Product Specification Sheet

Customer: _____

Model Name: MNG007DA5-1

Date: 2023/06/28

Version： V03

Customer's Approval		CSOT	
Signature	Date	Approved By	Date
		Reviewed By	Date
		Prepared By:	Date

Record of Revision

Version	Revise Date	Page	Content
V01	2023/03/07	All	Preliminary Specification
V02	2023/04/14	P5&P6&P9&39	Update Module Stacking thickness & ABOT & 2D drawing & Label drawing
	2023/04/20	P10&P11	Update Equivalent circuit /Feature drawing
V03	2023/06/06	P21&P28&P30-P38	I2C sequence drawing/Label drawing/Appendix. EDID
	2023/06/28	P20&P21	I2C sequence drawing

Contents

1. GENERAL DESCRIPTION

1.1 OVERVIEW

MNG007DA5-1 is a 16.0 WQ 165Hz TFT Liquid Crystal Display Low blue light module with LED Backlight unit and 40 pins eDP 1.4 interface. This module supports 2560 x 1600 mode and can display 16.7M colors.

1.2 SPECIFICATION SUMMARY

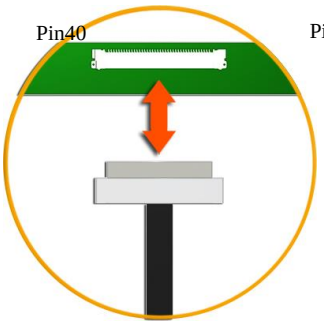
No.	Item	Specification	Unit	Note
1	LCD size	16.0	inch	
2	Resolution	2560 x RGB x 1600		WQ
3	Pixel Arrangement	RGB		
4	Model Type	LCM		
5	TFT Technology	LTPS		
6	Display mode	FFS, Normally Black		
7	Active Area	344.6784*215.424	mm	
8	pixel pitch	44.88(H)×134.64(V)	um	
9	Display Colors	16.7M		@ true 8bit
10	Contrast Ratio	1000:1 (Typ)		1000:1(Typ) 800:1(Min)
11	sRGB Coverage	sRGB 100% (Typ) 95% (min)		sRGB 100% (Typ) 95% min
12	LCM Outline Dimension	349.68×224.42×3.05	mm	Bent without PCBA,TYP
13	Luminance	300 (Typ)	nits	
14	Low blue light ratio	Y	%	Max
15	Surface treatment(UP)	Fine AG(Haze 25%)	--	Pol.
16	Interface	eDP 1.4		4 lane@8.1G
17	HDR function	NA		
18	Method of Inversion	Column Inversion		
19	Power consumption of Panel	1.8 (Max)	W	3.3V@Mosaic 165Hz
	Power consumption of Backlight	3.4 (Max)	W	
20	Weight	400 (Max)	g	

Note (1) The specified power consumption (with converter efficiency) is under the conditions at VCCS =3.3 V, LED_VCCS = Typ, fPWM = 200 Hz, Duty=100% and Ta = 25 ±2 ℃, whereas mosaic pattern is displayed.

2. MECHANICAL SPECIFICATIONS

Parameter		Min.	Typ.	Max.	Unit	Note
Unit outline dimensions	Width	349.38	349.68	349.98	mm	
	Height	224.12	224.42	224.72	mm	Without PCB
	Depth	2.90	3.05	3.20	mm	
Weight		-	-	400	g	

2.1 INTERFACE CONNECTION



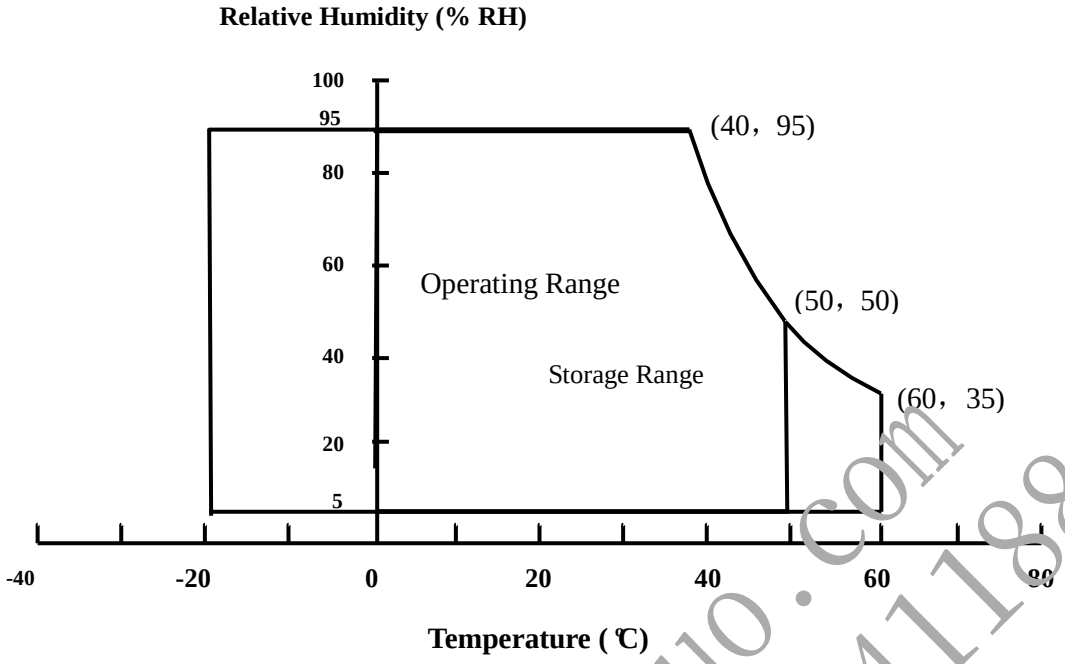
Please refer Appendix Outline Drawing for detail design.

Connector Part No.: STM-MSAK240250P40M

3. ABSOLUTE MAXIMUM RATINGS

3.1 ABSOLUTE RATINGS OF ENVIRONMENT

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Storage Temperature	T_{ST}	-20	+60	℃	(1)
Operating Ambient Temperature	T_{OP}	0	+50	℃	(1), (2)



Note (1)

(a) 95% RH Max. (Ta <= 40 ℃).

(b) Wet-bulb temperature should be 39 ℃ Max. (Ta > 40 ℃).

(c) No condensation.

Note (2) The temperature of panel surface should be 0 ℃ min. and 60 ℃ max.

3.2 ELECTRICAL ABSOLUTE RATINGS

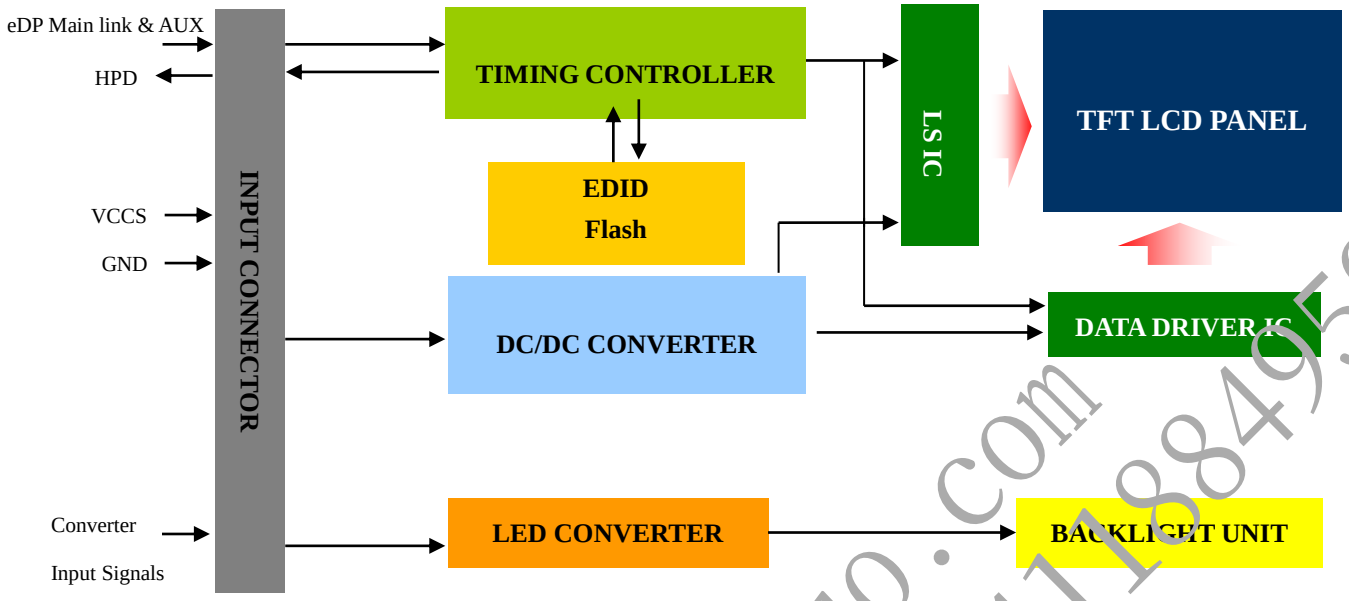
3.2.1 TFT LCD MODULE

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Power Supply Voltage	VCCS	-0.3	+4	V	(1)
Logic Input Voltage	V_{IN}	-0.3	+3.6	V	
Converter Input Voltage	LED_VCCS	-0.3	26	V	(1)
Converter Control Signal Voltage	LED_PWM,	-0.3	+3.6	V	(1)
Converter Control Signal Voltage	LED_EN	-0.3	+3.6	V	(1)

Note (1) Stresses beyond those listed in above “ELECTRICAL ABSOLUTE RATINGS” may cause permanent damage to the device. Normal operation should be restricted to the conditions described in “ELECTRICAL CHARACTERISTICS”.

