INNOVATIVE DISPLAY TECHNOLOGIES
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Specification

Part Number : SOG32034031-BTV-BWLW

Customer :

APPROVED BY: **(FOR CUSTOMER USE ONLY)**	**PCB VERSION:** **DATE:**

SOLD BY	APPROVED BY	CHECKED BY	ISSUE DATE

	MODLE NO :
RECORDS OF REVISION	**DOC. FIRST ISSUE**

VERSION	DATE	REVISED PAGE NO.	**SUMMARY**
0	2008.04.21		First issue
A	2008.05.20	18	Modify backlight information
B	2008/11/3	18	Modify backlight information

Contents

1. Module Classification Information

SOG32024031 – B T V- B W L W
① ② ③ ④ ⑤ ⑥ ⑦ ⑧

① Brand：Shelly Associates Inc.

② Display Type：SOG→ COG Type

③ Display Font：320 x 240 dots

④ Model serials no. A

⑤ Backlight Type： LW→ LED, White

⑥ LCD Mode： T→ FSTN Positive

⑦ LCD Polarize Type/ Temperature range/ View direction BW→ Transflective, W.T,6:00

⑧ Special Code #:Fit in with the ROHS Directions and regulations
V: Positive voltage

2. Precautions in use of LCD Modules

(1) Avoid applying excessive shocks to the module or making any alterations or modifications to it.
(2) Don't make extra holes on the printed circuit board, modify its shape or change the components of LCD module.
(3) Don't disassemble the LCM.
(4) Don't operate it above the absolute maximum rating.
(5) Don't drop, bend or twist LCM.
(6) Soldering: only to the I/O terminals.
(7) Storage: please storage in anti-static electricity container and clean environment.
(8) The factory reserves the right to change the passive components
(9). The factory reserves the right to change the PCB Rev.

3. General Specification

Item	Dimension	Unit
Number of Characters	320 x 240 dots	-
Module dimension	160.0x 109.0 x11.5(MAX)	mm
View area	120.0 x 90.0	mm
Active area	115.17 x86.37	mm
Dot size	0.33 x0.33	mm
Dot pitch	0.36 x 0.36	mm
LCD type	FSTN Positive, Transflective (In LCD production, It will occur slightly color difference. We can only guarantee the same color in the same batch.)	
Duty	1/240	
View direction	6 o'clock	
Backlight Type	LED White	

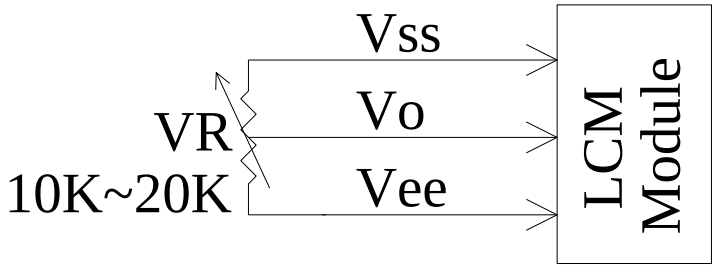
4. Absolute Maximum Ratings

Item	Symbol	Min	Typ	Max	Unit
Operating Temperature	T_{OP}	-20	-	+70	℃
Storage Temperature	T_{ST}	-30	-	+80	℃
Supply voltage for Logic	V_{DD}	-0.3	-	7.0	V
Input voltage	VI	-0.3	-	V_{DD} +0.3	V

5. Electrical Characteristics

Item	Symbol	Condition	Min	Typ	Max	Unit
Supply Voltage For Logic	V_{DD}-V_{SS}	-	4.75	5.0	5.25	V
			3.0	3.3	3.5	
Supply Voltage For LCM	VO-V_{SS}	Ta=-20℃	24.6	25.1	25.6	V
		Ta=25℃	22.1	22.6	23.1	V
		Ta=70℃	19.8	20.3	20.8	V
Input High Volt.	V_{IH}	-	0.8 V_{DD}	-	V_{DD}	V
Input Low Volt.	V_{IL}	-	Vss	-	0.2 V_{DD}	V
Power Supply Current	I_{DD}	V_{DD}=5.0V		95	-	mA

* Note: Please design the VOP adjustment circuit on customer's main board

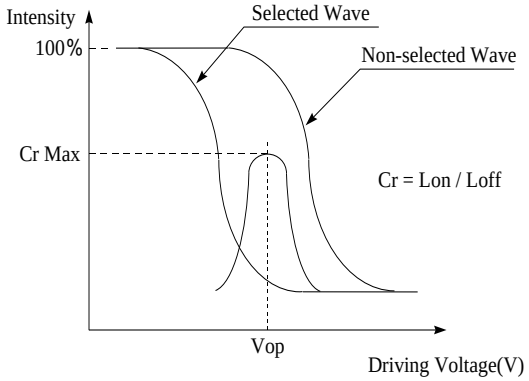


6. Optical Characteristics

Ta=25^{0}C

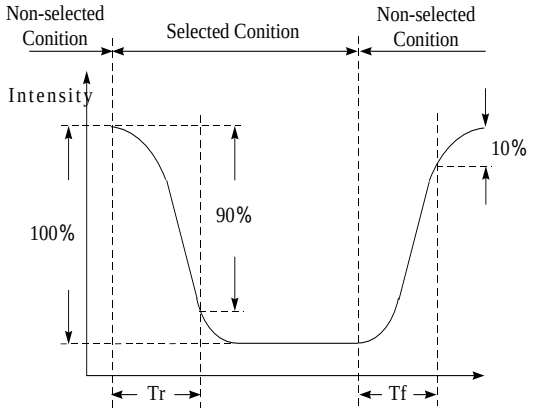
Item	Symbol	Condition	Min	Typ	Max	Unit
View Angle	(V)θ	CR≧ 2	-	35	-	deg
	(H)φ	CR≧ 2	-	30	-	deg
Contrast Ratio	CR	-	2.0	5	-	-
Response Time	T rise	-	-	250	375	ms
	T fall	-	-	200	300	ms

Definition of Operation Voltage (Vop)



[positive type]

Definition of Response Time (Tr , Tf)



