Shenzhen Leadtek Electronics Co.,Ltd

PRODUCT SPECIFICATION

TFT-LCD-TP   MODULE

Module No： LTK070WX40HFM026-V0

☑ Preliminary Specification

☐ Approval Specification

Designed by	Checked by	Approved by

Final Approval by Customer

Approved by	Comment

※The specification of "TBD" should refer to the measured value of sample . If there is difference between the design specification and measured value, we naturally shall negotiate and agree to solution with customer.

Revision Record

REV NO.	REV DATE	CONTENTS	Note
V0	2021-08-08	NEW ISSUE	

Table Of Contents

1. Numbering System

TBD

2. General Information

ITEM	STANDARD VALUES	UNITS
LCD type	7.0"TFT	--
Dot arrangement	800(RGB)×1280	dots
Color filter array	RGB vertical stripe	--
Display mode	Transmissive / Normally Black	--
TFT Driver IC	ILI9881C	--
Viewing Direction	80/80/80/80	--
Module size	192.8(W)×125.7(H)×4.2(T)	mm
LCM size	161.6W)×99.75(H)×2.6(T)	mm
Active area	150.72 (W)×94.2 (H)	mm
Dot pitch	0.11775(W)×0.11775(H)	mm
Interface	MIPI	
Operating temperature	-20 ~ +60	℃
Storage temperature	-30 ~ +70	℃
Back Light	20 White LED	--
Weight	TBD	g

3. External Dimensions

Front View

99.75±0.3（LCM OD）
95.8（POL）
94.2（LCD A.A）

161.6±0.3（LCM OD）
152.72（LCD A.A）
150.72（POL）

SILK:Back Printing GREY 8:
MUNSELL 0.8PB 2.81/0.2

VIEWING DIRECTION
FULL VIEW

TFT 7" ips 800×RGBx1280

R0.6

Side View

2.6±0.2（LCM）
4.5±0.3（LCM）（Including PCBA&Component）

Back View

14.4±0.8
FPC insertion
Connector:
Holy FPC0515FG-40P(H=1.5MM)

component area (H=1.0mmMax.)

(20.26)
(16.5)

