TQ 广州天嵌计算机科技有限公司
Guangzhou T &Q Technology Co.,LTD

APPROVAL SHEET
承　认　书

Customer 客户名称	
Part NO. 产品型号	**TQ 035 TS CM_V0.1_54P**
Product type 产品内容	Mode: Transmissive type .Normally white. TFT LCD Module LCD Module: Graphic 320RGB*240Dot-matrix
Remarks 备注栏	□APPROVAL FOR SEPCIFICATIONS AND SAMPLE ■APPROVAL FOR SEPCIFICATIONS ONLY
Signature by Customer: 客户确认签章	

Issued by	Checked by	Approved by	
		PD	QA

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1. General Description

TM024HYH03 is a 320RGB*240 dots matrix TFT LCD module. It has a TFT panel composed of 720 sources and 320gates. The LCM can be easily accessed by micro-controller.
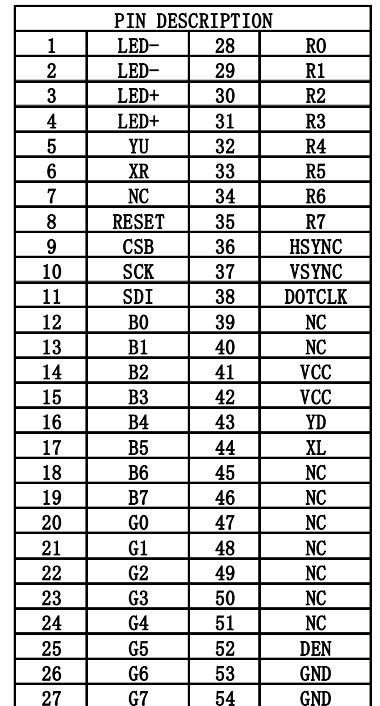
2. Features

Display Mode	Transmissive
	a-TFT
Display Format	Graphic 320RGB*240 Dot-matrix
Input Data	RGB interface
Viewing Direction	全视角
Drive	HX8238A

3. Mechanical Specification

Item	Specifications	Unit
Dimensional outline	77.9(W)*64.6(H)*4.35 (FPC not include)	mm
Resolution	320RGB*240	dots
LCD Active area	70.08(W)*52.56(H)	mm
Pixel size	0.153(W)*0.153(H)	mm

4. Mechanical Dimension

1. 3.5" Transmissive, Normally-White TFT-LCD Module
2. Resolution: 320 (RGB) x 240
3. Driver IC: HX8238
4. Interface: Parallel RGB-24 bit+SPI

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3.5 寸液晶---54 PIN(**CMO 玻璃**)
型号：TQ035TSCM_V0.1_54P

320(RGB)x240 DOTS
TFT 3.5"

Viewing Direction

PIN DESCRIPTION			
1	LED-	28	R0
2	LED-	29	R1
3	LED+	30	R2
4	LED+	31	R3
5	YU	32	R4
6	XR	33	R5
7	NC	34	R6
8	RESET	35	R7
9	CSB	36	HSYNC
10	SCK	37	VSYNC
11	SDI	38	DOTCLK
12	B0	39	NC
13	B1	40	NC
14	B2	41	VCC
15	B3	42	VCC
16	B4	43	YD
17	B5	44	XL
18	B6	45	NC
19	B7	46	NC
20	G0	47	NC
21	G1	48	NC
22	G2	49	NC
23	G3	50	NC
24	G4	51	NC
25	G5	52	DEN
26	G6	53	GND
27	G7	54	GND

5. Maximum Ratings

Item	Symbol	Min	Max	Unit	Note
Supply voltage	V	-0.3	4.6	V	
Operating temperature	V_T	-0.3	Vcc+0.3	V	
Storage temperature	T_{OPR}	-10	60	℃	
Storage temperature	T_{STR}	-20	70	℃	

6. Electrical Characteristics

Item		Symbol	Condition	Min.	Typ.	Max.	Unit
Supply voltage	Logic	V_{CC}		2.7	2.8	3.3	V
Input Voltage	H level	T_{IH}		0.8*IOVCC		IOVCC	V
	L level	T_{IL}		-0.3		0.2* IOVCC	
Storage temperature		I_{DD}	With internal voltage generation V_{CC}=2.8V; T_{emp}=25℃			TBD	mA

