LCD Module

Product Specification

☐ : **APPROVAL FOR SPECIFICATION**

For Customer：_____ ☐ : **APPROVAL FOR SAMPLE**

Module No.： TST500MTWH-01

For Customer's Acceptance ：

Approved by	Comment

Team Source Display ：

Presented by	Reviewed by	Organized by

This module uses ROHS material

TABLE OF CONTENT

1. GENERAL DESCRIPTION

FS-TST050MTWH-01 is a 800(RGB)X480 dot-matrix TFT module. The 5.0" screen produces 800 X480 resolution image. By applying R.G.B. input signal,full color images are displayed.

2. FEATURES

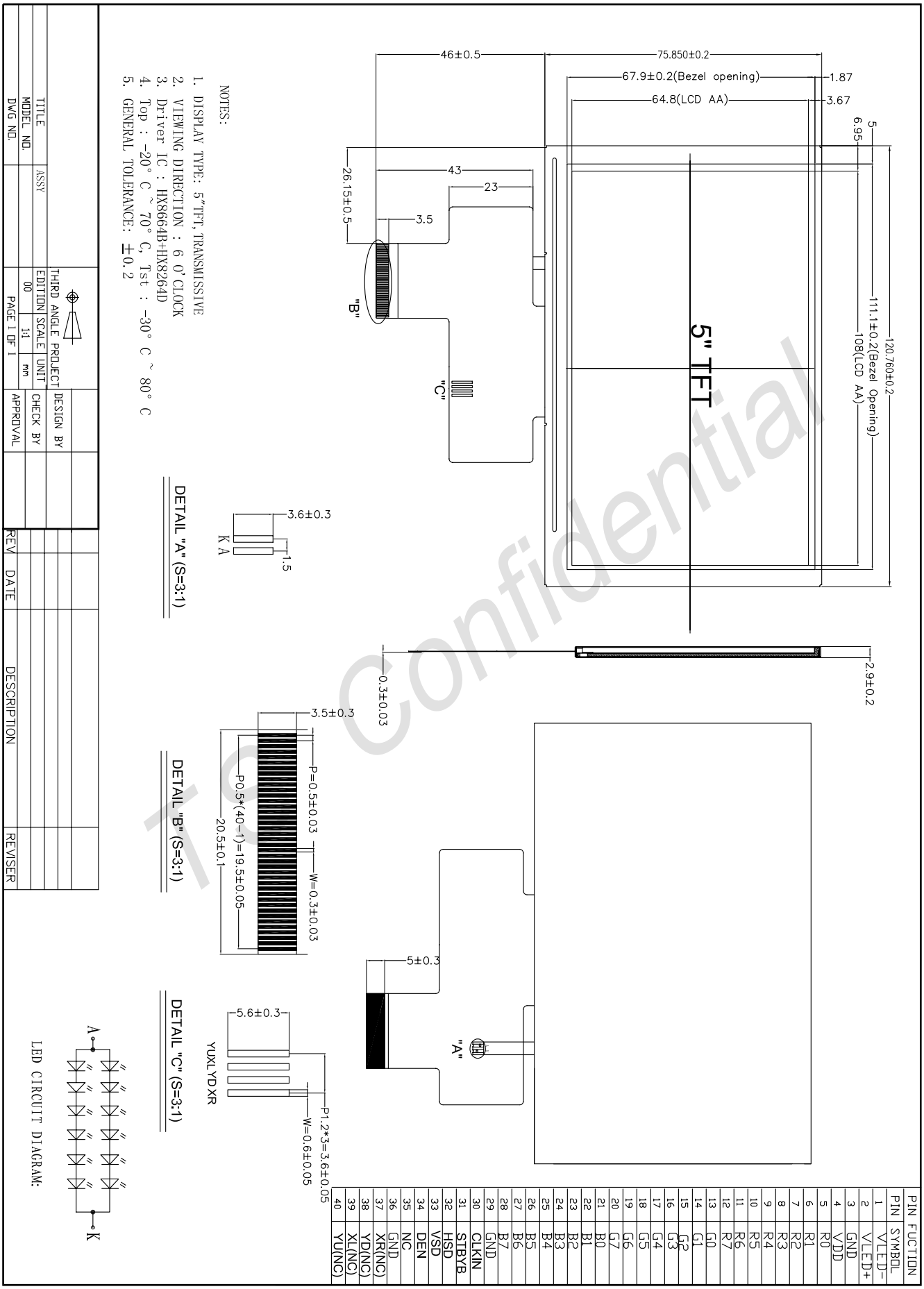
Display Mode	TFT LCD module
	Active matrix TFT ,Transmissive type
Display Format	RGB Stripe
Color	16.7m color
Input Data	RGB interface
Viewing Direction	6 O'clock
Driver IC	HX8664B+HX8264D

