Technical Reference Specification

MULTI INTERFACE CONTROLLER
FOR TFT LCD

Revision History

Date	Description	Rev. No.	Remarks
15.09.23	-. Initial version.	00	-

1. General Specification

No.	Item	Description	
1	**LCD Module**	**3840 x 2160** , LVDS ,V By One ,eDP	
2	**Input**	Analog RGB DVI HDMI Display Port Audio	
3	**Resolution Support**	H : 31 ~ 80KHz V : 55 ~ 76Hz	
4	**OSD Control**	Input, Menu, Left, Right, Down, Up, Power	**7 Keys**
5	**Plug & Play**	VESA DDC 2B Ver. 1.3	
6	**Power Consumption**	Supply Voltage : 18 [V]	
		Power : 10[W]	
7	**Signal Connector**	Analog : D-SUB 15P	
		Digital : HDMI, DP	
		Audio : 15W+15W (Max : 30W+30W)	
8	**Board Size**	W * H * D (mm) : 210 x 195 x 17	

2. Electrical Specification

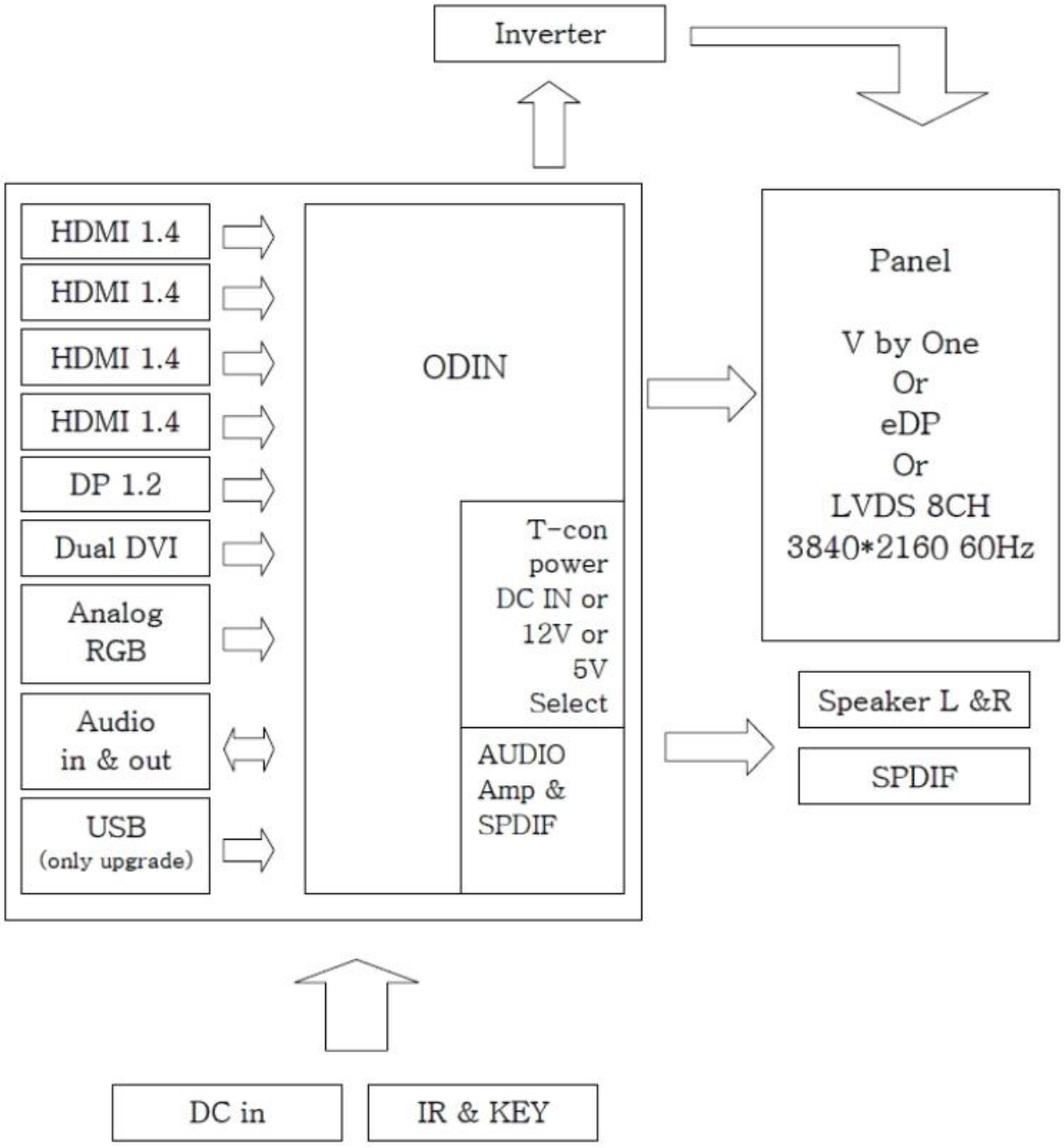
2.1 Input Characteristic

Description	Signal	Unit	Min	Typical	Max	Remarks
