

LITEMAX

SSF/SSH5846-Y

Sunlight Readable

58.4" LED B/L Ultra-Wide LCD

User Manual

Approved by	Checked by	Prepared by

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Record of Revision

Date	Page	Old Description	New Description	Remark
Aug /30 /2024	all		Initial release	

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1 General Description

The **SSF/SSH5846-Y** is a 58.4 inch color TFT-LCD display with special aspect ratio 16:4.5 and wide resolution **3840 x 1080**. It is Litemax's Spanpixel series product which designed for high brightness **1200** nits with power efficiency LED backlight. It is a low power consumption DC 24V input and build in high performance AD board provides **DVI-D**、**HDMI**、**DP** input port.

1.1 Key Features

- Ultra Wide Screen 16:4.5
- High Brightness 1200 nits
- Sunlight Readable
- LED Backlight
- Low Power Consumption
- LCD Blackening Defect Free(Hi-Tni 110 °C)
- BL MTBF: 100,000 hours

1.2 General Specifications

Model Name	SSF/SSH5846-Y
Description	58.4" TFT LCD, 1200nits LED Backlight, 3840x1080
Screen Size	58.4"
Display Area (mm)	1428.48(H) x 401.76(V)
Brightness	1200 cd/m ²
Resolution	3840x1080
Aspect Ratio	16:4.5
Contrast Ratio	5100 : 1
Pixel Pitch (mm)	0.372(H) x 0.372 (V)
Pixel Pre Inch (PPI)	68
Viewing Angle	178°(H),178°(V)
Color Saturation (NTSC)	84%
Display Colors	1.07G
Response Time (Typical)	8ms
Panel Interface	V-by-One
Input Interface	DVI-D , HDMI , DP
Input Power	DC24V
Power Consumption	156W(159W with AD Board)
OSD Key	5 Keys (Power Switch, Menu, +, -,Exit)
OSD Control	Brightness, Color, Contrast, Auto Turing, H/V Position...etc
Dimensions (mm)	1462.3x 432.9x 23.7
Bezel Size(U/B/L/R)	15.57/15.57/16.91/16.91 mm
Weight (Net)	11.5Kg
Operating Temperature	0 °C ~ 50 °C
Storage Temperature	-20 °C ~ 60 °C

SSF= Panel + LED Driving Board

SSH= Panel + LED Driving Board + AD Control Board

Specifications are subject to change without notice.

All brands or product names are trademarks or registered trademarks of their respective companies.

1.3 Absolute Maximum Ratings

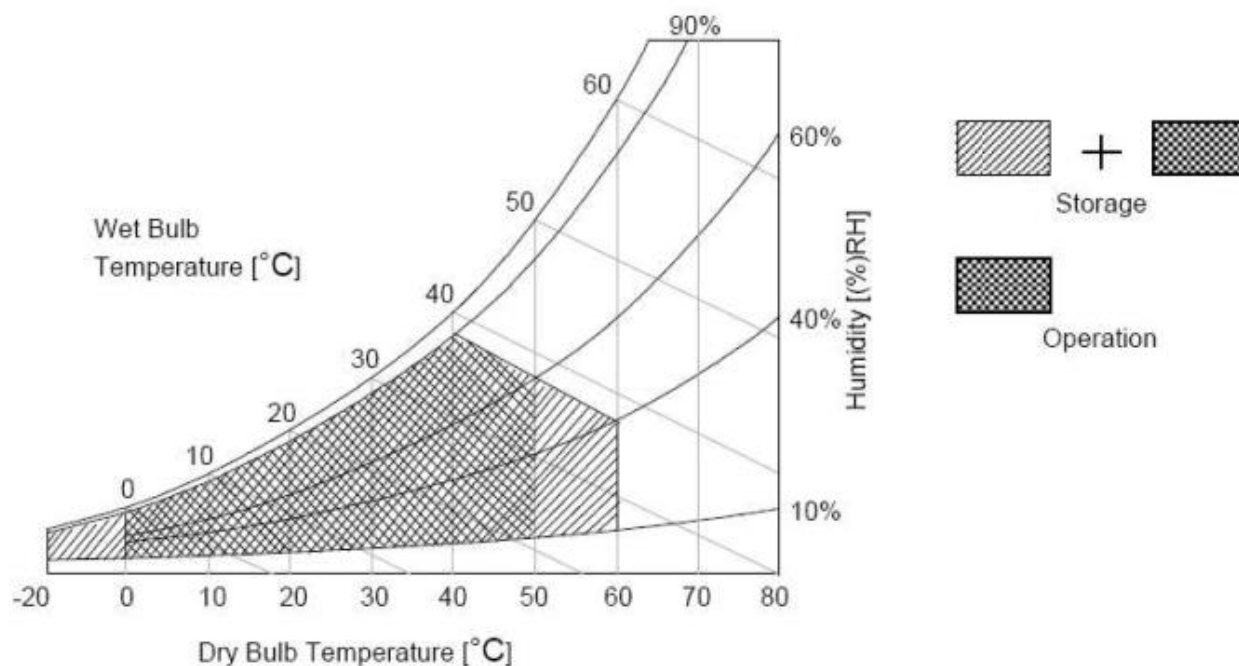
Item	Symbol	Min	Max	Unit	Conditions
Logic/LCD Drive Voltage	V _{DD}	-0.3	14	[Volt] _{DC}	Note 1
Input Voltage of Signal	V _{in}	-0.3	4	[Volt] _{DC}	Note 1
Operating Temperature	TOP	0	+50	[°C]	Note 2
Operating Humidity	HOP	10	90	[%RH]	Note 2
Storage Temperature	TST	-20	+60	[°C]	Note 2
Storage Humidity	HST	10	90	[%RH]	Note 2
Panel Surface Temperature	PST		65	[°C]	Note 3

Note 1: Duration:50 msec.

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

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

Note 3: Surface temperature is measured at 50°C Dry condition



2 Electrical Specifications

2.1 Input power

LCD Electronics Specification

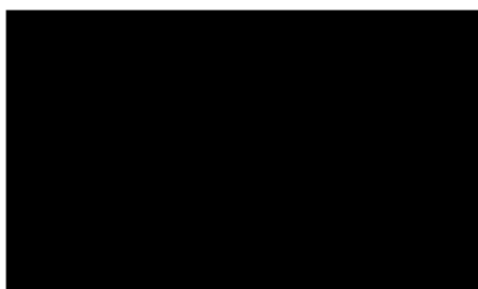
Item		Symbol	Min.	Typ.	Max	Unit	Note
Power Supply Input Voltage		V_{DD}	10.8	12	13.2	V	1
Power Supply Input Current	Black pattern	I_{DD}	-	0.92	1.10	A	2
	White pattern		-	1.25	1.50	A	
	H-strip pattern		-	1.21	1.45	A	
Power Consumption	Black pattern	P_C	-	11.04	14.52	Watt	
	White pattern		-	15.00	19.80	Watt	
	H-strip pattern		-	14.52	19.14	Watt	
Inrush Current		I_{RUSH}	--	--	5	A	3

Note1. The ripple voltage should be fewer than 5% of VDD.

Note2. Test Condition:

- (1) $V_{DD} = 12.0V$, (2) $F_v = 60Hz$, (3) $F_{clk} = 74.25MHz$, (4) Temperature = 25 °C
 (5) Power dissipation check pattern. (Only for power design)

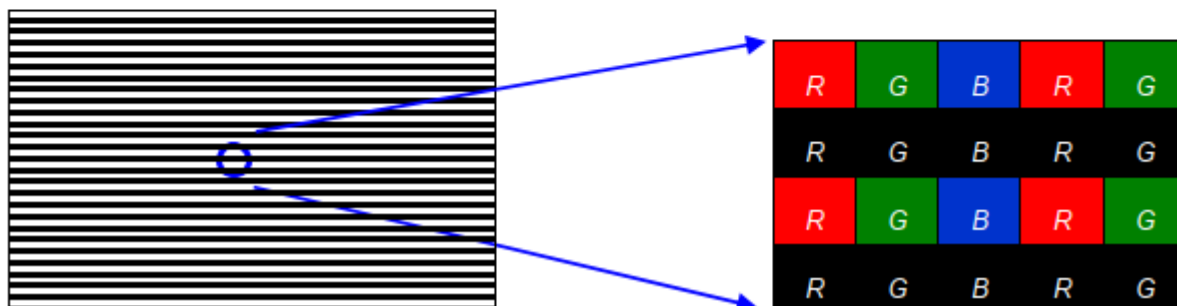
a. Black pattern



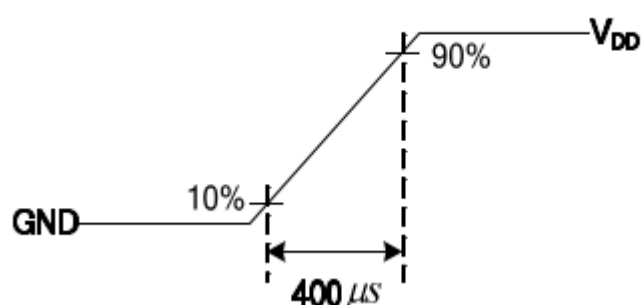
b. White pattern



c. H-Strip pattern



Note3. Measurement condition: Rising time = 400 μ s

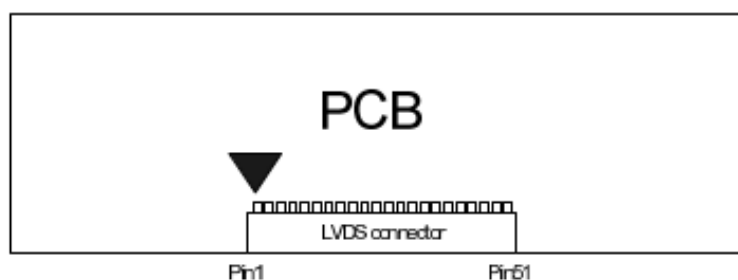


2.2 Connector Interface PIN & Function

■ LCD connector: (JAE) SJ11348-FI-RTE51SZ-HF, (P2)187059-51221-1,(Starconn)115E51-0000RA-M3-R

