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Sunlight Readable LCD!

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DURApixel LED B/L LCD

LITEMAX

DLF/DLH5501-B

Sunlight Readable 55” LED B/L LCD

User Manual

Approved by	Checked by	Prepared by

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Record of Revision

Version and Date	Page	Old Description	New Description	Remark
Sep/30/2025	all		Initial release	

Contents

1 General Description

The DLF/DLH5505-B is a 55 inch industrial grade sunlight readable LCD, with high brightness 4000 nits, 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 Key Features

- High Brightness 4000 nits
- Sunlight Readable
- RGBW Optical Color Technology
- Wide Viewing Angle of 178°(H), 178°(V)
- LED Backlight
- Low Power Consumption
- LCD Blackening Defect Free (H-Tni 105℃)
- BL MTBF: 100,000 hours

1.2 General Specifications

Model Name	DLF/DLH5501-B
Description	55” TFT LCD, 4000nits LED Backlight, 3840x2160
Screen Size	55”
Display Area (mm)	1209.6(H) x 680.4(V)
Brightness	4000 cd/m^2
Resolution	3840x2160
Aspect Ratio	16:9
Contrast Ratio	1400:1
Pixel Pitch (mm)	0.315(H) x 0.315 (V)
Pixel Pre Inch (PPI)	80
Viewing Angle	178°(H),178°(V)
Color Saturation (NTSC)	80%
Display Colors	1.07G
Response Time (Typical)	14ms
Panel Interface	V-by-One
Input Interface	HDMI, DP
Input Power	AC100~240V
Power Consumption	255W (258W With AD Board)
OSD Key	5 Keys (Power Switch, Menu, +, -,Exit)
OSD Control	Brightness, Color, Contrast, Auto Tuning, H/V Position…etc
Dimensions (mm)	1236.5(W) x 707.5(H) x 58.6(D)
Bezel Size(U/B/L/R)	13.55/13.55/13.45/13.45 mm
Weight (Net)	18.1kg
Operating Temperature	-20 ˚C ~ 60 ˚C
Storage Temperature	-30 ˚C ~ 80 ˚C

DLF= Panel+ LED Driving Board
DLH= Panel+ LED Driving Board + AD Control Board

1.3 Absolute Maximum Ratings

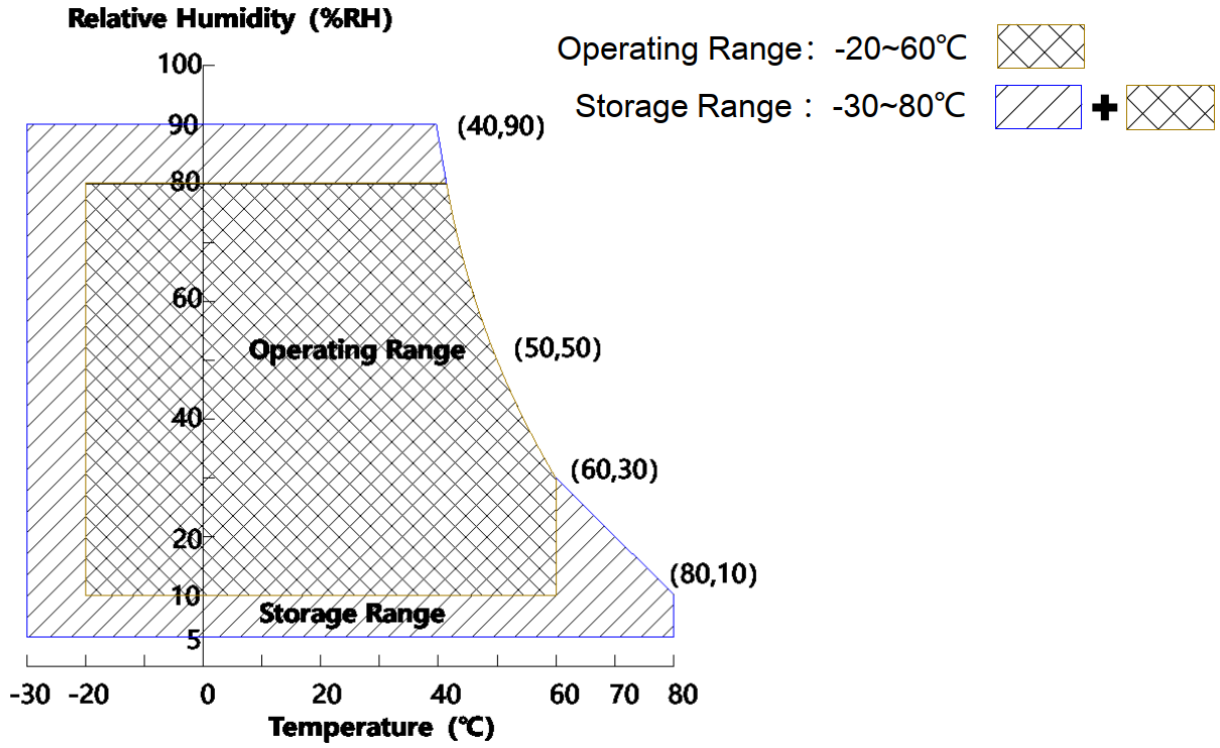
The followings are maximum values which, if exceed, may cause faulty operation or damage to the unit. The operational and non-operational maximum voltage and current values are listed in Table.

[VSS=GND=0V]

Parameter	Symbol	Min.	Max.	Unit	Remark
Power Supply Voltage	VDD	VSS-0.3	13.5	V	Ta = 25 ℃
Operating Temperature	T_{OP}	-20	+60	℃	Note1& Note 2
Storage Temperature	T_{ST}	-30	+80	℃	
Operating Ambient Humidity	Hop	10	80	%RH	
Storage Humidity	Hst	5	90	%RH	

Note1: Operating Temperature is OC with high brightness BLU, MDL brightness 4000 nit

Note2: Temperature and relative humidity range are shown in the figure below.



2 Electrical Specifications

2.1 TFT LCD

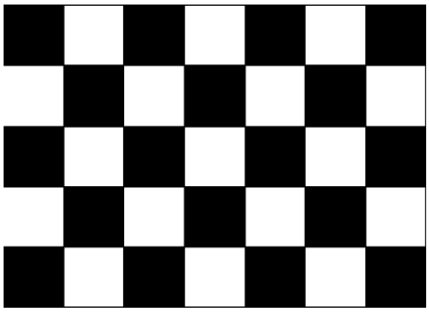
[Ta =25±2 ℃]

Parameter		Symbol	Values			Unit	Remark
			Min	Typ	Max		
Power Supply Input Voltage		VDD	10.8	12	13.2	Vdc	
Power Supply Ripple Voltage		VRP	-	-	300	mV	
Power Supply Current		IDD	-	675	1700	mA	Note 1
Power Consumption		PDD	-	8.1	20.4	Watt	
Rush current		IRUSH	-		4.0	A	Note 2
V by One Interface	Differential Input High Threshold Voltage	VLVTH	-	-	+50	mV	Note 3
	Differential Input Low Threshold Voltage	VLVTL	-50	-	-	mV	
	Common Input Voltage	VLVC	-	0	-	V	
CMOS Interface	Input High Threshold Voltage	VIH	2.7	-	3.3		
	Input Low Threshold Voltage	VIL	0	-	0.6	V	

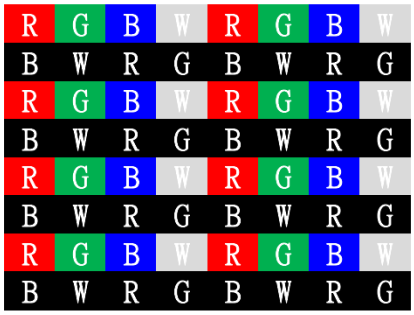
Note 1: The supply voltage is measured and specified at the interface connector of LCM.
The current draw and power consumption specified is for VDD=12.0V,
Frame rate Fv=60Hz and Clock frequency = 74.25MHz.
Test Pattern of power supply current

Note 2: The duration of rush current is about 2ms and rising time of Power Input is 0.5ms(min)

a) Typ : Mosaic 7X5 (L0/L255)



b) Max : H-1line Pattern(L255)



Note 3: V by One signal Eye diagram should be OK. Otherwise, there will be abnormal display.

