

KRAMER



USER MANUAL

MODEL:

TP-588D

HDBT to DVI/HDMI Receiver



TP-588D HDBaseT to DVI/HDMI Receiver Quick Start Guide

This guide helps you install and use your TP-588D for the first time. For more detailed information, go to <http://www.kramerav.com/manual/TP-588D> to download the latest manual or scan the QR code on the left.

Step 1: Check what's in the box

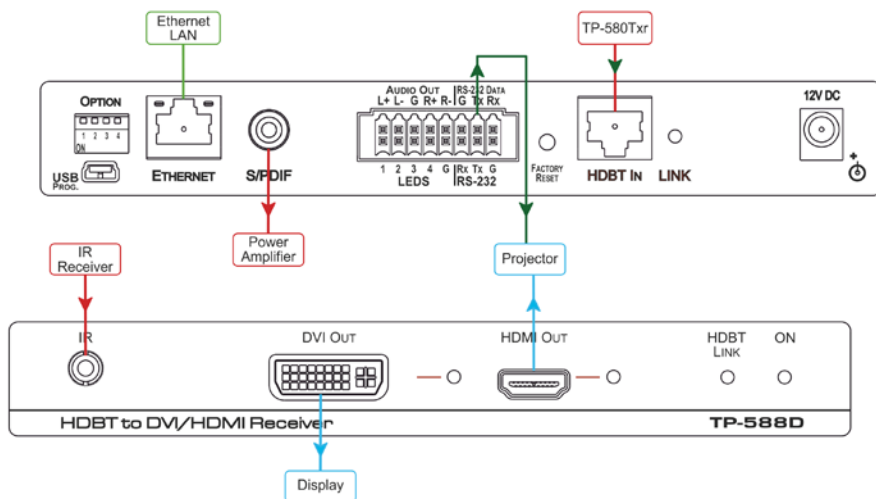
- ✓ TP-588D HDBaseT to DVI/HDMI Receiver
- ✓ 1 Power supply
- ✓ 1 Quick Start Guide
- ✓ 4 Rubber Feet

Step 2: Install the TP-588D

To mount the **TP-588D** in a rack, use an **RK-T2B** rack adapter. Alternatively, attach the rubber feet to the bottom of the device and place it on a table or a shelf.

Step 3: Connect the inputs and outputs

Always switch off the power to each device before connecting it to your **TP-588D**.



Kramer engineers have developed special twisted pair cables to best match our digital twisted pair products. These specially built cables significantly outperform regular CAT 6 or CAT 7a cables. For details, see the User Manual.

Step 4: Set the DIP-switches

#	Feature	Function	Switch State
1	EDID Control	Determines the source of the EDID	Off—EDID source is dictated by DIP-switch 2 (up, default) On—EDID is locked (down)
2	EDID Priority	Determines from which output to read the EDID	Off—EDID is from Output 1 HDMI (up, default) On—EDID is read from Output 2 DVI (down)
3	Output Shutdown Enable	Enables and disables the output timeout shutdown when the input signal is lost	Off—Always on, no timeout (up, default) On—5 minute (down)
4	Extra Range	Enables/disables the extra range function	Off—Disabled (up, default) On—Enabled (down)

Step 5: Connect the power



If the unit does not receive power via PoE, connect the power adapter to the **TP-588D** and plug the adapter into the mains electricity.

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1 Introduction

Welcome to Kramer Electronics! Since 1981, Kramer Electronics has been providing a world of unique, creative, and affordable solutions to the vast range of problems that confront video, audio, presentation, and broadcasting professionals on a daily basis. In recent years, we have redesigned and upgraded most of our line, making the best even better!

Our 1,000-plus different models now appear in 14 groups that are clearly defined by function: GROUP 1: Distribution Amplifiers; GROUP 2: Switchers and Routers; GROUP 3: Control Systems; GROUP 4: Format/Standards Converters; GROUP 5: Range Extenders and Repeaters; GROUP 6: Specialty AV Products; GROUP 7: Scan Converters and Scalers; GROUP 8: Cables and Connectors; GROUP 9: Room Connectivity; GROUP 10: Accessories and Rack Adapters; GROUP 11: Sierra Video Products; GROUP 12: Digital Signage; GROUP 13: Audio; and GROUP 14: Collaboration.

Congratulations on purchasing your Kramer **TP-588D HDBT to DVI/HDMI Receiver**. This product, which incorporates HDMI™ technology, is ideal for:

- Home theater, presentation and multimedia applications
- Rental and staging

2 Getting Started

We recommend that you:

- Unpack the equipment carefully and save the original box and packaging materials for possible future shipment
- Review the contents of this user manual



Go to www.kramerav.com/downloads/TP-588D to check for up-to-date user manuals, application programs, and to check if firmware upgrades are available (where appropriate).

2.1 Achieving the Best Performance

To achieve the best performance:

- Use only good quality connection cables (we recommend Kramer high-performance, high-resolution cables) to avoid interference, deterioration in signal quality due to poor matching, and elevated noise levels (often associated with low quality cables)
- Do not secure the cables in tight bundles or roll the slack into tight coils
- Avoid interference from neighbouring electrical appliances that may adversely influence signal quality
- Position your **TP-588D** away from moisture, excessive sunlight and dust



This equipment is to be used only inside a building. It may only be connected to other equipment that is installed inside a building.

2.2 Safety Instructions



Caution: There are no operator serviceable parts inside the unit

Warning: Use only the Kramer Electronics power supply that is provided with the unit

Warning: Disconnect the power and unplug the unit from the wall before installing

2.3 Recycling Kramer Products

The Waste Electrical and Electronic Equipment (WEEE) Directive 2002/96/EC aims to reduce the amount of WEEE sent for disposal to landfill or incineration by requiring it to be collected and recycled. To comply with the WEEE Directive, Kramer Electronics has made arrangements with the European Advanced Recycling Network (EARN) and will cover any costs of treatment, recycling and recovery of waste Kramer Electronics branded equipment on arrival at the EARN facility. For details of Kramer's recycling arrangements in your particular country go to our recycling pages at <http://www.kramerelectronics.com/support/recycling/>.

3 Overview

The high quality **TP-588D HDBT to DVI/HDMI Receiver** accepts an HDBaseT TP (Twisted Pair) signal from a compatible Kramer HDBaseT transmitter and decodes it into the following signals:

- DVI
- HDMI
- S/PDIF, digital audio
- Balanced, analog audio
- IR
- Ethernet
- RS-232

Using the **TP-588D** you can also receive via the TP cable:

- EDID (Extended Display Information Data) and DVI signals between the **TP-588D** and the transmitter
- HPD (Hot Plug Detect) signals from the display device to the source

The device is designed to be used in conjunction with any Kramer HDBaseT switcher or transmitter, (for example, the **TP-580TXR**, the **WP-20**, or the **SID-X2N**).

