

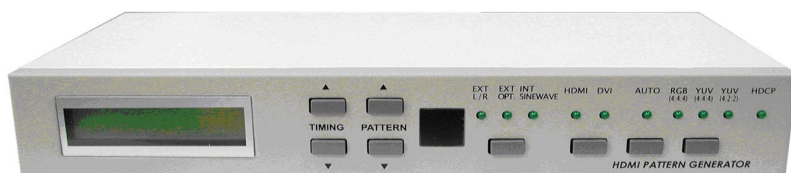
LINDY®

CONNECTION PERFECTION

Premium HDMI Pattern Generator

User Guide

English



LINDY No. 32628

www.lindy.com

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1. Features and Specifications

Features

- Provides a total of 35 Timings and 39 Patterns
- Supports HDCP signal verification pattern (P39)
- Front panel LCD display and LED indicators
- Remote control operation
- Supports RS-232 control, specific PC application included

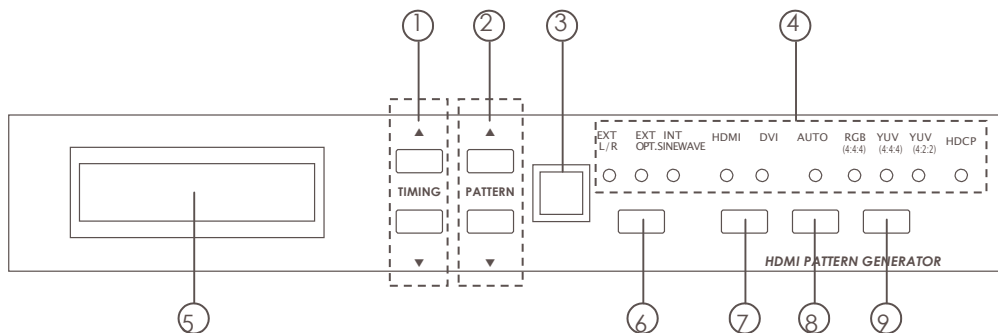
Specifications

- HDMI v1.2, HDCP 1.1 and DVI 1.0 compliant
- HDMI Frequency bandwidth: 1.65Gbps (single link)
- Input: Audio L+R x 1 and Toslink S/PDIF x 1
- Output: HDMI female port (type A connector) x 1
- Power Supply: 5VDC 3.2A power supply (AC 90-240V)
- Weight: 1.5Kgs
- Dimensions: 280(W) x 130(D) x 44(H) mm

RS-232 Protocol

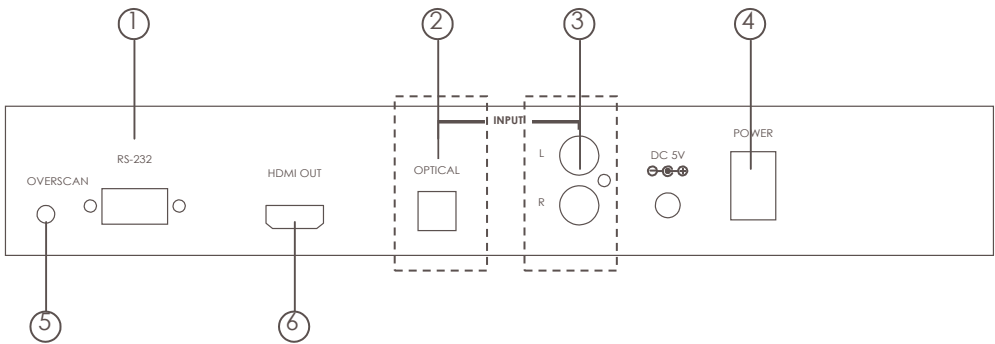
Pin	Definition		Pin	Definition
1	NC		1	NC
2	TxD		2	RxD
3	RxD		3	TxD
4	NC		4	NC
5	GND		5	GND
6	NC		6	NC
7	NC		7	NC
8	NC		8	NC
9	NC		9	NC

