BLACKBIRD™

4K 2x4 HDMI® Splitter and Extender Kit

P/N 43960

User's Manual

CONTENTS

SAFETY WARNINGS AND GUIDELINES

Please read this entire manual before using this device, paying extra attention to these safety warnings and guidelines. Please keep this manual in a safe place for future reference.

- This device is intended for indoor use only.
- Do not expose this device to water or moisture of any kind. Do not place drinks or other containers with moisture on or near the device. If moisture does get in or on the device, immediately remove it from its power source and allow it to fully dry before reapplying power.
- Do not touch the device, the power cord, or any other connected cables with wet hands.
- Do not expose this device to excessive vibration or extreme force, shock, or fluctuations in temperature or humidity.
- Do not expose this device to excessively high temperatures. Do not place it in, on, or near a heat source, such as a fireplace, stove, radiator, etc. Do not leave it in direct sunlight.
- Do not place or install this device in an area where it can be exposed to excessive amounts of dust, humidity, oil, smoke, or combustible vapors.
- Prior to operation, check the unit and power cord for physical damage. Do not use if physical damage has occurred.
- Before plugging the unit into a power outlet, ensure that the outlet provides the same type and level of power required by the device.
- Unplug this device from the power source when not in use.
- Take care to prevent damage to the power cord. Do not allow it to become crimped, pinched, walked on, or become tangled with other cords. Ensure that the power cord does not present a tripping hazard.
- Never unplug the unit by pulling on the power cord. Always grasp the connector head or adapter body.

- Clean using a soft, dry cloth only. Do not use chemical cleaners, solvents, or detergents. For stubborn deposits, moisten the cloth with warm water.
- This device has no user serviceable parts. Do not attempt to open, service, or modify this device.

INTRODUCTION

This 4K 2x4 HDMI® Splitter and Extender Kit allows you to distribute either one of two HDMI inputs to a single HDMI loop output and four RJ45 outputs for extension over single Cat5e/Cat6/Cat7 Ethernet cable. The loop output can be used for a local display or to cascade to additional Splitter and Extender Kits. It supports video resolutions up to 4K@60Hz with YCbCr 4:4:4, 8-bit, and all HDMI audio formats. It can extend a 4K signal to distances up to 229 feet (70 meters and a 1080 signal up to 262 feet (80 meters). It supports the Power over Cable (PoC) feature, which allows the receivers to be powered by the transmitter over the connecting Ethernet cables. It supports automatic video downscaling, bidirectional IR passthrough, IR cascading, and RS-232 control.

FEATURES

- Distributes either one of two HDMI® inputs to a single HDMI loop output and four RJ45 outputs for extension over single Cat5e/Cat6/Cat7 Ethernet cables
- Supports video resolutions up to 4K@60Hz with YCbCr 4:4:4 8-bit
- Supports all HDMI audio formats
- Complies with the HDMI 2.0 and HDCP™ 2.2 specifications
- Supports video and IR cascading to additional units
- Extends a 4K signal to distances up to 229 feet (70 meters) and a 1080p signal up to 262 feet (80 meters)
- Includes comprehensive EDID® management
- Supports automatic video downscaling from 4K to 1080p for use with 1080p displays
- De-embeds audio to digital optical S/PDIF and stereo analog audio outputs
- Supports bidirectional IR passthrough
- Supports the Power over Cable (PoC) feature, which delivers power from the transmitter to the receivers over the connecting Ethernet cables
- Can be controlled using the front panel buttons and using a computer to issue RS-232 commands
- Supports automatic switching based on 5V or TMDS® signal detection

CUSTOMER SERVICE

The Monoprice™ Customer Service department is dedicated to ensuring that your ordering, purchasing, and delivery experience is second to none. If you have any problem with your order, please give us an opportunity to make it right. You can contact a Monoprice Customer Service representative through the Live Chat link on our website **www.monoprice.com** or via email at **support@monoprice.com**. Check the website for support times and links.

