

## SPECIFICATION OF LCD MODULE

<b>CUSTOMER</b> 客户名称	
<b>PART NO.</b> 产品型号	<b>JHD1804 Y/YG(Black on Yellow) 1.1</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**

STN



FSTN



DFSTN

**2 Viewing Angle**

Lower 6:00



Upper 12:00



Others

**3 Display Mode**

Yellow Green positive



Blue Negative



Grey positive



FSTN positive



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



Green



Yellow Green



Red



White



Without backlight

**9 Temperature Grade**

Normal temperature



Wide temperature



Super wide temperature

**10 CG-ROM**

01 for English + Japanese language

## •REVISION RECORD

REV. NO.	REV. DATE	DESCRIPTION OF REVISION	PAGE	REMARK
1.0	18/08/30	INITIAL RELEASE	ALL	
1.1	18/09/13	Change GND\VCC to GND\VCC	ALL	

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## 1. FEATURES

- Display construction ..... 16 Characters \* 2 Lines
- Display mode ..... STN(Yellow Green )
- Display type ..... Negative Transmissive
- Backlight ..... LED/3.3-5.0V(Yellow Green)
- Viewing direction ..... 6 o'clock
- Operating temperature ..... 0 to 50°C
- Storage temperature ..... -10 to 60°C
- Controller ..... AIP31068L&AIP31065 or Equivalence
- Driving voltage ..... Single power
- Driving method ..... 1/16 duty, 1/5 bias
- Type ..... COB (Chip On Board)
- Number of data line ..... I2C-bus interface
- Connector ..... PIN

## 2. MECHANICAL DATA

ITEM		WIDTH	HEIGHT	THICKNESS	UNIT
Module size		80.0	40.0	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	0.50	-	mm
	Pitch	0.60	0.55	-	mm
Diameter of mounting hole		Φ2.5			mm
Weight		About 50			g

### 3. ABSOLUTE MAXIMUM RATINGS

(TA = 25, GND=0V)

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

### 4. ELECTRICAL CHARACTERISTICS

#### 4.1 DC Characteristic (VCC = 2.7 to 4.5V, TA = 25)

Characteristic	Symbol	Condition	Min.	Typ.	Max.	Unit
Operating Voltage	VCC	-	2.7	-	4.5	V
Supply Current	IDD	Internal oscillation or external clock. (VCC=3.0 V, fosc = 250 kHz)	-	0.2	0.4	mA
Input Voltage (1) (except OSC1)	V <sub>IH1</sub>	-	0.7VCC	-	VCC	V
	V <sub>IL1</sub>	-	-0.3	-	0.55	
Input Voltage (2) (OSC1)	V <sub>IH2</sub>	-	0.7VCC	-	VCC	
	V <sub>IL2</sub>	-	-	-	0.2VCC	
Output Voltage (1) (SDA)	V <sub>OH1</sub>	I <sub>OH</sub> = -0.1 mA	0.75VCC	-	-	V
	V <sub>OL1</sub>	I <sub>OL</sub> = 0.1 mA	-	-	0.2VCC	
Output Voltage (2) (except SDA)	V <sub>OH2</sub>	I <sub>O</sub> = -40 mA	0.8VCC	-	-	V
	V <sub>OL2</sub>	I <sub>O</sub> = 40 mA	-	-	0.2VCC	
Input Leakage Current	I <sub>IKG</sub>	V <sub>IN</sub> = 0 V to VCC	-1	-	1	
Input Low Current	I <sub>IL</sub>	V <sub>IN</sub> = 0 V, VCC = 3 V (PULL UP)	-10	-50	-120	mA
Internal Clock (external R <sub>f</sub> )	f <sub>OSC1</sub>	R <sub>f</sub> = 75 kΩ ± 2% (VCC = 3 V)	190	270	350	kHz
External Clock	f <sub>OSC2</sub>		125	270	410	kHz
	duty	-	45	50	55	%
	t <sub>R</sub> , t <sub>F</sub>		-	-	0.2	ms
COM ON resistance	R <sub>COM</sub>	I <sub>O</sub> = ±50μA, V <sub>LCD</sub> = 4.0V COM1 - COM16			20	KΩ
SEG ON resistance	R <sub>SEG</sub>	I <sub>O</sub> = ±50μA, V <sub>LCD</sub> = 4.0V SEG1 - SEG40			30	
LCD Driving Voltage	V <sub>LCD</sub>	VCC-V5 (1/5, 1/4 Bias)	3.0	-	9.0	V

## 4.2 DC Characteristic (VCC =4.5to 5.5V , TA = 25 )

Characteristic	Symbol	Condition	Min.	Typ.	Max.	Unit
Operating Voltage	VCC	-	4.5	-	5.5	V
Supply Current	IDD	Internal oscillation or external clock. (VCC=5.0 V, fosc = 250 kHz)	-	0.55	0.8	mA
Input Voltage (1) (except OSC1)	VIH1	-	2.5	-	VCC	V
	VIL1	-	-0.3	-	0.6	
Input Voltage (2) (OSC1)	VIH2	-	VCC-1.0	-	VCC	V
	VIL2	-	-0.2	-	1.0	
Output Voltage (1) (SDA)	VOH1	IOH= -0.205 mA	2.4	-	-	V
	VOL1	IOL= 1.2 mA	-	-	0.4	
Output Voltage (2) (except SDA)	VOH2	IO= -40 mA	0.9VCC	-	-	V
	VOL2	IO= 40 mA	-	-	0.1VCC	
Voltage Drop	VdCOM	IO=± 0.1 mA	-	-	1	V
	VdSEG		-	-	1	
Input Leakage Current	IIKG	VIN= 0 V to VCC	-1	-	1	uA
Input Low Current	IIL	VIN= 0 V, VCC= 5 V (PULL UP)	-50	-125	-250	
Internal Clock (external Rf)	fOSC1	Rf =91 kΩ ± 2% (VCC= 5 V)	190	270	350	kHz
	fOSC		125	270	410	
External Clock	duty		45	50	55	%
	tR, tF	-	-	-	0.2	ms
COM ON resistance	RCOM	IO = ± 50uA, VLCD = 4.0V COM1 - COM16			20	KΩ
SEG ON resistance	RSEG	IO = ± 50uA, VLCD = 4.0V SEG1 - SEG40			30	
LCD Driving Voltage	VLCD	VCC-V5(1/5, 1/4 Bias)	3.0	-	11.0	V

