HDMI-HDMI Extender Manual

Lumagen® Inc.

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This equipment has been tested and found to comply with the limits for a class B digital device, pursuant to Part 15 of the FCC rules, Canadian ICES-003, and CISPR 22. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

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Introduction:

The Lumagen HDMI 1.4 HDMI-to-HDMI cable extender is designed to allow more reliable real-world performance with longer cable lengths than competing products. Some key features are:

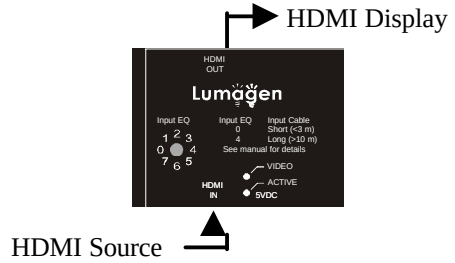
- Maximum pixel clock rate up to 300 MHz (3 Gbps per channel)
- Active signal buffering for video and control (DDC) signals, maximizes video, EDID, and HDCP-encryption-key, signal integrity and reliable cable length.
- Programmable cable equalization allows system specific settings with lower cable jitter than dynamic-cable-equalization solutions.
- External power supply eliminates power-supply-current induced cable voltage-drop. This improves signal integrity.
- With HDMI 1.3 24 AWG input cable, the HDMI-HDMI extender supports 1080p60 for a total distance of over 30 meters, under nominal conditions.
- Supports all HDMI 1.4 3D formats and the HDMI 1.4 Audio-Return-Channel (ARC).

The HDMI-HDMI extender has “static” input cable equalization (EQ). The input-EQ for the HDMI input cable is selected manually using an 8-position rotary switch. Static cable-EQ has less signal jitter than dynamic-cable-EQ solutions. This translates into the ability to support longer cable lengths.

When long cables, or cable extenders, have issues in a given system, Lumagen has found that often it is due to problems with the DDC signals. Since the DDC signals are needed for HDCP and EDID communication, Lumagen put active DDC buffers in the HDMI-HDMI extender to maximize achievable cable length.

Installation Instructions:

Insert the supplied 5-VDC power-supply into the HDMI-CAT6 Receiver’s 5-VDC jack, twisting it to make sure it seats all the way into the case. Plug the power supply into the wall outlet. Connect the HDMI cable for the source and the HDMI display going to the display. After all audio and video connections are made turn on system power. Once the system is turned on, the cable equaliztion setting may need to be adjusted. See the *Input Equalization Selection* section for more information.



Connection Block Diagram

Caution:

Ground loops are common even in well-designed systems -- even with power conditioners. Power conditioners do not prevent the most common ground loop issues, which are related to the ground prong on equipment with three prong power cords, and the difference in the case ground voltage potential between equipment. Given the longer distance involved, ground loops are generally worse for the source to display/projector connection. To help prevent damage, audio and video cables should be connected before power. This allows the ground wires of the audio/video cables to handle any ground loop current rather than the audio and video signals themselves.

Status Indicator Lights:

There are two light-emitting-diode (LED) indicator lights. These show the connection status as described below:

- **ACTIVE:** On if the external 5-VDC power is supplied, and HDMI "Standby Power" is active.
- **VIDEO:** On if the *ACTIVE* light is on, and the video input signals are actively driven.

Both indicators must be illuminated for the HDMI-HDMI extender to pass video/audio. However, having both indicators illuminated does not guarantee that video/audio can be passed, or that the desired resolution can be achieved for the system as configured. The lights indicate that power is applied, that the source's "standby power" is active, and that the video input signals are being driven, and not that video is being correctly received.

Input Equalization Selection:

The input-equalization (Input-EQ) rotary switch has settings from 0 (no Input-EQ) to 7 (maximum Input-EQ). For short input cables, set input-EQ to 0. Input-EQ settings range from 0 – 2 for up to 5 meters, 1 – 4 for 5 to 10 meters, and 2 – 7 for = 10 meters.

For best performance multiple switch settings should be tested and the average of the working settings should be used.

After the Input-EQ setting has been selected, power down the system and then power on normally to test that the video signal "locks" at power on. Acquiring signal "lock" is harder than maintaining "lock." A setting that works while changing Input-EQ settings may not "lock" during power-on. While unlikely, if this occurs, try other settings and test for power-on signal "lock."

Setup Tips and Trouble Shooting:

- For long HDMI cables, it is recommended that HDMI 1.3 22 AWG, or better, cables be used.
- Avoid bundling the HDMI cables with LAN and other digital cables.
- If the system is properly connected with quality cables of an appropriate length, and equipment is turned on, if no video is seen, the likely cause is the Input-EQ is not properly set for the given cable type and cable length.
- If video is absent and all connections have been made, and system is on, one trouble shooting method is to temporarily connect a shorter HDMI cable directly from the source to the HDMI-HDMI extender with the Input EQ set appropriately. This may help identify the long HDMI cable as an issue or eliminate it as the problem.
- Cable type, source-device clock-jitter, sink-device jitter-sensitivity, intra-cable crosstalk, inter-cable crosstalk, cable bundling, and ground loops, determine, and limit, maximum reliable cable length.
- HDMI audio is more sensitive to cable jitter than video. So, the maximum cable length may be reduced if audio is being used.

Specifications:

- Maximum pixel clock rate: 300 MHz (3 GHz bit rate per channel), which support up to 1080p120, or 1080p60 with 16-bit 4:4:4
- Maximum video rate using HDMI 1.3 22 AWG HDMI input cable, for nominal conditions is:

  For 1080p60 with 12-bit 4:2:2, or 8-bit 4:4:4: 30 meters
  For 1080p75 with 12-bit 4:2:2, or 8-bit 4:4:4: 30 meters
  For 1080p120 with 12-bit 4:2:2, or 8-bit 4:4:4: TBD
  For 1080p60 with 16-bit 4:4:4: TBD

- Maximum distance may be reduced if audio is used since HDMI audio is more sensitive to cable induced jitter than video.
- Supports all HDMI 1.4 3D formats and the HDMI 1.4 Audio-Return-Channel (ARC).
- Two HDMI-HDMI units can be placed in series, with long HDMI cables between the units, to increase the total achievable distance.
- Power: 2.5 Watts