产品规格承认书

Specification

TFT-LCD Module

Company:	深圳市华芯邦科技有限公司
Customer（客户）:	
Customer P/N（客户型号）:	

Customer Approved By（客户批准）:	
Qualified（合格）:	**Unqualified（不合格）:**

Internal Approval（公司批准）:		
Prepared	**Checked**	**Approved**

Records of Revision

Version	Date	Summary	Changed By
1.0	2024-04-22	First	Lucy
1.1	2024-06-20	更换LOGO 增加背光双面胶	Lucy
1.2	2024-09-16	FPC增加2个焊点，以利PCBA组装	Lucy

Table of Contents

1.General Specifications

This product is a transmissive type color active matrix liquid crystal display(LCD) which uses amorphous thin film transistor(TFT) as switching devices. This product is composed of a TFT LCD panel, a drive IC, a FPC, and a LED-backlight unit.

This product accords with RoHS environmental criterion.

This specification defines general provisions as well as inspection standards for TFT module supplied by HKDigital electronics.

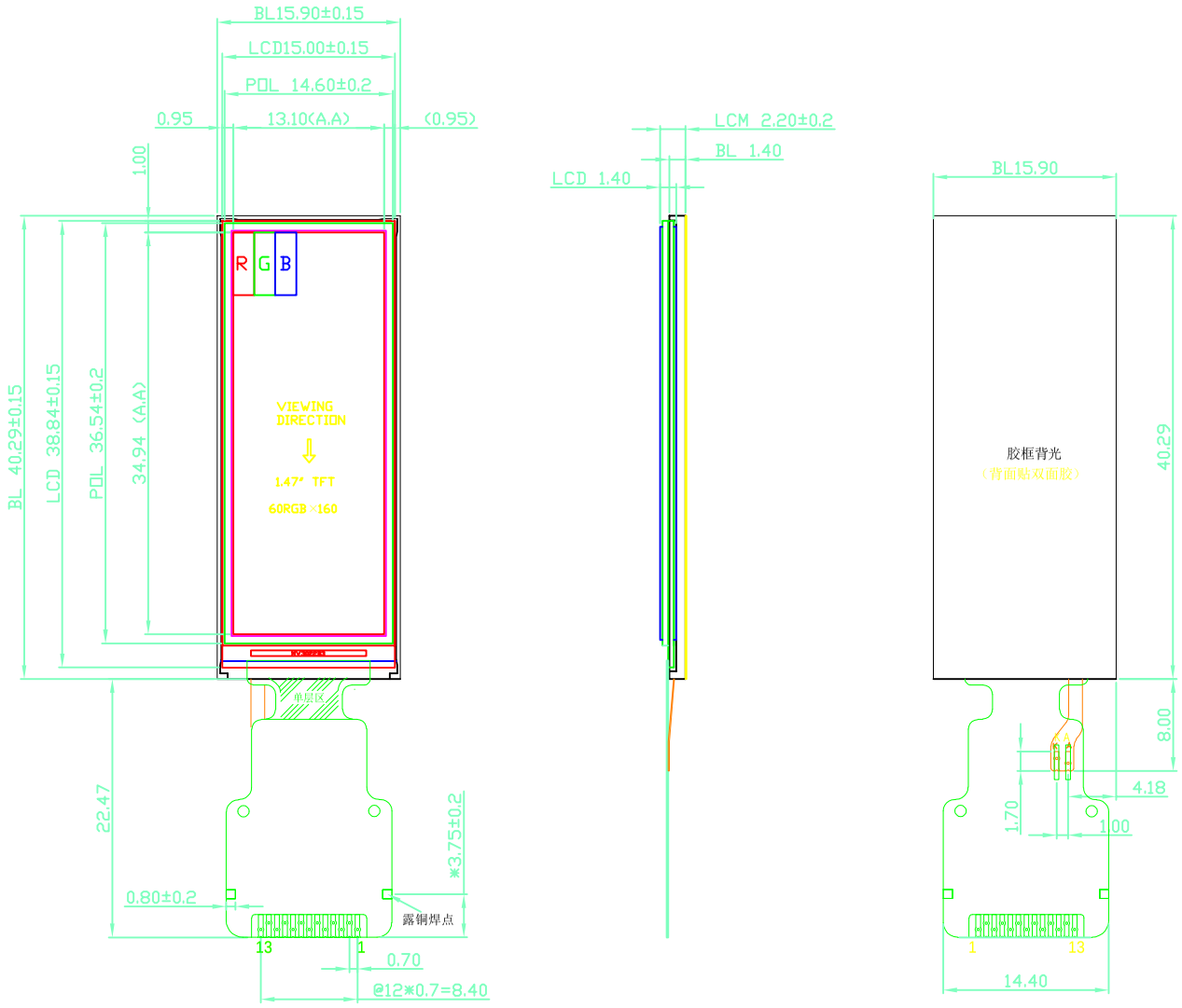
If the event of unforeseen problem or unspecified items may occur, naturally shall negotiate and agree to solution

Features of this product are listed in the following table.

