SPECIFICATIONS FOR LCD MODULE

CUSTOMER	
MODEL	**SC128128012-V01**
CUSTOMER APPROVED	

APPROVED BY	CHECKED BY	ORGANIZED BY
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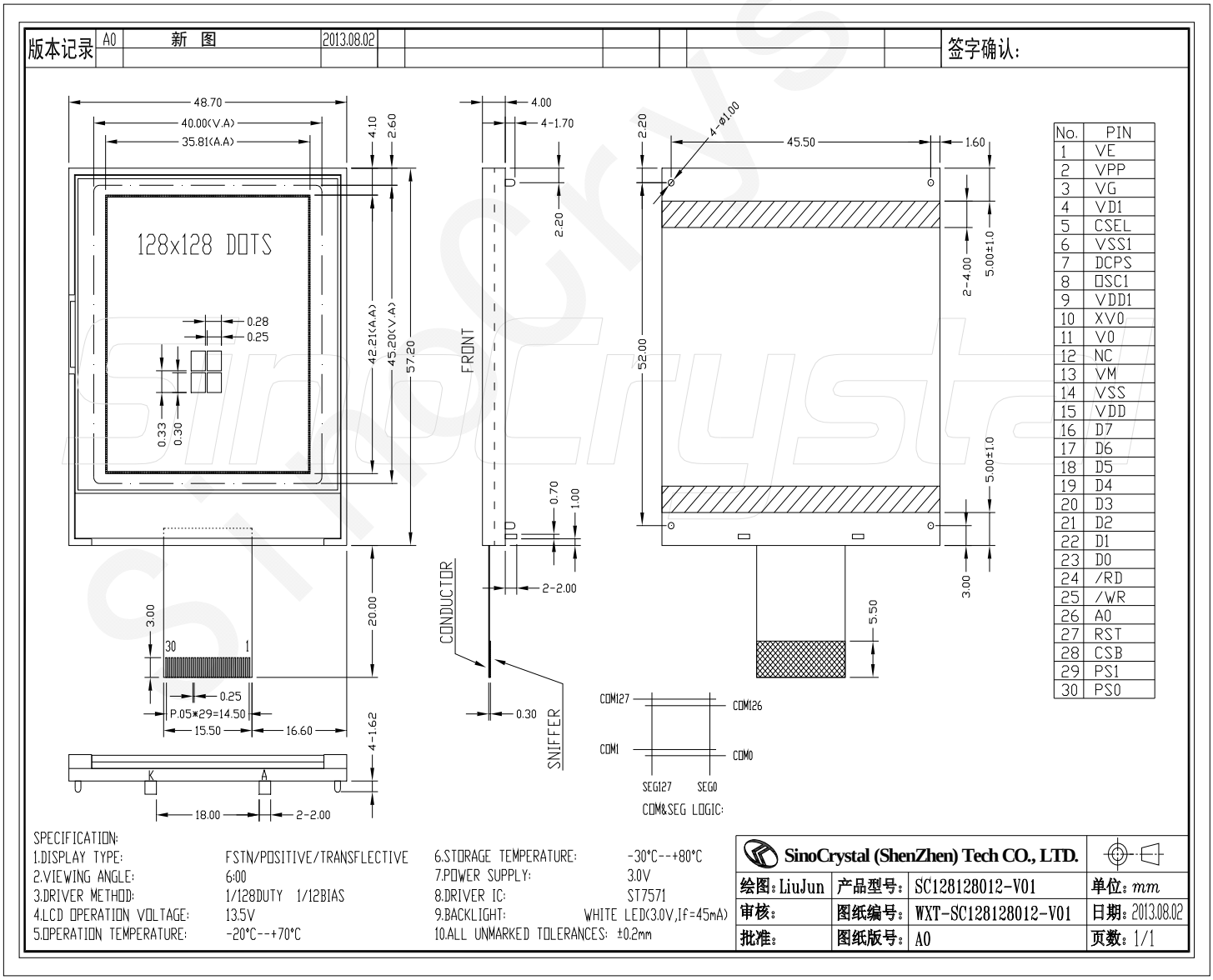
Specification Revision History

