

SPECIFICATION
FOR
LCM Module

MODULE No:	KD101UXFLD009
CUSTOMER:	

STARTEK	INITIAL	DATE
PREPARED BY		
CHECKED BY		
APPROVED BY		

CUSTOMER	INITIAL	DATE
APPROVED BY		

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1. Basic Specifications

* Description

This is a color active matrix TFT (Thin Film Transistor) LCD (liquid crystal display) that uses amorphous silicon TFT as a switching device. This module is composed of a Transmissive type TFT-LCD Panel, driver circuit, capacitance touch panel, back-light unit. The resolution of a 10.1" TFT-LCD contains 1920*1200 pixels, and can display up to 16.7M colors.

1.1 TFT Features

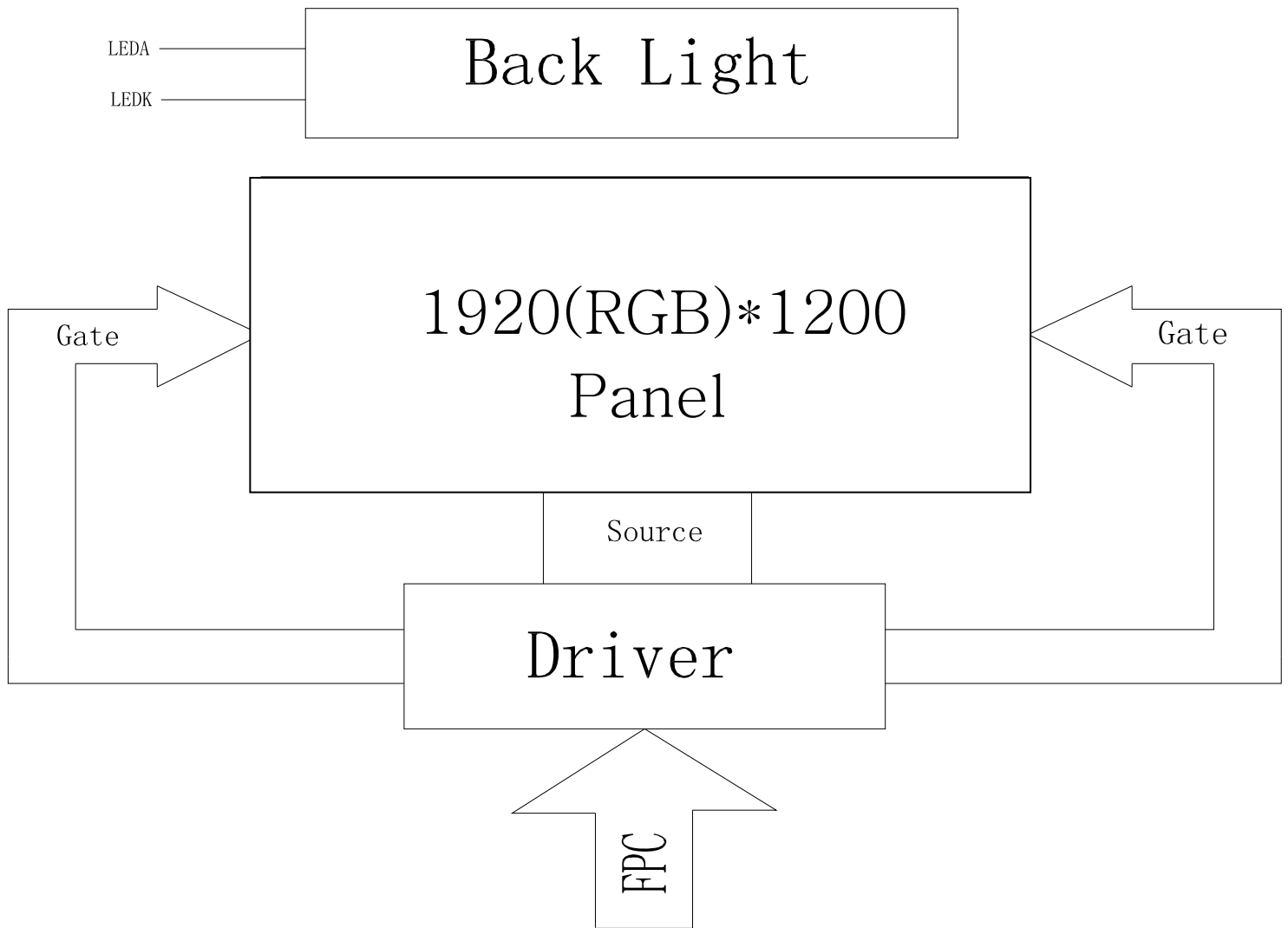
General Information Items	Specification	Unit	Note
	Main Panel		
Display area(AA)	217.44(H)*135.9(V) (10.1 inch)	mm	
Driver element	TFT active matrix	-	
Display colors	16.7M	colors	
Number of pixels	1920(RGB)*1200	dots	
Pixel arrangement	RGB vertical stripe	-	
Pixel pitch	0.113(H)*0.113(V)	mm	
Viewing angle	Free	o'clock	
Controller IC	4*HX8255+2*HX8678	-	
LCM Interface	2 Part LVDS	-	
Display mode	Transmissive /Normally Black	-	
Operating temperature	-30~+80	°C	
Storage temperature	-30~+80	°C	

