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Sunlight Readable LCD!

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DURApixel™ LED B/L LCD

RoHS·WEEE LITEMAX COMPLIANT

LITEMAX

DLD3201-B

Sunlight Readable 32” LED B/L LCD

User Manual

Approved by	Checked by	Prepared by

LITEMAX Electronics Inc.
8F, No.137, Lane 235, Bau-chiau Rd.,
Shin-dian Dist., New Taipei City, Taiwan
R.O.C.
Tel : 886-2-8919-1858
Fax: 886-2-8919-1300
Homepage: http://www.litemax.com

Record of Revision

Version and Date	Page	Old Description	New Description	Remark
Dec/14/2021	All		Initial Release	
Nov/5/2025	22	Old ADB photo without RS232	Updated ADB photo	

Contents

1 General Description

The DLD3201-B is a 32 inch industrial grade sunlight readable LCD, with high brightness 3000 nits and high color saturation, it produce sharp images, crisp text and lifelike colors. The Durapixel LED backlight technology ensures high reliability and low power consumption, suitable for outdoor application, kiosk, factory automation, military, transportation and gaming application.

1.1 Features

- High Brightness 3000 nits
- Sunlight Readable
- LED Backlight
- Wide Viewing Angle of 178°(H), 178°(V)
- Wide Operation Temperature (-20~60˚C)
- LCD Blacking Defect Free (H-Tni 105˚C)
- Low Power Consumption
- BL MTBF: 100,000 hours

1.2 General Specifications

Model Name	DLD3201-B
Description	32” TFT LCD, 3000nits LED Backlight, 1920x1080
Screen Size	32”
Display Area (mm)	698.40(H) x 392.85(V)
Brightness	3000 cd/m²
Resolution	1920x1080
Aspect Ratio	16 : 9
Contrast Ratio	1300 : 1
Pixel Pitch (mm)	0.36375(H) x 0.36375(V)
Pixel Pre Inch (PPI)	69
Viewing Angle	178°(H),178°(V)
Color Saturation (NTSC)	82%
Display Colors	16.7M
Response Time (Typical)	8ms
Panel Interface	LVDS
AD Board Input Interface	VGA, DVI-D, HDMI
Input Power	AC100~240V
Power Consumption	116W
OSD Key	4 Keys (Power Switch, Menu, +, -)
OSD Control	Brightness, Color, Contrast, Auto Turing, H/V Position…etc
Dimensions (mm)	735.8 x 430.3 x 92.2
Bezel Size(U/B/L/R)	18.7/18.7/18.7/18.7 mm
Weight (Net)	13.5kg
Mounting	400x100
Operating Temperature	-20 ˚C ~ 60 ˚C
Storage Temperature	-20 ˚C ~ 70 ˚C

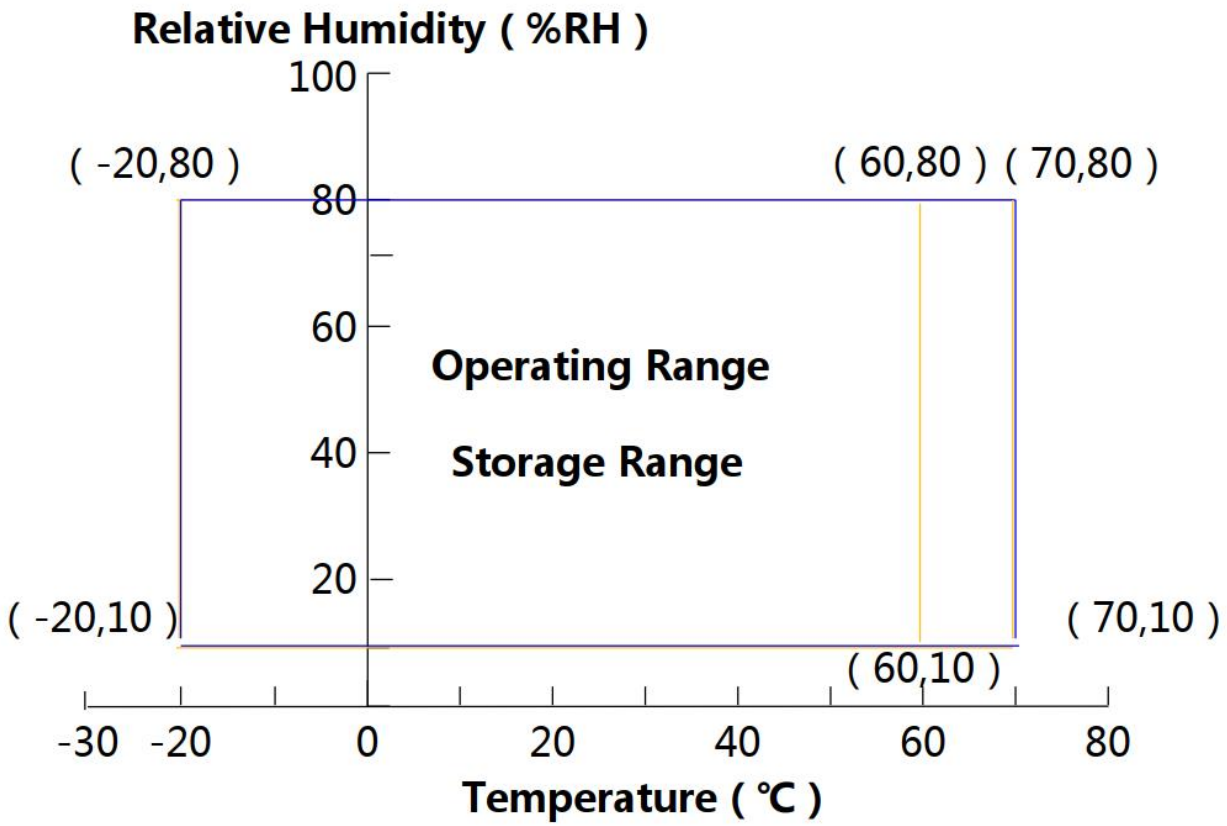
DLD= Panel + LED Driving Board + AD Control Board + Housing

1.3 Absolute Maximum Ratings

Permanent damage may occur if exceeding the following maximum rating.

Parameter	Symbol	Min.	Max.	Unit	Remark
Power Supply Voltage	VDD	VSS-0.3	14	V	Ta = 25 ℃
Operating Temperature	T_{OP}	-20	+60	℃	Note 1
	T_{SUR}	-20	+60	℃	
Storage Temperature	T_{ST}	-20	+70	℃	
Operating Ambient Humidity	Hop	10	80	%RH	
Storage Humidity	Hst	10	80	%RH	

Note 1 : Temperature and relative humidity range are shown in the figure below.
Wet bulb temperature should be 39 ℃ max. and no condensation of water.



2 Electrical Specifications

2.1 Electrical Characteristics

Parameter		Symbol	Values			Unit	Remark
			Min	Typ	Max		
Power Supply Input Voltage		VDD	10.8	12	14	Vdc	
Power Supply Ripple Voltage		VRP			300	mV	
Power Supply Current		IDD	-	333	630	mA	Note 1
Power Consumption		PDD		4.0	7.6	Watt	
Rush current		IRUSH	-	-	3.3	A	Note 2
LVDS Interface	LVDS Swing Voltage	VID	±100		±300	mV	Note 3
	Common Input Voltage	VLVC	1.0	1.2	1.4	V	
CMOS Interface	Input High Threshold Voltage	VIH	2.7	-	3.3	V	
	Input Low Threshold Voltage	VIL	0	-	0.6	V	

Note 1 : The supply voltage is measured and specified at the interface connector of LCM.

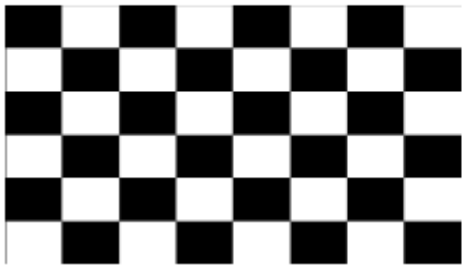
The current draw and power consumption specified is for VDD=12.0V,

Frame rate fV=60Hz and Clock frequency = 75.4MHz.

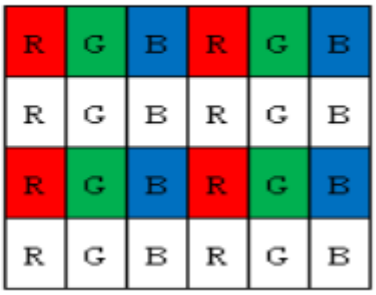
Test Pattern of power supply current

a) Typ : Mosaic 8 x 6 Pattern(L0/L255)

Pattern(L0/L255)



b) Max : H- Stripe



Note 2 : The duration of rush current is about 2ms and rising time of Power Input is 1ms(min)

Note 3 : The LVDS test point is at each terminal resistor

2.2 Interface Connection

LVDS Connector : IS050-C51B-C39-S (UJU) / FI-RE51S-HF-R1500 (JAE) or Equivalent.

