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User Guide

MS-21MV

8K HDMI 2x1 Switcher



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Notices

- This MSolutions product contains electrical components that may be damaged by electrical spikes, surges, electric shock, lightning strikes, etc. Use of surge protection is highly recommended in order to protect and extend the life of your equipment.
- The transmission distances of data over Cat cables are measured using TE CONNECTIVITY 1427071-6 EIA/TIA-568B termination (T568B) of cables is recommended for optimal performance. To minimise interference of unshielded twisted pairs in the Cat6A (or above) cable, do not run the Cat6A (or above) cabling with or in close parallel proximity to mains power cables.
- Do not substitute or use any other power supply other than the enclosed unit, or an MSolutions approved replacement. Do not disassemble either the Transmitter or Receiver units for any reason. Doing so will void the manufacturer's warranty.
- MSolutions reserves the right to change the specifications of this unit without prior notice. As a result of this, physical representations or graphical elements contained within this user guide may not be accurate.

Package Contents

- 1x 8K HDMI 2x1 Switcher
- 1x IR Remote
- 1x 5pin-3.5mm Phoenix Connector (male)
- 1x 3pin-3.5mm Phoenix Connector (male)
- 1x IR Wideband Receiver Cable (1.5m)
- 1x 12V/1A Multinational Locking Power Supply

Specifications

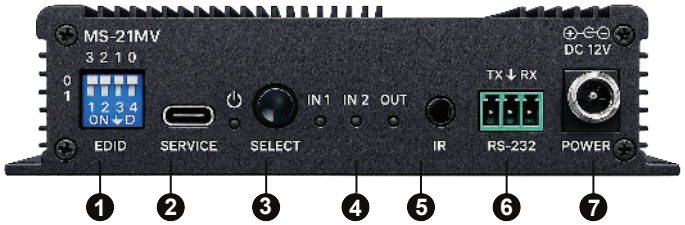
Technical	
HDMI Compliance	HDMI 2.1
HDCP Compliance	HDCP 2.3
Video Bandwidth	48Gbps
Audio Latency	No Latency
Video Latency	No Latency
Video Resolution	Up to 8K60 YCbCr 4:2:0 12bit, 8K30 RGB/YCbCr 4:4:4 12bit or 4K120 RGB/YCbCr 4:4:4 12bit
Color Depth	8/10/12-bit
Color Space	RGB, YCbCr 4:4:4, YCbCr 4:2:2, YCbCr 4:2:0
HDR	HDR, HDR10, HDR10+, Dolby Vision, HLG
IR Level	12Vp-p
IR Frequency	Wideband 20K-60KHz
Audio Formats	HDMI input/output: LPCM, Dolby Digital/Plus/EX, Dolby True HD, Dolby Atmos, DTS, DTS-EX, DTS-96/24, DTS High Res, DTS-HD Master Audio, DSD. Audio de-embedding output: Optical: Up to LPCM/Dolby/DTS 5.1CH. Analog: Only LPCM 2CH
ESD Protection	IEC 61000-4-2: ±8kV (Air-gap discharge) & ±4kV (Contact discharge)

Connection	
Input	2x HDMI IN [Type A, 19-pin female]
Output	1x HDMI OUT [Type A, 19-pin female] 1x OPTICAL AUDIO OUT [S/PDIF, female] 1x L/R AUDIO OUT [5pin-3.5mm Phoenix connector]
Control	1x RS-232 [3pin-3.5mm Phoenix connector] 1x IR CTL [3.5mm stereo mini-jack] 1x SERVICE [USB Type C, Update port]

Mechanical	
Housing	Aluminum Enclosure
Silkscreen Color	Black
Dimensions	142mm [W] × 70mm [D] × 32mm [H]
Weight	600g
Power Supply	Input: AC100-240V 50/60Hz, Output: DC 12V/1A (US/EU standards, CE/FCC/UL certified)
Power Consumption	5.04W (Max)
Operation Temperature	-10°C ~ 45°C / 14°F ~ 113°F
Storage Temperature	-20°C ~ 60°C / -4°F ~ 140°F
Relative Humidity	20~90% RH (non-condensing)