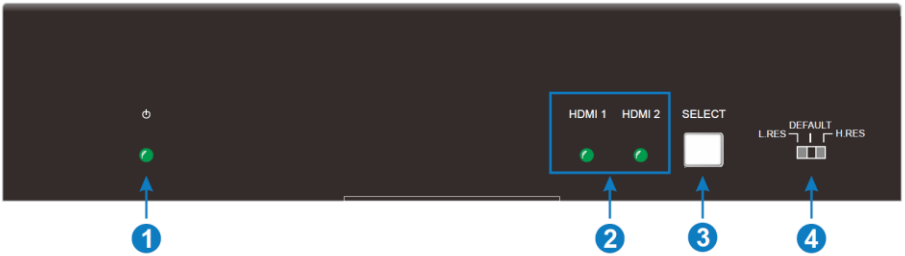
PACKAGE CONTENTS

Please take an inventory of the package contents to ensure you have all the items listed below. If anything is missing or damaged, please contact Monoprice™ Customer Service for a replacement.

- 1x 4K 2x4 HDMI® Splitter and Extender Transmitter
- 4x Receivers
- 1x IR Transmitter
- 4x IR Receivers
- 1x IR Cable (3.5mm to 3.5mm for IR cascading)
- 1x RS-232 Cable (3-pin to DB-9)
- 4x Plastic Feet
- 4x Hook and Loop Strips
- 1x AC Power Adapter (12 VDC, 2A)
- 1x User's Manual

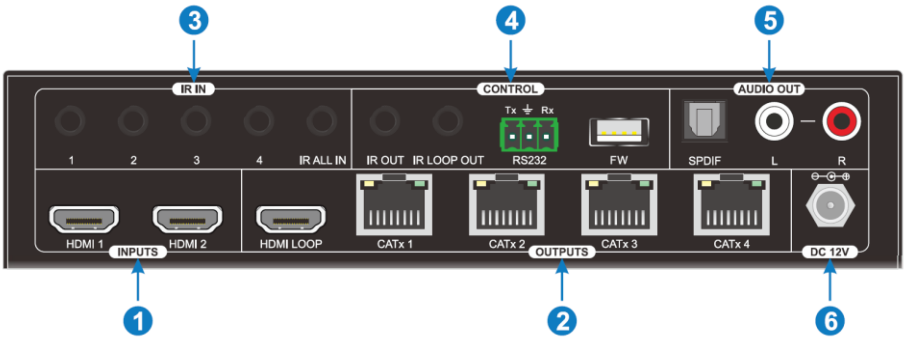
PRODUCT OVERVIEW

Front Panel



1. **POWER:** The LED illuminates green when power is applied, it blinks green when in standby mode, and it is off when there is no power.
2. **HDMI 1/HDMI 2:** One of the two LEDs illuminates green to indicate the selected input. The LED blinks green when the input is selected, but there is no active HDMI® signal.
3. **SELECT:** When in Manual Switching Mode, momentarily press the button to switch to the next input. Press and hold the button for 3 seconds to toggle between Auto Switching Mode and Manual Switching Mode.
4. **L.RES/DEFAULT/H.RES:** Slide switch to select the EDID® source. When in the **L.RES** position, it scans all displays and selects the one with the lowest maximum resolution. When in the **DEFAULT** position, it sets the EDID to 3840x2160@60Hz with Deep Color and stereo audio. When in the **H.RES** position, it scans all displays and selects the one with the highest maximum resolution.