IF=80mA, VF=16.0V(TYP)
A○
○K

Display Pin interface
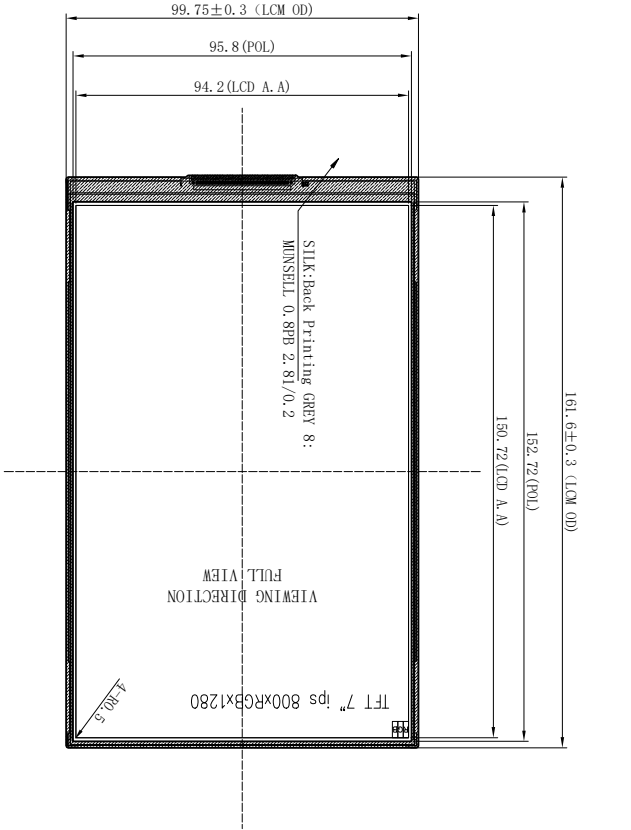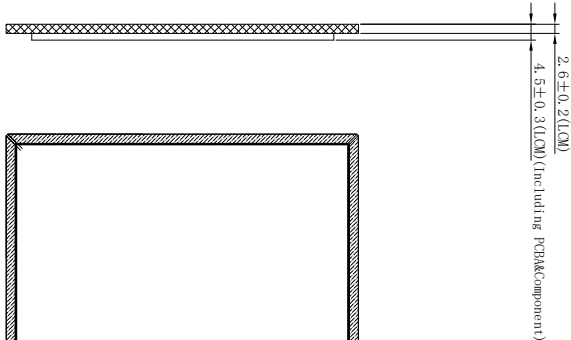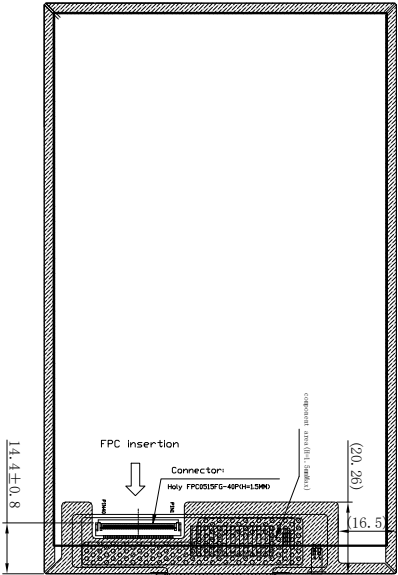
1	VCOM(NC)
2	VDDIN
3	VDDIN
4	GND
5	RESET
6	NC
7	GND
8	MIPI_D0N
9	MIPI_D0P
10	GND
11	MIPI_D1N
12	MIPI_D1P
13	GND
14	MIPI_CKN
15	MIPI_CKP
16	GND
17	MIPI_D2N
18	MIPI_D2P
19	GND
20	MIPI_D3N
21	MIPI_D3P
22	GND
23	NC
24	NC
25	GND
26	NC
27	LED_PWM
28	NC
29	VCL(NC)
30	GND
31	LED-
32	LED-
33	NC
34	NC
35	AVEE
36	NC
37	NC
38	AVDD
39	LED+
40	LED+
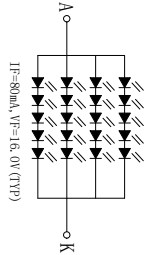
TFT NOTES:

1.DISPLAY TYPE: 7.0" TFT-ips 800*RGB*1280
TRANSMISSIVE/Normally Black
2.VIEWING DIRECTION: 80/80/80/80(U/D/L/R @ CR>10)
3.LCD DRIVE IC: ILI9881C(without RAM)
4.Luminance : LCM=350cd/m²(TYP),Uniformity≥80%
5.Connector:Holy FPC0515FG 40P(H=1.5MM)
6.OPERATING TEMP: -20℃~+60℃
7.STORAGE TEMP: -30℃~+70℃
8.UNMARKER TOLERANCE: ±0.20;():Reference dimension;
9.REQUIREMENTS ON ENVIRONMENTAL PROTECTION: RoHS