4. ELECTRICAL SPECIFICATIONS

4.1 FUNCTION BLOCK DIAGRAM



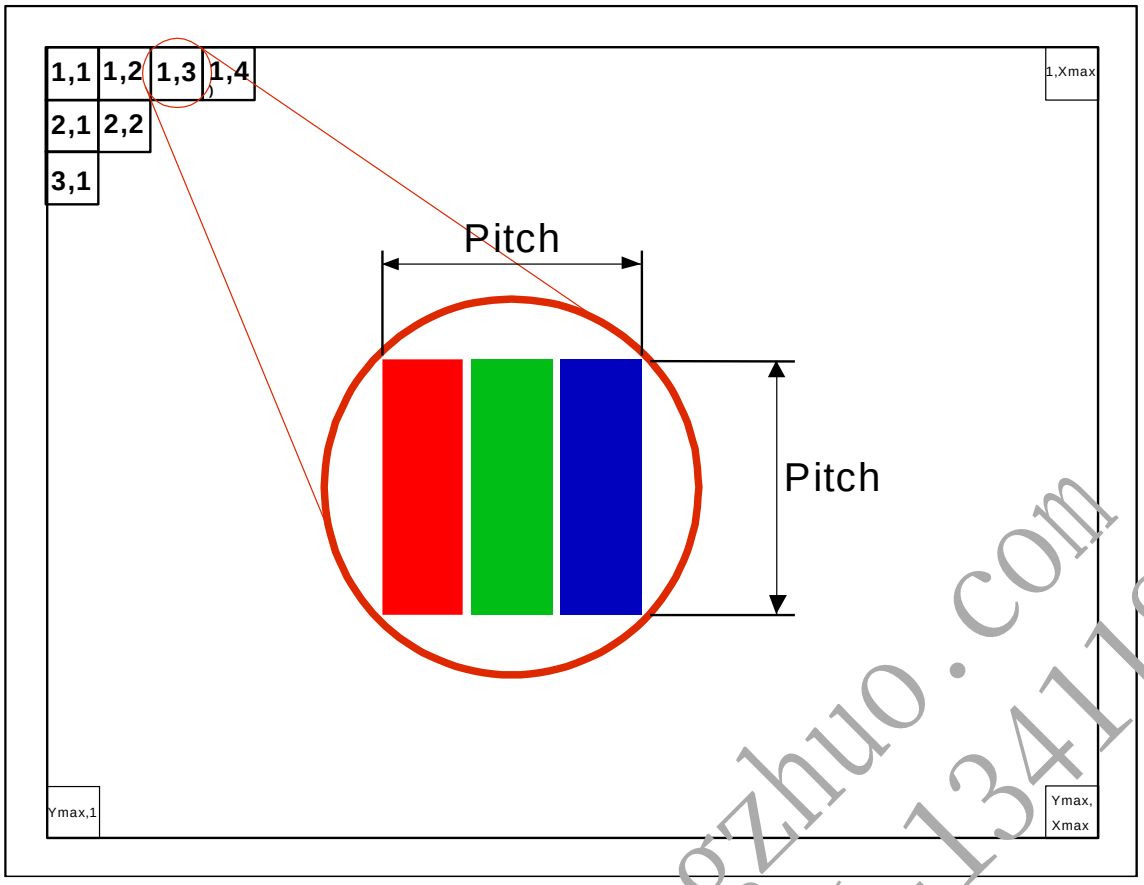
4.2 INTERFACE CONNECTIONS

PIN ASSIGNMENT

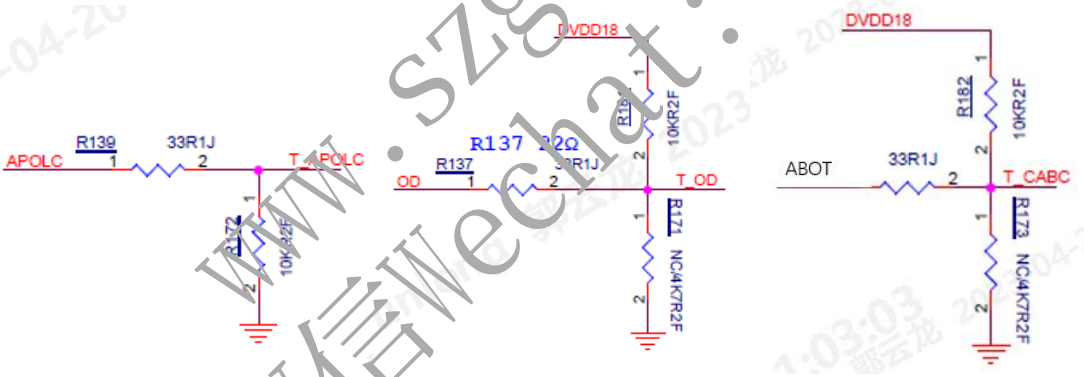
Pin	Symbol	Description	Note
1	I2C_SCL	I2C Serial Clock Signal	I2C SCL for APOL
2	H_GND	High Speed Ground	
3	ML3-	Complement Signal-Lane 3	
4	ML3+	True Signal-Main Lane 3	
5	H_GND	High Speed Ground	
6	ML2-	Complement Signal-Lane 2	
7	ML2+	True Signal-Main Lane 2	
8	H_GND	High Speed Ground	
9	ML1-	Complement Signal-Lane 1	
10	ML1+	True Signal-Main Lane 1	
11	H_GND	High Speed Ground	
12	ML0-	Complement Signal-Lane 0	
13	ML0+	True Signal-Main Lane 0	
14	H_GND	High Speed Ground	
15	AUX+	True Signal-Auxiliary Channel	
16	AUX-	Complement Signal-Auxiliary Channel	

17	H_GND	High Speed Ground	
18	VCCS	Power Supply +3.3V (typical)	
19	VCCS	Power Supply +3.3V (typical)	
20	VCCS	Power Supply +3.3V (typical)	
21	VCCS	Power Supply +3.3V (typical)	
22	BIST	Built-In Self Test (active high)	
23	ABOT	ABOT enable	(Disable@high(default),
24	GND	Ground	
25	GND	Ground	
26	GND	Ground	
27	HPD	Hot Plug Detect	
28	BL_GND	BL Ground	
29	BL_GND	BL Ground	
30	BL_GND	BL Ground	
31	APOLC	APOL control signal	
32	LED_EN	BL_Enable Signal of LED Converter	
33	LED_PWM	PWM Dimming Control Signal of LED Converter	
34	I2C_SDA	I2C Serial Data Signal	I2C SDA for APOL
35	HW	MOS preventing I2C overwrite*	For CSOT Use
36	LED_VCCS	LED Power Supply	
37	LED_VCCS	LED Power Supply	
38	LED_VCCS	LED Power Supply	
39	LED_VCCS	LED Power Supply	
40	OD_EN	Over Drive enable Pull high(1): OD off; Pull low(0): OD on	OD function default off which can be enable by pull low

Note (1) The pixel is shown in the following figure.



