LCM Specification

( )Preliminary Specification
(✓) Final Specification

PRODUCT TYPE: TFT MODULE

VERSION: V0

GeiLi

DESIGNED BY	
CHECKED BY	
APPROVED BY	

Customer

INSPECTION RESULT	
TESTED BY	
APPROVED BY	

Revision History

Date	Rev.	Reason
18-09-2018	V0	NEW ISSUE

CONTENTS

1. General Description

The 070001A0-50 model is a Color TFT LCD supplied by GELIVABLE OPTOELECTRONICS CO., LTD. This main Module has a **7.0** inch diagonally measured active display area with 800(RGB)X480 resolution. Each pixel is divided into Red, Green and Blue sub-pixels and dots which are arranged in vertical stripes.

LCD color is determined with 16.7M colors signal for each pixel.

The 070001A0-50 has been designed to apply the interface method that enables low power, high speed, and high contrast.

The 070001A0-50 is intended to support applications where thin thickness, wide viewing angle and low power are critical factors and graphic displays are important.

2. General Features

Item	Display Panel	Remark
Display Mode	Normally White, Transmissive LCD	
Viewing Direction	6 O'CLOCK	
Input Signals	RGB	
Outside Dimensions	164.86mm(W)*99.96mm(H)*3.5mm(T)	
Effective Area	-	
Active Area	154.08mm(W)×85.92mm(H)	
Number of Pixels	800×RGB×480Pixels	
Pixel Pitch	0.1926mm(H)×0.1790mm(W)	
Pixel Arrangement	RGB Vertical stripes	
Drive IC		

3. Absolute Maximum Ratings

The following are maximum values which, if exceeded may cause operation or damage to the unit.

ITEM	Symbol	Min.	Typ.	Max.	Unit	Remark
Power for Circuit Driving	VDD	-0.3	-	3.3	V	
Power for Circuit Logic	VCI	-0.3	-	5.0	V	
LC Operating Voltage *1)	Vop		3.3		V	
LED Forward Voltage	V_f	-	9.6	-	V	
LED Forward Current	Ir	-	100	-	mA	
LCD Face Luminance	B_P	-	250	-	cd/m^2	
Storage Humidity	H_{ST}	10	-	90	%RH	At 25±5℃
Storage Temperature	T_{ST}	-30	-	80	℃	
Operating Ambient Humidity	H_{OP}	10	-	90	%RH	
Operating Ambient temperature	T_{OP}	-20	-	70	℃	

