深圳市一众显示科技有限公司

SHEN ZHEN TEAM SOURCE DISPLAY TECH. CO, LTD.

TFT-LCD Module Specification

Module NO.： TST035VGGI-48

Version： V1.0

☐ APPROVAL FOR SPECIFICATION ☐ APPROVAL FOR SAMPLE

For Customer’ s Acceptance：	
Approved by	**Comment**

Team Source Display：		
Presented by	**Reviewed by**	**Organized by**

Version No.	Date	Content	Remark
V1.0	2018-9-10	Initial Release	

TABLE OF CONTENT

1. GENERAL DESCRIPTION

TST035VGGI-48 is a 480(RGB)x640 dot-matrix TFT module. This module can be easily accessed by MIPI interfaces, and is suitable for small mobile products as digital cell phone .

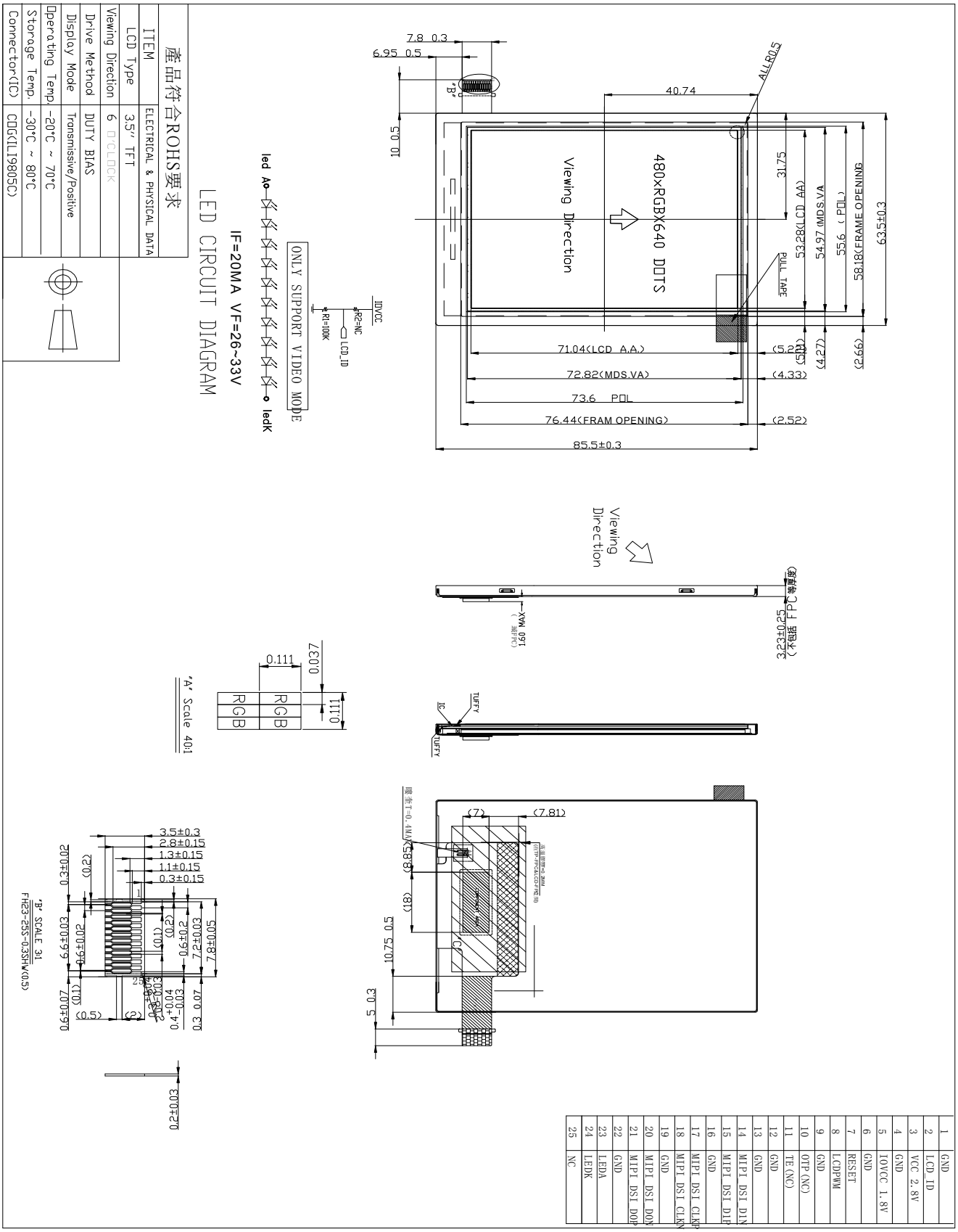
2. FEATURES

Display Mode	Normal White TN
	Active matrix TFT ,Transmissive type
Display Format	RGB Stripe
Color	16.7M
Input Data	MIPI interface
Viewing Direction	6 O'Clock'
Backlight	White LED
Driver IC	ILI9805C

3. MECHANICAL SPECIFICATION

Item	Specifications	Unit
Dimensional outline	63.5(W)×85.5(L)×3.23(D) (Exclude FPC)	mm
Number of Pixel	480(RGB)×640	Pixel
LCD A.A	53.28(W)×71.04 (L)	mm
Pixel Pitch	0.111 (W)× 0.111(L)	mm

4. MECHANICAL DIMENSION



5. MAXIMUM RATINGS

Item	Symbol	Min.	Max.	Unit	Note
Supply voltage for logic	V	-0.3	5.5	V	
Input Voltage	V_{IN}	-0.3	5.5	V	