2. Front Panel Operation



1. Pattern Selection:
From P01 ~ P39
2. Resolution/Freq. Selection:
From T01 ~ T35
3. Remote control sensor
4. HDCP LED Indicator:
The LED will illuminate when pattern "P39 HDCP-Produce" is selected and the output display (TV, monitor, etc.) supports HDCP. To turn off the HDCP indicator (Switch Off HDCP), first step to change to other pattern and then change either Timing, HDMI/DVI output selection or colour space selection.
5. Display of PATTERN/TIMING:
Upper line: Number of TIMING, Resolution and Frequency (Example: T01 640x480-60)
Lower line: Number of PATTERN and name of PATTERN (Example: P01 WHITE)
6. Audio Source Selection:
External L/R
External Optical
Internal Sine wave
7. HDMI/DVI Output Selection
8. Turn on/off AUTO pattern random-cycling
9. Colour Space Selection:
RGB 4:4:4
YUV 4:4:4
YUV 4:2:2

3. Rear Panel Installation and Connection



1. RS232 Communication Port:

Connect to the COM1 or COM2 port of your PC, and control the unit remotely using the application provided.

2. Audio Optical Input

3. Audio L/R Input

4. Power Switch

5. Fill-Screen Button:

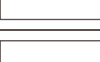
For some modals of TV/monitor, the video signal can not fill the screen of display completely, to correct this problem, press the button once when the power is on.

6. HDMI OUT:

The HDMI output can be connected to an HDMI display using a HDMI cable, or to a DVI display using a HDMI to DVI cable.

5. TIMING Table

No.	Resolution	Frequency (Hz)
T01	640x480	60
T02	640x480	72
T03	640x480	75
T04	640x480	85
T05	800x600	56
T06	800x600	60
T07	800x600	72
T08	800x600	75
T09	800x600	85
T10	1024x768	60
T11	1024x768	70
T12	1024x768	75
T13	1024x768	85
T14	1280x960	60
T15	1280x960	85
T16	1280x1024	60
T17	1280x1024	75
T18	1280x1024	85
T19	1600x1200	60
T20	1920x1200	60
T21	720x480 i	59
T22	720x480 i	60
T23	720x480 p	59
T24	720x480 p	60
T25	1280x720 p	59
T26	1280x720 p	60
T27	1920x1080 i	59
T28	1920x1080 i	60
T29	1920x1080 p	59
T30	1920x1080 p	60
T31	720x576 i	50
T32	720x576 p	50
T33	1280x720 p	50
T34	1920x1080 i	50
T35	1920x1080 p	50

No.	Signal Content	Description
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		
- The red and green patterns are most frequently used for checking colour purity. The red pattern is selected only this colour should be visible; the presence of any other colour is an indication that colour purity needs adjustment. - 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. - The blue is the complementary colors are often used to check the colour performance. - The red are used to ensure that there is no interference between the sound and chroma carrier. Furthermore the red pattern is used to adjust the long play delay level to minimum flicker. - In addition to the primary and complementary colours 100% white can be selected as well as black pattern with colour burst to check.		

P09		Gradient Pattern Graduated transition of colours. P09: Red P10: Green P11: Blue P12: Gray
P10		
P11		
P12		

Application

This pattern is for brightness control and luminance writing current. And this can overall the colour performance, amplitude response/resolution and linearity of chroma amplitude.

P13		Colour Bar Comprises 8 vertical bars- White, Yellow, Cyan, Green, Magenta, Red, Blue and Black
-----	---	--

Application

The white bar, to adjust the amplitude of the colour difference signals with respect to the luminance signal on the picture tube. The blue and green guns can be switched off to allow the amplitude of the R-Y signal to be adjusted. This is done by ensuring that no difference in brightness is observed between vertical bars five and six of the colour bar and the horizontal reference bar. In a similar fashion, the amplitude of the B-Y demodulator can be determined.

