

Product Specification



Model: LM700-MU

Version

Issued Date

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Thin-Film-Transistor LCD Module
Model: LM700-MU

Acceptance

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Landmark Technology, Inc.

172 Component Drive

San Jose, CA. 95131

Tel : 408 434-9302 Fax: 408 434-0954

Approved and Checked by

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Approved by	Checked by		Made by

Landmark Technology, Inc.

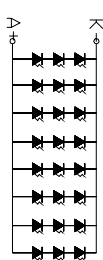
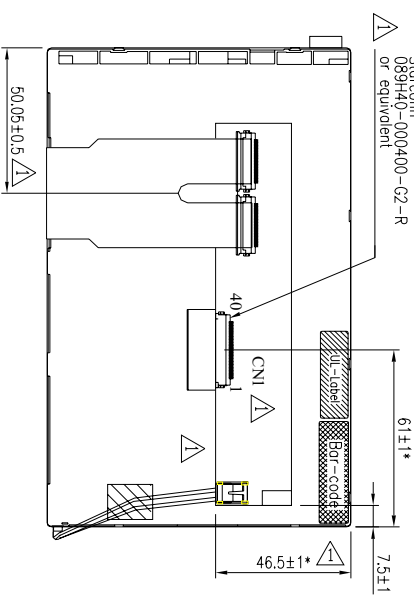
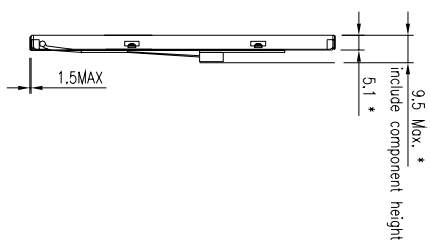
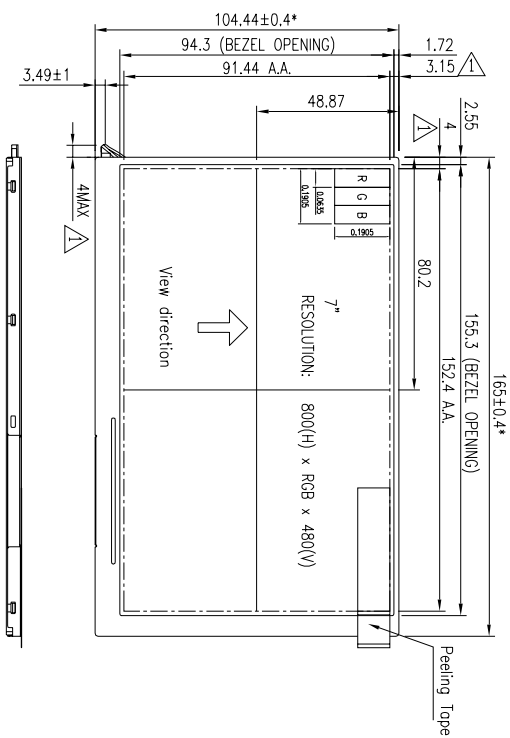
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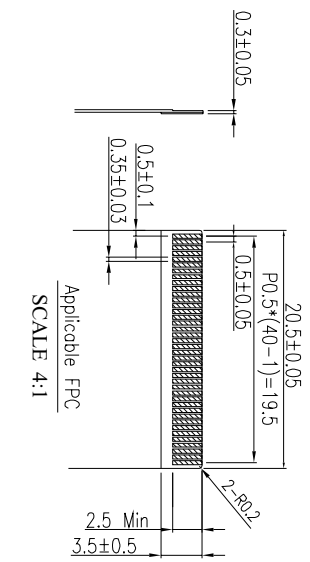
■ GENERAL INFORMATION

Item	Contents	Unit
LCD type	TFT/Normally white	/
Size	7.0	Inch
Viewing Direction	12:00	Clock
Gray scale inversion direction		
LCM (W × H × D)	165.00×104.44×9.50	mm ³
Active area (W×H)	152.40×91.44	mm ²
Dot pitch (W×H)	0.0635×0.1905	mm ²
Number of dots	800 (RGB) × 480	/
Backlight type	24 LEDs	/
Interface type	RGB 18 bits	/
Color depth	262K	/
Pixel configuration	Stripe	/
Surface treatment		
Input voltage	3.3	V
With/Without TSP	With TSP	/
Weight	TBD	g



SMD-LED: 3*8=24PCS
20mA*8=160mA
LED circuit:

CN1 PIN FUNCTION			
1	VSS	21	G5
2	VSS	22	G4
3	ADJ	23	G3
4	VDD	24	VSS
5	VDD	25	G2
6	VDD	26	G1
7	VCC	27	G0
8	VCC	28	VSS
9	DE	29	R5
10	VSS	30	R4
11	VSS	31	R3
12	VSS	32	VSS
13	B5	33	R2
14	B4	34	R1
15	B3	35	R0
16	VSS	36	VSS
17	B2	37	VSS
18	B1	38	DCLK
19	B0	39	VSS
20	VSS	40	VSS



- NOTE:
1. Tolerance is ±0.3 unless otherwise noted.
 2. For RoHS.
 3. * is important dimension.
 4. Center brightness :320 cd/m²(Typ.) .

■ ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Min	Max	Unit	
Power supply voltage	VCC,VDD	-0.3	6.0	V	
Logic input voltage	VI	-0.3	VCC+0.3	V	
Operating temperature	T _{OP}	-20	70	°C	
Storage temperature	T _{ST}	-30	80	°C	
Humidity	Operation	20%~90% relative humidity (Typ 38°C)			RH
	Non operation	5%~90% relative humidity (Typ 38°C)			

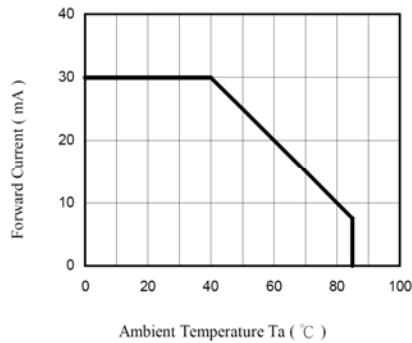
■ ELECTRICAL CHARACTERISTICS

DC CHARACTERISTICS

Parameter	Symbol	Min	Typ	Max	Unit
Power supply voltage for LCD	VCC	3.0	3.3	3.6	V
Power supply current for LCD	ICC	-	150	200	mA
Power supply voltage for LED	VDD	3.0	3.3	5.5	V
Power supply current for LED	IDD	-	650	850	mA
		-	400	550	
Input voltage 'H' level	V _{IH}	0.7VCC	-	VCC	V
Input voltage 'L' level	V _{IL}	0	-	0.3VCC	V
ADJ frequency		19K	20K	21K	Hz
ADJ input voltage	V _{IH}	3.0	-	3.3	V
	V _{IL}	0	-	0.3	
LED dice life time					

Note 1: The "LED dice life time" is defined as the brightness decrease to 50% original brightness that the ambient temperature is 18°C~28°C and LED dice current=20mA.

