CPLUS-V4H2HA

UHD+ 4×2 HDMI Matrix with Audio Output



Operation Manual





HIGH-DEFINITION MULTIMEDIA INTERFACE

The terms HDMI, HDMI High-Definition Multimedia Interface, and the HDMI Logo are trademarks or registered trademarks of HDMI licensing Administrator, Inc.

DISCLAIMERS

The information in this manual has been carefully checked and is believed to be accurate. Cypress Technology assumes no responsibility for any infringements of patents or other rights of third parties which may result from its use.

Cypress Technology assumes no responsibility for any inaccuracies that may be contained in this document. Cypress also makes no commitment to update or to keep current the information contained in this document.

Cypress Technology reserves the right to make improvements to this document and/or product at any time and without notice.

COPYRIGHT NOTICE

No part of this document may be reproduced, transmitted, transcribed, stored in a retrieval system, or any of its part translated into any language or computer file, in any form or by any means—electronic, mechanical, magnetic, optical, chemical, manual, or otherwise—without express written permission and consent from Cypress Technology.

© Copyright 2018 by Cypress Technology.

All Rights Reserved.

TRADEMARK ACKNOWLEDGMENTS

All products or service names mentioned in this document are trademarks of the companies with which they are associated.

SAFETY PRECAUTIONS

Please read all instructions before attempting to unpack, install or operate this equipment and before connecting the power supply. Please keep the following in mind as you unpack and install this equipment:

- Always follow basic safety precautions to reduce the risk of fire, electrical shock and injury to persons.
- To prevent fire or shock hazard, do not expose the unit to rain, moisture or install this product near water.
- Never spill liquid of any kind on or into this product.
- Never push an object of any kind into this product through any openings or empty slots in the unit, as you may damage parts inside the unit.
- Do not attach the power supply cabling to building surfaces.
- Use only the supplied power supply unit (PSU). Do not use the PSU if it is damaged.
- Do not allow anything to rest on the power cabling or allow any weight to be placed upon it or any person walk on it.
- To protect the unit from overheating, do not block any vents or openings in the unit housing that provide ventilation and allow for sufficient space for air to circulate around the unit.
- Please completely disconnect the power when the unit is not in use to avoid wasting electricity.

VERSION HISTORY

REV.	DATE	SUMMARY OF CHANGE
RDV1	2019/09/18	Preliminary release

CONTENTS

1. Introduction 1
2. Applications 1
3. Package Contents 1
4. System Requirements 2
5. Features 2
6. Operation Controls and Functions 3
6.1 Front Panel 3
6.2 Rear Panel 4
6.3 Remote Control (Optional) 5
6.4 RS-232 Pinout and Defaults 5
6.5 Serial Commands 6
7. Connection Diagram 14
8. Specifications 15
8.1 Technical Specifications 15
8.2 Video Specifications 16
8.3 Audio Specifications 17
8.3.1 Digital Audio 17
8.3.2 Analog Audio 18
8.4 Cable Specifications 18
9. Acronyms 19

1. INTRODUCTION

This 4K UHD+ 4×2 HDMI Matrix with Audio Output provides the ability to connect up to four 4K UHD+ HDMI sources to up to two 4K UHD+ HDMI displays and freely switch between them. This unit comes with full support for 4K@60Hz (4:4:4, 8- bit) signals as well as support for 16-bit Deep Color, HDR (High Dynamic Range), 3D content, HD audio and other features defined by the HDMI 2.0 specification. A high-quality local analog stereo audio breakout from a selected HDMI output is also available. Each input's EDID can be independently set to use either an internal (1080p@60Hz) or external (sink-copied) EDID. This unit also provides per-output auto source switching as well as connected display power control using CEC or RS-232 commands. Control of the unit is provided via front panel buttons, RS-232, and IR remote.

2. APPLICATIONS

- Smart Home Control
- Control Center
- Function Room
- Product Showroom
- Ballroom

3. PACKAGE CONTENTS

- 1× UHD+ 4×2 HDMI Matrix with Audio Output
- 1× 5V/2.6A DC Power Adapter
- 1× Remote Control (CR-190) (Optional)
- 2× 3-pin Terminal Block
- 1× Shockproof Feet (Set of 4)
- 1× Operation Manual

4. SYSTEM REQUIREMENTS

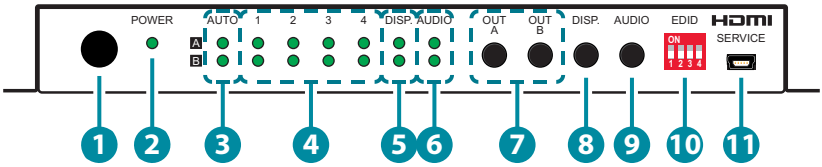
- HDMI source equipment such as media players, video game consoles, or set-top boxes.
- HDMI receiving equipment such as HDTVs, monitors, or audio amplifiers.
- The use of Premium High Speed HDMI cables is highly recommended.

