

## SPECIFICATION OF LCD MODULE

<b>CUSTOMER</b> 客户名称	
<b>PART NO.</b> 产品型号	<b>JHD1214 Y/YG 1.0</b>
<b>PRODUCTS TYPE</b> 产品内容	
<b>REMARKS</b> 备注	
<b>SIGNATURE BY CUSTOMER</b> 客户签署:	

		
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深圳市晶汉达电子有限公司

## LCM System

**1 LCD Type** S - STN F - FSTN D - DFSTN**2 Viewing Angle** D - Lower 6:00 U - Upper 12:00 O - Others**3 Display Mode** Yellow Green positive Blue negative Gray positive FSTN positive W - FSTN negative**4 Polarizer Mode** Reflective Transflective Transmissive**5 Connector** Pin Heat sealed Zebra**6 Thickness of Glass** 1.1mm 0.4mm 0.55mm 0.7mm**7 Backlight Mode:** LED CCFL**8 Backlight Color** Blue Amber Yellow Green Red White Without backlight**9 Temperature Grade** Normal temperature Wide temperature Super wide temperature**10 CG-ROM** 01 for English + Japanese Language



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## 1. FEATURES

Display construction	16 Characters * 2 Lines
Display mode	STN(Y/G)
Display type	Positive Transmissive
Backlight	LED(Y/G)/5.0V
Viewing direction	6 o' clock
Operating temperature	0 to 50°C
Storage temperature	-10 to 60°C
Controller	AIP31068L or Equivalence
Driving voltage	Single power
Driving method	1/16 duty, 1/5 bias
Type	COB (Chip On Board)
Number of data line	I <sup>2</sup> C-bus interface
Connector	PIN

## 2. MECHANICAL DATA

ITEM		WIDTH	HEIGHT	THICKNESS	UNIT
Module size		80.0	36.0	13.5 (MAX)	mm
Viewing area		64.5	14.5	-	mm
character	Construction	5*7			dots
	Size	2.95	4.35	-	mm
	Pitch	3.65	5.05	-	mm
Dot	Size	0.55	0.5	-	mm
	Pitch	0.6	0.55	-	mm
Diameter of mounting hole		Φ2.9			mm
Weight		About 50			g

## 3. ABSOLUTE MAXIMUM RATINGS

### 3.1 Electrical Absolute Maximum Rating

(TA = 25, Vss=0V)

Item	Symbol	MIN.	Max.	Unit
Supply Voltage (Logic)	VDD-VSS	0	7.0	V
Supply Voltage (LCD Driveer)	V <sub>LCD</sub>	VDD-12	VDD+0.3	V
Input Voltage	V <sub>IN</sub>	-0.3	VDD+0.3	V
Operating temperature	Top	0	50	°C
Storage temperature	Tsto	-10	60	°C

### 3.2 Environmental Absolute Maximum Rating

Item	Operating		Storage		Comment
	Min.	Max.	Min.	Max.	
Ambient temp	-20	+70	-30	+80	Note(1)
Humidity	Note(2)		Note(2)		Without condensation
Vibration	--	4.9M/S <sup>2</sup>	--	19.6M/S <sup>2</sup>	XYZ direction
Shock	--	29.4M/S <sup>2</sup>	--	490M/S <sup>2</sup>	XYX direction

Note(1) Ta=0°C: 50 Hr Max.

Note(2) Ta ≤ 40°C: 90%RH Max.

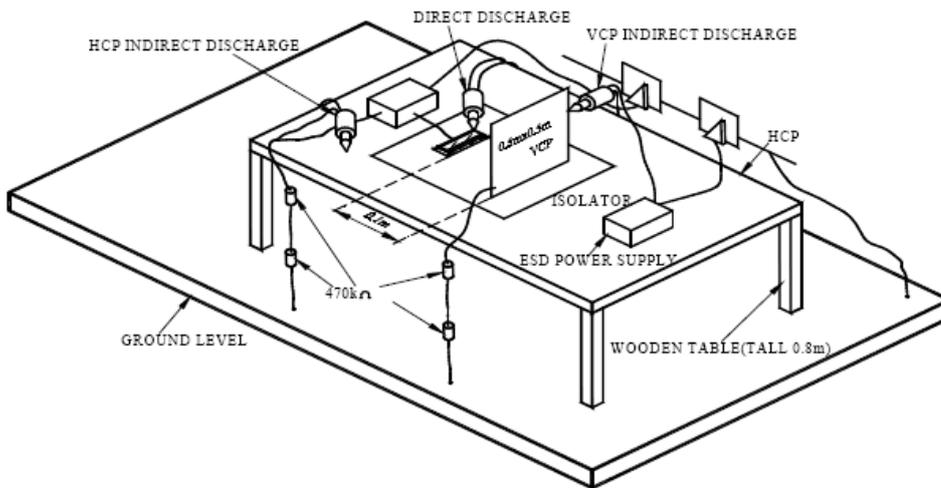
Ta ≥ 40°C: Abslue humidity must be lower than the humidity of 90%RH@40 °C

### 3.3 Electronic Static Discharge Maximum Rating

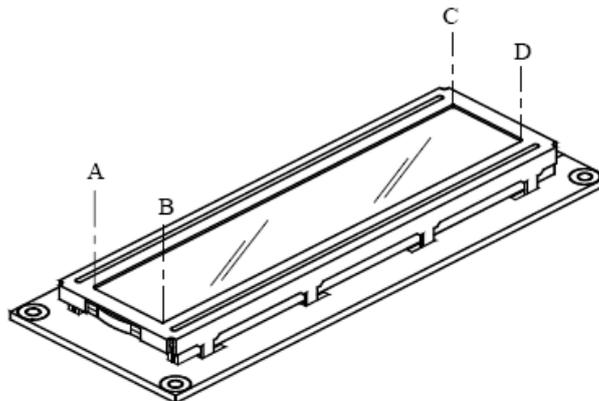
#### ESD Test Method : IEC-1000-4-2

Item	Description
Testing environment	Ambient temperature : 15°C to 35°C Humidity : 30% to 60% LCM(E.U.T) : Power up
Testing equipment	Manufacture : Noiseken, Model No. ESD
Testing condition	See drawing 1
Direct discharge	0 to ± 4KV      Discharge point, see drawing2
Indirect discharge	0 to ± 8KV      Discharge point, see drawing1
Pass condition	No malfunction of unit. Temporary malfunction of unit which can be recovered by system reset.
Fail condition	Non. Recoverable malfunction of LCM or system.