Note2: The LED Dice's Ambient Temp. vs. Allowable Forward Current Curve.



■ELECTRO-OPTICAL CHARACTERISTICS

Item	Symbol	Condition	Min	Typ	Max	Unit	Remark	Note
Response time	Tr+Tf	$\theta=0^\circ$ $\varnothing=0^\circ$ Ta=25°C	-	16	26	ms	FIG 1.	4
Contrast ratio	Cr		250	400	-	---	FIG 2.	1
Luminance uniformity	δ WHITE		70	80	-	%	FIG 2.	3
Surface Luminance	Lv				500	²	FIG 2.	2
Viewing angle range	θ	$\varnothing = 90^\circ$	55	60	-	deg	FIG 3.	6
		$\varnothing = 270^\circ$	55	60	-	deg	FIG 3.	
		$\varnothing = 0^\circ$	65	70	-	deg	FIG 3.	
		$\varnothing = 180^\circ$	65	70	-	deg	FIG 3.	
CIE (x, y) chromaticity	Red	x	-	-	-		FIG 2.	5
		y						
	Green	x						
		y						
	Blue	x						
		y						
	White	x	0.26	0.31	0.36			
y		0.28	0.33	0.38				
	tis		-	-	2			

Note 1. Contrast Ratio(CR) is defined mathematically as For more information see FIG 2.

$$\text{Contrast Ratio} = \frac{\text{Average Surface Luminance with all white pixels (P1, P2, P3, P4, P5)}}{\text{Average Surface Luminance with all black pixels (P1, P2, P3, P4, P5)}}$$

Note 2. Surface luminance is the LCD surface from the surface with all pixels displaying white. For more information see FIG 2.

$$L_v = \text{Average Surface Luminance with all white pixels (P1, P2, P3, P4, P5)}$$

Note 3. The uniformity in surface luminance , δ WHITE is determined by measuring luminance at each test position 1 through 5, and then dividing the maximum luminance of 5 points luminance by minimum luminance of 5 points luminance. For more information see FIG 2.

$$\delta \text{ WHITE} = \frac{\text{Minimum Surface Luminance with all white pixels (P1, P2, P3, P4, P5)}}{\text{Maximum Surface Luminance with all white pixels (P1, P2, P3, P4, P5)}}$$

Note 8: Definition of Image sticking (tis):

Continuously display the test pattern shown in the figure below for 2 hours. Then display a completely white screen. The previous image shall not persist more than 2 sec at 25 °C

Image sticking pattern

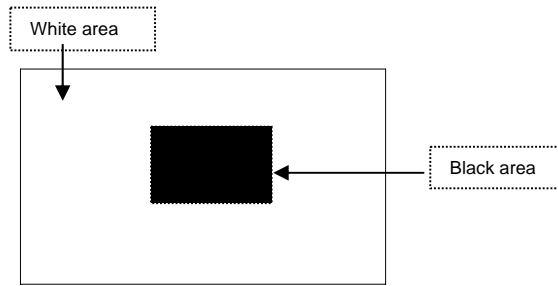


FIG. 1 The definition of Response Time

The response time is defined as the following figure and shall be measured by switching the input signal for "black" and "white".

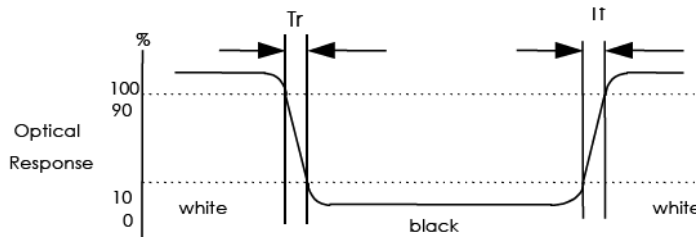
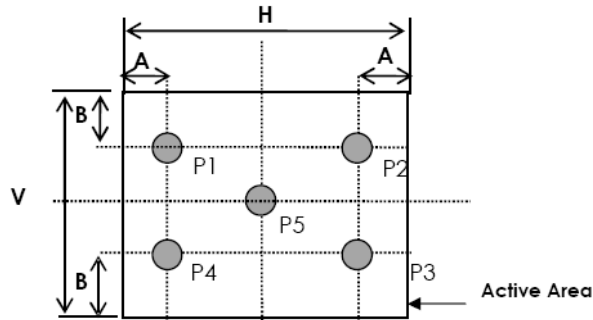


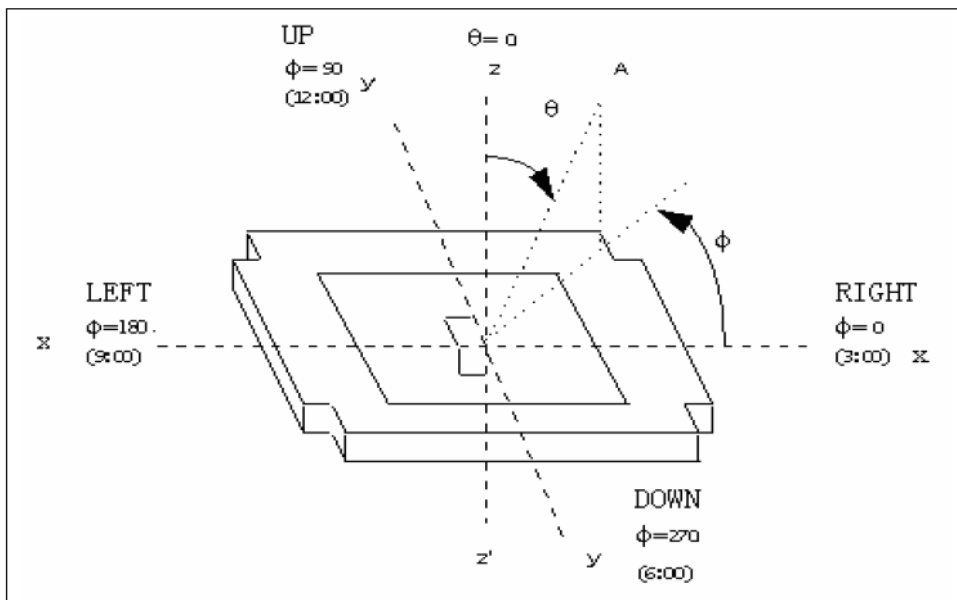
FIG. 2 Measuring method for Contrast ratio, surface luminance, Luminance uniformity , CIE (x, y) chromaticity



