

**SPECIFICATION
OF
LCD MODULE**

MODULE NO.: HL068T01-01

Customer Approval:

☐ **Accept**

☐ **Reject**

	SIGNATURE	DATE
PREPARED BY		
CHECKED BY		
APPROVED BY		

DOCUMENT REVISION HISTORY

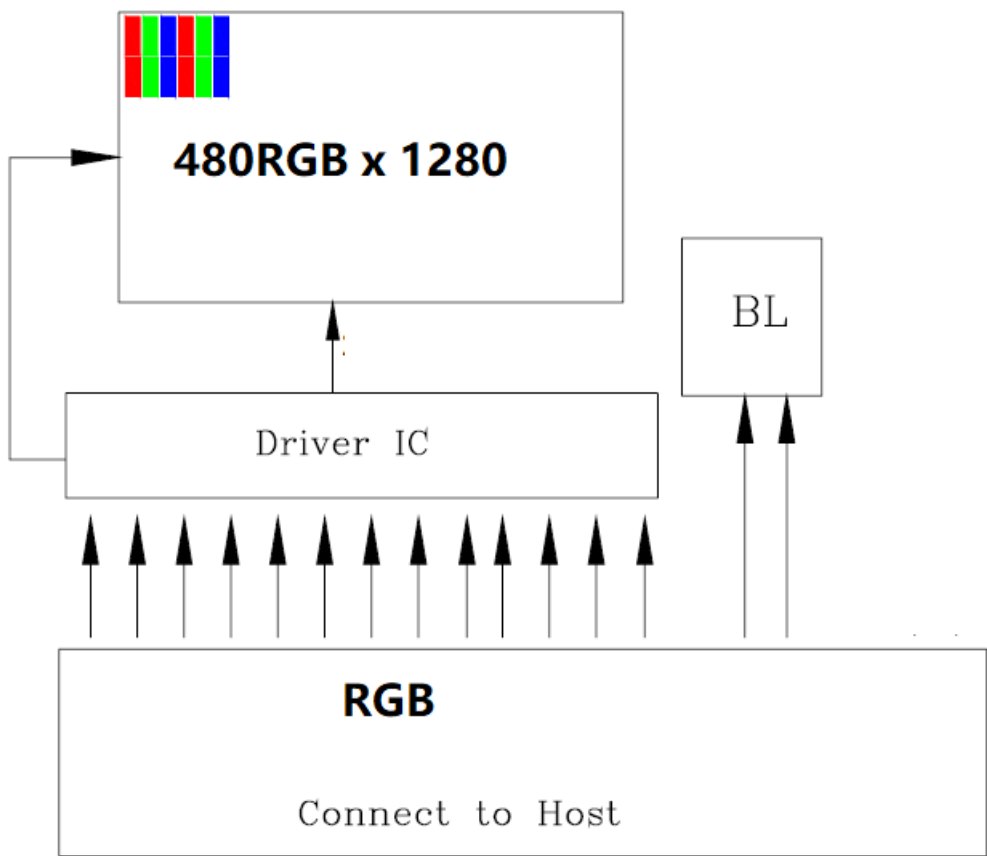
Sample Version	Doc. Version	DATE	DESCRIPTION	CHECKED BY
	A0	2025-4-7	First Release.	

1. MECHANICAL SPECIFICATIONS:

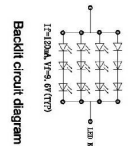
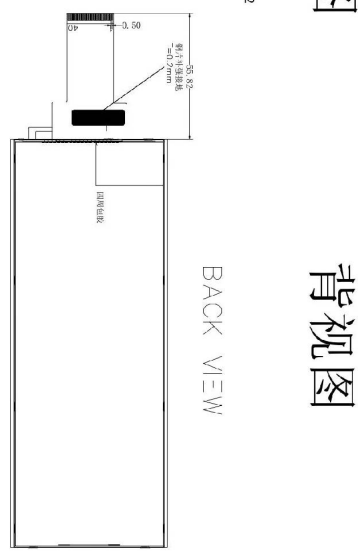
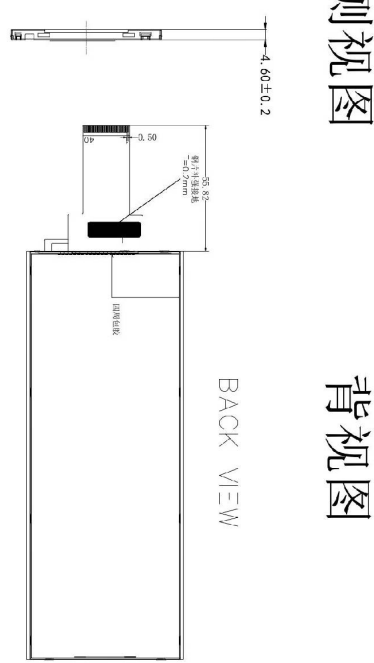
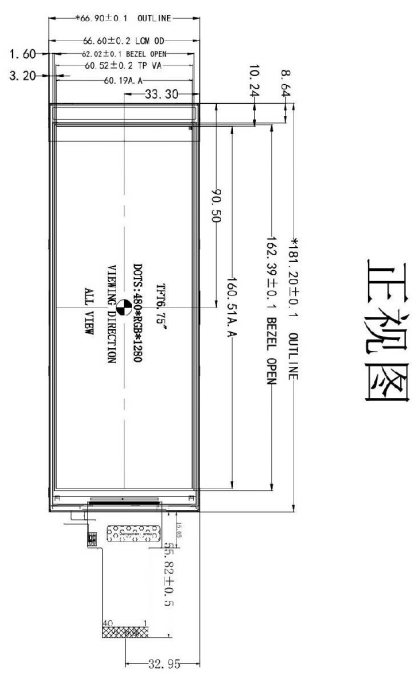
ITEM	SPECIFICATION	UNIT
OUTLINE DIMENSIONS	181.2 (W) X66.9 (H) X4.6(D)	mm
ACTIVE AREA	160.51 (W) X 60.19 (H)	
DISPLAY SIZE	6.86	inch
DOT PITCH	0.12mmX0.12mm	mm
NUMBER OF DOTS	480* (RGB) *1280	-
LCD TYPE	TFT(16.7M) TRANSMISSIVE	-
BACKLIGHT TYPE	LED White	-
VIEWING DIRECTION	FREE	-
TOUCH PANEL	NONE	

