AD BOARD
HR601U

Specifications

Approval

Rev. 01

Issue Date. 2018. 12. 12

Doc No. HR601U

Note | Specification is subject to change without notice.
Conseuently it is better to contact to our company before proceeding with the design of your product incorporating this board

Prepared	Checked I	CheckedII	Approved
K.B PARK			YH. HAN

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HR601U

Revision History

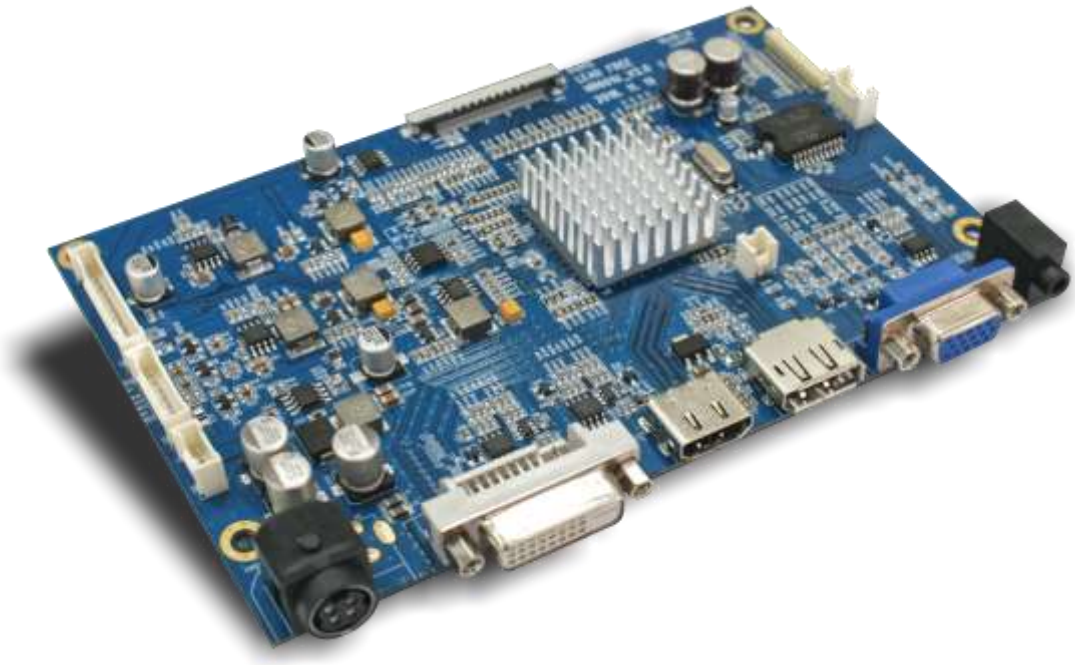
Rev.	ECN No.	Description of Changes	Date	Prepared
V1.0		Initial Release	2018.12.12	K.B PARK

HR601U

Rev. 01

1. General Specification

No.	Item	Description		
1	Model Name	HR601U		
2	LCD Module	V by one , eDP(8 lines & 4 lines) 3840x2160		
3	Input	Analog RGB(R, G, B Separate H, V Sync), DVI, HDMI, DP, AUDIO		
4	Max Support Resolution	3840X2160 (60Hz)		
5	OSD Control	Menu, Select, Down, Up, Power		5 keys
	Plug & Play	VESA DDC 2B Ver1.3		
6	Power Consumption	Supply Voltage	12Vdc	
		Power	10 Watt	Board Only
7	Signal Connector	Analog	DSUB 15P(R, G, B Separate H, V Sync)	
		Digital	DVI-D 24P(TMDS) / HDMI 2.0(TMDS), Display Port / HDCP 1.4, 2.2	
		Audio	5W + 5W (8 Ω)	
8	Board Size	W x H x D(mm)	165 x 100 x 18	