Power In (18Vdc)						
	Input	18VDC	17.4	18	18.6	
	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	

2.2 Output Characteristic

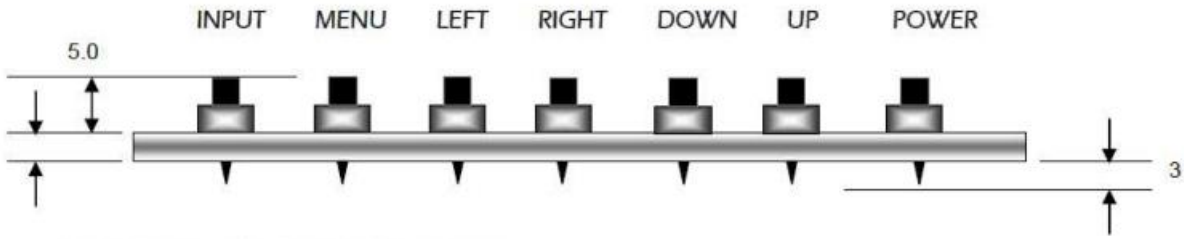
Description	Signal	Unit	Min	Typical	Max	Remarks
Panel Power						
	LCD Power (18V)	VDC	17.4	18	18.6	Jumper option
	LCD Power (12V)	VDC	11.5	12	12.6	Jumper option
	LCD Power (5V)	VDC	4.8	5	5.2	Jumper option
LVDS Interface						
	Differential output	Vp-p (mV)	250	350	450	Differential +/-
AUDIO Interface						
	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

3. Function Block Diagram



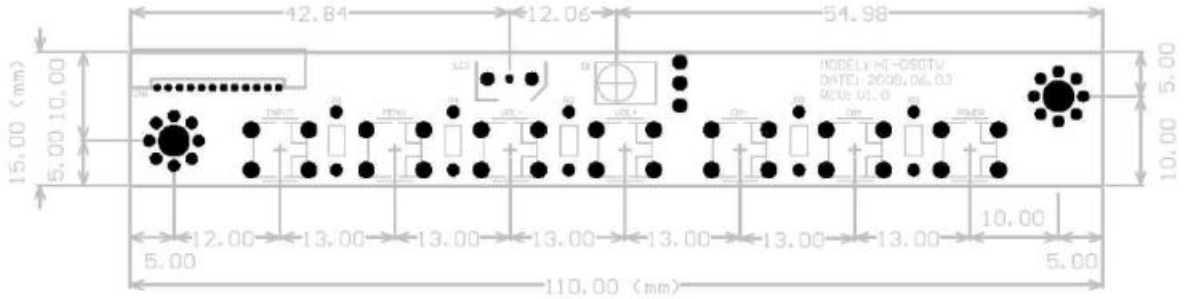
4. OSD Menu

The OSD (On Screen Display) provides certain function to have clear image and others.
This board support 7 buttons OSD operation as a standard.
The control function defined on OSD operation are below. (Unit : mm)