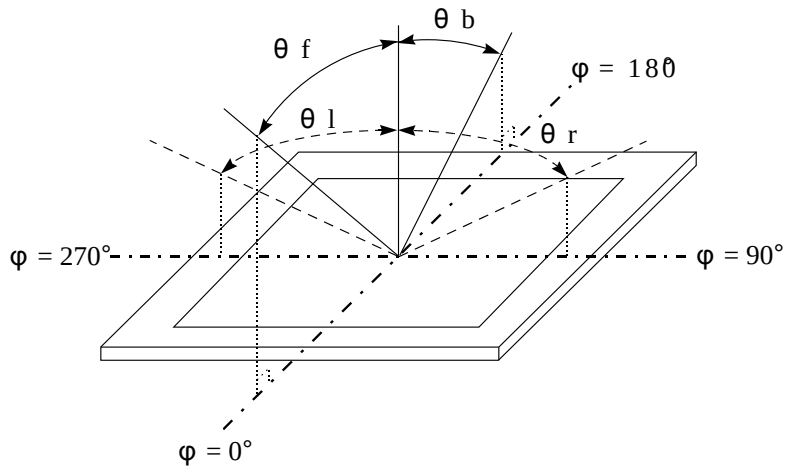
[positive type]

Conditions:

Operating Voltage: Vop Viewing Angle (θ , φ) : 0° , 0°

Frame Frequency: 64 HZ Driving Waveform: 1/N duty , 1/a bias

Definition of viewing angle(CR≧ 2)



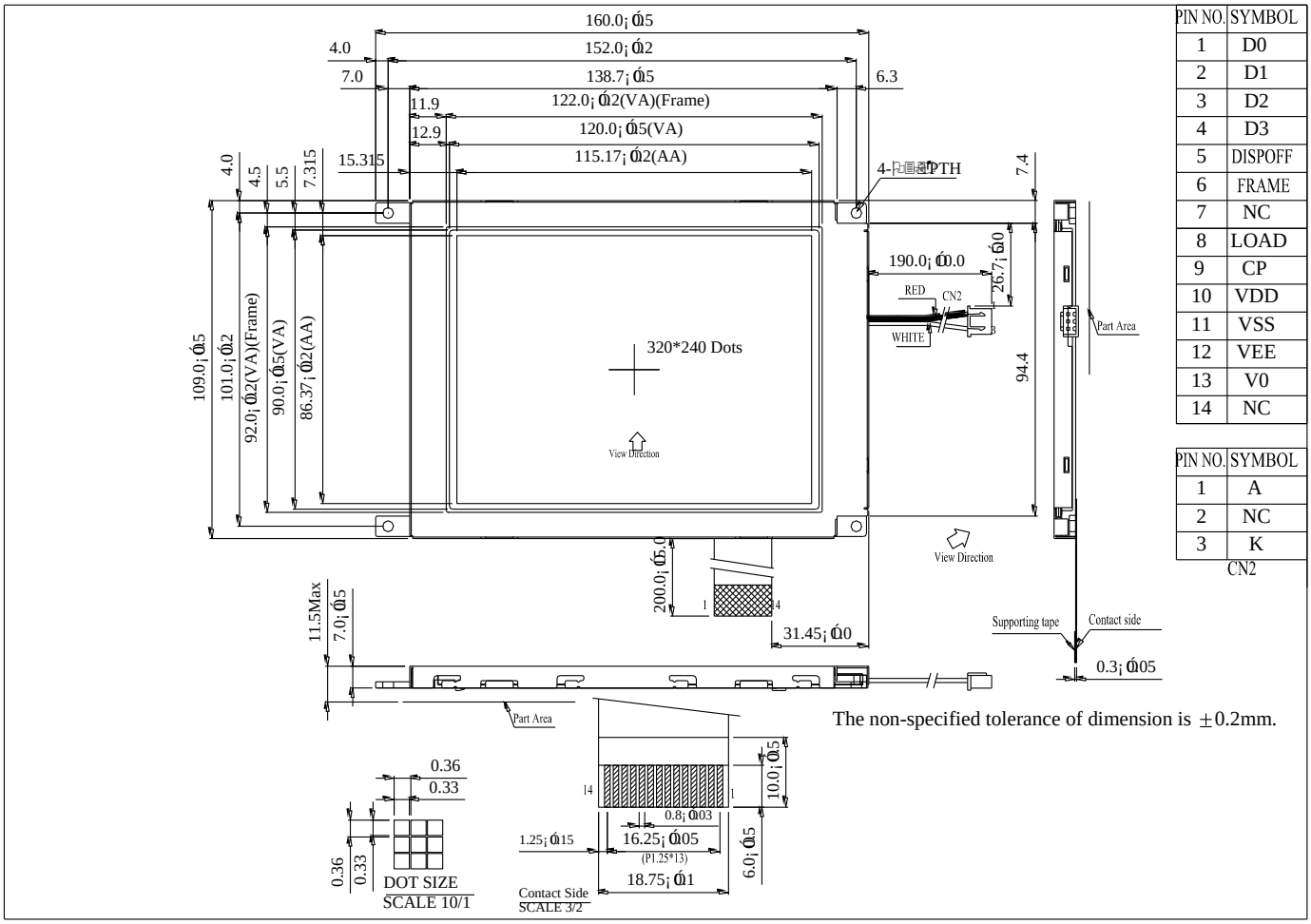
7. Interface Pin Function

Pin No.	Symbol	Level	Description
1	D0	H/L	Display data signal
2	D1		
3	D2		
4	D3		
5	/DISPOFF	H/L	H:ON L:OFF
6	FRAME	H	Scan start-up signal
7	NC	-	No connection
8	LOAD	H->L	Input data latch signal
9	CP	H->L	Data input clock signal
10	VDD	-	Power supply for logic (+5V or +3.3V)
11	VSS	-	Signal ground (0V)
12	VEE	-	Power supply for LCD
13	V0	-	LCD contrast adjust voltage
14	NC	-	No connection