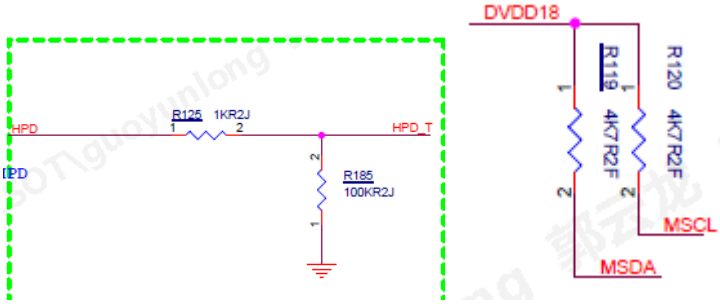
Note2 ： function pin feature



APOLC	APOLC feature
High	Enable
Low	enable

ODEN	OD feature
High	disable
Floating	disable
Low	enable

ABOT EN	ABOT feature
High	disable
Floating	disable
Low	enable



HPD	HPD feature
High	Enable
Low	enable

I2C singal	I2C feature
High	enable
Floating	disable
Low	disable

4.3 ELECTRICAL CHARACTERISTICS

4.4 LCD ELETRONICS SPECIFICATION

Parameter		Symbol	Value			Unit	Note
			Min.	Typ.	Max.		
Power Supply Voltage		VCCS	3.0	3.3	3.6	V	(1)
BIST Control Level		BIST on	2.2	3.3	3.6	V	(1)
		BIST off	0	-	0.5	V	(1)
Ripple Voltage		V_{RP}	-	-	100	mV	(1)
Inrush Current		I_{RUSH}	-	-	1.5	A	(1) (2)
Power Supply Current	Mosaic	I_{LCD}	-	515	545	mA	(3)
Power consumption	Mosaic	P_{LCD}	-	1.7	1.8	W	(3)
Power Supply Current	Heavy loading	I_{LCD}	-	1000	1300	mA	(4)
Power consumption	Heavy loading	P_{LCD}	-	3.3	4.29	W	(4)

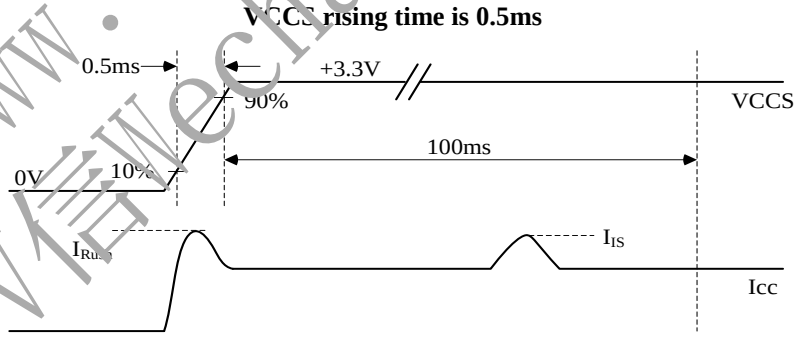
Note (1) The ambient temperature is Ta = 25 ±2 ℃

Note (2) I_{RUSH}: the maximum current when VCCS is rising

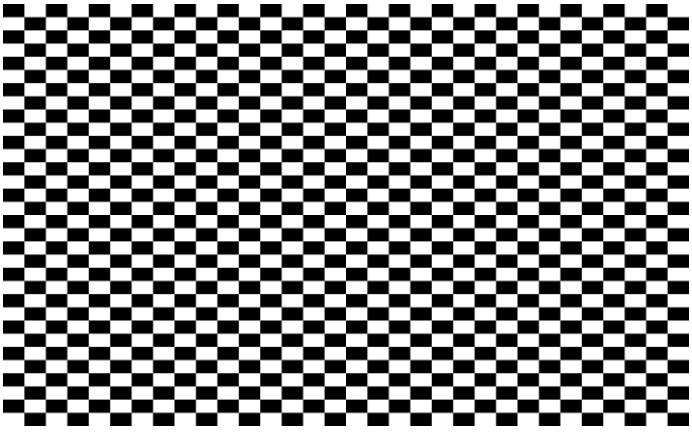
I_{IS}: the maximum current of the first 100ms after power-on

Measurement Conditions: Shown as the following figure.

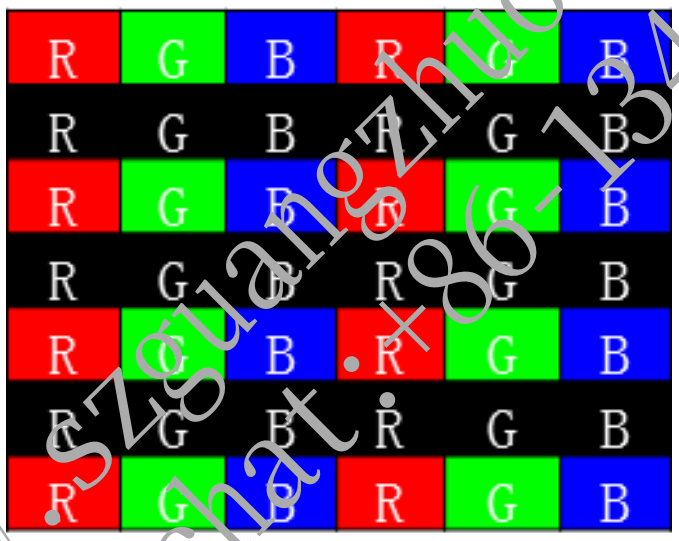
Test pattern: Mosaic



Note (3) The specified power supply current is under the conditions at VCCS = 3.3 V, Ta = 25 ±2 ℃, DC Current and f_v = 240 Hz, whereas a power dissipation check pattern below is displayed.



Note (4) The specified power supply current is under the conditions at VCCS = 3.3 V, T_P = 25 ± 2 ℃, DC Current and f_v = 240 Hz, whereas a power dissipation Heavy loading pattern below is displayed.



LED CONVERTER SPECIFICATION

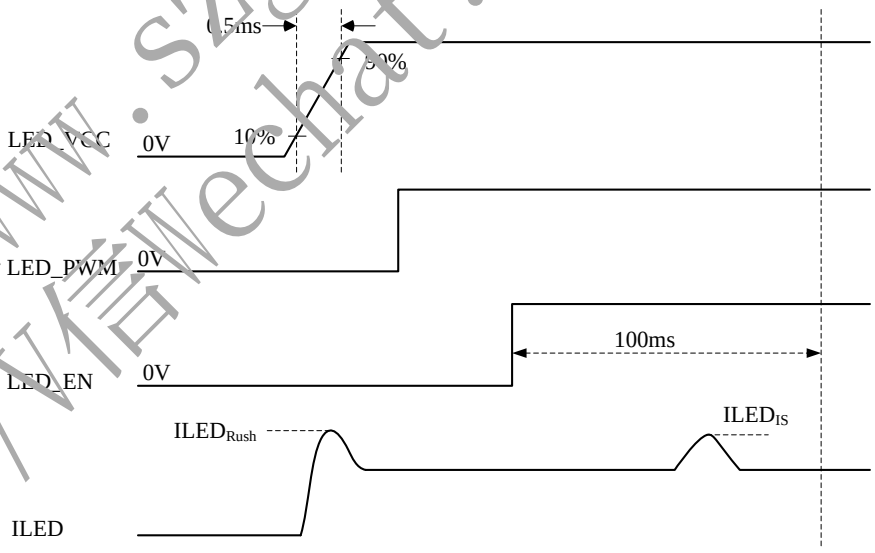
Parameter		Symbol	Value			Unit	Note
			Min.	Typ.	Max.		
Converter Input power supply voltage		LED_Vccs	5.0	12.0	21.0	V	
Converter Inrush Current		$ILED_{RUSH}$	-	-	1.5	A	(1)
EN Control Level	Backlight On		1.5	-	3.6	V	
	Backlight Off		0	-	0.5	V	
PWM Control Level	PWM High Level		1.5	-	3.6	V	
	PWM Low Level		0	-	0.5	V	
PWM Control Duty Ratio			1	-	100	%	
PWM Control Permissive Ripple Voltage		V_{PWM_pp}	-	-	100	mV	
PWM Control Frequency		f_{PWM}	200		2000	Hz	
LED Power consumption		P_L	-	-	3.6	W	(2)
LED Power Current	LED_VCCS =Typ.	IL-	-	-	300	mA	(3)

Note (1) $ILED_{RUSH}$: the maximum current when LED_VCCS is rising,

$ILED_{IS}$: the maximum current of the first 100ms after power-on,

Measurement Conditions: Shown as the following figure. LED_VCCS = Typ, Ta = 25 ±2 ℃, f_{PWM} = 200 Hz, Duty=100%.