Board Size (W x H x D) : 110 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	Input Select / Source		
LEFT	Cursor control Left		
RIGHT	Cursor control Right		
DOWN	Cursor control Down		
UP	Cursor control Up / Auto Adjust		



5. OSD Function

A. Input Source

Sub Menu	Description
Auto Select	-
VGA	-
Display Port	-
HDMI 1	-
HDMI 2	-
OPS	-
DVI-D	-

B. Brightness / Contrast

Sub Menu	Description
Brightness	Control Brightness level.
Contrast	Control Contrast level.
Dynamic Contrast	On / Off

C. Color Format Settings

Sub Menu	Description
Input Color Format	RGB, YPbPr, Auto Select
Color Domain	RGB Domain, YUV Domain

D. Color Settings

Sub Menu	Description
Bypass	On / Off
Gamma	Control the Gamma level. (1.8 ~ 2.6)
Color Modes	Standard, Vivid, Game, Movie
Color Temperature	5700K, 6500K, 9300K
Gain	Red, Green, Blue
Independent Color	-
Hue / Saturation	-

E. Picture Quality Settings

Sub Menu	Description
Bypass	On / Off
Sharpness	-
Response Time	On / Off
Noise Reduction	Low, Middle, High
Uniformity	On / Off
Super Resolution	Low, Middle, High
Dynamic Luminous	On / Off

F. Display Settings

Sub Menu	Description
Aspect Ratiio	Full Screen, 4:3, 5:4, 16:9
Horizontal Position	-
Vertical Position	-
Pixel Clock	-
Phase	-
Auto Adjust	-