***See attached drawing for details.**

2.BLOCK DIAGRAM:



3.DIMENSIONAL



1	LED1	21	B0
2	LED2	22	B1
3	LED3	23	B2
4	LED4	24	B3
5	LED5	25	B4
6	LED6	26	B5
7	LED7	27	B6
8	LED8	28	B7
9	LED9	29	B8
10	LED10	30	B9
11	LED11	31	B10
12	LED12	32	B11
13	LED13	33	B12
14	LED14	34	B13
15	LED15	35	B14
16	LED16	36	B15
17	LED17	37	B16
18	LED18	38	B17
19	LED19	39	B18
20	LED20	40	B19
21	LED21	41	B20
22	LED22	42	B21
23	LED23	43	B22
24	LED24	44	B23
25	LED25	45	B24
26	LED26	46	B25
27	LED27	47	B26
28	LED28	48	B27
29	LED29	49	B28
30	LED30	50	B29
31	LED31	51	B30
32	LED32	52	B31
33	LED33	53	B32
34	LED34	54	B33
35	LED35	55	B34
36	LED36	56	B35
37	LED37	57	B36
38	LED38	58	B37
39	LED39	59	B38
40	LED40	60	B39
41	LED41	61	B40
42	LED42	62	B41
43	LED43	63	B42
44	LED44	64	B43
45	LED45	65	B44
46	LED46	66	B45
47	LED47	67	B46
48	LED48	68	B47
49	LED49	69	B48
50	LED50	70	B49
51	LED51	71	B50
52	LED52	72	B51
53	LED53	73	B52
54	LED54	74	B53
55	LED55	75	B54
56	LED56	76	B55
57	LED57	77	B56
58	LED58	78	B57
59	LED59	79	B58
60	LED60	80	B59
61	LED61	81	B60
62	LED62	82	B61
63	LED63	83	B62
64	LED64	84	B63
65	LED65	85	B64
66	LED66	86	B65
67	LED67	87	B66
68	LED68	88	B67
69	LED69	89	B68
70	LED70	90	B69
71	LED71	91	B70
72	LED72	92	B71
73	LED73	93	B72
74	LED74	94	B73
75	LED75	95	B74
76	LED76	96	B75
77	LED77	97	B76
78	LED78	98	B77
79	LED79	99	B78
80	LED80	100	B79
81	LED81	101	B80
82	LED82	102	B81
83	LED83	103	B82
84	LED84	104	B83
85	LED85	105	B84
86	LED86	106	B85
87	LED87	107	B86
88	LED88	108	B87
89	LED89	109	B88
90	LED90	110	B89
91	LED91	111	B90
92	LED92	112	B91
93	LED93	113	B92
94	LED94	114	B93
95	LED95	115	B94
96	LED96	116	B95
97	LED97	117	B96
98	LED98	118	B97
99	LED99	119	B98
100	LED100	120	B99
101	LED101	121	B100
102	LED102	122	B101
103	LED103	123	B102
104	LED104	124	B103
105	LED105	125	B104
106	LED106	126	B105
107	LED107	127	B106
108	LED108	128	B107
109	LED109	129	B108
110	LED110	130	B109
111	LED111	131	B110
112	LED112	132	B111
113	LED113	133	B112
114	LED114	134	B113
115	LED115	135	B114
116	LED116	136	B115
117	LED117	137	B116
118	LED118	138	B117
119	LED119	139	B118
120	LED120	140	B119
121	LED121	141	B120
122	LED122	142	B121
123	LED123	143	B122
124	LED124	144	B123
125	LED125	145	B124
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142	LED142	162	B141
143	LED143	163	B142
144	LED144	164	B143
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146	LED146	166	B145
147	LED147	167	B146
148	LED148	168	B147
149	LED149	169	B148
150	LED150	170	B149
151	LED151	171	B150
152	LED152	172	B151
153	LED153	173	B152
154	LED154	174	B153
155	LED155	175	B154
156	LED156	176	B155
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161	LED161	181	B160
162	LED162	182	B161
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164	LED164	184	B163
165	LED165	185	B164
166	LED166	186	B165
167	LED167	187	B166
168	LED168	188	B167
169	LED169	189	B168
170	LED170	190	B169
171	LED171	191	B170
172	LED172	192	B171
173	LED173	193	B172
174	LED174	194	B173
175	LED175	195	B174
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178	LED178	198	B177
179	LED179	199	B178
180	LED180	200	B179
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182	LED182	202	B181
183	LED183	203	B182
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315	LED315	335	B314
316	LED316	336	B315
317	LED317	337	B316
318	LED318	338	B317
319	LED319	339	B318
320	LED320	340	B319
321	LED321	341	B320
322	LED322	342	B321
323	LED323	343	B322
324	LED324	344	B323

4. PIN DESCRIPTION:

NO.	PIN NAME	I/O	Description
1	VBL-	P	Backlight LED Cathode
2	VBL+	P	Backlight LED Anode
3	GND	P	System Ground
4	VCC	P	Power supply for logic operation
5	R0	I	Red data input(LSB)
6	R1	I	Red data input
7	R2	I	Red data input
8	R3	I	Red data input
9	R4	I	Red data input
10	R5	I	Red data input
11	R6	I	Red data input
12	R7	I	Red data input(MSB)
13	G0	I	Green data input(LSB)
14	G1	I	Green data input
15	G2	I	Green data input
16	G3	I	Green data input
17	G4	I	Green data input
18	G5	I	Green data input
19	G6	I	Green data input
20	G7	I	Green data input(MSB)
21	B0	I	Blue data input(LSB).
22	B1	I	Blue data input
23	B2	I	Blue data input
24	B3	I	Blue data input
25	B4	I	Blue data input
26	B5	I	Blue data input
27	B6	I	Blue data input
28	B7	I	Blue data input(MSB)
29	GND	P	Ground
30	CLK	I	Pixel clock signal ,in RGB mode
31	DISP	I	Display on/off control
32	HSYNC	I	Horizontal Sync signal in RGB mode
33	VSYNC	I	Vrtical Sync signal
34	DEN	I	Data Enable
35	NC	-	No connect
36	GND	P	System Ground
37	SCL	I	Serial clock
38	SDA	IO	Serial data
39	CS	I	Chip selction
40	NC	-	No connection

5. MAXIMUM ABSOLTE LIMIT:

Item	Symbol	Value	Unit
Power supply voltage for core	V _{DD}	-0.3~4	V
Input voltage	V _{in}	V _{DD} +0.3	V
Operating temperature	T _{opr}	-20 to 70	°C
Storage temperature	T _{stg}	-30 to 80	°C

Note: Note1: Absolute maximum rating is the limit value beyond which the IC maybe broken.

