USER MANUAL

MODEL:

VM-2UHD
1:2 HDMI DA
VM-2UHD Quick Start Guide

This guide helps you install and use your VM-2UHD for the first time. For more detailed information, go to http://www.kramerav.com/manual/VM-2UHD to download the latest manual or scan the QR code on the left.

Step 1: Check what’s in the box

- VM-2UHD 1:2 HDMI DA
- 1 Power supply (5V DC)
- 4 Rubber feet
- 1 Quick start guide

Step 2: Install the VM-2UHD

Attach the rubber feet and place on a table or mount the VM-2UHD in a rack (using an optional RK-3T rack mount).

Step 3: Connect inputs and outputs

Always switch OFF the power on each device before connecting it to your VM-2UHD.
For best results, we recommend that you always use Kramer high-performance cables to connect AV equipment to the VM-2UHD.

Step 4: Connect the power

Connect the 5V DC power adapter to the VM-2UHD and plug the adapter into the mains electricity.

Step 5: Acquire the EDID

Press the EDID Setup button once to display the present EDID. Each additional press cycles through the EDID source options:

<table>
<thead>
<tr>
<th>LEDs lit:</th>
<th>Chooses:</th>
</tr>
</thead>
<tbody>
<tr>
<td>OUT 1</td>
<td>Output 1 EDID</td>
</tr>
<tr>
<td>OUT 2</td>
<td>Output 2 EDID</td>
</tr>
<tr>
<td>All LEDs flash</td>
<td>Default EDID</td>
</tr>
</tbody>
</table>

Stop pressing the EDID Setup button when the desired EDID source is lit.
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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 **VM-2UHD 1:2 HDMI DA**, which is ideal for the following typical applications:

- Boardrooms and meeting rooms
- Presentation and multimedia applications
- Home theater
- 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/VM-2UHD 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 VM-2UHD 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 Kramer TOOLS® VM-2UHD is a high-quality 1:2 HDMI distributor that takes one HDMI input, equalizes and reclocks the signal and distributes it to two identical outputs. The VM-2UHD distributes signals having resolutions up to 4Kx2K and including WUXGA and 1080p.

In particular, the VM-2UHD features:

- A maximum data rate of 10.2Gbps (3.4Gbps per graphic channel)
- HDMI support for Deep Color, x.v.Color™, Lip Sync, HDMI Uncompressed Audio Channels, Dolby TrueHD, DTS-HD, CEC
- HDCP compliance
- Kramer Equalization & re-Klocking™ Technology that rebuilds the digital signal integrity to travel longer distances
- I-EDIDPro™ Kramer Intelligent EDID Processing™, an intelligent EDID handling and processing algorithm that ensures Plug and Play operation for HDMI systems
- A default EDID for fast and efficient connection of the unit
  The default EDID feature lets you connect the VM-2UHD without having to connect a display to the output
- 3D pass-through
- A USB port for firmware upgrading
- Software support for Protocol 3000, EDID Designer and K-Upload
- A compact TOOLS® enclosure with a 5V DC power source
3.1 Defining the VM-2UHD 1:2 HDMI DA

This section defines the VM-2UHD.

![Diagram of VM-2UHD 1:2 HDMI DA]

### Table: Feature and Function

<table>
<thead>
<tr>
<th>#</th>
<th>Feature</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PROGRAM USB Connector</td>
<td>Connect to a PC to perform firmware upgrades (via K-Upload) and work with the EDID Designer K-Upload and EDID Designer can be downloaded from our Web site at: <a href="http://www.kramerav.com/downloads/">www.kramerav.com/downloads/</a></td>
</tr>
<tr>
<td>2</td>
<td>EDID SETUP Button</td>
<td>Press to capture the input EDID or select the default EDID (see Section 4.1)</td>
</tr>
<tr>
<td>3</td>
<td>IN LED</td>
<td>Lights when an active input signal is detected</td>
</tr>
<tr>
<td>4</td>
<td>OUT 1-2 LEDS</td>
<td>Lights when an active output acceptor is detected</td>
</tr>
<tr>
<td>5</td>
<td>ON LED</td>
<td>Lights when the device is powered on</td>
</tr>
<tr>
<td>6</td>
<td>HDMI IN Connector</td>
<td>Connects to the HDMI source</td>
</tr>
<tr>
<td>7</td>
<td>HDMI OUT 1-2 Connectors</td>
<td>Connect to up to 2 HDMI acceptors</td>
</tr>
<tr>
<td>8</td>
<td>5V DC Connector</td>
<td>Connects to the 5V DC power supply</td>
</tr>
</tbody>
</table>
4 Connecting the VM-2UHD

Always switch off the power to each device before connecting it to your VM-2UHD. After connecting your VM-2UHD, connect its power and then switch on the power to each device.