7. Backlight Characteristic

Item	Symbol	Min	Typical	Max	Unit
LED module Forward voltage	V_{LED}	3.0	3.2	3.4	V
LED module current	V_{LED}		60		mA
L/G Surface Luminance　★1	L_S	3200	3400		Cd/m^3
LCM Surface brightness uniform　★2	L_D	80			%

★ 1Test condition is:

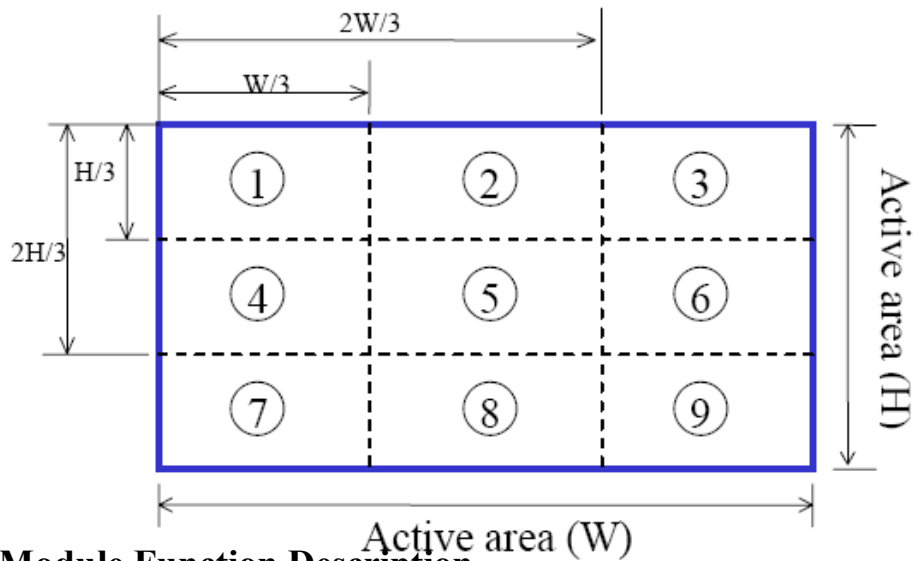   (a)   Center point on active area.

    (b)Best Contrast.

★2Uniform measure condition:

    (1)Measure 9 point. Measure location show below;

    (2)Uniform=(Min. brightness /Max. brightness)*100%

    (3)Best Contrast.

Active area (W)

8. Module Function Description

8.1 Pin Descriptions

Pin No.	Symbol	Functiona	Notes
1	VBL-	Power supply for backlight cathode input terminal.	
2	VBL-	Power supply for backlight cathode input terminal.	
3	VBL+	Power supply for backlight anode input terminal.	
4	VBL+	Power supply for backlight anode input terminal.	
5	Y+	Touch panel Y+ pin	
6	X+	Touch panel X+ pin	
7	NC	Read control signal input, active at 'L'.	
8	RESET	Reset signal input terminal. Active at 'L'.	
9	CSB	Chip select signal input terminal	
10	SCK	Clock pin of serial interface.	
11	SDI	Data input pin in serialm ode	
12~19	B0~B7	Blue Data	
20~27	G0~G7	Green Data	
28~35	R0~R7	Red Data	
36	HSYNC	Horizontal sync input in RGB mode. (Short to GND ifnot sued)	
37	VSYNC	Vertical sync input in RGB mode. (Short to GND if notsued)	
32	DCLK	Clock signal. Latching data at the rising edge.	
39、40	NC	Not Connect	
41、42	VCI	Digital Power(3.3V)	
43	Y-	Touch panel Y- pin	
44	X-	Touch panelX- pin	
45~51	NC	Not Connect	
52	ENABLE	Display enable pin from controller	
53、54	GND	Power Ground	

8.2Timing characteristics.

