XA-3

v1.3 HDMI Pattern Generator

OPERATION MANUAL

Safety Precautions

Please read all instructions before attempting to unpack or 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 module openings or empty slots, as you may damage parts.
- Do not attach the power supply cabling to building surfaces.
- Do not allow anything to rest on the power cabling or allow it to be abused by persons walking on it.
- To protect the equipment from overheating, do not block the slots and openings in the module housing that provide ventilation.

Revision History

Version No	Date	Summary of Change
V1	20090803	Preliminary Release

Table of Contents

1. Introduction

This HDMI v1.3 compliant test pattern generator is the most advanced device for testing your audio and video signals. With 39 built in timings and 51 test patterns that accept both analog and digital signals this pattern generator provides over a thousand types of test patterns. This handy device can be controlled via the front panel buttons or through the IR remote and viewed on an LCM screen.

2. Applications

- Device Testing
- Equipment adjustment
- EDID checking
- Defining source settings
- HDCP verification
- Production testing
- RD design

3. Features

- HDMI v1.3, HDCP v1.1 and DVI v1.0 compliant
- Provides 39 timings and 51 patterns
- Timings include SD, HD up to 1080p, PC up to UXGA/WUXGA (Reduced Blanking Pixel Rate at 154mhz)
- Graphic Tests and Data Analysis patterns included
- Output format with digital HDMI/DVI, or analog PC/HD (component)
- Supported color formats include RGB444, YCbCr444 AND YCbCr422
- Deep color support up to 8/10/12bits
- Selectable audio source from 7.1 CH, optical or internal sine wave
- Internal sinewave LPCM channel is selectable from 2CH, 5.1CH and 7.1CH
- Supports the following tests and analysis: HDCP, EDID, HDMI/DVI
- Has an Auto run setting
- Choose between different timings and patterns through RS-232 using the pre-bundled software and a user friendly interface that utilizes an LCM display, LED indicators, IR remote and a RS-232 remote.

4. Specifications

39 Timings: 640 x 480 ~ 1920 x 1200 (Details in section 13 TIMINGS TABLE)

SD timings: 480i , 480p, 576i and 576p

HD timings: 720p up to 1080p

PC timings: VGA up to UXGA, WUXGA (Reduced Blanking Pixel Rate at 154MHz)

- ***NOTE >*** *Analog PC output only supports PC timings*
  Analog HD output only supports SD/HD timings
  HDMI/DVI output supports all timings
- ***NOTE >*** *This system doesn't support user edited timing*

- **51 Patterns:**
  Graphic Test Patterns: 45 Patterns (Details in section 14 PATTERNS TABLE)
  Data Analysis Patterns: 6 Patterns
  - ***NOTE >*** *This system doesn't support user pattern editing*

- **HDMI/DVI Input & Output:**
  Signal: TMDS single link and clock bandwidth up to 225MHz
  Connector: HDMI TYPE-A. DVI input or output needs DVI to HDMI adaptor

- **Analog PC/HD Output:**
  Signal: Analog R/G/B/H/V or analog YPbPr supports color space conversion.
  Component HD outputs support tri-level sync and color space conversion.
  For HD component output, DB15 to 3-RCA adaptor cable is required.

Level	RGB	0.7Vp-p 75Ω
	YPbPr	Y 1.0Vp-p 75Ω
		PbPr 0.7Vp-p 75Ω
	H/V	5Vp-p

- **Video Color Space and Deep Color:**
  HDMI Output: RGB444(8/10/12bits), YCbCr444(8/10/12bits) and YCbCr422(8bits)
  DVI Output:RGB444(8bits)
  PC Output: RGB with separate sync H/V or
  YPbPr with separate sync H/V and without composite sync on Y.
  HD Output: YPbPr with composite sync on Y or RGB with composite sync on G.

- **Audio Inputs:**

  External Analog 7.1CH: RCA jacks.
  External Optical: Toslink jack.
  Internal Sinewave:
  Supports LPCM 2CH, 5.1CH and 7.1CH.
  Supported sampling rates 48KHz, 96KHz and 192KHz (Refer to Audio Output)
  Sinewave Frequency: FL (Front Left)=1000Hz, FR (Front Right)=600Hz, CNT (Center)=800Hz, SUB (Subwoofer)=400Hz, SL (Surround Left)=1200Hz, SR¹ (Surround Right)=1400Hz, SBL (Surround Back Left)=1600Hz, SBR (Surround Back Right)=1800Hz

  - ***NOTE>*** *This system doesn't support bit stream (Dolby, DTS) decoding from an external optical source.*