A : 5 mm
B : 5 mm
H, V : Active Area

Light spot size $\varnothing=7\text{mm}$, 500mm distance from the LCD surface to detector lens
measurement instrument is TOPCON's luminance meter BM-5

FIG. 3 The definition of viewing angle



INTERFACE DESCRIPTION

Pin NO.	SYMBOL	DESCRIPTION
1	V _{ss}	Power Ground
2	V _{ss}	Power Ground
3	ADJ	Brightness control for LED B/L
4	VDD	Power Supply for LED Driver
5	VDD	Power Supply for LED Driver
6	VDD	Power Supply for LED Driver
7	V _{cc}	Power Supply for Digital Circuit
8	V _{cc}	Power Supply for Digital Circuit
9	DE	Data Enable
10	V _{ss}	Power Ground
11	V _{ss}	Power Ground
12	V _{ss}	Power Ground
13	B5	Blue Data 5 (MSB)
14	B4	Blue Data 4
15	B3	Blue Data 3
16	V _{ss}	Power Ground
17	B2	Blue Data 2
18	B1	Blue Data 1
19	B0	Blue Data 0 (LSB)
20	V _{ss}	Power Ground
21	G5	Green Data 5 (MSB)
22	G4	Green Data 4
23	G3	Green Data 3
24	V _{ss}	Power Ground
25	G2	Green Data 2
26	G1	Green Data 1
27	G0	Green Data 0 (LSB)
28	V _{ss}	Power Ground
29	R5	Red Data 5 (MSB)
30	R4	Red Data 4
31	R3	Red Data 3
32	V _{ss}	Power Ground
33	R2	Red Data 2
34	R1	Red Data 1
35	R0	Red Data 0
36	V _{ss}	Power Ground
37	V _{ss}	Power Ground
38	DCLK	Clock Signals ; Latch Data at the Falling Edge
39	V _{ss}	Power Ground
40	V _{ss}	Power Ground

Remarks:

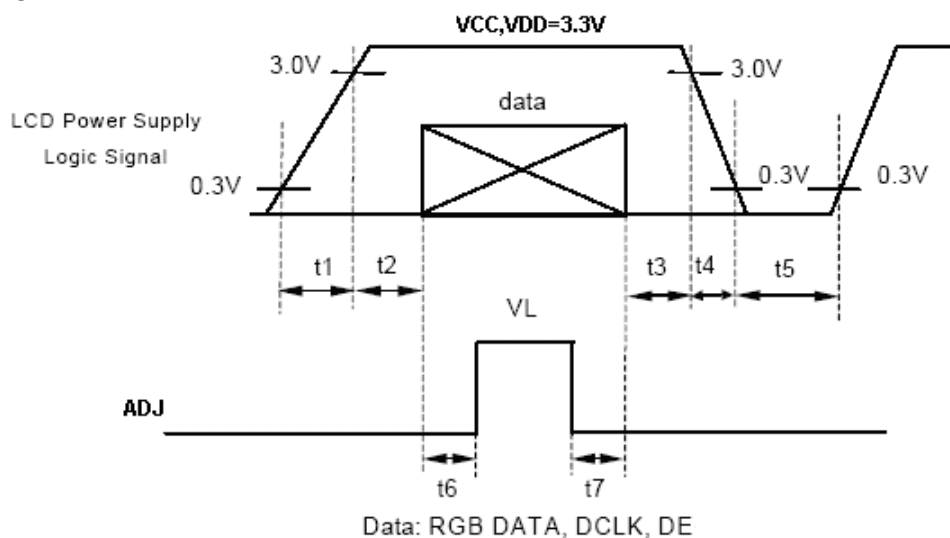
Power Signal sequence:

$t1 \leq 10\text{ms}$; $1 \text{ sec} \leq t5$

$50\text{ms} \leq t2$; $200\text{ms} \leq t6$

$0 < t3 \leq 50\text{ms}$; $200\text{ms} \leq t7$

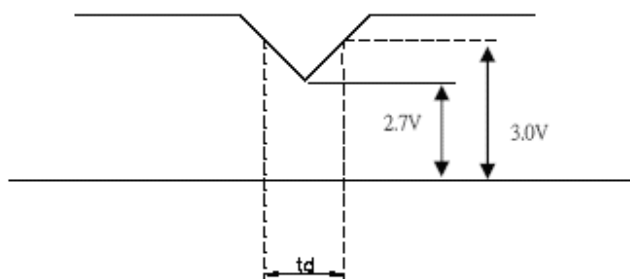
$0 < t4 \leq 10\text{ms}$



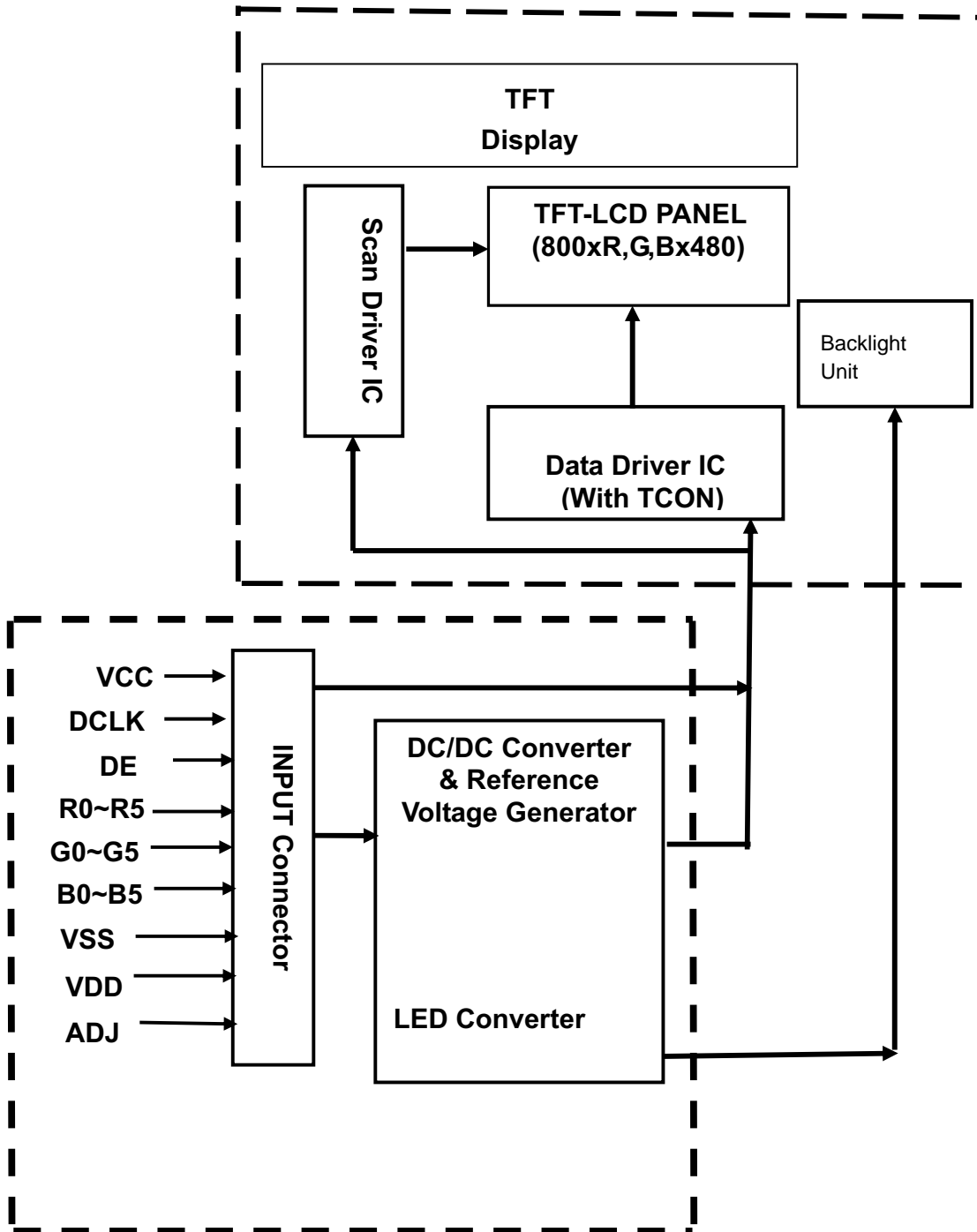
VCC,VDD -dip condition:

(1) $2.7\text{V} \leq VCC, VDD \leq 3.0\text{V}$: $t_d \leq 10 \text{ ms}$

(2) $VCC, VDD > 3.0\text{V}$: VCC,VDD -dip condition should be the same with VCC,VDD-turn-on condition.



■ BLOCK DIAGRAM



■ APPLICATION NOTES

1. AC Characteristics

1.1 AC Electrical Characteristics

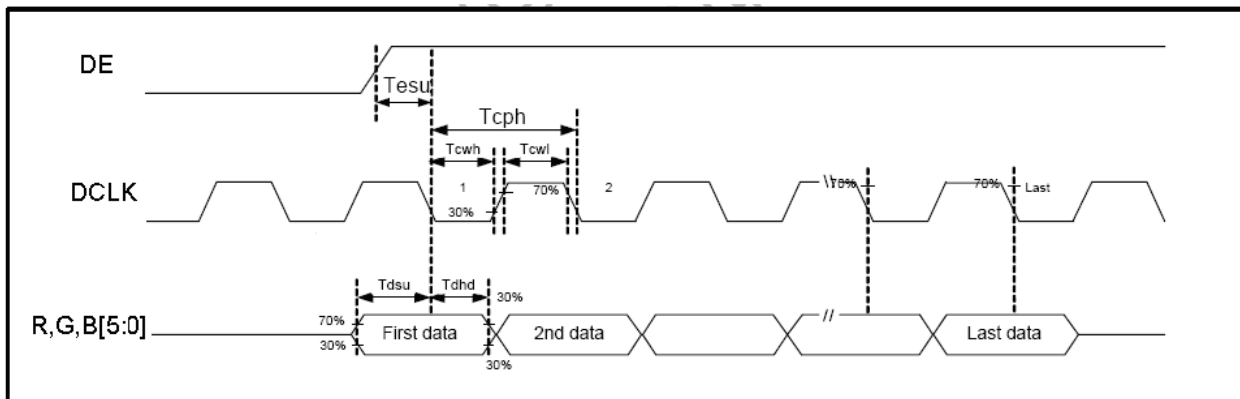
Parameter	Symbol	MIN.	TYP.	MAX.	Unit
Data setup time	T_{dsu}	6	-	-	ns
Data hold time	T_{dhd}	6	-	-	ns
DE setup time	T_{esu}	6	-	-	ns

