

Wuhan China Star Optoelectronics Technology Co.,Ltd

## Product Specification Sheet

Customer: \_\_\_\_\_

Model Name: MNG007DA6-1

Date: 2023/06/20

Version: V01

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

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### Record of Revision

Version	Revise Date	Page	Content
V01	2023/05/26	All	Preliminary Specification

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# 1. General Description

## 1.1 Overview

**MNG007DA6-1** is a 16" 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 Specifications Summary

No.	Item	Specification	Unit	Note
1	LCD size	16.0	inch	
2	Resolution	2560 x RGB x 1600		WQXGA
3	Pixel Arrangement	RGB		
4	Model Type	LCM		
5	TFT Technology	LTPS		
6	Display mode	FFS, Normally Black		
7	Active Area	344.6784 (H) x 215.424 (V)	mm	
8	pixel pitch	134.64(H) x 134.64(V)	um	
9	Display Colors	16.7M		
10	Contrast Ratio	1200:1(Typ)		
11	Color Gamut	DCI-P3 99.5% (typ) / 95% (min)	CIE1931	DCI
12	LCM Outline Dimension	349.68x224.42x2.45	mm	Typical
13	Luminance	500(Typ)	nits	
14	Low blue light ratio	Y	%	Max
15	Surface treatment(UP)	Fine AG(Haze 25%)	--	Pol.
16	Interface	eDP 1.4		
17	Refresh Rate	60-240	Hz	
18	Function	PSR2、LRR2.5、SDRRS、DMRRS、VRR		Intel
		PSR1、Panel replay、fast transport		AMD
		Gsync、DDS(PSR API)		NV
		DSC、AdaptiveSync、OD、ABOT、APOL		Other

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19	Method of Inversion	Column Inversion		
20	Power consumption of Panel	2.1(Max)	W	3.3V@Mosaic 240Hz
	Power consumption of Backlight	6.512	W	Max
21	Weight	320	g	Max

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 °C, 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	223.12	224.42	224.72	mm	
	Depth	2.3	2.45	2.6	mm	
Weight		-		320	g	

### 2.1 Interface Connection



Please refer Appendix Outline Drawing for detail design.

Connector Part No.: **STM MSAK24025P-10M**

## 3. Absolute Maximum Ratings

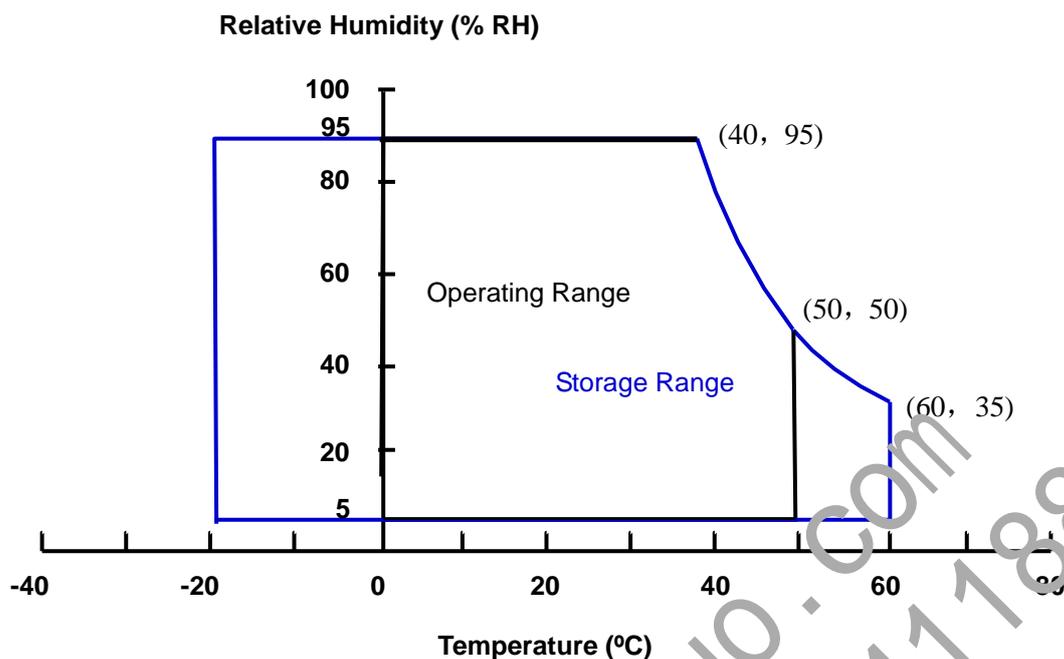
### 3.1 Absolute Ratings of Environment

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Storage Temperature	T <sub>ST</sub>	-20	+60	°C	(1)
Operating Ambient Temperature	T <sub>OP</sub>	0	+50	°C	(1), (2)

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Note (1)

- (a) 95% RH Max. ( $T_a \leq 40^\circ\text{C}$ ).
- (b) Wet-bulb temperature should be  $39^\circ\text{C}$  Max. ( $T_a > 40^\circ\text{C}$ ).
- (c) No condensation.

### 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	(1)
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”.

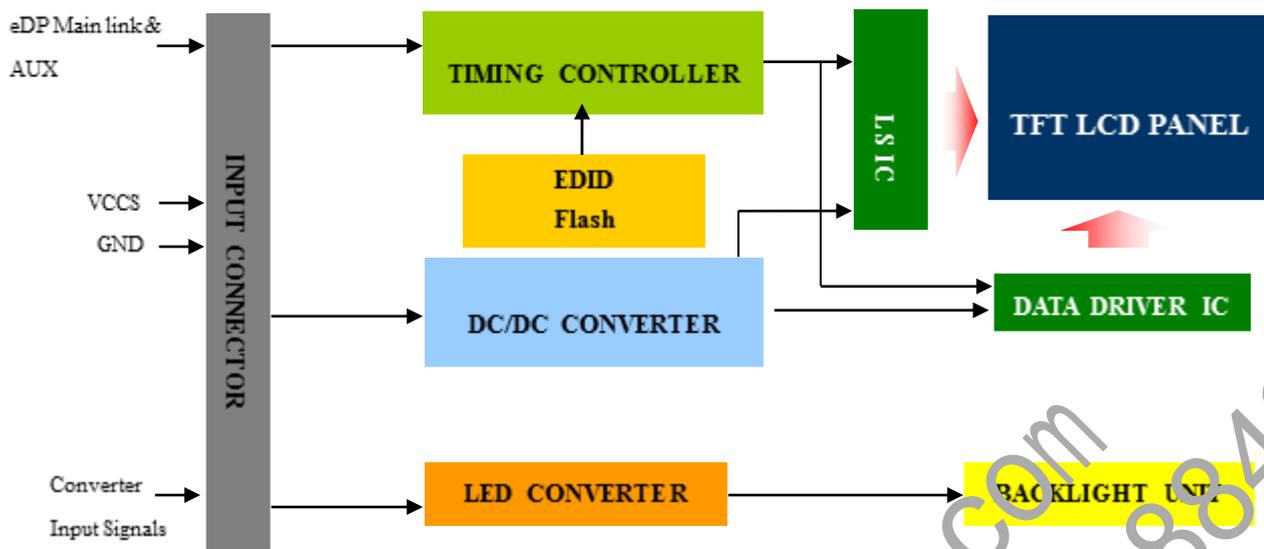
## 4. Electrical Specifications

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## 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)	

