SPECIFICATION OF LCD MODULE

CUSTOMER 客户名称	
PART NO. 产品型号	**JHD639 B/W-1 3.0**
PRODUCTS TYPE 产品内容	
REMARKS 备注	Controller IC:RA8835
SIGNATURE BY CUSTOMER 客户签署：	

APPROVED BY 李伟浩 JHD		

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   ☐ Amber   ☐ Yellow Green

☐ Red   🟥 White   ☐ Without backlight

9 **Temperature Grade**

☐ Normal temperature   🟥 Wide temperature   ☐ Super wide temperature

•REVISION RECORD

REV. NO.	REV. DATE	DESCRIPTION OF REVISION	PAGE	REMARK
1.0	02/17/08	INITIAL RELEASE	ALL	
2.0	10/08/09	1、Modify: OUTLINE DRAWING	15	
3.0	10/08/09	1、Modify: OUTLINE DRAWING	15	

CONTENTS

1. FEATURES

•Display construction……………　320*240 DOTS
•Display mode………………………　STN(BLUE)
•Display type………………………　Negative Transmissive
•Backlight……………………………　LED/5.0V(WHITE)
•Viewing direction…………………　6 o'clock
•Operating temperature……………　-20 to 70 ℃
•Storage temperature ……………　-30 to 80℃
•Driving voltage……………………　Single power
•Driving method………………………　1/240 duty, 1/16 bias
•Type…………………………………　COB (Chip On Board)
•Controller/Drive IC………………　RA8835 or Equivalence
•Number of data line………………　6800/8080 8-bit parallel
•Connector……………………………　FFC

2. MECHANICAL DATA

ITEM		WIDTH	HEIGHT	THICKNESS	UNIT
Module size		160.0	109.0	11.0(MAX)	mm
Active area		115.18	86.38	-	mm
Viewing area		122.0	92.0	-	mm
Dot	Size	0.34	0.34	-	mm
	Pitch	0.36	0.36	-	mm
Diameter of mounting hole		Φ3.5			mm
Weight		About 250			g

3. ABSOLUTE MAXIMUM RATINGS

(TA = 25 , Vss=0V)

Item	Symbol	MIN.	Max.	Unit
Supply Voltage (Logic)	VDD-VSS	0	6.5	V
Supply Voltage (LCD Driver)	V_{LCD}	VSS	-27.5	V
Input Voltage	V_{IN}	VSS	VDD	V
Operating temperature	Top	-20	70	℃
Storage temperature	Tsto	-30	80	℃

4. ELECTRICAL CHARACTERISTICS

Item	Symbol	MIN.	Typ.	Max.	Unit
Supply Voltage (Logic)	VDD-VSS	4.8	5.0	5.2	V
Supply Voltage (LCD Driver)	VLCD (VDD-VO)	20.0	21.0	22.0	V
Input Voltage	V_{IH}	$0.8 \times V_{DD}$	-	V_{DD}	V
	V_{IL}	V_{SS}	-	$0.2 \times V_{DD}$	V
Logic Supply Current	I_{DD}	-	50	-	mA

4.1 LED ELECTRICAL/OPTLCAL CHARACTERISTICS

Item	Symbol	min	typ	max	Unit	Condition
Forward Voltage	Vf	–	5.0	5.2	V	If=200mA
Reverse Current	Ir	–	200	–	uA	Vr=5V
Dominant wave length	λd	–	X=0.29 Y=0.30	–	nm	If=200mA
Spectral Line Half width	Δλ	–	–	–	mm	If= mA
Luminance	Lv	120	150	–	cd/m²	If=200mA

4.2LED ABSOLUTE MAXIMUM RATINGS

Item	Symbol	Condition	Rating	Unit
Reverse Voltage	Vr	Ta=25℃	5	V
Absolute maximum forward current	Ifm	Ta=25℃	250	mA
Power description	pd	Ta=25℃	1250	mW