1.2 Mechanical Information

Item		Min.	Typ.	Max.	Unit	Note
Module size	Horizontal(H)	-	237.92	-	mm	
	Vertical(V)	-	157.88	-	mm	
	Depth(D)	-	13	-	mm	Contains the bracket
Weight		-	TBD	-	g	

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2. Block Diagram



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4. Input terminal Pin Assignment

4.1 TFT PIN Define

NO.	SYMBOL	DISCRIPTION	I/O
1	GND	Ground	P
2	GND	Ground	P
3	VDD	Supply voltage (3.3V).	P
4	VDD	Supply voltage (3.3V).	I/O
5	VDD	Supply voltage (3.3V).	I/O
6	GND	Ground	P
7	ADJ_DC	B/L channel current control Connect to GND for normal operation	I/O
8	NC	No connection	-
9	SCLK	Serial clock input for EEPROM	I
10	SDAT	Serial data input for EEPROM	I
11	AGMODE	Aging pattern selection connect to GND for normal operation	I
12	PWM	B/L control input connect to VDD for normal operation	I
13	GND	Ground	P
14	OLV0N	Odd pixel LVDS data pair 0N	I
15	OLV0P	Odd pixel LVDS data pair 0P	I
16	GND	Ground	P
17	OLV1N	Odd pixel LVDS data pair 1N	I
18	OLV1P	Odd pixel LVDS data pair 1P	I
19	GND	Ground	P
20	OLV2N	Odd pixel LVDS data pair 2N	I
21	OLV2P	Odd pixel LVDS data pair 2P	I
22	GND	Ground	P
23	OLVCLKN	Odd pixel LVDS clock pair N	I
24	OLVCLKP	Odd pixel LVDS clock pair P	I
25	GND	Ground	P
26	OLV3N	Odd pixel LVDS data pair 3N	I
27	OLV3P	Odd pixel LVDS data pair 3P	I
28	GND	Ground	P
29	ELV0N	Even pixel LVDS data pair 0N	I
30	ELV0P	Even pixel LVDS data pair 0P	I

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31	GND	Ground	P
32	ELV1N	Even pixel LVDS data pair 1N	I
33	ELV1P	Even pixel LVDS data pair 1P	I
34	GND	Ground	P
35	ELV2N	Even pixel LVDS data pair 2N	I
36	ELV2P	Even pixel LVDS data pair 2P	I
37	GND	Ground	P
38	ELVCLKN	Even pixel LVDS clock pair N	I
39	ELVCLKP	Even pixel LVDS clock pair P	I
40	GND	Ground	P
41	ELV3N	Even pixel LVDS data pair 3N	I
42	ELV3P	Even pixel LVDS data pair 3P	I
43	GND	Ground	P
44	GND	Ground	P
45	VDD_LED	Power Supply for LED	P
46	VDD_LED	Power Supply for LED	P
47	VDD_LED	Power Supply for LED	P
48	VDD_LED	Power Supply for LED	P
49	GND	Ground	P
50	GND	Ground	P