4. Interface Description
4.1 TFT Interface Description

Pin NO.	SYMBOL	DESCRIPTION
1	VCOM (NC)	No connection
2	VDDIN	Power Voltage for digital circuit(3.3V)
3	VDDIN	Power Voltage for digital circuit(3.3V)
4	GND	Power ground.
5	RESET	Device reset signal.
6	NC	No connection
7	GND	Power ground.
8	MIPI_D0N	MIPI-DSI Data differential signal input pins. (Data lane 0-)
9	MIPI_D0P	MIPI-DSI Data differential signal input pins. (Data lane 0+)
10	GND	Power ground.
11	MIPI_D1N	MIPI-DSI Data differential signal input pins. (Data lane 1-)
12	MIPI_D1P	MIPI-DSI Data differential signal input pins. (Data lane 1+)
13	GND	Power ground.
14	MIPI_CKN	MIPI-DSI CLOCK differential signal input pins.
15	MIPI_CKP	MIPI-DSI CLOCK differential signal input pins.
16	GND	Power ground.
17	MIPI_D2N	MIPI-DSI Data differential signal input pins. (Data lane 2-)
18	MIPI_D2P	MIPI-DSI Data differential signal input pins. (Data lane 2+)
19	GND	Power ground.
20	MIPI_D3N	MIPI-DSI Data differential signal input pins. (Data lane 3-)
21	MIPI_D3P	MIPI-DSI Data differential signal input pins. (Data lane 3+)
22	GND	Power ground.
23	NC	No connection
24	NC	No connection
25	GND	Power ground.
26	NC	No connection
27	LED_PWM	PWM control signal for LED driver(CABC)
28	NC	No connection
29	VCL (NC)	No connection
30	GND	Power ground.
31	VLED-	Power for LED backlight (Cathode).
32	VLED-	Power for LED backlight (Cathode).
33	NC	No connection
34	NC	No connection
35	AVEE	Negative Power supply (-5.5V)
36	NC	No connection
37	NC	No connection
38	AVDD	Positive Power supply (+5.5V)
39	VLED+	Power for LED backlight (Anode).
40	VLED+	Power for LED backlight (Anode).

5. Absolute Maximum Ratings

Item	Symbol	Min.	Max.	Unit	Remarks:
TFT Supply Voltage	VDDIN	-0.3	5.5	V	Test condition refer to paragraph 10
CTP Supply Voltage	VDD	2.6	3.47	V	
Operating Temperature	T_{OP}	-20	60	°C	
Storage Temperature	T_{ST}	-30	70	°C	
Storage Humidity	HD	-	90	%RH	

6. DC Characteristics

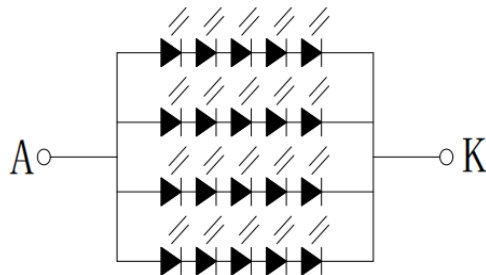| Item	Symbol	Min.	Typ.	Max.	Unit	Remark
TFT Supply Voltage	VDDIN	3.0	3.3	3.6	V	-
	AVDD	5.2	5.8	6.0	V	-
	AVEE	-6.0	-5.8	-5.2	V	-
CTP Supply Voltage	VDD	2.6	-	3.3	V	-
TFT Current Consumption	I_{VDDIN}	-	30	40	mA	VDDIN=3.3V
	I_{AVDD}	-	0.25	0.4	mA	AVDD=5.8V
	I_{AVEE}	-	0.25	0.4	mA	AVEE=-5.8V

