quality of the displayed output signal will depend largely upon the type and quality of the HDMI display used. For instance, some video displays just look better than others. It is useful to know the native resolution (intrinsic fixed resolution) of your HDMI display. For best results, always set the output resolution of your source device to match your display's native resolution.
- **Interconnection Cables** – Image quality can be significantly impaired by low-quality cables, especially when cable lengths exceed 5 meters (16.4 ft.). For best results, always use DVI Gear's Super High Resolution™ (SHR™) copper cables for cable runs up to 50 meters (164 ft.). For longer cable runs, please call DVI Gear to discuss other cabling options.
- **Interference from Nearby Electrical Devices** – can have an adverse effect on signal quality. For example, some types of motorized appliances, fluorescent lighting fixtures, and high current AC wiring can generate high levels of RFI / EMI (radio frequency and electromagnetic interference) that can affect the performance of video equipment in its proximity. CAT5 wiring can be especially sensitive to these conditions. In most cases, interference problems can be solved by using high-quality shielded cables.



## 2. SPECIFICATIONS

<b>Performance</b>	
Compliance	HDMI v1.3, HDCP v1.1, and DVI v1.0
Maximum Pixel Clock Frequency	225 MHz
Maximum Video Bit Rate	2.25 Gbps
Maximum Color Depth	36 bits (12 bit/color)
Supported HDTV Formats	480p, 576p, 720p, 1080i, and 1080p @ 24 Hz / 50 Hz / 60 Hz
Supported PC Resolutions	up to 1920x1200 and 2048x1080
Digital Audio Support	Dolby Digital, Dolby Digital Plus, Dolby TrueHD, DTS-HD Master Audio, DTS 32-192fs sample, LPCM 7.1/ch
Input Signal Equalization	Enhance Mode OFF: 6 dB @ 825 MHz Enhance Mode ON: 12 dB @ 825 MHz
EDID Management	Display's EDID is passed through to all sources.
<b>I/O Connectors</b>	
HDMI Inputs	DVI-4521b: 2x HDMI 19-pin female connectors w/ fixation points DVI-4541b: 4x HDMI 19-pin female connectors w/ fixation points
HDMI Outputs	1x HDMI 19-pin female connector with fixation point
RS232 Serial Port	D-sub 9-pin female connector
<b>Mechanical</b>	
Dimensions (H x W x D)	1.4" x 7.9" x 4.3" (35.5 mm x 200.5 mm x 109 mm)
Weight	1.28 lbs. (582 g)
<b>Environmental Specifications</b>	
Storage Temperature	-10° to 50°C (14° to 122° F)
Operating Temperature	0° to 50°C (32° to 122° F)
Humidity (storage / operating)	10% to 90% (non-condensing)
<b>Power Requirements</b>	
External AC Power Adapter	Input: 100-240 VAC / 50-60Hz Output: +5VDC @2A
<b>Regulatory Approvals</b>	
Switcher Unit	FCC, CE, RoHS
AC Power Adapter	UL, CUL, CE, PSE, GS, RoHS
<b>Warranty</b>	
Limited Warranty	1 year parts and labor
<b>Model Numbers</b>	
DVI-4521b	HDMI (v1.3) 2x1 Switcher
DVI-4541b	HDMI (v1.3) 4x1 Switcher
DVI-4500-RM	Optional Rack Mount Kit for DVI-4521b / DVI-4541b
<b>Accessories Included</b>	
1x External AC Power Adapter, 1x IR Remote Control Unit, 1x User Guide	

## 3.0 CHECKING PACKAGE CONTENTS

Before attempting to use this unit, please check the packaging and make certain the following items are contained in the shipping carton:

- HDMI Switcher
- External AC Power Adapter
- Infrared Remote Control
- User Guide

**Note:** Please retain the original packing material should the need ever arise to return the unit. If you find any items are missing, contact your reseller or DVIgear immediately. Please have the Model Number, Serial Number, and Invoice Number available for reference when you call.

