

GM-LEONA

Approval

Rev. 01



Issue Date.

2017. 02. 09

Doc No.

GM-LEONA BOARD 01

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
			
SW. OH	Samuel. Lee		YH. HAN

1. General Specification

No.	Item	Description		
1	Model Name	GM-LEONA		
2	LCD Module	3840X2160 10bit, V By One, eDP HBR2(Option)		
3	Input	HDMI 2.0*1(TMDS), Display Port, D-SUB		
4	Resolution Support	H: 31 ~ 135kH		
		V: 55 ~ 76Hz		
5	OSD Control	Input, Menu, Left, Right, Down, Up, Power		7 keys
	Plug & Play	VESA DDC 2B Ver1.4		
6	Power Consumption	Supply Voltage	12Vdc	
		Power	3.0 Watt	Board Only
7	Signal Connector	Digital	HDMI 2.0(TMDS), Display Port	
			HDCP Ver1.4	
		Audio	3W x 3W	
8	Board Size	W x H x D(mm)	140 x 130 x 17	



2. ELECTRICAL SPECIFICATION

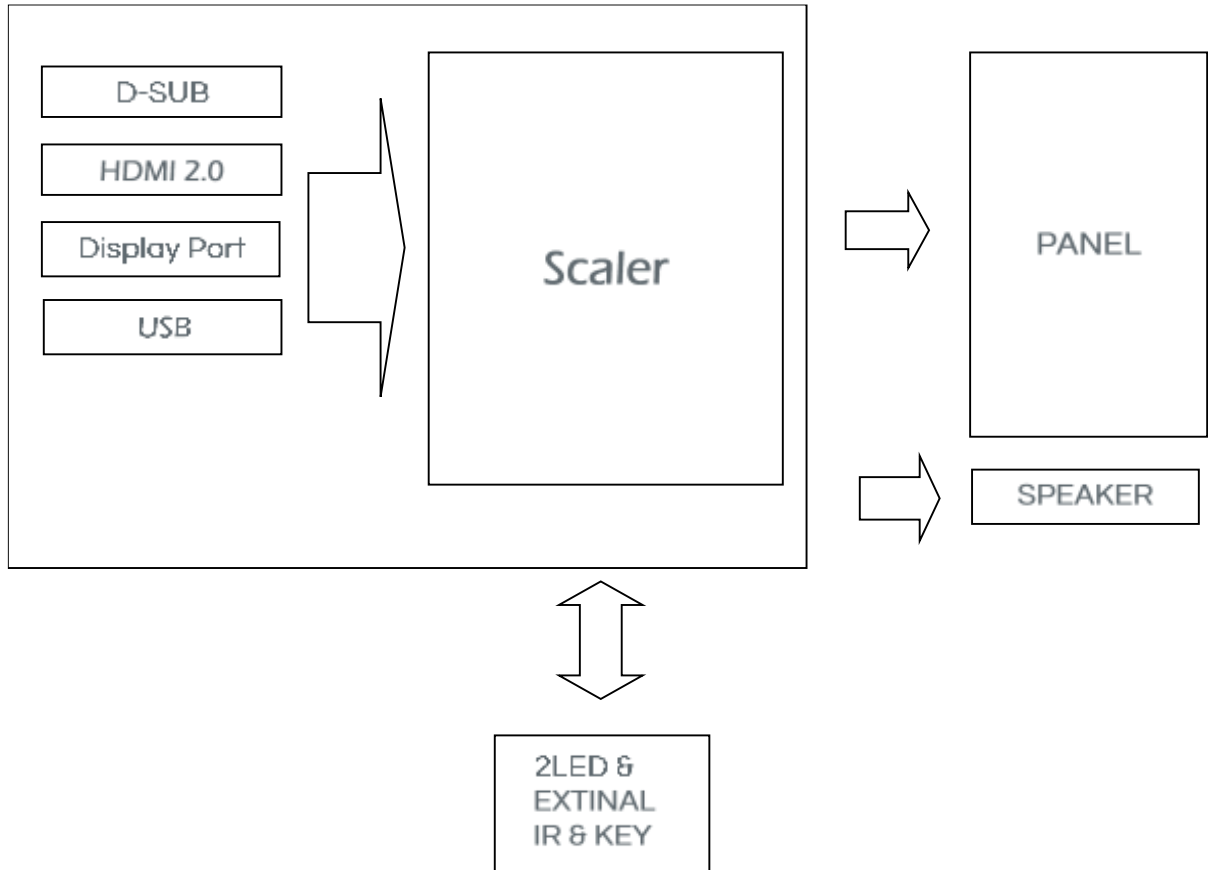
2.1. Input characteristic

Description	Signal	Unit	Min	Typical	Max	Remarks
Power In (12Vdc)						
	Input	12VDC	11.4	12	12.6	
	Consumption	Watt		3		
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						
	TMD5	mVp-p	450		900	
DP Input						
	HBR1.2	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	
	LCD Power(5V)	VDC	4.5	5	5.5	
	LCD Power(3.3V)	VDC	3.16	3.3	3.5	
AUDIO Interface						
	Output	Watt		3		
	Frequence	Hz	20Hz		20KHz	
	THD	POUT=3W@ 4Ω, THD 10%(at 5V)				
Inverter Interface						
	Power	V	11.4	12	12.6	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

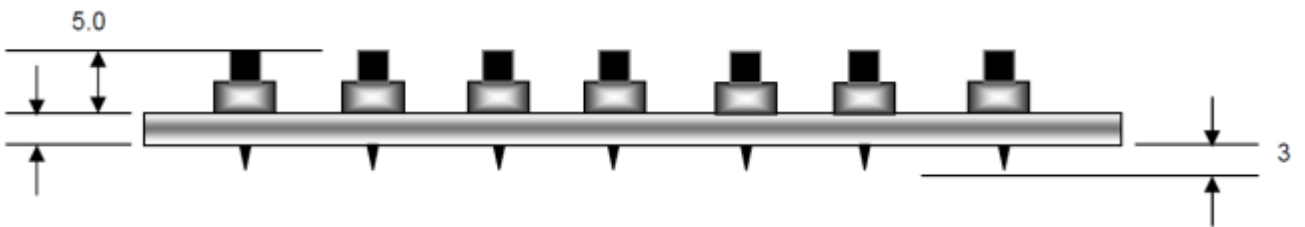
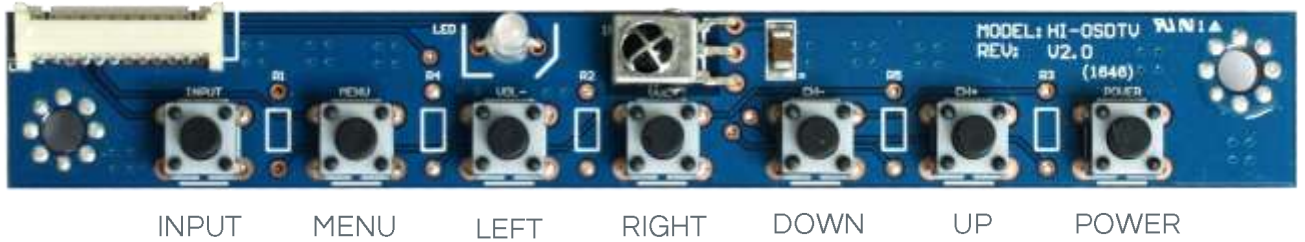
3. FUNCTIONAL BLOCK DIAGRAM



