

# Product Datasheet Rev.J0

SUPPLIER: JUZHEN INTERNATIONAL  
PART NUMBER: JZ104SOMN17  
PART NAME: TFT LCD MODULE

## REVISION HISTORY

REV.	ECN No.	DESCRIPTION	DATE	PREPARED	APPROVED
J0		Initial Release	18.02.2023	CHEN	SUN

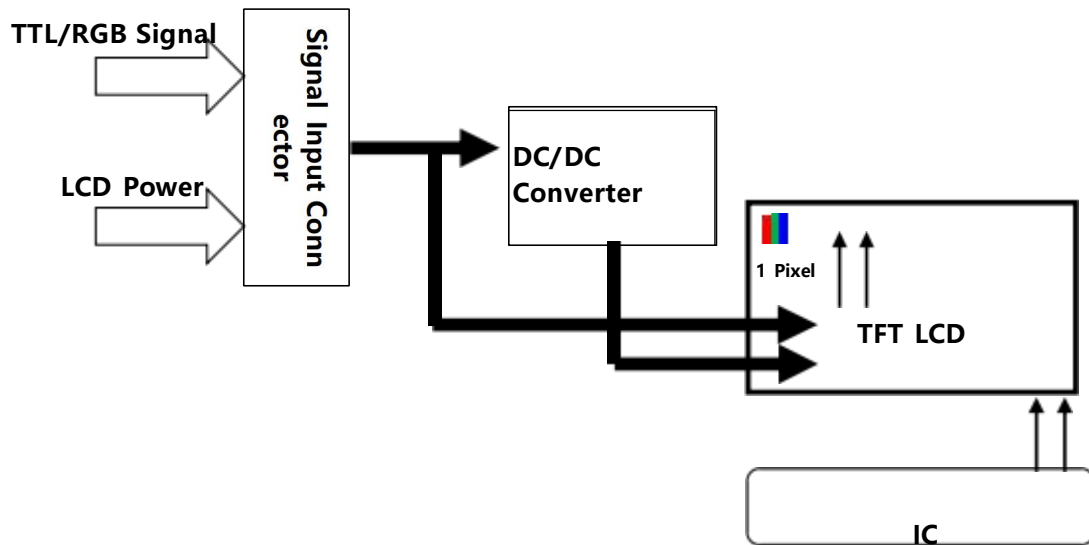
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## 1.0 GENERAL DESCRIPTION

### 1.1 Introduction

JZ104SOMN17 is a color active matrix TFT LCD module using amorphous silicon TFT 's (Thin Film Transistors) as an active switching device. This module has a 10.4 inch diagonally measured active area with SVGA resolutions (800 horizontal by 600 vertical pixel array). Each pixel is divided into RED, GREEN, BLUE dots which are arranged in vertical stripes and this module can display 16.7M colors.



### 1.2 Features

- 0.5T Glass ( Single) -
- Reverse Type
- 8bit color depth, display 16.7M colors.
- Frame Frequency: 60Hz

### 1.3 Application

- Medical
- Industrial
- HMI & Industrial Computer
- Instrument

### 1.4 General Specification

The following are general specifications at the JZ104SOMN17.

**<Table 1. LCD MDL Specifications>**

Parameter	Specification	Unit	Remarks
Active Area	211.2x158.4	mm	
Number Of Pixels	800*600	pixels	
Pixel Pitch	264x264	mm	
Pixel Arrangement	Pixels RGB stripe arrangement		
Display Mode	TN, Normally White		
Display Colors	16.7M	colors	Real 8bit
Surface Treatment	AG25		
Contrast Ratio	typ 800:1		
Viewing Angle (CR>10)	typ 80/80/65/75	deg.	L/R/U/D
Response Time	typ 30, max 35	ms	
Color Gamut	min 50% typ 55%		
Transmittance	Typ. 6.6%	%	w/o APF, based on Silicate LED
Power Consumption	LCD 0.76W Max.	watt	
Outline Dimension	220.4*171*1.43	mm	
Weight	117	gram	

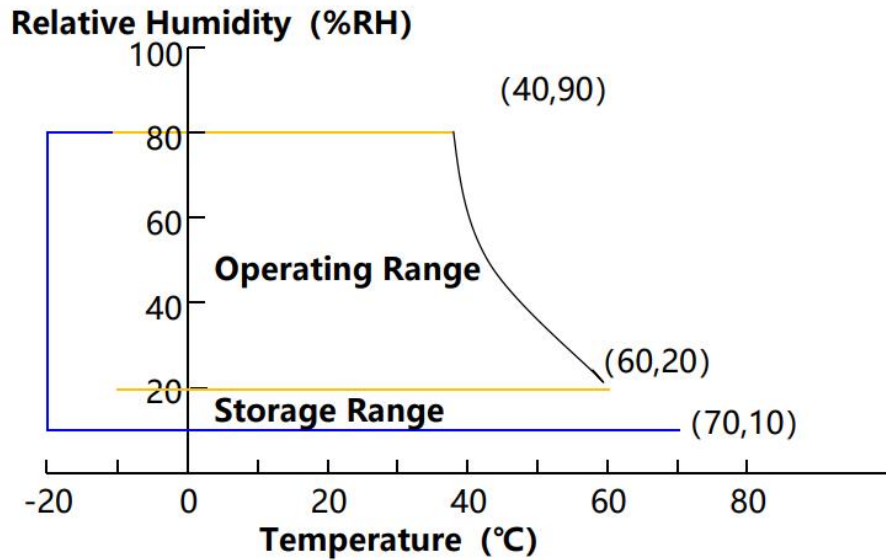
## 2.0 ABSOLUTE MAXIMUM RATINGS

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	Remark
Power Supply Voltage	VCC	0	3.6	V	Ta = 25 °C
Operating Temperature	T <sub>OP</sub>	-10	60	°C	Note 1
Storage Temperature	T <sub>ST</sub>	-20	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.



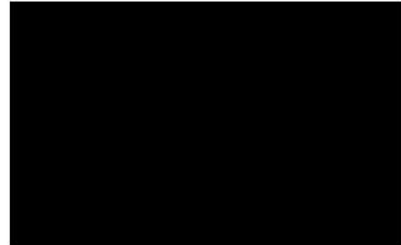
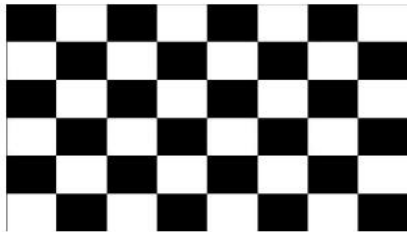
### 3.0 ELECTRICAL SPECIFICATIONS

#### 3.1 TFT LCD Module

< Table 3. Open cell Electrical specifications > [Ta =25±2 °C]

Parameter	Symbol	Values			Unit	Notes
		Min.	Typ.	Max.		
Power Supply Voltage	VCC	3.0	3.3	3.6	V	Note 1
Permissible Input Ripple Voltage	VRF	-10%VCC	-	10%VCC	mV	Note 3
Power Supply Current	IDD	144	180	230	mA	Note 1
Power Supply Inrush Current	Inrush	-	-	2	A	Note 2
Power Consumption	P <sub>D</sub>	0.48	0.59	0.76	W	Note 1