5. FEATURES

- HDMI 2.0 and DVI 1.0 compatible
- HDCP 2.2 and HDCP 1.x compliant
- 4 HDMI inputs and 2 HDMI outputs
- Matrix switching with sequential input selection via front panel controls or discrete input selection via IR remote and RS-232
- Supports up to 4K UHD+ (18Gbps, 4K@50/60Hz 4:4:4, 8-bit) video input and output
- Supports 10-bit and 12-bit HDR (High Dynamic Range) input and output
- Supports 16-bit Deep Color input and output up to 1080p@60Hz
- Supports pass-through of many audio formats including 8 channel LPCM, Bitstream, and HD Bitstream
- High-quality DAC provides local analog stereo audio breakout from the selected HDMI output (LPCM 2.0 sources only)
- Per-input EDID management with internal or external EDID options
- Per-output selectable auto-switch functionality
- Basic display power automation via RS-232 and CEC
- Controllable via front-panel buttons, RS-232, and IR remote

6. OPERATION CONTROLS AND FUNCTIONS

6.1 Front Panel



1. **IR Window:** Accepts IR signals from the optional IR remote for control of this unit only.
2. **POWER LED:** This LED will illuminate to indicate the unit is on and receiving power.
3. **AUTO A/B LEDs:** These LEDs will illuminate to indicate if auto switching has been enabled on the associated output.
4. **INPUT 1~4 A/B LEDs:** The illuminated LEDs indicate which source is currently selected for the associated output.
5. **DISP. A/B LEDs:** These LEDs will illuminate to indicate when a valid sink has been detected on the associated output port. When no sink is detected the LED will remain off.
6. **AUDIO A/B LEDs:** The illuminated LED indicates which output is selected as the source for the analog audio output. If both LEDs are off, the analog output is muted.

   Note: Only LPCM 2.0 audio sources are supported.
7. **OUT A/B Buttons:** Press these buttons to sequentially switch through the available inputs for the associated output. Pressing and holding a button for 3 seconds will enable or disable that output's auto switching function.
8. **DISP. Button:** Press this button to turn the connected displays on or off using CEC or RS-232 commands.

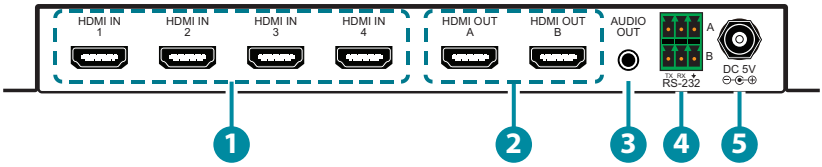
   Note: CEC functionality must be enabled on the connected displays. Not all displays support all CEC commands.
9. **AUDIO Button:** Press this button to sequentially switch the analog audio output source between Output A, Output B, and mute.

10 **EDID Dipswitch Block:** Each dipswitch toggles the EDID source for the associated HDMI input between external EDID (DOWN), and internal EDID (UP).

Note: The external EDID defaults to Output A's EDID. The internal EDID supports 1080p60 with LPCM 2.0 audio for maximum compatibility.

11 **SERVICE Port:** This port is reserved for firmware update use only.

6.2 Rear Panel



1 **HDMI IN 1~4 Ports:** Connect to HDMI source equipment such as media players, game consoles, or set-top boxes. DVI sources are supported with the use of an HDMI to DVI adapter.

2 **HDMI OUT A~B Ports:** Connect to HDMI TVs, monitors, or amplifiers for digital video and audio output.

3 **AUDIO OUT Port:** Connect to powered speakers, headphones, or an amplifier for analog stereo audio output.

4 **RS-232 A 3-pin Terminal Block:** Connect directly to a PC, laptop, or other serial control device with a 3-pin adapter cable to send RS-232 commands to control the unit. Alternatively, connect to an RS-232 controllable display connected to output A to send power on/off commands to it when the DISP. button is pressed.

