

EX-G012

8x8 HDMI over CAT5 Matrix with
IR Control Path

User Manual





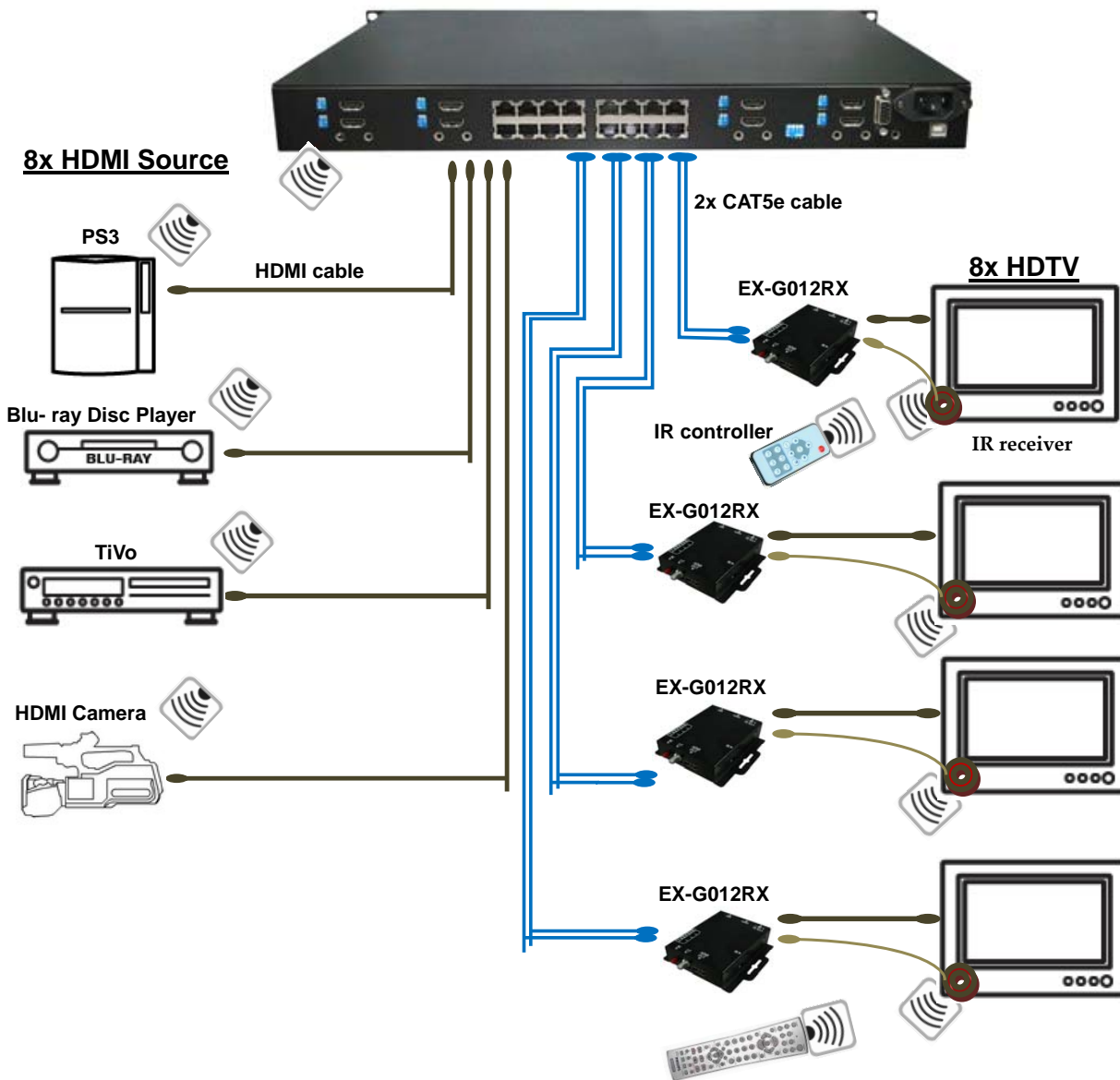
Safety and Notice

The **EX-G012 8x8 HDMI over CAT5 Matrix with IR Control Path** has been tested for conformance to safety regulations and requirements, and has been certified for international use. However, like all electronic equipments, the EX-G012 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.