They do not assure operations.

Note2: Background color changes slightly depending on ambient temperature. This Phenomenon is reversible.

T_a ≤ 70°C: 75%RH max

T_a > 70°C: absolute humidity must be lower than the humidity of 75%RH at 70°C

Note3: T_a at -30°C will be <48hrs, at 80 °C will be <120hrs

6.ELECTRICAL CHARACTERISTICS

6-1 DC Characteristics (T_a=25°C)

Item	Symbol	Min	Type	Max	Unit	Test condition
Operating voltage for core	V _{DD}	3.0	3.3	3.6	V	-
Supply current	I _{DD}	-	TBD	-	mA	V _{DD} =3.3V, T _a =25°C
Input voltage	V _{IH}	0.7V _{DD}	-	V _{DD}	V	-
	V _{IL}	0	-	0.3V _{DD}	V	
Input leakage current	I _{IL}	-1.0	-	1.0	μA	V _{IN} =V _{DD} or V _{SS}

Note: Voltage greater than above may damage the module.

All voltages are specified relative to V_{SS}=0V.

6-2 Backlight Electrical-optical Characteristics

1. Stander Lamp Styles(Edge Lighting Type):

The LED chips are distributed over the edge light area of the illumination unit, which gives the less power consumption:

2. The Main Advantages of the LED Backlight are as following:

2.1 The brightness of the backlight can simply be adjusted by a resistor or a potentiometer.

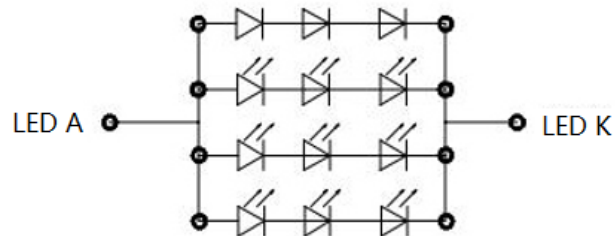
3. Data About LED Backlight:

Item	Symbol	MIN	TYP	MAX	UNIT	Test Condition	Note
Supply Voltage	Vf	-	9.6	10.2	V	If=120 mA	-
Supply Current	If	-	120	-	mA	-	-
Reverse Voltage	Vr	-	-	5	V	10uA	
Power dissipation	Pd	-	1152	-	mW	-	
Uniformity for LCM	-	80	-	-	%	If=120mA	3
Life Time	-	30000	-	-	Hr	If=120 mA	-
Backlight Color	White						

1. Average Luminous Intensity of P1-P9

2. Uniformity = Min/Max * 100%

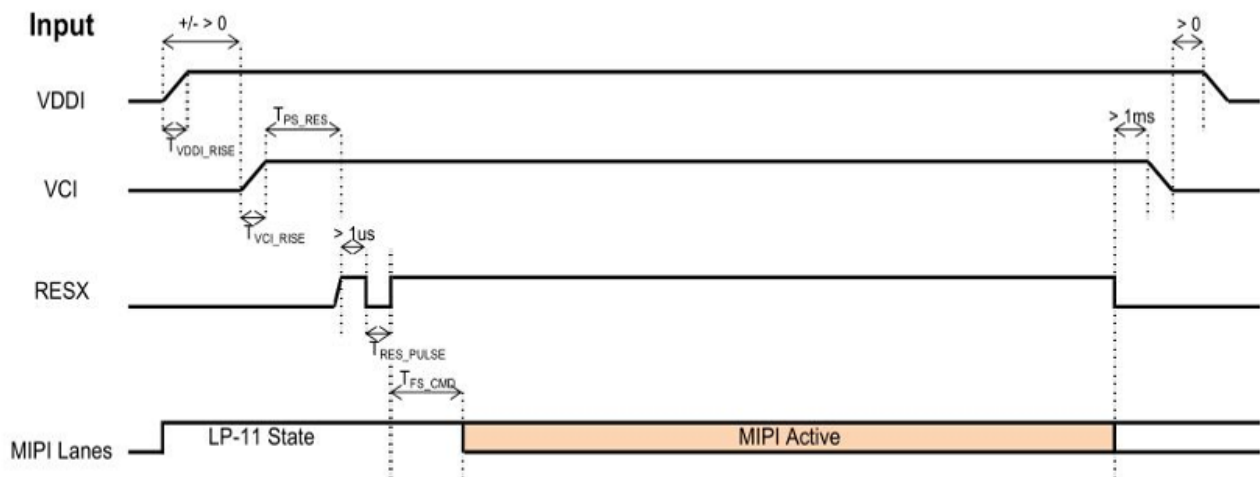
3.LED life time defined as follows: The final brightness is at 50% of original brightness



7.AC TIMING

480RGBx1280(4 Data Lanes)						
Parameter		Symbol	Min.	Typ.	Max.	Unit
MIPI data frequency		FDATA	300	320	350	Mbps
Clock frequency		FRAME		60		HZ
Hertical Section	Active	THD	480			us
	Period	TH	482.5	512	–	us
	HBP	THBP	1	12	–	us
	HFP	THFP	1	16	–	us
	HSYNC	THPW	0.2	4	–	us
Vorizontal Section	Active	TVD	1280			Line
	Period	TV	1286	1312	–	Line
	VBP	TVBP	2	12	–	Line
	VFP	TVFP	2	16	–	Line
	VSYNC	FTPW	2	4	–	Line

7.1 Power ON/OFF Sequence



Symbol	Characteristics	Min.	Typ.	Max.	Units
T _{VDDI_RISE}	VDDI Rise time	20	-	-	us
T _{VCI_RISE}	Case A: VCI Rise time	200	-	-	us
	Case B: VCI Rise time	40			
T _{PS_RES}	VDDI/VCI on to Reset high	5	-	-	ms
T _{RES_PULSE}	Reset low pulse time	10	-	-	us
T _{FS_CMD}	Reset to first command	10	-	-	ms