- Notes : 1. The supply voltage is measured and specified at the interface connector of MDL .  
 The current draw and power consumption specified is for VCC=3.3V, Frame rate f<sub>v</sub>=60Hz and Clock frequency = 40.2MHz. Test Pattern of power supply current  
 a) Typ : Mosaic 8 x 6 Pattern(L0/L255)                      b) Max : Black



2. Measure condition (Figure 4)  
 3. Input voltage range:3.0~3.6V.Test condition: Oscilloscope bandwidth 20MHz, AC coupling

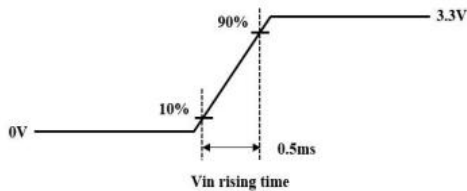


Figure 4. Inrush Measure Condition

## 4.0 INTERFACE CONNECTION

### 4.1 Interface Input Signal & Power

- Customer connector: HRS FH28-60S-0.5SH or equivalent

< Table4. Pin Assignment for open cell Connector >

Pin No.	Symbol	Description	Remarks
1	GND	Ground	
2	NC	No connection	
3	VCC	Power Supply,3.0V~3.6V, IVCC 0.23A max	
4-11	R0-R7	Red data Input	
12-19	G0-G7	Green data Input	
20-27	B0-B7	Blue data Input	
28	DCLK	Clock input (Latch data at falling edge)	
29	DE	Data enable	
30	HSYNC	Horizontal sync input. Negative polarity	
31	VSYNC	Vertical sync input. Negative polarity	
32	MODE	DE/SYNC mode select. VCC: DE mode , GND/NC: SYNC mode	
33	NC	No connection	
34	CSB	Serial communication chip select	
35	RESET	Reserved for Juzhen use only for RESET. Please leave it open.	
36	VCC	Power Supply3.0V~3.6V, IVCC 0.23A max	
37	STBYB	Reserved for Juzhen use only for STBYB. Please leave it open.	
38-39	GND	Ground	
40-41	NC	No connection	
42	SEL	VCC/NC:6Bit , GND:8Bit	
43-50	NC	No connection	
51	SCL	Reserved for Juzhen use only for SCL. Please leave it open.	
52	SDA	Reserved for Juzhen use only for SDA. Please leave it open.	
53-54	NC	No connection	
55	VOTP	Reserved for Juzhen use only for VDD_OTP. Please leave it open.	
56	NC	No connection	
57	VCC	Power Supply, 3.0V~3.6V, IVCC 0.23A max	
58	NC	No connection	
59	GND	Ground	
60	NC	No connection	

## 4.2 TTL Interface

< Table 5. Input Data Mapping >

MLSb='H'	
SEL=L(8bit)	SEL=H(6bit)
B7	GND
B6	GND
B5	B5
B4	B4
B3	B3
B2	B2
B1	B1
B0	B0
G7	GND
G6	GND
G5	G5
G4	G4
G3	G3
G2	G2
G1	G1
G0	G0
R7	GND
R6	GND
R5	R5
R4	R4
R3	R3
R2	R2
R1	R1
R0	R0



## 5.0 SIGNAL TIMING SPECIFICATION

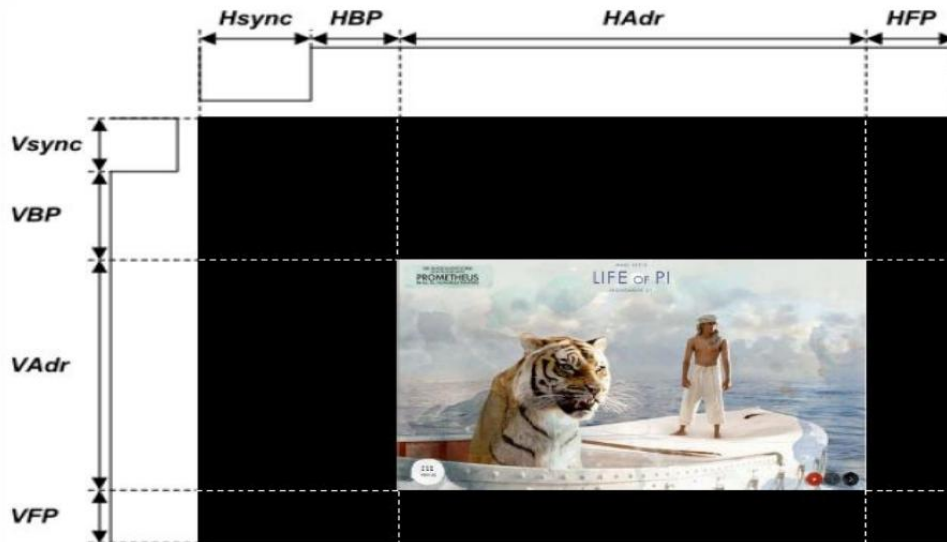
### 5.1 Timing Parameters

< Table6. Timing Parameter >

Item		Symbol	min	typ	max	UNIT	
LCD	Frame Rate	FR	59	60	61	Hz	
	Pixels Rate	tCLK	33	40.2	50	MHz	
Timing	Horizontal	Horizontal total time	tHP	860	1056	-	t <sub>CLK</sub>
		Horizontal Active time	tHAdr	800			t <sub>CLK</sub>
		Horizontal Back Porch	tHBP	30	46	-	t <sub>CLK</sub>
		Horizontal Front Porch	tHFP	30	210	354	t <sub>CLK</sub>
	Vertical	Vertical total time	tvp	624	635	700	t <sub>H</sub>
		Vertical Active time	tVadr	600			t <sub>H</sub>
		Vertical Back Porch	tVBP	-	23	-	t <sub>H</sub>
		Vertical Front Porch	tVFP	1	12	77	t <sub>H</sub>
Lane			-	1	-	Lane	

