LITEMAX

SSF/SSH4225-Y V2

Sunlight Readable 42.2" LED B/L LCD

User Manual

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Record of Revision

Version and Date	Page	Old Description	New Description	Remark
June/25/2024	all		Initial release	

Contents

1 General Description

The SSF/SSH4225-Y V2 is a 42.2 inch color TFT-LCD display with special aspect ratio 16:4 and wide resolution 1920 x 480. It is Litemax's Spanpixel series product which designed for high brightness 1000 nits with power efficiency LED backlight. It provides LCD panel with specific aspect ratios and sunlight readable for digital signage, public transportation, exhibition hall, department store, and vending machine.

1.1 Features

- 42.2" Stretched LCD
- Ultra-Wide Screen (16 : 4)
- High Brightness 1000 nits
- LED Backlight
- LCD blacking defect free (Hi-Tni 110 ˚C)
- Low Power Consumption
- BL MTBF: 50,000 hours

1.2 General Specifications

Model Name	SSF/SSH4225-Y V2
Description	42.2" TFT LCD, 1000 nits LED backlight, 1920x480
Screen Size	42.2"
Display Area (mm)	1039.68(H) x 259.92(V)
Brightness	1000 cd/m^2
Resolution	1920x480
Aspect Ratio	16 : 4
Contrast Ratio	5300 : 1
Pixel Pitch (mm)	0.54(H) x 0.54(V)
Pixel Pre Inch (PPI)	47
Viewing Angle	178°(H),178°(V)
Color Saturation (NTSC)	84%
Display Colors	1.07B
Response Time (Typical)	8ms
Panel Interface	LVDS
Input Interface	HDMI, DP
Input Power	DC 24V
Power Consumption	57W, 60W (with AD board)
OSD Key	4 Keys (Power Switch, Menu, +, -)
OSD Control	Brightness, Color, Contrast, Auto Turing, H/V Position…etc
Dimensions (mm)	1067. 48(H) x 287.72(V) x 27(T)
Bezel Size(U/B/L/R)	13.9/13.9/13.9/13.9 mm
Weight (Net)	4.53 kg
Operating Temperature	-20 ˚C ~ 60 ˚C
Storage Temperature	-20 ˚C ~ 60 ˚C

SSF= Panel + LED Driving Board
SSH= Panel + LED Driving Board + AD Control Board

1.3 Absolute Maximum Ratings

The followings are maximum values which, if exceeded, may cause faulty operation or damage to the unit

Item	Symbol	Min	Max	Unit	Conditions
Logic/LCD Drive Voltage	Vcc	-0.3	14	[Volt]	Note 1
Input Voltage of Signal	Vin	-0.3	4	[Volt]	Note 1
Operating Temperature	TOP	-20	+60	[ºC]	Note 2
Operating Humidity	HOP	10	90	[%RH]	Note 2
Storage Temperature	TST	-20	+60	[ºC]	Note 2
Storage Humidity	HST	10	90	[%RH]	Note 2
Panel Surface Temperature	PST		65	[ºC]	Note 3

Note 1: Duration:50 msec.

Note 2 : Maximum Wet-Bulb should be 39℃and No condensation.

The relative humidity must not exceed 90% non-condensing at temperatures of 40℃ or less. At temperatures greater than 40℃ the wet bulb temperature must not exceed 39℃

Note 3: Surface temperature is measured at 50℃ Dry condition.
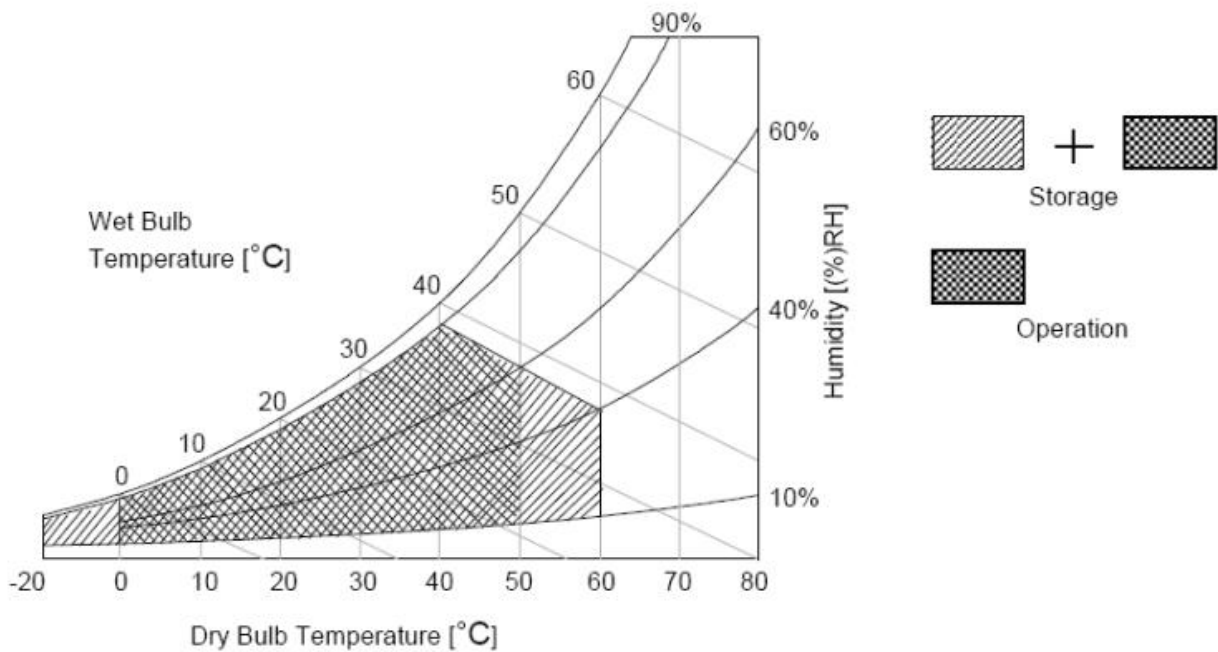
2 Electrical Specification

2.1 Electrical Characteristics

Parameter		Symbol	Value			Unit	Note
			Min.	Typ.	Max		
LCD							
Power Supply Input Voltage		V_{DD}	10.8	12	13.2	V_{DC}	
Power Supply Input Current		I_{DD}	--	0.516	0.619	A	1
Power Consumption		P_C	--	6.192	7.43	Watt	1
Inrush Current		I_{RUSH}	-	-	1.44	A	2
Permissible Ripple of Power Supply Input Voltage (for input power=12V)		V_{RP}	--	--	$V_{DD} * 5\%$	mV_{pk-pk}	3
LVDS Interface	Input Differential Voltage	$\mid V_{ID} \mid$	200	400	600	mV_{DC}	4
	Differential Input High Threshold Voltage	V_{TH}	+100	--	+300	mV_{DC}	4
	Differential Input Low Threshold Voltage	V_{TL}	-300	--	-100	mV_{DC}	4
	Input Common Mode Voltage	V_{ICM}	1.1	1.25	1.4	V_{DC}	4
CMOS Interface	Input High Threshold Voltage	V_{IH} (High)	2.7	--	3.3	V_{DC}	7
	Input Low Threshold Voltage	V_{IL} (Low)	0	--	0.6	V_{DC}	

2.2 AC Characteristics

Parameter		Symbol	Value			Unit	Note
			Min.	Typ.	Max		
LVDS Interface	Receiver Clock : Spread Spectrum Modulation range	Fclk_ss	Fclk -3%	--	Fclk +3%	MHz	8
	Receiver Clock : Spread Spectrum Modulation frequency	Fss	30	--	200	KHz	8
	Receiver Data Input Margin Fclk = 85 MHz Fclk = 65 MHz	tRMG	-0.4 -0.5	-- --	0.4 0.5	ns	9

Note:
1. Test Condition:
   (1) V_{DD} = 12.0V
   (2) Fv = Type Timing, 60Hz, 120Hz or Other
   (3) F_{CLK} = Max freq.
   (4) Temperature = 25 ℃
   (5) Test Pattern : White Pattern

2. Measurement condition : Rising time = 400us
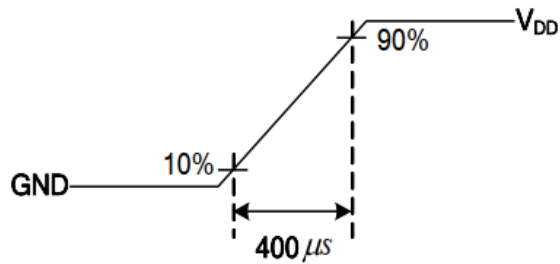
3. Test Condition:
   (1) The measure point of V_{RP} is in LCM side after connecting the System Board and LCM.
   (2) Under Max. Input current spec. condition.