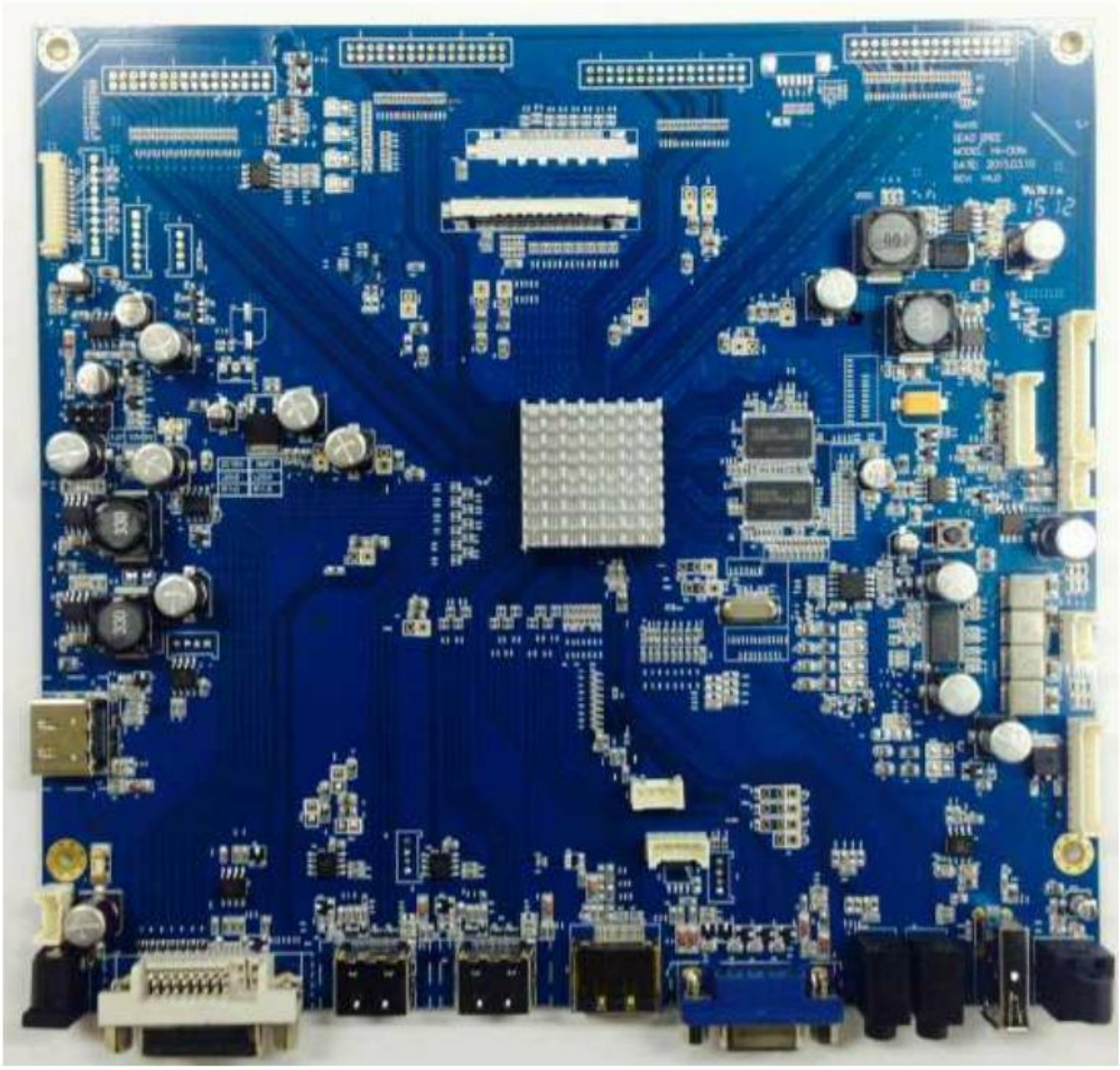
G. Multi – Windows Settings

Sub Menu	Description
Multi – Windows mode	PIP Mode, PBP Mode, Triple Mode, Quad Mode
Window Select	Window1, Window 2, Window3, Window4
PIP Size	-
PIP Horizontal Position	-
PIP Vertical Position	-

H. Other Settings

Sub Menu	Description
Language	English & Chinese
Menu Transparency	-
Menu Rotation	-
Factory Reset	-

6. Connector, Pinout & Jumpers



Reference	Item	Description	Type	Manufacture
J1	JACK	DC POWER JACK	2.5ø DC Jack	-
CON1401	CONNECTOR	USB CONNECTOR	USB 5P MINI	-
CN1001	CONNECTOR	DVI CONNECTOR	25PIN 3LAYER R/A	-
J318	CONNECTOR	ODIN DEBUG CONNECTOR	SMW200-04P-2.0mm	YEONHO
CN512	CONNECTOR	D-SUB CONNECTOR	DSH-15FR/A SHORT	-
CN8	CONNECTOR	DC 24V CONNECTOR	SMW200-04P-2.0mm	YEONHO
CN1	JACK	AUDIO IN JACK	AUDIO JACK PJ-325D	YEONHO
CN2	JACK	HS OUT JACK	AUDIO JACK PJ-325D	-
CN7,815,915	CONNECTOR	HDMI CONNECTOR	19P(R-S151L-3 LOCK)	-
CN3	CONNECTOR	INVER POWER CONNECTOR	SMW200-10P-2.0mm	YEONHO
CN4	CONNECTOR	DC POWER CONNECTOR	SMW200-04P-2.0mm	YEONHO
J1309	CONNECTOR	INVERTER CONNECTOR	SMW200-08P-2.0mm	YEONHO
CN12	CONNECTOR	OSD CONNECTOR	12505WR-12P-1.25mm	YEONHO
CN13	CONNECTOR	OSD CONNECTOR	SMW200-10P-2.0mm	YEONHO
CN14	CONNEXTOR	OSD CONNECTOR	SMW200-06P-2.0mm	YEONHO
J1310	CONNECTOR	V BY ONE CONNECTOR	FI-RE51S-HF	-
J3	CONNECTOR	eDP CONNECTOR	FI-RE41S-HF	-
CN6	CONNECTOR	SPEAKER CONNECTOR	SMW200-04P-2.0mm	YEONHO
CON1,2,3,4	CONNECTOR	LVDS CONNECTOR	YWD200-32-2.0mm	YEONHO
CON6	CONNECTOR	EXT LVDS CONNECTOR	12505WR-08-1.25mm	YEONHO
CN11	JACK	PANEL POWER	H-3x2-6p	-
CN613	CONNECTOR	DP CONNECTOR	20P(DP-SMD)	-
CN9	CONNECTOR	SMPS CONNECTOR	SMW200-12P-2.0mm	YEONHO
CN5	CONNECTOR	AMP POWER	H-2x2-4p	YEONHO
J4,502,804	CONNECTOR	DDC CONNECTOR	SMW200-04P-2.0mm	YEONHO