CN2

1	A	-	LED+
2	NC	-	No connection
3	K	-	LED-

8. Contour Drawing &Block Diagram

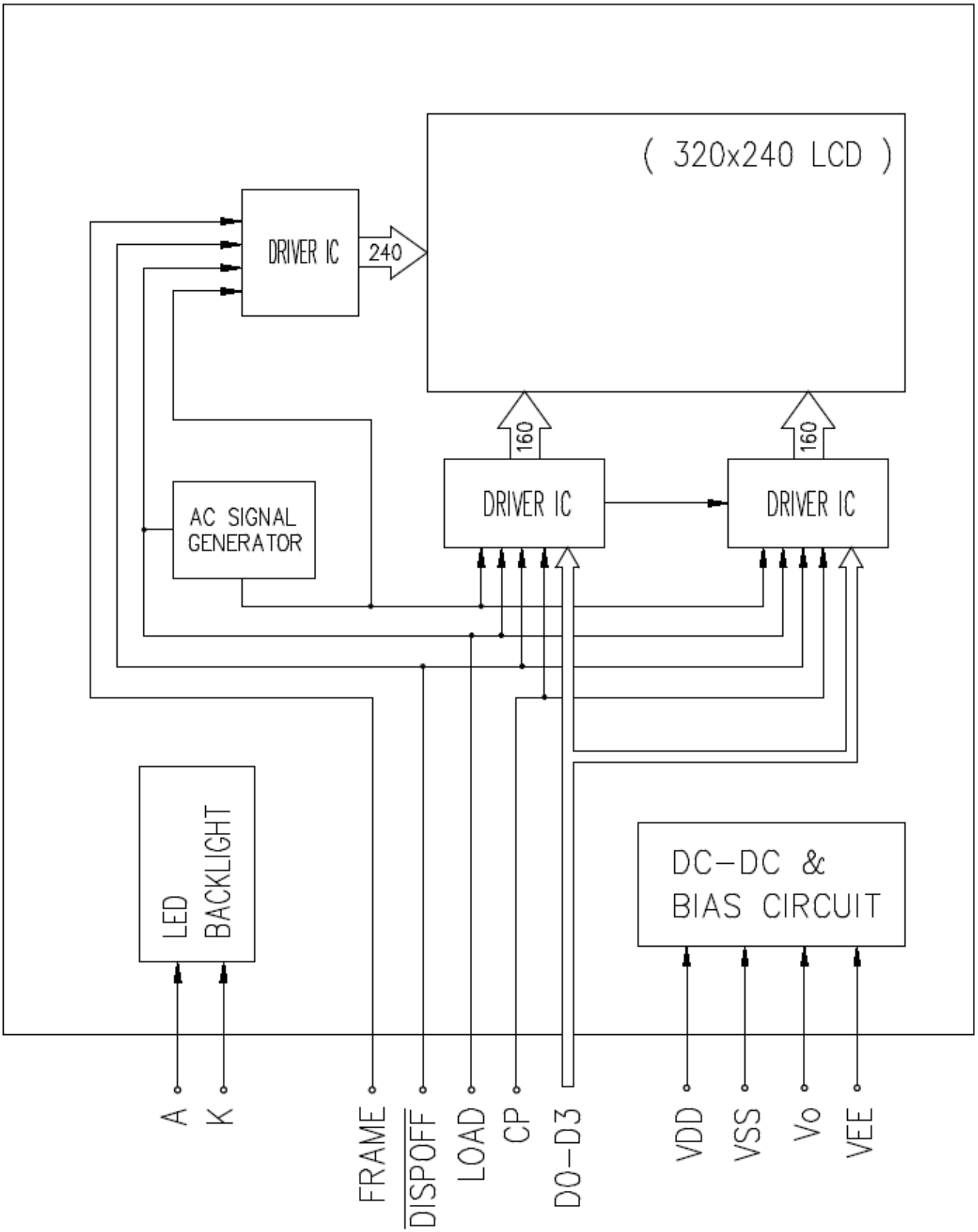


PIN NO.	SYMBOL
1	D0
2	D1
3	D2
4	D3
5	DISPOFF
6	FRAME
7	NC
8	LOAD
9	CP
10	VDD
11	VSS
12	VEE
13	V0
14	NC

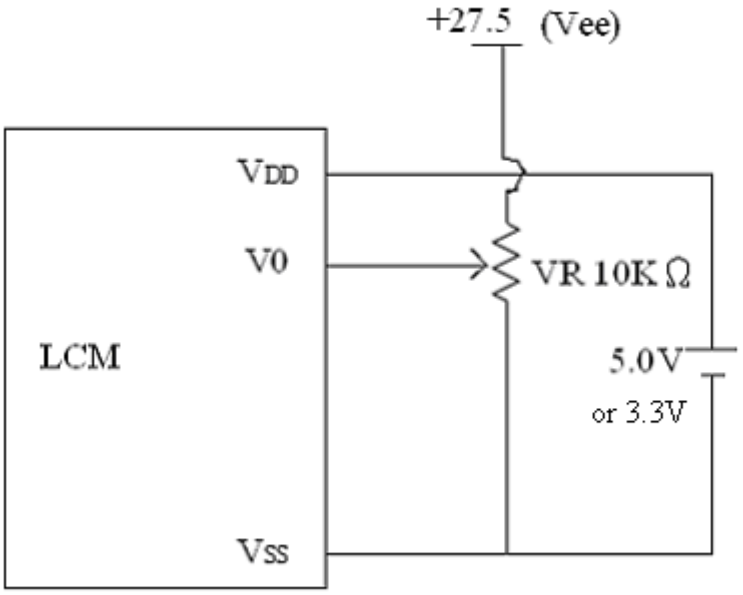
PIN NO.	SYMBOL
1	A
2	NC
3	K

CN2

The non-specified tolerance of dimension is ±0.2mm.


