

SPECIFICATION



YM220T-015AT-176220U3P34

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Version 1.0



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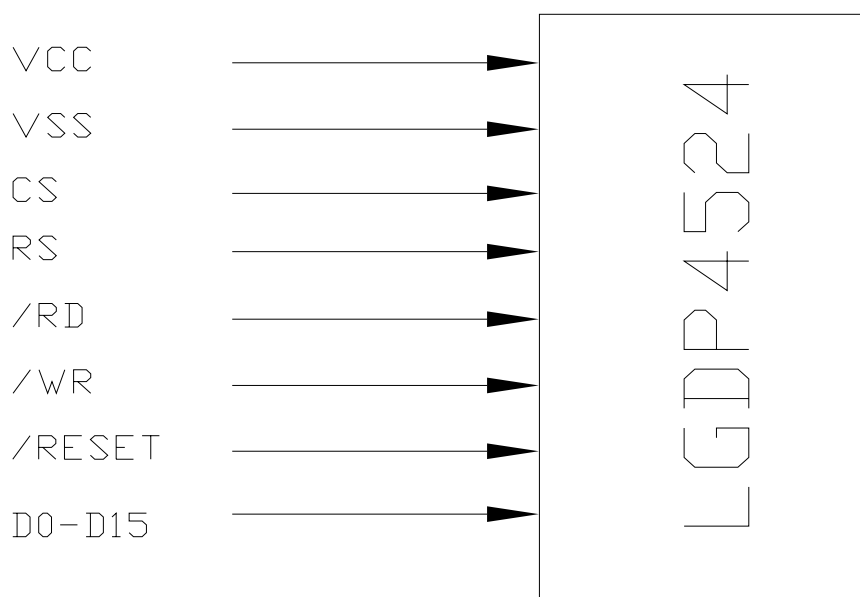
1. FEATURES

ITEM	STANDARD VALUE	UNIT
LCD Type	2.2" TFT-LCD (Thin Film Transistor Liquid Crystal Display)	---
Viewing Direction	12:00	O'clock
Backlight Type	3-parallel-White LED	---
Module Outsize	40.3*55.26*3.6 (with TP)	mm
TP Viewing area	37.0*49.4	mm
TP Active area	37.0*49.4	mm
LCD Active area	34.85*43.56	mm
Dot Number	176(RGB) × 220	---
Dot size	0.198*0.198	mm
Operation temperature	-10 ~70	℃
Storage temperature	-30 ~80	℃
Driver IC	LGDP4524	---
Interface mode	8080 System 8/16 bit Interface	---

Remark:

1. Display colour support 262K/65K, In detail please see also the **LGDP4524** certification.

2. BLOCK DIAGRAM



3. OUTLINE DIMENSIONS

REV

EC NUMBER

DESCRIPTION

DATE

XXXXXX

XXXXXX

xxxx/xx/xx

34PIN DESCRIPTION

1	GND
2	VDD
3	VDD
4	CS
5	RS
6	WR
7	RD
8	DB0
9	DB1
10	DB2
11	DB3
12	DB4
13	DB5
14	DB6
15	DB7
16	DB8
17	DB9
18	DB10
19	DB11
20	DB12
21	DB13
22	DB14
23	DB15
24	RESET
25	IM0
26	GND
27	YD
28	XL
29	YU
30	XR
31	LED-K3
32	LED-K2
33	

NOTS:

1.BackLight:3 CHIP LEDs,parallel connection

2.BackLightLuminance:3000 cd/m

3.Back Light Driver Voltage:3.0-3.3V

4.Back Light Circuit:54mA

5.GENERAL TOLERANCE:±0.2

6.未注明圆角皆为R=0.5mm

7. DRIVE IC : LGDP4524

8. OPERATING TEMP: -10° C-60° C

9. STORAGE TEMP : -20° C-70° C

CIRCUIT DIAGRAM (LED dices)

YM220T-015AT

DRAWN ME CHECKED EE CHECKED APPROVED

PAGE:1/1 VER. A SCALE:1/1

TOLERANCE UNLESS:±0.3

TOUCH PANEL FPC PIN SYMBOL

1	GND
2	VDD
3	VDD
4	CS
5	RS
6	WR
7	RD
8	DB0
9	DB1
10	DB2
11	DB3
12	DB4
13	DB5
14	DB6
15	DB7
16	DB8
17	DB9
18	DB10
19	DB11
20	DB12
21	DB13
22	DB14
23	DB15
24	RESET
25	IM0
26	GND
27	YD
28	XL
29	YU
30	XR
31	LED-K3
32	LED-K2
33	