Operating temperature	T_{OP}	-20	70	℃	
Storage temperature	T_{ST}	-30	80	℃	
Humidity	RH	-	90%	RH	MAX60℃

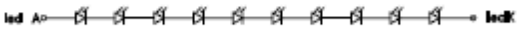
6. ELECTRICAL CHARACTERISTICS

Item		Symbol	Condition	Min.	Typ.	Max.	Unit
Supply voltage for logic		VCC	---	2.3	2.8	3.3	V
		IOVCC	---	1.65	1.8	3.3	V
Input Voltage	H level	V_{IH}	---	0.7VDDI	---	VDDI	V
	L level	V_{IL}		VSS	---	0.3VDDI	V
Supply current		I_{DD}	Without LED	---	33	50	mA
		I_{Sleep}		---	27	100	uA

7. BACKLIGHT CHARACTERISTICS

Item	Symbol	Min.	Typical	Max.	Unit
Current (One LED)	I_f	---	20	25	mA/Pcs
Number of LED ★1	---		10		Piece
Connection mode	S		Series		---
LCM Surface Luminance★2(I_f = 20mA)	L_S	320	---	----	Cd/㎡
LCM Surface brightness uniformity★3	L_D	80	---	----	%

★1 BACKLIGHT Block diagram：



IF=20MA VF=26~33V

LED CIRCUIT DIAGRAM

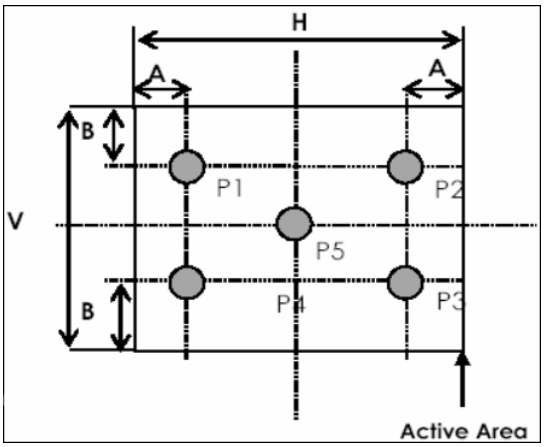
★2 Definition of Luminance:

From the LCD surface 50cm vertical suvery the center point，use BM-7 at field 1° when all pixels displaying white.

★3 Uniform measure condition：

(1)Measure 5 point. Measure location is show below：

(2)Uniformity = (Min. brightness / Max. brightness)×100%



A:1/4 H

B:1/4 V

H,V:Active Area

Measurement device is TOPCON luminance meter BM-7.