Connector Pin Assignment

Pin No	Symbol	Description	Pin No	Symbol	Description
1	NC	No Connection	21	GND	Ground
2	SDA	I²C Data	22	CH1[3]-	First pixel negative LVDS differential data input. Pair3
3	SCL	I²C Clock	23	CH1[3]+	First pixel positive LVDS differential data input. Pair3
4	NC	Not Connected	24	NC	Not Connected
5	NC	Not Connected	25	NC	Not Connected
6	NC	Not Connected	26	NC or GND	Not Connected
7	SELLVDS	High: JEIDA Low or Open: VESA	27	NC	Not Connected
8	NC	Not Connected	28	CH2[0]-	Second pixel negative LVDS differential data input. Pair0
9	NC	Not Connected	29	CH2[0]+	Second pixel positive LVDS differential data input. Pair0
10	NC	Not Connected	30	CH2[1]-	Second pixel negative LVDS differential data input. Pair1
11	GND	Ground	31	CH2[1]+	Second pixel positive LVDS differential data input. Pair1
12	CH1[0]-	First pixel negative LVDS differential data input. Pair0	32	CH2[2]-	Second pixel negative LVDS differential data input. Pair2
13	CH1[0]+	First pixel positive LVDS differential data input. Pair0	33	CH2[2]+	Second pixel positive LVDS differential data input. Pair2
14	CH1[1]-	First pixel negative LVDS differential data input. Pair1	34	GND	Ground
15	CH1[1]+	First pixel positive LVDS differential data input. Pair1	35	CH2CLK-	Second pixel negative LVDS clock
16	CH1[2]-	First pixel negative LVDS differential data input. Pair2	36	CH2CLK+	Second pixel positive LVDS clock
17	CH1[2]+	First pixel positive LVDS differential data input. Pair2	37	GND	Ground
18	GND	Ground	38	CH2[3]-	Second pixel negative LVDS differential data input. Pair3
19	CH1CLK-	First pixel negative LVDS clock	39	CH2[3]+	Second pixel positive LVDS differential data input. Pair3
20	CH1CLK+	First pixel positive LVDS clock			

Pin No	Symbol	Description	Pin No	Symbol	Description
40	NC	Not Connected	46	GND	Ground
41	NC	Not Connected	47	NC	Not Connected
42	NC or GND	Not Connected	48	VCC	Input Voltage +12V
43	NC or GND	Not Connected	49	VCC	Input Voltage +12V
44	NC or GND	Ground	50	VCC	Input Voltage +12V
45	GND	Ground	51	VCC	Input Voltage +12V

Notes : 1. NC(Not Connected) : This pins are only used for BOE internal operations.

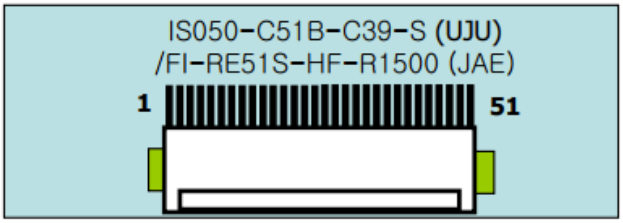
2. Input Level of LVDS signal is based on the IEA 664 Standard.

3. LVDS_SEL : This pin is used for selecting LVDS signal data format.

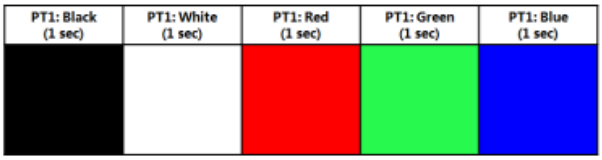
If this Pin : High (3.3V) → JEIDA LVDS format

Otherwise : Low (GND) or Open (NC) → Normal NS LVDS format.

Rear view of LCM



BIST Pattern



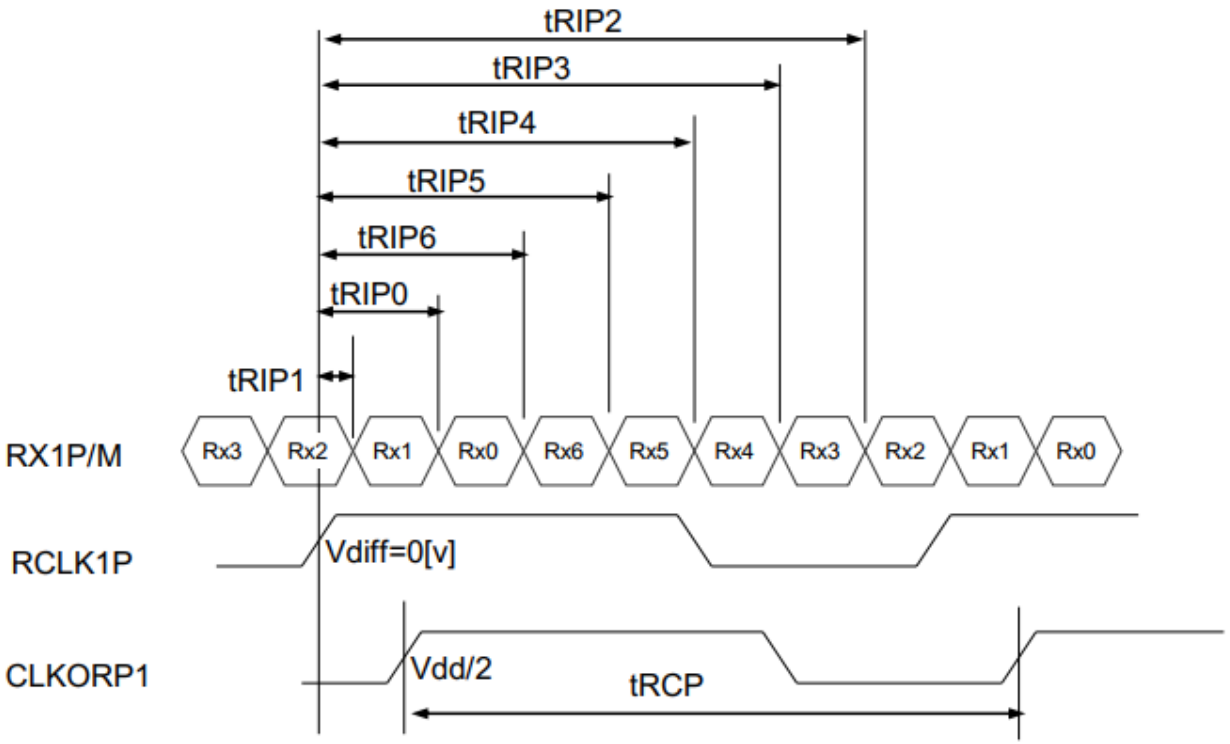
2.3 LVDS Interface

Channel No.	Data No.	8-bit LVDS Type	
		NS	JEIDA
0	Bit-0	R0	R2
	Bit-1	R1	R3
	Bit-2	R2	R4
	Bit-3	R3	R5
	Bit-4	R4	R6
	Bit-5	R5	R7
	Bit-6	G0	G2
1	Bit-0	G1	G3
	Bit-1	G2	G4
	Bit-2	G3	G5
	Bit-3	G4	G6
	Bit-4	G5	G7
	Bit-5	B0	B2
	Bit-6	B1	B3
2	Bit-0	B2	B4
	Bit-1	B3	B5
	Bit-2	B4	B6
	Bit-3	B5	B7
	Bit-4	HS	HS
	Bit-5	VS	VS
	Bit-6	DE	DE
3	Bit-0	R6	R0
	Bit-1	R7	R1
	Bit-2	G6	G0
	Bit-3	G7	G1
	Bit-4	B6	B0
	Bit-5	B7	B1
	Bit-6	-	

2.4 LVDS Rx Interface Timing Parameter

The specification of the LVDS Rx interface timing parameter is shown in Table.