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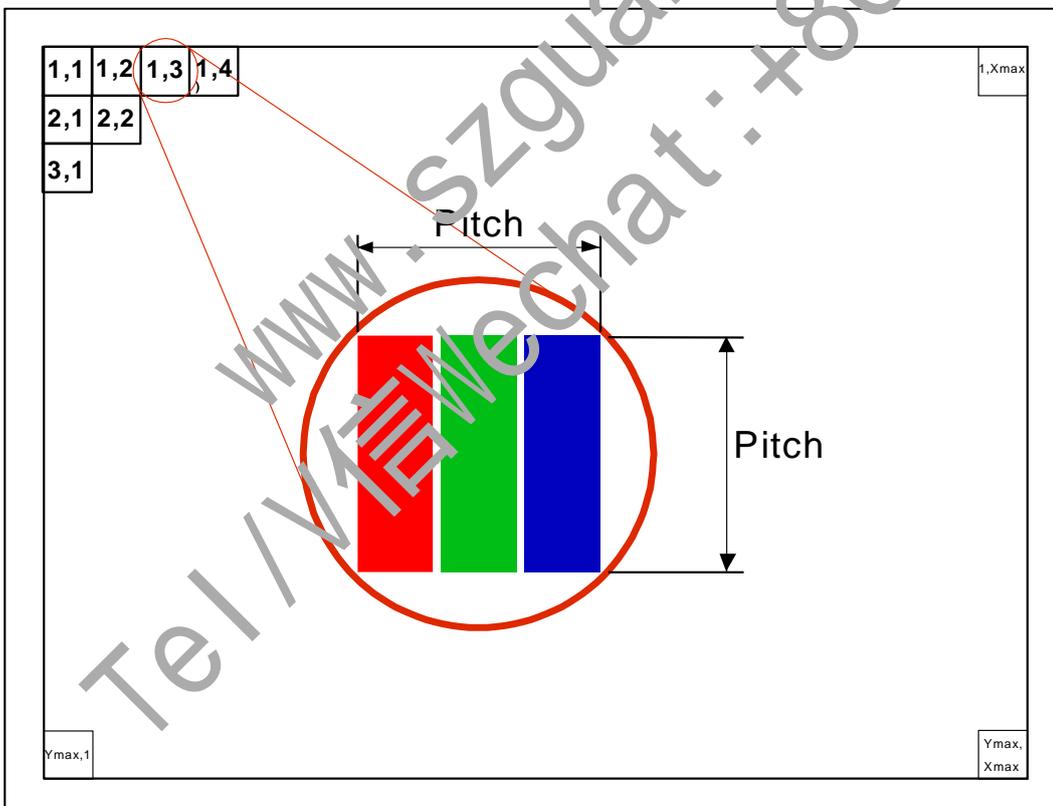
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22	BIST	Built-In Self Test (active high)	
23	ABOT	ABOT enable	(Disable@high(default),
24	GND	Ground	
25	GND	Ground	
26	GND	Ground	
27	HPD	Hot Plug Detect	
28	BL_GND	BL Ground	
29	BL_GND	BL Ground	
30	BL_GND	BL Ground	
31	APOLC	APOL control signal	
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

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



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### 4.3 Electrical Characteristics

#### 4.3.1 LCD Electronics 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 <sub>RP</sub>	-	-	100	mV	(1)
Inrush Current		I <sub>RUSH</sub>	-	-	1.5	A	(1)(2)
Power Supply Current	Mosaic	I <sub>LCD</sub>	-	-	636	mA	(3)
Power consumption	Mosaic	P <sub>LCD</sub>	-	-	21	W	(3)

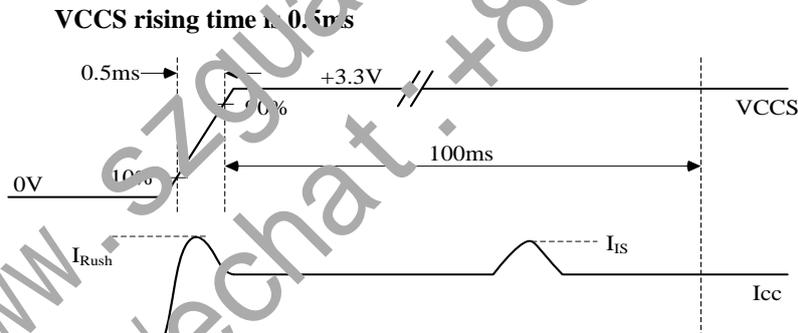
Note (1) The ambient temperature is  $T_a = 25 \pm 2 \text{ }^\circ\text{C}$ .

Note (2) I<sub>RUSH</sub>: the maximum current when VCCS is rising

I<sub>S</sub>: the maximum current of the first 100ms after power-on.

Measurement Conditions: Shown as the following figure.

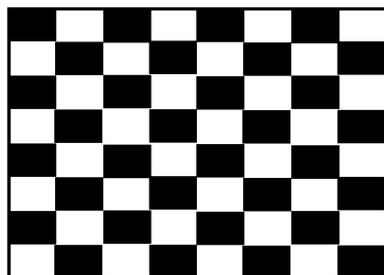
Test pattern: Mosaic



Note (3) The specified power supply current is under the conditions at VCCS = 3.3 V,  $T_a = 25 \pm 2 \text{ }^\circ\text{C}$ , DC Current and  $f_v = 240 \text{ Hz}$ , where a power dissipation check pattern below is displayed.

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Mosaic Pattern



Active Area

LED CONVERTER SPECIFICATION

Parameter	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
Converter Input power supply voltage	LED_Vccs	5.0	12.0	24.0	V	
Converter Inrush Current	I <sub>LED<sub>r</sub>USH</sub>	-	-	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 <sub>PWM_pp</sub>	-	-	100	mV	
PWM Control Frequency	f <sub>PWM</sub>	200	-	2000	Hz	
LED Power consumption	P <sub>L</sub>	-	-	6.512	W	(2)
LED Power Current	LED_VCCS =Typ.	-	542	464	mA	(3)

Note (1) I<sub>LED<sub>r</sub>USH</sub>: the maximum current when LED\_VCCS is rising,

I<sub>LED<sub>s</sub></sub>: the maximum current of the first 100ms after power-on,

Measurement Conditions: Shown as the following figure. LED\_VCCS = Typ, Ta = 25 ± 2 °C, f<sub>PWM</sub> = 200Hz, Duty=100%.