4. V_{ICM} = 1.25V
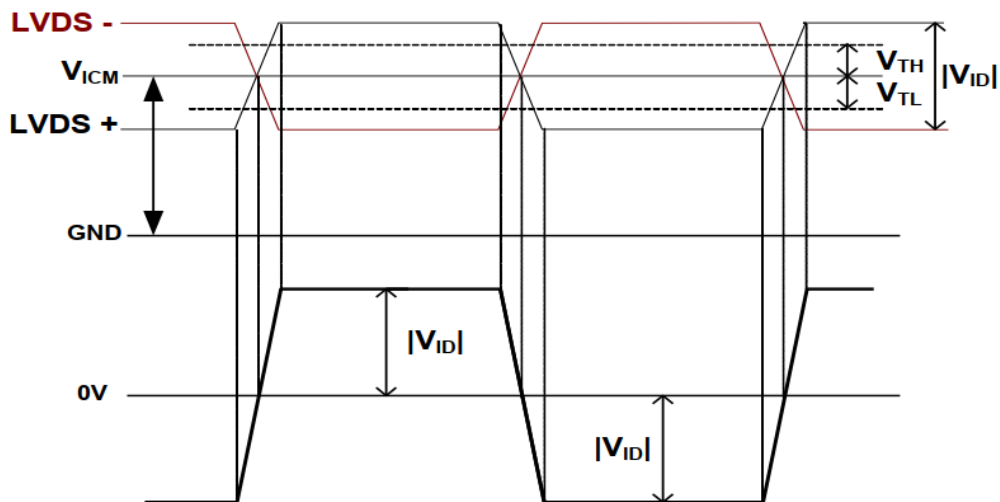
5. Do not attach a conducting tape to lamp connecting wire. If the lamp wire attach to conducting tape, TFT-LCD Module have a low luminance and the inverter has abnormal action because leakage current occurs between lamp wire and conducting tape.

6. The relative humidity must not exceed 80% non-condensing at temperatures of 40℃ or less. At temperatures greater than 40℃, the wet bu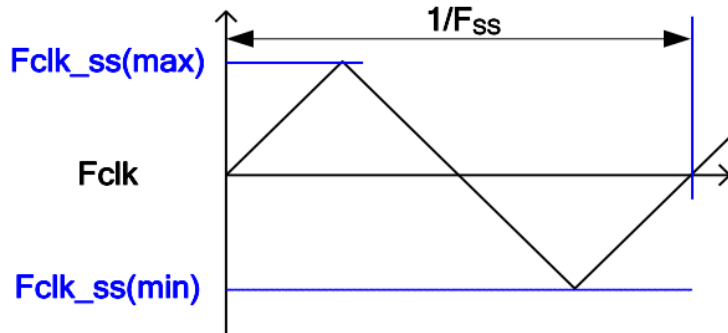lb temperature must not exceed 39℃ When operate at high temperatures, the brightness of LED will drop and the life time of LED will be reduced.

7. The measure points of V_{IH} and V_{IL} are in LCM side after connecting the System Board and LCM.

8. LVDS Receiver Clock SSCG (Spread spectrum clock generator) is defined as below figures

9. Receiver Data Input Margin

Parameter	Symbol	Rating			Unit	Note
		Min	Type	Max		
Input Clock Frequency	Fclk	Fclk (min)	--	Fclk (max)	MHz	T=1/Fclk
Input Data Position0	tRIP1	-|tRMG|	0	|tRMG|	ns	
Input Data Position1	tRIP0	T/7-|tRMG|	T/7	T/7+|tRMG|	ns	
Input Data Position2	tRIP6	2T/7-|tRMG|	2T/7	2T/7+|tRMG|	ns	
Input Data Position3	tRIP5	3T/7-|tRMG|	3T/7	3T/7+|tRMG|	ns	
Input Data Position4	tRIP4	4T/7-|tRMG|	4T/7	4T/7+|tRMG|	ns	
Input Data Position5	tRIP3	5T/7-|tRMG|	5T/7	5T/7+|tRMG|	ns	
Input Data Position6	tRIP2	6T/7-|tRMG|	6T/7	6T/7+|tRMG|	ns	
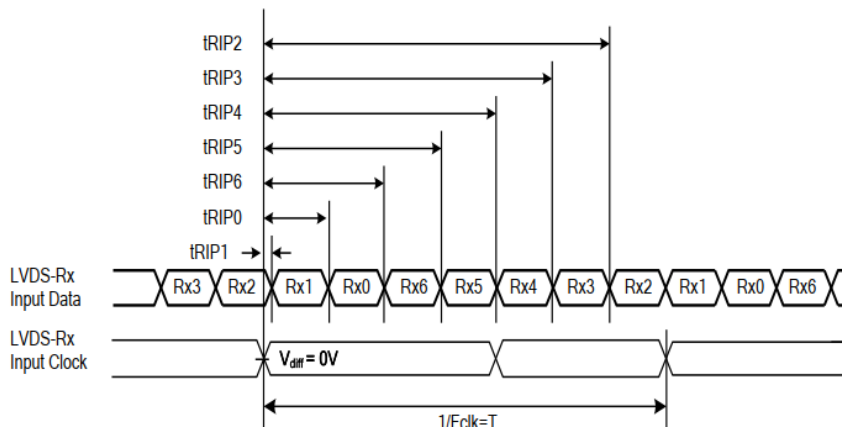
2.3 Interface Connection

LCD Connector : JAE FI-RTE51SZ-HF

PIN	Symbol	Description	Note	PIN	Symbol	Description	Note
1	N.C.	No connection	2	26	N.C.	No connection	2
2	N.C.	No connection (for AUO internal only)	3&5	27	N.C.	No connection	2
3	N.C.	No connection (for AUO internal only)	3&7	28	CH2_0-	LVDS Channel 2, Signal 0-	
4	N.C.	No connection (for AUO internal only)	3&5	29	CH2_0+	LVDS Channel 2, Signal 0+	
5	BITSEL	LVDS 8/10bit input selection Open/ Low (GND): 8bits High (3.3V): 10bit	3&6	30	CH2_1-	LVDS Channel 2, Signal 1-	
6	N.C.	No connection	2	31	CH2_1+	LVDS Channel 2, Signal 1+	
7	LVDS_SEL	Open/ High (3.3V) for NS Low (GND) for JEIDA	3&4	32	CH2_2-	LVDS Channel 2, Signal 2-	
8	N.C.	No connection	2	33	CH2_2+	LVDS Channel 2, Signal 2+	
9	N.C.	No connection	2	34	GND	Ground	
10	N.C.	No connection	2	35	CH2_CLK-	LVDS Channel 2, Clock -	
11	GND	Ground		36	CH2_CLK+	LVDS Channel 2, Clock +	
12	CH1_0-	LVDS Channel 1, Signal 0-		37	GND	Ground	
13	CH1_0+	LVDS Channel 1, Signal 0+		38	CH2_3-	LVDS Channel 2, Signal 3-	
14	CH1_1-	LVDS Channel 1, Signal 1-		39	CH2_3+	LVDS Channel 2, Signal 3+	
15	CH1_1+	LVDS Channel 1, Signal 1+		40	CH2_4-	LVDS Channel 2, Signal 4-	
16	CH1_2-	LVDS Channel 1, Signal 2-		41	CH2_4+	LVDS Channel 2, Signal 4+	
17	CH1_2+	LVDS Channel 1, Signal 2+		42	N.C.	No connection	2
18	GND	Ground		43	N.C.	No connection	2
19	CH1_CLK-	LVDS Channel 1, Clock -		44	GND	Ground	
20	CH1_CLK+	LVDS Channel 1, Clock +		45	GND	Ground	
21	GND	Ground		46	GND	Ground	
22	CH1_3-	LVDS Channel 1, Signal 3-		47	N.C.	No connection	2
23	CH1_3+	LVDS Channel 1, Signal 3+		48	V$_{DD}$	Power Supply Input Voltage	
24	CH1_4-	LVDS Channel 1, Signal 4-		49	V$_{DD}$	Power Supply Input Voltage	
25	CH1_4+	LVDS Channel 1, Signal 4+		50	V$_{DD}$	Power Supply Input Voltage	
				51	V$_{DD}$	Power Supply Input Voltage	

Note1. Pin number start from the left side as the following figure.
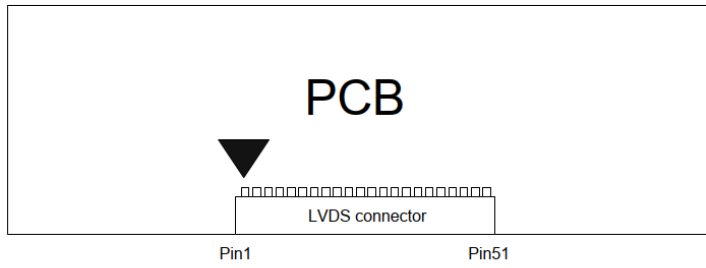
Note2. Please leave this pin unoccupied. It can not be connected by any signal (Low/GND/High)

Note3.   Input control signal threshold voltage definition

Item	Symbol	Min.	Typ.	Max.	Unit
Input High Threshold Voltage	VIH	2.7	-	3.6	V
Input Low Threshold Voltage	VIL	0	-	0.6	V