8. MODULE FUNCTION DESCRIPTION

8.1 PIN DESCRIPTION

NO.	Symbol	Description
1	GND	System ground.
2	LCM_ID	PIN for Customer
3	VCC	A supply voltage to the analog circuit.
4	GND	System ground.
5	IOVCC	Power supply to the I/O.
6	GND	System ground.
7	RESET	RESET pin.
8	LCDPWM	It is a PWM type control signal for brightness of the LED backlight.
9	GND	System ground.
10	OTP(NC)	NC
11	TE(NC)	NC
12	GND	System ground.
13	GND	System ground.
14	MIPI_DSI_D1N	MIPI_DSI data Lane 1 negative-end input pin.
15	MIPI_DSI_D1P	MIPI_DSI data Lane 1 positive-end input pin.
16	GND	System ground.
17	MIPI_DSI_CLKP	MIPI_DSI clock Lane positive-end input pin.
18	MIPI_DSI_CLKN	MIPI_DSI clock Lane negative-end input pin.
19	GND	System ground.
20	MIPI_DSI_DON	MIPI_DSI data Lane 0 negative-end input/output pin.
21	MIPI_DSI_D0P	MIPI_DSI data Lane 0 positive-end input/output pin.
22	GND	System ground.
23	LEDA	Anode for back light power supply.
24	LEDK	Cathode for back light power supply.
25	NC	NC

8.2 APPLICATION CIRCUIT

Please consult our technical department for detail information.

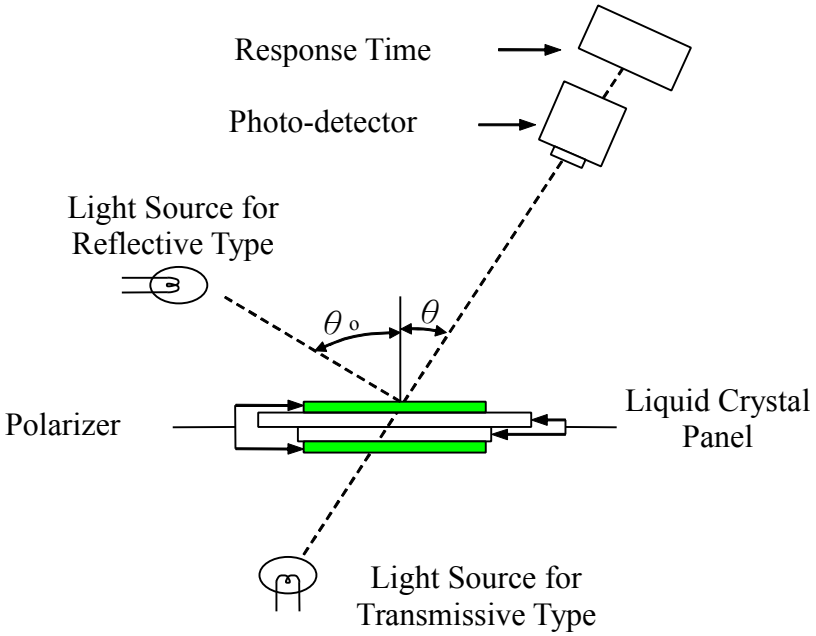
8.3 INITIAL CODE

Please consult our technical department for detail information.

