LITEMAX

ULF/ULH4904-L V1

49" LED B/L LCD

User Manual

Approved by	Checked by	Prepared by

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Record of Revision

Version and Date	Page	Old Description	New Description	Remark
Aug./7/2023	all		Initial release	

Contents

1   General Description

The ULF/ULH4904-L is a 49 inch industrial grade LCD, with high brightness 700 nits, it produce sharp images, crisp text and lifelike colors. The Ubipixel LED backlight technology ensures high reliability and low power consumption, suitable for outdoor application, kiosk, factory automation, military, transportation and gaming application.

1.1   Features

- High Brightness 700 nits
- LED Backlight
- LCD Blacking Defect Free (Hi-Tni 110˚C)
- Slim Bezel
- BL MTBF: 100,000 hours

1.2   General Specifications

Model Name	ULF/ULH4904-LNU
Description	49" TFT LCD, 700 nits LED Backlight, 3840x2160
Screen Size	49"
Display Area (mm)	1073.8(H) x 604(V)
Brightness	700 cd/m²
Resolution	3840 x 2160
Aspect Ratio	16 : 9
Contrast Ratio	900 : 1
Pixel Pitch (mm)	0.27963(H) x 0.27963(V)
Pixel Pre Inch (PPI)	90
Viewing Angle	178°(H),178°(V)
Color Saturation (NTSC)	80%
Display Colors	1.07G
Response Time (Typical)	8ms
Panel Interface	V-by-One
AD Board Input Interface	HDMIx2, DP
Input Power	DC24V
Power Consumption)	101W, (105W with AD board)
OSD Key	5 Keys (Power Switch, Menu, +, Exit, -)
OSD Control	Brightness, Color, Contrast, H/V Position…etc
Dimensions (mm)	1097.2 x 630.0 x 28.9
Bezel Size(U/B/L/R)	11.2/14.8/11.7/11.7 mm
Weight (Net)	15.5kg
Operating Temperature	0 ˚C ~ 50 ˚C
Storage Temperature	-20 ˚C ~ 60 ˚C

ULF= Panel+ LED Driving Board
ULH= Panel+ LED Driving Board + AD Control Board

1.3 Absolute Maximum Ratings

The following items are maximum values which, if exceeded, may cause faulty operation or permanent damage to the LCD module.

Parameter		Symbol	Value		Unit	Note
			Min	Max		
Power Input Voltage	LCD Circuit	VLCD	-0.3	+14.0	VDC	1
LED Input Voltage	Forward Voltage	VF	-	+155.5	VDC	
T-Con Option Selection Voltage		VLOGIC	-0.3	+4.0	VDC	
Operating Temperature		TOP	0	+50	°C	2,3,4
Storage Temperature		TST	-20	+60	°C	
Panel Front Temperature (Considering L/C Phase Transition Temperature)		TPT	-	+68	°C	
Operating Ambient Humidity		HOP	10	90	%RH	2,3,4
Storage Humidity		HST	5	90	%RH	

Notes

1. Ambient temperature condition (Ta = 25 ± 2 °C)

2. Temperature and relative humidity range are shown in the figure below.

   Wet bulb temperature should be Max 39°C, and no condensation of water.

3. Gravity mura can be guaranteed below 40°C condition.

4. The maximum operating temperatures is based on the test condition that the surface temperature of display area is less than or equal to 68°C with LCD module alone in a temperature controlled chamber. Thermal management should be considered in final product design to prevent the surface temperature of display area from being over 68°C. The range of operating temperature may be degraded in case of improper thermal management in final product design.
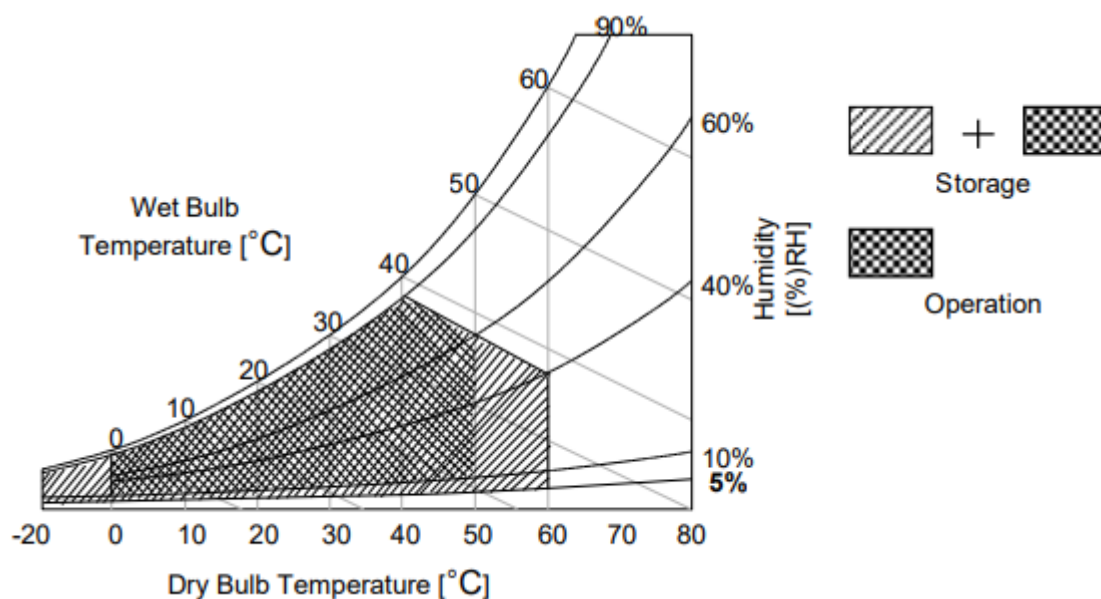
2 Electrical Specifications

2.1 Electrical Characteristics

It requires two power inputs. One is employed to power for the LCD circuit.

Parameter		Symbol	Value			Unit	notes
			Min	Typ	Max		
Circuit :							
Power Input Voltage		V_{LCD}	10.8	12.0	13.2	V_{DC}	4
Power Input Current		I_{LCD}	-	1168	1520	mA	1
			-	1535	1995	mA	2
T-CON Option Selection Voltage	Input High Voltage	V_{IH}	2.7	-	3.6	V_{DC}	4
	Input Low Voltage	V_{IL}	0	-	0.7	V_{DC}	4
Power Consumption		P_{LCD}	-	14.0	18.2	Watt	1
			-	18.4	24.0	Watt	2
Rush current		I_{RUSH}	-	-	10.0	A	3

Notes

1. The specified current and power consumption are under the V_{LCD}=12.0V, Ta=25 ±2° C, fv=120Hz condition, and mosaic pattern(8 x 6) is displayed and fv is the frame frequency.

2. The current and power consumption are specified at the maximum current patter.

3. The duration of rush current is about 2ms and rising time of power input is 0.5ms (min.).

4. Ripple voltage level is recommended under ±5% of typical voltage

White : 1023 Gray
Black :   0 Gray
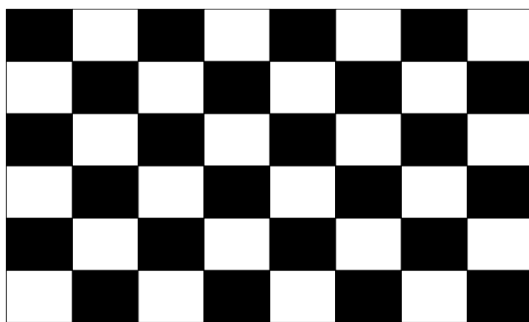
Mosaic Pattern(8 x 6)
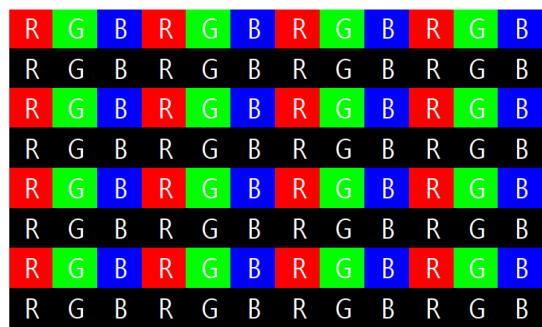
Max Current Pattern

2.2 Interface Connection

This LCD module employs two kinds of interface connection, 51-pin connector and 4-pin connector are used for the module electronics and two 8-pin connectors are used for the integral backlight system.