Parameter	Contents	Unit
LCD Mode	1.47″TFT Transmissive	-
Color Depth	262K	-
Display Resolution	60*RGB*160	pixels
Pixel Pitch Dimension(HxVx)	0.2184*0.2184mm	mm
Display Mode	TN/Normally Black	-
Viewing Direction	12:00	O'clock
Module Size(HxVxD)	40.29*15.9*2.15	mm
Active Area (HxVx)	13.10*34.94mm	mm
LCD Controller/Driver	NV3022B3/3023A	-
Interface Type	SPI	-
Power Supply Voltage	2.8	V
Backlight Type	White LED*2	pcs
Touch Panel	Without	-
Operating temperature	-20 ~ +70	°C
Storage temperature	-30 ~ +70	°C
Weight	TBD	g

2.Mechanical Specification

REV.	DESCRIPTION	DATE	DRAWN
A	Frist Design	2024. 2. 26	Lucy
B	修改胶框背光,背光增加贴双面胶，LCM料号	2024. 8. 23	Lucy
C	修改FPC,增加露铜焊接点以利组装	2024. 9. 16	Lucy
CUSTOMER APPROVED:			



FPC pin定义

No.	Symbol
1	NC(tp)
2	NC(tp)
3	SDA
4	SCL
5	RS
6	RES
7	CS
8	GND
9	NC
10	VCC
11	LED K
12	LED A
13	GND

(B/L) LED CIRCUIT
Vf=3V(TYP),If=40MA(恒流)

NOTES:
1. OPERATING TEMPERATURE: -20°C TO 70°C
2. STORAGE TEMPERATURE: -30°C TO 80°C
3. DRIVER IC: NV3022B3
4. DISPLAY MODE: TN/NW (60RGB*160)
5. VIEWING DIRECTION (GRAY LEVEL INVERSION DIRECTION): 12:00 .
6. GENERAL TOLERANCE: ±0.20mm;FPC PAD TOLERANCE: ±0.02mm
7. PRODUCT ENVIRONMENT PROTECTION MANAGEMENT STANDARD: ROHS
8. NO CONDUCTIVE MATERIAL IS ALLOWED TO TOUCH THE CROSS SECTION OF PANEL

深圳市华芯邦科技有限公司

DRAWING NO.	HK015TNW-K147W2	UNIT	mm	PRO (3)	
APPROVED BY	CHECKED BY	DRAWING BY		PAGE	
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REV 1.2

5/16

3.Interface Pin Descriptions

Pin.No	Symbol	Function
1	NC	/
2	NC	/
3	SDA	Serial input signal in SPI I/F
4	SCL	Used as serial clock pin
5	RS	Command/data select pin
6	RESET	Reset signal
7	CS	Chip select pin
8	GND	Ground
9	NC	/
10	VCC	Power supply
11	LEDK	Back light power supply negative
12	LEDA	Back light power supply positive
13	GND	Ground

4. Electrical Characteristics

4.1 Absolute Maximum Ratings

Item	Symbol	Min	Typ	Max	Unit	Remark
Analog Supply Voltage	VCI	-0.3	-	3.3	V	VDD
Logic Supply Voltage	IOVCC	-0.3	-	3.3	V	I/O Voltage
Logic Input voltage	VIL	-0.3	-	IOVCC+0.3	V	
Logic Output voltage	VO	-0.3	-	IOVCC+0.3	V	
Operating Temperature	TOP	-20	-	70	℃	
Storage Temperature	TST	-30	-	80	℃	
Storage Humidity	HD	20	-	90	%RH	