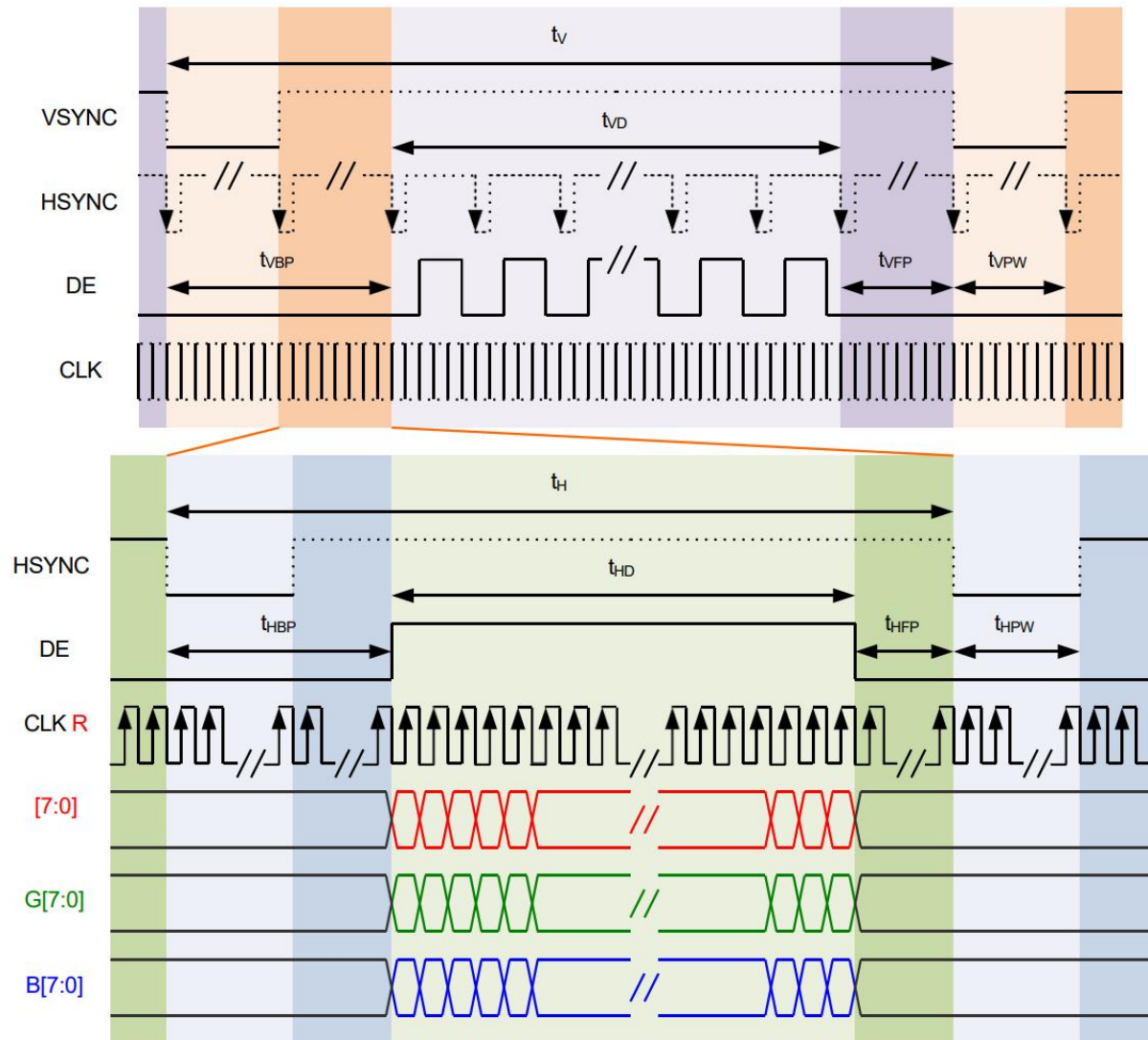
**Note**

1. DE Only Mode, While operation, DE signal should be have the same cycle. The input of HSYNC & VSYNC signal does not have an effect on normal operation.
2. Best operation clock frequency is 40.2Mhz.
3. [Frequency] = [H Total] \* [V Total] \* [vertical Frame rate]  
[Total, V Total and Frame rate]should operate within the range between Frequency\_Min and Frequency\_Max
4. Except Best operation clock frequency, FOS(Flicker & Brightness & Crosstalk, Etc.) are not guaranteed.
5. Main frequency Max is 50Mhz without spread spectrum



