FANNAL ELECTRONICS

SPEC. NUMBER	PRODUCT GROUP	REV.	ISSUE DATE	PAGE
AM-0700004B	TFT- LCM	V0	2022-5-18	1 OF 24

FN0700D004B

Product Specification Rev.V0

BUYER	
SUPPLIER	FANNAL Electronics CO., LTD
FG-Code	FN0700D004B

☐ Preliminary Specification
■ Approval Specification

ITEM	BUYER SIGNATURE	DATE

ITEM	SUPPLIER SIGNATURE	DATE
Prepared	dong	2022-6-18
Reviewed	xiong	2022-6-18
Approved	Jack	2022-6-18

REVISION HISTORY

REV.	ECN No.	DESCRIPTION OF CHANGES	DATE	PREPARED
V0		Initial Release	2022-5-18	dong

Contents

1.0 General Description /一般说明

1.1 Application /应用

■ Industrial

☐ Automotive

☐ Medical

☐ Outdoor highlight

1.2 General Specification /通用技术条件

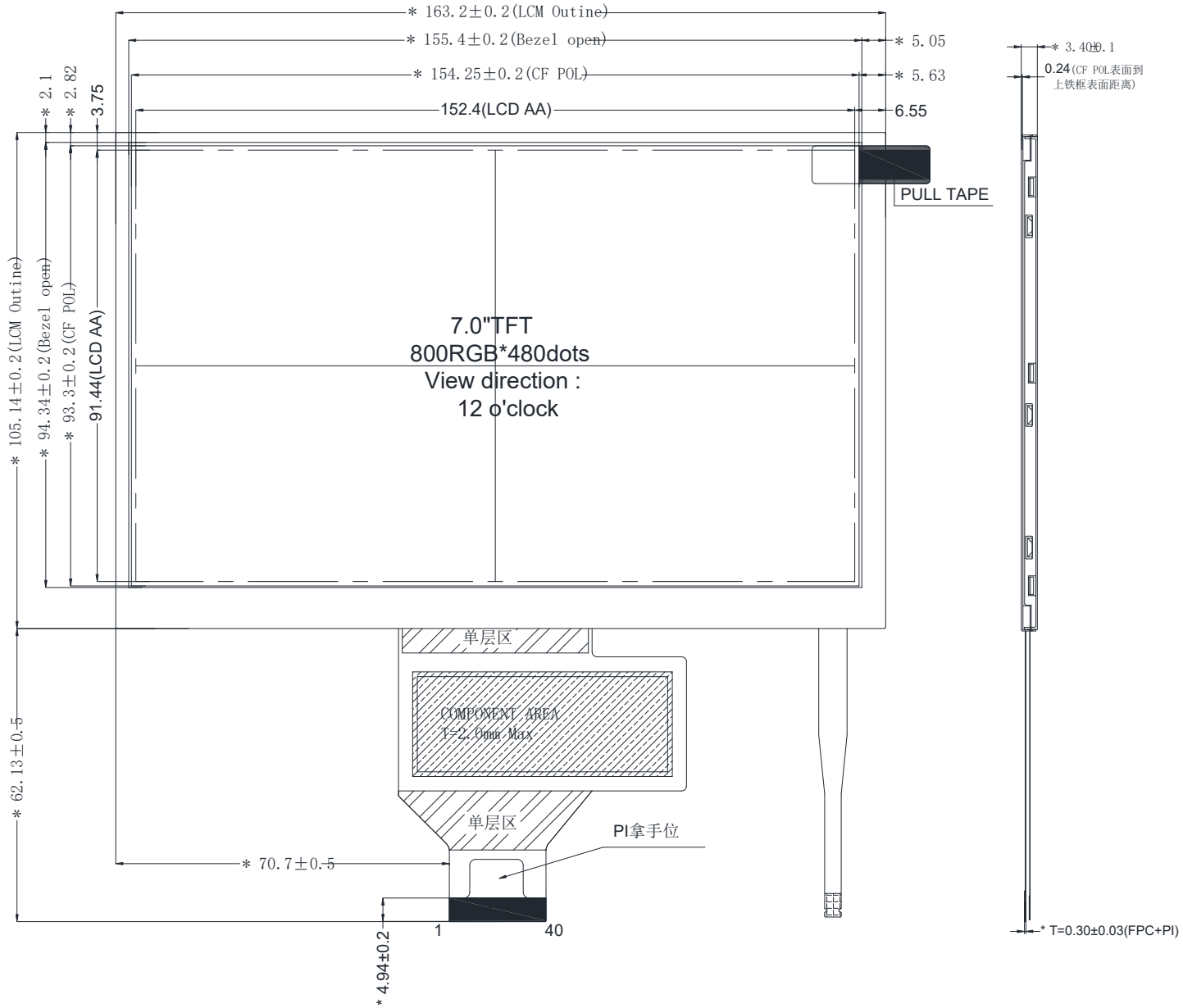
The followings are general specifications at the FN0700D004B.