7. Power on sequence

VDDIN = 3.0 V ~ 3.6V, AVDD= 4.5V ~ 6.0V, AVEE=-4.5V ~ -6.0V
Power on:
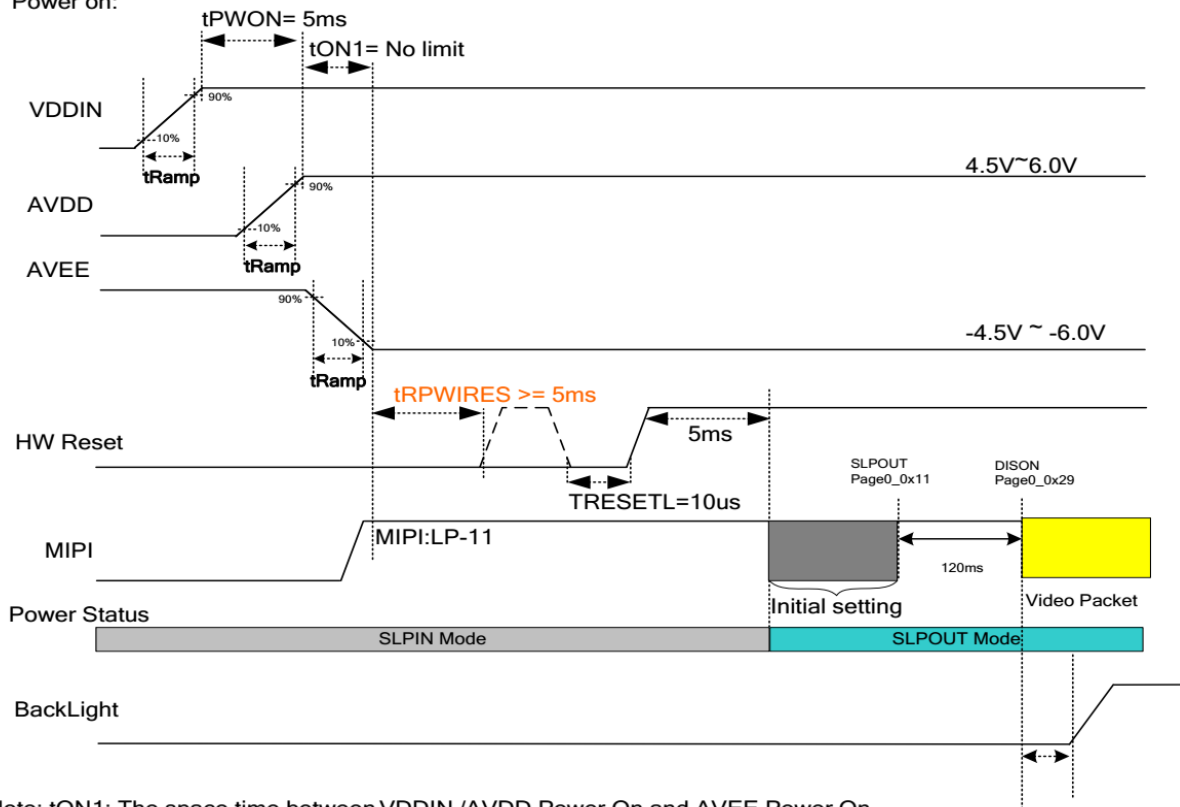
Note: tON1: The space time between VDDIN /AVDD Power On and AVEE Power On.

8. Backlight Charasterics

CURRENT IF=80mA
5C*4B=20LED

Item	Symbol	MIN	TYP	MAX	UNIT	Test Condition
Supply Voltage	Vf	15	16	17	V	If=80mA
Luminous Intensity for LCM	-	-	350	-	cd/m^2	If=80mA
Uniformity for LCM	-	-	80	-	%	If=80mA
LED Life Time	-	20,000	-	-	Hr	If=80mA
Backlight Color	White					

9. Optical Characteristics

Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing Angle range	Horizontal	Θ_3	CR > 10	80	89	-	Deg.	Note 1
		Θ_9		80	89	-	Deg.	
	Vertical	Θ_{12}		80	89	-	Deg.	
		Θ_6		80	89	-	Deg.	
Color Gamut				45	**50**	55	%	-
Tr.				-	6.8	-	%	With APF
Luminance Contrast ratio		CR	$\Theta = 0°$	700	850	-	-	Note 2
Luminance of White	Center Points	Y_w	$\Theta = 0°$	-	-	-	cd/m^2	Note 3
White Luminance uniformity	9 Points	$\Delta Y5$		-	-	-	%	Note 4
White balance	Color Temp		$\Theta = 0°$	-	-	-	K	Note 5
	Δuv			-	-	-	-	
Reproduction of color	Red	R_x	$\Theta = 0°$		0.610		-	Note6
		R_y			0.350			
	Green	G_x			0.340			
		G_y			0.570			
	Blue	B_x			0.160			
		B_y			0.120			
Response Time (Rising + Falling)		T_{RT}	Ta= 25° C $\Theta = 0°$	-	30	**35**	ms	Note 7
Gamma Scale		CT	$\Theta = 0°$	-	-	-	-	-

1. Note :

    1. Viewing angle is the angle at which the contrast ratio is greater than 10. The viewing angles are determined for the horizontal or 3, 9 o'clock direction and the vertical or 6, 12 o'clock direction with respect to the optical axis which is normal to the LCD surface (see FIGURE 1).