RS-232 B 3-pin Terminal Block: Connect to an RS-232 controllable display connected to output B to send power on/off commands to it when the DISP. button is pressed.

5 **DC 5V Port:** Plug the 5V DC power adapter into this port and connect it to an AC wall outlet for power.

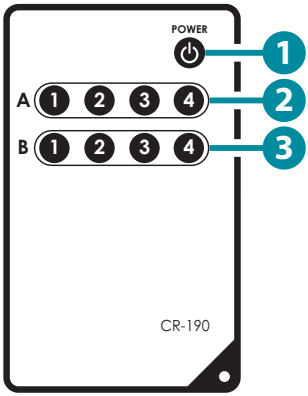
6.3 Remote Control (Optional)

1. **POWER Button:** Press this button to power the unit on or off.

   Note: The unit will also transmit the appropriate CEC/RS-232 on/off commands to any connected displays.

2. **OUT A 1~4 Buttons:** Press any of these buttons to immediately switch Output A to the corresponding input.

3. **OUT B 1~4 Buttons:** Press any of these buttons to immediately switch Output B to the corresponding input.

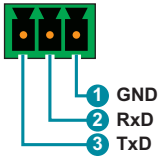


6.4 RS-232 Pinout and Defaults

Serial Port Default Settings	
Baud Rate	19200
Data Bits	8
Parity Bits	None
Stop Bits	1
Flow Control	None

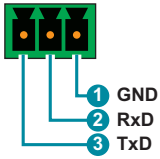
RS-232 Port A (Unit control)

3-pin Terminal Block



RS-232 Port B

3-pin Terminal Block



6.5 Serial Commands

COMMAND Description and Parameters
HELP↵ Show the full command list.
HELP N1↵ Show help details about the specified command. **N1** = {Command name}
GET MODEL NAME↵ Show the unit's model name.
GET FW VER↵ Show the unit's current firmware version.
SET SYSTEM REBOOT↵ Reboot the unit.
SET DESCRIPTION N1↵ Set the description/name of the unit. **N1** = {Name} [64 characters max]
GET DESCRIPTION↵ Show the unit's current description/name.
SET POWER N1↵ Turn the unit on or off (stand-by mode). Available values for **N1**: ON [Power on] OFF [Power off]
GET POWER↵ Show the unit's current power state.

COMMAND Description and Parameters
SET KEYLOCK N1↵ Enable or disable the front panel key lock. Available values for **N1**: ON [Lock front panel] OFF [Unlock front panel]
GET KEYLOCK↵ Show the current front panel lock state.
SET FACTORY DEFAULT↵ Reset the unit to the factory defaults.
GET IN PORT NUMBER↵ Show the total number of inputs on the unit.
GET IN TYPE LIST↵ List the port type of all inputs on the unit.
GET OUT PORT NUMBER↵ Show the total number of outputs on the unit.
GET OUT TYPE LIST↵ List the port type of all outputs on the unit.
GET OUT N1 HPD↵ Show the current hot plug status of the specified output. Available values for **N1**: A [Output A] B [Output B]
GET OUT N1 RSENSE↵ Show the current rsense status of the specified output. Available values for **N1**: A [Output A] B [Output B]

COMMAND Description and Parameters
GET IN N1 EDID DATA↵ Show the EDID currently used by the specified input as ASCII hex data. Available values for **N1**: 1 [Input 1] 2 [Input 2] 3 [Input 3] 4 [Input 4]
GET IN N1 EDID INFORMATION↵ Show English readable details derived from the EDID assigned to the specified input. Available values for **N1**: 1 [Input 1] 2 [Input 2] 3 [Input 3] 4 [Input 4]
GET OUT N1 EDID DATA↵ Show the EDID from the display connected to the specified output as ASCII hex data. Available values for **N1**: A [Output A] B [Output B]
GET OUT N1 EDID INFORMATION↵ Show English readable details derived from the EDID provided by the display connected to the specified output. Available values for **N1**: A [Output A] B [Output B]

COMMAND Description and Parameters
SET OUT N1 ROUTE N2↵ Route the specified input to the specified output. Available values for **N1**: A [Output A] B [Output B] Available values for **N2**: 1 [Input 1] 2 [Input 2] 3 [Input 3] 4 [Input 4]
GET OUT N1 ROUTE↵ Show the current input routed to the specified output. Available values for **N1**: A [Output A] B [Output B]
SET OUT N1 AUTO ROUTE N2↵ Enable or disable auto switching on the specified output. Available values for **N1**: A [Output A] B [Output B] Available values for **N2**: ON [Auto switching enabled] OFF [Auto switching disabled]
GET OUT N1 AUTO ROUTE↵ Show current auto switching mode of the specified output. Available values for **N1**: A [Output A] B [Output B]