The **TP-588D** features:

- HDCP support
- HDTV compatibility
- 4K support
- Deep color (36bpp in normal range and 24bpp in ultra mode) support
- 3D support

- Up to 130m (430ft) at normal mode (2K), up to 100m at normal mode (4K); up to 180m (590ft) ultra mode (1080p @60Hz @24bpp) when using **BC-HDKat6a** cables
- I-EDIDPro™ Kramer Intelligent EDID Processing™ – Intelligent EDID handling & processing algorithm ensures Plug and Play operation for HDMI systems
- Equalization and re-clocking of the data
- Up to 10.2Gbps data rate (3.4Gbps per graphics channel)
- Power over Ethernet receiver—the device can operate without a dedicated power supply when connected to a device that provides PoE, (for example, the **PSE-2**)
- A MegaTOOLS® sized enclosure. Three devices can be mounted in a 1U rack space using the optional **RK-3T** adapter
- Lockable EDID

Kramer engineers have developed special twisted pair cables to best match our digital twisted pair products; **BC-HDKat6a** (CAT 6 23 AWG cable) significantly outperforms regular CAT 6 cables.



We strongly recommend that you use shielded twisted pair cable

3.1 About HDBaseT™ Technology

HDBaseT™ is an advanced all-in-one connectivity technology (supported by the HDBaseT Alliance). It is particularly suitable in the ProAV – and also the home – environment as a digital networking alternative, where it enables you to replace numerous cables and connectors by a single LAN cable used to transmit, for example, uncompressed full high-definition video, audio, IR, as well as various control signals.



The products described in this user manual are HDBaseT certified.

3.2 About the Power over Ethernet Feature

Power over Ethernet passes electrical power along with data on Ethernet cabling. This allows a single cable to provide both data connection and electrical power to compatible devices.

4 Defining the TP-588D HDBT to DVI/HDMI Receiver

Figure 1 defines the front panel of the TP-588D.

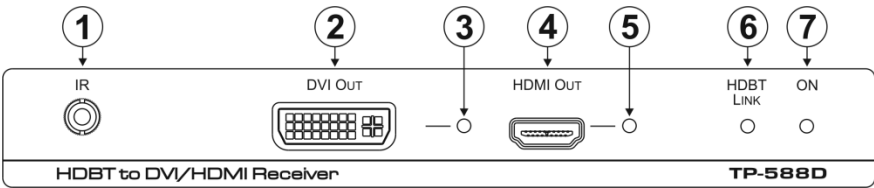


Figure 1: TP-588D HDBT to DVI/HDMI Receiver Front Panel

#	Feature		Function
1	IR 3.5mm Mini Jack		Connect to the IR emitter or sensor
2	DVI OUT	Connector	Connect to the DVI acceptor, (see Section 5)
3		LED	Lights green when there is a valid DVI acceptor, (see Section 6.4.1). If the acceptor does not support HDCP the LED flashes 10 times immediately after connecting the output to a non-HDCP acceptor, or after the acceptor is powered up, then lights solid
4	HDMI OUT	Connector	Connect to the HDMI acceptor, (see Section 5)
5		LED	Lights green when there is a valid HDMI acceptor, (see Section 6.4.1). If the acceptor does not support HDCP the LED flashes 10 times immediately after connecting the output to a non-HDCP acceptor, or after the acceptor is powered up, then lights solid
6	HDBT LINK LED		Lights green when there is a valid link to the HDBT transmitter, (see Section 6.3)
7	ON LED		Indicates the power supply status: • Lights green when the device is plugged into a power supply • Lights orange when operating on PoE and receiving power from a PoE provider, (see Section 6.4.4)

Figure 2 defines the rear panel of the **TP-588D**.

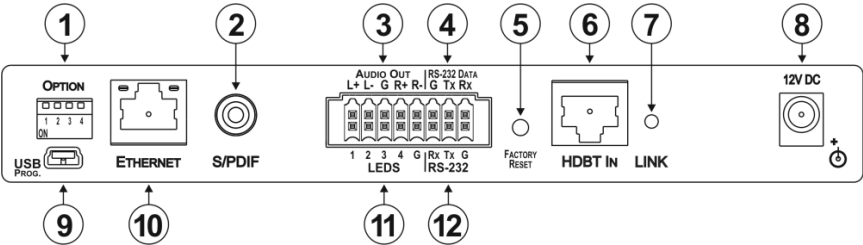


Figure 2: TP-588D HDBT to DVI/HDMI Receiver Rear Panel

#	Feature	Function
1	<i>OPTION</i> 4-way DIP-switch	For setting device functions, (see Section 6.1)
2	<i>S/PDIF</i> Digital Audio RCA Connector	Connect to the stereo, digital audio acceptor
3	<i>AUDIO OUT</i> 5-pin Terminal Block	Connect to the balanced, stereo audio acceptor, (see Section 5.2)
4	<i>RS-232 DATA</i> 3-pin Serial Terminal Block	Connect to the RS-232 serial transmitter or receiver. Note: Data is transmitted even in the absence of video and audio signals
5	<i>FACTORY RESET</i> Button	Press and hold for at least 5 seconds, or press while performing a power cycle to reset the device to default settings, (see Section 6.5)
6	<i>HDBT IN</i> RJ-45 TP Connector	Connect to a compatible HDBaseT switcher/transmitter, (for example, the TP-580Txr, WP-5VH2, or the SID-X2N)
7	<i>LINK</i> LED	Lights green when there is a valid link to the HDBT transmitter, (see Section 6.3)
8	<i>12V DC</i> Connector	Connect to the supplied power adapter, center pin positive, (see Section 3.1)
9	<i>USB PROG.</i> Mini USB Connector	Connect to a PC to perform a firmware upgrade
10	<i>ETHERNET</i> RJ-45 TP Connector	Connect to an Ethernet LAN
11	<i>LEDS</i> 5-pin Terminal Block	Connect to remote LED indicators, (see Section 6.3)
12	<i>RS-232</i> 3-pin Serial Terminal Block	Connect to the RS-232 controller or PC

5 Connecting the TP-588D



Always switch off the power to each device before connecting it to your **TP-588D**. After connecting your **TP-588D**, connect its power and then switch on the power to each device.

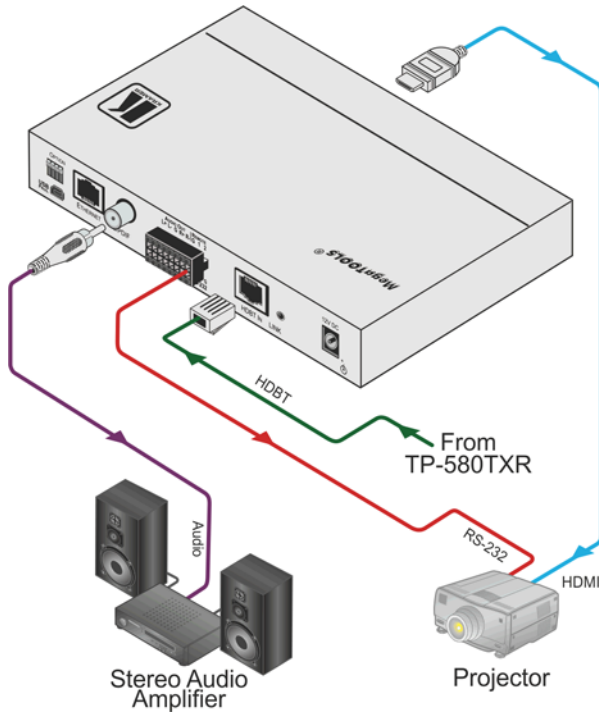


Figure 3: Connecting the TP-588D HDBT to DVI/HDMI Receiver

To connect the **TP-588D**, as illustrated in the example in [Figure 3](#):

1. Connect the HDBT Out RJ-45 connector on the transmitter, (for example, the **TP-580Txr**, **WP-5VH2**, or **SID-X2N**) to the HDBT In RJ-45 connector on the **TP-588D** using STP cable.
2. Connect the HDMI Out connector on the **TP-588D** to the HDMI acceptor, (for example, a projector).