CN3 : INVER Power Connector

Pin No.	Symbol	Description
1,2	12V	INVER POWER 12V
3,4	12V	INVER POWER 12V
5	12V	INVER POWER 12V
6,7	GND	Ground
8,9	GND	Ground
10	GND	Ground

J318 : Debug Connector

Pin No.	Symbol	Description
1	NC	No Connector
2	GND	Ground
3	SCL	I2C CLACK
4	SDA	I2C DATA

CN8 : 24V Connector

Pin No.	Symbol	Description
1,2	24V	Speaker POWER 24V
3,4	GND	Ground

CN9 : SMPS Connector

Pin No.	Symbol	Description
1	PW ON,OFF	Power On,Off
2	S5V	Start 5V
3,4	5V	5V
5,6	GND	Ground
7,8,9	12V	12V
10	BL ON,OFF	BackLight On,Off
11	BL ADJ	BackLight Adjust
12	BL PWM	BackLight PWM
13	GND	Ground

CN4 : DC Power Connector

Pin No.	Symbol	Description
1,2	12V	DC POWER 12V
3,4	GND	Ground

CN6 : Speaker Connector

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

CN12 : OSD Connector

Pin No.	Symbol	Description
1	LED-Green	GREEN Color
2	LED-Red	RED Color
3	GND	Ground
4	SOURCE	For Source Switch
5	MENU	For Menu Switch
6	LEFT	For Left Switch
7	RIGHT	For Right Switch
8	DOWN	For Down Switch
9	UP	For Up Switch
10	POWER	For Power Switch
11	IRD	IR DATA
12	3.3V	IR POWER 3.3V

CN13 : OSD Connector

Pin No.	Symbol	Description
1	GND	Ground
2	POWER	For Power Switch
3	UP	For Up Switch
4	DOWN	For Down Switch
5	RIGHT	For Right Switch
6	LEFT	For Left Switch
7	NC	No Connector
8	MENU	For Menu Switch
9	SOURCE	For Source Switch
10	GND	Ground

J4 : IR Connector

Pin No.	Symbol	Description
1	3.3V	IR POWER 3.3V
2	GND	Ground
3	IRD	IR DATA
4	LED-Green	GREEN Color
5	LED-Red	RED Color
6	NC	No Connector

J310 : V by One Connector

Pin No.	Symbol	Description
1,2	Vin	Power +12V
3,4	Vin	Power +12V
5,6	Vin	Power +12V
7,8	Vin	Power +12V
9	N.C	No Connection
10,11	GND	Ground
12,13,14	N.C	No Connection
15	L/R_O	Output signal for Glasses Left Right signal
16	L/R	Input signal for Left/Right synchronous siginal
17	2D/3D	2D/3D Enable
18	SDA	I2C Data signal
19	SCL	I2C Clock Signal
20,21	N.C	No Connection
22	LD_EN	Local Dimming Mode Enable
23,24	N.C	No Connection
25	HTPDN	Hot plug detect output, Open drain
26	LOCKN	Lock detect output, Open drain
27	GND	Ground
28	RX0N	1st Pixel Negative V-by-One Differential data input in area A
29	RX0P	1st Pixel Positive V-by-One Differential data input in area A
30	GND	Ground
31	RX1N	2nd Pixel Negative V-by-One Differential data input in area A
32	RX1P	2nd Pixel Positive V-by-One Differential data input in area A
33	GND	Ground
34	RX2N	3rd Pixel Negative V-by-One Differential data input in area A
35	RX2P	3rd Pixel Positive V-by-One Differential data input in area A
36	GND	Ground
37	RX3N	4th Pixel Negative V-by-One Differential data input in area A
38	RX3P	4th Pixel Positive V-by-One Differential data input in area A
39	GND	Ground
40	RX4N	5th Pixel Negative V-by-One Differential data input in area A
41	RX4P	5th Pixel Positive V-by-One Differential data input in area A
42	GND	Ground
43	RX5N	6th Pixel Negative V-by-One Differential data input in area A
44	RX5P	6th Pixel Positive V-by-One Differential data input in area A
45	GND	Ground
46	RX6N	7th Pixel Negative V-by-One Differential data input in area A
47	RX6P	7th Pixel Positive V-by-One Differential data input in area A
48	GND	Ground
49	RX7N	8th Pixel Negative V-by-One Differential data input in area A
50	RX7P	8th Pixel Positive V-by-One Differential data input in area A
51	GND	Ground