## 4.0 INSTALLATION

These switchers are equipped with 2 or 4 independent HDMI inputs and a single HDMI output. All input and output ports are arrayed on the switcher's rear panel together with the +5 VDC power input and RS232 serial port. Please study the images below to become familiar with the location of the signal inputs, signal output, power input, and controls.



DVI-4521b HDMI 2x1 Switcher



DVI-4541b HDMI 4x1 Switcher



#### 4.1 Connecting the Inputs to the Switcher

Connect HDMI compliant source device(s) to the ports marked “HDMI IN”. Make certain that the HDMI cables are securely plugged into the source devices as well as the switcher. Always use high quality HDMI cables for best results.

#### 4.2 Connecting the Output to the Destination Devices

Using a high-quality HDMI cable, connect the port marked “HDMI OUT” to an HDMI compliant display device, or other downstream sink. Make certain that the HDMI cables are securely plugged into the switcher and display.

*Note: Proper operation of this product requires the use of high quality cables. DVI Gear's SHR™ HDMI cables provide low-loss, high-bandwidth signal handling and are the recommended cables for use with all HDMI products. The cable distance specifications for this product cannot be guaranteed unless DVI Gear SHR™ cables are used throughout the system.*

#### 4.3 Using the Positive Cable Securing Feature

If HDMI cables with locking type connectors are to be installed, an added step is necessary. First, remove the Philips head screws from the rear of the unit just above the HDMI connectors and replace them with the Hex Nut Screws that came in the switcher. Next, fix these screws into the threaded holes vacated by the Philips head screws. The Hex Nut provides a threaded receptacle for the screw that is part of the locking HDMI connector on the cable. Finally, plug in the cable's Locking HDMI connector and secure it to the unit with its integral screw. This fastens the HDMI cable to the unit and prevents accidental removal.

#### 4.4 Connecting the Power

All units are shipped with an External Power Adapter to convert 100 to 240VAC at 50 or 60Hz to 5VDC 2A maximum. Connect the DC output cable from the External AC Power Adapter to the locking receptacle on the rear panel. Take care to insert the plug, then twist it a quarter turn in the clockwise direction for a secure fit. Next plug the Power Adapter into an AC receptacle. The unit will start functioning as soon as the power switch on the front panel is pressed and the LED to the left of the power switch is illuminated.

#### 4.5 Optional Rack Mount Kit

Using the optional DVI-4500-RM Rack Mount Kit, these HDMI Switchers can be mounted in a standard 19” equipment rack. This kit allows two switchers to be positioned side-by-side on a single 1U rack shelf.

## 5.0 OPERATING THE UNIT

These HDMI switchers have the following front panel controls:

### INPUT Selection:

Use this pushbutton switch to select the desired input. Each time the switch is pressed, the next input is selected in sequence (1, 2, 3, and so on). A Green LED indicates which input is active.

### ENHANCE Mode:

Press this button to activate a built-in cable equalizer, which helps to restore lost high-frequency components of the HDMI signal if the input cable length is too long or cable quality is questionable. When this mode is activated, a Yellow LED will be turned on.

### POWER On/Off:

This power switch turns the unit ON/OFF. A Red LED indicator turns on when the unit is in the powered ON state.

## 5.1 Operation of the HDMI Switcher via Remote Control



This HDMI switcher can be controlled using the included Infrared Remote Control Unit. The switcher can be turned ON or OFF, and the inputs can be selected by pressing the appropriate button on the remote. Selection of the Enhance mode is not possible from the IR Remote.

**Note:** When using the IR Remote Control for the first time, it may be necessary to remove an insulator from the battery compartment so that the remote can receive power. The battery compartment slides out from the bottom of the remote.