9. ELECTRO-OPTICAL CHARACT ERISTICS

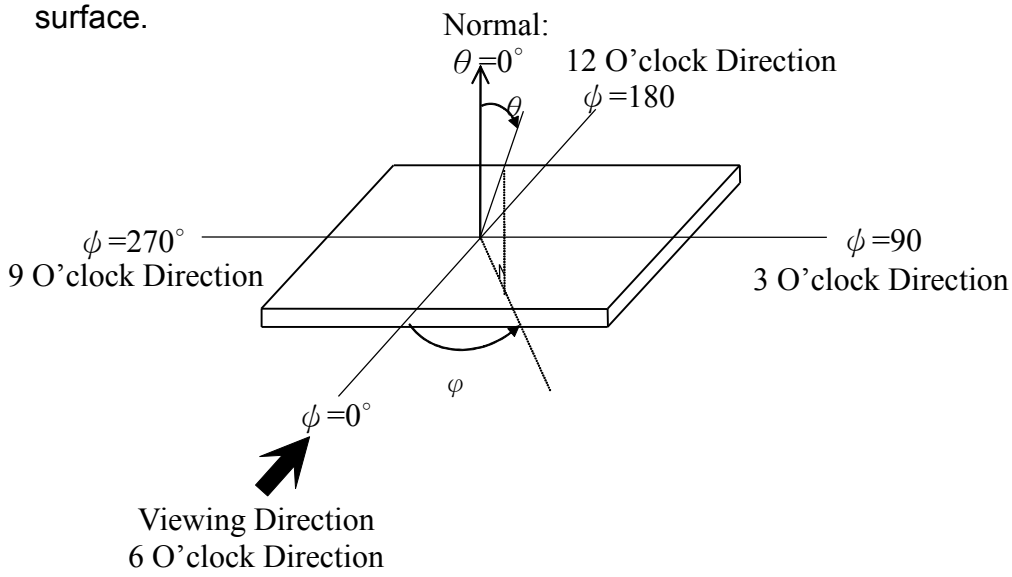
Electro-Optical Characteristics									
Item	Symbol		Condition	Temp.	Min.	Typ.	Max.	Units	Note
Viewing Angle Range	θ		ψ= 0° ψ= 90° ψ= 180° ψ= 270° (CR≧10)	25℃	--- --- --- ---	55 60 45 60	---- ---- ---- ----	degree	Note 2
Response Time	(Tr) (Tf)		θ=ψ= 0° θ_0 = 25°	25℃	----	30	----	msec	Note 1,4
Module Chromaticity	White	x	θ=ψ= 0°	25℃	0.26	0.27	0.32	---	Note 3
		y			0.28	0.30	0.34		
	Red	x			0.56	0.59	0.62		
		y			0.28	0.31	0.34		
	Green	x			0.29	0.32	0.35		
		y			0.50	0.53	0.56		
	Blue	x			0.12	0.15	0.18		
		y			0.06	0.09	0.12		
Module Contrast Ratio	CR		θ=ψ= 0°	25℃	450	---	----	---	Note3, 5

Note 1: Electro-Optical Characteristics Test Method.



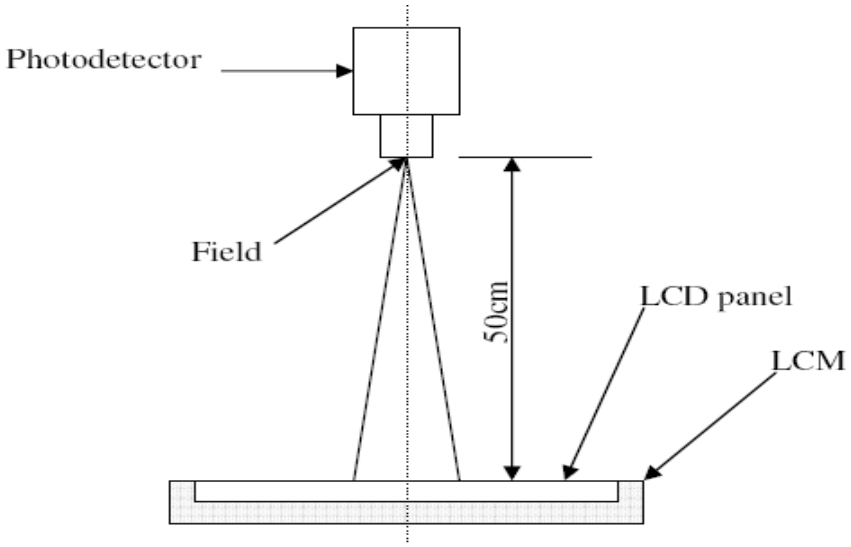
Note 2: Definition of Viewing Angle.

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.