J3 : eDP Connector

Pin No.	Symbol	Description
1	1st Lane3_N	Negative eDP differential data input
2	1st Lane3_P	Positive eDP differential data input
3	GND	Ground
4	1st Lane2_N	Negative eDP differential data input
5	1st Lane2_P	Positive eDP differential data input
6	GND	Ground
7	1st Lane1_N	Negative eDP differential data input
8	1st Lane1_P	Positive eDP differential data input
9	GND	Ground
10	1st Lane0_N	Negative eDP differential data input
11	1st Lane0_P	Positive eDP differential data input
12	GND	Ground
13	1st AUX_CH_P	Positive AUX Channel Differential data input
14	1st AUX_CH_N	Negative AUX Channel Differential data input
15	1st HPD	Hot plug detection
16	2nd Lane3_N	Negative eDP differential data input
17	2nd Lane3_P	Positive eDP differential data input
18	GND	Ground
19	2nd Lane2_N	Negative eDP differential data input
20	2nd Lane2_P	Positive eDP differential data input
21	GND	Ground
22	2nd Lane1_N	Negative eDP differential data input
23	2nd Lane1_P	Positive eDP differential data input
24	GND	Ground
25	2nd Lane0_N	Negative eDP differential data input
26	2nd Lane0_P	Positive eDP differential data input
27	GND	Ground
28	2nd AUX_CH_P	Positive AUX Channel Differential data input
29	2nd AUX_CH_N	Negative AUX Channel Differential data input
30	2nd HPD	Hot plug detection
31,32	N.C	No Connection
33,34	N.C	No Connection
35,36,37	GND	Ground
38	N.C	No Connection
39,40,41	VDD	Power +12V

J1309 : Inverter Connector

Pin No.	Symbol	Description
1,2	12V	INVERTER POWER 12V
3	5V	INVERTER POWER 5V
4	PWM0	INVERTER PWM0
5,6	GND	Ground
7	NO/OFF	INVERTER ON/OFF
8	PWM1	INVERTER PWM1