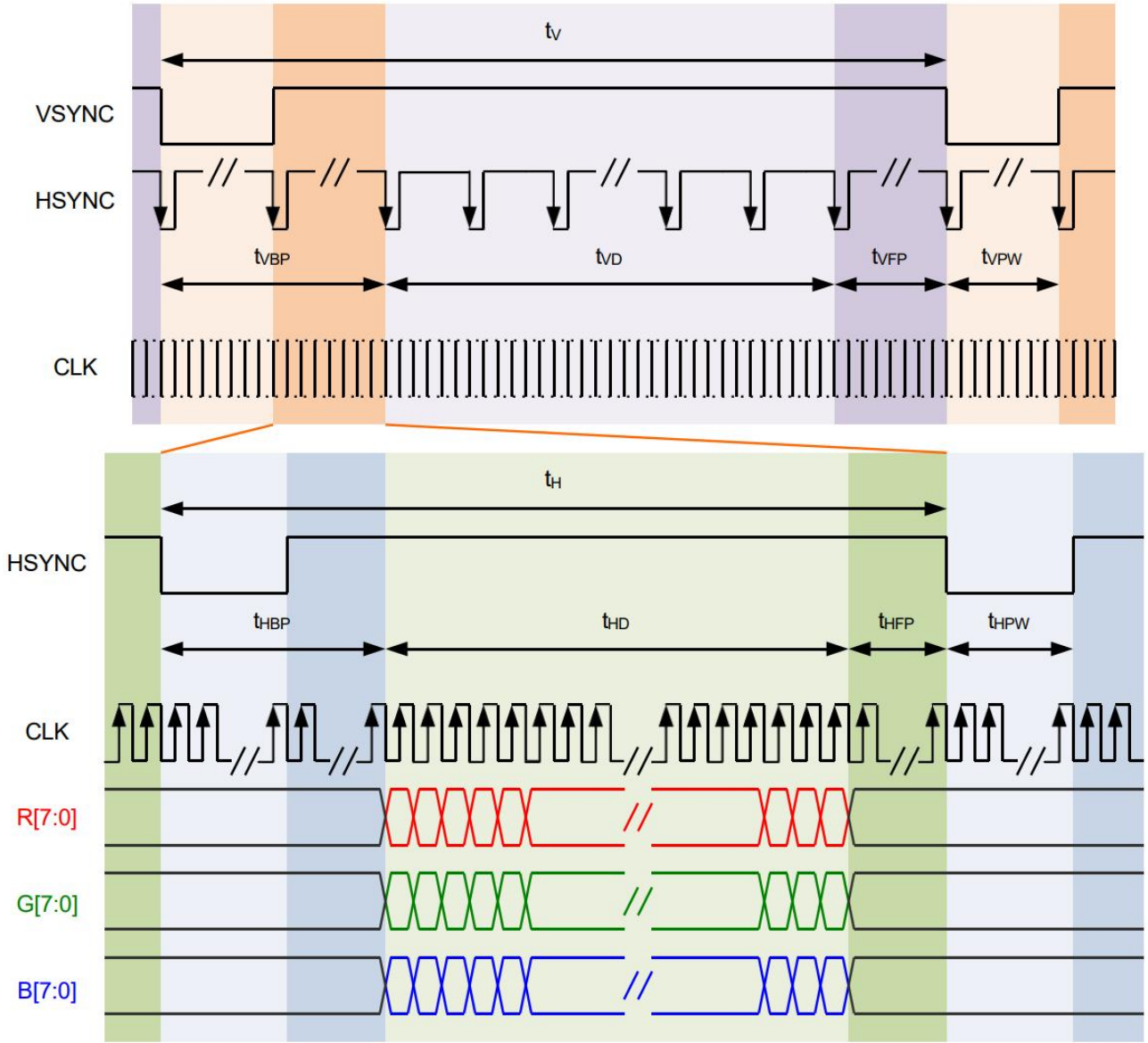
## 5.2 Signal Timing Waveform

DE Mode  
Parallel RGB



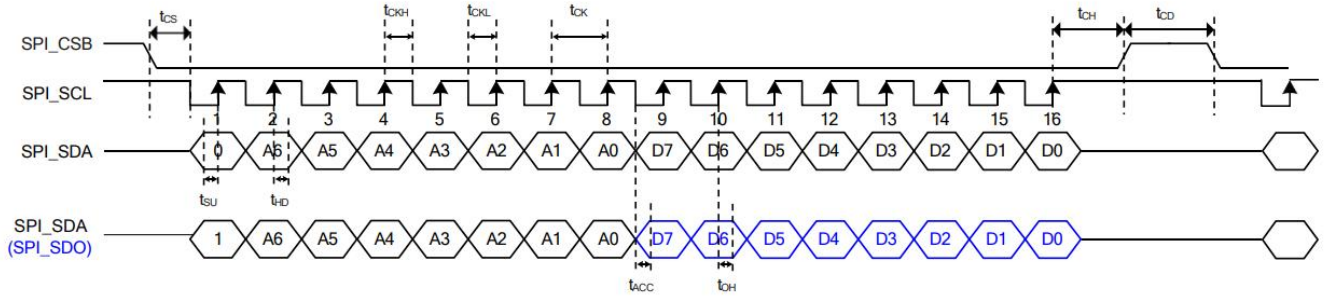
## 5.2 Signal Timing Waveform

**SYNC Mode**  
Parallel RGB



## 5.2 Signal Timing Waveform

### SPI AC Timing



<Table 7>

VSSI = VSSRX = VSSP = 0V, VDDI = VDDP= VDDR<sub>X</sub> = 3.0 ~ 3.3V, Ta Temperature

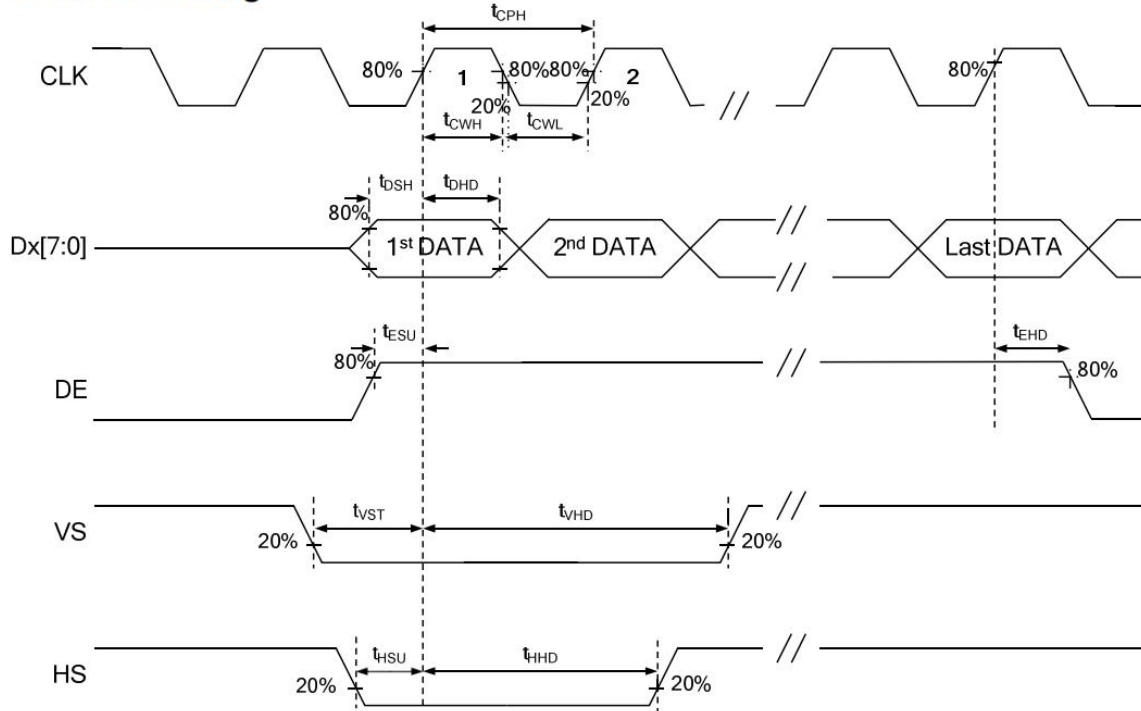
Item	Signal	Symbol	Condition	Min.	Max.	Unit		
Serial clock period (Write)	SPI_SCL	t <sub>ck</sub>	STBYB='0'	2500	—	ns		
Serial clock period (Read)			STBYB='1'	60	—			
SPI_SCL "H" pulse width (Write)			t <sub>ckH</sub>	STBYB='0'	1250		—	
SPI_SCL "H" pulse width (Read)				STBYB='1'	30		—	
SPI_SCL "L" pulse width (Write)				t <sub>ckL</sub>	STBYB='0'		2000	—
SPI_SCL "L" pulse width (Read)					STBYB='1'		100	—
Write data setup time	SPI_SDA (Write)	t <sub>su</sub>	12		—			
Write data hold time	SPI_SDA (Write)	t <sub>hd</sub>	12	—				
Read data access time	SPI_SDA (Read)	t <sub>acc</sub>	STBYB='0'	—	2500			
Read data output disable time			t <sub>oh</sub>	20	100			
SPI_CSB-SCL time			SPI_CSB	t <sub>cs</sub>	20		—	
SPI_CSB-SCL time	t <sub>ch</sub>	100		—				
SPI_CSB "H" pulse width	t <sub>cd</sub>	50		—				

Note:

- The input signal rise and fall time ( $t_r$ ,  $t_f$ ) are specified at 15ns or less.
- All timing is specified using 20% and 80% of VDDI as the standard.