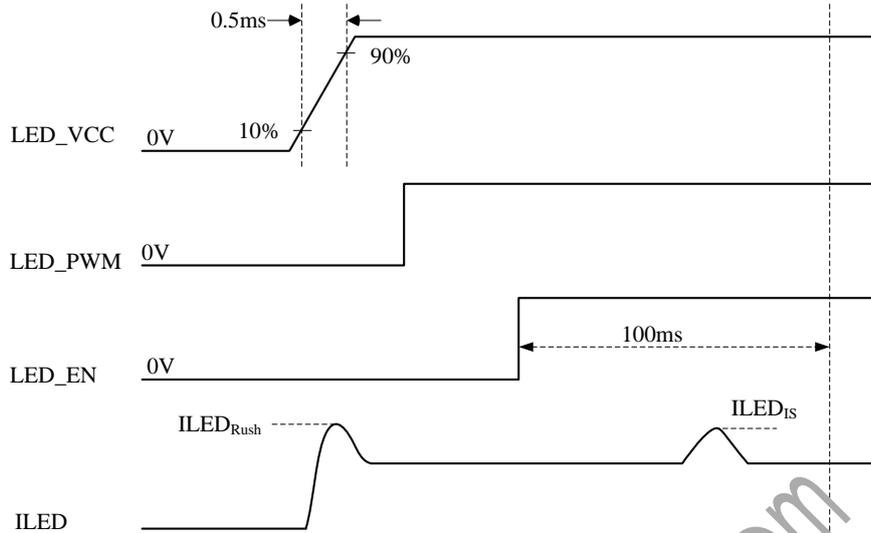
**VLED rising time is 0.5ms**

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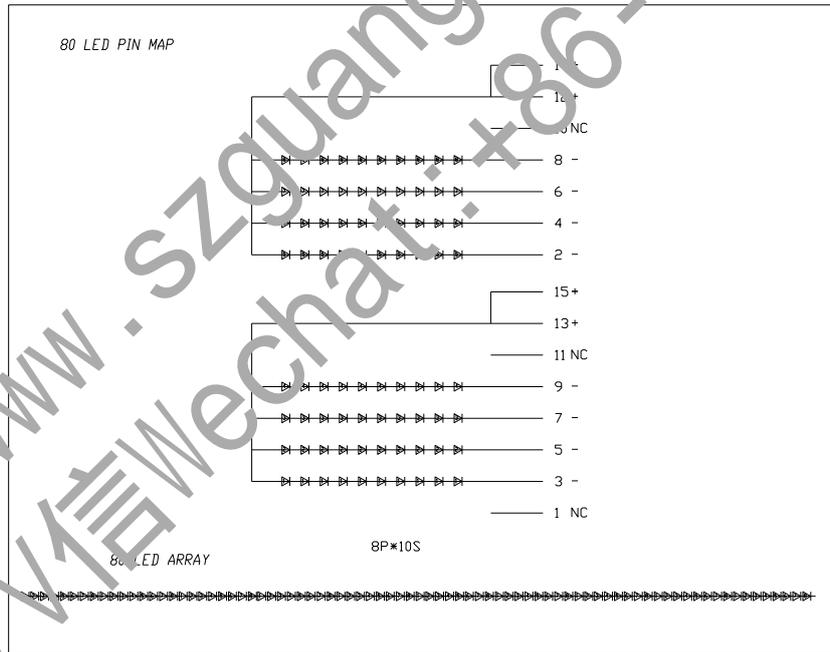
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Note(2)  $P_L = I_L \times V_L$  (With LED converter transfer efficiency);

Note (3) The specified LED power supply current is under the conditions at “LED\_VCCS = Typ. ,  $T_a = 25 \pm 2^\circ C$ , fPWM = 200 Hz, Duty=100%.

4.3.2 Backlight Unit



$T_a = 25 \pm 2^\circ C$

Parameter	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		

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LED Light Bar Power Supply Voltage	VL	-	-	29.1	V	(1)(2)
LED Light Bar Power Supply Current	IL	-	193.6	-	mA	(Duty100%)
Power Consumption	PL	-	-	5.634	W	(3)
LED Life Time	L <sub>BL</sub>	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 of  $T_a = 25 \pm 2 \text{ }^\circ\text{C}$  and  $I_L = 20 \text{ mA}$ (Per EA) until the brightness becomes  $\leq 50\%$  of its original value

## 4.4 Input Signal Timing Specification

### 4.4.1 eDP AUX Channel Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Unit Interval for AUX channel	UI <sub>AUX</sub>	0.4	-	0.6	μS	
Peak-to-peak voltage at TP1	V <sub>AUX-DIFF-pp</sub>	0.18	0.2	1.38	V	
AUX DC Common mode Voltage	V <sub>AUX-DC-CM</sub>	0	-	1.2	V	
AUX Short current limit	I <sub>AUX-SHORT</sub>	-	-	90	mA	
AUX CH termination DC resistor	R <sub>AUX-TERM</sub>	80	100	120	Ω	Differential input
AUX AC coupling capacitor	C <sub>AUX</sub>	75	-	200	nF	
Number of pre-charge pulses	Pre-charge pulses	10	-	16		

### 4.4.2 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 <sub>RX-DIFFp-p</sub>	100	-	1320	mV	
Differential termination resistance	R <sub>RX-TERM</sub>	80	100	120	Ω	
RX short circuit Current Limit	I <sub>RX-SHORT</sub>	-	-	50	mA	
Lane Intra-pair Skew at RX package pins	T <sub>RX-SKEW-INTRA-PAIR-High-Bit-Rate</sub>	-	-	50	ps	

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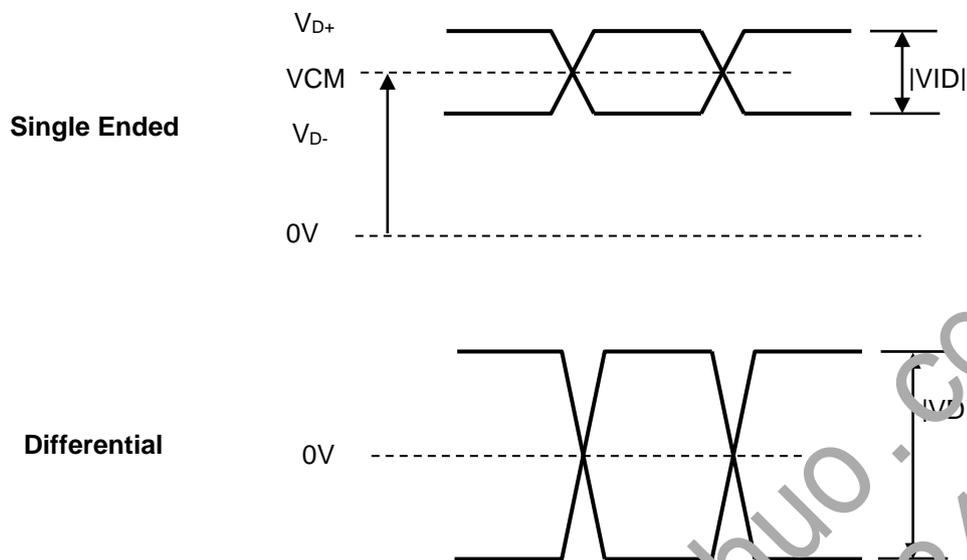
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**4.4.3 eDP AUX Channel Characteristics**

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Hot plug Detect	VHPD	2.5	-	2.8	V	

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



**4.4.4 Color Data Input Assignment**

The brightness of each primary color (red, green and blue) 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.