**4.3 AC Characteristic (VCC =2.7to 4.5V , TA = 25 )**

Characteristic	Symbol	Condition	Min.	Typ.	Max.	Unit
SCL Cycle Time	tSCYC	Write Mode (Refer to Fig-1)	200	-	-	ns
SCL Pulse Width (High)	tSHW		20	-	-	
SCL Pulse Width (Low)	tSLW		160	-	-	
SCL Rise / Fall Time	tr,tf		-	-	20	
Data Setup Time	tSDS		10	-	-	
Data Hold Time	tSDH		10	-	-	
SCL Cycle Time	tSCYC		20	-	-	
SCL Pulse Width (High)	tSHW		200	-	-	
SCL Frequency	fSCLK	Read Mode (Refer to Fig-2)	-	-	400	KHZ
SCL Pulse Width (High)	tSHW		0.6	-	-	us
SCL Pulse Width (Low)	tSLW		1.3	-	-	us
Data Setup Time	tSU:DAT		180	-	-	ns
Data Hold Time	tHD:DAT		0	-	0.9	us
SCL/SDA Rise / Fall Time	tr,tf		20	-	300	ns
START Setup Time	tSU:STA		0.6	-	-	us
START Hold Time	tHD:STA		0.6	-	-	us
STOPSetup Time	tSU:STO		0.6	-	-	us
STOP-START Time	tBUF		1.3	-	-	us

**4.4 AC Characteristic (VCC =4.5to 5.5V , TA = 25 )**

Characteristic	Symbol	Condition	Min.	Typ.	Max.	Unit
SCL Cycle Time	tSCYC	Write Mode (Refer to Fig-1)	100	-	-	ns
SCL Pulse Width (High)	tSHW		20	-	-	
SCL Pulse Width (Low)	tSLW		160	-	-	
SCL Rise / Fall Time	tr,tf		-	-	20	
Data Setup Time	tSDS		10	-	-	
Data Hold Time	tSDH		10	-	-	
SCL Cycle Time	tSCYC		20	-	-	
SCL Pulse Width (High)	tSHW		350	-	-	



SCL Frequency	fSCLK	Read Mode (Refer to Fig-2)	-	-	400	ns
SCL Pulse Width (High)	tSHW		0.6	-	-	
SCL Pulse Width (Low)	tSLW		1.3	-	-	
Data Setup Time	tSU:DAT		100	-	-	
Data Hold Time	tHD:DAT		0	-	0.9	
SCL/SDA Rise / Fall Time	tr,tf		20	-	300	
START Setup Time	tSU:STA		0.6	-	-	
START Hold Time	tHD:STA		0.6	-	-	
STOP Setup Time	tSU:STO		0.6	-	-	
STOP-START Time	tBUF		1.3	-	-	