4.2.1 LED ARRAY BLOCK DIAGRAM

(LED DICE 1×10= 10 dices)
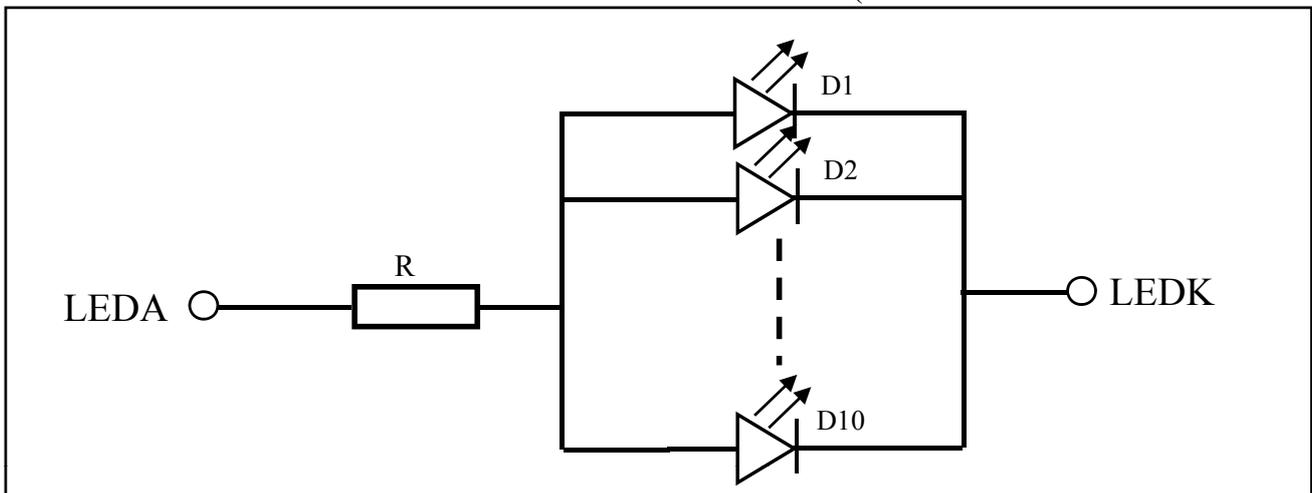
4.2.2 LED POWER SOURCE

	Option	Power source	Jumper setting
LED	A	21A/22K	R31-R34
	B	VDD/VSS	J1、J2、R31-34

5. ELECTRO-OPTICAL CHARACTERISTICS

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
Contrast ratio	K	$\varphi=0$	1.4	4	-	-	1
Response time (rise)	Tr	$\varphi=0$	-	250	300	ms	2
Response time (fall)	Tf	$\varphi=0$		250	350	ms	2
Viewing angle	φ	K ≥2.0	-30 -- +30			deg.	3
	θ		-40 -- +45				

Note 1: Definition of Contrast Ratio "K"

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

Brightness Curve of selected area

Brightness Curve of non-selected area

90%

Brightness

10%

A

B

Vop   Driving Voltage
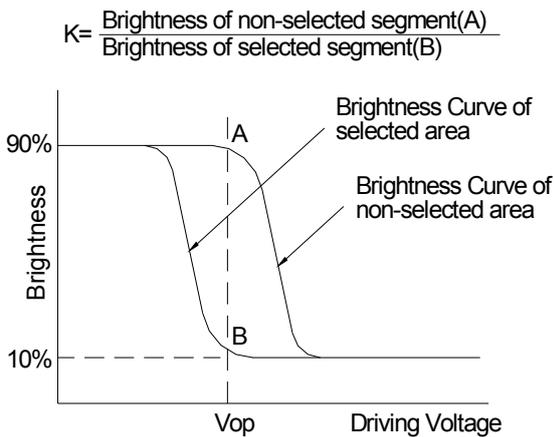
Note 2: Definition of Optical Response Time

Non-selected   Selected   Non-selected

100%
Brightness
0%

90%

10%

Tr   Tf
Rise Time   Fall Time
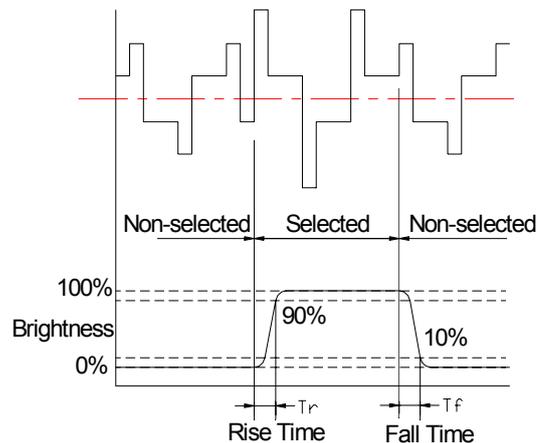
Note 3: Definition of Viewing Angle

Left   Right

∅   ∅

Top
Top Viewing Angle

Top

θ

Viewing Surface

θ

Bottom
Bottom Viewing Angle
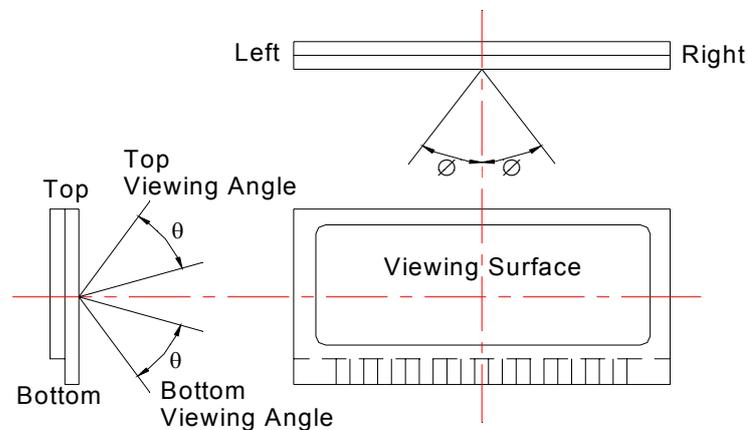
Please select either top or bottom viewing angle