Rear Panel

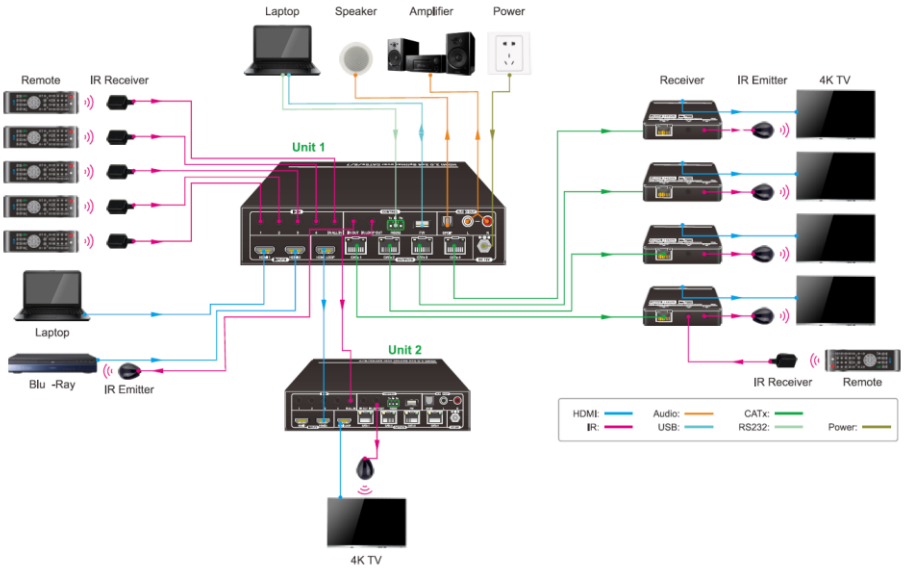


1. **INPUTS:** Two HDMI® ports for connecting video source devices.
2. **OUTPUTS:** One HDMI port for connecting a local display or cascading to other units, and four RJ45 jacks for connecting the receivers.
3. **IR IN:** Four numbered IR input jacks and an **IR ALL IN** jack for receiving IR signals to control the remote displays using their native remote(s). The individual jacks are appropriate for use when two or more displays use different remote controls, while the **IR ALL IN** jack is appropriate for use when all remote displays use the same remote control.
4. **CONTROL:** Use the **IR OUT** jack to connect an IR transmitter to control the video source device from the remote locations. Use the **IR LOOP OUT** jack to connect to a cascaded unit. Use the **RS232** connector to connect your computer using the included RS-232 Cable. Use the **FW** port to connect a USB cable (available separately) for performing firmware upgrades.
5. **AUDIO OUT:** Use the **SPDIF** port to connect to an amplifier or receiver using a digital optical S/PDIF cable (available separately). Use the **L-R** RCA jacks to connect to an amplifier or receiver using an RCA analog stereo audio cable (available separately).
6. **DC 12V:** DC barrel connector for connecting the included AC power adapter.

Receivers

1. **CATx IN:** RJ45 jack for connecting the Ethernet cable from the transmitter.
2. **IR IN:** 3.5mm jack for connecting an IR receiver.
3. **IR OUT:** 3.5mm jack for connecting an IR transmitter.
4. **DISPLAY:** HDMI® port for connecting an HDMI display.

SAMPLE CONNECTION DIAGRAM

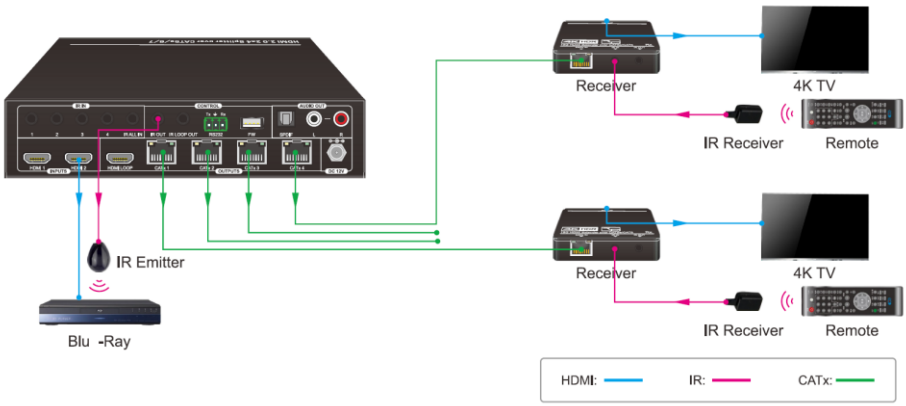


IR CONTROL

This system supports bidirectional IR passthrough, allowing you to control the remote displays from the source location and the connected source devices from the remote locations. The system includes one IR transmitter and four IR receivers, which allows for the basic source device control from the remote locations. However, you can purchase additional IR receivers and/or transmitters to add to the system to allow full control of both the source devices and the remote displays.

