

AD BOARD

Specifications

HI-4K MONITOR

Approval

Rev.01

Issue Date.

2015. 10. 29

Doc No.

HI-4K BOARD 04

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

Prepared	Checked I	CheckedII	Approved
			
Samuel. Lee			YH. HAN

HI-4K MONITOR

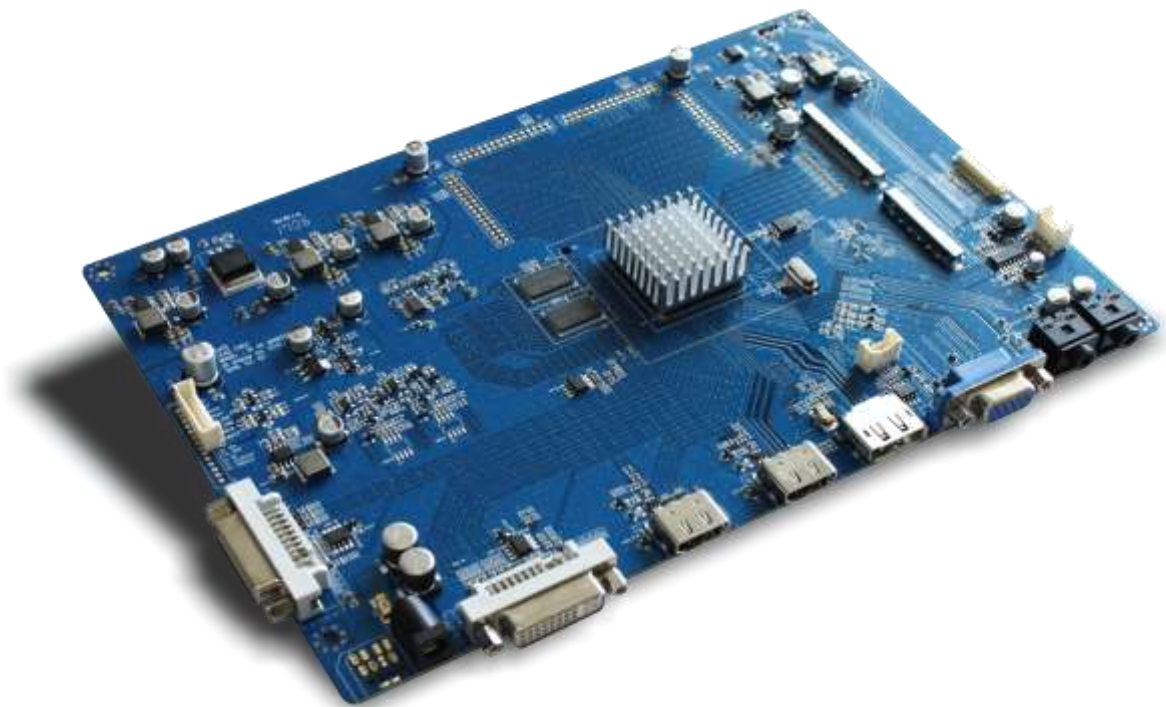
Revision History

Rev.	ECN No.	Description of Changes	Date	Prepared
V1.0		Initial Release	2015.10.29	Samuel. Lee

HI-4K MONITOR

1. General Specification

No.	Item	Description		
1	Model Name	HI-4K MONITOR		
2	LCD Module	V BY ONE , eDP(8 lines & 4 lines), LVDS*4 3840x2160		
3	Input	Analog RGB(R, G, B Separate H, V Sync), Dual and single DVI, HDMI*2, DP, AUDIO		
4	Max Support Resolution	4096X2160 (60Hz)		
5	OSD Control	Menu, Select, Down, Up, Power		5 keys
	Plug & Play	VESA DDC 2B Ver1.3		
6	Power Consumption	Supply Voltage	18Vdc	
		Power	10 Watt	Board Only
7	Signal Connector	Analog	DSUB 15P(R, G, B Separate H, V Sync)	
		Digital	DVI-D 24P(TMDS) / HDCP Ver1.4	
		Audio	2.5W + 2.5W (5 Ω)	
8	Board Size	W x H x D(mm)	240 x 160 x 17	