Parameter	Specification	Unit
LCD size	7.0 inch(Diagonal)	
Number Of Pixels	800(H) ×480(V)	pixels
Pixel Pitch	0.1905(H)×0.1905(V)	mm
Pixel Arrangement	RGB Vertical Stripe	
Active Area	152.4(H)×91.44(V)	mm
Viewing Direction	12:00	o'clock
Display Mode	Normally White	
Module Size	163.2(W)×105.14(H)×3.4(D)	mm
Display Colors	16.7M	colors
Interface	24Bit RGB	
Power Consumption	LCD: TBD(Typ.) Backlight: 1.44(Typ.)@IBL=60mA	W
Luminance	500(Typ.)	cd/m²
Driver IC	/	

2.0 Mechanical Drawing /机械制图

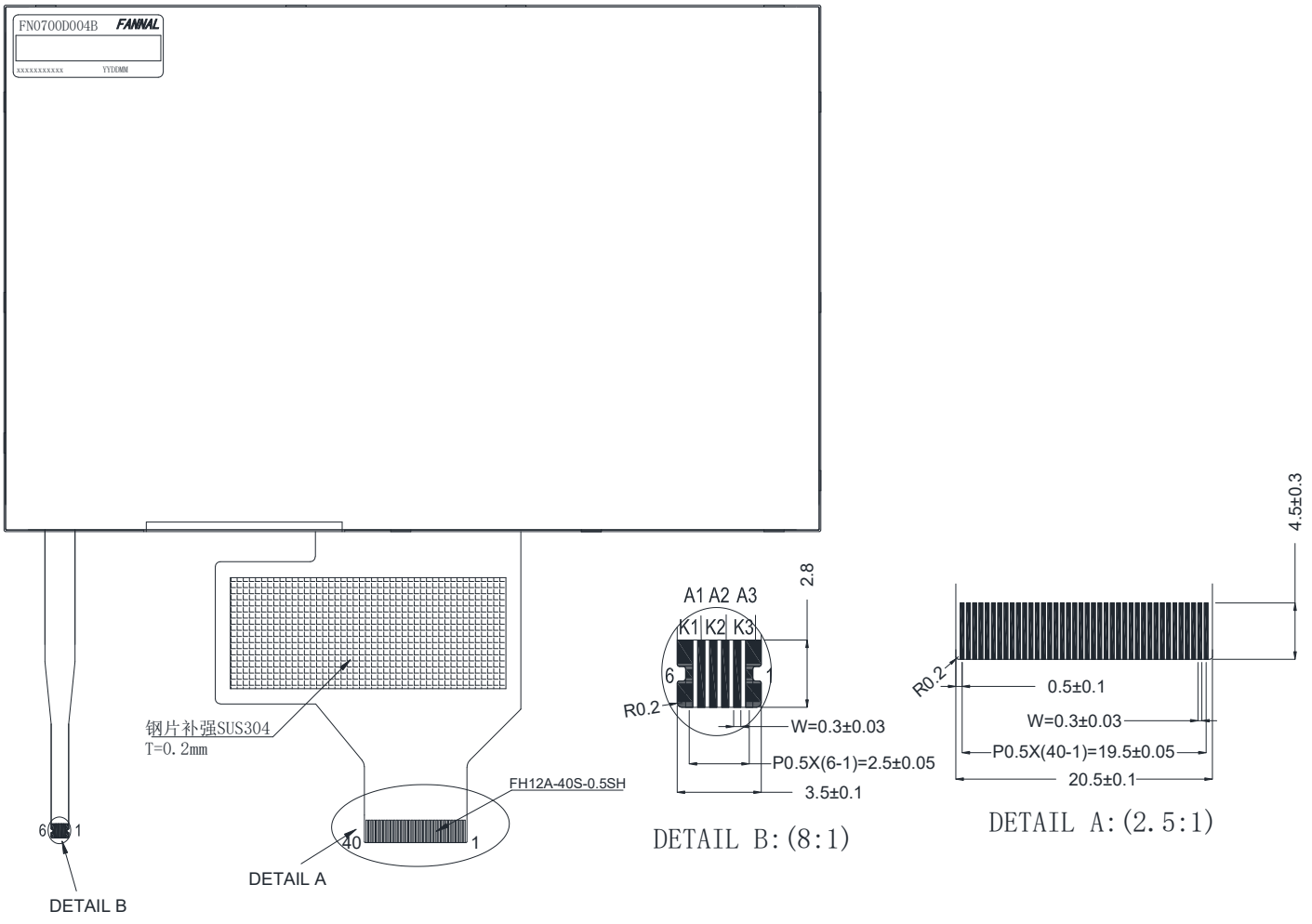
LCM Drawing

Drawing Attachment: Front



LCM Drawing

Drawing Attachment: Back



3.0 ABSOLUTE MAXIMUM RATINGS /绝对最大额定值

Parameter	Symbol	Min.	Max.	Unit
Power Supply Voltage	VDD	-0.3	+5.0	V
Operating Temperature	T_{OP}	-20	70	℃
Storage Temperature	T_{ST}	-30	80	℃
Humidity	RH	--	90%(Max60 °C)	RH

Note1: The absolute maximum rating values of this product are not allowed to be exceeded at any times. Should a module be used with any of the absolute maximum ratings exceeded, the characteristics of the module may not be recovered, or in an extreme case, the module may be permanently destroyed.