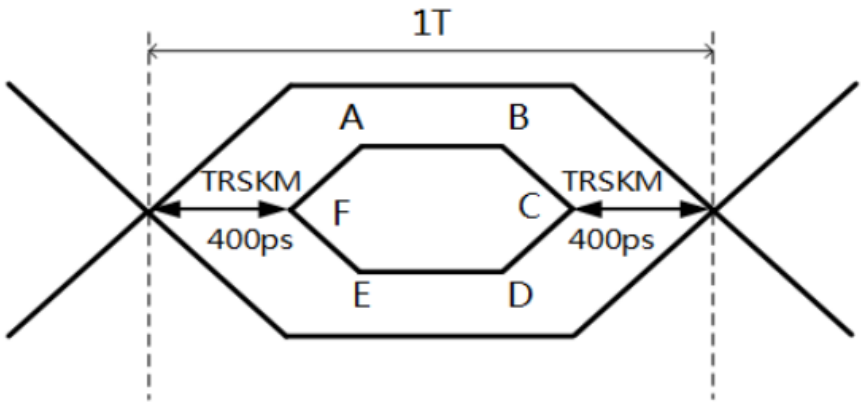
Item	Symbol	Min	Typ	Max	Unit	Remark
CLKIN Period	tRCP	9.09	T	25	nsec	
Receiver Data Input Margin	tRMG	-0.40	-	0.40	nsec	fCLKIN=65MHz
Input Data 0	tRIP1	- | tRMG |	0.0	| tRMG |	Clock	
Input Data 1	tRIP0	T/7- | tRMG |	T/7	T/7+ | tRMG |	Clock	
Input Data 2	tRIP6	2 T/7- | tRMG |	2T/7	2T/7+ | tRMG |	Clock	
Input Data 3	tRIP5	3T/7- | tRMG |	3T/7	3T/7+ | tRMG |	Clock	
Input Data 4	tRIP4	4T/7- | tRMG |	4T/7	4T/7+ | tRMG |	Clock	
Input Data 5	tRIP3	5T/7- | tRMG |	5T/7	5T/7+ | tRMG |	Clock	
Input Data 6	tRIP2	6T/7- | tRMG |	6T/7	6T/7+ | tRMG |	Clock	



* Vdiff = (RXz+)-(RXz-),…. ,(RXCLK+)-(RXCLK-)

2.5 LVDS Rx Interface Eye Diagram

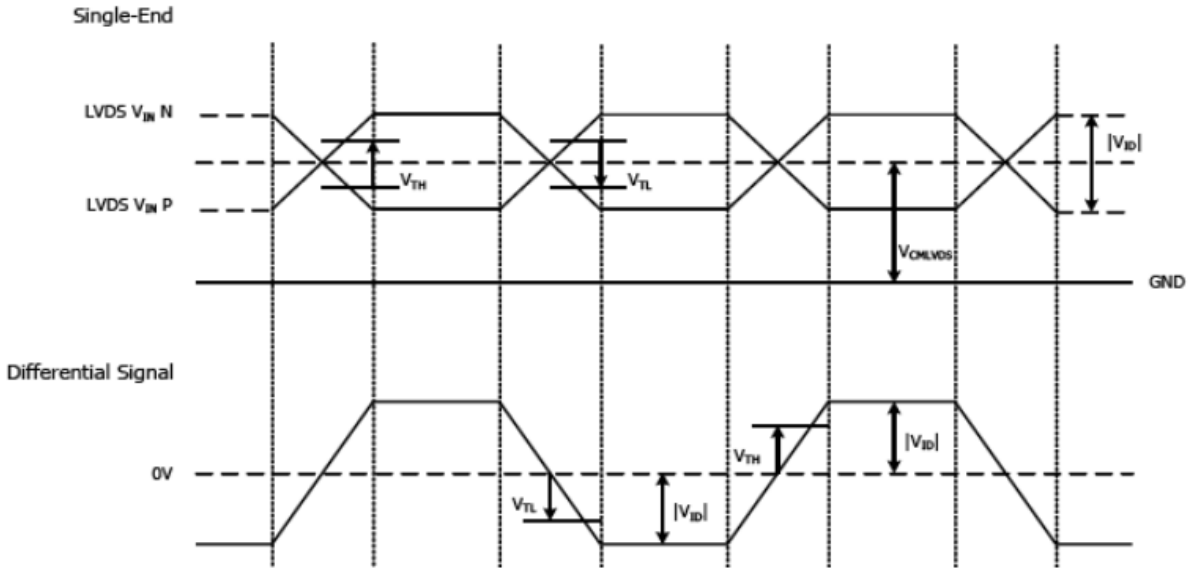
Symbol	Min	Typ	Max	Unit	Note
A	—	100	—	mV	
B	—	100	—	mV	
C	—	0	—	mV	
D	—	-100	—	mV	
E	—	-100	—	mV	
F	—	0	—	mV	



Notes: 1. Time F to A,B to C,C to D,E to F is 150p second.
2. LVDS clock=85Mhz.
3. The time A to B=1T-2*TRSKM-2*150ps.

2.6 LVDS Receiver Differential Input

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
LVDS Input High Threshold	V_{TH}	V_{CMLVDS} = 1.2V			+100	mV
LVDS Input Low Threshold	V_{TL}	V_{CMLVDS} = 1.2V	-100			mV
Single-End Input Voltage Range	V_{IN}		0		VCC_LVDS	V
LVDS Input Common Mode Voltage	V_{CMLVDS}			1.2	VCC_LVDS-0.4-|VID|/2	V
Differential Input Voltage	$\|V_{ID}\|$		100		600	mV
Input Leakage Current	IN		-10		+10	μA



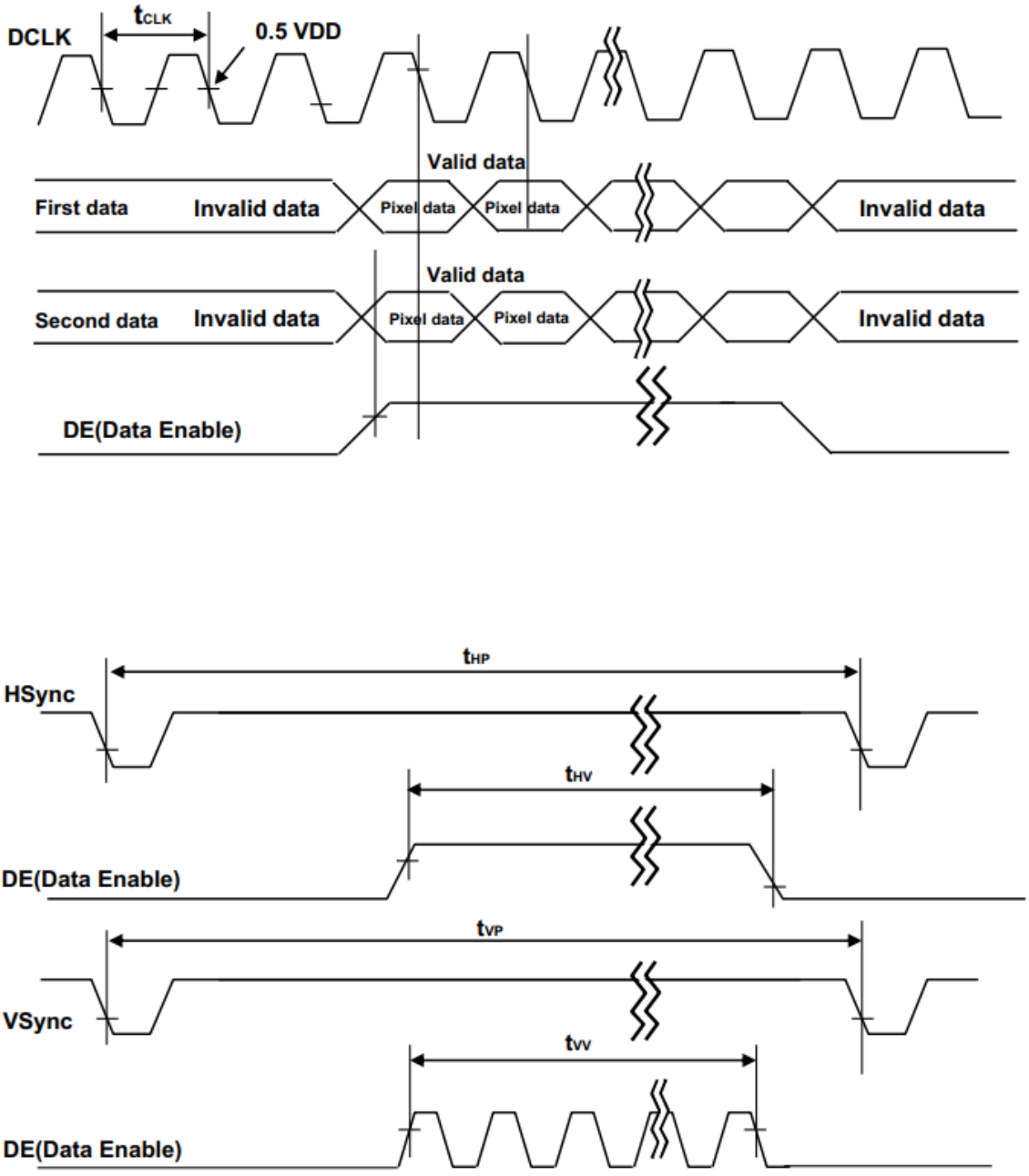
2.7 Signal Timing Specification

Timing Parameters (DE only mode)

Item		Symbols		Min	Typ	Max	Unit
Clock	Frequency	1/Tc		60	74.25 (92.8)	78	MHz
	High Time	Tch		-	4/7Tc	-	
	Low Time	Tcl		-	3/7Tc	-	
Frame Period		Tv		1100	1125	1149	lines
				48.5	60	63	Hz
Horizontal Active Display Term		Valid	t_{HV}	-	960	-	t_{CLK}
		Total	t_{HP}	1060	1100	1200	t_{CLK}
Vertical Active Display Term		Valid	t_{VV}	-	1080	-	t_{HP}
		Total	t_{VP}	1100	1125	1149	t_{HP}

Notes: This product is DE only mode. The input of Hsync & Vsync signal does not have an effect on normal operation.