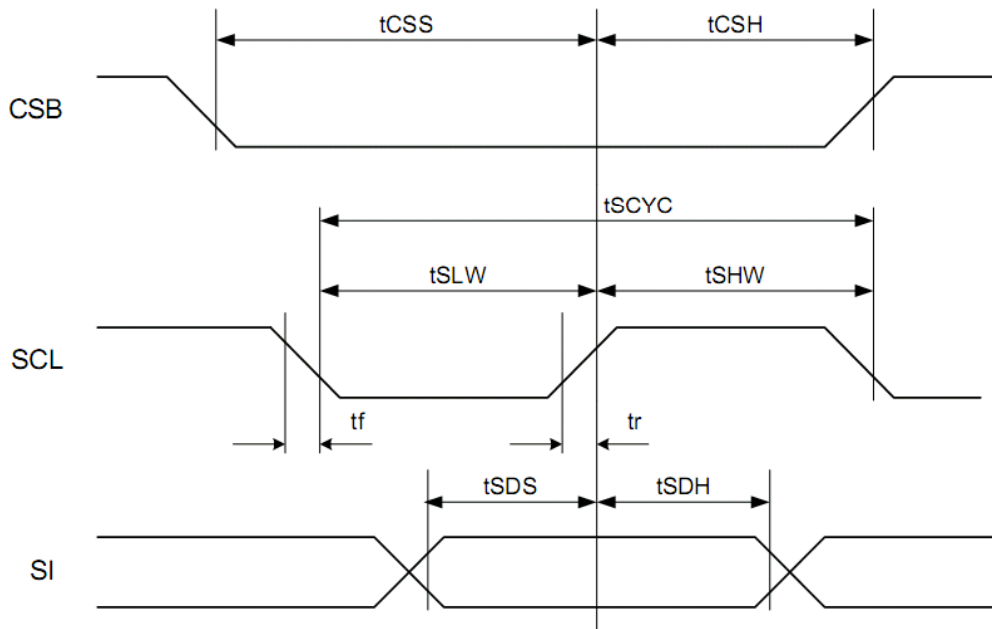


Figure 1 . Timing Diagram of 3-lines interface

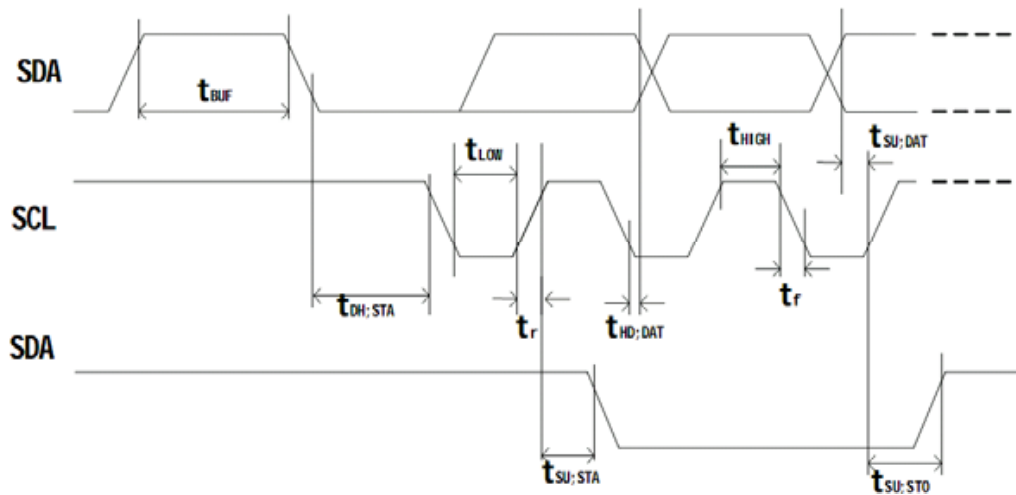


Figure 2 . Timing Diagram of 2-lines interface

## 5. B/L ELECTRICAL-OPTICAL CHARACTERISTICS

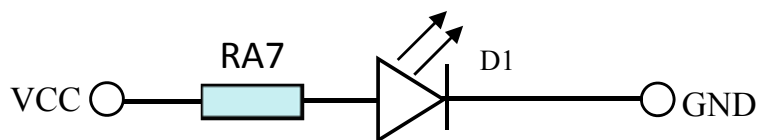
Item	Symbol	min	typ	max	Unit	Condition
Operating Voltage	VCC	3.3	-	5.0	V	If=20mA
Reverse Current	Ir	-	20	-	uA	Vr=5V
Dominant wave length	$\lambda_p$	565	-	575	nm	If=20mA
Spectral Line Half width	$\Delta \lambda$	-	120	-	nm	If=20mA
Luminance	Lv	-	60	-	cd/m <sup>2</sup>	If=20mA

### 5.1 B/L ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Condition	Rating	Unit
Reverse Voltage	Vr	Ta=25°C	5	V
Absolute maximum forward current	Ifm	Ta=25°C	25	mA
Power description	pd	Ta=25°C	125	mW

### 5.2 B/L LED ARRAY BLOCK DIAGRAM

( LED DICE 1 dices )



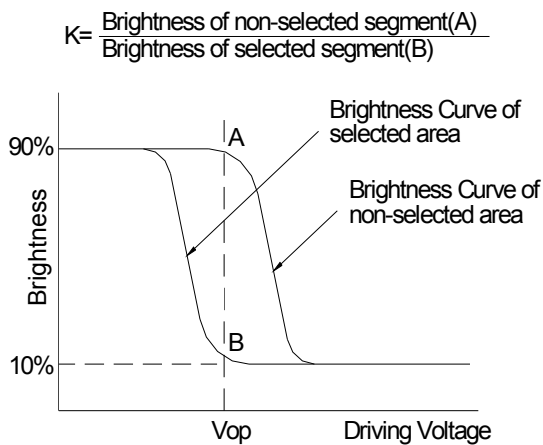
### 5.3 B/L POWER SOURCE

LED	Option	Power source	Jumper setting
	A	VCC/GND	RA1=10Ω

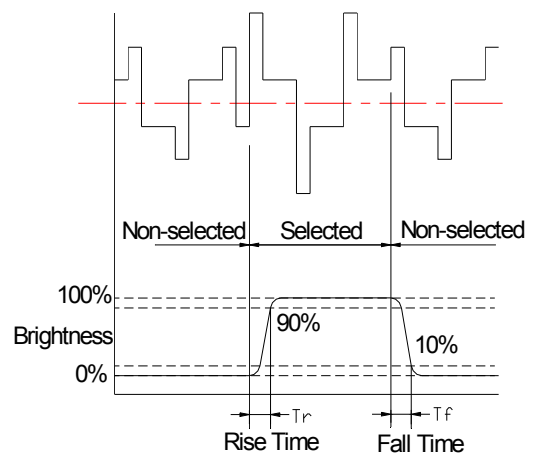
## 6. DISPLAY ELECTRO-OPTICAL CHARACTERISTICS

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
Contrast ratio	K	$\phi=0^{\circ}$	1.4	4	-	-	1
Response time (rise)	Tr	$\phi=0^{\circ} \theta=0^{\circ}$	-	130	-	ms	2
Response time (fall)	Tf	$\phi=0^{\circ} \theta=0^{\circ}$	-	130	-	ms	2
Viewing angle	$\phi$	K $\geq 1.4$	-40 -- +40			deg.	3
	$\theta$		-40 -- +15				