2. ELECTRICAL SPECIFICATION

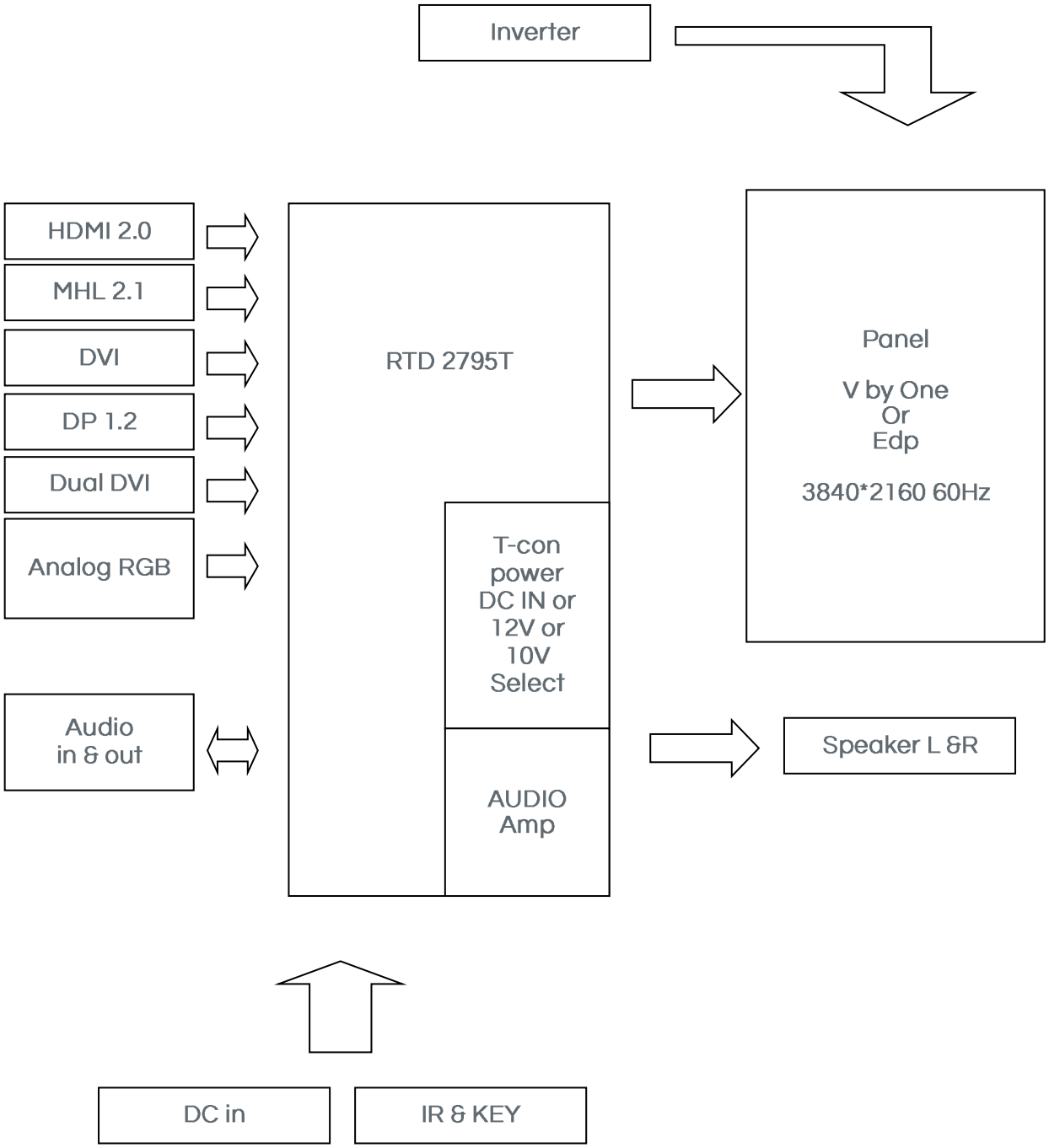
2.1. Input characteristic

Description	Signal	Unit	Min	Typical	Max	Remarks
Power In (12Vdc)						
	Input	18VDC	11.4	12	12.6	
	Consumption	Watt		10 Watt		Board Only
RGB Input						
	Analog RGB	VPP	0	0.7	-	
	Sync	VDC	0	5	5.5	
	H Frequency	KHz	31		80	Depends on Mode
	V Frequency	Hz	55	75	77	Depends on Mode
HDMI Input						
	TMDS	mVp-p	450		900	
DP Input						
	HBR2	Vp-p	1		1.3	

2.2. Output characteristic

Description	Signal	Unit	Min	Typical	Max	Remarks
Panel Power						
	LCD Power(12V)	VDC	11.4	12	12.6	
AUDIO Interface						
	Output	Watt		5	6	
	Frequence	Hz	700Hz		20KHz	
	THD	5% MAX AT 1500Hz 1.0W				
Inverter Interface						
	Power	V	11.4	12	24	Depends on Power
	On/Off control	V	0		3.3	L=off, H=on
	Brightness control	V	3.3		0	Option
			0		4.0	Option

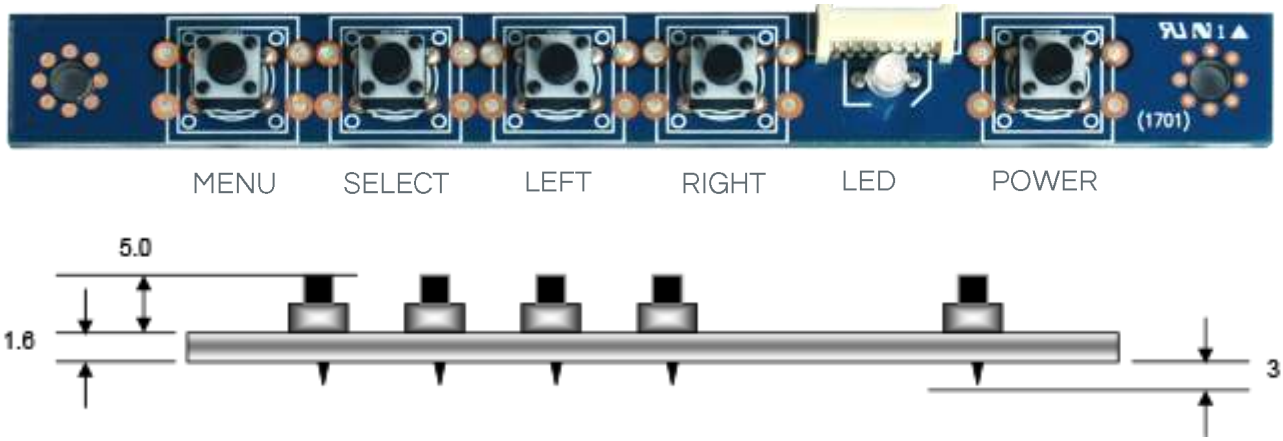
3. FUNCTIONAL BLOCK DIAGRAM



4. OSD Control Board

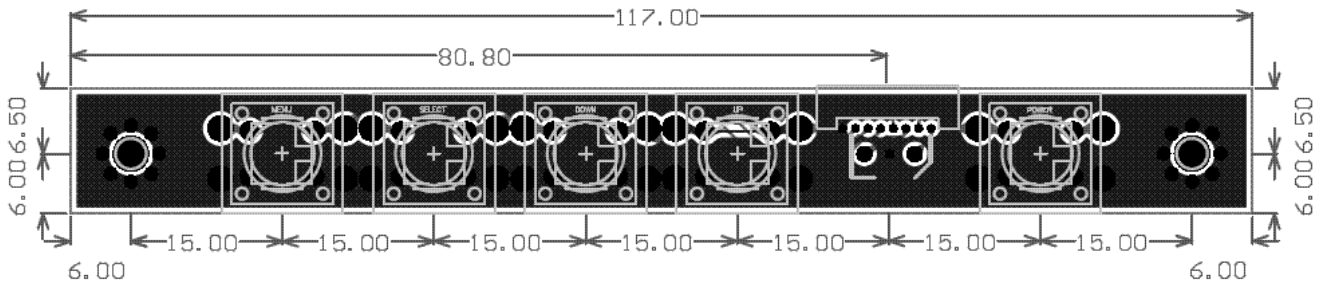
The OSD (On Screen Display) provides certain functions to have clear image and others. This board supports 5 buttons OSD operation as a standard. The control functions defined on OSD operation are as below. (Unit: mm)