Version	Content	Date
A0	First Issue	16-Jun-2014

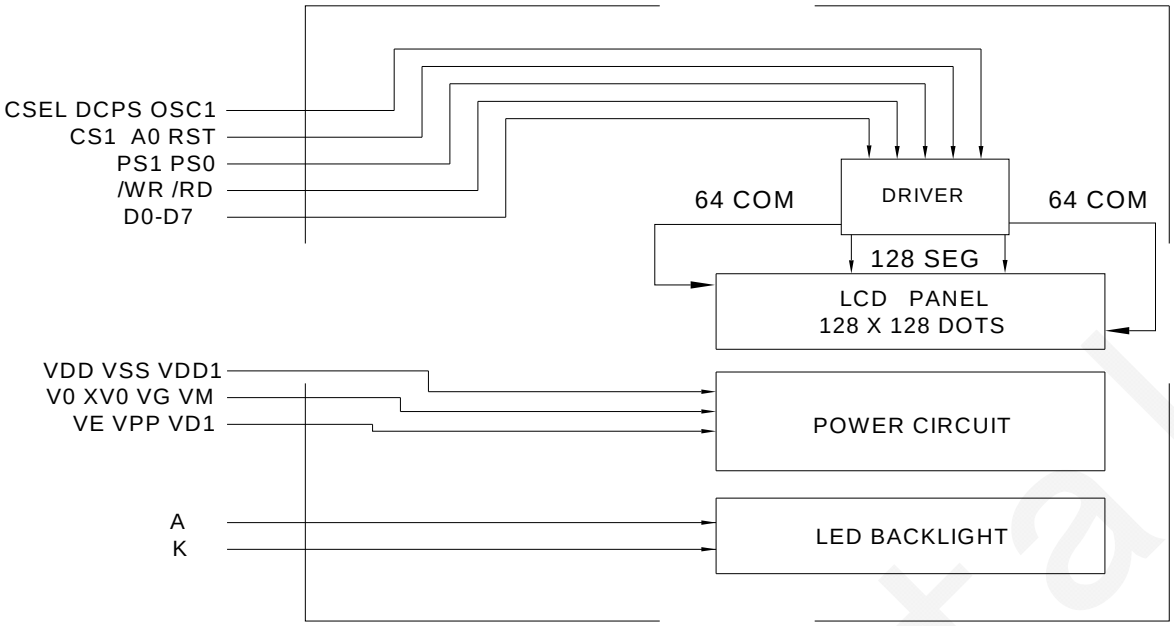
1. PHYSICAL DATA

ITEM	STANDARD VALUE	UNIT
NUMBER OF GRAPHIC	128×128	Mm
MODULE DIMENSION	48.7×57.2×4.0	Mm
VIEWING AREA	40.0×45.2	Mm
DOT SIZE	0.25×0.30	Mm
DOT PITCH	0.28×0.33	Mm
LCD TYPE	FSTN/POSITIVE/TRANSFLECTIVE	
DUTY	1/128	
VIEWING DIRECTION	6:00	o'clock
BACK LIGHT TYPE	SIDE LIT LED	
BACK LIGHT COLOR	WHITE	
APPROX. WEIGHT	TBD	G

2. EXTERNAL DIMENSIONS



3. BLOCK DIAGRAM



4. INTERFACE PIN CONNECTIONS

Pin No.	Symbol	Level	Description
1	VE	--	When writing EEPROM, VE should be pull-high externally.
2	VPP	--	When writing EEPROM, it needs external power supply voltage.
3	VG	--	VG is the LCD driving voltage for segment circuits. Connect a capacitor between this terminal and the Ground.
4	VD1	--	VD1 is the power supply pin of the internal digital circuits. When DCPS=L, VD1 is the output of the internal digital power regulator. Connect a capacitor between this terminal and the Ground. When DCPS=H, VD1 is provided by VDD1.
5	CSEL	--	Set CSEL=H to enable “Interlace” mode (recommended).
6	VSS1	--	Ground for digital circuit.
7	DCPS	H/L	This pin selects the supply voltage source of the digital circuit. If system VDD1 is 3.0V ~ 3.3V, set DCPS=L to select Internal Regulator as digital circuit power. If system VDD1 is 1.8V ~ 2.8V, set DCPS=H to select VDD1 as digital circuit power.
8	OSC1	--	Connect OSC1 to VDD1.
9	VDD1	--	Power supply for digital circuit.
10	XV0	--	XV0 is the LCD driving voltage for common circuits at positive frame. Connect a capacitor between this terminal and the V0 terminal.
11	V0	--	V0 is the LCD driving voltage for common circuits at negative frame. Connect a capacitor between this terminal and the XV0 terminal.
12	NC		
13	VM	--	LCD driving voltage for common circuits Connect a capacitor between this terminal and the Ground.
14	VSS	--	Ground for analog circuit.
15	VDD	--	Power supply for analog circuit.
16-23	D7(SID) D6(SCLK) D5-D0	H/L	This is an 8-bit bi-directional data bus that connects to an 8-bit or 16-bit standard MPU data bus. When the serial interface is selected: D7 : serial data input (SID) ; D6 : the serial clock input (SCL). D0 to D5 should be connected to VDD
24	/RD(E)	H/L	8080 series: Read signal 6800 series: Enable signal
25	/WR(R/W)	H/L	8080 series: Write signal 6800 series: Read or Write signal
26	A0	H/L	Register selection input H : Indicate that D0 to D7 are display data. L:Indicate that D0 to D7 are control data
27	RST	H/L	Chip reset signal
28	CSB	H/L	Chip select signal

29	PS1	H/L	PS1	PS0	Selected Interface Mode
			L	H	Parallel 8080 MPU Interface
30	PS0	H/L	H	H	Parallel 6800 MPU Interface
			L	L	Serial 3-Line Interface
			H	L	erial 4-Line Interface