4.0 ELECTRICAL SPECIFICATIONS/电气规范

4.1 TFT LCM Module

[Ta =25±2 ℃]

Parameter	Symbol	Min.	Typ.	Max.	Unit
Power Supply Voltage	VDD	3.0	3.3	3.6	V
Power Supply Current	IDD	-	TBD	-	mA
Input logic high voltage	VIH	0.7VDD	-	VDD	V
Input logic low voltage	VIL	0	-	0.3VDD	V

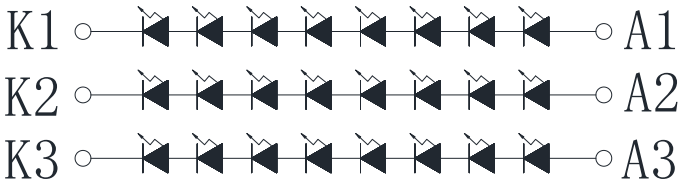
4.2 Backlight Driving Conditions

[Ta =25±2 ℃]

Parameter	Symbol	Values			Unit
		Min.	Typ.	Max.	
Forward voltage	VF	20.0	24.0	26.4	V
Forward current	IF	--	60	--	mA
Power Consumption	PLED	-	1.44	-	W
LED Life Time	--	-	30000	--	Hrs

Note : The "LED life time" is defined as the module brightness decrease to 50% original brightness at Ta=25℃ and 1/2 rated current. The LED lifetime could be decreased if operating IL is larger than 60 mA.

LED CIRCUIT DIAGRAM:



8*3=24EA If=60mA

VF:22~26.4V

5.0 Interface Description/接口说明

Connector Name/Designation	Interface Connector/Interface Card
Type Part Number	FPC 40PIN 0.5mmPITCH
Mating Housing Part Number	FH12A-40S-0.5SH

5.1 Pin assignment for LCM module

No.	Symbol	Description
1-2	GND	Ground.
3-4	VDD	Power supply.
5	R0	Red data bit 0.
6	R1	Red data bit 1
7	R2	Red data bit 2
8	R3	Red data bit 3
9	R4	Red data bit 4
10	R5	Red data bit 5
11	R6	Red data bit 6
12	R7	Red data bit 7
13	G0	Green data bit 0
14	G1	Green data bit 1
15	G2	Green data bit 2
16	G3	Green data bit 3
17	G4	Green data bit 4
18	G5	Green data bit 5
19	G6	Green data bit 6
20	G7	Green data bit 7
21	B0	Blue data bit 0
22	B1	Blue data bit 1
23	B2	Blue data bit 2
24	B3	Blue data bit 3
25	B4	Blue data bit 4
26	B5	Blue data bit 5
27	B6	Blue data bit 6

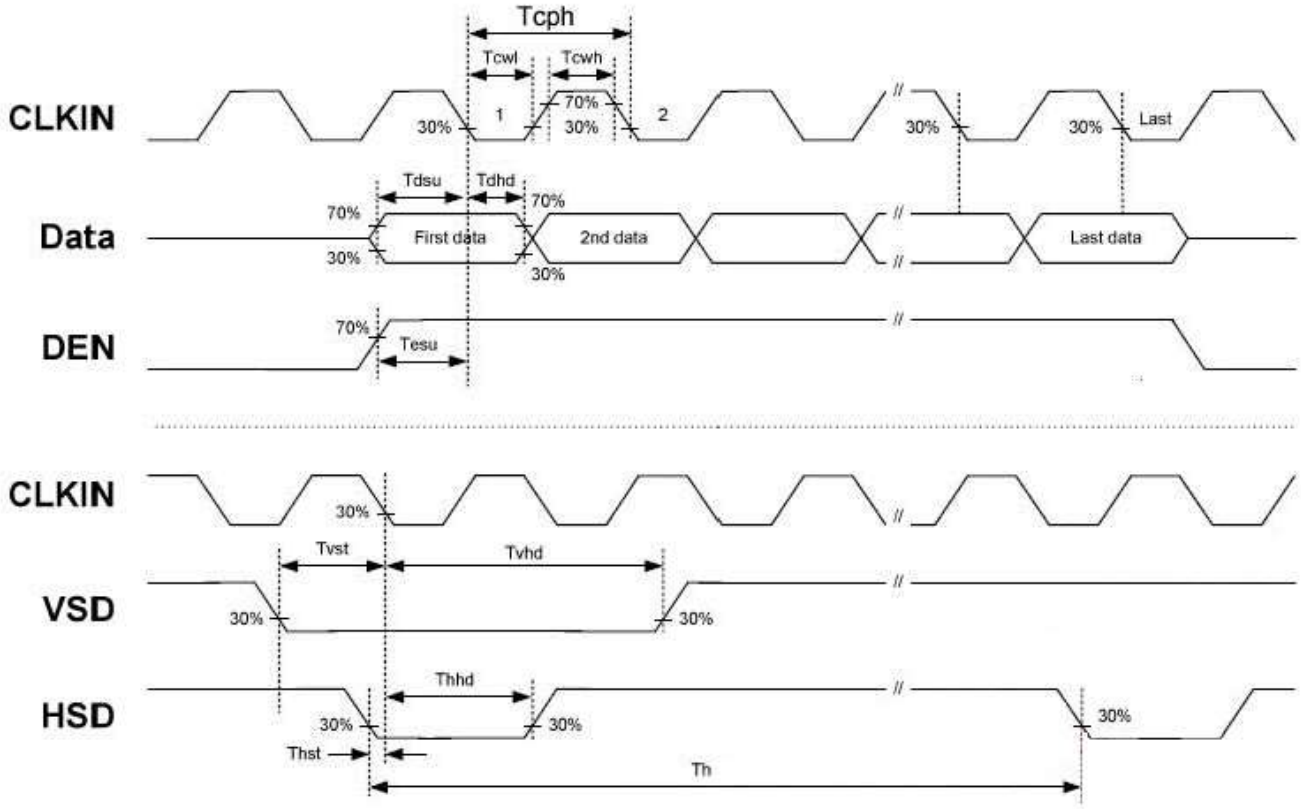
No.	Symbol	Description
28	B7	Blue data bit 7
29	GND	Ground
30	DCLK	Clock input pin
31	NC	No connection
32	HS	Horizontal sync input
33	VS	Vertical sync input
34	DE	Data enable signal input
35	NC	No connection
36	NC	No connection
37	GND	Ground
38	GND	Ground
39	NC	No connection
40	NC	No connection