- **Audio Outputs:**

  Analog 7.1CH: RCA jacks.
  Optical: Toslink jack.
  Coaxial: RCA jack.
  HDMI: Support I^2S bus control.
  Pattern 38: For Audio control functions please refer to the below table.
  (SR¹=Sampling Rate)
  2CH: FL (Front Left) and FR (Front Right). 6CH: FL (Front Left), FR (Front Right), CNT (Center), SUB (Subwoofer), SL (Surround Left) and SR (Surround Right)

OUTPUT / INPUT	Analog 7.1CH	OPTICAL/COAX	HDMI
Ext. 7.1CH	Bypass	LPCM 2CH SR[1]:48KHz	LPCM 2CH, 6CH SR[1]:48KHz
Ext. OPTICAL	2CH	Bypass	Bypass
Int. Sinewave	2CH, 6CH, 8CH	LPCM 2CH SR[1]:48KHz	LPCM 2CH, 6CH, 8CH SR[1]:48K, 96K, 192KHz Condition: 1. When timing is at 480i/p, 576i/p or VGA60, SR¹ 96kHz only supports 2CH. 2. When SR is at 192 kHz the audio output only supports 2CH.

- **Audio specifications:**

OUTPUT \ INPUT		External Analog7.1CH 2Vrms 1KHZ	External OPTICAL 0dBFS	Internal SINEWAVE 8CH
Analog 7.1CH	RMS LEVEL	575±20mVrms	1±0.05Vrms	780±20mVrms
	THD+N	0.01%↓	0.01%↓	0.01%↓
	Freq Response	-11±1dBrA	0~-1dBrA	
	SNR	80dB↑	80dB↑	
	Crosstalk	-60dB↑	-80dB↓	
OPT/ CAOX	RMS LEVEL	-6dBFS±1	0dB	-4±0.1dBFS
	THD+N	0.01%↓	0.01%↓	0.01%↓
	Freq Response	-6±1dBrA	0dBFS	
	SNR	80dB↑	80dB↑	
	Crosstalk	-60dB↑	-80dB↓	
HDMI	RMS LEVEL	0dBFS~-1dBFS	0dB	-4±0.1dBFS
	THD+N	0.01%↓	0.01%↓	0.01%↓
	Freq Response	-1±1dBrA	0dBFS	
	SNR	80dB↑	80dB↑	
	Crosstalk	-60dB↑	-80dB↓	

- **Pattern 32 - EDID Analysis:**
  The EDID analysis pattern has three different options and a 2 block analysis. The system will copy the Sink EDID and use the built-in Rx EDID to analyze and display information.
  Below are the ways to get the EDID:
  1. Built-in Rx EDID
  2. From Display HDMI/DVI Sink EDID
  3. From Display VGA EDID
  The supported EDID analysis versions are: VESA E-EDID v1.3 and EIA/CEA 861D version 3 standard.
- **Pattern P39 - HDCP Analysis:**
  This system supports both HDCP handshaking and link-integrity testing, and also Sink Repeater BKSV list and V values.
- **HDMI/DVI Input Analysis:**
  Support manual Hot-plug (Press [OPTION])
  Pattern 48: HDMI/DVI Video Timing Detection and Analysis
  Pattern 49: HDMI/DVI Video Packets and Infoframe Detection and Analysis.
  Pattern 50: HDMI Audio Packets and Infoframe Detection and Analysis.

- **User Interface:**

  LCD display, LED indicators, IR remote,
  RS-232 remote: D-SUB9 female connector.
  PC software supports RS-232 remote control.

Power Supply	5V DC / 3.2A (US/EU standards, CE/FCC/UL certified)
Weight(g)	1400
Dimensions(mm)	280(W) x 145(D) x 44(H)
Chassis Material	Aluminum
Silkscreen Color	Black with Red
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	13W

5. System Requirements

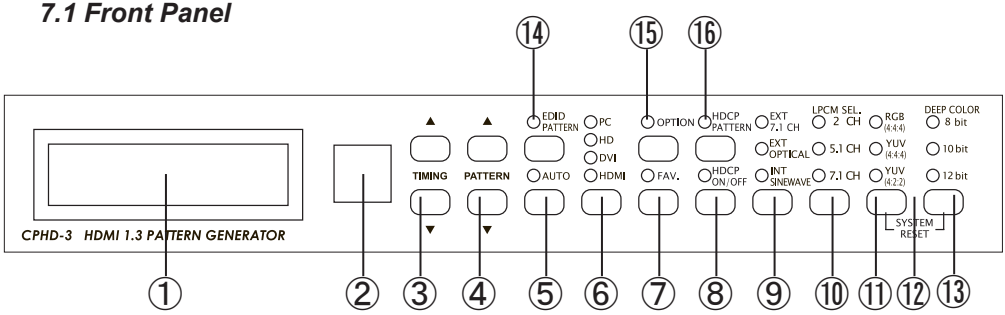
The pattern generator requires video and/or audio input sources with connecting cables and output display and/or speaker(s) with connecting cables.