P14		Gray scale Full screen linear staircase signal with 8/16/32/64 identical steps from black to white P14: 8 steps P15: 16 steps P16: 32 steps P17: 64 steps
P15		
P16		
P17		

Application

This is used to locate faulty linearity of the video amplifier or gray scale setting. Nonlinearities mainly result in a compression of the white level.

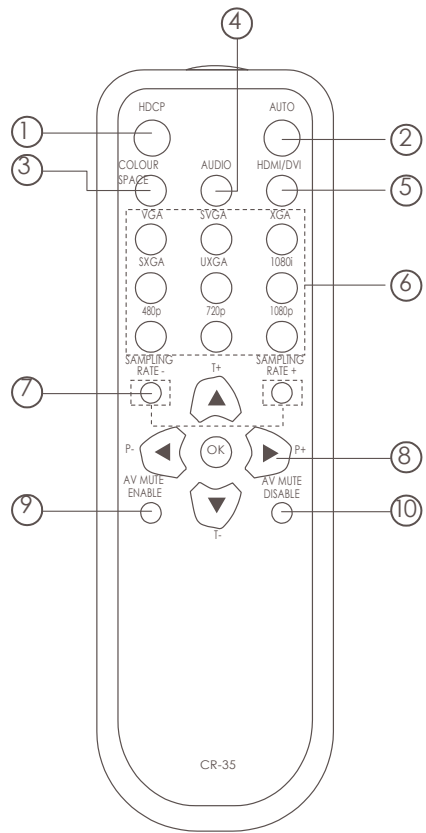
P18		Black-White Vertical Full screen linear vertical bar signal with black/white intervals of 1/6/12 pixels. P18: 1 pixel P19: 6 pixels P20: 12 pixels	
P19			
P20			
Application			
This pattern serves for a quick check of colour monitor's horizontal band-width and phase behavior of a video transmission. Also, verify video amplifier and colour temperature.			
P21		Black-White Horizontal Full screen linear Horizontal bar signal with black/white intervals of 1/3/6 pixels. P21: 1 pixel P22: 3 pixels P23: 6 pixels	
P22			
P23			
Application			
This pattern serves for a quick check of colour monitor's vertical bandwidth and phase behavior of a video transmission. Also, verify video amplifier and colour temperature.			
P24		Multi-burst Full screen definition pattern of frequencies 0.5, 1.0, 2.0, 4.0, 4.8, and 5.8 MHz for 625 line systems. P24: Multi-burst 1 P25: Multi-burst 2	-Video bandwidth -Check luminance amplifier in B/W -Amplitude response/resolution -Check resolution of monitors and video recorders -Measure the frequency amplitude response
P25			
Application			
The pattern checks the bandwidth of the video or luminance amplifier in B/ W or CTVs as well as the resolution of monitors and video recorders. It can also be used to check or measure the frequency amplitude response.			

P26		Grid Full screen grid with black/white intervals of 1/3/6/12 pixels. P26: 1 pixel P27: 3 pixels P28: 6 pixels P29: 12 pixels
P27		
P28		
P29		
Application		
This pattern is mainly used for checking and aligning dynamic and corner convergence of TVs or monitors.		
P30		Full screen filled with lines of H characters, a new line of H will run from upper left corner and fill down when a line is completed.
Application		
This is the special test for test/video motion verification and refreshing rate.		
P31		Black circles on white background, 640x480 has 4 by 3 total 12 circles, 800x600 has 5 by 3 total 15 circles, 1024x768 has 6 by 4 total 24 circles,
Application		
It's suited for checking the overall linearity and geometry of the screen of a monitor or TV.		
P32		Full screen filled with upper half of 100% white and lower half of 100% black.
Application:		
This pattern is used for checking the brightness control and purity. Also to check the white setting and synchronization.		