## 5.2 Operation of the HDMI Switcher via RS-232 Control

The DVI-4521b and DVI-4541b HDMI Switchers may be controlled via RS-232 serial communications. The technical information needed is provided in the two tables that follow below. The switcher uses the standard RS-232 interface with the following settings:

- 9600 Baud
- 8 data bits
- 1 stop bit
- no parity
- null modem cable

**Note:** This information should be used only by technically trained individuals.

**Pin Assignments:**

HDMI Switcher			Serial Control Unit	
PIN	Definition		PIN	Definition
1	NC		1	NC
2	Tx	→	2	Rx
3	Rx	←	3	Tx
4	NC		4	NC
5	GND		5	GND
6	NC		6	NC
7	NC		7	NC
8	NC		8	NC
9	NC		9	NC

**5.2.1 RS-232 Command Set**

The characters within the quotation marks “ - ” are ASCII characters.

Command	Action
“I” + “1”	Port 1 On
“I” + “2”	Port 2 On
“I” + “3”	Port 3 On
“I” + “4”	Port 4 On
“S” + “1”	Enable Signal Enhance
“S” + “0”	Disable Signal Enhance
“P” + “1”	Power On
“P” + “0”	Power Off

The unit will transmit the above characters when the button on the front of the unit is pressed. For example, when the unit is ON and the Power button is pressed to turn the unit OFF, the switcher will transmit the “P0” string over the RS232 link. Also when a string is transmitted to the switcher, the switcher will return the same string.



## 6.0 TROUBLESHOOTING

In the event of problems, first make certain that the HDMI Switcher is receiving power. Next, check to ensure that the input and output cables are of the highest possible quality, and not longer than 50 feet (unless using DVI Gear SHR™ cables). In most cases HDMI signals are HDCP encrypted; therefore, check to make sure that the source devices and destination device are fully HDMI capable. Note that switching times may vary as the HDCP authentication process requires additional processing time, which is highly dependent on the equipment connected to the switcher.

After trying the above suggestions should the problem still persist, contact your dealer for additional suggestions. Should the dealer's technical personnel be unable to assist you, please contact DVI Gear via telephone at (888) 463-9927 (United States and Canada); international callers may dial (770) 421-6699, or contact DVI Gear via e-mail at support@dvicear.com.

## 7.0 LIMITED WARRANTY

LIMITED WARRANTY – With the exceptions noted in the next paragraph, DVI Gear, Inc. warrants the original purchaser that the equipment it manufactures or sells will be free from defects in materials and workmanship for a period of one year from the date of purchase. Should this product, in DVI Gear's opinion, prove defective within this warranty period, DVI Gear, at its discretion, will repair or replace it without charge. Any defective parts replaced become the property of DVI Gear. This warranty does not apply to those products which have been damaged due to accident, unauthorized alterations, improper repair, modifications, inadequate maintenance and care, or use in any manner for which the product was not originally intended.

If repairs are necessary under this warranty policy, the original purchaser must obtain a Return Authorization Number from DVI Gear and return the product freight prepaid to a location designated by DVI Gear. After repairs are complete, the product will be returned, freight prepaid.

LIMITATIONS – All products sold are "as is" and the above Limited Warranty is in lieu of all other warranties for this product, expressed or implied, and is strictly limited to one year from the date of purchase. DVI Gear assumes no liability to distributors, resellers, end-users, or any third parties for any loss of use, revenue, or profit.

In respect to any of the products sold, DVI Gear makes no other representation of warranty as to fitness for the purpose or merchantability or otherwise. The liability of DVI Gear with respect to any defective products will be limited to the repair or replacement of such products. In no event shall DVI Gear be responsible or liable for any damage arising from the use of such defective products, whether such damage be direct, indirect, consequential, or otherwise and whether such damage are incurred by the reseller, end-user, or any third party.



## **8.0 REGULATORY COMPLIANCE**

This product has been tested for compliance with appropriate FCC and CE rules and regulations and is also RoHS compliant. The External AC Power Adapter has been tested for compliance with UL, CE, CEC, CSA, and PSE rules and regulations and is also RoHS compliant.



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