



# APPROVAL SHEET

## 承认书

客户名称 Customer	
产品型号 Part NO.	CNKT0220-13003A
产品内容 Product type	Mode: Transmissive type .Normally white. TFT LCD Module LCD Module: Graphic 240RGB*320Dot-matrix
备注栏 Remarks	<input type="checkbox"/> APPROVAL FOR SEPCIFICATIONS ONLY <input checked="" type="checkbox"/> APPROVAL FOR SEPCIFICATIONS AND SAMPLE
客户确认签章 Signature by Customer:	
备注 Notes:	

PREPARED BY	CHECKED BY	APPROVED BY

## TABLE OF Contents

1. General Description.....	3
2. Features.....	3
3. Mechanical Specification.....	3
4. Mechanical Dimension.....	4
5. Maximum Ratings.....	5
6. Electrical Characteristics.....	5
7. Backlight Characteristic.....	5
8. Module Function Description.....	6
9. Electro-optical Characteristics.....	9
10. Reliability.....	12
11. Inspection Standards.....	12
12. Precautions For Using LCD Modules.....	16
13. Factory.....	17
14. Revision History.....	17

## 1. General Description

CNKT022037-11002A is a 240\*320 dots matrix TFT LCD module. It has a TFT panel composed of 720sources and 320gates. The LCM can be easily accessed by micro-controller.