P33		Test Patterns Specifically designed patterns. P33: Grayscale P34: 3 step Horizontal colour bar P35: SMPTEbar P36: -4 P37: Britebox-1 P38: EDID
P34		
P35		
P36		
P37		
P38		
Application		
P33: This pattern is used for a reflection check or for adjusting the VCR video demodulator to a symmetrical black and white jump or opposite. P34: This pattern serves for a quick check of colour monitor. P35, P36: This pattern can be used to check the video handling capabilities of most parts of a television system. P37: The wrong brightness setting on the monitor may cause other tests such as Contrast, Focus and Beam Size to be invalid. P38: Reading EDID.		
P39		HDCP Green/Blue horizontal bars with HDCP verification and data comparison on the upper first third area of black background
Application		
To test DVI and HDMI receivers with HDCP. All DVI and HDMI options, including analyzer options, support HDCP production keys if the HDCP option is installed.		

6. Remote Control

1. Switch to P39 HDCP
2. Turn on/off AUTO pattern random-cycling
3. Colour Space Selection:
RGB 4:4:4
YUV 4:4:4
YUV 4:2:2
4. Audio Output Selection:
External L/R
External Optical
Internal Sine wave
5. HDMI/DVI Output Selection
6. Quick TIMING Selection:
VGA - T01 640x480-60
SVGA - T06 800x600-60
XGA - T10 1024x768-60
SXGA - T16 1280x1024-60
UXGA - T19 1600x1200-60
1080i - T27 1920x1080i-59
480p - T23 720x480p-59
720p - T25 1280x720p-59
1080p - T29 1920x1080p-59
7. Sampling Rate (-)
Sampling Rate (+)
192 KHz
96 KHz
48 KHz
44K1Hz
32 KHz
8. [Pattern]
UP/DOWN: TIMING (+) (-)
RIGHT/LEFT: PATTERN (+) (-)
9. A/V Mute ON
10. A/V Mute OFF



7. RS-232 Remote Control Protocol

- * The connection between the system and remote controller with **RS-232 modem cable**.
Pins definition of modem cable

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 format:
Baud Rate: 19200 bps
Data Bit: 8 bits
Parity: None
Stop Bit: 1 bit

* **Command**

Function	Command Code	CPHD-1 Reply	
Test connection			
	URTCNT+SPACE+0+SPACE+'A'+'D'		OK
Timing Selection			
	1. TMIX+SPACE+1+SPACE+'A'+'D'		OK
	2 SPACE + timing index + SPACE		OK
Pattern Selection			
	1.PTIX+SPACE+1+SPACE+'A'+'D'		OK
	2 SPACE + pattern index + SPACE		OK