Note4. LVDS data format selection

LVDS_SEL	Mode
H or OPEN	NS
L	Jeida

Input equivalent impedance of LVDE_SEL pin
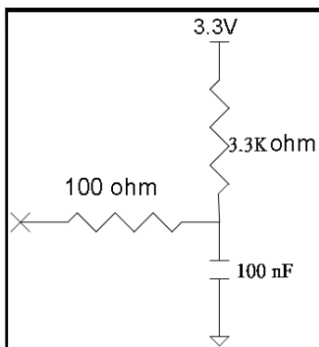
Note5. I2C Data and Clock

I2C Data and Clock timing

| Symbol	Parameter		Standard Mode		Fast Mode		Unit
			Min.	Max	Min	Max	
fSCL	SCL Clock Frequency			100		400	KHz
tBUF	Bus Free Between a STOP and START Condition		4.7		1.3		us
tHD;STA	Hold Time for START Condition		4.0		0.6		us
tLOW	LOW Period of The SCL Clock		4.7		1.3		us
tHIGH	HIGH Period of The SCL Clock		4.0		0.6		us
tSU;STA	Set-up Time for a Repeated START Condition		4.7		0.6		us
tHD;DAT	Data Hold Time	Transmitter	0.1		0.1	0.9	us
		Receiver	0		0		
tSU;DAT	Data Set-up Time		250		100		ns
Tr	Rise Time of Both SDA and SCL Signals			1000		300	ns
tf	Fall Time of Both SDA and SCL Signals			300		300	ns
tSU;STO	Set-up Time for STOP Condition		4.0		0.6		us
tSP	Pulse Width of spikes which must be suppressed by the input filter		0	50	0	50	ns
CI	Capacitance for each Bus Pin		-	10		10	pF
Cb	Capacitive load for each Bus Line		-	400		400	pF
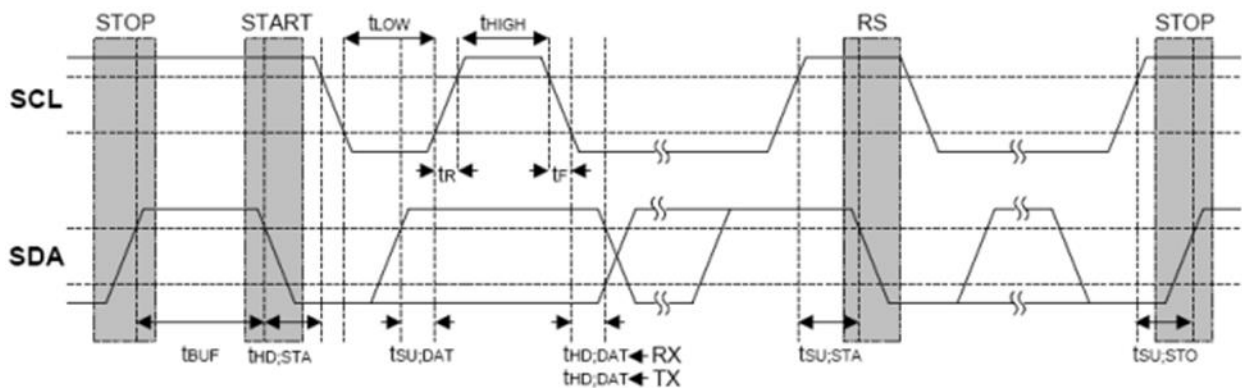
Input equivalent impedance of SDA/SCL pin
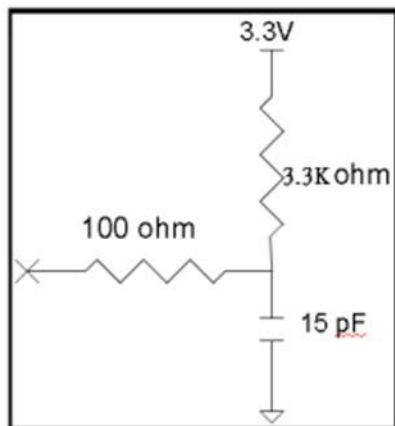
Note6. Data Bit mode format selection

BIT_SEL	Mode
H	10Bit
L or OPEN	8Bit

Input equivalent impedance of BIT_SEL pin

100 ohm

100 nF   3.3K ohm
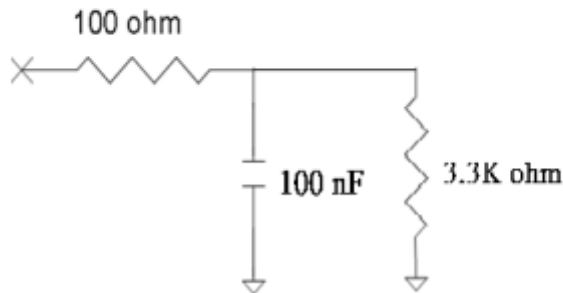
Note7. Write Protection

Mode selection

WP	Note
L or OPEN	Protection
H	Writable

Input equivalent impedance of WP pin

100 ohm

100 nF   4.7K ohm
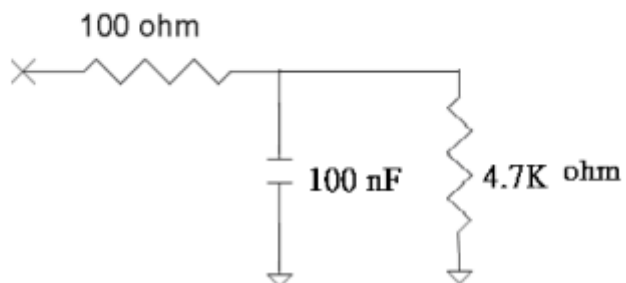
2.4 Input Data Format

LVDS Option for 8bit

■ **LVDS Option NS**

	Previous Cycle		Current Cycle							Next Cycle

Clock

CHx_0+ / CHx_0-	R1	R0	G0	R5	R4	R3	R2	R1	R0	G0
CHx_1+ / CHx_1-	G2	G1	B1	B0	G5	G4	G3	G2	G1	B1
CHx_2+ / CHx_2-	B3	B2	DE	NA	NA	B5	B4	B3	B2	DE
CHx_3+ / CHx_3-	R7	R6	NA	B7	B6	G7	G6	R7	R6	NA

Note: x = 1, 2, 3, 4…

■ **LVDS Option JEIDA**

	Previous Cycle		Current Cycle							Next Cycle

Clock

CHx_0+ / CHx_0-	R3	R2	G2	R7	R6	R5	R4	R3	R2	G2
CHx_1+ / CHx_1-	G4	G3	B3	B2	G7	G6	G5	G4	G3	B3
CHx_2+ / CHx_2-	B5	B4	DE	NA	NA	B7	B6	B5	B4	DE
CHx_3+ / CHx_3-	R1	R0	NA	B1	B0	G1	G0	R1	R0	NA
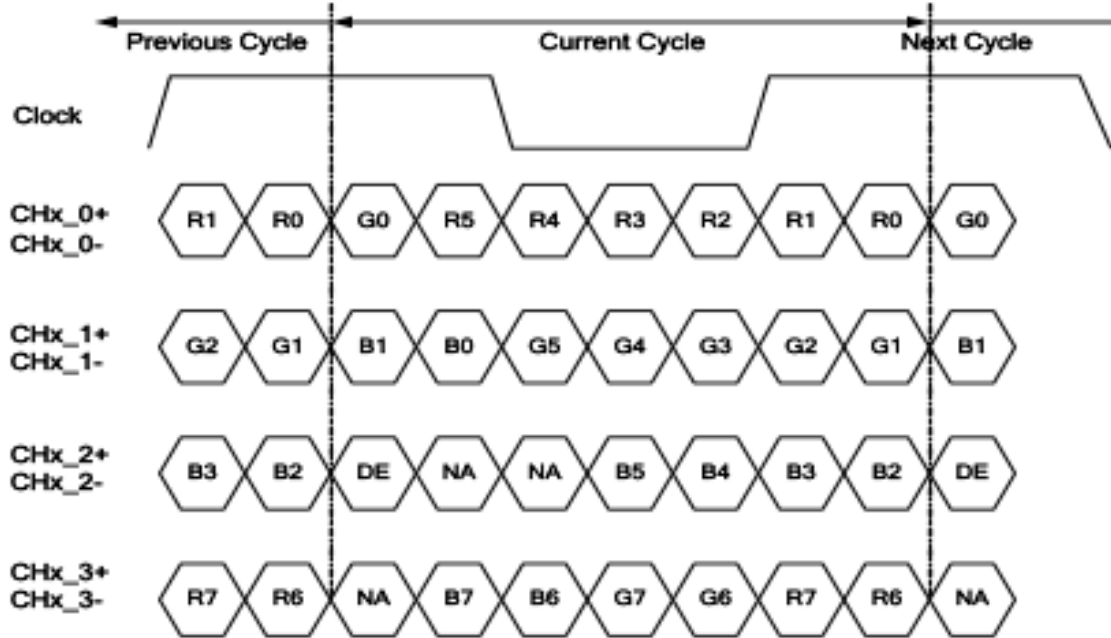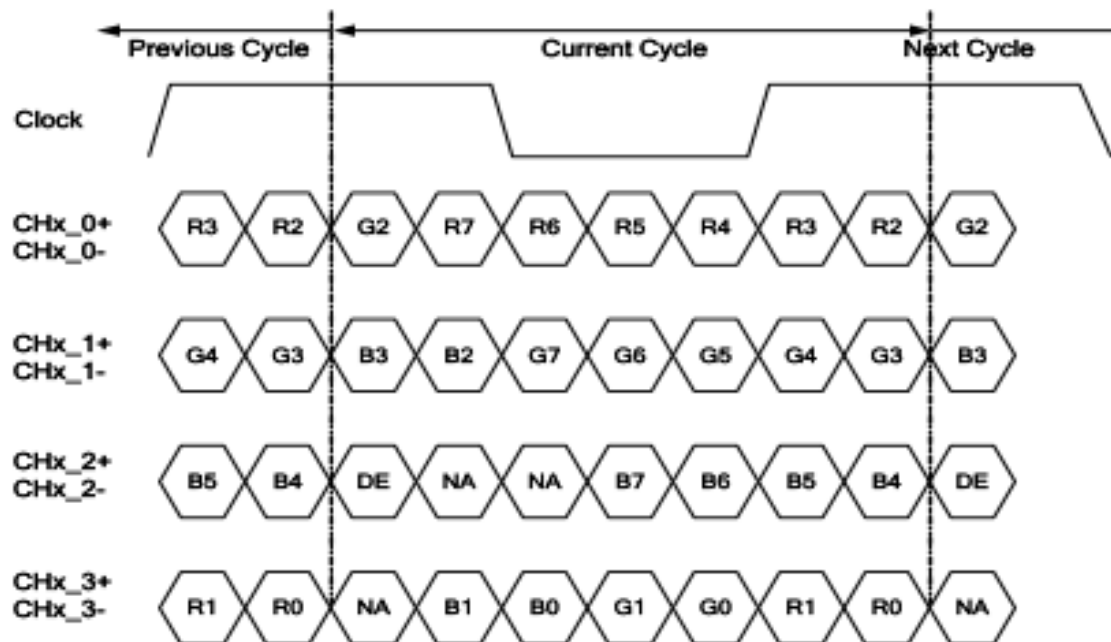
Note: x = 1, 2, 3, 4…