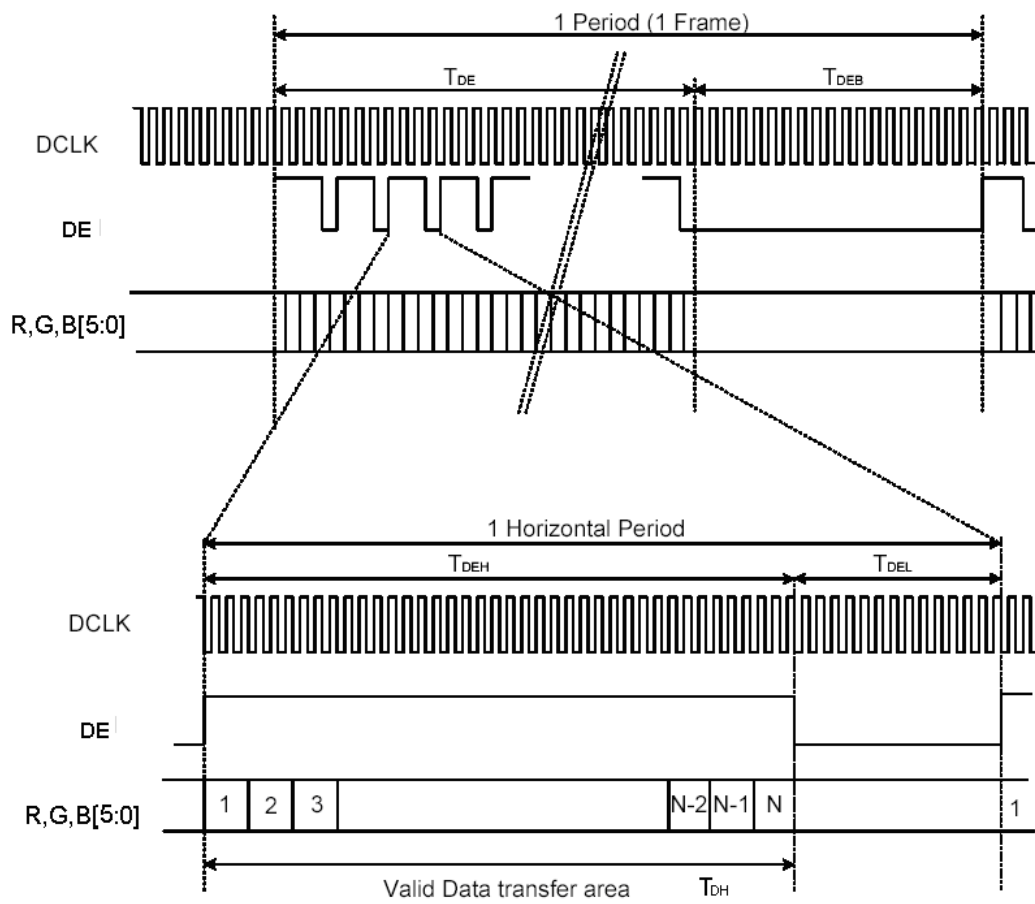
1.2 Resolution:800 x 480

Parameter	Symbol	MIN.	TYP.	MAX.	Unit
DCLK frequency	F_{CPH}	-	33.26	-	MHz
DCLK period	T_{CPH}	-	30.06	-	ns
DCLK pulse duty	T_{CWH}	40	50	60	%
DE period	$T_{DEH}+T_{DEL}$	1000	1056	1200	T_{CPH}
DE pulse width	T_{DEH}	-	800	-	T_{CPH}
DE frame blanking	T_{DEB}	10	45	110	$T_{DEH}+T_{DEL}$
DE frame width	T_{DE}	-	480	-	$T_{DEH}+T_{DEL}$

2. Timing Controller Timing Chart

2.1 Clock and Data input waveforms





3. Color Data Input Assignment

		Data Signal																	
		Red					Green					Blue							
Color		R5	R4	R3	R2	R1	R0	G5	G4	G3	G2	G1	G0	B5	B4	B3	B2	B1	B0
Basic Colors	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
	Green	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1
	Cyan	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1
	Magenta	1	1	1	1	1	1	0	0	0	0	0	0	1	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Gray Scale of Red	Red(0) / Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(1)	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	Red(2)	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Red(61)	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	Red(62)	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(63)	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Gray Scale of Green	Green(0)/ Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green(1)	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	Green(2)	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Green(61)	0	0	0	0	0	0	1	1	1	1	0	1	0	0	0	0	0	0
	Green(62)	0	0	0	0	0	0	1	1	1	1	1	0	0	0	0	0	0	0
	Green(63)	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0
Gray Scale of Blue	Blue(0)/ Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Blue (1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Blue (2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Blue (61)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	1
	Blue (62)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	0
	Blue (63)	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1

Correspondence between Data and Display Position

	S0001	S0002	S0003	S0004	S0005	S0006	S0007	S0008	-----	S2399	S2400
C001	R001	G001	B001	R002	G002	B002	R003	G003		G800	B800
C480	R001	G001	B001	R002	G002	B002	R003	G003		G800	B800

No.	Test Item	Test Condition	Inspection after test
1	High Temperature Storage	$80 \pm 2^{\circ}\text{C}/240$ hours	Inspection after 2~4hours storage at room temperature, the sample shall be free from defects: 1.Air bubble in the LCD; 2.Sealleak; 3.Non-display; 4.missing segments; 5.Glass crack; 6.Current Idd is twice higher than initial value.
2	Low Temperature Storage	$-30 \pm 2^{\circ}\text{C}/240$ hours	
3	High Temperature Operating	$70 \pm 2^{\circ}\text{C}/240$ hours	
4	Low Temperature Operating	$-20 \pm 2^{\circ}\text{C}/240$ hours	
5	Temperature Cycle storage	$-30 \pm 2^{\circ}\text{C} \sim 25 \sim 80 \pm 2^{\circ}\text{C} \times 100$ cycles (30min.) (5min.) (30min.)	
6	Damp proof Test operating	$40^{\circ}\text{C} \pm 5^{\circ}\text{C} \times 90\%\text{RH}/240$ hours	
7	Vibration Test	Frequency: 0~55Hz Amplitude: 1.5mm 6 cycles for each direction of X.Y.Z	
Remark: 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>10MΩ) 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.Failure Judgment Criterion: Basic Specification, Electrical Characteristic, Mechanical Characteristic, Optical Characteristic.			

TITLE:FUNCTIONAL TEST & INSPECTION CRITERIA

This specification is made to be used as the standard acceptance/rejection criteria for Wider Screen TFT-LCD module product.

1. Sample plan

Sampling plan according to GB/T2828.1-2003/ISO 2859-1 : 1999 and ANSI/ASQC Z1.4-1993, normal level 2 and based on:

Major defect: AQL 0.65

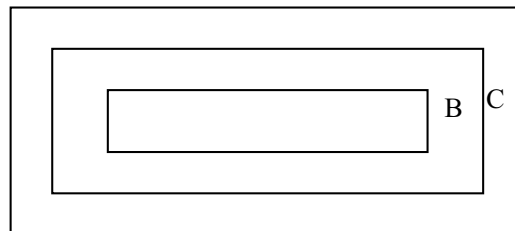
Minor defect: AQL 1.5

2. Inspection condition

Viewing distance for cosmetic inspection is about 30cm with bare eyes, and under an environment of 20~40W light intensity, all directions for inspecting the sample should be within 45° against perpendicular line. All inspection ND3% use.

3. Definition of Inspection Item.

3.1 Definition of inspection zone in LCD.



Zone A: character/Digit area

Zone B: viewing area except Zone A (ZoneA+ZoneB=minimum Viewing area)

Zone C: Outside viewing area (invisible area after assembly in customer’s product)

ZoneB+ZoneC= Around opaque edge area on TP.

Fig.1 Inspection zones in an LCD.

Note: As a general rule, visual defects in Zone C are permissible, when it is no trouble for quality and assembly of customer’s product.

3.2 Definition of some visual defect

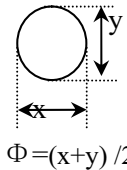
Bright dot.	Dots appear bright and unchanged in size in which LCD panel is displaying under black pattern.
Dark dot.	Dots appear dark and unchanged in size in which LCD panel is displaying under pure red, green, blue picture, or pure whiter picture.
Dark / Bright Lines.	Lines on display which appear dark/bright and usually result from the contamination.

TITLE:FUNCTIONAL TEST & INSPECTION CRITERIA

4. Major Defect

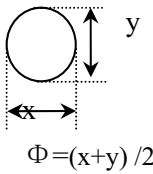
Item No	Items to be inspected	Inspection Standard	Classification of defects
4.1	All functional defects	1) No display 2) Display abnormally 3) Open or missing segment 4) Short circuit 5) Excess power consumption 6) Back-light no lighting, flickering and abnormal lighting.	Major
4.2	Missing	Missing component	
4.3	Outline dimension	Overall outline dimension beyond the drawing is not allowed.	
4.4	Crack	Creaks tend to break are not allowed.	