6. Package Contents

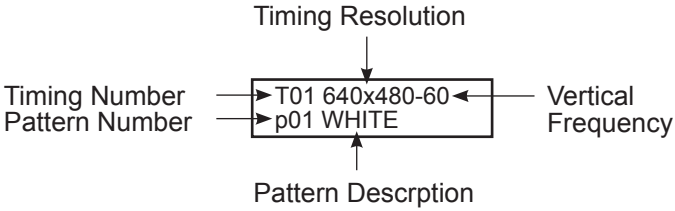
- HDMI V1.3 Pattern Generator
- RS-232 PC Application (downloadable from www.cypress.com.tw)
- Power Adaptor
- Remote Control
- User Manual

7. Control Panels

7.1 Front Panel



① LCD Display:



② IR Remote Control Sensor.

③ Timing Selection ▲/▼: Switch between timings from T01 to T39.

④ Pattern Selection▲/▼: Switch between patterns from P01 to P51.
Some patterns have the ability to select different options. After entering an option the user simply has to touch the Pattern button to adjust the up/down value.

⑤ AUTO: Turn ON/OFF Autorun Demonstration Function.
Using the RS-232 PC software, users can select timings from T01-T39 and patterns among P01-P51 for an Auto run demonstration. When Auto is turned on, the systems will automatically run the selected timings/ patterns in a sequential order.

⑥ Output Format Selection: Press the button to switch between PC, HD, DVI and HDMI output.

⑦ FAV.: Turn ON/OFF Favorite Function.
When turning on the favorites function users can only select the reserved timings and patterns. Users can set their favorite timings from T01-T39 and favorite patterns P01-P51 with the pre-bundled software and RS-232. When the favorites function is turned off users can select every timing and pattern.

⑧ HDCP ON/OFF: Turn ON/OFF the HDCP encryption. When the LED's light is on, it means the HDCP encryption is working properly.

⑨ Audio Source Selection: Press the button to switch between External 7.1CH(analog), external optical(digital) or internal sinewave audio sources.

⑩ LPCM Channel Selection: Press the button to switch between 2CH, 5.1CH or 7.1CH LPCM audio channels.

⑪ Color selection: Press the button to switch between RGB444, YCbCr444 and YCbCr422.

⑫ Press the two buttons at the same time to reset the system back to the factory default. When the system is resetting, the LCD display will show the "SYSTEM RESET" message.

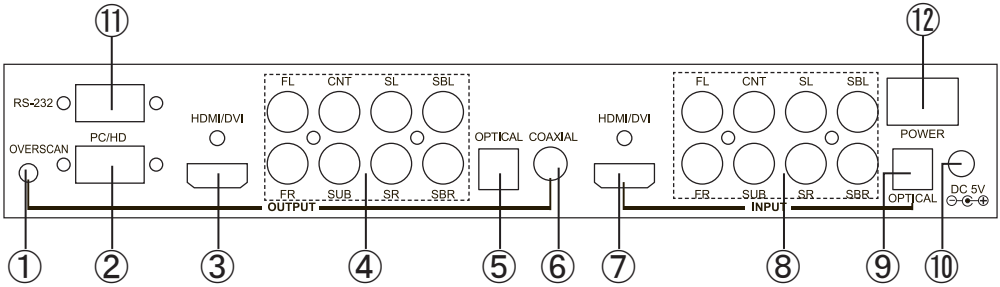
⑬ Deep Color Selection: Press the button to switch between 8 bits, 10 bits or 12 bits deep colors.

⑭ EDID Pattern: Pattern 32 hot key.

⑮ Not all the patterns are adjustable, when the screen shows “Press (Option) to do setting” that means this pattern supports adjustments. When users press the OPTION button the LED will come on, then you have to press Pattern ▲/▼ button to adjust the value. Turn off the option function before going to the next pattern.

⑯ HDCP Pattern: Pattern 39 hot key.

7.2 Rear Panel



① OVERSCAN: When output timing is 480i59/60,480p59/60, 576i50 or 576p50, the output signal may not show a full image on the screen, just press the OVERSCAN button to have the image fill the screen.
When the signal is under OVERSCAN mode, the LCD display will show a star (*) sign at the end of the timing resolution string. Press OVERSCAN to turn off the overscan mode and the STAR (*) sign will disappear.

② PC/HD Output: This is the slot where you connect VGA cable to the VGA monitor for analog PC timing or HD timing signal output.

③ HDMI/DVI Output: This is the slot where you connect HDMI or DVI cable to the HDMI or DVI display.

④ 7.1CH Output: These are the slots where you connect 7.1CH to the speaker or Audio Video Receiver. The audio printed definition as below:
FL:Front Left, FR:Front Right, CNT:Center, SUB:Subwoofer, SL:Surround Left SR:Surround Right, SBL:Surround Back Left, SBR:Surround Back Right.