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

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

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

Signal	Item	Symbol	Min.	Typ.	Max.	Unit	Note
	Frame	TV	/	240	/	Hz	
DCLK	Frequency	1/Tc	/	1142.4	/	MHz	-
DE	Vertical Total Time	TV	/	1750	/	TH	-
	Vertical Active Display Period	TVD	/	1600	/	TH	-
	Vertical Active Blanking Period	TVB	/	150	/	TH	-
	Horizontal Total Time	TH	/	2720	/	Tc	-
	Horizontal Active Display Period	THD	/	2560	/	Tc	-
	Horizontal Active Blanking Period	THB	/	160	/	Tc	-

Signal	Item	Symbol	Min.	Typ.	Max.	Unit	Note
	Frame	TV	/	60	/	Hz	
DCLK	Frequency	1/Tc	/	24.4	/	MHz	-
DE	Vertical Total Time	TV	/	1750	/	TH	-
	Vertical Active Display Period	TVD	/	1600	/	TH	-
	Vertical Active Blanking Period	TVB	/	150	/	TH	-
	Horizontal Total Time	TH	/	2720	/	Tc	-
	Horizontal Active Display Period	THD	/	2560	/	Tc	-
	Horizontal Active Blanking Period	THB	/	160	/	Tc	-

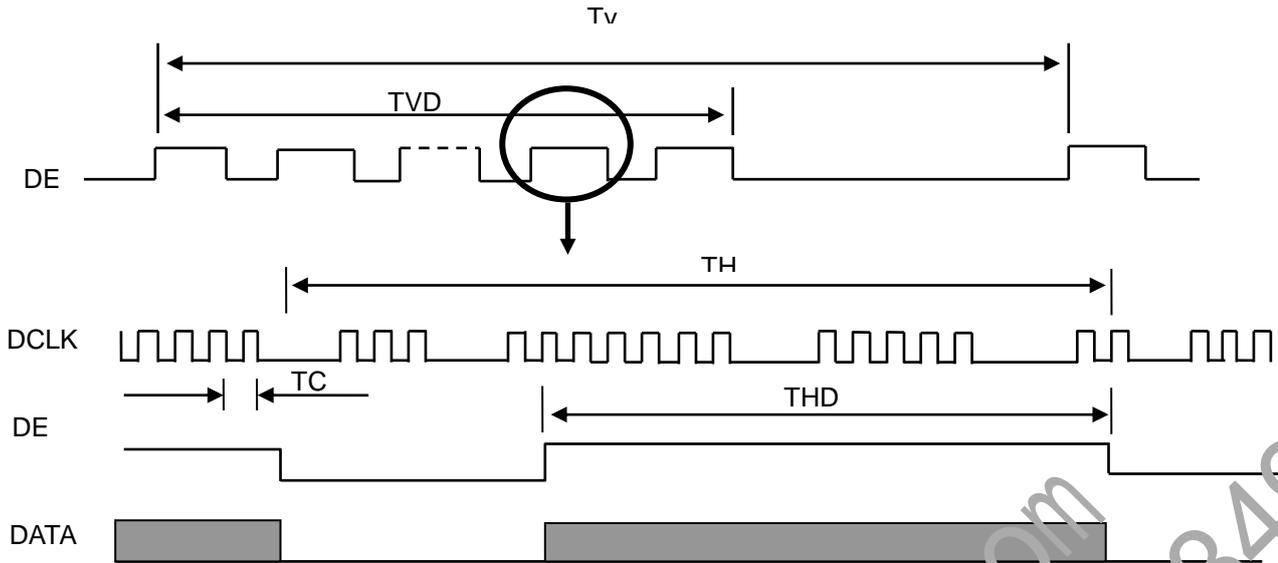
Note (1) Display timing signal should be contained and transferred by Display Port Main Link stream data packing described in VESA Display Port Standard V1.4b.

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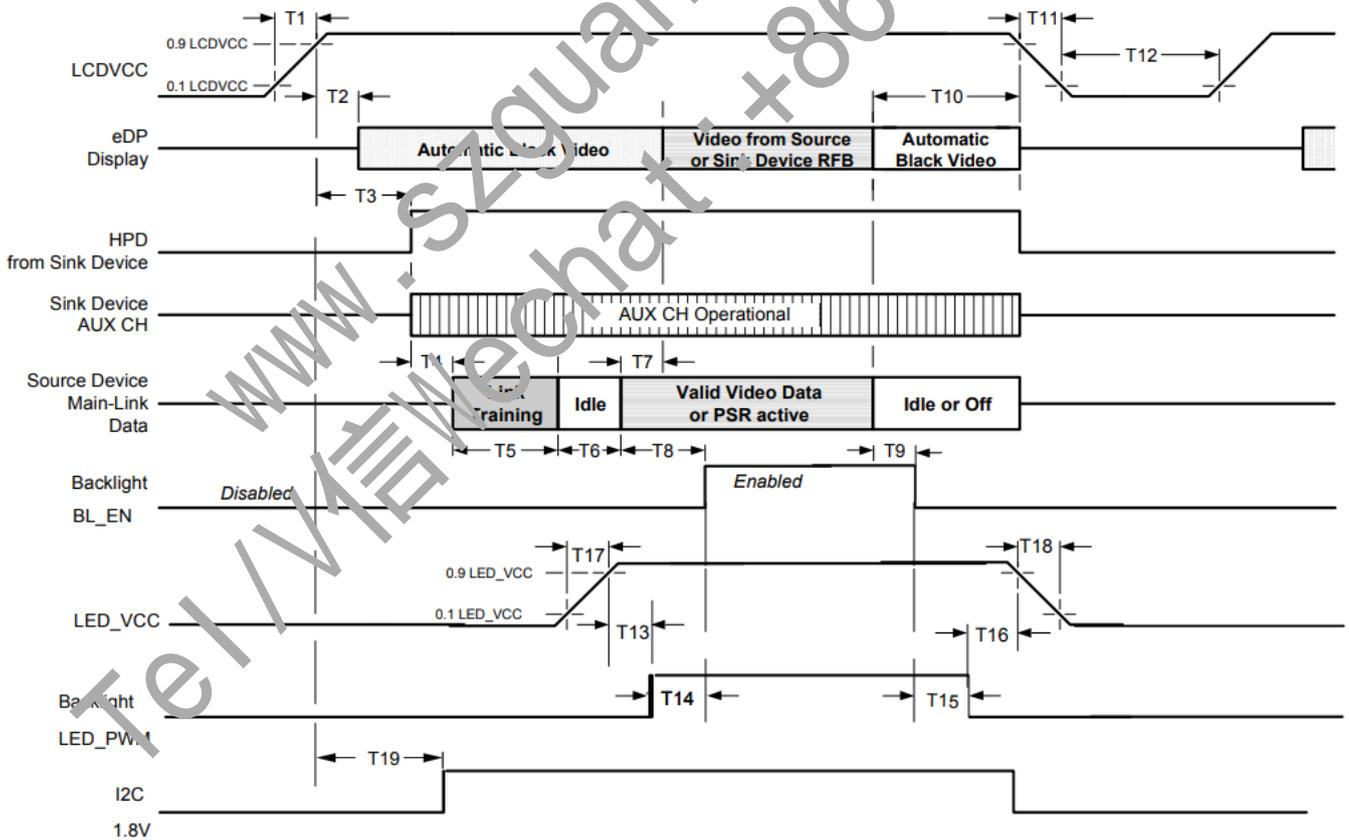
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4.6 Power ON/OFF Sequence