(320x240 LCD)
DRIVER IC
240
160
160
DRIVER IC
DRIVER IC
AC SIGNAL GENERATOR
LED BACKLIGHT
DC-DC & BIAS CIRCUIT
A
K
FRAME
DISPOFF
LOAD
CP
D0-D3
VDD
VSS
Vo
VEE

9. Power supply

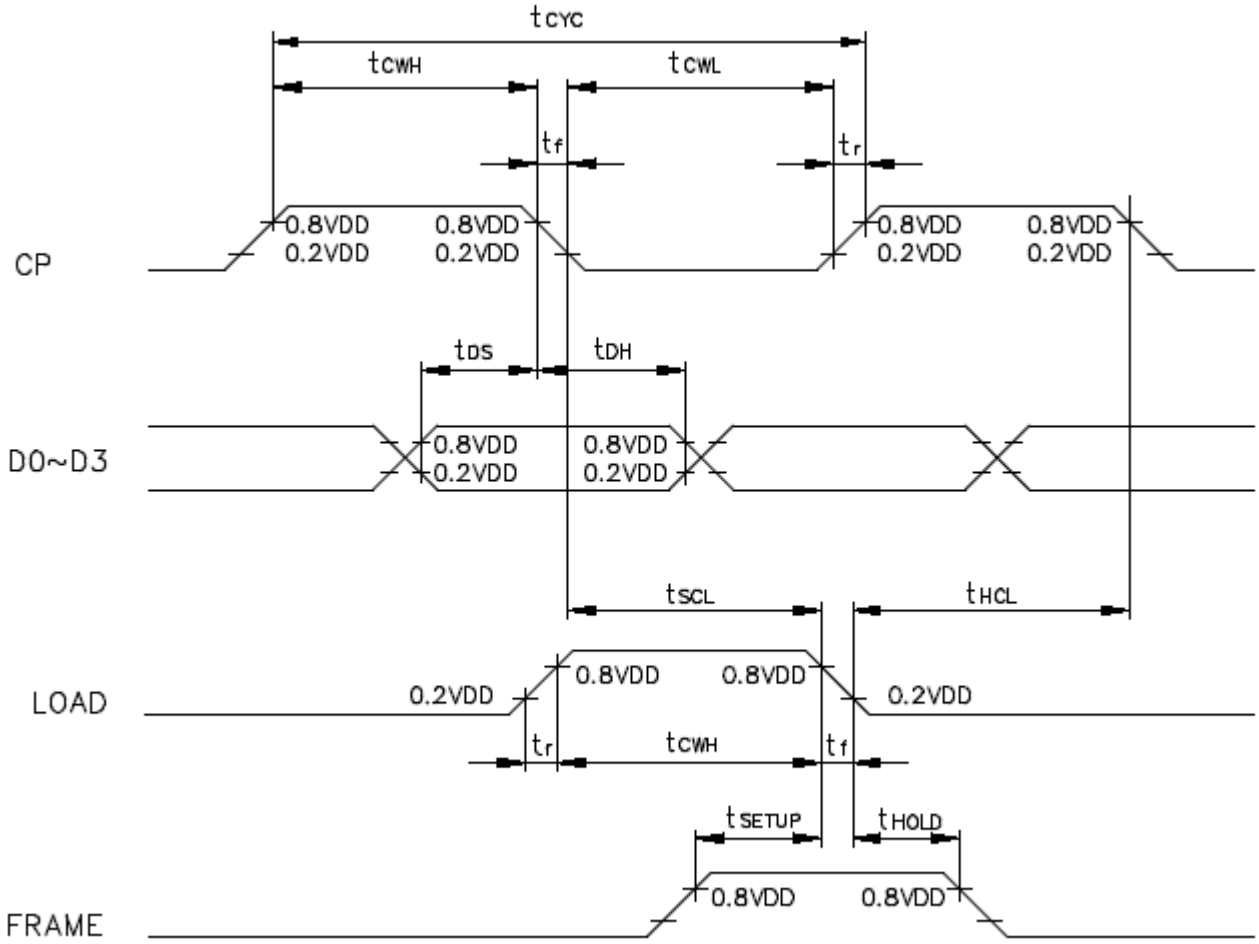


10. Timing Characteristics

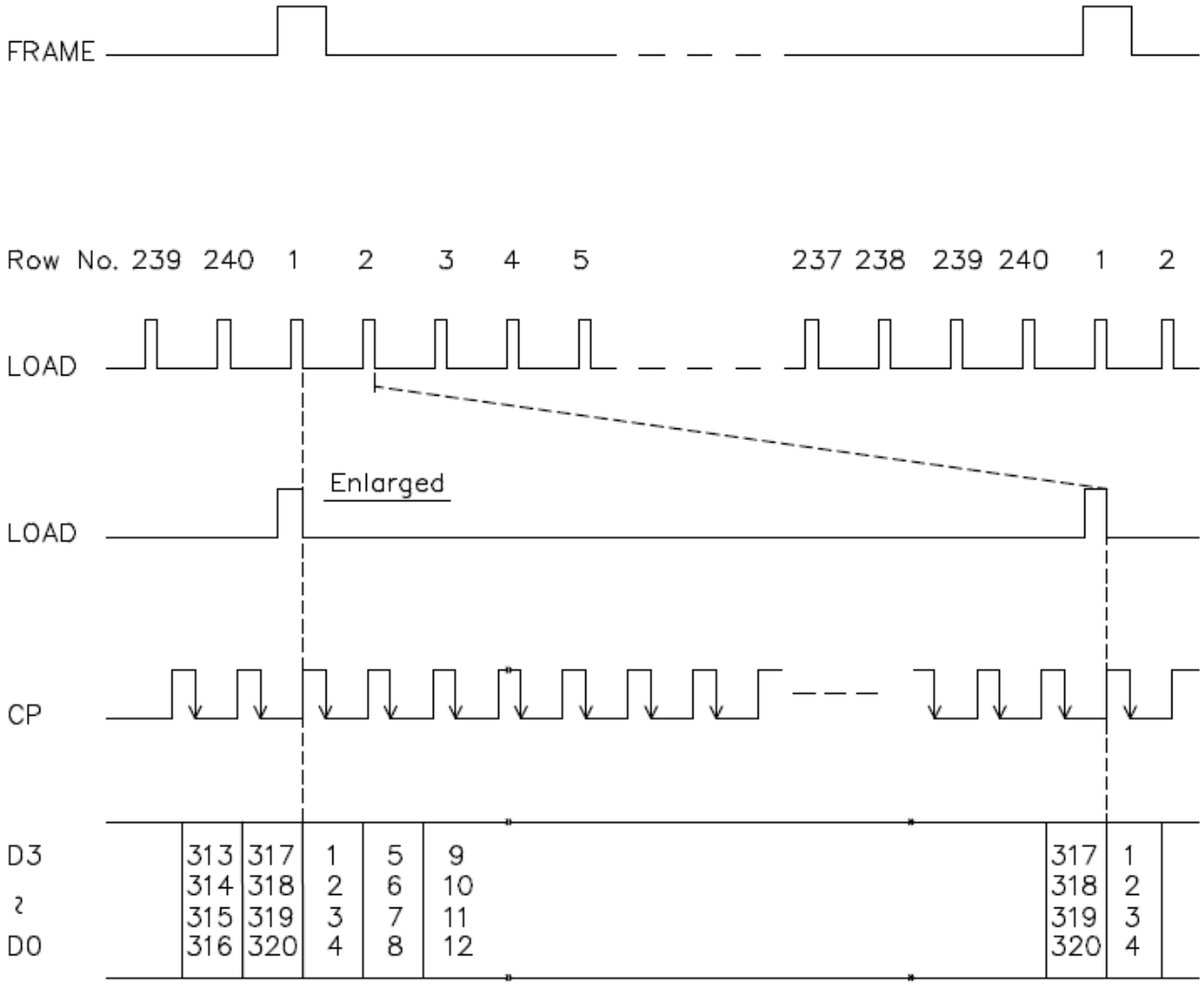
10-1 Clock Characteristics

Ta=-20^{0}C~70^{0}C

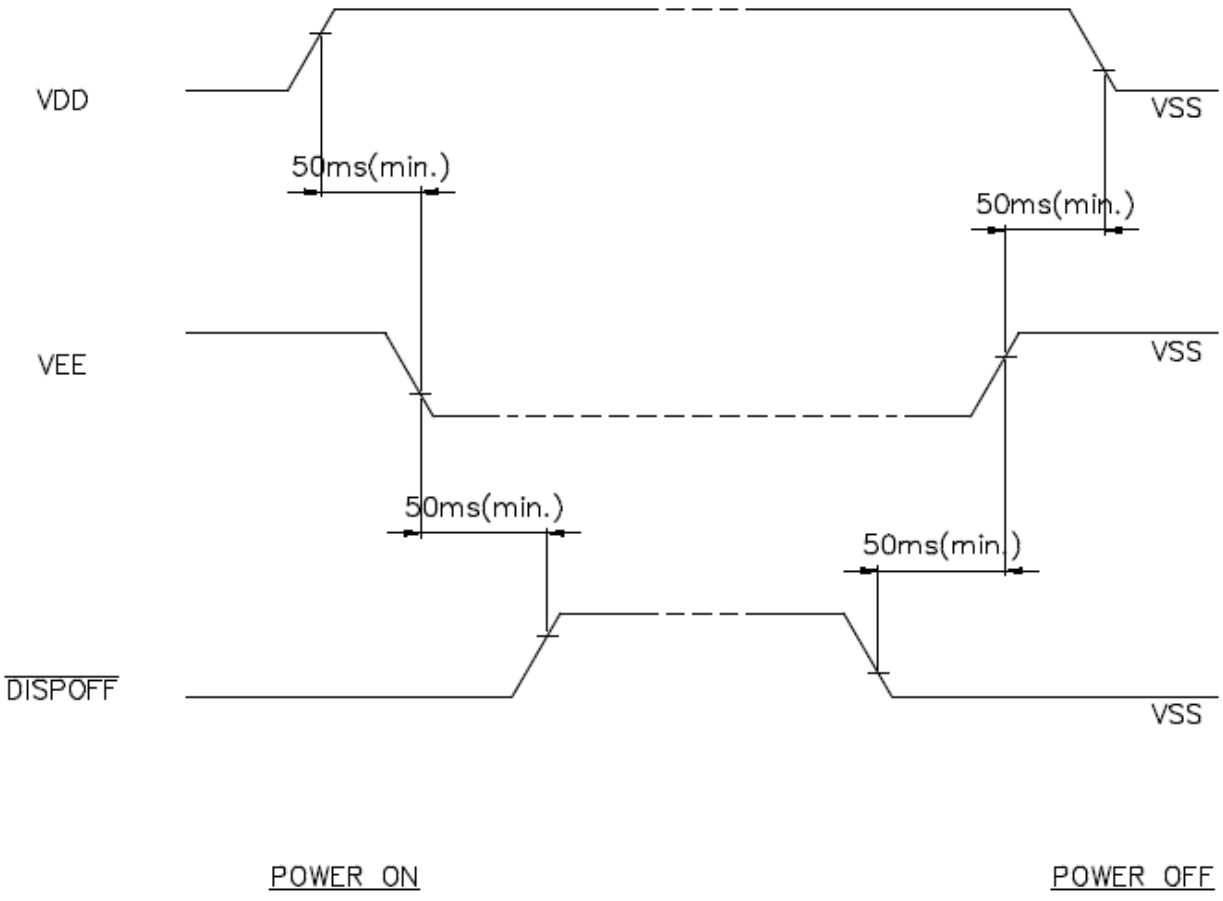
ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT
CLOCK CYCLE TIME	t_{CYC}	250	–	–	ns
CLOCK HIGH LEVEL WIDTH	t_{CWH}	45	–	–	ns
CLOCK LOW LEVEL WIDTH	t_{CWL}	45	–	–	ns
CLOCK RISE TIME	t_r	–	–	50	ns
CLOCK FALL TIME	t_f	–	–	50	ns
DATA SETUP TIME	t_{DS}	30	–	–	ns
DATA HOLD TIME	t_{DH}	30	–	–	ns
CLOCK SETUP TIME	t_{SCL}	80	–	–	ns
CLOCK HOLD TIME	t_{HCL}	80	–	–	ns
FRAME SETUP TIME	t_{SETUP}	30	–	–	ns
FRAME HOLD TIME	t_{HOLD}	30	–	–	ns


tCYC
tCWH
tCWL
tf
tr
CP
0.8VDD
0.2VDD
tDS
tDH
D0~D3
tSCL
tHCL
LOAD
tSETUP
tHOLD
FRAME