2. ELECTRICAL SPECIFICATION

2.1. Input characteristic

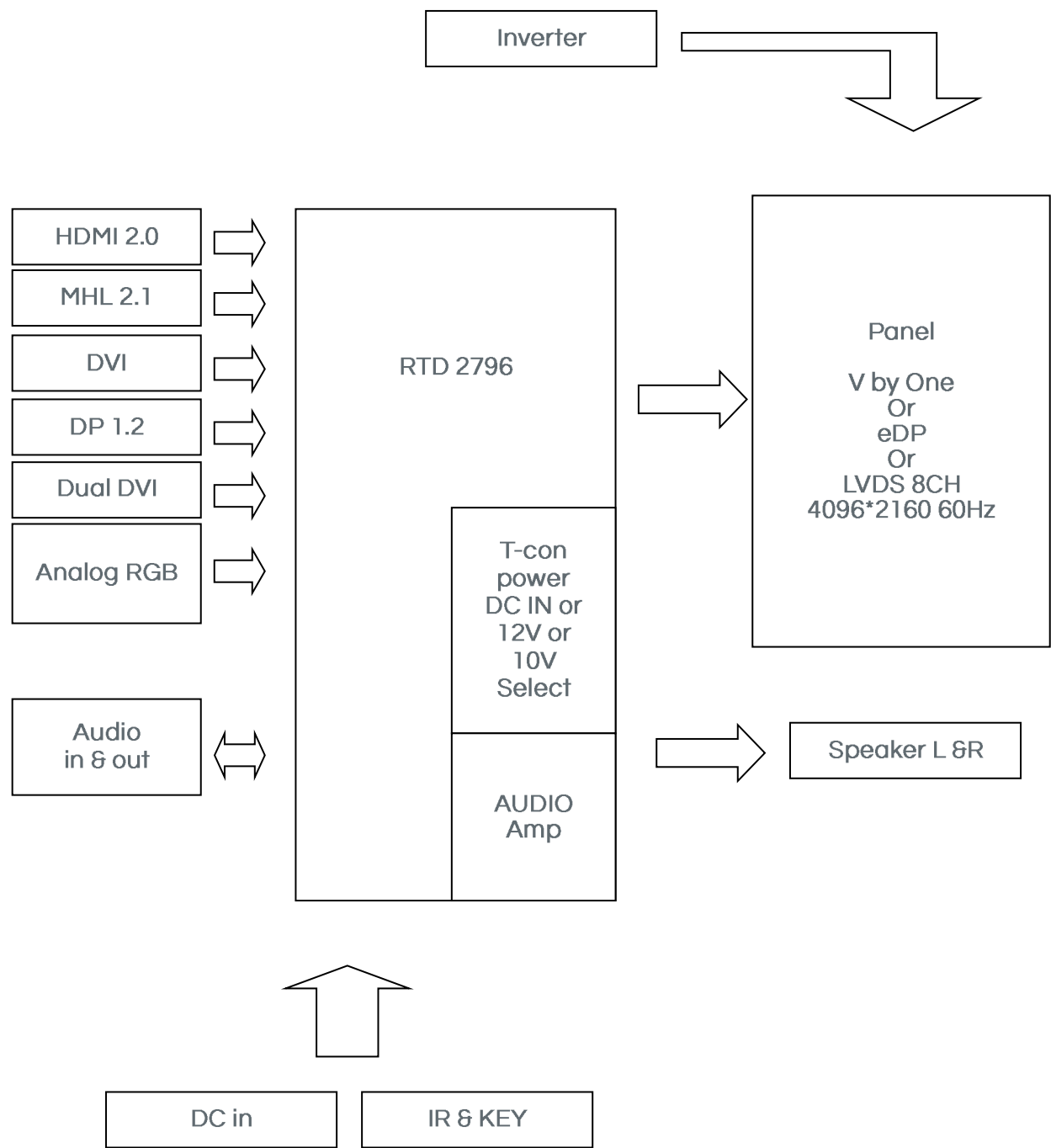
Description	Signal	Unit	Min	Typical	Max	Remarks
Power In (12Vdc)						
	Input	18VDC	17.4	18	24.5	
	Consumption	Watt		10 Watt		Board Only
RGB Input						
	Analog RGB	VPP	0	0.7	-	
	Sync	VDC	0	5	5.5	
	H Frequency	KHz	31		80	Depends on Mode
	V Frequency	Hz	55	75	77	Depends on Mode
HDMI Input						
	TMDs	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	17.4	18	18.6	Jumper option
	LCD Power(10V)	VDC	11.5	12	12.6	Jumper option
LVDS Interface						
	Differential output	Vp-p (mV)	250	350	450	Differential +/-
AUDIO Interface						
	Output	Watt		5	6	
	Frequence	Hz	700Hz		20KHz	
	THD	5% MAX AT 1500Hz 1.0W				
Inverter Interface						
	Power	V	17.4	18	18.6	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