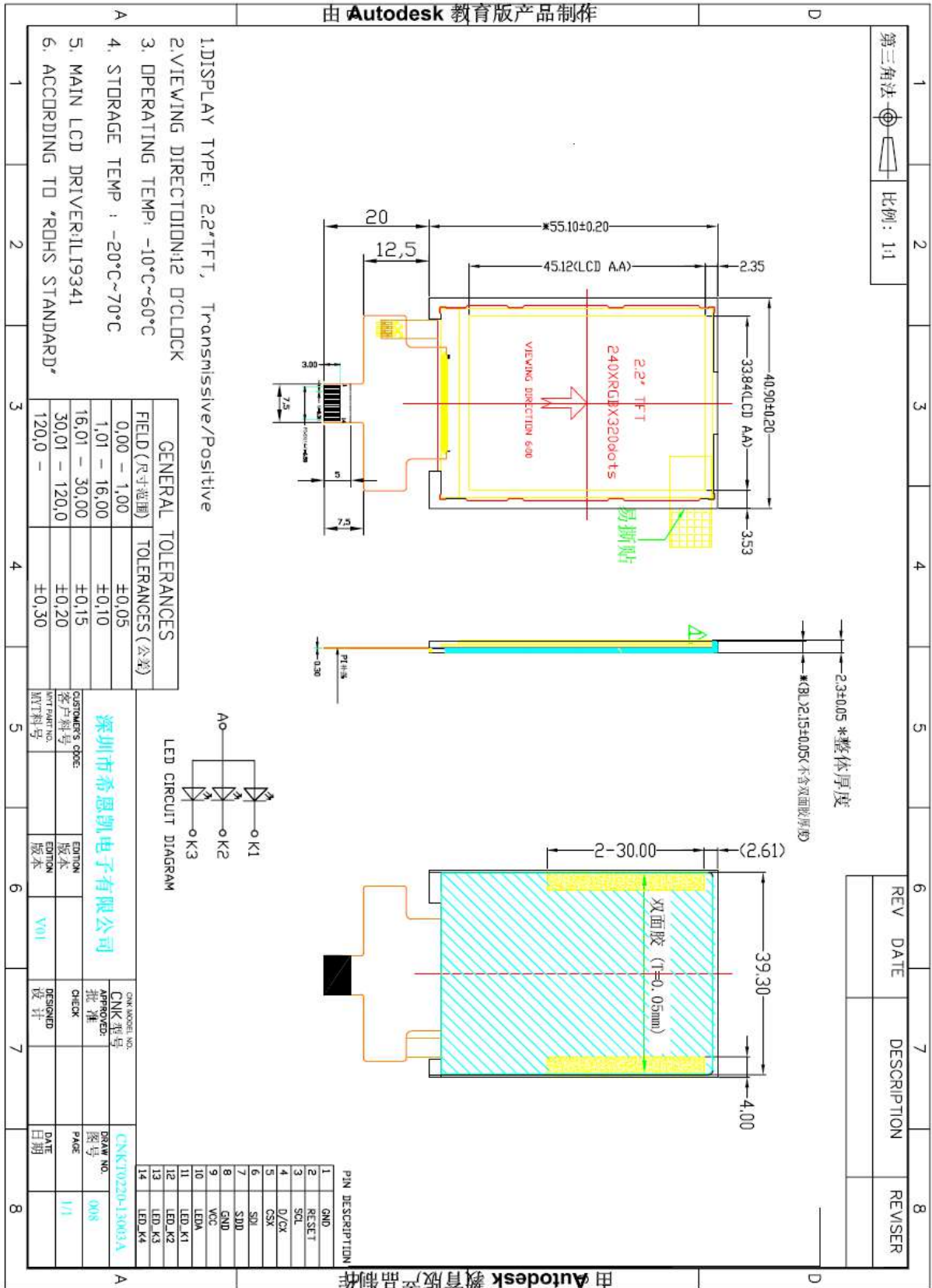
## 2. Features

Display Mode	Transmissive
	a-TFT
Display Format	Graphic 240RGB*320Dot-matrix
Input Data	4-wire 8-bit data serial interface
Viewing Direction	12 o'clock
Drive	ILI9341

## 3. Mechanical Specification

Item	Specifications	Unit
Dimensional outline	40.90(H) x 55.10(V) x 2.30(T) (FPC not include)	mm
Resolution	240RGB*320	dots
LCD Active area	33.84(H) x 45.12(V)	mm
Pixel size	0.141(H) x 0.141(V)	mm

### 4.MechanicalDimens



## 5. Maximum Ratings

Item	Symbol	Min	Max	Unit	Remark
Supply voltage	IOVCC	1.65	3.3	V	
Analog Supply Voltage	VCI	2.5	3.3	V	
Operating Temperature	T <sub>ORT</sub>	-20	70	°C	
Storage temperature	T <sub>STG</sub>	-30	80	°C	

## 6. Electrical Characteristics

Item		Symbol	Condition	Min.	Typ.	Max.	Unit
Supply voltage	Logic	V <sub>CC</sub>		2.7	2.8	2.9	V
Input Voltage	H level	T <sub>IH</sub>		0.8*IOVCC		IOVCC	V
	L level	T <sub>IL</sub>		-0.3		0.2* IOVCC	
Storage temperature		I <sub>DD</sub>	With internal voltage generation V <sub>CC</sub> =2.8V; T <sub>emp</sub> =25°C			TBD	mA

## 7. Backlight Characteristic

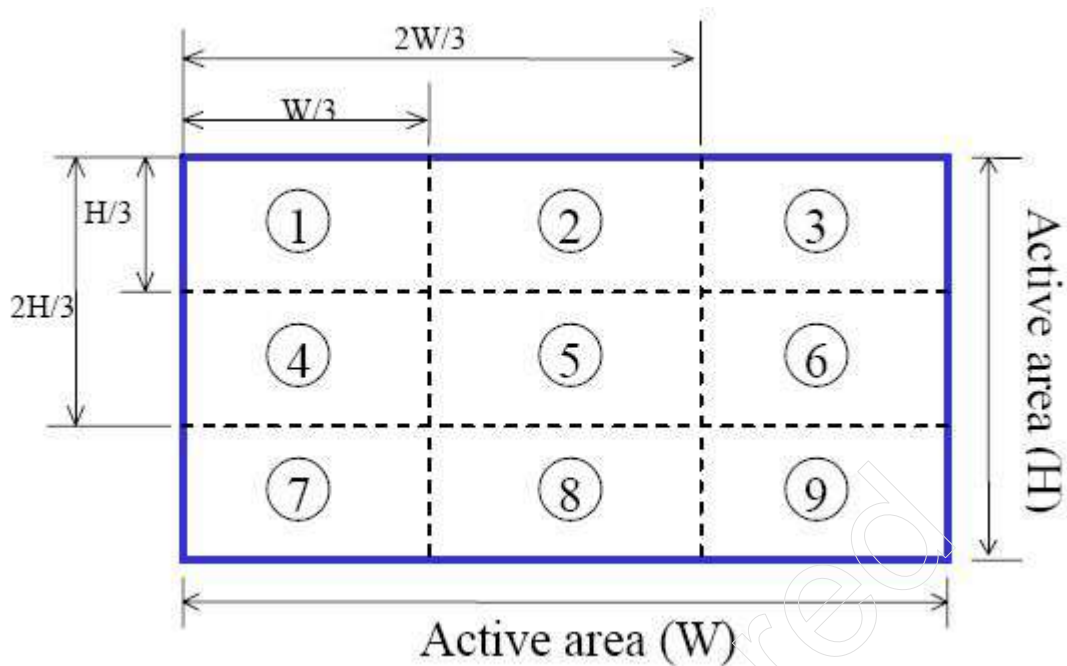
Item	Symbol	Min	Typical	Max	Unit
LED module Forward voltage	V <sub>LED</sub>		3.2		V
LED module current	V <sub>LED</sub>		45		mA
L/G Surface Luminance ★1	L <sub>S</sub>		3500		Cd/m <sup>3</sup>
LCM Surface brightness uniform ★2	L <sub>D</sub>	80			%

★ 1Test condition is:

- (a) Center point on active area.
- (b)Best Contrast.

