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Document: HSW44C\_manual.pdf

930-5026-01

# INSTRUCTION MANUAL



## HSW44C 4x4 HDMI Matrix Switch with CAT5 Output



## SAFETEEY & NOTICE

The **HSW44C 4x4 HDMI Matrix Switch with CAT5 Output** has been tested for conformance to safety regulations and requirements, and has been certified for international use. However, like all electronic equipments, the HSW44C should be used with care. Please read and follow the safety instructions to protect yourself from possible injury and to minimize the risk of damage to the unit.

- Follow all instructions and warnings marked on this unit.
- Do not attempt to service this unit yourself, except where explained in this manual.
- Provide proper ventilation and air circulation and do not use near water.
- Keep objects that might damage the device and assure that the placement of this unit is on a stable surface.
- Use only the power adapter and power cords and connection cables designed for this unit.
- Do not use liquid or aerosol cleaners to clean this unit. Always unplug the power to the device before cleaning.

## NOTICE

1. If the DVI or HDMI device requires the EDID information, please use EDID Reader/Writer to retrieve and provide DVI/HDMI EDID information.
2. All HDMI over CAT5 transmission distances are measured using Belden 1583A CAT5e 125MHz LAN cable and ASTRODESIGN Video Signal Generator VG-859C.
3. The transmission length is largely affected by the type of LAN cables, the type of HDMI sources, and the type of HDMI display. The testing result shows solid LAN cables (usually in bulk cable 300m/1000ft form) can transmit a lot longer signals than stranded LAN cables (usually in patch cord form). Shielded STP cables are better suit than unshielded UTP cables. A solid UTP CAT5e cable shows longer transmission length than stranded STP CAT6 cable. For long extension users, solid LAN cables are your only choice.
4. EIA/TIA-568-B termination (T568B) for LAN cables is recommended for better performance.
5. To reduce the interference among the unshielded twisted pairs of wires in LAN cable, you can use shielded LAN cables to improve EMI problems, which is worsen in long transmission.
6. Because the quality of the LAN cables has the major effects in how long transmission distance will be made and how good is the received display, the actual transmission length is subject to your LAN cables. For resolution greater than 1080i or 1280x1024, a CAT6 cable is recommended.
7. If your HDMI display has multiple HDMI inputs, it is found that the first HDMI input [HDMI input #1] generally can produce better transmission performance among all HDMI inputs.
8. The HSMR has been tested extensively and found that it doesn't require external power supply. If in rare situation you find it cannot work with the HSW44C, please use any +5V power adapter to plug in the power jack and see if it can work. If not, please contact your technical support for further service.
9. Additional IR remote controls and IR blaster cables can be purchased as optional accessories to control the HDMI sources located separately.

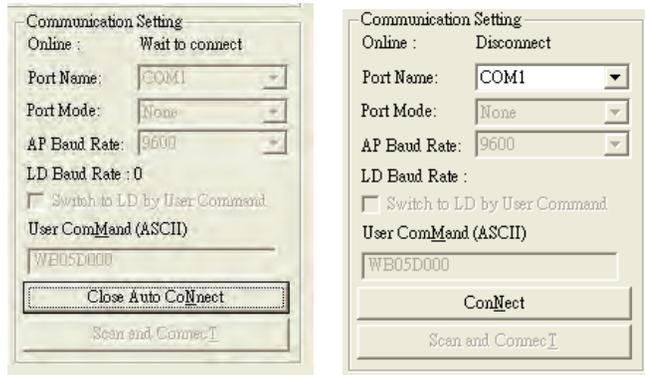
## Performance Guide for HDMI over LAN Cable Transmission

Performance rating		Type of LAN cable		
Wiring	Shielding	CAT5	CAT5e	CAT6
Solid	Unshielded (UTP)	***	****	*****
	Shielded (STP)	***	***	****
Stranded	Unshielded (UTP)	*	**	**
	Shielded (STP)	*	*	**
<b>Termination</b>		Please use <b>EIA/TIA-568-B</b> termination ( <b>T568B</b> ) at any time		

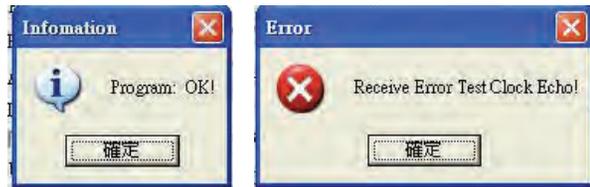
6. In the pop-up window, please select the [File Format] to Binary.