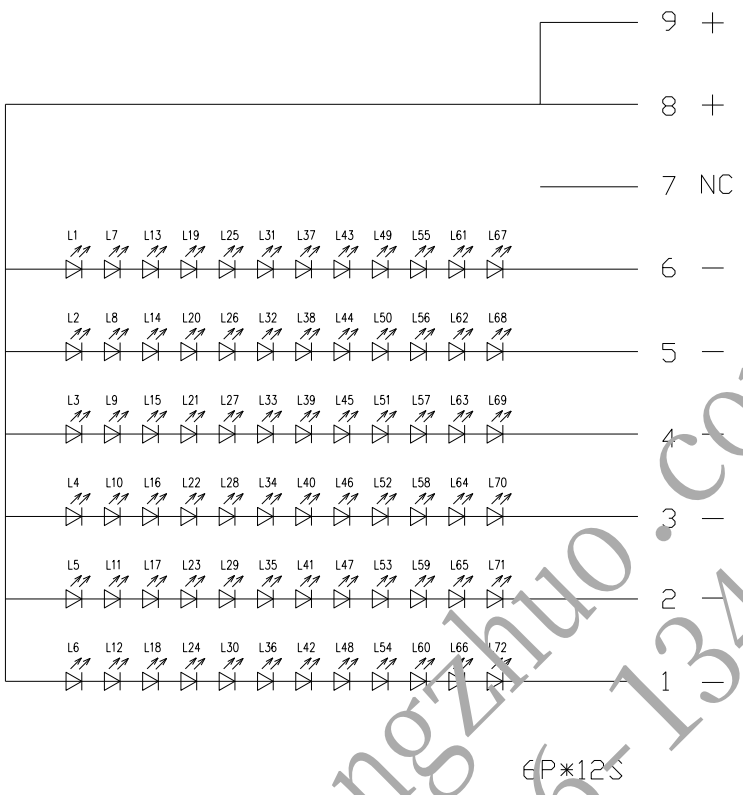
VLED rising time is 0.5ms



Note(2) $P_L = I_L \times V_L$ (With LED converter transfer efficiency);

Note (3) The specified LED power supply current is under the conditions at "LED_VCCS = Typ.", Ta = 25 ± 2 ºC, fPWM = 200 Hz, Duty=100%.

4.4.1 BACKLIGHT UNIT



Ta = 25 ±2 ℃

Parameter	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
LED Light Bar Power Supply Voltage	VL	-	-	33.72	V	(1)(2)
LED Light Bar Power Supply Current	IL	-	81.6	-	mA	(Duty100%)
Power Consumption	PL	-	-	2.75	W	(3)
LED Life Time	L_{BL}	15000	-	-	Hrs	(4)

Note (1) LED current is measured by utilizing a high frequency current meter :

Note (2) For better LED light bar driving quality, it is recommended to utilize the adaptive boost converter with current balancing function to drive LED light-bar.

Note (3) $P_L = I_L \times V_L$ (Without LED converter transfer efficiency)

Note (4) The lifetime of LED is defined as the time when it continues to operate under the conditions at Ta = 25 ±2 ºC and I_L = 20 mA(Per EA) until the brightness becomes ≦ 50% of its original value.

4.5 INPUT SIGNAL TIMING SPECIFICATIONS

4.5.1 eDP AUX Channel Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Unit Interval for AUX channel	UI_{AUX}	0.4	-	0.6	μS	
Peak-to-peak voltage at TP1	$V_{AUX-DIFF-pp}$	0.18	0.2	1.38	V	
AUX DC Common mode Voltage	$V_{AUX-DC-CM}$	0	-	1.2	V	
AUX Short current limit	I_{AUX_SHORT}	-	-	90	mA	
AUX CH termination DC resistor	R_{AUX_TERM}	80	100	120	Ω	Differential input
AUX AC coupling capacitor	C_{AUX}	75	-	200	nF	
Number of pre-charge pulses	Pre-charge pulses	10	-	16		

4.5.2 eDP Main Link Receiver Characteristics

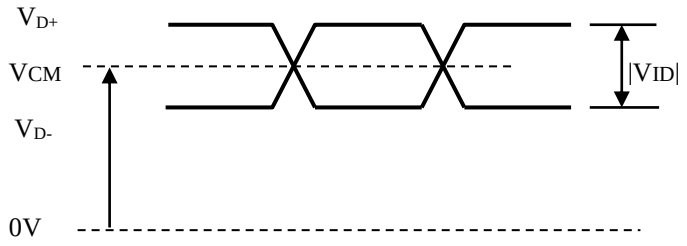
Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Link clock down spreading	Down_Spread_Amplitude	0		0.5	%	
Differential Peak-to-peak Input Voltage at Rx package pins	$V_{RX-DIFFp-p}$	100	-	1320	mV	
Differential termination resistance	$R_{RX-TERM}$	80	90	100	Ω	
RX short circuit Current Limit	$I_{RX-SHORT}$	-	-	50	mA	
Lane Intra-pair Skew at RX package pins	$T_{RX-SKEW-INTRA-PAIR-High-Bit-Rate}$		-	50	ps	

4.5.3 eDP AUX Channel Characteristics

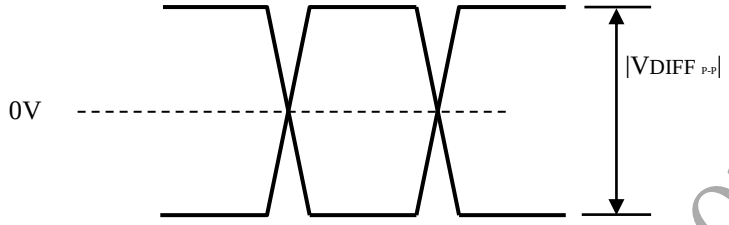
Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Hot plug Detect	V_{HPD}	2.3	-	2.8	V	

Note (1) Display port interface related AC coupled signals are following VESA Display Port Standard V1.4b.

Single Ended



Differential



4.5.4 COLOR DATA INPUT ASSIGNMENT

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 the assignment of color versus data input.

Color		Data Signal																							
		Red								Green								Blue							
		R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0
	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	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	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
Basic	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
Colors	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

	Red(0)/Dark	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(1)	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gray	Red(2)	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Scale	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
Of	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
Red	Red(253)	1	1	1	1	1	1	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
	Green(0)/Dark	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(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
Gray	Green(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Scale	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
Of	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
Green	Green(253)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	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

	Blue(0)/Dark	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(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Gray	Blue(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Scale	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
Of	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
Blue	Blue(253)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	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

Note (1) 0: Low Level Voltage, 1: High Level Voltage

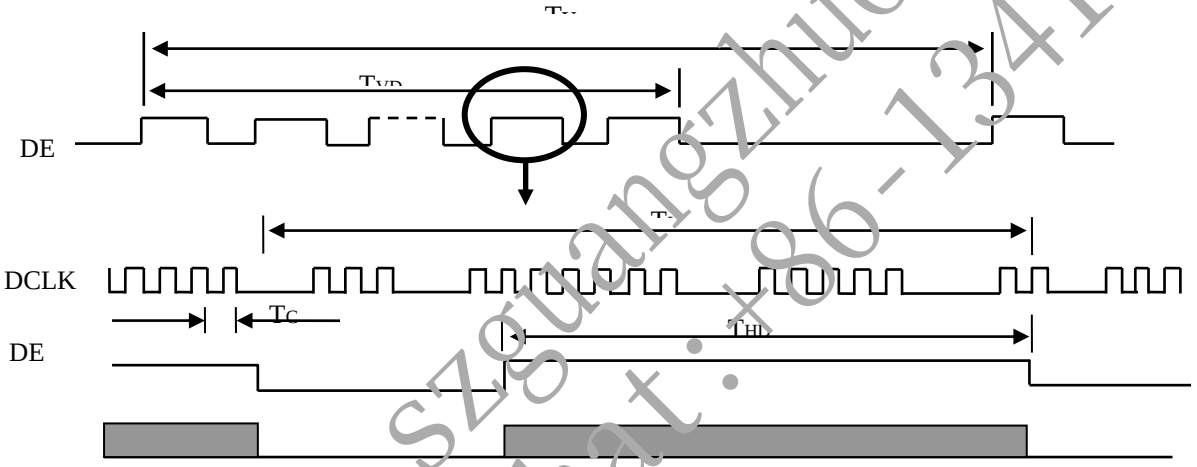
4.6 DISPLAY TIMING SPECIFICATIONS

The input signal timing specification is showed as the following table and timing diagram**.**