LCD Connector(CN1): FI-RXE51S-HFS (manufactured by JAE)

GT05S-51S-H38 (manufactured by LSM)

No	Symbol	Description	No	Symbol	Description
1	VLCD	Power Supply +12.0V	27	GND	Ground
2	VLCD	Power Supply +12.0V	28	Rx0n	V-by-One HS Data Lane 0
3	VLCD	Power Supply +12.0V	29	Rx0p	V-by-One HS Data Lane 0
4	VLCD	Power Supply +12.0V	30	GND	Ground
5	VLCD	Power Supply +12.0V	31	Rx1n	V-by-One HS Data Lane 1
6	VLCD	Power Supply +12.0V	32	Rx1p	V-by-One HS Data Lane 1
7	VLCD	Power Supply +12.0V	33	GND	Ground
8	VLCD	Power Supply +12.0V	34	Rx2n	V-by-One HS Data Lane 2
9	NC	NO CONNECTION	35	Rx2p	V-by-One HS Data Lane 2
10	GND	Ground	36	GND	Ground
11	GND	Ground	37	Rx3n	V-by-One HS Data Lane 3
12	GND	Ground	38	Rx3p	V-by-One HS Data Lane 3
13	GND	Ground	39	GND	Ground
14	NC	NO CONNECTION	40	Rx4n	V-by-One HS Data Lane 4
15	NC	NO CONNECTION	41	Rx4p	V-by-One HS Data Lane 4
16	Input Mode	Vx1 Input Data Format 'L'=Non-Division , 'H'=2-Division	42	GND	Ground
17	NC	NO CONNECTION	43	Rx5n	V-by-One HS Data Lane 5
18	NC	NO CONNECTION	44	Rx5p	V-by-One HS Data Lane 5
19	NC	NO CONNECTION	45	GND	Ground
20	NC	NO CONNECTION	46	Rx6n	V-by-One HS Data Lane 6
21	Bit SEL	'H' = 10bit(D) , 'L' = 8bit	47	Rx6p	V-by-One HS Data Lane 6
22	NC	NO CONNECTION	48	GND	Ground
23	RBF	'H' : AGP 'L' : NSB (No signal Black)	49	Rx7n	V-by-One HS Data Lane 7
24	GND	Ground	50	Rx7p	V-by-One HS Data Lane 7
25	HTPDN	Hot plug detect	51	GND	Ground
26	LOCKN	Lock detect	-	-	-

Notes

1. All GND (ground) pins should be connected together to the LCD module's metal frame.

2. All Input levels of V-by-One signals are based on the V-by-One HS Standard Version 1.4.

3. #9 & #14 & # 15 & #17~#20 & #22 NC(No Connection) : These pins are used only for LGD (Do not connect)

4. Specific pin No. #23 is used for "No signal detection" of system signal interface.

   It should be GND for NSB (No Signal Black) while the system interface signal is not.

   If this pin is "H", LCD Module displays AGP (Auto Generation Pattern).

2.3 Signal Timing Specifications

The signal timing required at the input of the Vx1 transmitter. All of the interface signal timings should be satisfied with the following specification for normal operation.

TIMING TABLE (DE Only Mode)

ITEM		Symbol	Min	Typ	Max	Unit	Note
Horizontal	Display Period	t_{HV}	480	480	480	t_{CLK}	
	Blank	t_{HB}	60	70	120	t_{CLK}	1
	Total	t_{HP}	540	550	600	t_{CLK}	
Vertical	Display Period	t_{VV}	2160	2160	2160	Lines	
	Blank	t_{VB}	40	90	600	Lines	1
	Total	t_{VP}	2200	2250	2760	Lines	

ITEM		Symbol	Min	Typ	Max	Unit	Note
Frequency	DCLK	f_{CLK}	67.00	74.25	78.00	MHz	
	Horizontal	f_{H}	121.8	135	140	KHz	2
	Vertical	f_{V}	47	60	63	Hz	2

Notes

1. The input of HSYNC & VSYNC signal does not have an effect on normal operation (DE Only Mode). If you use spread spectrum of EMI, add some additional clock to minimum value for clock margin.

2. The performance of the electro-optical characteristics may be influenced by variance of the vertical refresh rate and the horizontal frequency

3. Spread Spectrum Rate (SSR) is limited to ±0.5% center spread at 30KHz

※ Timing should be set based on clock frequency.

2.4   V by One Input Signal Characteristics

V by One Input Signal Timing Diagram
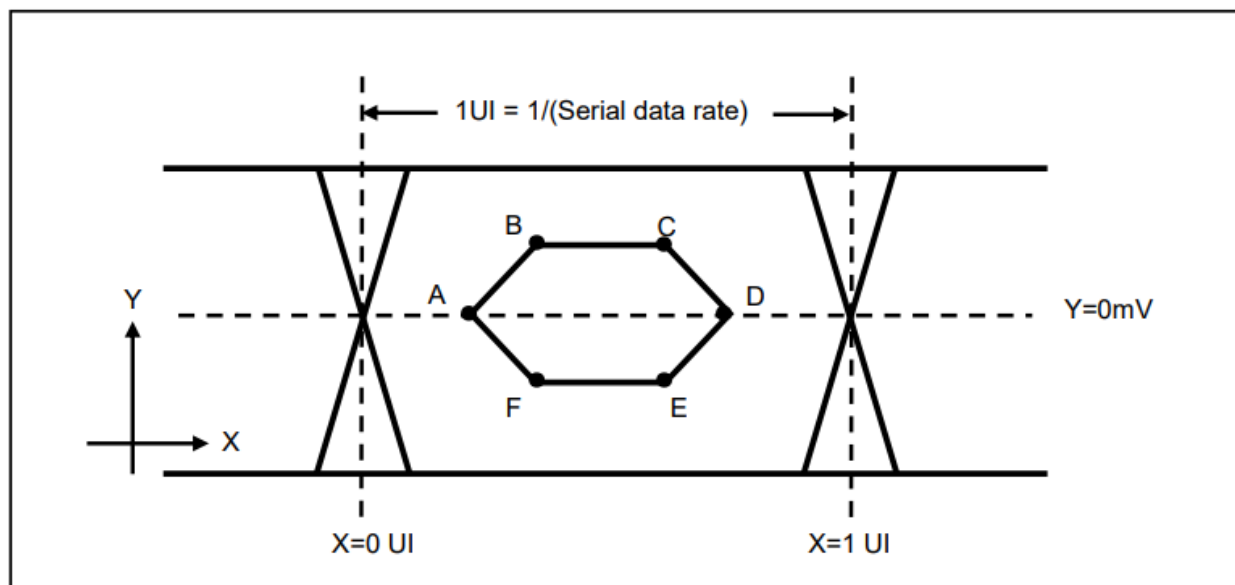
Eye Mask Specification

	X[UI]	Note	Y[mV]	Note
A	0.25 (max)	2	0	-
B	0.3 (max)	2	50	3
C	0.7(min)	3	50	3
D	0.75(min)	3	0	-
E	0.7(min)	3	I -50 I	3
F	0.3(max)	2	I -50 I	3

Notes

1. All Input levels of V by One signals are based on the V by One HS Standard Ver. 1.4

2. This is allowable maximum value.

3. This is allowable minimum value.

4. The eye diagram is measured by the oscilloscope and receiver CDR characteristic must be emulated.

- PLL bandwidth : 15 Mhz

- Damping Factor : 1

V by One Input Signal Characteristics

<Inter-pair Skew between two Lanes>
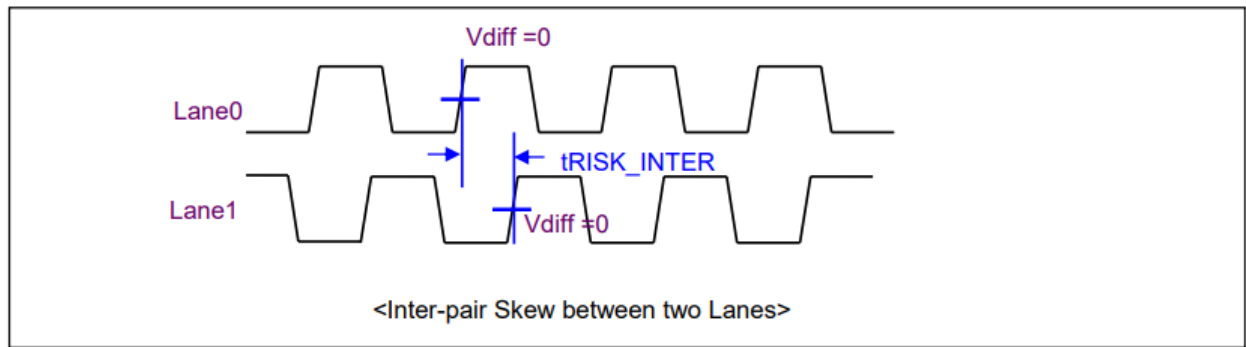
Description	Symbol	Min	Max	Unit	notes
Allowable inter-pair skew between lanes	tRISK_INTER	-	5	UI	1,2

Notes

1.1UI = 1/serial data rate

2. it is the time difference of the differential voltage between any two lanes in one sub block.

2.5   Color Data Reference

The brightness of each primary color (red, green, blue) is based on the 10bit or 8bit gray scale data input for the color. The higher binary input, the brighter the color. Table provides a reference for color versus data input.

