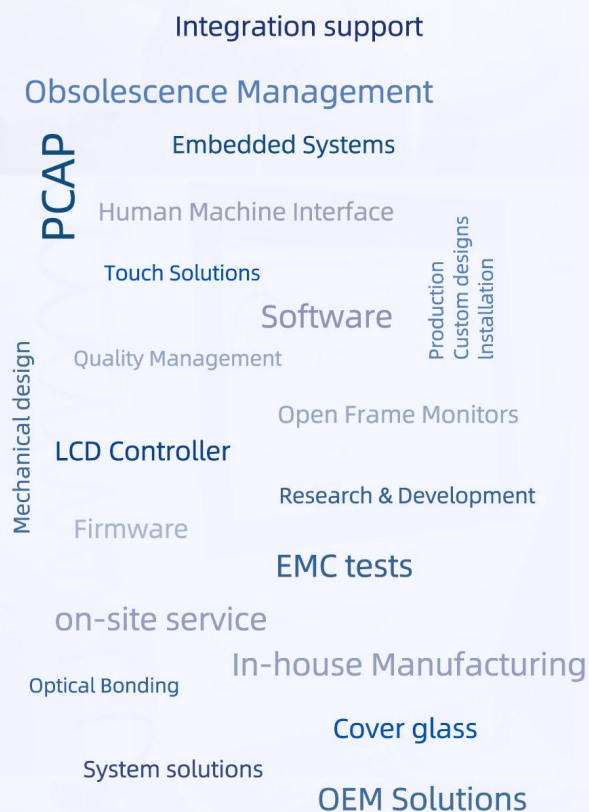


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B3 EV080X0M-A40 Product Specification Rev.P0

BUYER	
SUPPLIER	HEFEI BOE Optoelectronics Technology CO., LTD
FG-Code	EV080X0M-A40-3130

ITEM	BUYER SIGNATURE	DATE
_____	_____	_____
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_____	_____	_____

ITEM	SUPPLIER SIGNATURE	DATE
Prepared	_____	_____
Reviewed	_____	_____
Approved	_____	_____

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REVISION HISTORY

(√) preliminary specification

() Final specification

REV.	ECN No.	DESCRIPTION OF CHANGES	DATE	PREPARED
P0		Initial Release	2021-06-15	

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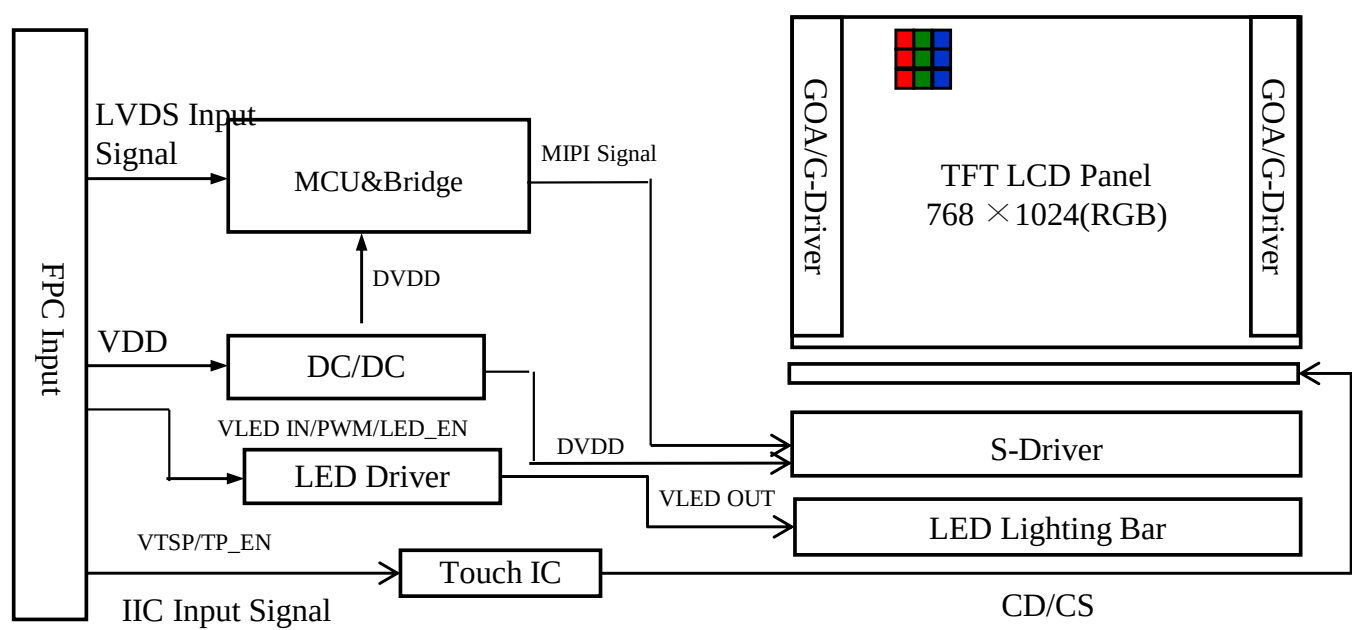
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1.0 GENERAL DESCRIPTION

1.1 Introduction

EV080X0M-A40 is a color active matrix TFT LCD module using amorphous silicon TFT 's (Thin Film Transistors) as an active switching devices. This module has a 8 inch diagonally measured active area with XGA resolutions (768 horizontal by 1024 vertical pixel array). Each pixel is divided into RED, GREEN, BLUE dots which are arranged in vertical stripe and this module can display 16.7M colors. The TFT-LCD module Touch Structure is GG.



1.2 Features

- 0.4T Glass (Single)
- Reverse Type
- 8bits LVDS data input
- Thin and light weight
- High luminance and contrast ratio, low reflection and wide viewing angle
- RoHS compliant

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1.3 Application

- Defibrillator (除颤仪)

1.4 General Specification

The followings are general specifications at the EV080X0M-A40

<Table 1-1. LCD Module Specifications>

Parameter	Specification	Unit	Remarks
Active Area	121.8816*162.5088	mm	
Number Of Pixels	768*1024	pixels	
Pixel Pitch	0.1587*0.1587	mm	
Pixel Arrangement	2domain, Z-Inversion		
Display Mode	HADS		
Display Colors	16.7M	colors	
Surface Treatment	AG+AF		
Contrast Ratio	Typ. 1500 Min.1000		
Viewing Angle(CR>10)	85/85/85/85 Typ.	deg.	
Response Time	35ms Max.	ms	
Color Gamut	Min.67% Typ.70.8%		
Brightness	Typ. 300nit Min. 250nit	cd/m2	
Brightness Uniformity	80% Typ. 75% Min.		
Power Consumption	TBD	watt	
Outline Dimension	130.882×175.304(LCM), 158.2×192(TLCM)	mm	Pre Spec
Weight	140±5(LCM),350±10g(TLCM)	gram	Pre Spec
Display Orientation	Portrait Only		

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1.5 Touch General Specification

The followings are touch general specifications at the model EV080X0M-A40.
(listed in Table 1-2)

<Table 1-2. General Specifications>

Parameter	Specification	Unit	Remarks
Type of Touch Sensor	OGS		
Touch Structure	GG		
Panel Size	8		
TP Active Area	163.51*122.88	mm	
Surface treatment	AG+AF		
Surface Hardness	7	H	
Interface	IIC		
Report Rate	≥85HZ		
Multi-Touch Point	Above 2 points		
Input method	医用橡胶手套0.7mm(约6层手套), 棉手套(2mm)		
Touch panel sensor IC	Atmel MXT1066TD		
Channel	35TX*26RX		
Support OS	Linux		
TP Power Consumption	-		

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2.0 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 2.