7. Please make sure your PC has direct connection to the RS-232 port of the HSW44C, as shown in the picture (left), that in [Communication Setting] the online status should be "Wait to connect". If the RS-232 connection is not firmly established, you will see the online status is "Disconnect." If so, please check the RS-232 connection until the online status becomes "Wait to Connect."



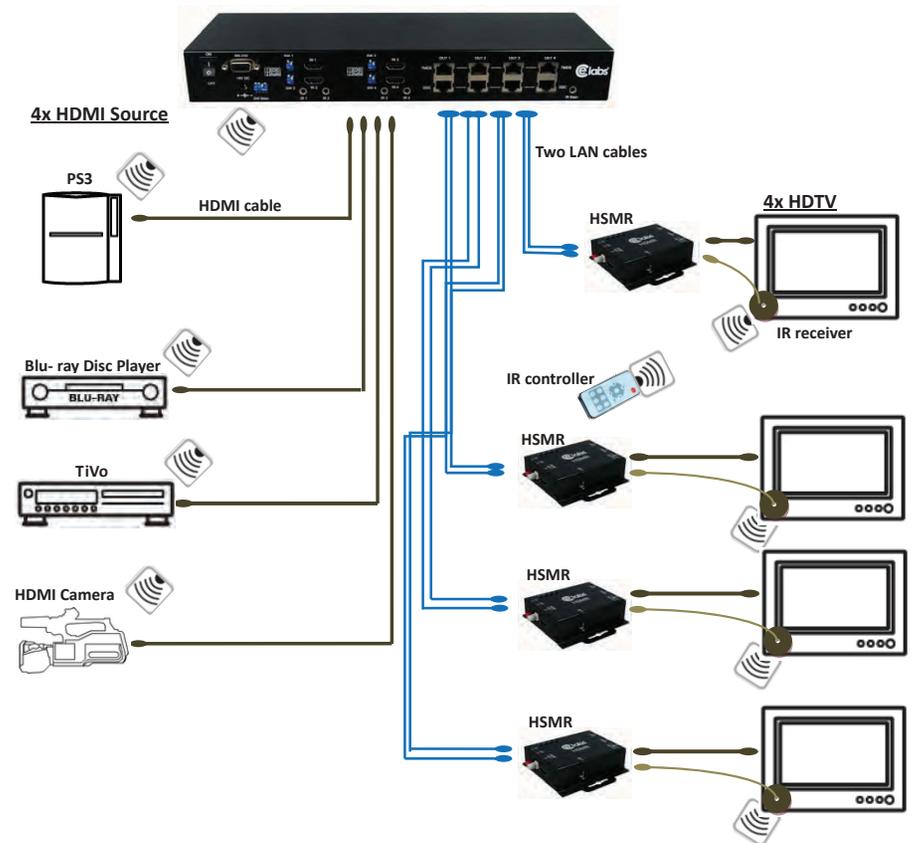
8. Please turn on the HSW44C. The firmware update process will automatically initiate. If nothing happens, please turn off and turn on the HSW44C again to initiate the automatic firmware update.
9. The firmware update process is successful if you see the [Information] window pops up to inform you that the process is complete. If you see the [Error] window pops up, please turn off the HSW44C and turn it on again. If necessary, please redo the whole sequences 1-9.



10. The message "Program: OK!" means the firmware update process is successful. If you see the [Error] window pops up after the message [Program: OK!], please ignore it.
11. Turn off HSW44C. Set DIP location of [SW Main] at Pin#1-OFF(▲), Pin#2-OFF(▲), Pin#3-ON(▼), & Pin#4-OFF(▲).
12. Turn the HSW44C back on and return to normal operation.

## INTRODUCTION

The **HSW44C 4x4 HDMI Matrix Switch with CAT5 Output** provides the most flexible and cost effective solution in the market to route high definition video sources plus multi-channel (up to 7.1-channel) digital audio from any of the four HDMI sources to the remote displays at the same time. Through low cost CAT5/5e/6 LAN cables, not only high quality video and audio can be transmitted to the display sites, but also users can switch among 4 HDMI sources using the push button or remote control. With single power design at the source site, each remote module is easily installed without power supply. Furthermore, the built-in IR extension function makes users at display site access the DVD player, PS3 or any HDMI equipped devices directly!