Introduction

The EX-G012 8x8 HDMI over CAT5 Matrix with IR Control Path 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 LAN cables, not only high quality video and audio can be transmitted to the display sites, but also users can switch among 8 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 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 to control main matrix center through control line at remote receiver
- Extends video signal up to 35m (115 feet) over CAT5e at 1080p
- Easy installation with rack-mounting and wall-mounting designs for master and receiver respectively



* HDMI 1.2a for EX-G012
HDMI 1.3c for EX-G012 v1.3

Specifications & Package Contents

Model Name		EX-G012 v1.2 / v1.3	
Technical		EX-G012	EX-G012RX
Role of usage	8x8 true matrix Transmitter [TX]	Receiver [RX]	
HDMI compliance	[EX-G012 v1.2] – HDMI 1.2a [EX-G012 v1.3] – HDMI 1.3c		
HDCP compliance	Yes		
Video bandwidth	[EX-G012 v1.2] – Single-link 165MHz [4.95Gbps] [EX-G012 v1.3] – Single-link 340MHz [10.2Gbps]		
Video support	480i / 480p / 720p / 1080i / 1080p60		
Audio support	Surround sound (up to 7.1ch) or stereo digital audio		
Transmission	Full HD (1080p) – 35m (115ft) [CAT5e] / 40m (130ft) [CAT6] HD (720p/1080i) – 50m (165ft) [CAT5e] / 55m (180ft) [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		
PCB stack-up	4-layer board [impedance control — differential 100Ω; single 50Ω]		
Input	8x HDMI 1x RS-232	1x RJ-45 TMDS 1x RJ-45 DDC 1x IR socket for IR receiver	
Output	8x RJ-45 TMDS 8x RJ-45 DDC 9x 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 characteristics: $\tau = 25^\circ$ / Carrier frequency: 38kHz		
HDMI connector	Type A [19-pin female]		
RJ-45 connector	WE/SS 8P8C with 2 LED indicators [TMDS & DDC channels]		
RS-232 connector	DE-9 [9-pin D-sub female]		
USB connector ³	Standard type-B [square shape]		
3.5mm connector	Earphone jack for IR emitter cable [IR Main] All sources IR control [IR1~IR8] Individual channel IR control	Earphone jack for IR receiver cable [IR] Receives IR control	
DIP switch [EX-G012]	[SW1~SW8] 2-pin for EDID & audio mode [SW Main] 6-pin operation & firmware update		
Mechanical		EX-G012	EX-G012RX
Housing		Metal case	
Dimensions (L x W x H)	Model	440 x 290 x 44mm [1'5.3"x11.4"x1.7"]	85 x 90 x 25mm [3.3"x3.5"x1"]
	Package	545 x 230 x 110mm [1'9.5"x9.1"x4.3"]	
	Carton	570 x 580 x 260mm [1'10.5"x1'10.9"x10.2"]	
Weight	Model	3250g [7.2 lbs]	
	Package		
Fixedness	1U rack-mount with ears Wall hanging holes	Wall-mount with screws	
Power supply	AC Power 100-240V	Not necessarily required ¹	
Power consumption	60 Watts [max]	1 Watt [max] (provided by EX-G012)	
Operation temperature	0~40°C [32~104°F]		
Storage temperature	-20~60°C [-4~140°F]		
Relative humidity	20~90% RH [no condensation]		