2.8 Signal Timing Waveform

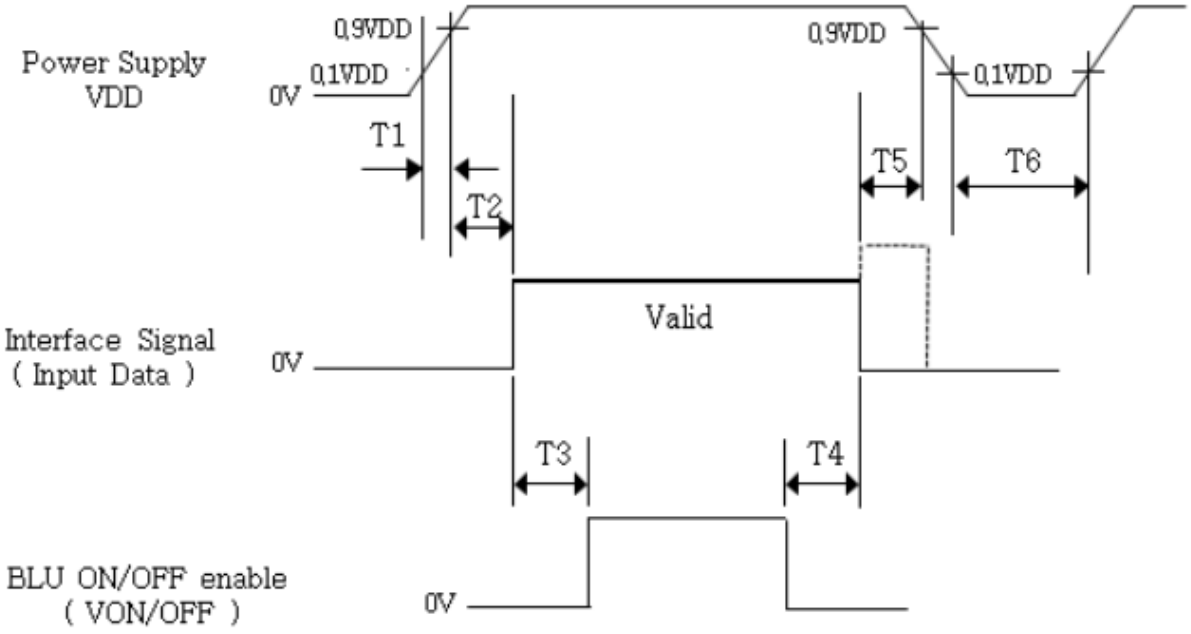


2.9 Input Signals and Display Color

Color & Gray Scale		Input Data Signal																									
		Red Data								Green Data								Blue Data									
		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 Colors	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
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Green	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	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
	Red	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	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
Gray Scale of Red	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	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Darker	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	△	↑								↑								↑							
	▽	↓								↓								↓							
	Brighter	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	▽	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	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gray Scale of Green	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	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	Darker	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
	△	↑								↑								↑							
	▽	↓								↓								↓							
	Brighter	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0
	▽	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	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
Gray Scale of Blue	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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Darker	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	△	↑								↑								↑							
	▽	↓								↓								↓							
	Brighter	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1
	▽	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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
Gray Scale of White	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	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
	Darker	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0
	△	↑								↑								↑							
	▽	↓								↓								↓							
	Brighter	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0	1
	▽	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	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

2.10 Power Sequence

To prevent a latch-up or DC operation of the Open Cell, the power on/off sequence shall be as shown in below



Parameter	Values			Units
	Min	Typ	Max	
T1	0.5	-	20	ms
T2	10	-	-	ms
T3	200	-	-	ms
T4	100	-	-	ms
T5	0	-	-	ms
T6	1	-	-	s

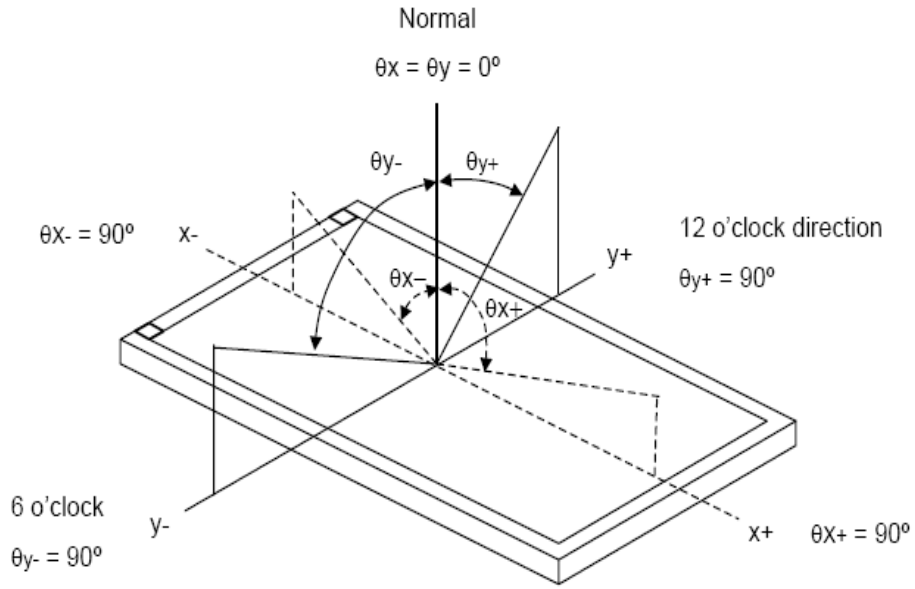
Notes: 1. Back Light must be turn on after power for logic and interface signal are valid.
2. Even though T1 is out of SPEC, it is still ok if the inrush current of VDD is below the limit.

3 Optical Specification

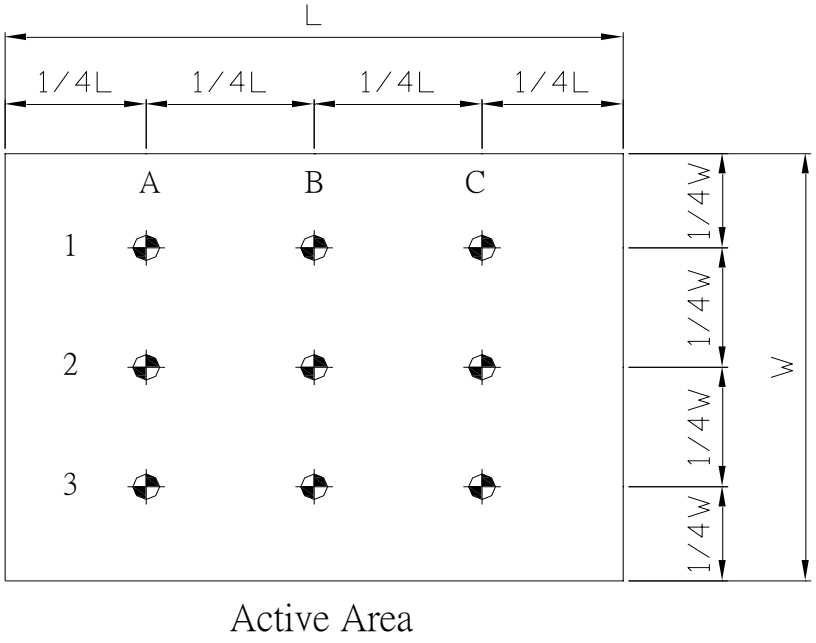
Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Color chromaticity	Red	Rx	θx=0 θy=0 Klein K-10	0.611	0.641	0.671	-	Test Mode: (1) (2) (3)
		Ry		0.314	0.344	0.374	-	
	Green	Gx		0.266	0.296	0.326	-	
		Gy		0.622	0.652	0.682	-	
	Blue	Bx		0.115	0.145	0.175	-	
		By		0.021	0.051	0.081	-	
	White	Wx		0.272	0.302	0.332	-	
		Wy		0.307	0.337	0.367	-	
Center Luminance of White		Lc	θx=0 θy=0 BM-7		3000		cd/m^2	
Uniform		Lu			84		%	
Contrast Ratio		CR	θx=0 θy=0 Klein K-10		1300:1		-	Test Mode: (1) (4)
Color Saturation		NTSC			82		%	
Viewing Angle	Horizontal	θx+	CR ≥ 10		89		Deg	Test Mode: (1) (3)
		θx-			89			
	Vertical	θy+			89			
		θy-			89			