3. Connect the RS-232 Data 3-pin terminal block on the **TP-588D** to the RS-232 controlled device, (for example, the projector).
4. Connect the Audio Out S/PDIF digital, RCA audio connector on the **TP-588D** to the audio acceptor, (for example, an audio amplifier with speakers).
5. If the device is not supplied power by a PoE provider, connect the power adapter to the **TP-588D** and to the mains electricity, (not shown).

5.1 Connecting a Device to the TP-588D via RS-232

To connect a serial device to the TP-588D for data or control:

- From the RS-232 9-pin D-sub serial port on the remote device connect:
 - Pin 5 to the GND pin on the **TP-588D** RS-232 terminal block
 - Pin 3 to the RX pin on the **TP-588D** RS-232 terminal block
 - Pin 2 to the TX pin on the **TP-588D** RS-232 terminal block

5.2 Connecting a Balanced/Unbalanced Stereo Audio Device

[Figure 4](#) and [Figure 5](#) illustrate how to connect a balanced and unbalanced stereo audio device to the Audio Out 5-pin terminal block.

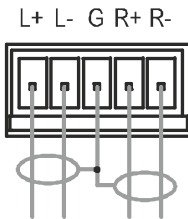


Figure 4: Balanced Stereo Audio Connection

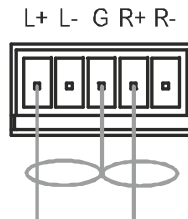


Figure 5: Unbalanced Stereo Audio Connection

6 Operating the TP-588D

6.1 The Setup 4-way DIP-switch

A DIP-switch that is up is off; a DIP-switch that is down is on. DIP-switches are off by default.

#	Feature	Function	Switch State
1	EDID Control	Determines from which output to read the EDID	Off—EDID source is dictated by DIP-switch 2 (up, default) On—EDID is locked (down)
2	EDID Priority	Determines from which input to read the EDID	Off—EDID is read from Output 1 HDMI (up, default) On—EDID is read from Output 2 DVI (down)
3	Output Timeout Shutdown Enable	Enables and disables the output timeout shutdown when the input signal is lost	Off—Always on, no shutdown (up, default) On—5 minutes (down)
4	Extra Range	Enables/disables the extra range function	Off—Disabled (up, default) On—Enabled (down)

6.2 Locking the EDID

You can lock the current EDID to prevent the EDID from being updated automatically when a new display is plugged in.

When the EDID is not locked:

- Any new EDID is written to non-volatile memory and is preserved through a power cycle
- The EDID from the output is transferred to the input when the new acceptor has a higher priority than the currently connected acceptor
- The default EDID is used in any case where there is no valid EDID

When the EDID is locked a new EDID cannot override the locked EDID.

Note: Performing a factory reset overrides the EDID even when the EDID is locked.

To lock the current EDID:

- Set DIP-switch 1 to ON

Note: When locking or unlocking the EDID the device must be rebooted.

6.3 Force RGB Mode

The **TP-588D** can toggle between “Normal” and “Force RGB” modes, using the EDID-CS command (see [Section 10.2](#)).

The default mode is “Force RGB”.

6.4 LED Indicators

The LEDs on the front and rear panels provide status information as detailed below.

6.4.1 DVI Out LED

DVI Out LED Color	DVI Signal State
Green	DVI acceptor present
Flashes 10 times immediately after connecting the output to a non-HDCP acceptor, or after the acceptor is powered up, then lights solid	DVI acceptor present but acceptor does not support HDCP

6.4.2 HDMI Out LED

HDMI Out LED Color	HDMI Signal State
Green	HDMI acceptor present
Flashes 10 times immediately after connecting the output to a non-HDCP acceptor, or after the acceptor is powered up, then lights solid	HDMI acceptor present but acceptor does not support HDCP

6.4.3 HDBT LINK LED

HDBT LED Color	HDBT Link State
Green	Valid HDBT link
Off	HDBT link not valid

6.4.4 Power LED

Power LED Color	Power State
Green	The device is plugged into a power supply
Orange	The device is operating on PoE and receiving power from a PoE provider

6.4.5 Link LED

Link LED Color	Link State
Green	Valid link
Off	Link not valid

6.5 Resetting the Device to Factory Default Parameters

To reset the device to factory default parameters:

1. Press and hold the Reset button on the rear panel of the device.
2. Power-cycle the device while holding the Reset button depressed.
The device is reset to factory default parameters.

7 Wiring the TP RJ-45 Ethernet Connector

Connect/solder the cable shield to the RJ-45 connector shield at both ends of the cable.



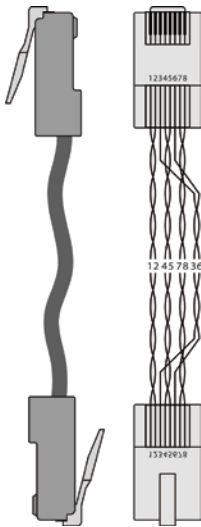
Do not use a crossed TP cable with this product.
Using a TP cable that is incorrectly wired may cause permanent damage to the device

Do not use unshielded TP cables with this product

[Figure 6](#) defines the TP pinout using a straight pin-to-pin cable with RJ-45 connectors.