Package Contents	1x EX-G012 8x IR emitter cable ² 2x 1U rack mounting-ear 1x IR remote ² 1x User Manual	8x EX-G012RX 8x IR receiver cable 16x Wall-mounting screws 1x UL AC power cord
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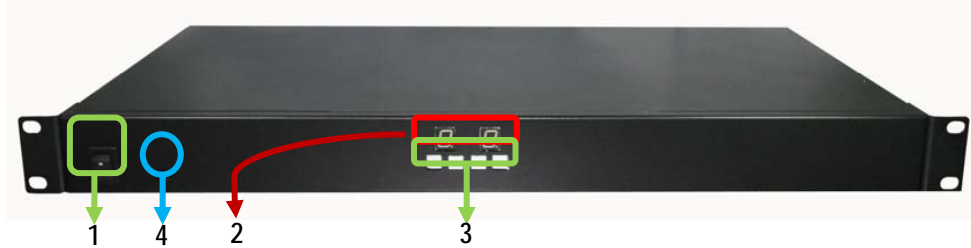
¹ *The EX-G012RX has been tested extensively and found that it doesn't require external power supply. If in rare situation you find it cannot work with the EX-G012, please use any +5V power adapter to plug in the power jack and see if it can work. If not, please contact your technical support for further service.*

² *Additional IR remote control and IR emitter cable can be purchased as optional accessories to control the HDMI sources located separately.*

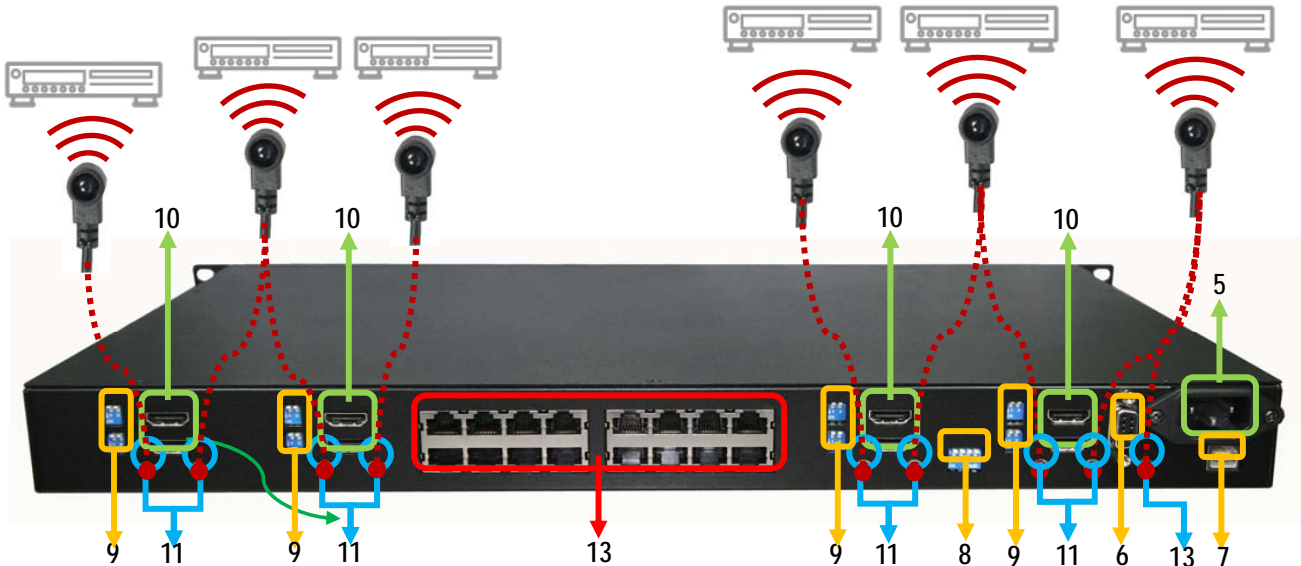
³ *USB or RS-232 control must be connected either one at a time. Connecting both types of cables may cause command confusion.*