5.2 Pin assignment for Backlight

No.	Symbol	Description
1	A1+	LED Backlight Anode Input
2	K1-	LED Backlight Cathode Input
3	A2+	LED Backlight Anode Input
4	K2-	LED Backlight Cathode Input
5	A3+	LED Backlight Anode Input
6	K3-	LED Backlight Cathode Input

5.2 AC Characteristics

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
HS setup time	T_{hst}	8	-	-	ns	
HS hold time	T_{hhd}	8	-	-	ns	
VS setup time	T_{vst}	8	-	-	ns	
VS hold time	T_{vhd}	8	-	-	ns	
Data setup time	T_{dsu}	8	-	-	ns	
Data hole time	T_{dhd}	8	-	-	ns	
DE setup time	T_{esu}	8	-	-	ns	
DE hole time	T_{ehd}	8	-	-	ns	
DV_{DD} Power On Slew rate	T_{POR}	-	-	20	ms	From 0 to 90% DV_{DD}
RESET pulse width	T_{Rst}	1	-	-	ms	
DCLK cycle time	T_{cph}	20	-	-	ns	
DCLK pulse duty	T_{cwh}	40	50	60	%	



5.3 Timing

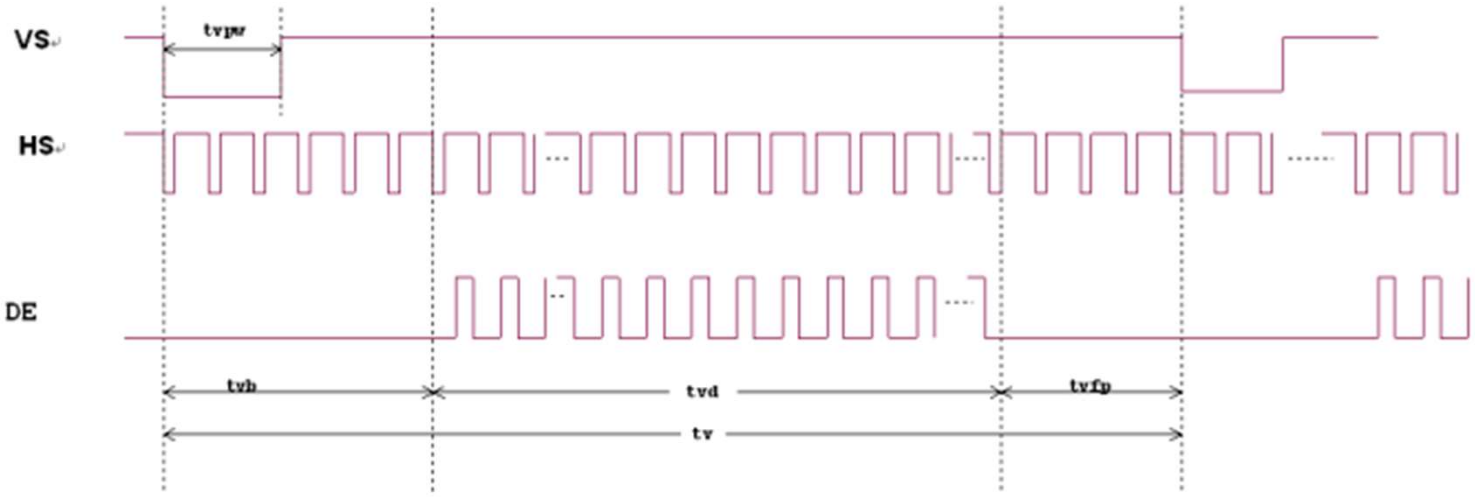
Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Horizontal Display Area	thd	-	800	-	DCLK	
DCLK Frequency	fclk	26.4	33.3	46.8	MHz	
One Horizontal Line	th	862	1056	1200	DCLK	
HS pulse width	thpw	1	6	40	DCLK	
HS Blanking	thb	46	46	46	DCLK	
HS Front Porch	thfp	16	204	354	DCLK	