4.2 DC Characteristics

Item	Symbol	Min	Typ	Max	Unit	Remark
Analog Supply Voltage	VCI	2.5	2.8	3.3	V	VDD
Logic Supply Voltage	IOVCC	1.65	2.8	3.3	V	I/O Voltage
Logic Input voltage	VIH	0.7IOVCC	-	IOVCC	V	
	VIL	GND	-	0.3IOVCC	V	
Logic Output Voltage	VOH	0.8IOVCC	-	IOVCC	V	
	VOL	GND	-	0.2IOVCC	V	
Input leakage current	ILKG	-	-	-	μA	

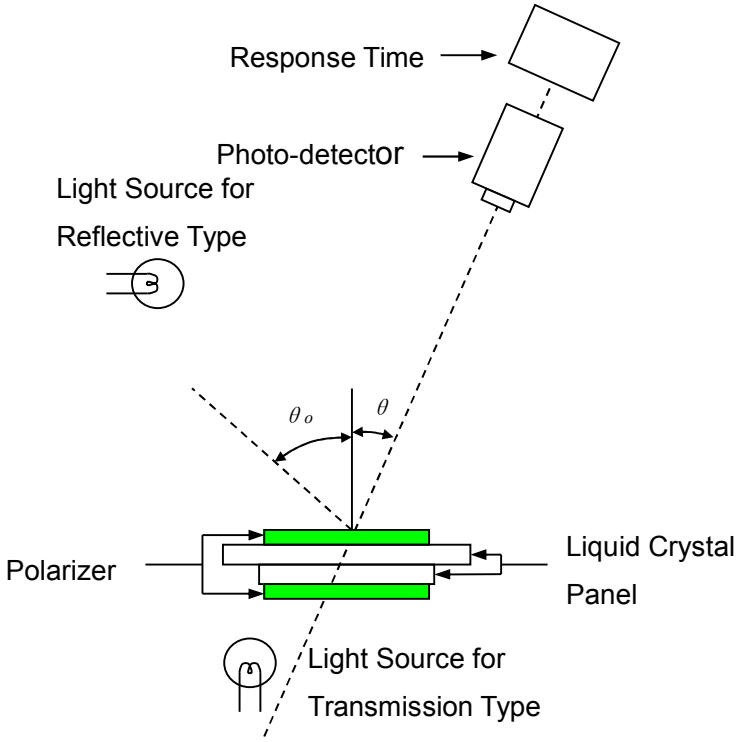
4.3 Backlight Characteristics

Item	Symbol	Conditions	Min	Typ	Max	Unit
Supply Voltage	VF	Only Backlight	-	3.0	-	V
Supply Current	IF					mA
Backlight Power Consumption	WBL		-	120	-	mW
Average Brightness	IV			400		Cd/m^2
CIE Color Coordinate	X		0.26	-	0.32	T=8000 ±1000K
	Y		0.26	-	0.32	
Uniformity	B		85	-	-	%
Number of LED	White LED*2pcs					