Appearance

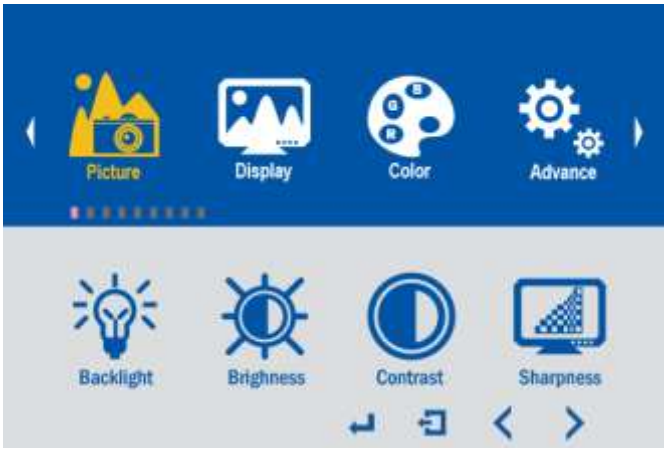


Board Size (W x H x D) : 112 x 15x 10mm

Button	Function	Status	HOT Key
LED	Indicates operation status	Green	On: Green Off: LED Off
POWER	Power on/off	On/Off	
MENU	Activate menu / Exit Menu		
INPUT	Select / Auto adjust		
LEFT	Cursor control Left / Screen information		
RIGHT	Cursor control Right / Input source		



5-1. OSD FUNCTION



Picture

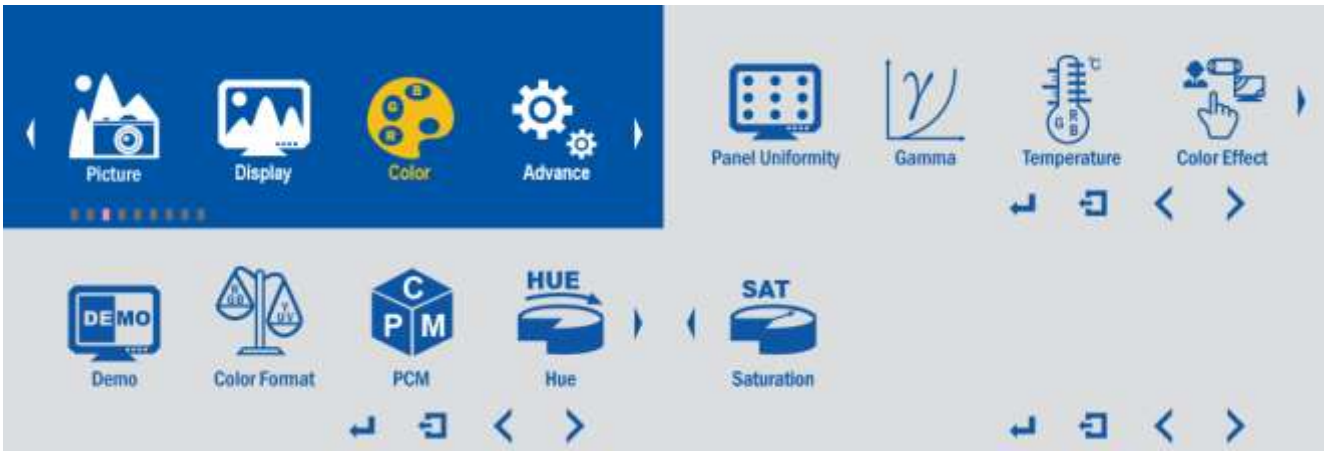
OSD Menu			
Backlight	Backlight Control		
	Range of Value	MIN	0
		MAX	100
Brightness	Brightness Control		
	Range of Value	MIN	0
		MAX	100
Contrast	Contrast Control		
	Range of Value	MIN	0
		MAX	100
Sharpness	Sharpness Control		
	Range of Value	MIN	0
		MAX	4

5-2. OSD FUNCTION

Display

OSD Menu			
Auto Adjust	Auto Adjust Control		
H Position	H Position Control		
	Range of Value	MIN	0
		MAX	100
V position	V position Control		
	Range of Value	MIN	0
		MAX	100
Clock	Clock Control		
	Range of Value	MIN	0
		MAX	100
Phase	Phase Control		
	Range of Value	MIN	0
		MAX	100
Disp Rotate	Disp Rotate Control		
	Mode	0	
		180	

5-3. OSD FUNCTION



Color

OSD Menu				
Panel Uniformity	ON		OFF	
GAMMA	Gamma Control			
	MODE	OFF	1.8	2.0
			2.2	2.4
Temperature	Temperature Control			
	MODE	9300	7500	6500
		5800	sRGB	User
Color Effect	Color Effect			
	MODE	Standard	Game	Movie
		Photo	ViVid	User
Demo	Demo Control			
	MODE	OFF	TYPE2	TYPE4
		TYPE1	TYPE3	TYPE5
Color Format	RGB		YUV	
PCM	Srgb	Adobe RGB	User	Native
HUE , SATUREATION	Hue , Saturation Control			
	Range of Value	MIN	0	
		MAX	100	