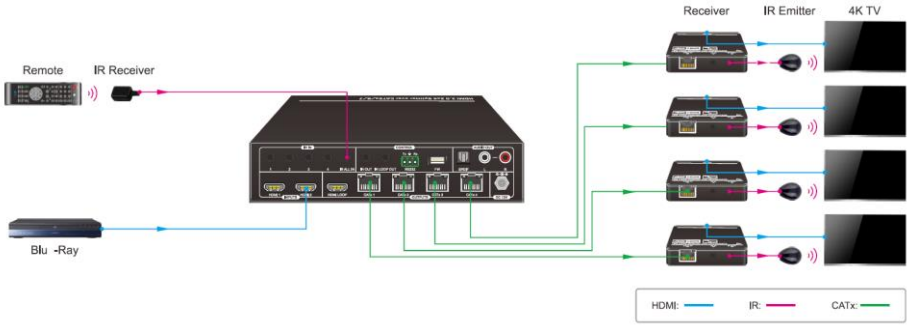
Controlling the Source Devices

The basic IR control system allows you to control the source devices from the remote locations. All necessary IR transmitters and receivers are included for this type of control. The following sample connection diagram illustrates the connections and signal paths.



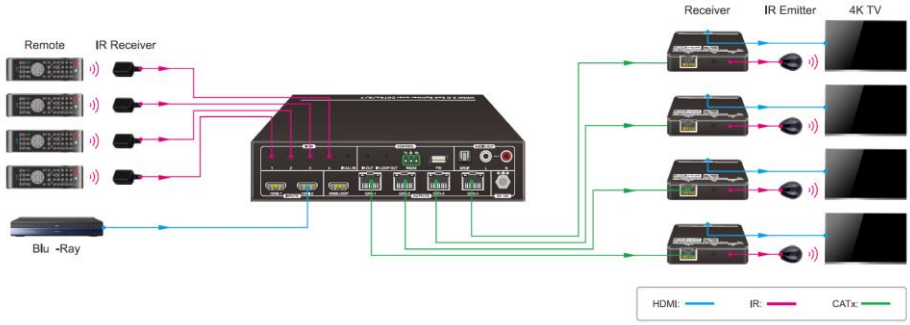
Controlling the Displays Using the Same Remote

You can control the remote displays from the source location when all displays use the same remote. To do this, you will need to purchase three additional IR transmitters. The following sample connection diagram shows the connections and signal paths.



Controlling the Displays Using Different Remotes

You can control the remote displays from the source location when the displays use one or more different remote controls. To do this, you will need to purchase three additional IR transmitters. The following sample connection diagram shows the connections and signal paths.



SOURCE SWITCHING

This system supports both Manual Switching Mode and Auto Switching Mode.

- When in Manual Switching Mode, momentarily press the **SELECT** button on the front panel to switch between the two inputs.
- Press and hold the **SELECT** button on the front panel for 3 seconds to toggle between Manual Switching Mode and Auto Switching Mode.

When Auto Switching Mode is enabled, the system will switch inputs according to the following rules:

- When first powered on, the system with switch to the lowest numbered active input.
- When a new input is detected, the system will automatically switch to that input.
- When the selected input is removed, either by unplugging or powering off, the system will switch to the lowest numbered active input.
- The system remembers the last configuration used before losing power or rebooting. If the system was in Auto Switching Mode, it will restart in Auto Switching Mode. If the last selected input is active, the system will switch to that input. Otherwise, the system will switch to the lowest numbered active input.
- When changing from Auto Switching Mode to Manual Switching Mode, the system will not switch the currently selected input.