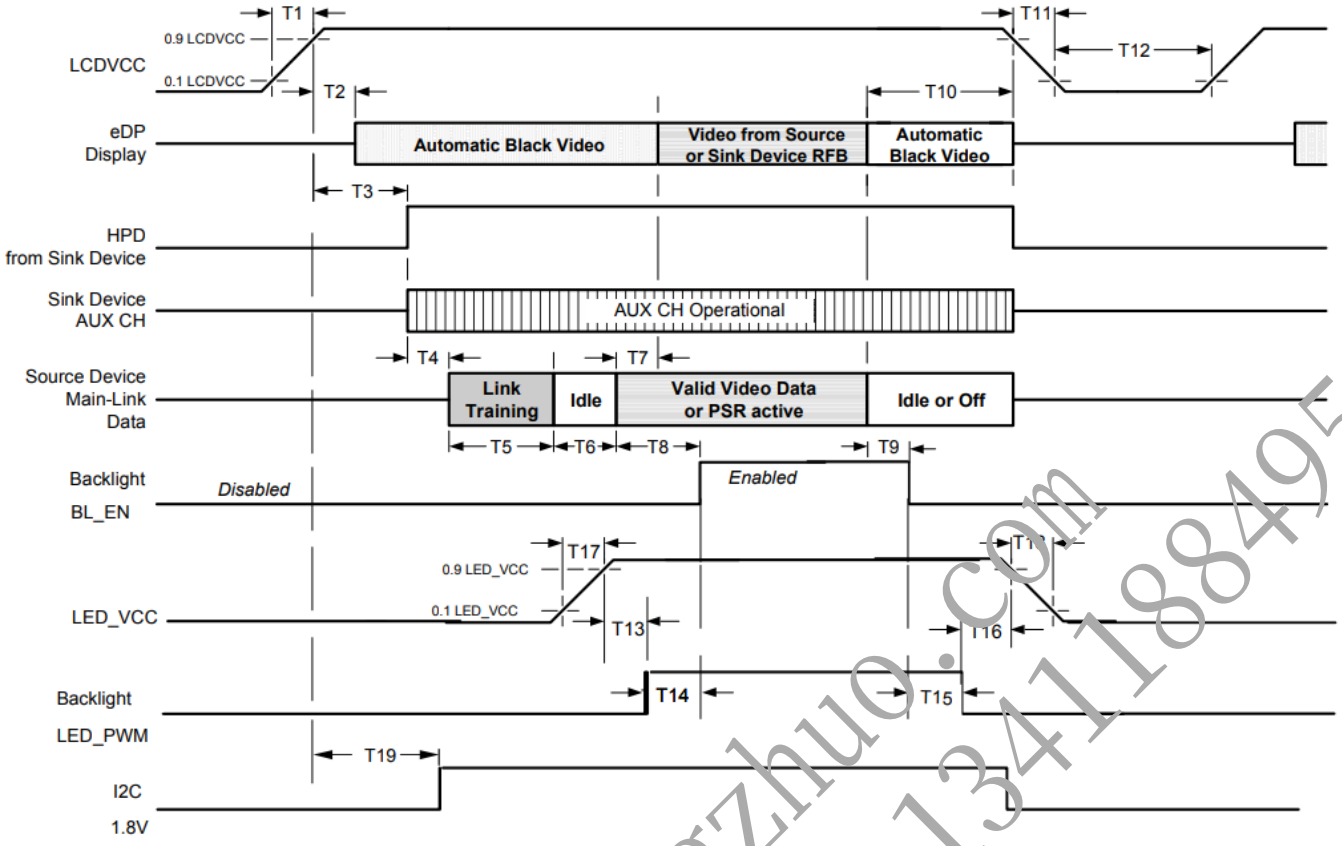
Signal	Item	Symbol	Min.	Typ.	Max.	Unit	Note
DCLK	Frequency	1/Tc	-	774.18	-	MHz	-
DE	Vertical Total Time	TV	-	1725	-	TH	-
	Vertical Active Display Period	TVD	1600	1600	1600	TH	-
	Vertical Active Blanking Period	TVB	-	125	-	TH	-
	Horizontal Total Time	TH	-	2720	-	Tc	-
	Horizontal Active Display Period	THD	2560	2560	2560	Tc	-
	Horizontal Active Blanking Period	THB	-	160	-	Tc	-

Note (1) Display timing signal should be contained and transferred by Display Port Main Link stream data packing described in VESA Display Port Standard V1.4b.

INPUT SIGNAL TIMING DIAGRAM



4.7 POWER ON/OFF SEQUENCE



Symbol	Description	Min	Typ.	Max	Unit	Note
t1	Power rail rise time, 10% to 90%	0.5		10	ms	
t2	Delay from LCD,VCCS to eDP Display	0		80	ms	
t3	Delay from LCD,VCCS to HPD high	0		80	ms	
t4	Delay from Sink AUX to link training initialization	-		-	ms	
t5	Link training duration	-		-	ms	
t6	Link idle	-		-	ms	
t7	Delay from valid video data from Source to video on display	0		50	ms	
t8	Delay from valid video data from Source to backlight on	-		-	ms	
t9	Delay from backlight off to end of valid video data	-		-	ms	
t10	Delay from end of valid video data from Source to power off	0		T10-50	ms	

t11	VCCS power rail fall time, 90% to 10%	50		10	ms	(1)
t12	VCCS Power off time	500		-	ms	
t13	Delay from VCC to PWM	0		-	ms	
t14	Delay from PWM to LED ENABLE	0		-	ms	
t15	Delay from LED ENABLE to PWM Disable	0		-	ms	
t16	Delay from PWM Disable to VBL 90%	0		-	ms	
t17	Delay from VBL 10% to VBL 90%	0		-	ms	
t18	VBL power rail fall time, 90% to 10%	0		-	ms	
t19	Delay from VCC to I2C signal	20		-	ms	

Note (1) Please follow the power on/off sequence described above. Otherwise, the LCD module might abnormal display or be damaged.

Note (2) Please avoid floating state of interface signal at invalid period. When the interface signal is invalid, be sure to pull down the power supply of LCD VCCS to 0 V.

Note (3) The backlight must be turned on after the power supply for the logic and the interface signal is valid.

The backlight must be turned off before the power supply for the logic and the interface signal is invalid.

Note (4) Please follow the LED backlight power sequence as above. If the customer could not follow, it might cause backlight flash issue during display ON/OFF or damage the LED backlight controller

5. Optical characteristics

Ta=25°C

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Viewing angle range	Left/Right	CR＞10	80	-	89	Deg.	(1), (3), (4), (6)
	Upper/Lower		80	-	89		
Contrast ratio	CR	θ=0 deg.	800	1000	-	-	(2), (4), (6)
Response time	τr+τd		-	9	10	ms	(5)
	GTG AVE.(w/o OD)		-	7	-	ms	
	GTG AVE.(w/i OD)		-	-	3.8	ms	
Chromaticity of white	x		Typ. -0.030	0.313	Typ. +0.030	-	(2), (6) Normal operation
	y			0.329		-	
Chromaticity of red	x			0.640		-	
	y			0.330		-	

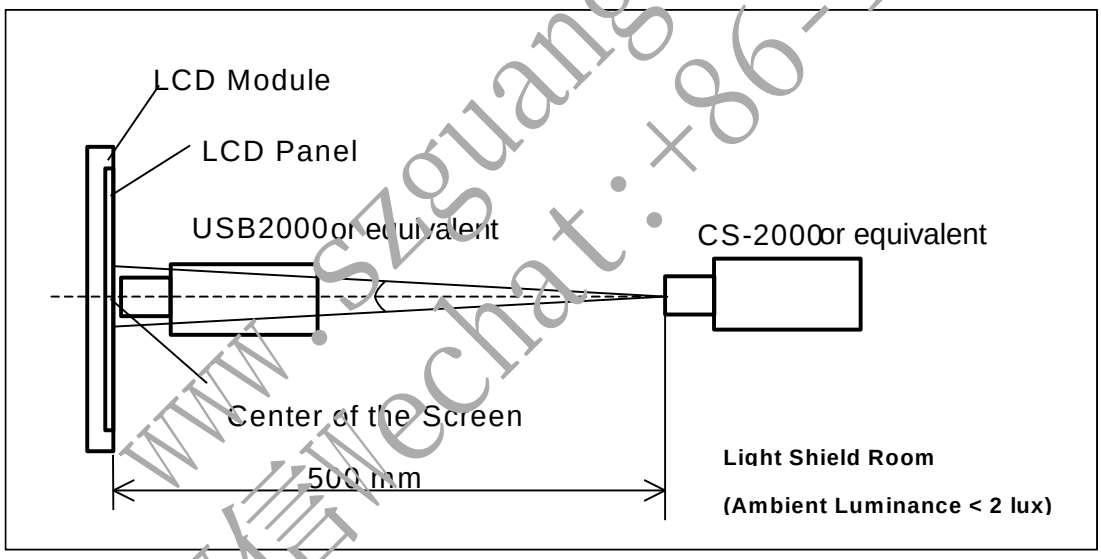
Chromaticity of green	x			0.300		-	
	y			0.600		-	
Chromaticity of blue	x			0.150		-	
	y			0.060		-	
sRGB Coverage	%		95%	100%.	-	sRGB	
Luminance of	Y_{LI}	@5 point	255	300	-	cd/m^2	(7)
gamma	--	--	2. 0	2.2	2.4	--	--
White uniformity	δ_W	θ=0 deg.	-	-	1.5	--	(8)
Eye safe	--	--	-				
CCT	--	--	-	-	-	K	(2), (8)

※The measurement shall be taken 5 minutes after lighting the LCM at the following rating.

※The optical characteristics shall be measured in a dark room or equivalent.