	Symbol	Description	Note	PIN	Symbol	Description	Note
1	V _{DD}	12Vin		26	LOCKN	Vx1 LOCK	
2	V _{DD}	12Vin		27	GND	Ground	
3	V _{DD}	12Vin		28	RX0N	Vx1 lane 0	
4	V _{DD}	12Vin		29	RX0P	Vx1 lane 0	
5	V _{DD}	12Vin		30	GND	Ground	
6	V _{DD}	12Vin		31	RX1N	Vx1 lane 1	
7	V _{DD}	12Vin		32	Rx1P	Vx1 lane 1	
8	V _{DD}	12Vin		33	GND	Ground	
9	N.C.	No connection	2	34	RX2N	Vx1 lane 2	
10	GND	Ground		35	RX2P	Vx1 lane2	
11	GND	Ground		36	GND	Ground	
12	GND	Ground		37	RX3N	Vx1 lane 3	
13	GND	Ground		38	RX3P	Vx1 lane 3	
14	GND	Ground		39	GND	Ground	
15	N.C.	No connection		40	RX4N	Vx1 lane 4	
16	N.C.	No connection		41	RX4P	Vx1 lane 4	
17	N.C.	No connection	2	42	GND	Ground	
18	SDA	I2C Data	2	43	RX5N	Vx1 lane 5	
19	SCL	I2C Clock	2	44	RX5P	Vx1 lane 5	
20	WP	Write Protection	2	45	GND	Ground	
21	N.C.	No connection	2	46	RX6N	Vx1 lane 6	
22	N.C.	No connection	2	47	RX6P	Vx1 lane 6	
23	N.C.	No connection	2	48	GND	Ground	
24	GND	Ground		49	RX7N	Vx1 lane 7	
25	HTPDN	Vx1 HTPDN		50	RX7P	Vx1 lane 7	
				51	GND	Ground	

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)

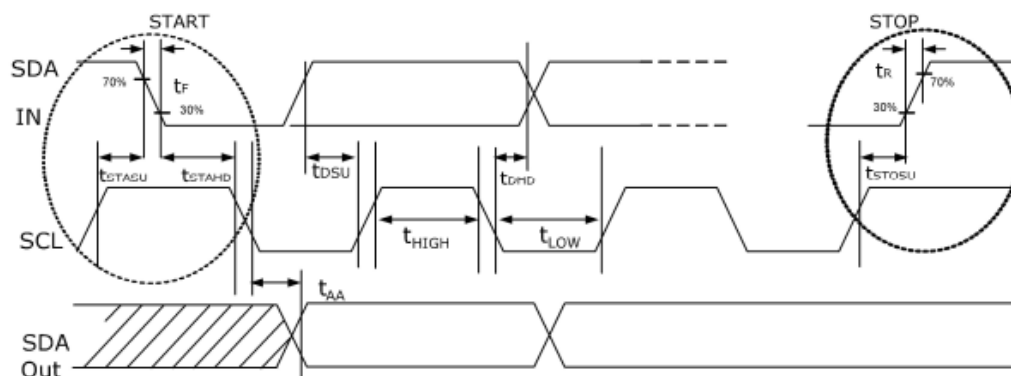
Note3. Input control signal threshold voltage definition

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

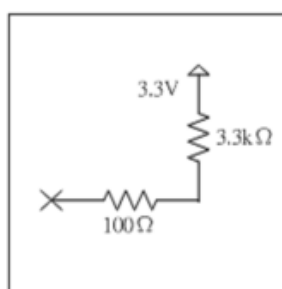
Note4. I2C Data and Clock

I2C Data and Clock timing

Parameter		Symbol	Min.	Typ.	Max	Unit
I2C	SCL clock frequency	fSCL	-	-	400	kHz
	Clock Pulse Width Low	tLOW	1.3	-	-	us
	Clock Pulse Width High	tHIGH	0.6	-	-	us
	Clock Low to Data Output Valid	tAA	-	-	1.1	us
	Start Setup Time	tSTASU	0.6	-	-	us
	Start Hold Time	tSTAHD	0.6	-	-	us
	Stop Setup Time	tSTOSU	0.6	-	-	us
	Data In Setup Time	tDSU	0.2	-	-	us
	Data In Hold Time	tDHD	0	-	-	us
	SCL/SDA Rise Time	tR	-	-	0.3	us
	SCL/SDA Fall Time	tF	-	-	0.3	us



Input equivalent impedance of SDA/SCL pin

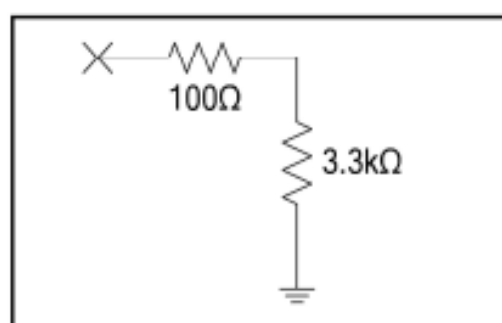


Note5. Write Protection

Mode selection

WP	Note
L or OPEN	Protection
H	Writable

Input equivalent impedance of WP pin



2.3 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										GREEN										BLUE											
		MSB					LSB					MSB					LSB					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	0	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	1	1	1	1	1	1	1	1	1	1	0	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	1	1	1	1	1	1	1	1	1	1	1		
	Cyan	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	1		
	Magenta	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	1		
	Yellow	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	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	1	0	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	0	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	1	0	0	0	0	0	0	0	0	0	0	0		

	GREEN(1022)	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	0		
	GREEN(1023)	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	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	1	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	1	1	1	1	1	1	1	1	1	1	1		

2.4 Signal Timing Specifications

Signal	Item	Symbol	Min.	Typ.	Max	Unit
Vertical Section	Period	T _v	2200	2250	2715	Th
	Active	T _{disp (v)}	2160			
	Blanking	T _{blk (v)}	40	90	555	Th
Horizontal Section	Period	T _h	530	550	600	Tclk
	Active	T _{disp (h)}	480			
	Blanking	T _{blk (h)}	50	70	120	Tclk
Clock	Frequency	F _{clk} =1/T _{clk}	66	74.25	77	MHz
Vertical Frequency	Frequency	F _v	47	60	63	Hz
Horizontal Frequency	Frequency	F _h	120	135	139.2	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.

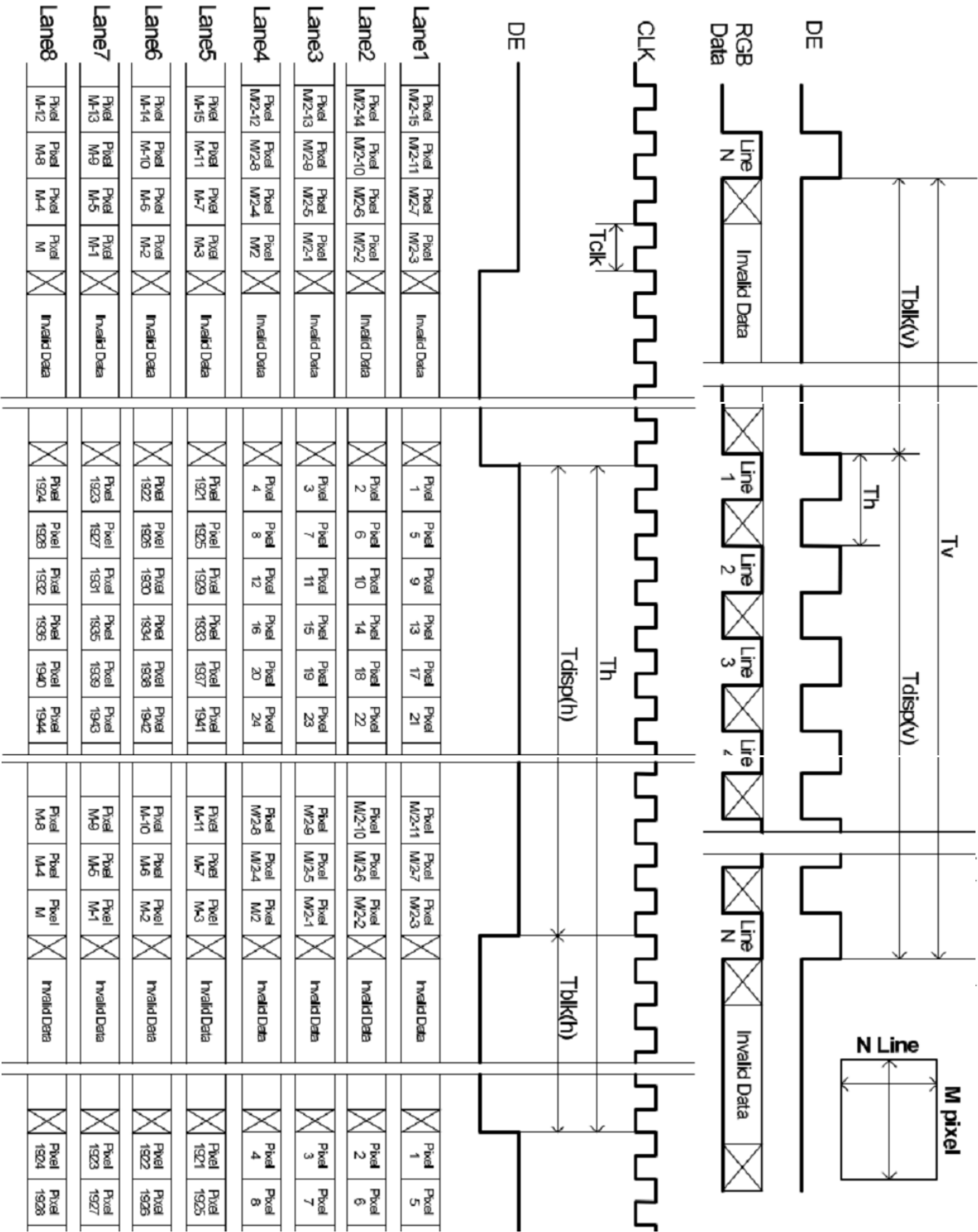
- (2) Vertical display position is specified by the rise of DE after a "Low" level period equivalent to eight times of horizontal period. The 1st data corresponding to one horizontal line after the rise of 1st DE is displayed at the top line of screen.