3. MECHANICAL SPECIFICATION

Item	Specifications	Unit
Dimensional outline	20 76 (W)×75.85 (L)× 2.9(D)	mm
Number of Pixel	800(H)(×3RGB) × 480(V)	Pixel
LCD A.A	108(W)×64.8(L)	mm
Pixel Pitch	0.135(W)×0.135(L)	mm

Note: 1 pixel = 3 dots = Red dot +Green dot +Blue dot.

4 MECHANICAL DIMENSION



PIN	SYMBOL	PIN FUCTION
1	VLED-	
2	VLED+	
3	GND	
4	VDD	
5	R0	
6	R1	
7	R2	
8	R3	
9	R4	
10	R5	
11	R6	
12	R7	
13	G0	
14	G1	
15	G2	
16	G3	
17	G4	
18	G5	
19	G6	
20	G7	
21	B0	
22	B1	
23	B2	
24	B3	
25	B4	
26	B5	
27	B6	
28	B7	
29	GND	
30	CLKIN	
31	STBYB	
32	HSD	
33	VSD	
34	DEN	
35	NC	
36	GND	
37	XR(NC)	
38	YD(NC)	
39	XL(NC)	
40	YU(NC)	

REV	DATE	DESCRIPTION	REVISER

THIRD ANGLE PROJECT

TITLE		DESIGN BY	
	ASSY	CHECK BY	
MODEL NO.	EDITION: 00	SCALE: 1:1	UNIT: mm
DWG NO.	PAGE 1 OF 1	APPROVAL	

5. MAXIMUM RATINGS

Item	Symbol	Min.	Max.	Unit	Note
Supply voltage for logic	V_{DD}	-0.5	5	V	
Input Voltage	V_{IN}	0	V_{DD}	V	
Operating temperature	T_{OP}	-20	70	℃	
Storage temperature	T_{ST}	-30	80	℃	
Humidity	RH	-	90%	RH	MAX60℃

6. ELECTRICAL CHARACTERISTICS

Item		Symbol	Condition	Min.	Typ.	Max.	Unit
Supply voltage for logic		V_{DD} - V_{SS}	-	3.0	3.3	3.6	V
Input Voltage	H level	V_{IH}	-	0.7x V_{DD}	---	V_{DD}	V
	L level	V_{IL}		V_{SS}	---	0.3xV_{DD}	V
BACKLIGHT Supply current		I_{DD}	WHITE LED	---	40	--	mA
		V_{LED}		---	18.3	---	V

