Vishay Dale Electronics, LLC
Information Display Products
LCD Product Data Sheet

SPECIFICATION

Model #: **LCD-240H064E-FTI-VZ**

Global/SAP #: **L240H064EFTI00VZ00**

APPROVED BY: (FOR CUSTOMER USE ONLY)	PCB VERSION: DATA:

SALES BY	APPROVED BY	CHECKED BY	PREPARED BY

VERSION	DATE	REVISED PAGE NO.	SUMMARY
D	2017/03/01		Modify VIL

VISHAY One of the world's **largest manufacturers** of discrete semiconductors and passive components

MODEL NO :
LCD-240H064E-FTI-VZ

RECORDS OF REVISION

DOC. FIRST ISSUE

VERSION	DATE	REVISED PAGE NO.	**SUMMARY**
0	2008/07/09		First issue
A	2013/10/14		Remove IC information Modify B/L information and vop
B	2015/12/09		Modify contour drawing Response Time.
C	2016/01/27		Modify Precautions in use of LCD Modules & Static electricity test
D	2017/03/01		Modify VIL

Contents

1.Module Classification Information

LCD -240 H 064 E -F T I -VZ
① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨

1. Brand：Vishay Intertechnology, Inc.
2.Horizontal Format: 240 columns
3.Display Type: N→Character, H→Graphic, O→COG, Y→TAB
(RoHS-compliant)
4.Vertical Format: 64 rows
5.Model Series: E

6.Backlight Type：	N→Without backlight	T→LED, White	S→LED, High light White
	B→EL, Blue green	A→LED, Amber	L→LED, Full color
	D→EL, Green	R→LED, Red	J→DIP LED,Blue
	W→EL, White	O→LED, Orange	K→DIP LED,White
	M→EL, Yellow Green	G→LED, Green	E→DIP LED, Yellow Green
	F→CCFL, White	P→LED, Blue	H→DIP LED,Amber
	Y→LED, Yellow Green	X→LED, Dual color	I→DIP LED, Red
	G→LED, Green	C→LED, Full color	

7.LCD Mode：	B→TN Positive, Gray	V→FSTN Negative, Blue
	N→TN Negative,	T→FSTN Negative, Black
	L→VA Negative	D→FSTN Negative (Double film)
	H→ HTN Positive, Gray	F→FSTN Positive
	I→HTN Negative, Black	K→FSC Negative
	U→HTN Negative, Blue	S→FSC Positive
	M→STN Negative, Blue	E→ISTN Negative, Black
	G→STN Positive, Gray	C→CSTN Negative, Black
	Y→STN Positive, Yellow Green	A→ASTN Negative, Black

8.LCD Polarizer Type/ Temperature range/ View direction	A→Reflective, N.T, 6:00	H→Transflective, W.T,6:00
	D→Reflective, N.T, 12:00	K→Transflective, W.T,12:00
	G→Reflective, W. T, 6:00	C→Transmissive, N.T,6:00
	J→Reflective, W. T, 12:00	F→Transmissive, N.T,12:00
	B→Transflective, N.T,6:00	I→Transmissive, W. T, 6:00
	E→Transflective, N.T.12:00	L→Transmissive, W.T,12:00

9.Special Code V: Built-in negative voltage generator
Z: NT7086 driver IC

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 the LCM.
(6) Solder only to the I/O terminals.
(7) Store in ESD-safe container and clean environment.
(8) The manufacturer has the right to change the passive components, including R3 & R6 bias and backlight adjustment resistors.
(9) The manufacturer has the right to change the PCB revision.
(10) To prevent latent/residual images and to ensure LCD stability & life, screen saver techniques are required after 30 mins of fixed display content.