Packer input & Unpacker output		30bpp RGB (10bit)	24bpp RGB (8bit)
Byte0	D[0]	R[2]	R[0]
	D[1]	R[3]	R[1]
	D[2]	R[4]	R[2]
	D[3]	R[5]	R[3]
	D[4]	R[6]	R[4]
	D[5]	R[7]	R[5]
	D[6]	R[8]	R[6]
	D[7]	R[9]	R[7]
Byte1	D[8]	G[2]	G[0]
	D[9]	G[3]	G[1]
	D[10]	G[4]	G[2]
	D[11]	G[5]	G[3]
	D[12]	G[6]	G[4]
	D[13]	G[7]	G[5]
	D[14]	G[8]	G[6]
	D[15]	G[9]	G[7]
Byte2	D[16]	B[2]	B[0]
	D[17]	B[3]	B[1]
	D[18]	B[4]	B[2]
	D[19]	B[5]	B[3]
	D[20]	B[6]	B[4]
	D[21]	B[7]	B[5]
	D[22]	B[8]	B[6]
	D[23]	B[9]	B[7]
Byte3	D[24]	Don't care	
	D[25]	Don't care	
	D[26]	B[0]	
	D[27]	B[1]	
	D[28]	G[0]	
	D[29]	G[1]	
	D[30]	R[0]	
	D[31]	R[1]	

2.6 Power Sequence

LCD Driving circuit
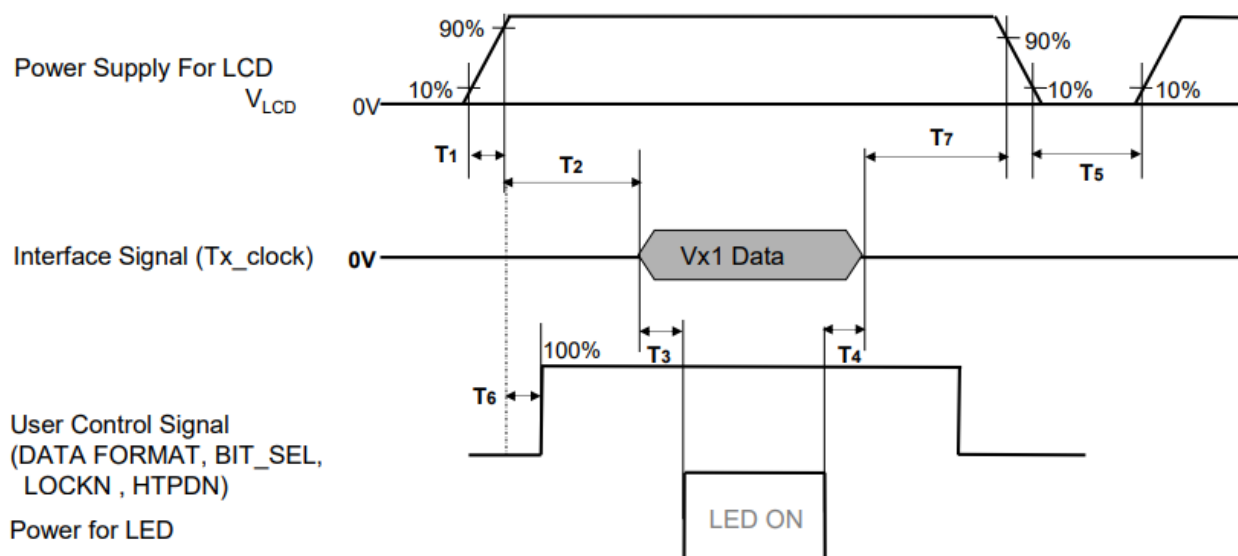
POWER SEQUENCE

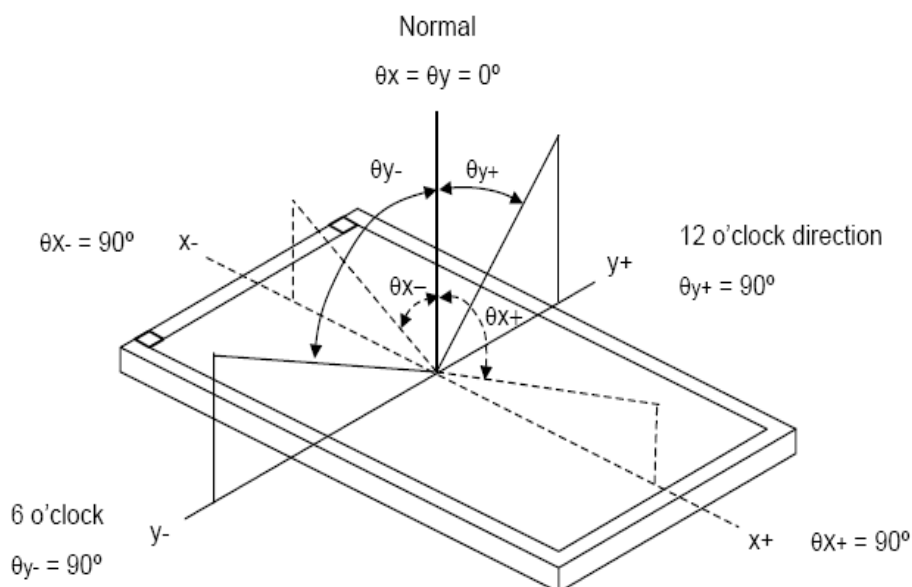| Parameter	Value			Unit	Notes
	Min	Typ	Max		
T1	0.5	-	20	ms	1
T2	0	-	-	ms	2
T3	400	-	-	ms	3
T4	100	-	-	ms	3
T5	1.0	-	-	s	4
T6	0	-	T2	ms	5
T7	0	-	-	ms	6

Notes

1. Even though T1 is over the specified value, there is no problem if I2T spec of fuse is satisfied.

2. If T2 is satisfied with specification after removing V by One Cable, there is no problem.

3. The T3 / T4 is recommended value, the case when failed to meet a minimum specification, abnormal display would be shown. There is no reliability problem.

4. T5 should be measured after the Module has been fully discharged between power off and on period.

5. If the on time of signals (Interface signal and user control signals) precedes the on time of Power (VLCD), it will be happened abnormal display. When T6 is NC status, T6 doesn't need to be measured.

6. It is recommendation specification that T7 has to be 0ms as a minimum value.

※ Please avoid floating state of interface signal at invalid period.

※ When the power supply for LCD (VLCD) is off, be sure to pull down the valid and invalid data to 0V.
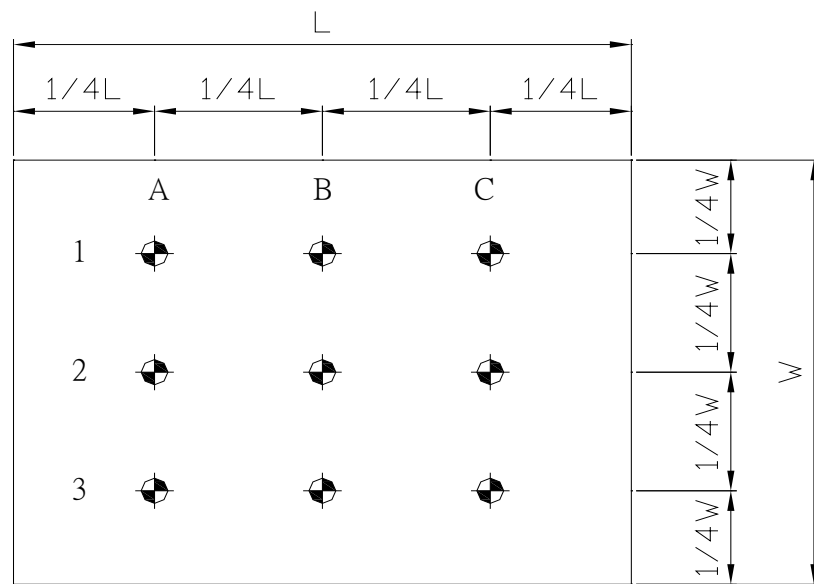
3　Optical Specification

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Color chromaticity	Red	Rx	θx=0 θy=0 Klein K-10	0.615	0.645	0.675	-	Test Mode: (1) (2) (3)
		Ry		0.298	0.328	0.358	-	
	Green	Gx		0.275	0.305	0.335	-	
		Gy		0.588	0.618	0.648	-	
	Blue	Bx		0.116	0.146	0.176	-	
		By		0.022	0.052	0.082	-	
	White	Wx		0.244	0.274	0.304	-	
		Wy		0.268	0.298	0.328	-	
Center Luminance of White		Lc	θx=0 θy=0	-	700	-	cd/㎡	
Uniform		Lu	BM-7	-	92	-	%	
Contrast Ratio		CR	θx=0 θy=0 Klein K-10	-	900:1	-	-	Test Mode: (1) (4)
Color Saturation		NTSC		-	80	-	%	
Viewing Angle	Horizontal	θx+	-	-	89	-	Deg	Test Mode: (1) (3)
		θx-		-	89	-		
	Vertical	θy+		-	89	-		
		θy-		-	89	-		