10-2 Timing Chart of input signals

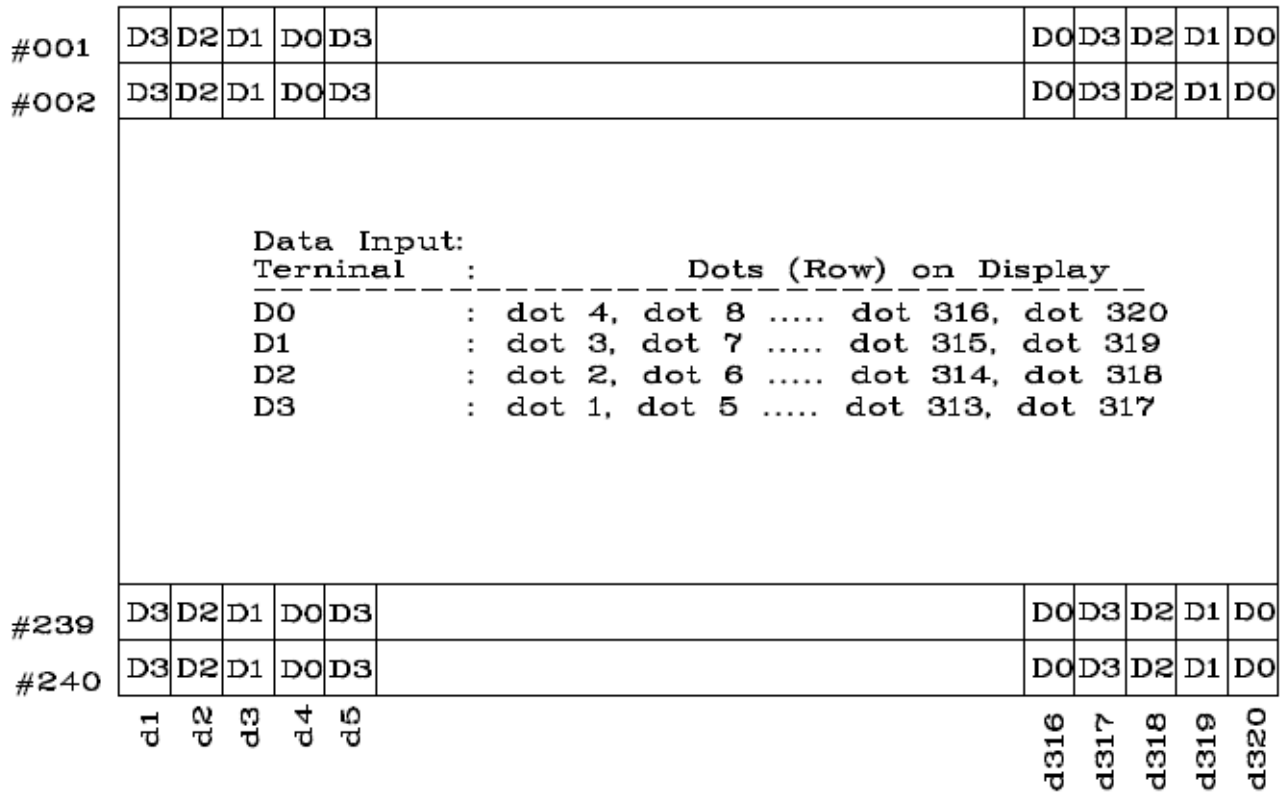


10-3 Power ON/OFF Timing



★The missing pixels may occur when the LCM is driven beyond above power interface timing sequence.

10-4 Display pattern



11. Reliability

Environmental Test			
Test Item	**Content of Test**	**Test Condition**	**Note**
High Temperature storage	Endurance test applying the high storage temperature for a long time.	80℃ 200hrs	2
Low Temperature storage	Endurance test applying the high storage temperature for a long time.	-30℃ 200hrs	1,2
High Temperature Operation	Endurance test applying the electric stress (Voltage & Current) and the thermal stress to the element for a long time.	70℃ 200hrs	____
Low Temperature Operation	Endurance test applying the electric stress under low temperature for a long time.	-20℃ 200hrs	1
High Temperature/ Humidity Operation	The module should be allowed to stand at 60 ℃,90%RH max For 96hrs under no-load condition excluding the polarizer, Then taking it out and drying it at normal temperature.	60℃,90%RH 96hrs	1,2
Thermal shock resistance	The sample should be allowed stand the following 10 cycles of operation -20℃ 25℃ 70℃ 3 1 cycle	-20℃/70℃ 10 cycles	____
Vibration test	Endurance test applying the vibration during transportation and using.	Total fixed amplitude : 1.5mm Vibration Frequency : 10~55Hz One cycle 60 seconds to 3 directions of X,Y,Z for Each 15 minutes	3
Static electricity test	Endurance test applying the electric stress to the terminal.	VS=800V,RS=1.5kΩ CS=100pF 1 time	____

C**ontent of Reliability Test (wide temperature, -20℃~70℃)**

Note1: No dew condensation to be observed.

Note2: The function test shall be conducted after 4 hours storage at the normal Temperature and humidity after remove from the test chamber.

Note3: Vibration test will be conducted to the product itself without putting it in a container.

12. Backlight Information

Specification

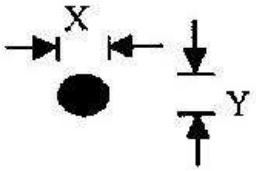
PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT	TEST CONDITION
Supply Current	ILED	108	128	200	mA	V=3.5V
Supply Voltage	V	3.4	3.5	3.6	V	-
Reverse Voltage	VR	-	-	5	V	-
Luminous Intensity (Without LCD)	IV	280	-	-	CD/M^2	ILED=128mA
Wave Length	X	0.275	0.300	0.325		ILED=128mA
	Y	0.265	0.29	0.315		
LED Life Time (For Reference only)	-	-	50K	-	Hr.	ILED≦128mA 25℃,50-60%RH, (Note1)
Color	White					

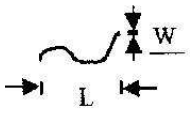
Note: The LED of B/L is drive by current only；driving voltage is only for reference

To make driving current in safety area (waste current between minimum and maximum).