5-4. OSD FUNCTION

Advance

OSD Menu				
Aspect Ratio	Aspect Ratio Control			
	MODE	Full	16:9	4:3
		5:4	1:1	User
Over Scan	ON		OFF	
Over Drive	ON / OFF		OD Gain	
DDCCI	ON		OFF	
Ultra Vivid	Vivid Control			
	MODE	OFF	L	
		M	H	
DP Option	Dp Option			
	MODE	D1		
		1.1	1.2	1.3
DP Resolution	DP Resolution Control			
	MODE	D2 : HDMI	D1 : DP	D3 : DVI
		DP(1080P)	DP(2560X1440)	DP(4K2K 60HZ)
Clone Mode	ON		OFF	

5-5. OSD FUNCTION

Input

OSD Menu		
INPUT SOURCE	Auto Select	
	A0	VGA
	D1	DP
	D2	HDMI
	D3	DVI

5-6. OSD FUNCTION

Audio

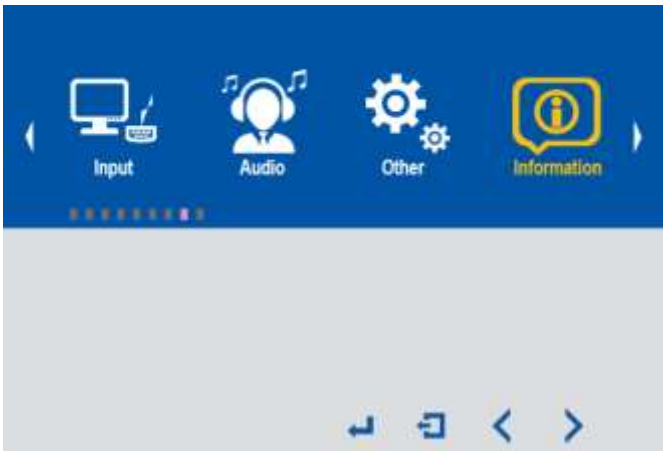
OSD Menu			
Volume	Volume Control		
	Range of Value	MIN	0
		MAX	100
Mute	ON		OFF
Stand Along	ON		OFF
Audio Source	Analog		Digital
Sound Mode			

5-7. OSD FUNCTION

Other

OSD Menu			
Reset	Reset		
Menu Time	Menu time Control		
	Range of Value	MIN	0
		MAX	60
OSD H Position	OSD H Position Control		
	Range of Value	MIN	0
		MAX	100
OSD V Position	OSD V Position Control		
	Range of Value	MIN	0
		MAX	100
Language	ENGLISH		中 文
Transparency	Transparency Control		
	Range of Value	MIN	0
		MAX	100
Rotate	Rotate Control		
	MODE	0	90
		180	270