## FEATURES

- State-of-the-art Silicon Image (Founder of HDMI) chipset embedded for upmost compatibility and reliability
- HDMI 1.2a/1.3c\* compliant
- HDCP compliant
- Allows any source to be displayed on multiple displays at the same time
- Allows any HDMI display to view any HDMI source at any time
- Supports 7.1 channel digital audio
- Supports default HDMI EDID and learns the EDID of displays
- The matrix master can switch every output channels to any HDMI inputs by push-in button, IR remote control, or RS-232 control
- Allows controlling local HDMI sources such as DVD and TiVo by IR extender through control path at remote receiver
- Allows control of main matrix center through control line at remote receiver
- Extends video signal up to 115 feet (35m) over CAT5e at 1080p
- Easy installation with rack-mounting and wall-mounting designs for master and receiver respectively

 \*HDMI 1.2a for HSW44C v1.2

## Specifications & Package Contents

Model Name	HSW44C v1.2 / HSW44C v1.3	
Technical	HSW44C	HSMR
Role of usage	4x4 matrix switch & transmitter [TX]	Receiver [RX]
HDMI compliance	[HSW44C v1.2] – HDMI 1.2a	[HSW44C v1.3] – HDMI 1.3c
HDCP compliance	Yes	
Video bandwidth	[HSW44C v1.2] – Single-link 165MHz [4.95Gbps] [HSW44C v1.3] – Single-link 340MHz [6.75Gbps]	
Video support	480i / 480p / 720p / 1080i / 1080p60	
Audio support	Surround sound (up to 7.1ch) or stereo digital audio	
Transmission	Full HD (1080p): 115ft (35m) [CAT5e] / 130ft (40m) [CAT6] HD (720p/1080i): 165ft (50m) [CAT5e] / 180ft (55m) [CAT6]	
Equalization	N/A	8-level digital control
Input TMDs signal	1.2 Volts [peak-to-peak]	
Input DDC signal	5 Volts [peak-to-peak, TTL]	
ESD protection	[1] Human body model— ±15kV [air-gap discharge] & ±8kV [contact discharge] [2] Core chipset — ±8kV	

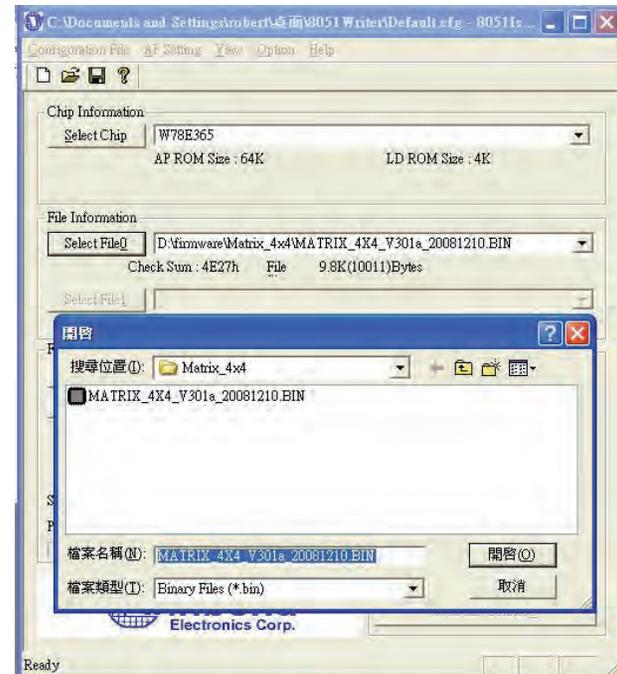
## FIRMWARE UPDATE



### Warning!

There could be unexpected consequences resulted from inappropriate firmware update operation. Please do it with caution.

1. Please unzip the **Matrix\_Firmware\_Update.zip** into your designated folder.
2. Please turn off the power of the HSW44C and set DIP location of [SW Main] at Pin#1-ON(↓), Pin#2-ON(↓), Pin#3-OFF(↑), & Pin#4-OFF(↑).
3. Please execute the file **Matrix\_Firmware\_Update.exe**
4. In the pop-up window, at [Select Chip], please select **W78E365**.
5. In the pop-up window, at [Select File], please choose the BIN file in the designated folder, as shown in the picture.