2.2 Interface Connection

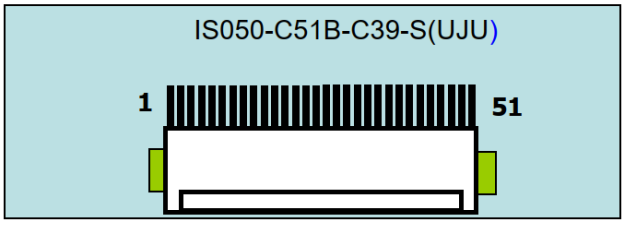
LCD Input Signal & Power:
- VBO Connector: IS050-C51B-C39-S(UJU).

Pin No	Symbol	Description	Pin No	Symbol	Description
1	VDD	Power Supply +12.0V	16	NC	Not Connected
2	VDD	Power Supply +12.0V	17	NC	Not Connected
3	VDD	Power Supply +12.0V	18	SDA	SDA(For Flicker tuning)
4	VDD	Power Supply +12.0V	19	SCL	SCL(For Flicker tuning)
5	VDD	Power Supply +12.0V	20	NC	Not Connected
6	VDD	Power Supply +12.0V	21	NC	Not Connected
7	VDD	Power Supply +12.0V	22	NC	Not Connected
8	VDD	Power Supply +12.0V	23	NC	Not Connected
9	NC	Not Connected	24	GND	Ground
10	GND	Ground	25	HTPDN	Hot plug detect
11	GND	Ground	26	LOCKN	Lock detect
12	GND	Ground	27	GND	Ground
13	GND	Ground	28	Rx0n	V-by-One HS Data Lane 0
14	GND	Ground	29	Rx0p	V-by-One HS Data Lane 0
15	NC	Not Connected	30	GND	Ground

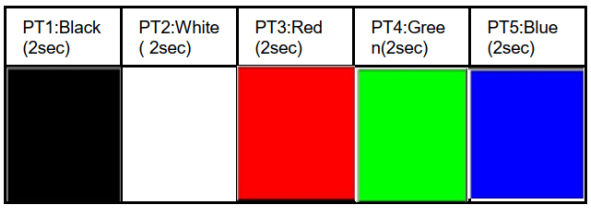
Pin No	Symbol	Description	Pin No	Symbol	Description
31	Rx1n	V-by-One HS Data Lane 1	42	GND	Ground
32	Rx1p	V-by-One HS Data Lane 1	43	Rx5n	V-by-One HS Data Lane 5
33	GND	Ground	44	Rx5p	V-by-One HS Data Lane 5
34	Rx2n	V-by-One HS Data Lane 2	45	GND	Ground
35	Rx2p	V-by-One HS Data Lane 2	46	Rx6n	V-by-One HS Data Lane 6
36	GND	Ground	47	Rx6p	V-by-One HS Data Lane 6
37	Rx3n	V-by-One HS Data Lane 3	48	GND	Ground
38	Rx3p	V-by-One HS Data Lane 3	49	Rx7n	V-by-One HS Data Lane 7
39	GND	Ground	50	Rx7p	V-by-One HS Data Lane 7
40	Rx4n	V-by-One HS Data Lane 4	51	GND	Ground
41	Rx4p	V-by-One HS Data Lane 4			

Notes: 1. NC (Not Connected): These pins are only used for Litemax internal operations.
2. BIST: This pin is used for selecting display pattern mode when input DE or input CLOCK quits toggling.

Rear view of LCM



BIST Pattern



2.3 Signal Timing Waveforms of Interface Signal

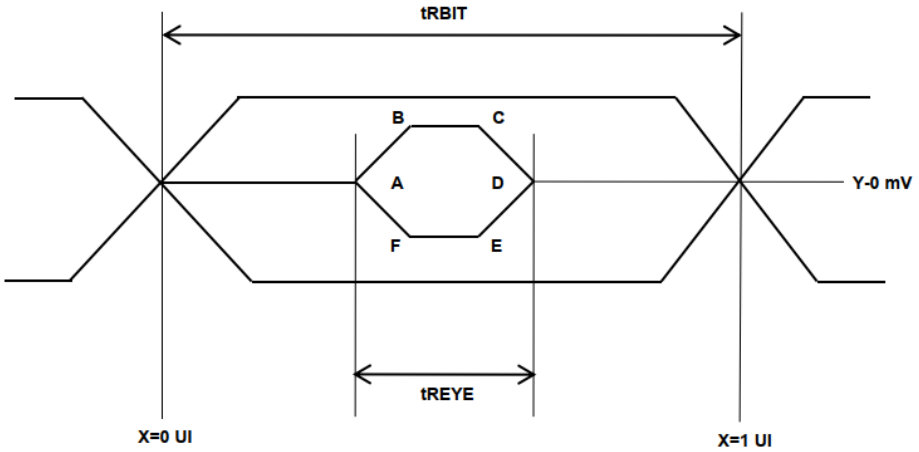
Input Data Specification - CN1

Vx1 Byte length and Color mapping

Byte	Packer input	Color data mapping
		30 bpp RGB
0	Bit-0	R2
	Bit-1	R3
	Bit-2	R4
	Bit-3	R5
	Bit-4	R6
	Bit-5	R7
	Bit-6	R8
	Bit-7	R9
1	Bit-8	G2
	Bit-9	G3
	Bit-10	G4
	Bit-11	G5
	Bit-12	G6
	Bit-13	G7
	Bit-14	G8
	Bit-15	G9
2	Bit-16	B2
	Bit-17	B3
	Bit-18	B4
	Bit-19	B5
	Bit-20	B6
	Bit-21	B7
	Bit-22	B8
	Bit-23	B9
3	Bit-24	-
	Bit-25	-
	Bit-26	B0
	Bit-27	B1
	Bit-28	G0
	Bit-29	G1
	Bit-30	R0
	Bit-31	R1