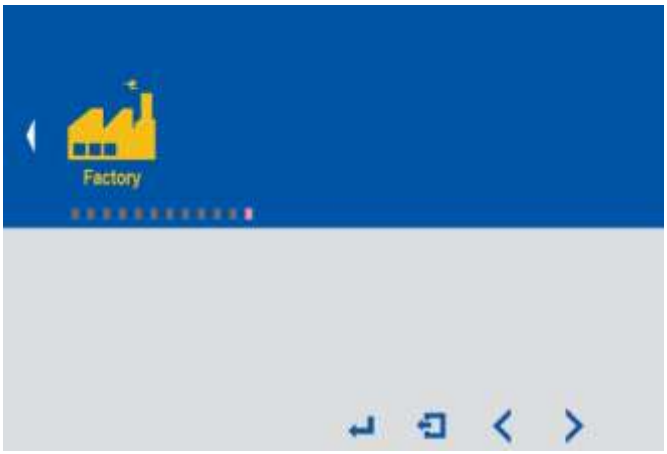
5-8. OSD FUNCTION



Information

Display information

5-9. OSD FUNCTION



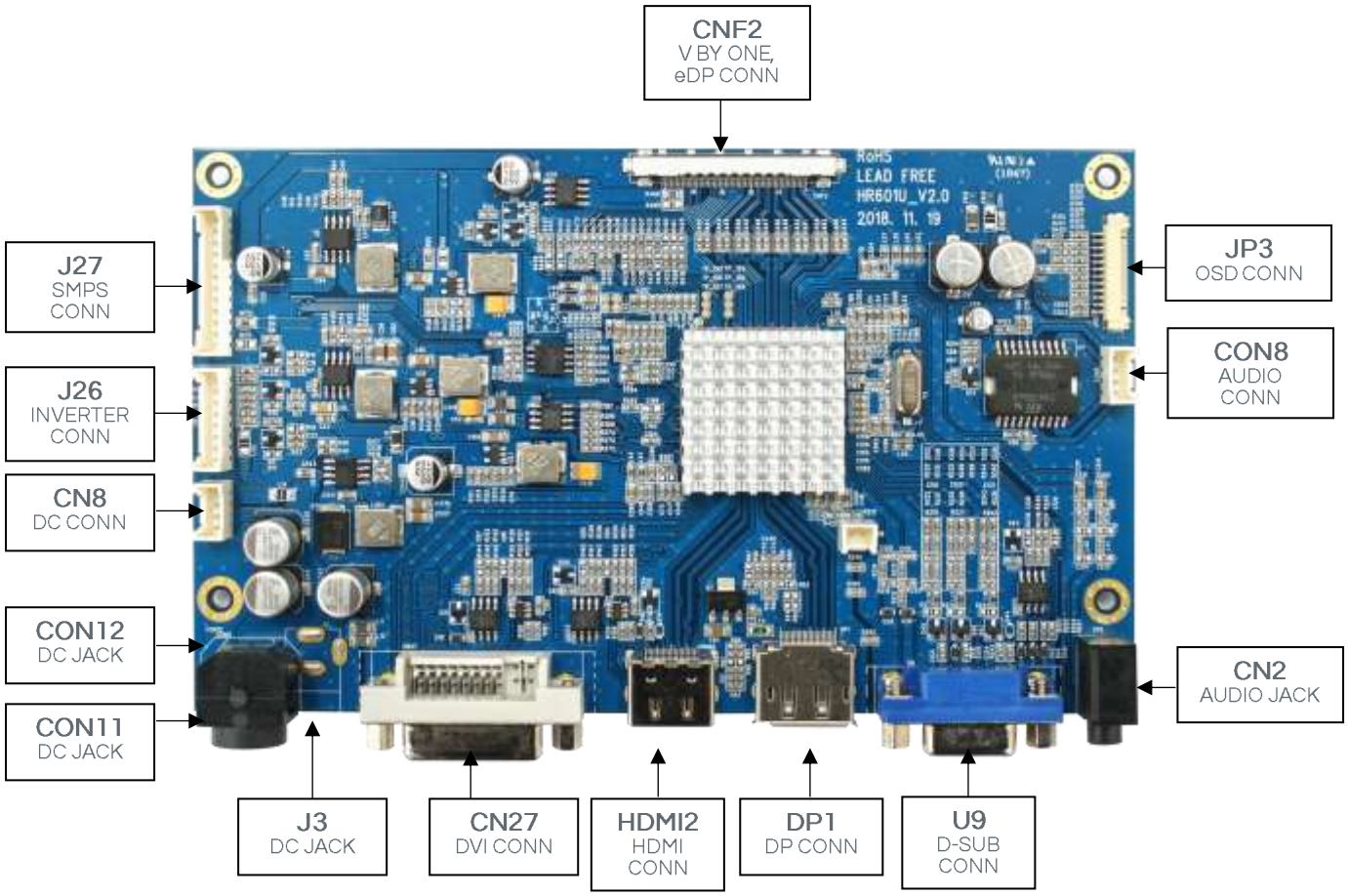
Factory

Factory Mode

HR601U

6. CONNECTOR, PINOUT & JUMPERS

The various connectors are:



Summary:

Reference	Item	Description	Type	Manufacture
CNF2	Connector	V BY ONE , eDP (HBR1, HBR2) CONNECTOR	FI-RE51S-HF	JAE
JP3	Connector	OSD CONNECTOR	12505WR-12P-1.25mm	YEONHO
CON8	Connector	AUDIO CONNECTOR	3.5ø Phone Jack	
CN2	Jack	AUDIO JACK	SMW200-04P	YEONHO
U9	Connector	D-SUB CONNECTOR	D SH-15FR	CFD
DP1	Connector	DP CONNECTOR	20P(DP-SMD)	
HDMI2	Connector	HDMI CONNECTOR	19P(R-S151L-3 LOCK)	
CN27	Connector	DVI CONNECTOR	25PIN 3LAYER R/A	
J3	Jack	DC JACK	2V/ 24V POWER JACK	
CON11	Jack	DC JACK	12V/ 24V POWER JACK(DIN-422A)	
CON12	Jack	DC JACK	12V/24V POWER JACK(DIN-422A)	
CN8	Connector	DC CONNECTOR	SMW200-04P	YEONHO
J26	Connector	INVERTER CONNECTOR	SMW200-08P	YEONHO
J27	Connector	SMPS CONNECTOR	SMW200-12P	YEONHO

CNF2: V BY ONE Connector

Pin No.	Symbol	Description
2	RX7P	8th Pixel Positive V-by-One Differential data input in area A
3	RX7N	8th Pixel Negative V-by-One Differential data input in area A
4	GND	Ground
5	RX6P	7th Pixel Positive V-by-One Differential data input in area A
6	RX6N	7th Pixel Negative V-by-One Differential data input in area A
7	GND	Ground
8	RX5P	6th Pixel Positive V-by-One Differential data input in area A
9	RX5N	6th Pixel Negative V-by-One Differential data input in area A
10	GND	Ground
11	RX4P	5th Pixel Positive V-by-One Differential data input in area A
12	RX4N	5th Pixel Negative V-by-One Differential data input in area A
13	GND	Ground
14	RX3P	4th Pixel Positive V-by-One Differential data input in area A
15	RX3N	4th Pixel Negative V-by-One Differential data input in area A
16	GND	Ground
17	RX2P	3rd Pixel Positive V-by-One Differential data input in area A
18	RX2N	3rd Pixel Negative V-by-One Differential data input in area A
19	GND	Ground
20	RX1P	2nd Pixel Positive V-by-One Differential data input in area A
21	RX1N	2nd Pixel Negative V-by-One Differential data input in area A
22	GND	Ground
23	RX0P	1st Pixel Positive V-by-One Differential data input in area A
24	RX0N	1st Pixel Negative V-by-One Differential data input in area A
25	GND	Ground
26	LOCKN	Lock detect output, Open drain
27	HTPDN	Hot plug detect output, Open drain
28	Bit select	V by One 8bit or 10bit select(Following panel spec)
29~32	N.C	No Connection
33	SCL	I2C Clock Signal
34	SDA	I2C Data signal
35~37	N.C	No Connection
38~42	GND	Ground
43	N.C	No Connection
44~51	P VCC	PANEL VCC(12V OR 10V)

JP3: OSD Connector

Pin No.	Symbol	Description
1	LED- Red	RED Color
2	LED- Green	GREEN Color
3	GND	Ground
4	MENU	For Menu Switch
5	SELECT	For Select Switch
6	LEFT	For Left Switch
7	RIGHT	For Right Switch
8	POWER	For Power Switch
9,10	N.C	No Connection
11	IRD	IR DATA
12	3.3V	IR POWER 3.3V