2. Contrast measurements shall be made at viewing angle of Θ= 0 and at the center of the LCD surface. Luminance shall be measured with all pixels in the view field set first to white, then to the dark (black) state . (see FIGURE 1) Luminance Contrast Ratio (CR) is defined mathematically.
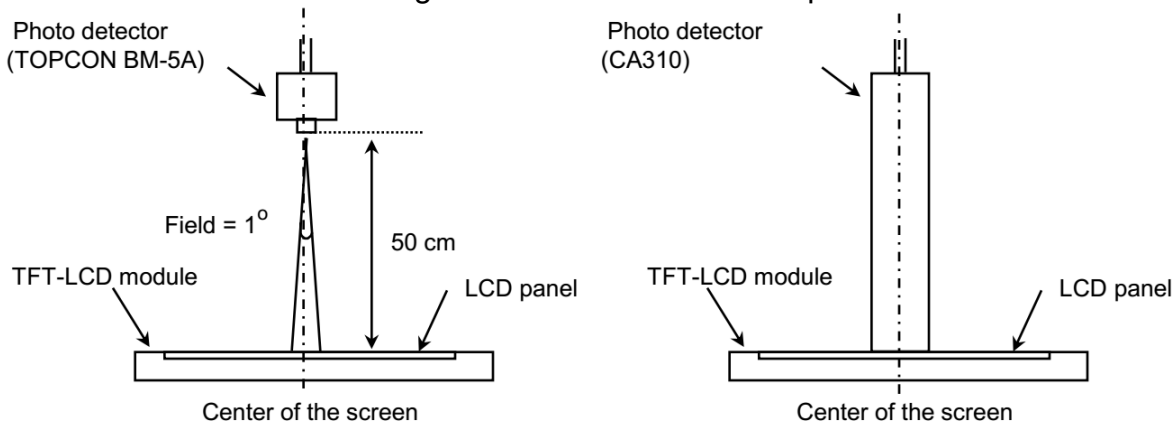
    CR = Luminance with all pixels white / Luminance with all pixels black

3. Center Luminance of white is defined as luminance values of 1point average across the LCD surface. Luminance shall be measured with all pixels in the view field set first to white. This measurement shall be taken at the locations shown in FIGURE 2 for a total of the measurements per display. The luminance is measured by CA310 when the LED current is set at 16.8mA.

4. The White luminance uniformity on LCD surface is then expressed as : ΔY = Minimum Luminance of 9points / Maximum Luminance of 9points (see FIGURE 2).

5. The color chromaticity coordinates specified shall be calculated from the spectral data measured with all pixels first in red, green, blue and white. Measurements shall be made at the center of the panel.
6. The color chromaticity coordinates specified shall be calculated from the spectral data measured with all pixels first in red, green, blue and white. Measurements shall be made at the center of the panel.
7. The electro-optical response time measurements shall be made as FIGURE 4 by switching the "data" input signal ON and OFF. The times needed for the luminance to change from 10% to 90% is Tr, and 90% to 10% is Td.

Figure 1. Measurement Set Up

Photo detector (TOPCON BM-5A)

Field = 1°

50 cm

TFT-LCD module

LCD panel

Center of the screen

Photo detector (CA310)

TFT-LCD module

LCD panel

Center of the screen

View angel range measurement setup   Luminance , uniformity and color measurement setup

Figure 4. Response Time Testing

Display data   Black (TFT OFF)   White (TFT ON)   Black (TFT OFF)