**FIG1 ESD Testing Equipment**



#### Direct Contact Discharge / Contact Point : A,B,C,D



## 4. ELECTRICAL CHARACTERISTICS

(V<sub>DD</sub> = 4.5 to 5.5V, TA = 25)

Characteristic	Symbol	Condition	Min	Typ	Max	Unit
Operating Voltage	V <sub>DD</sub>	-	4.5	-	5.5	V
Operating Current	I <sub>DD</sub>	Internal oscillation or external clock (V <sub>DD</sub> = 5.0V, f <sub>osc</sub> = 270kHz)	-	0.35	0.6	mA
Input Voltage (1) (except OSC1)	V <sub>IH1</sub>	-	2.2	-	V <sub>DD</sub>	V
	V <sub>IL1</sub>	-	-0.3	-	0.6	
Input Voltage (2) (OSC1)	V <sub>IH2</sub>	-	V <sub>DD</sub> -1.0	-	V <sub>DD</sub>	V
	V <sub>IL2</sub>	-	-0.2	-	1.0	
Output Voltage (1) (DB0 to DB7)	V <sub>OH1</sub>	I <sub>OH</sub> = -0.205mA	2.4	-	-	V
	V <sub>OL1</sub>	I <sub>OL</sub> = 1.2mA	-	-	0.4	
Output Voltage (2) (except DB0 to DB7)	V <sub>OH2</sub>	I <sub>O</sub> = -40μA	0.9V <sub>DD</sub>	-	-	V
	V <sub>OL2</sub>	I <sub>O</sub> = 40μA	-	-	0.1V <sub>DD</sub>	
Voltage Drop	V <sub>dCOM</sub>	I <sub>O</sub> = ±0.1mA	-	-	1	V
	V <sub>dSEG</sub>		-	-	1	
Input Leakage Current	I <sub>LKG</sub>	V <sub>IN</sub> = 0V to V <sub>DD</sub>	-1	-	1	μA
Input Low Current	I <sub>IL</sub>	V <sub>IN</sub> = 0V, V <sub>DD</sub> = 5V (pull up)	-50	-125	-250	
Internal Clock (external Rf)	f <sub>OSC1</sub>	Rf = 91kΩ ±2% (V <sub>DD</sub> = 5V)	190	270	350	kHz
External Clock	f <sub>OSC</sub>	-	125	270	350	kHz
	duty		45	50	55	%
	t <sub>R</sub> , t <sub>F</sub>		-	-	0.2	μA
LCD Driving Voltage	V <sub>LCD</sub>	V <sub>DD</sub> -V5 (1/5, 1/4 bias)	3.0	-	13.0	V

## 4.1 LED ELECTRICAL/OPTICAL CHARACTERISTICS

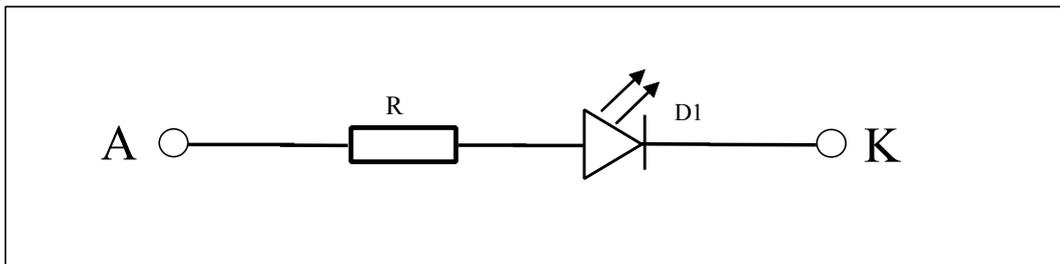
Item	Symbol	min	typ	max	Unit	Condition
Forward Voltage	V <sub>f</sub>	-	5.0	5.2	V	I <sub>f</sub> = 20 mA
Reverse Current	I <sub>r</sub>	-	20	-	uA	V <sub>r</sub> =5V
Dominant wave length	λ <sub>d</sub>	565	570	575	nm	I <sub>f</sub> = 20 mA
Spectral Line Half width	Δλ	-	30	-	nm	I <sub>f</sub> = 20 mA
Luminance	L <sub>v</sub>	-	80	-	cd/m <sup>2</sup>	I <sub>f</sub> = 20 mA

## 4.2 LED ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Condition	Rating	Unit
Reverse Voltage	V <sub>r</sub>	T <sub>a</sub> =25°C	5	V
Absolute maximum forward current	I <sub>fm</sub>	T <sub>a</sub> =25°C	30	mA
Power description	p <sub>d</sub>	T <sub>a</sub> =25°C	150	mW

### 4.2.1 LED ARRAY BLOCK DIAGRAM

( LED DICE 1 dices )



### 4.2.2 LED POWER SOURCE

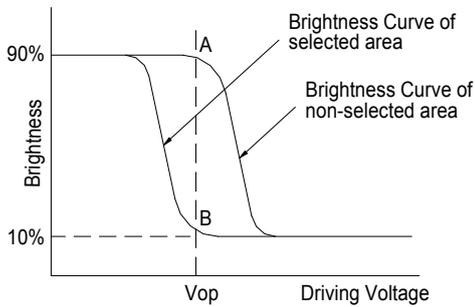
LED	Option	Power source	Jumper setting
	A	15A/16K	R7=110 Ω

## 5. ELECTRO-OPTICAL CHARACTERISTICS

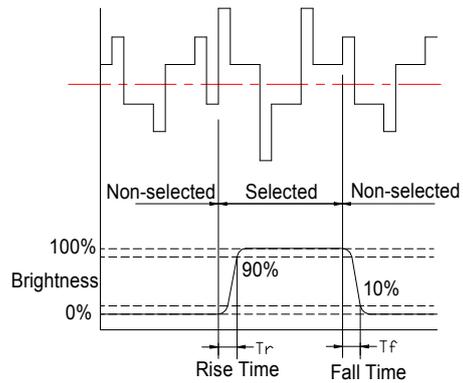
ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
Contrast ratio	K	$\phi = 0$	1.4	4	-	-	1
Response time (rise)	$T_r$	$\phi = 1$	-	130	-	ms	2
Response time (fall)	$T_f$	$\phi = 2$	-	130	-	ms	2
Viewing angle	$\phi$	$K \geq 1.4$	-30 -- +30			deg.	3
	$\theta$		-40 -- +20				