⑤ OPTICAL Output: This is the slot where you connect the optical audio output of the device to the audio equipment's optical input with optical fiber cable.

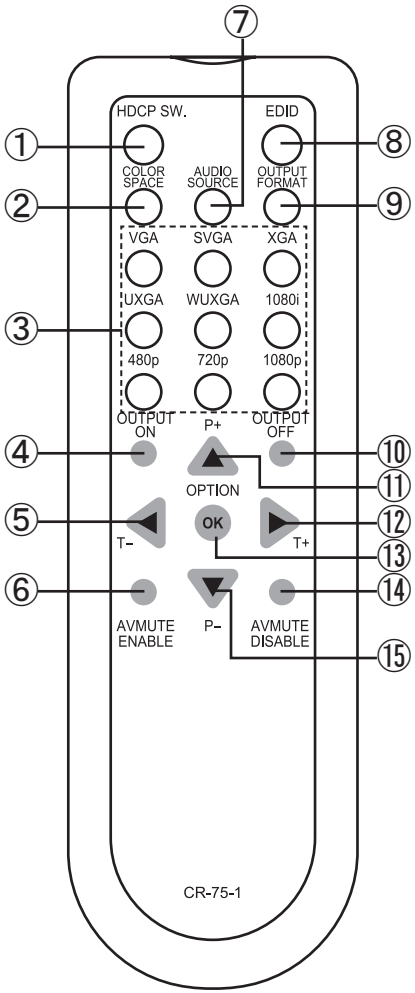
⑥ COAXIAL Output: This is the slot where you connect the coaxial audio ouput of the device to the audio equipment's coaxial input with coaxial cable.

⑦ HDMI/DVI Input: This is the slot where you connect HDMI or DVI Input source to the system.

⑧ 7.1CH Input: These are the slots where you connect Analog 7.1CH Inputs.
⑨ OPTICAL Input: When the signal is under OVERSCAN mode, the LCD display will show a star (*) sign at the end of the timing resolution string.
⑩ Power Input: Plug 5V DC power adaptor.
⑪ This is the slot where you connect the RS-232 cable from the device to the computer. You can control this device through the RS-232 port and the included computer software.
⑫ Power Switch: Turn ON/OFF the system.

8. Remote Control

① HDCP ON/OFF: Turn ON/OFF HDCP encryption.
② Color Space Selection: Switch between RGB444, YCbCr444 or YCbCr422.
③ Output Timing Selection
④ OUTPUT ON: Turn ON the output function.
⑤ Timing - : Backward Timing Selection.
⑥ AVMUTE ENABLE: For HDMI output, press to mute the Video / Audio. The LCD Display will show "AVMUTE ON".
⑦ AUDIO: Switch between External 7.1CH(analog), external optical(digital) or internal sinewave.
⑧ EDID: Pattern 32 hot key.
⑨ Output Format Selection: Switch between PC, HD, DVI or HDMI output.
⑩ Output OFF: Switch off the output signal. The LCD Display will show "OUTPUT OFF".
⑪ Pattern +: Next Pattern Selection. Some patterns have an options function. After entering into options, press Pattern then adjust the value using the up/down arrows.
⑫ Timing +:Nex Timing Selection.
⑬ OPTION(OK): Not all patterns are adjustable, so when you see the message “Press Option to do the setting” that means this pattern does in fact have option support. When users press the OPTION button the LED will come on, then you have to press the Pattern up/down button to adjust the value. Turn off the option function before going to the next pattern.

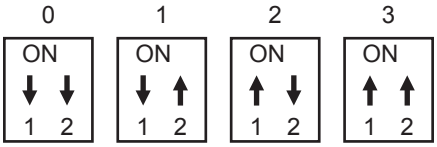


⑭ AVMUTE DISABLE: For HDMI output, press
⑮ Pattern -: Backward Pattern Selection.
Some patterns have OPTION support. Once you enter the option screen press the Pattern up/down button to adjust the value.

8.1 Dip-Switch Control Setting

The remote can control up to four other pattern generators. Using two switches on the back of the remote, inside the battery cover, select “IR remote address” from the system setup by pushing the pattern buttons on the devices front panel. The “System setup” is a selection after pattern 50 and this selection is not selectable from the remote control. When entering into the “IR remote address” four selections will available from 0 to 3. It is recommended that each device have a different setting to avoid signal frequency interruptions. The default factory setting is on 0.

IR Remote Address:



9. Built-In Rx EDID Structure:

- The system has four built in RX EDID, one is active and others are for backup.
- The Active EDID will copy the EDID from backup EDID. (Go to "System Setup" function)
- The system will copy the Sink EDID and use the built in RX EDID to analyze and display information.
- Supports EDID burner through RS-232 PC software.