- (3) If a period of DE "High" is less than 3840 DCLK or less than 2160 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.

The timing diagrams of the input timing

Two Section Mode

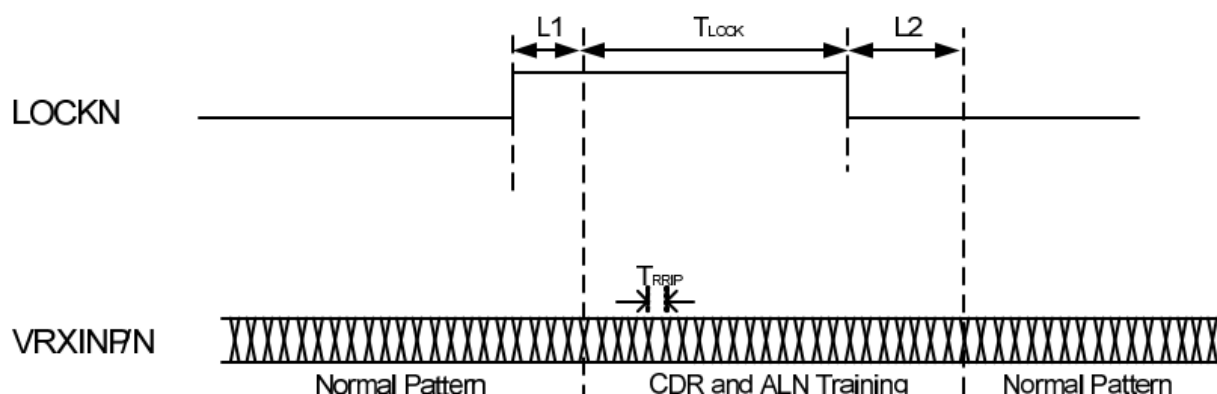


2.5 V by one spec

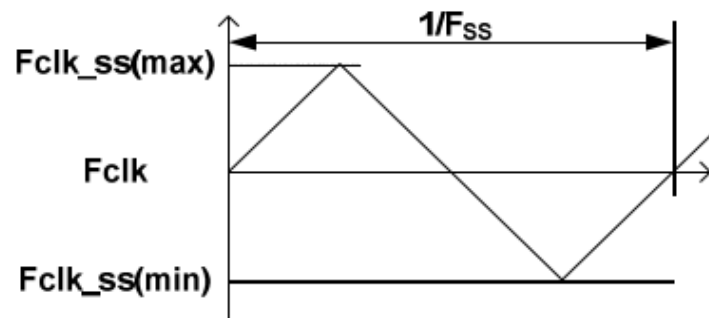
Item		Symbol	Min.	Typ.	Max	Unit	Note
V-by-one Interface	VRXINP/N input each bit Period	T_{RRIP} (UI)	310	--	379	ps	1
	Receiver Clock: Spread Spectrum Modulation range	Fclk_ss	Fclk -0.5%	--	Fclk +0.5%	MHz	2
	Receiver Clock: Spread Spectrum Modulation frequency	Fss	--	--	30	KHz	2
	CDR training pattern time	T _{LOCK}	--	500	--	us	1
	Latency from LOCKN 'HIGH' to clock training pattern	L1	0	--	--	us	1
	Latency from LOCKN 'LOW' to normal 8b10b data	L2	--	--	70	us	1
	CML Differential Input High Threshold	V _{RTH}	--	--	+50	mV _{DC}	
	CML Differential Input Low Threshold	V _{RTL}	-50	--	--	mV _{DC}	
	CML Common mode Bias Voltage	V _{RCT}	0.8	0.9	1.0	V _{dc}	
	Intra-pair skew	T _{INTRA}	--	--	0.3	UI	3
	Inter-pair skew	T _{INTER}	--	--	5	UI	4
	Eye diagram at receiver	A_X	--	0.25	--	UI	5
		A_Y	--	0	--	mV	
		B_X	--	0.3	--	UI	
		B_Y	--	50	--	mV	
		C_X	--	0.7	--	UI	
		C_Y	--	50	--	mV	
		D_X	--	0.75	--	UI	
		D_Y	--	0	--	mV	
		E_X	--	0.7	--	UI	
		E_Y	--	-50	--	mV	
		F_X	--	0.3	--	UI	
		F_Y	--	-50	--	mV	

Note:

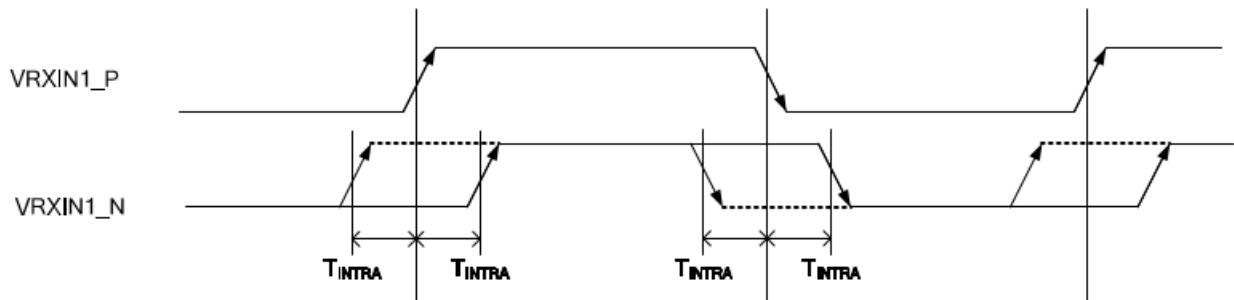
1. V-by-one Signal diagram



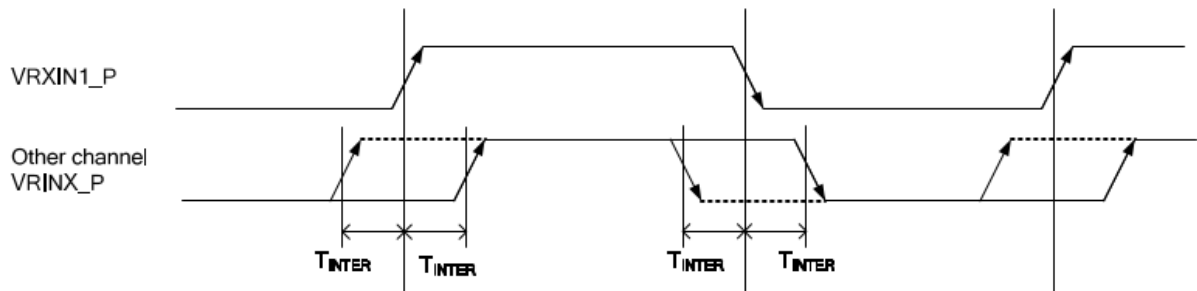
2. Receiver Clock SSCG (Spread spectrum clock generator) is defined as below figures.