CNF2: eDP (HBR1, HBR2) Connector

Pin No.	Symbol	Description	
2	VTX_TX7N	DPTX_LANE_N(7)_2	NC
3	VTX_TX7P	DPTX_LANE_P(7)_2	NC
4	GND	GND	NC
5	VTX_X6N	DPTX_LANE_N(6)_2	NC
6	VTX_X6P	DPTX_LANE_P(6)_2	NC
7	GND	GND	NC
8	VTX_X5N	DPTX_LANE_N(5)_2	NC
9	VTX_X5P	DPTX_LANE_P(5)_2	NC
10	GND	GND	NC
11	VTX_X4N	DPTX_LANE_N(4)_2	NC
12	VTX_X4P	DPTX_LANE_P(4)_2	NC
13	GND	GND	NC
14	VTX_TX3N	DPTX_LANE_N(3)_1	DPTX_LANE_N(3)_1
15	VTX_TX3P	DPTX_LANE_P(3)_1	DPTX_LANE_P(3)_1
16	GND	GND	GND
17	VTX_TX2N	DPTX_LANE_N(2)_1	DPTX_LANE_N(2)_1
18	VTX_TX2P	DPTX_LANE_P(2)_1	DPTX_LANE_P(2)_1
19	GND	GND	GND
20	VTX_TX1N	DPTX_LANE_N(1)_1	DPTX_LANE_N(1)_1
21	VTX_TX1P	DPTX_LANE_P(1)_1	DPTX_LANE_P(1)_1
22	GND	GND	GND
23	VTX_TX0N	DPTX_LANE_N(0)_1	DPTX_LANE_N(0)_1
24	VTX_TX0P	DPTX_LANE_P(0)_1	DPTX_LANE_P(0)_1
25	GND	GND	GND
26	EDPTX2_HPD_2	EDPTX2_HPD_2	NC
27	EDPTX1_HPD_1	EDPTX1_HPD_1	EDPTX1_HPD_1
29	AUX_CH_N_2	EDPTX_AUX_CH_N_2	NC
30	AUX_CH_P_2	EDPTX_AUX_CH_P_2	NC
31	AUX_CH_N_1	EDPTX_AUX_CH_N_1	EDPTX_AUX_CH_N_1
32	AUX_CH_P_1	EDPTX_AUX_CH_P_1	EDPTX_AUX_CH_P_1
33	PANEL_SCL	NC	NC
34	PANEL_SDA	NC	NC
44	VCC	VCC	VCC
45	VCC	VCC	VCC
46	VCC	VCC	VCC
48	VCC	VCC	VCC
49	VCC	VCC	VCC
50	VCC	VCC	VCC
51	VCC	VCC	VCC

CON8: AUDIO Connector

Pin No.	Symbol	Description
1	R+	Speaker Right+
2	R-	Speaker Right-
3	L+	Speaker Left+
4	L-	Speaker Left-

U9: DSUB Connector

Pin No.	Symbol	Description
1	RGB1_R+	VGA Red analog signal
2	RGB1_G+	VGA Green analog signal
3	RGB1_B+	VGA Blue analog signal
4	NC	No Connection
5	DET_VGA	VGA Cable Connection Detect
6	GND	Ground
7	GND	Ground
8	GND	Ground
9	VGA_5V	VGA 5V input
10	GND	Ground
11	NC	No Connection
12	SDA	VGA DDC-SDA
13	VGA_HSYNC	Horizontal Sync
14	VGA_VSYNC	Vertical Sync
15	SCL	VGA DDC-SCL

DP1: DP Connector

Pin No.	Symbol	Description
1	DP_2_RX_3N	DP Channel1 input data pair 3-
2	GND	Ground
3	DP_2_RX_3P	DP Channel1 input data pair 3+
4	DP_2_RX_2N	DP Channel1 input data pair 2-
5	GND	Ground
6	DP_2_RX_2P	DP Channel1 input data pair 2+
7	DP_2_RX_1N	DP Channel1 input data pair 1-
8	GND	Ground
9	DP_2_RX_1P	DP Channel1 input data pair 1+
10	DP_2_RX_0N	P Channel1 input data pair 0-
11	GND	Ground
12	DP_2_RX_0P	DP Channel1 input data pair 0+
13~14	GND	Ground
15	AUX_C_DAP	DP Channel1 AUX+
16	GND-	Ground
17	AUX_C_DAN	DP Channel1 AUX-
18	DP_2_RX_HPD	DP Channel1 hot-plug detect
19	GND	Ground
20	NC	Not Connect

HDMI2: HDMI Connector

Pin No.	Symbol	Description
1	HDMI_1_D2+	HDMI 2line 2data+
2	CD-SENSE-1	MHL Cable Detect Sense
3	HDMI_1_D2-	HDMI 2line 2data-
4	HDMI_1_D1+	HDMI 2line 1data+
5	GND	Ground
6	HDMI_1_D1-	HDMI 2line 1data-
7	HDMI_1_D0+	HDMI 2line 0data+
8	GND	Ground
9	HDMI_1_D0-	HDMI 2line 0data-
10	HDMI_1_CK+	HDMI 2line CLK+
11	GND	Ground
12	HDMI_1_CK	HDMI 2line CLK-
13	CEC	HDMI CEC
14	NC	Not Connect
15	HDMI_1_DDCCK	HDMI DDC SCL
16	HDMI_1_DDCDA	HDMI DDC SDA
17	GND	Ground
18	HDMI_TX_5V-1	HDMI power signal
19	CBUS-HPD-1	HPD pin