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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

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backlight flash issue during display ON/OFF or damage the LED backlight controller

5. Optical characteristics

Ta=25°C

	Symbol	Condition	Min.	Typ.	Max.	Unit	Note			
Viewing angle range	Left/Right	CR > 10	80		89	Deg.	(1), (3), (4), (6)			
	Upper/Low		80		89					
Contrast ratio	CR		960	1200	-	-	(2), (4), (6)			
Response time	Tr +Tf		-	9	-					
	GTG w/ CD		-	3	3.8	ms	(5)			
	GTG w/o		-	6	7	ms				
Chromaticity of white	x	$\theta = 0 \text{ deg.}$	Typ.	0.313	Typ.	-	(2), (6) Normal operation			
	y			0.329		-				
Chromaticity of red	x			0.680		-				
	y			0.316		-				
Chromaticity of green	x			-0.03		0.259		+0.03	-	
	y			0.697		-				
Chromaticity of blue	x			0.142		-				
	y			0.055		-				
Gamut	%			95%		99.5%		-	DCI	
Luminance of White	Y <sub>L1</sub>			-		425		500	-	cd/m <sup>2</sup>
Gamma	-	-	2.0	2.2	2.4	-	Gray 15~240			
White uniformity 5pt	$\delta W$	$\theta = 0 \text{ deg.}$	-	-	1.25	-	(8)			
White uniformity 13pt	$\delta W$	$\theta = 0 \text{ deg.}$	-	-	1.5	-	(2), (8)			

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

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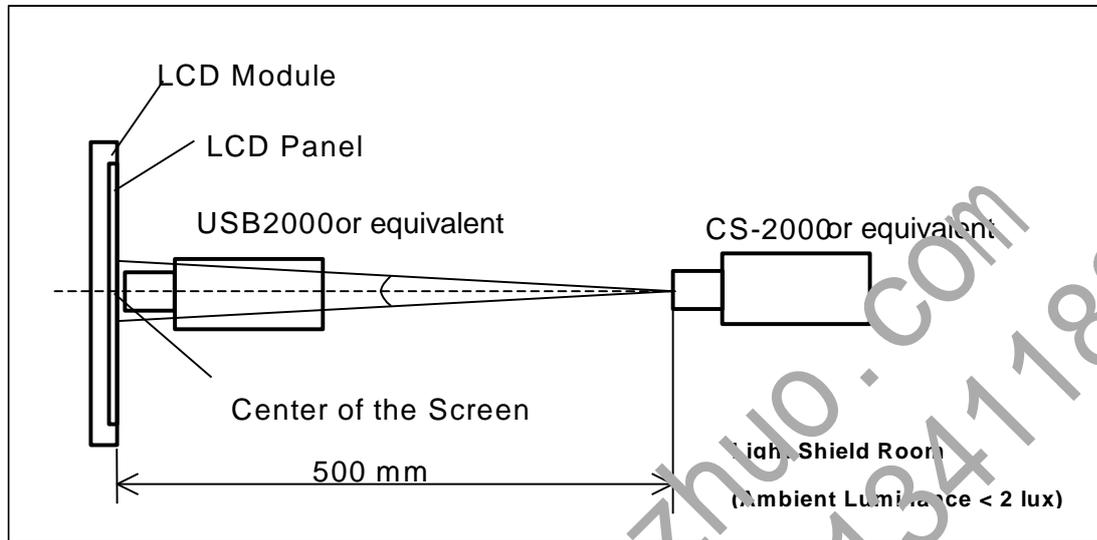
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※The optical characteristics shall be measured in a dark room or equivalent.

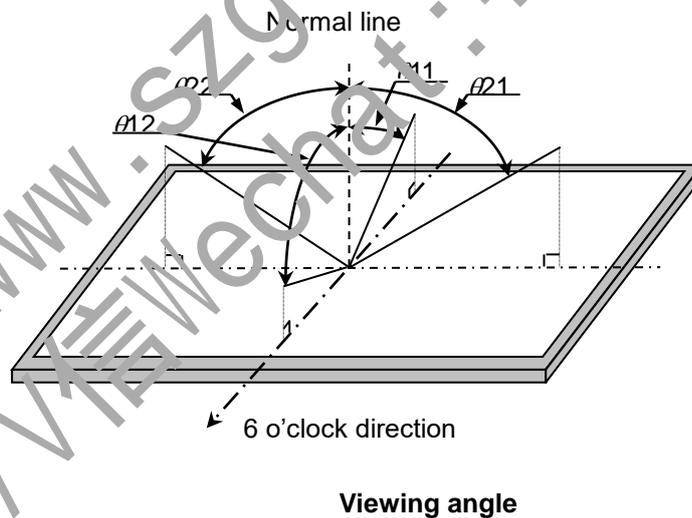
Note (1) Measurement of viewing angle range

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:



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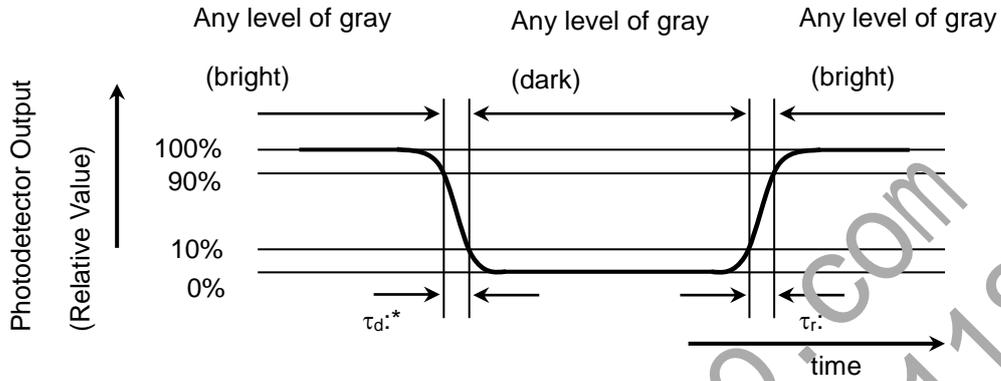
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Note (4) Definition of contrast ratio:

The contrast ratio is defined as the following.

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



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

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" ,

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

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

Note (8) Definition of white uniformity:

White uniformity of 5 points is defined as the following with 5 measurements(4,5,7,9,10).

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$$\delta_{W1} = \frac{\text{Maximum Luminance of 5 Points(Brightness)}}{\text{Minimum Luminance of 5 Points(Brightness)}}$$

White uniformity of 13 points is defined as the following with 13 measurements(1~13).

