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Sunlight Readable LCD!

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SPANPIXEL
Stretched LCD

RoHS·WEEE LITEMAX COMPLIANT

LITEMAX

SSD4221-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
Oct/30/2025	all		Initial release	

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1 General Description

The SSD4221-Y 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 2600 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 2600 nits
- LED Backlight
- LCD blacking defect free (Hi-Tni 110 ˚C)
- Low Power Consumption
- BL MTBF: 100,000 hours

1.2 General Specifications

Model Name	SSD4221-Y V2
Description	42.2" TFT LCD, 2600 nits LED backlight, 1920x480
Screen Size	42.2"
Display Area (mm)	1039.68(H) x 259.92(V)
Brightness	2600 cd/m^2
Resolution	1920x480
Aspect Ratio	16 : 4
Contrast Ratio	5200 : 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)	85%
Display Colors	16.7M
Response Time (Typical)	8ms
Panel Interface	LVDS
Input Interface	DVI-I, HDMI, DP
Input Power	DC 24V
Power Consumption	141W
OSD Key	4 Keys (Power Switch, Menu, +, -)
OSD Control	Brightness, Color, Contrast, Auto Turing, H/V Position…etc
Dimensions (mm)	1072.8(H) x 296.9(V) x 66.1 (T)
Bezel Size(U/B/L/R)	18.5/18.5/16.6/16.6 mm
Mounting	400x100
Weight (Net)	10.5 kg
Operating Temperature	0 ˚C ~ 50 ˚C
Storage Temperature	-20 ˚C ~ 60 ˚C

SSD= Panel + LED Driving Board + AD Control Board + Housing

1.3 Absolute Maximum Ratings

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

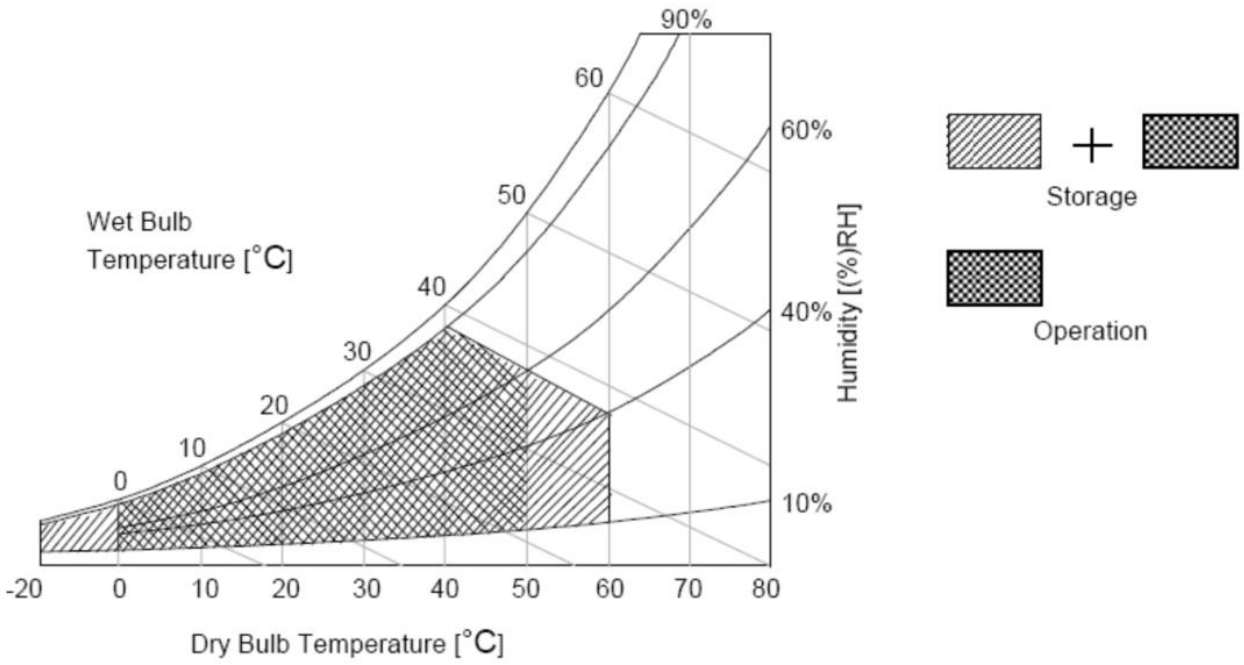
Item	Symbol	Min	Max	Unit	Conditions
Logic/LCD Drive Voltage	V_{DD}	-0.3	14	[Volt]	Note 1
Input Voltage of Signal	Vin	-0.3	4	[Volt]	Note 1
Operating Temperature	TOP	0	+50	[°C]	Note 2
Operating Humidity	HOP	10	90	[%RH]	Note 2
Storage Temperature	TST	-20	+60	[°C]	Note 2
Storage Humidity	HST	10	90	[%RH]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

Note 1: Duration:50 msec.

Note 2: Maximum Wet-Bulb should be 39℃ 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

TFT array and liquid crystal.

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	-		0.309	0.371	A	2
	White pattern	-		0.516	0.619	A	
	H-strip pattern	-		0.407	0.488	A	
Power Consumption	Black pattern	-		3.708	4.450	Watt	
	White pattern	-		6.192	7.430	Watt	
	H-strip pattern	-		4.884	5.861	Watt	
Inrush Current		I_{RUSH}			1.44	A	3

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

Note2. Test Condition:

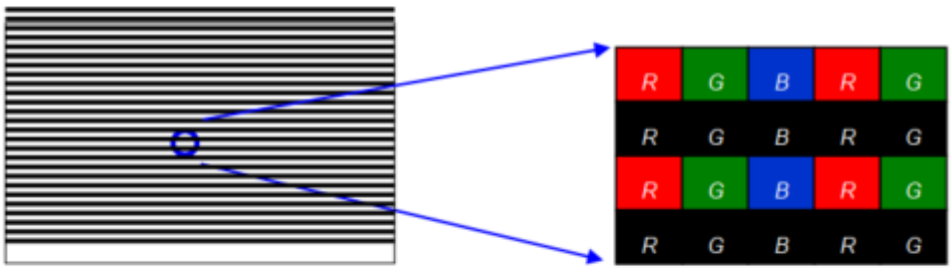
(1) V_{DD} = 12.0V, (2) Fv = 60Hz, (3) Fclk= 74.25MHz, (4) Temperature = 25 ℃

(5) Power dissipation check pattern. (Only for power design)

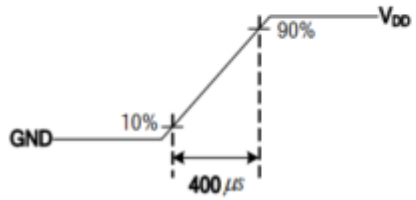
a. Black pattern

b. White pattern

c. H-Strip pattern



Note3. Measurement condition : Rising time = 400us

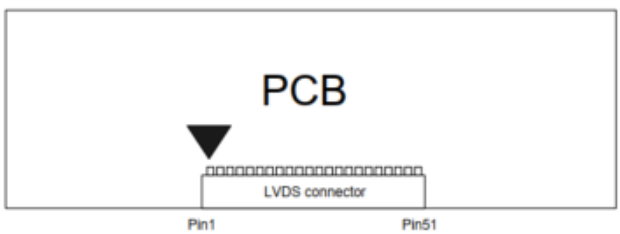


2.2 Input Connector

LCD Connector: JAE FI-RTE51SZ=HF (51 Pin)

PIN	Symbol	Description	Note	PIN	Symbol	Description	Note
1	N.C.	No connection	2	26	N.C.	No connection	2
2	SCL	I2C Serial Clock	3&5	27	N.C.	No connection	2
3	WP	EEPROM Write Protection High(3.3V) for Writable, Open/Low(GND) for Protection	3&7	28	CH2_0-	LVDS Channel 2, Signal 0-	
4	SDA.	I2C Serial Data	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).

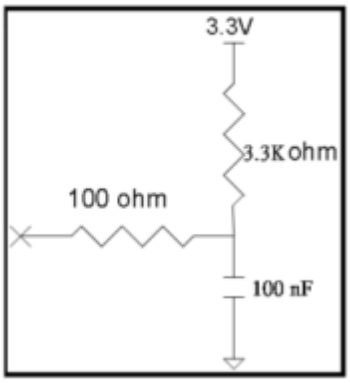
Note3. Input control signal threshold voltage definition

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

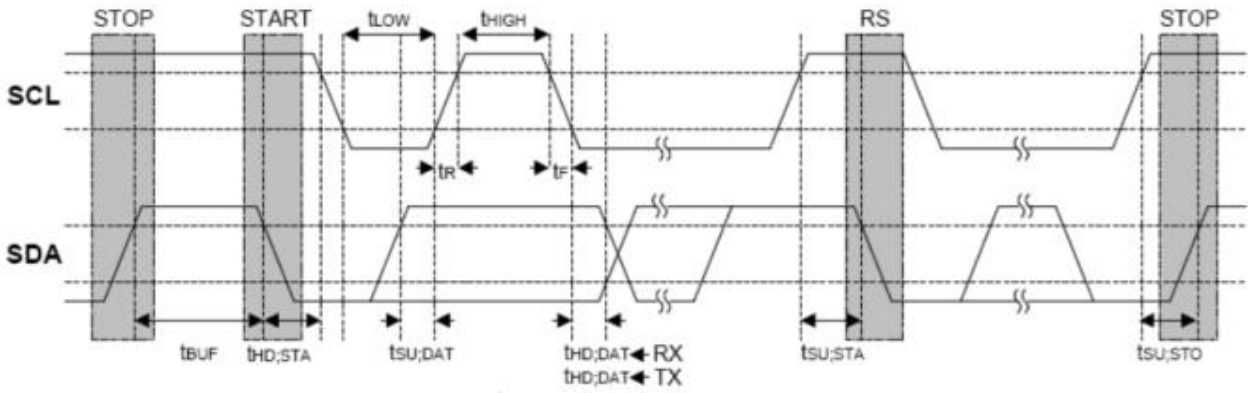
Input equivalent impedance of LVDE_SEL pin