Item	Symbol	Values			Unit	Remark
		Min.	Typ.	Max.		
Vertical Display Area	tvd	-	480	-	TH	
VS period time	tv	510	525	650	TH	
VS pulse width	tvpw	1	3	20	TH	
VS Blanking	tvb	23	23	23	TH	
VS Front Porch	tvfp	7	22	147	TH	

Note: Frame rate is 60±5Hz

5.4 Data Input Format

Horizontal input timing diagram



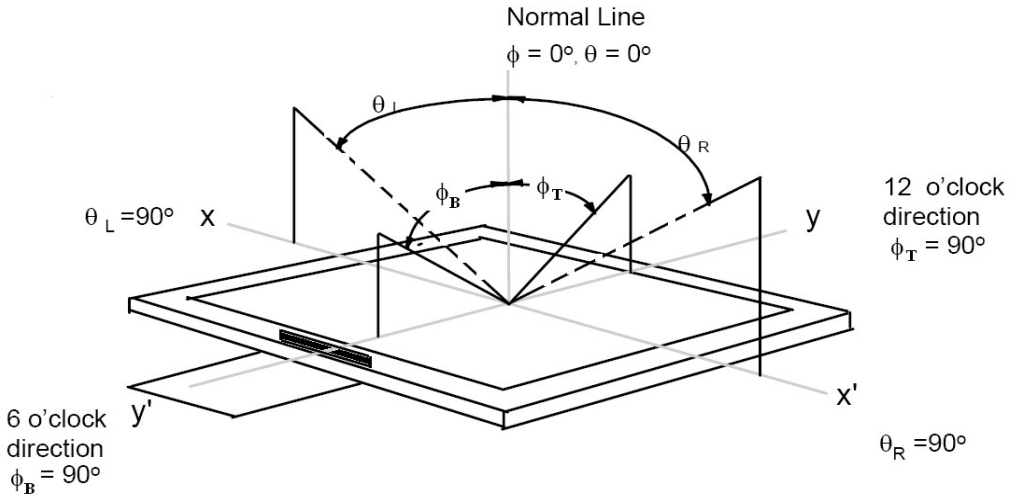
Vertical input timing diagram

6.0 OPTICAL SPECIFICATIONS /光学规格

Item	Symbol	Condition	Min	Typ.	Max	Unit	Note
Viewing Angle	θL	Cr≥10	60	70	--	deg	Note 1
	θ_R		60	70	--		
	ψ_T		50	60	--		
	ψ_B		60	70	--		
Contrast Ratio	Cr	θ=0° FF=0°	700	1000		-	Note 2
Response Time	Tr+Tf		--	20	30	ms	Note 3
Color Coordinate of CIE1931	Wx	θ=0°	Typ. -0.05	TBD	Typ. +0.05	-	Note 4
	Wy			TBD			
Uniformity	U		75	80		%	Note 5
Luminance	L		400	500	-	cd/m²	Note 6

Note 1:The definition of Viewing Angle

Refer to the graph below marked by *θ* and *Φ*.



Note2:The definition of Contrast Ratio

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

(Contrast Ratio is measured in optimum common electrode voltage)

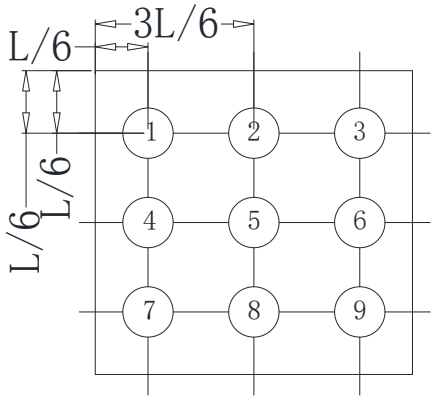
Note3: Definition of Response time.(Test LCD using RD80S or similar equipments):
The output sign also photo detector are measured when the input sign also are changed from "black" to " white "(Voltage falling time)and from " white " to " black " (Voltage rising time), respectively .The response time is defined as the time interval between the 10% and 90% of amplitudes . Refer to figures below.

Note 4: Color Coordinates of CIE 1931
The test condition is at ILED=20mA and measured on the surface of LCD module at 25℃.
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 Luminance Uniformity

Active area is divided into 9 measuring areas. Every measuring point is placed at the center of each measuring area.
Luminance Uniformity (U) = Lmin/ Lmax
L-------Active area length W----- Active area width
Lmax: The measured Maximum luminance of all measurement position.
Lmin: The measured Minimum luminance of all measurement position.