7. MODULE FUNCTION DESCRIPTION

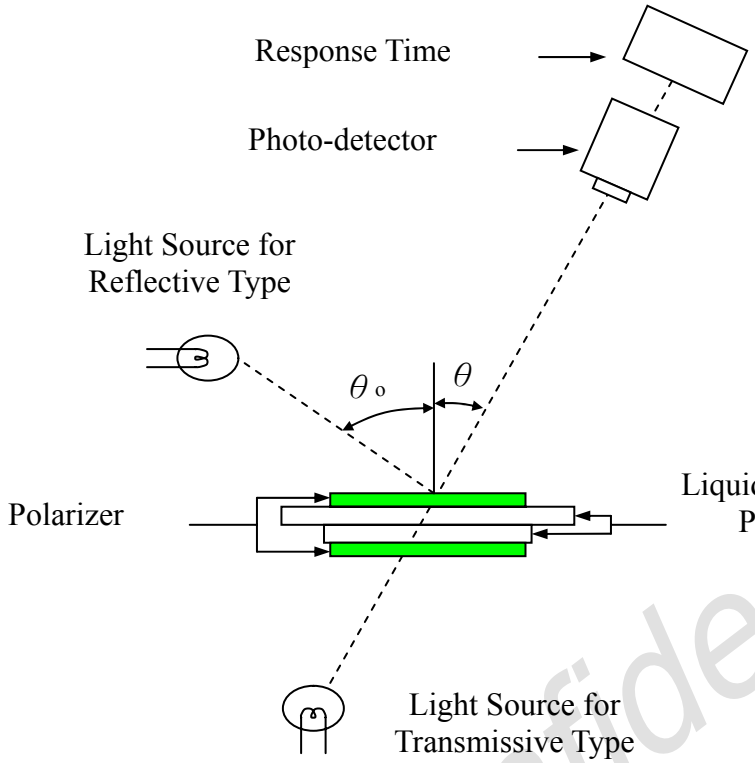
7.1 PIN DESCRIPTION

Pin No	Symbol	Function
1	VLED-	BACK LIGHT POWER GROUND
2	VLED+	BACK LIGHT POWER SUPPLY
3	GND	POWER GROUND
4	VDD	POWER SUPPLY
5-12	R0-R7	RED DATA
13-20	G0-G7	GREEN DATA
21-28	B0-B7	BLUE DATA
29	GND	POWER GROUND
30	CLKIN	In external interface mode, served as a dot clock signal.
31	STBYB	standby mode control pin
32	HSD	In external interface mode, served as a horizontal synchronized signal input
33	VSD	In external interface mode, served as a vertical synchronize signal input
34	DE	In external interface mode, polarity of ENABLE signal is synchronized with valid graphic data input.
35	NC	NC
36	GND	POWER GROUND
37	XR	NC
38	YD	
39	XL	
40	YU	

8. ELECTRO-OPTICAL CHARACT ERISTICS(For LCD)

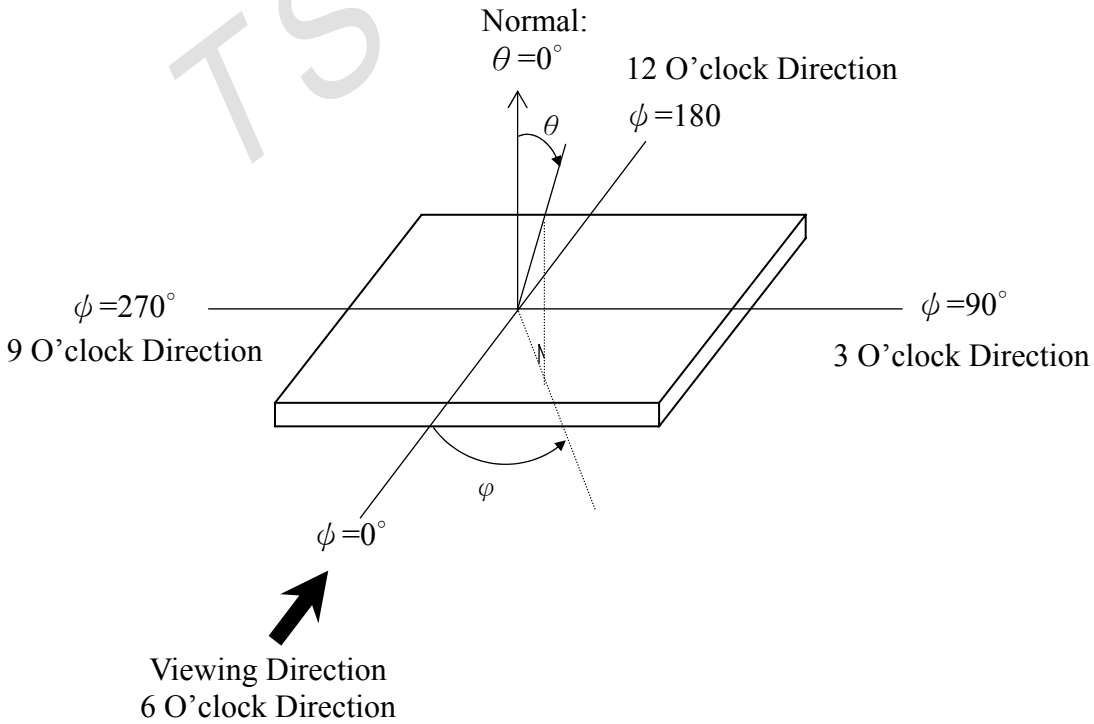
Item	Symbol		Condition	Temp.	Min.	Typ.	Max.	Units	Note
Viewing Angle Range	θ		ψ= 0° ψ= 90° ψ= 180° ψ= 270° (CR≧10)	25℃	60	70	----	degree	Note 2
					60	70	----		
					40	50	----		
					60	70	----		
Response Time	(Tr)+ (Tf)					20		msec	Note 1,4
Module Chromaticity	White	x	θ=ψ= 0°	25℃	0.260	0.310	0.360	---	Note 3
		y			0.280	0.330	0.380		
	Red	x			0.540	0.590	0.640		
		y			0.300	0.350	0.400		
	Green	x			0.298	0.348	0.398		
		y			0.520	0.570	0.620		
	Blue	x			0.095	0.145	0.195		
		y			0.050	0.110	0.160		
Module Contrast Ratio	CR		θ=ψ= 0°	25℃	400	500	----	---	Note3, 5
NTSC	----		----	----	45	50	----	%	