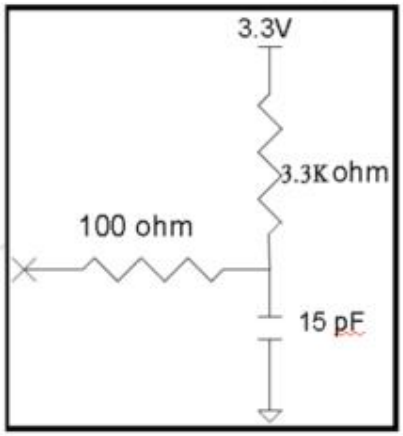
Note5. I2C Data and Clock

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



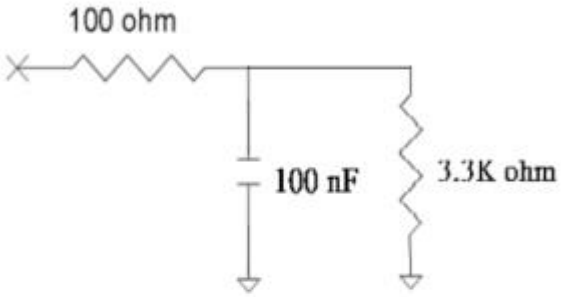
Input equivalent impedance of SDA/SCL pin