Test Mode：
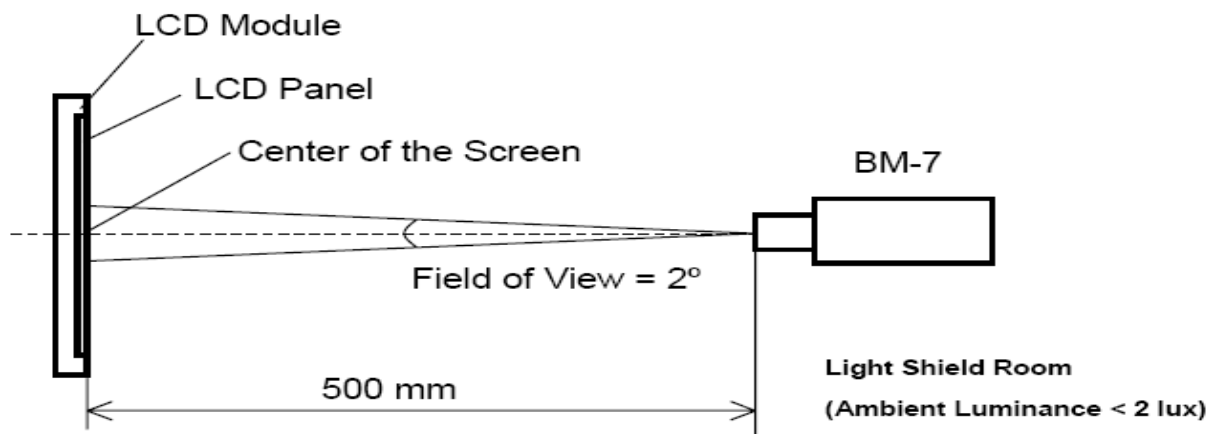
(1) Definition of Viewing Angle (θx , θy):
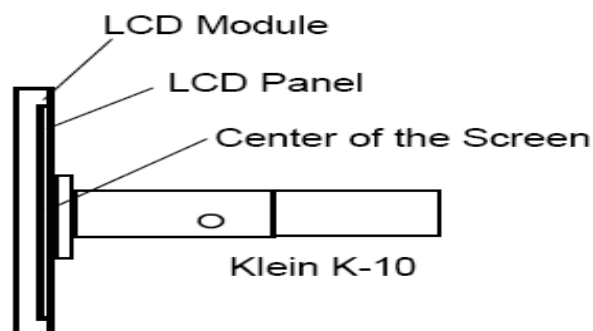
(2) Definition of Test Point:

Active Area

(3) BM-7 Measurement Setup:

(4) Klein K-10 Measurement Setup:

4   LED Driving Board Specifications

This specification is applied to LED converter unit for LED backlight.

4.1   Operating Characteristics

Item	Symbol	Condition	MIN.	TYP.	MAX.	Unit	Remark
Input Voltage	Vin		22	24	26	V	
Input Current (Low Brightness)	IinL	Brightness = 0%	0.0	-----	-----	mA	
Input Current (High Brightness)	IinH	Brightness = 100%	--	3.62	4	A	(1)
LED Current (Low Brightness)	IoutL	Brightness = 0%	0.0	-----	-----	Arms	
LED Current (High Brightness)	IoutH	Brightness = 100%	1.04	1.07	1.1	A	J1、J2
			1.04	1.07	1.1	A	J7、J8
Working Frequency	W_Freq	Brightness = 100%	350	400	450	KHZ	
Brightness Control		**DC mode**					
	Vadj	Connection of Voltage	0.2	-----	4.8	V	(2)
		PWM mode					
	PWM	Connect to PWM	0	-----	100	%	(3)
	Freq		-----	200	1000	Hz	(4)
ON/OFF Control	Von	Normal Operation	2	-----	5	V	
	Voff		0	-----	0.8	V	
Output Voltage	Vout	Brightness = 100%	37	37.4	38	V	J1、J2
			37	37.4	38	V	J7、J8
Efficiency	η	Brightness = 100%	--	92.3	--	%	(5)

Remark:
(1) this data is based on the testing result of practical input voltage, Iin is measured by related Vin.(min, typ, max)
(2) Max brightness at Vadj=0.2V. Min brightness at Vadj=4.8V.
(3) Max dimming ratio = 1:100.
(4) Frequency can be adjusted in accordance with demand(120Hz minimum, or lights will be flickering)
(5) η max = Vout(max)*IoutH(max)/Vin(max)*IinH(min)
    η min = Vout(min)*IoutH (min)/Vin(min)*IinH(max)

4.2 Connector Socket

Input Connector:

CN1(JST B10B-PH-K-S or Compatible)

PIN No	Symbol	Description
1	Vin	DC+
2	Vin	DC+
3	Vin	DC+
4	Vin	DC+
5	Vin	DC+
6	GND	Ground
7	GND	Ground
8	GND	Ground
9	GND	Ground
10	GND	Ground

DC or PWM Connector :CN2

PIN NO	Symbol	Description
1	DC	Clsoe pin 1,2
2	GND	LED driver is DC dimming
		Close pin 2,3
3	PWM	LED driver is PWM dimming

Note: If you use CN2 to set DC/PWM, please NC the pin1 of CN3.

Input Connector:

CN3(JST B3B-PH-K-S or Compatible)

PIN No	Symbol	Description
1	CL	PWM or DC selection
2	Control	ON/OFF Control
3	Brightness	Brightness Control
4	GND	Ground

Note: Pin1 is dimming method control pin,   Low → DC dimming,   High → PWM dimming.
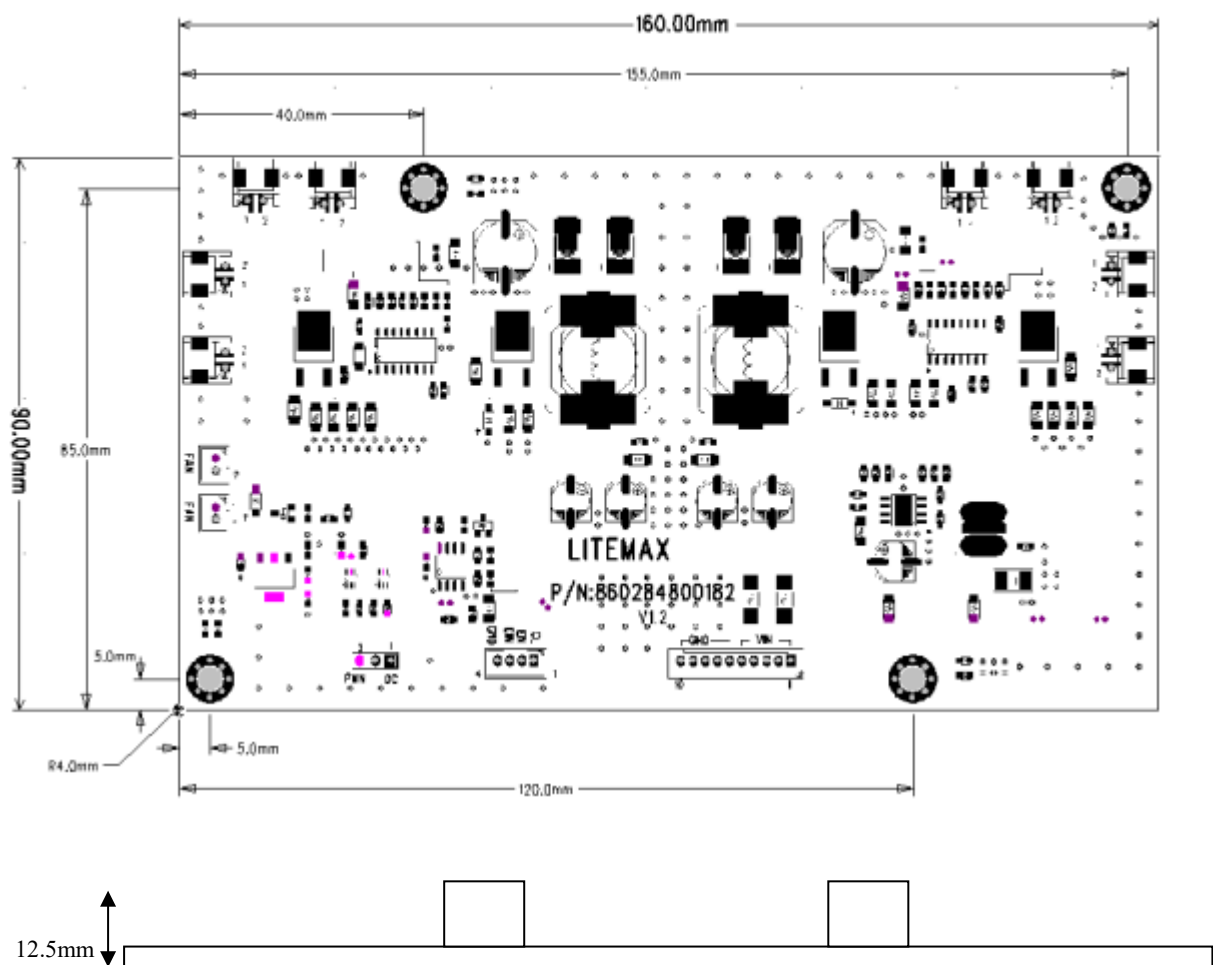If pin1 is be used, please NC CN2.