LVDS Option for 10bit

■ LVDS Option NS

	Previous Cycle		Current Cycle						Next Cycle	
Clock										
CHx_0+ / CHx_0-	R1	R0	G0	R5	R4	R3	R2	R1	R0	G0
CHx_1+ / CHx_1-	G2	G1	B1	B0	G5	G4	G3	G2	G1	B1
CHx_2+ / CHx_2-	B3	B2	DE	NA	NA	B5	B4	B3	B2	DE
CHx_3+ / CHx_3-	R7	R6	NA	B7	B6	G7	G6	R7	R6	NA
CHx_4+ / CHx_4-	R9	R8	NA	B9	B8	G9	G8	R9	R8	NA

Note: x = 1, 2, 3, 4…

■ LVDS Option JEIDA

	Previous Cycle		Current Cycle						Next Cycle	
Clock										
CHx_0+ / CHx_0-	R5	R4	G4	R9	R8	R7	R6	R5	R4	G4
CHx_1+ / CHx_1-	G6	G5	B5	B4	G9	G8	G7	G6	G5	B5
CHx_2+ / CHx_2-	B7	B6	DE	NA	NA	B9	B8	B7	B6	DE
CHx_3+ / CHx_3-	R3	R2	NA	B3	B2	G3	G2	R3	R2	NA
CHx_4+ / CHx_4-	R1	R0	NA	B1	B0	G1	G0	R1	R0	NA

Note: x = 1, 2, 3, 4…

2.5 Signal Timing Specification

This is the signal timing required at the input of the user connector. All of the interface signal timing should be satisfied with the following specifications for its proper operation.

Timing Table (DE only Mode)

Vertical Frequency Range (60Hz)

Signal	Item	Symbol	Min.	Typ.	Max	Unit
Vertical Section	Period	Tv	500	585	860	Th
	Active	Tdisp (v)	480			
	Blanking	Tblk (v)	20	105	380	Th
Horizontal Section	Period	Th	1200	1282	1325	Tclk
	Active	Tdisp (h)	960			
	Blanking	Tblk (h)	240	322	365	Tclk
Clock	Frequency	Fclk=1/Tclk	42	45	48	MHz
Vertical Frequency	Frequency	Fv	47	60	63	Hz
Horizontal Frequency	Frequency	Fh	33.6	35.1	36.6	KHz

Notes:

(1) Display position is specific by the rise of DE signal only.

Horizontal display position is specified by the rising edge of 1st DCLK after the rise of 1st DE, is displayed on the left edge of the screen.

(2) Vertical display position is specified by the rise of DE after a "Low" level period equivalent to eight times of horizontal period. The 1st data corresponding to one horizontal line after the rise of 1st DE is displayed at the top line of screen.

(3) If a period of DE "High" is less than 1920 DCLK or less than 480 lines, the rest of the screen displays black.

(4) The display position does not fit to the screen if a period of DE "High" and the effective data period do not synchronize with each other.

2.6 Signal Timing Waveforms

2.7 Color Input Data Reference

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

COLOR DATA REFERENCE

Color		Input Color Data																														
		RED (MSB → LSB)										GREEN (MSB → LSB)										BLUE (MSB → LSB)										
		R9	R8	R7	R6	R5	R4	R3	R2	R1	R0	G9	G8	G7	G6	G5	G4	G3	G2	G1	G0	B9	B8	B7	B6	B5	B4	B3	B2	B1	B0
Basic Color	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(1023)	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green(1023)	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0
	Blue(1023)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1
	Cyan	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Magenta	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
R	RED(000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(001)	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	RED(1022)	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(1023)	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
G	GREEN(000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GREEN(001)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0

	GREEN(1022)	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0
	GREEN(1023)	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0
B	BLUE(000)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	BLUE(001)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1

	BLUE(1022)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	0
	BLUE(1023)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1

2.8   Power Sequence
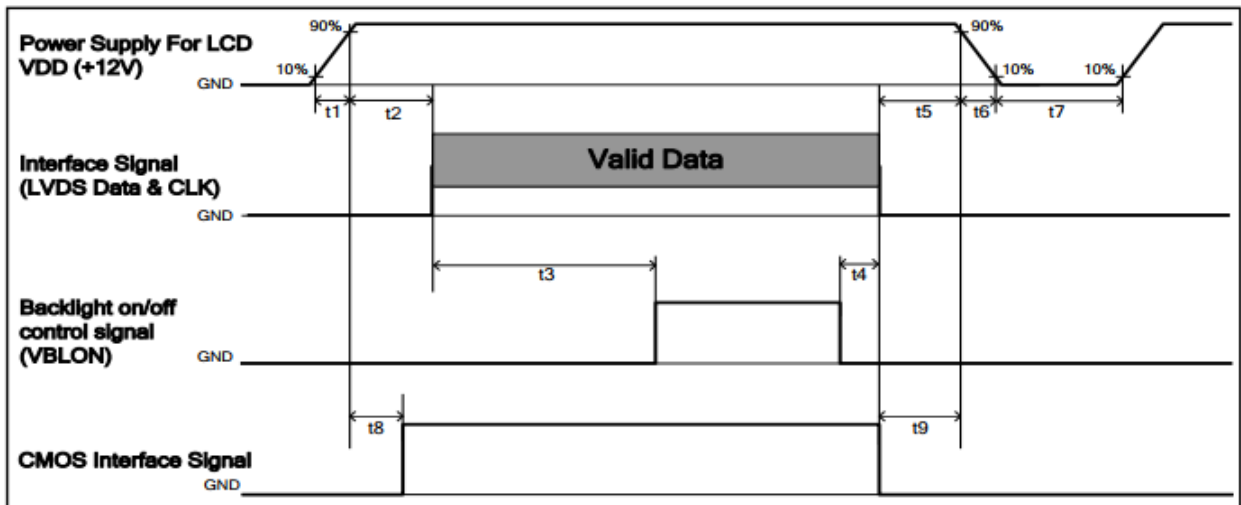
Parameter	Values			Unit
	Min.	Type.	Max.	
t1	0.4	---	30	ms
t2	0.1	---	50	ms
t3	450	---	---	ms
t4	0[*1]	---	---	ms
t5	0	---	---	ms
t6	---	---	---[*2]	ms
t7	500	---	---	ms
t8	10	---	50	ms
t9	0	---	---	ms

Note:

(1) t4=0 : concern for residual pattern before BLU turn off.