Optical Response

T_R T_F

100%
90%

10%
0%
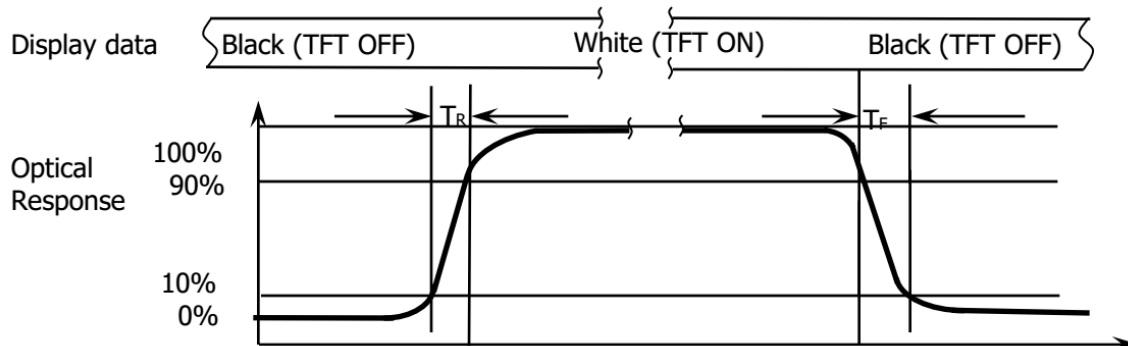
10. Reliability Test Conditions And Methods

NO.	TEST ITEMS	TEST CONDITION	INSPECTION AFTER TEST
①	High Temperature Storage	70℃±2℃×96Hours	Inspection after 2~4hours storage at room temperature,the samples should be free from defects: 1,Air bublle in the LCD. 2,Sealleak. 3,Non-display. 4,Missing segments. 5,Glass crack. 6,Current IDD is twice higher than initial value. 7,The surface shall be free from damage. 8,The electric charateristic requirements shall be satisfied.
②	Low Temperature Storage	-30℃±2℃×96Hours	
③	High Temperature Operating	60℃±2℃×96Hours	
④	Low Temperature Operating	-20℃±2℃×96Hours	
⑤	Temperature Cycle(Storage)	-20℃ ⟶ 25℃ ⟶ 60℃ (30min) (5min) (30min) 1cycle Total 10cycle	
⑥	Damp Proof Test (Storage)	50℃±5℃×90%RH×96Hours	
⑦	Vibration Test	Frequency:10Hz~55Hz~10Hz Amplitude:1.5M X,Y,Z direction for total 3hours (Packing Condition)	
⑧	Drooping Test	Drop to the ground from 1M height one time every side of carton. (Packing Condition)	
⑨	ESD Test	± 2KV, Human Body Mode, 100pF/1500Ω	

Note 1: Ta is the ambient temperature of samples.
Note 2: Ts is the temperature of panel's surface.
Note 3: In the standard condition, there shall be no practical problem that may affect the display function. After the reliability test, the product only guarantees operation, but don't guarantee all of the cosmetic specification.
Note 4: Before cosmetic and function test, the product must have enough recovery time, at least 2 hours at room temperature.
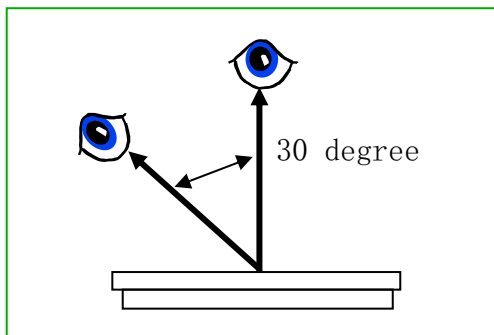
11. Inspection Standard

This standard apply to C-STN/TFT module

1. **Spot check plan：**

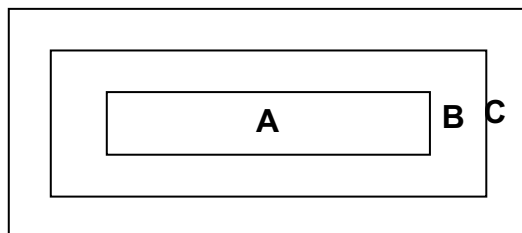According to spot check level Ⅱ,MIL-STD-105D Level Ⅱ,the rank of accept or reject is below:

A 级：major non-conformance： AQL 0.65　　minor non-conformance： AQL 1.