3.General Specification

Item	Dimension	Unit
Number of dots	240 x 64	—
Module dimension	180.0 x 70.5 x 14.0 (MAX)	mm
View area	137.0 x 44.0	mm
Active area	127.17 x 33.89	mm
Dot size	0.50 x 0.50	mm
Dot pitch	0.53 x 0.53	mm
LCD type	FSTN Negative Transmissive (In LCD production, slight color differences occur. The same color is only possible within the same manufacturing lot.)	
Duty	1/64	
View direction	6 o'clock	
Backlight Type	CCFL ,White	
IC	RA6963C	

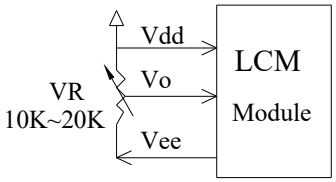
4.Absolute Maximum Ratings

Item	Symbol	Min	Typ	Max	Unit
Operating Temperature	T_{OP}	-20	—	+70	C
Storage Temperature	T_{ST}	-30	—	+80	C
Input Voltage	V_{IN}	-0.3	—	V_{DD}+0.3	V
Supply Voltage For Logic	V_{DD}-V_{SS}	-0.3	—	+7.0	V

5.Electrical Characteristics

Item	Symbol	Condition	Min	Typ	Max	Unit
Supply Voltage For Logic	V_{DD}-V_{SS}	—	3.0	—	5.5	V
Supply Voltage For LCD *Note	V_{DD}-V_0	Ta=-20C	—	—	14.2	V
		Ta=25C	13.0	13.25	13.5	V
		Ta=70C	10.1	—	—	V
Input High Volt.	V_{IH}	—	0.8V_{DD}	—	V_{DD}	V
Input Low Volt.	V_{IL}	—	0	—	0.15 V_{DD}	V
Output High Volt.	V_{OH}	—	V_{DD}-0.3	—	V_{DD}	V
Output Low Volt.	V_{OL}	—	0	—	0.3	V
Supply Current	I_{DD}	—	—	7	—	mA

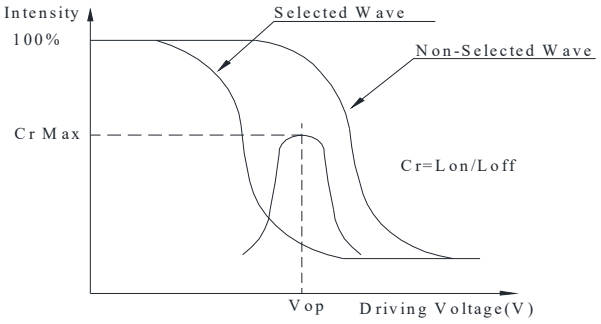
* Note: Please design the VOP adjustment circuit on customer's main board

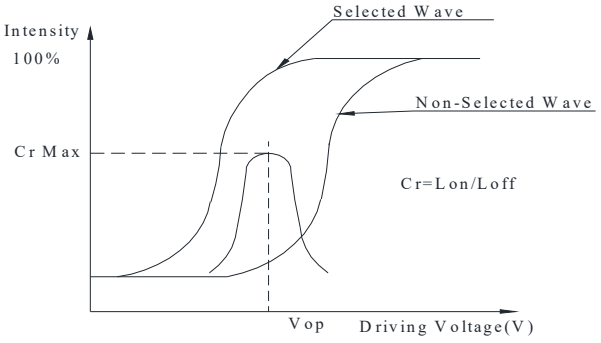


6.Optical Characteristics

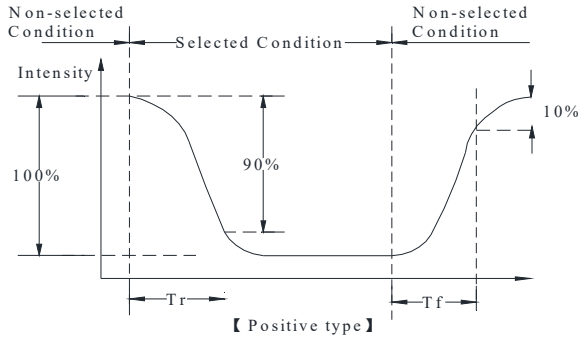
Item	Symbol	Condition	Min	Typ	Max	Unit
View Angle	θ	CR≧2	0	—	30	$\phi = 180^\circ$
	θ	CR≧2	0	—	60	$\phi = 0^\circ$
	θ	CR≧2	0	—	45	$\phi = 90^\circ$
	θ	CR≧2	0	—	45	$\phi = 270^\circ$
Contrast Ratio	CR	—	—	5	—	—
Response Time	T rise	—	—	200	300	ms
	T fall	—	—	250	350	ms