6. BLOCK DIAGRAM

A0 → | RA8835OR Equivalence |

/RD(E) →

/WR(R/W) →

/RES →

SEL1 →

DB0 →

DB7 →

COM DRIVE ×3 → LCD PANEL 320×240 DOTS

SEG DRIVE ×4

VDD → | BIAS CIRCUIT |

VSS →

V0 → | Negative Voltage Generator |

VEE ←

BACKLIGHT — R — LEDA

LEDK
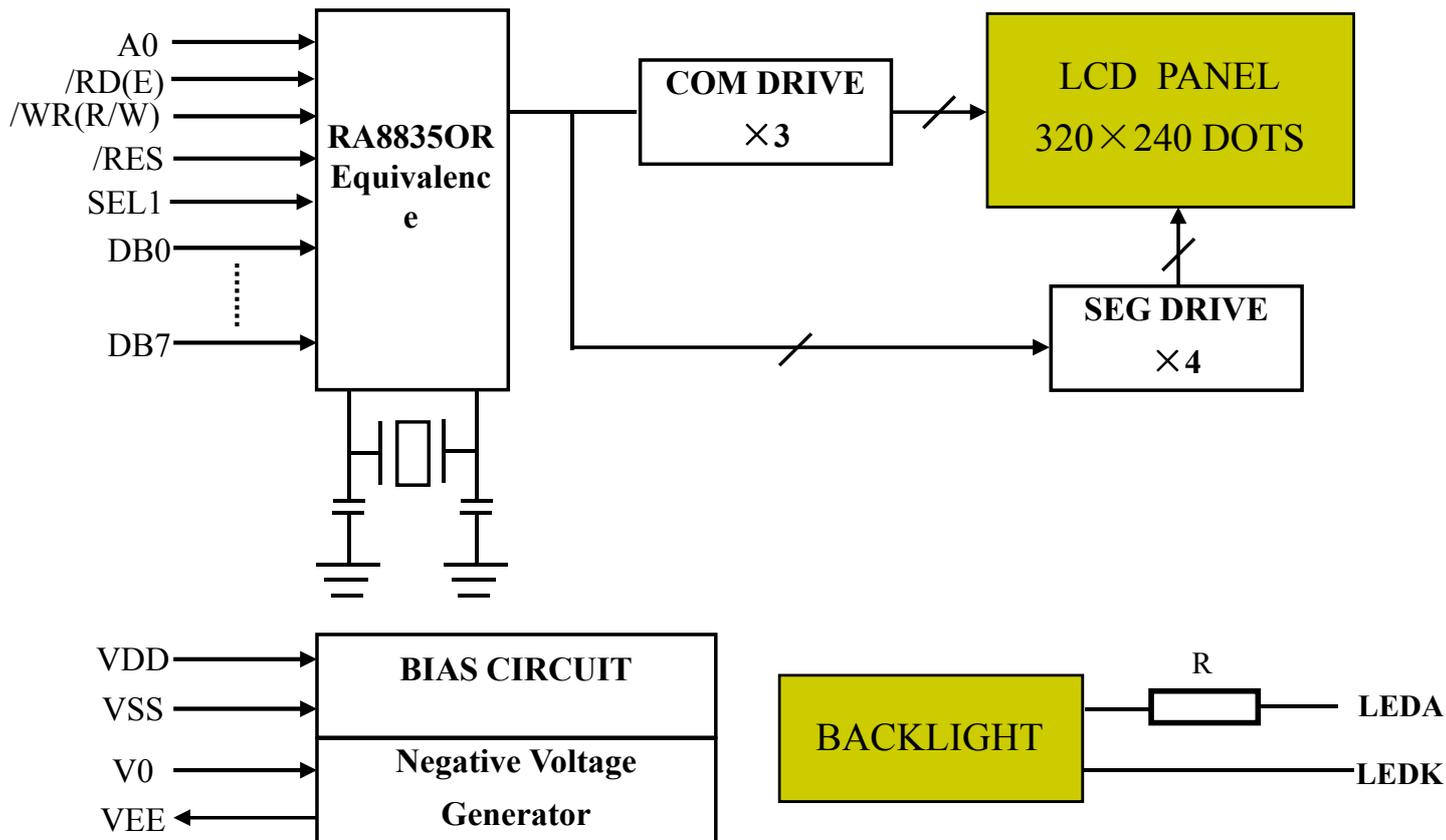
7. VOLTAGE REGULATOR CIRCUITS

+5V

VR=10K

LCM

VDD

VSS

VO

VEE
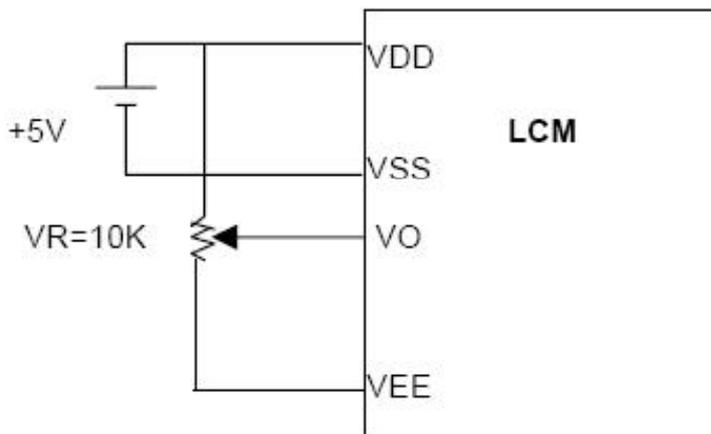
8. TIMING DIAGRAM

8080 Family Interface Timing
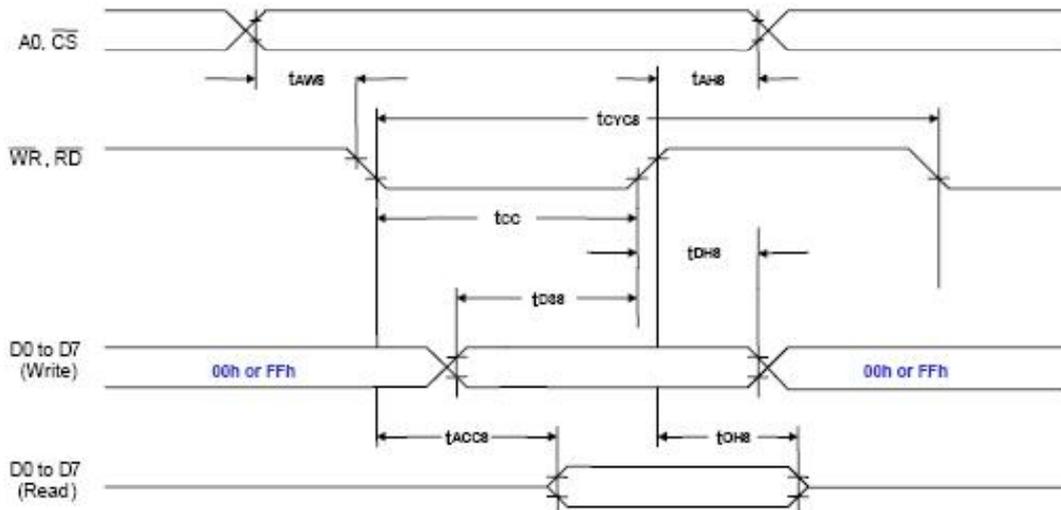
Ta = −20 to 75°C

Signal	Symbol	Parameter	V_{DD} = 4.5 to 5.5V		V_{DD} = 2.7 to 4.5V		Unit	Condition
			Min.	Max.	Min.	Max.		
A0, $\overline{CS}$	t_{AH8}	Address hold time	10	—	10	—	ns	CL = 100pF
	t_{AW8}	Address setup time	0	—	0	—	ns	
$\overline{WR}$, $\overline{RD}$	t_{CYC8}	System cycle time	note.	—	note.	—	ns	
	t_{CC}	Strobe pulse width	20+t_C	—	50+t_C	—	ns	
D0 to D7	t_{DS8}	Data setup time	120	—	120	—	ns	
	t_{DH8}	Data hold time	5	—	5	—	ns	
	t_{ACC8}	$\overline{RD}$ access time	—	50	—	80	ns	
	t_{OH8}	Output disable time	10	50	10	55	ns	

Note: For memory control and system control commands:
$t_{CYC8} = 2t_C + t_{CC} + t_{CEA} + 75 > t_{ACV} + 245$
For all other commands:
$t_{CYC8} = 4t_C + t_{CC} + 30$