INTERFACE PIN CONNECTIONS

PIN	SYMBOL	FUNCTION
1	GND	Ground
2	VDD	Power supply
3	VDD	Power supply
4	CS	Chip Select, active low
5	RS	Register select
6	WR	Write execution control pin
7	RD	Read execution control pin
8	DB0	LCD Data bus
9	DB1	LCD Data bus
10	DB2	LCD Data bus
11	DB3	LCD Data bus
12	DB4	LCD Data bus
13	DB5	LCD Data bus
14	DB6	LCD Data bus
15	DB7	LCD Data bus
16	DB8	LCD Data bus
17	DB9	LCD Data bus
18	DB10	LCD Data bus
19	DB11	LCD Data bus
20	DB12	LCD Data bus
21	DB13	LCD Data bus
22	DB14	LCD Data bus
23	DB15	LCD Data bus
24	RESET	LCD reset control pin, active low
25	IM0	Selects MPU interface format.
26	GND	Ground
27	YD	TOUCH PANEL YD
28	XL	TOUCH PANEL XL
29	YU	TOUCH PANEL YU
30	XR	TOUCH PANEL XR
31	LED-K3	Backlight Ground
32	LED-K2	Backlight Ground
33	LED-K1	Backlight Ground
34	LED-A	Backlight power supply

IM0	MPU-Interface Mode	DB Pin in use
GND	i80-system 16-bit interface	DB[15:0]
VCC	i80-system 8-bit interface	DB[15:8]

4. ELECTRICAL CHARACTERISTICS

5.1 ABSOLUTE MAXIMUM RATING

Item	Symbol	Unit	Value
Power supply voltage(1)	VCC	V	-0.3 ~ +3.0
Power supply voltage(2)	VDD28, IOVCC	V	-0.3 ~ +4.5
Power supply voltage(3)	Vci - AGND	V	-0.3 ~ +4.5
Power supply voltage(4)	DDVDH - AGND	V	-0.3 ~ +8.0
Power supply voltage(5)	VGND - VCL	V	-0.3 ~ +4.5
Power supply voltage(6)	VGH - AGND	V	-0.3 ~ +18
Power supply voltage(7)	AGND - VGL	V	-0.3 ~ +18
Input voltage	Vt	V	-0.3 ~ IOVcc+0.3

Detailed information please refer to the SPEC of LGDP4524 .

5.2 DC Characteristics

Item	Symbol	Rating			Unit	Remark
		Min	Typ	Max		
Power Voltage	VCI	2.6	2.8	3.3	V	
	VCC	2.6	2.8	3.3	V	
TFT gate on voltage	VGH	12	14	16	V	
TFT gate off voltage	VGL	-10	-8	-6	V	
TFT common electrode voltage	VcomH	2.5	---	4	V	
	VcomL	-1.5	---	0	V	

5.3 AC Characteristics

Please Refer to the SPEC of LGDP4524.

6. Electro-Optical Characteristics

6.1 Backlight Unit

Item	Symbol	Min	Typ.	Max	Unit	Remark
Input voltage	VBL	3.0	3.3	3.6	V	-
Current	I _{BL}	---	15	---	mA/chip	-
ICE	X	0.26	-	0.30	-	X>Y
	Y	0.27	-	0.31	-	
Brightness	-	---	3000	---	cd/m ²	
Luminous Intensity Ratio	-	---	----	20	%	-



6.2 LCD panel

Parameter	Symbol	Values			Unit	Notes
		Min	Typ	Max		
*1) Threshold Voltage	Vsat	2.0	2.1	2.2	V	Fig.2
	Vth	1.0	1.1	1.2	V	
*2) Transmittance	T(%)	-	15.9	-	%	Fig.1
*1) Contrast Ratio	C/R	300	350	-		
*1) Response Time	Tr+Tf	-	25	40	msec	Fig.3
*3) CIE Color Coordinate	Rx	0.579	0.599	0.619		
	Ry	0.300	0.320	0.340		
	Gx	0.290	0.310	0.330		
	Gy	0.543	0.563	0.583		
	Bx	0.118	0.138	0.158		
	By	0.140	0.160	0.180		
	Wx	0.288	0.308	0.328		
	Wy	0.324	0.344	0.364		
*1) Viewing Angle	• ↗	45	-	-	Degree	C/R>10 Fig.4
	• ↘	45	-	-		
	• ↙	35	-	-		
	• ↖	15	-	-		