2.4 Signal Timing Waveform

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Unit Interval(VBO Operation Bit Rate)	tRBIT	3-byte	380	tTCIP/30	1667	PS
		4-byte	285	tTCIP/40	1250	PS
		5-byte	266	tTCIP/50	1000	PS
Eye Width at Package Pin	tREYE	-	-	0.5	-	UI
Eye Width Position A at Package Pin	tA	-	-	0.25	-	UI
Eye Width Position B at Package Pin	tB	-	-	0.3	-	UI
Eye Width Position Cat Package Pin	tC	-	-	0.7	-	UI
Eye Width Position D at Package Pin	tD	-	-	0.75	-	UI
Eye Width Position E at Package Pin	tE	-	-	0.7	-	UI
Eye Width Position F at Package Pin	tF	-	-	0.3	-	UI
Intra – pair Skew	TTOSK_intra	-	-	-	0.3	UI
Inter – pair Skew	TTOSK_inter	-	-	-	40	UI
SSCG	–					%



	Y[mV]
A	0
B	50
C	50
D	0
E	-50
F	-50

2.5 Signal Timing Specification

Timing Parameters

Item	Symbol		Min	Typ	Max	Unit
DCLK	Period	tCLK	12.5	13.47	14.7	ns
	Frequency	-	68	74.25	80	MHz
Horizontal	Horizontal Period (Total)	tHP	530	550	570	tCLK
	Horizontal Valid	tHV	480			tCLK
	Horizontal Blank	tHB	50	70	90	-
Vertical	Vertical Period (Total)	tVP	2210	2250	2450	tHP
	Vertical Valid	tVV	2160			tHP
	Vertical Blank	tVB	50	90	290	tHP
	Frequency	fV	58	60	62	Hz
VBO Receiver Clock	Input spread spectrum ratio	SSr	-0.5	-	+0.5	%
	Inter-Pair Skew	T_{RISK_Inter}	-5	-	5	UI

Notes:

1. While operation, DE signal should be having the same cycle. The input of HSYNC & VSYNC signal does not have an effect on normal operation (DE Only Mode, but the signals of Hsync and Vsync must be inputted even though this TCON is operated at DE Only Mode.
2. Best operation clock frequency is 74.25Mhz.
3. Frequency = [Htyp. Total] * [Vtyp. Total] * [Vertical Frame Rate]
   H Total, V Total and Frame rate should operate within the range between Frequency_Min and Frequency_Max
4. Except Best operation clock frequency, FOS(Flicker & Brightness & Crosstalk, Etc.) are not guaranteed.
5. Main frequency Max is 80MHz without spread spectrum

2.6 Input Signals, Basic Display Colors and Gray Scale of Colors

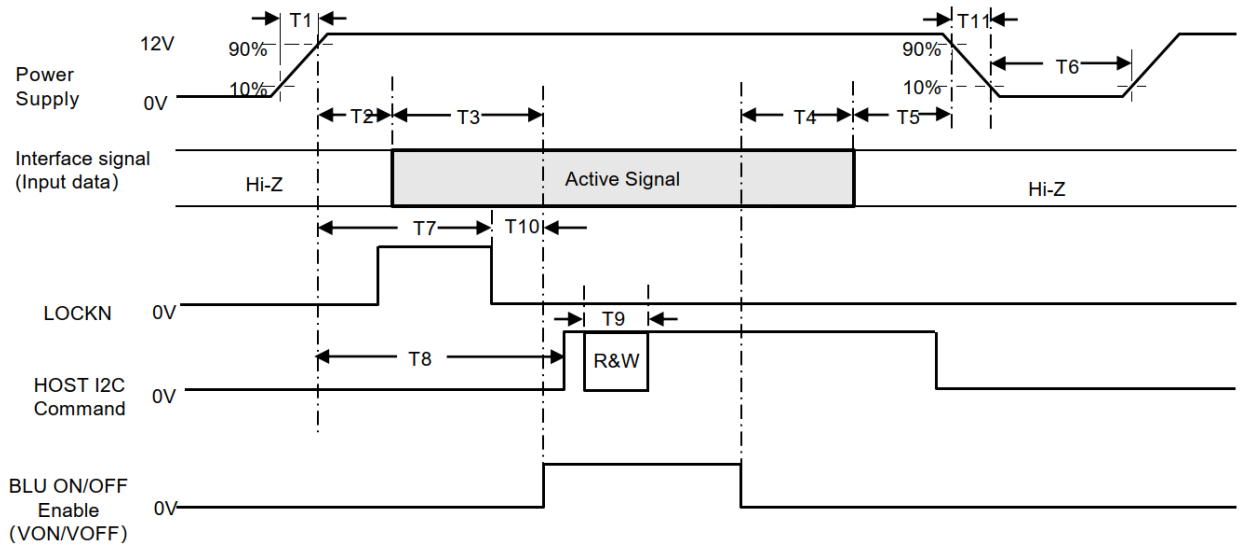
Color		Input Color Data																													
		MSB RED LSB										MSB GREEN LSB										MSB BLUE LSB									
		R9	R8	R7	R6	R5	R4	R3	R2	R1	R0	G9	G8	G7	G6	G5	G4	G3	G2	G1	G0	B9	B8	B7	B6	B5	B4	B3	B2	B1	B0
Basic Color	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(1023)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

2.7 Power Sequence



Parameter	Values			Units
	Min	Typ	Max	
T1	0.5	-	10	ms
T2	0	-	50	ms
T3	200	-	-	ms
T4	100	-	-	ms
T5	0	-	50	ms
T6	1	-	-	s
T7	-	-	200	ms
T8	1200	-	-	ms
T9	Depends on I2C command			
T10	-	One Frame time*2~5	-	ms
T11	-	-	-	

Note 1: Even though T1 is over the specified value, there is no problem if the rush current is within Spec.

Note 2: When the power supply VDD is 0V, keep the level of input signals on the low or high impedance.

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

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

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

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

Note 5: Even though T7&T10 is over the specified value, please extend the time of Back Light on to ensure invalid data will not be seen.

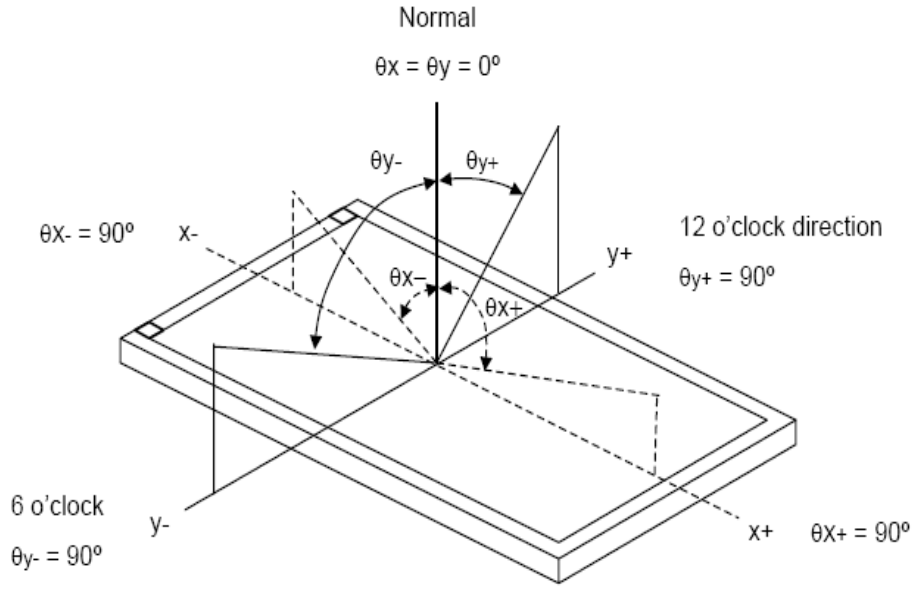
Note 6: T11: Voltage of VDD must decay smoothly after power-off, there should be none re-bounding voltage.
(customer system decide this value)