# RS-232 COMMANDS

## RS-232 Transmission Format

Baud rate: 9600

Data bit: 8

Parity: None

## Set Command

Command Code	Response	Description
Data	ACK	SET
0x08 0x4d 0x41 0x51 0x44 0x05 *0x01~0xff 0x31~0x2f	0xaa	SET MA-5144 Device ID
0x0c 0x4d 0x41 0x51 0x44 Device_Id 0x02 port1 port2 port3 port4	0xaa	Set MA-5144 Source Mapping of Output Port

## Status Command

Command Code	esponse	Description
Data	Get Status	Status
0x05 0x4d 0x4f 0x44	0xaa 0x06 0x4d 0x41 0x51 0x44	Get Device Type (MA-5144)
0x07 0x4d 0x41 0x53 0x57 0x04	0xaa 0x3 0x01~0xff	Get Device ID
0x08 0x4d 0x41 0x51 0x44 *0x01~0xFF 0x01	0xaa 0x06 port1 port2 port3 port4	Get Source Mapping of Output Port
0x08 0x4d 0x41 0x51 0x44 *0x01~0xFF 0x04	0xaa 0x08 0x56 0x33 0x2e 0x30 0x31 0x61	Software Version V.3.01a

## Check sum:

Check sum = (Data value sum)%256 The check sum of response is not included 0xaa.

## 0x01 ~ 0xFF:

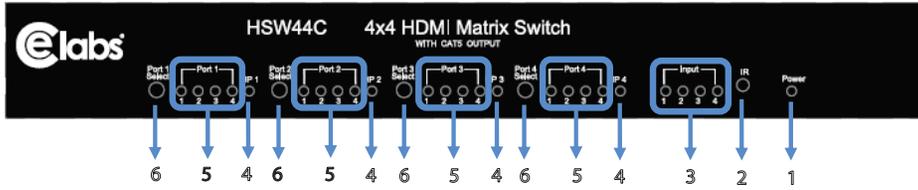
This data is device ID. The Device ID saved in the device, if the device ID of the controlled device is 0xff , the device will ignore its own ID and carry out the commands.

PCB stack-up	4-layer board [impedance control — differential 100Ω single 50Ω]	
Input	4x HDMI 1x RS-232	1x RJ-45 TMD5 1x RJ-45 DDC 1x IR socket for IR receiver
Output	4x RJ-45 TMD5 4x RJ-45 DDC 5x IR socket for IR emitter	1x HDMI
HDMI Input selection	Push button / IR remote / RS-232	Push button / IR remote
HDMI source control	Controllable through IR control path from IR receiver at receiver sites	
IR remote control	Electro-optical characteristic = 25° / Carrier frequency: 38kHz	
HDMI connector	Type A [19-pin female]	
RJ-45 connector	WE/SS 8P8C with 2 LED indicators [TMD5 & DDC channels]	
RS-232 connector	DE-9 [9-pin D-sub female]	
3.5mm connector	Earphone jack for IR emitter cable [IR Main] All sources IR control [IR1~IR4] Individual channel IR control	Earphone jack for IR receiver cable [IR] Receives IR control
DIP switch [for MA-5144 only]	[SW1~SW4] 2-pin for EDID, audio mode & safe mode [SW Main] 4-pin operation mode & firmware update	
<b>Mechanical</b>	<b>HSW44C</b>	<b>HSMR</b>
Housing	Metal case	
Dimensions (L x W x H)	Model	1'1.4"x4.3"x1.7" [340 x 110 x 44mm]
	Package	1'9.5"x9.1"x4.3" [545 x 230 x 110mm]
	Carton	1'10.5"x1'10.9"x10.2" [570 x 580 x 260mm]
Weight	Model	2.7 lbs [1220g]
	Package	7.0 lbs [3.2 kg]
Fixedness	1U rack-mount with ears Wall hanging holes	Wall-mount with screws
Power supply	5V 6A DC	Not necessarily required <sup>1</sup>
Power consumption	20 Watts [max]	1 Watt [max] (provided by HSW44C)
Operation temperature	0~40°C [32~104°F]	
Storage temperature	-20~60°C [-4~140°F]	
Relative humidity	20~90% RH [no condensation]	
<b>Package Contents</b>	1x HSW44C 1x IR emitter cable <sup>2</sup> 2x Rack-mounting ears 1x IR remote <sup>2</sup> 1x User Manual	4x HSMR 4x IR receiver cable 8x Wall-mounting screws 1x 5V 6A power adapter