Note 6: Definition of Luminance:
Measure the luminance of white state at center point.



7.0 RELIABLITY TEST /可靠性测试

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

No	Test Items	Conditions
1	High temperature storage	80℃ 240hrs
2	Low temperature storage	-30℃ 240hrs
3	Low temperature operation	-20℃ 240hrs
4	High temperature operation	70℃ 240hrs
5	High temperature & humidity (Storage)	60℃ 90%RH 240hrs
6	Thermal Shock	-20℃~70℃ 0.5hr/cycle 30cycle
7	Vibration	Frequency range: 10~55Hz, Stroke:1.mm Sweep: 10Hz~55Hz~10Hz 2 hours for each direction of X .Y. Z. (package condition)
8	Mechanical shock	60G 6ms ±X, ±Y,±Z, 3times for each direction
9	Package Drop	Height: 80 cm, 1 corner, 3 edges, 6 surfaces
10	ESD test	C=150pF, R=330 Ω, 5 points/panel Air:±8KV, 5 times; Contact: ±4KV, 5times;

• 8.0 Precautions /注意事项

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

• 8.1 Mounting Precautions /安装注意事项

• (1) Use fingerstalls with soft gloves in order to keep display clean during the incoming inspection and assembly process.

• (2) You must mount a module using specified mounting holes (Details refer to the drawings).

• (3) Please make sure to avoid external forces applied to the Source PCB or FPC and D-IC during the process of handling or assembling. If not, It causes panel damage or malfunction.

• (4) Note that polarizers are very fragile and could be easily damaged. 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.

• (5) Do not pull or fold the source D-IC which connect the source PCB or FPC and the panel.

• Do not pull or fold the LED wire.

• (6) After removing the protective film, when the surface becomes dusty, please wipe gently with absorbent cotton or other soft materials like chamois soaks with alcohol or purified water.

• Do not strong polar solvent because they cause chemical damage to the polarizer.

• (7) Wipe off saliva or water drops as soon as possible. Their long time contact with polarizer causes deformations and color fading.

• (8) Protection film for polarizer on the module shall be slowly peeled off just before use so that the electrostatic charge can be minimized.

• (9) Since the LCD is made of glass, do not apply strong mechanical impact or static load onto it. Handling with care since shock, vibration, and careless handling may seriously affect the product. If it f alls from a high place or receives a strong shock, the glass may be broken.

• (10) Do not disassemble the module.

• (11) To determine the optimum mounting angle, refer to the viewing angle range in the specification for each model.

• (12) If the customer's set presses the main parts of the LCD, the LCD may show the abnormal display. But this phenomenon does not mean the malfunction of the LCD and should be pressed by the way of mutual agreement.

• (13)Do not drop water or any chemicals onto the LCD’s surface.

8.2 Operating Precautions /操作注意事项

- (1) 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.
- (2) 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.
- (3) The electrochemical reaction caused by DC voltage will lead to LCD degradation, so DC drive should be avoided.
- (4) 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 equipments to protect against static electricity.
- (5) 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.
- (6) Design the length of cable to connect between the connector for back-light and the converter as short as possible and the shorter cable shall be connected directly.
The longer cable between that of back-light and that of converter may cause the luminance of LED to lower and need a higher startup voltage(Vs).
- (7) Connectors are precise devices for connecting PCB and transmitting electrical signals. Operators should insert and unplug MDL in parallel when assembling MDL.
- (8) Do not connect or disconnect the cable to/ from the module at the "Power On" condition.
- (9) When the module is operating, do not lose CLK, ENAB signals. If any one these signals is lost, the LCD panel would be damaged.
- (10) Obey the supply voltage sequence. If wrong sequence is applied, the module would be damaged.
- (11) Do not re-adjust variable resistor or switch etc.
- (12) For the Q/Single/OC Product, If the LED designed side view, LED bar should be putted in the L ong/short side；Otherwise, its reliability and function may not be guaranteed.

注:
①(1)涉及到Pol相关条目适用于OC/MDL出货产品,
②(6)(7)涉及到connector相关适用于OC/MDL出货产品
③ (12) 涉及到客户进行BLU设计，LED Bar位置需要避开GOA位置;

8.3 Electrostatic Discharge Control /静电放电控制

- (1) Since a module is composed of electronic circuits, it is not strong to electrostatic discharge. Make certain that treatment persons are connected to ground through wrist band etc. And don't touch interface pin directly. Keep products as far away from static electricity as possible.
- (2) Avoid the use work clothing made of synthetic fibers. We recommend cotton clothing or other conductivity-treated fibers.

8.4 Precautions for Strong Light Exposure /强光照射注意事项

It is not allowed to store or run directly in strong light or in high temperature and humidity for a long ti me; Strong light exposure causes degradation of polarizer and color filter.

8.5 Storage Precautions /存储注意事项

When storing modules as spares for a long time, the following precautions are necessary.