## 5.2 Signal Timing Waveform

### CMOS AC Timing



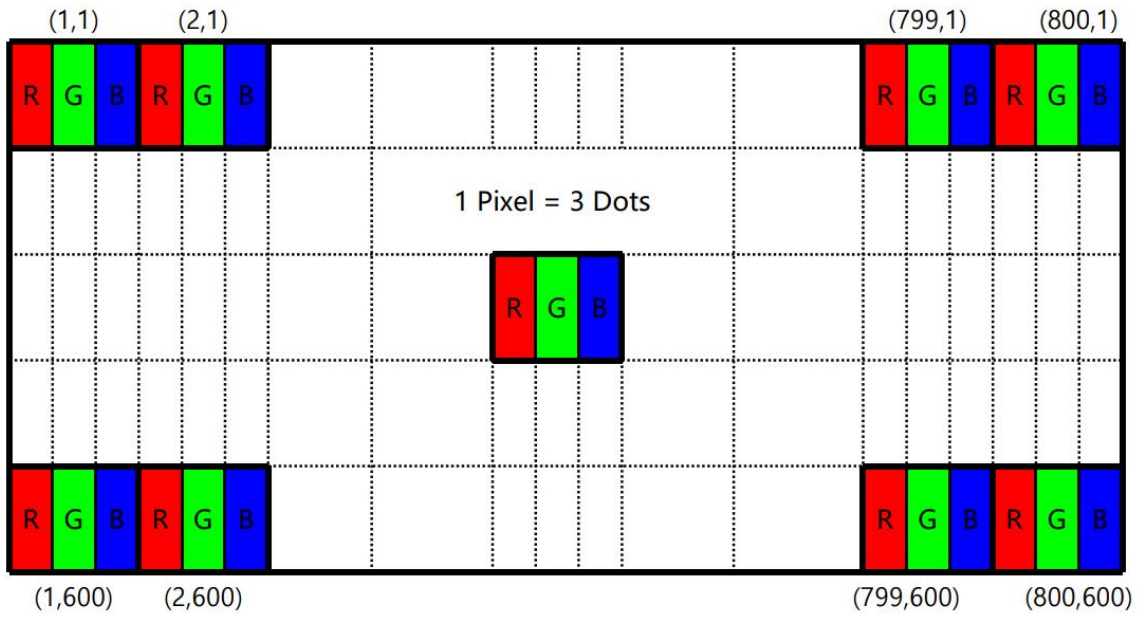
VSSI = VSSRX = VSSP = 0V, VDDI = VDDP= VDDR<sub>X</sub> = 3.0 ~ 3.3V, Ta Temperature

<Table 8>

Item	Signal	Symbol	Condition	Rating		Unit
				Min.	Max.	
CLK cycle time	CLK	$t_{CPH}$		25	200	ns
CLK pulse high duty		$t_{CWH}$		40	60	%
CLK pulse low duty		$t_{CWL}$		40	60	
VS setup time	VS	$t_{VST}$		4	-	ns
VS hold time		$t_{VHD}$		2	-	
HS setup time	HS	$t_{HST}$		4	-	
HS hold time		$t_{HHD}$		2	-	
Data setup time	Dx[7:0]	$t_{DSH}$		4	-	
Date hold time		$t_{DHD}$		2	-	
DE setup time	DE	$t_{ESU}$		4	-	
DE hold time		$t_{EHD}$		2	-	



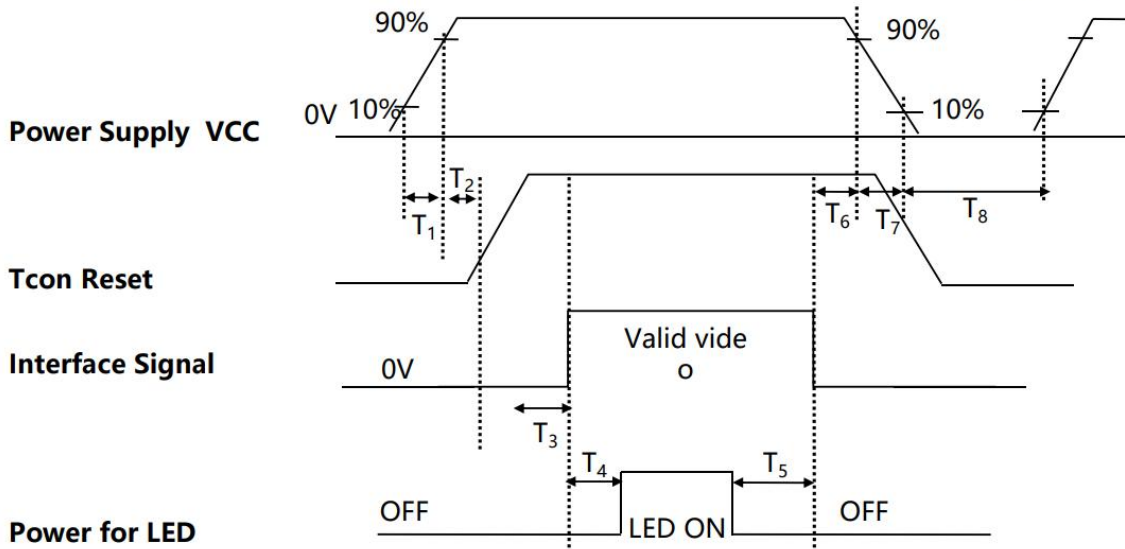
### 5.4 Input Color Data Mapping



Display Position of Input Data (V-H)

### 5.4 Power Sequence

[Ta = 25±2 °C]



Parameter	Value			Units
	Min.	Typ.	Max.	
T1	0.1	-	5	(ms)
T2	1	-	30	(ms)
T3	5	-	100	(ms)
T4	200	-	-	(ms)
T5	200	-	-	(ms)
T6	0.1	-	50	(ms)
T7	0.1	-	10	(ms)
T8	500	-	-	(ms)

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

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

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

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

Note 3: The T4 / T5 is recommended value, the case when failed to meet a minimum specification, abnormal display would be shown. There is no reliability problem.

Note 4: T8 should be measured after the Module has been fully discharged between power off and on period

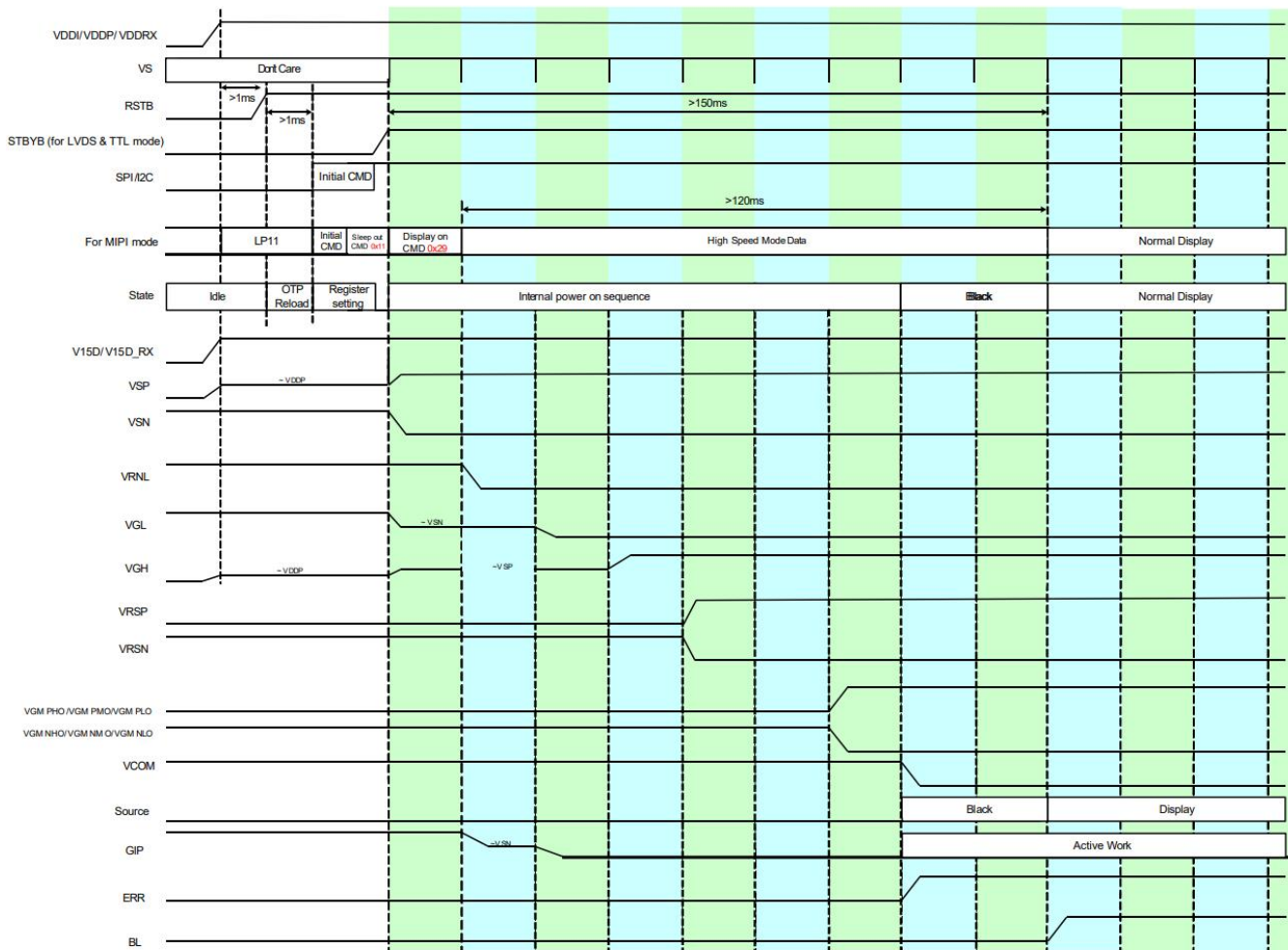
Note 5: If the on time of signals (Interface signal and user control signals) precedes the on time of Power (VCC), it will be happened abnormal display. When T6 is NC status, T6 doesn't need to be measured