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

**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: Q1K 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°C, 240Hrs
4	Low temperature storage test	-20°C, 240Hrs
5	Low temperature operation test	0°C, 240hrs
6	High temperature operation test	50°C, 240Hrs
7	High temperature & high humidity operation test	50°C, 80%RH, 240Hrs
8	Thermal shock test	-20°C/30min、60°C/30min 100cycles

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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

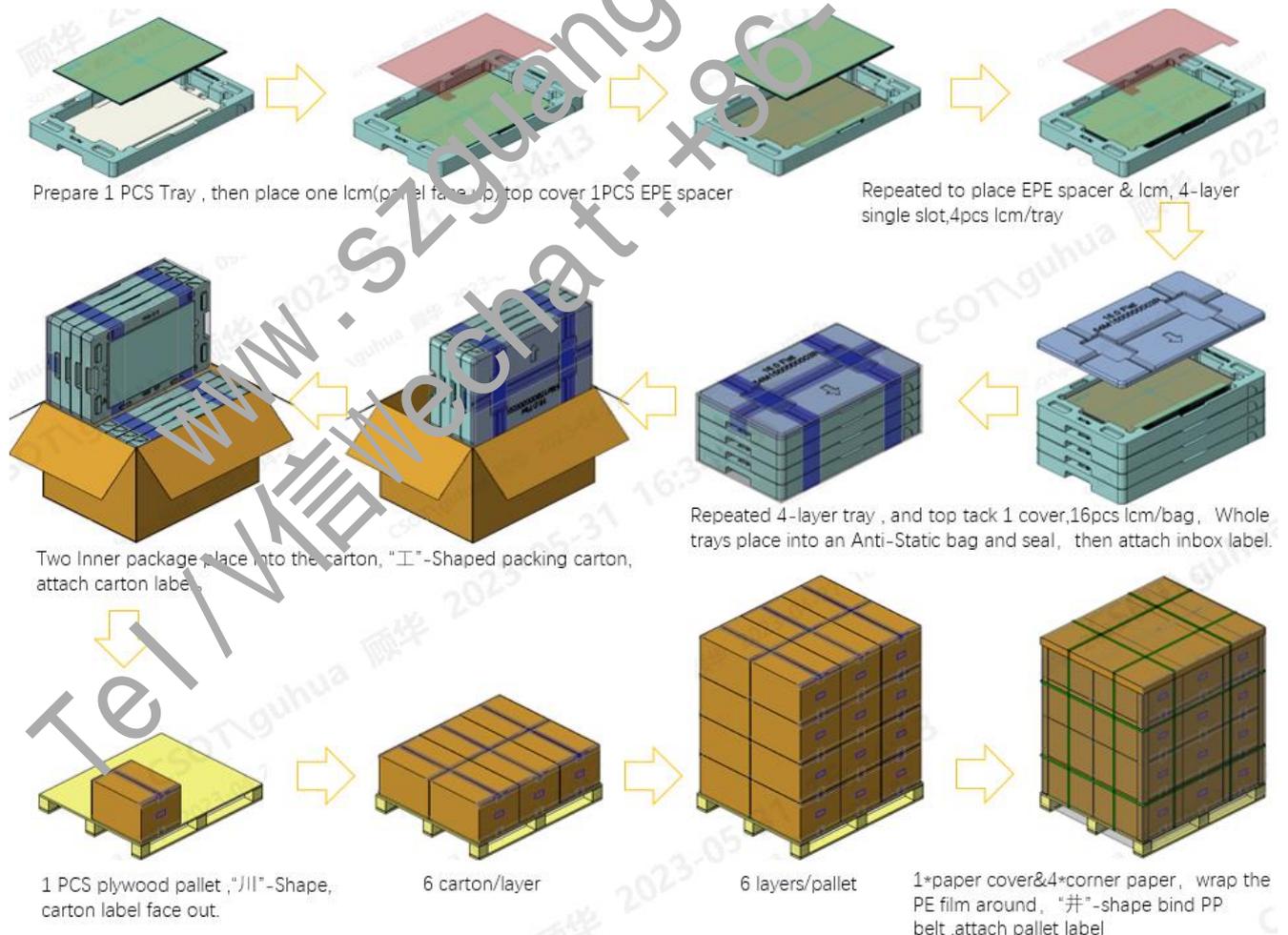
### 7. Display Quality

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

### 8. Packaging Condition

Item	Specification	Remark
Carton(Box) Packing	32 PCS/Carton(Box)	
Carton(Box) Packing Size	490mm(L)x392mm(W)x310mm(H)	Length x With x Height
Pallet Packing	36 Carton(Box)/Pallet	
Pallet Packing Size	1200mm(L) x 1000mm(W) x 1300mm(H)	Length x With x Height

#### 8.1 Packing Method



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8.2 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: MNG007DA6-1  
 (6) Serial ID: 18010-16060200126D0001N  
 NPI mark N, MP mark M  
 Serial NO.  
 Year, Month, Day  
 Product line  
 ASUS P/N  
 (7) ASUS P/N: 18010-16060200N  
 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. Manufacture 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

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

- 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.
- Be sure to design the cabinet so that the Module can be installed without any extra stress such as warp or twist.
- Since the front polarizer is easily damaged, pay attention not to scratch it.
- Wipe off water drop immediately. Long contact with water may cause discoloration or spots.
- When the panel surface is soiled, wipe it with absorbent cotton or other soft cloth.
- Since the panel is made of glass, it may break or crack if dropped or bumped on hard surface. Handle with care.

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- 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.

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**Appendix. EDID Data Structure**

EDID Table Format					
Address (DEC)	Address (HEX)	Field Name & Comments	Set Value (HEX)	Set Value (BIN)	Set Value (DEC)
0	00	Header	00	00000000	0
1	01	Header	FF	11111111	255
2	02	Header	FF	11111111	255
3	03	Header	FF	11111111	255
4	04	Header	FF	11111111	255
5	05	Header	FF	11111111	255
6	06	Header	FF	11111111	255
7	07	Header	00	00000000	0
8	08	EISA Manuf. Code LSB	0E	00001110	14
9	09	Compressed ASCII	6F	01101111	111
10	0A	Product Code	3A	00111010	58
11	0B	hex, LSB first	16	00010110	22
12	0C	32-bit ser #	00	00000000	0
13	0D	ID S/N - option	00	00000000	0
14	0E	ID S/N - option	00	00000000	0
15	0F	ID S/N - option	00	00000000	0
16	10	Week of manufacture	00	00000000	0
17	11	Year of manufacture	21	00100001	33
18	12	EDID Structure Ver	01	00000001	1
19	13	EDID revision #	04	00000100	4
20	14	Video input def.	A5	10100101	165
21	15	Max H image size	22	00100010	34
22	16	Max V image size	16	00010110	22
23	17	Display Gamma	78	01111000	120
24	18	Feature support ( no DPMS, Active off, RGB, timing BLK 1)	03	00000011	3
25	19	Red/Green Low bits	06	00000110	6
26	1A	Blue/White Low bits	45	01000101	69
27	1B	Red X Rx	AE	10101110	174
28	1C	Red Y Ry	51	01010001	81
29	1D	Green X Gx	42	01000010	66