5. LCD Optical Characteristics

5.1 Optical specification

Item		Symbol	Condition	Min.	Typ.	Max.	Unit.	Note
Contrast Ratio		CR	$\Theta=0$		TBD	--		
Response time	Rising	T_{R+T_F}	Normal viewing angle	--	TBD	--	msec	
	Falling							
Luminance Uniformity		White		70	--	--	%	
		Black		40				
Color Filter Chromaticity	White	W_X		0.275	0.315	0.355		
		W_Y		0.309	0.349	0.389		
	Red	R_X		0.532	0.572	0.612		
		R_Y		0.291	0.331	0.371		
	Green	G_X		0.261	0.301	0.341		
		G_Y		0.595	0.635	0.675		
	Blue	B_X		0.113	0.153	0.193		
		B_Y		0.075	0.115	0.155		
Viewing angle	Hor.	Θ_L	CR>10	--	85	--		
		Θ_R		--	85	--		
	Ver.	Θ_U		--	85	--		
		Θ_D		--	85	--		
Option View Direction		Free						

6. Electrical Characteristics

6.1 Absolute Maximum Rating

Characteristics	Symbol	Min.	Max.	Unit	Note
Digital Supply Voltage	VDD	-0.3	3.9	V	Note1
Operating temperature	T _{OP}	-30	+80	°C	
Storage temperature	T _{ST}	-30	+80	°C	

NOTE1: If the absolute maximum rating of even is one of the above parameters is exceeded even momentarily, the quality of the product may be degraded. Absolute maximum ratings, therefore, specify the values exceeding which the product may be physically damaged. Be sure to use the product within the range of the absolute maximum ratings.

6.2 DC Electrical Characteristics

Characteristics	Symbol	Min.	Typ.	Max.	Unit	Note
Digital Supply Voltage	VDD	3.2	3.3	3.4	V	
Normal mode Current	IDD	--	TBD	--	mA	
Level input voltage	V _{IH}	0.8*VDD	--	VDD	V	
	V _{IL}	GND-0.3	--	0.2*VDD	V	
Level output voltage	V _{OH}	VDD-0.4	--	VDD	V	
	V _{OL}	GND	--	GND+0.4	V	

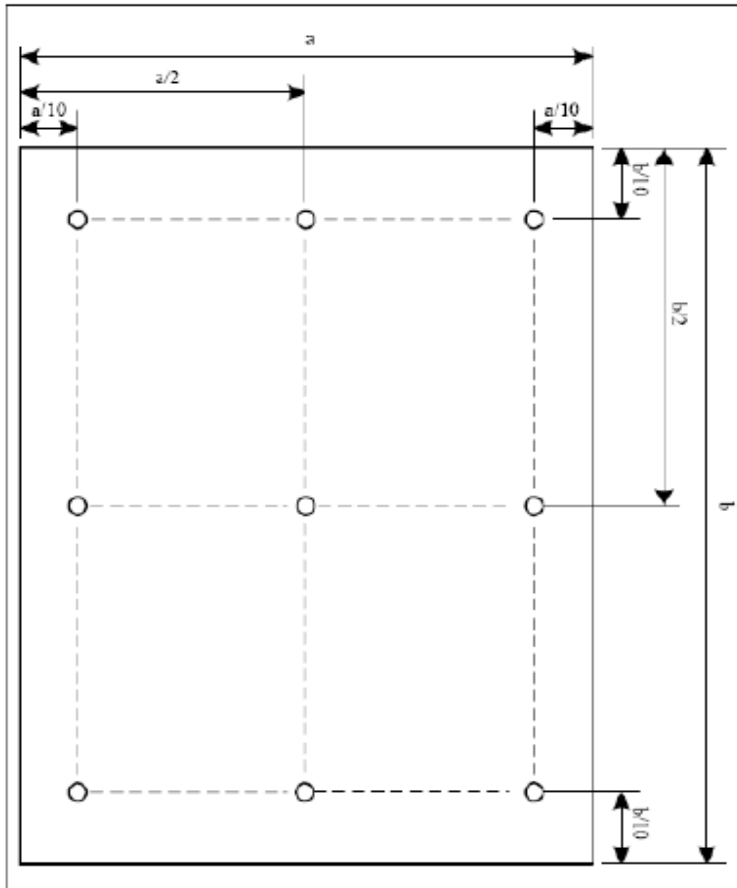
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6.3 LED Backlight Characteristics