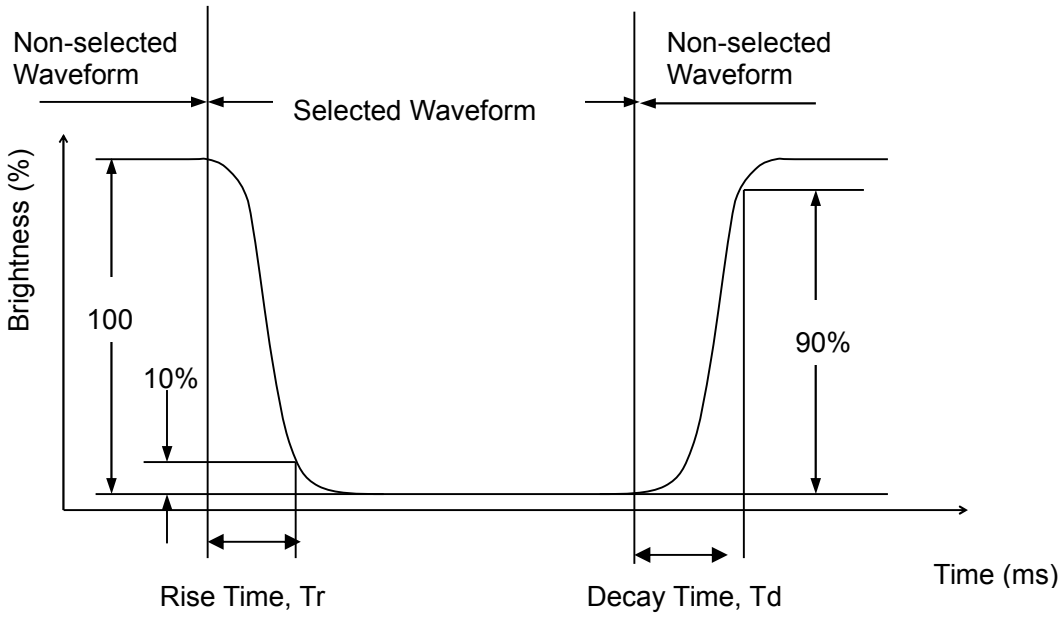
5.Optical Characteristics

Item		Symbol	Condition	SPECIFICATION			UNIT	NOTE
				MIN	TYP	MAX		
Brightness for LCM		B	Viewing normal angle				Cd/m^2	All left side data are based on HK's product
Contrast Ratio		CR				--	--	
ResponsTime		Tr		--	4	8	Msec	
ResponsTime		Tf		--	12	24		
CIE Color coordinate	Red	Rx		--	TBD	--	--	
		Ry			TBD		--	
	Green	Gx			TBD		--	
		Gy			TBD		--	
	Blue	Bx			TBD		--	
		By			TBD		--	
	White	Wx			0.307		--	
		Wy			0.344		--	
Viewing Angle	Hor	$\theta_{X\square}$	Center CR>=10		60	--	Deg.	
		$\theta_{X\square}$			60	--		
	Ver	$\theta_{Y\square}$			70	--		
		$\theta_{Y\square}$			70	--		
Uniformity	Un				80	--	%	

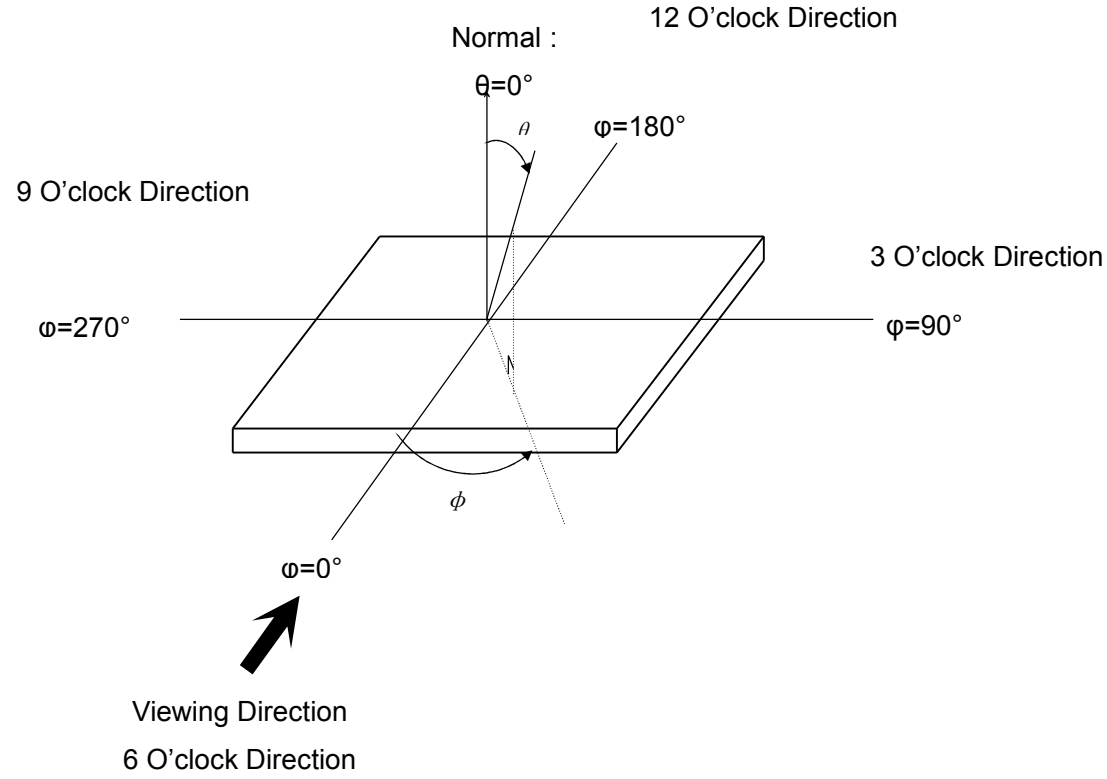
5.1 Electro-Optical Characteristics Test Method