4. OSD Control Board

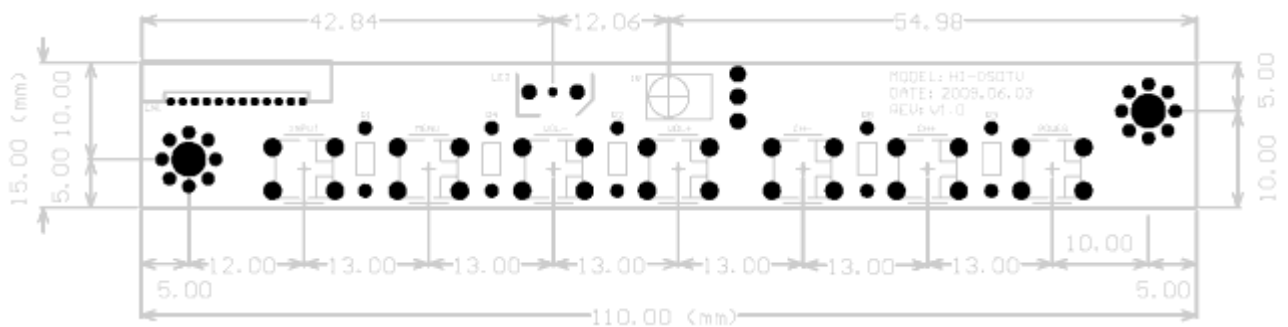
The OSD (On Screen Display) provides certain functions to have clear image and others. This board supports 7 buttons OSD operation as a standard. The control functions defined on OSD operation are as below. (Unit: mm)

Appearance



Board Size (W x H x D): 110 x 15 x 6.6 mm

Button	Function	Status	HOT Key
LED	Indicates operation status	Green	On: Green Off: LED
POWER	Power on/off	On/Off	
UP	Cursor control Up / Volume Select		
DOWN	Cursor control Down		
RIGHT	Cursor control Right		
LEFT	Cursor control left		
MENU	Activate menu / Exit Menu		
INPUT	Input Select / Source		



5-1. OSD FUNCTION

VGA		Resolution : 1080i
Input Source	● Auto Select	
Brightness/Contrast	VGA	
Color Format Settings	Display Port	
Color Settings	HDMI	
Picture Quality Settings		
Display Settings		
Audio Settings		
Other Settings		
Multi		

Input Source page

OSD Menu		
Input Source	Super Resolution mode Select	
	Mode	Auto Select
		VGA
		Display Port
		HDMI

5-2. OSD FUNCTION

VGA		Resolution : 1080i
Input Source	Brightness	75
Brightness/Contrast	Contrast	75
Color Format Settings	Dynamic Contrast	Off
Color Settings		
Picture Quality Settings		
Display Settings		
Audio Settings		
Other Settings		
Multi		

Brightness/Contrast

OSD Menu			
Brightness	Brightness Control		
	Range of Value	MIN	0
		MAX	100
Contrast	Contrast Control		
	Range of Value	MIN	0
		MAX	100
Dynamic Contrast	Dynamic Contrast Control		
	Mode	ON	
		OFF	

5-3. OSD FUNCTION

VGA		Resolution : 1080i
Input Source	Input Color Format	RGB
Brightness/Contrast	Color Domain	YUV Domain
Color Format Settings	Range Extension	Full Range
Color Settings		
Picture Quality Settings		
Display Settings		
Audio Settings		
Other Settings		
Multi		

Color Format Settings

OSD Menu		
Input Color Format	Color Mode Select	
	Mode	RGB
		UV 4:2:2
		YUV 4:4:4
		YUV 4:2:0
Color Domain	Color Select	
	Mode	YUV Domain
		RGB Domain
Range Extension	Range mode Select	
	Mode	Full Range
		Limited Range
		Auto Select

5-4. OSD FUNCTION

VGA		Resolution : 1080i
Input Source	Bypass	Off
Brightness/Contrast	Gamma	2.2
Color Format Settings	Color Modes	Standard
Color Settings	Color Temperature	
Picture Quality Settings	Gain	
Display Settings	Independent Color	
Audio Settings	Hue/Saturation	
Other Settings		
Multi		