Timing index 1	640x480-60	Pattern Index 1	White
Timing index 2	640x480-72	Pattern Index 2	Blue
Timing index 3	640x480-75	Pattern Index 3	Red
Timing index 4	640x480-85	Pattern Index 4	Magenta
Timing index 5	800x600-56	Pattern Index 5	Green
Timing index 6	800x600-60	Pattern Index 6	Cyan
Timing index 7	800x600-72	Pattern Index 7	Yellow
Timing index 8	800x600-75	Pattern Index 8	Black
Timing index 9	800x600-85	Pattern Index 9	Gradually Red
Timing index 10	1024x768-60	Pattern Index 10	Gradually Green
Timing index 11	1024x768-70	Pattern Index 11	Gradually Blue
Timing index 12	1024x768-75	Pattern Index 12	Gradually Gray
Timing index 13	1024x768-85	Pattern Index 13	Colour Bar
Timing index 14	1280x960-60	Pattern Index 14	Gray-8
Timing index 15	1280x960-85	Pattern Index 15	Gray-16
Timing index 16	1280x1024-60	Pattern Index 16	Gray-32
Timing index 17	1280x1024-75	Pattern Index 17	Gray-64
Timing index 18	1280x1024-85	Pattern Index 18	BW-1
Timing index 19	1600x1200-60	Pattern Index 19	BW-6
Timing index 20	1920x1200-60	Pattern Index 20	BW-12
Timing index 21	720x480i-59	Pattern Index 21	Hor-1
Timing index 22	720x480i-60	Pattern Index 22	Hor-3
Timing index 23	720x480P-59	Pattern Index 23	Hor-6
Timing index 24	720x480P-60	Pattern Index 24	Multibust-1
Timing index 25	1280x720P-59	Pattern Index 25	Multibust-2
Timing index 26	1280x720P-60	Pattern Index 26	Grid-1
Timing index 27	1920x1080i-59	Pattern Index 27	Grid-3
Timing index 28	1920x1080i-60	Pattern Index 28	Grid-6
Timing index 29	1920x1080P-59	Pattern Index 29	Grid-12
Timing index 30	1920x1080P-60	Pattern Index 30	Running-H
Timing index 31	720x576i-50	Pattern Index 31	Circles
Timing index 32	720x576P-50	Pattern Index 32	BW_Upper_Down
Timing index 33	1280x720P-50	Pattern Index 33	CYP_1
Timing index 34	1920x1080i-50	Pattern Index 34	CYP_2
Timing index 35	1920x1080P-50	Pattern Index 35	CYP_3
		Pattern Index 36	CYP_4
		Pattern Index 37	CYP_5
		Pattern Index 38	EDID
		Pattern Index 39	HDCP

SPACE = ASCII (32)

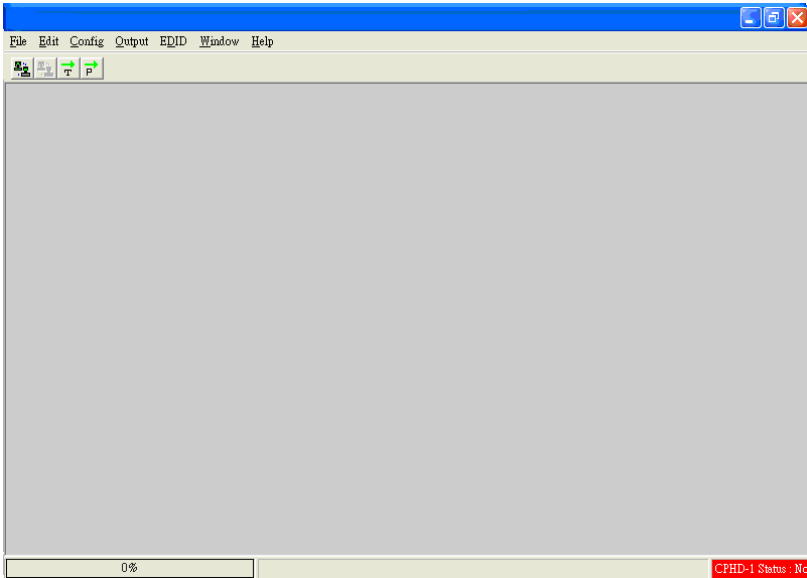
1 = ASCII (1)

Pattern Index = ASCII (Pattern Index)

8. RS232 Remote Control Application

8.1 Main Window

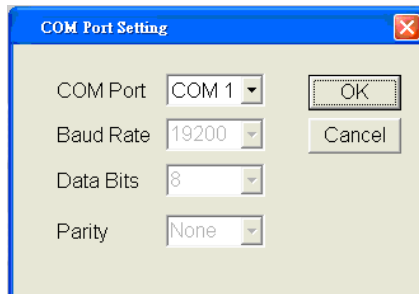
Double-click the executable exe file to launch the application, the main window will show up.



IMPORTANT: When the right hand bottom shows a warning message, then click the connect  button to re-connect the unit.

8.2 Select COM port settings

Click and select the [COM port] from [Config] option of the tool bar to launch the Program window. There are 8 different COM ports you can choose. After the port been selected click [OK] to confirm the control port.