Notes : 1. Contrast Ratio(CR) is defined mathematically as :

$$\text{Contrast Ratio} = \frac{\text{Surface Luminance with all white pixels}}{\text{Surface Luminance with all black pixels}}$$

2. Surface luminance is the center point across the TFT-LCD surface 500mm from the surface with all pixels displaying white. For more information see FIG 1.
3. Response time is the time required for the display to transition from white to black(Rise Time, Tr) and from black to white(Falling Time, Tf). For additional information see FIG 3.
4. Viewing angle is the angle at which the contrast ratio is greater than 10. The angles are determined for the horizontal or x axis and the vertical or y axis with respect to the z axis which is normal to the TFT-LCD surface. For more information see FIG 4.
5. Optimum contrast is obtained by adjusting the TFT-LCD Threshold voltage(Vth & Vsat)

FIG. 1 Optical Characteristic Measurement Equipment and Method

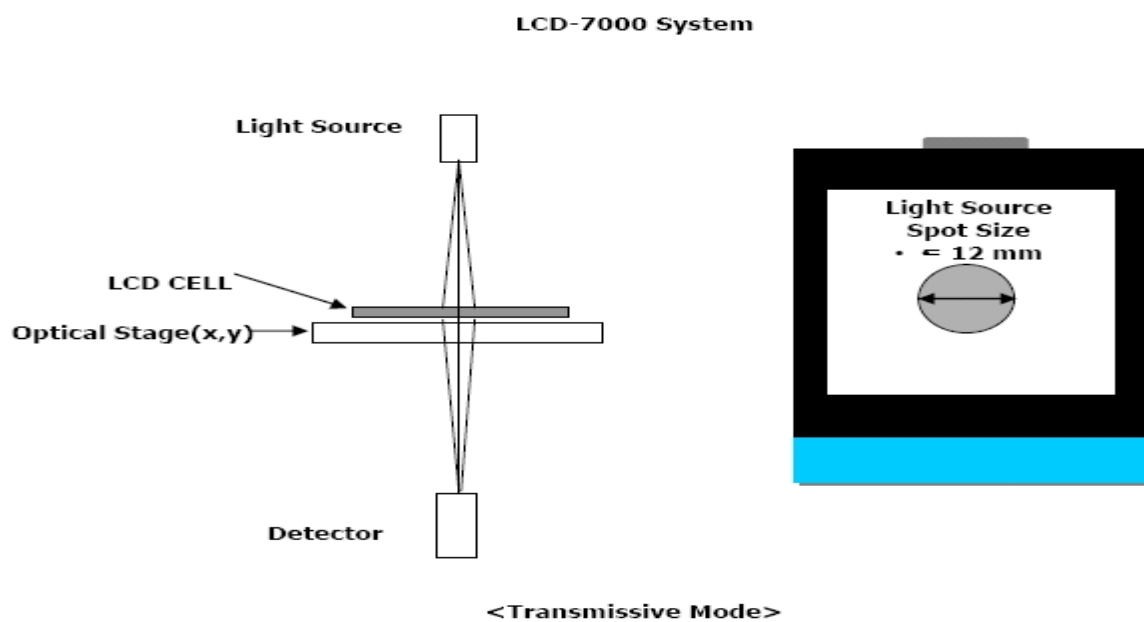


FIG. 2 The definition of V_{th} and V_{sat}

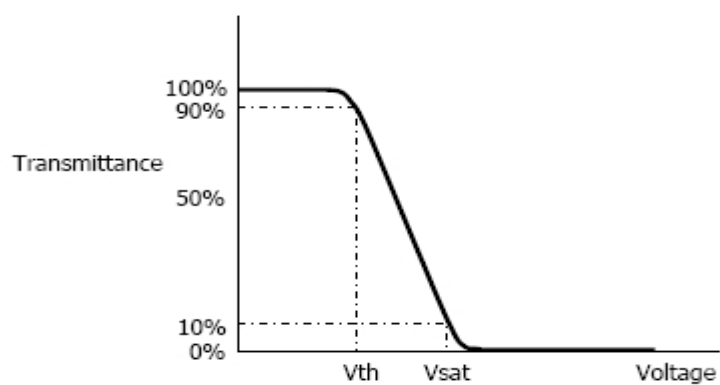
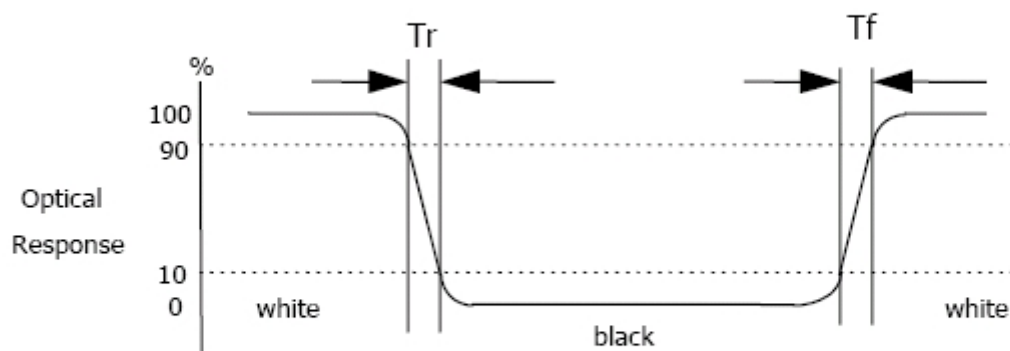


FIG. 3 The definition of Response Time

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



* Voltage conditions for Response time

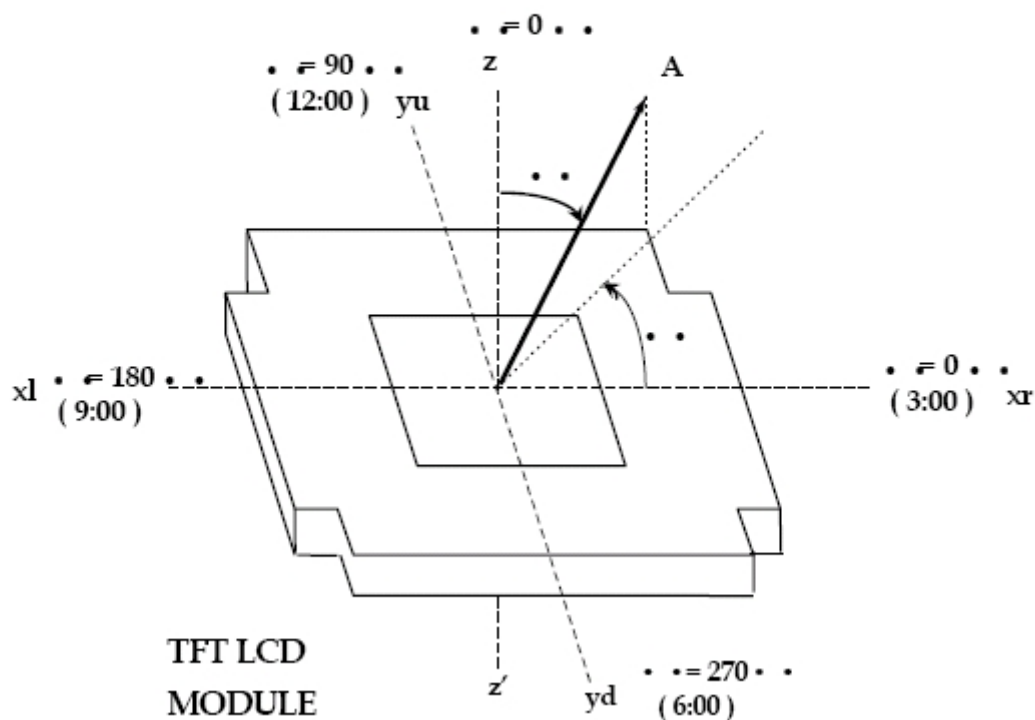
Vgate : 19V DC

Vdata : 0V~3.3V DC

Vcom : 0V (Ground)