4. Electrical Specification
Main Window Display

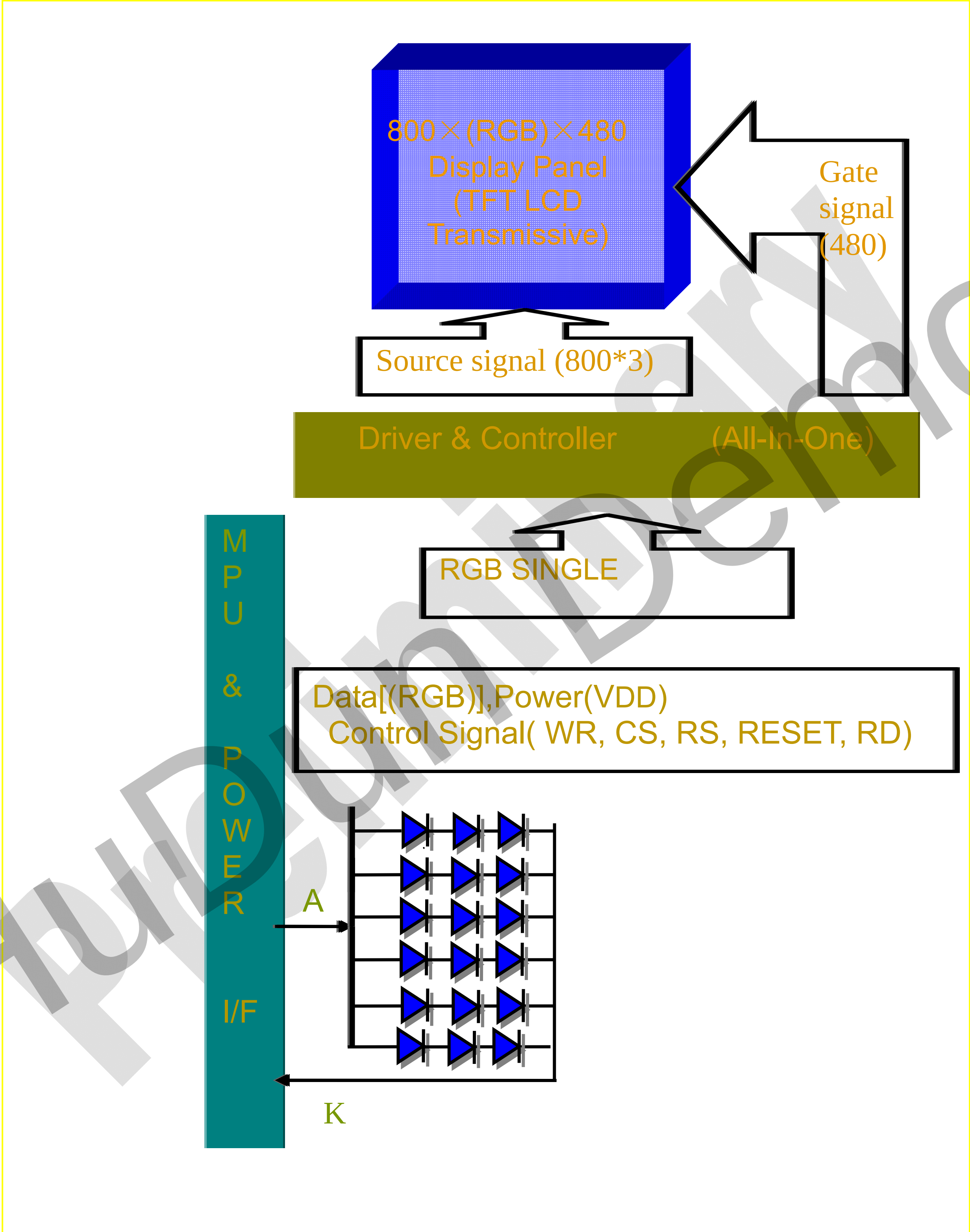
(Unless specified, the ambient temperature Ta=25℃)

Properties		Sym.	Min	Typ.	Max	Unit	Note
Supply Voltage		VDD	3.2	3.3	3.4	V	Note
		VGH	15	16	17	V	Note
		VGL	-8	-7	-6	V	
		AVDD	9.5	10	10.5	V	
		VCOM	3.5	3.6	3.7	V	
Logic Output Voltage	Low Voltage	VOL	0	-	0.1VDD	V	
	High Voltage	VOH	0.9VDD	-	VDD	V	
Power Consumption	White	P_w	T.B.D	T.B.D	T.B.D	mW	
	Black	P_b	T.B.D	T.B.D	T.B.D	mW	
	Vertical Stripe	P_v	T.B.D	T.B.D	T.B.D	mW	

5. Optical Specification

Parameter		Symbol	Condition	Min.	Typ.	Max.	Unit	Remark
Viewing Angle range	Horizontal	Θ_3	CR > 10	60	70	-	Deg.	WV-Pol Note 1
Viewing Angle range	Horizontal	Θ_3	CR > 10	60	70	-	Deg.	WV-Pol Note 1
		Θ_9		60	70	-	Deg.	
	Vertical	Θ_{12}		50	60	-	Deg.	
		Θ_6		60	70	-	Deg.	
Luminance Contrast ratio		CR	Θ = 0°	-	500	-		Note 2
Cell Transmittance		Tr		5.00	5.50	-	%	Base on BLU Light Note 3
White Chromaticity		x_w		0.276	0.306	0.336		Note 4 @C Light SIM @CF Glass
		y_w		0.314	0.344	0.374		
Reproduction of color (C light)	Red	R_x		0.567	0.597	0.627		
		R_y		0.289	0.319	0.349		
	Green	G_x		0.282	0.312	0.342		
		G_y		0.537	0.567	0.597		
	Blue	B_x		0.118	0.148	0.178		
		B_y		0.128	0.158	0.188		
Color Gamut (C light)				-	50	-	%	