8. OPTICAL CHARACTERISTICS:

Driving the backlight

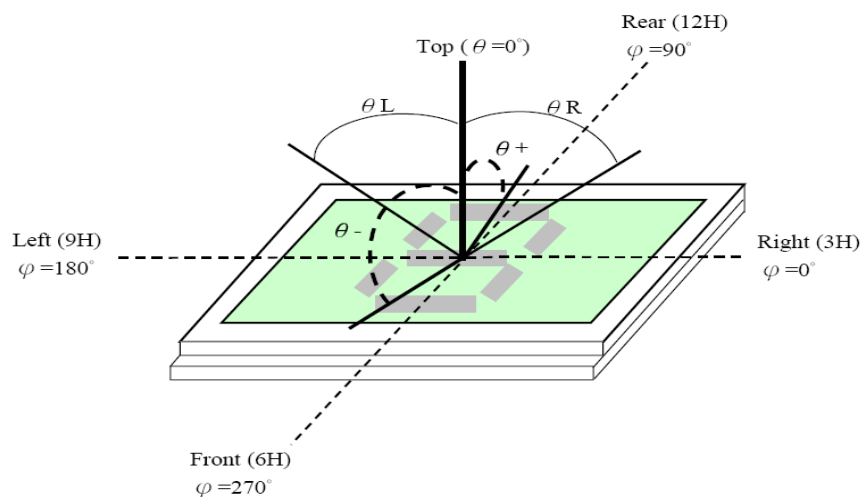
No.	ITEM		Symbol	Conditions	Specification			Unit	Note
					Min	Typ	Max		
1	Response Time		Tr+Tf	25℃	-	25	40	Ms	(1)(2)
2	Contrast Rate		Cr	θ=0, Normal viewing angle	600	800	-	-	(1)(3)
3	Viewing Angle	Hor.	θL	CR>10	70	80	-	Deg	-
			θR		70	80	-		
		Ver.	Θ+		70	80	-		
			Θ-		70	80	-		
4	Chromaticiry	White	x	Brightness is ON	0.278	0.298	0.318		
			y		0.311	0.331	0.51		
		Red	x		0.587	0.607	0.627		
			y		0.310	0.330	0.350		
		Green	x		0.258	0.278	0.298		
			y		0.526	0.546	0.566		
		Blue	x		0.121	0.141	0.161		
			y		0.138	0.158	0.178		
5	NTSC		S			50		%	
6	luminance		L		240	300		cd/m2	
7	Uniformity		U		80			%	

Measure Conditions:

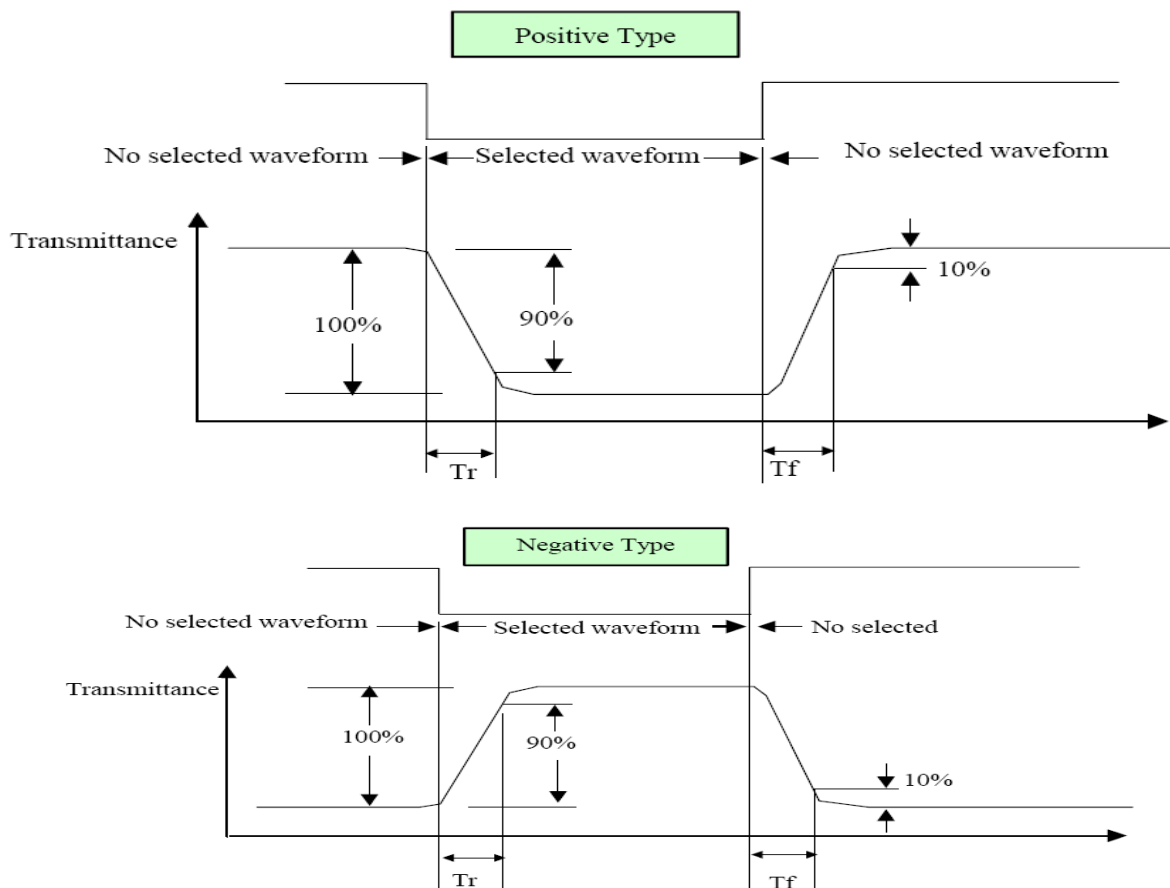
1. Measure surrounding : dark room;
2. Ambient temperature: 25±2°C;
3. 30min.warm-up time.