Note6. Data Bit mode format selection

BIT_SEL	Mode
H	10Bit
L or OPEN	8Bit

Input equivalent impedance of BIT_SEL pin

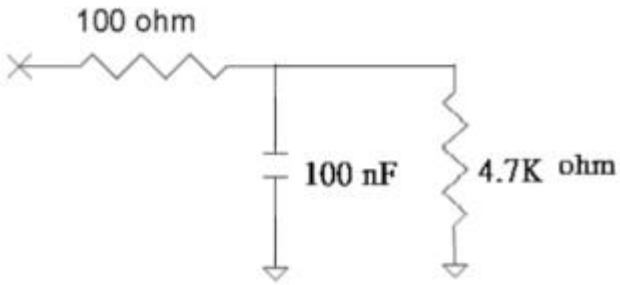


Note7. Write Protection

Mode selection

WP	Note
L or OPEN	Protection
H	Writable

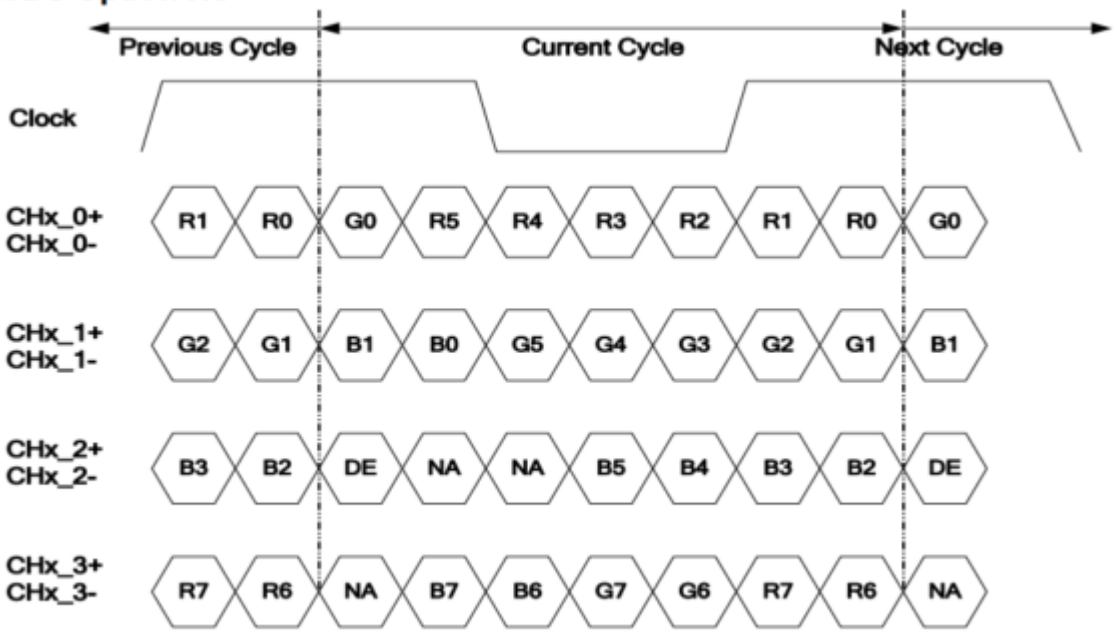
Input equivalent impedance of WP pin



2.3 Input Data Format

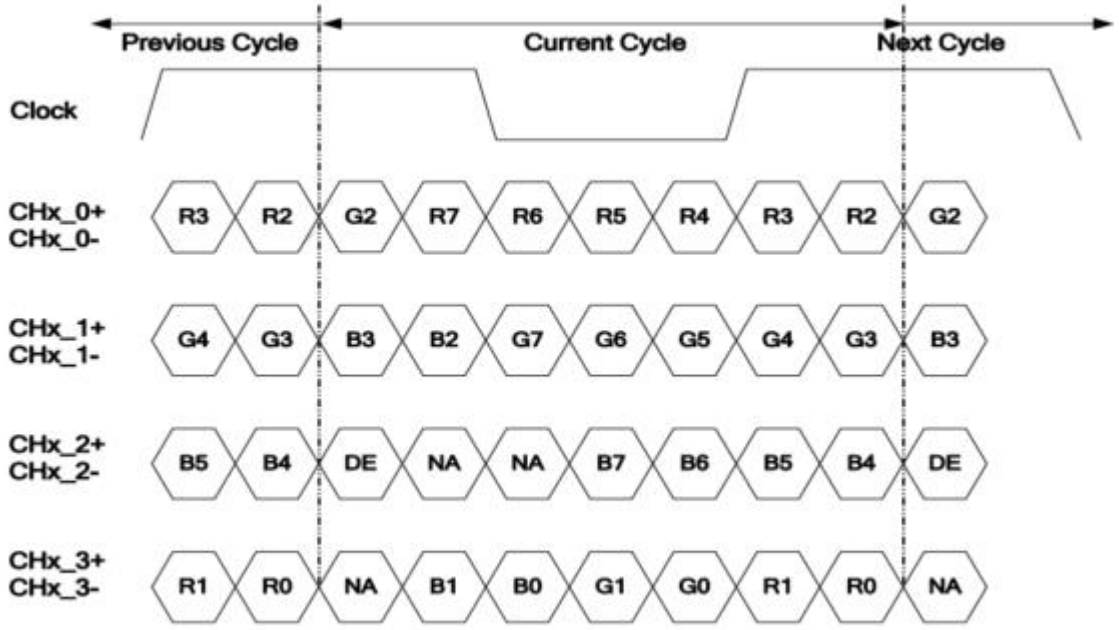
LVDS Option for 8 Bit

■ **LVDS Option NS**



Note: x = 1, 2, 3, 4…

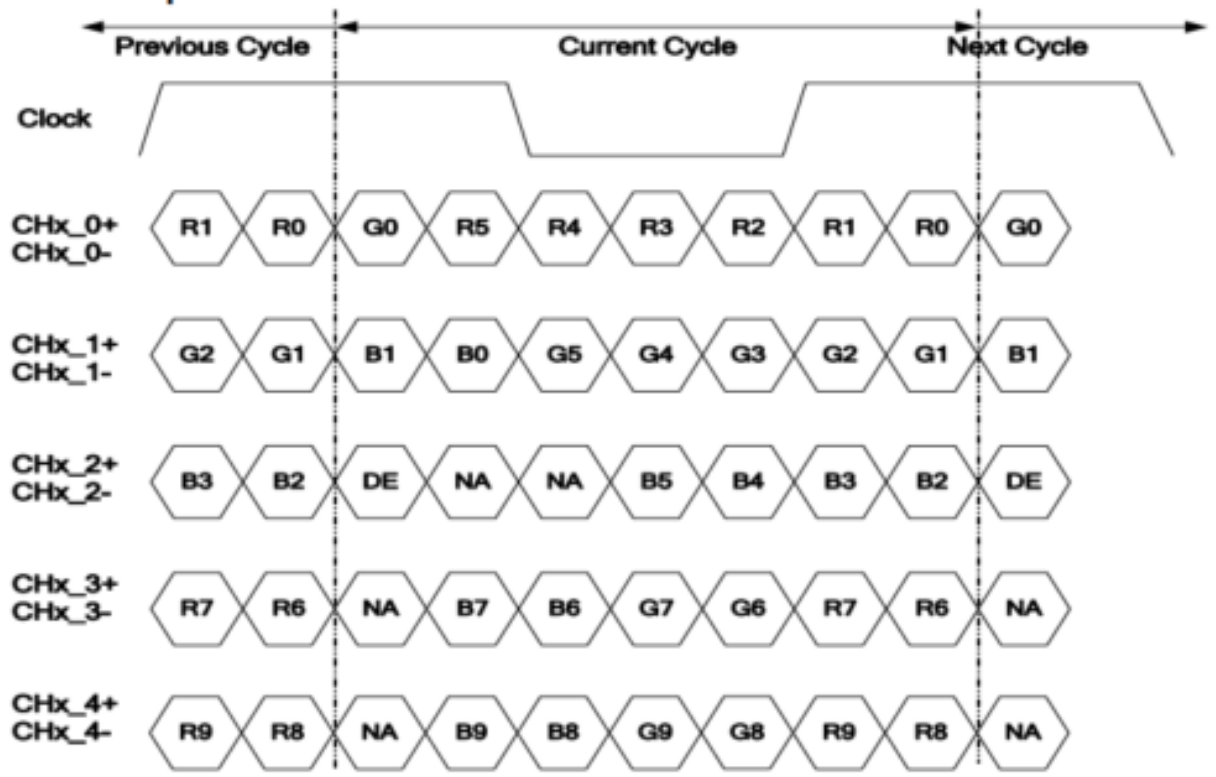
■ **LVDS Option JEIDA**



Note: x = 1, 2, 3, 4…

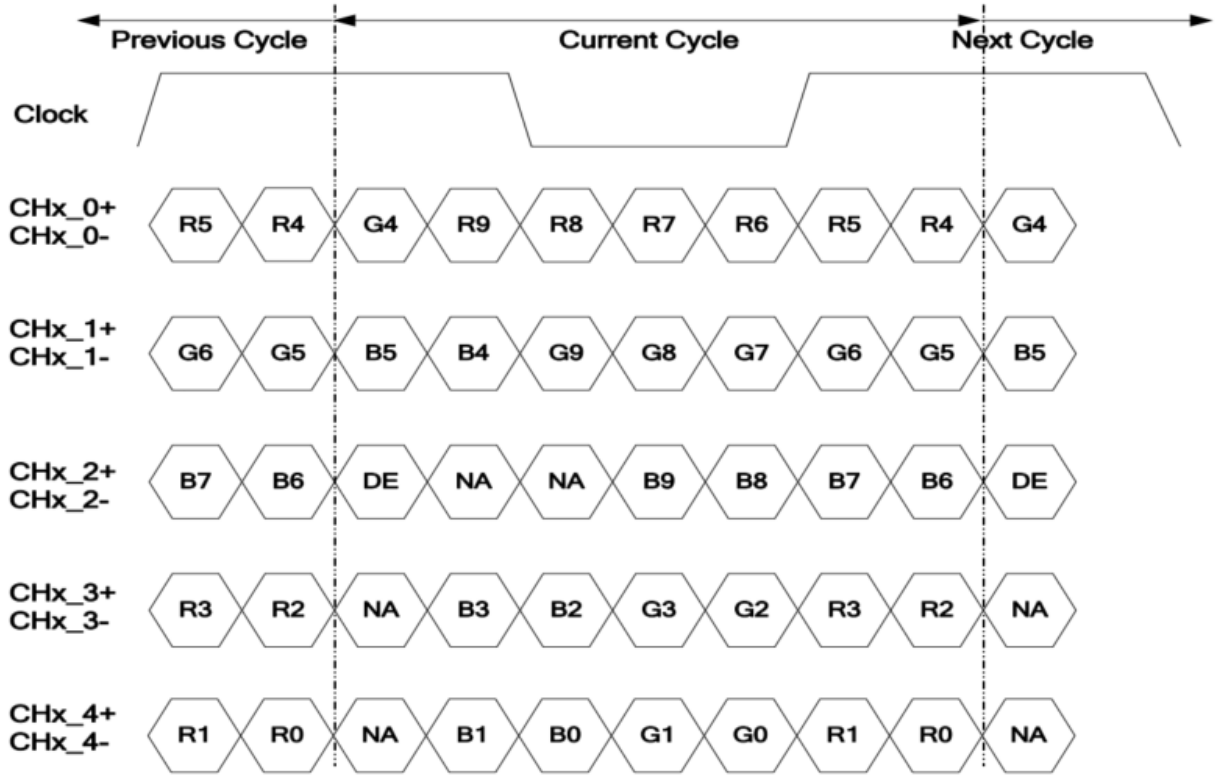
LVDS Option for 10 Bit

■ LVDS Option NS



Note: x = 1, 2, 3, 4...

■ LVDS Option JEIDA



Note: x = 1, 2, 3, 4...

Option for 8 Bit

The brightness of each primary color (red, green and blue) is based on the 8 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
		R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0	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
	Red(255)	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green(255)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	Blue(255)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Cyan	0	0	0	0	0	0	0	0	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	0	0	0	0	0	0	0	0	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	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
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
	RED(001)	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

	RED(254)	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RED(255)	1	1	1	1	1	1	1	1	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
	GREEN(001)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0

	GREEN(254)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0
	GREEN(255)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	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
	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	1

	BLUE(254)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0
	BLUE(255)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1

Option for 10 Bit

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	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

2.4 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:

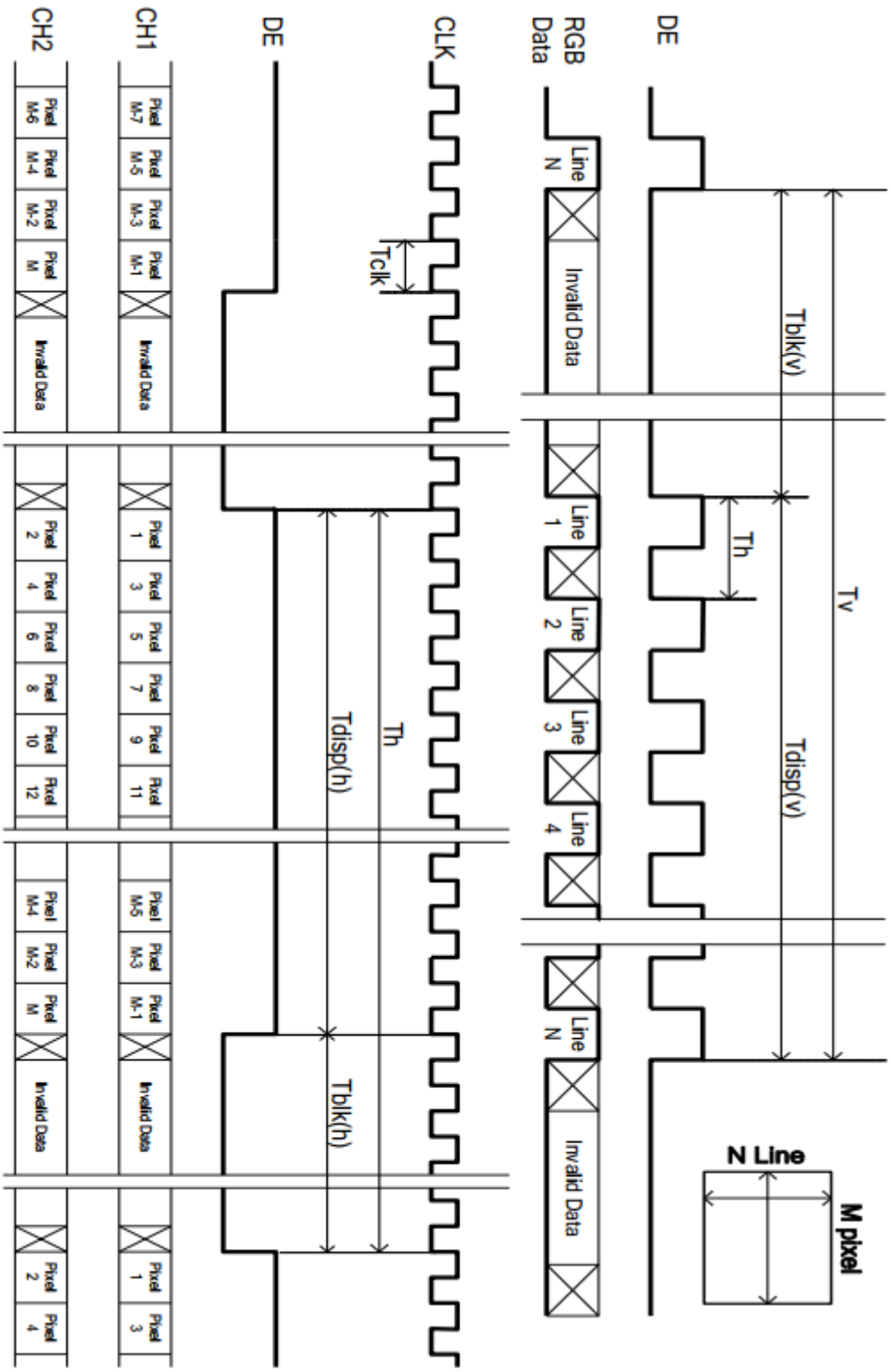
(1) Display position is specific by the rise of DE signal only.
Horizontal display position is specified by the rising edge of 1st DCLK after the rise of 1st DE, is displayed on the left edge of the screen.

(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.

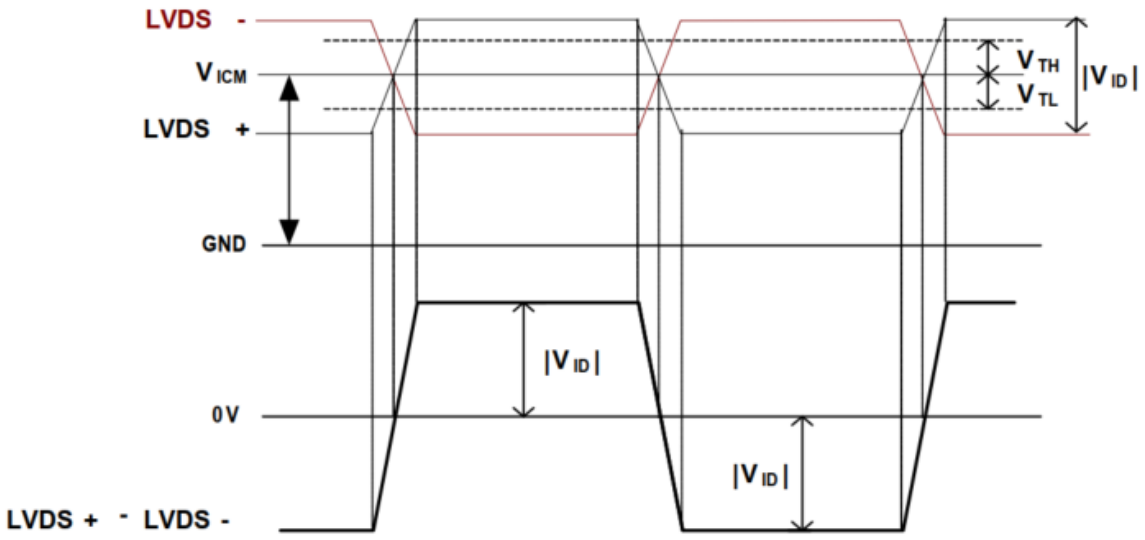
2.5 Signal Timing Waveforms



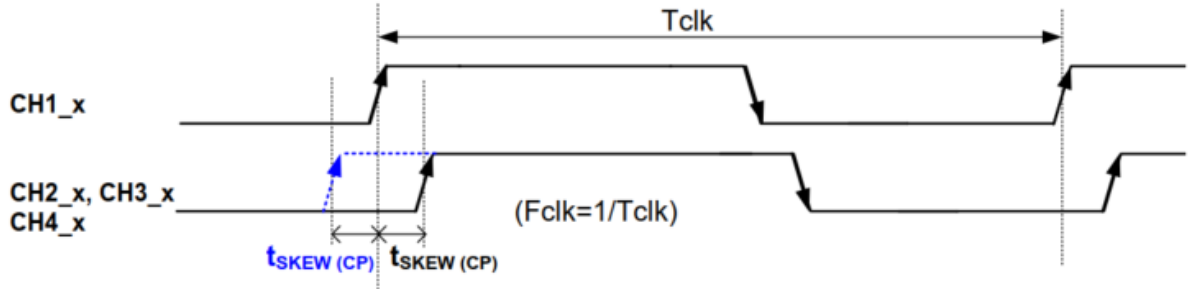
2.6 LVDS SPEC

Parameter		Symbol	Value			Unit	Note
			Min.	Typ.	Max		
LVDS Interface	Input Differential Voltage	$\lvert V_{ID} \rvert$	200	400	600	mV_{DC}	1
	Differential Input High Threshold Voltage	V_{TH}	+100	--	+300	mV_{DC}	1
	Differential Input Low Threshold Voltage	V_{TL}	-300	--	-100	mV_{DC}	1
	Input Common Mode Voltage	V_{ICM}	1.1	1.25	1.4	V_{DC}	1
	Input Channel Pair Skew Margin	$t_{SKEW\ (CP)}$	-500	--	+500	ps	2
	Input Channel Pair Skew Margin (only for M'Star MST7428BB)	$t_{SKEW\ (CP)}$	-400	--	+400	ps	2
	Receiver Clock : Spread Spectrum Modulation range	Fclk_ss	Fclk -3%	--	Fclk +3%	MHz	3
	Receiver Clock : Spread Spectrum Modulation frequency	Fss	30	--	200	KHz	3
	Receiver Data Input Margin Fclk = 85 MHz Fclk = 65 MHz	tRMG	 -0.4 -0.5	 -- --	 0.4 0.5	ns	8