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3. FUNCTIONAL BLOCK DIAGRAM

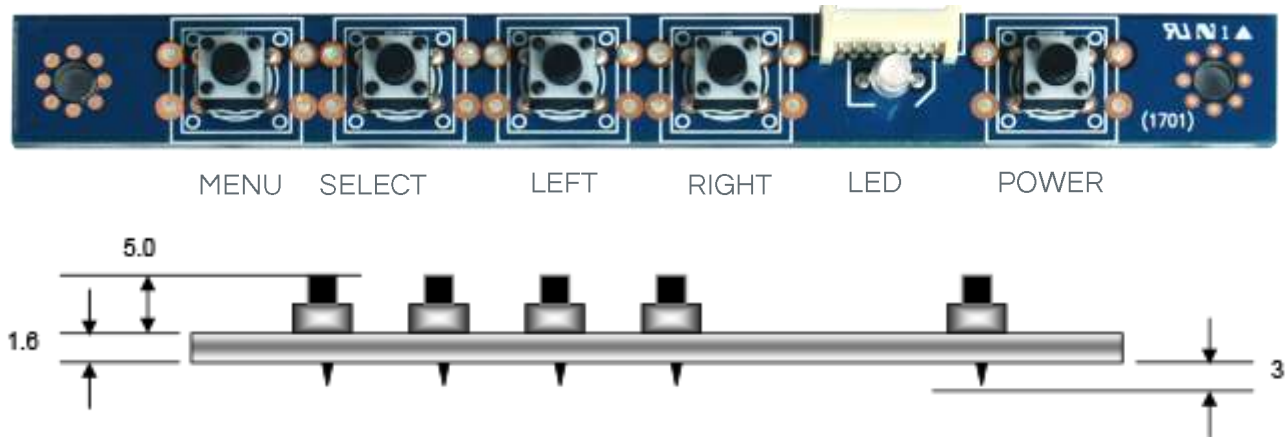


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4. OSD Control Board

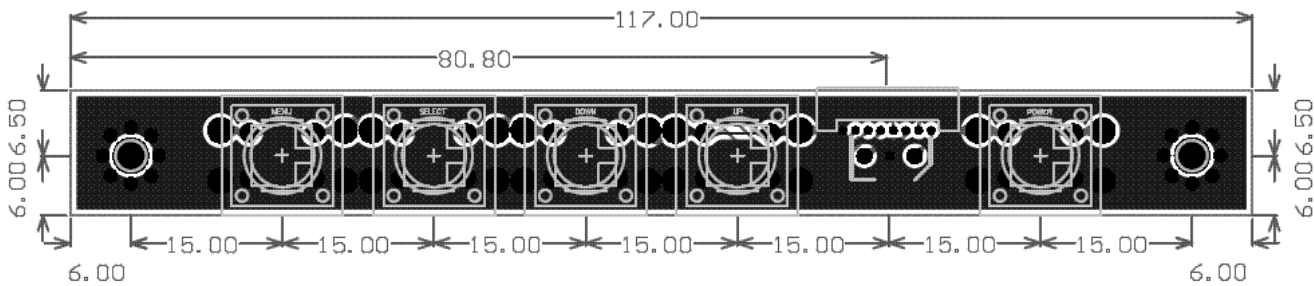
The OSD (On Screen Display) provides certain functions to have clear image and others. This board supports 5 buttons OSD operation as a standard. The control functions defined on OSD operation are as below. (Unit: mm)