★2Uniform measure condition:

- (1)Measure 9 point. Measure location show below;
- (2)Uniform=(Min. brightness /Max. brightness)\*100%
- (3)Best Contrast.



## 8. Module Function Description

### 8.1 Pin Descriptions

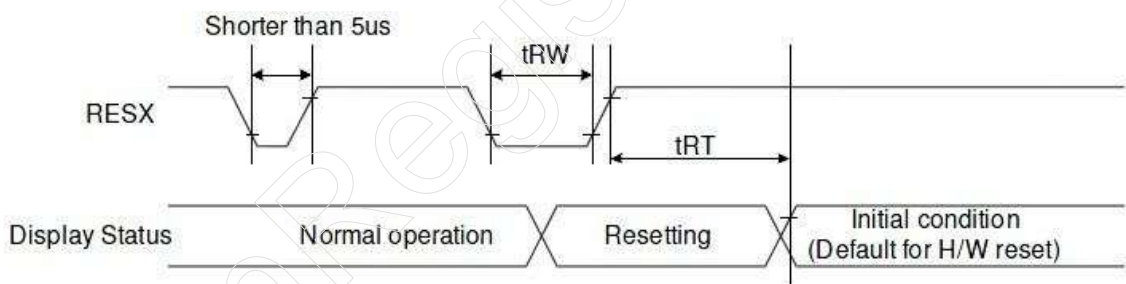
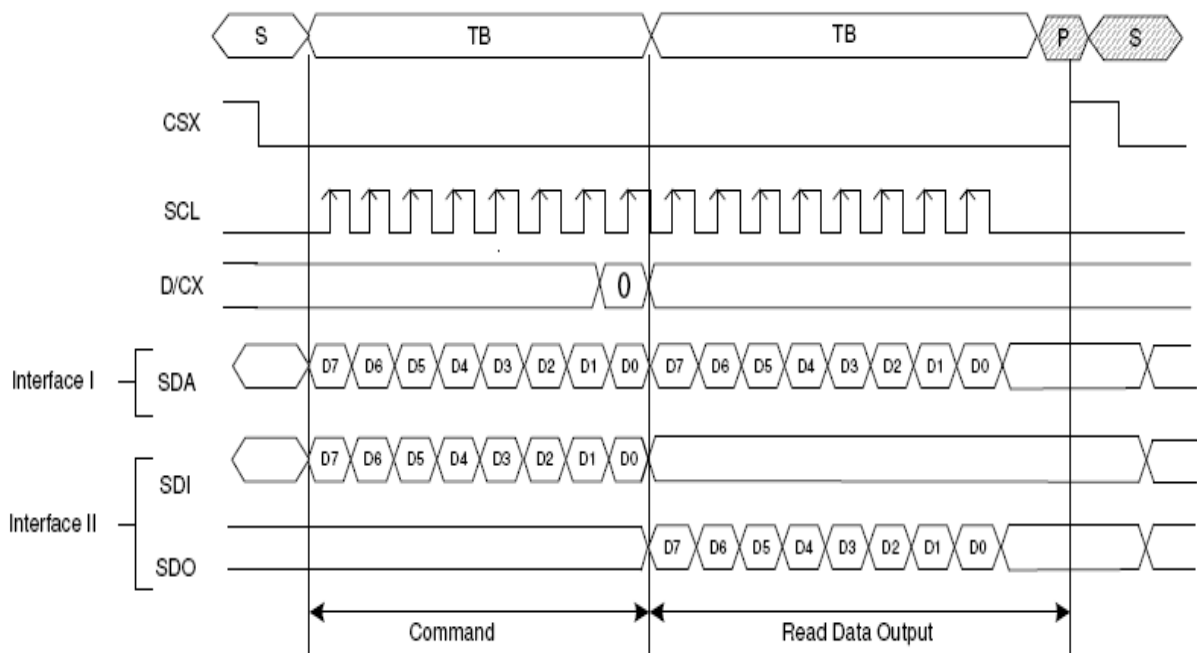
PIN	SYMBOL	FUNCTIONS
1	GND	GND
2	RESB	Hardware reset input pin. When RSTB is "L", internal initialization is executed and the internal registers will be initialized.
3	SCL	This pin is used to select "Data or Command" in the parallel interface or 4-wire 8-bit serial data interface. When DCX = '1', data is selected. When DCX = '0', command is selected. This pin is used serial interface clock in 3-wire 9-bit / 4-wire 8-bit serial data interface.
4	D/CX	- 8080- I /8080- II system (WRX): Serves as a write signal and writes data at the rising edge. - 4-line system (D/CX): Serves as command or parameter select.
5	CSX	Chip select input pin ("Low" enable). This pin can be permanently fixed "Low" in MPU interface mode only. * note1,2
6	SDI	When IM[3] : Low, Serial in/out signal. When IM[3] : High, Serial input signal. The data is applied on the rising edge of the SCL signal.
7	SDO	Serial output signal. The data is outputted on the falling edge of the SCL signal. If not used, open this pin
8	GND	GND
9	VCC	High voltage power supply for analog circuit blocks (2.5 ~ 3.3 V)
10	LED A	LED +
11-14	LED K1-K4	LED K-