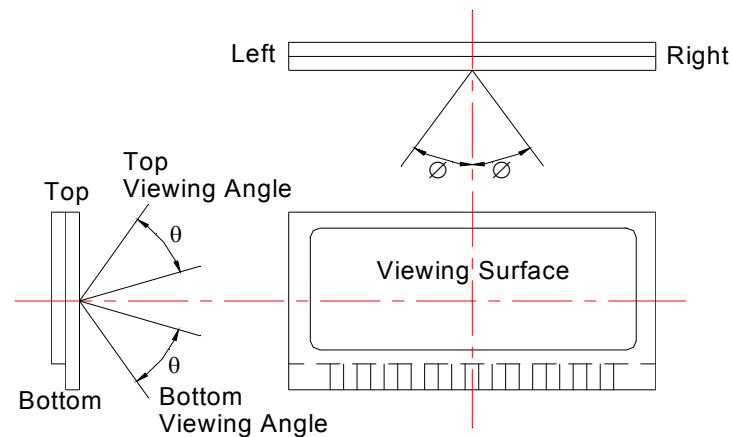
### Note 1: Definition of Contrast Ratio “K”



### Note 2: Definition of Optical Response Time

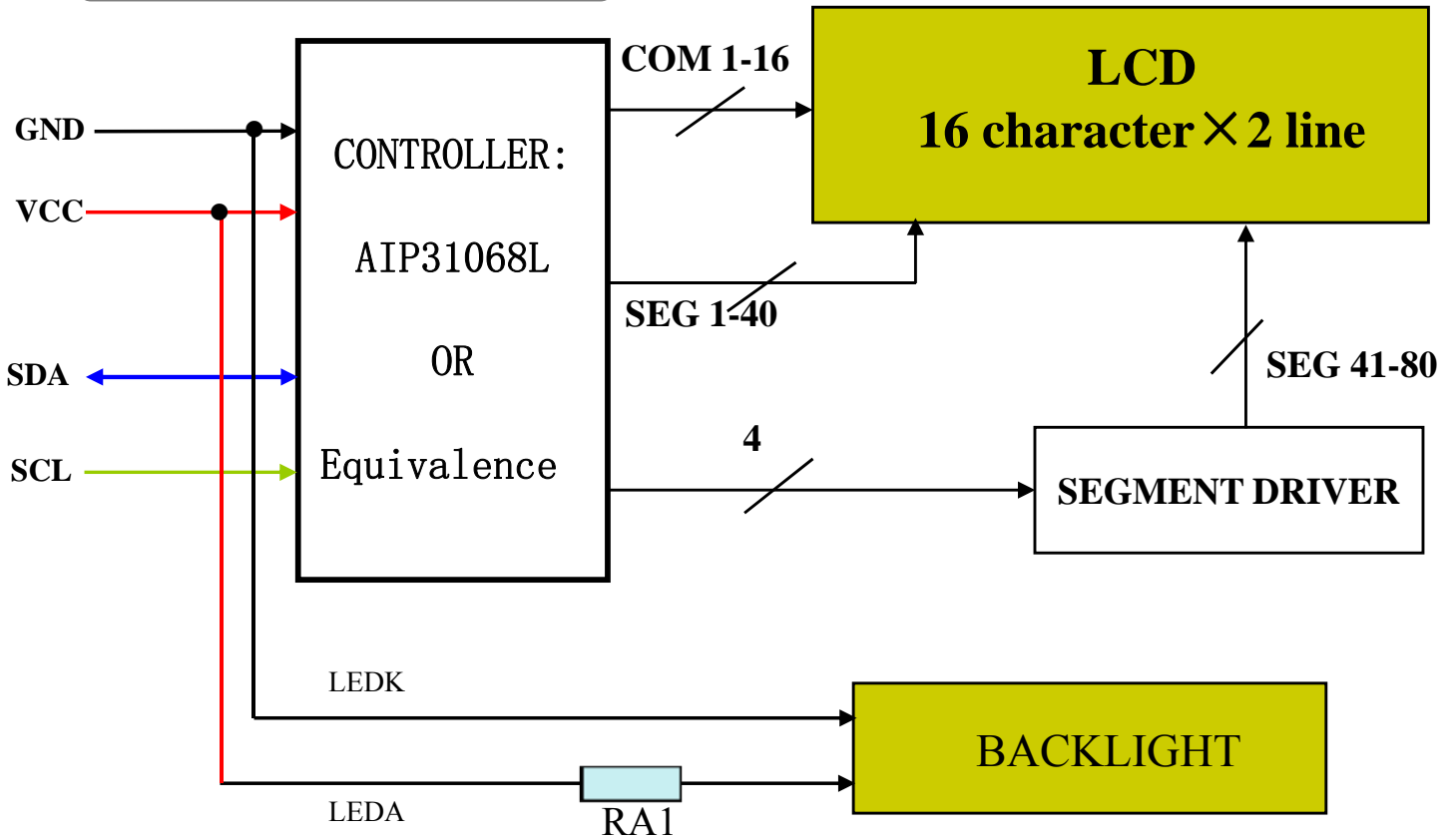


### Note 3: Definition of Viewing Angle