5.2 Definition of Optical Response Time

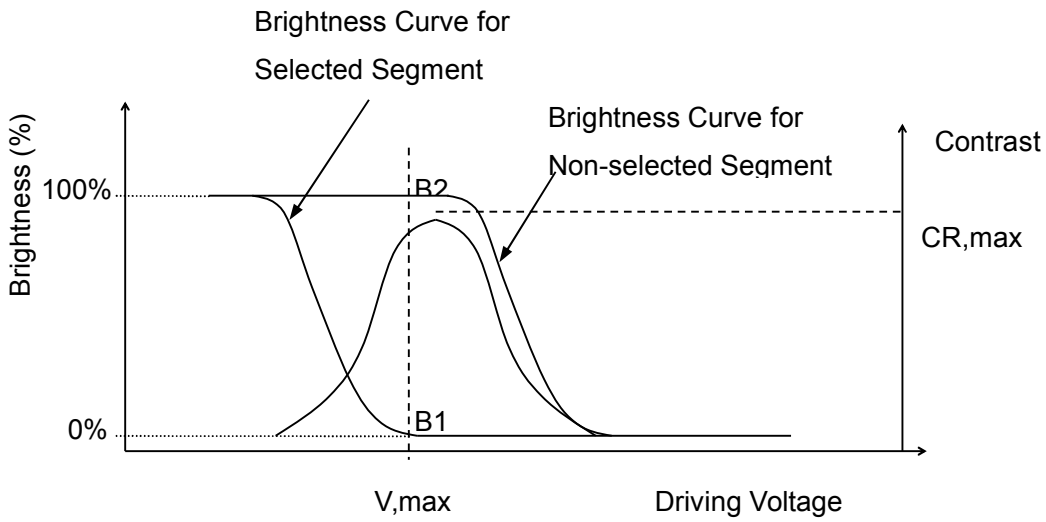


5.3 Definition of Viewing Angle θ and



5.4 Definition of Contrast ratio, CR

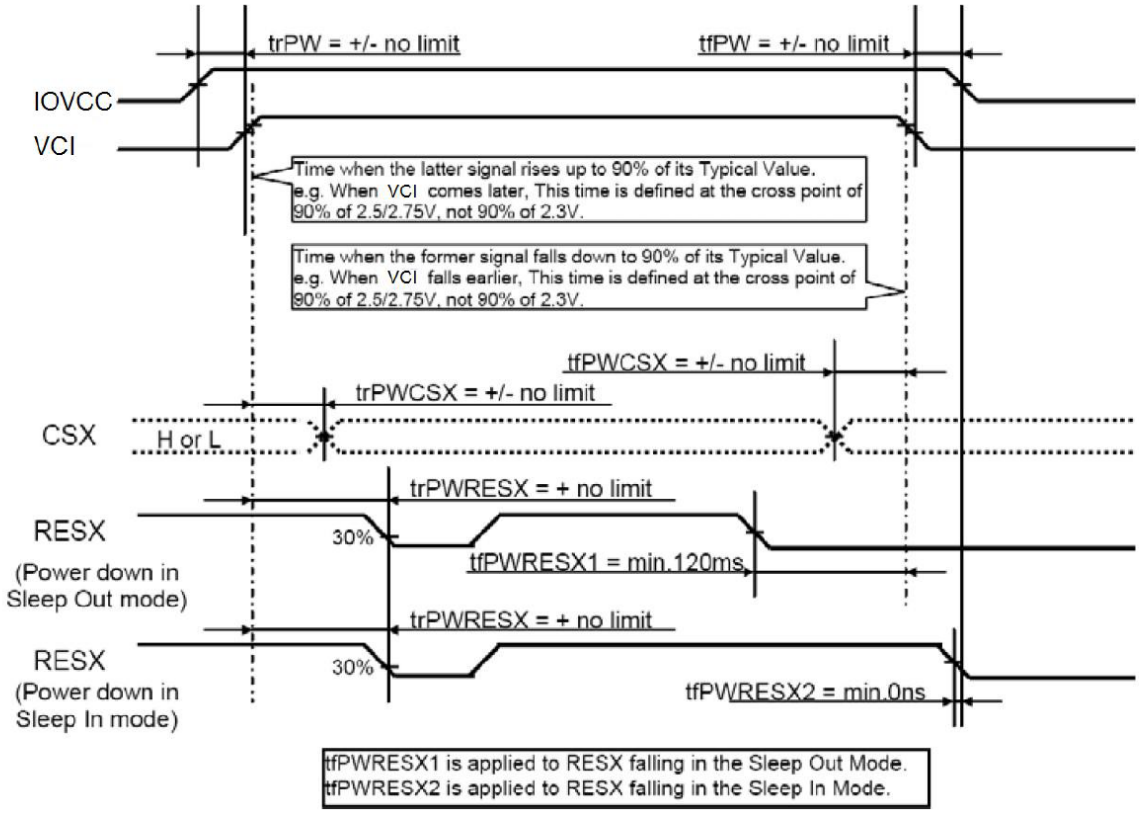
$$CR = \frac{\text{Brightness of Non-selected Segment (B2)}}{\text{Brightness of Selected Segment (B1)}}$$