3. V-by-one Intra-pair Skew

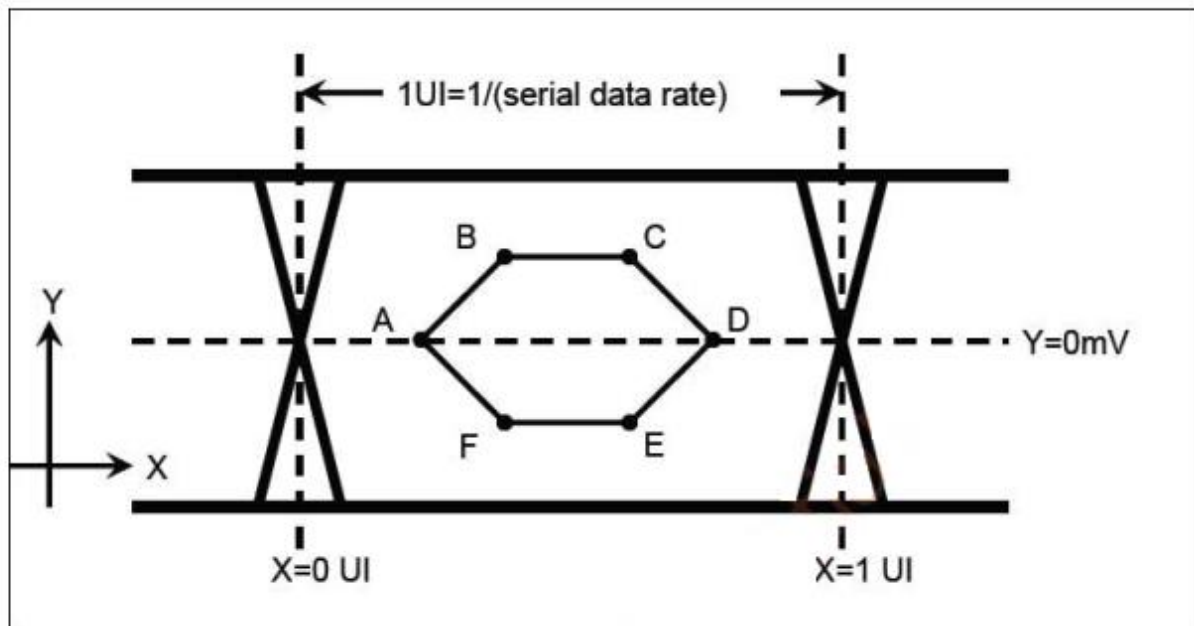


4. V-by-one Inter-pair Skew

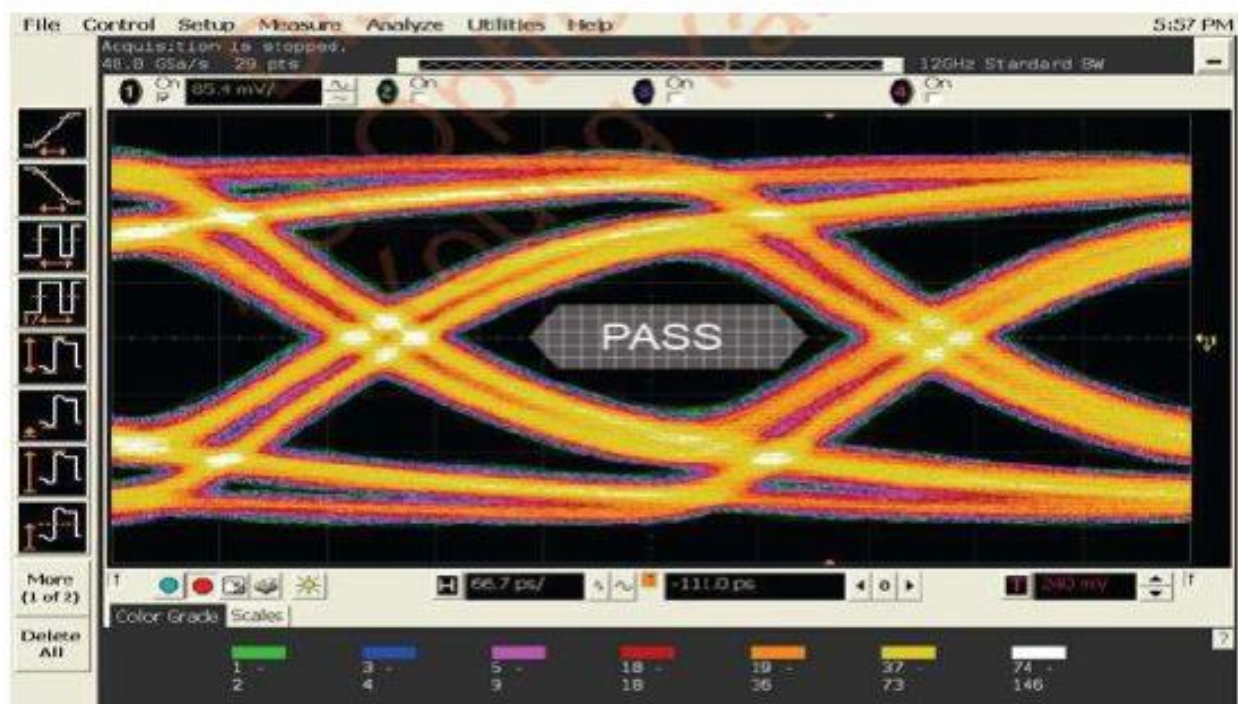


5. Eye diagram at receiver

Eye Mask



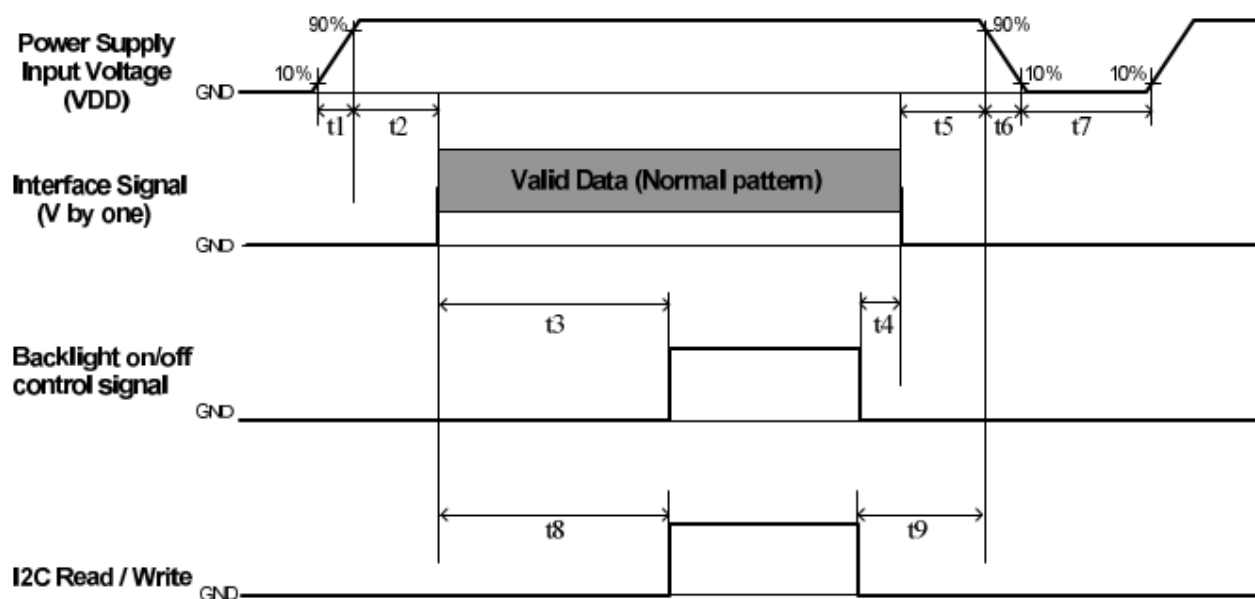
Example of Eye diagram



2.6 V by one color data mapping

Mode	Packer input & Unpacker output		30bpp RGB /YCbCr444 (10bit)
4byte mode	Byte0	D[0]	R/Cr[2]
		D[1]	R/Cr[3]
		D[2]	R/Cr[4]
		D[3]	R/Cr[5]
		D[4]	R/Cr[6]
		D[5]	R/Cr[7]
		D[6]	R/Cr[8]
		D[7]	R/Cr[9]
	Byte1	D[8]	G/Y[2]
		D[9]	G/Y[3]
		D[10]	G/Y[4]
		D[11]	G/Y[5]
		D[12]	G/Y[6]
		D[13]	G/Y[7]
		D[14]	G/Y[8]
		D[15]	G/Y[9]
	Byte2	D[16]	B/Cb[2]
		D[17]	B/Cb[3]
		D[18]	B/Cb[4]
		D[19]	B/Cb[5]
		D[20]	B/Cb[6]
		D[21]	B/Cb[7]
		D[22]	B/Cb[8]
		D[23]	B/Cb[9]
	Byte3	D[24]	--
		D[25]	--
		D[26]	B/Cb[0]
		D[27]	B/Cb[1]
		D[28]	G/Y[0]
		D[29]	G/Y[1]
		D[30]	R/Cr[0]
		D[31]	R/Cr[1]

2.7 Power Sequence for LCD



Parameter	Min.	Typ.	Max	Unit
t1	0.4	---	30	ms
t2	40	---	---	ms
t3	640	---	---	ms
t4	0 ^{*1}	---	---	ms
t5	0	---	---	ms
t6	---	---	--- ^{*2}	ms
t7	1000 ^{*3}	---	---	ms
t8	640	---	---	ms
t9	150	---	---	ms

Note:

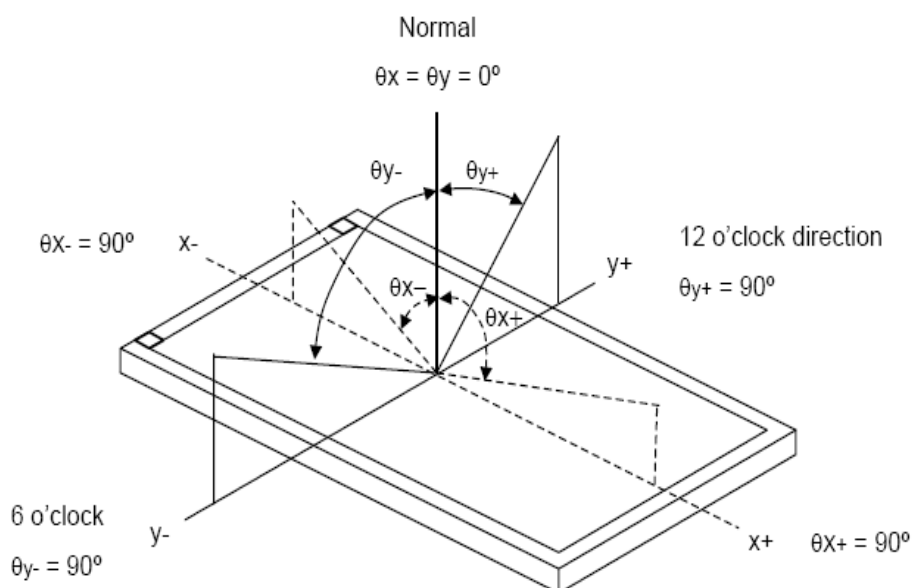
- (1) t4=0: concern for residual pattern before BLU turn off.
- (2) t6: voltage of VDD must decay smoothly after power-off. (customer system decide this value)
- (3) When the power supply input voltage(VDD) is off, be sure to pull down the valid and the invalid data to 0V.