VIDEO DOWNSCALING

The system support automatic downscaling of the 4K input signal when connected to one or more 1080p displays. The following table shows the input and output resolutions, refresh rates, and color spaces.

Input			Output		
Resolution	Refresh	Color Space	Resolution	Refresh	Color Space
3840x2160p	60	4:4:4	1920x1080p	60	4:4:4
3840x2160p	30	4:4:4	1920x1080p	30	4:4:4
3840x2160p	24	4:4:4	1920x1080p	24	4:4:4
3840x2160p	60	4:2:0	1920x1080p	60	4:4:4
3840x2160p	50	4:2:0	1920x1080p	50	4:4:4
3840x2160p	60	4:2:2	1920x1080p	60	4:4:4
3840x2160p	50	4:2:2	1920x1080p	50	4:4:4
3840x2160p	30	4:2:2	1920x1080p	30	4:4:4
3840x2160p	24	4:2:2	1920x1080p	24	4:4:4

FIRMWARE UPGRADE

The firmware in this splitter can be upgraded. If an upgraded firmware is available, it can be downloaded from the **43960** page on the **www.monoprice.com** website or from the Downloads section.

1. Download the firmware upgrade zip file and extract the firmware file.
2. Rename the file **FW_MERG.bin**.
3. Power off the splitter.

4. Using a USB cable (available separately), plug one end into the **FW** port on the splitter, then plug the other end into an available USB port on your computer.
5. Power on the switch. Your computer will automatically detect a U-disk named **BOOTDISK**.
6. Double-click the **BOOTDISK** U-disk to open it and view the contents. There should be a file named **READY.TXT**.
7. Copy the firmware upgrade file to the **BOOTDISK** U-disk.
8. Double-click the **BOOTDISK** U-disk again to check the contents. The **READY.TXT** file should have been replaced with a **SUCCESS.TXT** file. If not, double check the filename and try the above steps again.
9. Once the update is successful, remove the USB cable, then reboot the splitter by unplugging it from the wall, waiting 30 seconds, then plugging it back in.

RS-232 CONTROL

You can control the splitter with your computer using RS-232 commands issued through RS-232 control software, such as CommWatch.

Connection

Plug one end of the included RS-232 Cable into the **RS232** jack on the rear panel, then plug the other end into an available serial port on your computer.

Software

You can use any type of RS-232 control software, but we recommend using CommWatch, which can be downloaded from the internet.

Configuration

Launch your software package once it is installed, then set the communications parameters as follows:

PORT: the serial port on your computer that is connected to the switch.