(2) t6 : voltage of VDD must decay smoothly after power-off. (customer system decide this value)

3 Optical Specification

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Color chromaticity	Red	Rx	θx=0 θy=0 Klein K-10	0.626	0.656	0.686	-	Test Mode: (2) (3) (4)
		Ry		0.303	0.333	0.363	-	
	Green	Gx		0.275	0.305	0.335	-	
		Gy		0.609	0.639	0.669	-	
	Blue	Bx		0.115	0.145	0.175	-	
		By		0.035	0.065	0.095	-	
	White	Wx		0.272	0.302	0.332	-	
		Wy		0.299	0.329	0.359	-	
Center Luminance of White		Lc	θx=0 θy=0 CA-410	900	1000	1300	cd/m^2	
Uniformity		Lu		-	82	-	%	
Contrast Ratio		CR	θx=0 θy=0 Klein K-10	4770:1	5300:1	-	-	Test Mode: (4)
Color Saturation		NTSC		-	84	-	%	
Viewing Angle	Horizontal	θx+	CR ≥ 10	-	89	-	Deg	Test Mode: (1)
		θx-		-	89	-		
	Vertical	θy+		-	89	-		
		θy-		-	89	-		

Test Mode：

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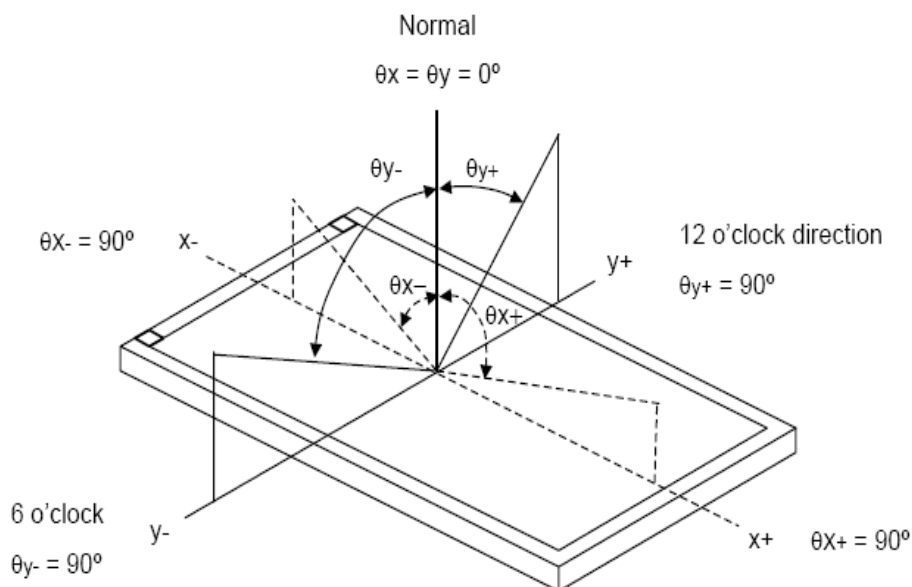
(2) Definition of Test Point:

Active Area

(3) CA-410 Measurement Setup:

LCD Panel
Distance: 0 mm
CA-410
Center of the Screen
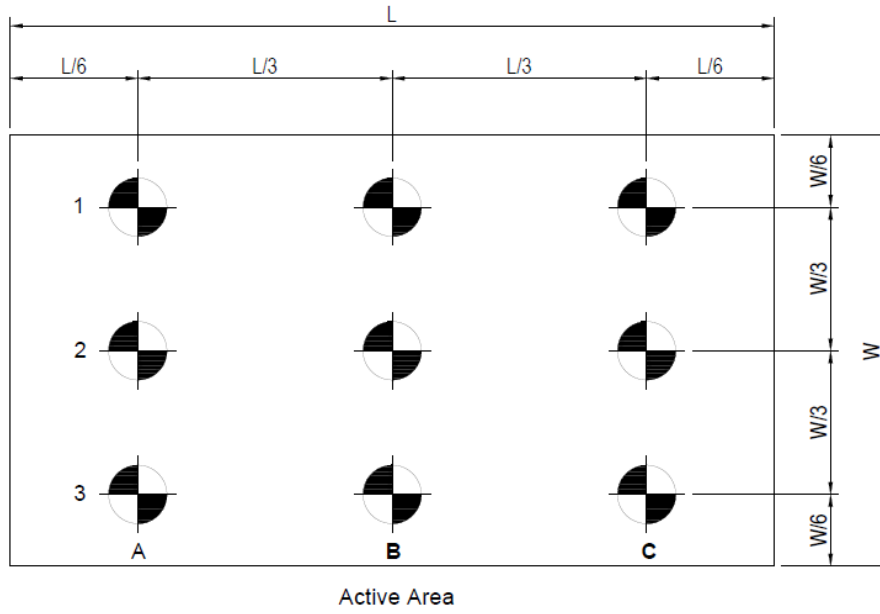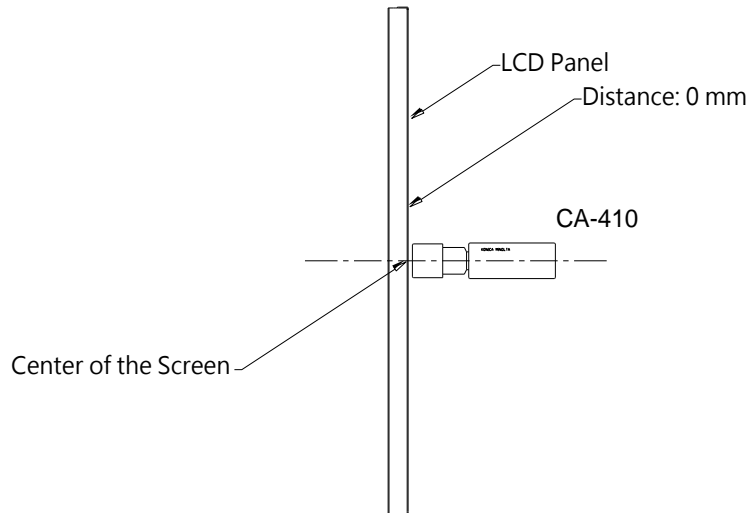
(4) Klein K-10 Measurement Setup:

LCD Panel
Distance: 0 mm
K-10
Center of the Screen
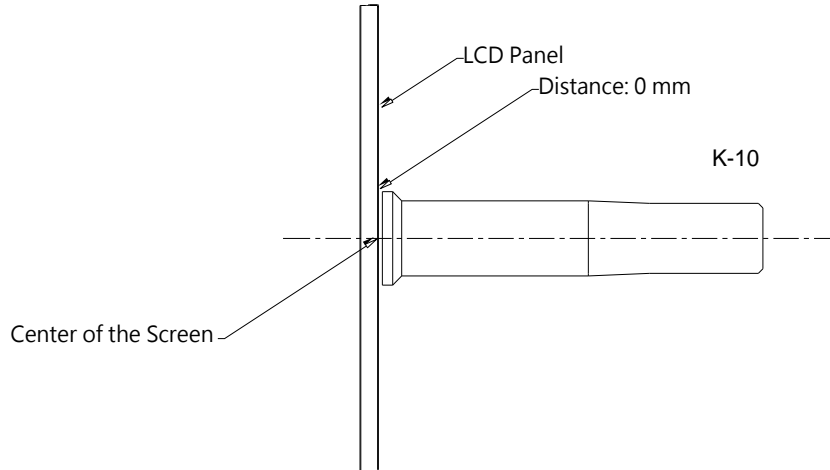
4   LED Driving Board Specifications

This specification is applied to LED converter unit for SSF/SSH4225-Y 1000nits LED backlight.

4.1   Operating Characteristics

	Item	Symbol		Condition	Min	Typ	Max	Unit	Note
1	Power Supply Input Voltage	VDDB		-	22.8	24	25.2	V	-
2	Power Supply Input Current	I_{DDB}		VDDB=24V	-	2.5 (TBD)	3 (TBD)	A	1
3	Power Consumption	P_{DDB}		VDDB=24V	-	60 (TBD)	72 (TBD)	Watt	1
4	Inrush Current	I_{RUSH}		VDDB=24V		-	8	A	2
5	Control signal voltage	V_{Signal}	Hi	VDDB=24V	2	-	5.5	V	-
			Low		0		0.8		3
6	Control signal current	I_{Signal}		VDDB=24V		-	1.5	mA	-
7	External PWM Duty ratio (input duty ratio)	D_EPWM		VDDB=24V	0	-	100	%	4
8	External PWM Frequency	F_EPWM		VDDB=24V	120	-	960	Hz	4
9	Input Impedance	Rin		VDDB=24V	300			Kohm	-

Note:

1. Dimming ratio= 100%, (Ta=25±5ºC, Turn on for 45minutes)

2. MAX input current while DB turn on, measurement condition VDDB rising time=20ms(VDDB: 10%~90%)
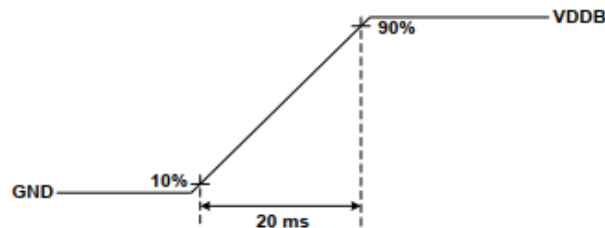
3. When BLU off (VDDB = 24V , VBLON = 0V) , IDDB (max) = 0.1A