2. **Inspection condition：**

Under daylight lamp 20～40W，product distance inspector'eye 30cm,incline degree 30°。

3. **LCD area define：**

Area A：display area

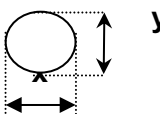Area B：VA area

Area C：out of VA area,not in sight after assemby

Remark :non-conformance at area C,but is OK that isn't influence raliability of product & assembly by customer.
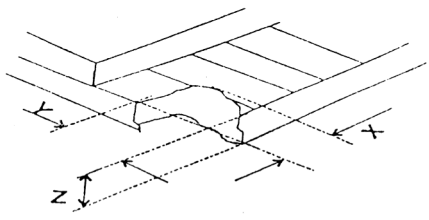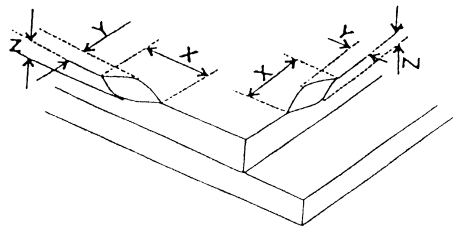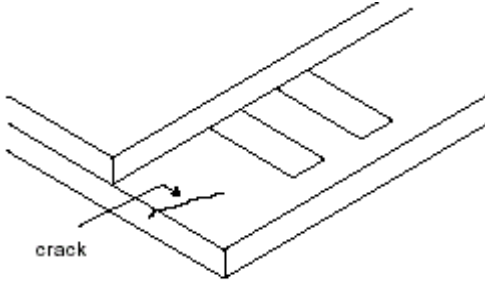
4. Inspection standard

4.1 Major non-conformance

NO.	Item	Inspection standard	Rate
4.1.1	Function non-conformance	1) No display,display abnormaly 2) Miss line, short 3) B/L no function or function abnormaly 4) TP no function	**major**
4.1.2	miss	No matter miss what component	
4.1.3	Out of size	Module dimension out of spec	

4.2 Appearance non-conformance

NO.	Item	Inspection standard	Rate
4.2.1	**Black or white spot（power on）**	dot non-conformance define Φ $\Phi = \dfrac{(x+y)}{2}$ **A grade** <table><tr><td rowspan="2">area size（mm）</td><td colspan="3">Most approve q'ty</td></tr><tr><td>A</td><td>B</td><td>C</td></tr><tr><td>Φ≤0.20</td><td colspan="2">ignore</td><td rowspan="3">ignore</td></tr><tr><td>0.20＜Φ≤0.3</td><td colspan="2">3</td></tr><tr><td>0.3＜Φ</td><td colspan="2">0</td></tr></table> **Most approve 4 damages, dot to dot ≥10mm**	**Minor**
4.2.2	**Black or white line（power on）**	**A grade** <table><tr><td colspan="2">Size(mm)</td><td colspan="3">Most approve q'ty</td></tr><tr><td>L(length）</td><td>W(width)</td><td>A</td><td>B</td><td>C</td></tr><tr><td>ignore</td><td>W≤0.05</td><td colspan="2">ignore</td><td rowspan="4">ignore</td></tr><tr><td>L≤10.0</td><td>0.05＜W≤0.07</td><td colspan="2">3</td></tr><tr><td>L≤10.0</td><td>0.07＜W≤0.1</td><td colspan="2">2</td></tr><tr><td></td><td>0.1＜W</td><td colspan="2">Treat with dot non-conformance</td></tr></table> **Most approve 3 damages, line to line ≥10mm**	**Minor**
4.2.3	**Polarizer position**	1) polarizer attach meet drawing,disallow out of LCD. 2) polarizer must cover display area（special require unless）	**Minor**

4.2.4	LCD non-conformance	**(i) crash at side（remark: S=ITO length）** | X	Y	Z
≤3.0	≤S	ignore | **Crash disallow extend to ITO or seal.** **(ii) commonly surface scathe** | X	Y	Z
≤2.0	<frame edge	ignore	 **(iii) crack** 　　**Disallow extend crack** 	Minor
---	---	---	---
4.2.5	Contrast voltage warp	VOP/Vlcd voltage of confirmed sample±0.15V	Minor
4.2.6	color	Color & luminance of module scope reference spec	Minor
4.2.7	Cross talk	Reference confirmed limit sample	Minor

12. Handling Precautions

12.1 Mounting method

The LCD panel of LCD module consists of two thin glass plates with polarizes which easily be damaged. And since the module in so constructed as to be fixed by utilizing fitting holes in the printed circuit board.