Note 1:50K hours is only an estimate for reference.

13. Inspection specification

<table>
<tr><th>NO</th><th>Item</th><th>Criterion</th><th>AQL</th></tr>
<tr><td>01</td><td>Electrical Testing</td><td>1.1 Missing vertical, horizontal segment, segment contrast defect.
1.2 Missing character, dot or icon.
1.3 Display malfunction.
1.4 No function or no display.
1.5 Current consumption exceeds product specifications.
1.6 LCD viewing angle defect.
1.7 Mixed product types.
1.8 Contrast defect.</td><td>0.65</td></tr>
<tr><td>02</td><td>Black or white spots on LCD (display only)</td><td>2.1 White and black spots on display ≦ 0.25mm, no more than three white or black spots present.
2.2 Densely spaced: No more than two spots or lines within 3mm</td><td>2.5</td></tr>
<tr><td>03</td><td>LCD black spots, white spots, contamination (non-display)</td><td>3.1 Round type : As following drawing
Φ =(x + y) / 2
 

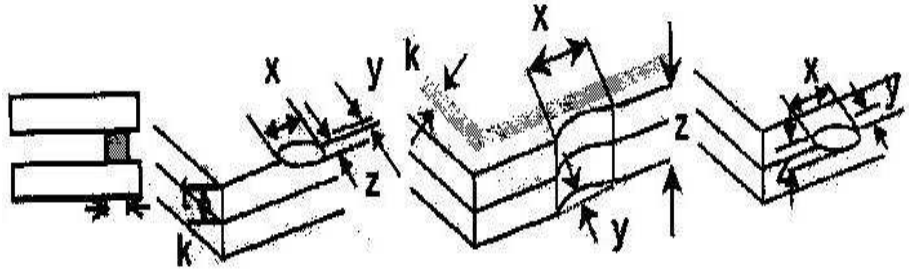
<table>
<tr><th>SIZE</th><th>Acceptable Q TY</th></tr>
<tr><td>Φ ≦ 0.10</td><td>Accept no dense</td></tr>
<tr><td>0.10 < Φ ≦ 0.20</td><td>2</td></tr>
<tr><td>0.20 < Φ ≦ 0.25</td><td>1</td></tr>
<tr><td>0.25 < Φ</td><td>0</td></tr>
</table></td><td>2.5</td></tr>
<tr><td></td><td></td><td>3.2 Line type : (As following drawing)
 

<table>
<tr><th>Length</th><th>Width</th><th>Acceptable Q TY</th></tr>
<tr><td>---</td><td>W≦ 0.02</td><td>Accept no dense</td></tr>
<tr><td>L≦ 3.0</td><td>0.02 < W≦ 0.03</td><td rowspan="2">2</td></tr>
<tr><td>L≦ 2.5</td><td>0.03 < W≦ 0.05</td></tr>
<tr><td>---</td><td>0.05 < W</td><td>As round type</td></tr>
</table></td><td>2.5</td></tr>
</table>

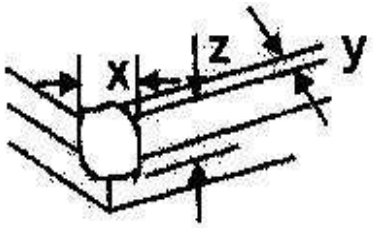
<table>
<tr>
<td>04</td>
<td>Polarizer bubbles</td>
<td>If bubbles are visible, judge using black spot specifications, not easy to find, must check in specify direction.
<table>
<tr><td>Size Φ</td><td>Acceptable Q TY</td></tr>
<tr><td>Φ ≦ 0.20</td><td>Accept no dense</td></tr>
<tr><td>0.20 < Φ ≦ 0.50</td><td>3</td></tr>
<tr><td>0.50 < Φ ≦ 1.00</td><td>2</td></tr>
<tr><td>1.00 < Φ</td><td>0</td></tr>
<tr><td>Total Q TY</td><td>3</td></tr>
</table>
</td>
<td>2.5</td>
</tr>
</table>

NO	Item	Criterion	AQL
05	Scratches	Follow NO.3 LCD black spots, white spots, contamination	

<table>
<tr>
<td>06</td>
<td>Chipped glass</td>
<td>
Symbols Define:
x: Chip length y: Chip width z: Chip thickness
k: Seal width t: Glass thickness a: LCD side length
L: Electrode pad length:

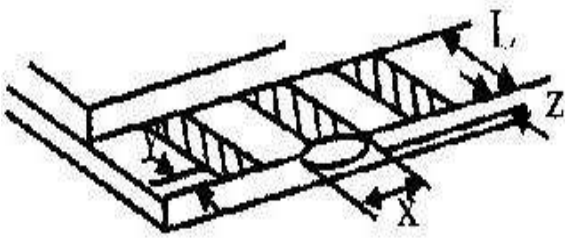
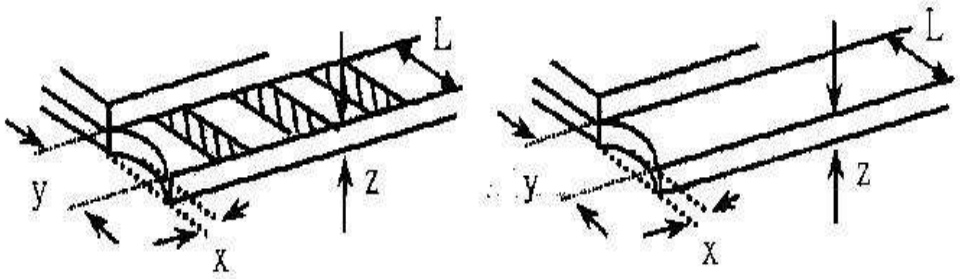
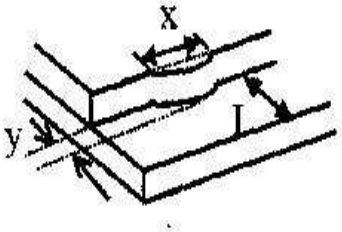
6.1 General glass chip :
6.1.1 Chip on panel surface and crack between panels:


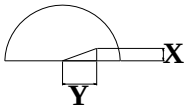
<table>
<tr><td>z: Chip thickness</td><td>y: Chip width</td><td>x: Chip length</td></tr>
<tr><td>Z≦ 1/2t</td><td>Not over viewing area</td><td>x≦ 1/8a</td></tr>
<tr><td>1/2t < z≦ 2t</td><td>Not exceed 1/3k</td><td>x≦ 1/8a</td></tr>
</table>
⊙ If there are 2 or more chips, x is total length of each chip.