Note 6: T7: Voltage of VDD must decay smoothly after power-off, there should be none re-bouncing voltage. (customer system decide this value)



## 5.4 Power Sequence

### Power on Sequence



## 6.0 OPTICAL SPECIFICATIONS

### 6.1 Overview

The test of optical specifications shall be measured in a dark room (ambient luminance  $\leq$  1lux and temperature =  $25\pm 2^\circ\text{C}$ ) with the equipment of Luminance meter system (CS200 0 or similar equipments) and test unit shall be located at an approximate distance 50cm from the LCD surface at a viewing angle of  $\theta$  and  $\phi$  equal to  $0^\circ$ . 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  $\theta$  and/or  $\phi$ , the center of the measuring spot on the Display surface shall stay fixed.

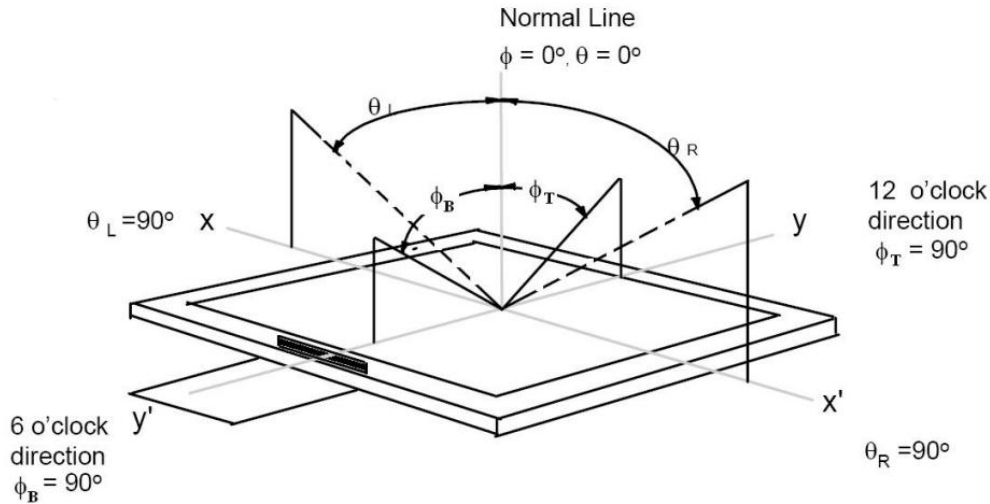
### 6.2 Optical Specifications

< Table10. Optical Table >

Item	Symbol	Condition	Min	Typ.	Max	Unit	Note
Transmittance ( center )			-	6.6	-	%	
Viewing Angle	$\theta_L$	$Cr \geq 10$	70	80	--	deg	Note 1
	$\theta_R$		70	80	--		
	$\psi_T$		55	65	--		
	$\psi_B$		65	75	--		
Contrast Ratio	Cr	$\theta=0^\circ$	600	800		-	Note 2
Response Time	Tr+Tf	FF= $0^\circ$	-	30	35	ms	Note 3
Color Coordinate of CIE1931	Rx	$\theta=0^\circ$	0.587	0.617	0.647	-	Note 4
	Ry		0.321	0.351	0.381		
	Gx		0.282	0.312	0.342		
	Gy		0.561	0.591	0.621		
	Bx		0.120	0.150	0.180		
	By		0.095	0.125	0.155		
	Wx		0.234	0.284	0.334		
	Wy		0.270	0.320	0.370		
NTSC Ratio	NTSC	CIE1931	50	55	--	%	Note 5
Polarization Direction of Front Polarizer	PdF			45°		deg	Note 6
Polarization Direction of Rear Polarizer	PdR			45°		Deg	
Gray inversion angle				6点钟			Note 7
Gamma Scale			1.9	2.2	2.5		

**Note 1: The definition of Viewing Angle**

Refer to the graph below marked by  $\theta$  and  $\phi$ .



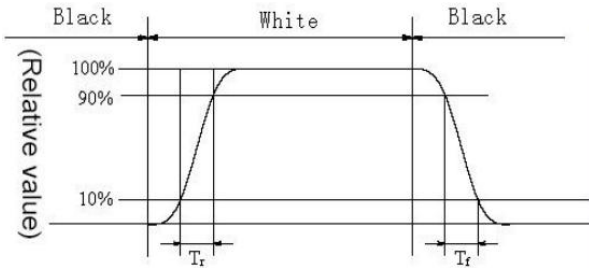
**Note 2: The definition of Contrast Ratio** (Test LCM using CS2000 or similar equipments):

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

(Contrast Ratio is measured in optimum common electrode voltage)

**Note 3: Definition of Response time.** (Test LCM using CS2000 or similar equipments):

The output signal also photo detector are measured when the input signal 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.