8.3 Switch TIMING

Click and select the [Timing] from [Output] option of the tool bar to launch the Program window.

Click [Show List] to display the timing for Horizontal/Vertical/Pixel Clock.

Click [Run Timing] button to start the output of the selected timing.

The Timing window contains the following controls:

- Timing No. Select:** A dropdown menu showing '1'.
- Timing No.:** A text field containing '640x480-60'.
- Show List:** A button.
- Run Timing:** A button.
- Horizontal Section:**
 - Total: 800 Pixels, 31.778 uS
 - Active: 640 Pixels, 25.422 uS
 - Pulse Delay: 16 Pixels, 0.636 uS
 - Pulse Width: 96 Pixels, 3.813 uS
 - Polarity: -
 - Rate: 31.469 KHz
- Vertical Section:**
 - Total: 525 Lines, 16.683 mS
 - Active: 480 Lines, 15.253 mS
 - Pulse Delay: 10 Lines, 0.318 mS
 - Pulse Width: 2 Lines, 0.064 mS
 - Polarity: -
 - Rate: 59.940 Hz
- Pixel Clock:** 25.175 MHz

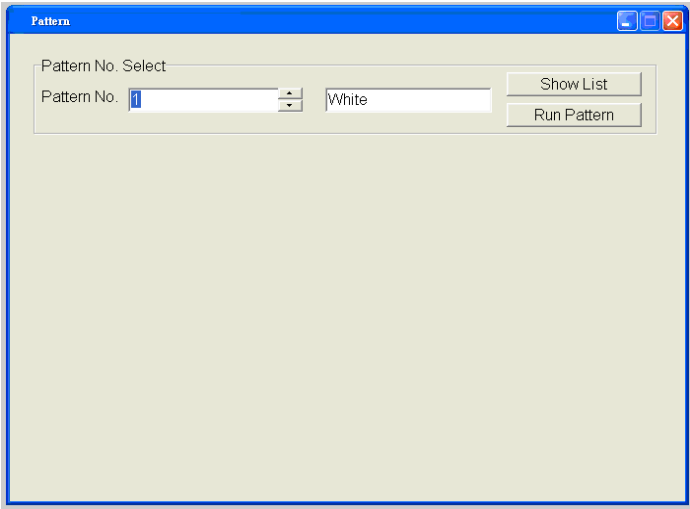
List of Timings

Timing Name	Pixel Rate	Horizontal	Vertical
640x480-60	25.175 MHz	31.469 KHz	59.940 Hz
640x480-72	31.500 MHz	37.861 KHz	72.809 Hz
640x480-75	31.500 MHz	37.500 KHz	75.000 Hz
640x480-85	36.000 MHz	43.269 KHz	85.008 Hz
800x600-56	36.000 MHz	35.156 KHz	56.250 Hz
800x600-60	40.000 MHz	37.879 KHz	60.317 Hz
800x600-72	50.000 MHz	48.077 KHz	72.188 Hz
800x600-75	49.500 MHz	46.875 KHz	75.000 Hz
800x600-85	56.250 MHz	53.674 KHz	85.061 Hz
1024x768-60	65.000 MHz	48.363 KHz	60.004 Hz
1024x768-70	75.000 MHz	56.476 KHz	70.069 Hz
1024x768-75	78.750 MHz	60.023 KHz	75.029 Hz
1024x768-85	94.500 MHz	68.677 KHz	84.997 Hz

8.4 Switch PATTERN

Click and select the [Pattern] from [Output] option of the tool bar to launch the Program window.

Click [Show List] to select output pattern and then click [Run Pattern] button to start the output of selected pattern.