6.Timing characteristics

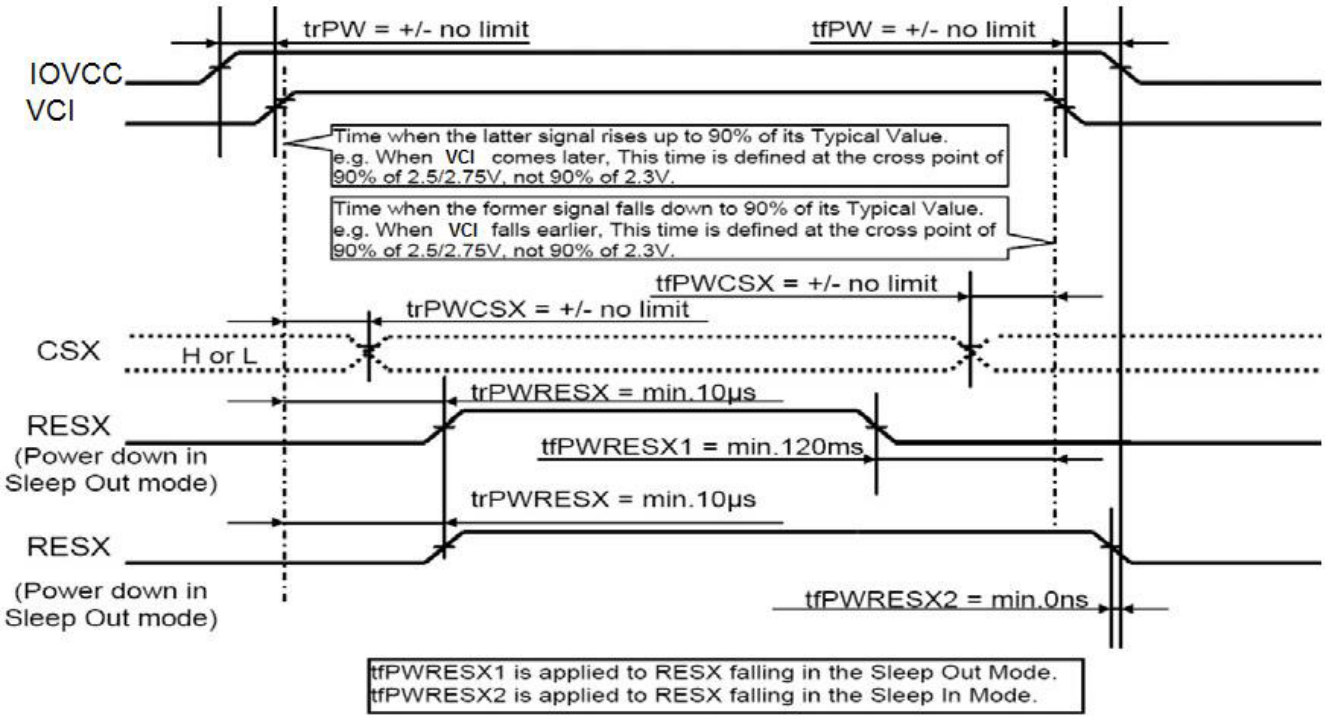
6.1 Power ON/OFF Sequence

If RESX line is held high or unstable by the host during Power On, then a Hardware Reset must be applied after both VCI and IOVCC have been applied – otherwise correct functionality is not guaranteed. There is no timing restriction upon this hardware reset.



6.2 Case 2 - RESX line is held low by Host at Power On

If RESX line is held Low (and stable) by the host during Power On, then the RESX must be held low for minimum 10 µsec after both VCI and IOVCC have been applied.