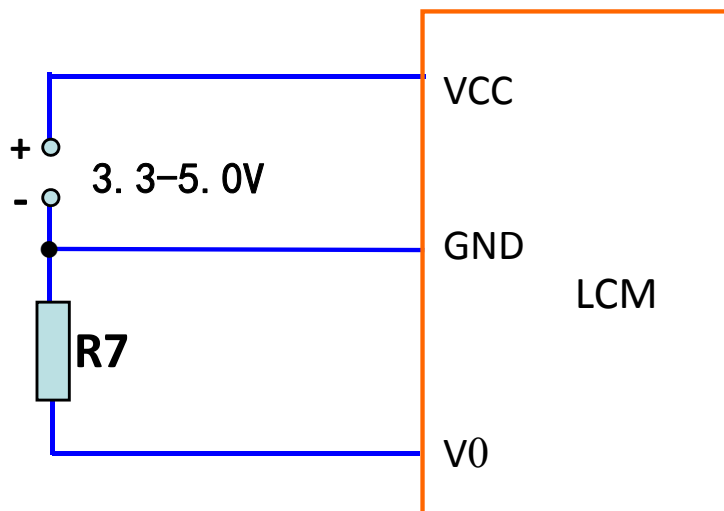


Please select either top or bottom viewing angle

## 7. BLOCK DIAGRAM

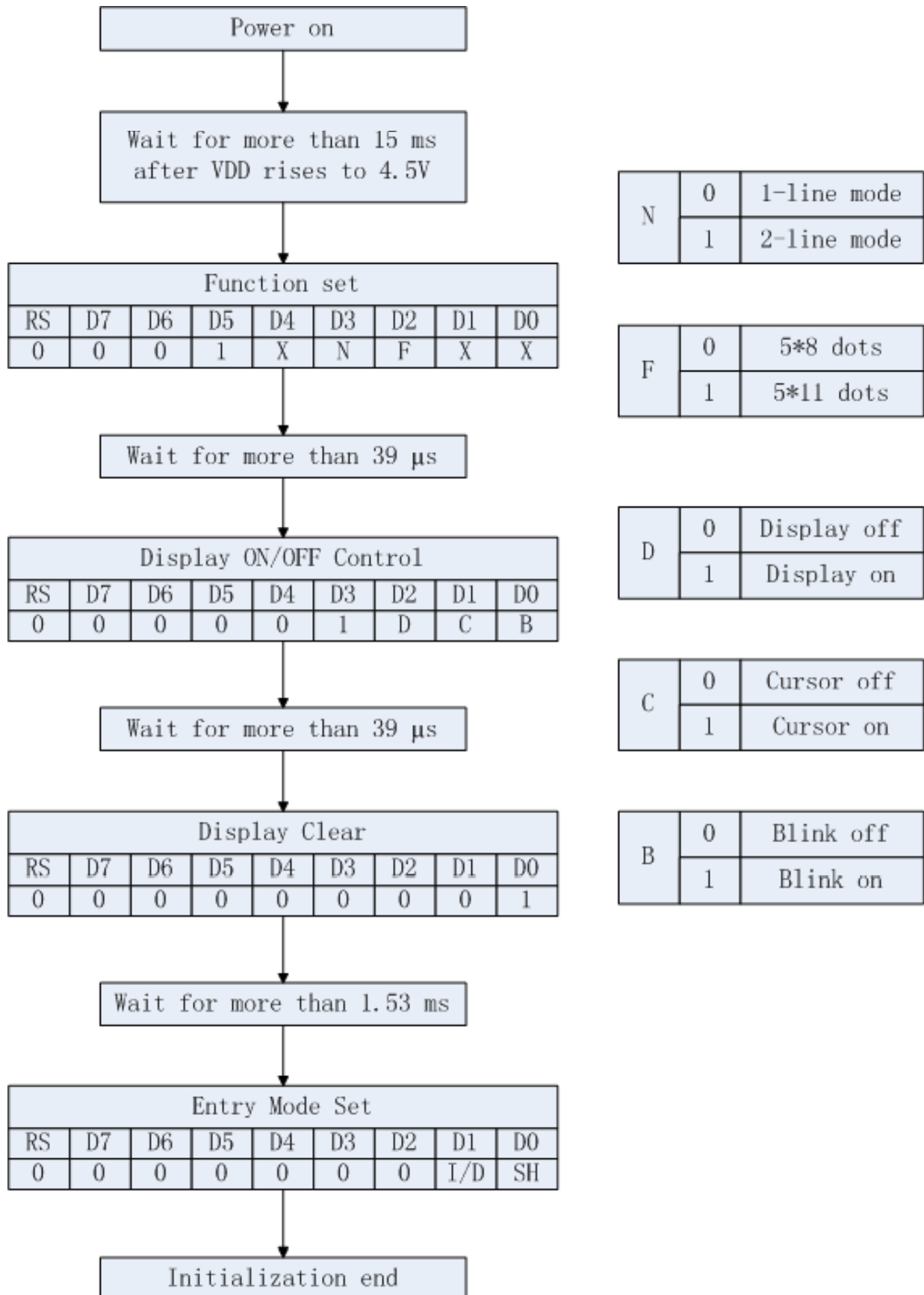


## 8. POWER SUPPLY



# 9. INITIALIZATION SEQUENCE

(VCC = 5.0V)