Note Definition:

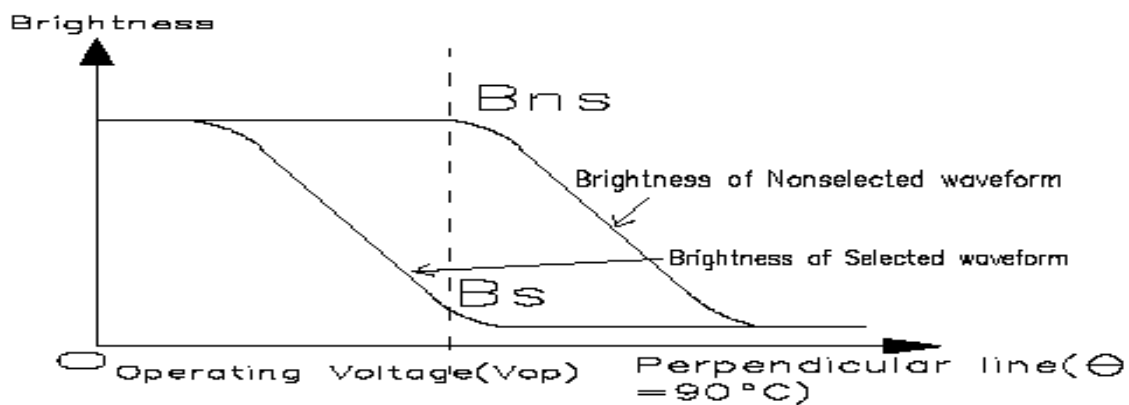
Note(1)Viewing angle range:



Note(2) Response Time:

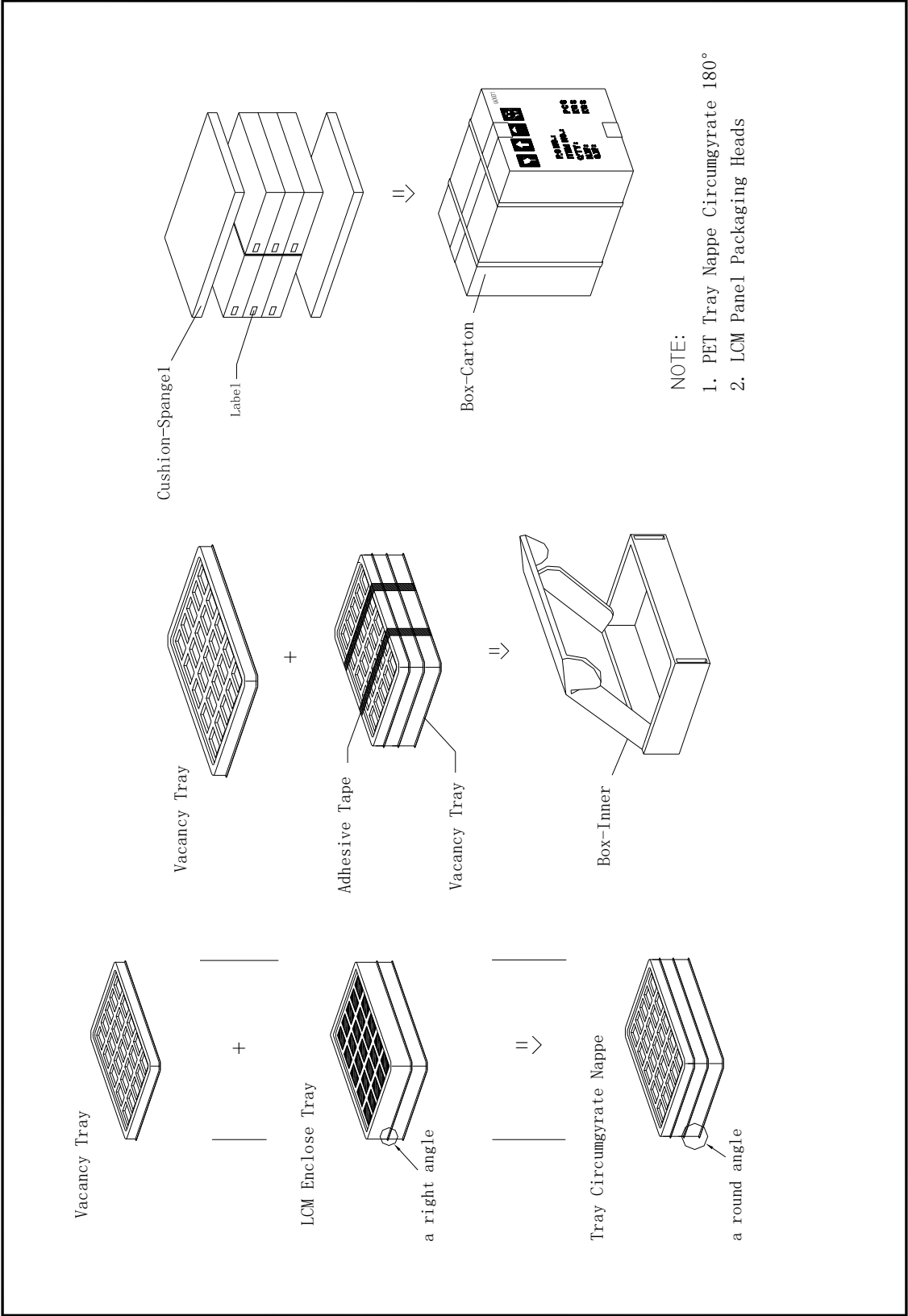


Note(3) Contrast Ratio Definition:



$$\text{Contrast Ratio (Cr)} = \frac{\text{Luminance with all pixel white}}{\text{Luminance with all pixel black}}$$

9.PACKAGE.



10. STANDARD SPECIFICATION FOR RELIABILITY:

Item	Condition		Time (hrs)	Assessment
High temp. Storage	80°C		120	No abnormalities in functions and appearance
High temp. Operating	70°C		120	
Low temp. Storage	-30°C		120	
Low temp. Operating	-20°C		120	
Humidity	40°C/ 90%RH		120	
Thermal Shock Temp. Cycle	-20°C ← →70°C (0.5hour ← → 0.5 hour)		10cycles	
ESD Testing	HBM:	±8KV		330Ω/150PF
	MM:	±200V		200PF/0Ω

Functions, performance, appearance, etc. shall be free from remarkable deterioration within 50,000 hours under ordinary operating and storage conditions room temperature ($25\pm 10^{\circ}\text{C}$), normal humidity ($45\pm 20\%$ RH), and in area not exposed to direct sun light. (Life time of backlight, please refer to Data about backlight.)