6. Block Diagram

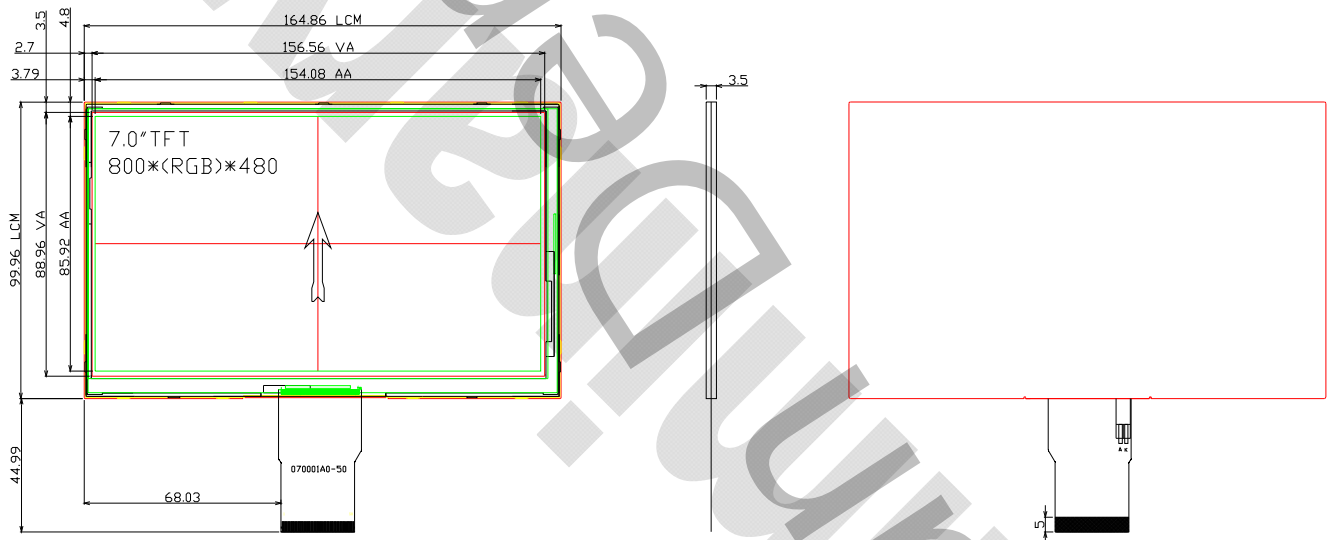


7. Pin Description

Pin NO.	Symbol	Description
1	V LEDA+	Power for LED backlight (Anode)
2	V LEDA+	Power for LED backlight (Anode)
3	V LED-	Power for LED backlight (Catgode)
4	V LED-	Power for LED backlight (Cathode)
5	GND	Power ground
6	VCOM	Common Voltage
7	DVDD	Digital Power
8	MODE	DE/SYNC mode select Normally pull high H;DE mode.L:HSD/VSD mode
9	DE	Data Enable signal
10	VSD	Vertical sync input.Negative polarity
11	HSD	Horizontal sync input.Negative polarity
12	B7	Blue Data lnput(MSB)
13	B6	Blue Data lnput
14	B5	Blue Data lnput
15	B4	Blue Data lnput
16	B3	Blue Data lnput
17	B2	Blue Data lnput
18	B1	Blue Data lnput
19	B0	Blue Data lnput(LSB)
20	G7	Green Data lnput(MSB)
21	G6	Green Data lnput
22	G5	Green Data lnput
23	G4	Green Data lnput
24	G3	Green Data lnput
25	G2	Green Data lnput
26	G1	Green Data lnput
27	G0	Green Data lnput(LSB)
28	R7	Red Data lnput(MSB)
29	R6	Red Data lnput
30	R5	Red Data lnput
31	R4	Red Data lnput
32	R3	Red Data lnput
33	R2	Red Data lnput
34	R1	Red Data lnput
35	R0	Red Data lnput(LSB)
36	GND	Power ground
37	DCLK	Clock input
38	GND	Power ground
39	SHLR	Left or Right DisplayControl
40	UPDN	Up/Down Display Control
41	VGH	Positive Power for TFT
42	VGL	Negative Power forTFT
43	AVDD	Analog Power
44	RSTB	Global reset pin Active low to enter reset state. Suggest to connecting with an RC reset circuit for stability. Normally pull high.(R=10KΩ，C=1μF)
45	NC	Not connect
46	VCOM	Common Voltage
47	DITH	Dithering setting