7.Reliability Test

ITEM	Condition	Criterion
High Temp. Storage	+70℃±2℃, 120 hrs	Inspection after 2~4hours storage at room temperature, the sample shall be free from defects: 1.Air bubble in the LCD; 2.Sealleak; 3.Non-display; 4.Missing segments; 5. The surface shall be free from damage. 6. Contrast must be no more than 10% by the linearity tester. 7. Power must be no more than 10% by the linearity tester
Low Temp. Storage	-20℃±2℃, 120 hrs	
High Temp. Operation	+70℃±2℃,72hrs	
Low Temp. Operation	-20℃±2℃, 72hrs	
High Temperature and High Humidity	60℃,90%RH ,72hrs	
Temp humidity cycles	25℃ → Calefaction/3hrs → 60℃/9hrs → Descend temp/3hrs 25℃/9hrs → 90%RH Total:10 cycles	
Thermal shock	-30℃/30min → 80℃/30mins Total:10 cycles	
Vibration	Amplitude between 10 and 150Hz:3G(100m/s ^{2})/2hrs for each direction(X,Y,Z)	After testing, there are no any defective appearances or electrical properties.
Drop test	1.5m,10times	
ESD	1.Contact discharge method± 2KV,150pF/330Ω 10times	1. After testing, there are no any defective appearances or electrical properties. 2. It can be acceptable when all defective ESD disappears in the RESET.
	2.Air discharge method± 4KV,150pF/330Ω 10times	

8.Safety Instructions

9.0.1 If the LCD panel breaks, be careful not to get any liquid crystal substance in your mouth.

9.0.2 If the liquid crystal substance touches your skin or clothes, please wash it off immediately by using soap and water.

9.Directions for Use

9.1Handling Precautions

9.1.1 Customers do structural design, please ensure the cabinet window size smaller than the touch screen VA unilateral 0.3mm. Foam window size larger than 0.2mm unilateral touchscreen V.A

9.1.2 Avoid static electricity damaging the LSI.

9.1.3 Do not remove the panel or frame from the module .

9.1.4 The polarizing plate of the display is very fragile . So, please handle it very carefully.

9.1.5 Do not wipe the polarizing plate with a dry cloth, as it may easily scratch the surface of the plate.

9.1.6 The color tone of display and background of LCM has the possibility to be changed in the storage temperature range.

9.1.7 Pay attention to the working environment, as the element may be destroyed by static electricity.
Be sure to ground human body and electric appliance during work.
Avoid working in a dry environment to minimize the generations of static electricity.
Static electricity may be generated when the protective film is fast peeled off.

9.1.8 When soldering the terminal of LCM, make certain the AC power source of soldering iron does not leak.

9.1.9 Humid environment may cause a bad ITO glass corrosion, in use, make sure the humidity is below 50%.

9.1.10 If the display surface becomes contaminated ,breathe on the surface and gently wipe it with a soft-dry- clean cloth .If it is heavily contaminated ,moisten cloth with the following solvent(ex:Ethyl alcohol).Solvents other than those above-mentioned may damage the polarizer(Especially ,do not use them .ex: Warter / Ketone)

9.2 Operation instructions

9.2.1 It is recommended to drive the LCD within the specified voltage limits, try to adjust the operating voltage for the optimal contrast, the color and contrast of LCD panel will varies at different temperature.

9.2.2 Response time is greatly delayed at low operating temperature range. However, this does not mean the LCD will be out of the order, It will recover when it returns to the specified temperature range.

9.2.3 If the display area is pushed hard during operation, the display will become abnormal.

9.2.4Do not operate the LCD at the environments over the specified conditions, this may cause damage on the LCD and shorten the lifetime.

9.3 Storage instructions

9.3.1 Store LCDs in a sealed polyethylene bag.

9.3.2 Store LCDs in a dark place, Do not expose to sunlight or fluorescent light. Keep the temperature between 0℃and 35℃.

9.3.3 Avoid the polarizer touch any other object, (It is recommended to store them in the container in which they were shipped.)