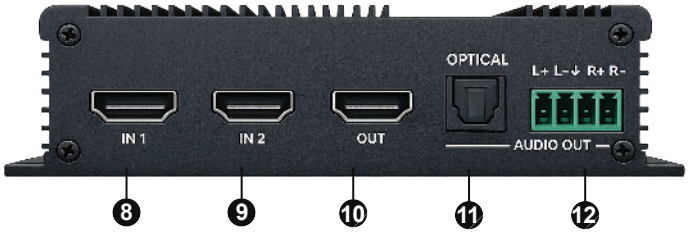
Operation Controls and Functions

Front Panel



No.	Name	Description
1	EDID DIP Switch	Used to configure the EDID mode.
2	SERVICE	USB-C port for firmware update, software debugging and API commands controlling.
3	Select Button	Signal source selection button. Pressing this button will allow the device to switch any of the two HDMI input signals to the HDMI output
4	IN LED (1~2)	When the HDMI IN 1/2 port is selected as the signal source input channel, the corresponding green LED will be on.
5	IR CTL	IR signal receiving port.
6	RS-232	RS-232 serial port, used for API commands control.
7	DC 12V	DC 12V/1A power input port.

Rear Panel



No.	Name	Description
8	HDMI IN 1	HDMI signal input port, connected to HDMI source device
9	HDMI IN 2	HDMI signal input port, connected to HDMI source device
10	HDMI OUT port	HDMI signal output port, connected to HDMI display device
11	OPTICAL (AUDIO OUT)	Optical fiber audio output port.
12	L+L-R+R- (AUDIO OUT)	Analog audio output port, supporting balanced audio output (with a maximum support of 2Vrms) and unbalanced audio output (with a maximum support of 1Vrms). Balanced connection method: L+, L-, R+, R-. Unbalanced connection method: L+, R+

Introduction

The MS-21MV Switch her can switch any of the two 8K HDMI source signals to one 8K HDMI display. It supports video resolution up to 8K@60Hz 4:2:0 12bit. It features a 4-pin DIP switch for advanced EDID management. It supports digital and analog audio de-embedding function (analog audio output with gain control). It can be controlled via front panel buttons, IR remote and RS- 232 API commands. The built-in HDMI signal generator function can quickly diagnose external device connections. This multi-functional product can be widely applied in scenarios of video conference, demonstration, multimedia teaching and other scenarios.

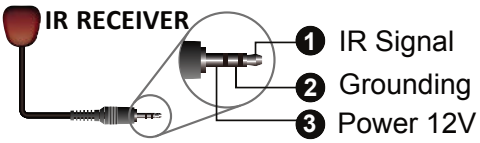
Key Features

- Video resolution up to 8K60 YCbCr 4:2:0 12bit, 8K30 RGB/YCbCr 4:4:4 12bit or 4K120 RGB/YCbCr 4:4:4 12bit, as specified in HDMI 2.1
- HDCP 2.3 compliant
- HDR, HDR10, HDR10+, Dolby Vision, ALLM/VRR pass-through
- HDMI audio formats pass-through: LPCM, Dolby Digital/Plus/EX, Dolby True HD, Dolby Atmos, DTS, DTS-EX, DTS-96/24, DTS High Res, DTS-HD Master Audio, DSD
- Digital and analog audio de-embedding (analog audio output with gain control)
- Built-in signal equalizer, retiming and driver
- Advanced EDID management
- Control via front panel buttons, IR remote and RS-232 API commands
- Compact design for easy and flexible installation

IR Cable Pin Assignment

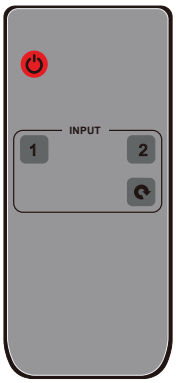


IR RECEIVER



Note: When the angle between the IR receiver and the remote control is ± 45 °, the transmission distance is 0-5 meters; when the angle between the IR receiver and the remote control is ± 90 °, the transmission distance is 0-8 meters

IR Remote



⏻ Power on the product or set it to standby mode.

1/2 Press 1/2 button to select HDMI signal source HDMI IN 1/2 to the HDMI OUT port.

Press this button to cyclically switch HDMI signal source HDMI IN 1/2 to the HDMI OUT port.