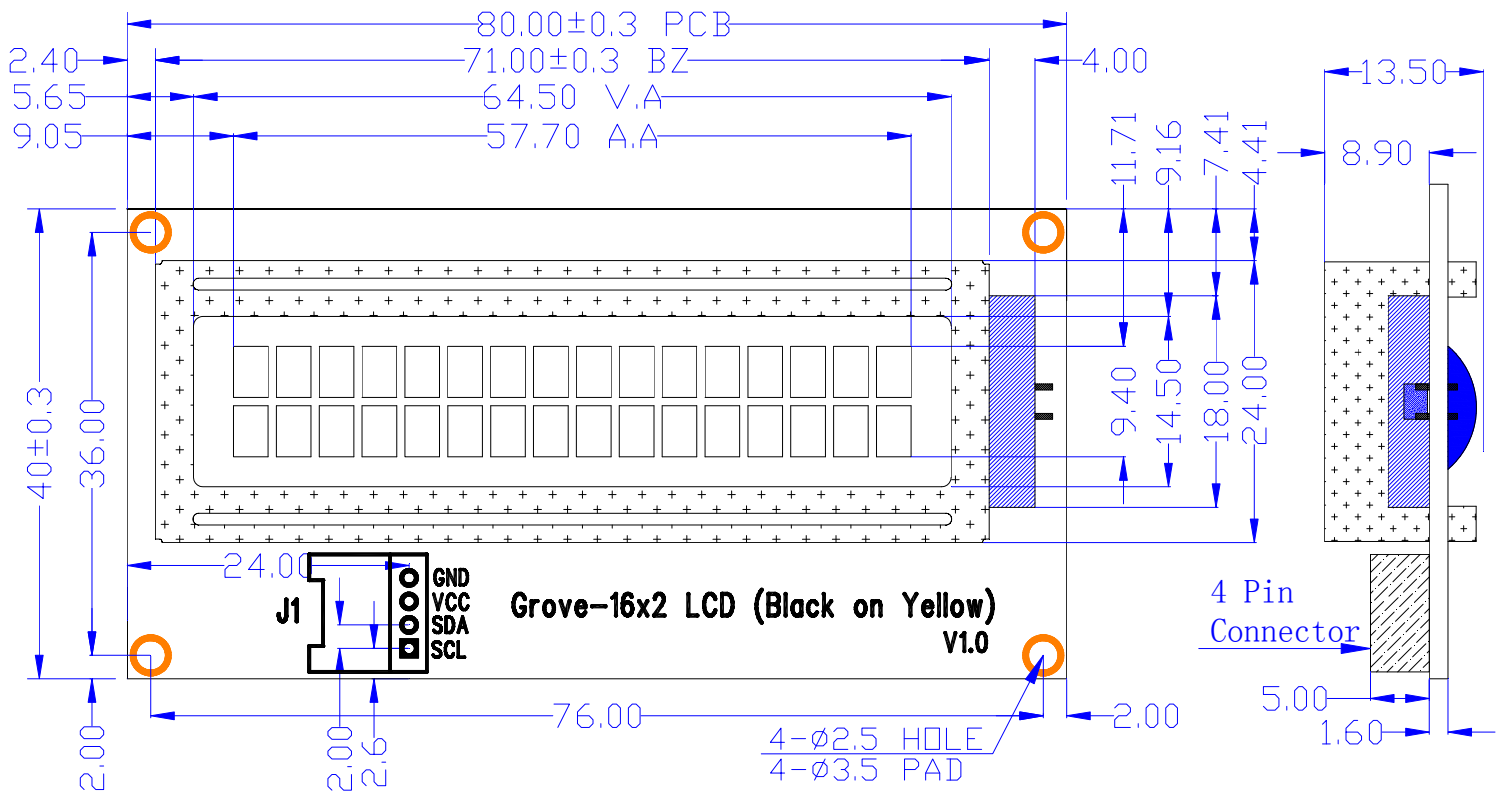
# 10. INSTRUCTION SET

COMMAND	COMMAND CODE									COMMAND CODE	E-CYCLE <small>f<sub>osc</sub>=270KHz</small>	
	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 f<sub>cp</sub> or f<sub>osc</sub>=270KHz</p> <p>40us x  250/270  =37us</p>	

# 11. FONT TABLE

b7- b3 b4 -b0	0000	0010	0011	0100	0101	0110	0111	1010	1011	1100	1101	1110	1111
0000	CG RAM (1)	0	a	P	`	P		—	9	E	a	p	
0001	(2)	!	1	A	Q	a	9	a	F	7	G	ä	q
0010	(3)	"	2	B	R	b	r	Γ	イ	ウ	×	P	θ
0011	(4)	#	3	C	S	c	s	┘	ウ	テ	E	e	∞
0100	(5)	\$	4	D	T	d	t	、	工	ト	ト	μ	Ω
0101	(6)	%	5	E	U	e	u	•	オ	ナ	一	ε	Ü
0110	(7)	&	6	F	V	f	v	ヲ	カ	ニ	ヨ	P	Σ
0111	CG RAM (8)	'	7	G	W	g	w	フ	キ	ヲ	ウ	g	π
1000	CG RAM (1)	(	8	H	X	h	x	イ	ウ	ホ	リ	γ	×
1001	(2)	)	9	I	Y	i	y	ウ	テ	リ	ル	ˆ	γ
1010	(3)	*	:	J	Z	j	z	エ	コ	ン	ル	j	〒
1011	(4)	+	;	K	L	k	l	(	オ	サ	ヒ	*	π
1100	(5)	,	<	L	¥	l	l	カ	シ	フ	ワ	φ	π
1101	(6)	—	=	M	J	m	›	ユ	ズ	、	コ	ト	÷
1110	(7)	.	>	N	^	n	→	ヨ	セ	ホ	、	ñ	
1111	CG RAM (8)	/	?	O	_	o	←	ッ	リ	マ	θ	ö	■