68000 Family Interface Timing
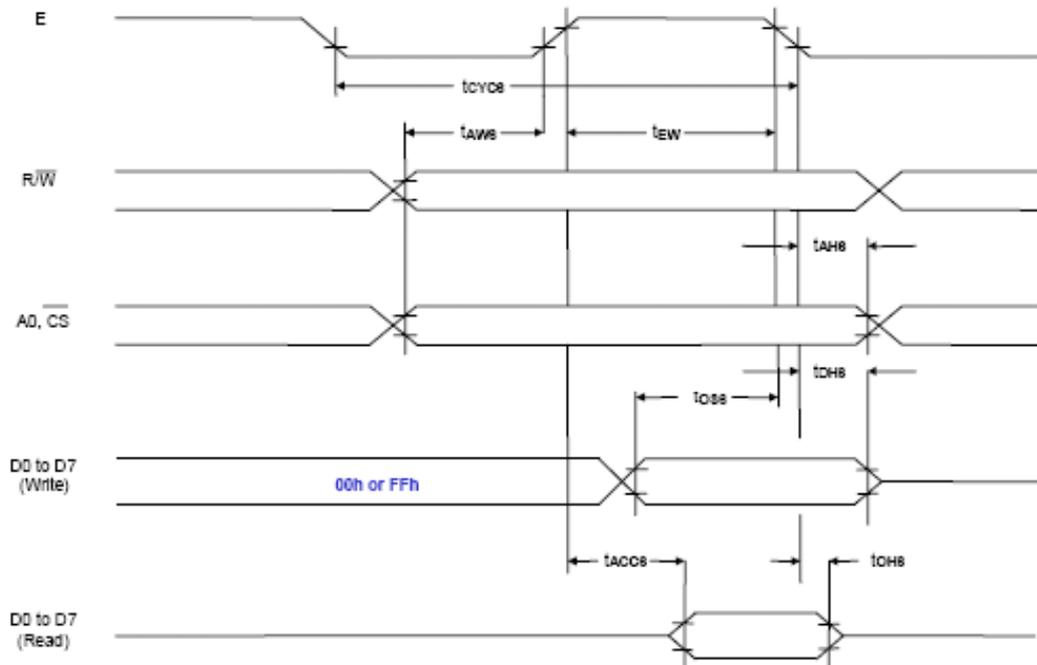
Ta = −20 to 75°C

Signal	Symbol	Parameter	V_{DD} = 4.5 to 5.5V		V_{DD} = 2.7 to 4.5V		Unit	Condition
			Min.	Max.	Min.	Max.		
A0, $\overline{CS}$, R/($\overline{W}$)	t_{CYC6}	System cycle time	note.	—	note.	—	ns	CL = 100 pF
	t_{AW6}	Address setup time	0	—	10	—	ns	
	t_{AH6}	Address hold time	0	—	0	—	ns	
D0 to D7	t_{DS6}	Data setup time	100	—	120	—	ns	
	t_{DH6}	Data hold time	0	—	0	—	ns	
	t_{OH6}	Output disable time	10	50	10	75	ns	
	t_{ACC6}	Access time	—	85	—	130	ns	
E	t_{EW}	Enable pulse width	$20+t_C$	—	$50+t_C$	—	ns	

Note: For memory control and system control commands:
$$t_{CYC6} = 2t_C + t_{EW} + t_{CEA} + 75 > t_{ACV} + 245$$
For all other commands:
$$t_{CYC6} = 4t_C + t_{EW} + 30$$

9. INSTRUCTION SET

Class	Command	Code											Hex	Command Description	Command Read Parameters	
		RD	WR	A0	D7	D6	D5	D4	D3	D2	D1	D0			No. of Bytes	Section
System Control	SYSTEM SET	1	0	1	0	1	0	0	0	0	0	0	40	Initialize device and display	8	9-2-1
	SLEEP IN	1	0	1	0	1	0	1	0	0	1	1	53	Enter standby mode	0	9-2-2
Display Control	DISPLAY ON/OFF	1	0	1	0	1	0	1	1	0	0	D	58, 59	Enable and disable display and display flashing	1	9-3-1
	SCROLL	1	0	1	0	1	0	0	0	1	0	0	44	Set display start address and display regions	10	9-3-2
	CSRFORM	1	0	1	0	1	0	1	1	1	0	1	5D	Set cursor type	2	9-3-3
	CGRAM ADR	1	0	1	0	1	0	1	1	1	0	0	5C	Set start address of character generator RAM	2	9-3-6
	CSRDIR	1	0	1	0	1	0	0	1	1	CD 1	CD 0	4C to 4F	Set direction of cursor movement	0	9-3-4
	HDOT SCR	1	0	1	0	1	0	1	1	0	1	0	5A	Set horizontal scroll position	1	9-3-7
	OVLAY	1	0	1	0	1	0	1	1	0	1	1	5B	Set display overlay format	1	9-3-5
Drawing Control	CSRW	1	0	1	0	1	0	0	0	1	1	0	46	Set cursor address	2	9-r1
	CSRR	1	0	1	0	1	0	0	0	1	1	1	47	Read cursor address	2	9-4-2
Memory Control	MWRITE	1	0	1	0	1	0	0	0	0	1	0	42	Write to display memory	—	9-5-1
	MREAD	1	0	1	0	1	0	0	0	0	1	1	43	Read from display memory	—	9-5-2

Notes:

1. In general, the internal registers of the RA8835 series are modified as each command parameter is input. However, the microprocessor does not have to set all the parameters of a command and may send a new command before all parameters have been input. The internal registers for the parameters that have been input will have been changed but the remaining parameter registers are unchanged. 2-byte parameters (where two bytes are treated as 1 data item) are handled as follows:

    a. CSRW, CSRR: Each byte is processed individually. The microprocessor may read or write just the low byte of the cursor address.

    b. SYSTEM SET, SCROLL, CGRAM ADR: Both parameter bytes are processed together. If the command is changed after half of the parameter has been input, the single byte is ignored.