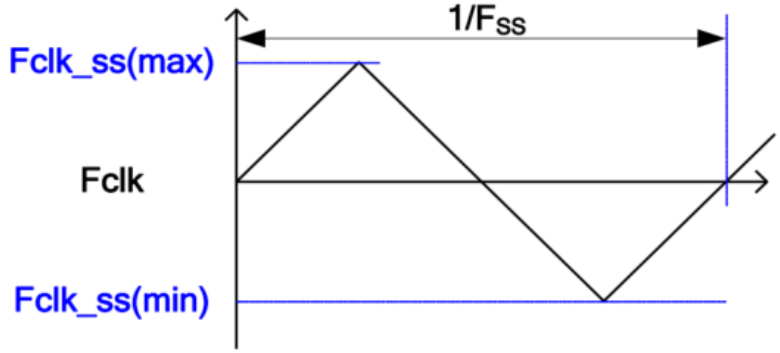
Note1. VICM = 1.25V



Note2. Input Channel Pair Skew Margin

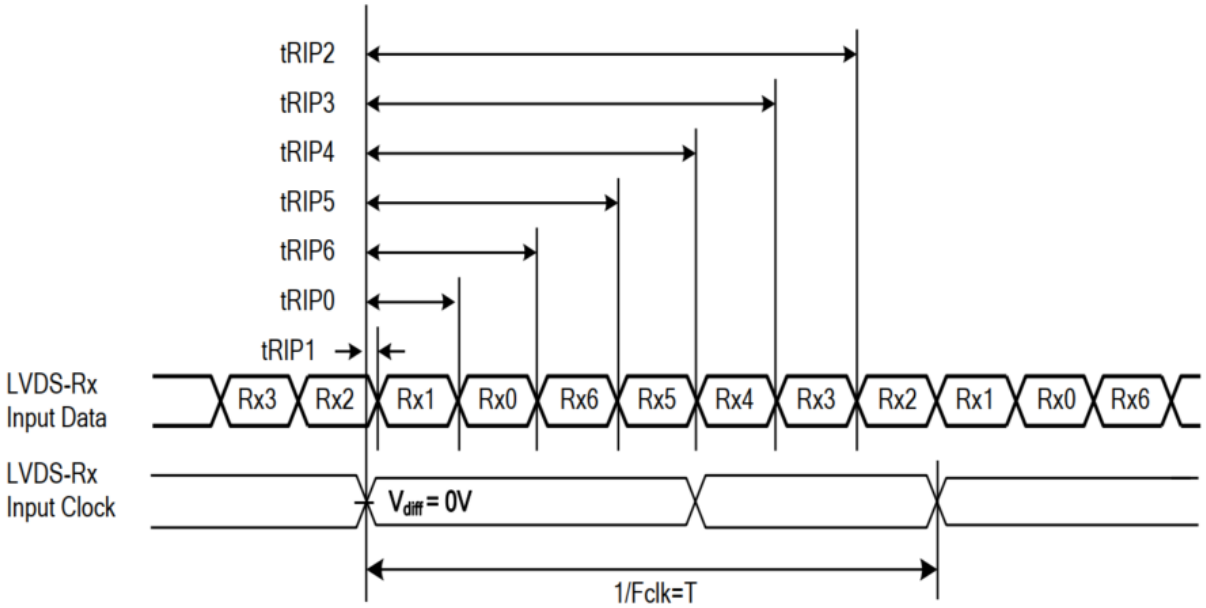


Note3. LVDS Receiver Clock SSCG (Spread spectrum clock generator) is defined as below figures.

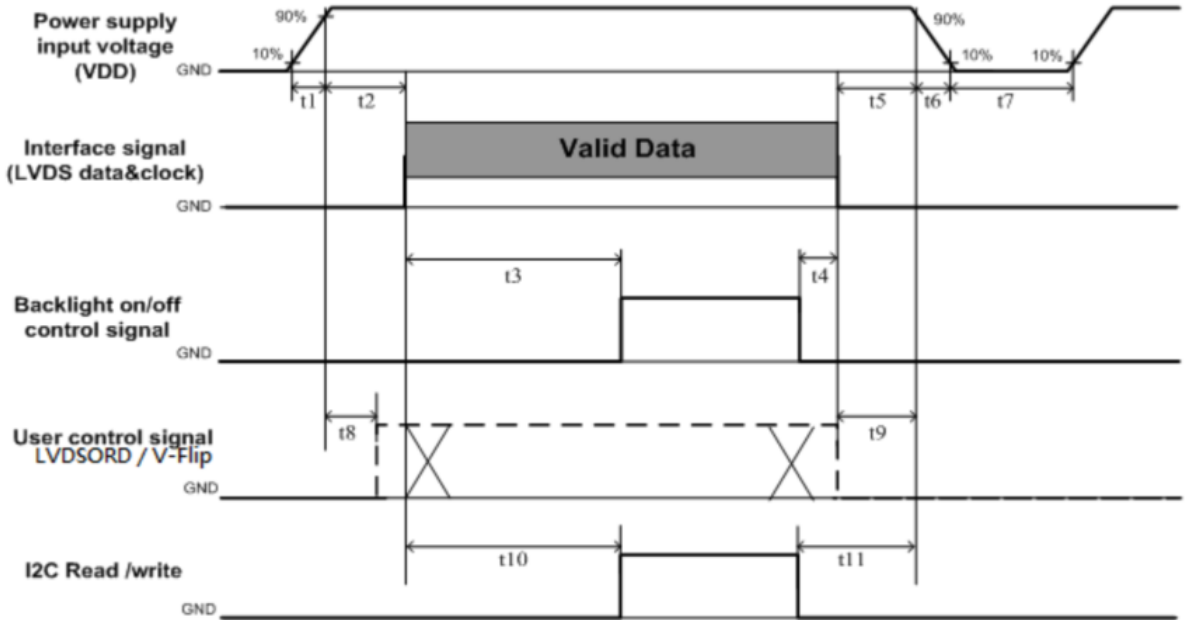


Note4. Receiver Data Input Margin

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	



2.7 Power Sequence



Parameter	Values			Unit
	Min.	Type.	Max.	
t1	0.4	---	30	ms
t2	0.1	---	50	ms
t3	400	---	---	ms
t4	0 *1	---	---	ms
t5	0	---	---	ms
t6	---	---	--- *2	ms
t7	1000 *3	---	---	ms
t8	20 *5	---	50	ms
t9	0	---	---	ms
t10	400	---	---	ms
t11	150 *4	---	---	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 t7 : When the power supply input voltage(VDD) is off, be sure to pull down the valid and invalid data to 0V

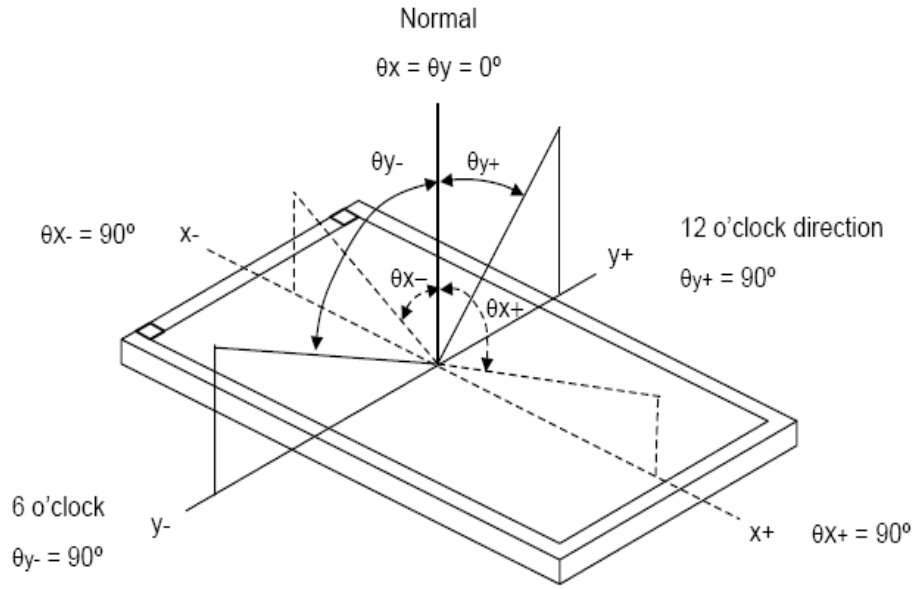
(4) When user control signal is N.C. (no connection), opened in Transmitted end, t8 timing spec can be negligible.