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30	1E	Green Y Gy	B2	10110010	178
31	1F	Blue X Bx	24	00100100	36
32	20	Blue Y By	0E	00001110	14
33	21	White X Wx	50	01010000	80
34	22	White Y Wy	54	01010100	84
35	23	Established timings 1	00	00000000	0
36	24	Established timing 2	00	00000000	0
37	25	Established timing 3	00	00000000	0
38	26	Standard timing #1	01	00000001	1
39	27	Standard timing #1	01	00000001	1
40	28	Standard timing #2	01	00000001	1
41	29	Standard timing #2	01	00000001	1
42	2A	Standard timing #3	01	00000001	1
43	2B	Standard timing #3	01	00000000	1
44	2C	Standard timing #4	01	00000001	1
45	2D	Standard timing #4	01	00000001	1
46	2E	Standard timing #5	01	00000001	1
47	2F	Standard timing #5	01	00000001	1
48	30	Standard timing #6	01	00000001	1
49	31	Standard timing #6	01	00000001	1
50	32	Standard timing #7	01	00000001	1
51	33	Standard timing #7	01	00000001	1
52	34	Standard timing #8	01	00000001	1
53	35	Standard timing #8	01	00000001	1
54	36	Pixel Clock LSP	90	10010000	144
55	37	Pixel Clock HSB	6F	01101111	111
56	38	Horizontal Active (lower 8 bits)	00	00000000	0
57	39	Hor blanking (lower 8 bits)	A0	10100000	160
58	3A	Horizontal Active/Horizontal blanking	A0	10100000	160
59	3B	Vertical active(lower 8 bits)	40	01000000	64
60	3C	Vertical blanking(lower 8 bits)	96	10010110	150
61	3D	Vertical Active : Vertical Blanking	60	01100000	96
62	3E	Horizontal Sync Offset	30	00110000	48
63	3F	Horizontal Sync Pulse Width	20	00100000	32
64	40	Vertical Sync Offset , Sync Width	36	00110110	54
65	41	Horizontal Vertical Sync Offset/Width	00	00000000	0
66	42	Horizontal Image Size	58	01011000	88
67	43	Vertical image Size	D7	11010111	215
68	44	Horizontal Image Size / Vertical image	10	00010000	16
69	45	Horizontal Border = (0 for Notebook LCD)	00	00000000	0
70	46	Vertical Border = (0 for Notebook LCD)	00	00000000	0

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71	47	Signal (non-intr, norm, no stero, sep sync, neg pol)	18	00011000	24
72	48	MRL(Monitor Range Limits)	00	00000000	0
73	49		00	00000000	0
74	4A		00	00000000	0
75	4B		FD	11111101	253
76	4C		0C	00001100	12
77	4D		3C	00111100	60
78	4E		F0	11110000	240
79	4F		A5	10100101	165
80	50		A5	10100101	165
81	51		73	01110011	115
82	52		01	00000001	1
83	53		0A	0000101	10
84	54		20	00100000	32
85	55		20	00100000	32
86	56		20	00100000	32
87	57		20	00100000	32
88	58		20	00100000	32
89	59	20	00100000	32	
90	5A	descriptor #3	00	00000000	0
91	5B	Reserved for definition	00	00000000	0
92	5C	Reserved for definition	00	00000000	0
93	5D	ASCII String	FC	11111100	252
94	5E	Reserved for definition	00	00000000	0
95	5F	Manufacture	4D	01001101	77
96	60	Manufacture	4E	01001110	78
97	61	Manufacture	47	01000111	71
98	62	Manufacture	30	00110000	48
99	63	Manufacture	30	00110000	48
100	64	Manufacture	37	00110111	55
101	65	Manufacture	44	01000100	68
102	66	Reserved for definition	41	01000001	65
103	67	Reserved for definition	36	00110110	54
104	68	Reserved for definition	2D	00101101	45
105	69	Reserved for definition	31	00110001	49
106	6A	Reserved for definition	0A	00001010	10
107	6B	Reserved for definition	20	00100000	32
108	6C	descriptor #4	00	00000000	0
109	6D	Reserved for definition	00	00000000	0

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110	6E	Reserved for definition	00	00000000	0
111	6F	Reserved for definition	FE	11111110	254
112	70	Reserved for definition	00	00000000	0
113	71	Manufacture P/N	43	01000011	67
114	72	Manufacture P/N	53	01010011	83
115	73	Manufacture P/N	4F	01001111	79
116	74	Manufacture P/N	54	01010100	84
117	75	Manufacture P/N	20	00100000	32
118	76	Manufacture P/N	54	01010100	84
119	77	Manufacture P/N	33	00110011	51
120	78	Manufacture P/N	0A	00001010	10
121	79	Manufacture P/N	20	00100000	32
122	7A	Manufacture P/N	20	00100000	32
123	7B	Manufacture P/N	20	00100000	32
124	7C	Reserved for definition	20	00100000	32
125	7D	Reserved for definition	20	00100000	32
126	7E	Extension Flag	01	00000001	1
127	7F	Checksum Default Value.	47	01000111	71
128	80	EDID Extension Tags	70	01110000	112
129	81	Display ID version	20	00100000	32
130	82	section size	79	01111001	121
131	83	product type identifier	02	00000010	2
132	84	extension count	00	00000000	0
133	85	block tag	21	00100001	33
134	86	block rev	00	00000000	0
135	87	Parload	1D	00011101	29
136	88	Pin# Clock	77	01110111	119
137	89		0D	00001101	13
138	8A		6B	01101011	107
139	8B	timing options	08	00001000	8
140	8C	H-Active	00	00000000	0
141	8D		0A	00001010	10
142	8E	H-Blanking	40	01000000	64
143	8F		06	00000110	6
144	90	H-offset	00	00000000	0
145	91		E1	11100001	225
146	92	H-sync pulse width	EA	11101010	234
147	93		50	01010000	80
148	94	V-Active	25	00100101	37
149	95		74	01110100	116

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150	96	V-Blanking	B2	10110010	178
151	97		46	01000110	70
152	98	V-offset	12	00010010	18
153	99		0E	00001110	14
154	9A	V-sync pulse width	02	00000010	2
155	9B		45	01000101	69
156	9C	Adaptive-Sync Data Block Block revision = 0	54	01010100	84
157	9D		D0	11010000	208
158	9E		5F	01011111	95
159	9F	FAVT and AVT Supported,Native panel	D0	11010000	208
160	A0	00h = Flicker performance is met in any duration increase within the refresh rate	5F	01011111	95
161	A1		00	00000000	0
162	A2	Maximum Refresh Rate(240x1.00035)Hz	34	00110100	52
163	A3		12	00010010	18
164	A4	00h = Flicker performance is met in any duration decrease within the refresh rate	78	01111000	120
165	A5		22	01100010	34
166	A6	Reserved for definition	00	00000000	0
167	A7		14	00010100	20
168	A8	Reserved for definition	3	00111111	63
169	A9		BE	10111110	190
170	AA	Reserved for definition	01	00000001	1
171	AB		05	00000101	5
172	AC	Reserved for definition	FF	11111111	255
173	AD		09	00001001	9
174	AE	Reserved for definition	9F	10011111	159
175	AF		00	00000000	0
176	B0	Reserved for definition	2F	00101111	47
177	B1	Reserved for definition	00	00000000	0
178	B2	Reserved for definition	1F	00011111	31
179	B3	Reserved for definition	00	00000000	0
180	B4	Reserved for definition	3F	00111111	63
181	B5	Reserved for definition	06	00000110	6
182	B6	Reserved for definition	95	10010101	149
183	B7	Reserved for definition	00	00000000	0
184	B8	Reserved for definition	02	00000010	2
185	B9	Reserved for definition	00	00000000	0
186	BA	Reserved for definition	05	00000101	5
187	BB	Reserved for definition	00	00000000	0
188	BC	Reserved for definition	2B	00101011	43
189	BD	Reserved for definition	00	00000000	0
190	BE	Reserved for definition	06	00000110	6