EIA /TIA 568B	
PIN	Wire Color
1	Orange / White
2	Orange
3	Green / White
4	Blue
5	Blue / White
6	Green
7	Brown / White
8	Brown
Pair 1	4 and 5
Pair 2	1 and 2
Pair 3	3 and 6
Pair 4	7 and 8

Figure 6: TP Pinout Wiring



8 Technical Specifications

INPUT:	1 HDBT TP on an RJ-45 connector
OUTPUTS:	1 HDMI on an HDMI connector 1 DVI-D on a DVI-I connector 1 S/PDIF digital audio on an RCA connector 1 Analog balanced stereo audio on a 5-pin terminal block
PORTS:	1 RS-232 data serial port on a 3-pin terminal block 1 RS-232 serial control port on a 3-pin terminal block 1 Ethernet on an RJ-45 TP connector 1 IR on a 3.5mm mini jack 4 remote LED ports on a 5-pin terminal block
BANDWIDTH:	Up to 10.2Gbps data rate (3.4Gbps per graphics channel)
COMPLIANCE WITH HDCP STANDARD:	Supports HDCP
INDICATOR LEDs:	DVI Out, HDMI Out, HDBT Link, Power, Link
POWER CONSUMPTION:	12V DC, 770mA
OPERATING TEMPERATURE:	0° to +40°C (32° to 104°F)
STORAGE TEMPERATURE:	–40° to +70°C (–40° to 158°F)
HUMIDITY:	10% to 90%, RHL non-condensing
COOLING:	Convection, vents
ENCLOSURE TYPE:	Aluminium
RACK MOUNT:	With optional adapter
FURNITURE MOUNT:	With included rubber feet
DIMENSIONS:	18.75cm x 11.5cm x 2.54cm (7.38" x 4.53" x 1") W, D, H
WEIGHT:	0.45kg (0.99lbs) approx.
SHIPPING WEIGHT:	0.99kg (2.18lbs) approx.
VIBRATION:	ISTA 1A in carton (International Safe Transit Association)
COMPLIANCE STANDARDS:	CE
ENVIRONMENTAL REGULATORY COMPLIANCE:	Complies with appropriate requirements of RoHs and WEEE
INCLUDED ACCESSORIES:	Power supply
OPTIONS:	RK-T2B 19" rack adapter
WARRANTY:	7 years parts and labor
Specifications are subject to change without notice at http://www.kramerav.com	

8.1 Default Parameters

HDCP mode on

8.1.1 Default Serial Parameters

RS-232	
Protocol 3000	
Baud Rate:	115,200
Data Bits:	8
Stop Bits:	1
Parity:	None
Command Format:	ASCII

8.1.2 Default IP Parameters

Ethernet	
Name:	KRAMER_
Model:	TP588D
IP Address:	192.168.1.39
Network Mask:	255.255.0.0
Gateway:	0.0.0.0
UDP Port:	50000
TCP Port:	5000

8.1.3 Supported Resolutions

640x480p 85Hz
640x480p 75Hz
640x480p 72Hz
640x480p 60Hz
640x480p 59.95Hz
720x480p 60Hz
720x576p 50Hz
800x600p 85Hz
800x600p 75Hz
800x600p 72Hz
800x600p 60Hz
848x480p 60Hz
852x480p 60Hz
1024x768p 85Hz
1024x768p 75Hz
1024x768p 70Hz
1024x768p 60Hz
1280x960 60Hz
1280x1024p 75Hz
1280x1024p 60Hz
1280x768p 60Hz
1280x800p 60Hz
1920x1080p 50Hz
1920x1080p 60Hz
1920x1080p 30Hz
1920x1080p 24Hz

1920x1080p 60Hz
1920x1080i 50Hz
1920x1080i 60Hz
1600x1200p 60Hz
1600x900p 60Hz
1152x864p 75Hz
1440x900p 60Hz
1680x1050p 60Hz
1360x768p 60Hz
1366x768 60Hz
1366x768 50Hz
1400x1050p 60Hz
720x480i 30Hz
3840x2160 30Hz
3840x2160 60Hz
4096x2160 30Hz

9 Default EDID

Monitor

Model name..... TP-588D
Manufacturer..... KMR
Plug and Play ID..... KMR0001
Serial number..... 505-80226010
Manufacture date..... 2015, ISO week 255
Filter driver..... None

EDID revision..... 1.3
Input signal type..... Digital
Color bit depth..... Undefined
Display type..... RGB color
Screen size..... 520 x 320 mm (24.0 in)
Power management..... Standby, Suspend, Active off/sleep
Extension blocs..... 1 (CEA-EXT)

DDC/CI..... n/a

Color characteristics

Default color space..... Non-sRGB
Display gamma..... 2.20
Red chromaticity..... Rx 0.674 - Ry 0.319
Green chromaticity..... Gx 0.188 - Gy 0.706
Blue chromaticity..... Bx 0.148 - By 0.064
White point (default).... Wx 0.313 - Wy 0.329
Additional descriptors... None

Timing characteristics

Horizontal scan range.... 30-83kHz
Vertical scan range..... 56-76Hz
Video bandwidth..... 170MHz
CVT standard..... Not supported
GTF standard..... Not supported
Additional descriptors... None
Preferred timing..... Yes
Native/preferred timing.. 1280x720p at 60Hz (16:10)
Modeline..... "1280x720" 74.250 1280 1390 1430 1650 720 725 730 750 +hsync +vsync

Standard timings supported

720 x 400p at 70Hz - IBM VGA
720 x 400p at 88Hz - IBM XGA2
640 x 480p at 60Hz - IBM VGA
640 x 480p at 67Hz - Apple Mac II
640 x 480p at 72Hz - VESA
640 x 480p at 75Hz - VESA
800 x 600p at 56Hz - VESA
800 x 600p at 60Hz - VESA
800 x 600p at 72Hz - VESA
800 x 600p at 75Hz - VESA
832 x 624p at 75Hz - Apple Mac II
1024 x 768i at 87Hz - IBM
1024 x 768p at 60Hz - VESA
1024 x 768p at 70Hz - VESA
1024 x 768p at 75Hz - VESA
1280 x 1024p at 75Hz - VESA
1152 x 870p at 75Hz - Apple Mac II
1280 x 1024p at 75Hz - VESA STD
1280 x 1024p at 85Hz - VESA STD
1600 x 1200p at 60Hz - VESA STD
1024 x 768p at 85Hz - VESA STD
800 x 600p at 85Hz - VESA STD
640 x 480p at 85Hz - VESA STD
1152 x 864p at 70Hz - VESA STD
1280 x 960p at 60Hz - VESA STD

EIA/CEA-861 Information

Revision number..... 3

IT underscan..... Supported
 Basic audio..... Supported
 YCbCr 4:4:4..... Supported
 YCbCr 4:2:2..... Supported
 Native formats..... 1
 Detailed timing #1..... 1920x1080p at 60Hz (16:10)
 Modeline..... "1920x1080" 148.500 1920 2008 2052 2200 1080 1084 1089 1125 +hsync +vsync
 Detailed timing #2..... 1920x1080i at 60Hz (16:10)
 Modeline..... "1920x1080" 74.250 1920 2008 2052 2200 1080 1084 1094 1124 interlace +hsync
 +vsync
 Detailed timing #3..... 1280x720p at 60Hz (16:10)
 Modeline..... "1280x720" 74.250 1280 1390 1430 1650 720 725 730 750 +hsync +vsync
 Detailed timing #4..... 720x480p at 60Hz (16:10)
 Modeline..... "720x480" 27.000 720 736 798 858 480 489 495 525 -hsync -vsync

CE audio data (formats supported)
 LPCM 2-channel, 16/20/24 bit depths at 32/44/48 kHz