3 Optical Specification

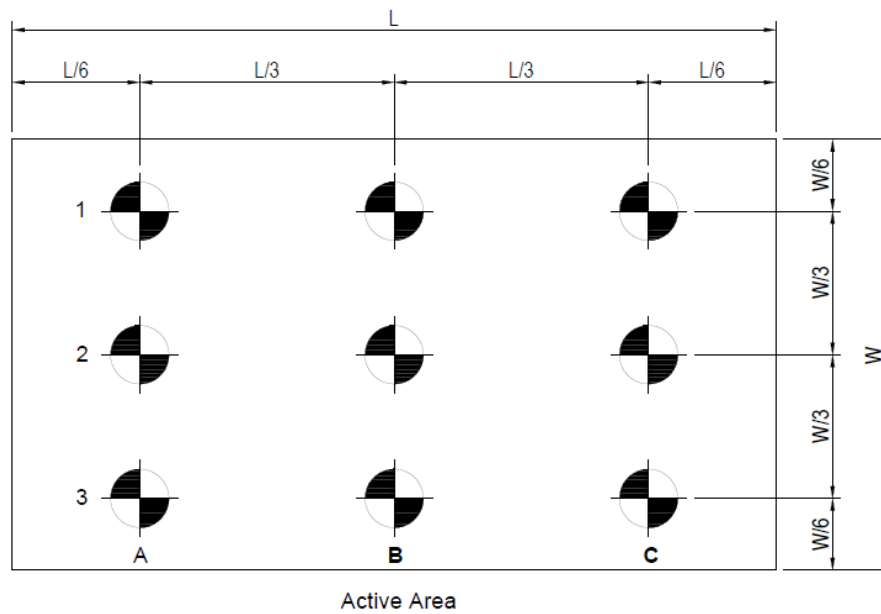
Item		Symbol	Condition	Min.	Typ.	Max .	Unit	Note
Color Chromaticity	Red	R _x	$\theta_x=0$ $\theta_y=0$ CA-410	0.617	0.647	0.677	-	Test Mode: (2) (3)
		R _y		0.304	0.334	0.364	-	
	Green	G _x		0.266	0.296	0.326	-	
		G _y		0.612	0.642	0.672	-	
	Blue	B _x		0.116	0.146	0.176	-	
		B _y		0.033	0.063	0.093	-	
	White	W _x		0.248	0.278	0.308	-	
		W _y		0.279	0.309	0.339	-	
Center Luminance of White		L _c	$\theta_x=0$	1080	1200	1560	cd/m ²	
Uniform		L _u	$\theta_y=0$ CA-410		93		%	
Contrast Ratio		CR	$\theta_x=0$	4590:1	5100:1		-	Test Mode: (4)
Color Saturation		NTSC	$\theta_y=0$ Klein K-10		84		%	
Viewing Angle	Horizontal	θ_{x+}	$CR \geq 10$		89		Deg	Test Mode: (1)
		θ_{x-}			89			
	Vertical	θ_{y+}			89			
		θ_{y-}			89			

Test Mode :

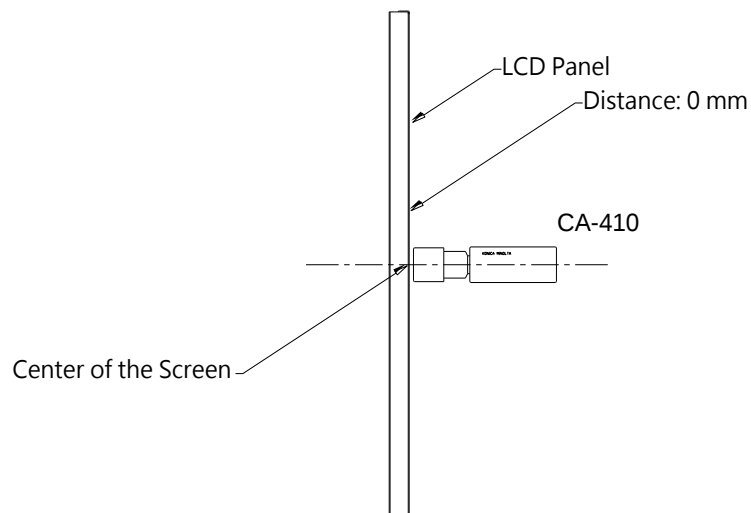
(1) Definition of Viewing Angle (θ_x , θ_y):



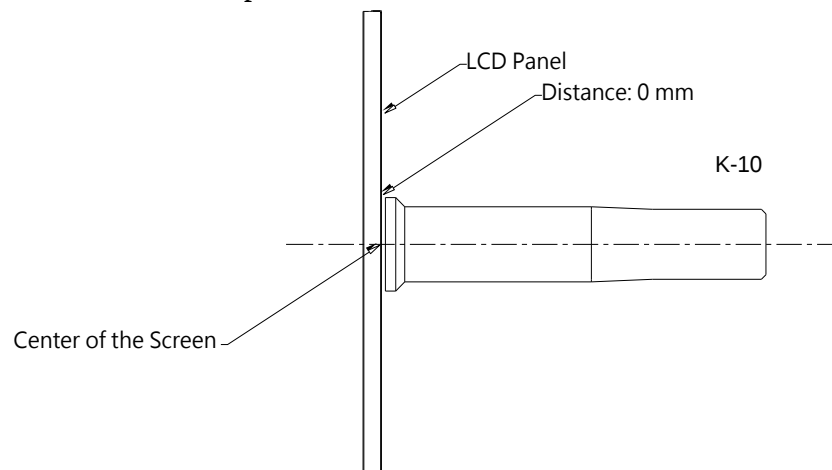
(2) Definition of Test Point:



(3) CA-410 Measurement Setup:



(4) Klein K-10 Measurement Setup:



4 LED Driving Board Specifications

This specification is applied to LED converter unit for SSP5846 1200nits LED backlight.

4.1 Converter Characteristics

Item	Symbol	Condition	MIN.	TYP.	MAX.	Unit	Remark
Input Voltage	V _{in}		22	24	26	V	
Input Current (Low Brightness)	I _{inL}	Brightness = 0%	0.0	-----	-----	mA	
Input Current (High Brightness)	I _{inH}	Brightness = 100%	-----	4.23	4.61	A	(1)
LED Current (Low Brightness)	I _{outL}	Brightness = 0%	0.0	-----	-----	A _{rms}	
LED Current (High Brightness)	I _{outH}	Brightness = 100%	1.15	1.2	1.25	A	J1・J3
			1.15	1.2	1.25	A	J6・J7
Working Frequency	W_Freq	Brightness = 100%	-----	400	-----	KHZ	
BrightnessControl	DC mode						
	V _{adj}	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	V _{on}	Normal Operation	2	-----	5	V	
	V _{off}		0	-----	0.8	V	
Output Voltage	V _{out}	Brightness = 100%	37.5	38.5	39.5	V	J1・J3
			37.5	38.5	39.5	V	J6・J7
Efficiency	η	Brightness = 100%	-----	91.5	-----	%	(5)

Remark:

(1) this data is based on the testing result of practical input voltage, I_{in} is measured by related V_{in}.

(min, typ, max)

(2) Max brightness at V_{adj}=0.2V. Min brightness at V_{adj}=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) $\eta_{\max} = V_{\text{out}(\max)} * I_{\text{outH}(\max)} / V_{\text{in}(\max)} * I_{\text{inH}(\min)}$

$\eta_{\min} = V_{\text{out}(\min)} * I_{\text{outH}(\min)} / V_{\text{in}(\min)} * I_{\text{inH}(\max)}$

4.2 Connector Socket

Input Connector:CN1(JST B10B-PH-K 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	Close pin 1,2 LED driver is DC dimming
2	GND	
3	PWM	Close pin 2,3 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