You do not have to connect all the inputs and outputs, connect only those that are required.

Connect the VM-2UHD as illustrated in the example in Figure 2:

1. Connect an HDMI input source (for example, a DVD player) to the HDMI IN connector.

2. Connect the two OUTPUT connectors to up to two HDMI acceptors, as follows:
   - HDMI OUT 1 connector to HDMI acceptor 1 (for example, an LCD TV)
   - HDMI OUT 2 connector to HDMI acceptor 2 (for example, plasma display 1)

3. Connect the 5V DC power adapter to the power socket unit and then connect the adapter to the mains electricity (not shown in Figure 2). The ON LED lights.
Figure 2: Connecting the VM-2UHD 1:2 HDMI DA
4.1 Acquiring an EDID

To acquire an EDID, press the EDID SETUP button as follows:

1. The first press of the EDID SETUP button displays the present EDID status similar to that shown in the next step.

2. The second press of EDID SETUP enters the read mode and each additional press cycles through the source options:
   OUT 1 -> OUT 2 -> all LEDs flash for a default EDID.

3. When the desired EDID source is reached, release the EDID SETUP button.
   The VM-2UHD reads the EDID for a few seconds. When finished, all LEDs return to display the present output connection status.
   If an unconnected output is chosen or the EDID cannot be read, the VM-2UHD loads the default EDID.

The VM-2UHD toggles between “Normal” and “Force RGB” modes.

In “Force RGB” mode, the read EDID is rewritten to identify only RGB support.

- To toggle, press the EDID button for three seconds.
- After setting Force RGB mode you must re-acquire the EDID to update the Force RGB change.

Powering on the device identifies the mode as follows:

- In “Normal mode” (meaning no forcing RGB), the LEDs flash once
- In “Force RGB mode”, the LEDs flash four times.

Note: Force RGB modifies the EDID saved on the input to not support YUV format.
In case of a pink display, use the Force RGB mode.
5 Default EDID

Model name.............. VM-2UHD
Manufacturer............. KMR
Plug and Play ID........ KMR0672
Data string.............. Default-EDID
Serial number........... 2
Manufacture date........ 2012, 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................. Not supported

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 725 730 750 +hsync +vsync

Standard timings supported
720 x 400p at 70Hz - IBM VGA
640 x 480p at 60Hz - IBM VGA
640 x 480p at 75Hz - VESA
800 x 600p at 60Hz - VESA
800 x 600p at 75Hz - VESA
1024 x 768p at 60Hz - VESA
1024 x 768p at 75Hz - VESA
1280 x 1024p at 75Hz - VESA
1280 x 1024p at 60Hz - VESA STD
1600 x 1200p at 60Hz - VESA STD
1152 x 864p at 75Hz - 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 1094 1124 interlace +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 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 - EDTV (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 audio data (formats supported)
LPCM 2-channel, 16/20/24 bit depths at 32/44/48 kHz

CE vendor specific data (VSDDB)
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........... 11/11/2014
Software revision........ 2.60.0.972
Data source............... Real-time 0x0032
Operating system........ 6.1.7601.2.Service Pack 1
## Technical Specifications

| **INPUT:** | 1 HDMI connector |
| **OUTPUTS:** | 2 HDMI connectors |
| **PORT:** | 1 USB for firmware upgrade |
| **MAX. DATA RATE:** | 10.2Gbps (3.4Gbps per graphic channel) |
| **COMPLIANCE WITH HDMI STANDARD:** | Supports HDMI and HDCP |
| **CONTROLS:** | EDID Setup button |
| **INDICATOR LEDs:** | IN, OUT 1 to 2 LEDs |
| **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 |
| **POWER CONSUMPTION:** | 5V DC, 1A |
| **DIMENSIONS:** | 12cm x 7.15cm x 2.4cm (4.73" x 2.82" x 0.95") W, D, H |
| **WEIGHT:** | 0.17kg (0.37lb) |
| **SHIPPING DIMENSIONS:** | 23.2cm x 12cm x 8.9cm (9.41" x 4.73" x 3.51") W, D, H |
| **SHIPPING WEIGHT:** | 0.67kg (0.67lb) |
| **INCLUDED ACCESSORIES:** | Power supply |