# 12. OUTLINE DRAWING



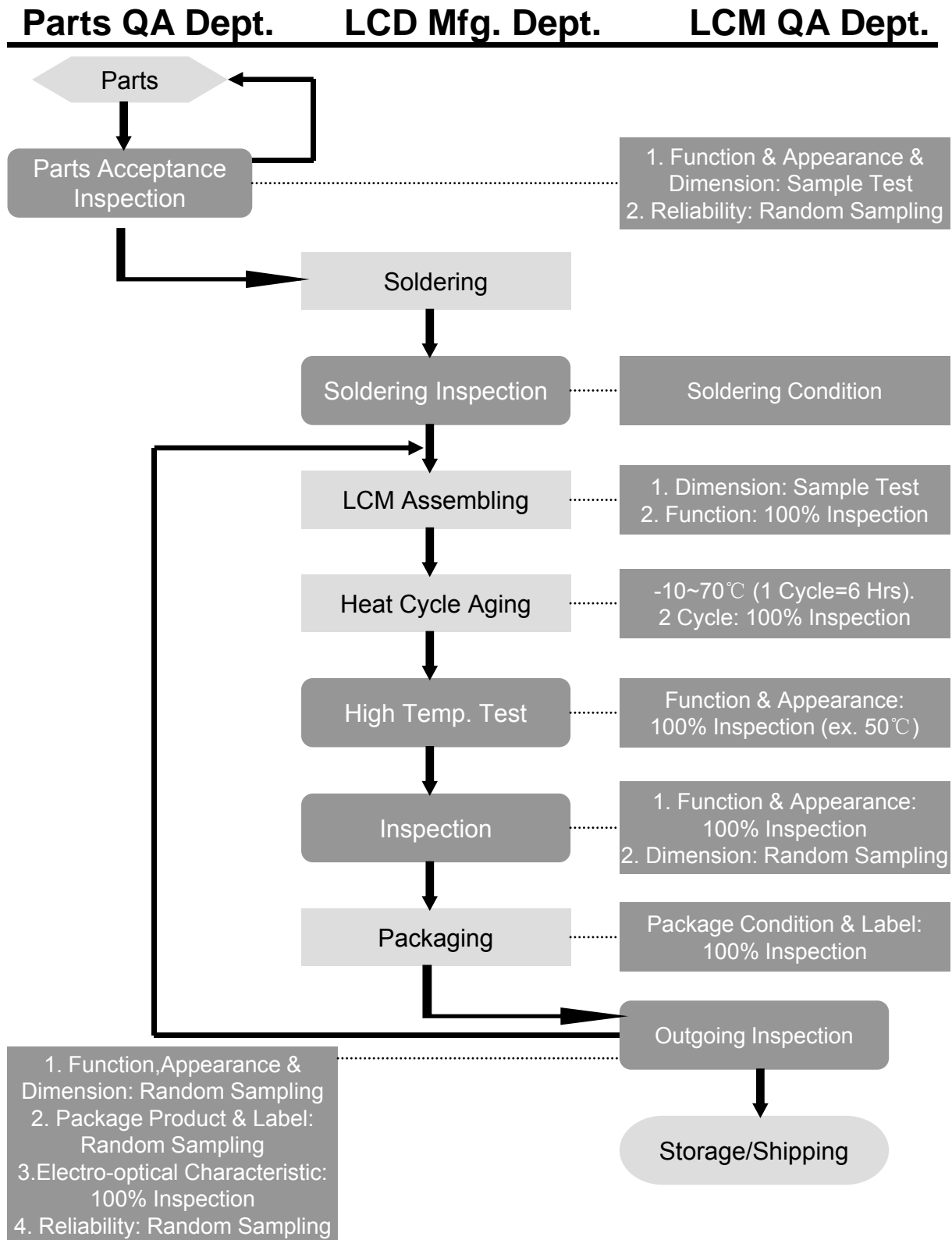
1	2	3	4
SCL	SDA	VCC	GND



**13. INTERFACE**

<b>PIN NO.</b>	<b>SYMBOL</b>	<b>I/O</b>	<b>FUNCTION</b>
1	SCL	I	I2C-bus serial clock
2	SDA	I/O	I2C-bus serial data
3	VCC	POWER SUPPLY	DC 3.3-5.0V
4	GND	POWER SUPPLY	0V (GND)

# 14. QC/QA PROCEDURE



## 15. RELIABILITY

### •Operating life time:

Longer than 50000 hours (at room temperature without direct irradiation of sunlight)

### •Reliability Characteristics:

Item	Test	Criterion
High temp	50°C / 200 Hrs	<ul style="list-style-type: none"> <li>■ Total current consumption should be below double of initial value</li> <li>■ Contrast ratio should be within initial value<math>\pm 50\%</math></li> <li>■ No defect in cosmetic and operational function is allowable</li> </ul>
Low temp.	0°C / 200 Hrs	
High humidity	40°C * 90%RH / 200 Hrs	
Thermal shock	0°C→25°C→50°C→25°C / 5 Cycles (30min) (5min) (30min) (5min)	
Vibration	1. Operating time: Thirty minutes exposure in each direction (x, y, z) 2. Sweep Frequency (1min): 10Hz→ 55Hz→10Hz 3. Amplitude: 0.75mm double amplitude	

# 16. 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)

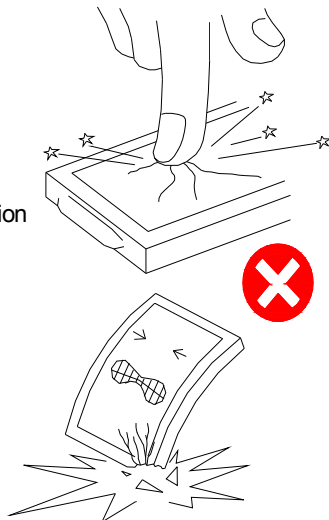
Jing Handa products are not designed, intended, or authorized for use in any application which the failure of the product could result in a situation where personal injury or death may occur. these applications include, but are not limited to. life-sustaining equipment, nuclear control devices, aerospace equipment, devices related to hazardous or flammable materials, etc. [If Buyer intends to purchase or use the Jing Handa Products for such unintended or unauthorized applications, Buyer must secure prior written consent to such use by a responsible officer of Jing Handa Corporation.] Should Buyer purchase or use Jing Handa Products for any such unintended or unauthorized application [without such consent]. Buyer shall indemnify and hold Jing Handa and its officers, 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 part.