Item	Symbol	Min.	Typ.	Max.	Unit	Note
Forward Current	I_F		160	--	mA	
Forward Voltage	V_F	--	28	--	V	
LCM Luminance	LV	--	400	--	cd/m ²	
LED life time	Hr	--	50000	--	Hour	
Uniformity	Avg	80	--	--	%	

Notes:LED Driver IC TBD.

Note (3) Luminance Uniformity of these 9 points is defined as below:



$$\text{Uniformity} = \frac{\text{minimum luminance in 9 points (1-9)}}{\text{maximum luminance in 9 points (1-9)}}$$

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$$\text{Luminance} = \frac{\text{Total Luminance of 9 points}}{9}$$

7. TFT AC Characteristics

TBD

8. LCD Module Out-Going Quality Level

8.1 VISUAL & FUNCTION INSPECTION STANDARD

8.1.1 Inspection conditions

Inspection performed under the following conditions is recommended.

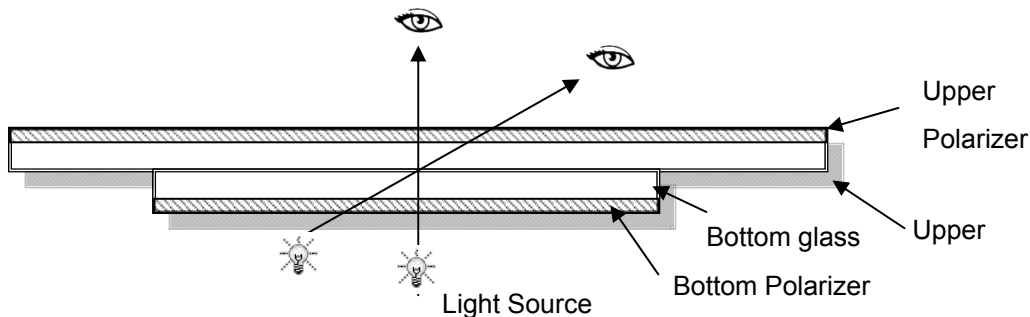
Temperature : 25±5℃

Humidity : 65%±10%RH

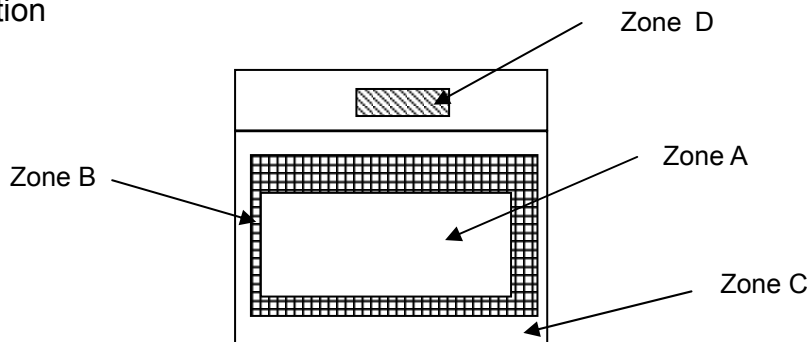
Viewing Angle : Normal viewing Angle.

Illumination: Single fluorescent lamp (300 to 700Lux)

Viewing distance:30-50cm



8.1.2 Definition



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Zone A : Effective Viewing Area(Character or Digit can be seen)

Zone B : Viewing Area except Zone A

Zone C Cover (Zone A+Zone B) which can not be seen after assembly by customer .)

