



# 冀雅（廊坊）电子有限公司

**JIYA (LANGFANG) ELECTRONICS CO., LTD**

## 模块产品规格书 SPECIFICATION FOR LCD MODULE

客户 COSTOMER	
产品型号 MODEL	<b>JYG-1017901G(R)-FT6L2-VA</b>

设 计 ORGANIZED BY	审 核 CHECKED BY	批 准 APPROVED BY
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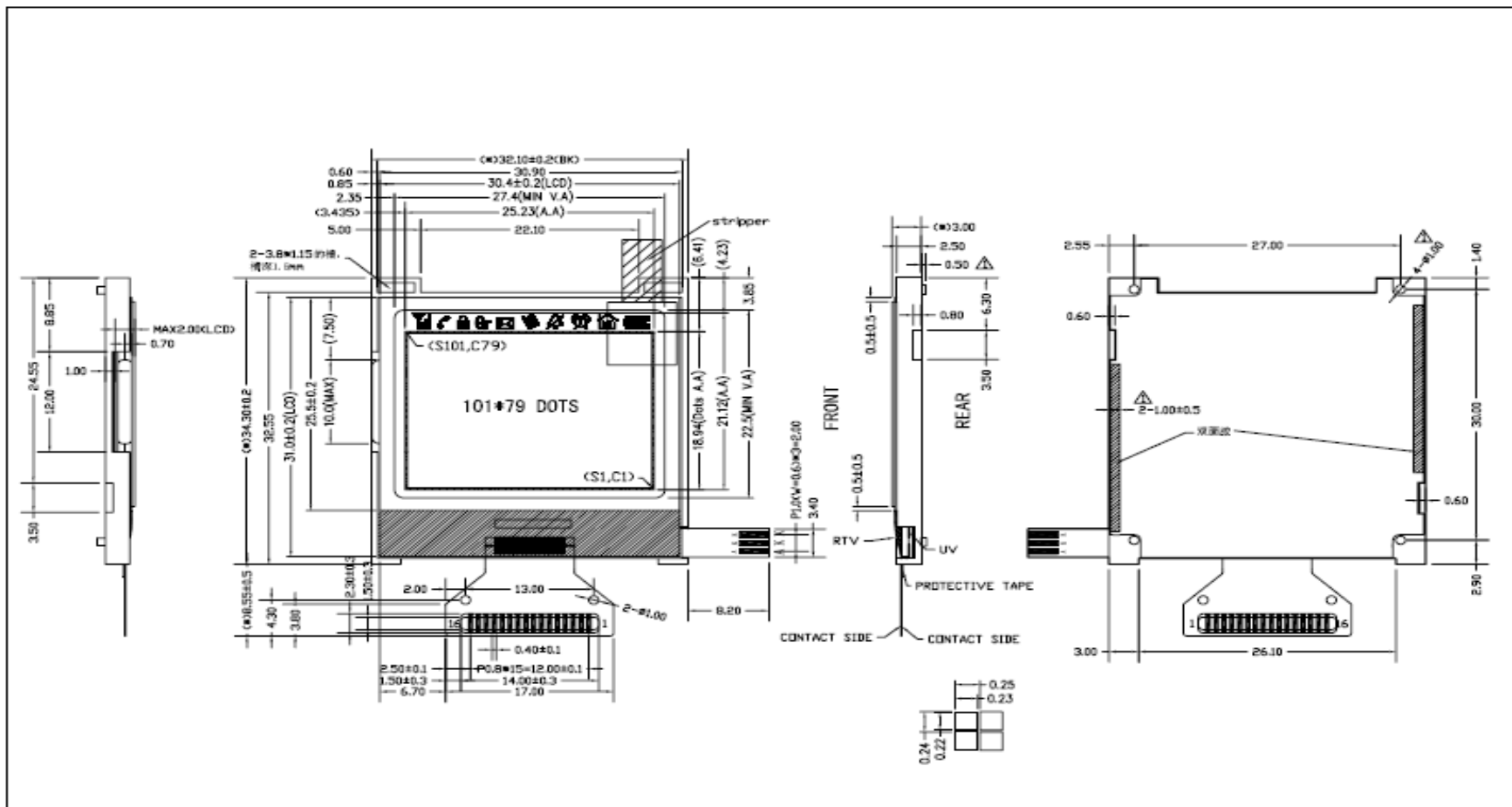
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# 1.LCM DRWING



更改记录					设计	审核	工艺	标准化	批准	产品型号	JYG-1017901G(R)-FT6L2-VA		
更改标记	日期	更改内容	设计	审核	批准	签名	寇曼			文件编号	G1017901G(R)-WX		
△	06.10.26	修改背光定位柱尺寸, 增加双面胶	寇曼			日期	06.08.21			分文件号	4		
										页数	1-1	单位	mm
						未注公差	±0.2				冀雅(廊坊)电子有限公司		

## 2. GENERAL DESCRIPTION

MAIN TECHNICS:	COG
DISPLAY CONTENT:	DOTS
DISPLAY TYPE:	FSTN, POSITIVE, TRANSMISSIVE
DRIVER METHOD:	1/81Duty, 1/10Bias
VIEWING DIRECTION:	6:00
CONTROLLER:	ST7588T(COG, SITRONIX)
BACKLIGHT:	WHITE WITH COLOR FILM
OPERATING TEMPERATURE:	-20°C - +70°C
STORAGE TEMPERATURE:	-30°C - +80°C
REFERENCE DOCUMENTS :	<u>ST7588T datasheet</u>

## 3. MECHANICAL SPECIFICATIONS

ITEM	CONTENT	UNIT
DOTS NUMBER	101x79	dots
MODULE DIMENSION	32.1(w)*42.85(h)*3.0(t)	mm
ACTIVE AREA	25.23(w)*21.12(h)	mm
DOT SIZE	0.23(w)*0.22(h)	mm
DOT SPACE	0.02 (w)*0.02(h)	mm