Note 1: Electro-Optical Characteristics Test Method.



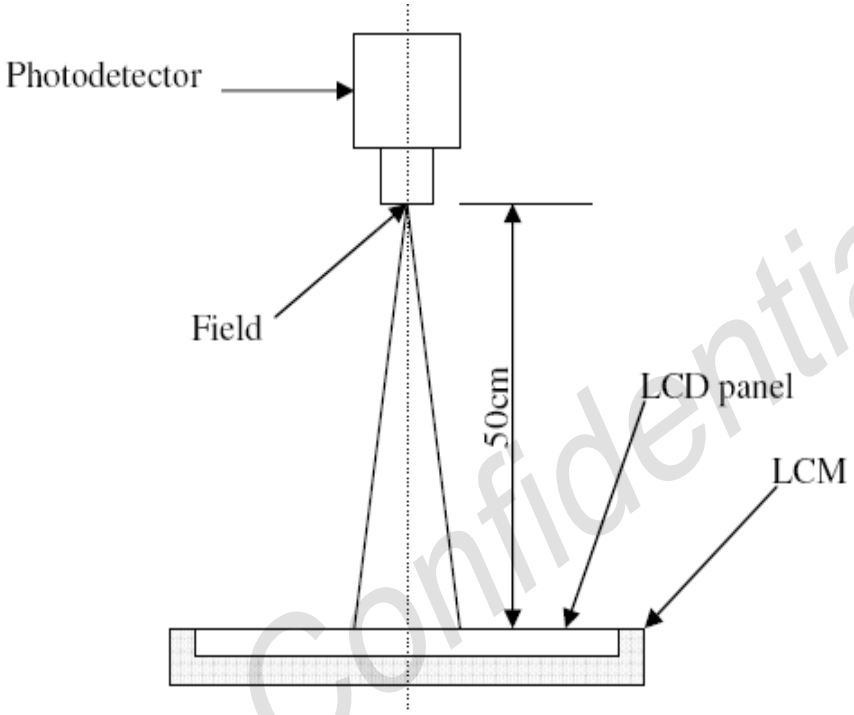
Note 2: Definition of Viewing Angel.

Viewing angle is the angle at which the contrast ratio is greater than 2,for TFT module thecontrast ratio is greater than 10. The angles are determined for the horizontal or x axis and the vertical or y axis with respect to the z axis which is normal to the LCD surface.