EDID Settings

The switcher supports advanced EDID management. You can set the EDID information in two methods.

Method 1: Via EDID DIP switch

You can dial the EDID DIP switch to set EDID information. For details, please refer to the introduction of EDID DIP switch in "5. Operation Controls and Functions".

Method 2: Via API commands

When the EDID DIP switch is dialed to "1111", you can send API commands to set EDID information. For the details of API commands, please refer to "9. API Commands".

DIP Switch	EDID Setting
0000	EDID pass-through (Copy from Sink 1) (as factory default)
0001	HDMI 1080p@60Hz, Audio 2CH PCM
0010	HDMI 1080p@60Hz, Audio 5.1CH DTS/DOLBY
0011	HDMI 4K@60Hz 4:4:4, 8-bit, Audio 2CH PCM
0100	HDMI 4K@60Hz 4:4:4, 8-bit, Audio 5.1CH DTS/DOLBY
0101	HDMI 4K@120Hz 4:4:4, 10-bit HDR/DV, Audio 2CH PCM
0110	HDMI 4K@120Hz 4:4:4, 10-bit HDR/DV, Audio 5.1CH DTS/DOLBY
0111	HDMI 4K@120Hz 4:4:4, 12-bit HDR/DV, Audio 2CH PCM
1000	HDMI 4K@120Hz 4:4:4, 12-bit HDR/DV, Audio 5.1CH DTS/DOLBY
1001	HDMI 8K@60Hz 4:2:0, 10-bit HDR/DV, Audio 2CH PCM
1010	HDMI 8K@60Hz 4:2:0, 10-bit HDR/DV, Audio 5.1CH DTS/DOLBY
1011	HDMI 8K@60Hz 4:2:0, 12-bit HDR/DV, Audio 2CH PCM
1100	HDMI 8K@60Hz 4:2:0, 12-bit HDR/DV, Audio 5.1CH DTS/DOLBY
1101	HDMI 8K@60Hz 4:2:0, 12-bit HDR/DV, Audio 2CH PCM - Inc VRR/DSC
1110	HDMI 8K@60Hz 4:2:0, 12-bit HDR/DV, Audio 5.1CH DTS/DOLBY - Inc VRR/DSC
1111	EDID Software if possible or HDMI 1080p@60Hz, Audio 2CH PCM

API Commands

The switcher also supports API commands control. Connect the RS-232 port or the SERVICE port of the switcher to a PC. Then open a Serial Command tool on PC to send ASCII commands to control the switcher.
The ASCII command list about the switcher is shown as below.

ASCII Commands
1. Service port (USB-C virtual RS-232) communication protocol (Internal debug)
Baud rate: 115200 (Fixed) Data bit: 8 Stop bit: 1 Parity bit: none
The end mark of command is "<CR><LF>"
2. Phoenix RS-232 port communication protocol (Connect to control system)
Baud rate: 4800~115200 (Configurable) Data bit: 8 Stop bit: 1 Parity bit: none
The end mark of command is "<CR><LF>"
x, y, z are parameters. Error Code: E00 → unknown command E01 → parameter out of range E02 → get the error edid data

Command Code	Function Description	Example	Feedback	Factory Default
set baud x	Set RS-232 baud rate to x bps x=1: 4800 x=2: 9600 x=3: 19200 x=4: 38400 x=5: 57600 x=6: 115200	set baud 6	baud rate 115200	115200
get baud	Get RS-232 baud rate	get baud	baud rate 115200	
set input x	Set input video (x=0~2) x=0: Off x=1~2: HDMI input 1~2	set input 1	input HDMI 1	1
get input	Get input port	get input	input HDMI 1	
get hdmi5v	Get input HDMI 5V	get hdmi5v	HDMI 1: 5V HDMI 2: none	
set autoswitch x	Set auto-switching on/off (HDMI 5V detection) x=On, Off	set autoswitch on	autoswitch on autoswitch off	on
get autoswitch	Get auto-switching status	get autoswitch	autoswitch on/off	
set output display y	Set output display mode (y=0~3) y=0: Off (disable TMDS output) y=1: Input video y=2: AVMUTE y=3: Internal pattern	set output display 2	output display off (disable TMDS output) output display input video output display AVMUTE output display internal pattern	1
get output display	Get output display mode	get output display	output display off/input video/AVMUTE/internal pattern	
set output HDCP y	Set output HDCP mode (y=0~4) y=0: Reserved y=1: Follow sink y=2: Follow source y=3: Force HDCP 1.4 y=4: Force HDCP 2.2	set output HDCP 1	output HDCP follow sink output HDCP follow source output HDCP force HDCP 1.4 output HDCP force HDCP 2.2	1
get output HDCP	Get output HDCP mode	get output HDCP	output HDCP follow sink/follow source/force HDCP 1.4/force HDCP 2.2	
set analog mute x	Set analog audio mute on/off x=On, Off	set analog mute on	analog mute on audio mute off	off
get analog mute	Get analog audio mute status	get analog mute	analog mute on audio mute off	