CN27: DVI Input Connector

Pin No.	Symbol	Description
1	TMDS DATA2-	TMDS DATA2 Differential Negative Signal
2	TMDS DATA2+	TMDS DATA2 Differential Positive Signal
3	TMDS DATA2 Shield	Shield for TMDS Channel #2
4~5	NC	No Connection
6	DDC Clock	The Data Line for the DDC Interface
7	DDC Data	The Clock Line for the DDC Interface
8	NC	No Connection
9	TMDS DATA1-	TMDS DATA1 Differential Negative Signal
10	TMDS DATA1+	TMDS DATA1 Differential Positive Signal
11	TMDS DATA1 Shield	Shield for TMDS Channel #1
12	NC	No Connection
13	NC	No Connection
14	+5V Power	+5 Volt signal for EDID (Un-powered Monitor)
15	GND(for +5V	Ground for +5 Volt Power pin, Sync return
16	HPD	Identify the presence of a monitor
17	TMDS DATA0-	TMDS DATA0 Differential Negative Signal
18	TMDS DATA0+	TMDS DATA0 Differential Positive Signal
19	TMDS DATA0 Shield	Shield for TMDS Channel #0
20~21	NC	No Connection
22	TMDS CLOCK Shield	Shield for TMDS Clock differential Pair
23	TMDS CLOCK+	TMDS DATA0 Differential Positive Signal
24	TMDS CLOCK-	TMDS DATA0 Differential Negative Signal

CON11~ CON12: DC JACK (CONNECTOR)

Pin No.	Symbol	Description
1	VCC	12V / 24V
2	VCC	12V / 24V
3	GND	GND
4	GBD	GND

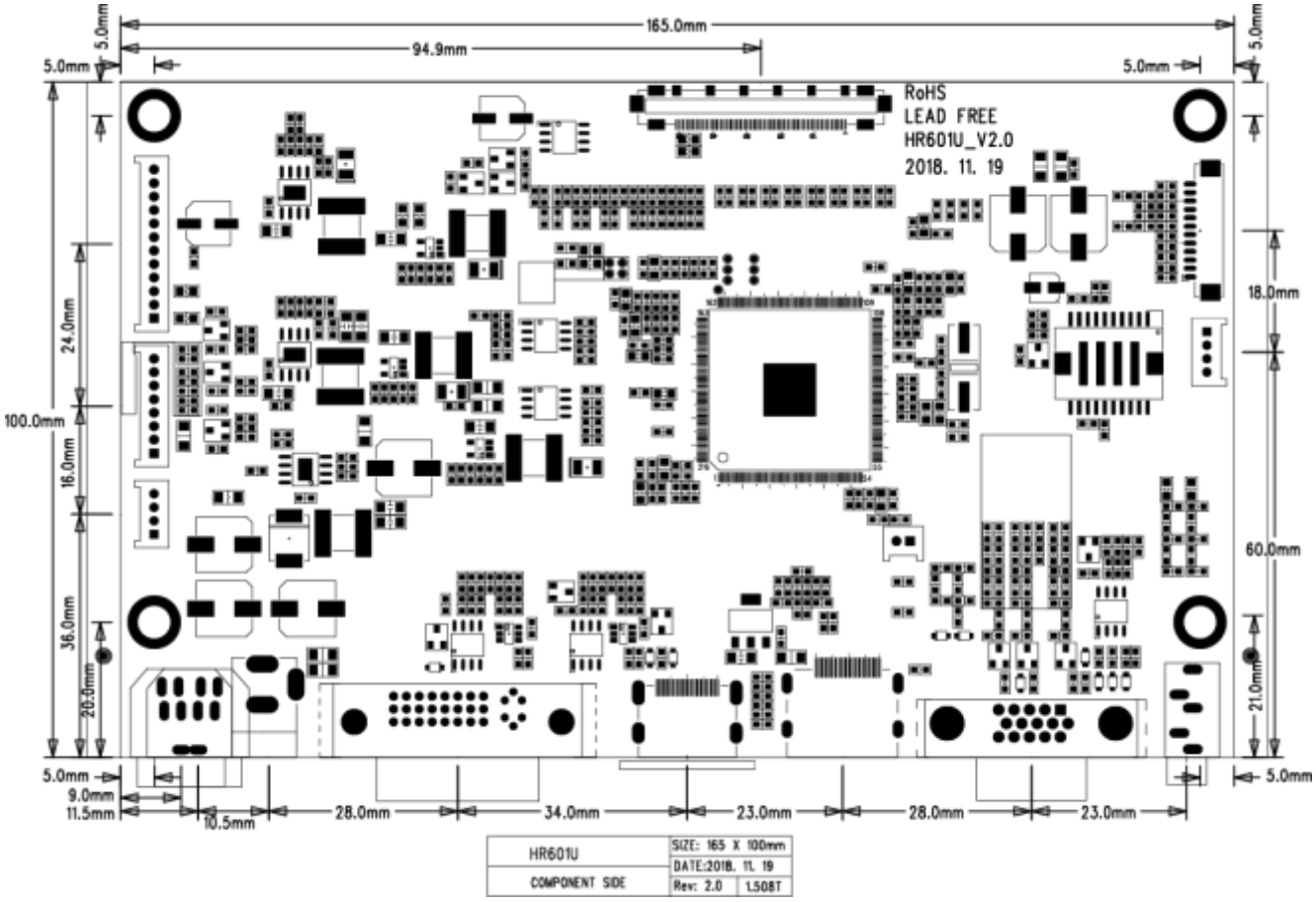
J26: Invertor Connector

Pin No.	Symbol	Description
1	+12V_NORMAL	10V / 12V
2	+12V_NORMAL	10V / 12V
3	+5V_NORMAL	5V
4	ADJ_PWM	Adjust PWM
5	GND	Ground
6	GND	Ground
7	BL-ON/OFF	Backlight on signal
8	BL-ADJUST	Backlight dimming signal