## 4. ELECTRO-OPTICAL CHARACTERISTICS

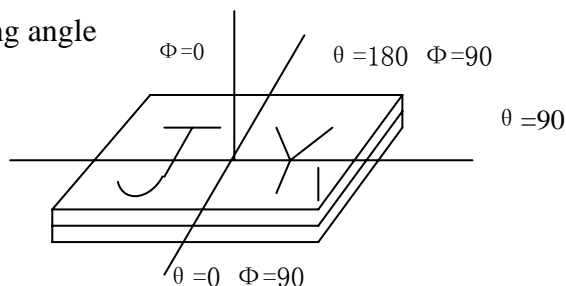
ITEM	SYMBOL	CONDITIO N	MIN.	TYP.	MAX .	UNIT
LCD OPERATING VOLTAGE	Vop.	25°C	10.3	10.5	10.7	V
RESPONSE TIME	Ton	25°C	-	23	400	Ms
	Toff	25°C	-	297	400	Ms
CONTRAST RATIO	CR	25°C	-	5	-	-
VIEWING RANGE		25°C	-	88	-	DEG
CROSSTALK		25°C	-	1.2	-	-

Note1: Definition of viewing angle

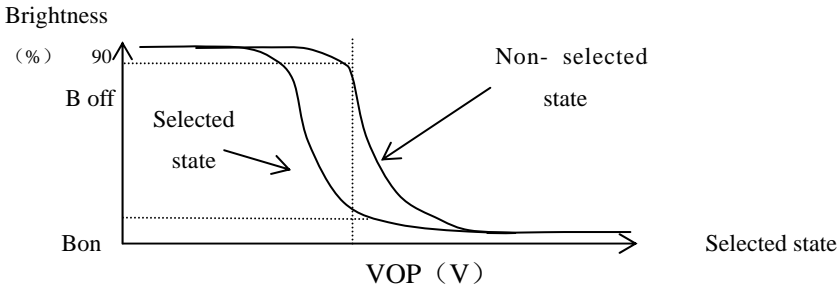
$0 \leq \Phi \leq 90$

$0 \leq \theta \leq 360$

$\theta = 270$



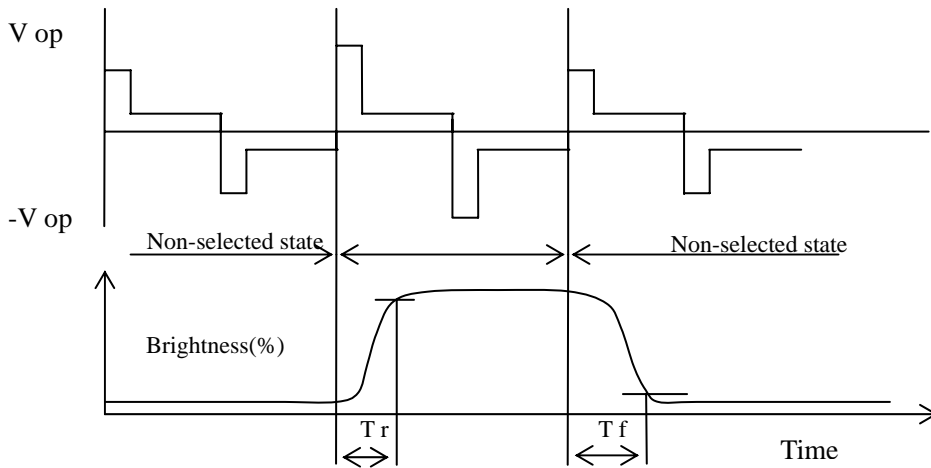
Note 2: Definition of contrast ratio



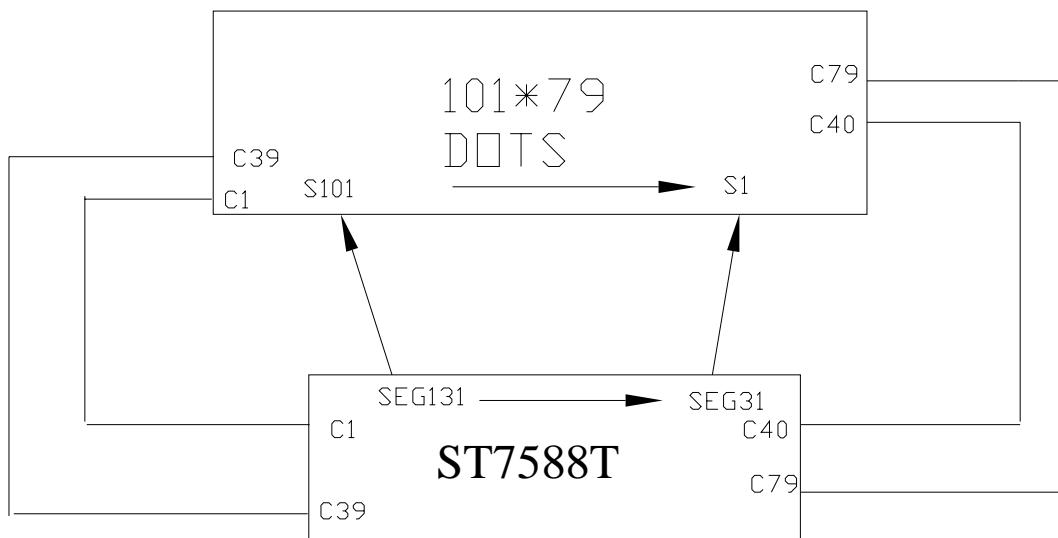
$$\text{Contrast ratio} = \frac{\text{Brightness under non-selected state}}{\text{Brightness under selected state}}$$

$$\text{Cross talk} = \frac{\text{Brightness under non-selected state}}{\text{Brightness under off state}}$$

Note 3: Definition of response time



**5.BLOCK DIAGRAM**



## 6. ELECTRONIC CHARACTERISTICS

### 6.1 MAXIMUM VALUES

ITEM	SYMBOL	STANDARD VALUE		UNIT
		MIN	MAX	
Logic supply voltage	V <sub>DD1</sub>	+1.3	+3.7	V
High voltage generator supply voltages	V <sub>DD2</sub>	+1.3	+3.7	V
LCD supply voltage	V <sub>LCD</sub>	-0.5	+15	V
Operating Temperature	Top	-20	+70	°C
Storage Temperature	Tst	-30	+80	°C

### 6.2. DC CHARACTERISTICS

V<sub>DD</sub> = 1.8 V to 3.3V; V<sub>SS</sub> = 0 V; V<sub>LCD</sub> = 4.5 to 14.0V; T<sub>amb</sub> = -40°C to +85°C; unless otherwise specified.