I80-System Interface Timing Characteristics
Normal Wrote 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			

Read Timing Characteristics

Reset Timing Characteristics(VCC=1.8~3.3V.IOVCC=1.65~3.3V)

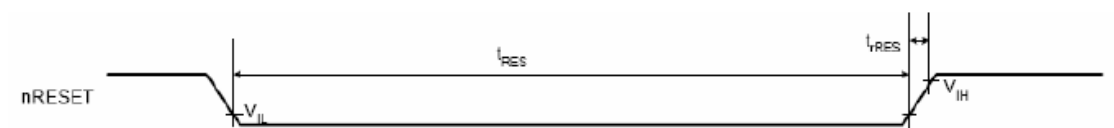| Item	Symbol	Unit	Min.	Typ..	Max
Reset low-level width	t_{RES}	ms	1		
Reset rise time	t_{RES}	μ s			10
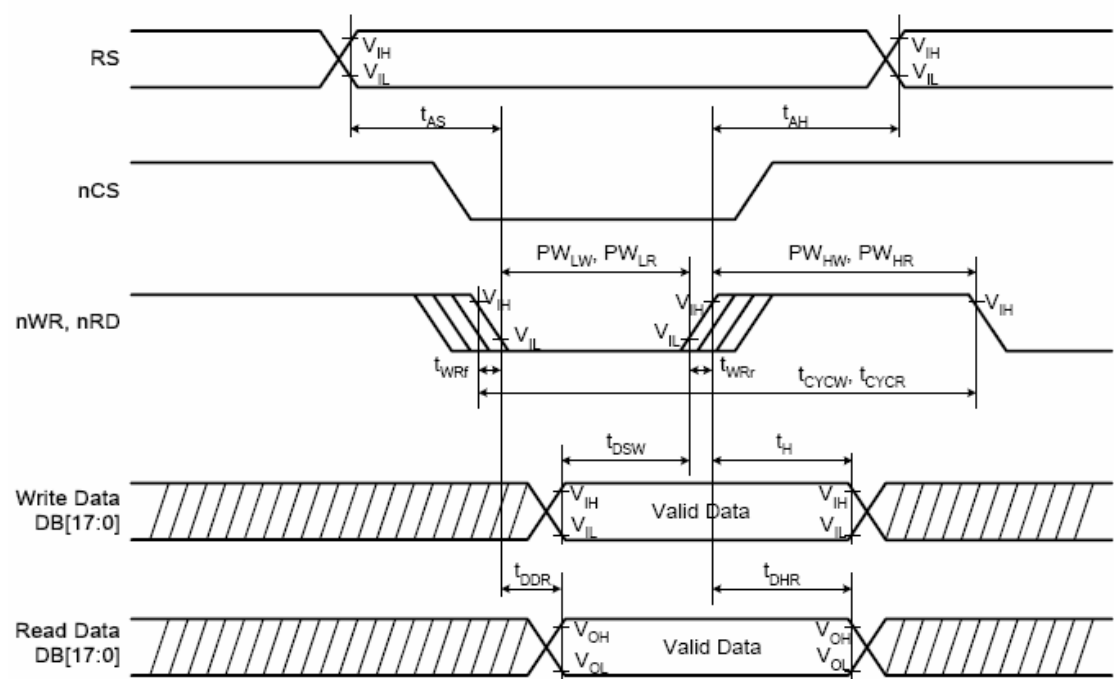
Figure 51 i80-System Bus Timing
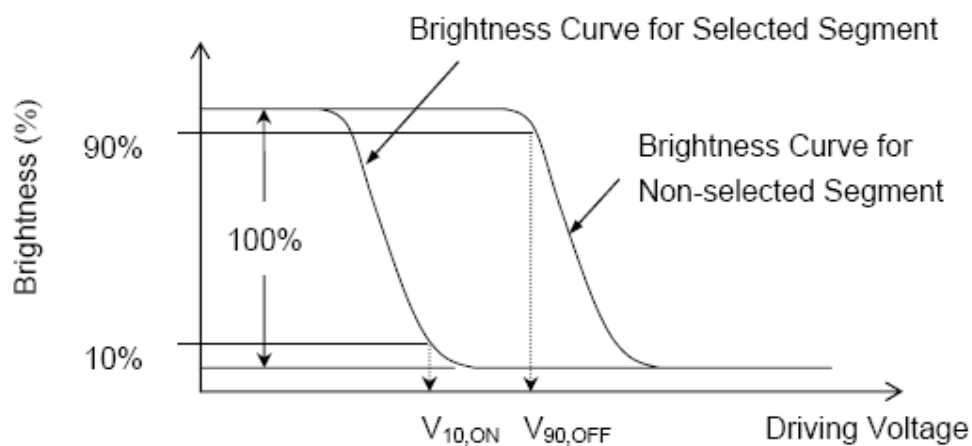
Reset Timing