Zone D : IC Bonding Area

Note: As a general rule ,visual defects in Zone C can be ignored when it doesn't effect product function or appearance after assembly by customer

8.1.3 Sampling Plan

According to GB/T 2828.1-2003 ; , normal inspection, Class II

AQL:

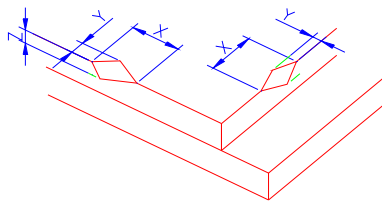
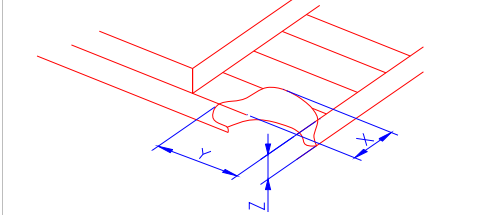
Major defect	Minor defect
0.65	1.5

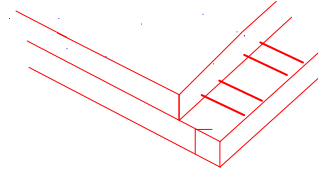
LCD: Liquid Crystal Display , LCM: Liquid Crystal Module

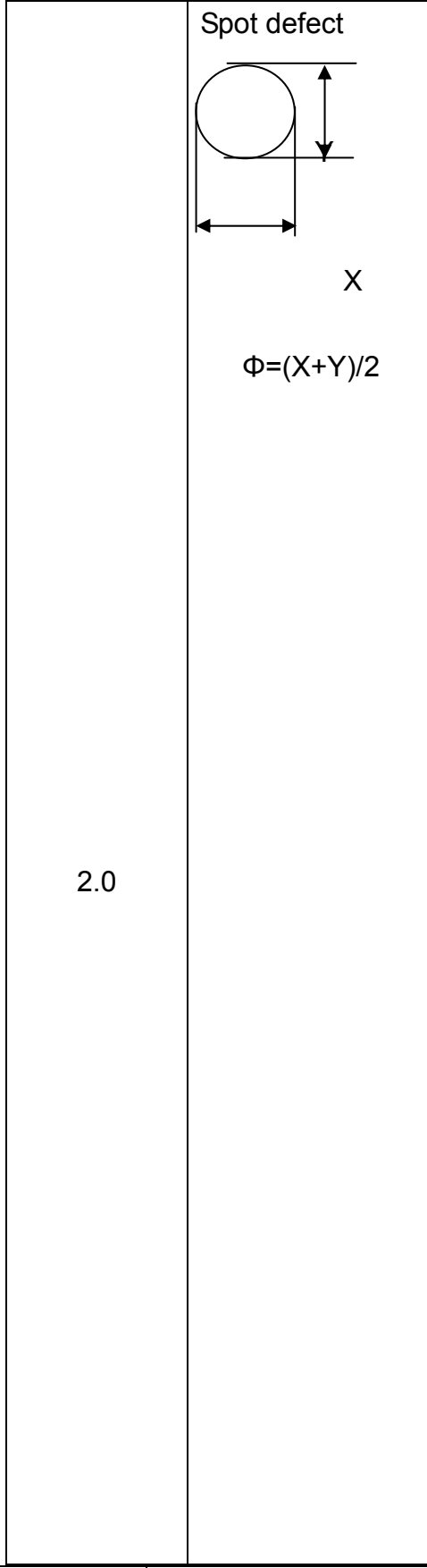
No	Items to be inspected	Criteria	Classification of defects
1	Functional defects	1) No display, Open or miss line 2) Display abnormally, Short 3) Backlight no lighting, abnormal lighting. 4) TP no function	Major
2	Missing	Missing component	
3	Outline dimension	Overall outline dimension beyond the drawing is not allowed	
4	Color tone	Color unevenness, refer to limited sample	Minor
5	Spot Line defect	Light dot , Dim spot , Polarizer Bubble ; Polarizer accidented spot.	
6	Soldering appearance	Good soldering , Peeling off is not allowed.	
7	LCD/Polarizer/TP	Black/White spot/line, scratch, crack, etc.	