10. RS-232 Connection and Protocol:

- Connection between the unit and remote controller with RS-232 modem cable (No Wire Crossing).

  Pin definition

System			Remote Controller	
PIN	Definition		PIN	Definition
1	NC		1	NC
2	TxD		2	RxD
3	RxD	→	3	TxD
4	NC		4	NC
5	GND		5	GND
6	NC	←	6	NC
7	NC		7	NC
8	NC		8	NC
9	NC		9	NC

- RS-232 transmission formats:
  Baud Rate=19200bps
  Data Bit=8bits
  Parity=None
  Stop Bit=1bit
  Flow Control=None

● Command / Response codes of RS-232 transmission:

Command	Description	CPHD-3 Response(*1)
ASC001	Audio source is from external L/R	ASC001
ASC002	Audio source is from external OPTICAL	ASC002
ASC003	Audio source is from internal Sinewave	ASC003
ASC999	Inquire audio source status	ASC???
ATO000	set Autorun Off	ATO000
ATO001	set Autorun On	ATO001
ATO999	Inquire Autorun Action status	ATO???
ATN???	Autorun Number, ???=001~032	ATNxxx (*2)
ATT???	Autorun Timing, ???=001~039	ATTxxx
ATP???	Autorun Pattern, ???=001~051	ATPxxx
ATI???	Autorun time Interval, ???=005~600 seconds	ATIxxx
ATS999	Inquire Autorun Configuration status	ATNxxx + ATTxxx + …
CRR???	Color Setting Red or Cr, ???=000~255	CRRxxx
CRG???	Color Setting Green or Y, ???=000~255	CRGxxx
CRB???	Color Setting Blue or Cb, ???=000~255	CRBxxx
CRY???	Color Setting Gray, ???=000~255	CRYxxx
CRR999	Inquire Color Setting Red or Cr status	CRR???/CRR300 (*3)
CRG999	Inquire Color Setting Green or Y status	CRG???/CRG300
CRB999	Inquire Color Setting Blue or Cb status	CRB???/CRB300
CRY999	Inquire Color Setting Gray	CRY???/CRY300
CSC001	Color space is RGB444	CSC001
CSC002	Color space is YUV444	CSC002
CSC003	Color space is YUV422	CSC003
CSC999	Inquire color space status	CSC???
DEE001	Deep Color is 8 bit	DEE001
DEE002	Deep Color is 10 bit	DEE002
DEE003	Deep Color is 12 bit	DEE003
DEE999	Inquire Deep Color status	DEE???
ESC001	EDID source is from TX (HDMI/DVI out)	ESC001
ESC002	EDID source is from RX (built-in Active EDID)	ESC002
ESC003	EDID source is from RX1 (built-in EDID1)	ESC003
ESC004	EDID source is from RX2 (built-in EDID2)	ESC004
ESC005	EDID source is from RX3 (built-in EDID3)	ESC005
ESC006	EDID source is from VGA (PC/HD out)	ESC006
ERX00?	set RX1,RX2 or RX3 EDID name. ?=1~3	ERX00? (*4)
"Name String"	EDID name string, string length is 12 byte	ERX004 (*5)
ERX99?	Inquire RX1,RX2 or RX3 EDID name. ?=1~3	ERX99? + "?????????????"(*6)
ERD001	Read sink's EDID	ERD001, datastream (*7)
ERS001	Erase sink's EDID and fill with 'FF'	ERS001, ERS002/ERS003 (*8)
EWR001	Write EDID to sink	EWR001, EWR002/EWR003 (note 9)
FAV000	set My Favorite Off	FAV000
FAV001	set My Favorite On	FAV001
FAV999	Inquire My Favorite action status	FAV???

FP+??? FP-??? FP+999 or FP-999	Add Favorite PATTERN, ???=001~051 Drop Favorite PATTERN, ???=001~051 Inquire Favorite PATTERN status	FP+xxx FP-xxx FP+??? FP-??? …
FT+??? FT-??? FT+999 or FT-999	Add Favorite TIMING, ???=001~039 Drop Favorite TIMING, ???=001~039 Inquire Favorite TIMING status	FT+xxx FT-xxx FT+??? FT-??? ...
HDC000 HDC001 HDC999	set HDCP Off set HDCP On Inquire HDCP status	HDC000 HDC001 HDC???
MOT001 "Custom String" MOT999	set Pattern 46.Motion's custom string. Custom string, string length is 12 byte Inquire Motion Pattern's custom string	MOT001 (*10) MOT002 (*11) MOT999+"????????????"(*12)
OUT001 OUT002 OUT003 OUT004 OUT999	Select output format [PC] Select output format [HD] Select output format [DVI] Select output format [HDMI] Inquire output format status	OUT001 OUT002 OUT003 OUT004 OUT???
PAT??? PAT999	Select PATTERN P01~P50, ???=001~051 Inquire PATTERN status	PATxxx PAT???
PCM001 PCM002 PCM003 PCM999	set LPCM 2CH set LPCM 5.1CH set LPCM 7.1CH Inquire LPCM Channel status	PCM001 PCM002 PCM003 PCM???
RST001	System reset	RST001
TIM??? TIM999	Select TIMING T01~T39, ???=001~039 Inquire TIMING status	TIMxxx TIM???
VER999	Inquire firmware version.	VER???(Ex:VER021=V2.1)