## 8.2 Timing characteristics.

### I80-System Interface Timing Characteristics

Normal Write Mode (IOVCC=1.65~3.3V, Vcc=2.4~3.3V)

Item		Symbol	Unit	Min.	Typ.	Max.	Test Condition
Bus cycle time	Write	$t_{CYCW}$	ns	100			
	Read	$t_{CYCR}$	ns	300			
Write low-level pulse width		$PW_{LM}$	ns	50		500	
Write high-level pulse width		$PW_{HW}$	ns	50			
Read low-level pulse width		$PW_{LR}$	ns	150			
Read high-level pulse width		$PW_{HR}$	ns	150			
Write/ Read rise/fall time		$t_{WRr}/t_{WRt}$	ns			25	
Setup time	Write (RS to nCS, E/nWR)	ns	ns	10			
	Read (RS to nCS, E/nWR)	ns	ns	5			
Address hold time		$T_{AH}$	ns	5			
Write data set up time		$t_{osw}$	ns	10			
Write data hold time		$t_H$	ns	15			
Read data set up time		$t_{DDR}$	ns			100	
Read data hold time		$t_{OHR}$	ns	5			



Signal	Symbol	Parameter	Min	Max	Unit
RESX	tRW	Reset pulse duration	10		uS
	tRT	Reset cancel		5 (note 1,5)	mS
				120 (note 1,6,7)	mS



## 9. Electro-optical Characteristics

### 9.1 Optical specification

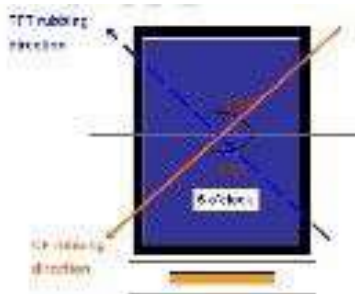
Light Source: C-light(using normal polarizer (E mode) reference only) Ta=25℃

Item	Symbol	Condition	Min	Typ	Max	Unit	Remark
View Angles	θT	CR≥10	45	50	-	Degree	Note 2
	θB		15	20	-		
	θL		40	45	-		
	θR		40	45	-		
Contrast Ratio	CR	θ=0°	250	350	-		Note1 Note3
Response Time	T <sub>ON</sub>	25℃	-	20	30	ms	Note1
	T <sub>OFF</sub>						Note4
Chromaticity	White	C-light	x	0.253	0.303	0.353	Note5 Note1
			y	0.309	0.359	0.409	
	Red		x	0.581	0.631	0.681	
			y	0.285	0.315	0.365	
	Green		x	0.261	0.311	0.361	
			y	0.478	0.528	0.578	
	Blue		x	0.081	0.131	0.181	
			y	0.119	0.169	0.219	
NTSC				48		%	Note 5
Transmittance	T		5.5	6.0		%	Note1 Note7

Test Conditions:

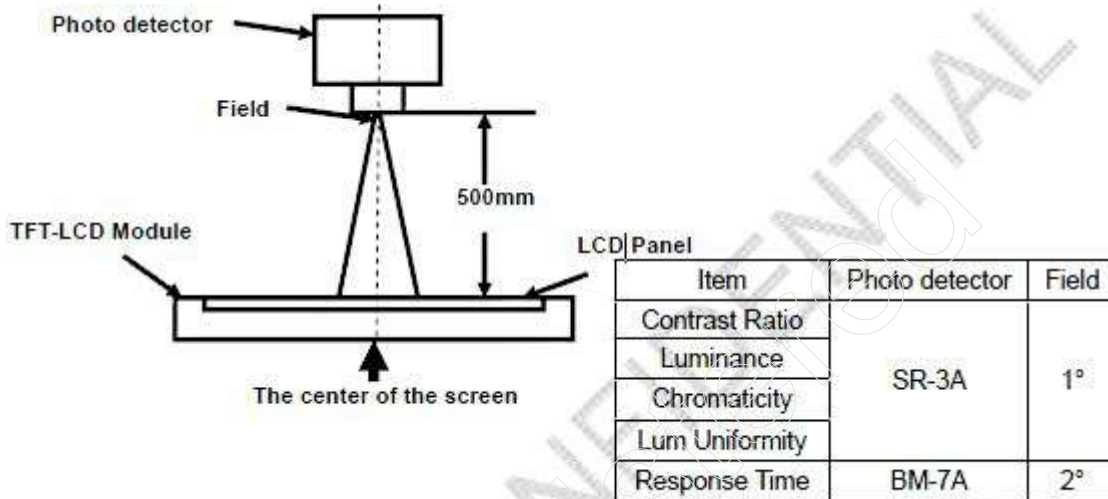
1. The ambient temperature is 25℃.
2. The test systems refer to Note1 and Note2.

### 9.2 Rubbing Direction



**Note 1: Definition of optical measurement system.**

The optical characteristics should be measured in dark room. After 5 minutes operation, the optical properties are measured at the center point of the LCD screen. All input terminals LCD panel must be ground when measuring the center area of the panel.



**Note 2: Definition of viewing angle range and measurement system.**

viewing angle is measured at the center point of the LCD by CONOSCOPE(ergo-80).

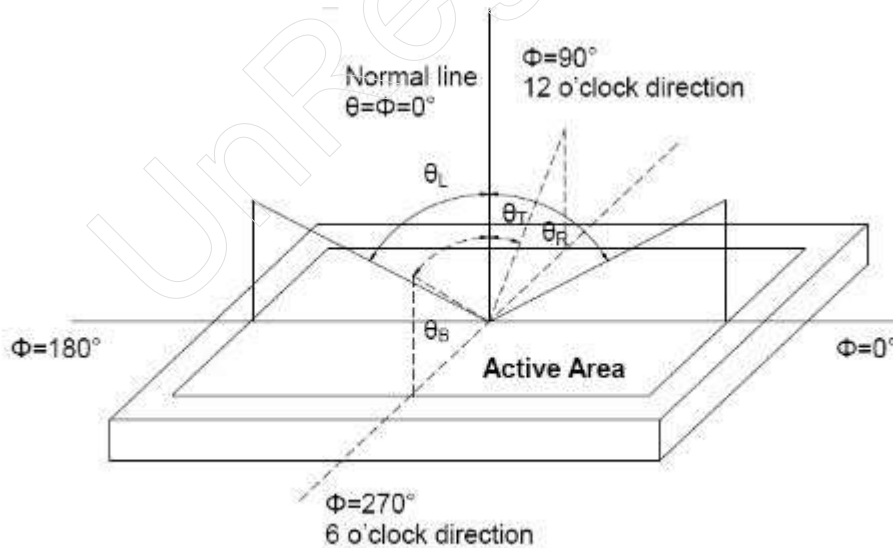


Fig. 1 Definition of viewing angle

### Note 3: Definition of contrast ratio

$$\text{Contrast ratio (CR)} = \frac{\text{Luminance measured when LCD is on the "White" state}}{\text{Luminance measured when LCD is on the "Black" state}}$$

“White state “:The state is that the LCD should driven by  $V_{\text{white}}$ .

“Black state”: The state is that the LCD should driven by  $V_{\text{black}}$ .

$V_{\text{White}}$ : To be determined  $V_{\text{Black}}$ : To be determined.

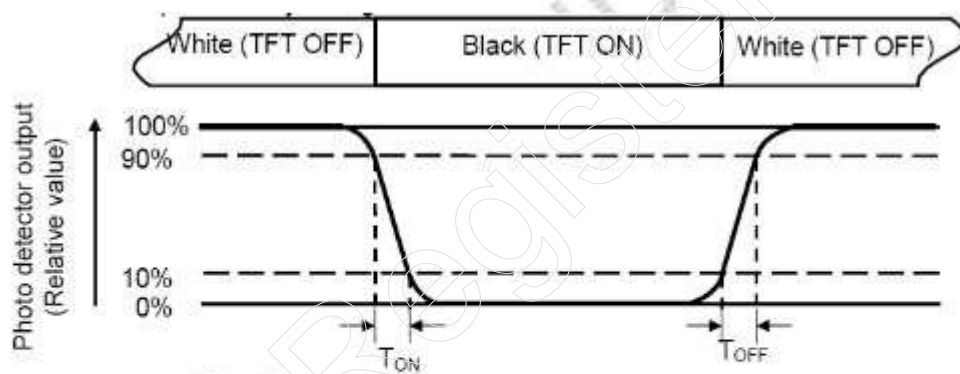
### Note 4: Definition of response time

The response time is defined as the LCD optical switching time interval between “White” state and

“Black” state. Rise time ( $T_{\text{ON}}$ ) is the time between photo detector output intensity changed from 90%

to 10%. And fall time ( $T_{\text{OFF}}$ ) is the time between photo detector output intensity changed from 10%

to 90%.