### Note 1: Definition of Contrast Ratio "K"

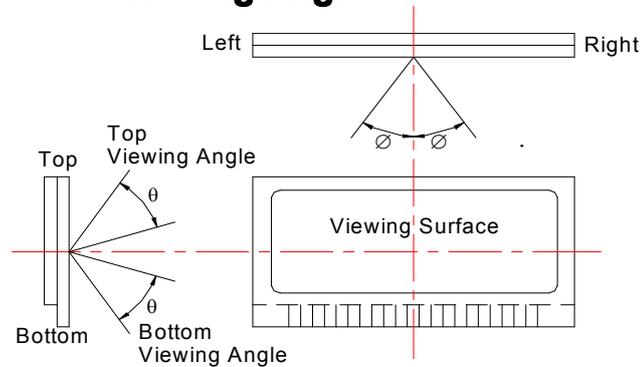
$$K = \frac{\text{Brightness of non-selected segment(A)}}{\text{Brightness of selected segment(B)}}$$



### Note 2: Definition of Optical Response Time

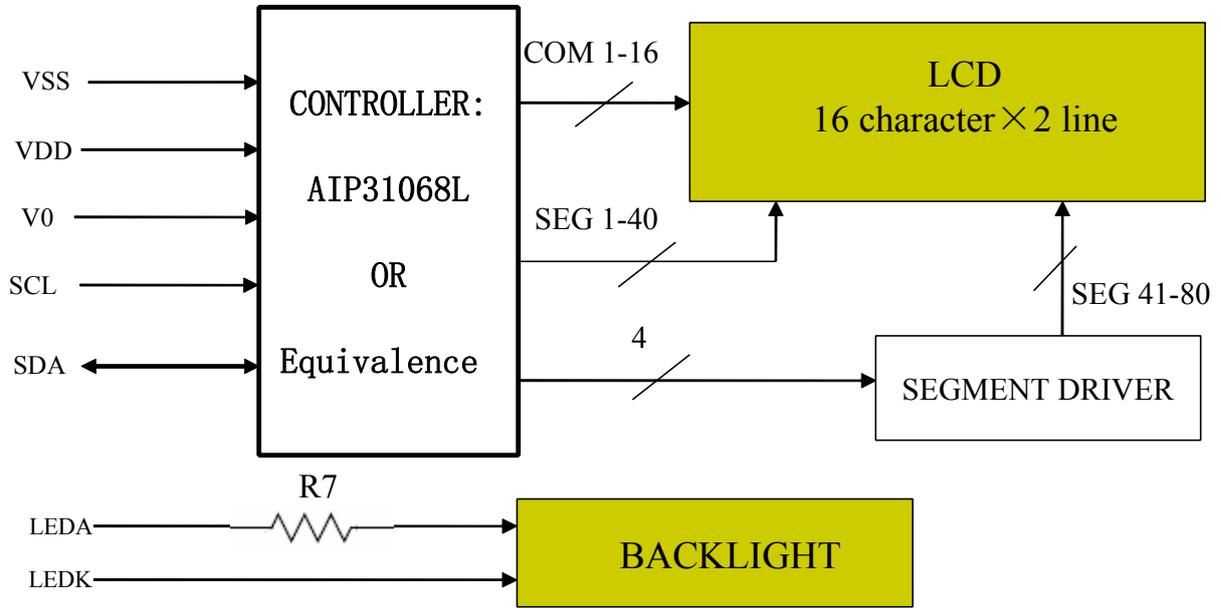


### Note 3: Definition of Viewing Angle

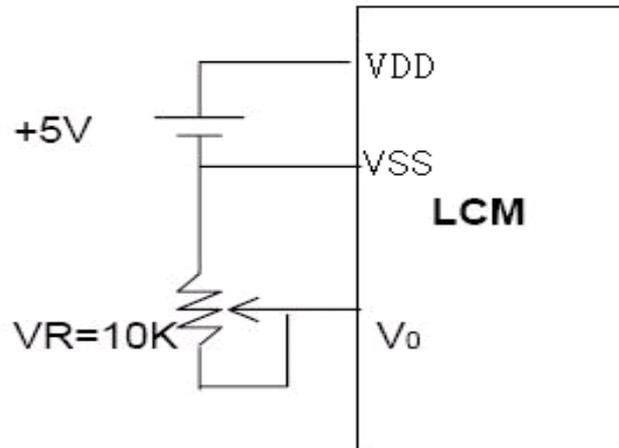


Please select either top or bottom viewing angle

## 6. BLOCK DIAGRAM

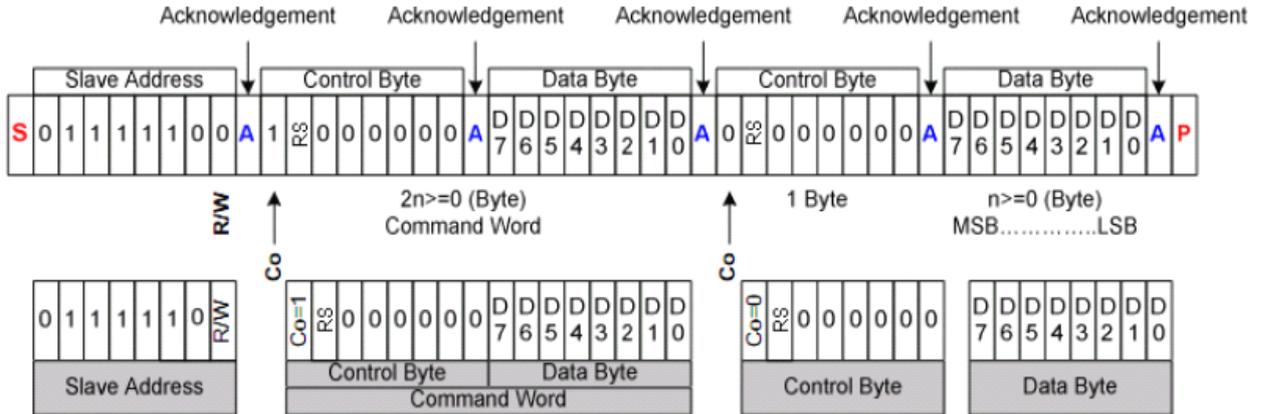


## 7. POWER SUPPLY



# 8. TIMING DIAGRAM

## Write Mode (R/W="0")

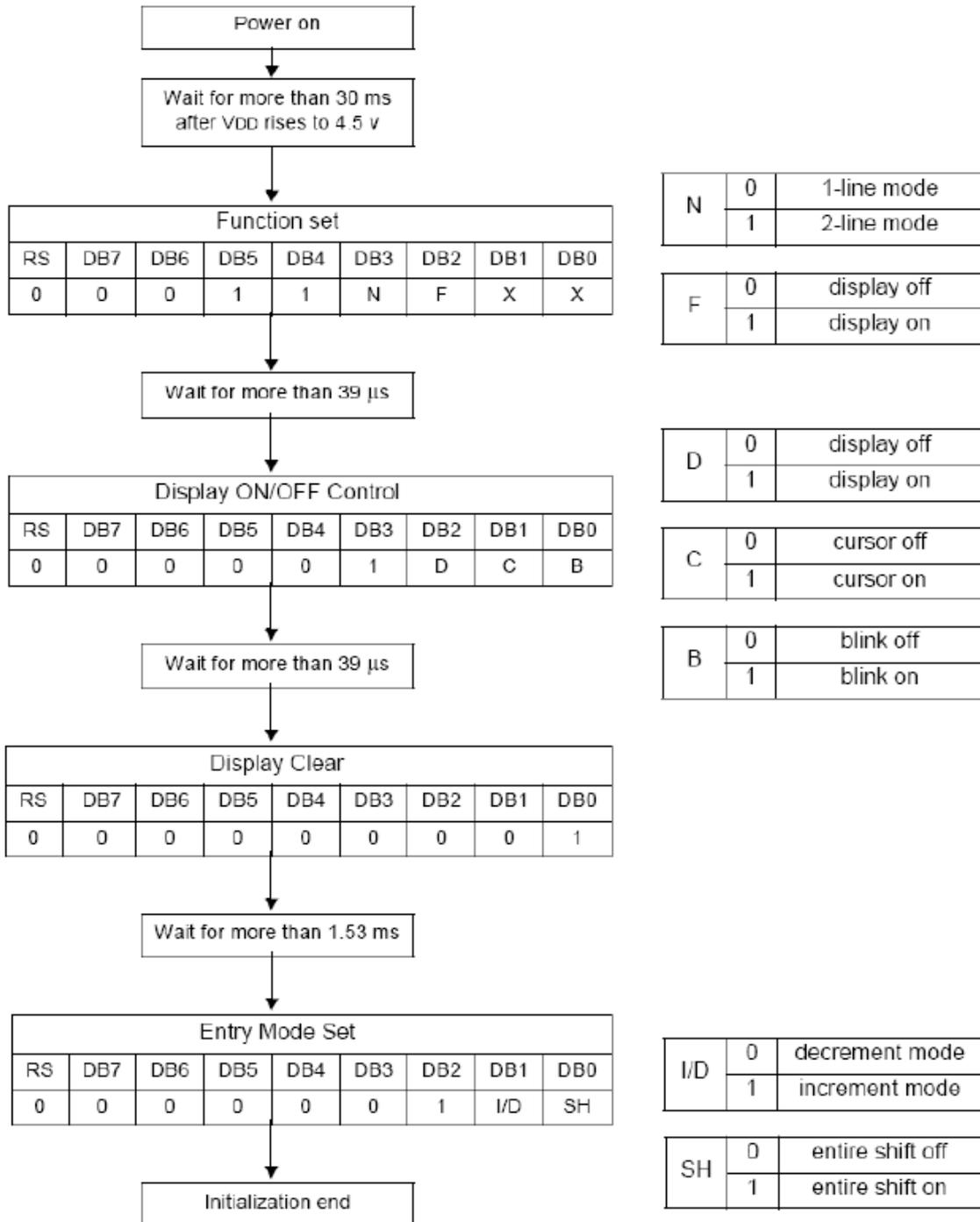


Co	0	Last control byte. Only a stream of data bytes is allowed to follow. This stream may only be terminated by a STOP or RE-START condition.
	1	Another control byte will follow the data byte.

## 9. AC CHARACTERISTICS

Characteristics	Symbol	Test Condition	Min.	Typ.	Max.	Unit
SCL Cycle Time	$f_{\text{SCLK}}$	I <sup>2</sup> C	–	–	400	KHz
SCL Pulse Width	$t_{\text{LOW}}$		1.3	–	–	us
SCL Rise/Fall Time	$t_{\text{HIGH}}$		0.6	–	–	
Address Setup Time	$t_{\text{SU:DAT}}$		100	–	–	ns
Address Hold Time	$t_{\text{HD:DAT}}$		0	–	0.9	us
SCL/SDA Rise/Pulse Time	$t_r, t_f$		20	–	300	ns
START Steup Time	$t_{\text{SU:STA}}$		0.6	–	–	us
START Hold Time	$t_{\text{HD:STA}}$		0.6	–	–	us
STOP Steup Time	$t_{\text{SU:STO}}$		0.6	–	–	us
STOP、START Spacing Interval	$t_{\text{BUF}}$		1.3	–	–	us