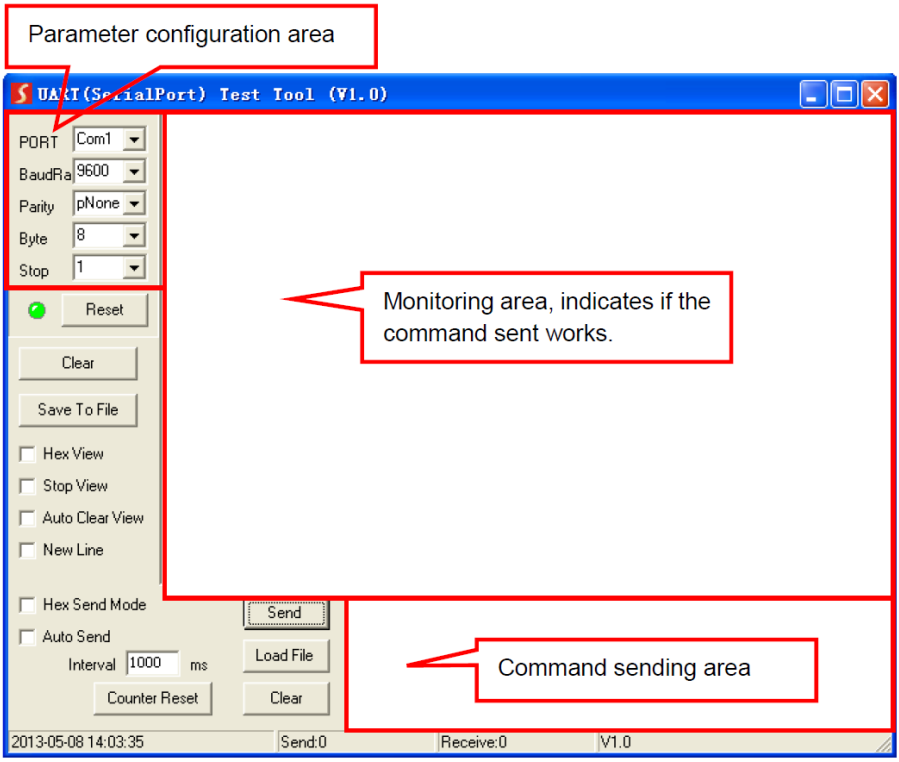
Baud Rate: 9600

Data Bits: 8

Stop Bits: 1

Parity: None

You can now issue RS-232 control commands to the switch.



RS-232 COMMANDS

Notes:

- All commands are case sensitive.
- All commands must end with **<CR><LF>**.
- In the commands below, do not type the **[** and **]** symbols. They are used to make the commands easier to read and to clearly delineate between the command and the parameter.

System Commands

Function	Command	Example Feedback
Set the device name, where **xxxx** is the desired name.	>SetDeviceModel:xxxx	<Model:43960
Get the device name.	>GetDeviceModel	<Model:43960
Reboot the system.	>SetDeviceModelRst	<DeviceModelRst

Switching Commands

Function	Command	Example Feedback
Switch the input source, where **param** is **01** or **02**, representing HDMI 1 and HDMI 2.	>SetVideo [param]	<Video 01
Gets the currently selected input.	>GetVideo	<Video 01
Enable or disable Auto Switching Mode, where **param** is **On** or **Off**.	>SetAutoSwitch [param]	<AutoSwitch On
Gets the Switching Mode.	>GetAutoSwitch	<AutoSwitch On

Function	Command	Example Feedback
Sets the signal detection mode, where **param** is **5V** or **TMDS**.	>SetSignalDetect [param]	<SignalDetectMode 5V
Gets the signal detection mode.	>GetSignalDetect	<SignalDetectMode 5V
Enable or disable standby mode, where **param** is **On** or **Off**.	>SetSystemStandbyMode [param]	<SystemStandbyMode On
Get the status of the system standby mode.	>GetSystemStandbyMode	<SystemStandbyMode On
Set the delay time to send standby commands after the input signal is removed, where **param** is a number between **1~10**.	>SetSystemStandbyModeTime: [param]	<SystemStandbyModeTime: 10min
Turns the system on or puts it into standby mode, where **param** is **On** or **Off**.	>SetSystemPowerMode [param]	<SystemPowerMode On
Get the system power status.	>GetSystemPowerMode	<SystemPowerMode On
Set the baud rate for RS-232 communications, where **param** is **115200**, **57600**, **38400**, **19200**, or **9600**.	>SetRS232Baud [param]	>SetRS232Baud 9600
Get the baud rate for RS-232 communications.	>GetRS232Baud	<RS232Baud 19200