4. Less than 5% dimming control is functional well and no backlight shutdown happened

5. LED MTTF is defined as the time which luminance of LED is 50% compared to its original value.

   [Operating condition: Continuous operating at Ta = 25±2ºC, for single LED only]

6. MTTF is a reference index, it is not representative of warranty.

4.2 Input Pin Assignment

LED DB connector:
CN2：CI0114M1HRL-NH(CviLux)
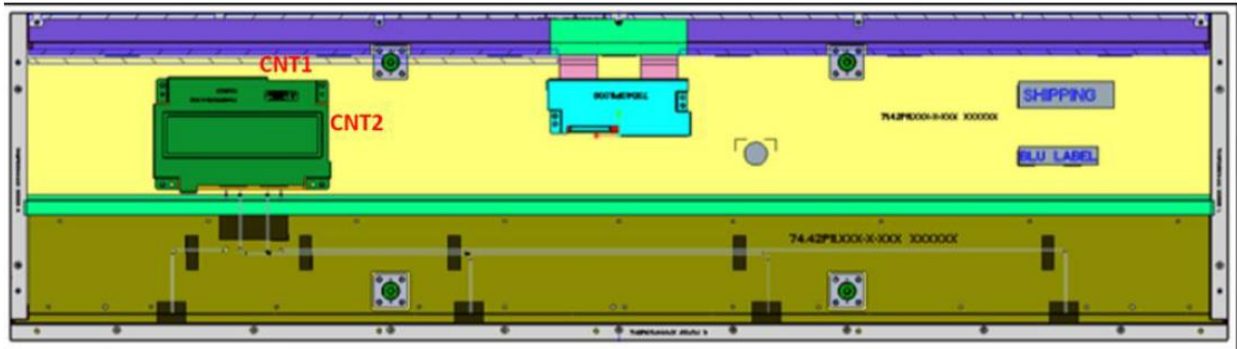
CN1			
Pin	Symbol	Description	Note
1	NC	No Connection	3
2	NC	No Connection	3
3	NC	No Connection	3
4	NC	No Connection	3
5	NC	No Connection	3
6	NC	No Connection	3
7	NC	No Connection	3
8	NC	No Connection	3
9	NC	No Connection	3
10	NC	No Connection	3
11	NC	No Connection	3
12	NC	No Connection	3
13	NC	No Connection	3
14	NC	No Connection	3

CN2			
Pin	Symbol	Description	Note
1	VDDB	Power Supply Input Voltage	
2	VDDB	Power Supply Input Voltage	
3	VDDB	Power Supply Input Voltage	
4	VDDB	Power Supply Input Voltage	
5	VDDB	Power Supply Input Voltage	
6	GND	Ground	
7	GND	Ground	
8	GND	Ground	
9	GND	Ground	
10	GND	Ground	
11	NC	NC	3
12	VBLON	BLU On-Off control:	1,2
13	NC	NC	3
14	PDIM	External PWM	1, 4

Note:

1. Input control signal threshold voltage definition

Item	Symbol	Min.	Typ.	Max.	Unit
Input High Threshold Voltage	VIH	2	-	5.5	V
Input Low Threshold Voltage	VIL	0	-	0.8	V

2. VBLON

Mode selection

VBLON	Note
H or OPEN	BL On
L	BL Off

3. Please leave this pin unoccupied. It cannot be connected by any signal (Low/GND/High)

4. PDIM

PWM Dimming range:
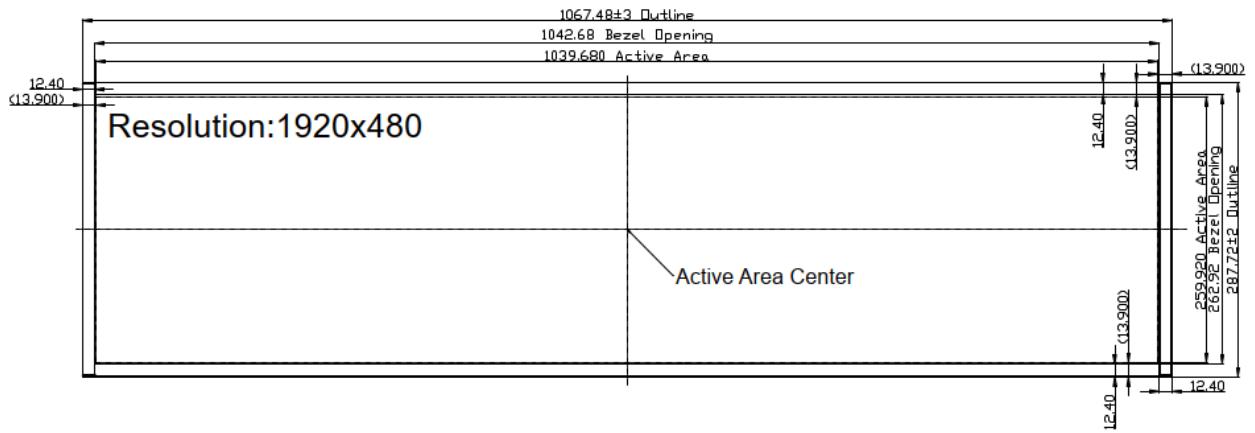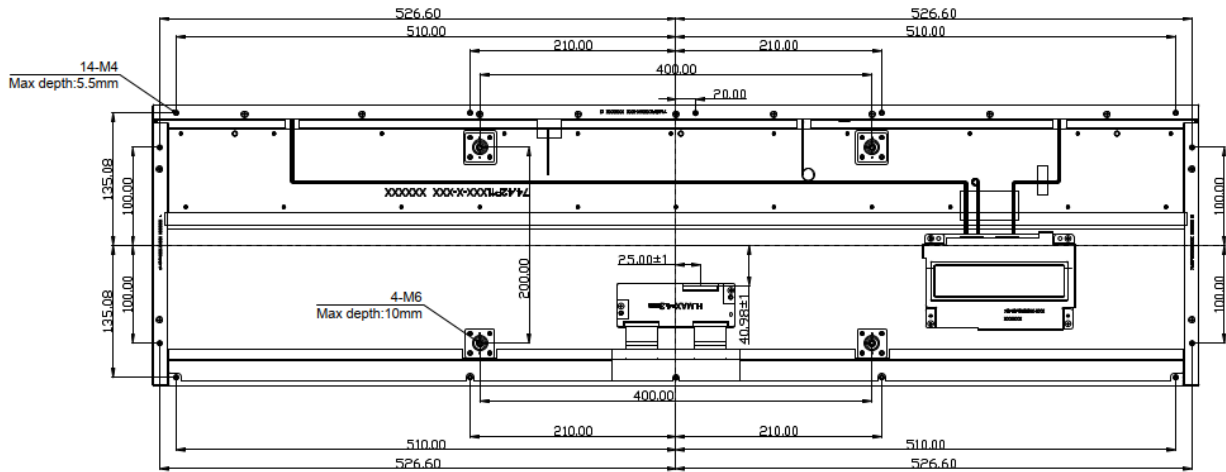

Performance guaranteed dimming range: 0%, 5~100%
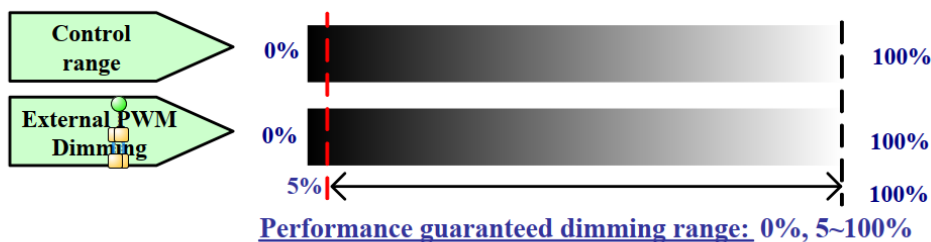
External PWM function dimming ratio 0%~100%, Judge condition as below:
(1) Backlight module must be lighted ON normally.
(2) All protection function must work normally.
(3) Uniformity and flicker could be guaranteed at External PWM function dimming ratio 5%~100%

5 Mechanical Drawing

Unit:mm

Resolution:1920x480

1067.48±3 Outline
1042.68 Bezel Opening
1039.680 Active Area
12.40
(13.900)
(13.900)
12.40
259.920 Active Area
262.92 Bezel Opening
287.72±2 Outline
(13.900)
12.40
12.40

Active Area Center

27.00
27.00
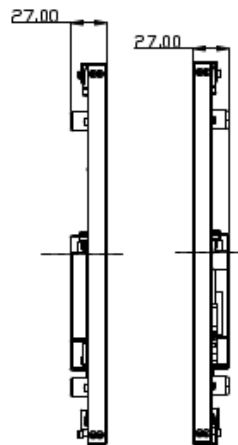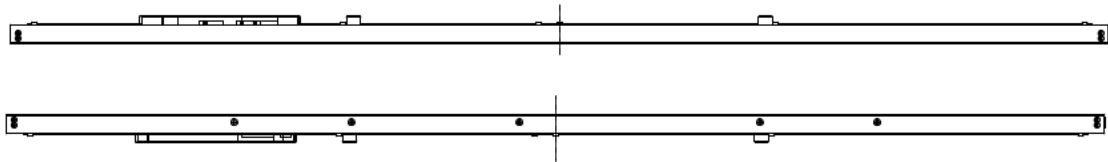
Note：
1. M3 USER HOLE SCREW TORQUE 6.0 kgf- cm MAX.
   M4 USER HOLE SCREW TORQUE 10.0 kgf- cm MAX.
   M6 USER HOLE SCREW TORQUE 16.0 kgf- cm MAX.
2. LVDS Connector:SJ11346-FI-RTE51SZ

6   AD68862HP 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 HDMI and Display Port input. Rev.1 is European RoHS compliant.