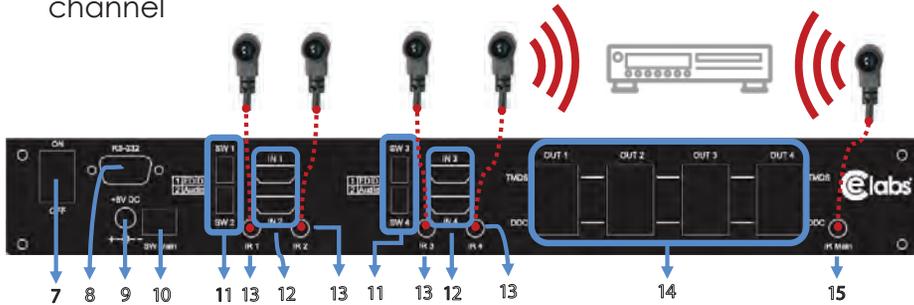


1. The HSMR has been tested extensively and found that it doesn't require external power supply. If in rare situation you find it cannot work with the HSW44C, please use any +5V power adapter to plug in the power jack and see if it can work. If not, please contact your technical support for further service.
2. Additional IR remote control and IR emitter cable can be purchased as optional accessories to control the HDMI sources located separately.

## PANEL DESCRIPTIONS

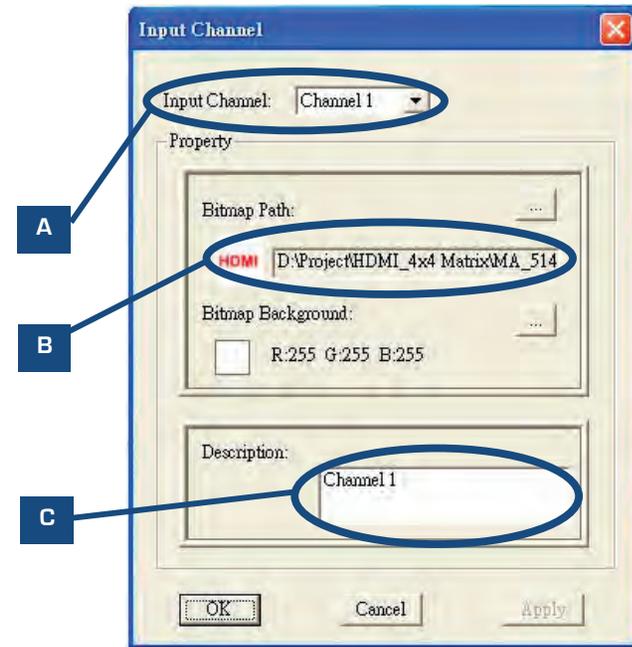


1. Power: Power indicator LED
2. IR: IR receiver
3. Input: Input source indicator LED
4. HP1–HP4: Connection status indicator LED for each output channel
5. Port1–Port4: Input source channels mapping LED for each output channel
6. Port1 Select–Port4 Select: Push button for selecting input channel



7. ON–OFF: Power ON/OFF
8. RS-232: RS-232 control port
9. +5V DC: 5V DC power jack
10. SW Main: DIP switches [see DIP Switch section in p.8]
11. SW1–SW4: DIP switch [see DIP Switch section in p.7]
12. IN1–IN4: HDMI inputs
13. IR1–IR4: IR extender jacks for individual HDMI source control
14. OUT1–OUT4: RJ-45 TMD/DC outputs for each output channel
15. IR Main: IR extender jack for all HDMI source control [default socket for IR emitter]

2. Open: Open the COM port after scan to establish the connection between PC and the matrix.
3. Close: Release the COM port after scan.
4. Quick Setup Buttons: Provide the fast setup between inputs and outputs of the matrix. “Default” button makes input 1, 2, 3, 4 mapped to output 1, 2, 3, 4 respectively. “Channel 1” makes all outputs see input-1, same for the remaining buttons.
5. Output Channel Setup: Click on this button, a quick selection table of inputs will show up. Users can therefore easily select the input video for each output.
6. Input Channel Setup: The button will bring up the setup window for the inputs as below.