Panel Descriptions

EX-G012



1. **Power Switch:** Power control
2. **Seven Segment LED Indicators:** Control display
3. **Front panel push buttons:** Used to input source and display channel number
4. **IR:** IR receiver



5. **AC Power:** 100-240V
6. **RS-232:** RS-232 control port
7. **USB IN:** USB control port
8. **SW Main:** DIP switches (see DIP Switch section in p.8)
9. **SW1–SW8:** DIP switch (see DIP Switch section in p.8)
10. **IN1–IN8:** HDMI inputs
11. **IR1–IR8:** IR extender jacks for individual HDMI source control
12. **OUT1–OUT8:** RJ-45 TMDs/DDC outputs for each output channel
13. **IR Main:** IR extender jack for all HDMI source control [**default socket for IR emitter**]

EX-G012



IN: Push button for switching input source channel in sequential order

1. **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.
2. **Source LED:** Indicate input source
3. **HDMI Out:** Connect to HDTV with a HDMI cable
4. **IR:** Plug in IR receiver cable





6. **+5V DC:** 5V power jack (optional*)
7. **TMDS:** RJ-45 input for TMDS channel
8. **DDC:** RJ-45 input for DDC channel





**The EX-G012RX 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 EX-G012, 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-SW8 for EDID/Audio

DIP Switch Position	Pin#1 OFF(↑) 	Pin#1 ON (↓) 
EDID Mode	Default EDID	Learn EDID ²

DIP Switch Position	Pin#2 OFF(↑) 	Pin#2 ON (↓) 
Audio Mode	Surround Sound (5.1/7.1-channel) ³	Stereo (2-channel)



Note

¹ Factory default for SW1-SW8: Pin#1-OFF (↑), Pin#2-ON (↓)

² 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.

³ If the HDTV shows video but without audio, please try to set audio mode to stereo.

SW Main for firmware update (for technical support only)

DIP Switch Position	Pin#1	Pin#2	Pin#3	Pin#4	Pin#5	Pin#6
Normal Operation Mode ⁴						
Firmware Update Mode ⁵						



Note

⁴ 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.

⁵ Sequence for firmware update

1. Power off the EX-G012.
2. Set the DIP switch position to Firmware Update Mode.
3. Power on the EX-G012.
4. Power off the EX-G012.
5. Set the DIP switch position to Normal Operation Mode.
6. Power on the EX-G012.

IR Control Path

IR Cables

IR Emitter Cable



IR Receiver Cable



IR Sockets

EX-G012

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.

EX-G012RX

IR: IR receiver cable connected here can receive all IR command signals from the IR remote controls of EX-G012 and all other HDMI source machines.

Definition of IR Earphone Jack

IR Emitter

1 = IR signal (38KHz)
2 = Grounding



IR Receiver

1 = Power
2 = IR signal (38KHz)
3 = Grounding



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

EX-G012 as master

1. Connect all sources to HDMI Inputs on the 4x4 HDMI over CAT5 matrix master EX-G012
2. Connect each DDC output on the EX-G012 to respective DDC input on the remote receiver EX-G012RX
3. Connect each TMDS output on the EX-G012 to respective TMDS input on the remote receiver EX-G012RX
4. Connect IR emitter cable to the EX-G012 and direct the IR emitter to the build-in IR receiver of the sources
5. Connect the +5V 6A DC power supply to the EX-G012
6. Power on all HDMI sources
7. Power on the EX-G012

EX-G012RX as receiver

1. Connect each HDMI output to HDMI displays
2. Connect the TMDS input on the EX-G012RX to the TMDS output on the EX-G012
3. Connect the DDC input on the EX-G012RX to the DDC output on the EX-G012
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 push button to adjust the EQ until the picture and sound are clear


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  to enter IR control mode

Note



If EX-G012 receives the IR commands, the LED will flash. If not, try again.

- b. 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 or repeat step (a) and (b).