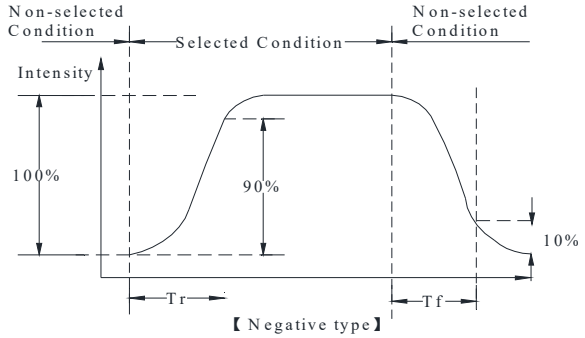
Definition of Operation Voltage (Vop)





Definition of Response Time (Tr , Tf)



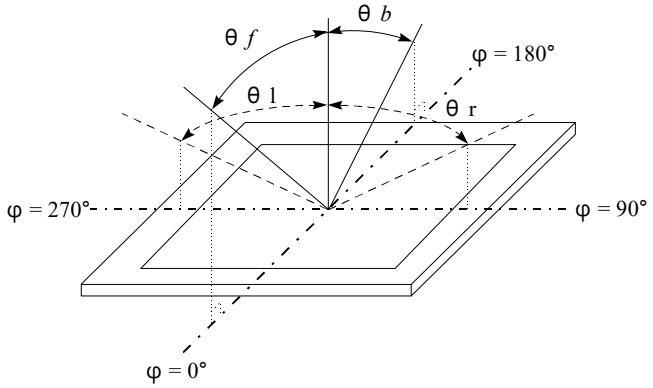


Conditions :

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

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

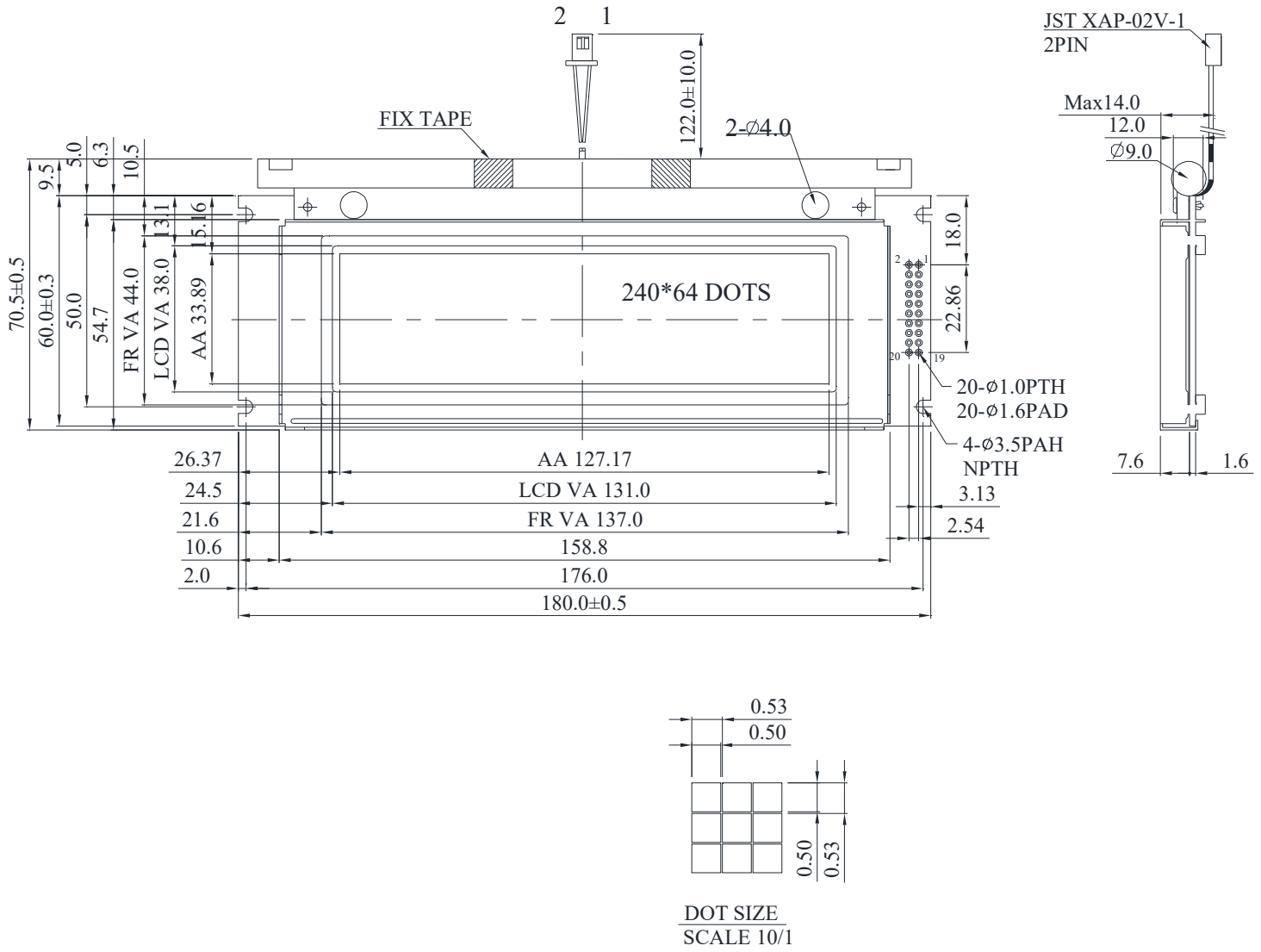
Definition of viewing angle(CR≧2)