# 10. INITIALIZATION SEQUENCE



## 11. INSTRUCTION SET

COMMAND	COMMAND CODE									COMMAND CODE	E-CYCLE $f_{osc}=270\text{KHz}$	
	RS	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0			
SCREEN CLEAR	0	0	0	0	0	0	0	0	1	Screen Clear, Set AC to 0 Cursor Reposition	1.53ms	
CURSOR RETURN	0	0	0	0	0	0	0	1	*	DDRAM AD=0, Return, Content Changeless	1.53ms	
INPUT SET	0	0	0	0	0	0	1	I/D	S	Set moving direction of cursor, Appoint if move	39us	
DISPLAY SWITCH	0	0	0	0	0	1	D	C	B	Set display on/off,cursor on/off, blink on/off	39us	
SHIFT	0	0	0	0	1	S/C	R/L	*	*	Remove cursor and whole display,DDRAM changeless	39us	
FUNCTION SET	0	0	0	1	DL	N	F	*	*	Set DL,display line,font	39us	
CGRAM AD SET	0	0	1	ACG						Set CGRAM AD, send receive data		39us
DDRAM AD SET	0	1	ADD						Set DDRAM AD, send receive data		39us	
CGRAM/ DDRAM DATA WRITE	1	DATA WRITE							Write data from CGRAM or DDRAM		43us	
<p>I/D=1: Increment Mode; I/D=0: Decrement Mode            S=1: Shift            S/C=1: Display Shift; S/C=0: Cursor Shift            R/L=1: Right Shift; R/L=0: Left Shift            DL=1: 8D DL=0: 4D            N=1: 2R N=0: 1R            F=1: 5x10 Style; F=0: 5x7 Style</p> <p>DDRAM: Display data RAM            CGRAM: Character Generator RAM            ACG: CGRAM AD            ADD: DDRAM AD &amp; Cursor AD            AC: Address counter for DDRAM &amp; CGRAM</p>											<p>E-cycle changing with main frequency.            Example:            If fcp or <math>f_{osc}=270\text{KHz}</math>            40us x 250/270 =37us</p>	

## 12. FONT TABLE

b7- b3 -b0	b4	0000	0010	0011	0100	0101	0110	0111	1010	1011	1100	1101	1110	1111
0000	CG RAM (1)		0	a	P	`	P	—	9	3	α	ρ		
	(2)	!	1	A	Q	a	9	α	7	7	α	ä	q	
0010	(3)	"	2	B	R	b	r	Γ	イ	ウ	×	β	θ	
	(4)	#	3	C	S	c	s	┘	ウ	7	ε	ε	ω	
0100	(5)	\$	4	D	T	d	t	、	工	ト	†	μ	Ω	
	(6)	%	5	E	U	e	u	•	オ	ナ	1	ε	ü	
0110	(7)	&	6	F	V	f	v	ヲ	カ	ニ	ヨ	ρ	Σ	
	CG RAM (8)	'	7	G	W	g	w	7	キ	ヌ	ラ	g	π	
1000	CG RAM (1)	(	8	H	X	h	x	イ	ウ	ホ	リ	7	Σ	
	(2)	)	9	I	Y	i	y	ウ	7	ル	ル	'	4	
1010	(3)	*	#	J	Z	j	z	エ	コ	ン	ク	j	7	
	(4)	+	:	K	[	k	[	★	サ	ヒ	ロ	*	π	
1100	(5)	,	<	L	¥	l	l	ホ	ヨ	フ	ワ	φ	π	
	(6)	—	=	M	I	m	)	ユ	ズ	ハ	ウ	ε	÷	
1110	(7)	.	>	N	^	n	→	ヨ	セ	ホ	°	ñ		
	CG RAM (8)	/	?	O	_	o	←	ウ	リ	マ	°	ö	■	

## 13. QUALITY ASSURANCE

### 13.1.1 Temperature and Humidity(Ambient Temperature)

Temperature :  $20 \pm 5^{\circ}\text{C}$

Humidity :  $65 \pm 5\%$

### 13.1.1.2 Operation

Unless specified otherwise, test will be conducted under function state.

### 13.1.1.3 Container

Unless specified otherwise, vibration test will be conducted to the product itself without putting it in a container.

### 13.1.1.4 Test Frequency

In case of related to deterioration such as shock test.It will be conducted only once.

### 13.1.5 Test Method

No.	Parameter	Conditions	Regulations
1	High Temperature Operating	$50 \pm 2^{\circ}\text{C}$	Note 3
2	Low Temperature Operating	$0 \pm 2^{\circ}\text{C}$	Note 3
3	High Temperature Storage	$60 \pm 2^{\circ}\text{C}$	Note 3
4	Low Temperature Storage	$-10 \pm 2^{\circ}\text{C}$	Note 3
5	Vibration Test (Non-operation state)	Total fixed amplitude : 1.5mm Vibration Frequency : 10 ~ 55Hz One cycle 60 seconds to 3 directions of X.Y.Z. for each 15 minutes	Note 3
6	Damp Proof Test (Non-operation state)	$40^{\circ}\text{C} \pm 2^{\circ}\text{C}$ , 90~95%RH, 96h	Note 1,2
7	Shock Test (Non-operation state)	To be measured after dropping from 60cm high once concrete surface in packing state	Note 3

Note 1: Returned under normal temperature and humidity for 4 hrs.

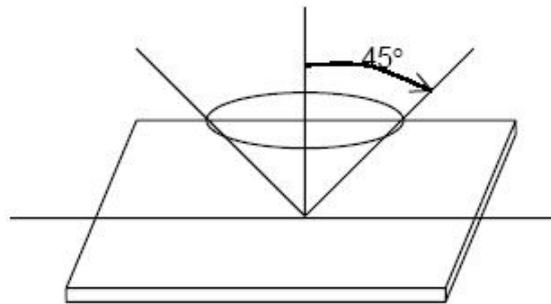
Note 2: No dew condensation to be observed.

Note 3: No change on display and in operation under the test condition

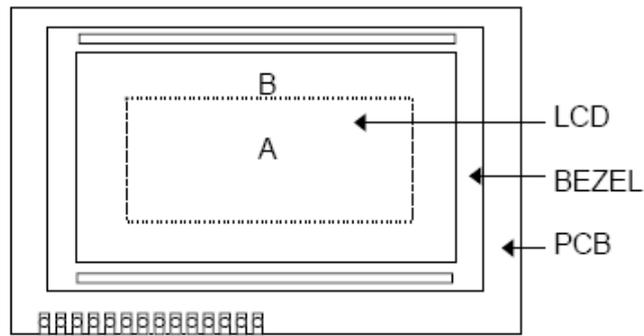
### 13.2 Inspection condition

#### 13.2.1 Inspection conditions

The LCD shall be inspected under 40W white fluorescent light.