Specifications are subject to change without notice.
For the most updated resolution list, go to our Web site at [http://www.kramerelectronics.com](http://www.kramerelectronics.com)
7 Protocol 3000

The VM-2UHD can be operated using serial commands from a PC, remote controller, or touch screen. The unit communicates using the default Kramer Protocol 3000.

This section describes:

- Kramer Protocol 3000 syntax (see Section 7.1)
- Kramer Protocol 3000 commands (see Section 7.2)

7.1 Syntax

With Kramer Protocol 3000 you can control a device from any standard terminal software (for example, the Windows® HyperTerminal Application) or from TCP/UDP clients connected to default TCP port 5000 or UDP port 50000 (port numbers can been changed by the user). RS-232/RS-485 communications protocol uses a data rate of 115200 bps, no parity, 8 data bits, and 1 stop bit.

7.1.1 Host Message Format

<table>
<thead>
<tr>
<th>Start</th>
<th>Address (opt)</th>
<th>Body</th>
<th>Delimiter</th>
</tr>
</thead>
<tbody>
<tr>
<td>#</td>
<td>Destination_id@</td>
<td>Message</td>
<td>CR</td>
</tr>
</tbody>
</table>

7.1.1.1 Simple Command

Command string with only one command without addressing:

<table>
<thead>
<tr>
<th>Start</th>
<th>Body</th>
<th>Delimiter</th>
</tr>
</thead>
<tbody>
<tr>
<td>#</td>
<td>Command [SP] Parameter_1,Parameter_2,…</td>
<td>CR</td>
</tr>
</tbody>
</table>
7.1.2 Command String

Formal syntax with commands concatenation and addressing:

<table>
<thead>
<tr>
<th>Start</th>
<th>Address</th>
<th>Body</th>
<th>Delimiter</th>
</tr>
</thead>
<tbody>
<tr>
<td>#</td>
<td>Destination_id@</td>
<td>Command_1 Parameter1_1,Parameter1_2,…</td>
<td>CR</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Command_2 Parameter2_1,Parameter2_2,…</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Command_3 Parameter3_1,Parameter3_2,…</td>
<td></td>
</tr>
</tbody>
</table>

7.1.2 Device Message Format

<table>
<thead>
<tr>
<th>Start</th>
<th>Address (opt)</th>
<th>Body</th>
<th>Delimiter</th>
</tr>
</thead>
<tbody>
<tr>
<td>~</td>
<td>Sender_id@</td>
<td>Message</td>
<td>CR LF</td>
</tr>
</tbody>
</table>

7.1.2.1 Device Long Response

Echoing command:

<table>
<thead>
<tr>
<th>Start</th>
<th>Address (opt)</th>
<th>Body</th>
<th>Delimiter</th>
</tr>
</thead>
<tbody>
<tr>
<td>~</td>
<td>Sender_id@</td>
<td>Command SP [Param1,Param2 …] result</td>
<td>CR LF</td>
</tr>
</tbody>
</table>

CR = Carriage return (ASCII 13 = 0x0D)

LF = Line feed (ASCII 10 = 0x0A)

SP = Space (ASCII 32 = 0x20)

7.1.3 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 alphanemic 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. Multiple commands are separated by a pipe ('|') character.
**Message starting character**

'#' - For host command/query

'~' - For machine response or machine command performed by keystroke operation on the front panel or IR remote controller.

**Device address** (Optional when directly connected to the device)

K-Net Device ID or MACHINE NUMBER followed by '@'

(ex. #02@CR LF)

**Query sign**

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

**All outputs sign**

'*' defines all outputs.

**Message closing character**

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

CR LF - For machine 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.

### 7.1.4 Entering Commands

You can directly enter all commands using a terminal with ASCII communication software, such as HyperTerminal, Hercules, etc. Connect the terminal to the serial, Ethernet, or USB port on the Kramer device. To enter CR, press the Enter key. (LF is also sent but is ignored by the command parser).