< Table 2. Absolute Maximum Ratings >

Parameter		Symbol	Min.	Max.	Unit	Remarks
Power Supply	LCD Module	VDD	0	3.6	V	Ta = 25 °C
	BLU	V _{LED}	-	18	V	
Operating Temperature		T _{OP}	-10	+60	°C	Note 1
Storage Temperature		T _{ST}	-30	+70	°C	

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

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3.0 ELECTRICAL SPECIFICATIONS

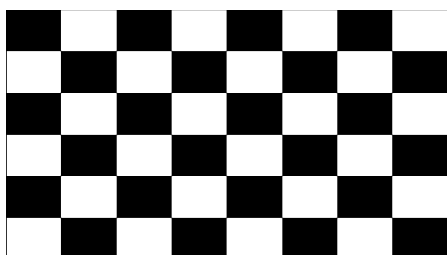
3.1.1 TFT LCD Module

[Ta =25 ± 2 °C]

< Table 3-1. LCD Module Electrical specifications >

Parameter	Symbol	Values			Unit	Notes
		Min.	Typ.	Max.		
Power Supply Voltage	VDD	3.0	3.3	3.3	V	Note 1
Power Supply Current	IDD	-	TBD	TBD	mA	
BLU Supply Voltage	V _{LED}	-	12	13.2	V	
BLU Supply Current	I _{LED}	-	TBD	-	mA	
Power Consumption	P _D	TBD	TBD	TBD	W	Note 1
	P _{LED}	-	-	TBD	W	
	P _{total}	-	-	TBD	W	
Rush current	IRUSH	-	-	TBD	A	Note 2

Notes : 1. The supply voltage is measured and specified at the interface connector of LCM.
The current draw and power consumption specified is for VDD=3.3V, Frame rate f_v=60Hz
and Clock frequency = 52MHz. Test Pattern of power supply current
a) Typ : Mosaic 8 x 6 Pattern(L0/L255) b) Max : H 1 Line



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

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3.1.2 Electrical Specifications for Touch Part

< Table 3-2. Electrical specifications >

Parameter		Min.	Typ.	Max.	Unit	Remarks	
Power Supply Voltage		V _{DD}	3.0	3.3	3.6	V	Note 1
Permissible Input Ripple Voltage		V _{RF}	-	-	100	mV	At V _{DD} = 3.3V
Power Supply Current		I _{DD}	-	-	61	mA	
Power Consumption	Active Mode	P _T	-	-	0.2	W	Note1
	Idle Mode		-	-	0.1	W	Note2
TP_EN	High Level		0.8* VDDIO	-	-	V	@VDDIO
	Low Level		-	-	0.15* VDDIO	V	

Notes :

1. The supply voltage is measured and specified at the interface connector of TLCM
The current draw and power consumption specified is for 3.3V at 25°C when touch function is active;
2. The supply voltage is measured and specified at the interface connector of TLCM
The current draw and power consumption specified is for 3.3V at 25°C when touch function is Idle;

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3.2 Back-Light Unit

Table 4. LED Bar Electrical Specifications >

[Ta =25±2 °C]

Parameter		Min.	Typ.	Max.	Unit	Remarks
LED Forward Voltage		V _F	-	-	3.0	V
LED Forward Current		I _F	-	20	-	mA
LED Power Input Voltage		V _{LED}	-	-	24	V
LED Power Input Current		I _{LED}	-	150	-	mA
LED Power Supply for LED driver Inrush		I _{RUSH}	-	-	TBD	A
EN Control Level	Backlight on		1.9	-	-	V
	Backlight off		-	-	0.8	V
PWM Control Level	PWM High Level		1.9	-	-	V
	PWM Low Level		-	-	0.8	V
PWM Control Frequency		F _{PWM}	100	-	30K	Hz
Duty Ratio		-	1	-	100	%
LED Quantity		QLED	-	24	-	EA
LED Life Time		TLED	15000	-	-	Hrs

Notes: 1. Power supply voltage 12V for LED driver.

Calculator value for reference $V_F \cdot I_F \cdot 24 / \text{driver efficiency} = \text{PLED}$

2. The life time of LED, 15000Hrs, is determined as the time at which luminance of the LED is 50% compared to that of initial value at the typical LED current on condition of continuous operating at 25 ± 2°C.

3. Only under the above operating conditions could the life time of LED be guaranteed.

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3.3 INPUT TERMINAL PIN ASSIGNMENT

3.3.1 Pin assignment for LCD module

FPC single Interface: 40PIN。 (Molex5051104091)

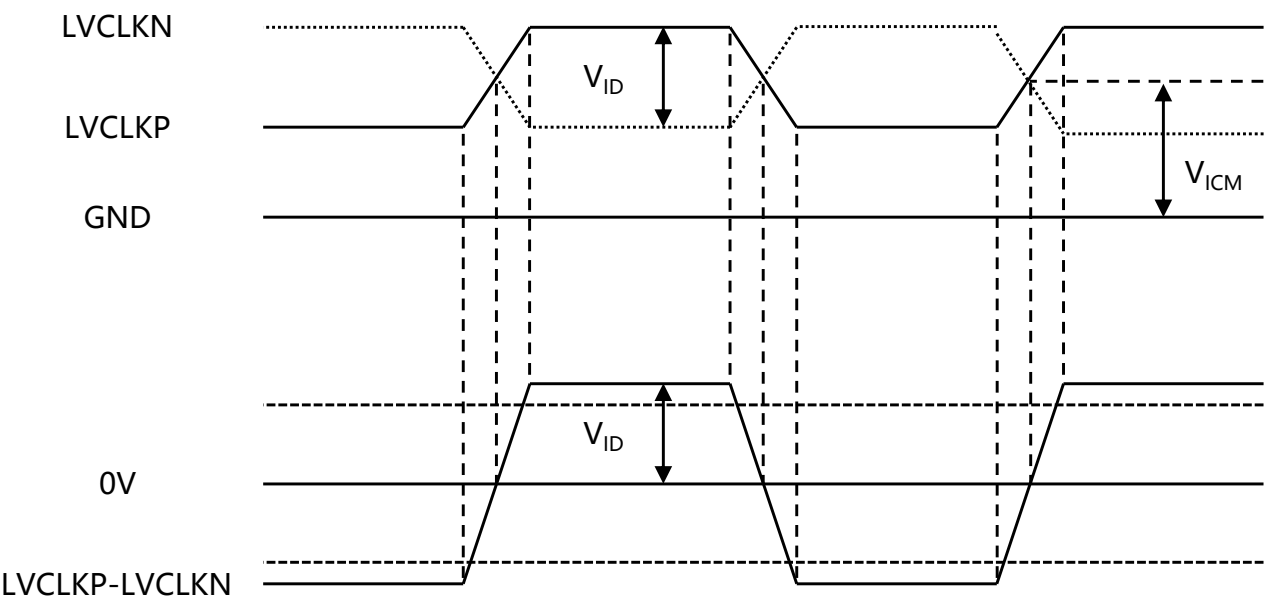
< Table5-1. Pin Assignment for LCD Module Connector >

Pin No	Symbol	Description	Pin No	Symbol	Description
1	NC	与40pin短接	21	GND	Ground
2	VDD	VDD (3.3V±0.3V)	22	NC	I2C for BOE use only
3	VDD	VDD (3.3V±0.3V)	23	NC	I2C for BOE use only
4	NC	BOE use only	24	PWM	PWM single for backlight dimming
5	NC	BOE use only	25	EN	ON/OFF Control single for backlight
6	GND	Ground	26	GND	Ground
7	RXIN0-	-LVDS differential data input	27	VPP	Power for backlight
8	RXIN0+	+LVDS differential data input	28	VPP	
9	GND	Ground	29	GND	Ground
10	RXIN1-	-LVDS differential data input	30	NC	BOE use only
11	RXIN1+	+LVDS differential data input	31	VDD	Power for touch
12	GND	Ground	32	NC	BOE use only
13	RXIN2-	-LVDS differential data input	33	SCL	SCL for touch
14	RXIN2+	+LVDS differential data input	34	SDA	SDA for touch
15	GND	Ground	35	GND	Ground
16	RXCLK-	-LVDS differential clock input	36	CHG	State change interrupt for touch
17	RXCLK+	+LVDS differential clock input	37	RESET	Reset for touch
18	GND	Ground	38	NC	客户端ID识别预留
19	RXIN3-	-LVDS differential data input	39	NC	客户端ID识别预留
20	RXIN3+	+LVDS differential data input	40	NC	与1pin短接

3.4 DC Specification

< Table7. DC Specification >

LVDS DC specifications						
Differential input high threshold	V_{TH}	-	-	+100	mV	$V_{ICM}=1.2V$
Differential input low threshold	V_{TL}	-100	-	-	mV	
LVDS common mode voltage	V_{ICM}		1.2		V	
LVDS swing voltage	V_{ID}	± 100	± 350	± 600	mV	