		DITH=”H” 6bit resolution(last 2 bit of input data truncated) DITH=”L” 8bit resolution(default setting)
48	GND	Power ground
49	NC	Not connect
50	NC	Not connect

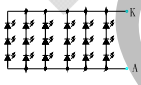
REV.	ECN No.	DESCRIPTION	DRAWN BY
#1.0		FIRST ISSUE	



NO.	Pin name	NO.	Pin name
1	LED-A	33	R2
2	LED-A	34	R1
3	LED-K	35	R0
4	LED-K	36	GND
5	GND	37	DCLK
6	VCOM	38	GND
7	VDD	39	SHLR
8	MODE	40	UPDN
9	DE	41	VGH
10	VSD	42	VGL
11	HSD	43	AVDD
12	B7	44	RSTB
13	B6	45	NC
14	B5	46	VCOM
15	B4	47	DITH
16	B3	48	GND
17	B2	49	NC
18	B1	50	NC
19	B0		
20	G7		
21	G6		
22	G5		
23	G4		
24	G3		
25	G2		
26	G1		
27	G0		
28	R7		
29	R6		
30	R5		
31	R4		
32	R3		

NOTE:

1. LCD TYPE : 7.0 " TFT
2. DRIVER IC :
3. VIEING DIRECTION : 6 O'CLOCK
4. BACKLIGHT: WHITE LED 18 CHIPS Parallel
5. OPERATION TEMP : -20°C~70°C
6. STORAGE TEMP : -30°C~80°C
7. GENERAL TOLERANCE: ±0.2
8. * IS IMPORTANT DIMENSION



LED 电路图

TOLERANCE		SCALE	N.T.S	深圳市给力光电有限公司			
.X	± 0.1	UNITS	mm				
.XX	±	MATERIAL		DRG DATE	2018.9.27	MODEL:	070001A0-50
∠	± 1°			DRG BY		TITLE:	800(RGB)X480 DOTS
				CHK BY		DWG NO	P 1 OF 1
				APPROVED		P/N	VER. 01

9. Timing Characteristics

Table 20. Horizontal input timing

Parameter	Symbol	Value			Unit	Note
Horizontal display area	thd	800			DCLK	
DCLK frequency	fclk	Min.	Typ.	Max		
		20	33.3	50	MHz	
1 Horizontal Line	th	908	928	1088	DCLK	thb+thpw=88 DCLK is fixed.
HSD pulse width	thpw	1	48	87		
HSD Back Porch (Blanking)	thb	87	40	1		
HSD Front Porch	thfp	20	40	200		

Table 21. Vertical input timing

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Vertical display area	tvd		480		H	
VSD period time	tv	517	525	712	H	tvpw+tvb=32H Is fixed
VSD pulse width	tvpw	1	1	3	H	
VSD Back Porch (Blanking)	tvb	31	31	29	H	
VSD Front Porch	tvfp	5	13	200	H	