Appearance



Board Size (W x H x D) : 112 x 12.5 x 6.6 mm

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		



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5-1. OSD FUNCTION

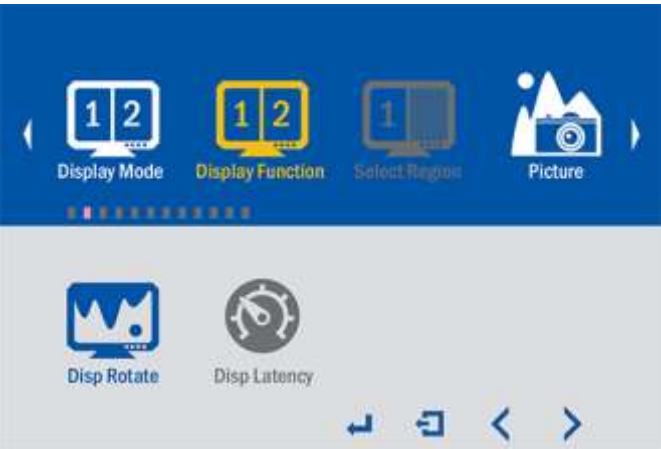


Display Mode

OSD Menu	
1P	1P Select
	1 Display
2P LR	2P LR Select
	2 Display Left and Right
2P TB	2P TB Select
	2 Display Top and Bottom
2P PIP	2P PIP Select
	PIP Function
4P	4P Select
	Not active this Function

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5-2. OSD FUNCTION



Display Function

OSD Menu		
1P Mode	Disp Rotate Mode Select	
	Mode	0
		90
		180
		270
2P LR Mode	2P LR Mode select	
	Mode	LR Ratio
		Put Swap
2P TB Mode	2P TB Mode select	
	Mode	Input Swap
2P PIP Mode	2P PIP Mode select	
	PIP Position	Left Top
		Right Top
		Left Bottom
		Right Bottom
		Center
	User	H Position
		V Position
	PIP Size	
	Input Swap	
4P Mode	Not active this Function	

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5-3. OSD FUNCTION

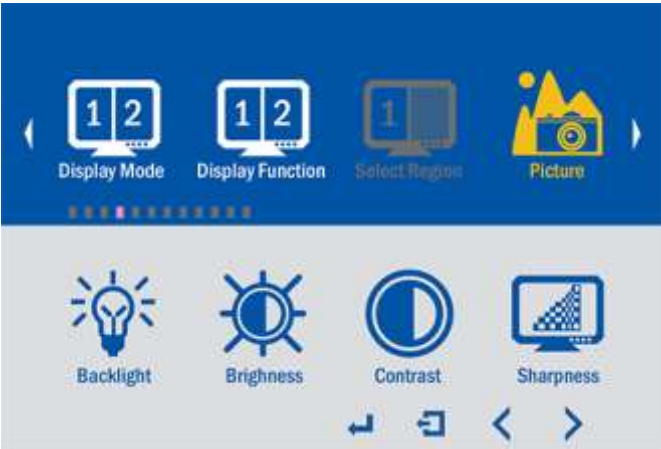


Select Region

OSD Menu		
1P Mode	Not active this Function	
2P LR Mode	2P LR Mode select	
	Mode	Left Side
		Right Side
		Full
2P TB Mode	2P TB Mode select	
	Mode	Top Side
		Bottom Side
		Full
2P PIP Mode	2P PIP Mode select	
	Mode	Main
		Sub
		Full
4P Mode	4P Mode select	
	Not active this Function	

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5-4. OSD FUNCTION



Picture

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

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5-5. OSD FUNCTION



Analog

OSD Menu			
Auto Adjust	Auto Adjust level control		
	Range of Value	MIN	0
		MAX	100
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 level control		
	Range of Value	MIN	1
		MAX	60
Phase	Phase level control		
	Range of Value	MIN	0
		MAX	100

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5-6. OSD FUNCTION



Color

OSD Menu				
Panel Uniformity	Panel Uniformity Mode select			
	Mode	ON		
		OFF		
Gamma	Gamma Mode select			
	Mode	OFF	1.8	2.0
		2.2	2.4	
Temperature	Temperature Mode select			
	Mode	9300	7500	6500
		5800	sRGB	User
Color Effect	Color Effect Mode select			
	Mode	Standard	Game	Movie
		Photo	Vivid	User
Demo	Demo Mode select			
	Mode	Type1	Type2	Type3
		Type4	Type5	
Color format	Color format Mode select			
	Mode	RGB		
		YUV		
Hue	Hue level control			
	Range of Value	MIN	0	
		MAX	100	
Saturation	Saturation level control			
	Range of Value	MIN	0	
		MAX	100	

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5-7. OSD FUNCTION



Advance

OSD Menu				
Aspect Ratio	Aspect Ratio Mode select			
	Mode	Full	16:9	4:3
		5:4	1:1	
Over Scan	Over Scan Mode select			
	Mode	ON		
		OFF		
Over Drive	Over Drive Mode select			
	Mode	ON		
		OFF		
	OD Gain level Control			
	Range of Value	MIN	0	
MAX		100		
DDCCI	DDCCI Mode select			
	Mode	ON		
		OFF		
Ultra Vivid	Ultra Vivid Mode select			
	Mode	OFF		
		L		
		M		
		H		
DCR	Not active this Function			
DP Option	DP Option Mode select			
	Mode	1.1		
		1.2		
DP MST	If you using HBR2 panel, It's not active			