Color Settings

OSD Menu					
Bypass	Mode Select				
	Mode	On			
		Off			
Gamma	Mode Select				
	Mode	1.8	2.0	2.6	
		2.2	2.4		
Color Modes	Mode Select				
	Mode	Standard	Adobe Rgb	DCI-P3	DICOM
		S rgb	BT709	BR2020	
Color Temperature	Mode Select				
	Mode	5700K		9300K	
		6500K		Default	
Gain	Mode Select				
	Mode	Red	Green	Blue	
Independent Color	Mode Select				
	Mode	R	G	B	
		C	M	Y	
Hue/Saturation	Mode Select				
	Mode	Hue			
		Saturation			

5-5. OSD FUNCTION

VGA		Resolution : 1080i
Input Source	Bypass	Off
Brightness/Contrast	Sharpness	50
Color Format Settings	Response Time	Off
Color Settings	Noise Reduction	Off
Picture Quality Settings	Super Resolution	Off
Display Settings	Skin Tone	0
Audio Settings	SNR	Off
Other Settings	Static Luminance Control	0
Multi	Dynamic Luminance Control	Off

Picture Quality Settings

OSD Menu			
Bypass	Mode Select		
	Mode	On	
		Off	
Sharpness	Sharpness Control		
	Range of Value	MIN	0
		MAX	100
Response Time	Mode Select		
	Mode	On	
		Off	
Noise Reduction	Mode Select		
	Mode	Off	High
		Middle	Low
Super Resolution	Mode Select		
	Mode	Off	High
		Middle	Low
Skin Tone	Skin Tone Control		
	Range of Value	MIN	0
		MAX	100
SNR	Mode Select		
	Mode	Off	High
		Middle	Low
Static Luminance Control	Luminance Control		
	Range of Value	MIN	0
		MAX	100
Dynamic Luminance Control	Mode Select		
	Mode	On	
		Off	

5-6. OSD FUNCTION

VGA		Resolution : 1080i
Input Source	Aspect Ratio	Full Screen
Brightness/Contrast	Horizontal Position	50
Color Format Settings	Vertical Position	50
Color Settings	Pixel Clock	50
Picture Quality Settings	Phase	14
Display Settings	Auto Adjust	
Audio Settings		
Other Settings		
Multi		

Display Settings

OSD Menu			
Aspect Ratio	Mode Select		
	Mode	Full Screen	Auto
		5:4	16:9
		4:3	1:1
Horizontal Position	Horizontal Control		
	Range of Value	MIN	0
		MAX	100
Vertical Position	Vertical Control		
	Range of Value	MIN	0
		MAX	100
Pixel Clock	Pixel Control		
	Range of Value	MIN	0
		MAX	100
Phase	Phase Control		
	Range of Value	MIN	0
		MAX	100
Auto Adjust			

5-7. OSD FUNCTION

VGA		Resolution : 1080i
Input Source	Power Save Audio	Off
Brightness/Contrast	Volume	80
Color Format Settings		
Color Settings		
Picture Quality Settings		
Display Settings		
Audio Settings		
Other Settings		
Multi		

Audio Settings

OSD Menu			
Power Save Audio	Mode Select		
	Mode	ON	
		OFF	
Volume	Volume Control		
	Range of Value	MIN	0
		MAX	100

5-8. OSD FUNCTION

VGA		Resolution : 1080i
Input Source	Language	English
Brightness/Contrast	Menu Transparency	20
Color Format Settings	Menu Rotation	
Color Settings	DP Config	
Picture Quality Settings	FreeSync Mode	
Display Settings	Factory Reset	
Audio Settings		
Other Settings		
Multi		

Other Settings

OSD Menu			
Language	Mode Select		
	Mode	English	简体中文
Menu Transparency	Mode Select		
	Range of Value	MIN	0
		MAX	100
Menu Rotation			
Free Sync Mode	Mode Select		
	Mode	On	
		Off	
Factory Reset			