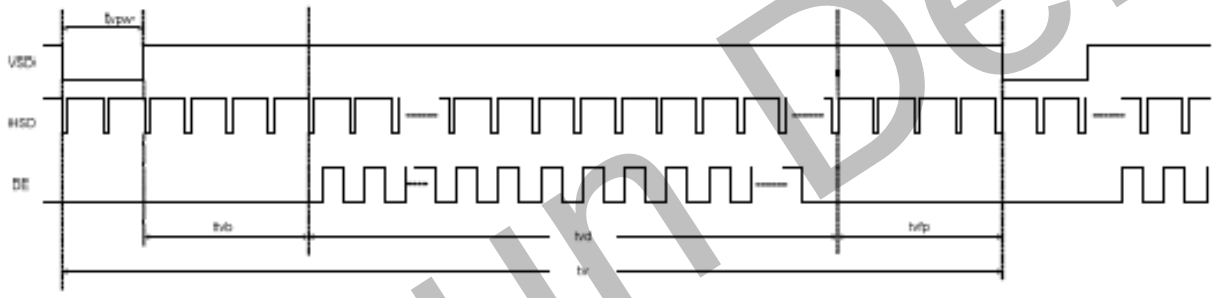


Figure 8. Vertical input timing

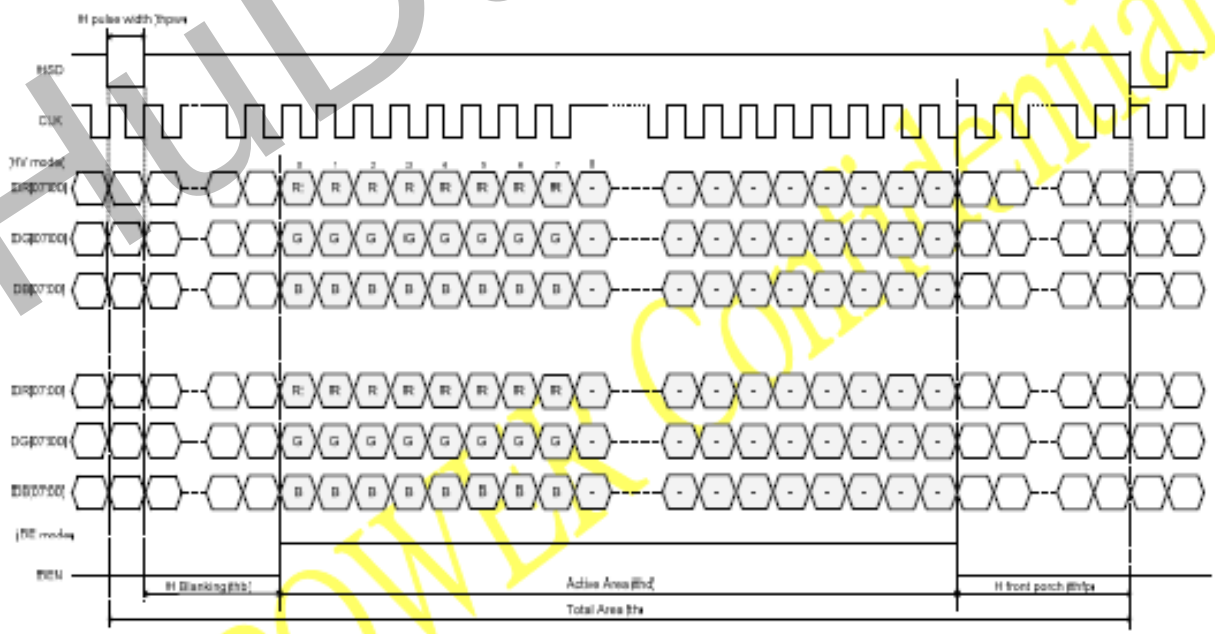


Figure 9. Horizontal input timing

10. Reliability and Inspection Standard

No.	Test Item		Test Conditions	Remark
1	High Temperature	Storage	70℃, 120Hr	Note
		Operation	60℃, 120Hr	Note
2	Low Temperature	Storage	-30℃, 120Hr	Note
		Operation	-20℃, 120Hr	
3	High Temperature and High Humidity		60℃, 90%RH, 120Hr	Note
4	Temperature Cycle	Storage	-10℃(1Hr)→25℃(5min)→60℃(1Hr) 32 Cycles	Note
		Operation	-20℃(1Hr)→25℃(5min)→60℃(1Hr) 25 Cycles	
5	Peeling Off (Storage)		≧500gf/cm	Note
6	FPC Bending Test		≧6,000 times, 2/sec	Note
7	Vibration Test(Storage)		50HZ, 30min, Amplitude: 2 cm, X/Y/Z directions	Note
8	Drop Test		60cm/ 3Corner/ 8Face, 1Cycle	Note

Note:

1) The test samples should be applied to only one test item.
2) Sample size for each test item is 5~10pcs.
3) For Damp Proof Test, pure water(Resistance>1MΩ) should be used.
4) 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.
5) EL evaluation should be excepted from reliability test with humidity and temperature: Some defects such as black spot/blemish can happen by natural chemical reaction with humidity and fluorescence EL has.
6) After the reliability test, the test samples should be inspected after 2 hours at least.
7) Functional test is OK. Missing segment, shorts, unclear segment, non display, display abnormally, liquid crystal leak are not allowed.