CEC Commands

Function	Command	Example Feedback
Send the CEC **MENU** command to a source device, where **param** is **01** or **02**, representing HDMI 1 and HDMI 2.	>SetCecSrcMenu [param]	<CecSrcMenu 01
Send the CEC **UP** command to a source device, where **param** is **01** or **02**, representing HDMI 1 and HDMI 2.	>SetCecSrcUp [param]	>CecSrcUp 01
Send the CEC **DOWN** command to a source device, where **param** is **01** or **02**, representing HDMI 1 and HDMI 2.	>SetCecSrcDown [param]	>CecSrcDown 01
Send the CEC **LEFT** command to a source device, where **param** is **01** or **02**, representing HDMI 1 and HDMI 2.	>SetCecSrcLeft [param]	>CecSrcLeft 01
Send the CEC **RIGHT** command to a source device, where **param** is **01** or **02**, representing HDMI 1 and HDMI 2.	>SetCecSrcRight [param]	>CecSrcRight 01
Send the CEC **BACK** command to a source device, where **param** is **01** or **02**, representing HDMI 1 and HDMI 2.	>SetCecSrcBack [param]	>CecSrcBack 01

Function	Command	Example Feedback
Send the CEC **ENTER** command to a source device, where **param** is **01** or **02**, representing HDMI 1 and HDMI 2.	>SetCecSrcEnter [param]	>CecSrcEnter 01
Send the CEC **ON** command to a source device, where **param** is **01** or **02**, representing HDMI 1 and HDMI 2.	>SetCecSrcOn [param]	>CecSrcOn 01
Send the CEC **OFF** command to a source device, where **param** is **01** or **02**, representing HDMI 1 and HDMI 2.	>SetCecSrcOff [param]	>CecSrcOff 01
Send the CEC **STOP** command to a source device, where **param** is **01** or **02**, representing HDMI 1 and HDMI 2.	>SetCecSrcStop [param]	>CecSrcStop 01
Send the CEC **PLAY** command to a source device, where **param** is **01** or **02**, representing HDMI 1 and HDMI 2.	>SetCecSrcPlay [param]	>CecSrcPlay 01
Send the CEC **PAUSE** command to a source device, where **param** is **01** or **02**, representing HDMI 1 and HDMI 2.	>SetCecSrcPause [param]	>CecSrcPause 01
Send the CEC **PREV** command to a source device, where **param** is **01** or **02**, representing HDMI 1 and HDMI 2.	>SetCecSrcPrev [param]	>CecSrcPrev 01

Function	Command	Example Feedback
Send the CEC **NEXT** command to a source device, where **param** is **01** or **02**, representing HDMI 1 and HDMI 2.	>SetCecSrcNext [param]	>CecSrcNext 01
Send the CEC **REWIND** command to a source device, where **param** is **01** or **02**, representing HDMI 1 and HDMI 2.	>SetCecSrcRewind [param]	>CecSrcRewind 01
Send the CEC **FAST FORWARD** command to a source device, where **param** is **01** or **02**, representing HDMI 1 and HDMI 2.	>SetCecSrcFastForward [param]	>CecSrcFastForward 01
Send the CEC **ON** command to the display devices.	>SetCecDisplayOn	<CecDisplayOn
Send the CEC **OFF** command to the display devices.	>SetCecDisplayOff	<CecDisplayOff

SPECIFICATIONS

Splitter/Transmitter

P/N	43960
Video Inputs	2x HDMI®
Video Outputs	1x HDMI, 4x RJ45
HDMI Version	2.0
HDCP™ Version	2.2
Video Bandwidth	18Gbps
Maximum Input Resolution	4K@60Hz YCbCr 4:4:4 8-bit
Maximum HDMI Output Resolution	4K@60Hz YCbCr 4:4:4
Maximum RJ45 Output Resolution	4K@60Hz YCbCr 4:4:4 compressed
Audio Outputs	1x Digital optical S/PDIF, 1x RCA analog stereo pair
S/PDIF Audio Output	
Supported Audio Formats	2CH LPCM, 2/5.1/7.1CH Dolby Digital™, 2/5.1CH DTS®
Output Level	±0.05dBFS
Frequency Response	20Hz ~ 20kHz, ±1dB
THD+N	< 0.05%, 20Hz ~ 20kHz bandwidth, 1kHz sine at 0dBFS or maximum level
Signal-to-Noise Ratio	> 90dB, 20Hz ~ 20kHz bandwidth
Crosstalk Isolation	> 70dB, 10kHz sine at 0dBFS or maximum level before clipping