### Note 5: Definition of color chromaticity (CIE1931)

Color coordinates measured at center point of LCD.

## 10. Reliability

### 10.1Mtbf

The LCD module shall be designed to meet a minimum MTBF value of 50000 hours with normal

### 10.2Test condition

NO.	ITEM	CONDITION	CRITERION
1	High Temperature Non-Operating Test	80°C*240Hrs	◦ No Defect Of Operational Function In Room Temperature Are Allowable ◦ IDD of LCM in Pre-and Post-Test Should Follow Specification
2	Low Temperature Non-Operating Test	-30°C*240Hrs	
3	High Temperature/Humidity Non Operating Test	60°C*90%RH*240Hrs	
4	High Temperature Operating Test	70°C*240Hrs	
5	Low Temperature Operating Test	-20°C*240Hrs	
6	Thermal Shock Test	-20°C (30Min) ↔70°C (30Min) *10CYCLES	

Notes:

- Judgments should be made after exposure in room temperature for two hours.
- The distill water is used for the high temperature/humidity test.
- The sample above is individually for every reliability tests condition.

## 11.Inspection standards

1.AQL(Acceptable Quality Level

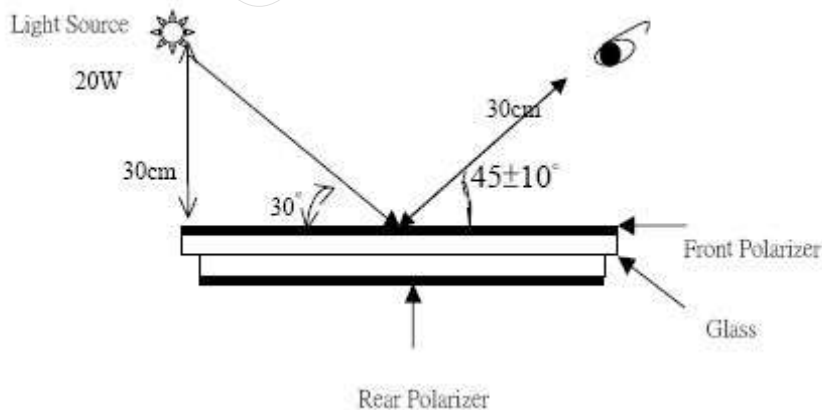
AQL of major and minor defect.

	MAJOR DEFECT	MINOR DEFECT
AQL	0.65	1.5

### 2. Basic conditions for inspection

The LCM face to us, in normal environment, the lux is  $1000 \pm 200$ . (Darkroom's lux:  $100 \pm 50$ ), About an angle of incidence 30, a distance of 30 cm with an angle of 45 degree to check the products without uncovering the film!


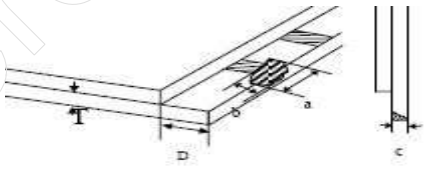
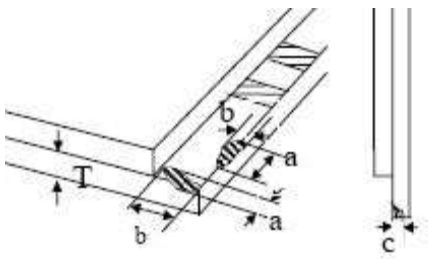
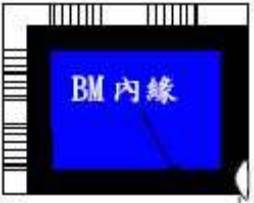
(As shown below)



### 3.Inspection item and criteria

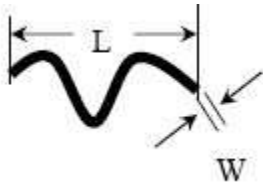
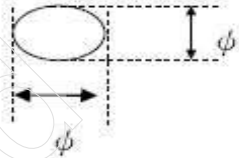
#### 3.1 Visual inspection criterion in immobility