COMMAND	
Description and Parameters	
SET DISPLAY N1 N2↵	
Send the CEC and designated RS-232 power on/off commands to the specified display.	
Available values for **N1**:	
A	[Display on output A]
B	[Display on output B]
Available values for **N2**:	
ON	[Transmit the “On” commands]
OFF	[Transmit the “Off” commands]
GET DISPLAY N1↵	
Show the currently detected power status of the specified display.	
Available values for **N1**:	
A	[Display on output A]
B	[Display on output B]
SET DISPLAY N1 UART BAUD RATE N2↵	
Set the baud rate of the specified RS-232 port.	
Available values for **N1**:	
A	[Output A]
B	[Output B]
Available values for **N2**:	
2400	[2400 baud]
4800	[4800 baud]
7200	[7200 baud]
9600	[9600 baud]
14400	[14400 baud]
19200	[19200 baud]
38400	[38400 baud]
57600	[57600 baud]
115200	[115200 baud]
GET DISPLAY N1 UART BAUD RATE↵	
Show the current baud rate of the specified RS-232 port.	
Available values for **N1**:	
A	[Output A]
B	[Output B]

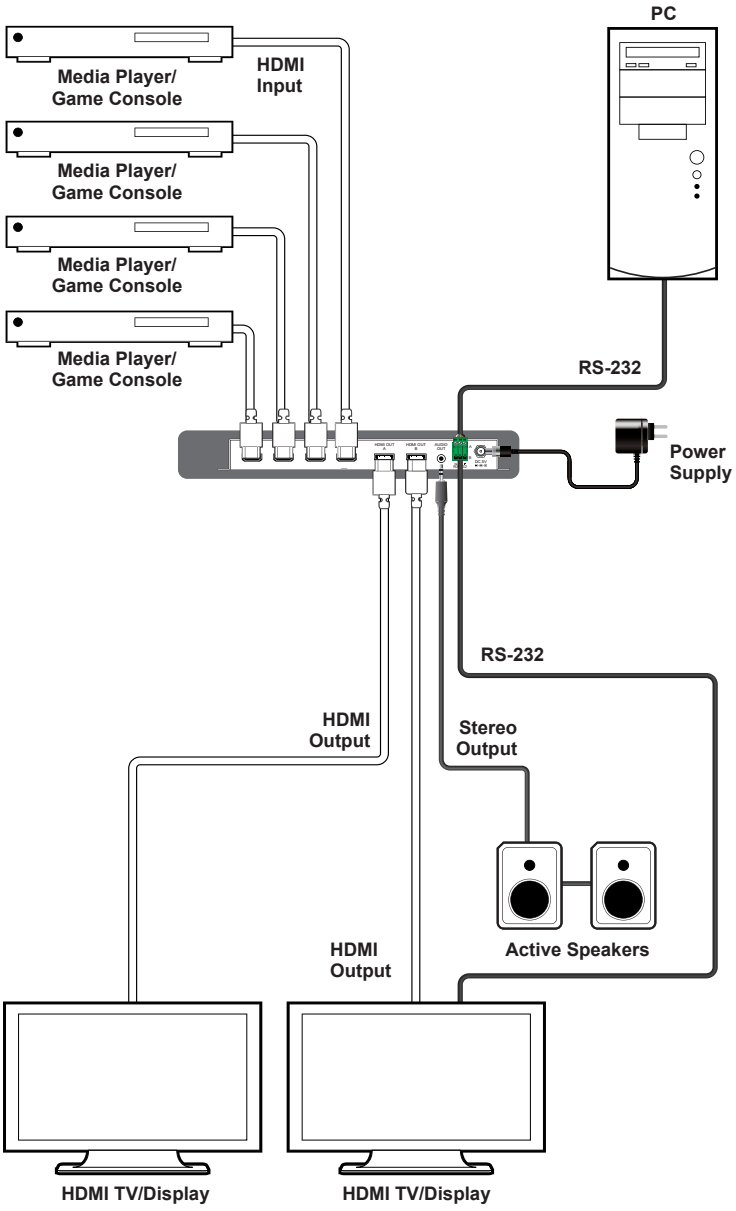
COMMAND Description and Parameters
SET DISPLAY N1 UART DATA BIT N2↵ Set the data bits for the specified RS-232 port. Available values for **N1**: A [Output A] B [Output B] Available values for **N2**: 7 [7 data bits] 8 [8 data bits]
GET DISPLAY N1 UART DATA BIT↵ Show the current number of data bits of the specified RS-232 port. Available values for **N1**: A [Output A] B [Output B]
SET DISPLAY N1 UART PARITY N2↵ Set the parity of the specified RS-232 port. Available values for **N1**: A [Output A] B [Output B] Available values for **N2**: 0 [None] 1 [Odd] 2 [Even]
GET DISPLAY N1 UART PARITY↵ Show the current parity setting of the specified RS-232 port. Available values for **N1**: A [Output A] B [Output B]