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

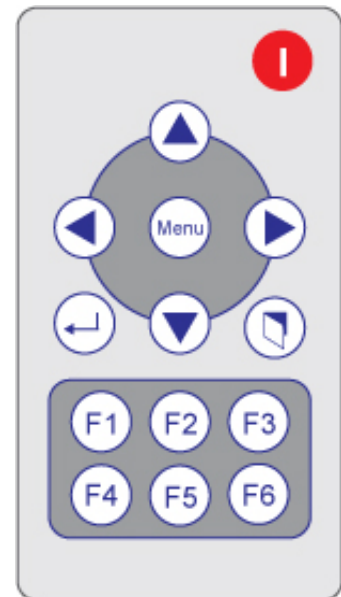
- c. Use  or  keys to select input source, and wait a few seconds for audio/video of next channel coming out after the channel switch command is sent.

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, ...)



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.

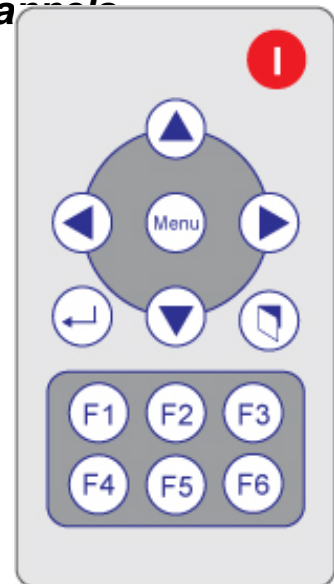
Method B1: IR remote control for switching input channels

Channel select switch must be set to zero.

- a. Press Power on button to enable IR control function.
Note: If EX-G012RX receives the IR command, the LED will flash. If not, try again.

- b. Press hot key for input source:

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

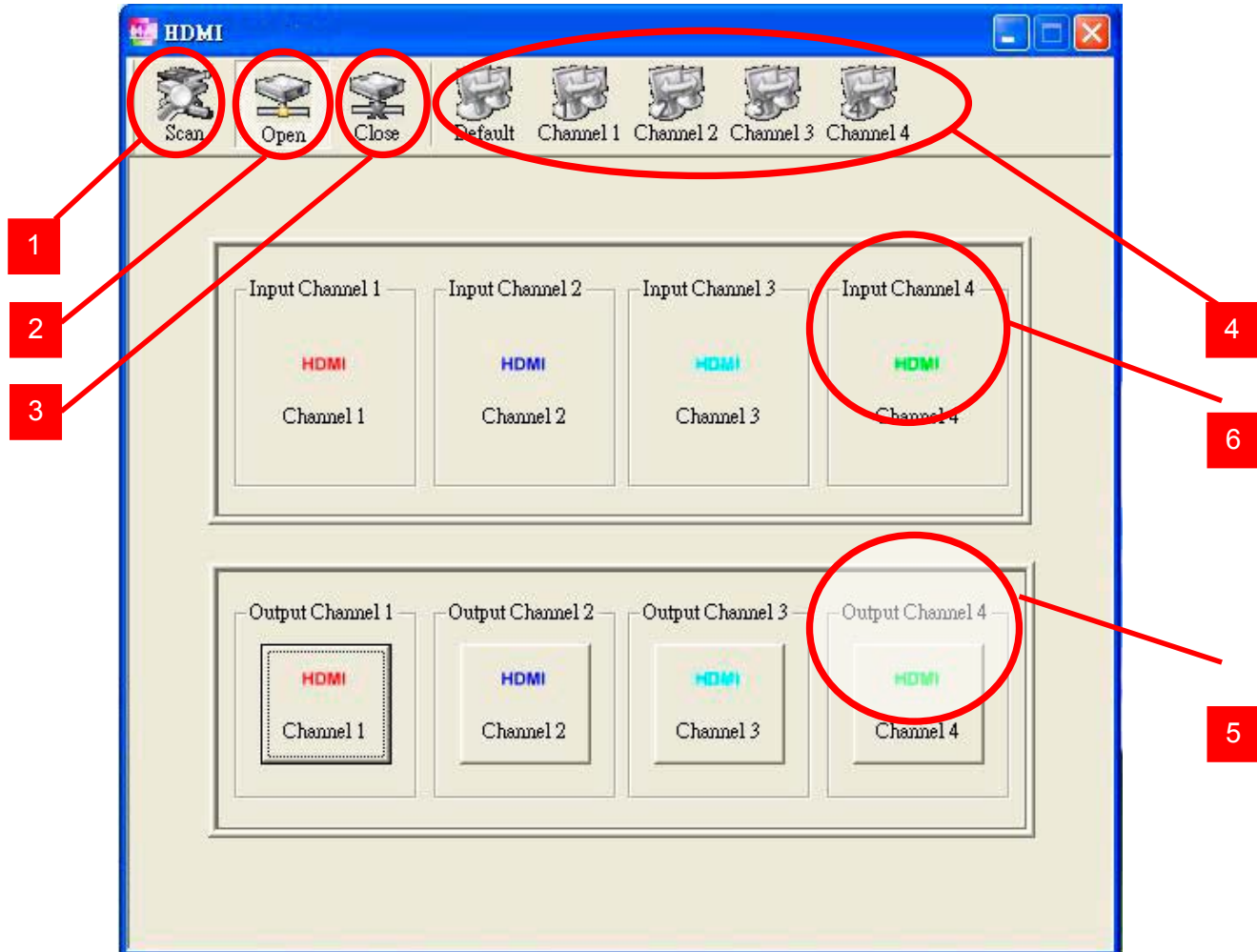


Method B2: IR remote control for controlling the HDMI sources

Users can use the corresponding IR remote to control respective DVD player or any HDMI compliant devices including EX-G012 itself with IR control at any display site.

RS-232 Serial Port Control

Method C: Software Control through RS-232

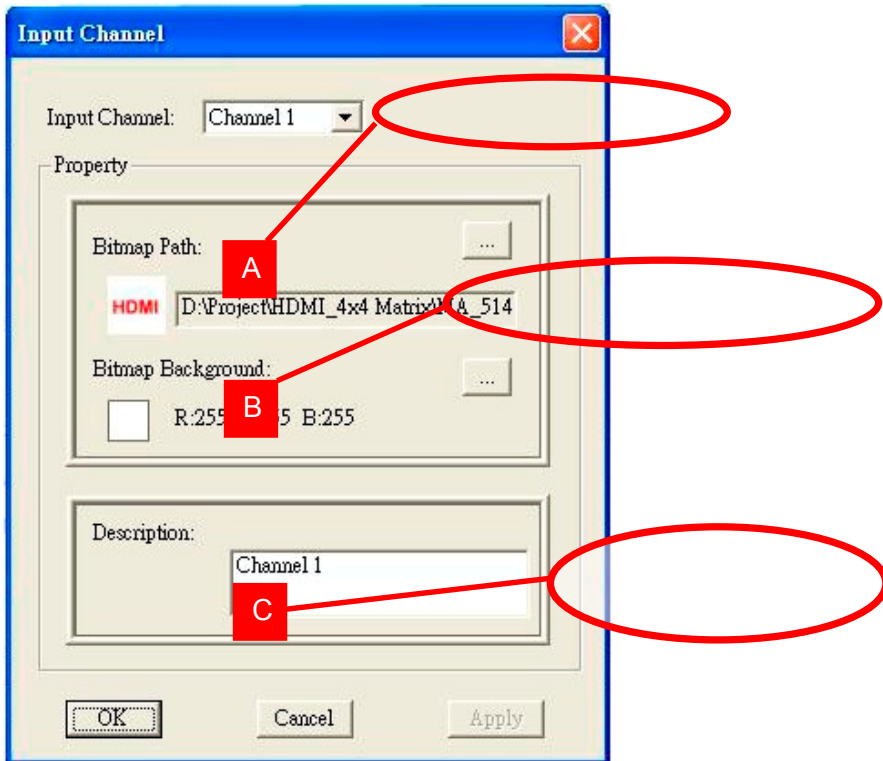


1 Scan: Push this button will trigger the automatic search over all the available COM ports (1-255). If the matrix is detected, the message window below will show up.