6.1.2 Corner crack:


<table>
<tr><td>z: Chip thickness</td><td>y: Chip width</td><td>x: Chip length</td></tr>
<tr><td>Z≦ 1/2t</td><td>Not over viewing area</td><td>x≦ 1/8a</td></tr>
<tr><td>1/2t < z≦ 2t</td><td>Not exceed 1/3k</td><td>x≦ 1/8a</td></tr>
</table>
⊙ If there are 2 or more chips, x is the total length of each chip.
</td>
<td>2.5</td>
</tr>
</table>

NO	Item	Criterion	AQL

06	Glass crack	Symbols : x: Chip length y: Chip width z: Chip thickness k: Seal width t: Glass thickness a: LCD side length L: Electrode pad length 6.2 Protrusion over terminal : 6.2.1 Chip on electrode pad :  y: Chip width | x: Chip length | z: Chip thickness y≦ 0.5mm | x≦ 1/8a | 0 < z ≦ t 6.2.2 Non-conductive portion:  y: Chip width | x: Chip length | z: Chip thickness y≦ L | x≦ 1/8a | 0 < z ≦ t ⊙ If the chipped area touches the ITO terminal, over 2/3 of the ITO must remain and be inspected according to electrode terminal specifications. ⊙ If the product will be heat sealed by the customer, the alignment mark not be damaged. 6.2.3 Substrate protuberance and internal crack.  y: width | x: length y≦ 1/3L | x ≦ a	2.5

NO	Item	Criterion	AQL
07	Cracked glass	The LCD with extensive crack is not acceptable.	2.5
08	Backlight elements	8.1 Illumination source flickers when lit. 8.2 Spots or scratched that appear when lit must be judged. Using LCD spot, lines and contamination standards. 8.3 Backlight doesn’ t light or color wrong.	0.65 2.5 0.65
09	Bezel	9.1 Bezel may not have rust, be deformed or have fingerprints, stains or other contamination. 9.2 Bezel must comply with job specifications.	2.5 0.65
10	PCB、COB	10.1 COB seal may not have pinholes larger than 0.2mm or contamination. 10.2 COB seal surface may not have pinholes through to the IC. 10.3 The height of the COB should not exceed the height indicated in the assembly diagram. 10.4 There may not be more than 2mm of sealant outside the seal area on the PCB. And there should be no more than three places. 10.5 No oxidation or contamination PCB terminals. 10.6 Parts on PCB must be the same as on the production characteristic chart. There should be no wrong parts, missing parts or excess parts. 10.7 The jumper on the PCB should conform to the product characteristic chart. 10.8 If solder gets on bezel tab pads, LED pad, zebra pad or screw hold pad, make sure it is smoothed down. 10.9 The Scraping testing standard for Copper Coating of PCB  **X * Y<=2mm^2**	2.5 2.5 0.65 2.5 2.5 0.65 0.65 2.5 2.5
11	Soldering	11.1 No un-melted solder paste may be present on the PCB.	2.5 2.5 2.5 0.65

		11.2 No cold solder joints, missing solder connections, oxidation or icicle. 11.3 No residue or solder balls on PCB. 11.4 No short circuits in components on PCB.	

NO	Item	Criterion	AQL
12	General appearance	12.1 No oxidation, contamination, curves or, bends on interface Pin (OLB) of TCP. 12.2 No cracks on interface pin (OLB) of TCP. 12.3 No contamination, solder residue or solder balls on product. 12.4 The IC on the TCP may not be damaged, circuits. 12.5 The uppermost edge of the protective strip on the interface pin must be present or look as if it cause the interface pin to sever. 12.6 The residual rosin or tin oil of soldering (component or chip component) is not burned into brown or black color. 12.7 Sealant on top of the ITO circuit has not hardened. 12.8 Pin type must match type in specification sheet. 12.9 LCD pin loose or missing pins. 12.10 Product packaging must the same as specified on packaging specification sheet. 12.11 Product dimension and structure must conform to product specification sheet.	2.5 0.65 2.5 2.5 2.5 2.5 2.5 0.65 0.65 0.65 0.65

14. Material List of Components for RoHs

1. The factory hereby declares that all of or part of products (with the mark "#"in code), including, but not limited to, the LCM, accessories or packages, manufactured and/or delivered to your company (including your subsidiaries and affiliated company) directly or indirectly by our company (including our subsidiaries or affiliated companies) do not intentionally contain any of the substances listed in all applicable EU directives and regulations, including the following substances.

Exhibit A：The Harmful Material List

.

Material	(Cd)	(Pb)	(Hg)	(Cr6+)	PBBs	PBDEs
Limited Value	100 ppm	1000 ppm	1000 ppm	1000 ppm	1000 ppm	1000 ppm
Above limited value is set up according to RoHS.						

2. Process for RoHS requirement：

(1) Use the Sn/Ag/Cu soldering surface；the surface of Pb-free solder is rougher than we used before.

(2) Heat-resistance temp.：

Reflow：250℃, 30 seconds Max.；

Connector soldering wave or hand soldering：320℃, 10 seconds max.

(3) Temp. curve of reflow, max. Temp.：235±5℃；

Recommended customer's soldering temp. of connector：280℃, 3 seconds.

SOG32024031-BTV-BWLW

Sales signature：_____

Customer Signature：_____ **Date： / /**