CE video identifiers (VICs) - timing/formats supported
 1920 x 1080p at 60Hz - HDTV (16:9, 1:1)
 1920 x 1080i at 60Hz - HDTV (16:9, 1:1)
 1280 x 720p at 60Hz - HDTV (16:9, 1:1) [Native]
 720 x 480p at 60Hz - EDTV (16:9, 32:27)
 720 x 480p at 60Hz - EDTV (4:3, 8:9)
 720 x 480i at 60Hz - Doublescan (16:9, 32:27)
 720 x 576i at 50Hz - Doublescan (16:9, 64:45)
 640 x 480p at 60Hz - Default (4:3, 1:1)
 NB: NTSC refresh rate = (Hz*1000)/1001

CE vendor specific data (VSDB)
 IEEE registration number. 0x000C03
 CEC physical address..... 1.0.0.0
 Maximum TMDS clock..... 165MHz

CE speaker allocation data
 Channel configuration..... 2.0
 Front left/right..... Yes
 Front LFE..... No
 Front center..... No
 Rear left/right..... No
 Rear center..... No
 Front left/right center.. No
 Rear left/right center... No
 Rear LFE..... No

Report information
 Date generated..... 20/07/2015
 Software revision..... 2.60.0.972
 Data source..... File
 Operating system..... 6.1.7601.2.Service Pack 1

Raw data
 00,FF,FF,FF,FF,FF,FF,00,2D,B2,01,00,01,00,00,00,FF,19,01,03,80,34,20,78,EA,B3,25,AC,51,30,B4,26,
 10,50,54,FF,FF,80,81,8F,81,99,A9,40,61,59,45,59,31,59,71,4A,81,40,01,1D,00,72,51,D0,1E,20,6E,28,
 55,00,07,44,21,00,00,1E,00,00,00,FF,00,35,30,35,2D,38,30,32,32,36,30,31,30,20,00,00,00,FC,00,54,
 50,2D,35,38,38,44,20,20,20,20,20,00,00,00,FD,00,38,4C,1E,53,11,00,0A,20,20,20,20,20,01,30,
 02,03,1B,F1,23,09,07,07,48,10,05,84,03,02,07,16,01,65,03,0C,00,10,00,83,01,00,00,02,3A,80,18,71,
 38,2D,40,58,2C,45,00,07,44,21,00,00,1E,01,1D,80,18,71,1C,16,20,58,2C,25,00,07,44,21,00,00,9E,01,
 1D,00,72,51,D0,1E,20,6E,28,55,00,07,44,21,00,00,1E,8C,0A,D0,8A,20,E0,2D,10,10,3E,96,00,07,44,21,
 00,00,18,00,47

10 Protocol 3000

The **TP-588D** can be operated using serial commands from a PC, remote controller or touch screen using the Kramer Protocol 3000.

This section describes the:

- Kramer Protocol 3000 syntax (see [Section 10.1](#))
- Kramer Protocol 3000 commands (see [Section 10.2](#))

10.1 Kramer Protocol 3000 Syntax

10.1.1 Host Message Format

Start	Address (optional)	Body	Delimiter
#	device_id@	Message	CR

10.1.1.1 Simple Command

Command string with only one command without addressing:

Start	Body	Delimiter
#	Command SP Parameter_1,Parameter_2,...	CR

10.1.1.2 Command String

Formal syntax with command concatenation and addressing:

Start	Address	Body	Delimiter
#	device_id@	Command_1 Parameter1_1,Parameter1_2,... Command_2 Parameter2_1,Parameter2_2,... Command_3 Parameter3_1,Parameter3_2,... ...	CR

10.1.2 Device Message Format

Start	Address (optional)	Body	delimiter
~	device_id@	Message	CR LF

10.1.2.1 Device Long Response

Echoing command:

Start	Address (optional)	Body	Delimiter
~	device_id@	Command SP [Param1 ,Param2 ...] result	CR LF

CR = Carriage return (ASCII 13 = 0x0D)

LF = Line feed (ASCII 10 = 0x0A)

SP = Space (ASCII 32 = 0x20)

10.1.3 Command Terms

Command

A sequence of ASCII letters ('A'-'Z', 'a'-'z' and '-').

Command and parameters must be separated by at least one space.

Parameters

A sequence of alphanumeric ASCII characters ('0'-'9', 'A'-'Z', 'a'-'z' and some special characters for specific commands). Parameters are separated by commas.

Message string

Every command entered as part of a message string begins with a **message starting character** and ends with a **message closing character**.

Note: A string can contain more than one command. Commands are separated by a pipe ('|') character.

Message starting character

'#' – For host command/query

'~' – For device response

Device ID (Optional, for K-NET)

K-NET Device ID followed by '@'

Query sign

'?' follows some commands to define a query request.

Message closing character

CR – For host messages; carriage return (ASCII 13)

CRLF – For device messages; carriage return (ASCII 13) + line-feed (ASCII 10)

Command chain separator character

When a message string contains more than one command, a pipe ('|') character separates each command.

Spaces between parameters or command terms are ignored.

10.1.4 Entering Commands

You can directly enter all commands using a terminal with ASCII communications software, such as HyperTerminal, Hercules, etc. Connect the terminal to the serial or Ethernet port on the Kramer device. To enter **CR** press the Enter key.

(**LF** is also sent but is ignored by command parser).

For commands sent from some non-Kramer controllers like Crestron, some characters require special coding (such as, /X##). Refer to the controller manual.

10.1.5 Command Forms

Some commands have short name syntax in addition to long name syntax to allow faster typing. The response is always in long syntax.

10.1.6 Chaining Commands

Multiple commands can be chained in the same string. Each command is delimited by a pipe character ("|"). When chaining commands, enter the **message starting character** and the **message closing character** only once, at the beginning of the string and at the end.

Commands in the string do not execute until the closing character is entered.

A separate response is sent for every command in the chain.

10.1.7 Maximum String Length

64 characters

10.2 Kramer Protocol 3000 Commands

Command	Description
#	Protocol handshaking
BUILD-DATE?	Read device build date
DISPLAY?	Read if output is valid
ETH-PORT	Set Ethernet port protocol
EDID-CS	Set/get EDID color space
FACTORY	Reset to factory default configuration
HDCP-MOD	Set HDCP mode
HDCP-STAT?	Get HDCP signal status
HELP	List of commands
MODEL?	Read device model
NAME	Set machine (DNS) name
NAME-RST	Reset machine name to factory default (DNS)
NET-DHCP	Set DHCP mode
NET-GATE	Set gateway IP
NET-IP	Set IP address
NET-MAC?	Get MAC address
NET-MASK	Set subnet mask
PROT-VER?	Read device protocol version
RESET	Reset device
SIGNAL?	Read if input is valid
SN?	Read device serial number
VERSION?	Get device firmware version

10.2.1 Command Descriptions

Command - #		Command Type - System-mandatory	
Command Name		Permission	Transparency
Set:	#	End User	Public
Get:	-	-	-
Description		Syntax	
Set:	Protocol handshaking	# ☐	
Get:	-	-	
Response			
~nn@ ☐ OK ☐			
Parameters			
Response Triggers			
Notes			
Use to validate the Protocol 3000 connection and get the machine number			