3 Optical Specification

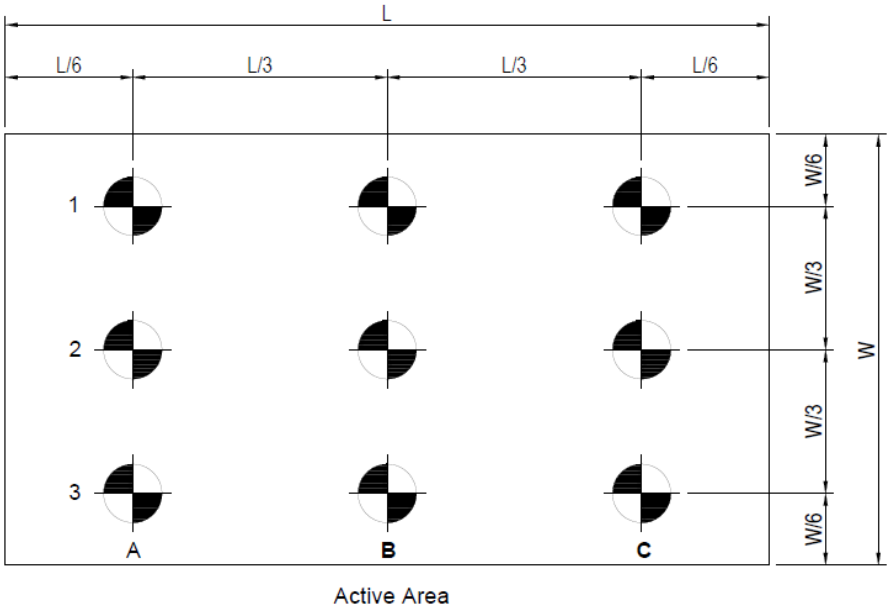
Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Color chromaticity	Red	Rx	θx=0 θy=0 CA-410	0.607	0.637	0.667	-	Test Mode: (2) (3)
		Ry		0.325	0.355	0.385	-	
	Green	Gx		0.276	0.306	0.336	-	
		Gy		0.582	0.612	0.642	-	
	Blue	Bx		0.114	0.144	0.174	-	
		By		0.031	0.061	0.091	-	
	White	Wx		0.262	0.292	0.322	-	
		Wy		0.268	0.298	0.328	-	
Center Luminance of White		Lc	θx=0 θy=0 CA-410	3600	4000	5200	cd/m^2	
Uniform		Lu			90		%	
Contrast Ratio		CR	θx=0 θy=0 Klein K-10	1260:1	1400:1		-	Test Mode: (4)
Color Saturation		NTSC			80		%	
Viewing Angle	Horizontal	θx+	- - -		89		Deg	Test Mode: (1)
		θx-			89			
	Vertical	θy+			89			
		θy-			89			

Test Mode：

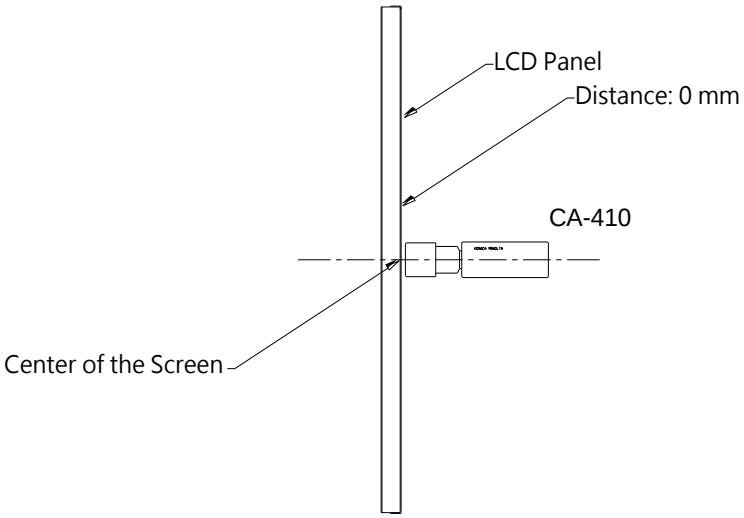
(1) Definition of Viewing Angle (θx , θy):



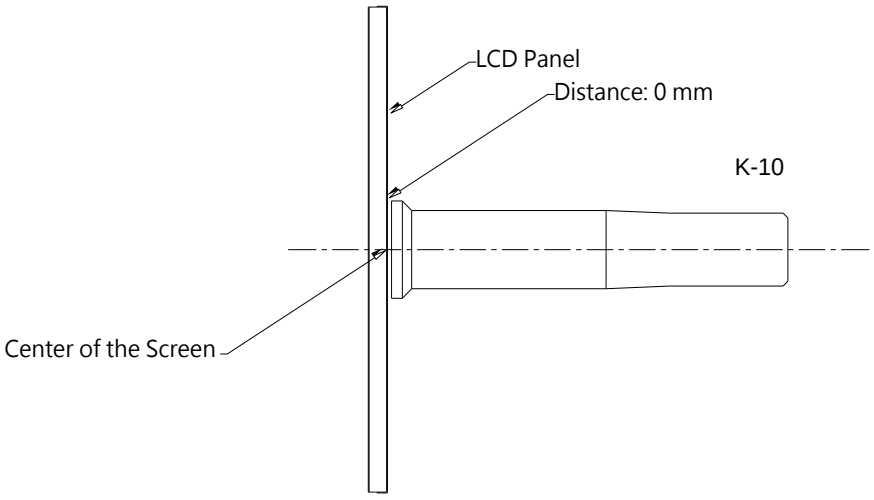
(2) Definition of Test Point:



(3) CA-410 Measurement Setup:



(4) Klein K-10 Measurement Setup:



4 LED Driving Board Specifications

This specification is applied to LED converter unit for DLF/DLH5501 4000nits LED backlight.

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%	5.25	4.85	4.65	A	(1)
Input Power Consumption	Pin	Brightness = 100%	-----	116.4	-----	W	
LED Current (High Brightness)	IoutH	Brightness = 100%	-----	1.09	-----	A	J2
			-----	2.19	-----	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%	-----	33.2	-----	V	J2
			-----	33.2	-----	V	J7、J8
Efficiency	η	Brightness = 100%	-----	93.8	-----	%	(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 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 (DC or PWM Connector)

PIN NO	Symbol	Description
1	DC	Clsoe 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.