Command Code	Function Description	Example	Feedback	Factory Default
set analog gain x	Set analog audio gain (x=0dB ~ -79dB)	set analog gain -79dB	analog gain -79dB	0dB
get analog gain	Get analog audio gain value	get analog gain	analog gain -79dB	

Command Code	Function Description	Example	Feedback	Factory Default
set generator x y	Set internal signal generator resolution (x=1~15) pattern (y=1~13) x=01: 8K30Hz x=02: 4K120Hz x=03: 4K100Hz x=04: 5K60Hz x=05: 5K50Hz x=06: 5K30Hz x=07: 5K25Hz x=08: 5K24Hz x=09: 4K60Hz x=10: 4K50Hz x=11: 4K25Hz x=12: 4K24Hz x=13: 1080P60Hz x=14: 480P60Hz x=15: 5760P50Hz y=01: Color bar y=02: Checkboard y=03: Strip y=04: Red y=05: Green y=06: Blue y=07: White y=08: Ramp y=09: Red ramp y=10: Green ramp y=11: Blue ramp y=12: PRBS y=13: Black	set generator 1 1	generator 8K30Hz color bar	
get generator	Get internal signal generator output resolution and pattern	get generator	generator 8K30Hz color bar	

Command Code	Function Description	Example	Feedback	Factory Default
set edid x to y	Set input ports (x=0~2) to EDID (y=0~32) x=0: all inputs x=1~2: HDMI input 1~2 y=00: HDMI 1080p@60Hz, Audio 2CH PCM (default) y=01: HDMI 1080p@60Hz, Audio 5.1CH DTS/DOLBY y=02: HDMI 1080p@60Hz, Audio 7.1CH DTS/DOLBY/HD y=03: HDMI 4K@60Hz 4:4:4, 8-bit, Audio 2CH PCM y=04: HDMI 4K@60Hz 4:4:4, 8-bit, Audio 5.1CH DTS/DOLBY y=05: HDMI 4K@60Hz 4:4:4, 8-bit, Audio 7.1CH DTS/DOLBY/HD y=06: HDMI 4K@120Hz 4:4:4, 8-bit, Audio 2CH PCM y=07: HDMI 4K@120Hz 4:4:4, 8-bit, Audio 5.1CH DTS/DOLBY y=08: HDMI 4K@120Hz 4:4:4, 8-bit, Audio 7.1CH DTS/DOLBY/HD y=09: HDMI 4K@120Hz 4:4:4, 10-bit HDR/DV, Audio 2CH PCM y=10: HDMI 4K@120Hz 4:4:4, 10-bit HDR/DV, Audio 5.1CH DTS/DOLBY y=11: HDMI 4K@120Hz 4:4:4, 10-bit HDR/DV, Audio 7.1CH DTS/DOLBY/HD y=12: HDMI 4K@120Hz 4:4:4, 12-bit HDR/DV, Audio 2CH PCM y=13: HDMI 4K@120Hz 4:4:4, 12-bit HDR/DV, Audio 5.1CH DTS/DOLBY y=14: HDMI 4K@120Hz 4:4:4, 12-bit HDR/DV, Audio 7.1CH DTS/DOLBY/HD y=15: HDMI 4K@120Hz 4:4:4, 12-bit HDR/DV, Audio 2CH PCM - Inc VRR/DSC y=16: HDMI 4K@120Hz 4:4:4, 12-bit HDR/DV, Audio 5.1CH DTS/DOLBY - Inc VRR/DSC y=17: HDMI 4K@120Hz 4:4:4, 12-bit HDR/DV, Audio 7.1CH DTS/DOLBY/HD - Inc VRR/DSC	set edid 0 to 0 set edid 1 to 1	all inputs EDID: HDMI 1080p@60Hz, Audio 2CH PCM (default) input 1 EDID: HDMI 1080p@60Hz, Audio 5.1CH DTS/DOLBY	HDMI 1080p @60Hz, Audio 2CH PCM