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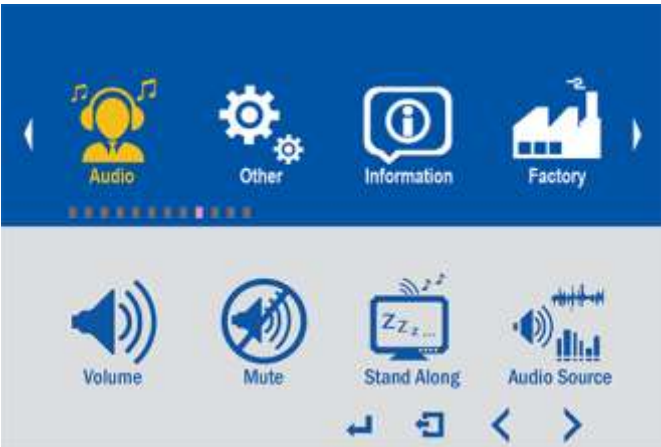
5-8. OSD FUNCTION



Input

OSD Menu
A0: VGA
D0: DP
D1: HDMI1
D2: HDMI2
D3: Dual DVI
D4: NONE
D5: DVI
D6: NONE
D7: NONE
Auto Select

5-9. OSD FUNCTION



Audio

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

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5-10. OSD FUNCTION



Other

OSD Menu			
Reset	Reset		
Menu time	Menu time level Control		
	Range of Value	1	
		60	
OSD H Position	OSD H Position level Control		
	Range of Value	0	
		100	
OSD V Position	OSD V Position level Control		
	Range of Value	0	
		100	
Transparency	Transparency level Control		
	Range of Value	0	
		255	
Rotate	Rotate Mode select		
	Mode	0	
		90	
		270	
Border Width	Border Width level Control		
	Range of Value	1	
		10	
Border Color	Border Color Mode select		
	Mode	R	G
		B	W