Test Mode：

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

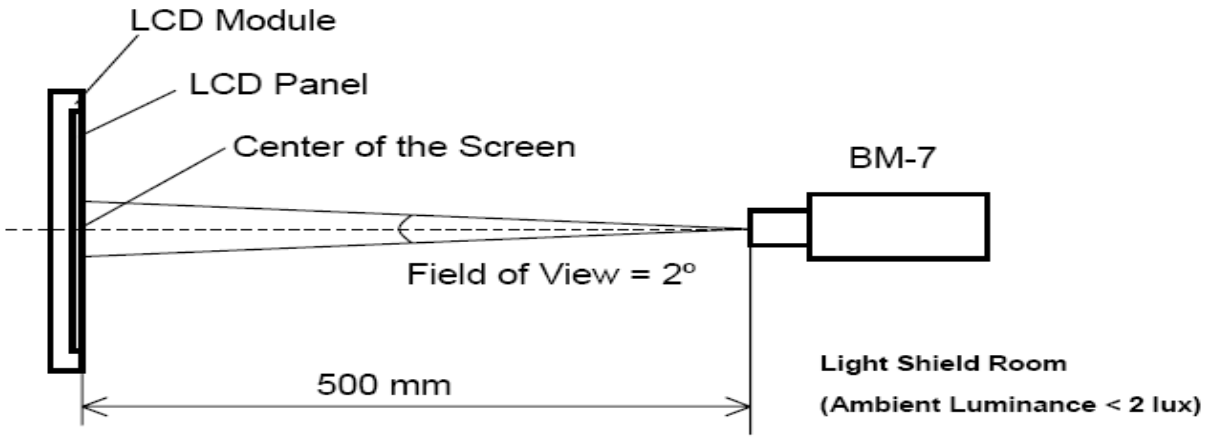


(2) Definition of Test Point:

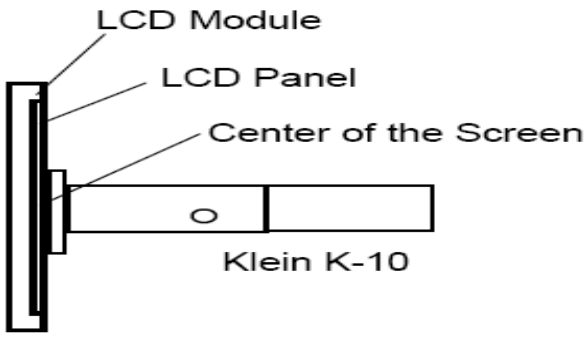


Active Area

(3) BM-7 Measurement Setup:



(4) Klein K-10 Measurement Setup:



4 LED Driving Board Specifications

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

4.1 Operating Characteristics

Item	Symbol	Conditions	MIN.	TYP.	MAX.	Unit	Remark
Input Voltage	Vin		22	24	26	V	
Input Current (Low Brightness)	IinL	Vadj=5V	0.0	-----	-----	mA	
Input Current (High Brightness)	IinH	Vadj=0V	4.29	4.05	3.92	A	(1)
LED Current (Low Brightness)	IoutL	Vadj=5V	0.0	-----	-----	Arms	
LED Current (High Brightness)	IoutH	Vadj=0V	1.20	1.22	1.24	A	J1~J4
			1.20	1.22	1.24	A	J5~J8
Working	Freq	Vadj=0V	350	400	450	KHz	
Brightness Control	Vadj	Connection of Voltage	0.2	-----	4.8	V	Vadj±5%
ON/OFF Control	Von	Normal Operation	2	-----	5	V	
	Voff		0	-----	0.8	V	
Output Voltage	Vout	Vadj=0V	37.4	38.5	39.6	V	J1~J4
			37.4	38.5	39.6	V	J5~J8
Efficiency	η	Vadj=0V	95.1	96.1	96.3	%	(2)

Remark:

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

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

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

4.2 Connector Socket

Input Connector:

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

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

Input Connector:

CN2(JST B3B-PH-K-S or Compatible)

PIN No	Symbol	Description
1	Control	ON/OFF Control
2	Brightness	Brightness Control
3	GND	Ground

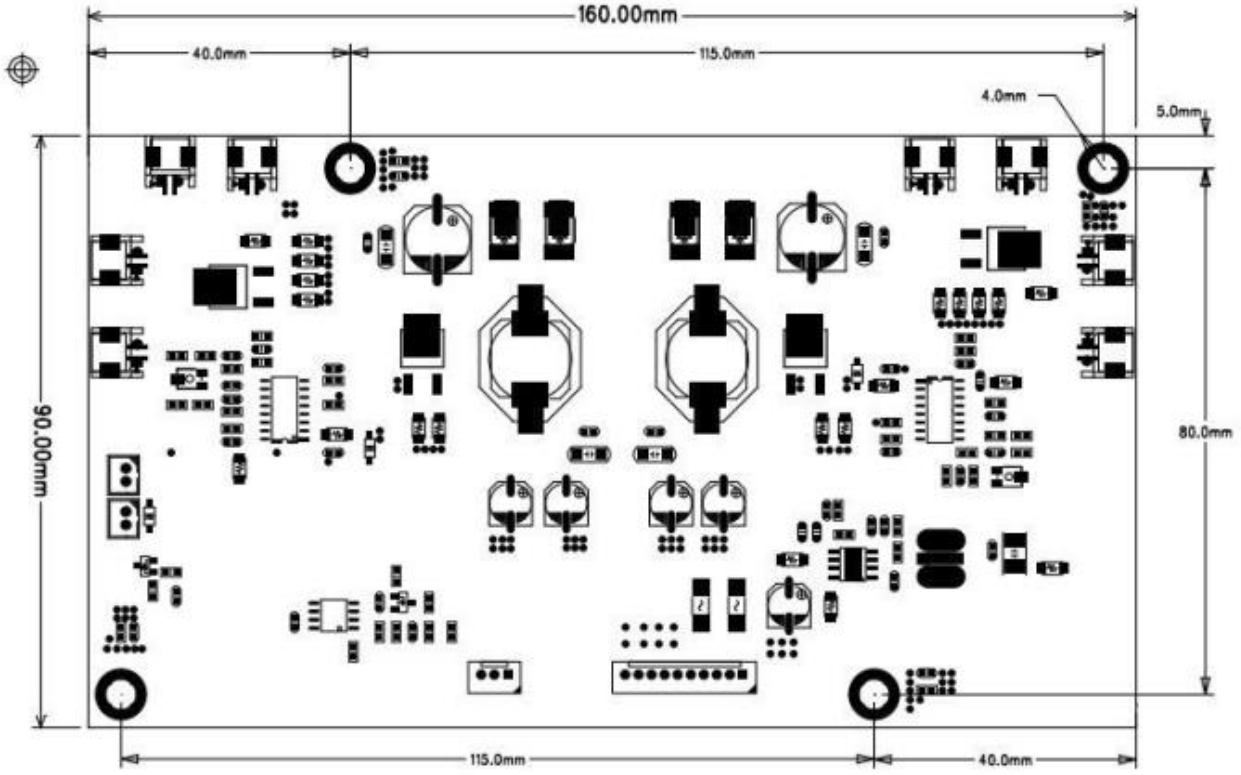
Output Connector:

J3,J7 (JST S2B-EH or Compatible)