General Description
- **Max resolution 1920 x 1080 60Hz**
- **One DP 1.2 , supports 1920 x 1080 60Hz**
- **One HDMI 1.4 , supports 1920 x 1080 60Hz**
- **Embedded MCU with ADC port for VR, Light sensor application. (Optional)**
- **Embedded OSD.**
- **Support panel voltage 3.3/ 5/ 12 V**
- **Support eDP panel.**
- **Support Dual/Single LVDS**
- **Support 2.8W speaker x 2 (Optional)**
- **Support output voltage 12V(1A) or 5V(1A)**
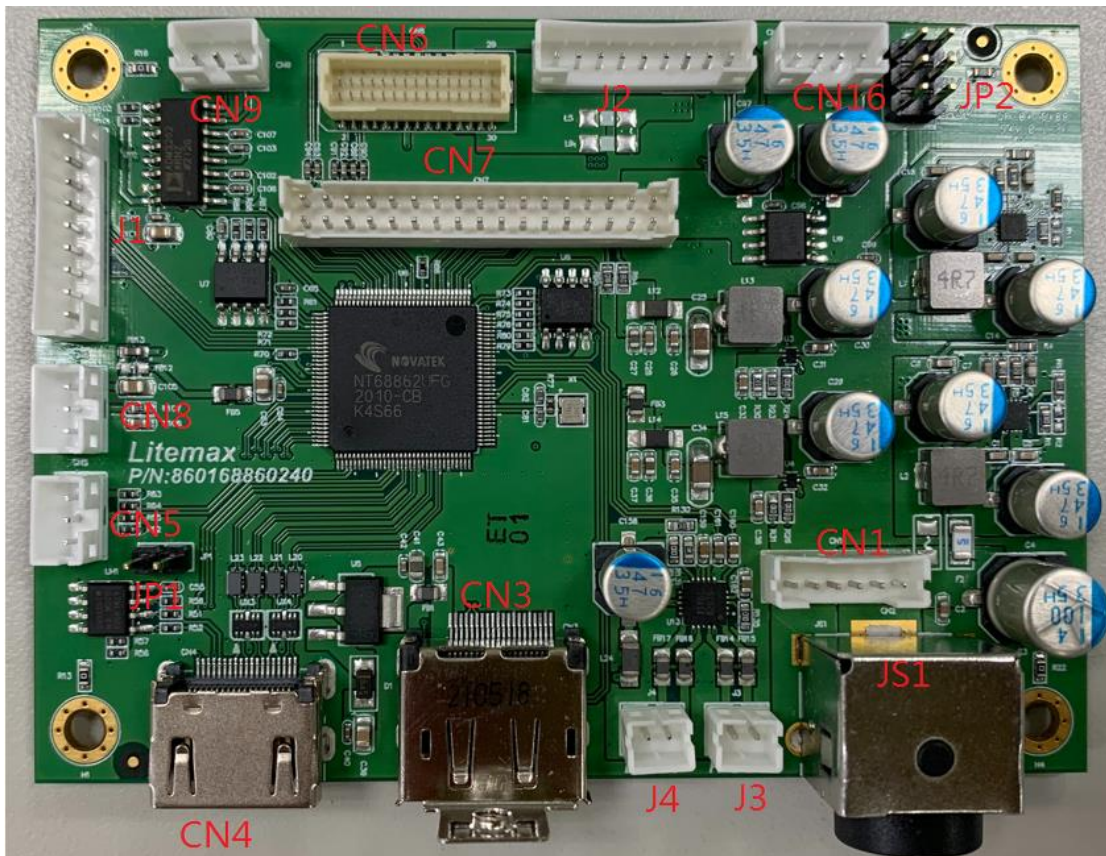
Outline Dimensions
AD68862   100mm x 72mm
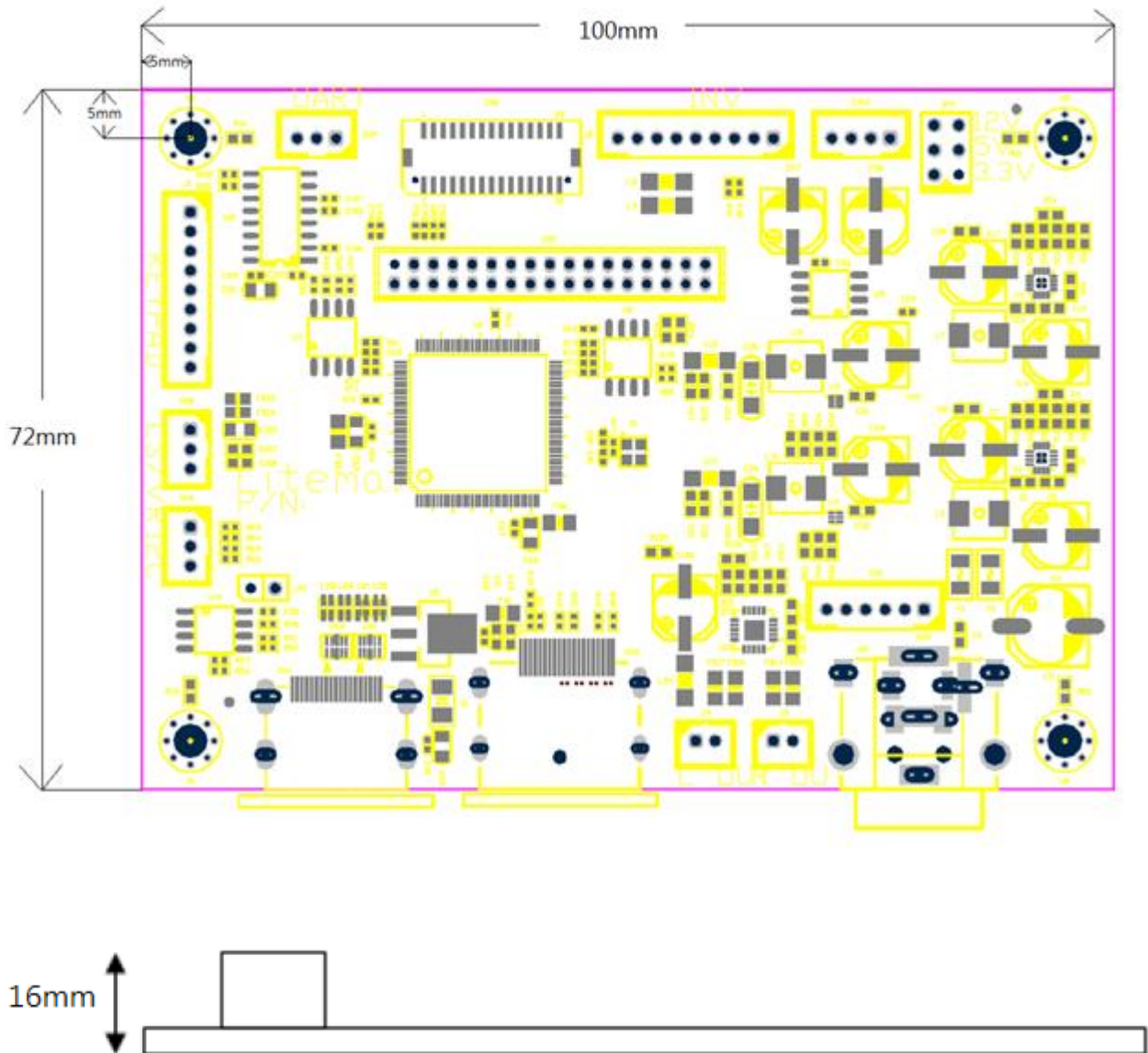
AD68862 Board Pin Define

CN6: eDP output(Wafer 1.0mm, 15*2P)