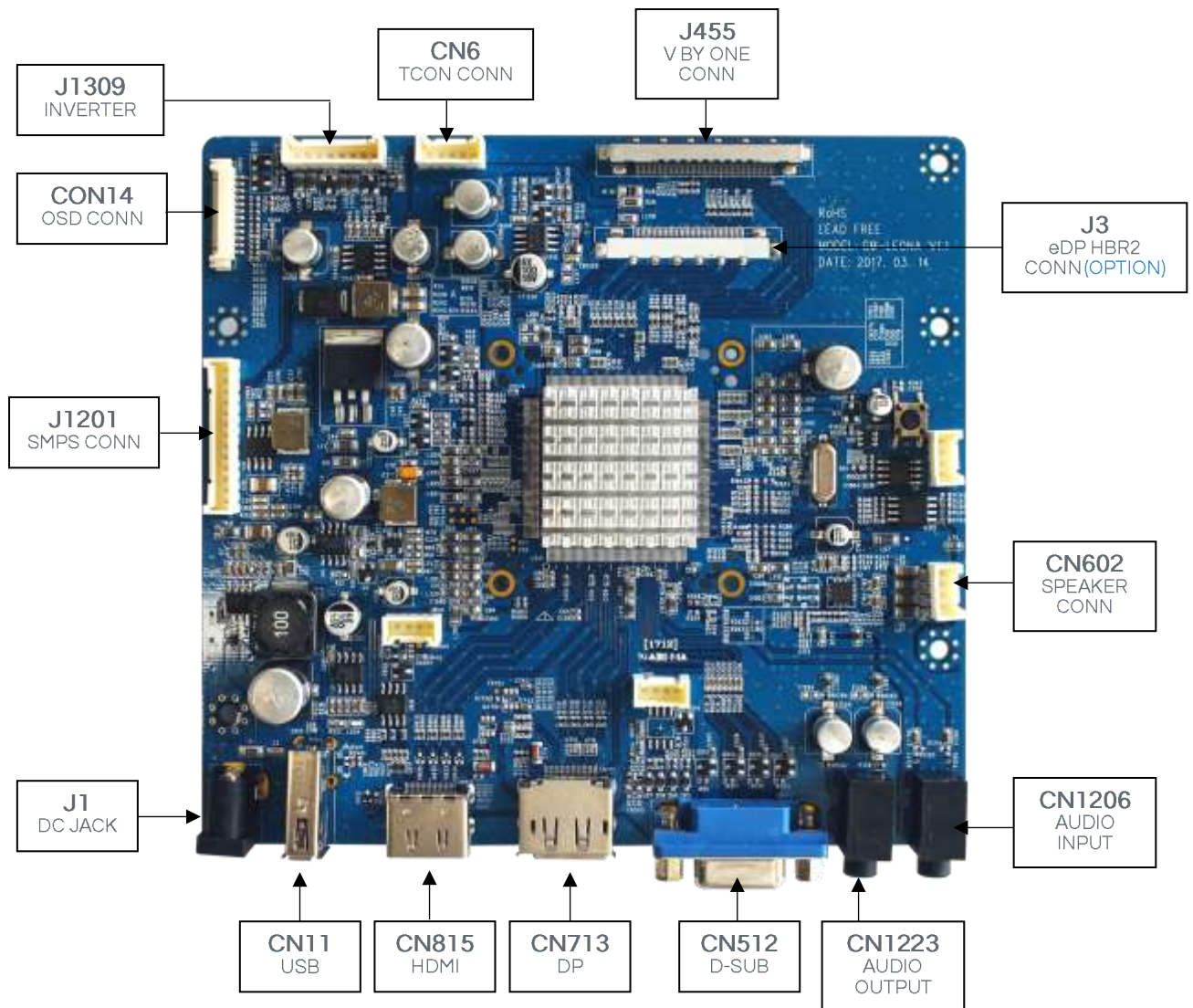
5-9. OSD FUNCTION

VGA		Resolution : 1080i
Input Source	MULTI ID	1
Brightness/Contrast	H Count	1
Color Format Settings	V Count	1
Color Settings	H Position	1
Picture Quality Settings	V Position	1
Display Settings	H Gap Size	0
Audio Settings	V Gap Size	0
Other Settings		
Multi		