9.Electro-optical Characteristics

Item	Symbol	Conditions	Temp	Min.	Typ.	Max.	Unit	Note
Response Time	T_R	$\theta = \phi = 0$	25℃		TBD	TBD	msec	NOTE2
	T_F				TBD	TBD		
Viewing Angle Range	$\Phi=0^0$（6"）	$\Phi=90^0$（3"）	$\Phi=180^0$（12"）		$\Phi=270^0$（9"）			NOTE3
θ（25℃）CR≥10	TBD	TBD	TBD		TBD			NOTE3

The above "viewing angle" is the measuring position with the largest contrast ratio. Not for good image quality. Viewing direction for good image quality is 12 O'clock.

● For panel only

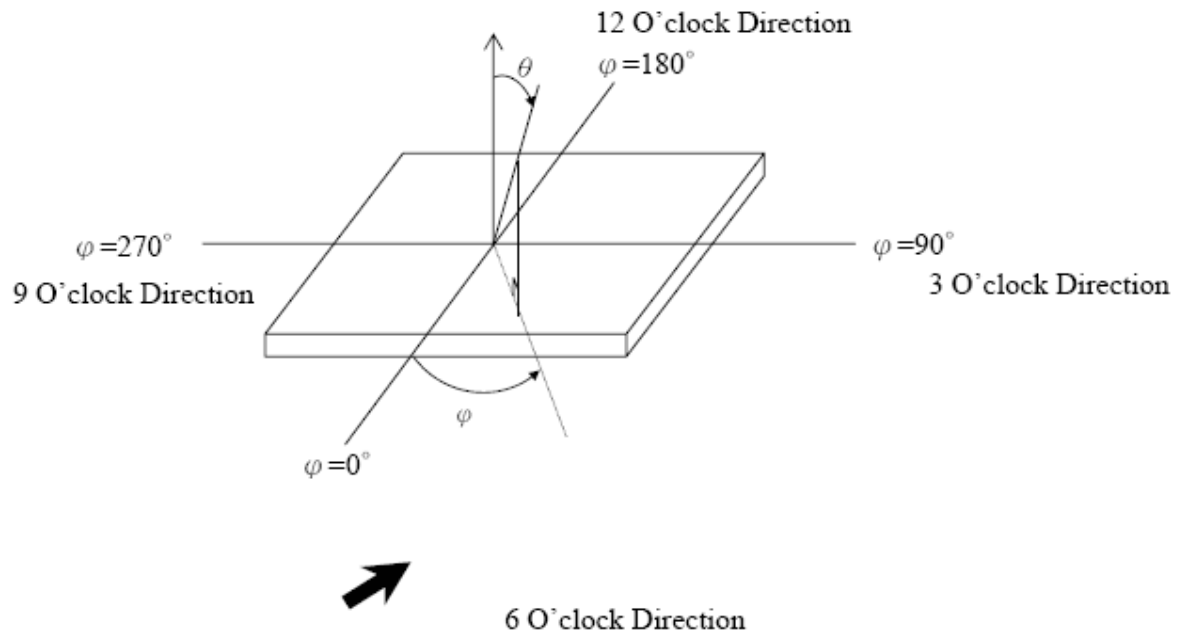● Electro-Optical Characteristics Test Method
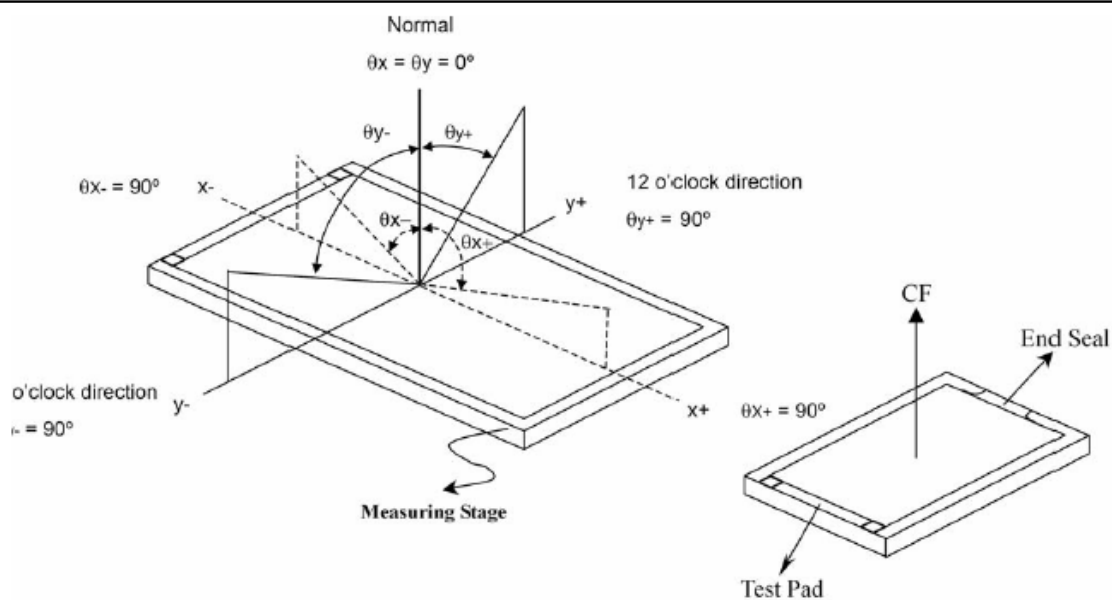
$$Vop = (V_{10,ON} + V_{90,OFF})/2$$