Measured Response Time	Target																
	0	15	31	47	63	79	95	111	127	143	159	175	191	207	223	239	255
0																	
15																	
31																	
47																	
63																	
79																	
95																	
111																	
127																	
143																	
159																	
175																	
191																	
207																	
223																	
239																	
255																	

Response time of gray to gray:

Response time  $T_g$  is the average time required for display transition by switching the input signal as below table and is based on Frame rate  $f_v = 60\text{Hz}$  to optimize. Each time in below table is defined as Figure 2 and shall be measured by switching the signals for "any level of gray ( bright )" and any level of gray ( dark )

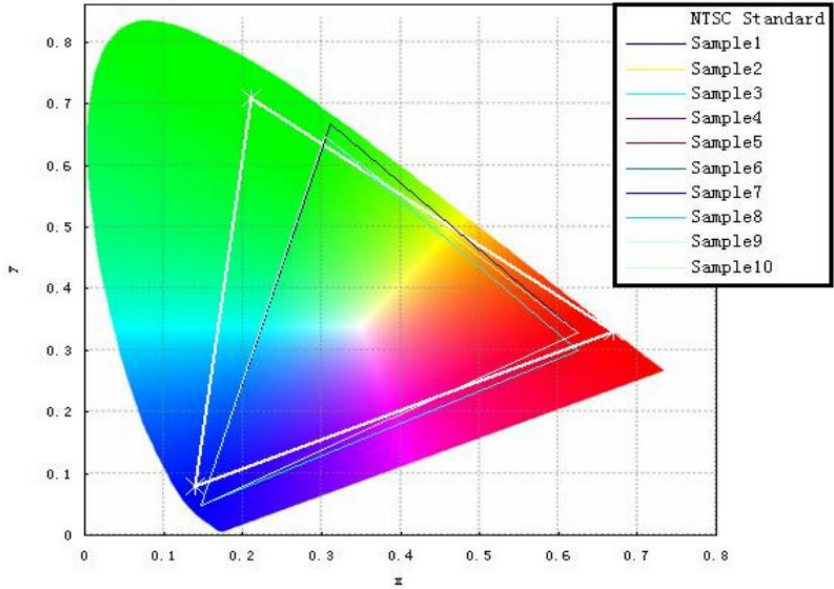
5. The output signals of photodetector are measured when the input signals are rechanged from "Lx" to "Ly",  $x, y = [0, 7]$ . The response time is defined as the time interval between the 10% and 90% of amplitudes. The result of the test can be noted as below:

**Note 4: 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.

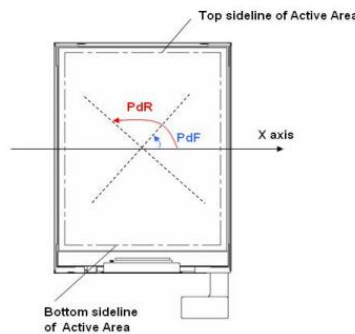
**Note 5: Definition of Color of CIE Coordinate and NTSC Ratio.**

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



**Note 6: Polarization Direction Definition**

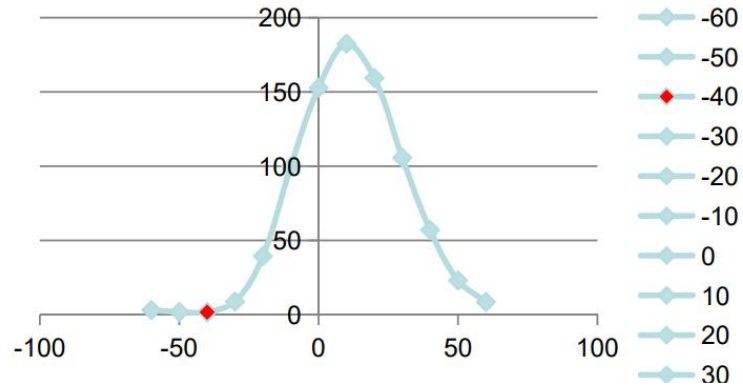
- Viewing direction is normal user viewing direction which is vertical to the display surface
- The polarizer which is closer to viewer is defined as Front Polarizer
- The polarizer which is on the rear side of viewer is defined as Rear Polarizer
- The X axis is defined as parallel line to top & bottom 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 7: 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:



## 7.0 MECHANICAL CHARACTERISTICS

### 7.1 Dimensional Requirements

As shown in Table 13.

< Table 11. Dimensional Parameters >

Parameter	Specification	Unit
Dimensional outline	220.4(H)*171(V)*1.43(B)	mm
Weight	117	gram
Active area	211.2x158.4	mm
Pixel pitch	264(H) ×264(V)	um
Number of pixels	800(H) ×600(V)(1 pixel = R + G + B dots)	pixels

### 7.2 Anti-Glare and Polarizer Hardness.


The surface of the LCD has an anti-glare coating to minimize reflection and a coating to reduce scratching.

## 8.0 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	-20°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, 50cycle
8	ESD	150pF, 330Ω, ±8kV(Contact), ±15kV (Air), Class B
9	Image Sticking	1h at room temperature, Chess 10*10 Pattern 1hrs, Gray 127 no image stickin -g
10	Packing VIB	5倍负载, f=1-200Hz, 1.47G, Random, ±Z: 60min
11	Packing Drop	+Z, 高度根据整箱重量确定

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## 9.0 PACKING INFORMATION (MDL)

Package Quantity in one Outer Box: 50pcs

### Packing Note

- Layout above is standard package, it will be re-packed if customer purchased quantity is less than standard pack.
- Box Dimension: 496 mm(W)x 396 mm(D)x 290 mm(H)




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## 10.0 Handling & Cautions

Please pay attention to the followings when you use this TFT LCD open cell (MDL) .

### 10.1 Mounting Precautions

- Use fingerstalls with soft gloves to keep display clean during the incoming inspection and assembly process.
- You should consider the mounting structure so that uneven force (ex. Twisted stress, Concentrated stress) is not applied to the MDL. And the case on which an MDL is mounted should have sufficient strength so that external force is not transmitted directly to the MDL.
- You must mount an MDL using specified mounting holes (Details refer to the drawings)..
- 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 MDL, Abnormal display cause by pressing some parts of MDL during assembly process, do not belong to product failure, the press should be agreed by two sides.
- .
- 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
- Do not apply mechanical stress or static pressure on MDL, and avoid impact, vibration and falling.
- .
- Protection film for polarizer on the MDL should be slowly peeled off before display.
- Be careful to prevent water & chemicals contact the MDL 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 soaked 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.
- Avoid impose stress on PCB and Driver IC during assembly process, Do not drawing, bending, COF package & wire
- This MDL has its circuitry PCBs on the rear side and Driver IC, should be handled carefully in order not to be stressed.
- Do not disassemble the MDL.

## 10.2 Operating Precautions

- Do not allow to adjust the adjustable resistance or switch
- Do not connect or disconnect the cable to/from the MDL at the “Power On” Condition.
- Obey the supply voltage sequence. If the wrong sequence is applied, the MDL would be damaged.
- When the MDL is operating, do not lose CLK, ENAB signals. If any one of these signals is lost, the MDL would be damaged.
- The electrochemical reaction caused by DC voltage will lead to LCD open cell degradation, so DC drive should be avoided.
- The LCD panel 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 e power is turn on, and ground your 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 MDL may be damaged.
- MDL has high frequency circuits. Sufficient suppression to the electromagnetic interference shall be done by system manufacturers. Grounding and shielding methods may be important to minimize the interference.