Output Connector:

J2,J3,J6,J7(JST S2B-EH or Compatible)

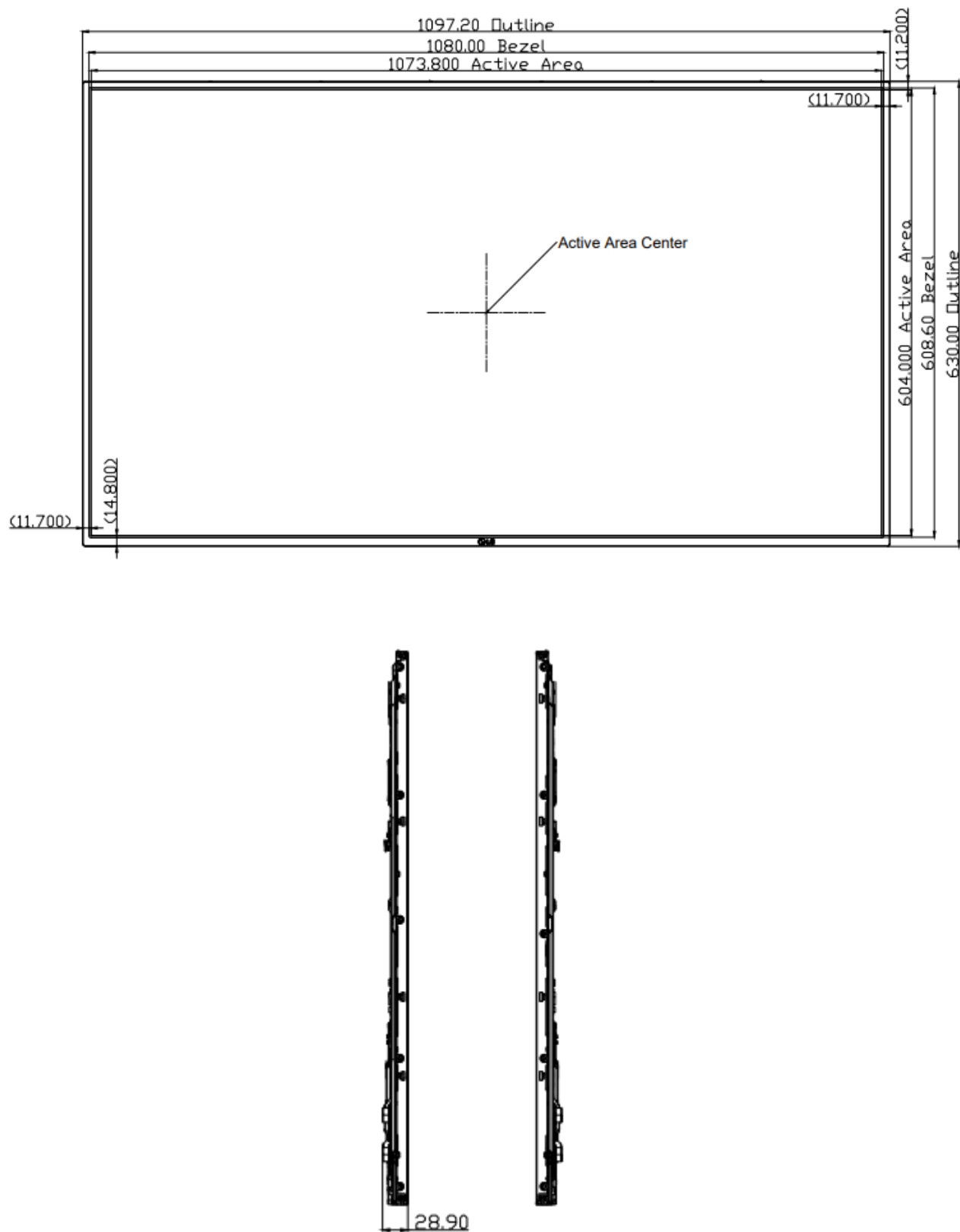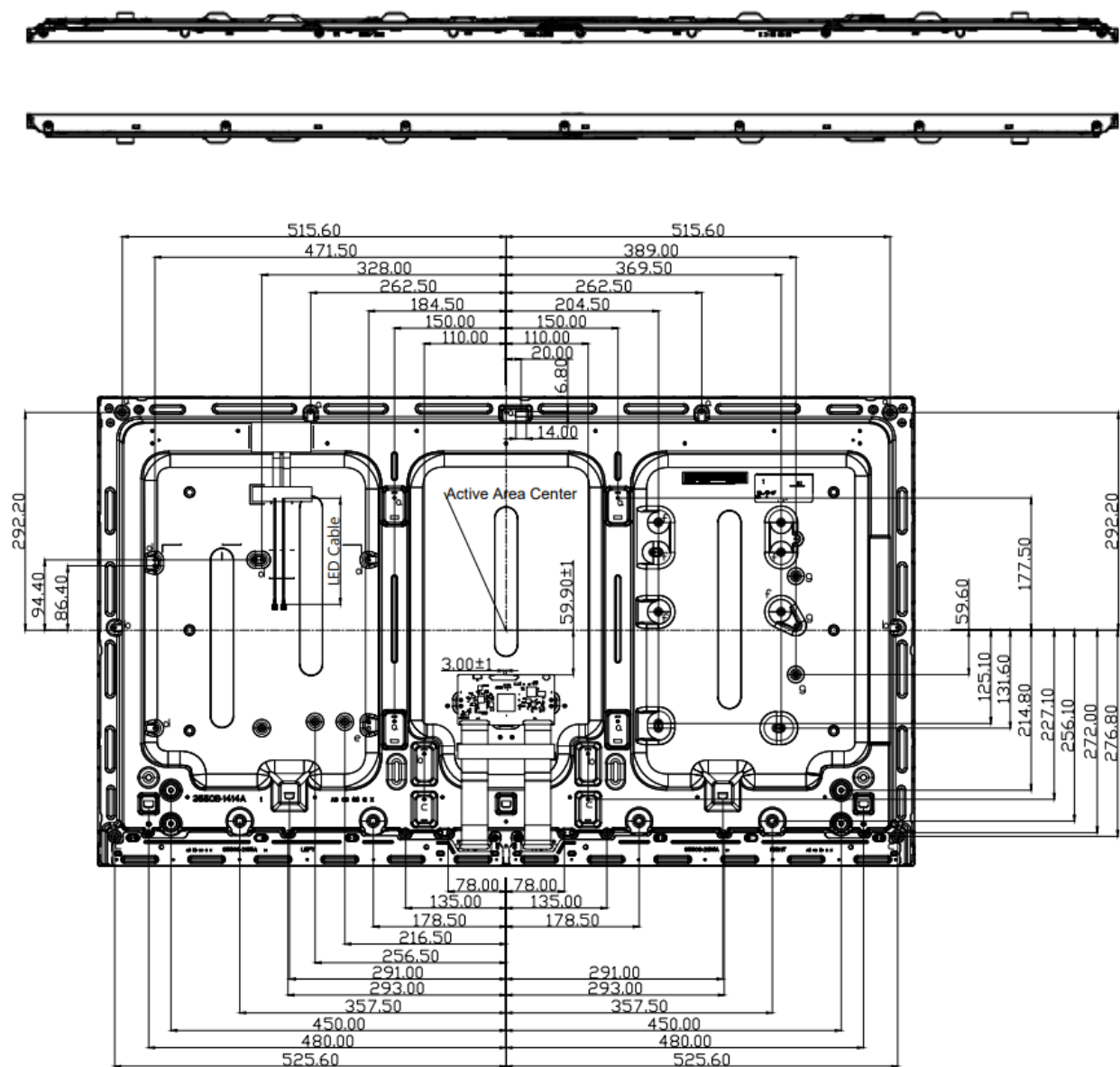| PIN NO	Symbol	Description
1	Output	LED High Voltage(+)
2	Output	LED Low Voltage (-)

4.3   Mechanical Characteristics

Dimension: 160mm*90mm*12.5mm
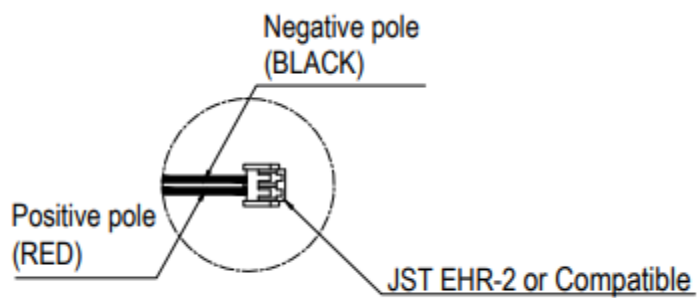
5   Mechanical Drawing

Unit:mm

Note：
1. Tolerance is ±1.0mm unless noted.
2. LED cable length=900±50 mm

Negative pole
(BLACK)

Positive pole
(RED)

JST EHR-2 or Compatible

Connector View

6　AD68415HHP Board & OSD Functions

We developed this A/D board to support industrial high brightness and commercial applications. This A/D board has many functions. It has a display port and two HDMI input.