.Note2.Definition of Optical Response Time:

Non-selected Waveform

Selected Waveform

Non-selected Waveform

Brightness

100

10%

90%

Time (ms)

Rise Time, Tr

Decay Time, Td
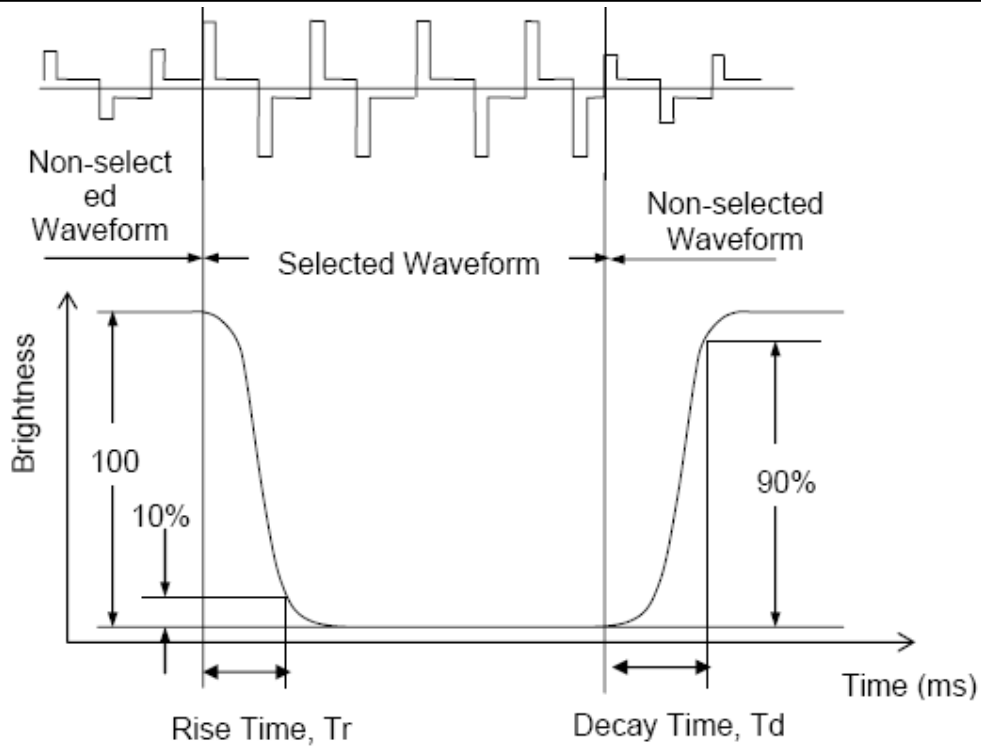
.Note3.Definition of Viewing Angle θ and ϕ :