5. Minor Defect

Item No	Items to be inspected	Inspection Standard	Classification of defects																	
5.1	Bright dot defect.  $\Phi = (x+y) / 2$	<table border="1"> <thead> <tr> <th rowspan="2">Zone Size(mm)</th> <th colspan="3">Acceptable Qty</th> </tr> <tr> <th>A</th> <th>B</th> <th>C</th> </tr> </thead> <tbody> <tr> <td>$\Phi \leq 0.15$</td> <td colspan="2">Acceptable (clustering of spot not allowed)</td> <td rowspan="3">Acceptable</td> </tr> <tr> <td>$0.15 < \Phi \leq 0.25$</td> <td colspan="2">N ≤ 6.</td> </tr> <tr> <td>$0.25 < \Phi \leq 0.50$</td> <td colspan="2">N ≤ 2</td> </tr> </tbody> </table>	Zone Size(mm)	Acceptable Qty			A	B	C	$\Phi \leq 0.15$	Acceptable (clustering of spot not allowed)		Acceptable	$0.15 < \Phi \leq 0.25$	N ≤ 6.		$0.25 < \Phi \leq 0.50$	N ≤ 2		Minor
Zone Size(mm)	Acceptable Qty																			
	A	B	C																	
$\Phi \leq 0.15$	Acceptable (clustering of spot not allowed)		Acceptable																	
$0.15 < \Phi \leq 0.25$	N ≤ 6.																			
$0.25 < \Phi \leq 0.50$	N ≤ 2																			
5.2	Dark dot defect.	<table border="1"> <thead> <tr> <th rowspan="2">Zone Size(mm)</th> <th colspan="3">Acceptable Q'ty</th> </tr> <tr> <th>A</th> <th>B</th> <th>C</th> </tr> </thead> <tbody> <tr> <td>$\Phi \leq 0.15$</td> <td colspan="2">Acceptable</td> <td rowspan="3">Acceptable</td> </tr> <tr> <td>$0.15 < \Phi \leq 0.30$</td> <td colspan="2">N ≤ 6</td> </tr> <tr> <td>$0.30 < \Phi \leq 0.50$</td> <td colspan="2">N ≤ 4</td> </tr> </tbody> </table>	Zone Size(mm)	Acceptable Q'ty			A	B	C	$\Phi \leq 0.15$	Acceptable		Acceptable	$0.15 < \Phi \leq 0.30$	N ≤ 6		$0.30 < \Phi \leq 0.50$	N ≤ 4		
Zone Size(mm)	Acceptable Q'ty																			
	A	B	C																	
$\Phi \leq 0.15$	Acceptable		Acceptable																	
$0.15 < \Phi \leq 0.30$	N ≤ 6																			
$0.30 < \Phi \leq 0.50$	N ≤ 4																			
5.3	Bright / Dark line.	$0.01 < W \leq 0.10, 0.30 < L \leq 1.50, N \leq 1$	Acceptable																	

Note: 1. Total defective dots shall not exceed 6 pcs.
 2. Minimum distance between defective dots is more than 5mm.
 3. 2 Adjacent dark sub pixel defect or bright sub pixel defect is not more than 1pair.
 4. W: Width, L: Length, N: Count.

TITLE:FUNCTIONAL TEST & INSPECTION CRITERIA

Item No	Items to be inspected	Inspection Standard	Classification of defects																										
5.4	Linear defect Foreign material under polarizer,	<table border="1"> <thead> <tr> <th colspan="2">Size(m)</th> <th colspan="3">Acceptable Qty</th> </tr> <tr> <th rowspan="2">L(Length)</th> <th rowspan="2">W(Width)</th> <th colspan="3">Zone</th> </tr> <tr> <th>A</th> <th>B</th> <th>C</th> </tr> </thead> <tbody> <tr> <td>Ignore</td> <td>$W \leq 0.05$</td> <td colspan="2">Acceptable</td> <td rowspan="3">Acceptable</td> </tr> <tr> <td>$L \leq 5.0$</td> <td>$0.05 < W \leq 0.15$</td> <td colspan="2">$N \leq 5$</td> </tr> <tr> <td>$5.0 \leq L$</td> <td>$0.15 \leq W$</td> <td colspan="2">0</td> </tr> </tbody> </table>	Size(m)		Acceptable Qty			L(Length)	W(Width)	Zone			A	B	C	Ignore	$W \leq 0.05$	Acceptable		Acceptable	$L \leq 5.0$	$0.05 < W \leq 0.15$	$N \leq 5$		$5.0 \leq L$	$0.15 \leq W$	0		Minor
	Size(m)		Acceptable Qty																										
L(Length)	W(Width)	Zone																											
		A	B	C																									
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	Circular Defect, Foreign material under polarizer, 	<table border="1"> <thead> <tr> <th rowspan="2">Zone \ Size(mm)</th> <th colspan="3">Acceptable Q'ty</th> </tr> <tr> <th>A</th> <th>B</th> <th>C</th> </tr> </thead> <tbody> <tr> <td>$\Phi \leq 0.25$</td> <td colspan="2">Acceptable</td> <td rowspan="3">Acceptable</td> </tr> <tr> <td>$0.25 < \Phi \leq 0.50$</td> <td colspan="2">$N \leq 4$</td> </tr> <tr> <td>$0.50 \leq \Phi$</td> <td colspan="2">0</td> </tr> </tbody> </table>	Zone \ Size(mm)	Acceptable Q'ty			A	B	C	$\Phi \leq 0.25$	Acceptable		Acceptable	$0.25 < \Phi \leq 0.50$	$N \leq 4$		$0.50 \leq \Phi$	0		Minor									
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5.5	Polarizer defect.	5.4.1 Polarizer Position (i) Shifting in position should not exceed the glass outline dimension. (ii) Incomplete covering of the viewing area due to shifting is not allowed. 5.4.2 Dirt on polarizer Dirt which can be wiped easily should be accepted. 5.4.3 Polarizer Nick & Dent <table border="1"> <thead> <tr> <th rowspan="2">Sizes(mm)</th> <th colspan="3">Acceptable Qty</th> </tr> <tr> <th colspan="3">Zone</th> </tr> <tr> <th></th> <th>A</th> <th>B</th> <th>C</th> </tr> </thead> <tbody> <tr> <td>$\Phi < 0.25$</td> <td colspan="2">Acceptable</td> <td rowspan="3">Acceptable</td> </tr> <tr> <td>$0.25 \leq \Phi \leq 0.5$</td> <td colspan="2">$N \leq 4$</td> </tr> <tr> <td>$\Phi > 0.5$</td> <td colspan="2">0</td> </tr> </tbody> </table>	Sizes(mm)	Acceptable Qty			Zone				A	B	C	$\Phi < 0.25$	Acceptable		Acceptable	$0.25 \leq \Phi \leq 0.5$	$N \leq 4$		$\Phi > 0.5$	0		Minor					
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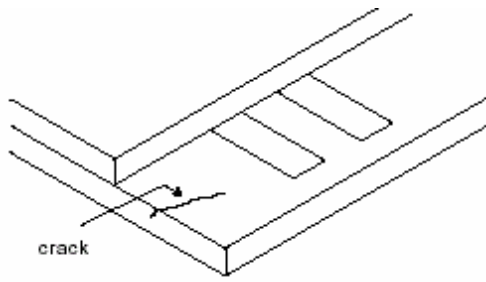
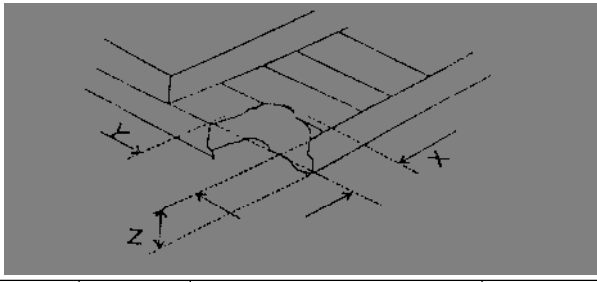
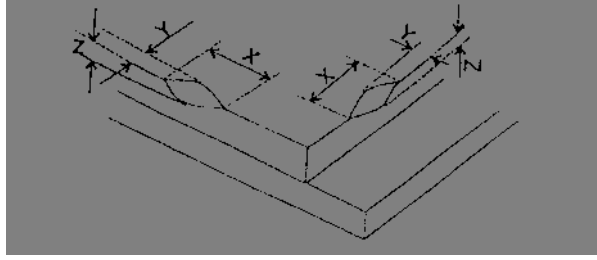
TITLE:FUNCTIONAL TEST & INSPECTION CRITERIA