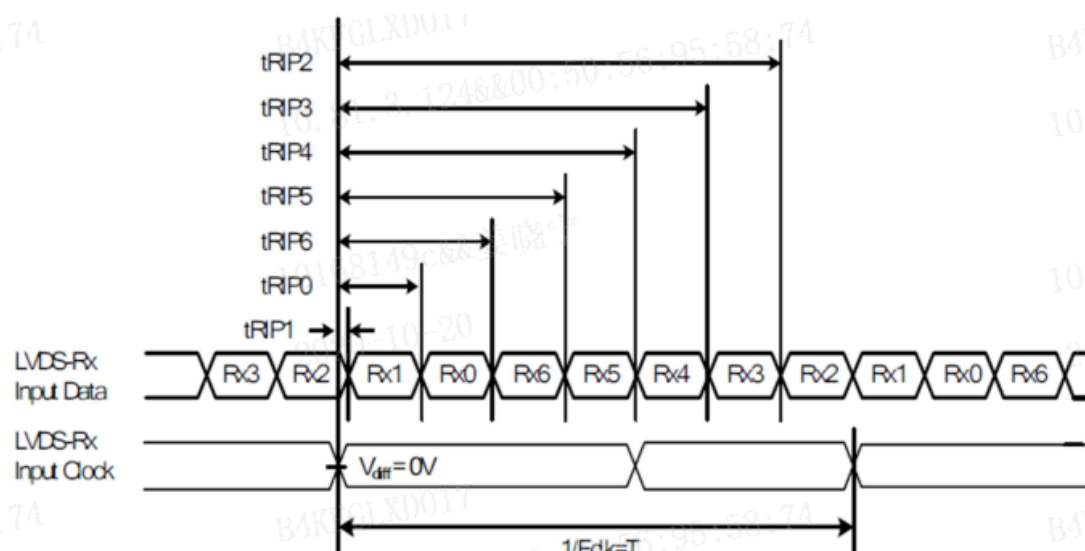
< LVDS V_{ID} and V_{ICM} definition>

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3.5 AC Specification

Symbol	Parameter	Min	Typ	Max	Unit
fCLKIN	Input clock frequency	40		100	MHz
tRCP	CLKORP1 Period	10		25	ns
tRCH	CLKORP1 High time	0.45T	0.5T	0.55T	TCK
tRCL	CLKORP1 Low time	0.45T	0.5T	0.55T	TCK
tRMG	Receiver Data Input Margin				
	FCLKIN = 100MHz	-0.30		0.30	ns
	FCLKIN = 85MHz	-0.45		0.45	
	FCLKIN = 65MHz	-0.60		0.60	
tRIP 1	Input data Position1	- tRMG	0.0	+ tRMG	Clock
tRIP 0	Input data Position0	T/7- tRMG	T/7	T/7+ tRMG	Clock
tRIP 2	Input data Position2	6T/7- tRMG	6T/7	6T/7+ tRMG	Clock
tRIP 3	Input data Position3	5T/7- tRMG	5T/7	5T/7+ tRMG	Clock
tRIP 4	Input data Position4	4T/7- tRMG	4T/7	4T/7+ tRMG	Clock
tRIP 5	Input data Position5	3T/7- tRMG	3T/7	3T/7+ tRMG	Clock
tRIP 6	Input data Position6	2T/7- tRMG	2T/7	2T/7+ tRMG	Clock
tRPLL	Phase Locked Loop set time			300	us

LVDS Receiver AC Electrical Characteristics



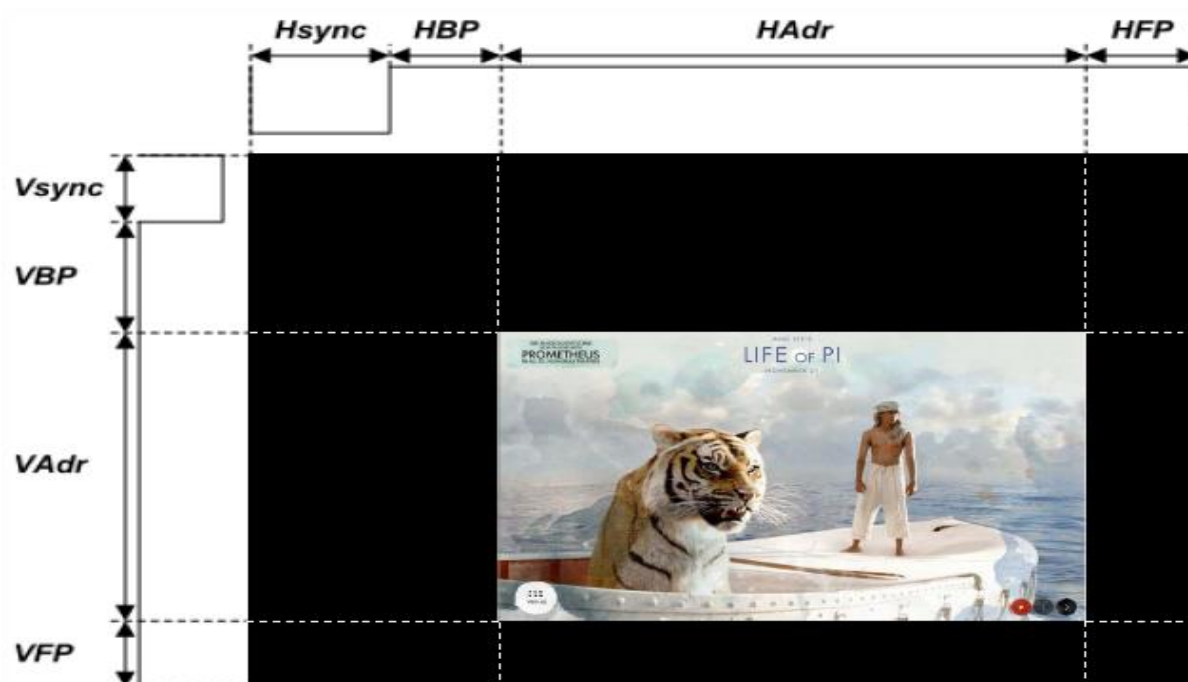
LVDS RX data Margin

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3.6 Interface timing Parameter

< Table9. Timing Parameter >

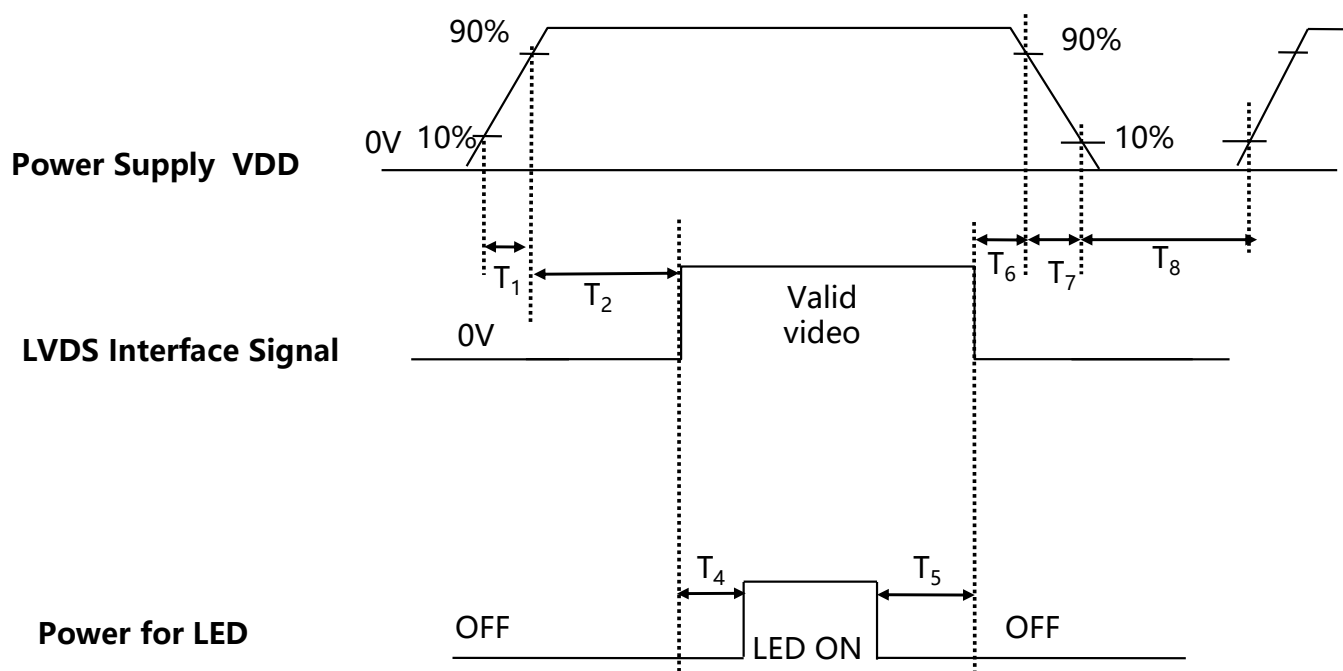
Item			Symbol	min	typ	max	UNIT
LCD	Frame Rate		-	-	60	-	Hz
	Pixels Rate		-	-	52.016	-	MHz
Timing	Horizontal	Total time	tHP	-	832	-	t _{CLK}
		Active time	tHadr	768			t _{CLK}
	Vertical	Total time	tvp	-	1044	-	t _H
		Active time	tVadr	1024			t _H
Port				-	1	-	Port



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3.7 Power Sequence

[Ta =25±2 °C]