3 Optical Specification

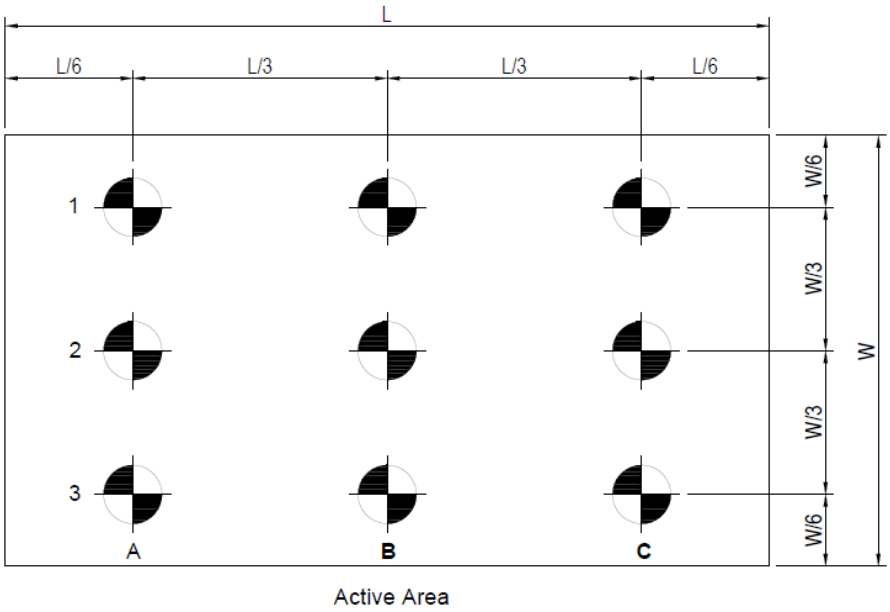
Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Color chromaticity	Red	Rx	θx=0 θy=0 CA-410	0.619	0.649	0.679	-	Test Mode: (2) (3)
		Ry		0.305	0.335	0.365	-	
	Green	Gx		0.282	0.312	0.342	-	
		Gy		0.595	0.625	0.655	-	
	Blue	Bx		0.122	0.152	0.182	-	
		By		0.039	0.069	0.099	-	
	White	Wx		0.263	0.293	0.323	-	
		Wy		0.296	0.326	0.356	-	
Center Luminance of White		Lc	θx=0 θy=0 CA-410	2340	2600	3380	cd/m^2	
Uniformity		Lu		-	87	-	%	
Contrast Ratio		CR	θx=0 θy=0 Klein K-10	4680:1	5200:1	-	-	Test Mode: (4)
Color Saturation		NTSC		-	85	-	%	
Viewing Angle	Horizontal	θx+	CR ≥ 10	-	89	-	Deg	Test Mode: (1)
		θx-		-	89	-		
	Vertical	θy+		-	89	-		
		θy-		-	89	-		

Test Mode：

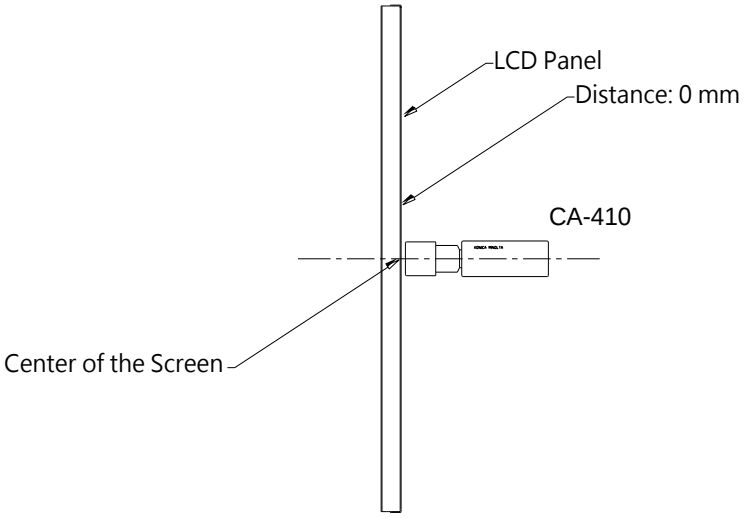
(1) Definition of Viewing Angle (θx , θy):



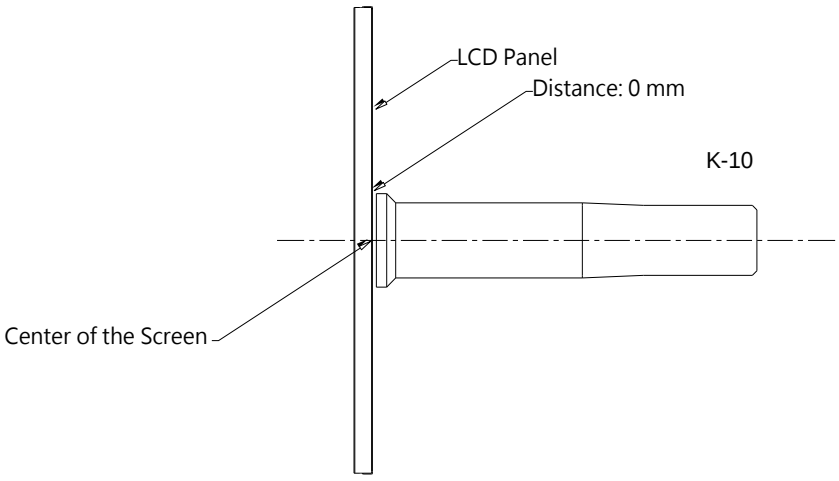
(2) Definition of Test Point:



(3) CA-410 Measurement Setup:



(4) Klein K-10 Measurement Setup:



4 LED Driving Board Specifications

4.1 Operating Characteristics

Item	Symbol	Condition	MIN.	TYP.	MAX.	Unit	Remark
Input Voltage	Vin		22.0	24.0	26.0	V	
Input Current (High Brightness)	IinH	Brightness = 100%	5.92	5.43	5.01	A	(1)
Input Power Consumption	Pin	Brightness = 100%	-----	130.8	-----	W	
LED Current (High Brightness)	IoutH	Brightness = 100%	-----	1.45	-----	A	J2
			-----	1.45	-----	A	J7、J8
Working Frequency	W_Freq	Brightness = 100%	-----	400	-----	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	-----	Hz	(4)
ON/OFF Control	Von	Normal Operation	2	-----	5	V	
	Voff		0	-----	0.8	V	
Output Voltage	Vout	Brightness = 100%	-----	40.46	-----	V	J2
			-----	40.46	-----	V	J7、J8
Efficiency	η	Brightness = 100%	-----	90.1	-----	%	(5)

Remark:

(1) This data is based on the testing result of practical input voltage, Iin is measured by related Vin. (min, typ, max). If the voltage is increased, the current will decrease. If the voltage is decrease, the current will increase.

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

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

4.2 Input Connector

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 LED driver is DC dimming
2	GND	Close pin 2,3 LED driver is PWM dimming
3	PWM	

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

Input Connector: CN3 (JST B4B=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

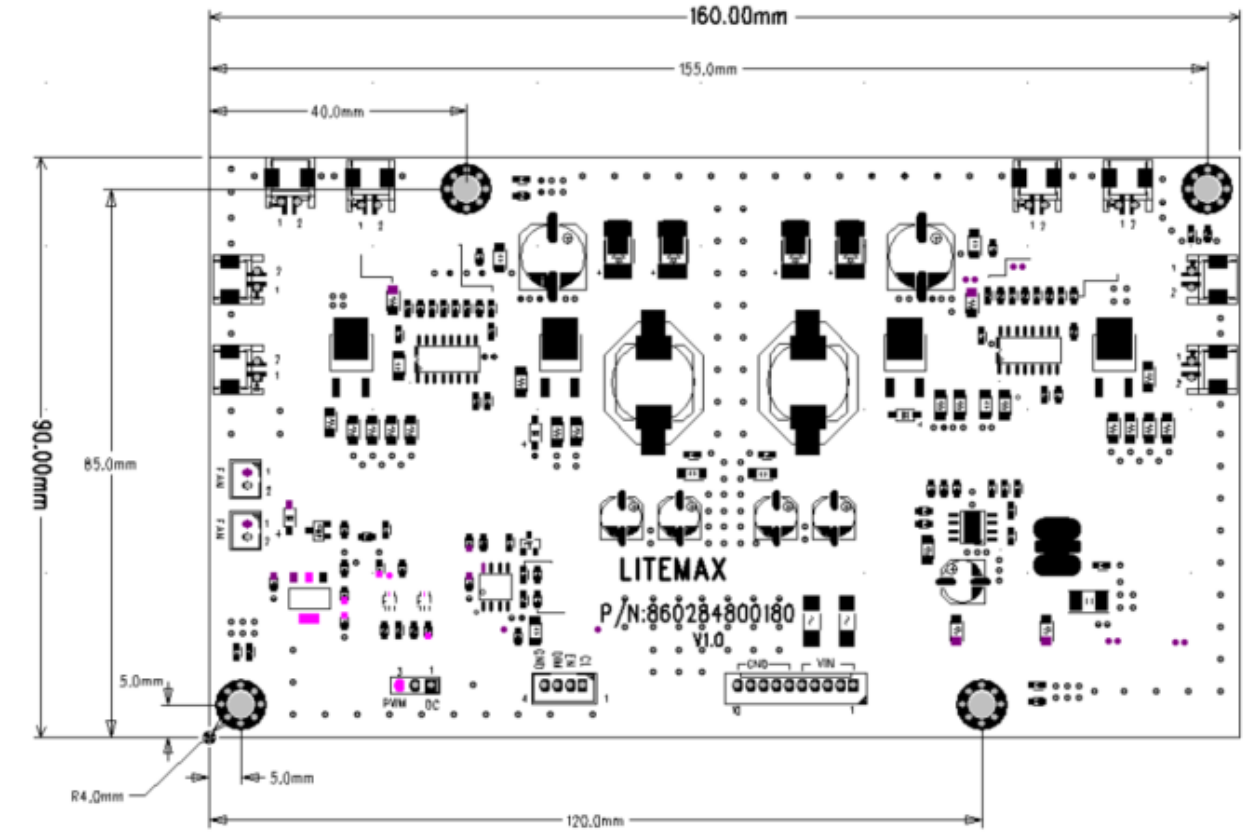
Note: Pin1 is dimming method control pin, Low → DC dimming, High → PWM dimming.
If pin1 is be used, please NC CN2.