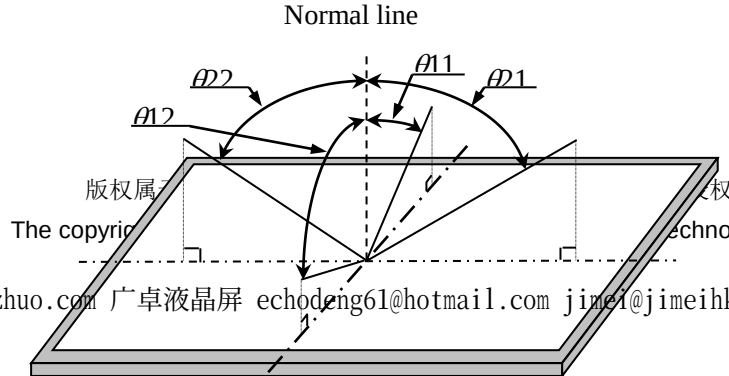
Note (1) Measurement of viewing angle range

Note (2) Measurement of luminance and Chromaticity and Contrast.



Measurement of Contrast, Luminance, Chromaticity, White variation, Crosstalk and Color temperature variation

Note (3) Definitions of viewing angle range:

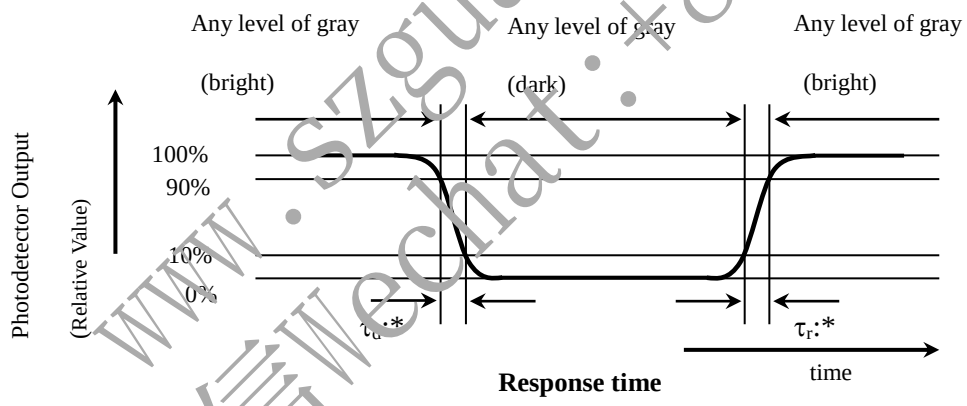


Viewing angle

Note (4) Definition of contrast ratio:

The contrast ratio is defined as the following.

$$\text{Contrast Ratio} = \frac{\text{Luminance(Brightness) with all pixels white}}{\text{Luminance(Brightness) with all pixels Black}}$$



Response time

		Start Gray								
		0	31	63	95	127	159	191	223	255
End Gray	0	■								
	31		■							
	63			■						
	95				■					
	127					■				
	159						■			
	191							■		
	223								■	
	255									■

Response time

Note (5) Definition of response time:

The response time is defined as the following figure and shall be measured by switching the input signal for "black" and "white" .

$$GTG\ ave = \frac{t_{0-31} + t_{31-0} + t_{0-63} + t_{63-0} + \cdots + t_{223-255} + t_{255-223}}{8 * 9}$$

Note (6) This shall be measured at center of the screen.

Note (7) The Luminance of White is the average of 5 points measurements (4,5,7,9,10) showing in the Fig.9-5.

Note (8) Definition of white uniformity: White uniformity of 13 points is defined as the following with 13 measurements(1~13).

$$\delta_{W2} = \frac{\text{Maximum Luminance of 13 Points(Brightness)}}{\text{Minimum Luminance of 13 Points(Brightness)}}$$

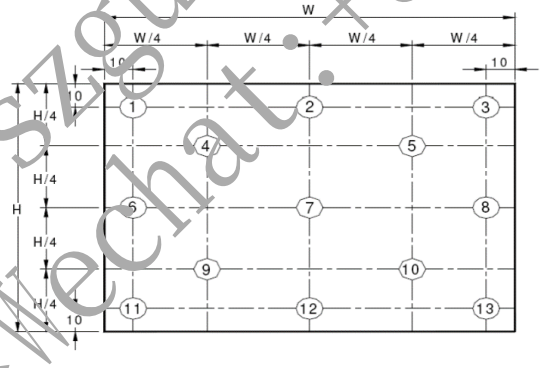


Fig.9-5

6. Reliability Test Items

No	Test Item	Conditions

1	ESD	Non-OP ESD a. Surface discharge Air discharged +/- 15kV Criteria C Contact discharged +/-8kV Criteria C b. Golden Finger/ Connector pin Contact discharged +/- 2kV Criteria OP ESD Air discharged +/- 15kV Criteria B Contact discharged +/-8kV Criteria B
2	IS	a. pattern: 8*4 chess board temperature: 25˚ 10s/5mins/10mins/20mins/30mins/1hr @ 5s recovery with nude eye 6hrs @ 10mins recovery with nude eye -->recovery by G127, and checked by G127 b. pattern: QTR test pattern temperature:40˚, humidity: 85% 24hrs @ white(G255) pattern 1hrs recovery(under 25˚) with nude eye -->recovery by G255, and checked by G127 and G255
3	High temperature storage test	60℃，240Hrs
4	Low temperature storage test	-20℃，240Hrs
5	Low temperature operation test	0℃，240hrs
6	High temperature operation test	50℃，240Hrs
7	High temperature & high humidity operation test	40℃，90%RH，240Hrs
8	Thermal shock test	-20℃/30min、60℃/30min 100cycles
9	Vibration	1.5G/10-500Hz, Sine wave, 30min/cycle, 1cycle for each X,Y,Z
10	Shock	220G, 2ms, half sine wave, 1 time for each direction of ±X,±Y,±Z

[Result Evaluation Criteria] Under the display quality test condition with normal operation state.

Do not change these condition as such changes may affect practical display function.

[Normal operation state] temperature：﹢15℃~﹢35℃，Humidity：45~75%，Atmospheric pressure：86~106kPa

7. Display Quality

The display quality of the color TFT-LCD Module shall be in compliance with the Incoming Inspection Standard.

8. Packaging Condition

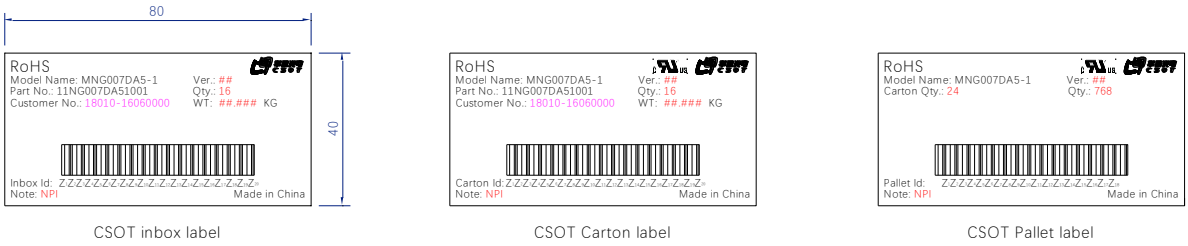
8.1 Packing Specifications

Item	Specification	Remark
Carton(Box) Packing	32 PCS/Carton(Box)	4 PCS/Tray,（4+1）*2
Carton(Box) Packing Size	490mm(L)x392mm(W)x310mm(H)	Length x Width x Height
Pallet Packing	24 Carton(Box)/Pallet	6*4
Pallet Packing Size	1200mm(L)x1000mm(W)x1360mm(H)	Length x Width x Height

8.2 Packing Method

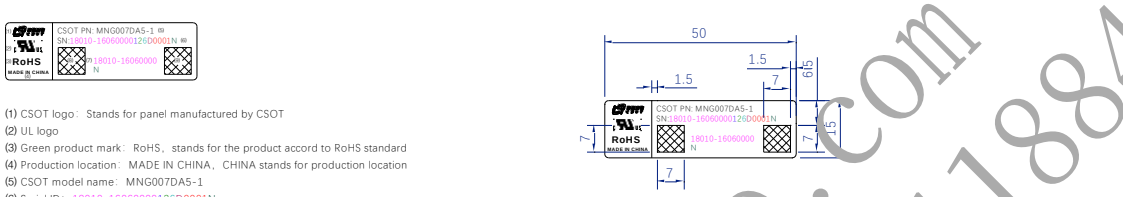
8.3 Label

Package label



CSOT inbox label　　CSOT Carton label　　CSOT Pallet label

LCM label



(1) CSOT logo: Stands for panel manufactured by CSOT
(2) UL logo
(3) Green product mark: RoHS, stands for the product accord to RoHS standard
(4) Production location: MADE IN CHINA, CHINA stands for production location
(5) CSOT model name: MNG007DA5-1
(6) Serial ID: 18010-16060000126D0001N

- NPI mark N, MP mark M
- Serial NO.
- Year, Month, Day
- Product line
- ASUS P/N

(7) ASUS P/N: 18010-16060000N

- NPI mark N, MP mark M
- ASUS P/N

(8) Serial ID DM code: same content as (6)
(9) ASUS P/N DM code: same content as (7)

Serial ID includes the information as below
a. Manufactured Date: Year: Last code of the year
Month: 1~9,A,B,C
Day: 1~Z,Except I/O/Q/U
b. Serial NO.: 0001~ZZZZ,Except I/O/Q/U
c. Product line.: 1~Z,Except I/O

Qty: the values for reference,base on reality quantity
WT: the values for reference,base on reality weight
Carton Qty.: the values for reference,base on reality carton quantity

NOTES:
1.Font:reference(Arial),Height:2mm,Space:1mm;
2.CSOT Barcode Style:Code 128;
3.Attached position see the RD Packing manual;
4.The printing information must be clearly.