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5-11. OSD FUNCTION

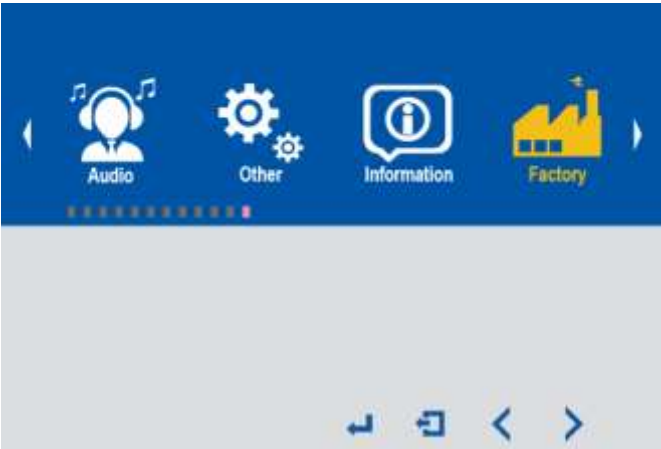


Information

OSD Menu	
Information	Video source information

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5-12. OSD FUNCTION

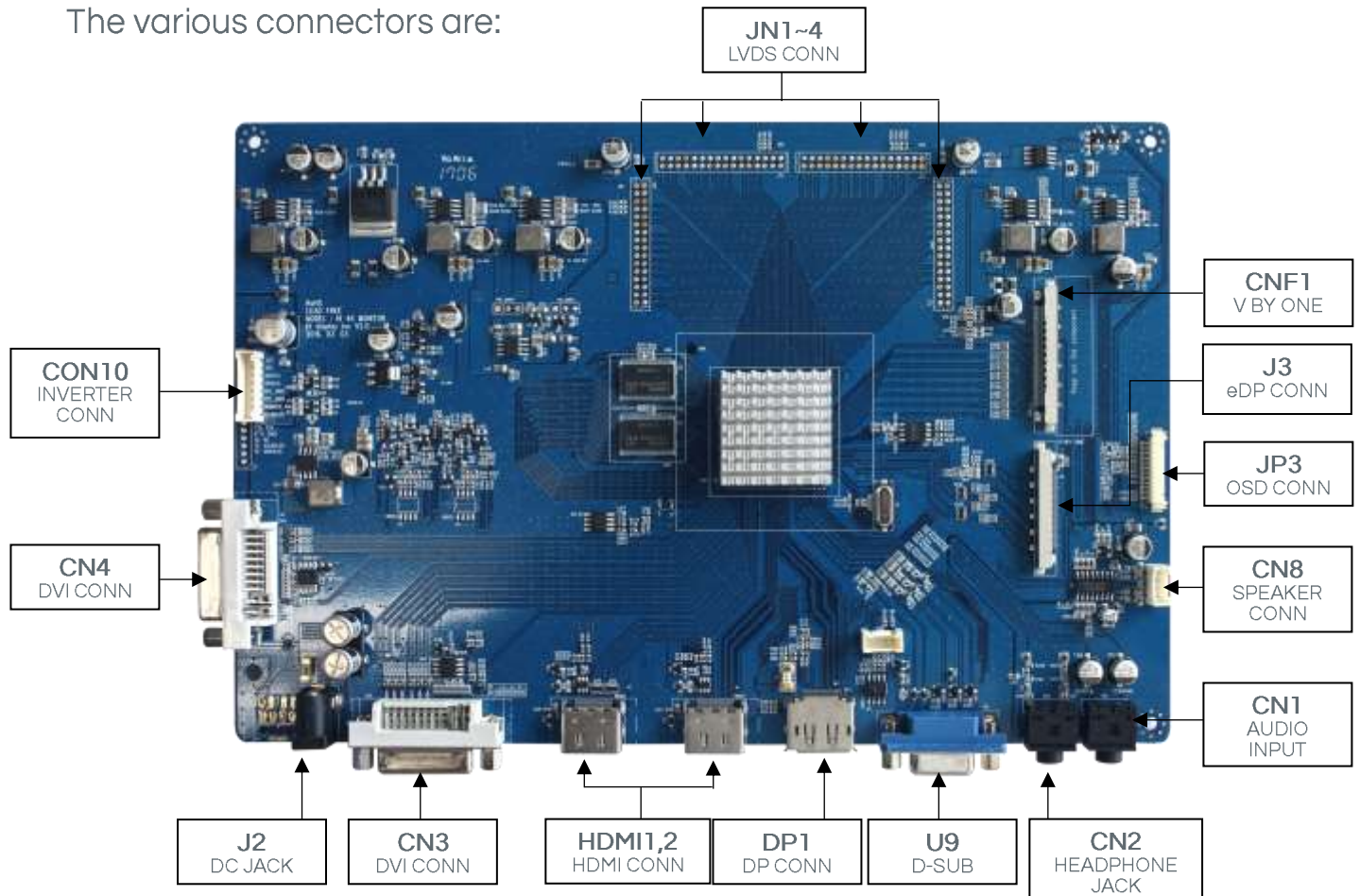


Factory

OSD Menu	
Factory	Factory Mode Screen

6. CONNECTOR, PINOUT & JUMPERS

The various connectors are:



Summary:

Reference	Item	Description	Type	Manufacture
J2	Jack	DC POWER JACK	2.5ø DC Jack	-
CN1	Jack	AUDIO INPUT	3.5ø Phone Jack	
CN2	Jack	HEADPHONE JACK	3.5ø Phone Jack	
CN3,4	Connector	DVI CONNECTOR	25PIN 3LAYER R/A	
CN8	Connector	SPEAKER CONNECTOR	SMW200-04P-2.0mm	YEONHO
DP1	Connector	DP CONNECTOR	20P(DP-SMD)	
HDMI1,2	Connector	HDMI CONNECTOR	19P(R-S151L-3 LOCK)	
CON10	Connector	INVER POWER CONNECTOR	SMW200-10P-2.0mm	YEONHO
CNF1	Connector	V BY ONE CONNECTOR	FI-RE51S-HF	
JN1~4	Connector	LVDS CONNECTOR	YWD200-32-2.0mm	YEONHO
J3	Connector	eDP(HBR2) CONNECTOR	FI-RE41S-H	
JP3	Connector	OSD CONNECTOR	12505WR-12P-1.25mm	YEONHO
U9	Connector	D-SUB CONNECTOR	D SH-15FR	CFD

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CN8: SPEAKER Connector

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

CNF1: 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)