Output Connector: J1,J2,J7,J8 (JST S2B-EH or Compatible)

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

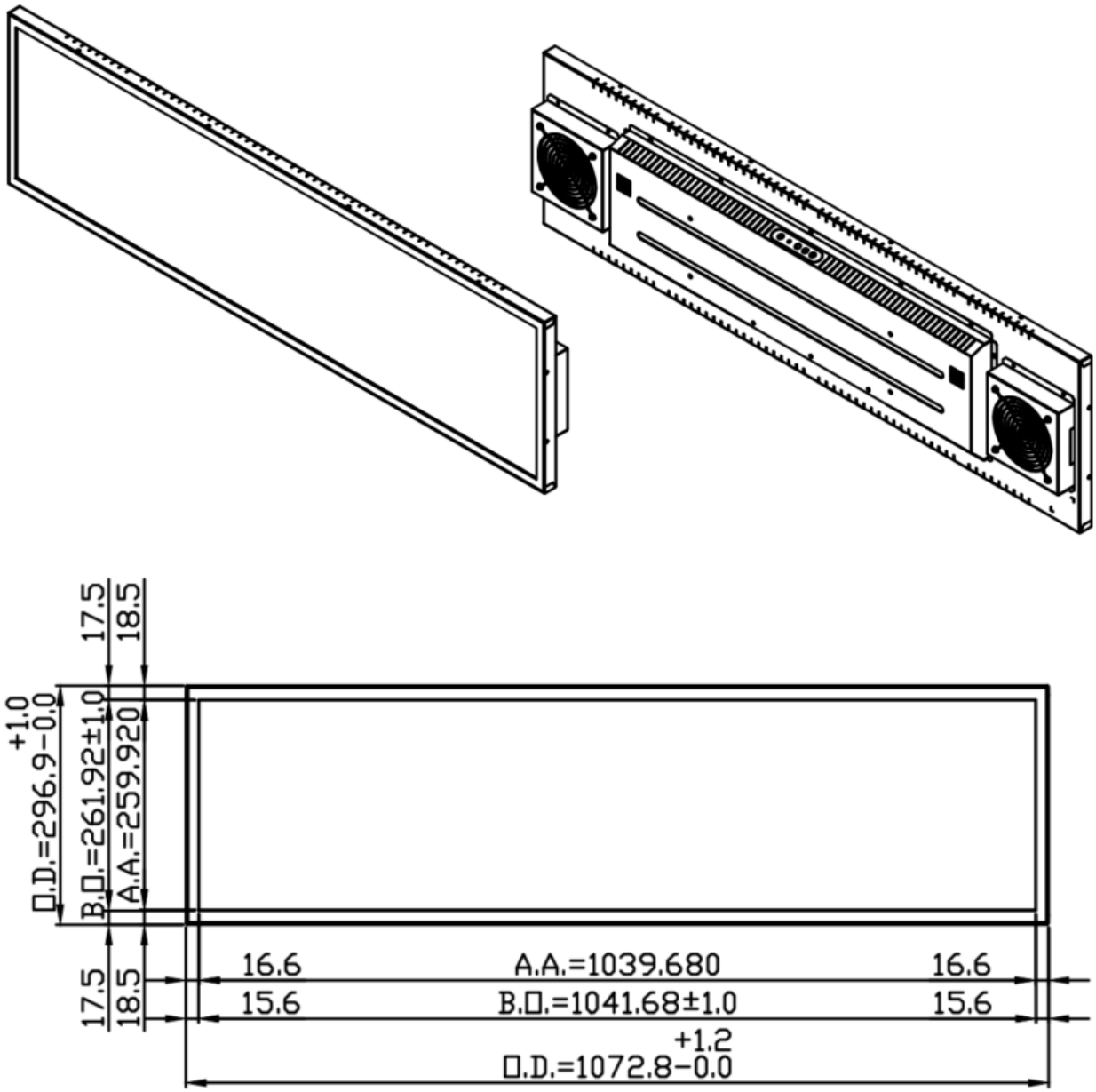
4.3 Mechanical Characteristics

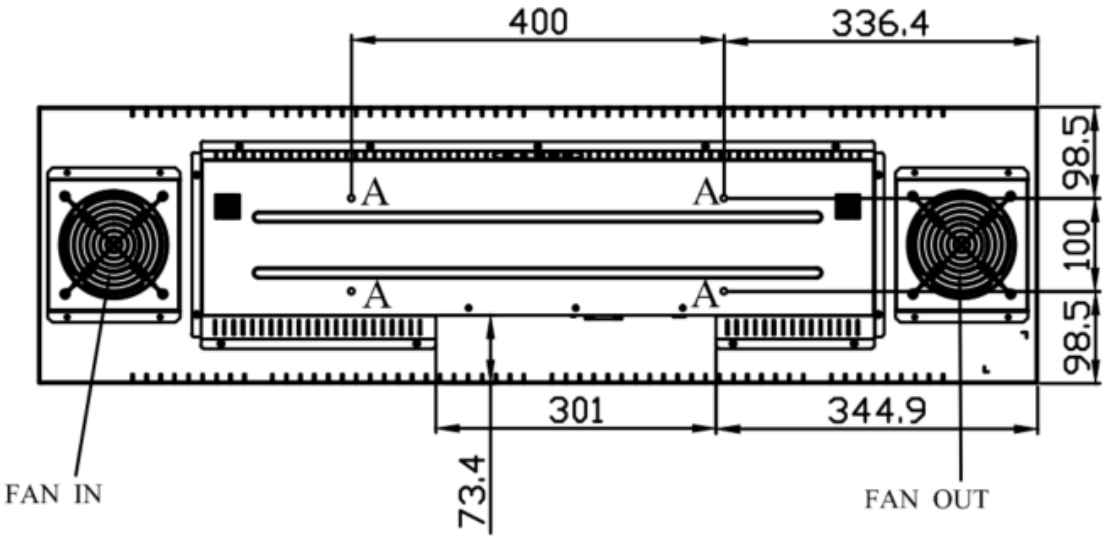
Dimension: 160 x 90 x 12.5mm

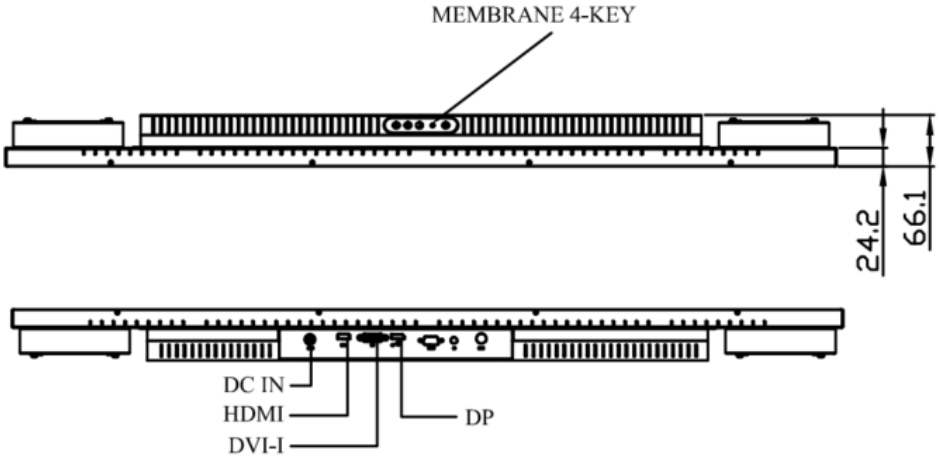


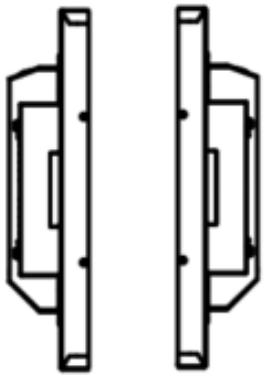
5 Mechanical Drawing

Unit:mm







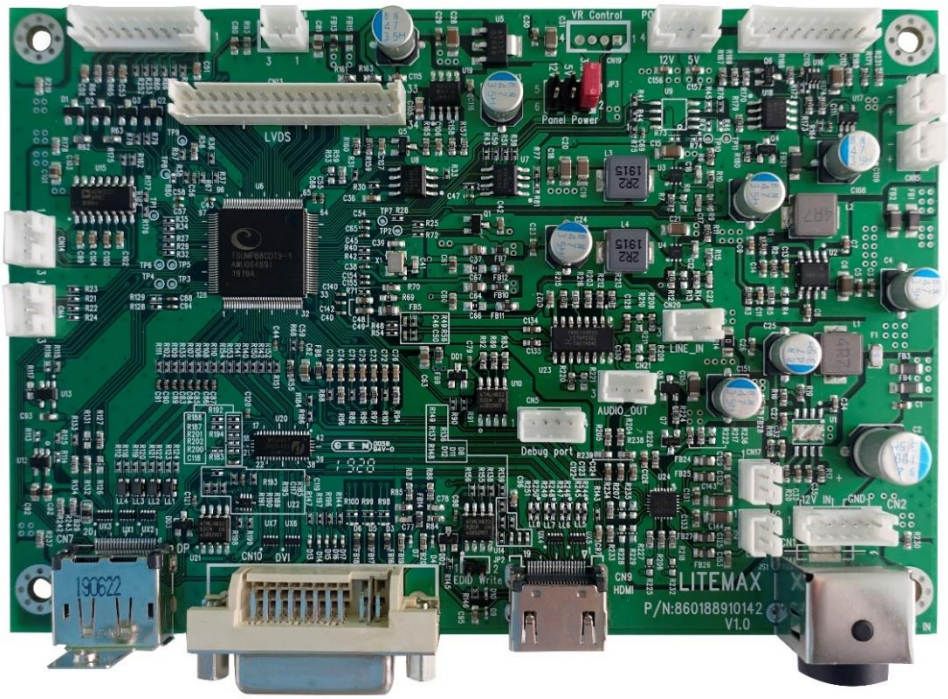


Note：
O.D : Outline Dimension(mm)
B.O : Bezel Opening
A.A : LCD Active Area
A:4-M6_USER HOLE_MAX DEPTH=6mm