COMMAND Description and Parameters
SET DISPLAY N1 UART STOP BIT N2↵ Set the number of stop bits for the specified RS-232 port. Available values for **N1**: A [Output A] B [Output B] Available values for **N2**: 1 [1 stop bit] 2 [2 stop bits]
GET DISPLAY N1 UART STOP BIT↵ Show the current number of stop bits of the specified RS-232 port. Available values for **N1**: A [Output A] B [Output B]
SET DISPLAY N1 POWER ON COMMAND N2↵ Set the RS-232 “Power On” command to use with the specified output’s display. Available values for **N1**: A [Output A] B [Output B] **N2** = {Command string}
GET DISPLAY N1 POWER ON COMMAND↵ Show the current RS-232 “Power On” command for the specified output’s display. Available values for **N1**: A [Output A] B [Output B]

COMMAND Description and Parameters
SET DISPLAY N1 POWER OFF COMMAND N2↵ Set the RS-232 “Power Off” command to use with the specified output’s display. Available values for **N1**: A [Output A] B [Output B] **N2** = {ASCII string}
GET DISPLAY N1 POWER OFF COMMAND↵ Show the current RS-232 “Power Off” command for the specified output’s display. Available values for **N1**: A [Output A] B [Output B]
SET AUDIO OUT ROUTE N1↵ Route the specified output’s audio to the analog audio output. Available values for **N1**: A [Output A] B [Output B]
GET AUDIO OUT ROUTE↵ Show which output’s audio is currently routed to the analog audio output.
SET ANALOG OUT MUTE N1↵ Enable or disable muting the analog audio output. Available values for **N1**: ON [Mute enabled] OFF [Mute disabled]
GET ANALOG OUT MUTE↵ Show the current mute state of the analog audio output.

Note: Commands will not be executed unless followed by a carriage return. Commands are not case-sensitive.

7. CONNECTION DIAGRAM



8. SPECIFICATIONS

8.1 Technical Specifications

HDMI Bandwidth	18Gbps
Input Ports	4×HDMI (Type-A)
Output Ports	2×HDMI (Type-A) 1×Stereo Audio (3.5mm)
Control Ports	2×RS-232 (3-pin Terminal Block)
Service Port	1×USB 2.0 (Mini B)
IR Frequency	38kHz
Baud Rate	Up to 115200 (19200 default)
Power Supply	5V/2.6A DC (US/EU standards, CE/FCC/UL certified)
ESD Protection (HBM)	±8kV (Air Discharge) ±4kV (Contact Discharge)
Dimensions (W×H×D)	231.5mm×25mm×108mm [Case Only] 231.5mm×25mm×117mm [All Inclusive]
Weight	620g
Chassis Material	Metal (Steel)
Chassis Color	Black
Operating Temperature	0˚C – 40˚C/32˚F – 104˚F
Storage Temperature	-20˚C – 60˚C/-4˚F – 140˚F
Relative Humidity	20 – 90% RH (Non-condensing)
Power Consumption	8.62W

8.2 Video Specifications

Supported Resolutions (Hz)	Input	Output
	HDMI	HDMI
720×400p@70/85	✓	✓
640×480p@60/72/75/85	✓	✓
720×480i@60	✓	✓
720×480p@60	✓	✓
720×576i@50	✓	✓
720×576p@50	✓	✓
800×600p@56/60/72/75/85	✓	✓
848×480p@60	✓	✓
1024×768p@60/70/75/85	✓	✓
1152×864p@75	✓	✓
1280×720p@50/60	✓	✓
1280×768p@60/75/85	✓	✓
1280×800p@60/75/85	✓	✓
1280×960p@60/85	✓	✓
1280×1024p@60/75/85	✓	✓
1360×768p@60	✓	✓
1366×768p@60	✓	✓
1400×1050p@60	✓	✓
1440×900p@60/75	✓	✓
1600×900p@60RB	✓	✓
1600×1200p@60	✓	✓
1680×1050p@60	✓	✓
1920×1080i@50/60	✓	✓
1920×1080p@24/25/30	✓	✓
1920×1080p@50/60	✓	✓
1920×1200p@60RB	✓	✓