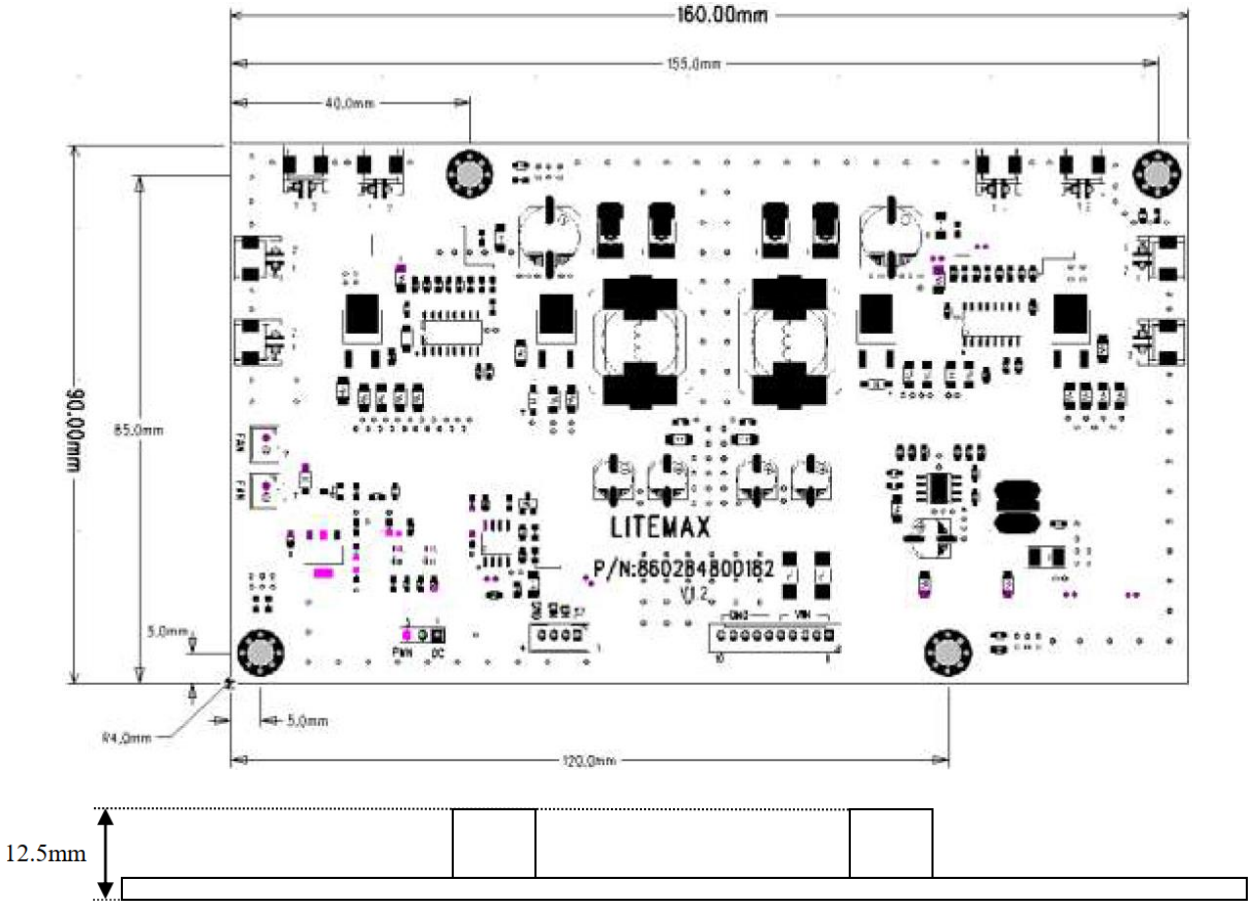
Output Connector:

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

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

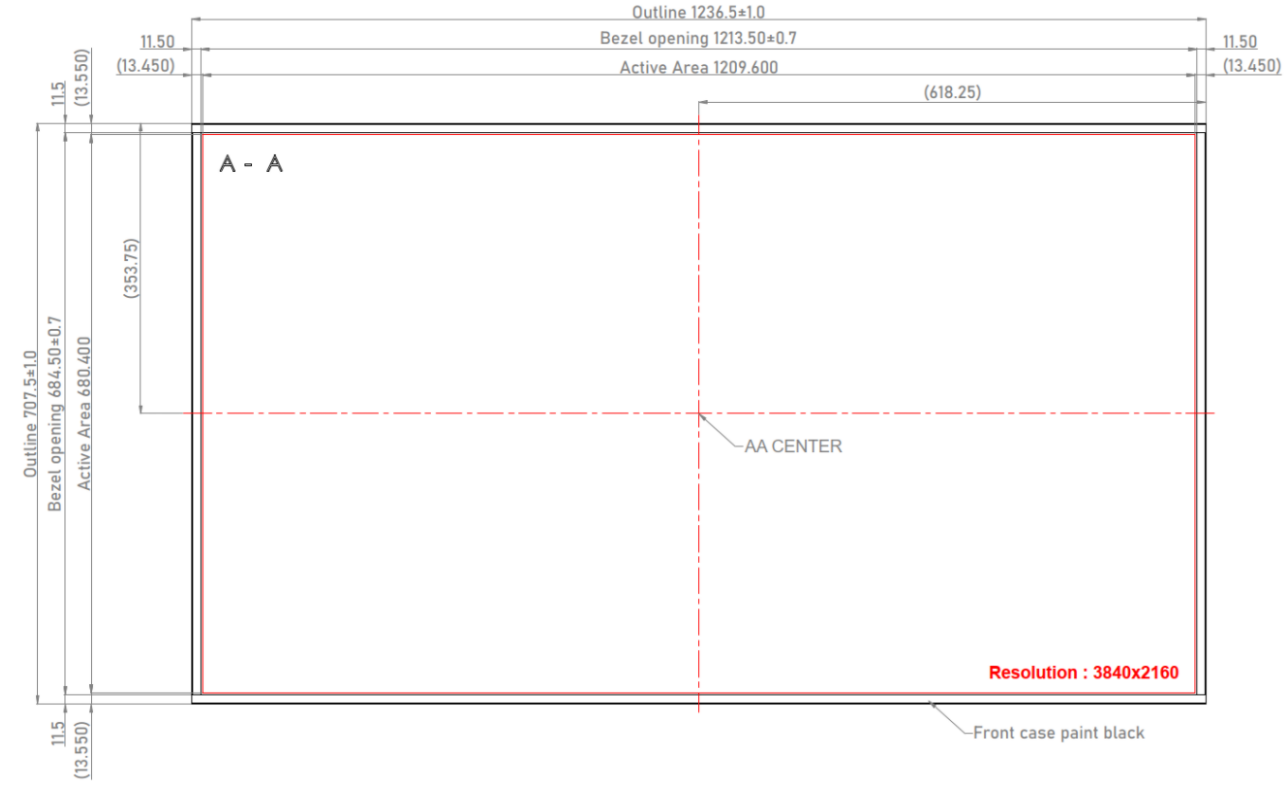
4.3 Mechanical Characteristics

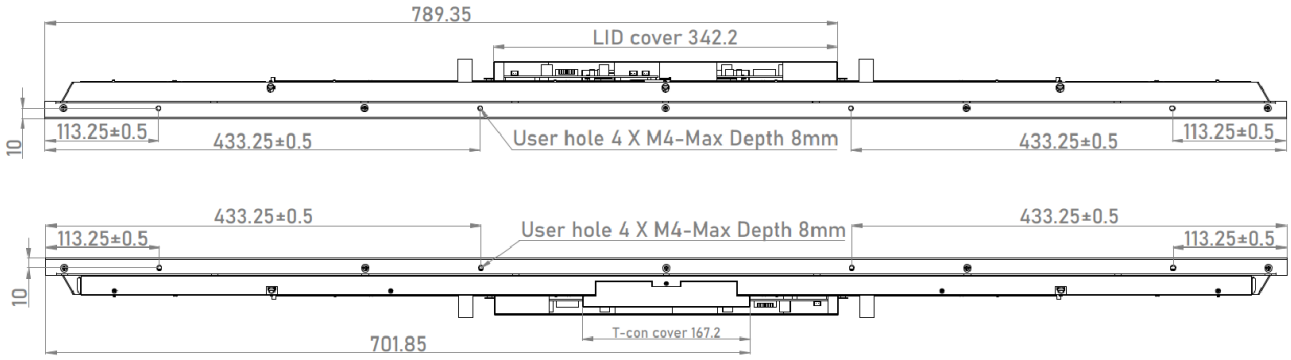
Dimension: 160 x 90 x 12.5mm

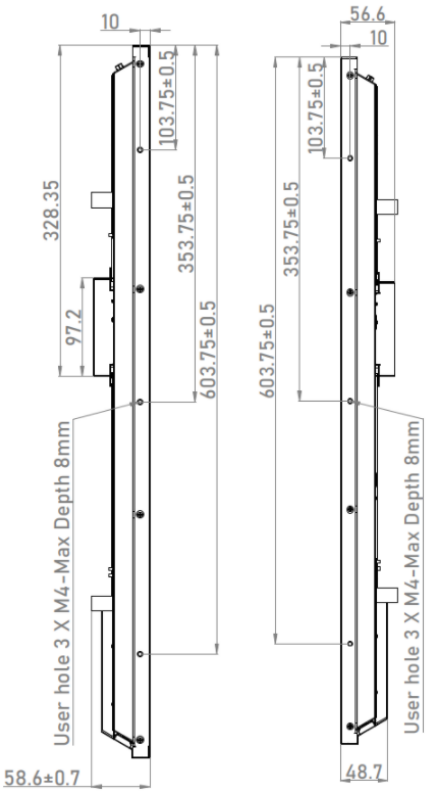


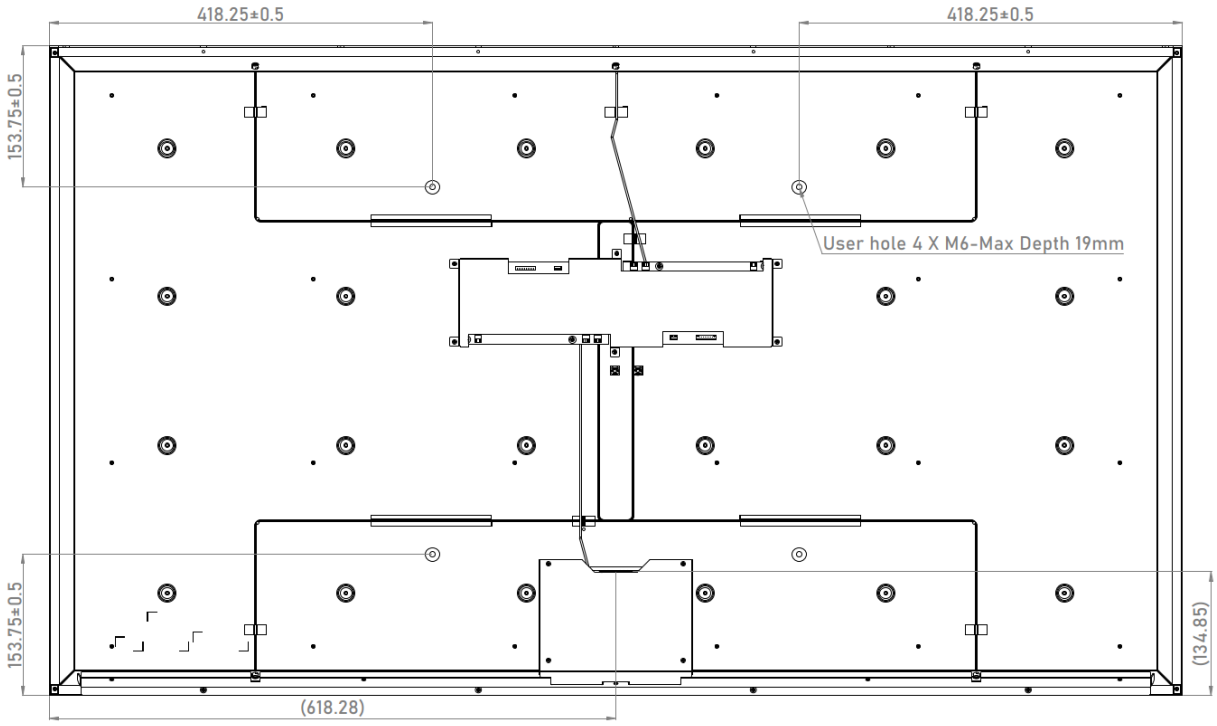
5 Mechanical Drawing

Unit:mm

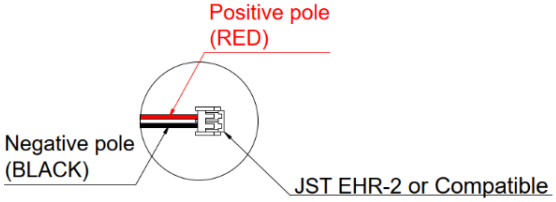








Note：
1."( )" marks the reference dimension.
2. Front Case is black paint.
3. M4 user hole screw torque 6 kgf- cm max.
4. M6 user hole screw torque 25 kgf- cm max.



Connector View

6 AD9800HP Board & OSD Functions

AD9800 is a good performance AD board for Litemax 4K resolution display product. Input interface supports HDMI, DP. Output supports V-by-1 and eDP panel. Max resolution up to 3840x2160.

For high level application, AD9800 supports screen rotation by embedded frame buffer.

General Description

- **Max resolution 3840x2160 60Hz**
- **One HDMI 2.1, supports 3840x2160 60Hz.**
- **One Display port 1.4, supports 3840x2160 60Hz.**
- **Support 90, 180, degree rotation.**
- **Embedded MCU with ADC port for VR, light sensor application.**
- **Support HDCP 2.3.**
- **Audio line in and speaker output.**
- **Embedded OSD.**
- **Support V-by-1, eDP panel.**
- **Support up to 64 zones LED local dimming control.**