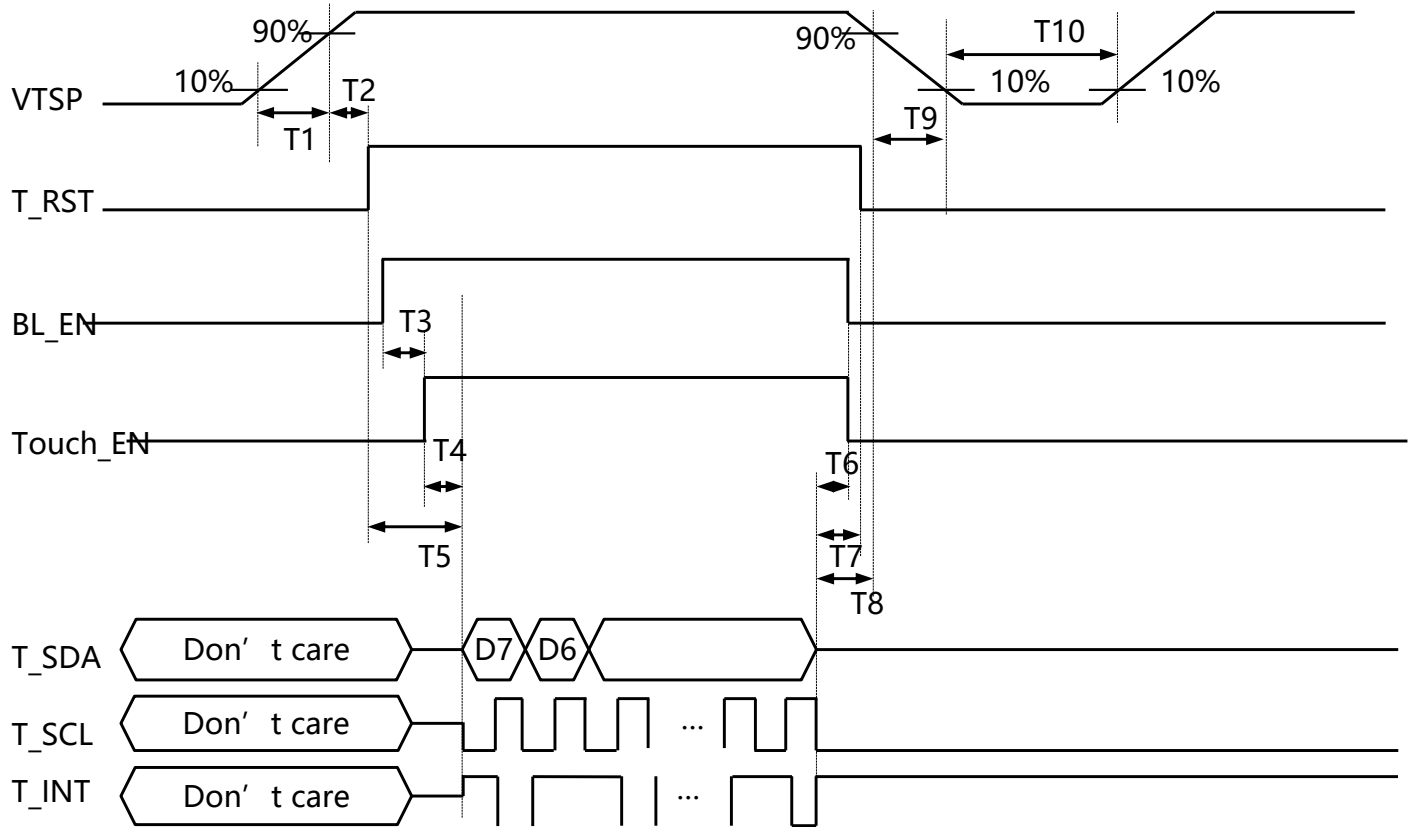


< Table10. Sequence Table >

Parameter	Value			Units
	Min.	Typ.	Max.	
T1	0.5	-	10	(ms)
T2	0	-	500	(ms)
T4	1500	-	-	(ms)
T5	500	-	-	(ms)
T6	100	-	-	(ms)
T7	0	-	200	(ms)
T8	2000	-	-	(ms)

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



< Table10-2. Touch Power Sequence Table >

Parameter	Values			Units
	Min	Typ	Max	
T1				
T2				
T3				
T4				
T5				
T6				
T7				
T8				
T9				
T10				

Notes:

1. When the power supply VDD is 0V, keep the level of input signals on the low or keep high impedance.
2. Do not keep the interface signal high impedance when power is on. Back Light must be turn on after power for logic and interface signal are valid.

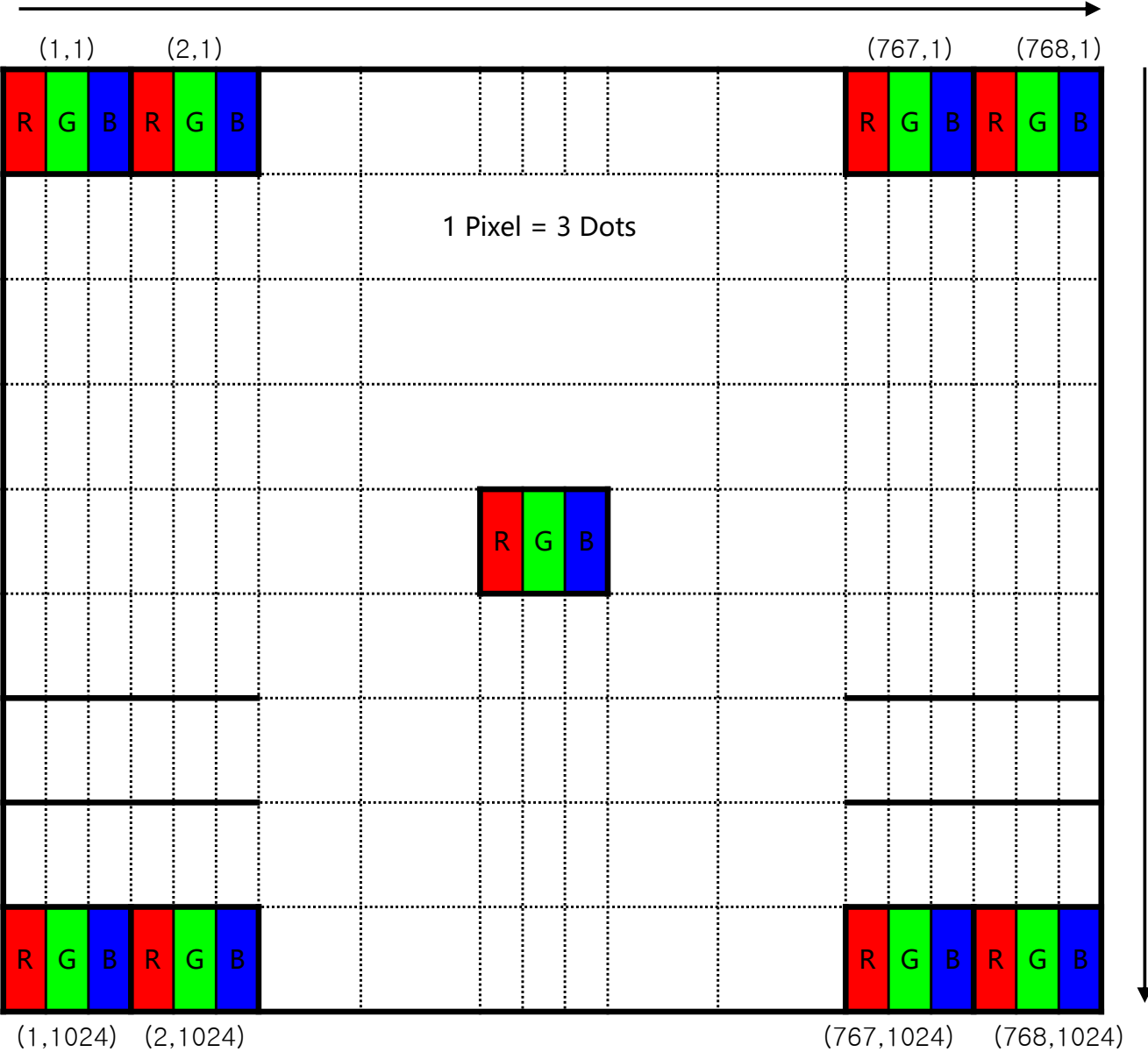
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3.8 Input Color Data Mapping