5. Minor Defect

Item No	Items to be inspected	Inspection Standard	Classification of defects																										
5.6	Polarizer defect	5.4.4 Air bubbles between glass & polarizer: <table border="1" style="margin-left: 20px;"> <thead> <tr> <th rowspan="3">Size(mm)</th> <th colspan="3">Acceptable Qty</th> </tr> <tr> <th colspan="3">Zone</th> </tr> <tr> <th>A</th> <th>B</th> <th>C</th> </tr> </thead> <tbody> <tr> <td>$\Phi \leq 0.3$</td> <td colspan="2">Acceptable</td> <td rowspan="4">Acceptable</td> </tr> <tr> <td>$0.3 < \Phi \leq 1.0$</td> <td colspan="2">3</td> </tr> <tr> <td>$1.0 < \Phi \leq 1.5$</td> <td colspan="2">1</td> </tr> <tr> <td>$\Phi > 1.5$</td> <td colspan="2">0</td> </tr> </tbody> </table>	Size(mm)	Acceptable Qty			Zone			A	B	C	$\Phi \leq 0.3$	Acceptable		Acceptable	$0.3 < \Phi \leq 1.0$	3		$1.0 < \Phi \leq 1.5$	1		$\Phi > 1.5$	0		Minor			
		Size(mm)		Acceptable Qty																									
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$\Phi > 1.5$	0																												
		5.4.5 Polarizer scratch <p>(i) If the Polarizer scratch can be seen after cover assembling or in the operating condition, judge by the line defect of 5.4.</p> <p>(ii) If the Polarizer scratch can be seen only in non-operating condition or some special angle, judge by the following.</p> <table border="1" style="margin-left: 20px;"> <thead> <tr> <th colspan="2">Size(mm)</th> <th colspan="3">Acceptable Qty</th> </tr> <tr> <th rowspan="2">L(Length)</th> <th rowspan="2">W(Width)</th> <th colspan="3">Zone</th> </tr> <tr> <th>A</th> <th>B</th> <th>C</th> </tr> </thead> <tbody> <tr> <td>Ignore</td> <td>$W \leq 0.02$</td> <td colspan="2">Ignore</td> <td rowspan="3">Ignore</td> </tr> <tr> <td>$1.0 < L \leq 5.0$</td> <td>$0.02 < W \leq 0.2$</td> <td colspan="2">$N \leq 4.$</td> </tr> <tr> <td>$5.0 < L$</td> <td>$0.2 < W$</td> <td colspan="2">0</td> </tr> </tbody> </table>	Size(mm)		Acceptable Qty			L(Length)	W(Width)	Zone			A	B	C	Ignore	$W \leq 0.02$	Ignore		Ignore	$1.0 < L \leq 5.0$	$0.02 < W \leq 0.2$	$N \leq 4.$		$5.0 < L$	$0.2 < W$	0		Minor
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TITLE:FUNCTIONAL TEST & INSPECTION CRITERIA

5. Minor Defect

Item No	Items to be inspected	Inspection Standard	Classification of defects								
5.7	Glass defect	<p>(i) Crack Cracks are not allowed.</p>  <p>The diagram shows a 3D perspective of a glass surface with a crack. The crack is labeled 'crack' and is shown as a jagged line extending across the surface.</p>	Minor								
		<p>(ii) TFT chips on corner</p>  <table border="1" data-bbox="475 1243 1161 1400"> <thead> <tr> <th>X</th> <th>Y</th> <th>Z</th> <th>Acceptable</th> </tr> </thead> <tbody> <tr> <td>≤ 3.0</td> <td>≤ 3.0</td> <td>Not more than the thickness of glass.</td> <td>$N \leq 3.$</td> </tr> </tbody> </table> <p>Chips on the corner of terminal shall not be allowed to extend into the ITO pad or expose perimeter seal.</p>	X	Y	Z	Acceptable	≤ 3.0	≤ 3.0	Not more than the thickness of glass.	$N \leq 3.$	Minor
		X	Y	Z	Acceptable						
≤ 3.0	≤ 3.0	Not more than the thickness of glass.	$N \leq 3.$								
<p>(iii) Usual surface cracks</p>  <table border="1" data-bbox="481 1792 1152 1960"> <thead> <tr> <th>X</th> <th>Y</th> <th>Z</th> <th>Acceptable</th> </tr> </thead> <tbody> <tr> <td>≤ 1.5</td> <td>≤ 1.5</td> <td>Not more than the thickness of glass.</td> <td>$N \leq 4.$</td> </tr> </tbody> </table> <p>It is only applicable to the upper glass of LCD.</p>	X	Y	Z	Acceptable	≤ 1.5	≤ 1.5	Not more than the thickness of glass.	$N \leq 4.$	Minor		
X	Y	Z	Acceptable								
≤ 1.5	≤ 1.5	Not more than the thickness of glass.	$N \leq 4.$								