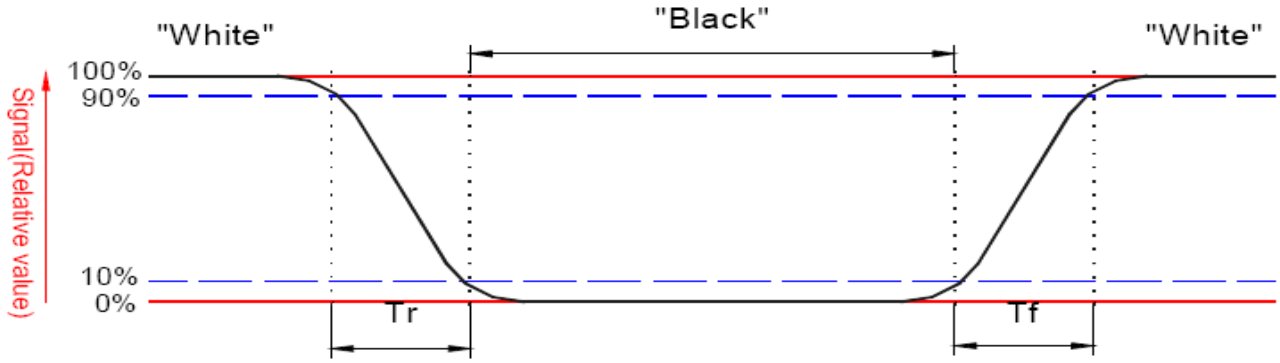
Note 3: Optical measurement equipment setup

-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 1º)



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.

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

10.RELIABILITY

10.1 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)

10.2 TESTS

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	60℃ * 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:

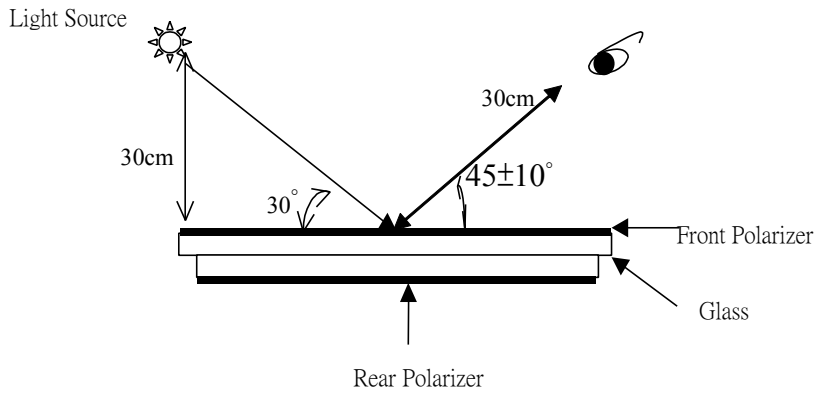
1. Judgments should be made after exposure in room temperature for two hours.
2. The pure water is used for the high temperature / humidity test.
3. The sample above is individually for every reliability tests condition.

11. INSPECTION CRITERIA

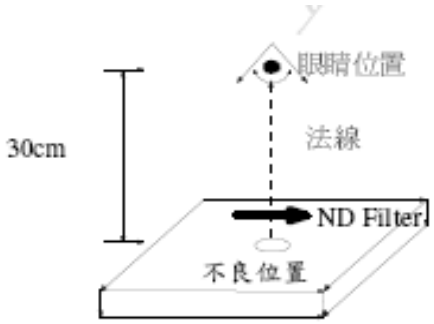
1. AQL(Acceptable Quality Level)
AQL of major and minor defect

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

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 distance of 30 cm with normal eye.with an angle of 45 degree to check the products without uncovering the film!
(As shown below).

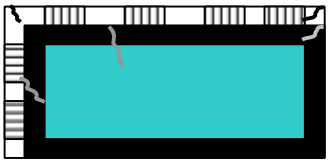
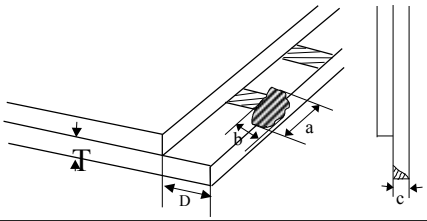
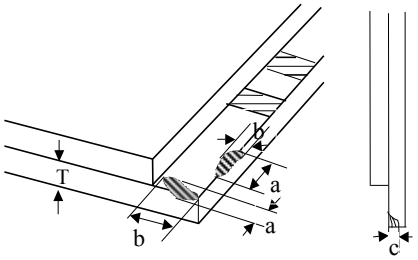
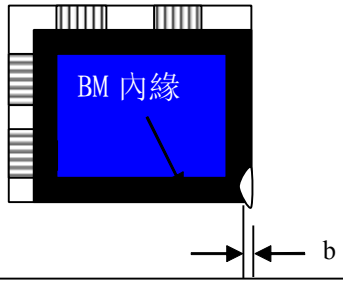


The distance which TFT ND Filter between the defect place is about 25~30mm.