< Table11. Input Signal and Display Color Table >

Color & Gray Scale		Input Data Signal																							
		Red Data								Green Data								Blue Data							
		R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0
Basic Colors	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Green	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	Cyan	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Red	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Magenta	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Gray Scale of Red	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	△	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Darker	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	△	↑								↑								↑							
	▽	↓								↓								↓							
	Brighter	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	▽	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gray Scale of Green	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	△	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	Darker	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
	△	↑								↑								↑							
	▽	↓								↓								↓							
	Brighter	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0
	▽	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0
	Green	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
Gray Scale of Blue	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	△	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Darker	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	△	↑								↑								↑							
	▽	↓								↓								↓							
	Brighter	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1
	▽	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
Gray Scale of White	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	△	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1
	Darker	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0
	△	↑								↑								↑							
	▽	↓								↓								↓							
	Brighter	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0	1	1	1	1	1	1	0	1	1
	▽	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0	1	1	1	1	1	1	1	0
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

3.9 Input Color Data Mapping



Display Position of Input Data (V-H)

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4.0 OPTICAL SPECIFICATIONS

4.1 Overview

The test of optical specifications shall be measured in a dark room (ambient luminance ≤ 1 lux and temperature = $25\pm 2^{\circ}\text{C}$) with the equipment of Luminance meter system (Gonio meter system and TOPCON BM-5) and test unit shall be located at an approximate distance 50cm from the LCD surface at a viewing angle of θ and Φ equal to 0° . We refer to $\theta=0$ ($=\theta_3$) as the 3 o' clock direction (the "right"), $\theta=90$ ($=\theta_{12}$) as the 12 O' clock direction ("upward"), $\theta=180$ ($=\theta_9$) as the 9 O' clock direction ("left") and $\theta=270$ ($=\theta_6$) as the 6 O' clock direction ("bottom"). While scanning θ and/or Φ , the center of the measuring spot on the Display surface shall stay fixed.

4.2 Optical Specifications

< Table11. Optical Table >

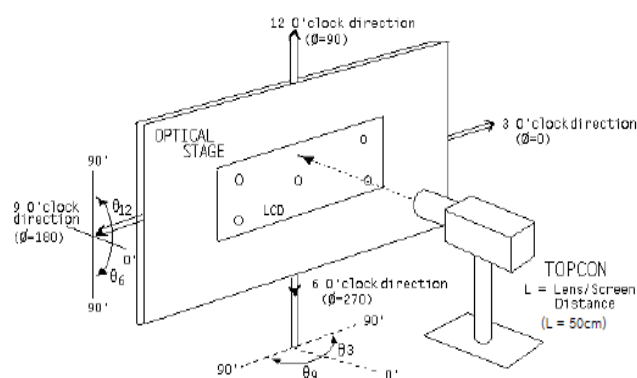
Item	Symbol	Condition	Min	Typ.	Max	Unit	Note
luminance	Bp	$\theta=0^{\circ}$	250	300	--	cd/m2	Note 1
Brightness Uniformity	ΔBp		75	80	--	%	Note 2
Viewing Angle	θ_L	$Cr \geq 10$	80	85	--	deg	Note 3
	θ_R		80	85	--		
	ψ_T		80	85	--		
	ψ_B		80	85	--		
Contrast Ratio	Cr	$\theta=0^{\circ}$	1000	1500		-	Note 4
Response Time	Tr+Tf	FF= 0°	-	30	35	ms	Note 5
Color Coordinate of CI E1931	Rx	$\theta=0^{\circ}$	0.636	0.639	0.642	-	Note 6
	Ry		0.337	0.340	0.343		
	Gx		0.302	0.305	0.308		
	Gy		0.610	0.613	0.616		
	Bx		0.145	0.148	0.151		
	By		0.060	0.063	0.066		
	Wx		0.289	0.292	0.295		
	Wy		0.326	0.329	0.332		
NTSC Ratio	NTSC	CIE1931	67	78.0	--	%	Note 7
Polarization Direction of Front Polarizer	PdF		--	0°	--	deg	Note 8
Polarization Direction of Rear Polarizer	PdR		--	90°	--	Deg	
Gray inversion angle			--	ADS无	--		Note 9
Gamma Scale			2.0	2.2	2.4		

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Note1:Luminance measurement

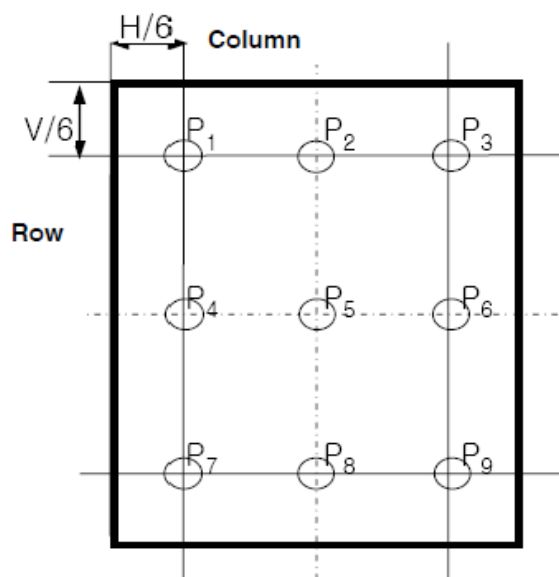
The test condition is at ILED=100mA and measured on the surface of LCD module at 25°C.

- The data are measured after LEDs are lighted on for more than 5 minutes and LCM displays are fully white. The brightness is the center of the LCD. Measurement equipment CS2000 or similar equipments (Field of view:1deg,Distance:50cm)
- Measuring surroundings: Dark room.
- Measuring temperature: Ta=25°C.
- Adjust operating voltage to get optimum contrast at the center of the display.
- Measured value at the center point of LCD panel must be after more than 5 minutes while backlight turning on.



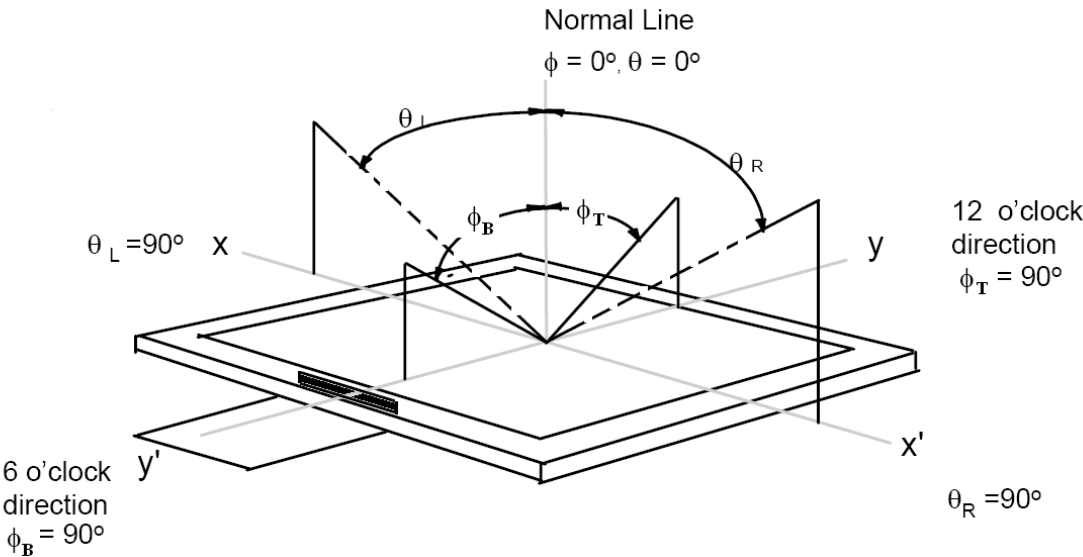
Note2:Uniformity

- The test condition is at ILED=100mA and measured on the surface of LCD module at 25°C.
- Measurement equipment:CS2000 or similar equipments
- The luminance uniformity is calculated by using following formula:
- $\Delta Bp = Bp \text{ (Min.)} / Bp \text{ (Max.)} \times 100 \text{ (\%)}$
- Bp (Max.) = Maximum brightness in 9 measured spots
- Bp (Min.) = Minimum brightness in 9 measured spots.



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Note 3:The definition of Viewing Angle
Refer to the graph below marked by θ and ϕ .