Item	Symbol	Condition	Rating			Units	Applicable Pin	
			Min.	Typ.	Max.			
Operating Voltage (1)	V <sub>DD1</sub>		1.8	--	3.3	V	V <sub>SS</sub>	
Operating Voltage (2)	V <sub>DD2</sub>	(Relative to V <sub>SS</sub> )	1.8	--	3.3	V	V <sub>SS</sub>	
High-level Input Voltage	V <sub>IHC</sub>		0.7 x V <sub>DD</sub>	--	V <sub>DD</sub>	V		
Low-level Input Voltage	V <sub>ILC</sub>		V <sub>SS</sub>	--	0.3 x V <sub>DD</sub>	V		
High-level Output Voltage	V <sub>OHC</sub>	I <sub>OH</sub> =1mA	0.7 x V <sub>DD</sub>	--	V <sub>DD</sub>	V		
Low-level Output Voltage	V <sub>OLC</sub>	I <sub>OL</sub> =1mA	V <sub>SS</sub>	--	0.3 x V <sub>DD</sub>	V		
Input leakage current	I <sub>LI</sub>	V <sub>IN</sub> = V <sub>DD</sub> or V <sub>SS</sub>	-1.0	--	1.0	µA		
Liquid Crystal Driver ON Resistance	R <sub>ON</sub>	T <sub>a</sub> = 25°C (Relative To V <sub>SS</sub> )	V <sub>LCD</sub> = 11.0 V	--	0.8	1.1	kΩ	SEgN COMn
Oscillator Frequency	Internal Oscillator	1/81 duty	f <sub>OSC</sub>	--	53	--	kHz	*1
	Frame frequency		f <sub>FRAME</sub>	--	80	--	Hz	

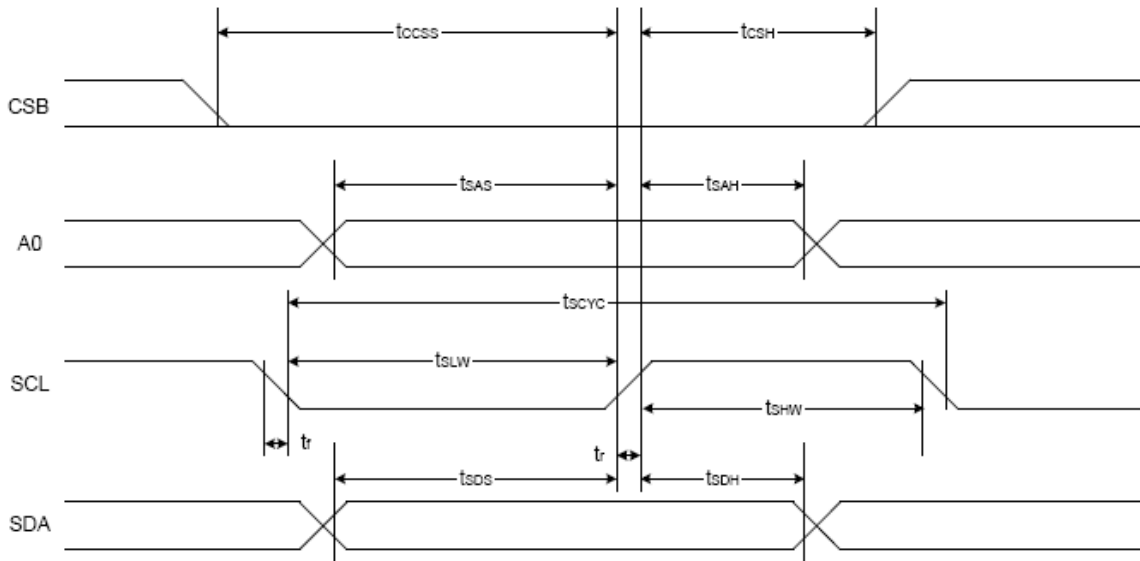
Item	Symbol	Condition	Rating			Units	Applicable Pin
			Min.	Typ.	Max.		
Internal Power	Input voltage	(Relative To V <sub>SS</sub> )	1.8	--	3.3	V	V <sub>SS</sub>
	Supply Step-up output voltage Circuit	(Relative To V <sub>SS</sub> )	--	--	15.0	V	V <sub>SS</sub> , *2

Dynamic Consumption Current: During Display, with the Internal Power Supply OFF Current consumed by total ICs when an external power supply is used.

Test pattern	Symbol	Condition	Rating			Units	Notes
			Min.	Typ.	Max.		
Display Pattern SNOW	I <sub>SS</sub>	V <sub>DD</sub> = 3.0 V, V <sub>O</sub> - V <sub>SS</sub> = 10.0 V	--	120	--	µA	*3
Power Down	I <sub>SS</sub>	T <sub>a</sub> = 25°C	--	0.05	2	µA	*4

### 6.3 .TIMING CHARACTERISTICS

#### SERIAL INTERFACE (4-Line Interface)



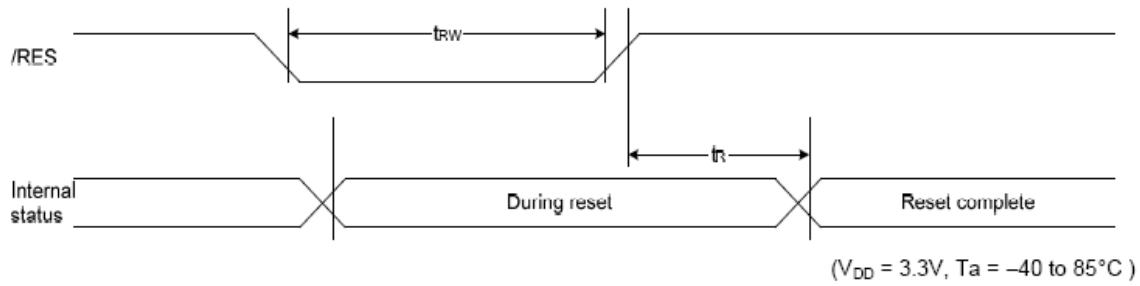
(V<sub>DD</sub>=3.3V, Ta=25°C)

Item	Signal	Symbol	Condition	Rating		Units
				Min.	Max.	
Serial Clock Period	SCL	t <sub>SCYC</sub>		100	--	ns
SCL "H" pulse width		t <sub>SHW</sub>		60	--	
SCL "L" pulse width		t <sub>SLW</sub>		60	--	
Address setup time	A0	t <sub>SAS</sub>		20	--	
Address hold time		t <sub>SAH</sub>		80	--	
Data setup time	SDA	t <sub>SDS</sub>		20	--	
Data hold time		t <sub>SDH</sub>		20	--	
CS-SCL time	CSB	t <sub>CSS</sub>		30	--	
CS-SCL time		t <sub>CSH</sub>		120	--	