### 3.1.1 Glass defect


NO	Defect item	Criteria	Remark
1	Dimension Unconformity (Major defect)	By Engineering Drawing	
2	Cracks (Major defect)	1. Linear cracks panel <b>【Reject】</b> 2. Nonlinear crack contrast by limited sample	
3	Glass extrude the conductive area (minor defect)	a: disregards and no influence assemblage. 1) $b \leq 1/3$ Pin width (non bonding area) <b>【Accept】</b> 2) bonding area $\leq 0.5$ mm <b>【Accept】</b>	A: Length, b: Width
4	Pin-side ,conductive area damaged (minor defect)	(a c: disregards) $b \leq 1/3$ of effective length for bonding electrode <b>【Accept】</b>	a: length, b: Width, c: Thickness 
5	Pin-side, non-conductive area damaged (minor defect)	1) Damage area don't touch the ITO (Including contraposition mark, except scribing mark) <b>【Accept】</b> 2) $C < T$ $b \cong BM 1/3$ of width <b>【Accept】</b> 3) $c = T$ b not touch the seal glue <b>【Accept】</b> 4) a disregards	a: Length, b: Width c: Thickness 
6	Non-pin-side damage (minor defect)	$c < T$ 1) b exceeds $1/3 B_m$ <b>【Reject】</b> $c = T$ b not touch the seal glue <b>【Reject】</b>	c: Thickness b: width of  damage

### 3.1.2 LCD appearance defect (View area)

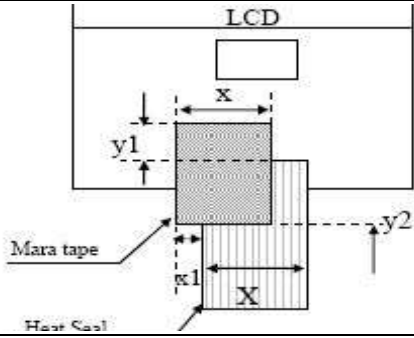
NO	Defect item	Criteria		Remark
1	Fiber、 glass cratch、 polarizer	Specification	Allowable	note 1: L: Length, W: Width
		$W \leq 0.03$ mm	disregard	note 2: disregard if out of AA

	scratch/folded (minor defect)	$0.03\text{mm} < W \leq 0.05\text{mm};$ $L \leq 3.0\text{mm}$	2	
		$0.05\text{mm} < W \leq 0.1\text{mm};$ $L \leq 3.0\text{mm}$	1	
		$W > 0.1\text{mm}; L > 3.0\text{mm}$	0	
2	Polarizer bubble, concave and convex (minor defect)	$\phi \leq 0.2\text{mm}$	disregard	note1: $\phi = (L+W)/2$ , L:Length, W :Width note2:disregard if out of AA
		$0.2\text{mm} < \phi \leq 0.3\text{mm}$	2	
		$0.3\text{mm} < \phi \leq 0.5\text{mm}$	1	
		$0.5\text{mm} < \phi$	0	
3	Black dots, dirty dots, impurities, eye winker (minor defect)	$\phi \leq 0.15\text{mm}$	disregard	note2:disregard if out of AA 
		$0.15\text{mm} < \phi \leq 0.25\text{mm}$	2	
		$0.25\text{mm} < \phi \leq 0.3\text{mm}$	1	
		$0.3\text{mm} < \phi$	0	
4	Polarizer prick (minor defect)	$\phi \leq 0.1\text{mm}$	disregard	note1: $\phi = (L+W)/2$ , L=Length, W=Width note2:the distance between two dots>5mm
		$0.1\text{mm} < \phi \leq 0.25\text{mm}$	3	
		$\phi > 0.25\text{mm}$	0	

### 3.1.3FPC

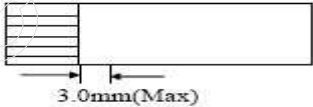
NO	Defect item	Criteria		Remark
1	Copper screen peel (minor defect)	Copper screen peel 【Reject】		
2	No release tape or peel	No release tape or peel 【Reject】		
3	Dirty dot and impurity of FPC for customer using side (minor defect)	Specification	Allowable	Note1: Cannot have stride ITO impurities
		$\phi \leq 0.25\text{mm}$	2	
		$\phi > 0.25$	0	

### 3.1.4Black tape & Mara tape

NO	Defect item	Criteria	Remark
1	FPC or H/S black tape (minor defect)	1. shift spec: 1) glue to the polarize 【Reject】 2) IC bare     【Reject】 2. left-and-right spec: 1)exceed of FPC edge or H-S edge 【Reject】 2) IC bare     【Reject】	
2	No black tape	No black tape	