Command - BUILD-DATE		Command Type - System-mandatory	
Command Name		Permission	Transparency
Set:	-	-	-
Get:	BUILD-DATE?	End User	Public
Description		Syntax	
Set:	Get device build date	#BUILD-DATE[CR]	
Get:	-	-	
Response			
~nn@BUILD-DATE[SP]date[SP]time[CR LF]			
Parameters			
date - Format: YYYY/MM/DD where YYYY = Year, MM = Month, DD = Day			
time - Format: hh:mm:ss where hh = hours, mm = minutes, ss = seconds			
Response Triggers			
Notes			

Command - DISPLAY?		Command Type - System	
Command Name		Permission	Transparency
Set:	-	-	-
Get:	DISPLAY?	End User	Public
Description		Syntax	
Set:	-	-	
Get:	Get output HPD status	# DISPLAY? _SP out_id _CR	
Response			
~ nn @ DISPLAY _SP out_id,status _CR LF			
Parameters			
<i>out_id</i> - output number			
<i>status</i> - HPD status according to signal validation			
Response Triggers			
After execution, response is sent to the com port from which the Get was received			
Response is sent after every change in output HPD status ON to OFF			
Response is sent after every change in output HPD status OFF to ON and ALL parameters (new EDID, etc.) are stable and valid			
Notes			

Command - ETH-PORT		Command Type - Communication	
Command Name		Permission	Transparency
Set:	ETH-PORT	Administrator	Public
Get:	ETH-PORT?	End User	Public
Description		Syntax	
Set:	Set Ethernet port protocol	#ETH-PORT _{SP} portType, ETHPort _{CR}	
Get:	Get Ethernet port protocol	#ETH-PORT? _{SP} portType _{CR}	
Response			
~nn@ ETH-PORT _{SP} portType, ETHPort _{CR LF}			
Parameters			
portType - TCP/UDP			
ETHPort - TCP/UDP port number			
Response Triggers			
Notes			

Command – EDID-CS		Command Type – EDID Handling	
Command Name		Permission	Transparency
Set:	EDID-CS	End User	Public
Get:	EDID-CS?	End User	Public
Description		Syntax	
Set:	Set EDID color space	# EDID-CS _{SP} id, ColSpace _{CR}	
Get :	Get EDID color space	# EDID-CS? _{SP} i _{CR}	
Response			
~nn@EDID-CS _{SP} id, ColSpace _{CR LF}			
Parameters			
id – channel number			
ColSpace – color space (see Section 10.3.7 EDID Color Space)			
Response Triggers			
Notes			
Set command might change the current EDID			
K-Config Examples			
"#EDID-CS 1,0", 0x0D (auto) – Set channel 1 color space to auto mode (normal)			
"#EDID-CS 1,1", 0x0D (force RGB) – Set channel 1 color space to force RGB mode			
"#EDID-CS? 1", 0x0D – Get channel 1 color space			

Command - FACTORY		Command Type - System-mandatory	
Command Name		Permission	Transparency
Set:	FACTORY	End User	Public
Get:	-	-	-
Description		Syntax	
Set:	Reset device to factory default configuration	#FACTORY␣	
Get:	-	-	
Response			
~nn@FACTORY␣OK␣␣			
Parameters			
Response Triggers			
Notes			
This command deletes all user data from the device. The deletion can take some time.			

Command - HDCP-MOD		Command Type - System	
Command Name		Permission	Transparency
Set:	HDCP-MOD	Administrator	Public
Get:	HDCP-MOD?	End User	Public
Description		Syntax	
Set:	Set HDCP mode	#HDCP-MOD[SP]inp_id,mode[CR]	
Get:	Get HDCP mode	#HDCP-MOD?[SP]stage_id[CR]	
Response			
Set / Get: ~[nn]@HDCP-MOD[SP]stage_id,mode[CR LF]			
Parameters			
inp_id - input number (1.. max number of inputs) mode - HDCP mode			
Response Triggers			
Response is sent to the com port from which the Set (before execution) / Get command was received Response is sent to all com ports after execution if HDCP-MOD was set by any other external control device (button press, device menu and similar) or HDCP mode changed			
Notes			
Set HDCP working mode on the device input: HDCP supported - HDCP_ON [default] HDCP not supported - HDCP OFF HDCP support changes following detected sink - MIRROR OUTPUT			

Command - HDCP-STAT		Command Type - System	
Command Name		Permission	Transparency
Set:	-	-	-
Get:	HDCP-STAT?	End User	Public
Description		Syntax	
Set:	None	-	
Get:	Get HDCP signal status	#HDCP-STAT? _{SP} stage,stage_id _{CR}	
Response			
Set / Get: ~ _{nn} @HDCP-STAT _{SP} stage,stage_id,model _{CR LF}			
Parameters			
stage – input/output			
stage_id - number of chosen stage (1.. max number of inputs/outputs)			
actual_status - signal encryption status - valid values ON/OFF			
Response Triggers			
Response is sent to the com port from which the Set (before execution) / Get command was received			
Response is sent to all com ports after execution if HDCP-STAT was set by any other external control device (button press, device menu and similar) or HDCP mode changed			
Notes			
On output – sink status			
On input – signal status			

Command - HELP		Command Type - System-mandatory	
Command Name		Permission	Transparency
Set:	-	-	-
Get:	HELP	End User	Public
Description		Syntax	
Set:	-	-	
Get:	Get command list or help for specific command	2 options: 1. #HELP 2. #HELP <i>command_name</i>	
Response			
1. Multi-line: ~ @Device available protocol 3000 commands: <i>command</i> , <i>command</i> ... To get help for command use: HELP (COMMAND_NAME) 2. Multi-line: ~ @ HELP <i>command</i> : <i>description</i> USAGE : <i>usage</i>			
Parameters			
Response Triggers			
Notes			

Command - MODEL?		Command Type - System-mandatory	
Command Name		Permission	Transparency
Set:	-	-	-
Get:	MODEL?	End User	Public
Description		Syntax	
Set:	-	-	
Get:	Get device model	#MODEL? ☐ CR	
Response			
~nn@MODEL _{SP} model_name _{CR LF}			
Parameters			
model_name - String of up to 19 printable ASCII chars			
Response Triggers			
Notes			

Command - NAME		Command Type - System (Ethernet)	
Command Name		Permission	Transparency
Set:	NAME	Administrator	Public
Get:	NAME?	End User	Public
Description		Syntax	
Set:	Set machine (DNS) name	# NAME _machine_name	
Get:	Get machine (DNS) name	# NAME?	
Response			
Set: ~nn@ NAME _machine_name			
Get: ~nn@ NAME? _machine_name			
Parameters			
machine_name - String of up to 14 alpha-numeric chars (can include hyphen, not at the beginning or end)			
Response Triggers			
Notes			
The machine name is not the same as the model name. The machine name is used to identify a specific machine or a network in use (with DNS feature on)			