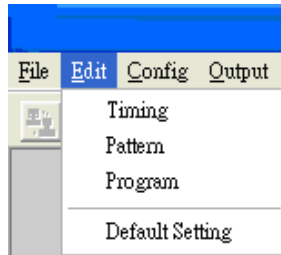
List of Patterns

List of patterns

Pattern NO.	Pattern Name
1	White
2	Blue
3	Red
4	Magenta
5	Green
6	Cyan
7	Yellow
8	Black
9	Gradually Red
10	Gradually Green
11	Gradually Blue
12	Gradually Gray
13	Color Bar
14	Gray-8

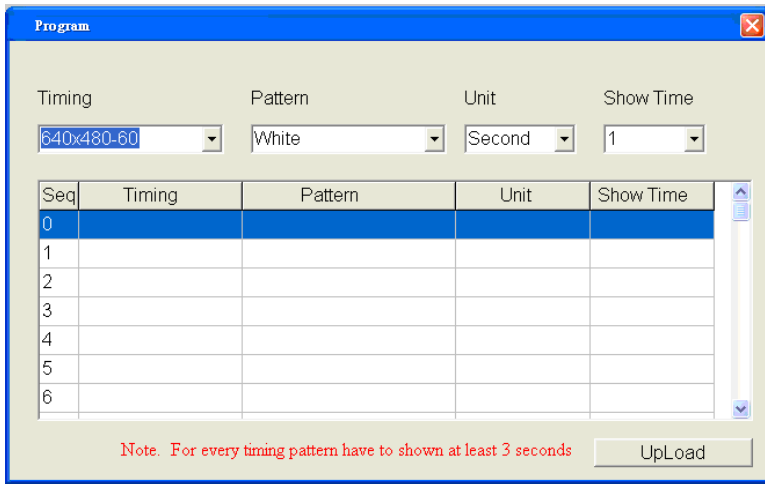
8.5 Programming TIMING/PATTERN

Click and select the [Program] from [Edit] option of the tool bar to launch the program window.



Program the desired sequence of timing/pattern/unit/show time, then click [Upload] to send the program to the unit.

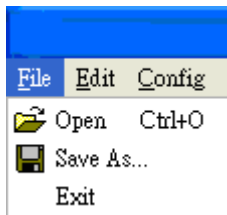
IMPORTANT: For every timing pattern have to shown at least 3 seconds.

A screenshot of a software window titled 'Program'. It contains a table with 5 columns: 'Seq', 'Timing', 'Pattern', 'Unit', and 'Show Time'. The table has 7 rows, with the first row (Seq 0) highlighted in blue. Above the table, there are four dropdown menus: 'Timing' (set to '640x480-60'), 'Pattern' (set to 'White'), 'Unit' (set to 'Second'), and 'Show Time' (set to '1'). Below the table, there is a red note: 'Note. For every timing pattern have to shown at least 3 seconds' and an 'UpLoad' button.

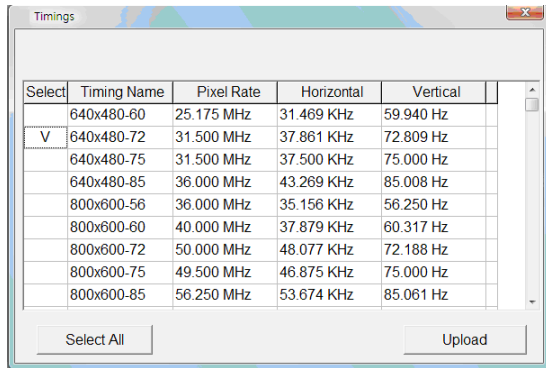
Seq	Timing	Pattern	Unit	Show Time
0				
1				
2				
3				
4				
5				
6				

Click and select the [Save as] from [File] option of the tool bar to save your settings.

Click the [Open] from [File] option of the tool bar to load the saved data.



Click and select the [Timing] from [Edit] option of the tool bar to launch the program window.