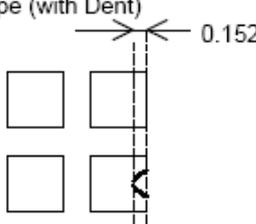


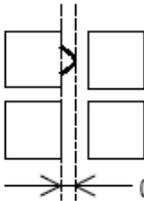
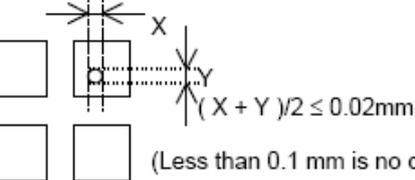
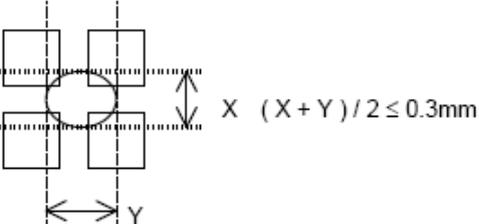
#### 13.2.2 Definition of applicable Zones



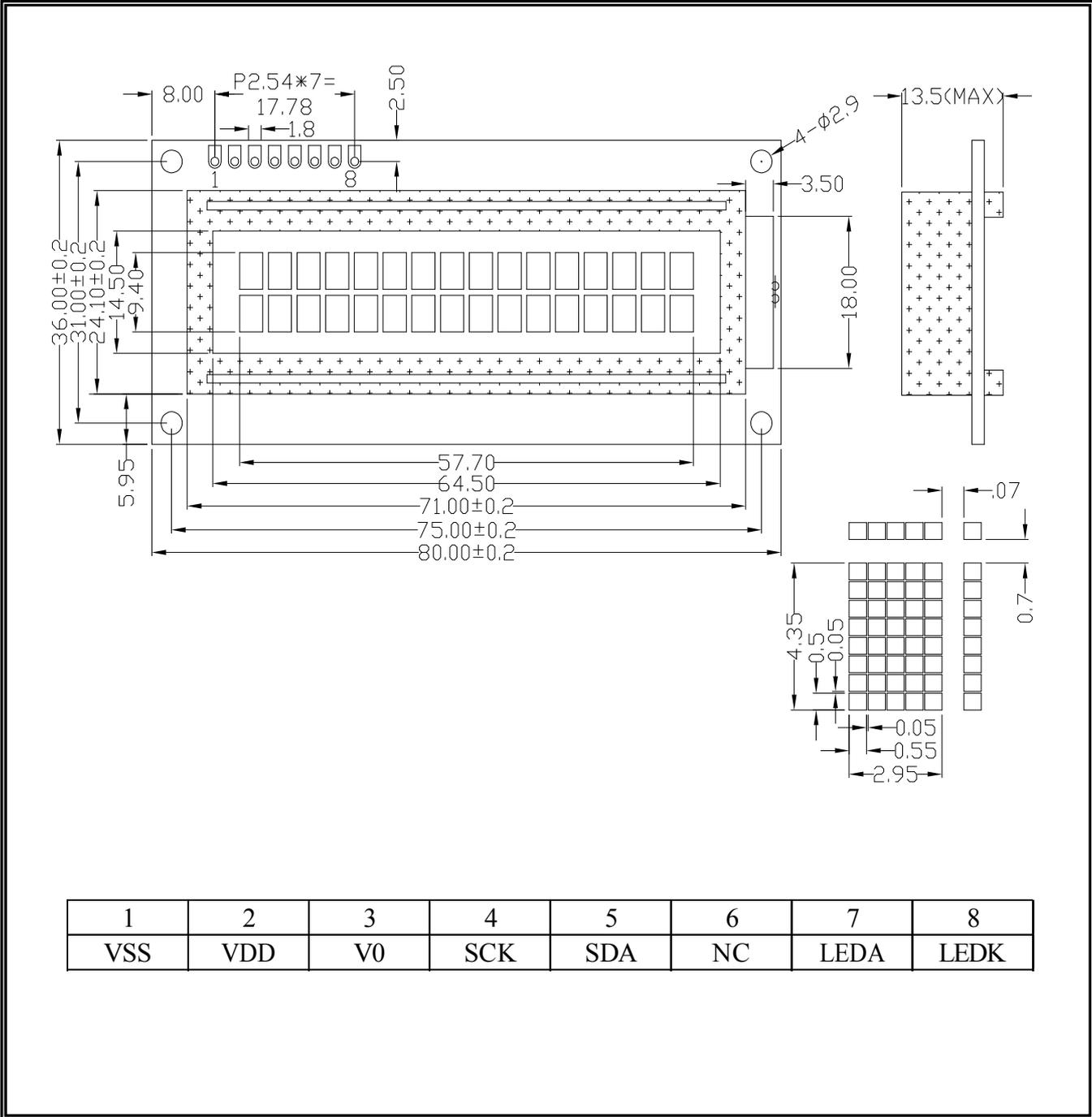
A : Display Area  
B : Non-Display Area

### 13.2.3 Inspection Parameters

No.	Parameter	Criteria																												
1	Black or White spots	<table border="1"> <thead> <tr> <th rowspan="2">Zone Dimension</th> <th colspan="2">Acceptable number</th> <th rowspan="2">Class Of Defects</th> <th rowspan="2">AQL Level</th> </tr> <tr> <th>A</th> <th>B</th> </tr> </thead> <tbody> <tr> <td><math>D &lt; 0.15</math></td> <td>*</td> <td>*</td> <td rowspan="4">Minor</td> <td rowspan="4">2.5</td> </tr> <tr> <td><math>0.15 \leq D &lt; 0.2</math></td> <td>4</td> <td>4</td> </tr> <tr> <td><math>0.2 \leq D \leq 0.25</math></td> <td>2</td> <td>2</td> </tr> <tr> <td><math>D \leq 0.3</math></td> <td>0</td> <td>1</td> </tr> </tbody> </table> <p style="text-align: center;"><math>D = (\text{Long} + \text{Short}) / 2</math> * : Disregard</p>	Zone Dimension	Acceptable number		Class Of Defects	AQL Level	A	B	$D < 0.15$	*	*	Minor	2.5	$0.15 \leq D < 0.2$	4	4	$0.2 \leq D \leq 0.25$	2	2	$D \leq 0.3$	0	1							
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$0.25 < D$	0	1																												
4	Uniformity of Pixel	<p>(1) Pixel shape (with Dent)</p> 																												