Pin	Function	Pin	Function
1	TX0P	16	TXAUX-
2	TX0N	17	TX_HPD
3	TX1P	18	GND
4	TX1N	19	VCC
5	GND	20	VCC
6	GND	21	DIM_EDP
7	NC	22	ON/OFF_EDP
8	NC	23	INVGND
9	GND	24	INVGND
10	GND	25	INVGND
11	NC	26	GND
12	NC	27	12INV
13	GND	28	12INV
14	GND	29	12INV
15	TXAUX+	30	12INV

CN7: LVDS output(Wafer 2.0mm,17x2P)

Pin	Function	Pin	Function
1	RXO0-	18	RXE1+
2	RXO0+	19	RXE2-
3	RXO1-	20	RXE2+
4	RXO1+	21	RXEC-
5	RXO2-	22	RXEC+
6	RXO2+	23	RXE3-
7	RXOC-	24	RXE3+
8	RXOC+	25	NC
9	RXO3-	26	NC
10	RXO3+	27	GND
11	NC	28	GND
12	NC	29	+3.3V
13	GND	30	GND
14	GND	31	VCC
15	RXE0-	32	VCC
16	RXE0+	33	VCC
17	RXE1-	34	VCC

CN3: DP input

Pin	Function	Pin	Function
1	ML_Lane3(n)	11	GND
2	GND	12	ML_Lane0(p)
3	ML_Lane3(p)	13	CONFIG1
4	ML_Lane2(n)	14	CONFIG2
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
9	ML_Lane1(p)	19	Return
10	ML_Lane0(n)	20	DP_PWR

CN4: HDMI input

Pin	Function	Pin	Function	Pin	Function
1	RX2+	9	RX0-	17	GND
2	GND	10	TMDS Clock+	18	HDMI +5V
3	RX2-	11	HDMI DET	19	HPD
4	RX1+	12	TMDS Clock-		
5	GND	13	NC		
6	RX1-	14	NC		
7	RX0+	15	HDMI_SCL		
8	GND	16	HDMI_SDA		

CN1: 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

JS1: Power input (Power Din 4 pin)

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

CN2: Power input (Power Jack 3 pin)

Pin	Function	Pin	Function
1	Power Input	3	GND
2	GND		

CN16: Power output (Wafer 2.0mm pitch 4 pin)

Pin	Function	Pin	Function
1	+5V(1A)	3	+12V(1A)
2	GND	4	GND

J2: 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.

J1: Keypad (Wafer 2.0mm pitch 9 pin)

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

CN8: Light sensor (Wafer 2.0mm pitch 2 pin)

Pin	Function	Pin	Function
1	3.3V	3.	GND
2	Sensor Out		

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

Pin	Function	Pin	Function
1-2 close	3.3V	5-6 close	12V
3-4 close	5V		

CN9: UART (Wafer 2.0mm pitch 3 pin)

Pin	Function	Pin	Function
1	TX	3	GND
2	RX		

CN5: I2C (Wafer 2.0mm pitch 3 pin)

Pin	Function	Pin	Function
1	SDA	3	GND
2	SCL		

J3: Audio out R (Wafer 2.0mm pitch 2 pin)(2.8W 4ΩLoad)

Pin	Function	Pin	Function
1	ROUTP	2	ROUTN

J4: Audio out L (Wafer 2.0mm pitch 2 pin) (2.8W 4ΩLoad)

Pin	Function	Pin	Function
1	LOUTP	2	LOUTN

6.1   OSD Function

MEMBRANE CONTROL BUTTOM
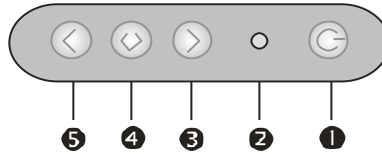
⊚**POWER SWITCH:** Pushing the power switch will turn the monitor on.   Pushing it again to turn the monitor off.

⊚**Power LED:** Power ON-Green / Power off-No.

⊚**Up Key >:** Increase item number or value of the selected item.

⊚**Menu Key:** Enter to the OSD adjustment menu.   It also used for go back to previous menu for sub-menu, and the change data don't save to memory.

⊚**Down Key <:** Decrease item number or item value when OSD is on.

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 SELECT 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 10 sec (default OSD timeout), it goes back to the stand-by mode and no more switching is accepted except MENU to restart the setting.

6.2   OSD Menu

Here are some instructions for you to use the OSD (On Screen Display). By pressing the "menu", you will see the below picture.
Timing shows resolution and V-frequency of the panel. This 2 information is not changeable by user.

There are 6 sub menus within the OSD user interface:
Brightness, **Signal Select**, **Sound**, **Color**, **Tools**, and **Exit**.

 Brightness

When you press the "menu" button, you enter the "Brightness" sub directory. In this directory, you will see 6 selections: **Brightness Mode**, **OSD Brightness**, **Contrast**, **Sharpness**, **Auto Tune**, **Exit**.

 Brightness Mode：
press "menu" once, you can go into the Brightness Mode.

 VR: (OPTION)
press this Icon to activate the VR control of brightness.

 Ambient light sensor: (OPTION)
press this Icon, must to accompany with Litemax ambient light sensor to auto dimming.

OSD Brightness：

Press the "menu" once, to adjust the brightness. Press "left" to dim down the brightness to "0", press "right" to increase the brightness to "100"

Contrast：

Press "Menu" once, you can adjust the contrast from"0" to "100" by pressing the "Left" and "Right".

Sharpness：

Press "Menu" once, you can adjust the Sharpness from"0" to "4" by pressing the "Left" and "Right".
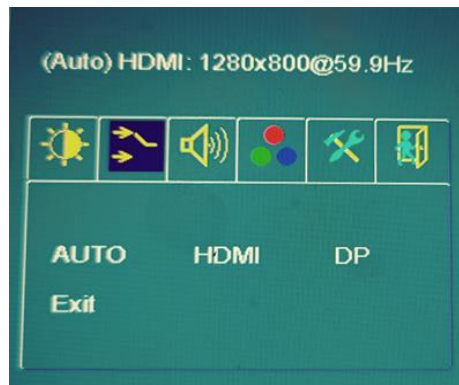
Auto Tune： (VGA only)

Press "Menu" once, you can activate the Auto Tune.
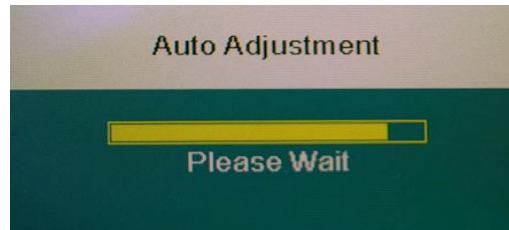
Exit: back to the beginning menu.

Input Signal: (default auto detect)

AUTO: auto detect

HDMI: HDMI input

DP: DisplayPort input

Exit: back to the beginning menu.

Audio:

Audio Volume: Audio volume adjustment, from"0" to "100".

UnMute/Mute: You can mute the speaker by pressing this option.

Exit: back to the beginning menu.

Color:

Auto Color (VGA only)：

By navigating over to the "Auto Color" option, optimal color performance is invoked.

Color Tempture_6500K: Warm color scheme.

Color Tempture_9300K: Cold color scheme.

Color Temperature User Define: Default is 100 for "R", "G", and "B". Range is"0" to "255".

Exit: back to the beginning menu.

Other Setting:

HPos: You can shift the screen horizontally using this function.

VPos: You can shift the screen vertically using this function.

Rotation: You can rotate the screen to 0° (No) 、270° (Yes).

Load Default: You can load the default data using this function.

Exit: back to the beginning menu.

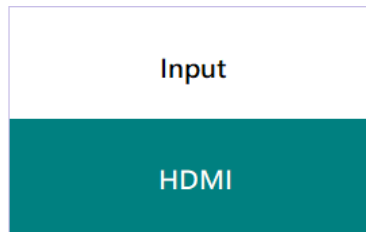< **Hot Key** >

Left click to display brightness adjustment.
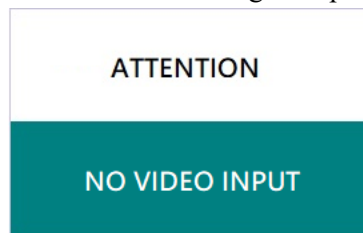

Right click to display Input Source Menu.

<Others>
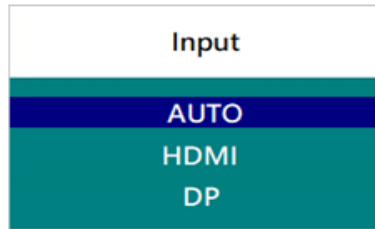
Signal Information will be displayed after powering on or switching the signal.
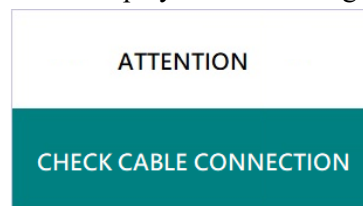

(Signal Information)

NO VIDEO INPUT will be displayed when there is no signal input.

(No Video Input)

CHECK CABLE CONNECTION will be displayed when the signal cable is not connected.

(Check Cable Connection)

7 Precautions

7.1 Handling and Mounting 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.