(V<sub>DD</sub>=2.7V, Ta=25°C)

Item	Signal	Symbol	Condition	Rating		Units
				Min.	Max.	
Serial Clock Period	SCL	t <sub>SCYC</sub>		120	--	ns
SCL "H" pulse width		t <sub>SHW</sub>		70	--	
SCL "L" pulse width		t <sub>SLW</sub>		70	--	
Address setup time	A0	t <sub>SAS</sub>		20	--	
Address hold time		t <sub>SAH</sub>		100	--	
Data setup time	SDA	t <sub>SDS</sub>		20	--	
Data hold time		t <sub>SDH</sub>		20	--	
CS-SCL time	CSB	t <sub>CSS</sub>		30	--	
CS-SCL time		t <sub>CSH</sub>		150	--	

**■ RESET TIMING**



Item	Signal	Symbol	Condition	Rating			Units
				Min.	Typ.	Max.	
Reset time		$t_R$		--	--	400	ns
Reset "L" pulse width	/RES	$t_{RW}$		1.2	--	--	$\mu$ s

( $V_{DD} = 2.7V, T_a = -40 \text{ to } 85^\circ\text{C}$ )

Item	Signal	Symbol	Condition	Rating			Units
				Min.	Typ.	Max.	
Reset time		$t_R$		--	--	350	ns
Reset "L" pulse width	/RES	$t_{RW}$		1.6	--	--	$\mu$ s

**7. PINS DESCRIPTION**

Pin No.	Symbol	Description
1	CSB	L: Chip Selected H: Chip Unselected
2	/RES	Reset: L: Enable; H: Disable
3	A0	L: Instruction; H: Data
4	SCL	Serial input clock
5	SDA	Serial input data
6	VSS	Ground
7	VDD	Power supply pin: 3.0V
8	VOUT	DC-DC voltage converter
9	C3N	For voltage booster circuit Capacitor connection pin for voltage converter
10	C3P	
11	C1N	
12	C1P	
13	C2P	
14	C2N	
15	C4P	
16	V0	LCD supply voltage



## 8. INSTRUCTION DESCRIPTION

### ■ INSTRUCTION TABLE

INSTRUCTION	A0	WR (R/W)	COMMAND BYTE								DESCRIPTION
			D7	D6	D5	D4	D3	D2	D1	D0	
<b>H independent instruction</b>											
Write data	1	0	D <sub>7</sub>	D <sub>6</sub>	D <sub>5</sub>	D <sub>4</sub>	D <sub>3</sub>	D <sub>2</sub>	D <sub>1</sub>	D <sub>0</sub>	Write data to RAM
Read data	1	1	D <sub>7</sub>	D <sub>6</sub>	D <sub>5</sub>	D <sub>4</sub>	D <sub>3</sub>	D <sub>2</sub>	D <sub>1</sub>	D <sub>0</sub>	Read data to RAM
Read status byte	0	1	PD	0	V	D	E	MX	MY	DO	Read status byte
Function Set	0	0	0	0	1	MX	MY	PD	H1	H0	Mirror X, mirror Y, Power down, Extended table

INSTRUCTION	A0	WR (R/W)	COMMAND BYTE								DESCRIPTION
			D7	D6	D5	D4	D3	D2	D1	D0	
<b>H[1:0]=[0:0]</b>											
Set V <sub>LCD</sub> range	0	0	0	0	0	0	0	1	0	PRS	V <sub>LCD</sub> range L/H select
END	0	0	0	0	0	0	0	1	1	0	Release read/modify/write
Read/modify/write	0	0	0	0	0	0	0	1	1	1	RAM address at R:+0, W:+1
Display control	0	0	0	0	0	0	1	D	0	E	Sets display configuration
SI3-8bit data(L)&start	0	0	0	1	0	1	DA <sub>3</sub>	DA <sub>2</sub>	DA <sub>1</sub>	DA <sub>0</sub>	Specify the number of data bytes (8 bit 3-line SPI)
SI3-8bit data(L)	0	0	0	1	1	0	DA <sub>7</sub>	DA <sub>6</sub>	DA <sub>5</sub>	DA <sub>4</sub>	Specify the number of data bytes (8 bit 3-line SPI)
SI3-8bit data (M)	0	0	0	1	1	1	0	DA <sub>10</sub>	DA <sub>9</sub>	DA <sub>8</sub>	Specify the number of data bytes (8 bit 3-line SPI)
Set Y address of RAM	0	0	0	1	0	0	Y <sub>3</sub>	Y <sub>2</sub>	Y <sub>1</sub>	Y <sub>0</sub>	Sets Y address of RAM 0 ≤ Y ≤ 9
Set Address (Low)	0	0	1	1	1	0	X <sub>3</sub>	X <sub>2</sub>	X <sub>1</sub>	X <sub>0</sub>	Set X address of RAM 0 ≤ X ≤ 131
Set Address (High)	0	0	1	1	1	1	X <sub>7</sub>	X <sub>6</sub>	X <sub>5</sub>	X <sub>4</sub>	Set X address of RAM 0 ≤ X ≤ 131
<b>H[1:0]=[0:1]</b>											
Display configuration	0	0	0	0	0	0	1	DO	0	V	Top/bottom row mode set data order
Bias system	0	0	0	0	0	1	0	BS <sub>2</sub>	BS <sub>1</sub>	BS <sub>0</sub>	Sets bias system (BSx)
Set V <sub>OP</sub>	0	0	1	V <sub>OP6</sub>	V <sub>OP5</sub>	V <sub>OP4</sub>	V <sub>OP3</sub>	V <sub>OP2</sub>	V <sub>OP1</sub>	V <sub>OP0</sub>	Write V <sub>OP</sub> to register