6.1　General Description

- Max resolution up to UHD (4096x2160)
- Support V-by-one or e-DP panel
- Two HDMI input (HDMI 2.0) support 4Kx2K@60Hz (Optional)
- Display port input (DP 1.2a) support 4Kx2K@60Hz
- V-by-one or e-DP interface
- Support PIP (Optional ,1920x1080), PBP (Optional)
- Support panel DC 5V/10V/12V Output
- OSD control
- PWM/DC dimming control for backlight driver
- Input power DC 24V or DC 12V (Optional)
- Embedded MCU with ADC port for light sensor application (Optional)
- Auto detect digital light sensor
- External fan control by software
- EDID code protect control by software
- Audio line out and speaker output (Optional)
- External RS232 control (Optional)
- Audio in and 4Wx2(4Ω) Audio Out (Optional)

Characteristics

|	
Power Input	12V/24V (Note1)
Power Consumption	15W Max. (Note2)
Input interface	HDMI 2.0, DP 1.2a
Output interface	V-by-1 8 lanes, eDP 8 lanes.
Resolution	Max 4096x2160
Support panel voltage	5 / 10 / 12 V
Speaker	4W speaker x 2
Backlight control	EN and PWM or DC dimming for backlight
Operation Temperature	-20 ~ 70 degree C
Storage Temperature	-20 ~ 70 degree C

Note1: 12V or 24V are two different PCBA version, selection should be noted.

Note2: 15W means AD board own consumption, not include Backlight, LCD and T-con.
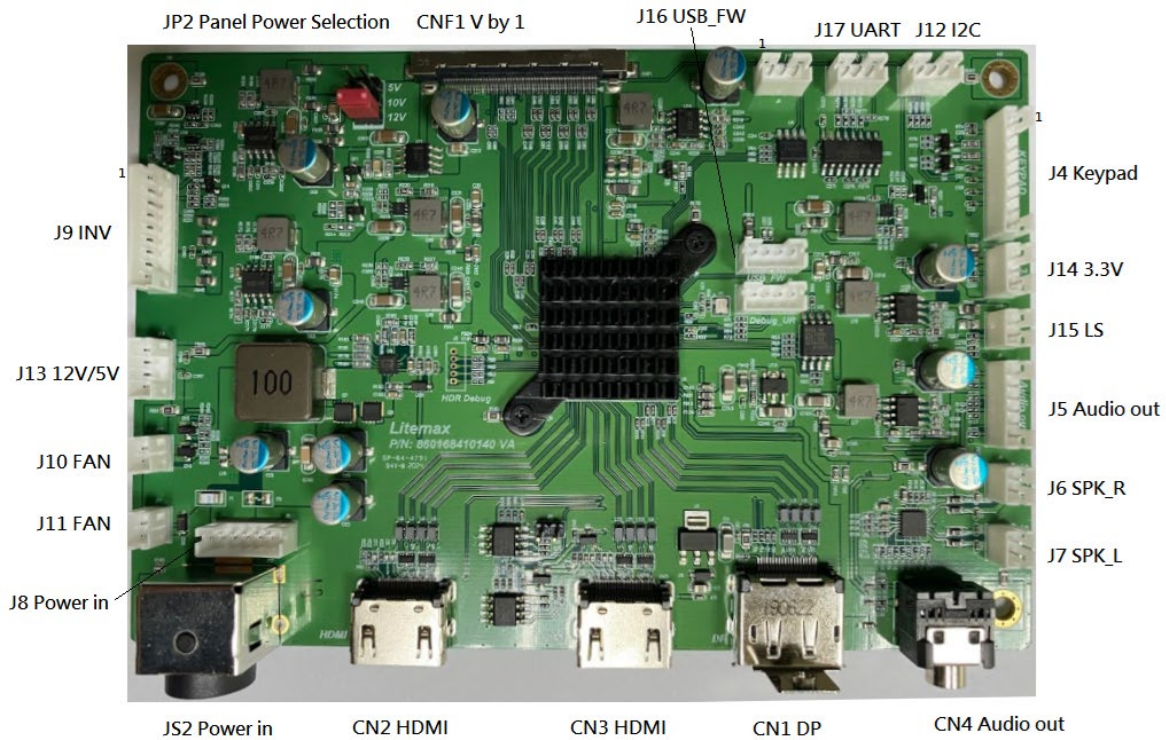
6.2 Outline Dimensions

AD68415   150mm x 100mm x 18mm
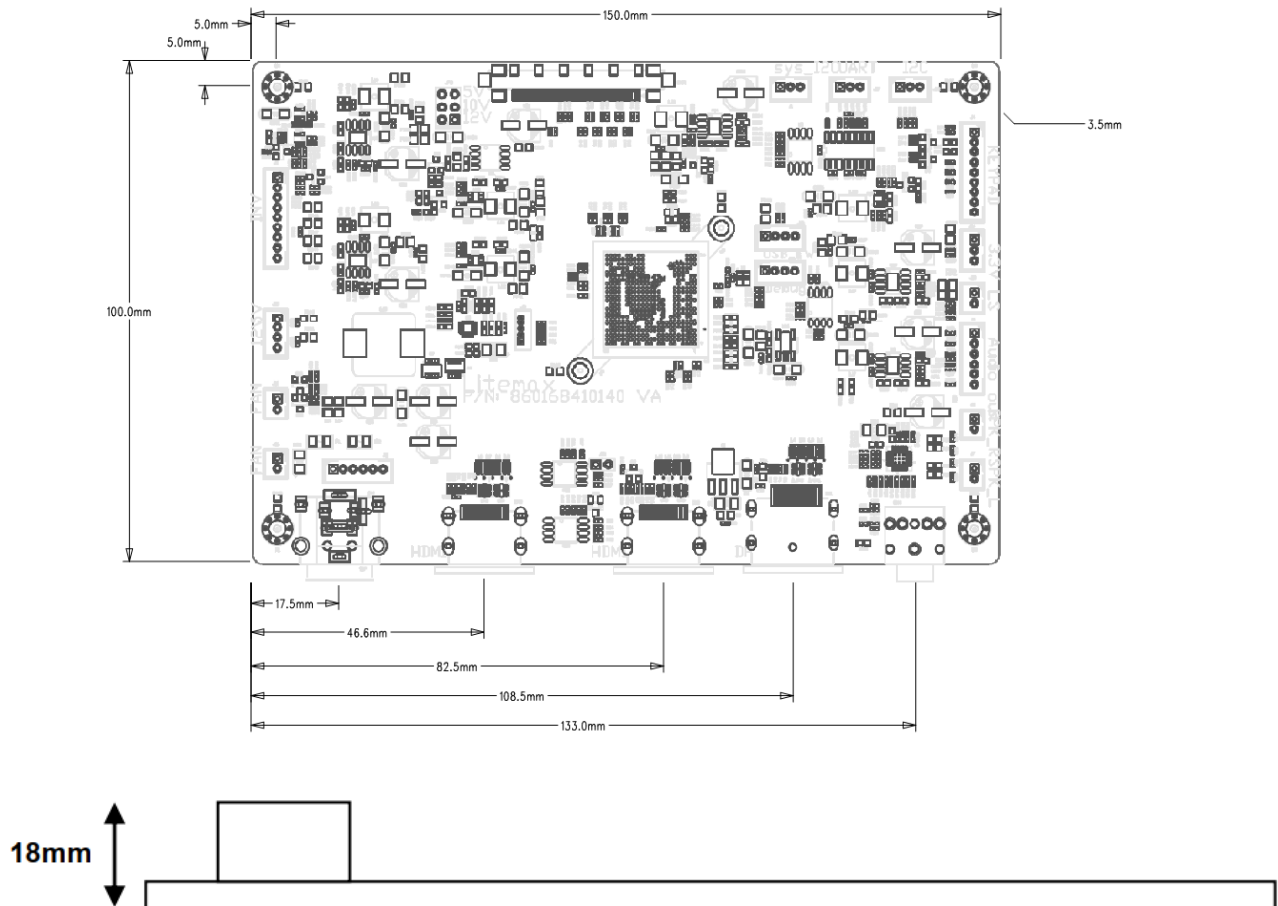
6.3   AD68415HHP Board Pin Define

CNF1: V-by-one output (Wafer 0.5mm pitch 51 pin SMD 90°)

Pin	Function	Pin	Function
1	GND	27	HPD
2	RX7P	28	8b/10b SEL
3	RX7N	29	NC
4	GND	30	NC
5	RX6P	31	NC
6	RX6N	32	NC
7	GND	33	SCL
8	RX5P	34	SDA
9	RX5N	35	NC
10	GND	36	NC
11	RX4P	37	NC
12	RX4N	38	GND
13	GND	39	GND
14	RX3P	40	GND
15	RX3N	41	GND
16	GND	42	GND
17	RX2P	43	NC
18	RX2N	44	Panel power
19	GND	45	Panel power
20	RX1P	46	Panel power
21	RX1N	47	Panel power
22	GND	48	Panel power
23	RX0P	49	Panel power
24	RX0N	50	Panel power
25	GND	51	Panel power
26	LOCKN		

J16: USB FW (Wafer 2.0mm pitch 4 pin)

Pin	Function	Pin	Function
1	+5V	3	D+
2	D-	4	GND

J17: UART (Wafer 2.0mm pitch 3 pin)