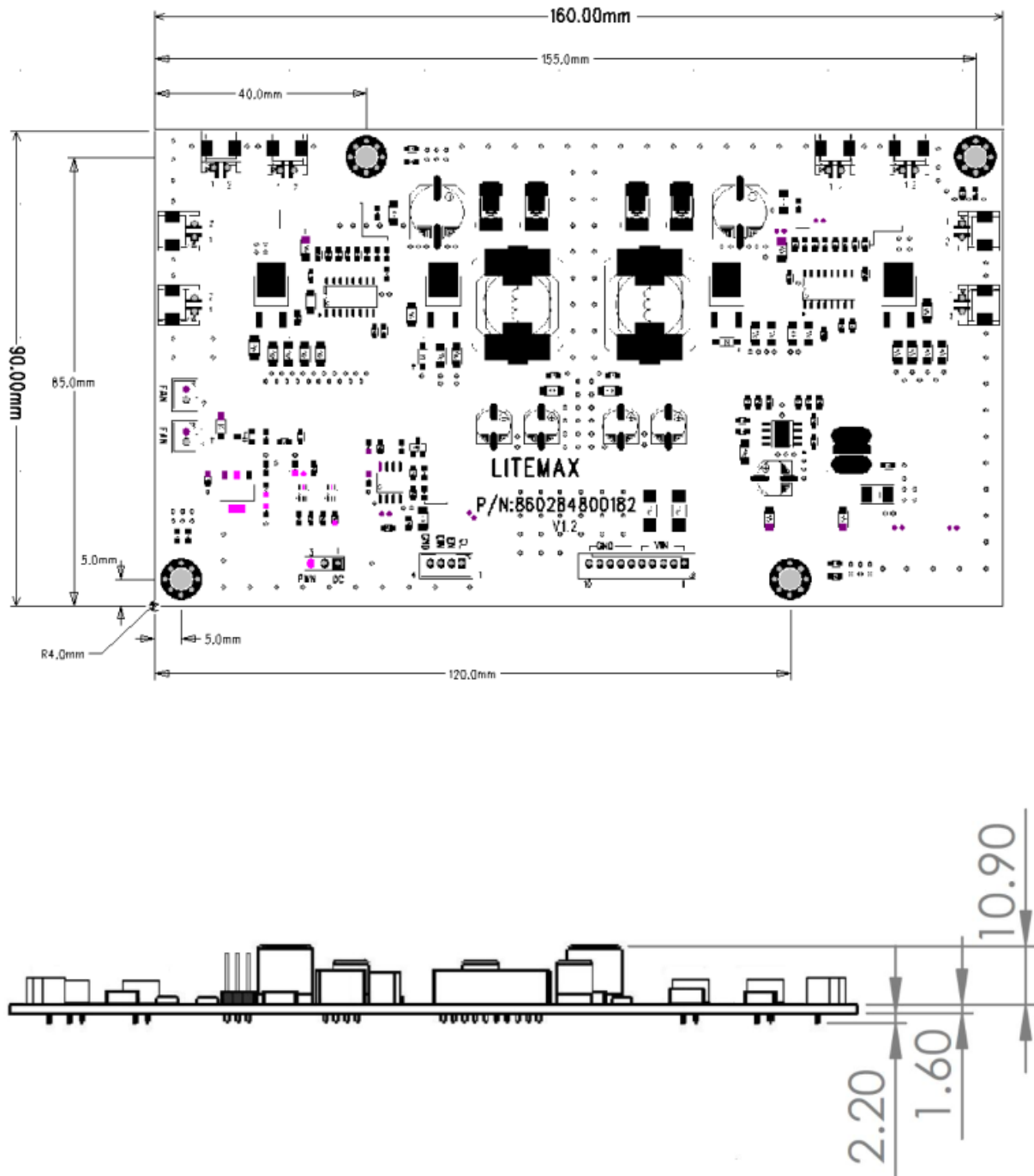
Note: Pin1 is dimming method control pin, Low → DC dimming, High → PWM dimming.
If pin1 is be used, please NC CN2.

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 (-)

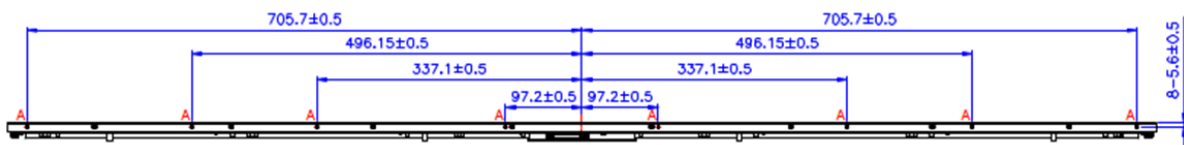
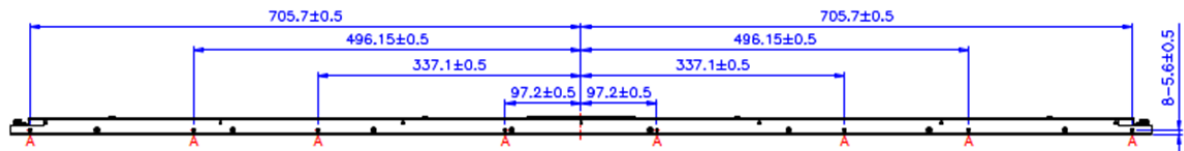
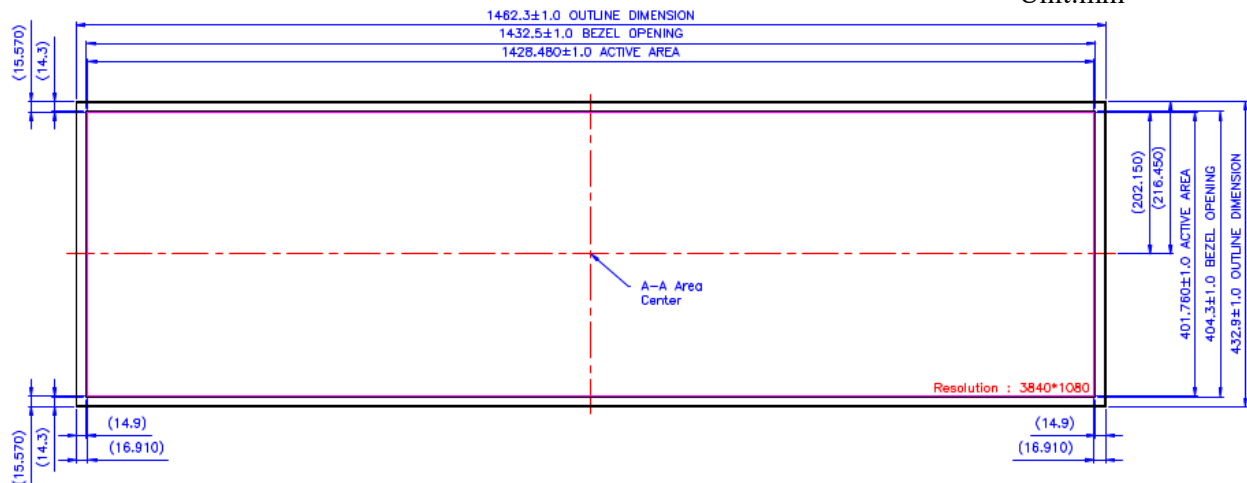
4.3 Mechanical Characteristics

Dimension: 160 x 90 x 12.5mm

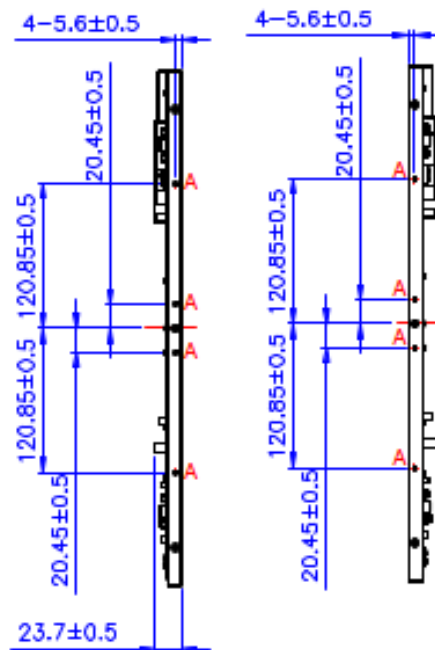


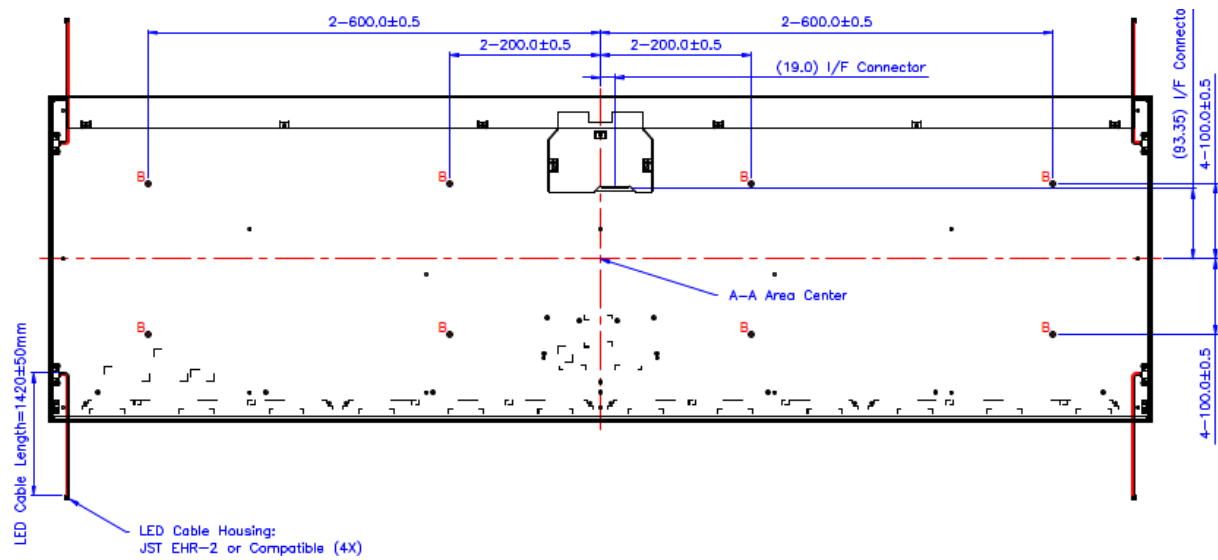
5 Mechanical Drawing

Unit:mm



A M3 MOUNTING HOLE (24X), DP=5.0mm MAX, TOUQUE=5.0kgf-cm MAX





B	M4 MOUNTING HOLE (8X), DP=7.0mm MAX, TOUQUE=8.0kgf-cm MAX
---	---

Note :