Testing Conditions and Inspection Criteria:

For the final test the testing sample must be stored at room temperature for 24 hours, after the tests listed in up Table, Standard specifications for Reliability have been executed in order to ensure stability.

Item	Test Model	In section Criteria
Current Consumption	Refer To Specification	The current consumption should conform to the product specification.
Contrast	Refer To Specification	After the tests have been executed, the contrast must be larger than half of its initial value prior to the tests.
Appearance	Visual inspection	Defect free.

11.SPECIFICATION OF QUALITY ASSURANCE:

11.1 Purpose

This standard for Quality Assurance should affirm the quality of LCD Module products to supply.

11.2 Standard for Quality Test

a. Inspection:

Before delivering, the supplier should take the following tests, and affirm the quality of product.

b. Electro-Optical Characteristics:

According to the individual specification to test the product.

c. Test of Appearance Characteristics:

According to the individual specification to test the product.

d. Test of Reliability Characteristics:

According to the definition of reliability on the specification for testing products.

e. Delivery Test:

Before delivering, the supplier should take the delivery test.

(i) Test method: According to MIL-STD105E.General Inspection Level II take a single time.

(ii) The defects classify of AQL as following:

Major defect: AQL = 0.65

Minor defect: AQL = 2.5

Total defects: AQL = 2.5

11.3. Nonconforming Analysis & Deal With Manners

a. Nonconforming Analysis:

(i) Purchaser should supply the detail data of non- conforming sample and the non- conforming.

(ii) After accepting the detail data from purchaser, the analysis of nonconforming should be finished in two weeks.

(iii) If supplier can not finish analysis on time, must announce purchaser before two weeks.

b. Disposition of nonconforming:

(i) If find any product defect of supplier during assembly time, supplier must change the good product for every defect after recognition.

(ii) Both supplier and customer should analyze the reason and discuss the disposition of nonconforming when the reason of nonconforming is not sure.

11.4. Agreement items

Both sides should discuss together when the following problems happen.

a. There is any problem of standard of quality assurance, and both sides think that it must be modified.

b. There is any argument item which does not record in the standard of quality assurance.

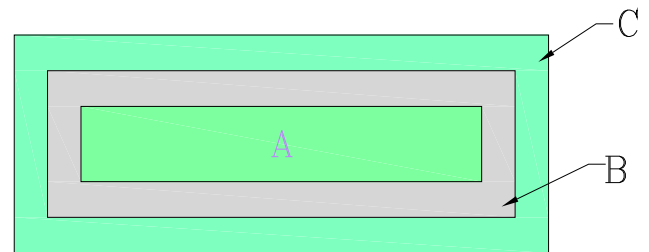
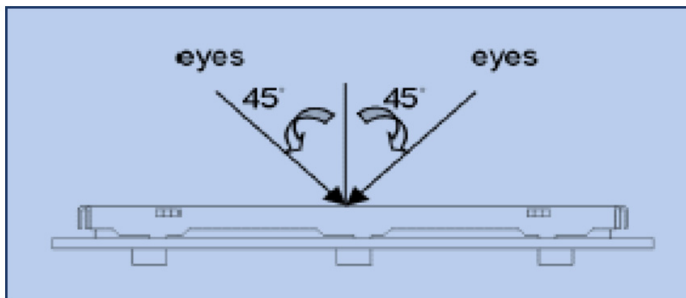
c. Any other special problem.

11.5 Standard of The Product Appearance Test

a. Manner of appearance test: This specification should be applied for both light on and off situation.

(i) The test must be under $20W \times 2$ or $40W$ fluorescent light, and the distance of view must be at $30 \pm 5cm$.

- (ii) When test the model of transmissive product must add the reflective plate.
- (iii) The test direction is base on about around 10° of vertical line (Left graph)
- (iii) Temperature: $25 \pm 5^\circ\text{C}$ Humidity: $65 \pm 10\% \text{RH}$



(iv) Definition of area (Right graph)

A. Area: Viewing area. B. Area: Out of viewing area.(Outside viewing area)

b. Basic principle:

- (i) It will accord to the AQL when the standard can not be described.
- (ii) The sample of the lowest acceptable quality level must be discussed by both supplier and customer when any dispute happened.
- (iii) Must add new item on time when it is necessary.

c. Standard of inspection: (Unit: mm)

Allowable limits defined in follow Dot defect Table should be met for each white, black , R, G, B raster. The limits apply to the entire area. Missing white in 60% or more of typical (one color, R or G or B) pixel aperture is defined as a bright defect, less than 60% is acceptable .Black spot in 60% or more of typical pixel aperture is defined as a dark defect, less than 60% is acceptable.

Dot defect table:

Item		White dot defect	Black dot defect	Total
1	Defect counts	3	3	3
2	Combined defect Counts	No combined dot defect allowed. Two Single dot defect that within 5mm during each dot defect should be counted as combined dot defect.		

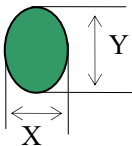
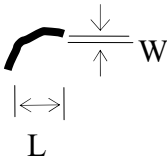
11.6 Inspection specification

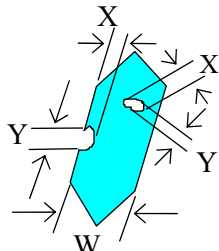
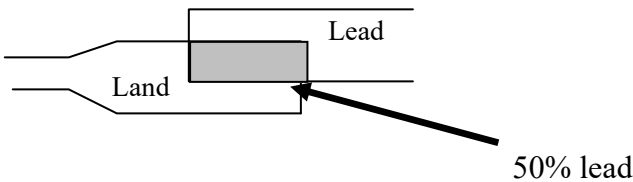
AQL inspection standard

Sampling method: MIL-STD-105E, Level II, single sampling

Classify	Item		Note	AQL	
Major	Display state	Short or open circuit	1	0.65	
		Contrast defect (dim, ghost)			
		LC leakage			
		Flickering			
		No display			
		Wrong viewing direction	2		
		Wrong Back-light	7		
	Non-display	Flat cable or pin reverse	9		
		Wrong or missing component	10		
Minor	Display state	Background color deviation	2	2.5	
		Black spot and dust	3		
		Line defect	4		
		Scratch			
		Rainbow	5		
		Pin hole	6		
	Polarizer	Bubble and foreign material	3		
		Scratch	4		
	PCB,FPC	Scratch	4		
	Soldering	Poor connection	8		
	Wire	Poor connection	9		
	LCD	CHIP OUT	11		