Command - NAME-RST		Command Type - System (Ethernet)	
Command Name		Permission	Transparency
Set:	NAME-RST	Administrator	Public
Get:	-	-	-
Description		Syntax	
Set:	Reset machine (DNS) name to factory default	#NAME-RST ^{CR}	
Get:	-	-	
Response			
~nn@NAME-RST ^{SP} OK ^{CR LF}			
Parameters			
Response Triggers			
Notes			
Factory default of machine (DNS) name is "KRAMER_" + 4 last digits of device serial number			

Command - NET-DHCP		Command Type - Communication	
Command Name		Permission	Transparency
Set:	NET-DHCP	Administrator	Public
Get:	NET-DHCP?	End User	Public
Description		Syntax	
Set:	Set DHCP mode	#NET-DHCP[SP]mode[CR]	
Get:	Get DHCP mode	#NET-DHCP?[CR]	
Response			
~[m]@ NET-DHCP[SP]mode[CR LF]			
Parameters			
mode - 0 - Do not use DHCP. Use the IP set by the factory or using the IP set command 1 - Try to use DHCP. If unavailable, use IP as above			
Response Triggers			
Notes			
Connecting Ethernet to devices with DHCP may take more time in some networks To connect with a randomly assigned IP by DHCP, specify the device DNS name (if available) using the command "NAME". You can also get an assigned IP by direct connection to USB or RS-232 protocol port if available For proper settings consult your network administrator			

Command - NET-GATE		Command Type - Communication	
Command Name		Permission	Transparency
Set:	NET-GATE	Administrator	Public
Get:	NET-GATE?	End User	Public
Description		Syntax	
Set:	Set gateway IP	# NET-GATE _{SP} <i>ip_address</i> _{CR}	
Get:	Get gateway IP	# NET-GATE? _{CR}	
Response			
~nn@ NET-GATE _{SP} <i>ip_address</i> _{CR LF}			
Parameters			
<i>ip_address</i> - format: xxx.xxx.xxx.xxx			
Response Triggers			
Notes			
A network gateway connects the device via another network and maybe over the Internet. Be careful of security problems. For proper settings consult your network administrator			

Command - NET-IP		Command Type - Communication	
Command Name		Permission	Transparency
Set:	NET-IP	Administrator	Public
Get:	NET-IP?	End User	Public
Description		Syntax	
Set:	Set IP address	# NET-IP _{SP} <i>ip_address</i> _{CR}	
Get:	Get IP address	# NET-IP? _{CR}	
Response			
~nn@ NET-IP _{SP} <i>ip_address</i> _{CR LF}			
Parameters			
<i>ip_address</i> - format: xxx.xxx.xxx.xxx			
Response Triggers			
Notes			
For proper settings consult your network administrator			

Command - NET-MAC?		Command Type - Communication	
Command Name		Permission	Transparency
Set:	-	-	-
Get:	NET-MAC?	End User	Public
Description		Syntax	
Set:	-	-	
Get:	Get MAC address	#NET-MAC? ☐	
Response			
~ ☐ @NET-MAC ☐ <i>mac_address</i> ☐			
Parameters			
<i>mac_address</i> - Unique MAC address. Format: XX-XX-XX-XX-XX-XX where X is hex digit			
Response Triggers			
Notes			

Command - NET-MASK		Command Type - Communication	
Command Name		Permission	Transparency
Set:	NET-MASK	Administrator	Public
Get:	NET-MASK?	End User	Public
Description		Syntax	
Set:	Set subnet mask	#NET-MASK _{SP} net_mask _{CR}	
Get:	Get subnet mask	#NET-MASK? _{CR}	
Response			
~nn@NET-MASK _{SP} net_mask _{CR LF}			
Parameters			
net_mask - format: xxx.xxx.xxx.xxx			
Response Triggers			
The subnet mask limits the Ethernet connection within the local network For proper settings consult your network administrator			
Notes			

Command - PROT-VER?		Command Type - System-mandatory	
Command Name		Permission	Transparency
Set:	-	-	-
Get:	PROT-VER?	End User	Public
Description		Syntax	
Set:	-	-	
Get:	Get device protocol version	# PROT-VER? [CR]	
Response			
~ [STX] @ PROT-VER [SP] 3000:version [CR LF]			
Parameters			
Version - XX.XX where X is a decimal digit			
Response Triggers			
Notes			

Command - RESET		Command Type - System-mandatory	
Command Name		Permission	Transparency
Set:	RESET	Administrator	Public
Get:	-	-	-
Description		Syntax	
Set:	Reset device	#RESET[CR]	
Get:	-	-	
Response			
~[STX]@RESET[SP]OK[CR LF]			
Parameters			
Response Triggers			
Notes			
To avoid locking the port due to a USB bug in Windows, disconnect USB connections immediately after running this command. If the port was locked, disconnect and reconnect the cable to reopen the port.			

Command - SIGNAL		Command Type - System	
Command Name		Permission	Transparency
Set:	-	-	-
Get	SIGNAL?	End User	Public
Description		Syntax	
Set:	-	-	
Get:	Get input signal lock status	# SIGNAL? [SP] <i>inp_id</i> [CR]	
Response			
~ [nn] @ SIGNAL [SP] <i>inp_id,status</i> [CR LF]			
Parameters			
<i>inp_id</i> - input number			
<i>status</i> - lock status according to signal validation			
Response Triggers			
After execution, a response is sent to the com port from which the Get was received			
Response is sent after every change in input signal status ON to OFF, or OFF to ON			
Notes			

Command - SN?		Command Type - System-mandatory	
Command Name		Permission	Transparency
Set:	-	-	-
Get:	SN?	End User	Public
Description		Syntax	
Set:	-	-	
Get:	Get device serial number	# SN? [CR]	
Response			
~ [nn] @ SN [SP] <i>serial_number</i> [CR LF]			
Parameters			
<i>serial_number</i> - 11 decimal digits, factory assigned			
Response Triggers			
Notes			
For new products with 14 digit serial numbers, use only the last 11 digits			

10.3 Parameters

10.3.1 On/Off

Number	Value
0	Off
1	On

10.3.2 Stage

Number	Value
0	Input
1	Output
2	(Reserved)
3	(Reserved)

10.3.3 Video Resolutions

VIC Number	Resolution
0	No Signal (for input) / Native - EDID (for output)
1	640x480p @59.94Hz/60Hz
2	720x480p @59.94Hz/60Hz
3	720x480p @59.94Hz/60Hz
4	1280x720p @59.94Hz/60Hz
5	1920x1080i @59.94Hz/60Hz
6	720(1440)x480i @59.94Hz/60Hz
7	720(1440)x480i @59.94Hz/60Hz
8	720(1440)x240p @59.94Hz/60Hz
9	720(1440)x240p @59.94Hz/60Hz
10	2880x480i @59.94Hz/60Hz
11	2880x480i @59.94Hz/60Hz
12	2880x240p @59.94Hz/60Hz
13	2880x240p @59.94Hz/60Hz
14	1440x480p @59.94Hz/60Hz
15	1440x480p @59.94Hz/60Hz
16	1920x1080p @59.94Hz/60Hz
17	720x576p @50Hz
18	720x576p @50Hz
19	1280x720p @50Hz
20	1920x1080i @50Hz
21	720(1440)x576i @50Hz
22	720(1440)x576i @50Hz
23	720(1440)x288p @50Hz
24	720(1440)x288p @50Hz