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.

- 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 Commands

RS-232 transmission Format

Baud rate: 9600

Data bit: 8

Parity: None

Set Command

Command Code		Response	Description
Data	Check SUM	ACK	SET
0x08 0x4d 0x41 0x51 0x44 0x05 *0x01~0xff	0x31~0x2f	0xaa	SET EX-G012 Device ID
0x0c 0x4d 0x41 0x51 0x44 Device_Id 0x02 port1 port2 port3 port4	0x0c+...+port4	0xaa	Set EX-G012 Source Mapping of Output Port

Status Command

Command Code		Response		Description
Data	Check SUM	Get Status	Check SUM	Status
0x05 0x4d 0x4f 0x44	0xe5	0xaa 0x06 0x4d 0x41 0x51 0x44	0x29	Get Device Type (EX-G012)
0x07 0x4d 0x41 0x53 0x57 0x04	0x43	0xaa 0x3 0x01~0xff	0x04~0x02	Get Device ID
0x08 0x4d 0x41 0x51 0x44 *0x01~0xFF 0x01	0x2e~0x2c	0xaa 0x06 port1 port2 port3 port4	0x06 + port1~port4	Get Source Mapping of Output Port
0x08 0x4d 0x41 0x51 0x44 *0x01~0xFF 0x04	0x30~0x2e	0xaa 0x08 0x56 0x33 0x2e 0x30 0x31 0x61	0x81	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.

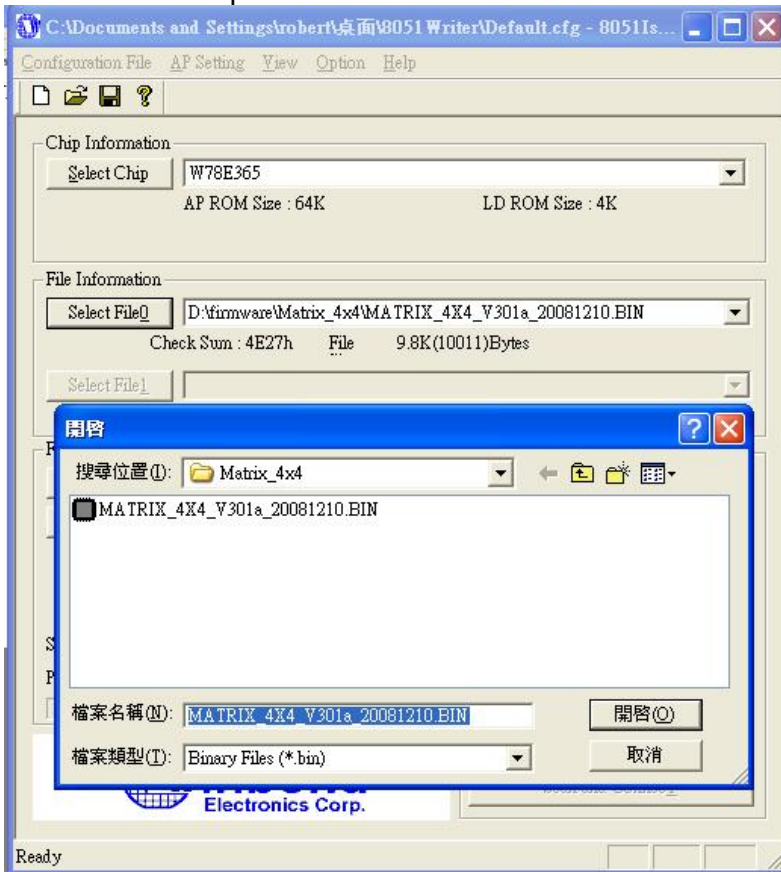
Firmware Update



Warning!