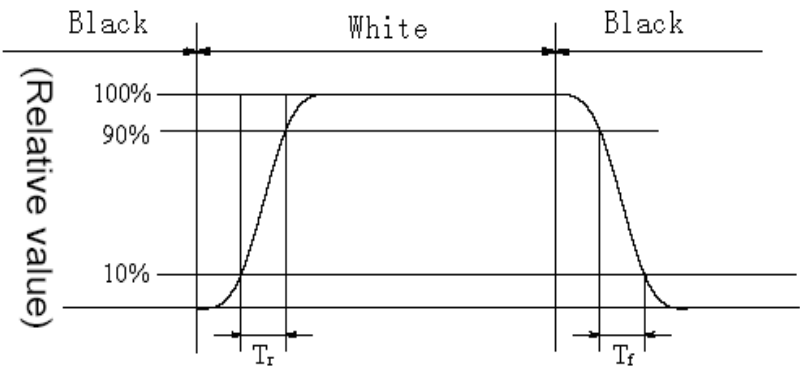


Note4:The definition of Contrast Ratio (Test LCM using CS2000 or similar equipments):

$$\text{Contrast Ratio (CR)} = \frac{\text{Luminance When LCD is at "White" state}}{\text{Luminance When LCD is at "Black" state}}$$

(Contrast Ratio is measured in optimum common electrode voltage)

Note5:Definition of Response time.(Test LCD using DMS501 or similar equipments):
The output sign also photo detector are measured when the input sign also are changed from "black" to "white" (Voltage falling time)and from "white" to "black" (Voltage rising time), respectively . The response time is defined as the time interval between the 10% and 90% of amplitudes . Refer to figures below.



	L0	L1	L2	L3	L4	L5	L6	L7
L0	Black	White	Black	White	Black	White	Black	White
L1	White	Black	White	Black	White	Black	White	Black
L2	Black	White	Black	White	Black	White	Black	White
L3	White	Black	White	Black	White	Black	White	Black
L4	Black	White	Black	White	Black	White	Black	White
L5	White	Black	White	Black	White	Black	White	Black
L6	Black	White	Black	White	Black	White	Black	White
L7	White	Black	White	Black	White	Black	White	Black

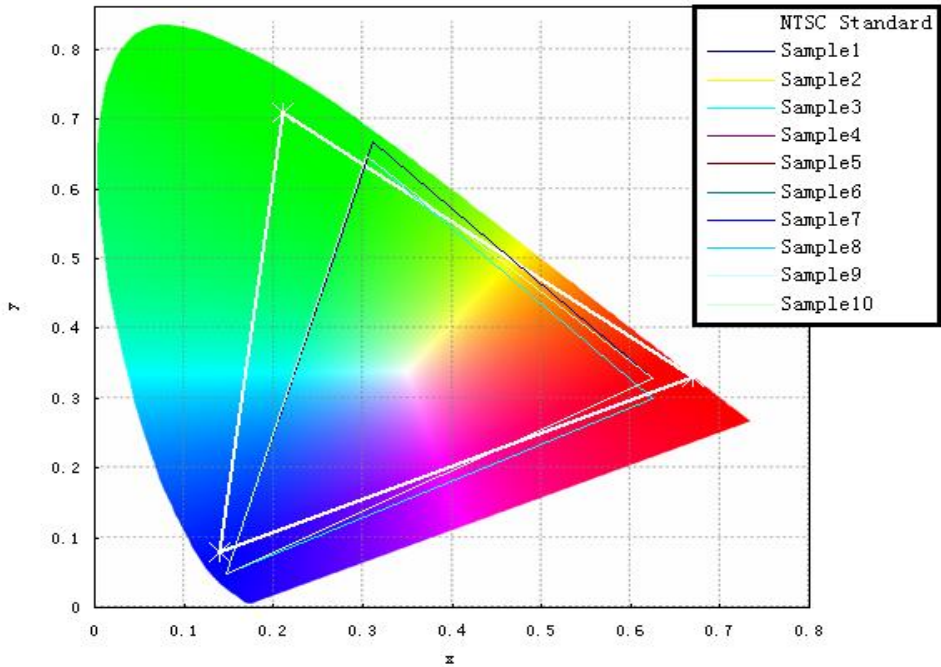
Response time of gray to gray:
Measurement equipment: DMS501 or similar equipments.
Test method: we define 8 grays L0-L7,the grays of L0-L7 were defined as:0,36,73, 109, 146, 182, 219, 255. Theoutputsignalsofphotodetectoraremeasuredwhentheinputsignalsarechanged from "Lx" to "Ly" , x, y= [0, 7]. The response time is defined as the time interval between the 10% and 90% of amplitudes. The result of the test can be noted as below:

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Note 6: Color Coordinates of CIE 1931
 The test condition is at ILED=100mA and measured on the surface of LCD module at 25°C.
 Measurement equipment: CS2000 or similar equipments
 The Color Coordinate (CIE 1931) is the measurement of the center of the display shown in below figure.

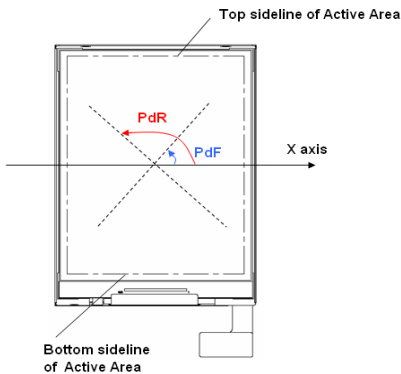
Note 7: Definition of Color of CIE Coordinate and NTSC Ratio.

$$S = \frac{\text{area of RGB triangle}}{\text{area of NTSC triangle}} \times 100\%$$



Note 8: Polarization Direction Definition

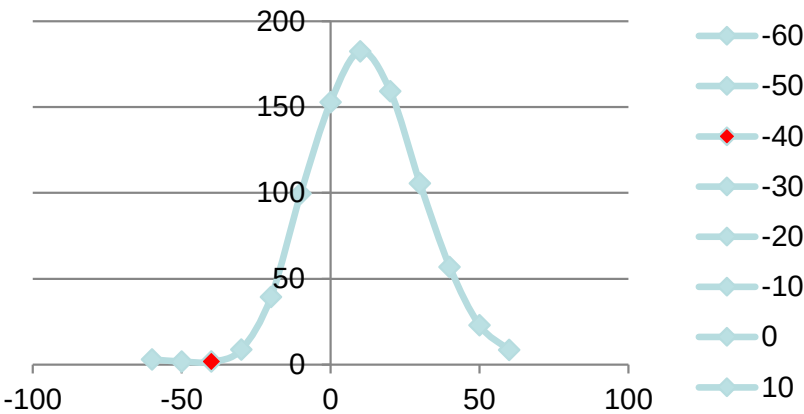
- Viewing direction is normal user viewing direction which is vertical to the display surface
- The polarizer which is closer to viewer is defined as Front Polarizer
- The polarizer which is on the rear side of viewer is defined as Rear Polarizer
- The X axis is defined as parallel line to top & bottom sidelines of the Active Area
- PdF which is marked in blue arrow is polarization degree of Front polarizer
- PdR which is marked in red arrow is polarization degree of Back polarizer
- The polarization degree parameter must be indicated in range of 0deg to 180deg according to above definition



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Note 9: Definition of gray inversion angle

- Refer to the graph of note 9.
- Using luminance test method.
- Test pattern : 128 gray
- If the viewing direction is 12 o’ clock ,then test the luminance while $\theta = -60^{\circ}, \theta = -50^{\circ}, \theta = -40^{\circ}, \theta = -30^{\circ}, \theta = -20^{\circ}, \theta = -10^{\circ}, \theta = 0^{\circ}, \theta = 10^{\circ}, \theta = 20^{\circ}, \theta = 30^{\circ}, \theta = 40^{\circ}, \theta = -50^{\circ}, \theta = 60^{\circ}$. The luminance test as figure below:



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5.0 RELIABILITY TEST

The Reliability test items and its conditions are shown in below.