6 AD8891DHP Board & OSD Functions

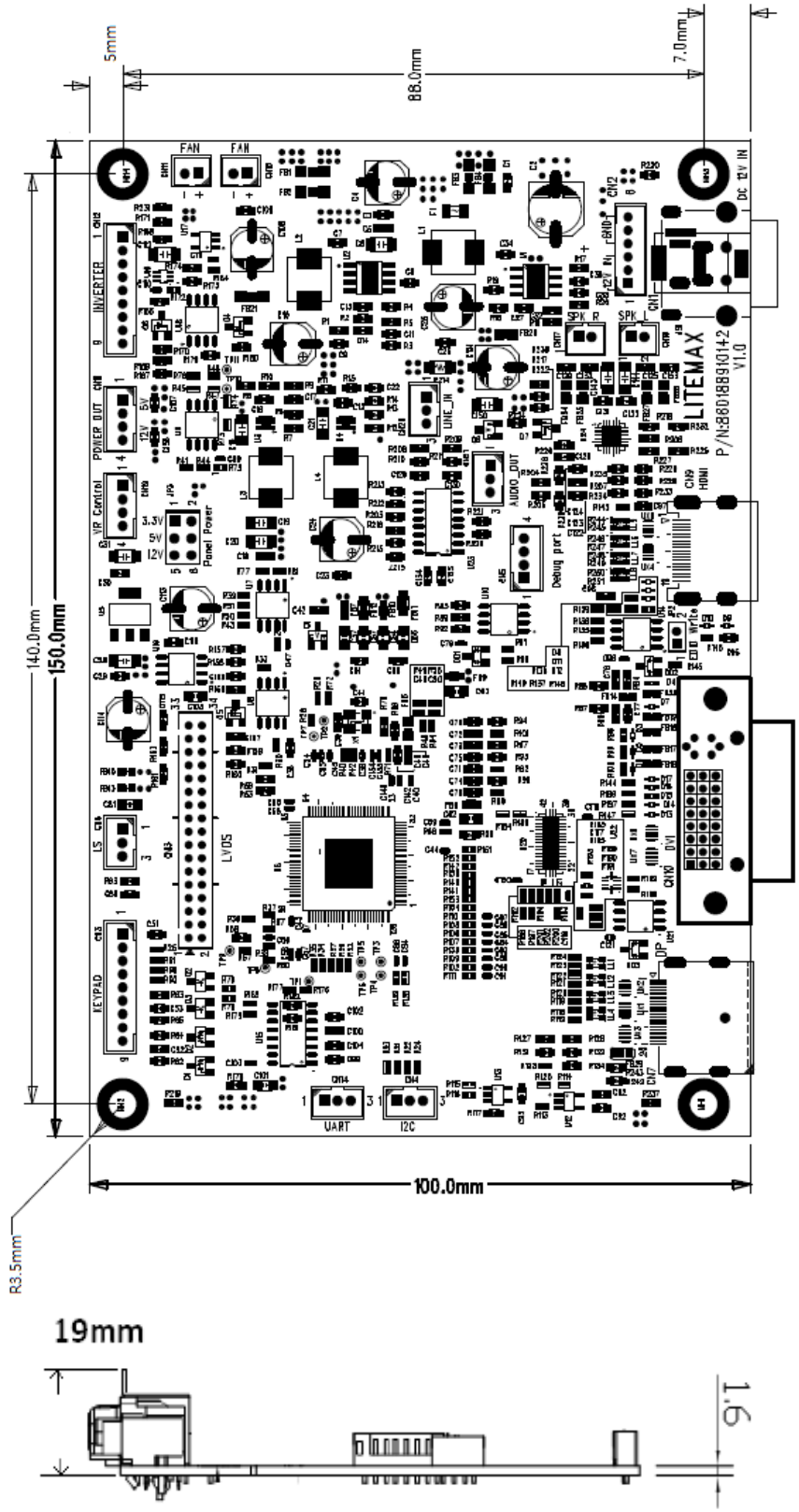
We developed this A/D board to support industrial high brightness and commercial applications. This A/D board has many functions. It has a Display Port and DVI-I and HDMI input. Rev.1 is European RoHS compliant.

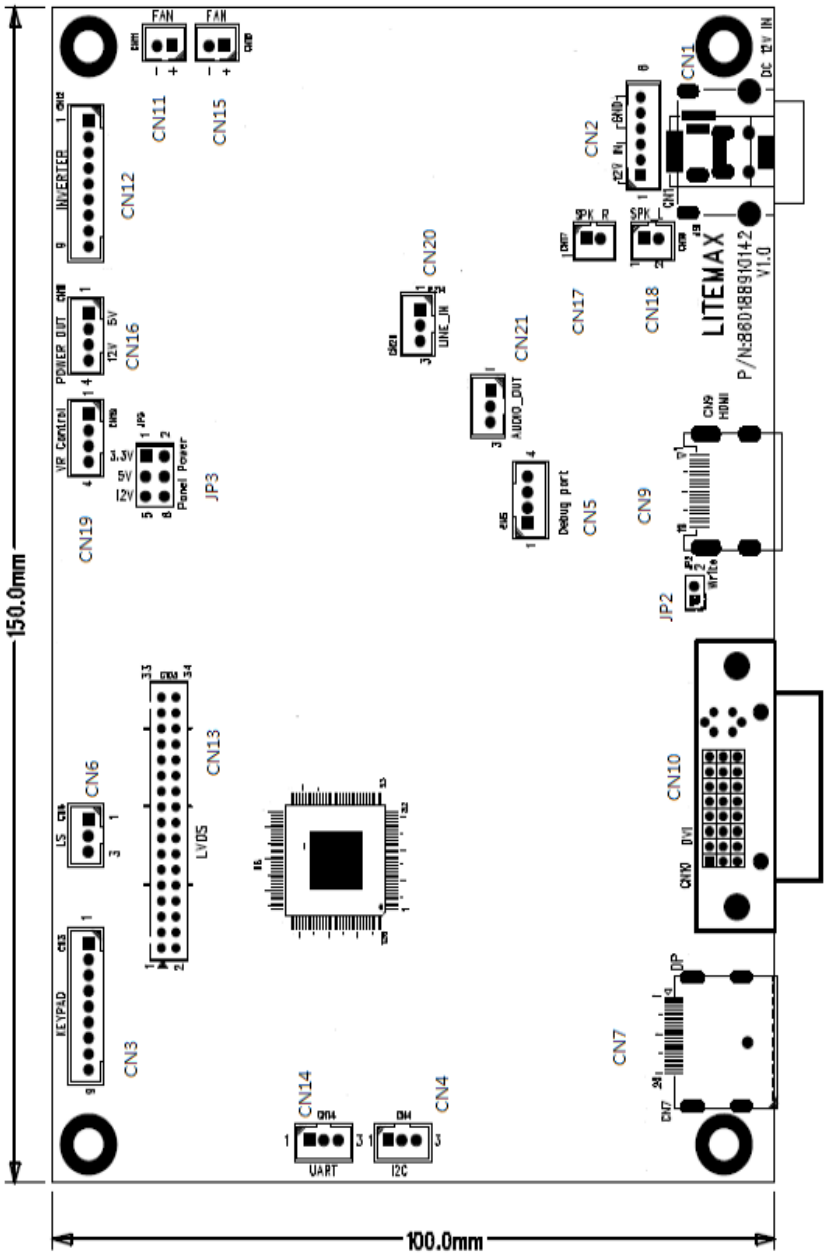
■Max Resolution Up To Full HD
■ Analog RGB Input Up to 205MHz
■ Ultra-Reliable DVI-I Input
■ HDMI Input (HDMI 1.3)
■ Dual/Single LVDS Interface
■ Support Panel DC 5V or 12V,3.3V Output
■ OSD Control
■ PWM/DC Dimming Control For Backlight Driver.
■ External RS232 Control (Optional)
■ Input Power DC 24V
■ Display Port Input. (Support Display Port 1.2a)
■ Audio in And 3Wx2 (4Ω)Audio Out(Optional)
■ *External Digital light Sensor Brightness Control (Optional)
■ *External Light Sensor Brightness Control (Optional)
■ Support Output Voltage 12V(1A) And 5V(1A)



Outline Dimensions

AD8891 150mmX100mm




150.0mm
100.0mm
FAN
FAN
CN11
CN15
CN12
INVERTER
POWER OUT
CN16
VR Control
CN19
JP3
Panel Power
3.3V
5V
12V
CN20
LINE_IN
CN21
AUDIO_OUT
Debug port
CN5
CN17
CN18
CN2
GND
12V IN
SPK_R
SPK_L
CN1
DC 12V IN
LITEMAX
P/N:8801889101+2
V1.0
CN9
HDMI
JP2
CN6
LVDS
CN13
CN10
DVI
CN3
KEYPAD
CN14
UART
CN4
I2C
CN7
DP

AD8891 Board Pin Define

CN13: Panel LVDS Connector

Pin No.	Function	Pin No.	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	RxE4-
9	RxO3-	26	RxE4+
10	RxO3+	27	GND
11	RxO4-	28	GND
12	RxO4+	29	Pull Low
13	GND	30	Pull High
14	GND	31	VLCD
15	RxE0-	32	VLCD
16	RxE0+	33	VLCD
17	RXE1-	34	VLCD

CN10: DVI-I Input Connector

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-
C1	Red input	C2	Green input	C3	Blue input
C4	Horizontal SYNC.	C5	Analog GND		

CN7: Display Port

Pin No.	Function	Pin No.	Function
1	RX3-	11	GND
2	GND	12	RX0+
3	RX3+	13	GND
4	RX2-	14	GND
5	GND	15	AUX+
6	RX2+	16	GND
7	RX1-	17	AUX-
8	GND	18	Hot plug detect
9	RX1+	19	GND
10	RX0-	20	DP +3.3V

CN9: HDMI Input Connector (HDMI 19Pin)

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		

CN1: Power DIN (12V)

Pin No.	Function	Pin No.	Function
1	12V/24VDC	2	12V/24VDC
3	GND	4	GND

CN2: Power Connector (12V) (6PIN 2.0mm)

Pin No.	Function	Pin No.	Function
1	12V/24VDC	2	12V/24VDC
3	12V/24VDC	4	GND
5	GND	6	GND

CN16: Touch Power Connector

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

CN12: Inverter Connector(9PIN 2.0mm)

Pin No.	Symbol	Description	Pin No.	Symbol	Description
1	DIM_SEL	PWM/DC SEL	6	GND	GND
2	ON/OFF	Backlight	7	12VDC	12INV
3	BRIGHT	Dimming adjust	8	12VDC	12INV
4	GND	GND	9	12VDC	12INV
5	GND	GND			

CN11, CN15: Fan Control (2PIN 2.0mm)

Pin No.	Function	Pin No.	Function
1	12V	2	GND

CN3: 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	NC
5	UP KEY		

JP3: Panel Power

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

CN14: RS232 Connector (3PIN 2.0mm)

Pin No.	Function	Pin No.	Function
1	UART TX	2	UART RX
3	GND		

CN20: LINE IN (3PIN 2.0mm)

Pin No.	Function	Pin No.	Function
1	AUDIO-R	2	AUDIO-L
3	GND		

CN17: Speaker Connector (2PIN 2.0mm)

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

CN18: Speaker Connector (2PIN 2.0mm)

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

CN19: VR Control (4PIN 2.0mm)

Pin No.	Function	Pin No.	Function
1	5V	2	INT
3	GPIO	4	GND

Reserve for some control

CN6: Ambient (2PIN 2.0mm)

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

CN21: Audio Out Connector (3PIN 2.0mm)

Pin No.	Function	Pin No.	Function
1	Audio R out	2	Audio L out
3	GND		

For audio connect to another Audio AMP

CN4: I2C Connector (3PIN 2.0mm)

Pin No.	Function	Pin No.	Function
1	I^2C_SDA	2	I^2C_SCL
3	GND		

For digital LS

JP2: EDID Jumper (2PIN 2.0mm)

Pin No.	Function	Pin No.	Function
1	3.3V	2	GND

When EDID want to update it must be short.