9.4 Limited Warranty

9.4.1 will replace or repair any of its LCD modules, which are found to be defective, when inspected in accordance with LCM acceptance standards (copies available upon request) for a period of 12 months from ink- print date on product

9.4.2 Any defects must be returned to within 60 days since ship-out. Confirmation of such date shall be based on freight documents. The warranty liability of was am limited to repair and/or replacement on defects above (7.1,7.2)

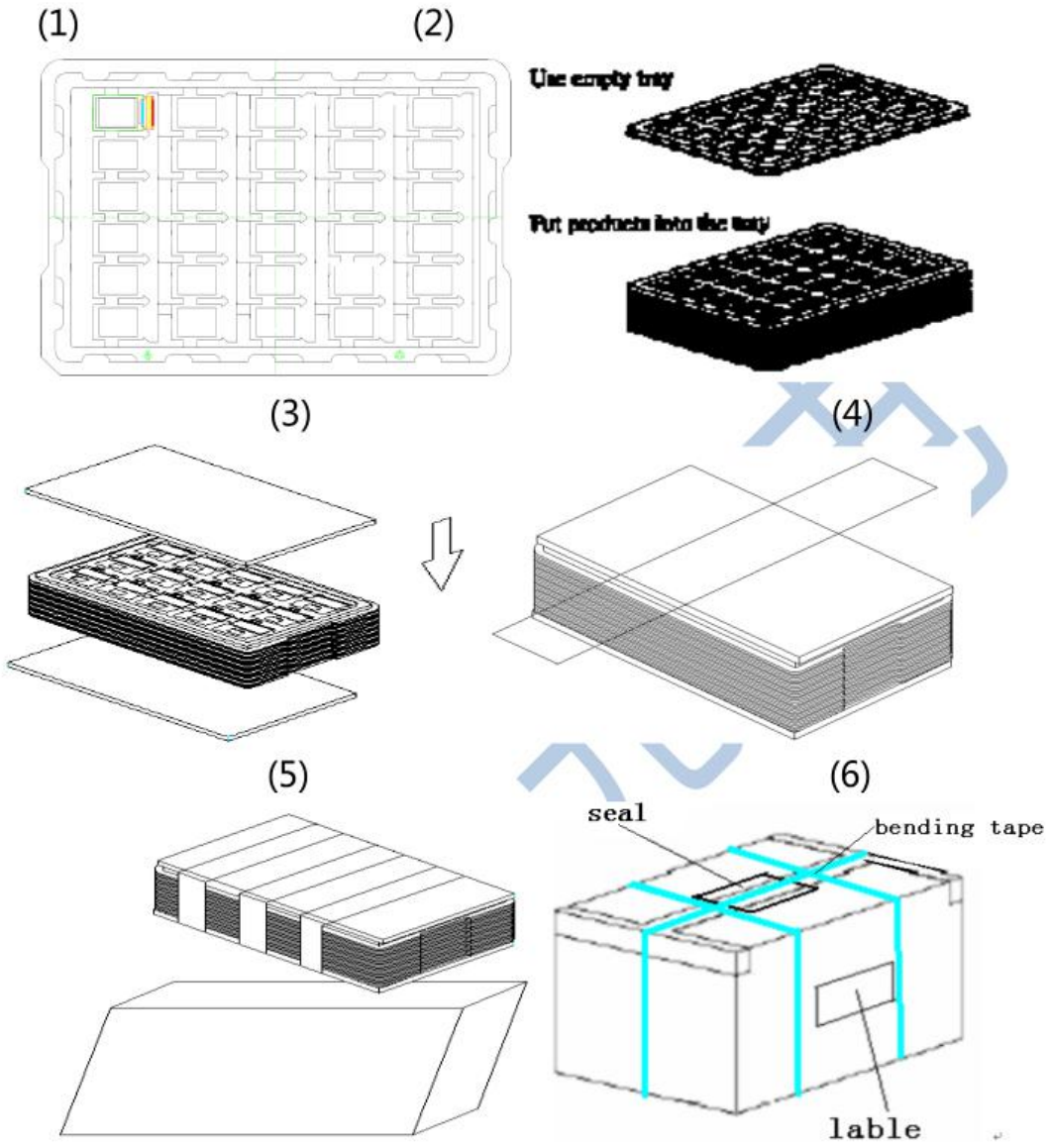
9.4.3 No warranty can be granted if the precautions stated above have been disregarded. The typical samples are as below:

-- LCD glass crack/break
-- PCB outlet is damaged or modified.
--PCB conductors damaged.
--Circuit modified with by grinding, engraving or painting varnish.
-- FPC crack

9.4.4 Modules must be returned with sufficient description of the failures of defects. Any connectors or cable installed by the customer must be removed completely without damaging the PCB outlet, conductors and terminals. Modules must be packed with the container in which they were shipped.

10.Packing Method

Package picture:



Please consult our technical department for detail information.