1. Resolution: 3840x1080
2. "()" marks the reference dimensions
3. Front case is black paint

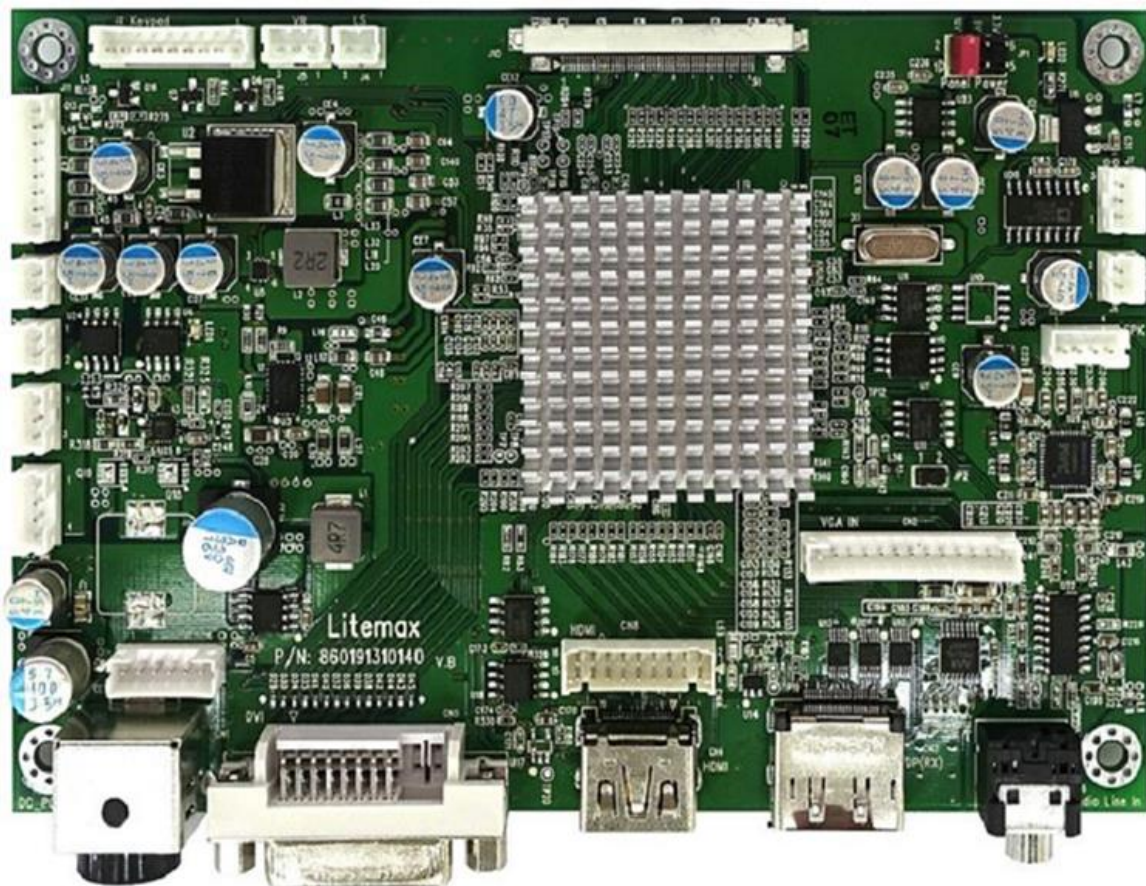
7 AD9131DHP Board & OSD Functions

We developed this A/D board to support industrial high brightness and commercial applications. This A/D board has many functions. It has an external luminance sensor as an option, or optional VR button to control brightness, fan rotation and RS232.

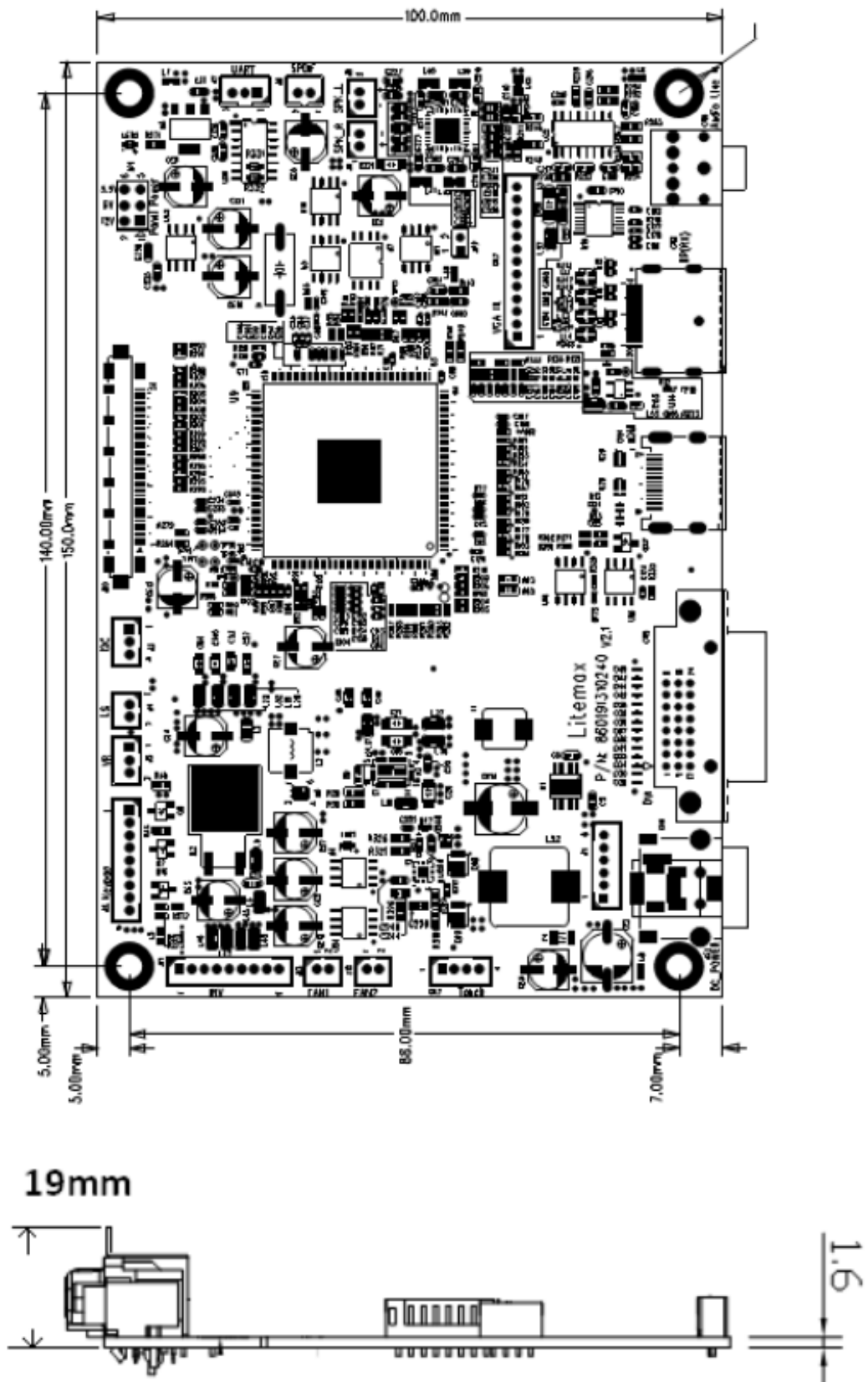
Rev.2 is European RoHS compliant.