Multi

OSD Menu			
MULTI ID	MULTI ID Control		
	Range of Value	MIN	0
		MAX	1
H Count	H Count control		
	Range of Value	MIN	0
		MAX	1
V Count	V Count control		
	Range of Value	MIN	0
		MAX	1
H Position	H Position Control		
	Range of Value	MIN	0
		MAX	1
V Position	V Position Control		
	Range of Value	MIN	0
		MAX	1
H Gap Size	H Gap Size		
	Range of Value	MIN	0
		MAX	1
V Gap Size	V Gap Size		
	Range of Value	MIN	0
		MAX	1

6. CONNECTOR, PINOUT & JUMPERS



Summary:

Reference	Item	Description	Type	Manufacture
CN6	Connector	TCON CONNECTOR	W200-05P-2.0mm	YEONHO
CN11	Connector	USB CONNECTOR		
CN512	Connector	D-SUB CONNECTOR		
CN602	Connector	Speaker CONNECTOR	SMW200-04P-2.0mm	YEONHO
CN713	Connector	DP CONNECTOR		
CN815	Connector	HDMI CONNECTOR		
CN1206	Connector	AUDIO INPUT CONNECTOR		
CN1223	Connector	AUDIO OUTPUT CONNECTOR		
J1	Jack	DC Power Jack	2.5ø DC Jack	
J3	Connector	eDP HBR2 CONNECTOR(OPTION)	FI-RE41S-HF	
J455	Connector	V BY ONECONNECTOR	FI-RE51S-HF	
J1201	Connector	SMPS CONNECTOR	SMW200-13P-2.0mm	YEONHO
J1309	Connector	INVERTER CONNECTOR	SMW200-08P-2.0mm	YEONHO
CON14	Connector	OSD CONNECTOR	12505WR-12P	

CN6: TCON Connector

Pin No.	Symbol	Description
1	VLCD	12V
2	VLCD	12V
3	VLCD	12V
4	GND	Ground
5	GND	Ground

CN11: USB Connector

Pin No.	Symbol	Description
1	GND	Ground
2	USB_D+	USB DATA+
3	USB_D-	USB DATA-
4	5V_USB	+5V

CN512: D-SUB Connector

Pin No.	Symbol	Description
1	RIN	VGA Red analog signal
2	GIN	VGA Green analog signal
3	BIN	VGA Blue analog signal
4	GND	Ground
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	GND	Ground
12	DAT_DDC	VGA DDC-SDA
13	HSI	Horizontal Sync
14	VSI	Vertical Sync
15	CLK_DDC	VGA DDC-SCL

CN602: Speaker Connector

Pin No.	Symbol	Description
1	OUTRN	Speaker Right -
2	OUTRP	Speaker Right +
3	OUTLP	Speaker Left +
4	OUTLN	Speaker Left -

CN713: 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	GND	Ground
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