Characteristics

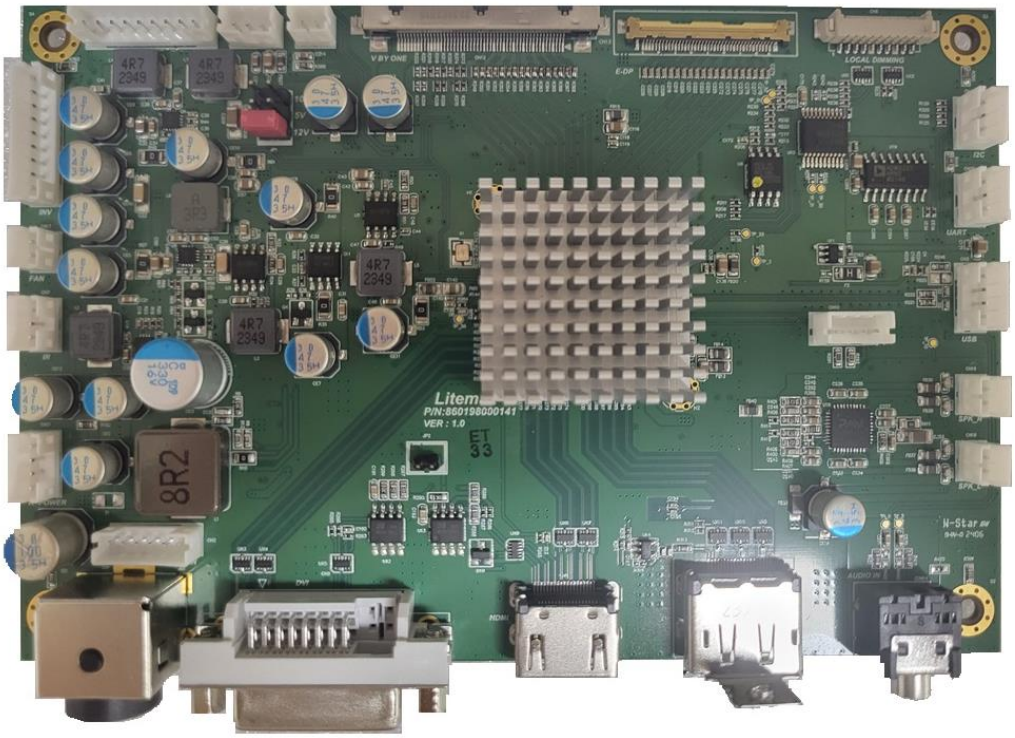
Power Input	12V/24V (Note1)
Power Consumption	15W Max. (Note2)
Input interface	HDMI 2.1, DP 1.4, DVI (Optional)
Output interface	V-by-1 8 lanes, eDP 8 lanes.
Resolution	Max 3840x2160. (DVI only 1080P)
Support panel voltage	5 / 10 / 12 V
Speaker	5W speaker x 2(8Ω)
Backlight control	EN and PWM or DC dimming for backlight
Operation Temperature	-20 ~ 70 degree C

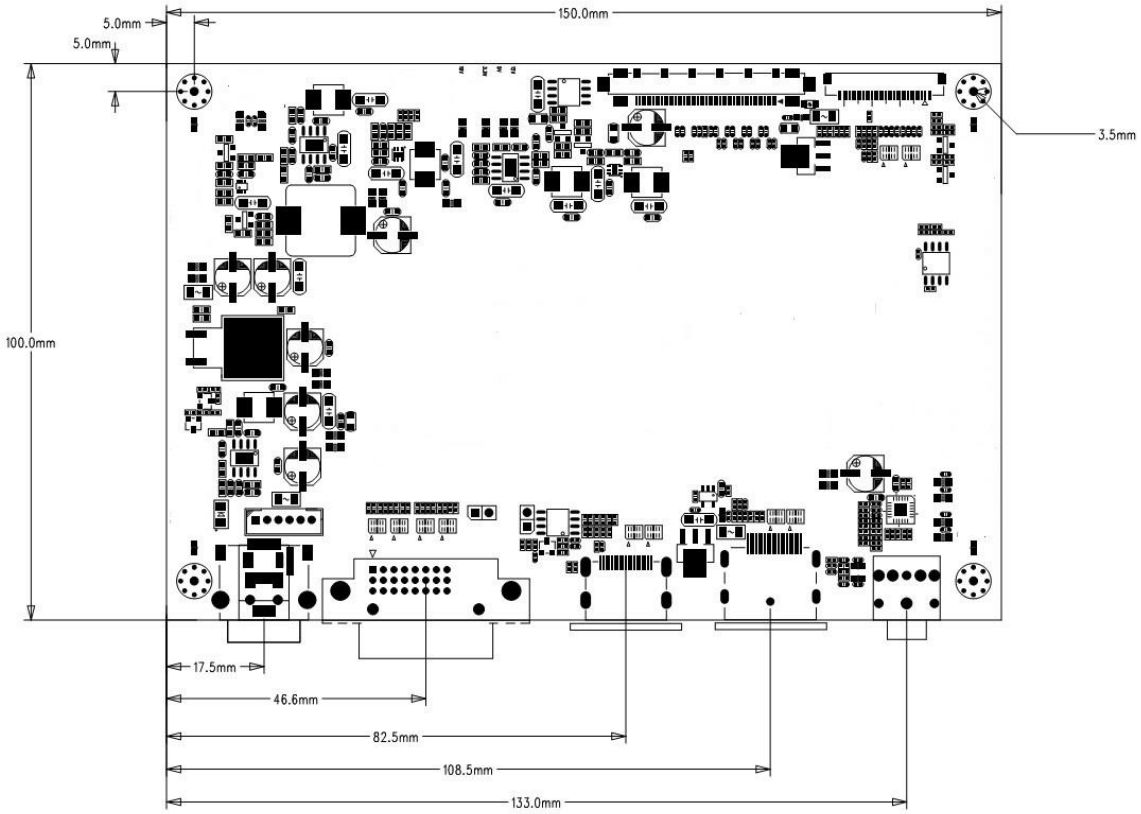
Note1: 12V or 24V are two different PCBA version, selection should be noted.

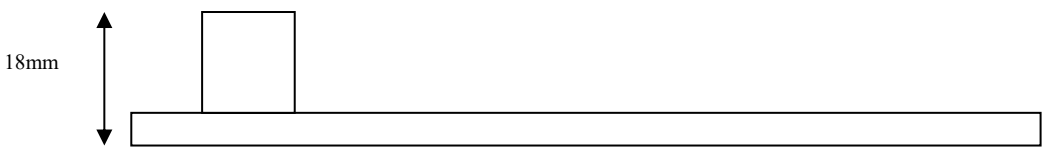
Note2: 15W means AD board own consumption, not include LCD and T-con.