INSTRUCTION	A0	WR (R/W)	COMMAND BYTE								DESCRIPTION
			D7	D6	D5	D4	D3	D2	D1	D0	
<b>H[1:0]=[1:0]</b>											
Partial screen mode	0	0	0	0	0	0	0	1	0	PS	Partial screen enable
Partial Display	0	0	0	0	0	0	1	0	0	WS	Set partial screen size
Partial Display part	0	0	0	0	0	1	DP <sub>3</sub>	DP <sub>2</sub>	DP <sub>1</sub>	DP <sub>0</sub>	Set display part for partial screen mode
Set Start line	0	0	1	S <sub>6</sub>	S <sub>5</sub>	S <sub>4</sub>	S <sub>3</sub>	S <sub>2</sub>	S <sub>1</sub>	S <sub>0</sub>	Specify the initial display line to realize vertical scrolling
<b>H[1:0]=[1:1]</b>											
RESET	0	0	0	0	0	0	0	0	1	1	Software reset
High Power Mode	0	0	1	0	1	1	0	HP	0	0	High Power Mode SET
Frame	0	0	0	0	0	0	1	FR <sub>2</sub>	FR <sub>1</sub>	FR <sub>0</sub>	Frame rate control
N line inversion	0	0	0	1	0	NL <sub>4</sub>	NL <sub>3</sub>	NL <sub>2</sub>	NL <sub>1</sub>	NL <sub>0</sub>	Sets N line inversion

## 9. BACKLIGHT PARAMETERS

### 极限参数 ABSOLUTE MAXIMUM RATINGS

(除非特别说明,环境温度 Ta=25°C. Unless specified, The Ambient temperature Ta=25°C)

项目 Item	符号 Symbol	条件 Conditions	值 Rating	单位 Unit
* 极限直流正向电流 Absolute maximum forward current	Ifm		40	mA
* 脉冲驱动时极限正向电流 Peak forward current	Ifp	1 msec 脉冲, 1/10 占空比 1 msec Plus 10% Duty Cycle	120	mA
反向电压 Reverse Voltage	Vr		1.0	V
* 极限功耗 Power dissipation	Pd		132	mW
工作温度 Operating Temperature Range	Topr		-20~+70°C	°C
贮存温度 Storage Temperature Range	Tstg		-30~+80°C	°C

### 电、光特性 ELECTRICAL-OPTICAL CHARACTERISTICS

(除非特别说明,环境温度 Ta=25°C. Unless specified, The Ambient temperature Ta=25°C)

项目 Item	符号 Symbol	最小值 min.	典型值 typ.	最大值 max.	单位 Unit	测定条件 Condition
正向电压 Forward Voltage	Vf		3.3		V	If= 30 mA
消耗功率 Power Dissipation	Pd		0.13		W	If= 30 mA
反向电流 Reverse Current	Ir		10		mA	Vr= 1.0 V
* 亮度 Luminance	Lv		120		cd/m <sup>2</sup>	If= 30 mA

## 10. Quality Assurance

### 10.1 Standard for Quality Test

#### 10.1.1 Inspection :

Before delivering, the supplier should take the following tests, and affirm the quality of product.

#### 10.1.2 Electro-Optical Characteristics:

According to the individual specification to test the product.

#### 10.1.3 Test of Appearance Characteristics:

According to the individual specification to test the product.

#### 10.1.4 Test of Reliability Characteristics:

According to the definition of reliability on the specification for testing products.

#### 10.1.5 Delivery Test:

Before delivering, the supplier should take the delivery test.

A. Test method: According to MIL-STD-105E, General Inspection Level II take a single time.

B. The defects classify of AQL as following:

Major defect: AQL=0.65

Minor defect: AQL=2.5

Total defects: AQL=2.5

**10.2 Standard for inspection**

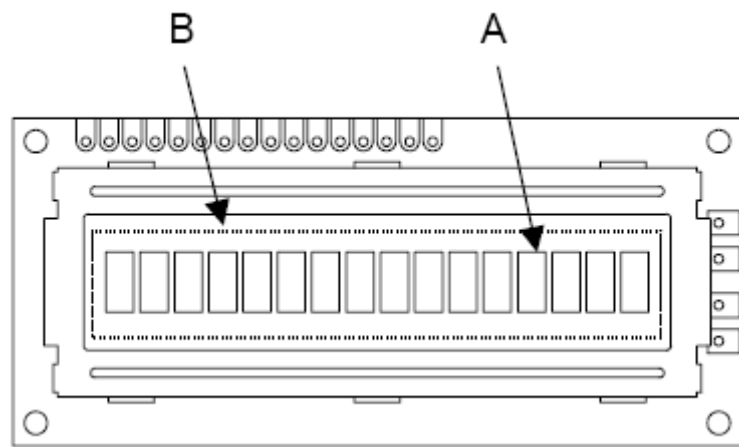
10.2.1 Manner of appearance test:

- a. The test must be under a 40W fluorescent light, and the distance of view must be at 30 cm.
- b. When test the model of transmissive product must add the reflective plate.
- c. The test direction is base on about around 45° of vertical line.

10.2.2 Definition of area: B A

A Area : Viewing area.

B Area : Out of viewing area.(Outside viewing area)

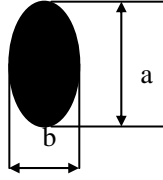


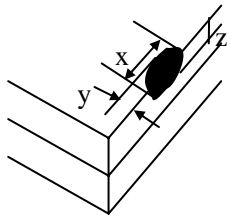
10.2.3 Basic principle:

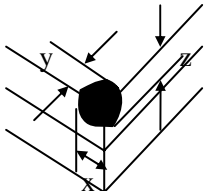
- A. In principle the defect out of Area A should be acceptable if the defect does not affect assemblage and the quality of productions.
- B. If defects that can not describe clearly, acceptable samples will be the standard.
- C. The sample of the lowest acceptable quality level must be discussed by both supplier and customer when any dispute happened.
- D. Must add new item on time when it is necessary.

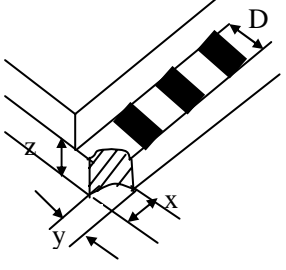
10.2.4 Standard of inspection

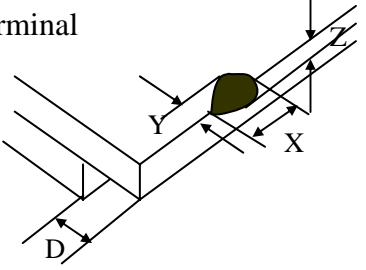
Defect	Inspect item	Criteria
1 Minor	Scratch and fold on polarizer.	length ignore
	Scratch on glass.	width ≤0.03mm acceptable
	Glass fiber etc. (by bare eyes, defect outside viewing area is acceptable)	

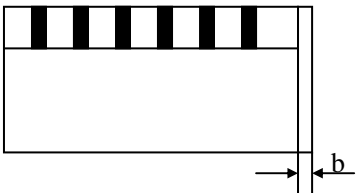
Defect	Inspect item	Criteria
2 Minor	Chip on glass(round type) Chip on polarizer(round type) Air bubble between polarizer and glass  $\Phi=(a + b)/2$	$\Phi \leq 0.5\text{mm}$ acceptable $0.5 < \Phi \leq 0.7\text{mm}$ two are acceptable $\Phi > 0.7\text{mm}$ reject  1.The distance between any two dots should be more than 5mm. 2.Defect outside viewing area is acceptable. 3.If the air bubble is black, it can be judged as black spot.