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8.1.4 Criteria (Visual)

Number	Items	Criteria(mm)						
1.0 LCD Crack/Broken NOTE: X: Length Y: Width Z: Height L: Length of ITO, T: Height of LCD	(1) The edge of LCD broken	 <table border="1" data-bbox="756 1037 1455 1184"> <thead> <tr> <th>X</th> <th>Y</th> <th>Z</th> </tr> </thead> <tbody> <tr> <td>≤3.0mm</td> <td><Inner border line of the seal</td> <td>≤T</td> </tr> </tbody> </table>	X	Y	Z	≤3.0mm	<Inner border line of the seal	≤T
X	Y	Z						
≤3.0mm	<Inner border line of the seal	≤T						
	(2)LCD corner broken	 <table border="1" data-bbox="815 1491 1394 1592"> <thead> <tr> <th>X</th> <th>Y</th> <th>Z</th> </tr> </thead> <tbody> <tr> <td>≤3.0mm</td> <td>≤L</td> <td>≤T</td> </tr> </tbody> </table>	X	Y	Z	≤3.0mm	≤L	≤T
X	Y	Z						
≤3.0mm	≤L	≤T						

	(3) LCD crack	 <p>Crack Not allowed</p>
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① light dot (LCD/TP/Polarizer black/white spot , light dot, pinhole, dent, stain)

Zone Size (mm)	Acceptable Qty		
	A	B	C
$\Phi \leq 0.10$	Ignore		
$0.10 < \Phi \leq 0.25$	4(distance $\geq 10\text{mm}$)		
$0.25 < \Phi \leq 0.35$	3		
$\Phi > 0.4$	0		

② Dim spot (LCD/TP/Polarizer dim dot, light leakage, dark spot)

Zone Size (mm)	Acceptable Qty		
	A	B	C
$\Phi \leq 0.1$	Ignore		
$0.10 < \Phi \leq 0.25$	4(distance $\geq 10\text{mm}$)		
$0.25 < \Phi \leq 0.35$	3		
$\Phi > 0.4$	0		

③ Polarizer accidented spot

Zone Size (mm)	Acceptable Qty		
	A	B	C
$\Phi \leq 0.2$	Ignore		
$0.3 < \Phi \leq 0.5$	3(distance $\geq 10\text{mm}$)		
$\Phi > 0.5$	1		

④ Pixel bad points (light dot, Dim dot, color dot)

Zone Size (mm)	Acceptable Qty		
	A	B	C
$\Phi \leq 0.15$	Ignore		
$0.2 < \Phi \leq 0.3$	2(distance $\geq 10\text{mm}$)		
$\Phi > 0.4$	1		

⑤ Polarizer Bubble

Zone Size (mm)	Acceptable Qty		
	A	B	C
$\Phi \leq 0.2$	Ignore		
$0.3 < \Phi \leq 0.4$	4(distance $\geq 10\text{ m}$)		
$0.4 < \Phi \leq 0.5$	3		
$\Phi > 0.5$	1		

2.0

3.0	Line defect (LCD /Polarizer backlight black/white line, scratch, stain)	Width(mm)	Length(m)	Acceptable Qty		
				A	B	C
		$\Phi \leq 0.05$	Ignore	Ignore		
		$0.05 < W \leq 0.06$	$L \leq 4.0$	N \leq 3		
		$0.07 < W \leq 0.08$	$L \leq 3.0$	N \leq 2		
	$0.08 < W$	Define as spot defect				
4.0	Electronic Components SMT	Not allow missing parts, solderless connection, cold solder joint, mismatch, The positive and negative polarity opposite				
5.0	Display color & Brightness	1. Color: Measuring the color coordinates, The measurement standard according to the datasheet or samples. 2. Brightness: Measuring the brightness of White screen, The measurement standard according to the datasheet or Samples.				
6.0	LCD Mura	By 5% ND filter invisible.				