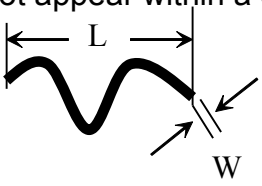
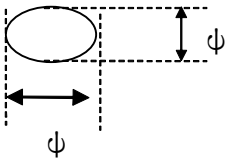


3. Inspection item and criteria
3.1 Visual inspection criterion in immobility

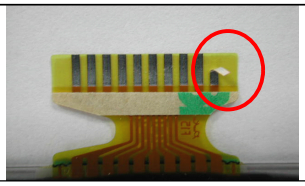
3.1.1 Glass defect

No	Defect item	Criteria	Remark
1	Dimension Unconformity (Major defect)	By Engineering Drawing	
2	Cracks (Major defect)	1. No-extended crack according to limited 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 

3.1.2 LCD appearance defect (View area)

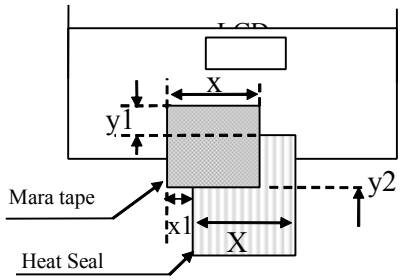
No	Defect item	Criteria		Remark
1	Fiber、glass cratch、polarizer scratch/folded (minor defect)	Specification	Allowable	note1: L: Length, W: Width note2: disregard if out of AA The above cut foreign bodies are cannot appear within a 30mm 
		W≦0.03mm	disregard	
		0.03mm<W≦0.05mm ; L≦3.0mm	2	
		0.05mm<W≦0.1mm; 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)	ψ ≦0.1mm	disregard	note 1: disregard if out of AA note2: Inspection by RGB pattern Black/White dots and foreign bodies are cannot appear within a 10mm 
		0.1mm<ψ ≦0.15mm	2	
		0.15<ψ ≦0.2mm	1	
		0.2 mm<ψ	0	
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	

3.1.3 .FPC

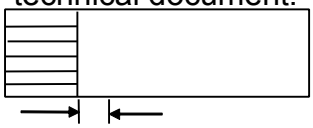
No	Defect item	Criteria	Remark
1	Copper screen peel (Major defect)	Copper screen peel 【Reject】	
2	No release tape or peel (Major defect)	No release tape or peel 【Reject】	

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	

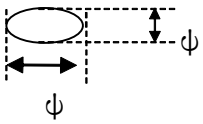
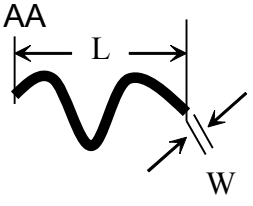
3.1.4 Black tape & Mara tape

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】	

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。

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	MURA (Minor defect)	It should be invisible under 5% ND filter		
11	Black/White dots 、Dirty dots、eyewinker、Bright (Minor defect)	Specification	Allowable	Note1: disregard if out of AA note2: Inspection by RGB pattern Black/White dots and foreign bodies are cannot appear within a 30mm 
		ψ≦0.10mm	disregard	
		0.10mm<ψ ≦ 0.15mm	2	
		0.15<ψ ≦0.2mm	1	
		0.2 mm<ψ	0	
12	Fiber、glass cratch、polarizer scratch/folded (Minor defect)	W≦0.03mm	disregard	note1: L: Length，W: Width 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	

12.ILLUSTRATIONOFLCDDATACODE

TBD

13. PRECAUTIONS FOR USE

13.1 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.

13.2 STORAGE 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.

13.3 HANDLING 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.

13.4 WARRANTY

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

14. PACKAGING

TBD