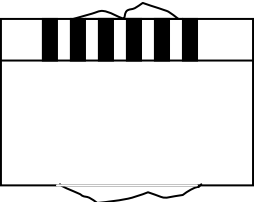
Defect	Inspect item	Criteria
3 Minor	Chip out  a: LCD length x: length y: width z: thickness	$a \geq 80\text{mm}, x \geq 7\text{mm}$ reject $a < 80\text{mm}, x \geq 5\text{mm}$ reject $z < 2/3t, y \geq s$ reject $z \geq 2/3t, y \geq 1/3s$ reject t: glass thickness. S: distance between glass edge and inside of edge sealing

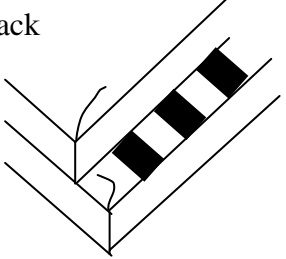
Defect	Inspect item	Criteria
4 Minor	Chip on corner of neat edge  X: length              Y: width S: width of edge sealing	$a \geq 80\text{mm}, x \geq 7\text{mm}$ reject $a < 80\text{mm}, x \geq 5\text{mm}$ reject $x > S * 2/3, x > S * 2/3$ reject z: ignore any chip exposes the silver dot              reject

Defect	Inspect item	Criteria
5 Minor	Chip on corner of terminal edge  D: terminal length	$a \geq 80\text{mm}, x \geq 7\text{mm}$ reject $a < 80\text{mm}, x \geq 5\text{mm}$ reject y, z: ignore

Defect	Inspect item	Criteria
6 Minor	Chip on opposite side of terminal 	$a \geq 80\text{mm}, x \geq 7\text{mm}$ reject $a < 80\text{mm}, x > 5\text{mm}$ reject $y > 1/2D$ reject $z > 1/2t, y > 1/4D$ reject D: terminal length

Defect	Inspect item	Criteria
7 Minor	Cutting/breaking defect (flare) 	Dimension not meet the drawing specification      reject $b \geq 0.3\text{mm}$ reject

Defect	Inspect item	Criteria
8 Major	Cutting/breaking defect (flare) 	According to the dimension of drawing

Defect	Inspect item	Criteria
9 Major	Crack 	Any crack trend to extend      reject

Defect	Inspect item	Criteria
10 Minor	Black spot, air bubble, stain, white spot (defect outside viewing area is acceptable) $\phi = (\text{length} + \text{width}) / 2$	$\phi \leq 0.1\text{mm}$ acceptable $0.1\text{mm} < \phi \leq 0.20\text{mm}$ two are acceptable $0.2\text{mm} < \phi \leq 0.25\text{mm}$ one are acceptable $\phi > 0.25\text{mm}$ reject the distance between two spots $> 5\text{mm}$

Defect	Inspect item	Criteria
11 Major	Liquid leakage, open sealant	reject

Defect	Inspect item	Criteria
12 Minor	Rainbow	According to samples

Defect	Inspect item	Criteria
13 Major	Display type not meet the requirement	According to samples

Defect	Inspect item	Criteria
14 Major	FPC、TCP、FLEX are broken or not connected firmly	reject

Defect	Inspect item	Criteria
15 Major	The component on PCB is missing ,soldered unfirmly or bridged	reject

Defect	Inspect item	Criteria
16 Minor	The soldering tin of pinouts is not enough	A. The height of soldering tin in though-holes is 1/2 less than the height of PCB looked down from the component side reject B. The width of soldering tin on pads around the though-hole is 2/3 less than the width of pad reject

Defect	Inspect item	Criteria
17 Minor	The soldering tin of pinouts overflows	The distance between pieces of soldering tin is less than 0.2 mm reject

Defect	Inspect item	Criteria
18 Minor	The soldering tin of SMT is not enough	The height that soldering tin covers the bump of SMT component is 1/2 less than the height of bump reject

Defect	Inspect item	Criteria
19 Minor	The soldering tin of SMT overflows	The soldering tin covers whole bump reject

Defect	Inspect item	Criteria
20 Minor	The component is broken	reject

Defect	Inspect item	Criteria
21 Minor	The shape of pinouts is not the same as that in the criterion	It makes the LCM work badly      reject

Defect	Inspect item	Criteria
22 Mjor	The pinout is broken	reject

Defect	Inspect item	Criteria
23 Minor	The paint falls off the frame or the frame is damaged	$\Phi > 1.0\text{mm}$ reject $\phi = (\text{length} + \text{width}) / 2$

Defect	Inspect item	Criteria
24 Minor	The frame is scratched visibly	Length      ignore Width $\leq 0.5\text{mm}$ reject

Defect	Inspect item	Criteria
25 Minor	The frame is rusted (accumulation)	When the shape is as dot,reference to defect 23 When the shape is as line,reference to defect 24

Defect	Inspect item	Criteria
26 Major	The foot of frame is broken or can not be fixed	reject

Defect	Inspect item	Criteria
27 Minor	The copper on PCB is damaged	A.the track or pad is borken      reject



Defect	Inspect item	Criteria
28 Minor	Paste layer falls off	When the shape is as dot,reference to defect 23 When the shape is as line,reference to defect 24

Defect	Inspect item	Criteria
29 Major	The bolt is missed	reject

Defect	Inspect item	Criteria
30 Minor	The bolt is not hard up	reject

Defect	Inspect item	Criteria
31 Major	No function	reject

Defect	Inspect item	Criteria
32 Major	Some row or column is absent	reject

Defect	Inspect item	Criteria
33 Major	The frame is absent	reject

Defect	Inspect item	Criteria
34 Major	The LCM can not follow the program	reject

Defect	Inspect item	Criteria
35 Minor	Some row or column displays more heavily or lightly than others in the same frame	Reference to the sample

Defect	Inspect item	Criteria
36 Minor	The display is not equality	Reference to the sample