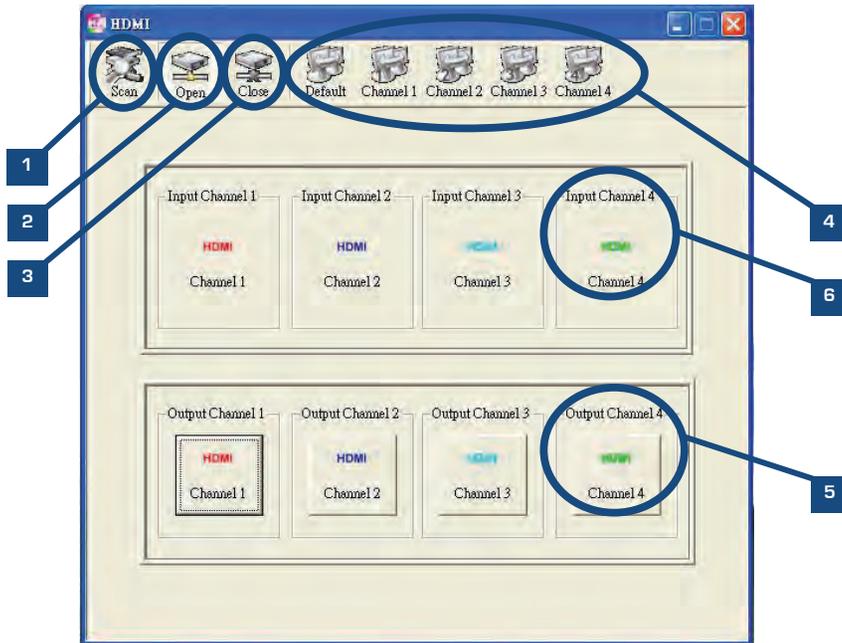


- A. Input Channel: Select the input channel to do bitmap and label change.
- B. Bitmap Path: Select the figure for each channel. Notice that only pictures in BMP format are supported.
- C. Description: Channel description.

## RS-232 SERIAL PORT CONTROL

### Method C: Software Control through RS-232

#### Method A: Method A: Push-in Button

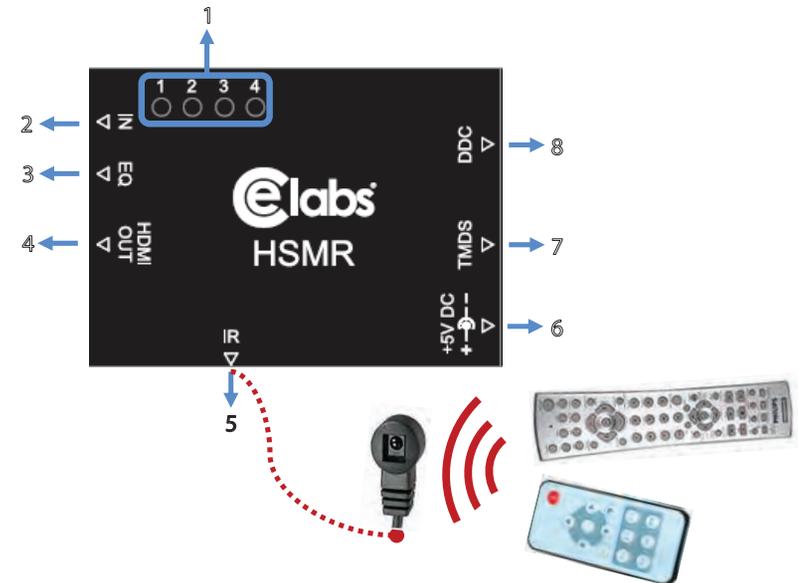


1. Scan: Push this button will trigger the automatic search over all the available COM ports (1-255). If the matrix is detected, the message window below will show up.



Otherwise, an error message shows up to indicate no legal device can be found. Notice that successful connection is only established if there exists at least one available COM port.

## HSMR



1. Source LED: Indicate input source
2. IN: Push button for switching input source channel in sequential order
3. EQ: Adjust the 8-level equalization control for HDMI signals. 0 – 7 = strongest – weakest. It is recommended to switch from 7 to 0 to find the optimal visual experience.
4. HDMI Out: Connect to HDTV with a HDMI cable
5. IR: Plug in IR receiver cable
6. 5V DC power jack [optional\*]
7. RJ-45 Input: TMDS channel [connect to TMDS channel of OUT1 to OUT4 on HSW44C]
8. RJ-45 Input: DDC channel [connect to DDC channel of OUT1 to OUT4 on HSW44C]



\*The HSMR has been tested extensively and found that it doesn't require external power supply. If in rare situation you find it cannot work with the HSW44C, please use any +5V power adapter to plug in the power jack and see if it can work. If not, please contact your technical support for further service.