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

All commands are bidirectional. That is, if the device receives the code, it performs the instruction. If the instruction is performed (due to a keystroke operation on the front panel or IR controller) these codes are sent to the PC or other RS-232 / Ethernet / USB controller.

7.1.6 Command Chaining

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 once only, 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.

7.1.7 Maximum String Length

64 characters (except for special commands that are defined in the command syntax description).
## 7.2 Kramer Protocol 3000 Commands

<table>
<thead>
<tr>
<th>Command</th>
<th>Description</th>
<th>Type</th>
<th>Permission</th>
</tr>
</thead>
<tbody>
<tr>
<td>#</td>
<td>Protocol handshaking</td>
<td>System-mandatory</td>
<td>End User</td>
</tr>
<tr>
<td>BUILD-DATE?</td>
<td>Get device build date</td>
<td>System-mandatory</td>
<td>End User</td>
</tr>
<tr>
<td>CPEDID</td>
<td>Copy EDID data from the output to the input EEPROM</td>
<td>EDID Handling</td>
<td>End User</td>
</tr>
<tr>
<td>DISPLAY?</td>
<td>Get output HPD status</td>
<td>Switch</td>
<td>End User</td>
</tr>
<tr>
<td>FACTORY</td>
<td>Reset to factory default configuration</td>
<td>System-mandatory</td>
<td>End User</td>
</tr>
<tr>
<td>GEDID</td>
<td>Set/get EDID data</td>
<td>EDID Handling</td>
<td>End User</td>
</tr>
<tr>
<td>HDCP-STAT?</td>
<td>Get HDCP signal status</td>
<td>System</td>
<td>End User</td>
</tr>
<tr>
<td>HELP</td>
<td>Get command list</td>
<td>System-mandatory</td>
<td>End User</td>
</tr>
<tr>
<td>MODEL?</td>
<td>Get device model</td>
<td>System-mandatory</td>
<td>End User</td>
</tr>
<tr>
<td>NAME</td>
<td>Set/get machine (DNS) name</td>
<td>System</td>
<td>Administrator</td>
</tr>
<tr>
<td>NAME-RST</td>
<td>Reset machine name to factory default (DNS)</td>
<td>System</td>
<td>Administrator</td>
</tr>
<tr>
<td>PROT-VER?</td>
<td>Get device protocol version</td>
<td>System-mandatory</td>
<td>End User</td>
</tr>
<tr>
<td>RESET</td>
<td>Reset device</td>
<td>System-mandatory</td>
<td>Administrator</td>
</tr>
<tr>
<td>SIGNAL?</td>
<td>Read if input is valid</td>
<td>System</td>
<td>End User</td>
</tr>
<tr>
<td>SN?</td>
<td>Get device serial number</td>
<td>System-mandatory</td>
<td>End User</td>
</tr>
<tr>
<td>Command - #</td>
<td>Command Type - System-mandatory</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------</td>
<td>----------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Command Name</td>
<td>Permission</td>
<td>Transparency</td>
<td></td>
</tr>
<tr>
<td>Set:</td>
<td>#</td>
<td>End User</td>
<td>Public</td>
</tr>
<tr>
<td>Get:</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

**Description**

**Syntax**

| Set: | Protocol handshaking | #cr |
| Get: | - | - |

**Response**

```
~nn@SPOK
```

**Parameters**

**Response Triggers**

**Notes**

Validates the Protocol 3000 connection and gets the machine number.
Step-in master products use this command to identify the availability of a device.

---

<table>
<thead>
<tr>
<th>Command - BUILD-DATE</th>
<th>Command Type - System-mandatory</th>
</tr>
</thead>
<tbody>
<tr>
<td>Command Name</td>
<td>Permission</td>
</tr>
<tr>
<td>Set:</td>
<td>-</td>
</tr>
<tr>
<td>Get:</td>
<td>BUILD-DATE?</td>
</tr>
</tbody>
</table>