Note:

*1: After the computer sends a command to the system, the computer has to wait for a response from the system. After receiving a command the computer can then send the next command to the system.
If this system is on auto run, RS-232 communications might fail.

*2: To configurate Autorun users need to follow a sequence of commands --- ATNxxx + ATTxxx + ATPxxx + ATIxxx … and …etc.

*3: If this system is not on Pattern 47.Color Setting, respond CRR300, CRG300, CRB300 or CRY300.

*4: Procedure of setting RX EDID name string :
send "ERX00?" -> wait "ERX00?" response -> send name string (12 bytes) -> wait "ERX004"

*5: In the name string, the rest unused bytes (<12bytes) should be filled with 0x00.

*6: After ERX99? response, name string (12 bytes) is followed.

*7: After ERD001 response, this system reads sink's EDID and transmits them (datastream) to a remote terminal.
If the system reading sink's EDID fails, the system sends 'Oxfe' and stops the data stream.
This system supports 2-block EDID, datastream length=block0+block1=256 bytes

*8: After a EWR001 response this system erases sink's EDID and fills it with 'FF'.
After being completely erased, the system responds with ERS002.
If erasing fails, the system responds with ERS003.

*9: After a EWR001 response, this system will wait for EDID data stream (256 bytes) from the PC. After receiving the data stream, the system writes data stream to sink. If writing is successful, the system responds with EWR002 or EWR003.

*10: Procedure of setting custom string :
send "MOT001" -> wait "MOT001" response -> send custom string (12 bytes) -> wait "MOT002"

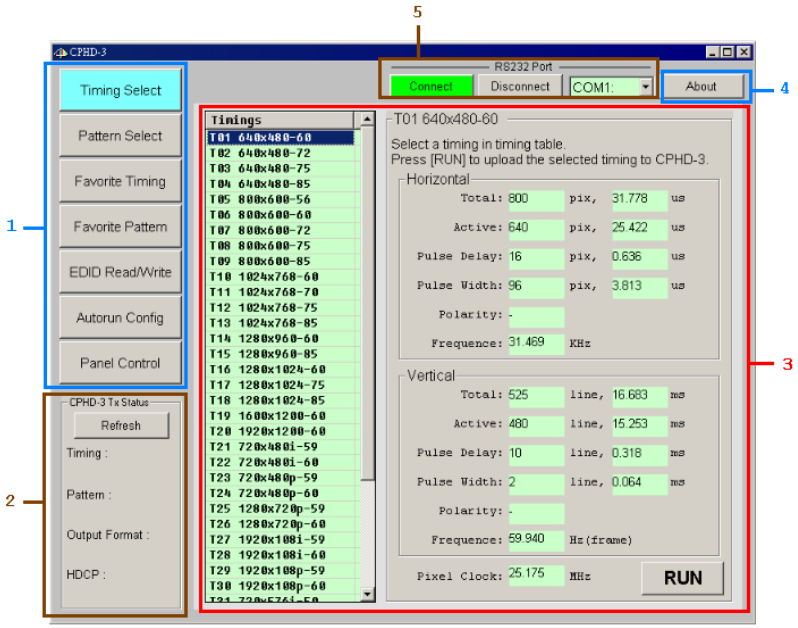
*11: In the custom string, the rest unused bytes (<12bytes) should be filled with 0x00. Custom string supports English language only.

*12: After MOT999 response, custom string (12 bytes) is followed.

11. Features of RS-232 PC Software

- Click button and upload selected timing or pattern.
- Select [My Favorite] timings and patterns.
- Read out EDID contents from sink.
- Write EDID contents to sink.
- Can be an EDID burner.
- Analyze EDID data and generate a report file.
- Configurate Autorun [AUTO] List.
- Panel Controls through RS-232
- Monitor System status.
- Edit custom string of Motion Pattern (Pattern 46).
- Adjust color-levels pattern (Pattern 47).

12. RS-232 PC Software Operation



① Main Function Selection:

Timing Select:Select a timing among T01~T39

Pattern Select:Select a pattern among P01~P51

Favorite Timing:Select favorite timings among T01~T39

Favorite Pattern: Select favorite patterns among P01~P51

EDID Read/Write: Read, write EDID contents and analyze EDID data.