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

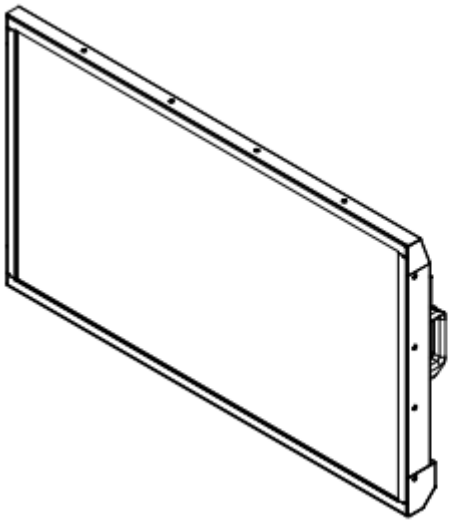
4.3 Mechanical Characteristics

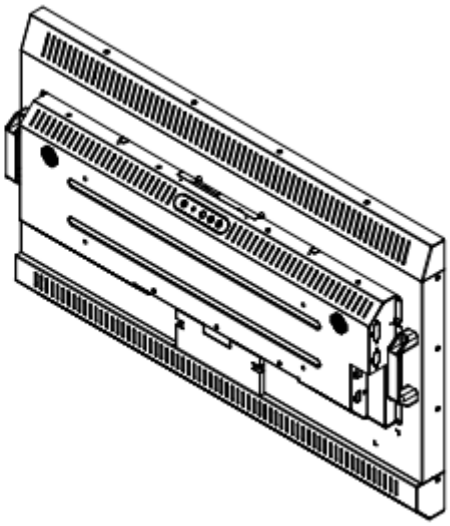
Dimension: 160mm*90mm*12.5mm

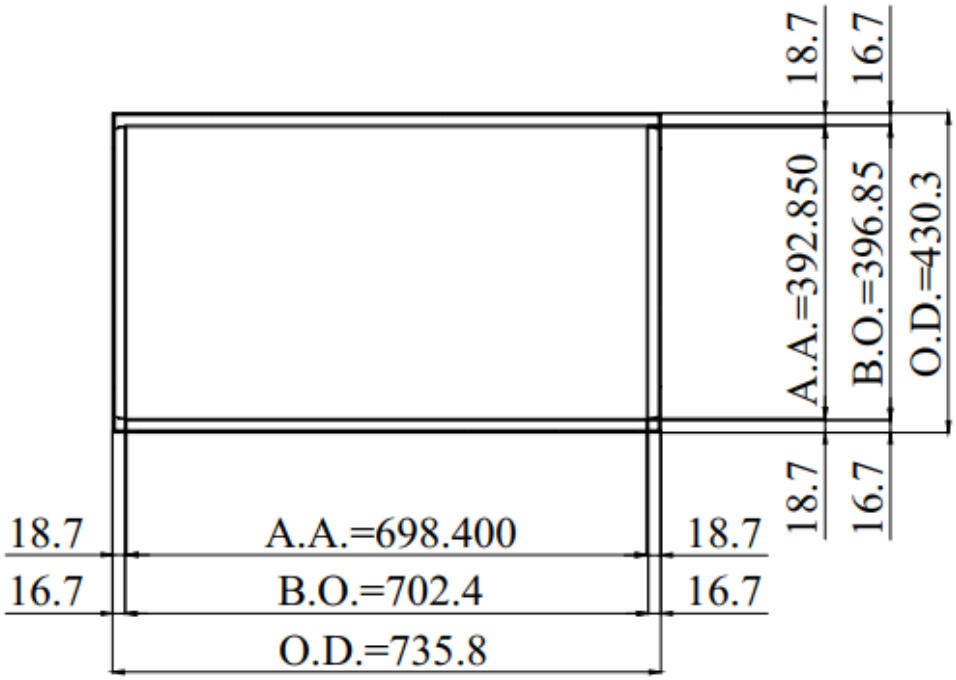


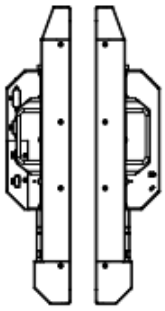
5 Mechanical Drawing

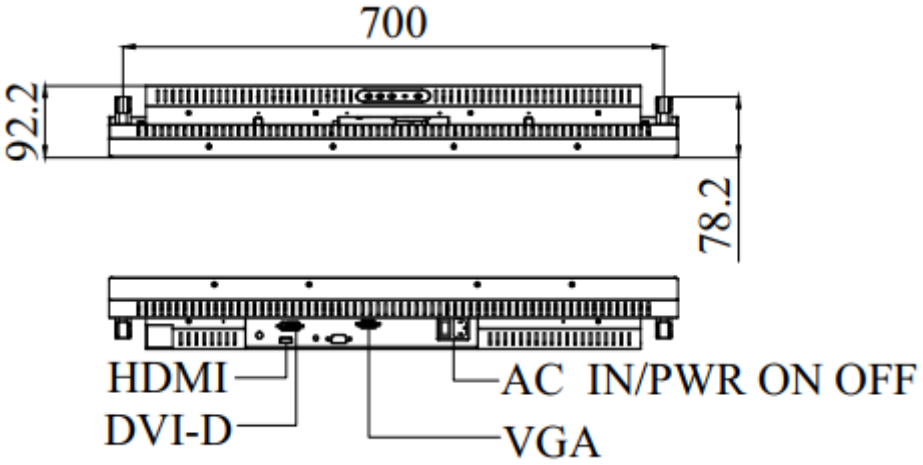
Unit:mm

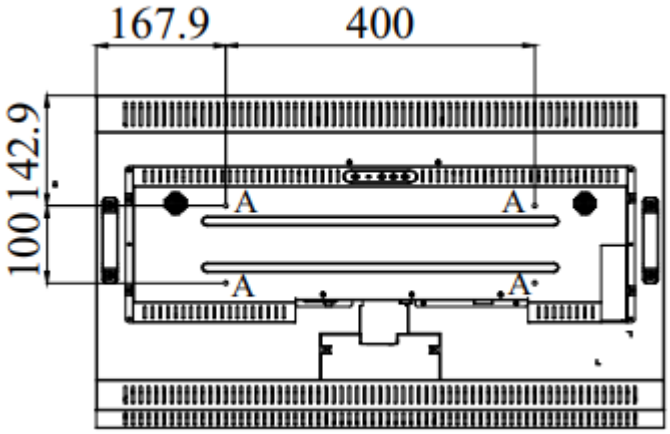












NOTE：
O.D.：OUTLINE DIMENSION
B.O.：BEZEL OPENING
A.A.：LCD ACTIVE AREA

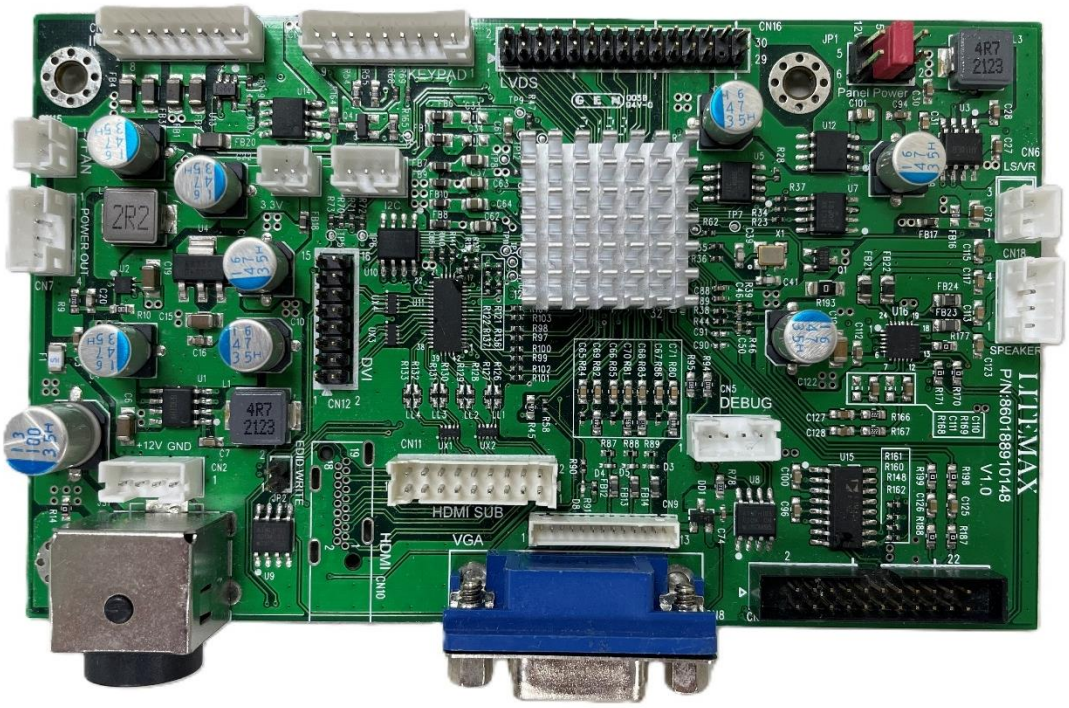
A：4-M6_USER HOLE_MAX. DEPTH=6 mm

6 AD8891G-DH 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 VGA, DVI-D and HDMI input.

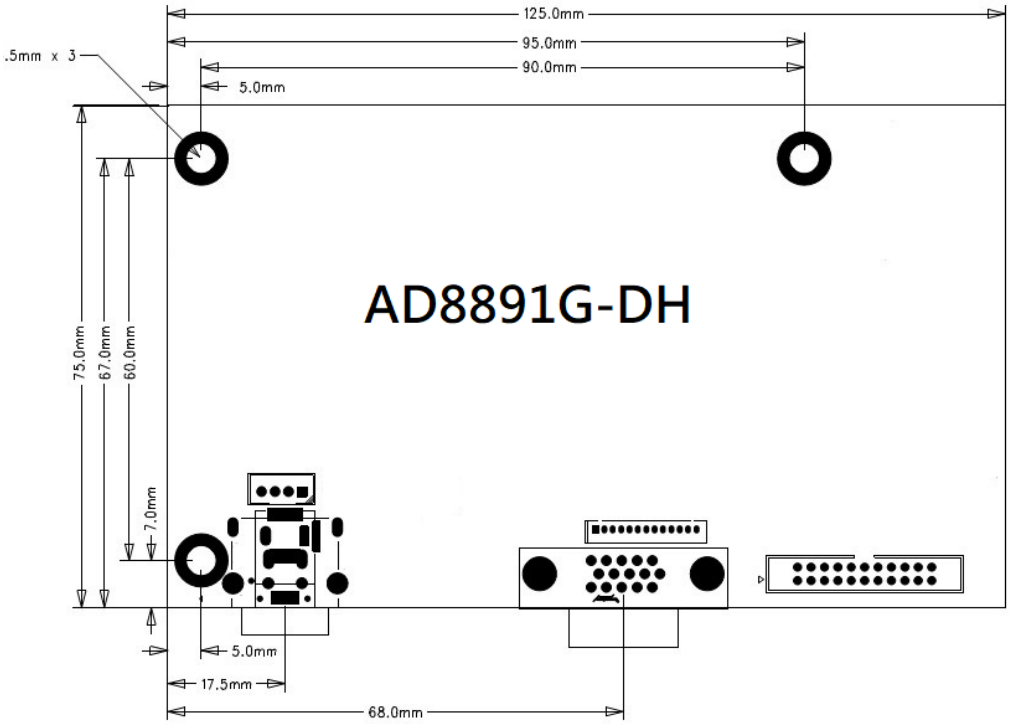
6.1 General Description

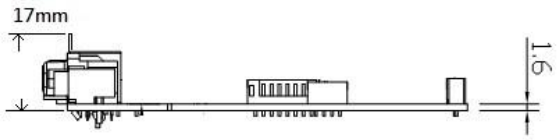
- **Max Resolution Up To Full HD**
- **Analog RGB Input up to 205MHz**
- **Ultra-Reliable DVI-D Input (CN12 Pin header)**
- **HDMI Input (HDMI 1.3) (CN11 Pin header) (CN10 Optional)**
- **Dual/single LVDS interface**
- **Inverter Analog or PWM Dimming Control.**
- **Support Panel DC 3.6V, 5V or 12V Output**
- **OSD Control**
- **External RS232 control (Optional)**
- **Input Power DC 12V**
- **Audio Speaker Out (MAX 3W 4Ω) (optional), Audio In (Optional)**
- ***External Digital light sensor brightness control (Optional)**
- ***External light sensor brightness control or VR (Optional)**
- **Support output voltage 12V(1A) and 5V(1A)**
- **External FAN control (Optional)**

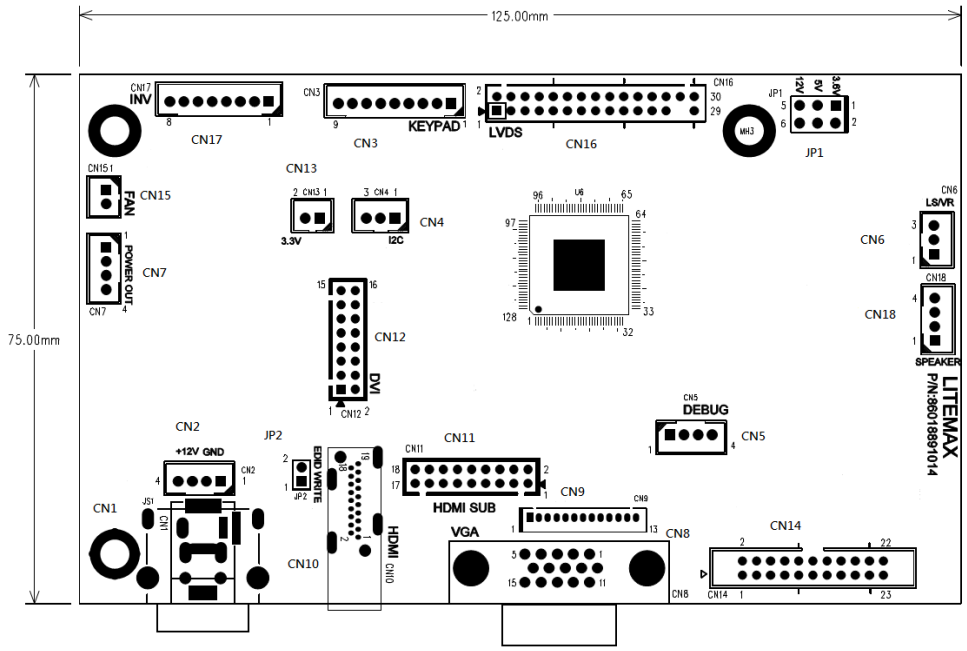


6.2 Outline Dimensions

AD8891G-DH 125mm x 75mm







6.3 AD8891G-DH Board Pin Define

CN16: Panel LVDS connector (THS201-152-4.0/2.8)

Pin No.	Function	Pin No.	Function
1	RxO0-	16	RxE1+
2	RxO0+	17	RxE2-
3	RxO1-	18	RxE2+
4	RxO1+	19	RxEC-
5	RxO2-	20	RxEC+
6	RxO2+	21	RxE3-
7	RxOC-	22	RxE3+
8	RxOC+	23	GND
9	RxO3-	24	GND
10	RxO3+	25	GND
11	GND	26	GND
12	GND	27	NC
13	RxE0-	28	PANEL-VCC
14	RxE0+	29	PANEL-VCC
15	RxE1-	30	PANEL-VCC

CN12: DVI-D INPUT Connector (THS201-82-4.0/2.8)

Pin No.	Function	Pin No.	Function	Pin No.	Function
1	DATA2-	7	DVI_SDA	13	GND
2	DATA2+	8	DVI_SCL	14	GND
3	DATA1-	9	GND	15	DVI HP
4	DATA1+	10	DET_DVI	16	DVI_5V
5	DATA0-	11	DCLK-		
6	DATA0+	12	DCLK+		

CN8: Analog RGB Input connector (D-SUB 15Pin)