**Description**

**Syntax**

| Set: | Get device build date | #BUILD-DATEcr |
| Get: | - | - |

**Response**

```
~nn@BUILD-DATE sp date cr 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**
<table>
<thead>
<tr>
<th>Command - CPEDID</th>
<th>Command Type - EDID Handling</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Command Name</strong></td>
<td><strong>Permission</strong></td>
</tr>
<tr>
<td>Set: CPEDID</td>
<td>End User</td>
</tr>
<tr>
<td>Get: -</td>
<td>-</td>
</tr>
</tbody>
</table>

**Description**

**Set:** Copy EDID data from the output to the input EEPROM

**Get:**

**Syntax**

Set: 

#CPEDID\[
\begin{array}{l}
\text{src\_type, src\_id, dst\_type,}
\text{dest\_bitmap}
\end{array}^

Get: -

**Response**

~\[CPEDID\[
\begin{array}{l}
\text{src\_stg, src\_id, dst\_type, dest\_bitmap}
\end{array}_\text{cr}_\text{lf}

**Parameters**

- **src\_type** - EDID source type (usually output) (see Section 9.2 EDID Source)
- **src\_id** - number of chosen source stage (1.. max number of inputs/outputs)
- **dst\_type** - EDID destination type (usually input) (see Section 9.2 EDID Source)
- **dest\_bitmap** - bitmap representing destination IDs. Format: XXXX...X, where X is hex digit. The binary form of every hex digit represents corresponding destinations. Setting ‘1’ says that EDID data has to be copied to this destination.

**Response Triggers**

Response is sent to the com port from which the Set was received (before execution)

**Notes**

Destination bitmap size depends on device properties (for 64 inputs it is a 64-bit word)
Example: bitmap 0x0013 means inputs 1,2 and 5 are loaded with the new EDID
### Command - DISPLAY?

<table>
<thead>
<tr>
<th>Command Name</th>
<th>Permission</th>
<th>Transparency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set:</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Get: DISPLAY?</td>
<td>End User</td>
<td>Public</td>
</tr>
</tbody>
</table>

**Description**

Set: Get output HPD status

**Syntax**

Get: 

~ \texttt{\textasciicircum} \texttt{DISPLAY} \texttt{out_id, status} \texttt{L LF}

**Parameters**

- \texttt{out_id} - output number
- \texttt{status} - HPD status according to signal validation (see Section 9.3 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**

This command deletes all user data from the device. The deletion can take some time.

Your device may require powering off and powering on for the changes to take effect.

---

### Command - FACTORY

<table>
<thead>
<tr>
<th>Command Name</th>
<th>Permission</th>
<th>Transparency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set:</td>
<td>FACTORY</td>
<td>End User</td>
</tr>
<tr>
<td>Get:</td>
<td>-</td>
<td>Public</td>
</tr>
</tbody>
</table>

**Description**

Set: Reset device to factory default configuration

**Syntax**

Get: 

~ \texttt{\textasciicircum} \texttt{FACTORY} \texttt{L LF}

**Parameters**

**Response Triggers**

**Notes**

This command deletes all user data from the device. The deletion can take some time.

Your device may require powering off and powering on for the changes to take effect.
### Command - **HDCP-STAT**

<table>
<thead>
<tr>
<th>Command Name</th>
<th>Permission</th>
<th>Transparency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set:</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Get:</td>
<td>HDCP-STAT?</td>
<td>End User</td>
</tr>
</tbody>
</table>

**Description**
Set: None
Get: Get HDCP signal status

**Syntax**
Set: ~
Get: #HDCP-STAT?\[CR\][LF]stage,stage_id,mode

**Parameters**
- **stage** – input/output (see [Section 9.1 Stage](#))
- **stage_id** - number of chosen stage (1.. max number of inputs/outputs)
- **actual_status** - signal encryption status - valid values ON/OFF (see [Section 9.4 HDCP Types](#))

**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**

<table>
<thead>
<tr>
<th>Command Name</th>
<th>Permission</th>
<th>Transparency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set:</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Get:</td>
<td>HELP</td>
<td>End User</td>
</tr>
</tbody>
</table>

**Description**
Get command list or help for specific command

**Syntax**
Set: ~
Get: #HELP\[CR\][LF]

**Response**

To get help for command use: HELP (COMMAND_NAME)\[CR\][LF]

**Parameters**

**Response Triggers**

**Notes**

---

### Command - **MACH-NUM**

<table>
<thead>
<tr>
<th>Command Name</th>
<th>Command Type</th>
<th>System</th>
</tr>
</thead>
</table>

---

VM-2UHD - Protocol 3000
### Command - **MODEL?**

<table>
<thead>
<tr>
<th>Command Name</th>
<th>Permission</th>
<th>Transparency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set:</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Get: MODEL?</td>
<td>End User</td>
<td>Public</td>
</tr>
</tbody>
</table>

**Description**

**Syntax**

**Set:**

**Response**