FIG. 4 The definition of viewing angle

<dimension of viewing angle range>

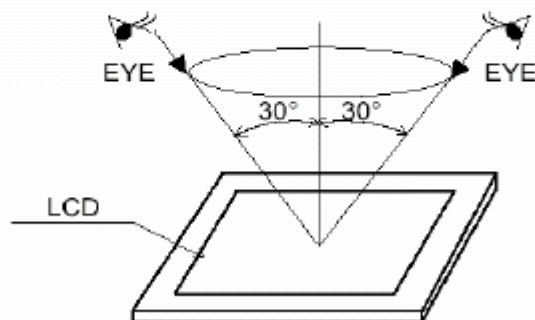


7. QUALITY GUARANTEE & INSPECTION CRITERIA

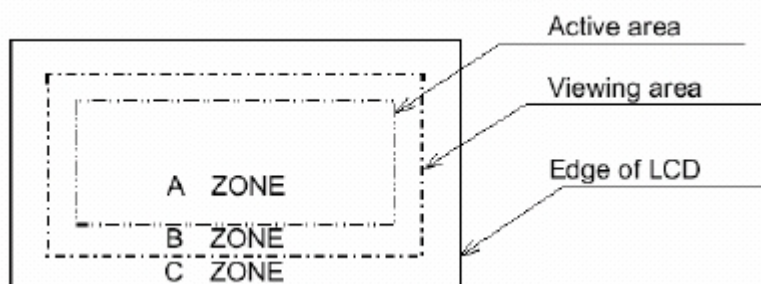
7.1 Appearance inspection

Appearance inspection should be done under the following condition.

- (1) In the dark room.
- (2) The distance from eyes to LCD must be 30 cm.
- (3) Viewing direction must be within 30 degrees to vertical line of LCD center.



7.2 Definition of A zone, B zone and C zone



7.3 Electrical Testing

1. Missing vertical, horizontal segment, segment contrast defect.
2. Missing character, dot or icon.
3. Display malfunction.
4. No function or no display.
5. Current consumption exceeds product specifications.
6. LCD viewing angle defect.
7. Mixed product types.
8. Contrast defect

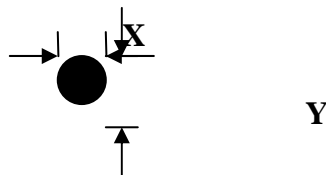
7.4 Black or white spots on LCD (display only)

1. White and black spots on display $\leq 0.20\text{mm}$, no more than three white or black spots present.
2. Densely spaced: No more than two spots or lines within 5mm

7.5 LCD black spots, white spots, contamination (non-display)

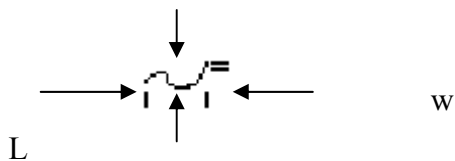
1. Round type: As following drawing

$$\psi = (x+y)/2$$



SIZE	Acceptable QTY
$\psi \leq 0.10$	Accept no dense
0.10 $< \psi \leq 0.15$	2
0.15 $< \psi \leq 0.20$	1
total	2

2. Line Type: (As following drawing)



Length	Width	Acceptable QTY
---	$W \leq 0.02$	Accept no dense
$L \leq 3.0$	$0.02 < W \leq 0.03$	2
$L \leq 2.5$	$0.03 < W \leq 0.05$	
---	$0.05 < W$	As round type

7.6 Polarizer bubbles

If bubbles are visible, judge using black spot specifications, not easy to find, must check in specify direction.

Size ψ	Acceptable QTY
$\psi \leq 0.20$	Accept no dense
$0.20 < \psi \leq 0.50$	2



7.7 Chipped glass

Symbols:

a: Chip length b: Chip width c: Chip thickness

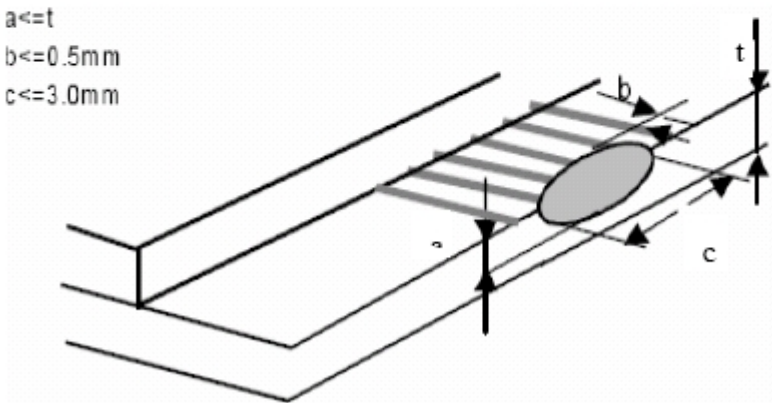
t: Glass thickness

1 ITO electrode

$$a \leq t$$

$$b \leq 0.5\text{mm}$$

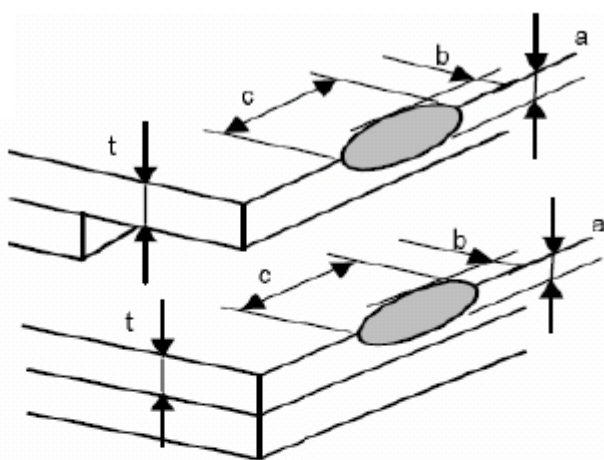
$$c \leq 3.0\text{mm}$$



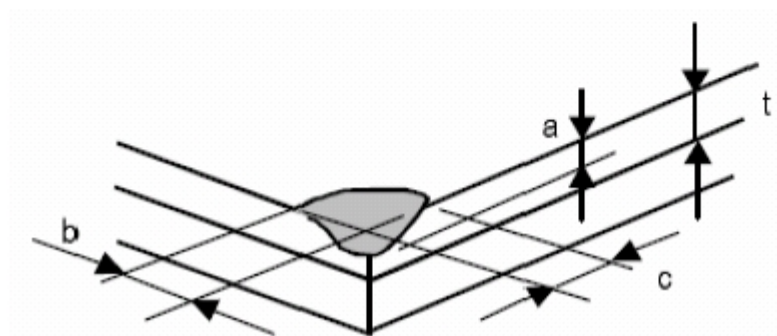
2 General ,corner portion

$$a \leq t$$

$$b \leq 1.0\text{mm}$$



*Effective width of seal area shall be more than 0.3mm.



7.8 Backlight elements

1. Illumination source flickers when lit.
2. Spots or scratches that appear when lit must be judged using LCD spot, lines and contamination standards.
3. Backlight doesn't light or color is wrong

7.9 Soldering

1. No unmelted solder paste may be present on the PCB.
2. No cold solder joints, missing solder connections, oxidation or icicle.
3. No residue or solder balls on PCB.
4. No short circuits in components on PCB.

7.10 General appearance

1. No oxidation, contamination, curves or, bends on interface pin (OLB) of TCP.
2. No cracks on interface pin (OLB) of TCP
3. NO contamination, solder residue or solder balls on product.
4. The IC on the TCP may not be damaged, circuits.
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.
6. The residual rosin or tin oil of soldering (component or chip component) is not burned into brown or black color.
7. Sealant on top of the ITO circuit has not hardened
8. Pin type must match type in specification sheet.
9. LCD pin loose or missing pins.
10. Product packaging must the same as specified on packaging specification sheet.
11. Product dimension and structure must conform to product specification sheet.
12. The appearance of Heat Seal should not admit any dirt and break.

8. RELIABILITY

Test Item	Sample Type	Test Condition	Test result determinant gist
High temperature storage	Normal temperature	$70 \pm 3^{\circ}\text{C}; 240\text{H}$	the inspection of Appearance and function character.
	Broad temperature	$80 \pm 3^{\circ}\text{C}; 240\text{H}$	
Low temperature storage	Normal temperature	$-20 \pm 3^{\circ}\text{C}; 240\text{H}$	
	Broad temperature	$-30 \pm 3^{\circ}\text{C}; 240\text{H}$	
High temperature	Normal temperature	$50^{\circ}\text{C} \pm 3^{\circ}\text{C}, 90\% \pm 3\%\text{RH}; 240\text{H}$	