Pin No.	Symbol	Description	Pin No.	Symbol	Description
1	RED	Analog Red	9	+5V	+5VDDC
2	GREEN	Analog Green	10	SGND	Sync GND
3	BLUE	Analog Blue	11	GND	Reserved
4	GND	Reserved	12	VGA SDA	DDC Serial Data
5	DET_VGA	DET_VGA	13	HSYNC	Horizontal Sync
6	RED_RTN	Red Return	14	VSYNC	Vertical Sync

7	GREEN_RTN	Green Return	15	VGA SCL	DDC Data Clock
8	BLUE_RTN	Blue Return			

CN9: Analog RGB Input connector (13pin connector) (1251-13-ST-D)

Pin No.	Symbol	Description	Pin No.	Symbol	Description
1	VGA SCL	DDC Data Clock	8	BLUE	Analog Blue
2	VGA SDA	DDC Serial Data	9	G GND	Green Return
3	DET_VGA	DET_VGA	10	GREEN	Analog Green
4	GND	Reserved	11	R GND	Red Return
5	HSYNC	Horizontal Sync	12	RED	Analog Red
6	VSYNC	Vertical Sync	13	+5V	+5VDDC
7	B GND	Blue Return			

CN10: HDMI Input connector (HDMI 19Pin) (Optional)

Pin No.	Function	Pin No.	Function	Pin No.	Function
1	T.M.D.S. Data2+	9	T.M.D.S. Data0-	17	GND
2	HDMI_DET	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		

CN11: HDMI Connector (18pin 2.0mm) (2001D-18-ST)

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

CN1: Power DIN (12V)

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

CN1: Power Jack (12V) (Optional)

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

CN2: Power connector (12V) (4PIN 2.0mm) (B4B-PH-KL)

Pin No.	Function	Pin No.	Function
1	GND	2	GND
3	12VDC	4	12VDC

CN7: Touch Power connector (4PIN 2.0mm) (B4B-PH-KL)

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

CN15: Fan control (2PIN 2.0mm) (B2B-PH-KL)

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

CN3: Key Pad (9PIN 2.0mm) (B9B-PH-KL)

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		

JP1: Panel Power(3PIN 2.54mm) (PHS201-23) (B3B-PH-KL)

Pin No.	Function	Pin No.	Function
1-2	3.6V	5-6	12V
3-4	5V		

CN6: Ambient (2PIN 2.0mm)/VR (3PIN 2.0mm)

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

CN4: I2C Connector (3PIN 2.0mm) (B3B-PH-KL)

Pin No.	Function	Pin No.	Function
1	I2C_SDA	2	I2C_SCL
3	GND		

For digital LS

CN13: 3.3V OUT (2PIN 2.0mm) (B2B-PH-KL)

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

JP2: EDID Jumper (2PIN 2.0mm)

Pin No.	Function	Pin No.	Function
1	Pull Height	2	GND

When EDID want to update it must be short.