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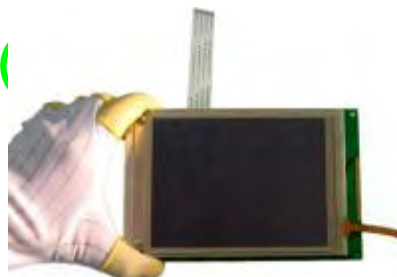
6. Module Cosmetic Criteria

Item No	Items to be inspected	Inspection Standard	Classification of defects
1	Difference in Spec.	None allowed	Major
2	Pattern peeling	No substrate pattern peeling and floating	Major
3	Soldering defects	No soldering missing No soldering bridge No cold soldering	Major Major Minor
4	Resist flaw on Printed Circuit Boards	visible copper foil ($\varnothing 0.5\text{mm}$ or more) on substrate pattern.	Minor
5	Accretion of metallic Foreign matter	No accretion of metallic foreign matters (Not exceed $\varnothing 0.2\text{mm}$).	Minor Minor
6	Stain	No stain to spoil cosmetic badly.	Minor
7	Plate discoloring	No plate fading, rusting and discoloring.	Minor
8	Solder amount	a. Soldering side of PCB Solder to form a 'Filet' all around the lead. Solder should not hide the lead form perfectly. (too much)	Minor
	1. Lead parts	b. Components side (In case of 'Through Hole PCB') Solder to reach the Components side of PCB.	
	2. Flat packages	Either 'Toe' (A) or 'Seal' (B) of the lead to be covered by 'Filet'. Lead form to be assume over solder.	
3. Chips	$(3/2) H \geq h \geq (1/2) H$		Minor
9	Solder ball/Solder splash	a. The spacing between solder ball and the conductor or solder pad $h \geq 0.13\text{mm}$. The diameter of solder ball $d \leq 0.15\text{mm}$.	Minor Minor Major Minor
		b. The quantity of solder balls or solder. Splashes isn't beyond 5 in 600 mm^2 .	
		c. Solder balls/Solder splashes do not violate minimum electrical clearance.	
		d. Solder balls/Solder splashes must be entrapped / encapsulated or attached to the metal surface .	
		Note: Entrapped/encapsulated/attached is intended to mean that normal service environment of the product will not cause a solder ball to become dislodged.	

2 Handling precaution for LCM

2.1 LCM is easy to be damaged. Please note below and be careful for handling.

2.2 Correct handling:

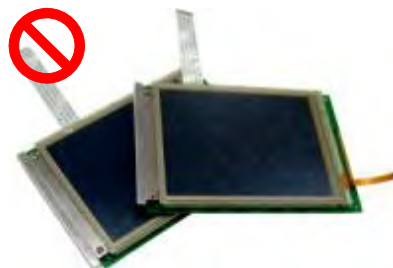


As above picture, please handle with anti-static gloves around LCM edges.

2.3 Incorrect handling:



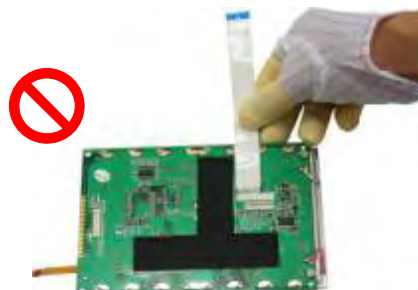
Please don't touch IC directly.



Please don't stack LCM.



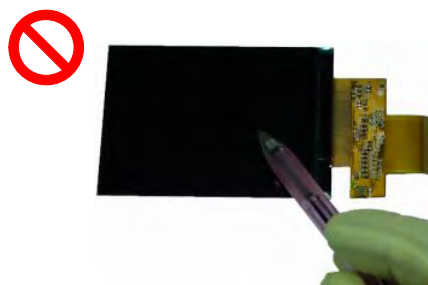
Please don't hold the surface of panel.



Please don't stretch interface of output, such as FPC cable.



Please don't hold the surface of IC.



Please don't operate with sharp stick such as pens.

3 Storage Precautions

3.1 When storing the LCD modules, the following precaution are necessary.

- 3.1.1 Store them in a sealed polyethylene bag. If properly sealed, there is no need for the desiccant.
- 3.1.2 Store them in a dark place. Do not expose to sunlight or fluorescent light, keep the temperature between 0°C and 35°C, and keep the relative humidity between 40%RH and 60%RH.
- 3.1.3 The polarizer surface should not come in contact with any other objects (We advise you to store them in the anti-static electricity container in which they were shipped).

3.2 Others 其它

- 3.2.1 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.
- 3.2.2 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.
- 3.2.3 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.
 - 3.2.3.1 - Exposed area of the printed circuit board.
 - 3.2.3.2 - Terminal electrode sections.

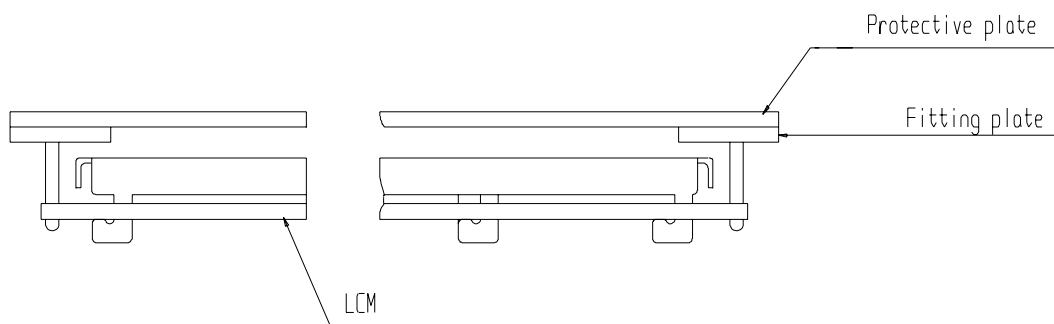
4 USING LCD MODULES

4.1 Installing LCD Modules

The hole in the printed circuit board is used to fix LCM as shown in the picture below.

Attend to the following items when installing the LCM.

- 4.1.1 Cover the surface with a transparent protective plate to protect the polarizer and LC cell.



4.3 Precaution for soldering the LCM

	Manual soldering	Machine drag soldering	Machine press soldering
No RoHS Product	290°C ~350°C. Time : 3-5S.	330°C ~350°C. Speed : 15-17 mm/s.	300°C ~330°C. Time : 3-6S. Press: 0.8~1.2Mpa
RoHS Product	340°C ~370°C. Time : 3-5S.	350°C ~370°C. Speed : 15-17 mm/s.	330°C ~360°C. Time : 3-6S. Press: 0.8~1.2Mpa