Pin	Function	Pin	Function
1	UART_TX	3	GND
2	UART_RX		

J12: I2C (Wafer 2.0mm pitch 3 pin)

Pin	Function	Pin	Function
1	SDA	3	GND
2	SCL		

J4: Keypad (Wafer 2.0mm pitch 9 pin)

Pin	Function	Pin	Function
1	POWER KEY	6	UP KEY
2	GREEN LED	7	DOWN KEY
3	RED LED	8	GND
4	AUTO KEY	9	NC
5	MENU KEY		

J14: 3.3V (Wafer 2.0mm pitch 3 pin)

Pin	Function	Pin	Function
1	3.3V	3	GND
2	VR(Optional)		

J15: Analog light sensor (Wafer 2.0mm pitch 2 pin)

Pin	Function	Pin	Function
1	5V	2	Sensor Out

J5: Audio out (Wafer 2.0mm pitch 6 pin) (Optional)

Pin	Function	Pin	Function
1	MUTE	4	Audio_Out_R
2	VOL	5	GND
3	Audio_Out_L	6	SPDIF

J6, J7: Speaker output (Wafer 2.0mm pitch 2 pin)

Pin	Function	Pin	Function
1	SPK+	2	SPK-

CN4: Audio line out (Phone.3.5∮ 90° 5 pin)

Pin	Function	Pin	Function
1	GND	4	GND
2	Audio_Out_R	5	GND
3	Audio_Out_L		

CN1: Display port input (Display port 1.2a)

Pin	Function	Pin	Function
1	LAN_C_D3N	11	GND
2	GND	12	ML_LANE0_P
3	LAN_C_D3P	13	GND
4	ML_LANE2_N	14	GND
5	GND	15	AUX _CH_P
6	ML_LANE2_P	16	GND
7	ML_LANE1_N	17	AUX _CH_N
8	GND	18	Hot plug detect
9	ML_LANE1_P	19	GND
10	ML_LANE0_N	20	DP +5V

CN2, CN3: HDMI input (HDMI 2.0)

Pin	Function	Pin	Function	Pin	Function
1	TMDS Data2+	9	TMDS Data0-	17	GND
2	Shield	10	TMDS Clock+	18	HDMI +5V
3	TMDS Data2-	11	Shield	19	HPD
4	TMDS Data1+	12	TMDS Clock-		
5	Shield	13	CEC		
6	TMDS Data1-	14	NC		
7	TMDS Data0+	15	HDMI_SCL		
8	Shield	16	HDMI_SDA		

JS2: Power input (Power Din 4 pin)

Pin	Function	Pin	Function
1	Power Input	3	GND
2	Power Input	4	GND

JS1: Power input (Power Jack 3 pin) (Optional)

Pin	Function	Pin	Function
1	Power Input	3	GND
2	GND		

J8: Power input (Wafer 2.0mm pitch 6 pin)

Pin	Function	Pin	Function
1	Power Input	4	GND
2	Power Input	5	GND
3	Power Input	6	GND

J10, J11: 12V for Fan power (Wafer 2.0mm pitch 2 pin)

Pin	Function	Pin	Function
1	Fan+ (12V)	2	Fan-

J13: Reserved 12/5V (Wafer 2.0mm pitch 4 pin)

Pin	Function	Pin	Function
1	5V	3	12V
2	GND	4	GND

J9: Backlight power and control (Wafer 2.0mm pitch 9 pin)

Pin	Function	Pin	Function
1	DC/PWM SEL	6	GND
2	Enable	7	12V (Note3)
3	Dimming	8	12V (Note3)
4	GND	9	12V (Note3)
5	GND		

Note3: Pin 7,8,9 are for 12V version only. If you choose 24V version, these 3 pin are NC.

JP2: Panel power selection (2.54mm pitch 2x3 jump) (Note4)

Pin	Function	Pin	Function
1-2 close	12V	5-6 close	5V
3-4 close	10V		

Note4: Panel power selection can only be chosen one. If you short multi jump at the same time, it will damage product

6.4 OSD Function

MEMBRANE CONTROL BUTTOM
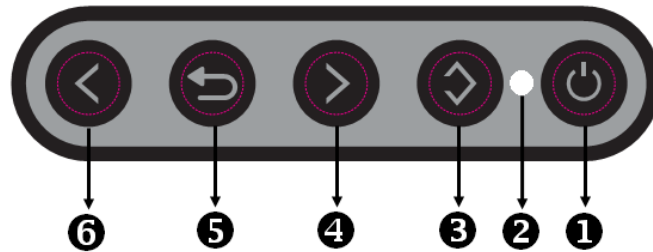
❶ **Key:** (Power) function key

    Press the power switch will turn the monitor on.

    Press it again to turn the monitor off.

❷ **LED Status:** Power ON-Green / Power off-No.

❸ **Key:** (Menu + Selection Right + Enter) function key
Press this button to the OSD "main menu". And then press this button go to the "Selection Right" function, and press again this button to "Enter".

❹ **Key:** (Menu + Selection Up + Increase) function key
Press this button to the OSD "main menu". And then press this button go to the "Selection Up" function, and press again this button to adjustment value "Increase".

❺ **Key:** (Menu + Exit) function key
Enter to the OSD adjustment menu. It also used for go back to previous menu for sub-menu.

❻ **Key:** (Menu + Selection Down + Decrease) function key

    Press this button to the OSD "main menu". And then press this button go to the "Selection Down" function, and press again this button to adjustment value "Decrease".

Screen Adjustment Operation Procedure

1. **Entering the screen adjustment**

    The setting switches are normally at stand-by.   Push the **Menu Key** once to display the main menu of the screen adjustment.   The adjustable items will be displayed in the main menu.

2. **Entering the settings**

    Use the **Down Key** and **Up Key** buttons to select the desired setting icon and push the SELECT button to enter sub-menu.

3. **Change the settings**

    After the sub-menu appears, use the **Down Key** and **Up Key** buttons to change the setting values.

4. **Save**

    After finishing the adjustment, push the button to memorize the setting.

5. **Return & Exit the Main Menu**

    Exit the screen adjustment; push the "MENU" button.   When no operation is done around 30 sec (default OSD timeout), it goes back to the stand-by mode and no more switching is accepted except MENU to restart the setting.

6.5 OSD Menu

1- Picture

1-1. Brightness mode

Choose the brightness mode by OSD. The function of light sensor and VR are optional.

1-2. Brightness

Adjust the brightness range (0~100)

1-3. ⬖ Contrast

Adjust the contrast range (0~100)

1-4. 🅰 Sharpness

Adjust the sharpness range (0~4)

2- ➤ Input source

3- Audio

3-1. Volume

Adjust the volume range (0~100)

3-2. Mute

Turn on or turn off the mute

4- Color

4-1. 6500K

4-2. 9300K

4-3. User Define

Red gain
    Adjust the red gain range (0~100)
Green gain
    Adjust the green gain range (0~100)
Blue gain
    Adjust the blue gain range (0~100)

5- Other setting

5-1. OSD_HPos

Move the OSD user interface horizontally on screen (0~100)
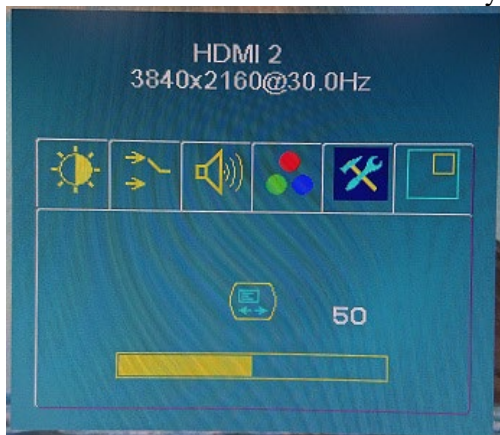
5-2. OSD_VPos

Move the OSD user interface vertically on screen (0~100)
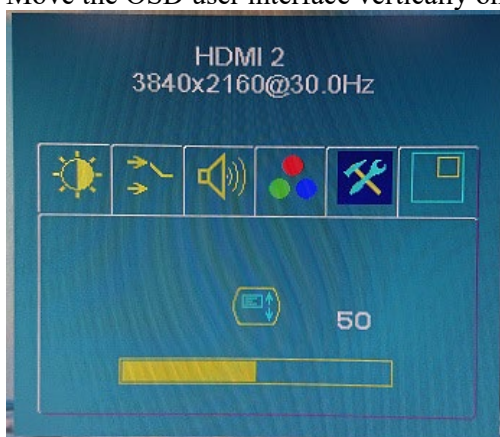
5-3.   OSD Rotation

Rotate the degrees of OSD (0, 90, 180, 270 degrees)