•(1) 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.
Temperature : 5 ~ 40 ℃

•(2) Humidity : 35 ~ 75 %RH

•(3) Period : 6 months

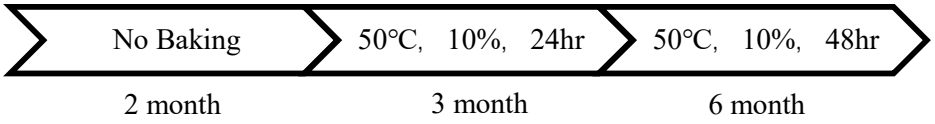
•(4) Control of ventilation and temperature is necessary.

•(5) Please make sure to protect the product from strong light exposure, water or moisture.
Be careful for condensation.

•(6) Store in a polyethylene bag with sealed so as not to enter fresh air outside in it.

•(7)Do not store the LCD near organic solvents or corrosive gasses.

•(8) Please keep the Modules/OC/FOG at a circumstance shown below Fig.



8.6 Precautions for Protection Film /保护膜注意事项

• (1) 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 th e humidity of working room should be kept over 50%RH to reduce the risk of static charge.

• (2) In handling the LCD, wear non-charged material gloves. And the conducting wrist to the earth and the conducting shoes to the earth are necessary.

8.7 Appropriate Condition for Display /适当的显示条件

•(1) Normal operating condition
- Temperature: 0 ~ 40℃
- Operating Ambient Humidity : 10 ~ 90 %
- Display pattern: dynamic pattern (Real display)
- Suitable operating time: under 12 hours a day.

•(2) Special operating condition

If the product will be used in extreme conditions such as high temperature, humidity, display patterns or 7*24hrs operation time etc.., It is strongly recommended to contact us for Application engineering advi ce. Otherwise, its reliability and function may not be guaranteed.

•(3)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.
- (5) Please contact us in advance when you display the same pattern for a long time.
- (6) If the Module keeps displaying the same pattern for a long period of time, the image may be "sticked" or "turn off" to the screen. To avoid image sticking, it is recommended to use a screen saver.
- (7) 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.
- (8) Dew drop atmosphere should be avoided.
- (9) The storage room should be equipped with a good ventilation facility and avoid to expose to corrosive gas , which has a temperature controlling system.
- (10) The LCD should be avoided to expose to corrosive gas for long time, ,the LCD may be affected by the gas as SO2 ,H2S etc.
- (11) When expose to drastic fluctuation of temperature (hot to cold or cold to hot) ,the LCD may be affected; Specifically, drastic temperature fluctuation from cold to hot ,produces dew on the LCD's surface which may affect the operation of the polarizer and the LCD.
- (12) Response time will be extremely delayed at lower temperature than the operating temperature range and on the other hand at higher temperature LCD may turn black at temperature above its operational range. However those phenomena do not mean malfunction or out of order with the LCD. The LCD will revert to normal operation once the temperature returns to the recommended temperature range for normal operation

8.8 Others /其他

A. LC Leak /液晶泄露

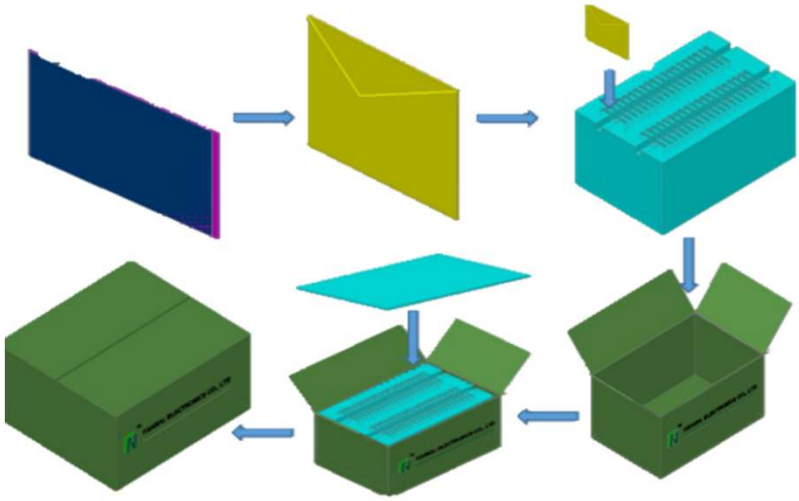
- If the liquid crystal material leaks from the panel, it is recommended to wash the LC with acetone or ethanol and then burn it.
- In case of contact with hands, skin or clothes, it has to be washed away thoroughly with soap.
- If LC in mouth, mouth need to be washed, drink plenty of water to induce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

B. Rework /返工

- When returning the module for repair or etc., Please pack the module not to be broken. 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 LCM Line (适用于Q/Single/OC出货产品)

9.0 PACKING INFORMATION(产品形态： LCM)



FANNAL ELECTRONICS CO.,LTD
Model:
Number:
Qty:
Date:

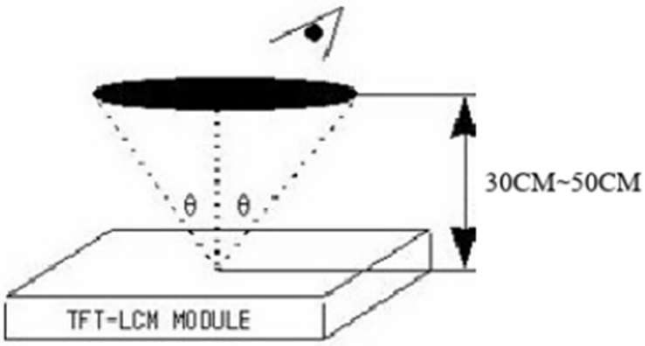
	Size	QTY.
Outer Box	530 x 360 x 275(mm)	80 products/Outer Box
Pallet	1130 x 930 x 150(mm)	1600 products/pallet

10.0 VISUAL INSPECTION CRITERIA FOR ALL CUSTMERS /所有客户的目视检查标准

10.1 Sampling Method /抽样方法

Unless otherwise agreed upon in writing, the sampling insepction shall be applied to t he Customers incoming inspection.

10.1.1 Lot size：1 pallet per same model
10.1.2 Sampling type：Random sampling
10.1.3 Inspection level：II
10.1.4 Sampling table：MIL-STD-105E



10.2 Inspection Environment /检验环境

10.2.1 Ambient conditions
a. Ambient Temperature:25±3℃
b. Relative Humidity:65±20%RH
c. Ambient Illumination:300-700LUX(Normal:500LUX)

10.2.2 Viewing Distance
The distance between the LCM and the inspector's eyes shall be at least 30cm-50cm

10.2.3 Viewing Angle
performing in front of the panel
[Vertical]：±25degree
[Horizontal]：±40degree

10.2.4 Inspection Area:
Display Area(Active Area)

10.3 Definitions /定义

10.3.1 Dark / Bright Spots
Points on display which appear dark/bright and usually result form the contamination.
These defects do not vary in size or intensity(contrast)when contrast is varied.
10.3.2 Dark / Bright Lines
Lines on display which appear dark/bright and usually result from the contamination.
10.3.3 Polarizer Scratch
Lines on display which are seen across a darker background and do not vary in size.
10.3.4 Polarizer Dent
White spots on display which appear againse a darker backgound and do not vary in size.
103.5 Bright Dot Defects
Dots(sub-pixels)on display which appear bright in the display area and visible throug h the 5%ND filter at Black Pattern.

10.3.6 Dark Dot Defects

Dots(sub-pixels)on display which appear dark in the display area at R.G.B Color Pattern.

10.3.7 Line Defects

All line defects on display which appear brigh/dark such as vertical,horizontal,or cross lines.

10.3.8 Mura

Mura on display which appears darker/brighter against background birghtness on parts of display area.

10.3.9 BM Defects

Bright(white)Points on display which are off BM(Black Matrix).

10.3.10 Visual Inspection

Inspection for LCM when the unit turns on.

10.3.11 Appearance Inspection

External inspection for LCM when the unit turns off.

10.3.12 Other

Defects which cannot be classified into the above defect definitions.

Note 1: Bright& Dark dots are not smaller than a sub-pixel(Dots smaller than a sub-pixel are not counted as defect dots)

10.4 Inspectin Criteria /检验标准

Refer to 《TFT LCM general inspection standard》

10.5 Verification /验证

The supplier can verify the defective LCMs to segregate the responsibilities at customer's facility or can request the Customer to ship the defective LCMs to assigned place for verification

This verificatin result shall be agreed mutually buy the Customer and Supplier. This result can be corrected/changed after detail failure analysis at Supplier's facilities.

10.6 Supplier Induced Defects /供应商引起的缺陷

All of the Supplier induced defective LCMs shall be returned to the Supplier for repair or replacement.

Bfore return the defective LCMs, the Customer needs Supplier's confirmatin with RMA Number.

All of the returned LCMs shall be returned to the Customer within agreed time period.

10.7 Customer Induced Defects /顾客引起的缺陷

The Customer can return the custmoer induced defective LCMs to the Supplier for repair.

The repair cost for Customer induced defective LCMs shall be agreed with both parties, Customer and Supplier.

10.8 Warranty Period /质量保证期

In-warranty period is Eighteen(18)Months from manufacturing month of LCM

Note：

a. Eighteen months are composed of twelfth months in-warranty period and sixth months distribution period

b. The manufacturing Month is on the LCMs as Supplier's serial No.

10.9 Repair Warranty /维修保证书

Repair warranty is Twelve(12)Months from repaired month for repaired LCMs

Note：a. The Label for repair will be added after repairing.

10.10 Warranty avoidance /避免担保

The warranty will be avoided in cases of below:

a. When the warranty period is expired.

b. The Customer induced defective LCMs.

c. When the LCMs were repaired by 3rd party without Suppolier's approval.

d.When the LCMs were treated like Disassemble and Rework by the Customer and/or Customer's representatives without Supplier's approval.

10.11 Others /其他

If any problems arise with the LCMs supplied by supplier, the customer and supplier will coopeate and make ettorts to solve it with mutual contidence and respect