VIC Number	Resolution
25	2880x576i @50Hz
26	2880x576i @50Hz
27	2880x288p @50Hz
28	2880x288p @50Hz
29	1440x576p @50Hz
30	1440x576p @50Hz
31	1920x1080p @50Hz
32	1920x1080p @23.97Hz/24Hz
33	1920x1080p @25Hz
34	1920x1080p @29.97Hz/30Hz
35	2880x480p @59.94Hz/60Hz
36	2880x480p @59.94Hz/60Hz
37	2880x576p @50Hz
38	2880x576p @50Hz
39	1920x1080i @50Hz
40	1920x1080i @100Hz
41	1280x720p @100Hz
42	720x576p @100Hz
43	720x576p @100Hz
44	720(1440)x576i @100Hz
45	720(1440)x576i @100Hz
46	1920x1080i @119.88/120Hz
47	1280x720p @119.88/120Hz
48	720x480p @119.88/120Hz
49	720x480p @119.88/120Hz
50	720(1440)x480i @119.88/120Hz
51	720(1440)x480i @119.88/120Hz
52	720x576p @200Hz
53	720x576p @200Hz
54	720(1440)x576i @200Hz
55	720(1440)x576i @200Hz
56	720x480p @239.76/240Hz
57	720x480p @239.76/240Hz
58	720(1440)x480i @239.76/240Hz
59	720(1440)x480i @239.76/240Hz
60	1280x720p @23.97Hz/24Hz
61	1280x720p @25Hz
62	1280x720p @29.97Hz/30Hz
63	1920x1080p @119.88/120Hz
64	1920x1080p @100Hz
65-100	(Reserved)

VIC Number	Resolution
100	Custom resolution 1
101	Custom resolution 2
102	Custom resolution 3
103	Custom resolution 4
104	Custom resolution 5
104-254	(Reserved)

10.3.4 EDID Source

Number	Value
0	Input
1	Output
2	Default EDID

10.3.5 Signal Validation

Number	Value
0	Signal or sink is not valid
1	Signal or sink is valid
2	Sink and EDID is valid

10.3.6 HDCP Types

Number	Value
0	HDCP Off
1	HDCP On
2	Follow input
3	Mirror output ("MAC mode")

10.3.7 EDID Color Space

Number	Value
0	auto
1	RGB
2	RGB + YUV444
3	RGB + YUV422
4	RGB + YUV444 + YUV422

LIMITED WARRANTY

The warranty obligations of Kramer Electronics for this product are limited to the terms set forth below:

What is Covered

This limited warranty covers defects in materials and workmanship in this product.

What is Not Covered

This limited warranty does not cover any damage, deterioration or malfunction resulting from any alteration, modification, improper or unreasonable use or maintenance, misuse, abuse, accident, neglect, exposure to excess moisture, fire, improper packing and shipping (such claims must be presented to the carrier), lightning, power surges, or other acts of nature. This limited warranty does not cover any damage, deterioration or malfunction resulting from the installation or removal of this product from any installation, any unauthorized tampering with this product, any repairs attempted by anyone unauthorized by Kramer Electronics to make such repairs, or any other cause which does not relate directly to a defect in materials and/or workmanship of this product. This limited warranty does not cover cartons, equipment enclosures, cables or accessories used in conjunction with this product.

Without limiting any other exclusion herein, Kramer Electronics does not warrant that the product covered hereby, including, without limitation, the technology and/or integrated circuit(s) included in the product, will not become obsolete or that such items are or will remain compatible with any other product or technology with which the product may be used.

How Long Does this Coverage Last

Seven years as of this printing; please check our Web site for the most current and accurate warranty information.

Who is Covered

Only the original purchaser of this product is covered under this limited warranty. This limited warranty is not transferable to subsequent purchasers or owners of this product.

What Kramer Electronics will do

Kramer Electronics will, at its sole option, provide one of the following three remedies to whatever extent it shall deem necessary to satisfy a proper claim under this limited warranty:

1. Elect to repair or facilitate the repair of any defective parts within a reasonable period of time, free of any charge for the necessary parts and labor to complete the repair and restore this product to its proper operating condition. Kramer Electronics will also pay the shipping costs necessary to return this product once the repair is complete.
2. Replace this product with a direct replacement or with a similar product deemed by Kramer Electronics to perform substantially the same function as the original product.
3. Issue a refund of the original purchase price less depreciation to be determined based on the age of the product at the time remedy is sought under this limited warranty.

What Kramer Electronics will not do Under This Limited Warranty

If this product is returned to Kramer Electronics or the authorized dealer from which it was purchased or any other party authorized to repair Kramer Electronics products, this product must be insured during shipment, with the insurance and shipping charges prepaid by you. If this product is returned uninsured, you assume all risks of loss or damage during shipment. Kramer Electronics will not be responsible for any costs related to the removal or re-installation of this product from or into any installation. Kramer Electronics will not be responsible for any costs related to any setting up this product, any adjustment of user controls or any programming required for a specific installation of this product.

How to Obtain a Remedy under this Limited Warranty

To obtain a remedy under this limited warranty, you must contact either the authorized Kramer Electronics reseller from whom you purchased this product or the Kramer Electronics office nearest you. For a list of authorized Kramer Electronics resellers and/or Kramer Electronics authorized service providers, please visit our web site at www.kramerelectronics.com or contact the Kramer Electronics office nearest you.

In order to pursue any remedy under this limited warranty, you must possess an original, dated receipt as proof of purchase from an authorized Kramer Electronics reseller. If this product is returned under this limited warranty, a return authorization number, obtained from Kramer Electronics, will be required. You may also be directed to an authorized reseller or a person authorized by Kramer Electronics to repair the product.

If it is decided that this product should be returned directly to Kramer Electronics, this product should be properly packed, preferably in the original carton, for shipping. Cartons not bearing a return authorization number will be refused.

Limitation on Liability

THE MAXIMUM LIABILITY OF KRAMER ELECTRONICS UNDER THIS LIMITED WARRANTY SHALL NOT EXCEED THE ACTUAL PURCHASE PRICE PAID FOR THE PRODUCT. TO THE MAXIMUM EXTENT PERMITTED BY LAW, KRAMER ELECTRONICS IS NOT RESPONSIBLE FOR DIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES RESULTING FROM ANY BREACH OF WARRANTY OR CONDITION, OR UNDER ANY OTHER LEGAL THEORY. Some countries, districts or states do not allow the exclusion or limitation of relief, special, incidental, consequential or indirect damages, or the limitation of liability to specified amounts, so the above limitations or exclusions may not apply to you.

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P/N:

2900-300325



Rev: 3



SAFETY WARNING

Disconnect the unit from the power supply before opening and servicing

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