5-4.   Load Default

Recovery the value of OSD
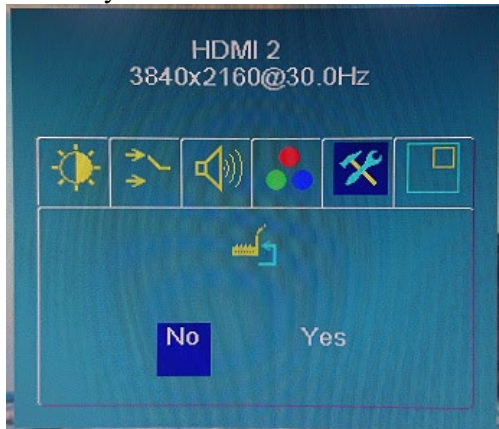
6-   PIP / PBP (Optional)

6-1. PIP / PBP Mode

Choose the Mode (OFF、PIP、PBP)

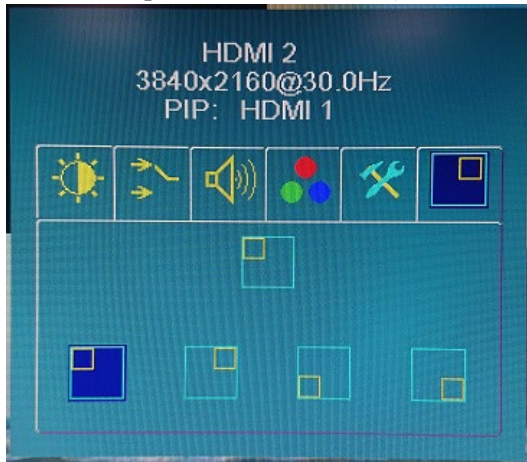
6-2. PIP / PBP Input

Switch the signal source of PIP/PBP
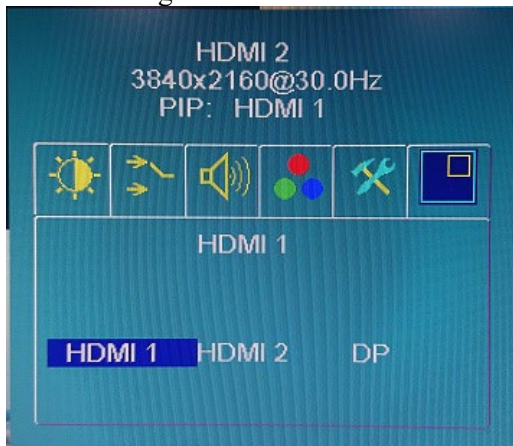
6-3. PIP / PBP Size

Choose the PIP/PBP size (1280x720, 1366x768, 1920x1080)

6-4.   PIP / PBP Pos

Choose the position of PIP/PBP (LT、RT、LB、RB)
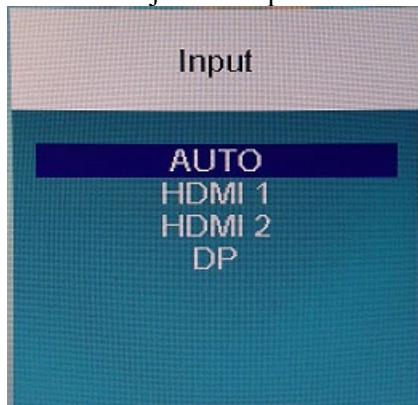

< Hot key >
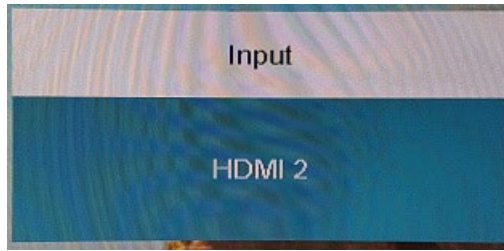Left key can adjust the brightness.

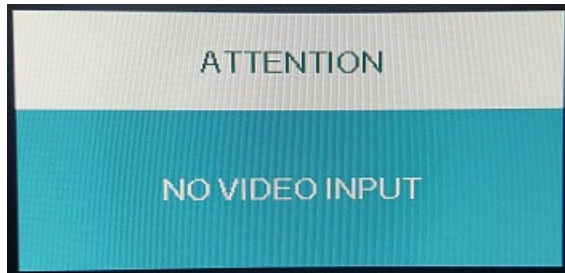Right key can exhibit and adjust the input source.

< Other >
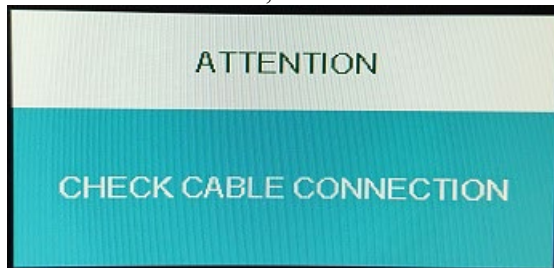Power on or switch the source can exhibit the information.

(Information)

No input source can exhibit NO VIDEO INPUT

(No Video Input)

If the cable doesn't connect the socket, the screen will exhibit CHECK CABLE CONNECTTION

(Check Cable Connection)

7   Precautions

7.1   Handling Precautions

(1)   The module should be assembled into the system firmly by using every mounting hole. Do not apply rough force such as bending or twisting to the LCD during assembly.

(2)   You should consider the mounting structure so that uneven force (ex. Twisted stress, Concentrated stress) is not applied to the module. And the case on which a module is mounted should have sufficient strength so that external force is not transmitted directly to the LCD module.

(3)   While assembling or installing LCD modules, it can only be in the clean area. The dust and oil may cause electrical short or damage the polarizer.

(4)   Use fingerstalls or soft gloves in order to keep display clean during the incoming inspection and assembly process.

(5)   Do not press or scratch the surface harder than a HB pencil lead on the panel because the polarizer is very soft and easily be scratched.

(6)   Please attach the surface transparent protection film to the surface in order to protect the polarizer. Transparent protection film should have sufficient strength in order to the resist external force.

(7)   When the transparent protection film is peeled off, static electricity is generated between the film and polarizer. This should be peeled off slowly and carefully by people who are electrically grounded and with well ion-blown equipment or in such a condition, etc.

(8)   If the surface of the polarizer is dirty, please clean it by some absorbent cotton or soft cloth. Do not use Ketone type materials (ex. Acetone), Ethyl alcohol, Toluene, Ethyl acid or Methyl chloride. It might permanently damage the polarizer due to chemical reaction.

(9)   Wipe off water droplets or oil immediately. Staining and discoloration may occur if they left on panel for a long time.

(10)   If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contacting with hands, legs or clothes, it must be washed away thoroughly with soap.

(11)   Protect the LCD module from static electricity, it may cause damage to the C-MOS Gate Array IC.

(12)   Do not disassemble the module.

(13)   Do not pull or fold the lamp wire.

(14)   Pins of I/F connector should not be touched directly with bare hands.

7.2   Storage Precautions

(1)   High temperature or humidity may reduce the performance of LCD module. Please store LCD module within the specified storage conditions.

(2)   If possible store them in a dark place. Do not expose the module to sunlight or fluorescent light. Keep the temperature between 5℃ and 35℃ at normal humidity.

(3)   It is dangerous that moisture come into or contacted the LCD module, because the moisture may damage LCD module when it is operating.

(4)   The polarizer surface should not come in contact with any other object. It is recommended that they be stored in the container in which they were shipped.

7.3　Operation Precautions

(1)　Do not pull the I/F connector in or out while the LCD module is operating.

(2)　Always follow the correct power on/off sequence when LCD module is connecting and operating. This can prevent the CMOS LSI chips from damage during latch-up.

(3)　Response time depends on the temperature. (In lower temperature, it becomes longer.)

(4)　Brightness depends on the temperature. (In lower temperature, it becomes lower.)

(5)　Be careful for condensation at sudden temperature change. Condensation makes damage to polarizer or electrical contacted parts. And after fading condensation, smear or spot will occur.

(6)　Module has high frequency circuits. Sufficient suppression to the electromagnetic interference shall be done by system manufacturers. Grounding and shielding methods are very important to minimize the interference.

(7)　Please do not give any mechanical and/or acoustical impact to module. Otherwise, module can't be operated its full characteristics perfectly.

(8)　Since a module is composed of electronic circuits, it is not strong to electrostatic discharge. Make certain that treatment persons are connected to ground through wrist band etc. And don't touch interface pin directly.

(9)　Do not display the fixed pattern for a long time because it may cause image sticking.

(10)　In order to prevent image sticking, periodical power-off or screen save is needed after fixed pattern long time display.

(11)　Black image or moving image is strongly recommended as a screen save.

(12)　Static information display recommended to use with moving image. Cycling display between 10 minutes' information (static) display and 10 seconds' moving image.

(13)　Background and character (image) color change is recommended. Use different colors for background and character, respectively. And change colors themselves periodically.

(14)　LCD system is required to place in well-ventilated environment. Adapting active cooling system is highly recommended.

(15)　Product reliability and functions are only guaranteed when the product is used under right operation usages.

(16)　If product will be used in extreme conditions, such as high temperature/ humidity, shock and vibration it is strongly recommended to contact Litemax for filed application engineering advice. Otherwise, its reliability and function may not be guaranteed. Extreme conditions are commonly found at airports, transit stations, taxi-top, in vehicle and controlling systems.

8　Disclaimer

All information in this document are subject to change, please constant LiteMax for any new design.