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

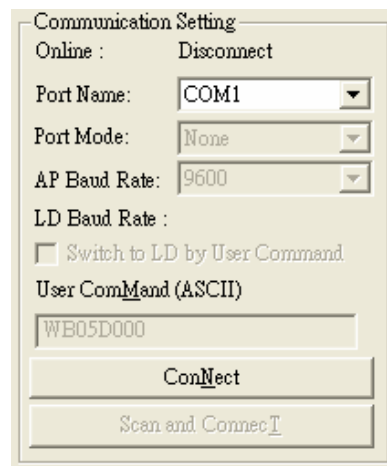
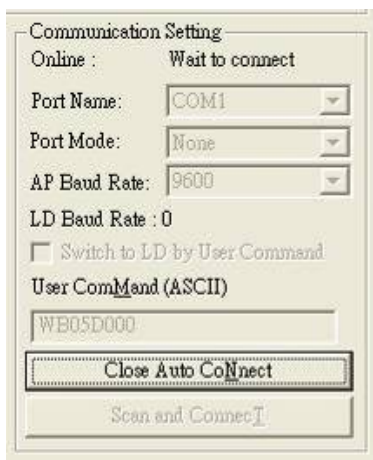
1. Please unzip the **Matrix_Firmware_Update.zip** into your designated folder.
2. Please turn off the power of the MATRIX and set DIP location of [SW Main] at Pin#1-ON(↓), Pin#2-ON(↓), Pin#3-OFF(↑), & Pin#4-OFF(↑).
3. Please execute the file **Matrix_Firmware_Update.exe**
4. In the pop-up window, at [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.



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 MATRIX, 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 MATRIX. The firmware update process will automatically initiate.

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 MATRIX 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 MATRIX. Set DIP location of [SW Main] at Pin#1-OFF(▲), Pin#2-OFF(▲), Pin#3-ON(▼), & Pin#4-OFF(▲).

12. Turn the MATRIX back on and return to normal operation.

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 EX-G012RX 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 EX-G012, 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 emitter 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)	★	★	★★
Termination		Please use EIA/TIA-568-B termination (T568B) at any time		

Limited Warranty

The SELLER warrants the **EX-G012 8x8 HDMI Matrix over CAT5 with IR Control Path** to be free from defects in the material and workmanship for 1 year from the date of purchase from the SELLER or an authorized dealer. Should this product fail to be in good working order within 1 year warranty period, the SELLER, at its option, repair or replace the unit, provided that the unit has not been subjected to accident, disaster, abuse or any unauthorized modifications including static discharge and power surges.

Unit that fails under conditions other than those covered will be repaired at the current price of parts and labor in effect at the time of repair. Such repairs are warranted for 90 days from the day of reshipment to the Buyer. If the unit is delivered by mail, customers agree to insure the unit or assume the risk of loss or damage in transit. Under no circumstances will a unit be accepted without a return authorization number.

The warranty is in lieu of all other warranties expressed or implied, including without limitations, any other implied warranty or fitness or merchantability for any particular purpose, all of which are expressly disclaimed.

Proof of sale may be required in order to claim warranty. Customers outside Taiwan are responsible for shipping charges to and from the SELLER. Cables are limited to a 30 day warranty and cable must be free from any markings, scratches, and neatly coiled.

The content of this manual has been carefully checked and is believed to be accurate. However, the SELLER assumes no responsibility for any inaccuracies that may be contained in this manual. The SELLER will NOT be liable for direct, indirect, incidental, special, or consequential damages resulting from any defect or omission in this manual, even if advised of the possibility of such damages. Also, the technical information contained herein regarding the EX-G012 features and specifications is subject to change without further notice.