Command Code	Function Description	Example	Feedback	Factory Default
set edid x to y (continued)	y=18: HDMI 8K@60Hz 4:2:0, 10-bit HDR/DV, Audio 2CH PCM y=19: HDMI 8K@60Hz 4:2:0, 10-bit HDR/DV, Audio 5.1CH DTS/DOLBY y=20: HDMI 8K@60Hz 4:2:0, 10-bit HDR/DV, Audio 7.1CH DTS/DOLBY/HD y=21: HDMI 8K@60Hz 4:2:0, 12-bit HDR/DV, Audio 2CH PCM y=22: HDMI 8K@60Hz 4:2:0, 12-bit HDR/DV, Audio 5.1CH DTS/DOLBY y=23: HDMI 8K@60Hz 4:2:0, 12-bit HDR/DV, Audio 7.1CH DTS/DOLBY/HD y=24: HDMI 8K@60Hz 4:2:0, 12-bit HDR/DV, Audio 2CH PCM - Inc VRR/DSC y=25: HDMI 8K@60Hz 4:2:0, 12-bit HDR/DV, Audio 5.1CH DTS/DOLBY - Inc VRR/DSC y=26: HDMI 8K@60Hz 4:2:0, 12-bit HDR/DV, Audio 7.1CH DTS/DOLBY/HD - Inc VRR/DSC y=27: DVI 1920x1080@60Hz, Audio None y=28: DVI 1920x1200@60Hz, Audio None y=29: HDMI 1920x1200@60Hz, Audio 2CH PCM y=30: User EDID 1 y=31: User EDID 2 y=32: EDID pass-through (Copy from Sink 1)	set edid 0 to 0 set edid 1 to 1	all inputs EDID: HDMI 1080p@60Hz, Audio 2CH PCM (default) input 1 EDID: HDMI 1080p@60Hz, Audio 5.1CH DTS/DOLBY	
get edid x	Get input ports EDID x=0: all inputs x=1~2: HDMI input 1~2	get edid 0	input 1 EDID: HDMI 1080p@60Hz, Audio 2CH PCM (default) input 2 EDID: HDMI 1080p@60Hz, Audio 2CH PCM (default)	HDMI 1080p @60Hz, Audio 2CH PCM
get edid data x	Get input ports EDID data x=0: all inputs x=1~2: HDMI input 1~2	get edid data 0	HDMI input 1 EDID <00 FF FF FF….> HDMI input 2 EDID <00 FF FF FF….>	

Command Code	Function Description	Example	Feedback	Factory Default
set user edid x <y>	Set user defined EDID (x=1~2) x=1: User Defined 1 x=2: User Defined 2 y = 00 FF FF FF ….. (y is 256 bytes EDID data)	set user edid 1 <00 FF FF FF….>	user defined 1 EDID is loaded successfully	
get user edid x	Get user defined EDID (x=1~2) x=1: User Defined 1 x=2: User Defined 2	get user edid 1	user defined 1 EDID <00 FF FF FF….>	

Note: The feedback of the command of "get status" is as following. (The middle line ends with <LF><CR> and the last line ends with <CR><LF>.)

```
================================================================================
Status Info 8K 2x1 Switcher
FW 1.0.0
Power Key IR Baud Autoswitch
On On On 115200 On
Input Cable EDID
01 Connected DIP_0000:EDID pass-through
02 Connected DIP_0000:EDID pass-through
Output FromIn Cable Resolution ColorSpace ColorDepth HDCP
01 01 Connected 3840x2160p60Hz YUV 4:2:0 12bit Sink
================================================================================
```