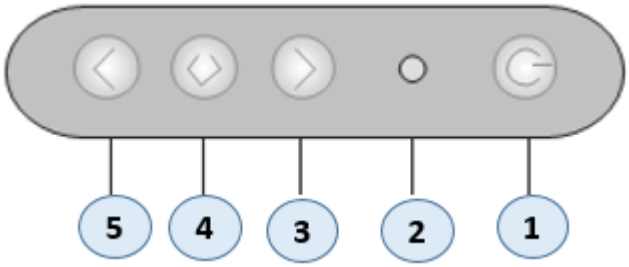
CN5: Debug Connector (4PIN 2.0mm)

Pin No.	Function	Pin No.	Function
1	3.3V	2	DDCA_SCL
3	DDCA_SDA	4	GND

For F/W debug

6.1 OSD Functions

MEMBRANE CONTROL BUTTON



❶**POWER SWITCH:** Pushing the power switch will turn the monitor on. Pushing it again to turn the monitor off.

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

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

❹**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.

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

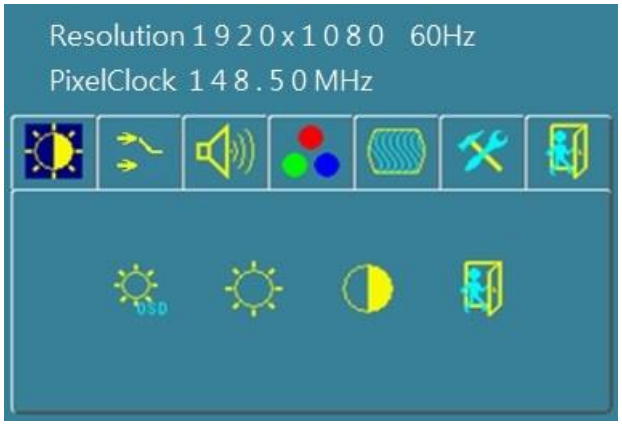
Screen Adjustment Operation Procedure

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 7 sub menus within the OSD user interface:
Brightness, Signal Select, Sound, Color, Image, Tools, and Exit.

When you press the “menu” button, you enter the “Brightness” sub directory. In this directory, you will see 4 selections:

press “menu” once, you can go into the **Ambient light sensor**.

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

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”.

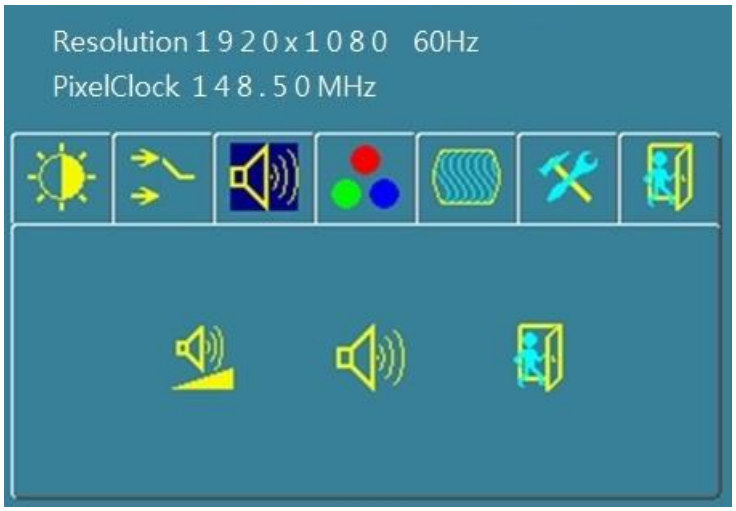
Exit: back to the beginning menu.

HDMI **HDMI:** HDMI input

DVI **Digital:** DVI input

DP **DP:** DisplayPort input

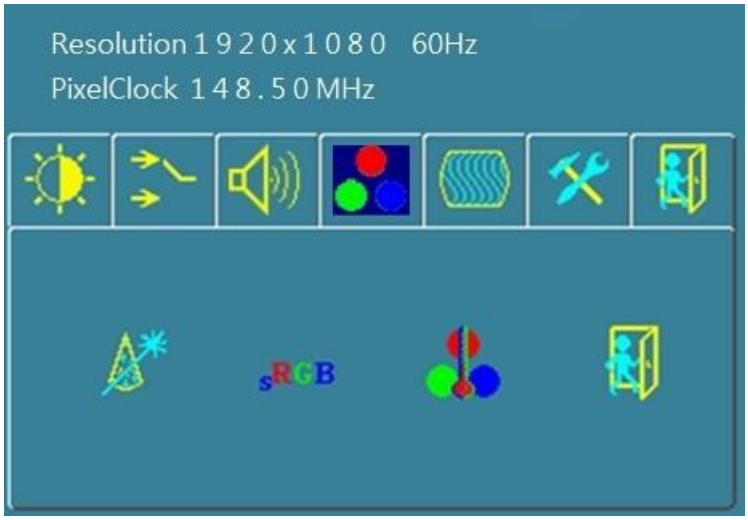
Exit **Exit:** Back to the beginning menu.



Audio Volume: Audio volume adjustment.

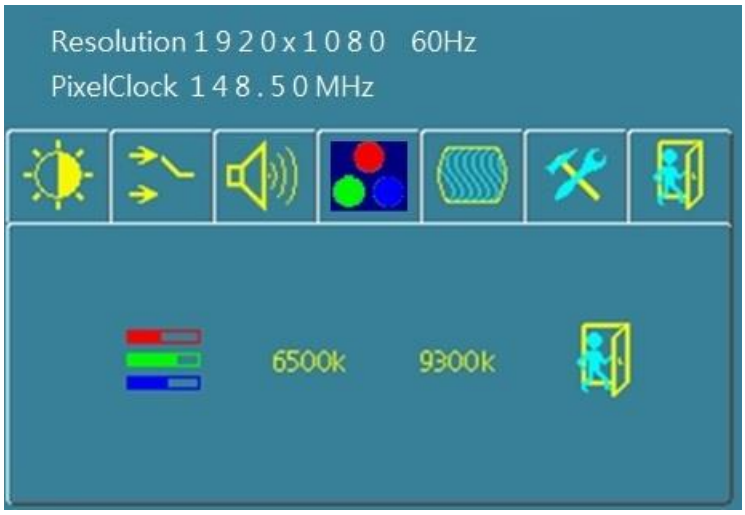
UnMute/Mute: You can mute the speaker by pressing this option.

Exit: Back to the beginning menu.



Auto Color：By navigating over to the “Auto Color” option, optimal color performance is invoked.

SRGB: Windows standard color setting



Color Temperature: You have 4 options in this selection

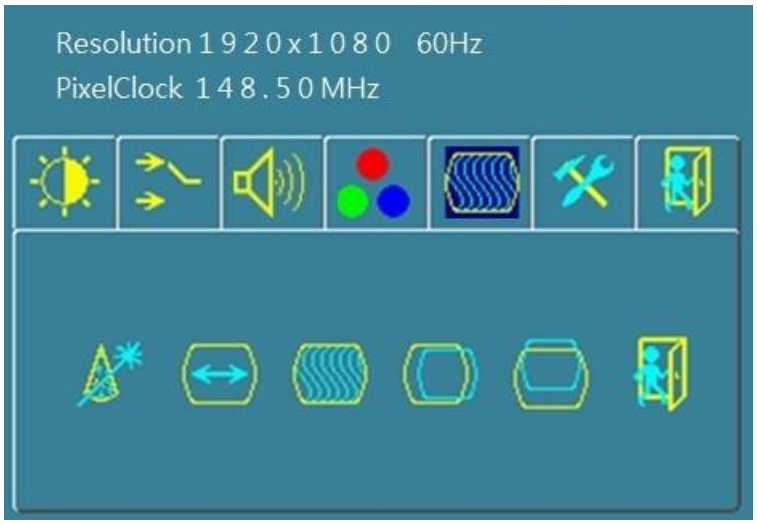
.

Color Temperature User Define: Default is 100 for “R”, “G”, and “B”.

Color Tempture_6500K: Warm color scheme

Color Tempture_9300K: Cold color scheme

Exit: Back to the beginning menu.



Auto Adjust:
Choose this option and the AD8891 will adjust to the optimal horizontal and vertical frequency.

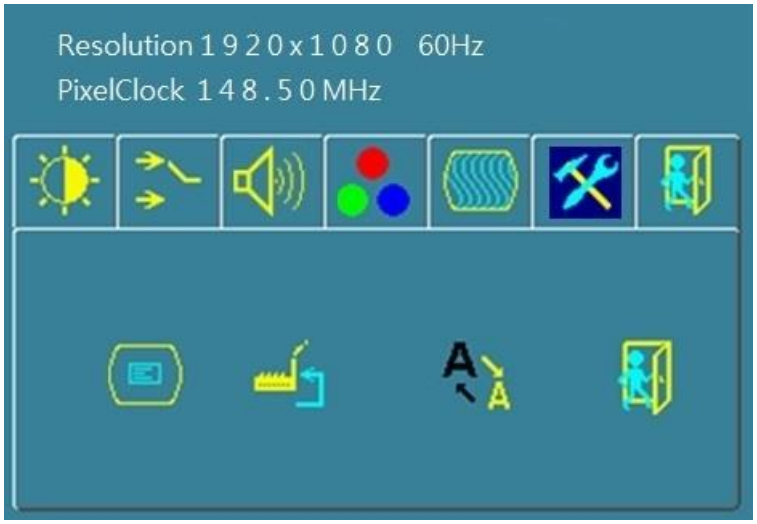
Clock: If you are not satisfied with the Auto tune result, you can adjust manually by pressing “Clock”. Using this will make the image wider.

Phase: If “double images” appear around the characters, choose “Phase” to remove them..

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

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

Exit: Back to the beginning menu.



OSD Control: Selecting this option, brings you to 4 more options:

OSD_time: Select time for the OSD user interface to stay on screen, for 2 sec. to 16 sec. Default is 10 sec.

OSD_HPos: Moves the OSD user interface horizontally on screen.

OSD_VPos: Moves the OSD user interface vertically on screen.

Exit: You can exit this sub menu back to the beginning

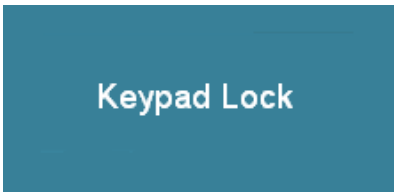
Factory_Reset: By pressing this, the screen will revert to factory settings, and the previous settings will be deleted.

Sharpness: Sharpen characters.

Exit: Back to the normal screen

OSD Lock Function：

It is possible to lock all the OSD buttons to prevent unauthorized changes to occur by pressing "**right >**" and "Menu" buttons simultaneously. You will see the "lock" icon below on the center of the screen for 8 ~ 9 seconds. If any button is pushed after the lock function is initiated, the below icon will appear on the screen.'



To release the OSD lock, press and "**right >**" and "Menu". The below icon will appear on the center of the screen for 8 ~ 9 seconds. Now all OSD keys are active again.

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.