9. RoHS Directive

This LCD Module is compliant with RoHS Directive.

10. Handling Precautions

a) Be sure to turn off the power supply when inserting or disconnecting the cable .Please insert for too much stress not to join a connector in the case of insertion of a connector.

b) Be sure to design the cabinet so that the Module can be installed without any extra stress such as warp or twist.

c) Since the front polarizer is easily damaged, pay attention not to scratch it.

d) Wipe off water drop immediately. Long contact with water may cause discoloration or spots.

e) When the panel surface is soiled, wipe it with absorbent cotton or other soft cloth.

f) Since the panel is made of glass, it may break or crack if dropped or bumped on hard surface. Handle with care.

g) Since CMOS LSI is used in this Module, take care of static electricity and injure the human earth when handling. Observe all other precautionary requirements in handling components.

h) This Open-cell has its circuitry PCBs on the side and should be handled carefully in order not to be stressed.

i) Laminate film is attached to the Module surface to prevent it from being scratched. Peel the laminate film off slowly just before the use with strict attention to electrostatic charges. Ionized air shall be blown over during the action. Blow off the 'dust' on the polarizer by using an ionized nitrogen gun, etc. Working under the following environments is desirable.

- All workers wear conductive shoes, conductive clothes, conductive fingerstalls and grounding belts without fail.
- Use Ionized blower for electrostatic removal, and peel of the laminate film with a constant speed. (Peeling of it at over 2 seconds)

j) The polarizer surface on the panel is treated with Anti Glare . In case of attaching protective board over the LCD, be careful about the optical interface fringe etc. which degrades display quality.

k) Do not expose the LCD Module to a direct sunlight, for a long period of time to protect the Module from the ultra violet ray.

l) When handling LCD Modules and assembling them into cabinets, please be noted that long-term storage in the environment of oxidization or deoxidization gas and the use of such materials as reagent, solvent, adhesive, resin, etc. which generate these gasses, may cause corrosion and discoloration of the Modules.

m) Liquid crystal contained in the panel may leak if the LCD is broken. Rinse it as soon as possible if it gets inside your eye or mouth by mistake.

n) Disassembling the Module can cause permanent damage and should be strictly avoided.(Except for protection film of the panel.)

o) Be careful when using it for long time with fixed pattern display as it may cause afterimage.(Please use a screen saver etc., in order to avoid an afterimage.)

p) If a minute particle enters in the Module and adheres to an optical material, it may cause display non-uniformity issue, etc. Therefore, fine-pitch filters have to be installed to cooling and inhalation hole if you intend to install a fan.

q) Epoxy resin (amine series curing agent), silicone adhesive material (dealcoholization series and oxime series), tray forming agent (azo compound) etc, in the cabinet or the packing materials may induce abnormal display with polarizer film deterioration regardless of contact or noncontact to polarizer film.Be sure to confirm the component of them.

r) Do not use polychloroprene. If you use it, there is some possibility of generating Cl2 gas that influences the reliability of the connection between LCD panel and driver IC.

s) Do not put a laminate film on LCD Module, after peeling of the original one. If you put on it, it may cause discoloration or spots because of the occurrence of air gaps between the polarizer and the film.

t) Ground module bezel to stabilize against EMI and external noise.

Appendix. EDID DATA STRUCTURE:

EDID Table Format					
EDID structure	Address (HEX)	Field Name & Comments	Requirements	Hex	Binary
Header	00	Header	"00h" fixed	00	00000000
	01		"FFh" fixed	FF	11111111
	02		"FFh" fixed	FF	11111111
	03		"FFh" fixed	FF	11111111
	04		"FFh" fixed	FF	11111111
	05		"FFh" fixed	FF	11111111
	06		"FFh" fixed	FF	11111111
	07		"00h" fixed	00	00000000
Vendor & Product Identification	08	ID Manufacturer Name	"0Eh" fixed	0E	00001110
	09		"6Fh" fixed	6F	01101111
	0A	ID Product Code	Pls Check"CSOT ID table"	32	00110010
	0B			16	00010110
	0C	32-bit serial No.	Basically "00h"	00	00000000
	0D		Basically "00h"	00	00000000
	0E		Basically "00h"	00	00000000
	0F		Basically "00h"	00	00000000
	10	Week of manufacture	Basically "00h"	00	00000000
	11	Year of Manufacture	2022	21	00100001
EDID Version & Revision	12	EDID Structure Ver.	"01h" fixed	01	00000001
	13	EDID revision #	"04h" fixed	04	00000100
Basic Display Parameters & Features	14	Video input definition		A5	10100101
	15	Max H image size		22	00100010
	16	Max V image size		16	00010110
	17	Display Gamma		78	01111000
	18	Feature support		03	00000011

Color Characteristics	19	Red/Green low bits	Pls input values in cell D3~D10 of sheet "Coordinates"	EE	11101110
	1A	Blue/White low bits		95	10010101
	1B	Red x high bits		A3	10100011
	1C	Red y high bits		54	01010100
	1D	Green x high bits		4C	01001100
	1E	Green y high bits		99	10011001
	1F	Blue x high bits		26	00100110
	20	BLue y high bits		0F	00001111
	21	White x high bits		50	01010000
	22	White y high bits		54	01010100
Established Timings	23	Established timing 1	"00h" fixed	00	00000000
	24	Established timing 2	"00h" fixed	00	00000000
	25	Established timing 3	"00h" fixed	00	00000000
Standard Timings: Identification 1 → 8	26	Standard timing #1	"01h" fixed	01	00000001
	27		"01h" fixed	01	00000001
	28	Standard timing #2	"01h" fixed	01	00000001
	29		"01h" fixed	01	00000001
	2A	Standard timing #3	"01h" fixed	01	00000001
	2B		"01h" fixed	01	00000001
	2C	Standard timing #4	"01h" fixed	01	00000001
	2D		"01h" fixed	01	00000001
	2E	Standard timing #5	"01h" fixed	01	00000001
	2F		"01h" fixed	01	00000001
	30	Standard timing #6	"01h" fixed	01	00000001
	31		"01h" fixed	01	00000001
	32	Standard timing #7	"01h" fixed	01	00000001
	33		"01h" fixed	01	00000001
	34	Standard timing #8	"01h" fixed	01	00000001
	35		"01h" fixed	01	00000001
Preferred Timing Mode	36	Pixel Clock/10,000 (LSB)	Preferred Timing Mode	60	01100000
	37	Pixel Clock/10,000 (MSB) /		6C	01101100

	38	Horizontal Active		00	00000000
	39	Horizontal Blanking		A0	10100000
	3A	Horizontal Active : Horizontal Blanking		A0	10100000
	3B	Vertical Active		40	01000000
	3C	Vertical Blanking		64	01100100
	3D	Vertical Active : Vertical Blanking		60	01100000
	3E	Horizontal Sync. Offset		30	00110000
	3F	Horizontal Sync Pulse Width		20	00100000
	40	Vertical Sync Offset : Sync Width		36	00110110
	41	Horizontal Vertical Sync Offset/Width		00	00000000
	42	Horizontal Image Size		58	01011000
	43	Vertical Image Size		D7	11010111
	44	Horizontal & Vertical Image Size		10	00010000
	45	Horizontal Border		00	00000000
	46	Vertical Border		00	00000000
	47	Signal Interface Type		18	00011000
Detailed Timing # 2	48	Pixel Clock/10,000 (LSB) (Slow Refresh rate)	【 LRR 2.5(PSR2, VRR) 】: MRL 【 Not LRR 】: All "00h" or Timing MRL (Monitor Range Limits) 48h -> "00h" fixed 49h -> "00h" fixed 4Ah -> "00h" fixed 4Bh -> "FDh" fixed 52h -> "01h" fixed 53h -> "0Ah" fixed 54h -> "20h" fixed 55h -> "20h" fixed 56h -> "20h" fixed 57h -> "20h" fixed 58h -> "20h" fixed	00	00000000
	49	Pixel Clock/10,000 (MSB) / (Slow Refresh rate)		00	00000000
	4A	Horizontal Active		00	00000000
	4B	Horizontal Blanking		FD	11111101
	4C	Horizontal Active : Horizontal Blanking		0C	00001100
	4D	Vertical Active		30	00110000
	4E	Vertical Blanking		A5	10100101
	4F	Vertical Active : Vertical Blanking		1A	00011010
	50	Horizontal Sync. Offset		1A	00011010
	51	Horizontal Sync Pulse Width		4D	01001101
	52	Vertical Sync Offset : Sync Width		01	00000001
	53	Horizontal Vertical Sync Offset/Width		0A	00001010
	54	Horizontal Image Size		20	00100000
	55	Vertical Image Size		20	00100000