2. APL and APH are 2-byte parameters, but are treated as two 1-byte parameters.

10. STANDARD CHARACTER CODE TABLE

Character code bits 0 to 3

11. INSTRUCTION SEQUENCE

INIT:

```
lcd_cmdwrite(0x40);      //SYSTEM SET
lcd_datawrite(0x30);     //p1
lcd_datawrite(0x87);     //p2
lcd_datawrite(0x07);     //p3
lcd_datawrite(0x27);     //p4
lcd_datawrite(0x37);     //p5
lcd_datawrite(0xef);     //p6
lcd_datawrite(0x28);     //p7
lcd_datawrite(0x00);     //p8

lcd_cmdwrite(0x44);      //SCROLL
lcd_datawrite(0x00);     //sa1-L
lcd_datawrite(0x00);     //sa1-H
lcd_datawrite(0xf0);     //sL1
lcd_datawrite(0x80);     //sa2-L
lcd_datawrite(0x25);     //sa2-H
lcd_datawrite(0xf0);     //sL2
lcd_datawrite(0x00);     //sa3-L
lcd_datawrite(0x3a);     //sa3-H
lcd_datawrite(0x00);     //sa4-L
lcd_datawrite(0x3a);     //sa4-H

lcd_cmdwrite(0x5a);      //HDOT SCR
lcd_datawrite(0x00);

lcd_cmdwrite(0x58);      //DISP OFF
lcd_datawrite(0x54);

lcd_cmdwrite(0x5d);      //CSR FORM
lcd_datawrite(0x00);     //CRX
lcd_datawrite(0x00);     //CRY

lcd_cmdwrite(0x59);      //DISP ON
lcd_datawrite(0x54);

lcd_cmdwrite(0x5b);
lcd_datawrite(0x00);
```

RET

12. OUTLINE DRAWING

320X40 DOTS

160±0.3 (PCB)
152±0.3
141±0.3
122 (V.A)
115.18 (A.A)
4
11
14

4-Ø3.5 HOLE
4-Ø6.0 PAD

11(MAX)
6.5
1.6

104.7±0.3
92 (V.A)
86.38 (A.A)

91±0.3 (B/L)
101±0.3
109±0.3 (PCB)

3.5
22
4
21

REINFORCEMENT
CONTACT SIDE

CN1
1   20

123.85±0.5
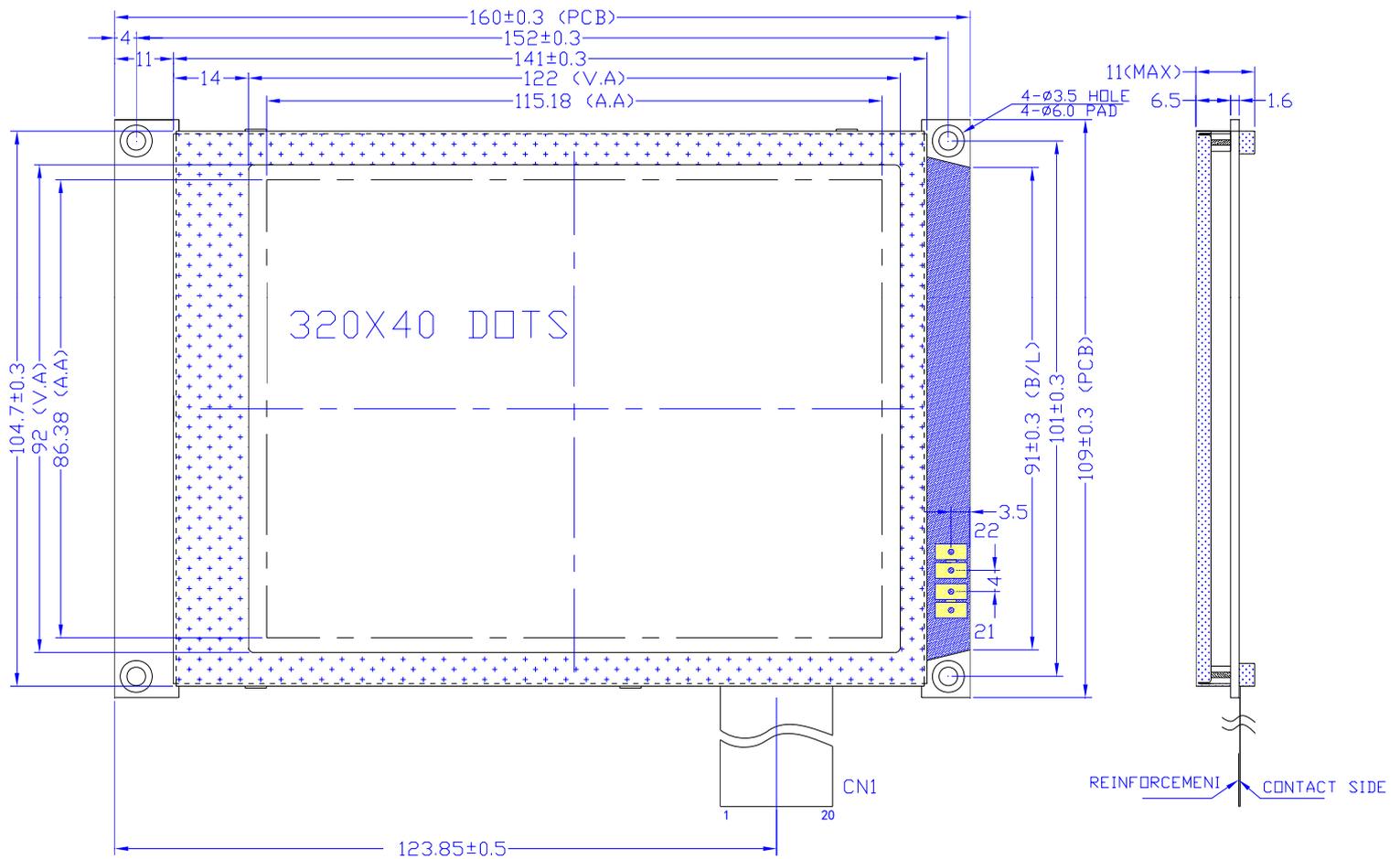
Note:tolerance is ±0.3
unless otherwise noted.