## DIP SWITCH

### SW1-SW4 for EDID/Audio

DIP Switch Position		Video	Audio	Description
Pin#1	Pin#2			
OFF [▲]	OFF [▲]	Up to 1080p	Stereo <sup>1</sup>	<b>Default Mode<sup>2</sup></b> - Up to 1080p & stereo audio output for most HDTVs
OFF [▲]	ON [▼]	Up to 720p /1080i	Stereo	<b>Safe Mode<sup>3</sup></b> - Enforce the system output at 720p/1080i video and stereo audio for basic compatibility among HDTVs
ON [▼]	OFF [▲]	Bypass <sup>4</sup>	Bypass <sup>4</sup>	<b>EDID Learning Mode<sup>5</sup></b> - for learning from the display while playing any received HDMI audio format
ON [▼]	ON [▼]	Bypass	Stereo	<b>EDID Learning &amp; Stereo Mode<sup>5</sup></b> - for learning EDID from the display while enforcing stereo output if any HDTV cannot play surround sound normally



#### Note

- If the HDTV shows video but without audio, please try to set audio mode to stereo.
- Factory default of SW1-SW4: Pin#1-OFF [▲] & Pin#2- OFF [▲] for 1080p with stereo.
- If you encounter any unsolved audio/video output problem during system installation, please turn any SW1-SW4 to Pin#1-OFF [▲] & Pin#1-ON [▼], for safe mode to enforce the most compatible 720p stereo output for system check. However, the safe mode cannot be initiated if your HDMI source is set to enforce 1080p output. In this case, please reconfigure your HDMI source to all resolution output for troubleshooting.
- Bypass means the matrix will maintain playing the original format of HDMI signals in video and perhaps audio. By setting at this mode, the users may encounter compatibility issue among different kinds of HDMI sources and displays. If you cannot get the audio and/or video output normally at the system installation, please change the DIP switch setting to default mode or even safe mode to verify the functionality of the device.
- Set Pin#1 at ON [▼] first then connect the HDMI Input to HDTV through a HDMI cable. Wait for 20 seconds. The EDID learning procedure will be finished. If you want to learn the EDID from another HDTV, you must set Pin#1 at OFF [▲] first and repeat this procedure.

Dip Switch Position	Pin#1	Pin#2	Pin#3	Pin#4
<b>Normal Operation Mode<sup>6</sup></b>	OFF [▲]	OFF [▲]	ON [▼]	OFF [▲]
<b>Firmware Update Mode<sup>7</sup></b>	ON [▼]	ON [▼]	OFF [▲]	OFF [▲]



#### Note

- Factory default for SW Main: Pin#1-OFF [▲], Pin#2-OFF [▲], Pin#3-ON [▼], Pin#4-OFF [▲]. PLEASE MAINTAIN THIS SETTING AT ANYTIME FOR REGULAR USE!
- Sequence for firmware update
  - Power off the HSW44C.
  - Set the DIP switch position to Firmware Update Mode.
  - Power on the HSW44C.
  - Power off the HSW44C.
  - Set the DIP switch position to Normal Operation Mode.
  - Power on the HSW44C.

## DISPLAY SIDE

### Method A: Push button

Push the switch buttons of respective output channels then the output channel will switch from HDMI source 1 to source 4 in sequential order, and wait a few seconds for audio/video of next channel coming out after the channel switch command is sent.

### Method B1: IR remote control for switching input channels

Channel select switch must be set to zero.

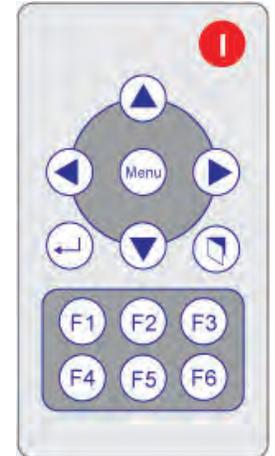
- Press Power on button to enable IR control function.

#### Note:

If HSMR receives the IR command, the LED will flash. If not, try it again.

- Press hot key for input source:

F1	HDMI source #1
F2	HDMI source #2
F3	HDMI source #3
F4	HDMI source #4



### Method B2: IR remote control for controlling the HDMI sources

Users can use the corresponding IR remote to control respective DVD player or any HDMI compliant devices including HSW44C itself with IR control at any display site.

## OPERATION AND IR CONTROL

### SOURCE SIDE

#### Method A: Push Button

Push the switch button on the front panel, the source will be sequentially changed.