	56	Horizontal & Vertical Image Size	59h -> "20h" fixed	20	00100000
	57	Horizontal Border		20	00100000
	58	Vertical Border		20	00100000
	59	Signal Interface Type		20	00100000
Display Descriptor # 3	5A	Flag	Model Name : MNH301CA3-1 5Ah -> "00h" fixed	00	00000000
	5B	Flag	5Bh -> "00h" fixed	00	00000000
	5C	Flag	5Ch -> "00h" fixed	00	00000000
	5D	Data Type Tag	5Dh -> "FEh" fixed	FC	11111100
	5E	Reserved	5Eh -> "00h" fixed	00	00000000
	5F	ASCII		4D	01001101
	60	ASCII		4E	01001110
	61	ASCII		47	01000111
	62	ASCII		30	00110000
	63	ASCII		30	00110000
	64	ASCII		37	00110111
	65	ASCII		44	01000100
	66	ASCII		41	01000001
	67	ASCII		35	00110101
	68	ASCII		2D	00101101
	69	ASCII		31	00110001
	6A	ASCII		0A	00001010
	6B	ASCII		20	00100000
Display Descriptor # 4	6C	Flag	【ASCII】Display Product 6Ch -> "00h" fixed	00	00000000
	6D	Flag	6Dh -> "00h" fixed	00	00000000
	6E	Flag	6Eh -> "00h" fixed	00	00000000
	6F	Data Type Tag	6Fh -> "FEh" fixed	FE	11111110
	70	Flag	70h -> "00h" fixed	00	00000000
	71	Model Name		43	01000011
	72	Model Name		53	01010011
	73	Model Name		4F	01001111
	74	Model Name		54	01010100

	75	Model Name		20	00100000
	76	Model Name		54	01010100
	77	Model Name		33	00110011
	78	Model Name		0A	00001010
	79	Model Name		20	00100000
	7A	Model Name		20	00100000
	7B	Model Name		20	00100000
	7C	Model Name		20	00100000
	7D			20	00100000
Extension Block Count N	7E	Extension flag		01	00000001
Checksum	7F	Checksum		24	00100100
DID 2.0	80	EDID Extension Tags		70	01110000
	81	Display ID version		20	00100000
	82	section size		79	01111001
	83	product Type identifier		2	00000010
DID Block #1 Header	84	extension count		00	00000000
	85	block tag		22	00100010
	86	block rev		0	00000000
	87	Payload		14	00010100
First Timing	88	Pixel Clock		4F	01001111
	89			A4	10100100
	8A			B	00001011
	8B	timing options		85	10000101
	8C	H-Active		FF	11111111
	8D			09	00001001
	8E	H-Blanking		9F	10011111
	8F			00	00000000
	90	H-offset		2F	00101111
	91			00	00000000
	92	H-sync pulse width		1F	00011111

	93			00	00000000
	94	V-Active		3F	00111111
	95			6	00000110
	96	V-Blanking		63	01100011
	97			0	00000000
	98	V-offset		02	00000010
	99			00	00000000
	9A	V-sync pulse width		5	00000101
	9B			00	00000000
adaptive sync data block	9C	Adaptive-Sync Data Block		2B	00101011
	9D	Block revision = 0		00	00000000
	9E	Number of Payload Bytes in block= 6 byte		0C	00001100
	9F	FAVT and AVT Supported,Native panel range,successive frame duration Decrease met with in RR Range.		27	00100111
	A0	00h = Flicker performance is met in any duration increase within the refresh rate range without jitter impact.		00	00000000
	A1	Minimum Refresh Rate(60/1.001)Hz		3C	00111100
	A2	Maximum Refresh Rate(240/1.00035)Hz		A4	10100100
	A3			00	00000000
	A4	00h = Flicker performance is met in any duration decrease within the refresh rate range		00	00000000
unused	A5	Reserved for definition		27	00100111
	A6	Reserved for definition		00	00000000
	A7	Reserved for definition		30	00110000
	A8	Reserved for definition		3B	00111011
	A9	Reserved for definition		00	00000000
	AA	Reserved for definition		00	00000000
	AB	Reserved for definition		81	10000001
	AC	Reserved for definition		00	00000000

	AD	Reserved for definition		15	00010101
	AE	Reserved for definition		74	01110100
	AF	Reserved for definition		1A	00011010
	B0	Reserved for definition		00	00000000
	B1	Reserved for definition		00	00000000
	B2	Reserved for definition		03	00000011
	B3	Reserved for definition		C1	11000001
	B4	Reserved for definition		30	00110000
	B5	Reserved for definition		A5	10100101
	B6	Reserved for definition		0	00000000
	B7	Reserved for definition		1	00000100
	B8	Reserved for definition		00	00000000
	B9	Reserved for definition		00	00000000
	BA	Reserved for definition		00	00000000
	BB	Reserved for definition		00	00000000
	BC	Reserved for definition		A5	10100101
	BD	Reserved for definition		00	00000000
	BE	Reserved for definition		E0	11100000
	BF	Reserved for definition		57	01010111
	C0	Reserved for definition		0E	00001110
	C1	Reserved for definition		00	00000000
	C2	Reserved for definition		00	00000000
	C3	Reserved for definition		00	00000000
	C4	Reserved for definition		00	00000000
	C5	Reserved for definition		00	00000000
	C6	Reserved for definition		00	00000000
	C7	Reserved for definition		00	00000000
	C8	Reserved for definition		00	00000000
	C9	Reserved for definition		00	00000000
	CA	Reserved for definition		00	00000000
	CB	Reserved for definition		00	00000000

	CC	Reserved for definition		00	00000000
	CD	Reserved for definition		00	00000000
	CE	Reserved for definition		00	00000000
	CF	Reserved for definition		00	00000000
	D0	Reserved for definition		00	00000000
	D1	Reserved for definition		00	00000000
	D2	Reserved for definition		00	00000000
	D3	Reserved for definition		00	00000000
	D4	Reserved for definition		00	00000000
	D5	Reserved for definition		00	00000000
	D6	Reserved for definition		00	00000000
	D7	Reserved for definition		00	00000000
	D8	Reserved for definition		00	00000000
	D9	Reserved for definition		00	00000000
	DA	Reserved for definition		00	00000000
	DB	Reserved for definition		00	00000000
	DC	Reserved for definition		00	00000000
	DD	Reserved for definition		00	00000000
	DE	Reserved for definition		00	00000000
	DF	Reserved for definition		00	00000000
	E0	Reserved for definition		00	00000000
	E1	Reserved for definition		00	00000000
	E2	Reserved for definition		00	00000000
	E3	Reserved for definition		00	00000000
	E4	Reserved for definition		00	00000000
	E5	Reserved for definition		00	00000000
	E6	Reserved for definition		00	00000000
	E7	Reserved for definition		00	00000000
	E8	Reserved for definition		00	00000000
	E9	Reserved for definition		00	00000000
	EA	Reserved for definition		00	00000000

	EB	Reserved for definition		00	00000000
	EC	Reserved for definition		00	00000000
	ED	Reserved for definition		00	00000000
	EE	Reserved for definition		00	00000000
	EF	Reserved for definition		00	00000000
	F0	Reserved for definition		00	00000000
	F1	Reserved for definition		00	00000000
	F2	Reserved for definition		00	00000000
	F3	Reserved for definition		00	00000000
	F4	Reserved for definition		00	00000000
	F5	Reserved for definition		00	00000000
	F6	Reserved for definition		00	00000000
	F7	Reserved for definition		00	00000000
	F8	Reserved for definition		00	00000000
	F9	Reserved for definition		00	00000000
	FA	Reserved for definition		00	00000000
	FB	Reserved for definition		00	00000000
	FC	Reserved for definition		00	00000000
	FD	Reserved for definition		00	00000000
Checksum1	FE	Checksum(101~17E)		8D	10001101
Checksum2	FF	Checksum(100~17F)		90	10010000

Appendix. OUTLINE DRAWING