Outline Dimensions

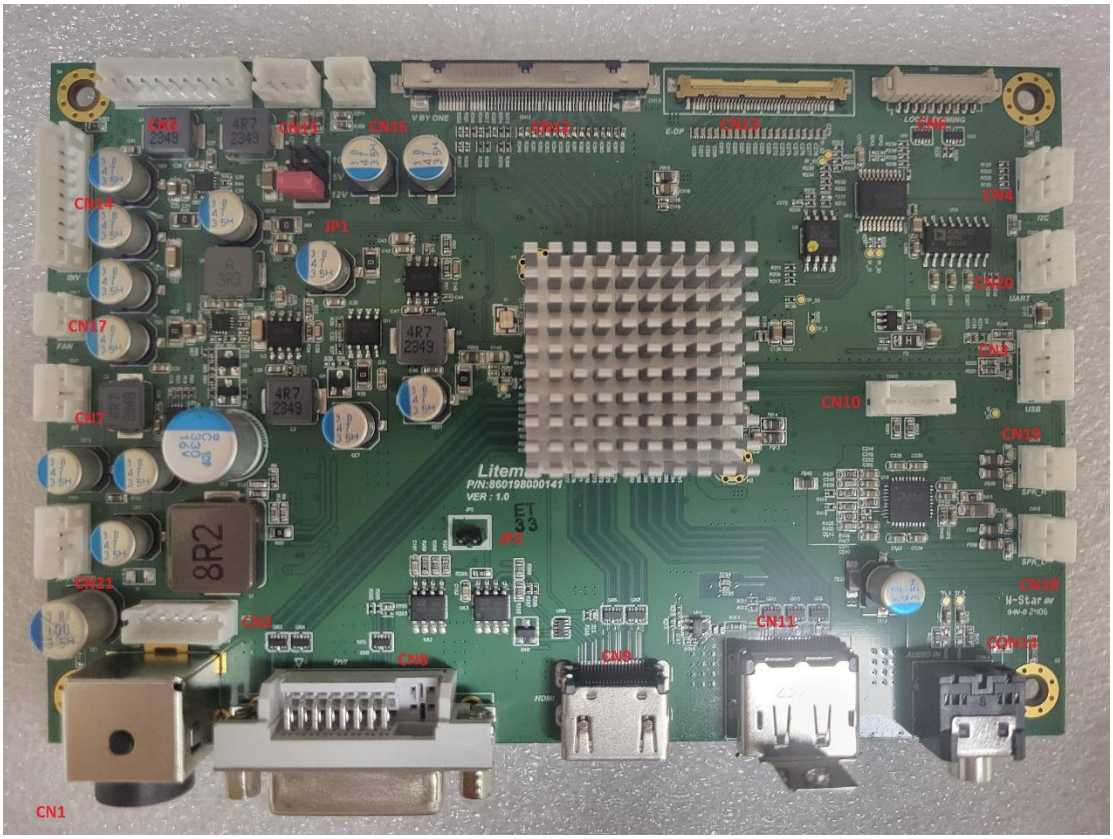
AD9800DHP 150mm x 100mm







AD9800HP Board Pin Define



Connector pin define

➢ CN12: V-by-one output

Pin	Function	Pin	Function
1	GND	27	HPD
2	X7P	28	8b/10b SEL
3	X7N	29	NC
4	GND	30	LD_EN_U
5	X6P	31	NC
6	X6N	32	NC
7	GND	33	SCL
8	X5P	34	SDA
9	X5N	35	3D_EN_U
10	GND	36	NC
11	X4P	37	NC
12	X4N	38	GND
13	GND	39	GND
14	X3P	40	GND
15	X3N	41	GND
16	GND	42	GND

17	X2P	43	NC
18	X2N	44	Panel power
19	GND	45	Panel power
20	X1P	46	Panel power
21	X1N	47	Panel power
22	GND	48	Panel power
23	X0P	49	Panel power
24	X0N	50	Panel power
25	GND	51	Panel power
26	LOCKN		

- CN9: HDMI input

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

- CN11: DisplayPort input

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

➢ CN1: Power input (Power Din 4 pin)

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

➢ CN1: Power input (Power Jack 3 pin)

Pin	Function	Pin	Function
1	Power Input	3	GND
2	GND		

➢ CN2: Power input (Wafer 2.0mm pitch 6 pin)

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

➢ CN21: Reserved 12/5V (Wafer 2.0mm pitch 4 pin)

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

➢ CN14: Backlight Power and Control (Wafer 2.0mm pitch 9 pin)

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

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

➢ CN17: 12V for Fan power (Wafer 2.0mm pitch 2 pin)

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

➢ CN5: Keypad (Wafer 2.0mm pitch 9 pin)

Pin	Function	Pin	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		

- CN15: VR (Wafer 2.0mm pitch 3 pin)

Pin	Function	Pin	Function
1	3.3V	3	GND
2	VR		

- CN16: Light sensor (Wafer 2.0mm pitch 2 pin)

Pin	Function	Pin	Function
1	5V/3.3V	2	Sensor Out

- JP1: Panel power selection (2.54mm pitch 2x3 jump)

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

- CN18,CN19: Speaker output (Wafer 2.0mm pitch 2 pin)

Pin	Function	Pin	Function
1	SPK+	2	SPK-

- CN20: UART (Wafer 2.0mm pitch 3 pin)

Pin	Function	Pin	Function
1	TX	3	GND
2	RX		

- CN4: I2C (Wafer 2.0mm pitch 3 pin)

Pin	Function	Pin	Function
1	SDA	3	GND
2	SCL		

- CN13: eDP output

Pin	Function	Pin	Function
1	GND	21	GND
2	NC	22	EDP-D1-
3	GND	23	EDP-D1+
4	EDP-D7-	24	GND
5	EDP-D7+	25	EDP-D0-
6	GND	26	EDP-D0+
7	EDP-D6-	27	GND
8	EDP-D6+	28	AUXTX_1P
9	GND	29	AUXTX_1N
10	EDP-D5-	30	GND
11	EDP-D5+	31	AUXTX_0P

12	GND	32	AUXTX_0N
13	EDP-D4-	33	GND
14	EDP-D4+	34	eHPD1
15	GND	35	eHPD0
16	EDP-D3-	36	NC
17	EDP-D3+	37	Panel power
18	GND	38	Panel power
19	EDP-D2-	39	Panel power
20	EDP-D2+	40	Panel power

➢ CN3: USB (Wafer 2.0mm pitch 4 pin)

Pin	Function	Pin	Function
1	USB_5V	3	D0+
2	D0-	4	GND

Note: CN3 only for update FW.

➢ CN6: Local Dimming (Wafer 1.25mm pitch 10 pin)

Pin	Function	Pin	Function
1	LDSPI0_SDI_OUT	6	LD_VSYNC_OUT
2	LDSPI0_SDO_OUT	7	LD_HSYNC_OUT
3	LDSPI0_SCL_OUT	8	GND
4	LDSPI0_CS_OUT	9	VBLCTRL
5	GND	10	NC

➢ JP2: EDID Write Protect (Wafer 2.0mm pitch 2 pin)

Pin	Function	Pin	Function
1	3.3V	2	GND

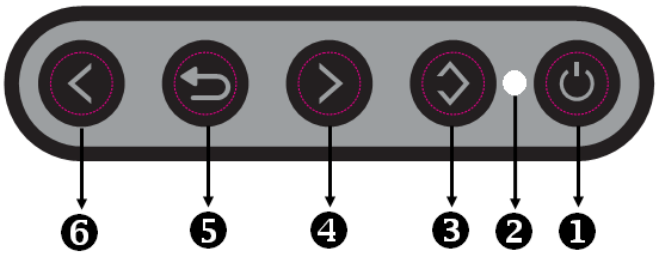
Note: When update EDID , this JP2 must be short.

➢ CON14: Phone Jack(Optional)

Pin	Function	Pin	Function
1	GND	4	GND
2	Audio IN_R	5	GND
3	Audio IN_L		

6.1 OSD Function

MEMBRANE CONTROL BUTTOM



❶ **Key:** (Power) function key

Press the power switch will turn the monitor on.

Press it again to turn the monitor off.

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

❸ **Key:** (Menu + Selection Right + Enter) function key

Press this button to the OSD “main menu”. And then press this button go to the “Selection Right” function, and press again this button to “Enter”.

❹ **Key:** (Menu + Selection Up + Increase) function key

Press this button to the OSD “main menu”. And then press this button go to the “Selection Up” function, and press again this button to adjustment value “Increase”.

❺ **Key:** (Menu + Exit) function key

Enter to the OSD adjustment menu. It also used for go back to previous menu for sub-menu.

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

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

Screen Adjustment Operation Procedure

1. **Entering the screen adjustment**

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

2. **Entering the settings**

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

3. **Change the settings**

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

4. **Save**

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

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

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

6.2 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.

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.