CN5: Debug Connector (4PIN 2.0mm) (B4B-PH-KL)

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

For F/W debug

CN17: Inverter Connector (8PIN 2.0mm) (B8B-PH-KL)

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

CN18: Speaker Connector (4PIN 2.0mm) (B4B-PH-KL)

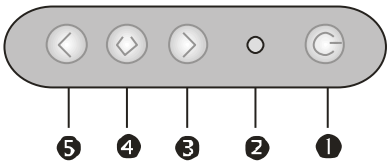
Pin No.	Function	Pin No.	Function
1	SPK_R+	2	SPK_R-
3	SPK_L-	4	SPK_L+

CN14:11P X 2 Connector

Pin No.	Function	Pin No.	Function
1	NC	2	NC
3	NC	4	NC
5	NC	6	NC
7	NC	8	NC
9	NC	10	NC
11	GND	12	GND
13	TXD	14	RXD
15	GND	16	GND
17	GND	18	GND
19	Audio IN(R)	20	Audio IN(L)
21	GND	22	GND

6.4 OSD Function

MEMBRANE CONTROL BUTTOM



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.

When OSD is off, it is hot key for input switch between VGA, AV, and S-video.

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**

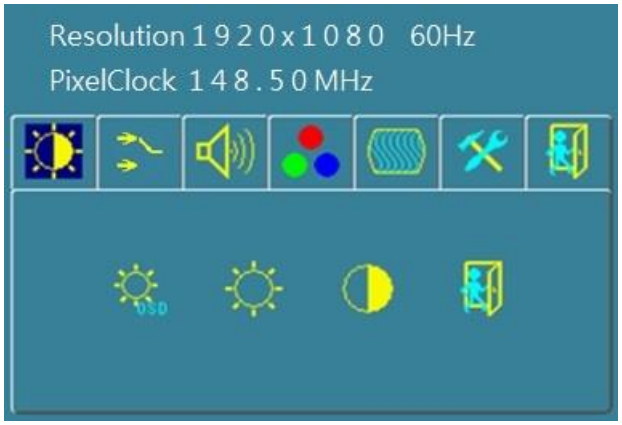
   After finishing the adjustment, push the SELECT button to memorize the setting.

5. **Return & Exit the main menu**

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

6.5 OSD Menu

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”.

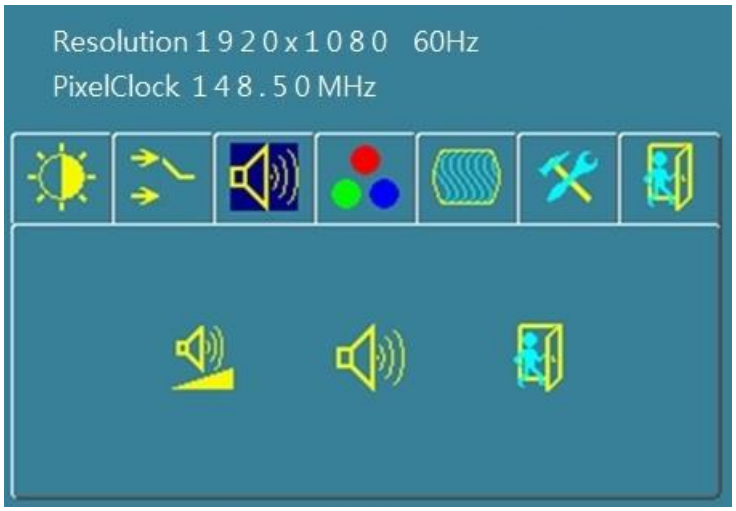
Exit: back to the beginning menu.

VGA **Analog:** RGB/VGA input

DVI **Digital:** DVI input

HDMI **HDMI:** HDMI input

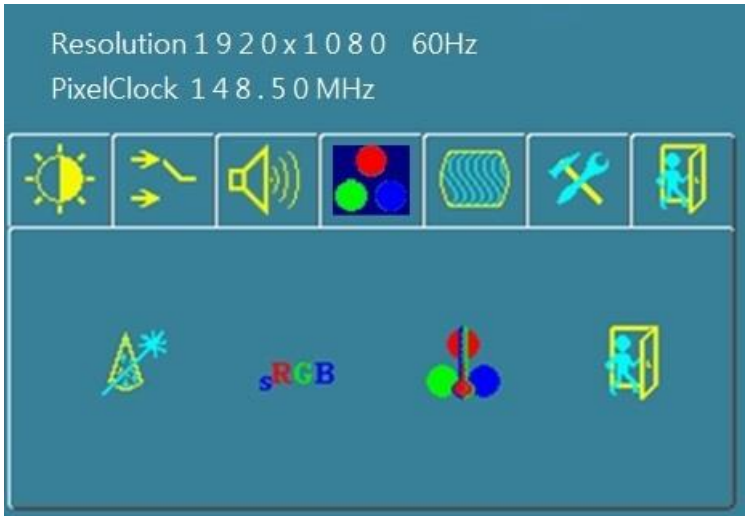
Exit **Exit:** back to the beginning menu



Audio Volume: Audio volume adjustment.

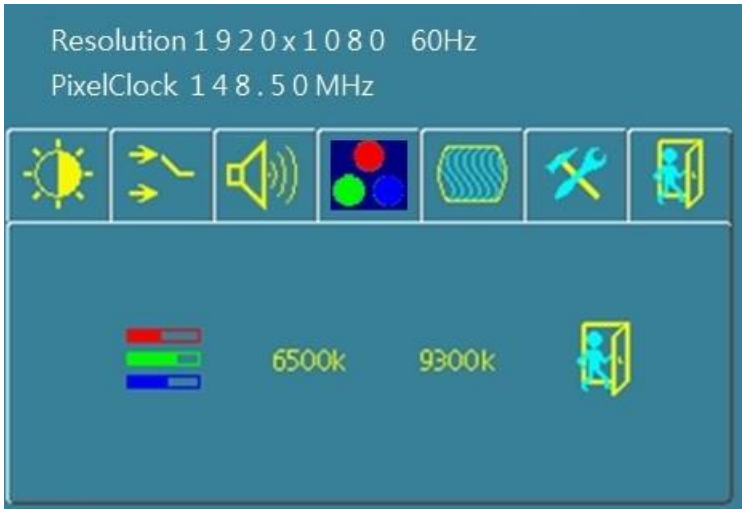
UnMute/Mute: You can mute the speaker by pressing this option.

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.



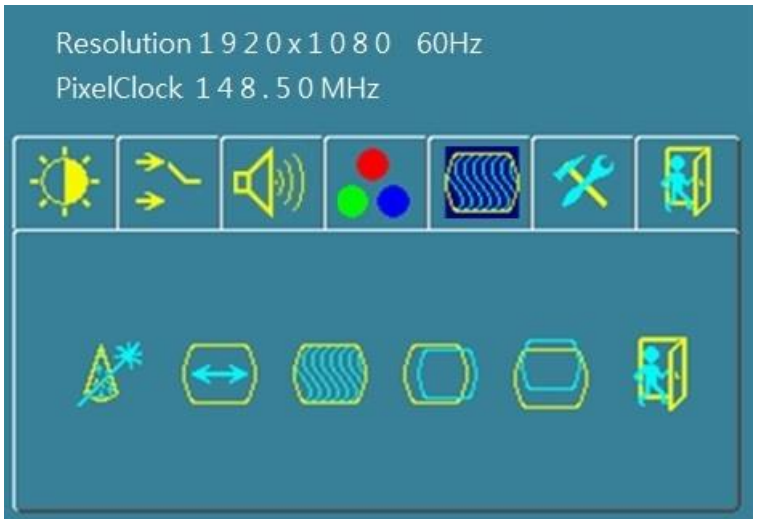
Color Temperature: You have 4 options in this selection
.

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.

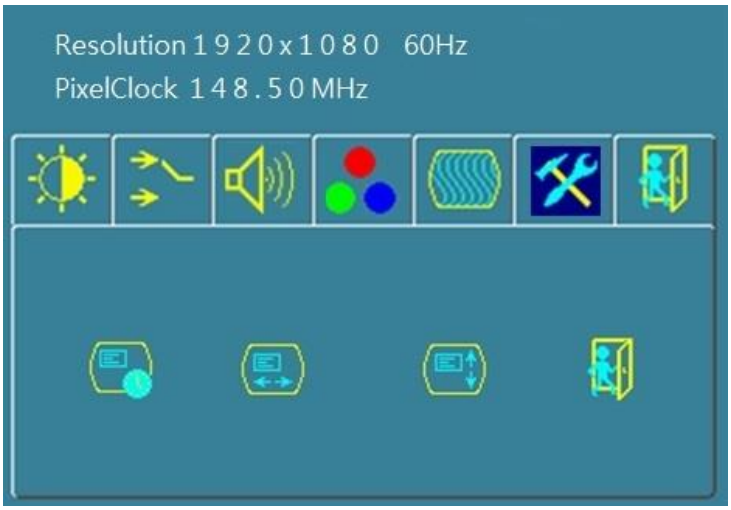
Phase: If "double images" appear around the characters, choose "Phase" to remove them..

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 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°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.

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.