4	Uniformity of Pixel	<p>(2) Pixel shape ( with Projection)</p>  <p>Should not be connected to next pixel</p> <p>0.152</p> <p>(3) Pin hole</p>  <p><math>(X + Y) / 2 \leq 0.02\text{mm}</math></p> <p>(Less than 0.1 mm is no counted)</p> <p>(4) Deformation</p>  <p><math>X (X + Y) / 2 \leq 0.3\text{mm}</math></p> <p>Total acceptable number : 1/pixel, 5/cell</p>	
		Class of defects	<p><b>Major</b></p> <p>AQL 0.65%</p> <p>AQL 1.00%</p> <p><b>Minor</b></p> <p>AQL 2.5%</p>

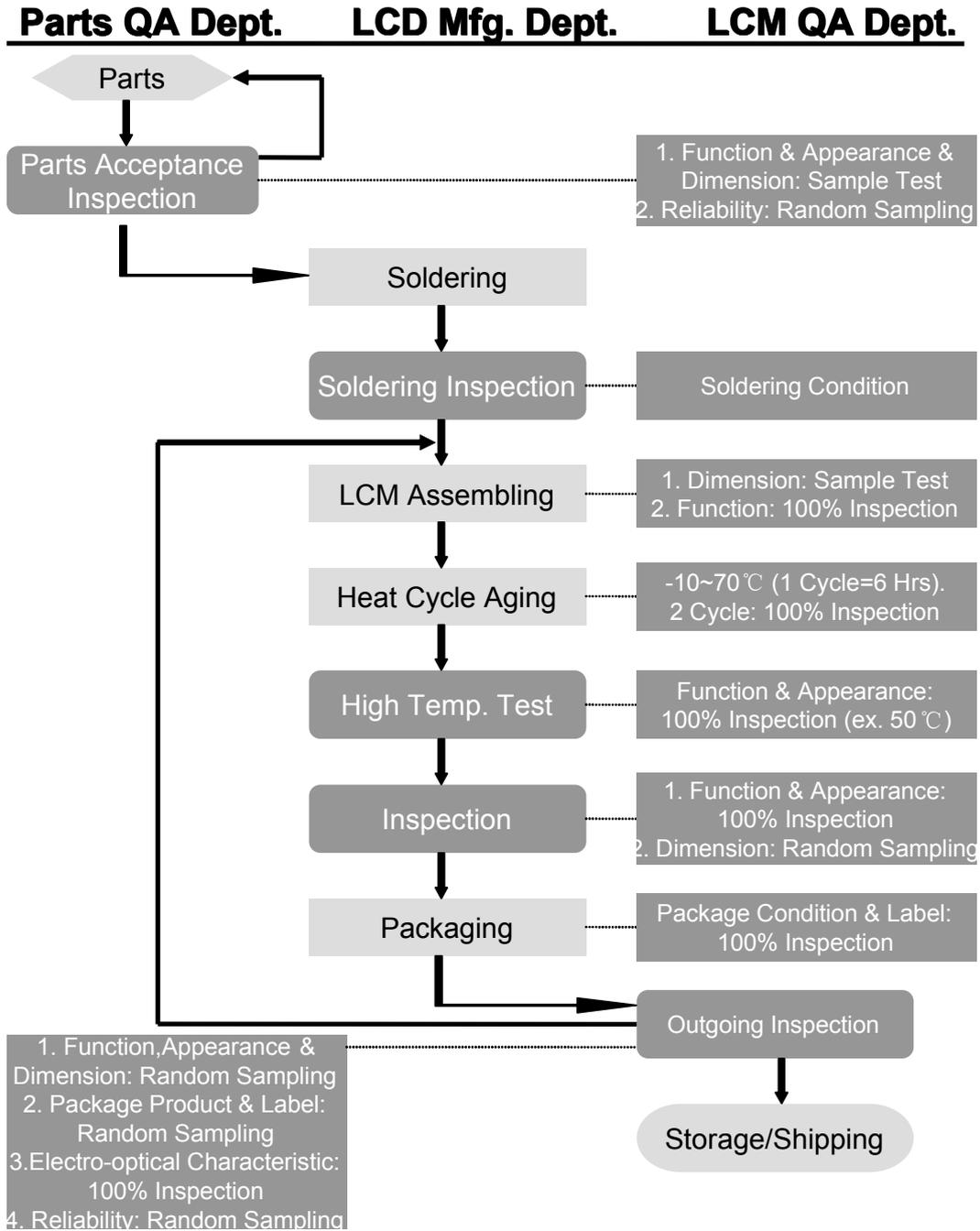
# 14. OUTLINE DRAWING



**15. INTERFACE**

<b>PIN NO.</b>	<b>SYMBOL</b>	<b>I/O</b>	<b>FUNCTION</b>
1	VSS	POWER SUPPLY	0V (GND)
2	VDD	POWER SUPPLY	+5.0V
3	V0	POWER SUPPLY	LCD CONTRAST ADJUSTMENT
4	SCK	I	I2C-bus serial clock
5	SDA	I/O	I2C-bus serial data
6	NC		
7	LEDA	POWER SUPPLY	SUPPLY VOLTAGE FOR LED(+5.0V)
8	LEDK	POWER SUPPLY	SUPPLY VOLTAGE FOR LED(0V)

# 16. QC/QA PROCEDURE



## 17. Handling Precautions

### 1. Limitation of Application:

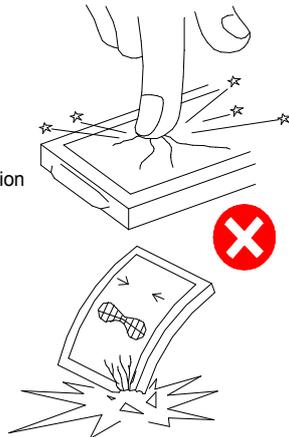
Jing handa products are designed for use in ordinary electronic devices such as business machines, telecommunications equipment, measurement devices and etc. Please handle the products with care. (see below)

Jing handa products are not designed, intended, or authorized for use in any application which the failure of the product could result in a situation where personal injury or death may occur. These applications include, but are not limited to: life-sustaining equipment, nuclear control devices, aerospace equipment, devices related to hazardous or flammable materials, etc. [If you intend to purchase or use the Jing handa Products for such unintended or unauthorized applications, Buyer must secure written consent to such use by a responsible officer of Jing handa Corporation.] Should Buyer purchase or use Jing handa in any such unintended or unauthorized application [without such consent], Buyer shall indemnify and hold Jing handa and its employees, subsidiaries, affiliates and distributors harmless against all claims, costs, damages and expenses, and reasonable attorney's fees, arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that Jing handa was negligent regarding the design or manufacture of the product.