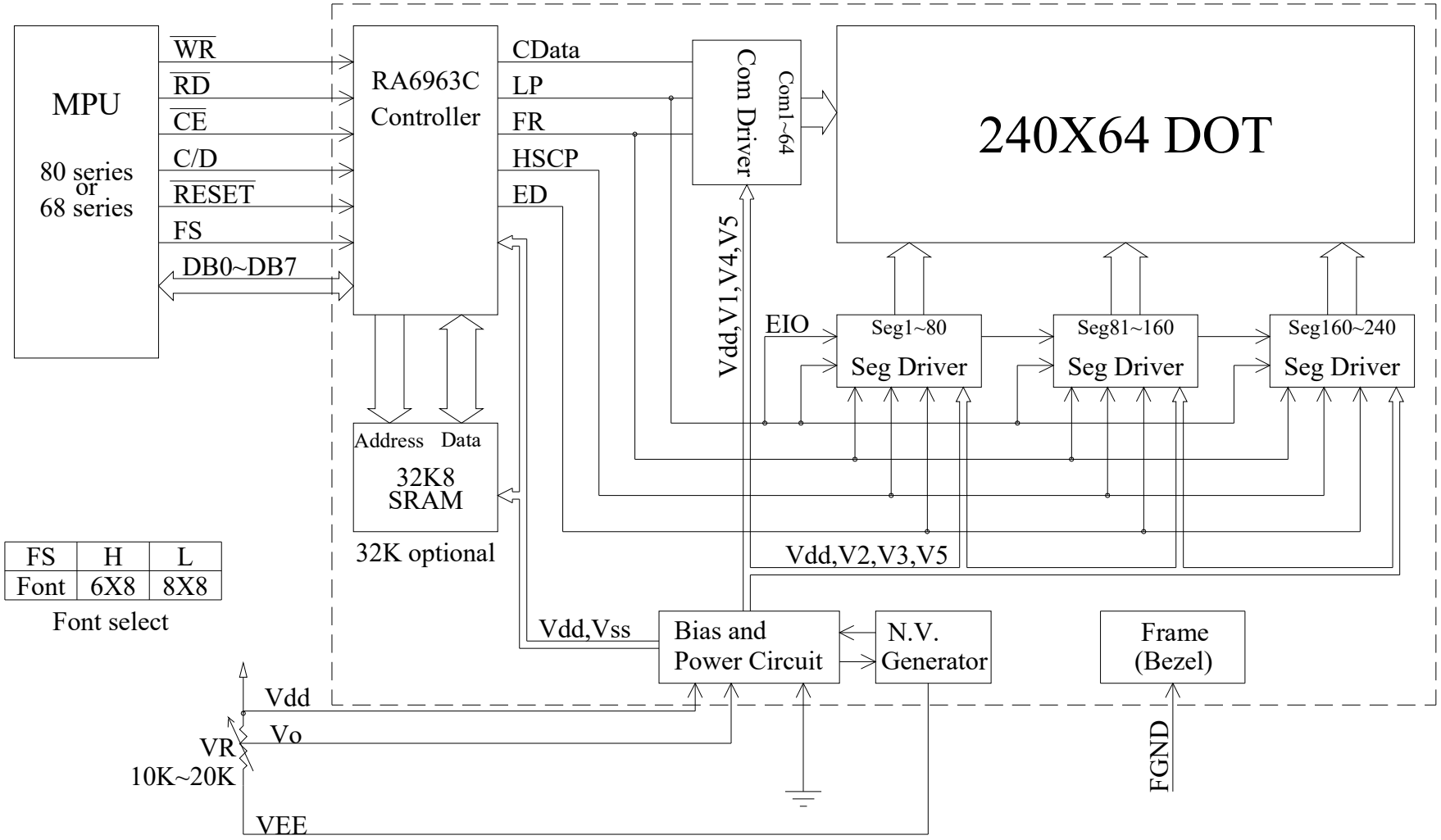
7.Interface Pin Function

Pin No.	Symbol	Level	Description
1	FG	-	Frame ground
2	Vss	-	GND
3	Vdd	-	Power supply
4	Vo	-	Power supply for LCD driver
5	/WR	L	Data write. Write data into RA6963C when WR = L
6	/RD	L	Data read. Read data from RA6963C when RD = L
7	/CE	L	L : Chip enable
8	C/D	H / L	WR=L , C/D=H : Command Write C/D=L: Data write RD=L , C/D=H : Status Read C/D=L: Data read
9	Vee	-	Negative Voltage Output
10	/RESET	H / L	H : Normal ; L : Initialize RA6963C
11	DB0	H / L	Data bus line
12	DB1	H / L	Data bus line
13	DB2	H / L	Data bus line
14	DB3	H / L	Data bus line
15	DB4	H / L	Data bus line
16	DB5	H / L	Data bus line
17	DB6	H / L	Data bus line
18	DB7	H / L	Data bus line
19	FS	H / L	Pins for selection of font; H : 6 * 8 , L : 8 * 8
20	MS	H / L	H: Reverse L: Normal

8.Contour Drawing & Block Diagram



PIN NO.	SYMBOL
1	FG
2	Vss
3	Vdd
4	Vo
5	$\overline{WR}$
6	$\overline{RD}$
7	$\overline{CE}$
8	C / $\overline{D}$
9	Vee
10	$\overline{RESET}$
11	DB0
12	DB1
13	DB2
14	DB3
15	DB4
16	DB5
17	DB6
18	DB7
19	FS
20	MS



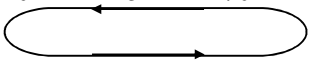
FS	H	L
Font	6X8	8X8

Font select

External contrast adjustment.

9.Reliability

Content of Reliability Test (Wide temperature, -20C~70C)

Environmental Test			
Test Item	**Content of Test**	**Test Condition**	**Note**
High Temperature storage	Endurance test applying the high storage temperature for a long time.	80C 200hrs	2
Low Temperature storage	Endurance test applying the low storage temperature for a long time.	-30C 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.	70C 200hrs	———
Low Temperature Operation	Endurance test applying the electric stress under low temperature for a long time.	-20C 200hrs	1
High Temperature/ Humidity storage	The module should be allowed to stand at 60C,90%RH max For 96hrs under no-load condition excluding the polarizer, Then taking it out and drying it at normal temperature.	60C,90%RH 96hrs	1,2
Thermal shock resistance	The sample should be allowed stand the following 10 cycles of operation -20C 25C 70C  30min 5min 30min 1 cycle	-20C/70C 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=±600V(contact), ±800v(air), RS=330Ω CS=150pF 10 times	———

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: The packing have to including into the vibration testing.