J27: Invertor Connector

Pin No.	Symbol	Description
1	VCC	5V_ONOFF
2	VCC	S+5V
3	VCC	5VCC
4	VCC	10V / 12V
5	GND	Ground
6	GND	Ground
7	VCC	10V / 12V
8	VCC	10V / 12V
9	BL-ON/OFF	Backlight on signal
10	BL-ADJ	Backlight dimming signal
11	BL-PWM	Adjust PWM
12	GND	Ground

7. CONTROLLER DIMENSIONS



DIMENSION DOWNLOAD

8. APPLICATION NOTES

A. USING THE CONTROLLER WITHOUT BOTTONS ATTACHED:

This is very straightforward:

- ▷ Firstly setup the controller/display system with the buttons. With the attached controllers and display system active make any settings for color, contrast and image position as required then switch everything off.
- ▷ Remove the control switches, the 7-way cable.
- ▷ Refer to inverter specifications for details as to fixing brightness to a desired level, this may require a resistor, an open circuit or closed circuit depending on inverter

B. INVERTER CONNECTION:

There are 3 potential issues to consider with inverter connection:

- ▷ Power
- ▷ ON/OFF
- ▷ Brightness (DIM-ADJ)

Inverter power : This should be matched with the inverter specification.

Inverter ON/OFF : This is a pin provided on some inverter for ON/OFF function and is used by this panel controller for VESA DPMS compliance. If the inverter does not have on/off pin or the on/off pin is not used DPMS will not operate. Pin5 should be matched to the inverter specification for the ON/OFF pin.

Brightness Dimming control : This controller boards are supported analog dimming and PWM dimming control method too. And it is important to consider the specifications for the inverter to be used.

9. APPLICABLE GRAPHIC MODE

The microprocessor measures the, H- sync V- sync and polarity for RGB Inputs, and uses this timing information to control all of the display operation to get the proper image on a screen. This board can detect all VESA standard Graphic modes shown on the table below and Provide mare clear and stable image on a screen.

PC, DVI input format

Spec / Mode	Pixel Freq.	Horizontal Timing		Vertical Timing	
		Freq.	Active	Freq.	Active
	MHz	KHz	Pixel	Hz	Lind
640*350@70Hz	25.144	31.430	640	70.000	350
640*400@70Hz	28.287	31.430	640	70.000	400
720*400@ 70Hz	28.287	31.430	720	70.000	400
640*480@60Hz	28.175	31.469	640	59.940	480
640*480@72Hz	31.500	37.861	640	72.809	480
640*480@75Hz	31.500	37.500	640	75.000	480
800*600@56 Hz	36.000	35.156	800	56.250	600
800*600@60Hz	40.000	37.879	800	60.317	600
800*600@72Hz	50.000	48.077	800	72.188	600
800*600@75Hz	49.500	46.875	800	75.000	600
1024*768@60Hz	65.000	48.363	1024	60.005	768
1024*768@ 70Hz	75.000	56.476	1024	70.070	768
1024*768@75Hz	78.750	60.023	1024	75.030	768
1280*720@60Hz	74.500	44.772	1280	59.855	720
1280*720@75Hz	95.75	56.456	1280	74.777	720
1280*768@60Hz	80.14	47.7	1280	60	768
1280*768@75Hz	102.25	60.289	1280	74.893	768
1280*960@60Hz	101.25	59.699	1280	59.939	960
1280*960@75Hz	129.6	75	1280	75	960
1360*768@60Hz	84.75	47.72	1360	59.799	768
1280*1024@60Hz	108.000	63.981	1280	60.020	1024
1280*1024@75Hz	135.000	79.976	1280	75.035	1024
1600*1200@60Hz	162.000	75.000	1600	60.000	1200
1920*1080@60Hz	138.500	66.587	1920	59.934	1080
1920*1200@60Hz	193.250	74.556	1920	59.885	1200

HR601U

HDMI input format

Mode \ Spec	Horizontal Timing		Vertical Timing	
	Freq.	Active	Freq.	Active
	KHz	Pixel	Hz	Lind
720X480(P)	31.469	720	59.94	480
1280X720(P)	45	1280	60	720
1920X1080(P)	33.75	1920	60	540
720X480(I)	15.734	720	59.94	240
720X576(P)	31.25	720	50	576
1280X720(P)	37.50	720	50	720
1920X1080(I)	28.125	1920	50	540
720X576(I)	15.625	720	50	288
1920X1080(P)	67.432	1920	59.940	1080
1920X1080(P)	56.250	1920	50	1080
1920X1080(I)	26.973	1920	23.976	1080
1920X1080(I)	33.750	1920	30	1080
2560X1440@60Hz	88.787	2560	60	1440
3440X1440@60Hz	88.819	3440	60	1440
3840X2160 30Hz	65.688	3840	30	2160
3840X2160 60Hz	133.313	3840	60	2160

DP input format

Mode \ Spec	Horizontal Timing		Vertical Timing	
	Freq.	Active	Freq.	Active
	KHz	Pixel	Hz	Lind
720X480(P)	31.469	720	59.94	480
1280X720(P)	45	1280	60	720
1920X1080(P)	33.75	1920	60	540
720X480(I)	15.734	720	59.94	240
720X576(P)	31.25	720	50	576
1280X720(P)	37.50	720	50	720
1920X1080(I)	28.125	1920	50	540
720X576(I)	15.625	720	50	288
1920X1080(P)	67.432	1920	59.940	1080
1920X1080(P)	56.250	1920	50	1080
1920X1080(I)	26.973	1920	23.976	1080
1920X1080(I)	33.750	1920	30	1080
2560X1440@60Hz	88.787	2560	60	1440
3440X1440@60Hz	88.819	3440	60	1440
3840X2160 30Hz	65.688	3840	30	2160
3840X2160 60Hz	133.313	3840	60	2160

10. ACCESSORY

REMOCON