Jing handa shall not be responsible for any infringement of industrial property rights of third parties in any country arising from the application or use of Jing handa products, except which directly concern the structure or production of such products.

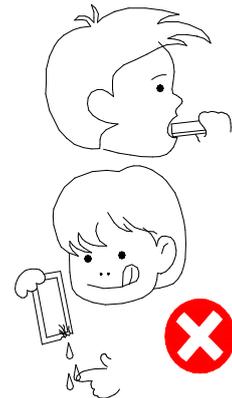
### No Press and Shock!

If pressure to LCD, orientation may be disturbed.  
LCD will be broken by shock!



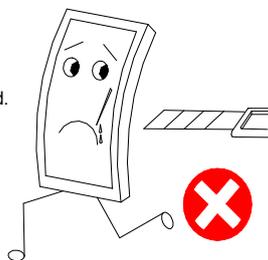
### Don't Swallow or Touch Liquid Crystal!

Liquid Crystal may be leaked when display is broken.  
If it accidentally gets your hands, wash them with water!



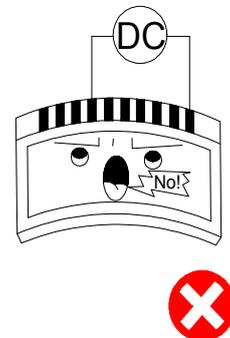
### Don't not Scratch!

Polarizer is a soft material and can easily be scratched.



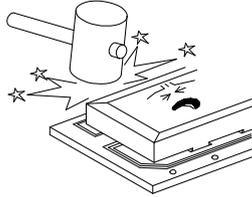
### No DC Voltage to LCD!

DC voltage or driving higher than the specified voltage will reduce the lifetime of the LCD.

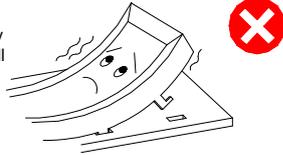


**Don't Press the Metallic Frame and Disassemble the LCM | Slowly Peel Off Protective Film!**

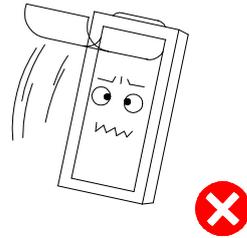
Pressure on the metallic frame and PCB may deform the conductive rubber or break the liquid crystal cell and back light, which will cause defects.



LCD may be shifted or conductive rubber may be reshaped, which will cause defects.

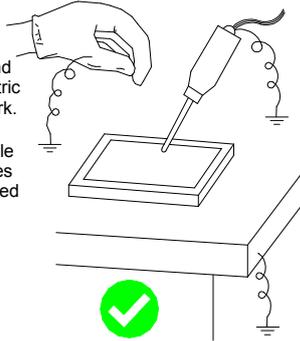


Avoid static electricity.



**Avoid Static Electricity!**

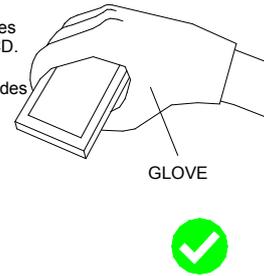
Please be sure to ground human body and electric appliances during work. It is preferable to use conductive mat on table and wear cotton clothes or conduction processed fiber. Synthetic fiber is not recommended.



**Wear Gloves While Handling!**

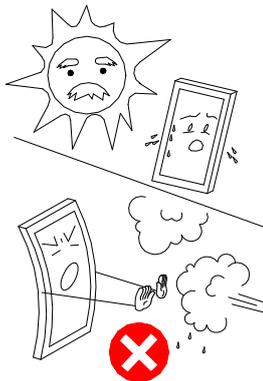
It is preferable to wear gloves to avoid damaging the LCD.

Please do not touch electrodes with bare hands or make them dirty.

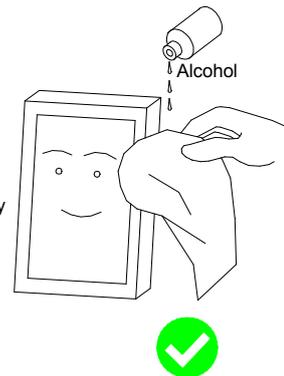


**Keep Away From Extreme Heat and Humidity | Use Alcohol to Clean Terminals!**

LCD deteriorates.

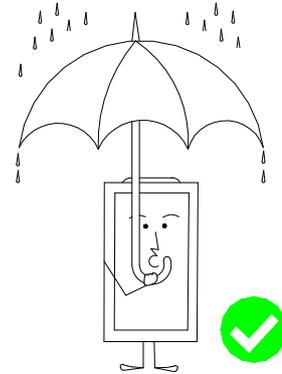


When attaching with the heat seal or anisotropically conductive film, wipe off with alcohol before use.



**Don't Drop Water on LCD!**

Note that the presence of waterdrops or dew in the LCD panel may deteriorate the polarizer or corrode electrode.

**Precaution in Soldering LCD Module**

Basic instructions: Solder I/O terminals only.

Use soldering iron without leakage.

(1) Soldering condition to I/O terminals

Temperature at tip of the iron:  $280 \pm 10^{\circ}\text{C}$

Soldering time: 3~4 sec.

Type of solder: Eutectic solder (containing colophony-flux)

\*Please do not use flux because it may soak into LCD Module or contaminate it.

\*It is preferable to peel off protective film on display surface after soldering I/O terminals is finished.

(2) Remove connector or cable

\*When you remove connector or cable soldered to I/O terminals, please confirm that solder is fully melted. If you remove by force, electrodes at I/O terminals may be damaged (or stripped off).

\*It is recommended to use solder suction machine.

**Long-term Storage**

If it is necessary to store LCD modules for a long time, please comply with the following procedures.

If storage condition is not satisfactory, display (especially polarizer) may be deteriorated or soldering I/O terminals may become difficult (some oxide is generated at I/O terminals plating).

1. Store as delivered by Jing handa

2. If you store as unpacked, put in anti-static bag, seal its opening and store where it is not subjected to direct sunshine nor fluorescent lamp.

3. Store at temperature 0 to  $+35^{\circ}\text{C}$  and at low humidity. Please refer to our specification sheets for storage temperature range and humidity condition.

**Long-term Storage**

Please use power supply with built-in surge protection circuit.