8) After testing, the current Idd should be within initial value ±20%.
9) No low temperature bubbles ,end seal loose and fall, frame rainbow, ACF bubble growing are allowable in the appearance test.

11. Inspection Criterion

11.1. Sampling Method

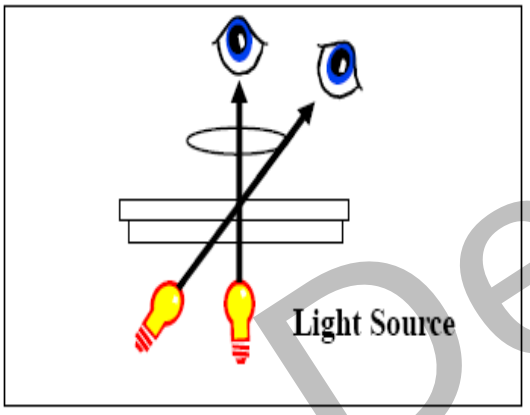
Unless otherwise agreed upon in writing, the sampling inspection shall be applied to the Customer's incoming inspection.

1) Lot size: Quantity per shipment lot
2) Sampling type: Normal inspection , single sampling
3) Inspection level: II

4) Sampling table: MIL-STD-105D
5) Acceptable Quality Level(AQL): Major=0.65 Minor=1.5

11.2. Inspection Method

1) Ambient Condition:
   a. Temperature: Room temperature 25±5℃
   b. Illumination: Single fluorescent lamp non-directive(300 to 700 Lux)
2) Viewing distance
   The distance between the LCD and the inspector’s eyes shall be at least 30-50cm.
3) Viewing Angle
   The inspection shall be conducted within normal viewing angle range.



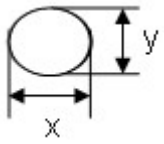
12.3. Inspection Criteria

12.3.1. Major defect

No.	Item	Inspection Standard	Classification of defects
1	All functional defects	1) No display 2) Display abnormally 3) Open or missing segment 4) Short circuit 5) Excess power consumption 6) Backlight no lighting, flickering and abnormal lighting	Major
2	Missing	Missing component	Major
3	Outline dimension	Overall outline dimension beyond the drawing is not allowed	Major