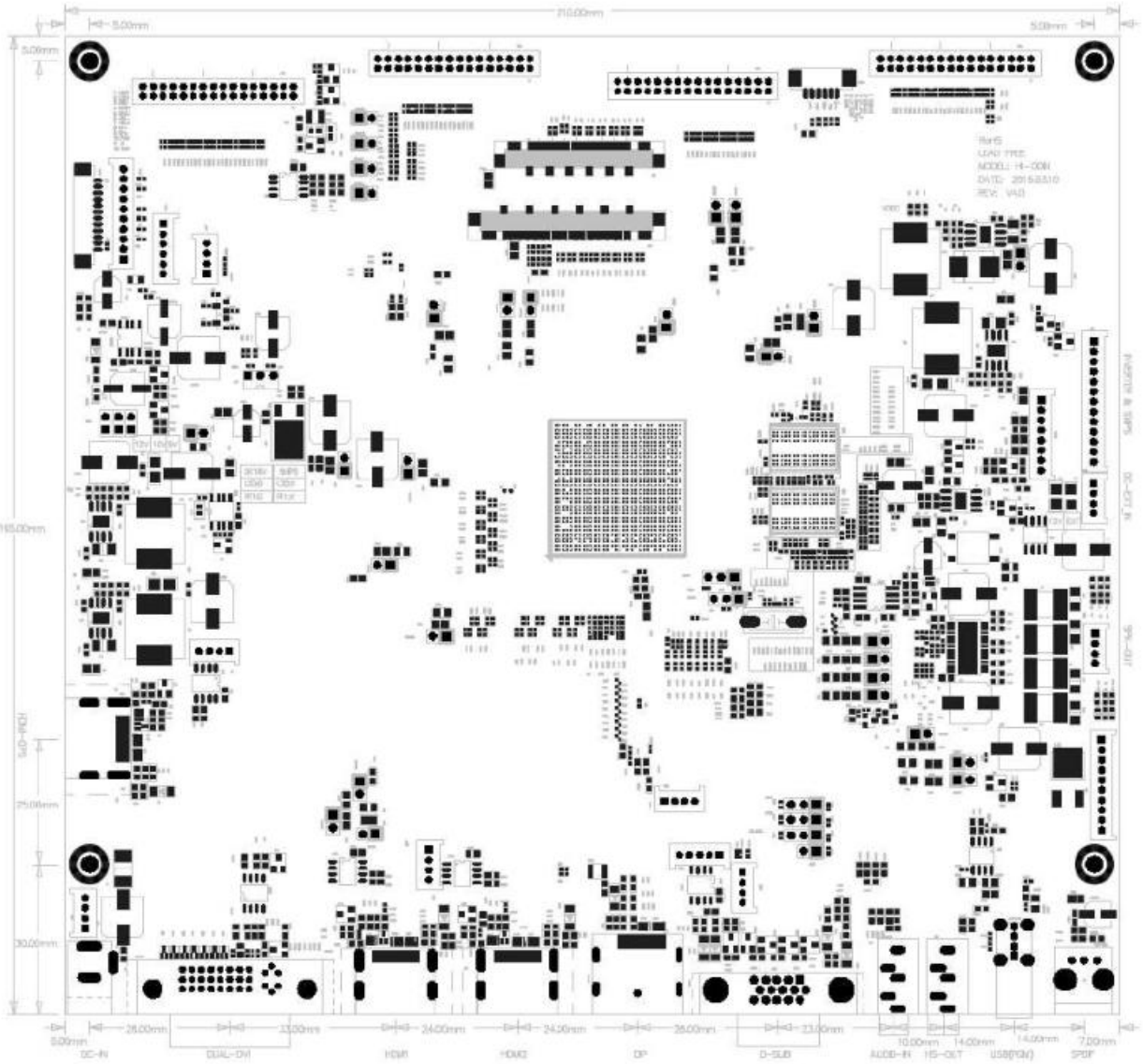
CON 1,2,3,4 : LVDS Connector

Pin No.	Symbol	Description
1,2,3	GND	Ground
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

CON 6 : EXT LVDS Connector

Pin No.	Symbol	Description
1	SDA	I2C Data
2	SCL	I2C Clock
3	2D/3D	Input signal for 2D/3D Mode Selection
4	L/R_O	Output signal for Left Right Glasses control
5	L/R	Input signal for Left Right eye frame synchronous
6	GND	Ground

7. Dimension


210.00mm
5.00mm
165.00mm
DC-IN
DUAL-DVI
HDMI
HDMI2
DP
D-SUB
AUDIO-IN
HS-OUT
USB(TGH)
SPDF

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 analog dimming control method. And it is important to consider the specifications for the inverter to be used.

9. Application Graphic Mode

The microprocessor measures the “H Sync, V Sync polarity for RGB Input, 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.

A. 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

B. HDMI Input Format

Spec / Mode	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
3840X2160(I)		3840	30	2160

C. DP Input Format

Spec / Mode	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
3840X2160(I)		3840	30	2160
3840X2160(I)		3840	60	2160