```
~nn@MODEL$[model_name]cr
```

**Parameters**

- `model_name`: String of up to 19 printable ASCII chars

**Notes**

This command identifies equipment connected to Step-in master products and notifies of identity changes to the connected equipment. The Matrix saves this data in memory to answer REMOTE-INFO requests.

### Command - **NAME**

<table>
<thead>
<tr>
<th>Command Name</th>
<th>Permission</th>
<th>Transparency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set: NAME</td>
<td>Administrator</td>
<td>Public</td>
</tr>
<tr>
<td>Get: NAME?</td>
<td>End User</td>
<td>Public</td>
</tr>
</tbody>
</table>

**Description**

**Syntax**

**Set:**

**Response**

```
~nn@NAME$[machine_name]cr
```

**Parameters**

- `machine_name`: String of up to 14 alpha-numeric chars (can include hyphen, not at the beginning or end)

**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

<table>
<thead>
<tr>
<th>Command</th>
<th>Command Type</th>
<th>System (Ethernet)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Command Name</strong></td>
<td>Permission</td>
<td>Transparency</td>
</tr>
<tr>
<td>Set: NAME-RST</td>
<td>Administrator</td>
<td>Public</td>
</tr>
<tr>
<td>Get:</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Description</strong></td>
<td>Syntax</td>
<td></td>
</tr>
<tr>
<td>Set: Reset machine (DNS) name to factory default</td>
<td>#NAME-RST CR</td>
<td></td>
</tr>
<tr>
<td>Get:</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Response</strong></td>
<td></td>
<td>~nn@NAME-RST LF OK CR LF</td>
</tr>
</tbody>
</table>

**Parameters**

**Response Triggers**

**Notes**

Factory default of machine (DNS) name is "KRAMER_" + 4 last digits of device serial number

---

### Command - PROT-VER?

<table>
<thead>
<tr>
<th>Command</th>
<th>Command Type</th>
<th>System-mandatory</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Command Name</strong></td>
<td>Permission</td>
<td>Transparency</td>
</tr>
<tr>
<td>Set:</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Get: PROT-VER?</td>
<td>End User</td>
<td>Public</td>
</tr>
<tr>
<td><strong>Description</strong></td>
<td>Syntax</td>
<td></td>
</tr>
<tr>
<td>Set:</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Get: Get device protocol version</td>
<td>#PROT-VER? CR</td>
<td></td>
</tr>
<tr>
<td><strong>Response</strong></td>
<td></td>
<td>~nn@PROT-VER LF 3000:version CR LF</td>
</tr>
</tbody>
</table>

**Parameters**

**Response Triggers**

**Notes**

Version - XX.XX where X is a decimal digit
### Command - **RESET**

<table>
<thead>
<tr>
<th>Command Name</th>
<th>Permission</th>
<th>Transparency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set:</td>
<td>RESET</td>
<td>Administrator</td>
</tr>
<tr>
<td>Get:</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

**Description**

Set: Reset device

**Syntax**

Set: #RESET\cr

**Parameters**

Response

~\[\h\]RESETP\[\h\]OK\cr\lf

**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**

<table>
<thead>
<tr>
<th>Command Name</th>
<th>Permission</th>
<th>Transparency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set:</td>
<td>-</td>
<td>End User</td>
</tr>
<tr>
<td>Get:</td>
<td>SIGNAL?</td>
<td>Public</td>
</tr>
</tbody>
</table>

**Description**

Get: Get input signal lock status

**Syntax**

Get: #SIGNAL?\cr\inp_id\cr

**Parameters**

inp_id - input number  
status - lock status according to signal validation (see Section 9.3 Signal Validation)

**Response**

~\[\h\]SIGNAL\[\h\]\ cr\ inp_id, status\ cr\lf

**Notes**

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.
<table>
<thead>
<tr>
<th>Command</th>
<th>Command Type</th>
<th>Permission</th>
<th>Transparency</th>
</tr>
</thead>
<tbody>
<tr>
<td>SN?</td>
<td>System-mandatory</td>
<td>End User</td>
<td>Public</td>
</tr>
</tbody>
</table>

**Command Name**
- **Set:** -
- **Get:** SN?

**Description**
- **Set:** Get device serial number
- **Get:** Get device serial number

**Syntax**
- **Get:** \#SN?CR

**Parameters**
- serial_number - 14 decimal digits, factory assigned

**Response**
- \~\[ serial_number \]CR LF

**Notes**
<table>
<thead>
<tr>
<th>Command Name</th>
<th>Permission</th>
<th>Transparency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set: GEDID</td>
<td>Administrator</td>
<td>Public</td>
</tr>
<tr>
<td>Get: GEDID?</td>
<td>End User</td>
<td>Public</td>
</tr>
</tbody>
</table>

**Description**

Set: Set EDID data from device

Get: Get EDID support on certain input/output

**Syntax**

Set:

```
#GEDID stage, stage_id
```

Get:

```
#GEDID? stage, stage_id
```

**Parameters**

- `stage`: input/output (see Section 9.2 EDID Source)
- `stage_id`: number of chosen stage (1.. max number of inputs/outputs)
- `size`: EDID data size. For Set, size of data to be sent from device, for Get, 0 means no EDID support

**Response Triggers**

Response is sent to the com port from which the Set (before execution) / Get command was received

**Notes**

For Get, size=0 means EDID is not supported

For old devices that do not support this command, ~nn@ ERR 002 is received
8 Packet Protocol Structure

The packet protocol is designed to transfer large amounts of data, such as files, IR commands, EDID data, etc.

8.1 Using the Packet Protocol

To use the packet protocol:

4. Send a command: LDRV, LOAD, IROUT, LDEDID

5. Receive Ready or ERR###

6. If Ready:
   - Send a packet
   - Receive OK on the last packet
   - Receive OK for the command

7. Packet structure:
   - Packet ID (1, 2, 3…) (2 bytes in length)
   - Length (data length + 2 for CRC) - (2 bytes in length)
   - Data (data length -2 bytes)
   - CRC - 2 bytes

8. Response:

   ~NNNNSP0KCR LF

   Where NNNN is the received packet ID in ASCII hex digits.
8.2 Calculating the CRC

The polynomial for the 16-bit CRC is:
CRC-CCITT: $0x1021 = x^{16} + x^{12} + x^5 + 1$
Initial value: 0000
Final XOR Value: 0

For a code example, see:
http://sanity-free.org/133/crc_16_ccitt_in_csharp.html

CRC example:
Data = “123456789”
Result => 0x31C3
# 9 Parameters

## 9.1 Stage

<table>
<thead>
<tr>
<th>Number</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Input</td>
</tr>
<tr>
<td>1</td>
<td>Output</td>
</tr>
<tr>
<td>2</td>
<td>(Reserved)</td>
</tr>
<tr>
<td>3</td>
<td>(Reserved)</td>
</tr>
</tbody>
</table>

## 9.2 EDID Source

<table>
<thead>
<tr>
<th>Number</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Input</td>
</tr>
<tr>
<td>1</td>
<td>Output</td>
</tr>
<tr>
<td>2</td>
<td>Default EDID</td>
</tr>
</tbody>
</table>

## 9.3 Signal Validation

<table>
<thead>
<tr>
<th>Number</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Signal or sink is not valid</td>
</tr>
<tr>
<td>1</td>
<td>Signal or sink is valid</td>
</tr>
<tr>
<td>2</td>
<td>Sink and EDID is valid</td>
</tr>
</tbody>
</table>

## 9.4 HDCP Types

<table>
<thead>
<tr>
<th>Number</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>HDCP Off</td>
</tr>
<tr>
<td>1</td>
<td>HDCP On</td>
</tr>
<tr>
<td>2</td>
<td>Follow input</td>
</tr>
<tr>
<td>3</td>
<td>Mirror output (“MAC mode”)</td>
</tr>
</tbody>
</table>
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This limited warranty covers defects in materials and workmanship in this product.

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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 repairs attempted by anyone other than an authorized 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.

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We welcome your questions, comments, and feedback.

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info@kramerel.com