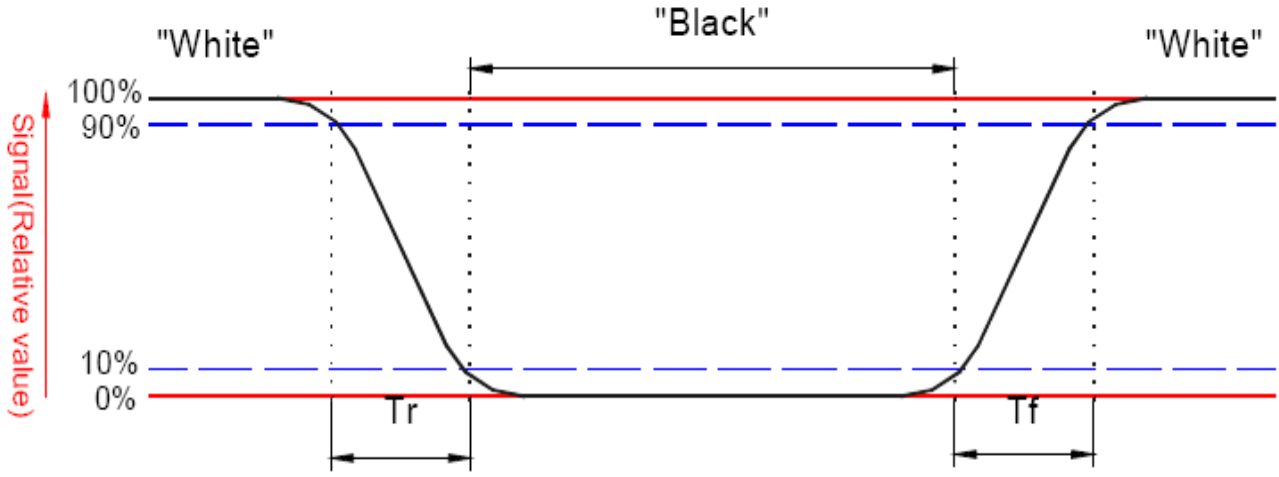
Note 3: **Optical measurement equipment setup**

-Measurement should be executed in a stable, windless, and dark room. After lighting thebacklight for 30mins.
-Environment condition : Common air conditioner cleanness Ta=25±5
Humidity=60±15%
-Distance : 50cm
-Photodetector : BM-7 (Field 1°)



Note 4: Definition of Optical Response Time

The output signals of photo detector are measured when the input signals are changed from “black” to “white”(falling time) and from “white” to “black”(rising time), respectively.
The response time is defined as the time interval between the 10% and 90% of amplitudes.
Refer to figure as below:



Note 5: Definition of Contrast Ratio (CR).

Contrast ratio is calculated with the following formula.

$$\text{Contrast ratio (CR)} = \frac{\text{Photo detector output when LCD is at "White" state}}{\text{Photo detector output when LCD is at "Black" state}}$$

9. RELIABILITY

9.1. MTBF

The LCD module shall be designed to meet a minimum MTBF value of 50000 hours with normal. (25°C in the room without sunlight)

9.2. Test condition

NO.	ITEM	CONDITION	CRITERION
1	High Temperature Non-Operating Test	80℃ * 240Hrs	◦ No defect of operational functions in room temperature are allowable. ◦ IDD of LCM should be below specification.
2	Low Temperature Non-Operating Test	-30℃ * 240Hrs	
3	High Temperature/Humidity Operating Test	50℃ * 90±5%RH * 96Hrs	
4	High Temperature Operating Test	70℃ * 240Hrs	
5	Low Temperature Operating Test	-20℃ * 240Hrs	
6	Thermal Shock Test	-30℃(30Min)↔ 80(30Min)* 10 Cycles	
7	ESD Test	Air discharge:±6KV Contact discharge:±4KV	

Notes:

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

10. INSPECTION CRITERIA

10.1 AQL(Acceptable Quality Level)

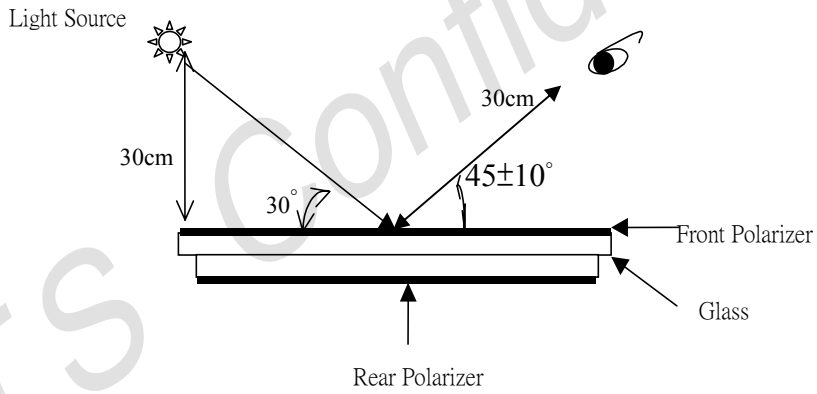
AQL of major and minor defect

	MAJOR DEFECT	MINOR DEFECT	MAJOR+MINOR
APPEARANCE	0.40%	1.0%	1.0%
ELECTRIC-OPTICAL	0.15%	0.15%	0.15%

10.2 Basic conditions for inspection

The LCM face to us, According to the criteria of luminance measurement instruction, About an angle of incidence 30,a distence of 30 cm with normal eye.with an angle of 45 degree to check the products without uncovering the film!

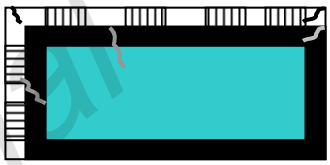
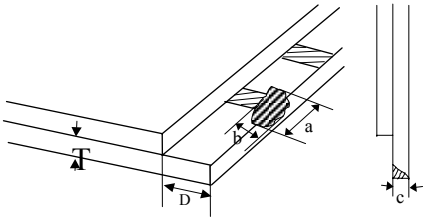
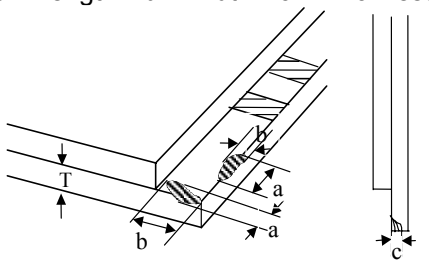
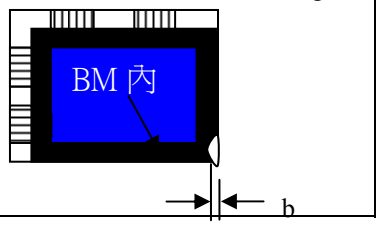
(As shown below).



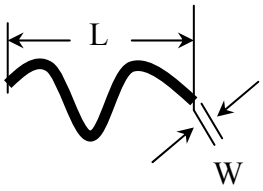
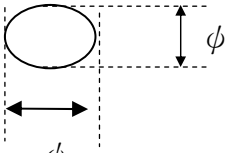
10.3 Inspection item and criteria

10.3.1 Visual inspection criterion in immobility

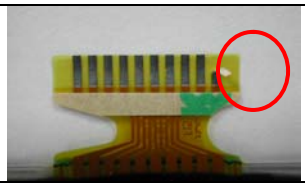
10.3.1.1 Glass defect

No	Defect item	Criteria	Remark
1	Dimension Unconformity (Major defect)	By Engineering Drawing	
2	Cracks (Major defect)	1)Not-extended crack according to the limit sample 2) Extended crack when C≦T and the crack touch ≦1/3 sealant width is OK	
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≦ 1/3 of effective length for bonding electrode 【Accept】	a：Length，b：Width，c：Thickness 
5	Pin-side，non-conductive area damaged (minor defect)	1) Damage area don't touch the ITO (Inclueling contraposition mark,except scribing mark) 【Accept】 2) c<T b≦BM 1/3 of width 【Accept】 3) c=T b not touch the seal glue 【Accept】 4) a disregards	a：Length，b：Width，c：Thickness 
6	Non-pin-side damage (minor defect)	c<T 1) b exceeds 1/3 BM 【Reject】 c=T b not touch the seal glue 【Accept】	c：Thickness b: width of damage 

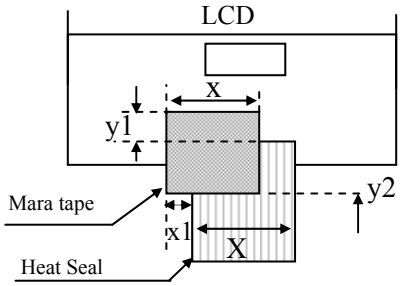
10.3.1.2 LCD appearance defect (View area)