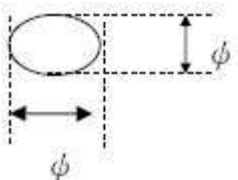
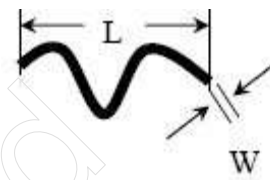
	(major defect)	<b>【Reject】</b>	
3	Tape position mistake (minor defect)	Not by engineering drawing	
4	Mara tape defect (minor defect)	Peel before pulling the protecting film <b>【Reject】</b>	

### 3.1.5 Silicon and Taffy glue

NO	Defect item	Criteria	Remark
1	Quantity of silicon (major defect)	Uncover the ITO and circuit area <b>【Reject】</b>	note: compared by engineering
2	Taffy glue (major defect)	1.Uncover the reveal copper area <b>【Reject】</b> 2.Cover layer 0.3mm(Min)~3.0mm(Max) <b>【Reject】</b>	note: if customer has special requirement, refer to the technical document 
3	Depth of glue covering (major defect)	Depth of glue covering overtop front Polarizer <b>【Reject】</b>	Except of the special requirement

### 3.2Electrical criteria

NO	Defect item	Criteria	Remark
1	No display (major defect)	No display <b>【Reject】</b>	
2	Missing line (major defect)	Missing line <b>【Reject】</b>	
3	Seg-com light and dark (major defect)	Seg-com light and dark <b>【Reject】</b>	ND filter 2% test
4	No display in immobility (major defect)	No display in immobility <b>【Reject】</b>	
5	Flicker of Pattern (major defect)	Flicker of Pattern <b>【Reject】</b>	
6	Mura (major defect)	ND filter 2%test	
7	Over current (major defect)	Over current <b>【Reject】</b>	
8	Voltage out of specification (major defect)	Voltage out of specification <b>【Reject】</b>	
9	Pattern blur, error code (major defect)	Pattern blur, error code <b>【Reject】</b>	
10	Dark light, Flicker	Dark light, Flicker	

	(major defect)	【Reject】		
11	Black/white dots 、 Dirty dots、 eye winker (major defect)	Specification	Allowable	Note1:disregard if out of AA 
		$\phi \leq 0.15\text{mm}$	disregard	
		$0.15\text{mm} < \phi \leq 0.25\text{mm}$	2	
		$0.25\text{mm} < \phi \leq 0.3\text{mm}$	1	
		$0.3\text{mm} < \phi$	0	
12	Fiber、glass crutch、Polarizer scratch/folded (major defect)	$W \leq 0.03\text{mm}$	disregard	Note1:L: Length, W: Width Note2: disregard if out of AA 
		$0.03\text{mm} < W \leq 0.05\text{mm}$ $L \leq 3.0\text{mm}$	2	
		$0.05\text{mm} < W \leq 0.1\text{mm}$ $L \leq 3.0\text{mm}$	1	
		$W > 0.1\text{mm}; L > 3.0\text{mm}$	0	

## 12.Precautions for using LCD modules.

### 12.1 Safety

- (1) Do not swallow any liquid crystal, even if there is no proof that liquid crystal is poisonous.
- (2) If the LCD panel breaks, be careful not to get liquid crystal to touch your skin.
- (3) If skin is exposed to liquid crystal, wash the area thoroughly with alcohol or soap.

### 12.2 Storage Conditions

- (4) Store the panel or module in a dark place where the temperature is  $23 \pm 5^\circ\text{C}$  and the humidity is below  $45 \pm 20\% \text{RH}$ .
- (5) Store in anti-static electricity container.
- (6) Store in clean environment, free from dust, active gas, and solvent.
- (7) Do not place the module near organics solvents or corrosive gases.
- (8) Do not crush, shake, or jolt the module.

### 12.3 Handling Precautions

- (9) Avoid static electricity, which can damage the CMOS LSI.
- (10) The polarizing plate of the display is very fragile, please handle it very carefully.
- (11) Do not give external shock.
- (12) Do not apply excessive force on the surface.
- (13) Do not wipe the polarizing plate with a dry cloth, as it may easily scratch the surface of plate.
- (14) Do not use ketonic solvent & Aromatic solvent, use with a soft cloth soaked with a cleaning naphtha solvent.
- (15) Do not operate it above the absolute maximum rating.



(16) Do not remove the panel or frame from the module.

## 12.4 Warranty

The period is within twelve months since the date of shipping out under normal using and storage conditions.

## 13. Factory

**FACTORY NAME:**

**FACTORY ADDRESS:**

**FACTORY PHONE:**

## 14. Revision history

Version	Revise record	Date
A01	Original version	2011-8-26