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- The cables should be as short as possible between System Board and PCB interface
- Do not leave the open cell operation or storage in Strong light. Strong light exposure causes degradation of polarizer and color filter.
- Connectors are precision devices to transmit electrical signals, and operators should plug in parallel.
- Be careful about condensation at sudden temperature change. Condensation causes damage to polarizer or electrical contacted parts. And after fading condensation, smears or spots 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 hrs., it is strongly recommended to contact Juzhen for filed application engineering advice.
- Long time and large angle forward use or unconventional use, it is strongly recommended to contact Juzhen for filed application engineering advice.
- Products exposed to low temperature environment for a long time, need to carry out necessary protection, low temperature environment is usually refrigerators, vending machine Etc....

### **10.3 Electrostatic Discharge Precautions**

- Avoid the use of work clothing made of synthetic fibers. We recommend cotton clothing or other conductivity-treated fibers.
- Do not touch interface pin directly
- Since an MDL 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.

### **10.4 Precautions for Strong Light Exposure**

- The cables should be as short as possible between System Board and PCB interface
- Do not leave the open cell operation or storage in Strong light. Strong light exposure causes degradation of polarizer and color filter.

## 10.5 Precautions for Storage

### A. Atmosphere Requirement

ITEM	UNIT	MIN	TYP	MAX
Storage Temperature	(°C)	5	25	40
Storage Humidity	(%rH)	40	50	75
Storage Life	6 months			
Storage Condition	<ul style="list-style-type: none"> <li>• The storage room should be equipped with a dark and good ventilation facility.</li> <li>• Prevent products from being exposed to the direct sunlight, moisture and water.</li> <li>• The product need to keep away from organic solvent and corrosive gas.</li> <li>• Be careful for condensation at sudden temperature change.</li> <li>• Storage condition is guaranteed under packing conditions.</li> </ul>			

### 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.

## 10.6 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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## 10.7 Appropriate Condition for Commercial Display

-Generally large-sized LCD panels 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 panel 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 panel will return to normal display.

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

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 MDL 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, highlight, 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 12 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.

## 10.8 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.

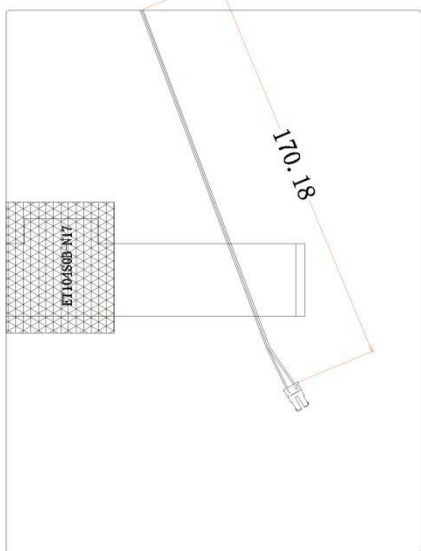
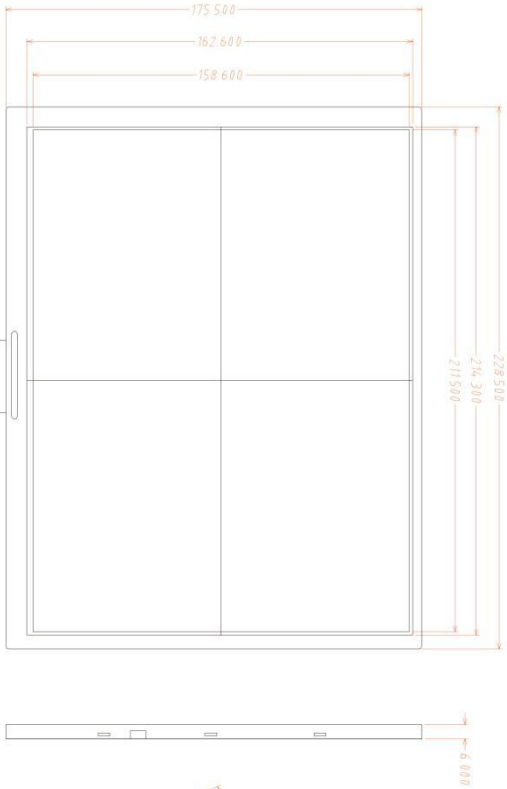
### B. Rework

- When returning the Open Cell for repair or etc., Please pack the MDL not to be broke

n. We recommend to use the original shipping packages.

- C. In order to prevent potential problems, flicker should be adjusted by optimizing the Vcom value in customer panel Line through the I2C Interface.

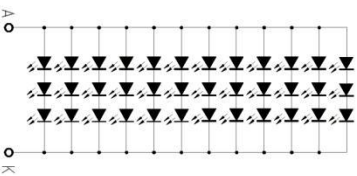
MECHANICAL OUTLINE, UNIT:mm  
(Unspecified Tolerances is: ±0.3 mm)



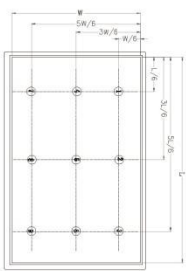
**ELECTRICAL-OPTICAL CHARACTERISTICS**  
(To=25°C. The Ambient temperature To=25°C)

Item	Symbol	Condition	min.	Typ.	max.	Unit
Forward Current	I <sub>F</sub>	I <sub>F</sub> = 480 mA	9	9.5	10.5	V
Reverse Current	I <sub>R</sub>	V <sub>R</sub> = -5 V	--	--	10	μA
Power dissipation	P <sub>D</sub>	I <sub>F</sub> = 480 mA	--	--	10.08	W
Colour Coordinates	X <sub>Y</sub>	I <sub>F</sub> = 480 mA	--	--	--	--
EL Luminance (Center Area)	L <sub>v</sub>	I <sub>F</sub> = 480 mA	--	--	75	cd/m <sup>2</sup>
Luminous Uniformity	L <sub>v</sub>	I <sub>F</sub> = 480 mA	400	500	--	cd/m <sup>2</sup>
LCM Luminance (reference???)	L <sub>v</sub>	I <sub>F</sub> = 480 mA	400	500	--	cd/m <sup>2</sup>
Operating Temperature Range	T <sub>opr</sub>	normal use	-10	--	+60	°C
Storage Temperature Range	T <sub>stg</sub>	normal use	-20	--	+70	°C

电路原理图：3串X12并=36 LED



测试9点, 测试距离:50±5cm, 测试角度:1° Ø5  
均匀性:最小/最大亮度\*100%, 测试仪器:测试-7A



NO.	TITLE (项目)	QUANTITY
1	HOUSING (壳体)	1
2	BEFL (基板)	2
3	DI-Fuser (灯板)	1
4	Roll box (灯板) 翻制T=0.30MM	1
5	Reflective tape (基板)	1
6	LED (4014)	36
7	PCB+导线	1
8	Lightguide (基板)	1

PRODUCT NAME: 产品名称

CUST NUMBER: 客户型号

PROJECTION: 三角法

CHECK: 核对

DESIGN: 设计

APPROVALS: 签字

SCALE: 比例

DATE: 日期

REV	DESCRIPTION:	DATE
V0	新发行	2022.11.12