CN815: 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

J1: DC Jack

Pin No.	Symbol	Description
1	VCC	12V
2	GND	Ground
3	GND	Ground

J3: eDP HBR2 Connector

Pin No.	Symbol	Description
1~3	VLCD	PANEL VCC
4	NC	Not Connect
5~7	GND	Ground
8~14	NC	Not Connect
15	GND	Ground
16	NC	Not Connect
17	NC	Not Connect
18	GND	Ground
19	NC	Not Connect
20	NC	Not Connect
21	GND	Ground
22	NC	Not Connect
23	NC	Not Connect
24	GND	Ground
25	NC	Not Connect
26	NC	Not Connect
27	EDP_HPDP0	eDP Channel hot-plug detect
28	AUXTX_N0	eDP Channel AUX-
29	AUXTX_P0	eDP Channel AUX+
30	GND	Ground
31	HBR2+_EDP0_L0	HBR2+ EDP0
32	HBR2-_EDP0_L0	HBR2- EDP0
33	GND	Ground
34	HBR2+_EDP1_L0	HBR2+ EDP1
35	HBR2-_EDP1_L0	HBR2- EDP1
36	GND	Ground
37	HBR2+_EDP2_L0	HBR2+ EDP2
38	HBR2-_EDP2_L0	HBR2- EDP2
39	GND	Ground
40	HBR2+_EDP3_L0	HBR2+ EDP3
41	HBR2-_EDP3_L0	HBR2- EDP3

J455: V By One Connector

Pin No.	Symbol	Description
1	GND	Ground
2	VBY7P	V BY ONE 7+
3	VBY7N	V BY ONE 7-
4	GND	Ground
5	VBY6P	V BY ONE 6+
6	VBY6N	V BY ONE 6-
7	GND	Ground
8	VBY5P	V BY ONE 5+
9	VBY5N	V BY ONE 5-
10	GND	Ground
11	VBY4P	V BY ONE 4+
12	VBY4N	V BY ONE 4-
13	GND	Ground
14	VBY3P	V BY ONE 3+
15	VBY3N	V BY ONE 3-
16	GND	Ground
17	VBY2P	V BY ONE 2+
18	VBY2N	V BY ONE 2-
19	GND	Ground
20	VBY1P	V BY ONE 1+
21	VBY1N	V BY ONE 1-
22	GND	Ground
23	VBY0P	V BY ONE 0+
24	VBY0N	V BY ONE 0-
25	GND	Ground
26	VBYLOCKN	Lock Detect
27	VBYHTPDN	Hot Plug Detect
28 - 32	NC	No Connection
33	EE_SCL	SCL For I2C
34	EE_SDA	SDA For I2C
35 - 38	NC	No Connection
39 - 42	GND	Ground
43 - 44	NC	No Connection
45 - 51	VLCD	PANEL VCC

J1201: SMPS Connector

Pin No.	Symbol	Description
1	PD_CTLZ	+3.3V Normal
2	+5V_STANDBY	Stand By 5V
3	+5V	+5V
4	+5V	+5V
5	GND	Ground
6	GND	Ground
7	+12V_PWR	12V Power
8	+12V_PWR	12V Power
9	NC	No Connection
10	BKL_EN	Backlight Enable
11	BKL_DIM	Backlight Dimming
12	BRI_ADJ_PWM	Backlight Adjust PWM