Autorun Config: Configure autorun list.

Panel Control: Control system functions.

② Status Monitor: Click [Refresh] button to get system status.

③ Work Area: Different main functions have their own working area.

④ About: Get PC software and system firmware version number.

⑤ RS-232 Setup: Select RS-232 Comport and turn on/off connection.

13. Timings Table

No.	Resolution	V Hz	No.	Resolution	V Hz
T01	640x480	60	T21	720x480i	59
T02	640x480	72	T22	720x480i	60
T03	640x480	75	T23	720x480p	59
T04	640x480	85	T24	720x480p	60
T05	800x600	56	T25	1280x720p	59
T06	800x600	60	T26	1280x720p	60
T07	800x600	72	T27	1920x1080i	59
T08	800x600	75	T28	1920x1080i	60
T09	800x600	85	T29	1920x1080p	59
T10	1024x768	60	T30	1920x1080p	60
T11	1024x768	70	T31	720x576i	50
T12	1024x768	75	T32	720x576p	50
T13	1024x768	85	T33	1280x720p	50
T14	1280x960	60	T34	1920x1080i	50
T15	1280x960	85	T35	1920x1080p	50
T16	1280x1024	60	T36	1920x1080p	23
T17	1280x1024	75	T37	1920x1080p	24
T18	1280x1024	85	T38	1366x768	60
T19	1600x1200	60	T39	1366x768	50
T20	1920x1200	60			

14. Patterns Table

- Graphic Test Patterns: 45 Patterns
- Data Analysis Patterns: 6 Patterns (Include P32, P38, P39, P48, P49, P50)

P01 WHITE		P24 MULTI-BURST	
P02 BLUE		P25 Pluge	V
P03 RED		P26 GRID-1	
P04 MAGENTA		P27 GRID-36	
P05 GREEN		P28 GRAY-256-R	
P06 CYAN		P29 GRAY-256-G	
P07 YELLOW		P30 GRAY-256-B	
P08 BLACK		P31 CIRCLES	
P09 RED Setting	V	**P32** EDID	V
P10 GRN Setting	V	P33 H Grey Scale	
P11 BLUE Setting	V	P34 Hori.RGB Bar	
P12 GRAY Setting	V	P35 SMPT Bar	
P13 COLOR BAR		P36 Split Bar	
P14 GRAY-8		P37 CROSS HATCH	V
P15 GRAY-16		**P38** AUDIO	
P16 GRAY-32		**P39** HDCP	V
P17 GRAY-64		P40 Win Blue	
P18 GRAY-256		P41 Win Red	
P19 V line ONOFF		P42 Win Magenta	
P20 BW-12		P43 Win Green	
P21 H line ONOFF		P44 Win Cyan	
P22 HOR.-3		P45 Win Yellow	
P23 HOR.-6		P46 Motion	V
		P47 Color Setting	
		P48 Rx Timing	V
		P49 Rx Video	V
		P50 Rx Audio	V
		P51 RGB Delay	
		System Setup	

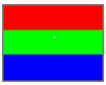
*** V Support [OPTION] setting.**

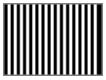
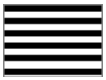
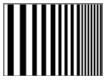
15. Description of Patterns

GROUP	NO.	PATTERN	DESCRIPTION
Full Screen Purity	P01		Purity pattern Purity offers eight different full field patterns: Black, White (100% Y) Primary colors: Red, Green, Blue Complementary colors: Magenta, Yellow, Cyan P01: White P02: Blue P03: Red P04: Magenta P05: Green P06: Cyan P07: Yellow P08: Black
	P02		
	P03		
	P04		
	P05		
	P06		
	P07		
	P08		

Application

1. The red and green patterns are most frequently used for checking color purity. When the red pattern is selected only this color should be visible; the presence of any other color is an indication that color purity needs adjustment.
2. The green pattern provides a purity check for three in-line tubes. In the in-line tubes, the guns are in a horizontal position and the green gun is located in the center.
3. The blue pattern is the complementary color and often used to check color performance.
4. Red is used to ensure there is no interference between the sound and chroma carrier. Furthermore the red pattern is used to adjust the long play delay level to a minimum flicker.
5. In addition to the primary and complementary colors 100% white can be selected as well as black pattern with color burst to check.