Defect	Inspect item	Criteria
37 Major	Pattern not meet the drawing specification	reject

Defect	Inspect item	Criteria
38 Major	Deformation	reject

Defect	Inspect item	Criteria
39 Minor	Black dots or white dots in viewing area	reference to defect 23 or the sample

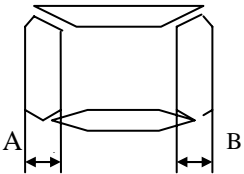
Defect	Inspect item	Criteria
40 Minor	Black lines or white lines in viewing area	reference to defect 1

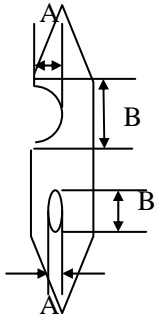
Defect	Inspect item	Criteria
41 Major	Wrong viewing direction	reject

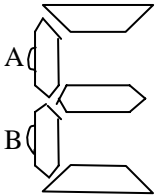
Defect	Inspect item	Criteria
42 Major	Operating current upper the specification	reject

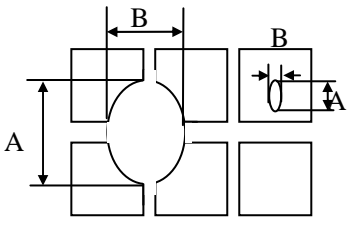
Defect	Inspect item	Criteria
43 Major	The backlight can not light	reject

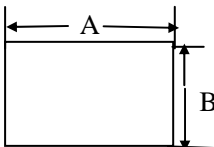
Defect	Inspect item	Criteria
44 Minor	The backlihtg is not equality	Reference to the sample

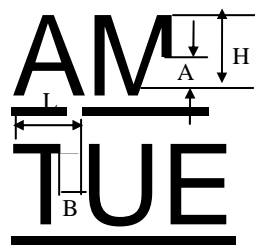
Defect	Inspect item	Criteria
45 Minor	Shape of pattern   W: width of pattern	$ A-B  > 1/3W$ reject $ A-W  > 1/3W$ reject $ A-B  > 0.25mm$ reject

Defect	Inspect item	Criteria
46 Minor	pinhole   W: width of character	$\phi < 0.2mm$ acceptable $0.2mm < \phi \leq 0.25mm$ three are acceptable (distance between two spots should be more than 20mm) $\phi > 0.25mm$ or $\phi > 1/3W$ reject

Defect	Inspect item	Criteria
47 Minor	Concave   $\Phi = 1/2$ (length + width)	$\Phi > 0.25mm$ or $1/3W$ reject

Defect	Inspect item	Criteria
48 Minor	Pinhole in pixels  $\Phi = (A+B) / 2$	Reference to defect 10

Defect	Inspect item	Criteria
49 Minor	Pixel deformation 	A: Quantity of deformation > 25% reject B: Quantity of deformation > 25% reject

Defect	Inspect item	Criteria
50 Minor	Pinhole in character 	Vertical: $A > 1/4H$ reject Horizontal: $B > 1/3L$ reject

**10.2RELIABILITY**

ITEM	CONDITION
High temperature operation	70 °C, 96 hrs
Low temperature operation	-20 °C, 96 hrs
Moisture storage	60 °C, 90%RH, 96 hrs
High temperature storage	80 °C, 96 hrs
Low temperature storage	-30 °C, 96 hrs
Thermal shock	-30 °C (30 minute) 25 °C (5 minute) 80 °C (30 minute) CYCLES: 10
LIFE TIME	50,000 hours, 25±10°C, 45±20% RH

## **11.PRECAUTIONS IN USING**

### **11.1 Liquid crystal display (LCD)**

The LCD panel is made up of glass, organic fluid and polarizer. When handling, please pay attention to the following items:

- 1) Keep the operation and storage temperature of the LCD within the range specified in the LCD specification. Otherwise, excessive temperature and humidity would cause polarization degradation, bubble generation or polarizer peel-off.
- 2) Prevent it from mechanical shock by dropping it from a high place, etc.
- 3) Don't contact, push or rub the exposed polarizers with anything harder than HB pencil lead.
- 4) Avoid using chemicals such as acetone, toluene, ethanol and isoropylalcohol to clean the front/rear polarizers and reflectors, which will cause damage to them.
- 5) Wipe off saliva or water drops immediately. Contact with water over a long period of time may cause deformation or color fading. The LCM is assembled and adjusted with a high degree of precision.
- 6) Do not put or attach anything on the display area. Avoid touching the display area with bare hand.

### **11.2 Precaution for handling LCD modules**

The LCM is assembled and adjusted with a high degree of precision, do not applying excessive shocks to it or making any alterations or modifications to it, the following precautions should be taken when handing.

- 1) Do not drop, bend or twist the module.
- 2) Do not alter or making any modification on the shape of the metal frame.
- 3) Do not change the shape, the pattern wiring or add any extra hole on the PCB.
- 4) Do not modify or touch the zebra rubber strip(conductive rubber) with another object.
- 5) Do not change the positions of components on the PCB.

### **11.3 Eletro-static discharge control**

Careful attention should be paid to control the electrostatic discharge of the modules, since the modules contain no. of CMOS LSI.

- 1) Make sure you are grounded properly when remove the module from its antistatic bag. Be sure that the module and have the same electric potential.
- 2) Only properly grounded soldering iron should be used.
- 3) Modules should be stored in antistatic bag or other containers resistant to static after remove from its original package.
- 4) When using the electric screw-driver is used, make sure the screw driver had been ground potentiality to minimize the transmission of EM wave produced by commutator sparks.
- 5) In order to reduce the generation of static electricity, a relative humidity of 50-60% is recommended.

#### **11.4 Precaution for soldering**

- 1) Soldering should apply to I/O terminals only.
- 2) Soldering temperature is  $280^{\circ}\text{C}+(-)10^{\circ}\text{C}$ .
- 3) Soldering time 3-4 seconds.
- 4) Eutectic solder (rosin flux filled) should be used.
- 5) If soldering flux is used, be sure to remove any remaining flux after finishing the soldering operation and LCD surface should be covered during soldering to prevent any damage to flux spatters.
- 6) When remove the lead wires from the I/O terminals, use proper de-soldering methods, e.g. suction type de-soldering irons. Do not repeat wiring by soldering more than three times at the pads and plated though holes may be damaged.