10
20
1.5
P1.0*19
19
21

0.34
0.36
0.34
0.36

DOT SIZE
SCALE:10/1
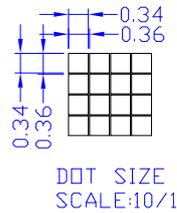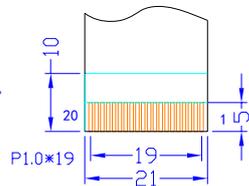
13.INTERFACE

"CN1" PIN FUNCTION

No.	Symbol	Function
1	VSS	Ground(0V) 0V
2	VDD	Logic Power input +5V
3	V0	LCD contrast control
4	A0	Command / Data Select
5	/WR (R/W)	8080:Data write 6800: Write OR Read
6	/RD (E)	8080:Data read 6800: Enable Signal
7	D0	Data bus line 0
8	D1	Data bus line 1
9	D2	Data bus line 2
10	D3	Data bus line 3
11	D4	Data bus line 4
12	D5	Data bus line 5
13	D6	Data bus line 6
14	D7	Data bus line 7
15	/CS	LCD IC Chip Select
16	/RES	LCD Controller Function reset
17	VEE	Negative voltage output(-23V)
18	SEL1	SEL1=L,8080 interface; SEL1=H,6800 interface(NC)
19	FGND	Front Panel Ground
20	NC	NC
21	LEDA	Power Supply For Led Backlight(A) +5V
22	LEDK	Power Supply For Led Backlight(K) 0V

14. PACKAGE INFORMATION

A Box include 25pcs

Anti-static Bag

Module

15. QC/QA PROCEDURE

Parts QA Dept. **LCD Mfg. Dept.** **LCM QA Dept.**

Parts

Parts Acceptance Inspection ········ 1. Function & Appearance & Dimension: Sample Test
2. Reliability: Random Sampling

Soldering

Soldering Inspection ········ Soldering Condition

LCM Assembling ········ 1. Dimension: Sample Test
2. Function: 100% Inspection

Heat Cycle Aging ········ -20~70℃ (1 Cycle=6 Hrs).
2 Cycle: 100% Inspection

High Temp. Test ········ Function & Appearance:
100% Inspection (ex. 50℃)

Inspection ········ 1. Function & Appearance:
100% Inspection
2. Dimension: Random Sampling

Packaging ········ Package Condition & Label:
100% Inspection

Outgoing Inspection

1. Function,Appearance & Dimension: Random Sampling
2. Package Product & Label: Random Sampling
3.Electro-optical Characteristic: 100% Inspection
4. Reliability: Random Sampling

Storage/Shipping

16. RELIABILITY

•Operating life time:

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

•Reliability Characteristics:

Item	Test	Criterion
High temp	70℃ / 200 Hrs	■Total current consumption should be below double of initial value ■Contrast ratio should be within initial value±50% ■No defect in cosmetic and operational function is allowable
Low temp.	-20℃ / 200 Hrs	
High humidity	40℃ * 90%RH / 200 Hrs	
Thermal shock	-20℃→25℃→70℃→25℃ /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	