7.1 General Description

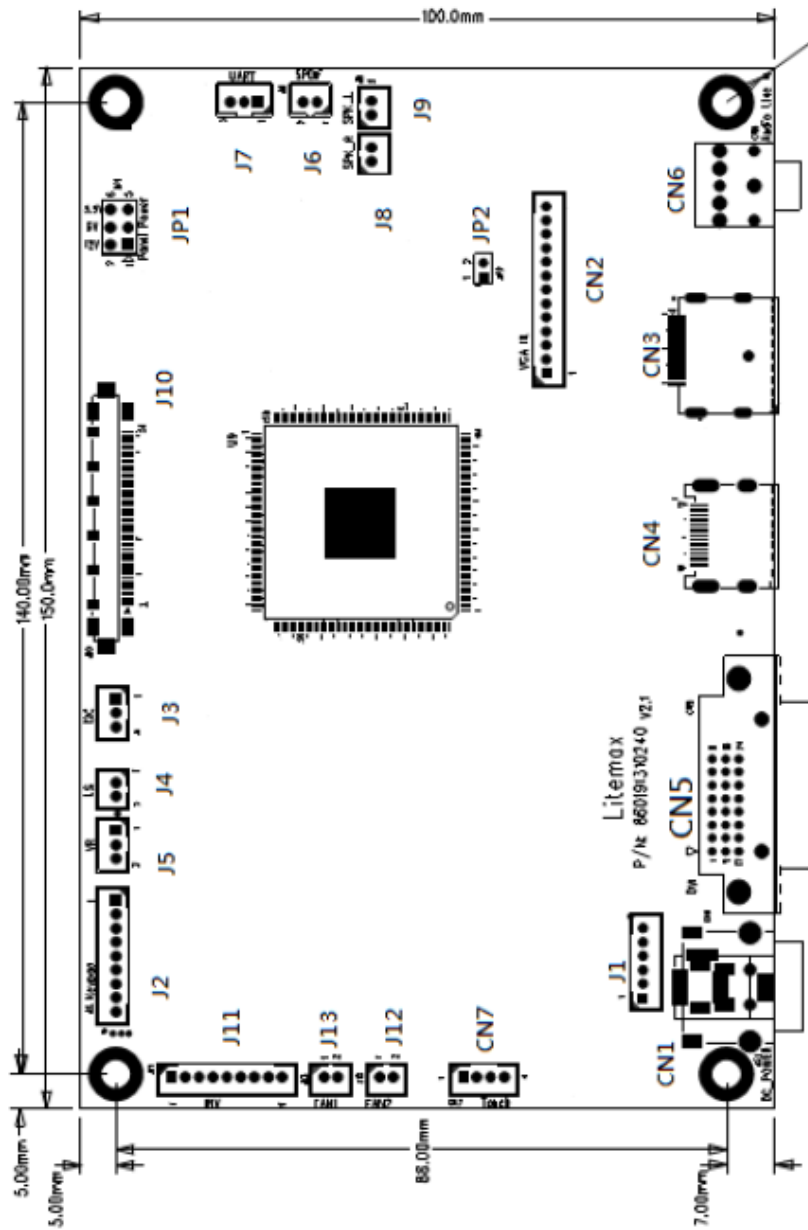
- Max resolution up to UHD (4096x2160)
- Support V-By-one or e-DP panel
- DVI operates up to 165MHz
- One ultra-reliable dual-link DVI input(4K2K@30Hz)
- One HDMI(HDMI 2.0) input(4K2K@60Hz)
- One display port input (DP 1.2a) (4K2K@60Hz)
- V-by-One or e-DP interface
- Support panel DC5V or 3.3V, 12V output
- External fan control by software
- OSD control
- Inverter analog or PWM dimming control
- External V.R. brightness control (Optional)
- External light sensor brightness control (Optional)
- External RS232 control (Optional)
- Input power 24V DC or 12V DC (24V DC power input is optional)



AD9131DHP 100mm x 150mm



7.3 AD9131DHP Board Pin Define



J10: Panel (V-By-one or e-DP) connector

Pin No.	Function	Pin No.	Function
1	PANEL-VCC	27	GND
2	PANEL-VCC	28	RX0N
3	PANEL-VCC	29	RX0P
4	PANEL-VCC	30	GND
5	PANEL-VCC	31	RX1N
6	PANEL-VCC	32	RX1P
7	PANEL-VCC	33	GND
8	PANEL-VCC	34	RX2N
9	NC	35	RX2P
10	GND	36	GND
11	GND	37	RX3N
12	GND	38	RX3P
13	GND	39	GND
14	GND	40	RX4N
15	eDP_HPD1	41	RX4P
16	AUXTX_P1	42	GND
17	AUXTX_N1	43	RX5N
18	P_SDA	44	RX5P
19	P_SCL	45	GND
20	NC	46	RX6N
21	eDP_HPD0	47	RX6P
22	LD_EN	48	GND
23	AUXTX_P0	49	RX7N
24	AUXTX_N0	50	RX7P
25	HTPDN	51	GND
26	LOCKN		

CN5: DVI-D Input Connector (24pin)

Pin No.	Function	Pin No.	Function	Pin No.	Function
1	T.M.D.S. Data2-	9	T.M.D.S. Data1-	17	T.M.D.S. Data0-
2	T.M.D.S. Data2+	10	T.M.D.S. Data1+	18	T.M.D.S. Data0+
3	T.M.D.S. Data2/4 Shield	11	T.M.D.S Data1/3 Shield	19	T.M.D.S. Data0/5 Shield
4	T.M.D.S. Data4-	12	T.M.D.S. Data3-	20	T.M.D.S. Data5-
5	T.M.D.S. Data4+	13	T.M.D.S. Data3+	21	T.M.D.S. Data5+
6	DDC Clock	14	+5V Power	22	T.M.D.S. Clock Shield
7	DDC Data	15	Ground (for +5V)	23	T.M.D.S. Clock+
8	Vertical SYNC.	16	Hot Plug Detect	24	T.M.D.S. Clock-

CN4: HDMI Connector (19pin HDMI)

Pin No.	Function	Pin No.	Function	Pin No.	Function
1	T.M.D.S. Data2+	9	T.M.D.S. Data0-	17	GND
2	Shield	10	T.M.D.S. Clock+	18	HDMI 5V
3	T.M.D.S. Data2-	11	Shield	19	Hot Plug Detect
4	T.M.D.S. Data1+	12	T.M.D.S. Clock-		-
5	Shield	13	CEC		
6	T.M.D.S. Data1-	14	NC		
7	T.M.D.S. Data0+	15	HDMI_SCL		
8	Shield	16	HDMI_SDA		

CN3: DISPLAY PORT Connector (20pin DP)

Pin No.	Function	Pin No.	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

CN6: Audio Jack in

Pin No.	Function	Pin No.	Function
1	GND	2	LINE IN R
3	GND	4	GND
5	LINE IN L		

CN1: Power DIN(24V or 12V)

Pin No.	Function	Pin No.	Function
1	24Vdc or 12Vdc(Note 1)	2	24Vdc or 12Vdc (Note 1)
3	GND	4	GND

CN1: Power Jack (24V or 12V)

Pin No.	Function	Pin No.	Function
1	24Vdc or 12Vdc(Note 1)	2	GND
3	GND		

J1: Power input connector (6 pin 2.0mm)

Pin No.	Function	Pin No.	Function
1	24Vdc or 12Vdc(Note 1)	2	24Vdc or 12Vdc(Note 1)
3	24Vdc or 12Vdc(Note 1)	4	GND
5	GND	6	GND

Note 1: Power input has two different versions, 12V power input version and 24V input version don't mistake.

CN7: Power out connector (5V/12V)(4PIN 2.0mm)

Pin No.	Function	Pin No.	Function
1	5Vdc	2	GND
3	12Vdc	4	GND

J11: Inverter Connector (8PIN 2.0mm)

Pin No.	Symbol	Description	Pin No.	Symbol	Description
1	DC/PWM	DC/PWM SEL	5	GND	GND
2	ON/OFF	Backlight ON/OFF	6	GND	GND
3	BRIGHT	Dimming adjust	7	12VDC	Input 12VDC
4	GND	GND	8	12VDC	Input 12VDC

J13,J12: FAN (2PIN 2.0mm)

Pin No.	Function	Pin No.	Function
1	FAN(+)	2	GND

J2: Key Pad (9PIN 2.0mm)

Pin No.	Function	Pin No.	Function
1	POWER KEY	6	MENU KEY
2	GREEN LED	7	AUTO KEY
3	RED LED	8	GND
4	DOWN KEY	9	GND
5	UP KEY		

J5: VR connector (3PIN 2.0mm)

Pin No.	Function	Pin No.	Function
1	3,3VDC	2	VR OUT
3	GND		

J4: Ambient (2PIN 2.0mm)

Pin No.	Function	Pin No.	Function
1	3.3VDC/5VDC	2	Sensor Out

JP1: PANEL VCC (3PIN 2.54mm)

Pin No.	Function	Pin No.	Function
1-2	12V	5-6	3.3V
3-4	5V		

J8& J9: Speaker Connector (2PIN 2.0mm)

Pin No.	Function	Pin No.	Function
1	SPK+	2	SPK-

J7 UART Connector (RS232 IN) (3PIN 2.0mm)

Pin No.	Function	Pin No.	Function
1	TXD	2	RXD
3	GND		

J3 I2C Connector (3PIN 2.0mm)

Pin No.	Function	Pin No.	Function
1	SDA	2	SCL
3	GND		

J6: SPDIF (2PIN 2.0mm)

Pin No.	Function	Pin No.	Function
1	SPDIF_OUT	2	GND

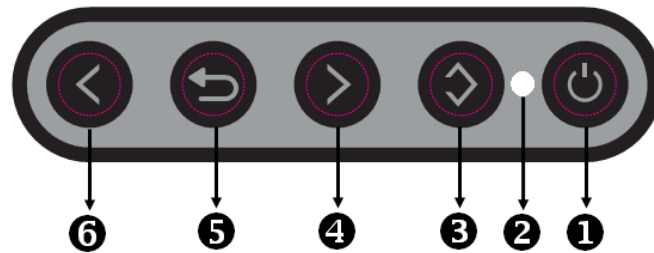
JP2: EDID (2PIN 2.0mm)

Pin No.	Function	Pin No.	Function
1	EEROM Write protect	2	GND

When need to rewrite EEROM EDID , short two pin .

7.4 OSD Function

MEMBRANE CONTROL BUTTOM



- ①**  **Key:** (Power) function key
Press the power switch will turn the monitor on.
Press it again to turn the monitor off.
- ②**  **LED Status:** Power ON-Green / Power off-No.
- ③**  **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”.
- ④**  **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”.
- ⑤**  **Key:** (Menu + Exit) function key
Enter to the OSD adjustment menu. It also used for go back to previous menu for sub-menu.
- ⑥**  **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.

7.5 OSD Menu

By pressing the “menu” button, you will see the below picture. Across from timing you will see resolution, frequency, and V-frequency of the panel. These cannot be altered by the user.



8 Precautions

8.1 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 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.

8.2 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°C and 35°C 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.

8.3 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.

9 Disclaimer

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