#### **11.5 Precaution for operation**

- 1) Adjust liquid crystal driving voltage ( $V_o$ ) to varies viewing angle and obtain the contrast.
- 2)  $V_o$  should be kept in proper range stated in the specification. Excess voltage will shorten the LCD life.
- 3) Response time is greatly delayed at low temperature. It will recover when go back to normal temperature.
- 4) Condensation on terminals can cause an electrochemical reaction disrupting the terminal circuit. Therefore it should be used under the relative condition of 50% RH.

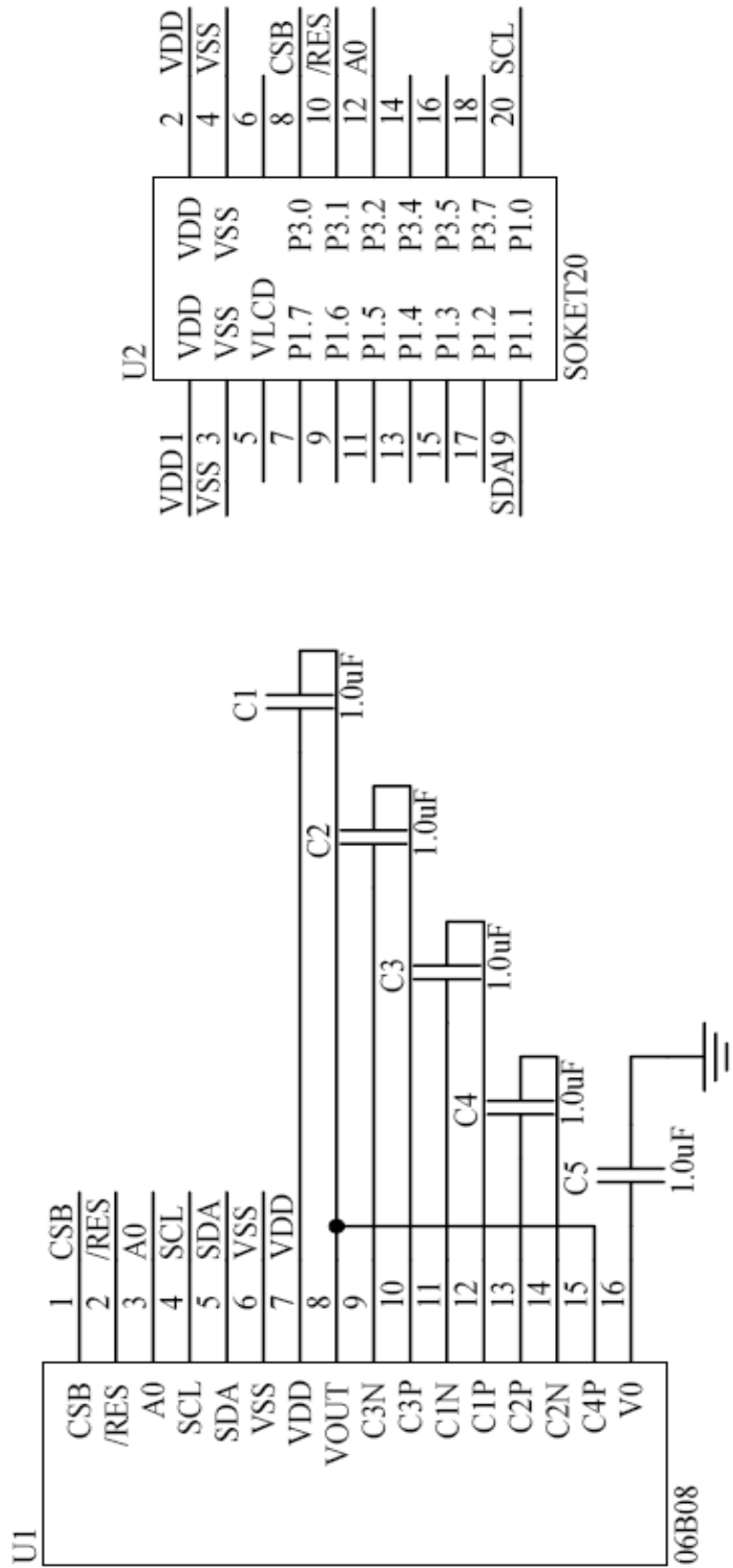
#### **11.6 Storage**

When long term storage is required, following precautions are necessary:

- 1) Storage them in a sealed polyethylene bag (antistatic), seal the opening, and store it where it is not subjected to direct sunshine, or to the light of fluorescent lamp. If properly sealed, there is no need for desiccant.
- 2) Store them in the temperature range of  $-30^{\circ}\text{C}\sim +80^{\circ}\text{C}$  and at low humidity is recommended.

## 12. APPLICATION

### 12.1 REFERENCE CIRCUIT



## **12.2 APPENDIX**

INITIALIZATION FOR REFERENCE (MPU: AT89C52):

```
ORG 0000H
LJMP BBEGIN
;
ORG 0040H
NOP
BBEGIN: MOV SP,#60H
clr EA
clr EX1
CLR IT1 ;

mov p1,#0ffh
mov p3,#0ffh
clr RES_
mov time1,#80
lcall delay
setb RES_

BINITIAL:
mov time1,#20
lcall Delay

MOV A,#39H ;Function Set
LCALL BWRCTRL
mov time1,#20
lcall delay

MOV A,#11H ;Set system Bias
LCALL BWRCTRL ;1/81 duty;1/10 bias
mov time1,#20
lcall delay

MOV A,#08H ;Display configuration
LCALL BWRCTRL ;Set DO=0

mov a,#0ABH ;Set VOP value:Vop=10.6V
lcall Bwrctrl

MOV A,#38H ;Function Set
LCALL BWRCTRL
mov time1,#20
lcall delay
```



**mov a,#05H ;Set VLCD range**  
**lcall Bwrctrl ;PRS=1: VLCD programming range HIGH**

**mov a,#0CH ;Display Control**  
**lcall Bwrctrl ;Normal display**

**mov a,#0F0H ;Set X address of RAM**  
**lcall Bwrctrl**  
**mov a,#0E0H ;Set X address of RAM**  
**lcall Bwrctrl**

**mov a,#40H ;Set Y address of RAM**  
**lcall Bwrctrl**

.....**TO YOUR CODE**

**REVISIONS**

No.	DATE	DESCRIPTION	ORGANIZED BY	CHECKED BY	APPROVED BY
1	06.11.16	LCM 外形图	宿惠菊	SPON AN	
2					
3					
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