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191	BF	Reserved for definition	27	00100111	39
192	C0	Reserved for definition	00	00000000	0
193	C1	Reserved for definition	3C	00111100	60
194	C2	Reserved for definition	EF	11101111	239
195	C3	Reserved for definition	00	00000000	0
196	C4	Reserved for definition	00	00000000	0
197	C5	Reserved for definition	81	10000001	129
198	C6	Reserved for definition	00	00000000	0
199	C7	Reserved for definition	14	00010100	20
200	C8	Reserved for definition	74	01110100	116
201	C9	Reserved for definition	1A	00011010	26
202	CA	Reserved for definition	00	00000000	0
203	CB	Reserved for definition	00	00000000	0
204	CC	Reserved for definition	03	00000011	3
205	CD	Reserved for definition	C1	11001001	193
206	CE	Reserved for definition	3C	01111100	60
207	CF	Reserved for definition	EF	11101111	239
208	D0	Reserved for definition	00	00000000	0
209	D1	Reserved for definition	00	00000100	4
210	D2	Reserved for definition	00	00000000	0
211	D3	Reserved for definition	00	00000000	0
212	D4	Reserved for definition	00	00000000	0
213	D5	Reserved for definition	00	00000000	0
214	D6	Reserved for definition	EF	11101111	239
215	D7	Reserved for definition	00	00000000	0
216	D8	Reserved for definition	38	00111000	56
217	D9	Reserved for definition	55	01010101	85
218	DA	Reserved for definition	13	00010011	19
219	DB	Reserved for definition	00	00000000	0
220	DC	Reserved for definition	00	00000000	0
221	DD	Reserved for definition	00	00000000	0
222	DE	Reserved for definition	00	00000000	0
223	DF	Reserved for definition	00	00000000	0
224	E0	Reserved for definition	00	00000000	0
225	E1	Reserved for definition	00	00000000	0
226	E2	Reserved for definition	00	00000000	0
227	E3	Reserved for definition	00	00000000	0
228	E4	Reserved for definition	00	00000000	0
229	E5	Reserved for definition	00	00000000	0
230	E6	Reserved for definition	00	00000000	0
231	E7	Reserved for definition	00	00000000	0

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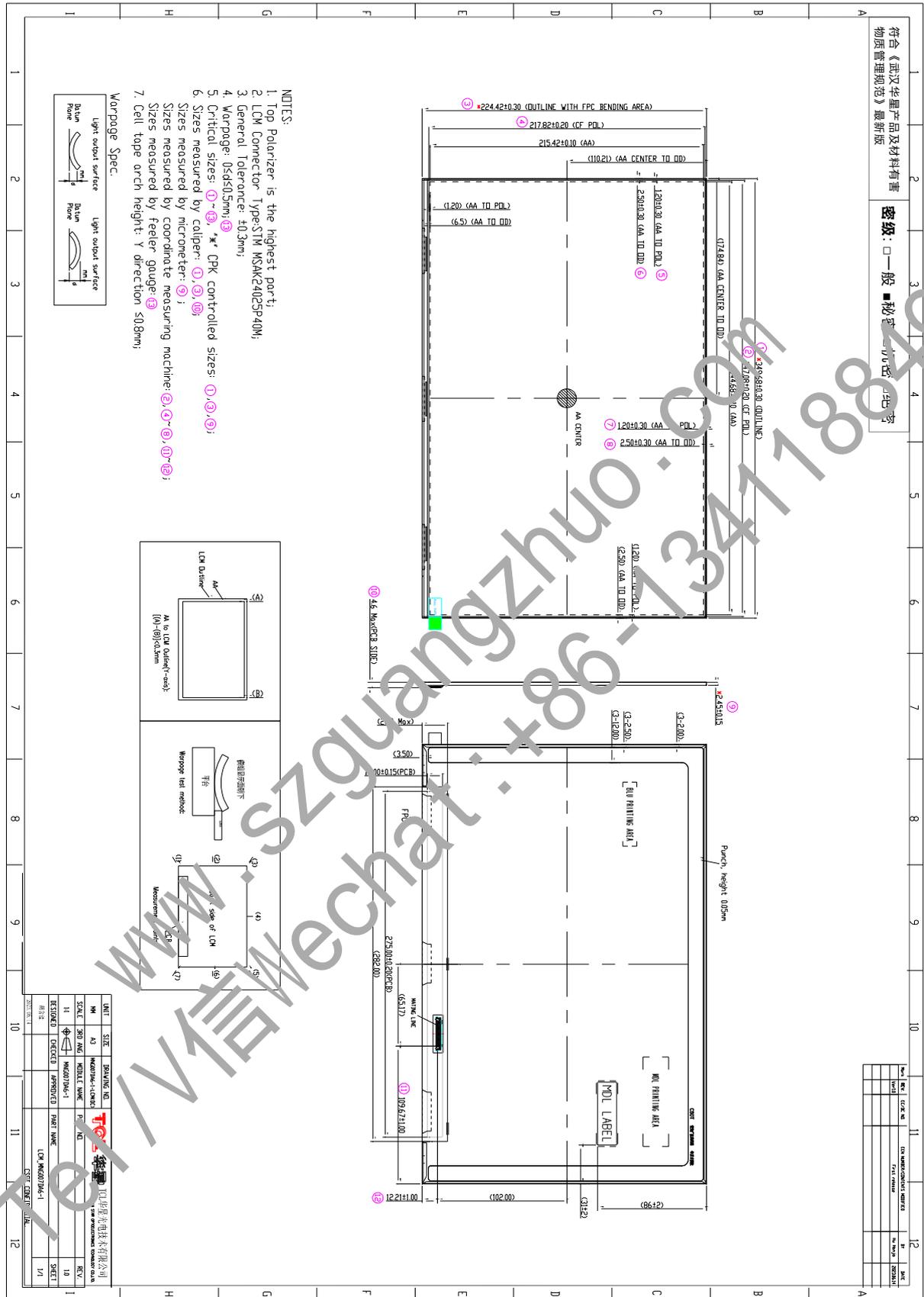
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Appendix. Outline Drawing



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