12 O'clock Direction

$\varphi = 180°$

θ

$\varphi = 270°$
9 O'clock Direction

$\varphi = 90°$
3 O'clock Direction

φ

$\varphi = 0°$

6 O'clock Direction

Note4.Definition of Contrast ratio (CR)：

$$CR = \frac{\text{Brightness of Non-selected Segment (B2)}}{\text{Brightness of Selected Segment (B1)}}$$
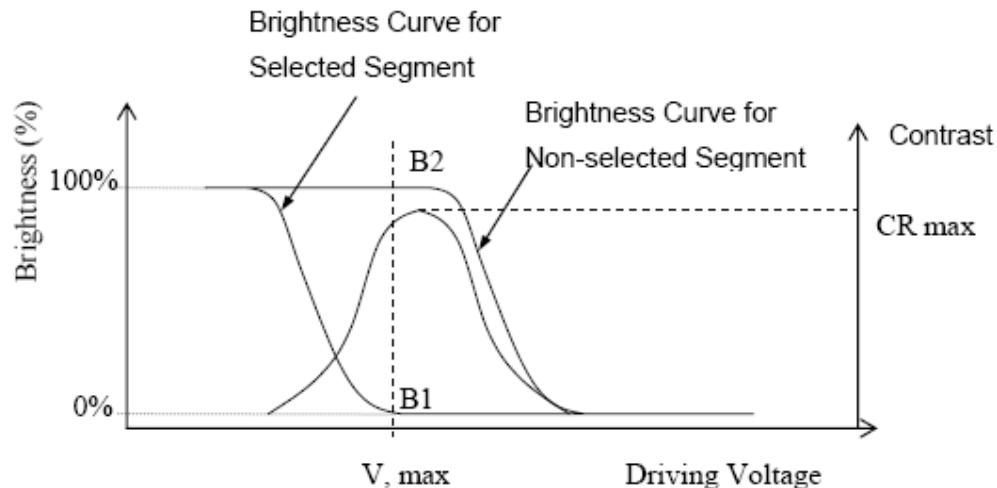
10. Reliability
10.1Mtbf

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℃*240Hrs	。No Defect Of Operational Function In Room Temperature Are Allowable
2	Low Temperature Non-Operating Test	-30℃*240Hrs	
3	High Temperature/Humidity Non Operating Test	60℃*90%RH*240Hrs	
4	High Temperature Operating Test	70℃*240Hrs	
5	Low Temperature Operating Test	-20℃*240Hrs	。IDD of LCM in Pre-and Post-Test Should Follow Specification
6	Thermal Shock Test	-20℃(30Min) ↻70℃(30Min)*10CYCLES	

Notes:

1. Judgments should be made after exposure in room temperature for two hours.

2. The distill water is used for the high temperature/humidity test.

3. 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 ± 200.(Darkroom's lux: 100 ± 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!
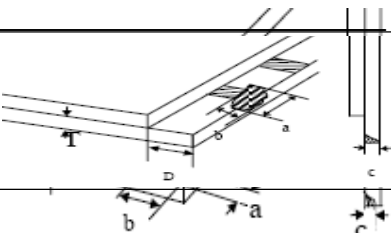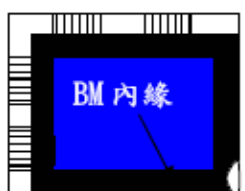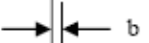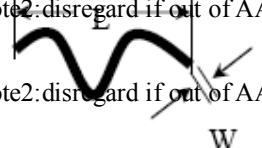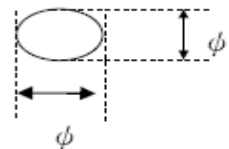
(As shown below)
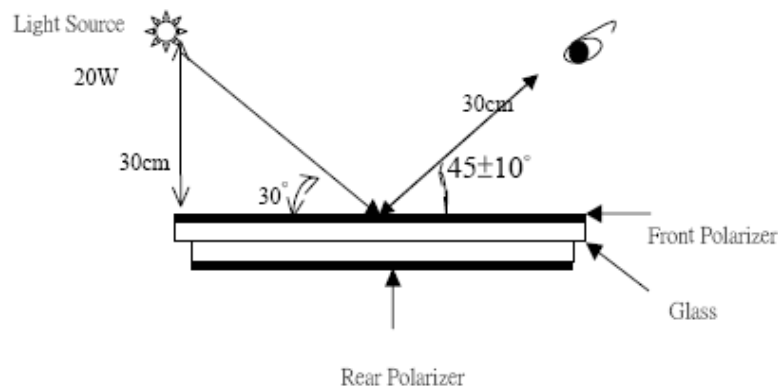
3.Inspection item and criteria
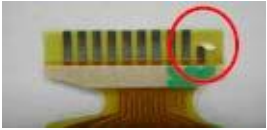
3.1 Visual inspection criterion in immobility

3.1.1Glass defect

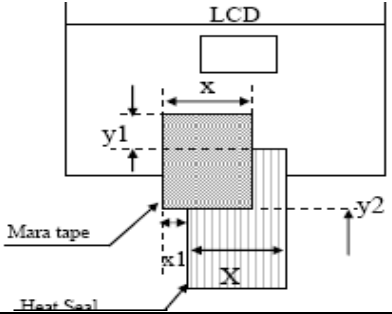| NO	Defect item	Criteria	Remark
1	Dimension Unconformity (Major defect)	By Engineering Drawing	
2	Cracks (Major defect)	1. Linear cracks panel 【Reject】 2. Nonlinear crack contrast by limited sample	
3	Glass extrude the conductive area (minor defect)	a: disregards and no influence assemblage. 1) b≤1/3Pin width(non bonding area) 【Accept】 2)bonding area≤0.5mm 【Accept】	A: Length, b: Width
4	Pin-side ,conductive area damaged (minor defect)	(a c: disregards) b≤1/3of effective length for bonding electrode 【Accept】	a: length, b: Width, c: Thickness

	Pin-side,non-conductive area damaged	1)Damage area don't touch the ITO (Inclueling contraposition mark,	a: Length, b: Width c: Thickness
5	(minor defect)	except scribing mark) 【Accept】 2)C<T b≦BM1/3of width 【Accept】	
6	Non-pin-side damage (minor defect)	3)c=T b not touch the seal glue 【Accept】 4)a disregards c<T 1)b exceeds 1/3Bm 【Reject】 c=T b not touch the seal glue 【Reject】	c: Thickness b: width of damage

3.1.2LCD appearance defect(View area)

NO	Defect item	Criteria		Remark
		Specification	Allowable	note1:L: Length, W: Width
1	Fiber、glass cratch、polarizer scratch/folded (minor defect)	W≦0.03mm	disregard	note2: disregard if out of AA
		0.03mm<W≦0.05mm; L≦3.0mm	2	
		0.05mm<W≦0.1mm; L≦3.0mm	1	
		W>0.1mm;L>3.0mm	0	
2	Polarizer bubble、concave and convex (minor defect)	Φ≦0.2mm	disregard	note1: Φ=(L+W)/2,L:Length, W :Width
		0.2mm<Φ≦0.3mm	2	note2:disregard if out of AA
		0.3mm<Φ≦0.5mm	1	
		0.5mm<Φ	0	
3	Black dots、dirty dots、impurities、eye winker (minor defect)	Φ≦0.15mm	disregard	note2:disregard if out of AA
		0.15mm<Φ≦0.25mm	2	
		0.25mm<Φ≦0.3mm	1	
		0.3mm<Φ	0	