12.3.2. Cosmetic Defect

No.	Item	Inspection Standard	Classification of defects

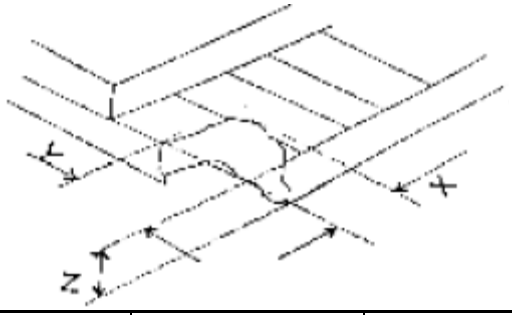
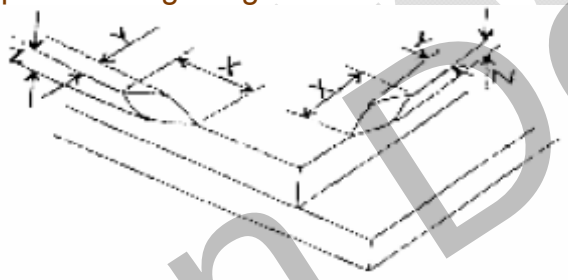
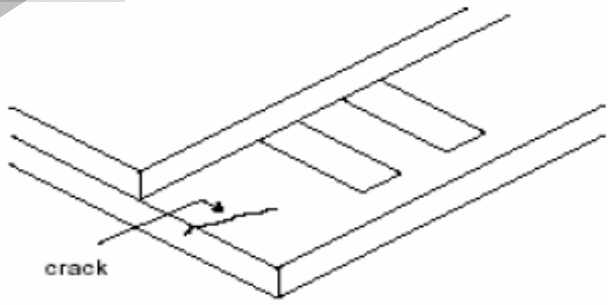
<table>
<tr><td>1</td><td>(spot defect) Black and White spot pinhole</td><td colspan="2">For dark/white spot, size Φ is defined as Φ=(x+y)/2
 

<table>
<tr><th>Size Φ (mm)</th><th>Acceptable Quantity</th></tr>
<tr><td>Φ≤0.1</td><td>Ignore</td></tr>
<tr><td>0.10≤Φ≤0.15</td><td>2</td></tr>
<tr><td>0.15≤Φ≤0.2</td><td>1</td></tr>
<tr><td>0.2<Φ</td><td>0</td></tr>
</table></td><td>Minor</td></tr>
<tr><td>2</td><td>(line defect) Black and White line Polarizer scratch</td><td colspan="2">Define:
 

<table>
<tr><th>Width(mm)</th><th>Length(mm);Acceptable Qty</th></tr>
<tr><td>Φ≤0.03</td><td>Ignore</td></tr>
<tr><td>0.03<W≤0.05</td><td>L≤3.0; N≤2</td></tr>
<tr><td>0.05<W≤0.1</td><td>L≤2.0; N≤2</td></tr>
<tr><td>0.1<W</td><td>Define as spot defect</td></tr>
</table></td><td>Minor</td></tr>
<tr><td>3</td><td>Polarizer defect</td><td colspan="2">Dent or bubble(between the polarizer and glass)
<table>
<tr><th>Size Φ(mm)</th><th>Acceptable Qty</th></tr>
<tr><td>Φ≤0.10</td><td>Ignor</td></tr>
<tr><td>0.10<Φ≤0.20</td><td>2</td></tr>
<tr><td>0.20<Φ≤0.30</td><td>1</td></tr>
<tr><td>0.30<Φ</td><td>0</td></tr>
</table></td><td>Minor</td></tr>
</table>

12.3.3. Cosmetic Defect

No.	Item	Inspection Standard	Classification of defects

<table>
<tr><td rowspan="3">1</td><td rowspan="3">Glass defect</td><td>1) Chip on the corner
 
<table><tr><td>X</td><td>Y</td><td>Z</td></tr><tr><td>≤3.0</td><td>≤S</td><td>≤T</td></tr></table>
Remark: S=contact pad length;
T=the thickness of glass
Chips on the corner of terminal shall not be allowed to extend into the ITO pad or expose perimeter seal. Acceptable Quantity N≤2.</td><td>Minor</td></tr>
<tr><td>2) Chip on the edge of glass
 
<table><tr><td>X</td><td>Y</td><td>Z</td></tr><tr><td>Ignore</td><td>≤0.5</td><td>≤T</td></tr></table>
Acceptable Quantity: N≤2</td><td>Minor</td></tr>
<tr><td>3) Creak
Creaks tend to break are not allowed.
 