Color Setting	P09 Red Setting P10 Green Setting P11 Blue Setting P12 Gray Setting		Press [OPTION],[PATTERN ▲/▼] to adjust color level. There are 11 steps to adjust color level: 0, 25, 51, 76, 102, 127(default), 153, 178, 204, 229 and 255.
	P47 Color Setting		Through RS-232 PC software to adjust each color component values.
Application			
This can show the overall color performance, amplitude response/resolution and linearity of chroma amplitude.			
Color Bar	P13		8 Bars
	P34		Hori. RGB Bar
	P35		SMPTE Color Bar
	P36		Split Color Bar
	P51		RGB Delay
Application			
The Color matrix test is to test for fixed quantity of color. To sum up, test for R, G, B color bar.			
Gray Scale	P14		8 steps
	P15		16 steps
	P16		32 steps
	P17		64 steps
	P18		256 steps
	P33		H Grey Scale
Application			
This is used to locate faulty linearity of the video amplifier or greyscale setting. Nonlinearities mainly result in a compression of the white level.			

Black White Line	P19		Vertical BW1 (black 1 pixel, white 1 pixel)
	P20		Vertical BW12(black 12 pixels, white 12 pixels)
	P21		Horizontal BW1(black 1 pixel, white 1 pixel)
	P22		Horizontal BW3(black 3 pixels, white 3 pixels)
	P23		Horizontal BW6(black 6 pixels, white 6 pixels)
	P24		Multi-Burst BW6+BW3+BW2+BW1

Application

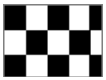
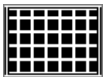
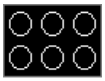
The vertical patterns serve for a quick check of a color monitors horizontal bandwidth and phase behavior during a video transmission. It also verifies video amplifier and color temperature.

The horizontal patterns serve for a quick check of a color monitors vertical bandwidth and phase behavior during a video transmission. It also verifies video amplifier and color temperature.

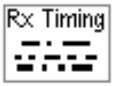
PLUGE	P25		Picture Line-Up Generation Equipment Press [OPTION] to select color range Full Range=0~255, Limited Range=16~235 PC/HD output gets Full Range=0%~100%

Application

PLUGE is used to perform accurate and consistent line-up of picture monitors. The usual procedure is to adjust the brightness control of a monitor so that bar 1 is invisible on the background while bar 2 can be still distinguished. The white level luminance is mainly adjusted by the contrast control to 70 ±10 cd/m2 by means of the upper 100% white area of the vertical grayscale.

Grid	P26		1x1(pixel) checkerboard
	P27		36x36(pixels) checkerboard
	P37		Cross Hatch Press [OPTION] to inverse black/white.
Application			
This pattern is mainly used for checking and aligning dynamic and corner convergence of TVs or monitors.			
Gradient	P28		Red Gradient
	P29		Green Gradient
	P30		Blue Gradient
Application			
This is used to locate faulty linearity of the video amplifier. Nonlinearities mainly result in a compression of the color level.			
Circle	P31		Circles
Application			
It's suited for checking the overall linearity and geometry of the screen of a monitor or TV.			
EDID	P32		EDID Analysis Press[OPTION],[PATTERN▲/▼] to analyze sink's EDID contents.
Audio	P38		Audio Control Source, Channel Number, Sampling Rate, I2S Controls
HDCP	P39		HDCP handshaking and link-integrity test If sink is a repeater, press [OPTION] to show BKSV List / V' value.

Window Purity	P40		75% of Height/Width Window Pattern.
	P41		
	P42		
	P43		
	P44		
	P45		
Application			
Electromagnetism can cause distortions to appear because a monitor is controlled by electro magnetism. If there are no distortions then the monitor has 75% color purity.			
Motion	P46		Font base motion test. Press [OPTION] to select motion object. Through RS-232 PC software, edit custom string.
Application			
check that digital video is being processed correctly, especially the AD conversion of modern TV equipment. This pattern can be used to check moving pictures or slow motion applications on VCR's or other personal video devices.			

Rx Data Analysis	P48		HDMI/DVI input timing detection and analysis. Press [OPTION] to pull hot-plug NOTE> The values below are approximation. Pixel Rate, Horizontal Frequency, Vertical Frequency Those are for reference only.
	P49		HDMI/DVI input video packets and infoframes detection and analysis. Press [OPTION] to pull hot-plug
	P50		HDMI input audio packets and infoframes detection and analysis. Press [OPTION] to pull hot-plug
Sys Setup			System Setup Built-in Rx EDID setup, IR remote address setup.

16. Firmware Revision History

Version	Release Date	Description
v1.0	2009.06.19	First release
v1.1	2009.07.xx	Add pattern 51-RGB Delay.

Acronyms

A

CEA	Consumer Electronic Association
BKSV	B Key Selection Vector
DVI	Digital Visual Interface
EDID	Extended Display Identification Data
EIA	Electronic Industries Alliance
HDCP	High-bandwith Digital Content Protection
HDMI	High-Definition Multimedia Interface
LCD	Liquid Crystal Display
LPCM	Linear Pulse Code Modulation
TMDS	Transition Minimized Differential Signaling
UXGA	Ultra Extended Graphics Array
VESA	Video Electronics Standards Association
WUXGA	Widescreen Ultra Extended Graphics Array

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