4	Polarizer prick (minor defect)	$\varphi \leq 0.1mm$	disregard	note1: $\varphi=(L+W)/2$,L=Length, W=Width
		$0.1mm<\varphi \leq 0.25mm$	3	note2:the distance between two
		$\varphi>0.25mm$	0	dots>5mm

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
		$\phi \leq 0.25mm$	2	
		$\phi>0.25$	0	

3.1.4Black tape &Mara tape

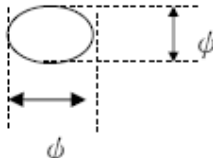| NO	Defect item	Criteria	Remark
1	FPC or H/S black tape (minor defect)	1. shift spec: 1) glue to the polarize 【Reject】 2) IC bare 【Reject】 2. left-and-right spec: 1)exceed of FPC edge or H-S edge【Reject】	
2	No black tape (major defect)	No black tape 【Reject】	
3	Tape position mistake (minor defect)	Not by engineering drawing	
4	Mara tape defect (minor defect)	Peel before pulling the protecting film 【Reject】	

3.1.5Silicon and Taffy glue

NO	Defect item	Criteria	Remark
1	Quantity of silicon (major defect)	Uncover the ITO and circuit area 【Reject】	note: compared by engineering
2	Taffy glue (major defect)	1.Uncover the reveal copper area【Reject】 2.Cover layer 0.3mm(Min)~3.0mm(Max)	note: if customer has special requirement, refer to the

			【Reject】	document
3	Depth of glue covering (major defect)	Depth of glue covering overtop front		Except of the special requirement

3.2 Electrical criteria

NO	Defect item	Criteria	Remark		
1	No display (major defect)	No display 【Reject】			
2	Missing line (major defect)	Missing line 【Reject】			
3	Seg-com light and dark (major defect)	Seg-com light and dark 【Reject】	ND filter 2% test		
4	No display in immobility (major defect)	No display in immobility 【Reject】			
5	Flicker of Pattern (major defect)	Flicker of Pattern 【Reject】			
6	Mura (major defect)	ND filter 2%test			
7	Over current (major defect)	Over current 【Reject】			
8	Voltage out of specification (major defect)	Voltage out of specification 【Reject】			
9	Pattern blur, error code (major defect)	Pattern blur, error code 【Reject】			
10	Dark light, Flicker (major defect)	Dark light, Flicker 【Reject】			
11	Black/white dots、Dirty dots、eye winker (major defect)	Specification	Allowable	Note1:disregard if out of AA	
		$\Phi \leqq 0.15mm$	disregard		
		$0.15mm<\Phi \leqq 0.25mm$	2		
		$0.25mm<\Phi \leqq 0.3mm$	1		
		$0.3mm<\Phi$	0		
12	Fiber glass crutchPolarizer scratch/folded (major defect)	$W \leqq 0.03mm$	disregard	Note1:L: Length, W: Width Note2: disregard if out of AA	
		$0.03mm<W \leqq 0.05mm$ $L \leqq 3.0mm$	2		
		$0.05mm<W \leqq 0.1mm$ $L \leqq 3.0mm$	1		

12.Precautions for using LCD modules.

12.1 Safety

(1)Do mot 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.

12.2Srorang Conditions

(4)Store the panel or module in a dark place where the temperature is 23±5℃and the humidity is below 45

±20%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.

12.3Handling Precautions

(9)Avoid static electricity, which can damage the CMOS LSI.

(10)The polarizing plate of the display is very fragile, please handle if very carefully.

(11)Do not give external shock.

(12)DO mot apply excessive force on the surface.

(13)Bo not wipe the polarizing plate with a dry cloth, as it may easily scratch the surface of plate.

(14)Do not use ketonics 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.

12.4Warranty

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
A	Original version	2010-01-04