</td><td>Minor</td></tr>
</table>

■ PRECAUTIONS FOR USING LCD MODULES

Handing Precautions

(1) The display panel is made of glass and polarizer. As glass is fragile, it tends to become or

chipped during handling especially on the edges. Please avoid dropping or jarring. Do not subject it to a mechanical shock by dropping it or impact.

(2) If the display panel is damaged and the liquid crystal substance leaks out, be sure not to get any in your mouth. If the substance contacts your skin or clothes, wash it off using soap and water.

(3) Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary. Do not touch the display with bare hands. This will stain the display area and degraded insulation between terminals (some cosmetics are determined to the polarizer).

(4) The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully. Do not touch, push or rub the exposed polarizers with anything harder than an HB pencil lead (glass, tweezers, etc.). Do not put or attach anything on the display area to avoid leaving marks on. Condensation on the surface and contact with terminals due to cold will damage, stain or dirty the polarizer. After products are tested at low temperature they must be warmed up in a container before coming is contacting with room temperature air.

(5) If the display surface becomes contaminated, breathe on the surface and gently wipe it with a soft dry cloth. If it is heavily contaminated, moisten cloth with one of the following solvents
- Isopropyl alcohol
- Ethyl alcohol
Do not scrub hard to avoid damaging the display surface.

(6) Solvents other than those above-mentioned may damage the polarizer. Especially, do not use the following.
- Water
- Ketone
- Aromatic solvents
Wipe off saliva or water drops immediately, contact with water over a long period of time may cause deformation or color fading. Avoid contacting oil and fats.

(7) Exercise care to minimize corrosion of the electrode. Corrosion of the electrodes is accelerated by water droplets, moisture condensation or a current flow in a high-humidity environment.

(8) Install the LCD Module by using the mounting holes. When mounting the LCD module make sure it is free of twisting, warping and distortion. In particular, do not forcibly pull or bend the I/O cable or the backlight cable.

(9) Do not attempt to disassemble or process the LCD module.

(10) NC terminal should be open. Do not connect anything.

(11) If the logic circuit power is off, do not apply the input signals.

(12) Since LCM has been assembled and adjusted with a high degree of precision, avoid applying excessive shocks to the module or making any alterations or modifications to it.
- Do not alter, modify or change the shape of the tab on the metal frame.
- Do not make extra holes on the printed circuit board, modify its shape or change the positions of components to be attached.
- Do not damage or modify the pattern writing on the printed circuit board.
- Absolutely do not modify the zebra rubber strip (conductive rubber) or heat seal connector.
- Except for soldering the interface, do not make any alterations or modifications with a soldering iron.
- Do not drop, bend or twist LCM.

Storage Precautions

When storing the LCD modules, the following precaution is necessary.

(1) Store them in a sealed polyethylene bag. If properly sealed, there is no need for the dessicant.
(2) Store them in a dark place. Do not expose to sunlight or fluorescent light, keep the temperature between 0°C and 35°C.
(3) The polarizer surface should not come in contact with any other objects. (We advise you to store them in the container in which they were shipped).

Others

Liquid crystals solidify under low temperature (below the storage temperature range) leading to defective orientation or the generation of air bubbles (black or white). Air bubbles may also be generated if the module is subject to a low temperature.
If the LCD modules have been operating for a long time showing the same display patterns, the display patterns may remain on the screen as ghost images and a slight contrast irregularity may also appear. A normal operating status can be regained by suspending use for some time. It should be noted that this phenomenon does not adversely affect performance reliability.
To minimize the performance degradation of the LCD modules resulting from destruction caused by static electricity etc., exercise care to avoid holding the following sections when handling the modules.
- Exposed area of the printed circuit board.
-Terminal electrode sections.