## 2. Industrial Rights and Patents

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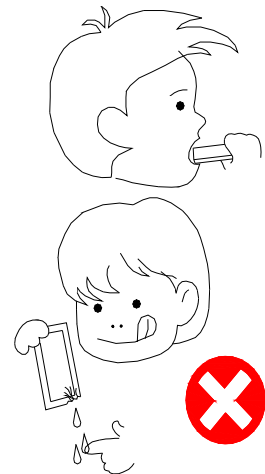
### No Press and Shock!

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



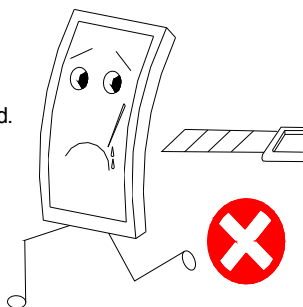
### Don't Swallow or Touch Liquid Crystal!

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



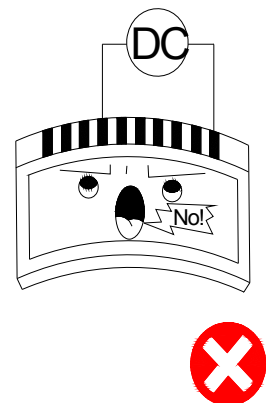
### Don't not Scratch!

Polarizer is a soft material and can easily be scratched.



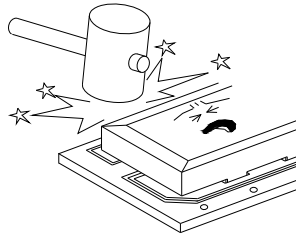
### No DC Voltage to LCD!

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

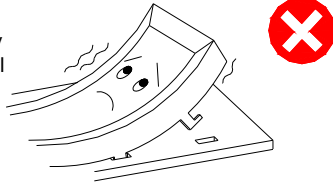


**Don't Press the Metallic Frame and Disassemble the LCM**

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.

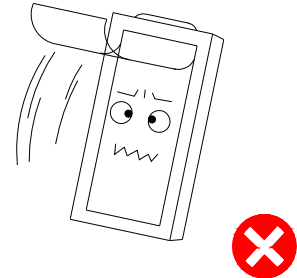


LCD may be shifted or conductive rubber may be reshaped, which will cause defects.



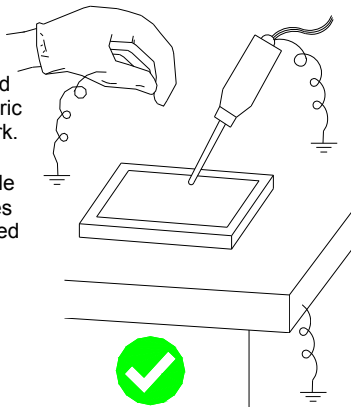
**Slowly Peel Off Protective Film!**

Avoid static electricity.



**Avoid Static Electricity!**

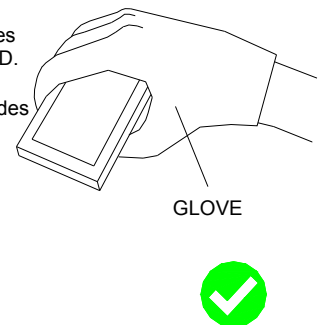
Please be sure to ground human body and electric appliances during work. It is preferable to use conductive mat on table and wear cotton clothes or conduction processed fiber. Synthetic fiber is not recommended.



**Wear Gloves While Handling!**

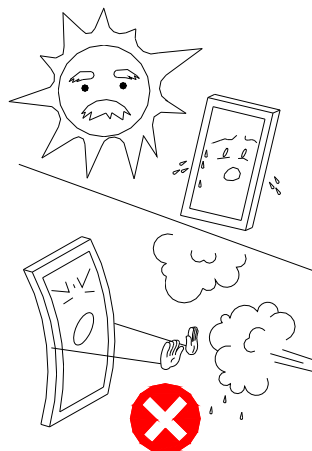
It is preferable to wear gloves to avoid damaging the LCD.

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



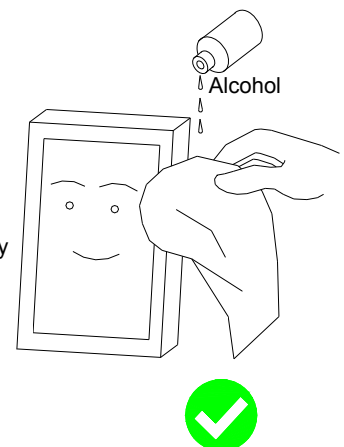
**Keep Away From Extreme Heat and Humidity!**

LCD deteriorates.



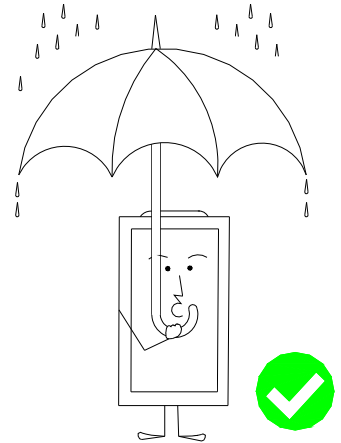
**Use Alcohol to Clean Terminals!**

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 Optrex

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.