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CON10: INVER POWER Connector

Pin No.	Symbol	Description
1,2	12V	INVER POWER 12V
3,4	5V	Normal 5V
5,6	GND	Ground
7	BL ON,OFF	Backlight on / off
8	BL ADJ	Backlight Adjust

JN1~4: LVDS Connector

Pin No.	Symbol	Description
1~3	P VCC	PANEL VCC(12V OR 10V)
4	N.C	No Connection
5	GND	Ground
6	RXE4-	Even pixel Negative LVDS differential data input. Pair4
7	RXE4+	Even pixel Positive LVDS differential data input. Pair4
8	RXE3-	Even pixel Negative LVDS differential data input. Pair3
9	RXE3+	Even pixel Positive LVDS differential data input. Pair3
10	RXEC-	Even pixel Negative LVDS differential clock input.
11	RXEC+	Even pixel Positive LVDS differential clock input.
12	GND	Ground
13	RXE2-	Even pixel Negative LVDS differential data input. Pair2
14	RXE2+	Even pixel Positive LVDS differential data input. Pair2
15	RXE1-	Even pixel Negative LVDS differential data input. Pair1
16	RXE1+	Even pixel Positive LVDS differential data input. Pair1
17	RXE0-	Even pixel Negative LVDS differential data input. Pair0
18	RXE0+	Even pixel Positive LVDS differential data input. Pair0
19	GND	Ground
20	RXO4-	Odd pixel Negative LVDS differential data input. Pair4
21	RXO4+	Odd pixel Positive LVDS differential data input. Pair4
22	RXO3-	Odd pixel Negative LVDS differential data input. Pair3
23	RXO3+	Odd pixel Positive LVDS differential data input. Pair3
24	RXOC-	Odd pixel Negative LVDS differential clock input.
25	RXOC+	Odd pixel Positive LVDS differential clock input.
26	GND	Ground
27	RXO2-	Odd pixel Negative LVDS differential data input. Pair2
28	RXO2+	Odd pixel Positive LVDS differential data input. Pair2
29	RXO1-	Odd pixel Negative LVDS differential data input. Pair1
30	RXO1+	Odd pixel Positive LVDS differential data input. Pair1
31	RXO0-	Odd pixel Negative LVDS differential data input. Pair0
32	RXO0+	Odd pixel Positive LVDS differential data input. Pair0

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J3: eDP Connector(HBR2)

Pin No.	Symbol	Description
1~3	P VCC	PANEL VCC(12V OR 10V)
4	N.C	No Connection
5~7	GND	Ground
8~14	N.C	No Connection
15	GND	Ground
16,17	N.C	No Connection
18	GND	Ground
19,20	N.C	No Connection
21	GND	Ground
22,23	N.C	No Connection
24	GND	Ground
25,26	N.C	No Connection
27	HPD	Hot plug detection
28	2nd AUX_CH_N	Negative AUX Channel Differential data input
29	2nd AUX_CH_P	Positive AUX Channel Differential data input
30	GND	Ground
31	2nd Lane0_P	Positive eDP differential data input
32	2nd Lane0_N	Negative eDP differential data input
33	GND	Ground
34	2nd Lane1_P	Positive eDP differential data input
35	2nd Lane1_N	Negative eDP differential data input
36	GND	Ground
37	2nd Lane2_P	Positive eDP differential data input
38	2nd Lane2_N	Negative eDP differential data input
39	GND	Ground
40	2nd Lane3_P	Positive eDP differential data input
41	2nd Lane3_N	Negative eDP differential data input

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



9. 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.

10. 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 more clear and stable image on a screen.

PC, DVI input format

Spec Mode	Pixel Freq. MHz	Horizontal Timing		Vertical Timing	
		Freq.	Active	Freq.	Active
		KHz	Pixel	Hz	Line
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
2560*1440@60Hz					

HDMI input format

Mode \ Spec	Horizontal Timing		Vertical Timing	
	Freq.	Active	Freq.	Active
	KHz	Pixel	Hz	Line
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
3840X2160 30Hz		3840	30	2160
3840X2160 60Hz		3840	60	2160

DP input format

Mode \ Spec	Horizontal Timing		Vertical Timing	
	Freq.	Active	Freq.	Active
	KHz	Pixel	Hz	Line
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
3840X2160 30Hz		3840	30	2160
3840X2160 60Hz		3840	60	2160

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10. ACCESSORY

REMOCON