Extreme care should be needed when handling the LCD modules.

12.2 Caution of LCD handling and cleaning

When cleaning the display surface, Use soft cloth with solvent
[recommended below] and wipe lightly
- Isopropyl alcohol
- Ethyl alcohol

Do not wipe the display surface with dry or hard materials that will damage the polarizer surface.

Do not use the following solvent:
- Water
- Aromatics

Do not wipe ITO pad area with the dry or hard materials that will damage the ITO patterns
Do not use the following solvent on the pad or prevent it from being contaminated:
- Soldering flux
- Chlorine (CI) , Salfur (S)

If goods were sent without being sili8con coated on the pad, ITO patterns could be damaged due to the corrosion as time goes on.

If ITO corrosion happen by miss-handling or using some materials such as Chlorine (CI), Salfur (S) from customer, Responsibility is on customer.

12.3 Caution against static charge

The LCD module use C-MOS LSI drivers, so we recommended that you:

Connect any unused input terminal to Vdd or Vss, do not input any signals before power is turned on, and ground your body, work/assembly areas, assembly equipment to protect against static electricity.

12.4 packing

- Module employ LCD elements and must be treated as such.
- Avoid intense shock and falls from a height.
- To prevent modules from degradation, do not operate or store them exposed direct to sunshine or high temperature/humidity

12.5 Caution for operation

- It is an indispensable condition to drive LCD's within the specified voltage limit since the higher voltage then the limit cause the shorter LCD life.
- An electrochemical reaction due to direct current causes LCD's undesirable deterioration, so that the use of direct current drive should be avoided.
- Response time will be extremely delayed at lower temperature then the operating temperature range and on the other hand at higher temperature LCD's how dark color in them. However those phenomena do not mean malfunction or out of order with LCD's, which will come back in the specified operation temperature.
- If the display area is pushed hard during operation, some font will be abnormally displayed but it resumes normal condition after turning off once.
- A slight dew depositing on terminals is a cause for electro-chemical reaction resulting in terminal open circuit.
Usage under the maximum operating temperature, 50%Rh or less is required.

12.6 storage

In the case of storing for a long period of time for instance, for years for the purpose or replacement use, the following ways are recommended.
- Storage in a polyethylene bag with the opening sealed so as not to enter fresh air outside in it . And with no desiccant.
- Placing in a dark place where neither exposure to direct sunlight nor light's keeping the storage temperature range.
- Storing with no touch on polarizer surface by the anything else.
   [It is recommended to store them as they have been contained in the inner container at the time of delivery from us

12.7 Safety

- It is recommendable to crash damaged or unnecessary LCD's into pieces and wash off liquid crystal by either of solvents such as acetone and ethanol, which should be burned up later.
- When any liquid leaked out of a damaged glass cell comes in contact with your hands, please wash it off well with soap and water

13. Precaution For Use

13.1

A limit sample should be provided by the both parties on an occasion when the both parties agreed its necessity. Judgment by a limit sample shall take effect after the limit sample has been established and confirmed by the both parties.

13.2

On the following occasions, the handing of problem should be decided through discussion and agreement between responsible of the both parties.
- When a question is arisen in this specification
- When a new problem is arisen which is not specified in this specifications
- When an inspection specifications change or operating condition change in customer is reported to LCD , and some problem is arisen in this specification due to the change
- When a new problem is arisen at the customer's operating set for sample evaluation in the customer site.

14. Packing Method

TBD