#### Method B: IR Remote Control

a. Please press F1 to F4 to enter IR control mode and decide which output port to be controlled by pressing F1 to F4, and wait a few seconds for audio/video of next channel coming out after the channel switch command is sent.

#### Note

If the setting is correct, the corresponding LED will flash. If not, please press output port select button again.

F1	HDMI output #1
F2	HDMI output #2
F3	HDMI output #3
F4	HDMI output #4



b. Use ◀ or ▶ keys to select input source, and wait a few seconds for audio/video of next channel coming out after the channel switch command is sent.

#### Note

If the setting is correct, the corresponding LED will flash. If there is no response, please wait until the LED stops flashing, and try again.

Left button to switch channels in ascending order (1, 2, 3, 4, 1, ...)  
Right button to switch channels in descending order (1, 4, 3, 2, 1, ...)

## IR EXTENDER

### IR Cables



### IR Sockets

#### HSW44C

**IR Main:** The default location for IR emitter extension cable to transmit all IR command signals received from any of the four remote receivers to all of the HDMI sources.

**IR1:** IR emitter extension cable connected here can only transmit IR command signals from the remote receivers that are setting at the input channel 1.

**IR2:** IR emitter extension cable connected here can only transmit IR command signals from the remote receivers that are setting at the input channel 2.

**IR3:** IR emitter extension cable connected here can only transmit IR command signals from the remote receivers that are setting at the input channel 3.

**IR4:** IR emitter extension cable connected here can only transmit IR command signals from the remote receivers that are setting at the input channel 4.

#### HSMR

**IR:** IR receiver cable connected here can receive all IR command signals from the IR remote controls of HSW44C and all other HDMI source machines.

## Definition of IR Earphone Jack



You can buy any IR extension cables in the market that are compatible to the definition of the IR sockets for the matrix if necessary for replacement use.

## Supported IR Data Format

Data Format	Suitable	Not Recommended
NEC	<input checked="" type="checkbox"/>	
RC5	<input checked="" type="checkbox"/>	
TOSHIBA MICOM CODE	<input checked="" type="checkbox"/>	
GRUNDIG CODE	<input checked="" type="checkbox"/>	
SONY 12 BIT CODE	<input checked="" type="checkbox"/>	
SONY 15 BIT CODE	<input checked="" type="checkbox"/>	
SONY 20 BIT CODE	<input checked="" type="checkbox"/>	
RCA CODE		<input checked="" type="checkbox"/>
RCM CODE		<input checked="" type="checkbox"/>
MATSUSHITA CODE		<input checked="" type="checkbox"/>
MITSUBISHI CODE	<input checked="" type="checkbox"/>	
ZENITH CODE	<input checked="" type="checkbox"/>	
JVC CODE	<input checked="" type="checkbox"/>	
M50560-001P	<input checked="" type="checkbox"/>	
MN6125H	<input checked="" type="checkbox"/>	
MN6125L	<input checked="" type="checkbox"/>	
MN6014_C5D7	<input checked="" type="checkbox"/>	
MN6014-C6D6	<input checked="" type="checkbox"/>	
MC14457P	<input checked="" type="checkbox"/>	
LC7464(AHEA)	<input checked="" type="checkbox"/>	
GEMINI_CM	<input checked="" type="checkbox"/>	

## HARDWARE INSTALLATION

### HSW44C as Master

1. Connect all sources to HDMI Inputs on the HSW44C 4x4 HDMI matrix switch with CAT5 output.
2. Connect each DDC output on the HSW44C to respective DDC input on the remote receiver HSMR.
3. Connect each TMDS output on the HSW44C to respective TMDS input on the remote receiver HSMR.
4. Connect IR emitter cable(s) to the HSW44C and direct the IR emitter(s) to the built-in IR receiver of the HDMI sources.
5. Connect the +5V 6A DC power supply to the HSW44C.
6. Power on all HDMI sources.
7. Power on the HSW44C.

### HSMR as Receiver

1. Connect each HDMI output to HDMI displays.
2. Connect the TMDS input on the HSMR to the TMDS output on the HSW44C.
3. Connect the DDC input on the HSMR to the DDC output on the HSW44C.
4. Connect IR receiver cable and place the IR receiver at the appropriate position that can receive the IR signals sent from the users.
5. Use rotary control to adjust the EQ until the picture and sound are clear. It is recommended to switch from 7 to 0 to find the optimal visual experience.