Supported Resolutions (Hz)	Input	Output
	HDMI	HDMI
2560×1440p@60RB	✓	✓
2560×1600p@60RB	✓	✓
2048×1080p@24/25/30	✓	✓
2048×1080p@50/60	✓	✓
3840×2160p@24/25/30	✓	✓
3840×2160p@50/60 (4:2:0)	✓	✓
3840×2160p@24, HDR10	✓	✓
3840×2160p@50/60 (4:2:0),HDR10	✓	✓
3840×2160p@50/60	✓	✓
4096×2160p@24/25/30	✓	✓
4096×2160p@50/60 (4:2:0)	✓	✓
4096×2160p@24, HDR10	✓	✓
4096×2160p@50/60 (4:2:0),HDR10	✓	✓
4096×2160p@50/60	✓	✓

8.3 Audio Specifications

8.3.1 Digital Audio

HDMI Input / Output	
LPCM	
Max Channels	8 Channels
Sampling Rate (kHz)	32, 44.1, 48, 88.2, 96, 176.4, 192
Bitstream	
Supported Formats	Standard & High-Definition

8.3.2 Analog Audio

Analog Output	
Max Audio Level	2Vrms
THD+N	< −64dB@0dBFS 1kHz (A-wt)
SNR	> 70dB@0dBFS
Frequency Response	< ±1dB@20Hz~20kHz
Crosstalk	< −60dB@10kHz
Impedance	470Ω
Type	Unbalanced

8.4 Cable Specifications

Cable Length	1080p		4K30	4K60
	8-bit	12-bit	(4:4:4) 8-bit	(4:4:4) 8-bit
High Speed HDMI Cable				
HDMI Input	15m	10m	5m	3m
HDMI Output	15m	10m	5m	3m

Bandwidth Category Examples:

- **1080p (FHD Video)**
  - Up to 1080p@60Hz, 12-bit color
  - Data rates lower than 5.3Gbps or below 225MHz TMDS clock
- **4K30 (UHD Video)**
  - 4K@24/25/30Hz & 4K@50/60Hz (4:2:0), 8-bit color
  - Data rates higher than 5.3Gbps or above 225MHz TMDS clock but below 10.2Gbps
- **4K60 (UHD^{+} Video)**
  - 4K@50/60Hz (4:4:4, 8-bit)
  - 4K@50/60Hz (4:2:0, 10-bit HDR)
  - Data rates higher than 10.2Gbps

9. ACRONYMS

ACRONYM	COMPLETE TERM
ASCII	American Standard Code for Information Interchange
AV	Audio/Video
AVR	Audio/Video Receiver or Recorder
CEC	Consumer Electronics Control
CLI	Command-Line Interface
DAC	Digital-to-Analog Converter
dB	Decibel
DVI	Digital Visual Interface
EDID	Extended Display Identification Data
Gbps	Gigabits per second
HD	High-Definition
HDCP	High-bandwidth Digital Content Protection
HDMI	High-Definition Multimedia Interface
HDR	High Dynamic Range
HDTV	High-Definition Television
HPD	Hot Plug Detection
IR	Infrared
kHz	Kilohertz
LED	Light-Emitting Diode
LPCM	Linear Pulse-Code Modulation
MHz	Megahertz
NTSC	National Television System Committee
PAL	Phase Alternating Line
SDTV	Standard-Definition Television
SNR	Signal-to-Noise Ratio
THD+N	Total Harmonic Distortion plus Noise
TMDS	Transition-Minimized Differential Signaling
UHD	Ultra-High-Definition (10.2Gbps)

ACRONYM	COMPLETE TERM
UHD+	Ultra-High-Definition Plus (18Gbps)
UHDTV	Ultra-High-Definition Television
USB	Universal Serial Bus
VGA	Video Graphics Array
WUXGA (RB)	Widescreen Ultra Extended Graphics Array (Reduced Blanking)
XGA	Extended Graphics Array
Ω	Ohm



CYPRESS TECHNOLOGY CO., LTD.
www.cypress.com.tw