Note on defect classification:

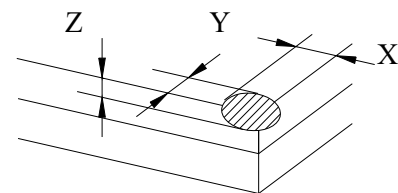
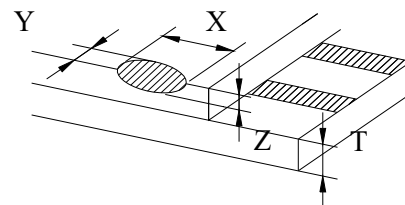
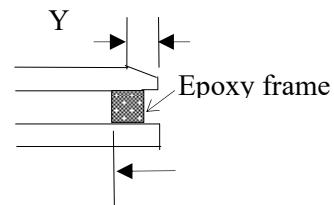
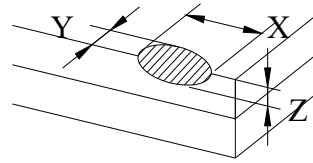
No.	Item	Criterion																				
1	Short or open circuit	Not allow																				
	LC leakage																					
	Flickering																					
	No display																					
	Wrong viewing direction																					
	Wrong Back-light																					
2	Contrast defect	Refer to approval sample																				
	Background color deviation																					
3	Point defect, Black spot, dust (incl. Polarizer) ex.: dirt under polarizer, Pinhole of reflector ,glass scratch, dirt under glass,scratch on polarizer $\phi = (X+Y)/2$	 <table><tr><td>Point</td><td>Acceptable Qty.</td></tr><tr><td>Size</td><td></td></tr><tr><td>$\phi \leq 0.20$</td><td>Disregard</td></tr><tr><td>$0.20 < \phi \leq 0.25$</td><td>3</td></tr><tr><td>$0.25 < \phi \leq 0.30$</td><td>2</td></tr><tr><td>$\phi > 0.30$</td><td>0</td></tr></table> Unit: mm	Point	Acceptable Qty.	Size		$\phi \leq 0.20$	Disregard	$0.20 < \phi \leq 0.25$	3	$0.25 < \phi \leq 0.30$	2	$\phi > 0.30$	0								
	Point	Acceptable Qty.																				
Size																						
$\phi \leq 0.20$	Disregard																					
$0.20 < \phi \leq 0.25$	3																					
$0.25 < \phi \leq 0.30$	2																					
$\phi > 0.30$	0																					
4	Line defect	 <table><tr><td></td><td>Line</td><td>Acceptable Qty.</td></tr><tr><td>L</td><td>W</td><td></td></tr><tr><td>---</td><td>$0.015 \geq W$</td><td>Disregard</td></tr><tr><td>$3.0 \geq L$</td><td>$0.03 \geq W$</td><td rowspan="2">2</td></tr><tr><td>$2.0 \geq L$</td><td>$0.05 \geq W$</td></tr><tr><td>$1.0 \geq L$</td><td>$0.1 > W$</td><td>1</td></tr><tr><td>---</td><td>$0.05 < W$</td><td>Applied as point defect</td></tr></table> Unit: mm		Line	Acceptable Qty.	L	W		---	$0.015 \geq W$	Disregard	$3.0 \geq L$	$0.03 \geq W$	2	$2.0 \geq L$	$0.05 \geq W$	$1.0 \geq L$	$0.1 > W$	1	---	$0.05 < W$	Applied as point defect
	Line	Acceptable Qty.																				
L	W																					
---	$0.015 \geq W$	Disregard																				
$3.0 \geq L$	$0.03 \geq W$	2																				
$2.0 \geq L$	$0.05 \geq W$																					
$1.0 \geq L$	$0.1 > W$	1																				
---	$0.05 < W$	Applied as point defect																				
5	Rainbow	Not more than two color changes across the viewing area																				

No.	Item	Criterion								
6	Segment pattern W = Segment width $\phi = (X+Y)/2$	(1) Pin hole $\phi < 0.10\text{mm}$ is acceptable.  <table><tr><th>Point Size</th><th>Acceptable Qty</th></tr><tr><td>$\phi \leq 1/4W$</td><td>Disregard</td></tr><tr><td>$1/4W < \phi \leq 1/2W$</td><td>1</td></tr><tr><td>$\phi > 1/2W$</td><td>0</td></tr></table> Unit: mm	Point Size	Acceptable Qty	$\phi \leq 1/4W$	Disregard	$1/4W < \phi \leq 1/2W$	1	$\phi > 1/2W$	0
Point Size	Acceptable Qty									
$\phi \leq 1/4W$	Disregard									
$1/4W < \phi \leq 1/2W$	1									
$\phi > 1/2W$	0									
7	Back-light	(1) The color of backlight should correspond its specification. (2) Not allow flickering								
8	Soldering	(1) Not allow heavy dirty and solder ball on PCB or FPC. (The size of dirty refer to point and dust defect) (2) Over 50% of lead should be soldered on Land. 								
9	Wire	(1) Copper wire should not be rusted (2) Not allow crack on copper wire connection. (3) Not allow reversing the position of the flat cable. (4) Not allow exposed copper wire inside the flat cable.								
10	PCB,FPC	(1) Not allow screw rust or damage. (2) Not allow missing or wrong putting of component.								