17. HANDING 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

Jing handa shall not be responsible for any infringement of industrial property rights of third parties in any country arising out of 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.
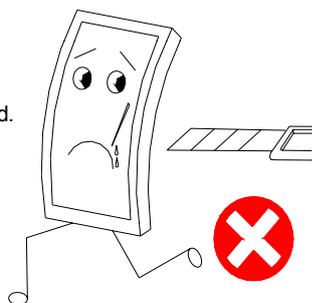LCD will broken by shock!
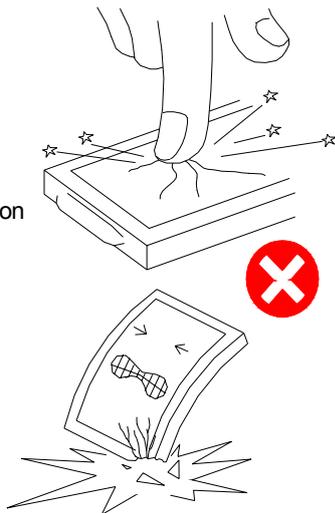
Don't Swallow or Touch Liquid Crystal!

Liquid Crystal may be leaked when display is broked.
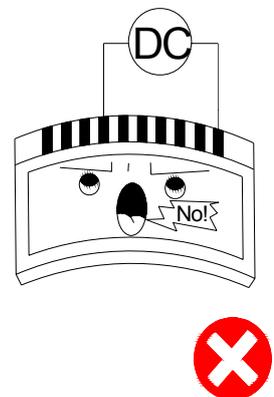If it accidentally gets your hands, wash then with water!
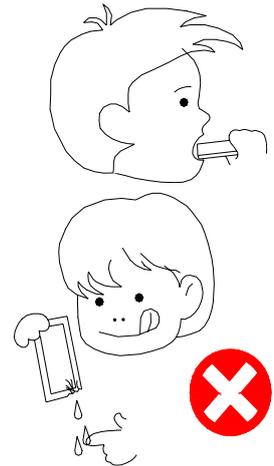
Don't not Scratch!

Polarizer is a soft material and can easily be scratched.

No DC Voltage to LCD!

DC

DC volrage or driveing higher than the specified voltage will reduce the lifetime of the LCD.
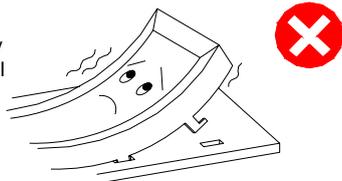
No!

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.
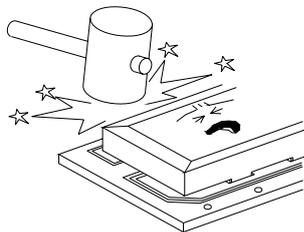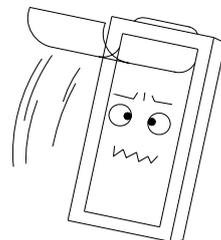
LCD may be shifted or conductive rubber may be reshaped, which will cause defects.
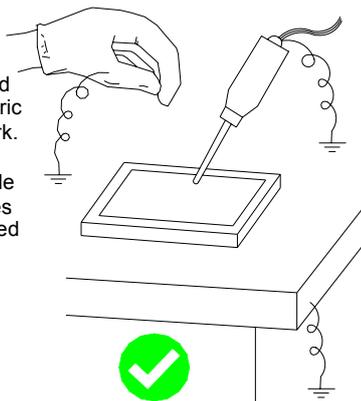
Slowly Peel Off Protective Film!

Avoid static electricity.

Avoid Static Electricity!

Please be sure to ground human body and electric apploances 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 Handing!

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

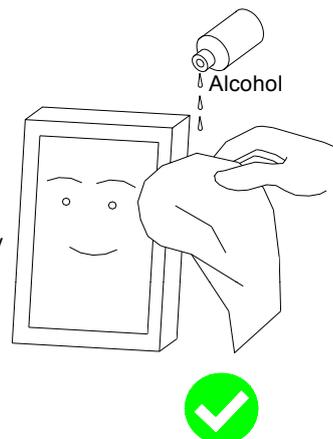Please do not touch electrodes with bare hands or make them dirty.

GLOVE
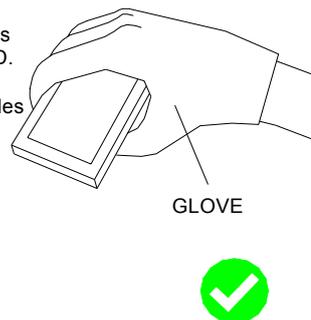
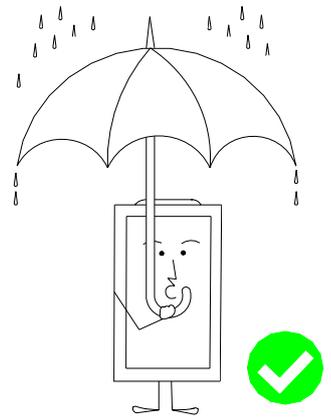## Keep Away From Extreme Heat and Humidity!

LCD deteriorates.

Use Alcohol to Clean Terminals!

Alcohol

When attaching with the heat seal or anisontropically 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 corrade 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±10℃
　　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℃ 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.