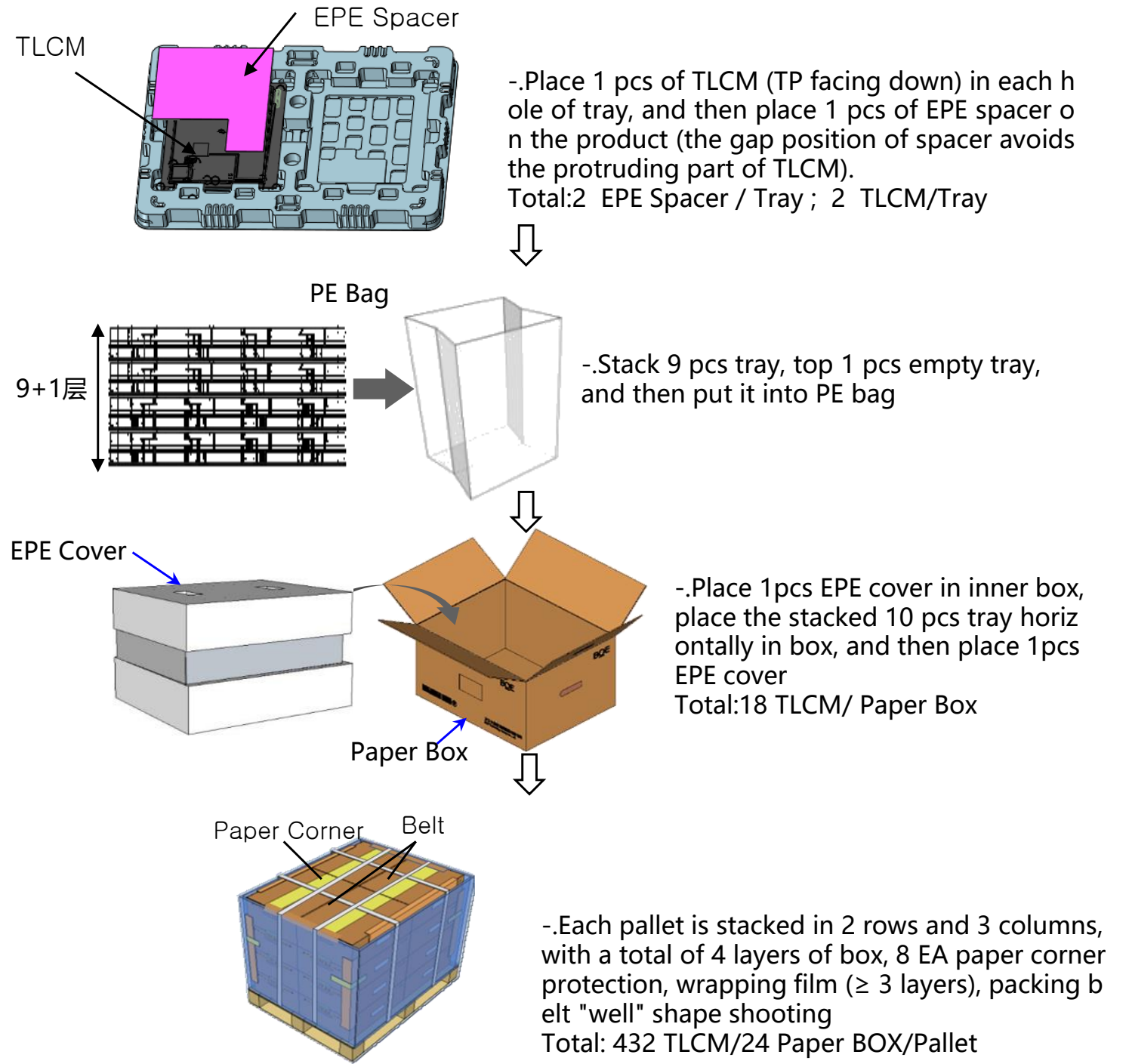
<Table 12. Reliability Test Parameters >

No	Test Items	Conditions
1	High temperature & high humidity (storage test)	60°C, 90%RH, 240hr
2	High temperature storage test	70°C, 240hr
3	Low temperature storage test	-30°C, 240hr
4	High temperature & high humidity (operation test)	60°C, 90%RH, 240hr
5	Low temperature operation test	-10°C, 240hr
6	High temperature operation test	60°C, 240hr
7	Thermal Shock Test	-20°C~60°C, 1hr/cycle, 100cycle
8	PCT	121°C, 100%RH, 2atm, 12hr
9	ESD	150pF, 330Ω, ±8kV(Contact), ±15kV (Air)
10	Image Sticking	6*8chess to Gray 128: 2hr+1min image need disappear
11	Packing VIB	1.47G, 1-200hz, X, Y, ±Z, 30min/Axis
12	Packing Drop	Height: Xcm, 1角3边6面 注: X根据整箱重量而定, > 10Kg取60cm, ≤10Kg取80cm
13	VIB	1.5G, 10-500Hz, Sine, 方向 +X +Y +Z S weep 60min
14	Shock	220G, 2ms, half sine, 方向±X ±Y ±Z, 每个方向各冲击1次
15	Water Immunity	滴水不报点, 擦拭后正常触控; 表面水雾可正常操作; 少许雨水可湿手操作; 水平状态少量积水可操作;
16	Touch method	医用橡胶手套0.7mm (约6层手套), 棉手套 (2mm) 可操作

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6.1 PACKING INFORMATION(产品形态：TLCM)

Packing process:



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6.2 BOX LABEL (产品形态: TLCM)

Serial number marked part needs to print, As follows

1. FG-CODE(前12位)
2. Product Quantity
3. Box ID
4. Packing Date
5. Customer Part No.--Empty
6. the last four numbers FG-Code
7. Vendor Code --- Empty

Total Size:110×55mm

BOE Technology Group Co., Ltd

MODEL: XXXXXXXX-XXX ① QTY: XX ②

SERIAL NO: XXXXXXXXXXXX ③ DATE: XXXX/XX/XX ④

Box ID bar code

XXXXXX ⑤ XXXX ⑥ XXXX ⑦ (QA)

- Box Label Naming Rule

Digit	1	2	3	4	5	6	7	8	9	10	11	12	13
Code	S	L	S	5	1	2	3	D	0	0	0	6	8
Description	Products/GBN		Grade	Line	Year		Month	Revision Code	Serial Number				

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6.3 Product Label



Serial number marked part needs to print, As follows

1. FG-CODE(前12位)
 2. Product ID barcode
 3. Product ID
- Total Size:48×12mm

• Product Label Naming Rule

Digit	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Code	S	L	S	5	1	2	3	5	9	4	2	0	0	0	1	D	B
Description	Model Code/GBN		Grade	Line	Year		Month	Model Extension Code (Last 4 Digits Of FG-Code)				Serial Number:00001~ZZZZZZ					

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8.0 Handling & Cautions

Please pay attention to the followings when you use this TFT LCD Module.

8.1 Mounting Precautions

- Use finger-stalls with soft gloves in order to keep display clean during the incoming inspection and assembly process.
- You must mount a module using specified mounting holes (Details refer to the drawings).
- 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 module.
- Do not apply mechanical stress or static pressure on module; Abnormal display cause by pressing some parts of module during assembly process, do not belong to product failure, the press should be agreed by two sides.
- Determine the optimum mounting angle, refer to the viewing angle range in the specification for each model.
- Do not apply mechanical stress or static pressure on module, and avoid impact, vibration and falling.
- Acetic acid type and chlorine type materials for the cover case are not desirable because the former generates corrosive gas of attacking the polarizer at high temperature and the latter causes circuit break by electro-chemical reaction.
- Protection film for polarizer on the module should be slowly peeled off before display.
- Be careful to prevent water & chemicals contact the module surface.
- You should adopt radiation structure to satisfy the temperature specification.
- Do not touch, push or rub the exposed polarizers with glass, tweezers or anything harder than HB pencil lead. And please do not rub with dust clothes with chemical treatment.

Do not touch the surface of polarizer for bare hand or greasy cloth. (Some cosmetics are detrimental to the polarizer.)

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- When the surface becomes dusty, please wipe gently with absorbent cotton or other soft materials like chamois soaks with petroleum benzine. Normal-hexane & alcohol is recommended for cleaning the adhesives used to attach front / rear polarizers. Do not use acetone, toluene , because they cause chemical damage to the polarizer.
- Wipe off saliva or water drops as soon as possible. Their long time contact with polarizer causes deformations and color fading.
- This module has its circuitry PCB' s on the rear side and Driver IC, should be handled carefully in order not to be stressed.
- Avoid impose stress on PCB and Driver IC during assembly process ,Do not drawing, bending, COF package & wire.
- Do not disassemble the module.

8.2 Operating Precautions

- Do not connector or disconnect the cable to/from the Module at the "Power On" Condition.
- When the module is operating, do not lose CLK, ENAB signals. If any one of these signals is lost, the module would be damaged.
- Obey the supply voltage sequence. If wrong sequence is applied, the module would be damaged.
- Do not allow to adjust the adjustable resistance or switch.
- The electrochemical reaction caused by DC voltage will lead to LCD module degradation, so DC drive should be avoided.
- The LCD modules use C-MOS LSI drivers, so customers are recommended that any unused input terminal would be connected to Vdd or Vss, do not input any signals before power is turn on, and ground you body, work/assembly area, assembly equipment to protect against static electricity.
- Do not exceed the absolute maximum rating value. (supply voltage variation, input voltage variation, variation in part contents and environmental temperature, and so on) Otherwise the Module may be damaged.
- Module has high frequency circuits. Sufficient suppression to the electromagnetic interference shall be done by system manufacturers. Grounding and shielding methods may be important to minimized the interference.

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- The cables should be as short as possible between System Board and PCB interface.
- Connectors are precision devices to transmit electrical signals, and operators should plug in parallel.
- 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.
- Long side LED Bar design is recommended when using E-LED type Back Light.
- For long-term lighting products, it is recommended to shut down periodically.
- If the product is used for a long time under the condition of 7*24 hr, it is strongly recommended to contact BOE for filed application engineering advice.
- Long time and large angle forward use or unconventional use , It is strongly recommended to contact BOE for filed application engineering advice.