11

LCD

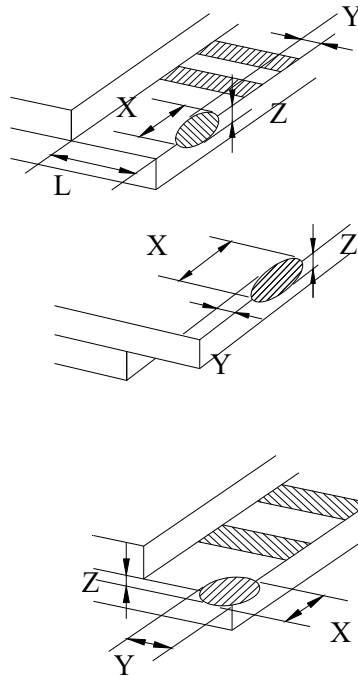
2.1.1 chip on the surface



Note: A: LCD Length

X	Y	Z
$>1/8A$	$\leq 0.3\text{mm}$	$\leq 1/2T$
$\leq 1/8A$	Not enter into epoxy frame	$\leq T$
	Not enter into the inner edge of epoxy	$\leq 1/2T$

2.1.2 Chip on the terminal

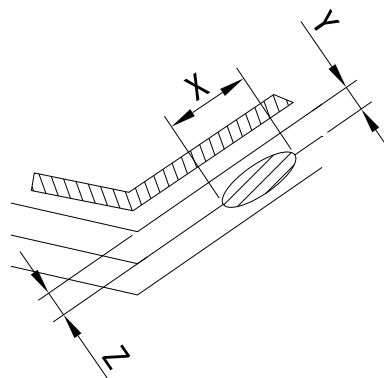


X	Y	Z
$> 1/8A$	$\leq 0.3\text{mm}$	$\leq 1/2T$
$\leq 1/8A$	$\leq 1/2L$	$\leq T$
$\leq 1/8A \text{ \& } \leq 1\text{mm}$	$\leq L$	$\leq T$
$\leq 1/8A \text{ \& } \leq 2\text{mm}$	$\leq L$	$\leq 1/2T$

Note: A: LCD Length.

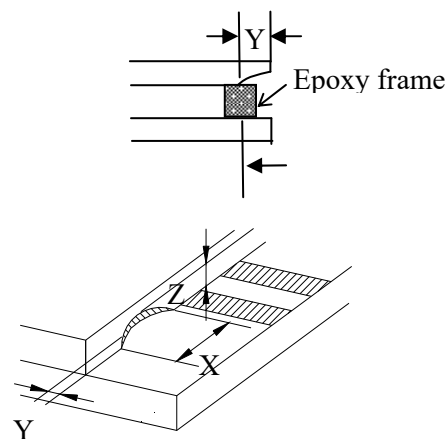
the distance between crack and contact pad must be greater than the width of 1st contact pad.

2.1.3 Chip out on between side



11

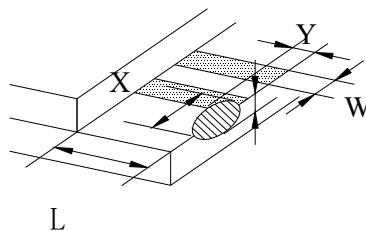
LCD



X	Y	Z
$\leq 1/8A$	Not enter into epoxy frame	$Z \leq 2T$
	Not enter into 1/2 epoxy frame	$Z \leq 1/2T$

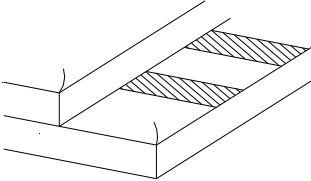
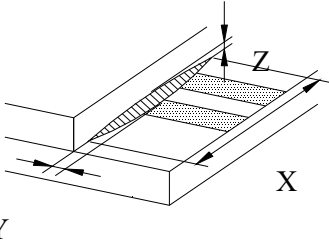
Note: A : LCD Length

2.1.4 including corner chip and side chip



Note: A:LCD Length

X	Y	Z
$>1/8A$	$\leq 1/6L$	$\leq 1/2T$
$\leq 1/8A$	$\leq 1/3L$	
$\leq 1/4W$	$\leq 2/3L$	

11	LCD	2.2 Chip out  1) Chip out is that crackles extend to inner edge. 2) Crackles round epoxy frame will be rejected. 3) Chip out on the terminal will be rejected: $Z=T$ length $>1\text{mm}$ or $Z<T$ length $>2\text{mm}$ 4) The chip out at ITO will be rejected. 2.3 Poor cutting  <table border="1" data-bbox="676 943 1158 1189"> <thead> <tr> <th>X</th><th>Y</th><th>Z</th></tr> </thead> <tbody> <tr> <td>$>1/8$ A</td><td>≤ 0.3</td><td>$\leq 1/2T$</td></tr> <tr> <td>$\leq 1/8$ A</td><td>According to drawing</td><td>$1/2T \leq Z \leq T$</td></tr> </tbody> </table> Note : A: LCD Length.	X	Y	Z	$>1/8$ A	≤ 0.3	$\leq 1/2T$	$\leq 1/8$ A	According to drawing	$1/2T \leq Z \leq T$
X	Y	Z									
$>1/8$ A	≤ 0.3	$\leq 1/2T$									
$\leq 1/8$ A	According to drawing	$1/2T \leq Z \leq T$									
12	SMT	According to the <Acceptable of electronic assemblies> IPC-A-610C class 2 stander. Component missing or function defect are Major defect ,the others are Minor defect.									
Any one out of the specification will be rejected.											

12. GENERAL PRECAUTIONS

(1) Mounting Method

The panel of the LCD Module consists of two thin glass plates with polarizers which easily get damaged since the Module is fixed by utilizing fitting holes in the printed circuit board. Extreme care should be taken when handling the LCD Modules.

(2) Caution of LCD handling & cleaning

When cleaning the display surface, use soft cloth with solvent (recommended below) and wipe lightly.

- Isopropyl alcohol
- Ethyl alcohol
- Trichlorotrifluoroethane

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

- Water
- Ketone
- Aromatics

(3) Caution against static charge

The LCD Module use C-MOS LSI drivers, so we recommend 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 table. And assembly equipment to protect against static electricity.

(4) Packaging

Modules use 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 directly to sunshine or high temperature/humidity.

(5) Caution for operation

- It is indispensable to drive LCD's within the specified voltage limit since the higher voltage than the limit shorten LCD life. An electrochemical reaction due to direct current causes LCD deterioration, Avoid the use of direct current drive.
- Response time will be extremely delayed at lower temperature than the operating temperature range and on the other hand at higher temperature LCD's show 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 operating temperature range.

- If the display area is pushed hard during operation, some font will be abnormally displayed but it resumes normal condition after turning off once.
- As light dew depositing on terminals is a cause for electro-chemical reaction resulting in

terminal open circuit.

Usage under the relative condition of 40°C, 50%RH or less is required.

(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 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 is.

Keeping temperature in the specified 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)

(7) Safety

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

Hello Lighting co., ltd reserves the right to change this specification.

www.hello-lighting.com

- END -