Noise	-90dB
Stereo Analog Audio Output	
Supported Audio Formats	PCM
Frequency Response	20Hz ~ 20kHz, ±1dB
Maximum Output Level	2.0 V_{rms} ±0.5dB
THD+N	< 0.05%, 20Hz ~ 20kHz bandwidth, 1kHz sine at 0dBFS or maximum level
Signal-to-Noise Ratio	> 80dB, 20Hz ~ 20kHz bandwidth
Crosstalk Isolation	> 70dB, 10kHz sine at 0dBFS or maximum level before clipping
L/R Level Deviation	< 0.3dB, 1kHz sine at 0dBFS or maximum level before clipping
Output Load Capability	1kΩ and higher, supports 10x paralleled 10kΩ loads
Noise	-80dB
General	
Power over Cable	12V PoC power for the receivers
Transmission Distance	4K: up to 229 feet (70 meters) 1080p: up to 262 feet (80 meters)
Input Power	12 VDC, 2A
AC Adapter Input Power	100 ~ 240 VAC, 50/60 Hz
Maximum Power Consumption	14.5W
Operating Temperature	+14 ~ +131°F (-10 ~ +55°C)

Storage Temperature	-13 ~ +158°F (-25 ~ +70°C)
Operating Humidity	10 ~ 90% RH, noncondensing
Dimensions (WxHxD)	7.9" x 1.7" x 5.1" (200 x 44 x 130 mm)
Weight	1.9 lbs. (855 g)

Note that the digital optical S/PDIF output does not support the DTS-HD Master Audio™ or Dolby TrueHD™ formats.

Receivers (each)

Video Inputs	1x RJ45
Video Outputs	1x HDMI®
HDMI Version	2.0
HDCP™ Version	2.2/1.4
Video Bandwidth	18Gbps
Maximum Input Resolution	4K@60Hz YCbCr 4:2:0
Maximum Output Resolution	4K@60Hz YCbCr 4:4:4 8-bit HDR10
Maximum HDMI Cable Length	4K@60Hz 4:4:4: up to 16 feet (5 meters) 4K@60Hz 4:2:0: up to 32 feet (10 meters) 1080p@60Hz 4:4:4: up to 49 feet (15 meters)
Transmission Distance	4K: up to 229 feet (70 meters) 1080p: up to 262 feet (80 meters)
Input Power	12V PoC
Maximum Power Consumption	4W
Operating Temperature	+23 ~ +131°F (-5 ~ +55°C)
Storage Temperature	-13 ~ +158°F (-25 ~ +70°C)

Operating Humidity	10 ~ 90% RH, noncondensing
Dimensions (WxHxD)	3.1" x 0.7" x 3.1" (80 x 17 x 80 mm)
Weight	2.5 oz. (70 g)

TECHNICAL SUPPORT

Monoprice™ is pleased to provide free, live, online technical support to assist you with any questions you may have about installation, setup, troubleshooting, or product recommendations. If you ever need assistance with your new product, please come online to talk to one of our friendly and knowledgeable Tech Support Associates. Technical support is available through the online chat button on our website **www.monoprice.com** or through email by sending a message to **tech@monoprice.com**. Check the website for support times and links.

To download the latest drivers, firmware, manuals, etc., go to **www.monoprice.com** and type the **P/N** into the search bar. If available, support files are linked at the bottom of the product page.

REGULATORY COMPLIANCE

Notice for FCC

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Modifying the equipment without Monoprice's authorization may result in the equipment no longer complying with FCC requirements for Class B digital devices. In that event, your right to use the equipment may be limited by FCC regulations, and you may be required to correct any interference to radio or television communications at your own expense.

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. 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 to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Notice for Industry Canada

This Class B digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.