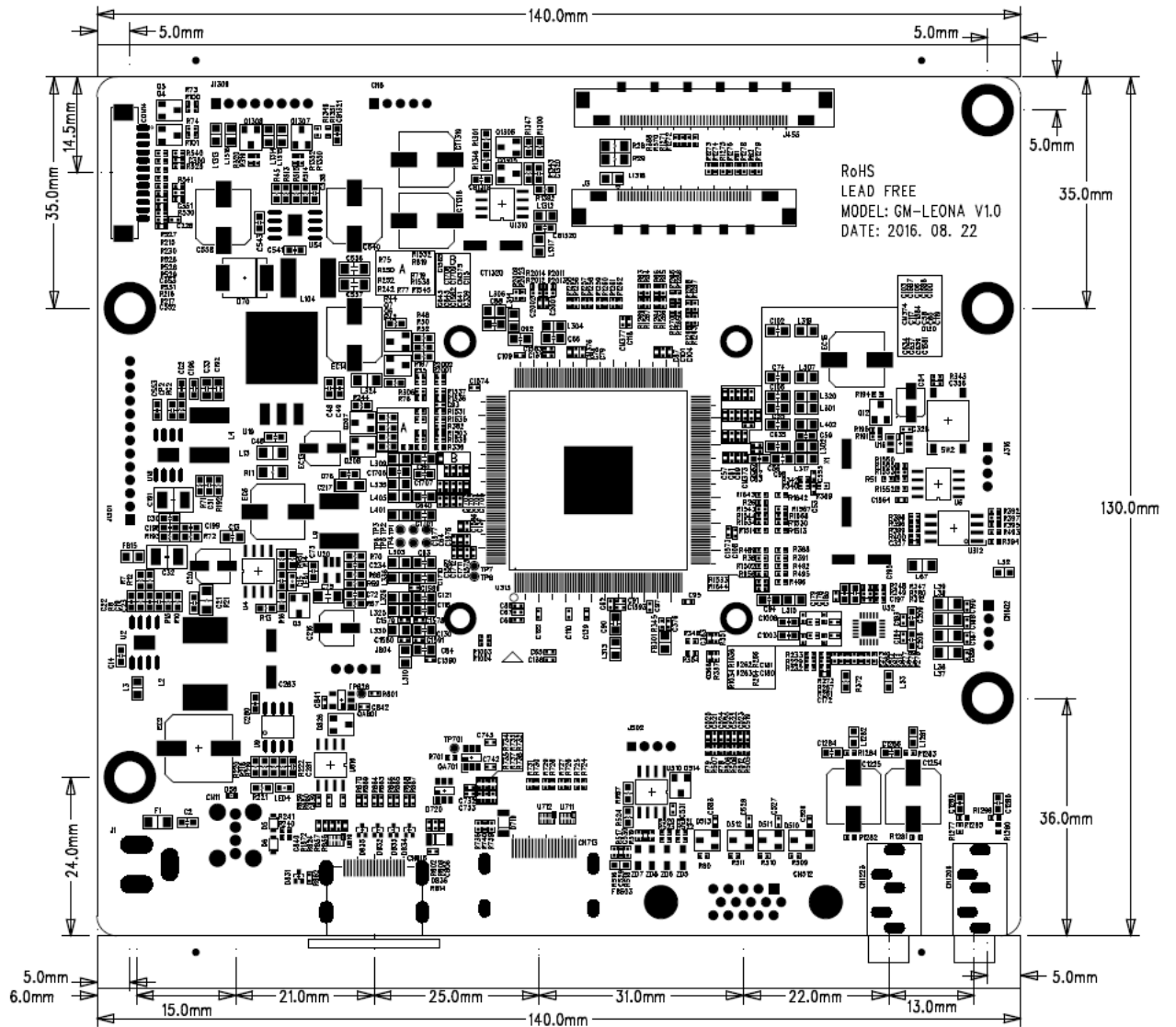
J1309: Invertor Connector

Pin No.	Symbol	Description
1-2	12V_IN	12V Power in
3-4	+5V	+5V
5	GND	Ground
6	GND	Ground
7	BL-ON/OFF	Backlight on signal
8	BL-ADJUST	Backlight dimming signal

CON14: OSD Connector

Pin No.	Symbol	Description
1	LED-RED	RED Color
2	LED-GREEN	GREEN Color
3	GND	Ground
4	INPUT	For INPUT Switch
5	MENU	For Menu Switch
6	VOL+	For Volume Up Switch
7	VOL-	For Volume Down Switch
8	CH-	For Up Switch
9	CH+	For Down Switch
10	POWER	For Power Switch
11	IR_OUT	IR DATA
12	+3V3	IR Power 3.3V

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 input format

Mode \ Spec	Pixel Freq. MHz	Horizontal Timing		Vertical Timing	
		Freq. KHz	Active Pixel	Freq. Hz	Active Lind
720*400@ 85Hz	35.500	37.927	720	85.000	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

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