Criteria (functional items)

Number	Items	Criteria (mm)
1	No display	Not allowed
2	Missing segment	Not allowed
3	Short	Not allowed
4	Backlight no lighting	Not allowed

9. Reliability Test Result

Item	Condition	Inspection after test
High Temperature Operating	80°C,96HR	Inspection after 2~4hours storage at room temperature, the sample shall be free from defects: 1.Air bubble in the LCD; 2.Non-display; 3.Missing segments/line; 4.Glass crack; 5.Current IDD is twice higher than initial value.
Low Temperature Operating	-30°C, 96HR	
High Temperature Storage	80°C, 96HR	
Low Temperature Storage	-30°C, 96HR	
High Temperature & High Humidity Operating	+60°C, 90% RH ,96 hours.	
Thermal Shock (Non-operation)	-30°C,30 min ↔ 80°C,30 min, Change time:5min 20CYC.	
ESD test	C=150pF, R=330,5points/panel Air:±8KV, 5times; Contact:±6KV, 5 times; (Environment: 15°C~35°C, 30%~60%).	
Vibration (Non-operation)	Frequency range:10~55Hz, Stroke:1.5mm Sweep:10Hz~55Hz~10Hz 2 hours for each direction of X.Y.Z. (6 hours for total) (Package condition).	
Box Drop Test	1 Corner 3 Edges 6 faces,80cm(MEDIUM BOX)	

Remark:

- The test samples should be applied to only one test item.
- Sample size for each test item is 5~10pcs.
- For Damp Proof Test, Pure water(Resistance > 10MΩ) should be used.
- In case of malfunction defect caused by ESD damage, if it would be recovered to normal state after resetting, it would be judged as a good part.
- Failure Judgment Criterion: Basic Specification, Electrical Characteristic, Mechanical Characteristic, Optical Characteristic.

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10. Cautions and Handling Precautions

10.1 Handling and Operating the Module

- (1) When the module is assembled, it should be attached to the system firmly.
Do not warp or twist the module during assembly work.
- (2) Protect the module from physical shock or any force. In addition to damage, this may cause improper operation or damage to the module and back-light unit.
- (3) Note that polarizer is very fragile and could be easily damaged. Do not press or scratch the surface.
- (4) Do not allow drops of water or chemicals to remain on the display surface.
If you have the droplets for a long time, staining and discoloration may occur.
- (5) If the surface of the polarizer is dirty, clean it using some absorbent cotton or soft cloth.
- (6) The desirable cleaners are water, IPA (Isopropyl Alcohol) or Hexane.
Do not use ketene type materials (ex. Acetone), Ethyl alcohol, Toluene, Ethyl acid or Methyl chloride. It might permanent damage to the polarizer due to chemical reaction.
- (7) If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contact with hands, legs, or clothes, it must be washed away thoroughly with soap.
- (8) Protect the module from static; it may cause damage to the CMOS ICs.
- (9) Use finger-stalls with soft gloves in order to keep display clean during the incoming inspection and assembly process.
- (10) Do not disassemble the module.
- (11) Protection film for polarizer on the module shall be slowly peeled off just before use so that the electrostatic charge can be minimized.
- (12) Pins of I/F connector shall not be touched directly with bare hands.
- (13) Do not connect, disconnect the module in the "Power ON" condition.
- (14) Power supply should always be turned on/off by the item 6.1 Power On Sequence & 6.2 Power Off Sequence

10.2 Storage and Transportation.

- (1) Do not leave the panel in high temperature, and high humidity for a long time.
It is highly recommended to store the module with temperature from 0 to 35 °C and relative humidity of less than 70%
- (2) Do not store the TFT-LCD module in direct sunlight.
- (3) The module shall be stored in a dark place. When storing the modules for a long time, be sure to adopt effective measures for protecting the modules from strong ultraviolet radiation, sunlight, or fluorescent light.
- (4) It is recommended that the modules should be stored under a condition where no condensation is allowed. Formation of dewdrops may cause an abnormal operation or a failure of the module.
In particular, the greatest possible care should be taken to prevent any module from being operated where condensation has occurred inside.
- (5) This panel has its circuitry FPC on the bottom side and should be handled carefully in order not to be stressed.

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11. Packing

---TBD-----

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