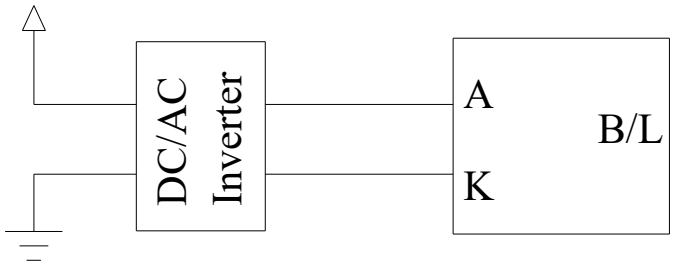
10.Backlight Information

CCFL backlight Specification

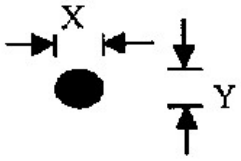
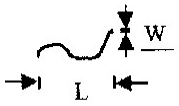
(Ta=25C)

Item	Symbol	Specification			Unit	Condition
		Min	Typ	Max		
Driving Voltage	V_{FL}	378	390	402	Vrms	—
Input current	I_{FL}	3.0	5.0	6.0	mArms	—
Luminance	L	750	—	—	Cd/m^2	φ, θ=0 deg, I_{FL} =5.0mArms
Chromaticity	x	0.33	—	0.37	—	—
	y	0.36	—	0.40	—	—
Luminance Uniformity (Testing 9 point)	—	75%	—	—	%	φ, θ=0 deg, I_{FL} =5.0mArms
Life time	—	20000	—	—	hrs	

CCFL B\L drives directly from A , K.

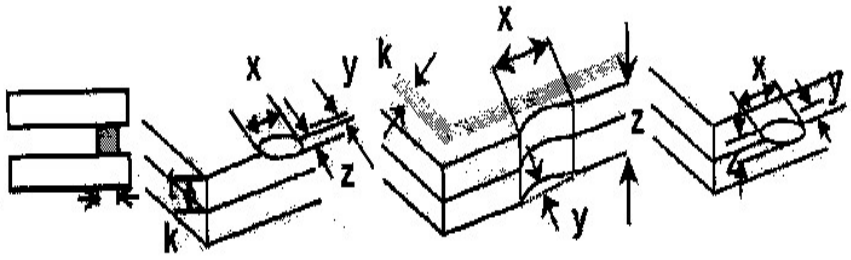


11.Inspection Specification

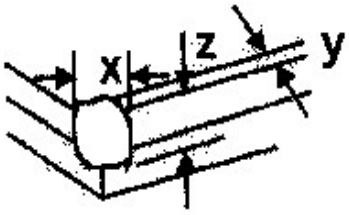
<table>
<tr><th>NO</th><th>Item</th><th>Criterion</th><th>AQL</th></tr>
<tr><td>01</td><td>Electrical Testing</td><td>Missing vertical, horizontal segment, segment contrast defect.
Missing character, dot, or icon.
Display malfunction.
No function or no display.
Current consumption exceeds product specifications.
LCD viewing angle defect.
Mixed product types.
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 rowspan="2">03</td><td rowspan="2">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>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>
<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><th>Size Φ</th><th>Acceptable Q TY</th></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>

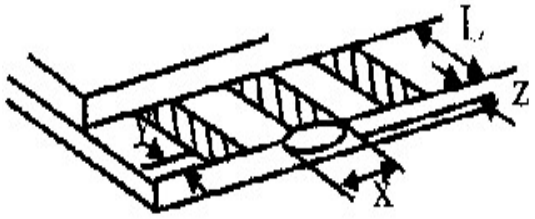
<table>
<tr><th>NO</th><th>Item</th><th>Criterion</th><th>AQL</th></tr>
<tr><td>05</td><td>Scratches</td><td>Follow NO.3 LCD black spots, white spots, contamination</td><td></td></tr>
<tr><td>06</td><td>Chipped glass</td><td>Symbols Define:
x: Chip length y: Chip width z: Chip thickness
k: Seal width t: Glass thickness a: LCD side length
L: Electrode pad length:

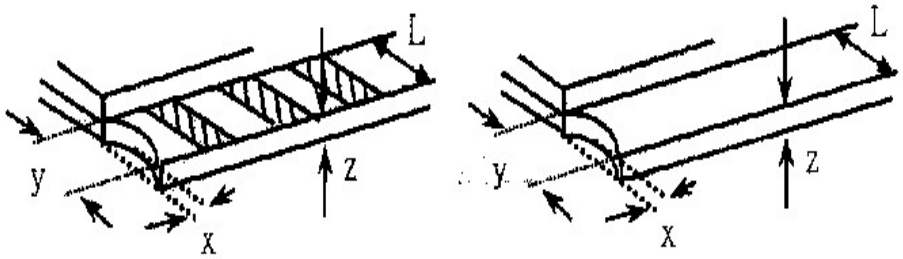
6.1 General glass chip :
6.1.1 Chip on panel surface and crack between panels:
 

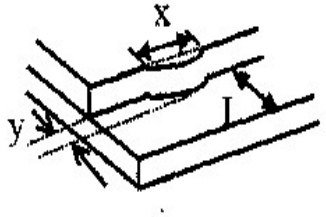
<table>
<tr><th>z: Chip thickness</th><th>y: Chip width</th><th>x: Chip length</th></tr>
<tr><td>Z≦1/2t</td><td>Not over viewing area</td><td>x≦1/8a</td></tr>
<tr><td>1/2t＜z≦2t</td><td>Not exceed 1/3k</td><td>x≦1/8a</td></tr>
</table>
⊙If there are 2 or more chips, x is total length of each chip.

6.1.2 Corner crack:
 

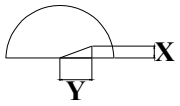
<table>
<tr><th>z: Chip thickness</th><th>y: Chip width</th><th>x: Chip length</th></tr>
<tr><td>Z≦1/2t</td><td>Not over viewing area</td><td>x≦1/8a</td></tr>
<tr><td>1/2t＜z≦2t</td><td>Not exceed 1/3k</td><td>x≦1/8a</td></tr>
</table>
⊙If there are 2 or more chips, x is the total length of each chip.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

<table>
<tr><th>NO</th><th>Item</th><th>Criterion</th><th>AQL</th></tr>
<tr><td>06</td><td>Glass crack</td><td>
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 :


<table>
<tr><td>y: Chip width</td><td>x: Chip length</td><td>z: Chip thickness</td></tr>
<tr><td>y≦0.5mm</td><td>x≦1/8a</td><td>0 ＜ z ≦ t</td></tr>
</table>
6.2.2 Non-conductive portion:


<table>
<tr><td>y: Chip width</td><td>x: Chip length</td><td>z: Chip thickness</td></tr>
<tr><td>y≦ L</td><td>x≦1/8a</td><td>0 ＜ z ≦ t</td></tr>
</table>
⊙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.


<table>
<tr><td>y: width</td><td>x: length</td></tr>
<tr><td>y≦1/3L</td><td>x ≦ a</td></tr>
</table>
</td><td>2.5</td></tr>
</table>

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. 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.	2.5 2.5 2.5 0.65

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

12.Material List of Components for RoHS

1. Declaration that all of or part of products, 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+	PBB	PBDE	DEHP	BBP	DBP	DIBP
Limited Value	**100 ppm**	**1000 ppm**	**1000 ppm**	**1000 ppm**	**1000 ppm**	**1000 ppm**	**1000 ppm**	**1000 ppm**	**1000 ppm**	**1000 ppm**
Above limits are according to RoHS.										

2. Process for RoHS requirement：(For RoHS considerations only, appropriate soldering processes must be used to avoid product damage by heat and contamination from flux or cleaning solvents.)
(1) Use the Sn/Ag/Cu soldering surface；the surface of Pb-free solder is rougher than used previously.
(2) Heat-resistance temperature：
Reflow：250C, 30 seconds Max.；
Connector soldering wave or hand soldering：320C, 10 seconds max.
(3) Temperature curve of reflow, maximum temperature：235±5C；
Recommended soldering temperature of connector：280C, 3 seconds.

13.Recommended Storage

1. Place the panel or module in the temperature 25°C±5°C and the humidity below 65% RH
2. Do not place the module near organics solvents or corrosive gases.
3. Do not crush, shake, or jolt the module.

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