/humidity storage	Broad temperature	$60^{\circ}\text{C} \pm 3^{\circ}\text{C}, 90\% \pm 3\%\text{RH}; 240\text{H}$	
High temperature operation	Normal temperature	$60 \pm 3^{\circ}\text{C}; 96\text{H}$	No objection of the function character; no fatal objection of the appearance.
	Broad temperature	$70 \pm 3^{\circ}\text{C}; 96\text{H}$	
Low temperature operation	Normal temperature	$0 \pm 3^{\circ}\text{C}; 96\text{H}$	
	Broad temperature	$-20 \pm 3^{\circ}\text{C}; 96\text{H}$	
High temperature /humidity operation	Normal temperature	$40^{\circ}\text{C} \pm 3^{\circ}\text{C}, 90\% \pm 3\%\text{RH}; 96\text{H}$	
	Broad temperature	$50^{\circ}\text{C} \pm 3^{\circ}\text{C}, 90\% \pm 3\%\text{RH}; 96\text{H}$	
Temperature Shock	Normal temperature	$-20 \pm 3^{\circ}\text{C}, 30\text{min} \rightarrow 70 \pm 3^{\circ}\text{C}, 30\text{min}; 10\text{cycle}$	inspect the objections appearance、function & the whole structure
	Broad temperature	$-30 \pm 3^{\circ}\text{C}, 30\text{min}$ $80 \pm 3, 30\text{min}; 10\text{cycle}$	The inspection of appearance、function & the whole structure
ESD test	ALL	Discharge modality: Air discharge. Discharge voltage: $\pm 2\text{KV} / \pm 4 \text{KV} / \pm 6\text{K} \pm 8\text{KV} / \pm 12\text{KV} / 15\text{KV}$.no software error & objection in $\pm 2\text{KV} \sim \pm 12\text{KV}$, no hardware errors & objection in $\pm 15\text{KV}$.
		Discharge modality: Contact discharge Discharge voltage: $\pm 2\text{KV} / \pm 4 \text{KV} / \pm 6\text{KV} / \pm 8\text{KV}$	no software errors & objection in $\pm 2\text{KV} \sim \pm 12\text{KV}$, no hardware errors & objection in $\pm 8\text{KV}$.
Bend test	ALL	Bend velocity: 60time/min; Bendtimes:50000tims	Stimulate the folder's repeat folding, no objection of display function
Vibration test	ALL	frequencyrange:10HZ~55HZ;swing:0.75mm;Z-axis direction: 60min.	the inspection of appearance、function & the whole structure

9. PRECAUTIONS FOR USING LCD MODULES

Handling Precautions

(1) The display panel is made of glass. Do not subject it to a mechanical shock by dropping it or impact.

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

(3) Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary.

(4) The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully.

(5) If the display surface becomes contaminated, breathe on the surface and gently wipe it with a soft dry cloth. If it is heavily contaminated, moisten cloth with one of the following solvents :

- Isopropyl alcohol
- Ethyl alcohol

(6) Solvents other than those above-mentioned may damage the polarizer. Especially, do not use the following.

- Water
- Ketone
- Aromatic solvents

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

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

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

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

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

(12) To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.

- Be sure to ground the body when handling the LCD modules.
- Tools required for assembling, such as soldering irons, must be properly grounded.
- To reduce the amount of static electricity generated, do not conduct assembling and other work under dry conditions.

- The LCD module is coated with a film to protect the display surface. Exercise care when peeling off this protective film since static electricity may be generated.

Storage Precautions

When storing the LCD modules, avoid exposure to direct sunlight or to the light of fluorescent



lamps. Keep the modules in bags (avoid high temperature, high humidity and low temperatures below 0°C). Whenever possible, the LCD modules should be stored in the same conditions in which they were shipped from our company.

Others

Liquid crystals solidify under low temperature (below the storage temperature range) leading to defective orientation or the generation of air bubbles (black or white). Air bubbles may also be generated if the module is subject to a low temperature.

If the LCD modules have been operating for a long time showing the same display patterns, the display patterns may remain on the screen as ghost images and a slight contrast irregularity may also appear. A normal operating status can be regained by suspending use for some time. It should be noted that this phenomenon does not adversely affect performance reliability.

To minimize the performance degradation of the LCD modules resulting from destruction caused by static electricity etc., exercise care to avoid holding the following sections when handling the modules.

- Exposed area of the printed circuit board.
- Terminal electrode sections.