8.3 Electrostatic Discharge Precautions

- Avoid the use work clothing made of synthetic fibers. We recommend cotton clothing or other conductivity-treated fibers.
- 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.
- Do not close to static electricity to avoid product damage.
- Do not touch interface pin directly.

8.4 Precautions for Strong Light Exposure

- Do not leave the module operation or storage in Strong light . Strong light exposure causes degradation of polarizer and color filter.

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8.5 Precautions for Storage

A. Atmosphere Requirement

ITEM	UNIT	MIN	MAX
Storage Temperature	(°C)	5	40
Storage Humidity	(%rH)	40	75
Storage Life	6 months		
Storage Condition	- The storage room should be equipped with a dark and good ventilation facility. - Prevent products from being exposed to the direct sunlight, moisture and water. - The product need to keep away from organic solvent and corrosive gas. - Be careful for condensation at sudden temperature change. - Storage condition is guaranteed under packing conditions.		

B. Package Requirement

- The product should be placed in a sealed polythene bag.
- Product Should be placed on the pallet, Which is away from the floor, Be cautions not to pile the product up.
- 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.
- As the original protective film, do not use the adhesive protective film to avoid change of Pol color and characteristic.

8.6 Precautions for protection film

- Remove the protective film slowly, keeping the removing direction approximate 30-degree not vertical from panel surface, If possible, under ESD control device like ion blower, and the humidity of working room should be kept over 50%RH to reduce the risk of static charge.
- People who peeled off the protection film should wear anti-static strap and grounded well.

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8.7 Appropriate Condition for Commercial Display

-Generally large-sized LCD modules are designed for consumer applications . Accordingly, long-term display like in Commercial Display application, can cause uneven display including image sticking. To optimize module's lifetime and function, several operating usages are required.

1. Normal operating condition

- Temperature: $20\pm 15^{\circ}\text{C}$
- Operating Ambient Humidity : $55\pm 20\%$
- Display pattern: dynamic pattern (Real display)
- Well-ventilated place is recommended to set up Commercial Display system

2. Special operating condition

a. Ambient condition

- Well-ventilated place is recommended to set up Commercial Display system.

b. Power and screen save

- Periodical power-off or screen save is needed after long-term display.

c. As the low temperature, the response time is greatly delayed. As the high temperatures (higher than the operating temperature) the LCD module may turn black screen. The above phenomenon cannot explain the failure of the display. When the temperature returns to the normal operating temperature, the LCD module will return to normal display.

d. When expose to drastic fluctuation of temperature (hot to cold or cold to hot) ,the LCD module may be affected; Specifically, drastic temperature fluctuation from cold to hot ,produces dew on the LCD module 's surface which may affect the operation of the polarizer and LCD module .

e. Do not exceed the absolute maximum rating value. (supply voltage variation, input voltage variation, variation in part contents and environmental temperature, and so on) Otherwise the Module may be damaged.

f. Product reliability and functions are only guaranteed when the product is used under right operation usages. If product will be used in extreme conditions such as high temperature, high humidity, high altitude, special display images, running time, long time operation, outdoor operation, etc. It is strongly recommended to contact BOE for filed application engineering advice. Otherwise, its reliability and function may not be guaranteed. Extreme conditions are commonly found at airports, transit stations, banks, stock market and controlling systems.

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3. Operating usages to protect against image sticking due to long-term static display.
 - a. Suitable operating time: under 20 hours a day.
 - b. Static information display recommended to use with moving image.
 - Cycling display between 5 minutes' information(static) display and 10 seconds' moving image.
 - c. Background and character (image) color change
 - Use different colors for background and character, respectively.
 - Change colors themselves periodically.
 - d. Avoid combination of background and character with large different luminance.
 - 1) Abnormal condition just means conditions except normal condition.
 - 2) Black image or moving image is strongly recommended as a screen save
4. Lifetime in this spec. is guaranteed only when Commercial Display is used according to operating usages.

8.8 Other Precautions

A. LC Leak

- If the liquid crystal material leaks from the panel, it is recommended to wash the LC with acetone or ethanol and then burn it.
- If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contact with hands, skin or clothes, it has to be washed away thoroughly with soap.
- If LC in mouth, mouth need to be washed, drink plenty of water to induce vomiting and follow medical advice.
- If LC touch eyes, eyes need to be washed with running water at least 15 minutes.

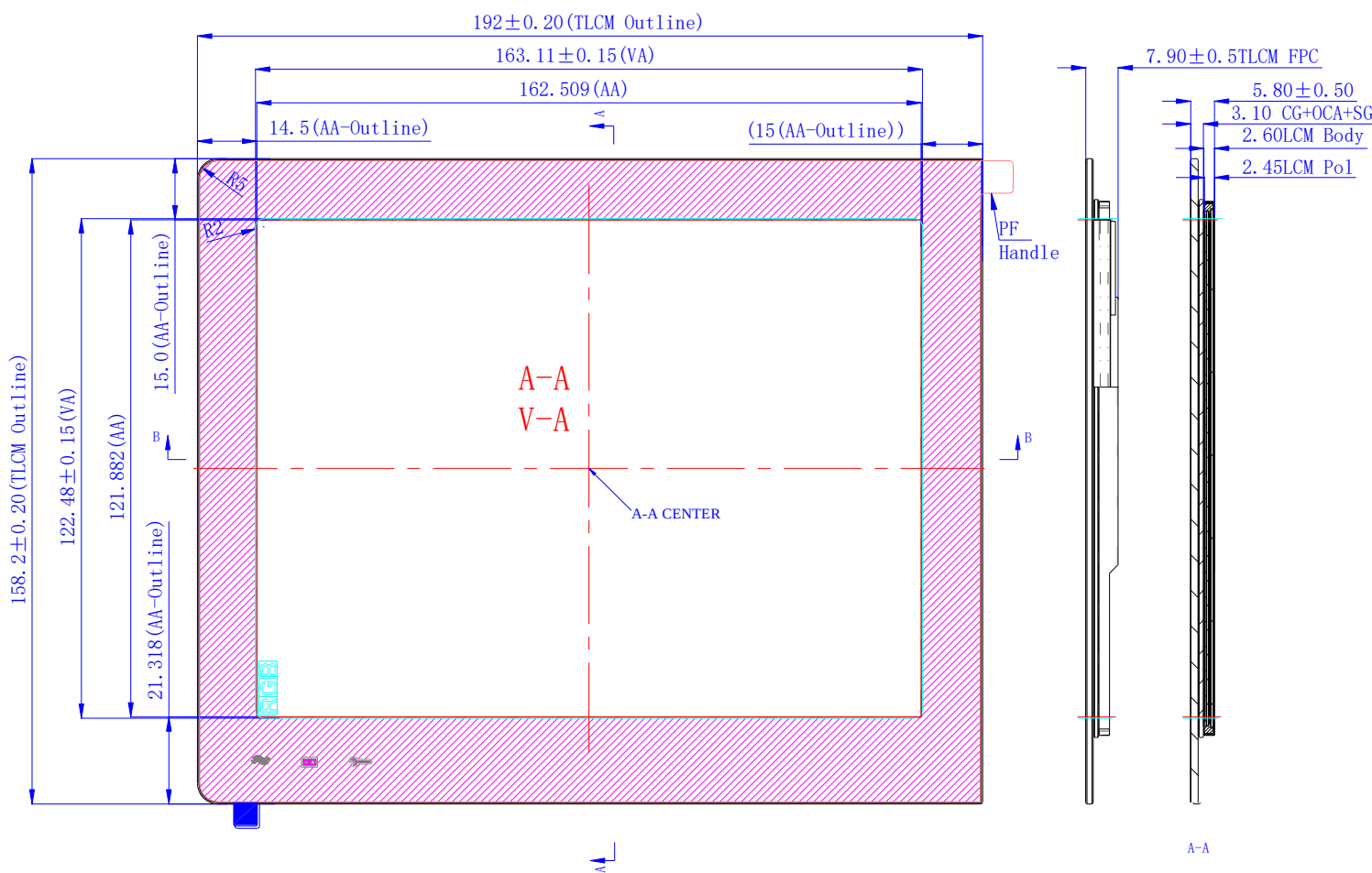
B. Rework

- When returning the module for repair or etc., Please pack the module not to be broken. We recommend to use the original shipping packages.

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9.0 APPENDIX

Mechanical Drawing
Drawing Attachment: Landscape Front View



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Mechanical Drawing

Drawing Attachment: Landscape Back View