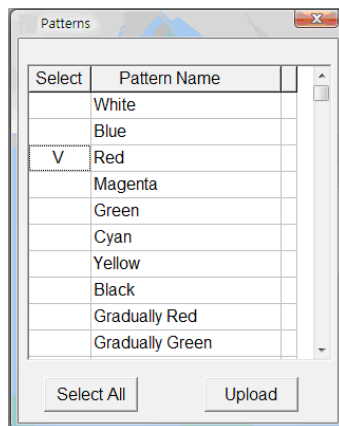
Select	Timing Name	Pixel Rate	Horizontal	Vertical
	640x480-60	25.175 MHz	31.469 KHz	59.940 Hz
V	640x480-72	31.500 MHz	37.861 KHz	72.809 Hz
	640x480-75	31.500 MHz	37.500 KHz	75.000 Hz
	640x480-85	36.000 MHz	43.269 KHz	85.008 Hz
	800x600-56	36.000 MHz	35.156 KHz	56.250 Hz
	800x600-60	40.000 MHz	37.879 KHz	60.317 Hz
	800x600-72	50.000 MHz	48.077 KHz	72.188 Hz
	800x600-75	49.500 MHz	46.875 KHz	75.000 Hz
	800x600-85	56.250 MHz	53.674 KHz	85.061 Hz

Select All Upload

Program the desired timings, and then click [Upload] to send the program to the unit.

Click and select the [Pattern] from [Edit] option of the tool bar to launch the program window.

Program the desired patterns and then click [Upload] to send the program to the unit.



Select	Pattern Name
	White
	Blue
V	Red
	Magenta
	Green
	Cyan
	Yellow
	Black
	Gradually Red
	Gradually Green

Select All Upload

Click and select the [Default Setting] from [Edit] option of the tool bar to reset the unit to factory setting.

8.6 EDID

8.6.1 Read EDID

Click and select the [Read EDID] from [EDID] option of the tool bar to read out the EDID from the display source (e.g. LCD TV). Meanwhile, click and select the [Save as] from [File] option of the tool bar to save the EDID information to the computer in .bin format (e.g. to save as this file format "name.bin").

8.6.2 Memory of EDID

When click and select the [Memory] from [EDID] to read out the data, but the user may not know the data information that reads out from the source. The user can use "Explore Semiconductor EDID Editor" to read out the EDID information. From "Explore Semiconductor EDID Editor", click the [Open] from [File] option of the tool bar to read out the EDID data.

8.6.3 Upload EDID

Click the [Open] from [File] option of the tool bar to load the saved data (e.g. name.bin).

Click and select the [Upload EDID] from [EDID] option of the tool bar to write the EDID to the unit.

IMPORTANT: After upload EDID to the unit, don't operate the unit before writing the EDID to the display unit. Otherwise, the EDID data will be lost due to the memory size.

8.6.4 Write EDID

Click and select the [Write EDID] from [EDID] option of the tool bar to write the EDID to the display unit.

CE Statement

This device complies with the European Regulations for EMC (Electromagnetic Compatibility) for the European Union and it is marked with the CE mark. This unit must be used with high quality shielded connection cables. Only if such high quality shielded cables are used can you be sure that the EMC compatibility is not adversely affected.

FCC Statement

Shielded cables must be used with this equipment to maintain compliance with radio frequency energy emission regulations and ensure a suitably high level of immunity to electromagnetic disturbances.

FCC Warning

This equipment has been tested and found to comply with the limits for a Class B Digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, then the user is encouraged to try correct the interference by one or more of the following measures.

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and receiver
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected
- Consult the dealer or an experienced technician for help

You are advised that changes or modifications not expressly approved by the party responsible for compliance could void your authority to operate the equipment.

WEEE (waste Electrical and Electronic equipment), Recycling of Electronic Products

In 2006 the European Union introduced regulations (WEEE) for the collection of all waste electrical and electronic equipment. It is no longer allowed to simply throw away electrical and electronic equipment. Instead, these products must enter the recycling process. Each individual EU member state has implemented the WEEE regulations into national law in slightly different ways. Please follow your national law when you want to dispose of any electrical or electronic products.

More details can be obtained from your national WEEE recycling agency.

No. 32628

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