No	Defect item	Criteria		Remark
1	Fiber、glass cratch、polarizer scratch/folded (minor defect)	Specification	Allowable	note1: L：Length，W：Width note2: disregard if out of AA 
		W≦0.03mm	disregard	
		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)	ψ≦0.2mm	disregard	note 1:ψ=(L+W)/2；L：Length，W：Width note2: disregard if out of AA
		0.2mm<ψ ≦ 0.3mm	2	
		0.3mm<ψ ≦ 0.5mm	1	
		0.5mm<ψ	0	
3	Black dots、dirty dots、impurities、eyewinker (Major defect)	ϕ ≦0.15mm	disregard	note 1: disregard if out of AA note2: Inspection by RGB pattern 
		0.15mm<ψ≦0.25mm	2	
		0.25< ϕ ≦0.3mm	1	
4	Polarizer prick (Major defect)	ψ≦0.1mm	disregard	note1:ψ=(L+W)/2 ；L= Length，W=Width note2: the distance between two dots ＞5mm
		0.1mm<ψ≦0.25mm	3	
		ψ＞0.25mm	0	

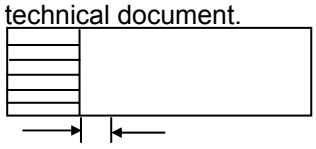
10.3.1.3 .FPC

No	Defect item	Criteria		Remark
1	Copper screen peel (Major defect)	Copper screen peel 【Reject】		
2	No release tape or peel (Major defect)	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
		ψ≦0.25mm	2	
		ψ>0.25	0	

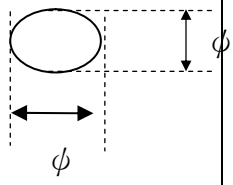
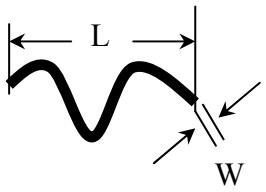
10.3.1.4 Black tape & Mara tape

No	Defect item	Criteria	Remark
1	FPC or H/S black tape shift (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 (Major defect)	No black tape 【Reject】	
3	Tape position mistake (minor defect)	Not by engineering drawing 【Reject】	
4	Mara tape defect (minor defect)	Peel before pulling the protecting film. 【Reject】	

10.3.1.5 Silicon and Tuffy glue

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

10.3.2 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】	
4	No display in immobility (Major defect)	No display in immobility 【Reject】	
5	Flicker of Pattern (Major defect)	Flicker of Pattern 【Reject】	
6	Over current (Major defect)	Over current 【Reject】	
7	Voltage out of specification (Major defect)	Voltage out of specification 【Reject】	
8	Pattern blur ,error code (Major defect)	Pattern blur ,error code 【Reject】	
9	Dark light, Flicker (Major defect)	Dark light, Flicker 【Reject】	
10	Black/White dots 、Dirty dots、eyewinker (Major defect)	Specification / Allowable ψ≦0.15mm / disregard 0.15mm<ψ ≦ 0.25mm / 2 0.25<φ≦0.3mm / 1	Note1: disregard if out of AA note2: Inspection by RGB pattern 
11	Fiber、glass cratch、polarizer scratch/folded (minor defect)	W≦0.03mm / disregard 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	note1: L：Length，W：Width note2: disregard if out of AA 

12. PRECAUTIONS FOR USE

12.1Safety

(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.

12.2Storage Conditions

(1) Store the panel or module in a dark place where the temperature is 23±5°C and the humidity is below 45±20%RH.
(2) Store in anti-static electricity container.
(3) Store in clean environment, free from dust, active gas, and solvent.
(4) Do not place the module near organics solvents or corrosive gases.
(5) Do not crush, shake, or jolt the module.

12.3Handling Precautions

(1) Avoid static electricity, which can damage the CMOS LSI.
(2) The polarizin plate of the display is very fragile. so, please handle if very carefully.
(3) Do not give external shock.
(4) Do not apply excessive force on the surface.
(5) Do not wipe the polarizing plate with a dry cloth, as it may easily scratch the surface of plate.
(6) Do not use ketonics solvent & Aromatic solvent, use with a soft cloth soaked with a cleaning naphtha solvent.
(7) Do not operate it above the absolute maximum rating.
(8) 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.