5. ABSOLUTE MAXIMUM RATINGS

(1) Electrical Absolute Ratings

Item	Symbol	Min.	Max.	Unit	Note
Power Supply for Digital	VDD1	0	3.6	Volt	Note 1
Power Supply for Analog	VDD	0	3.6		
Power Supply for LCD	V0-XV0		15	Volt	
Input Voltage	V_I	0	VDD1	Volt	
Current for LED backlight	I_{LED}		60	mA	

Note 1: Operator should be grounded during handling LCM

（2）Environmental Absolute Maximum Ratings

Item	Normal Temperature				Wide Temperature			
	Operating		Storage		Operating		Storage	
	Min.	Max,	Min.	Max,	Min.	Max,	Min.	Max,
Ambient Temperature	0℃	+50℃	-10℃	+60℃	-20℃	+70℃	-30℃	+80℃
Humidity(without condensation)	Note 2,4		Note 3,5		Note 4,5		Note 4,6	

Note 2 Ta≦50℃: 80% RH max

Ta>50℃: Absolute humidity must be lower than the humidity of 85%RH at 50℃

Note 3 Ta at -20℃ will be<48hrs at 70℃will be <120hrs when humidity is higher than 75%.

Note 4 Background color changes slightly depending on ambient temperature. This phenomenon is reversible.

Note 5 Ta≦70℃: 75RH max

Ta>70℃: absolute humidity must be lower than the humidity of 75%RH at 70℃

Note 6 Ta at -20℃ will be <48hrs, at 80℃will be <120hrs when humidity is higher than 75%.

6. ELECTRICAL CHARACTERISTICS

DC Characteristics

(VSS=0V,VDD=3.3V, Ta=25℃)

Item	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Power Supply for Digital	VDD1		1.7	-	3.4	Volt
Power Supply for Analog	VDD		2.6		3.4	
Input Voltage	V_{IH}		0.7VDD1	-	VDD	Volt
	V_{IL}		0	-	0.3VDD1	Volt
LCM Recommend LCD Module Driving Voltage	V_{LCD}	T_a＝0℃	-	-	-	Volt
		T_a＝25℃	10	13.5	14.5	
		T_a＝50℃	-	-	-	
Power Supply Current for LCM	I_{DD}(BL OFF)	-	-	-	5	mA
	I_{DD}(BL ON)	-	-	-	50	
Power Supply for LED Backlight	V_{BLA}- V_{BLK}	Ta=25℃	-	-	3.3	V

AC Characteristics

8080 Series MPU

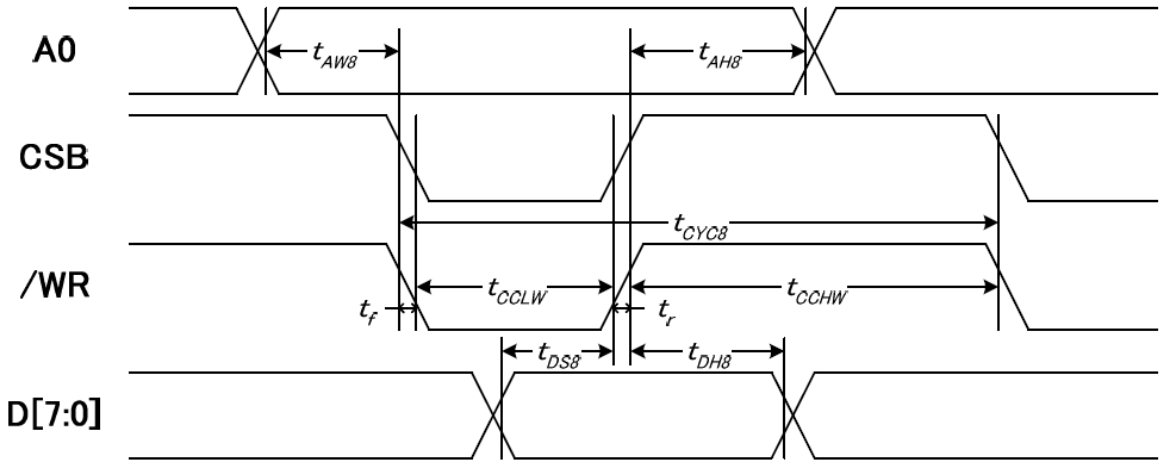


Fig. 31

(VDD1 = 1.8V~3.3V, Ta =-30~85°C)

Item	Signal	Symbol	Condition	Rating		Units
				Min.	Max.	
Address hold time	A0	tAH8		0	—	ns
Address setup time		tAW8		0	—	
System cycle time	/WR	tCYC8		500	—	
Write L pulse width		tCCLW		250	—	
Write H pulse width		tCCHW		250	—	
WRITE Data setup time	DB[7:0]	tDS8		80	—	
WRITE Data hold time		tDH8		30	—	

- The input signal rise time and fall time (tr, tf) is specified at 15 ns or less. When the system cycle time is extremely fast, (tr + tf) ≤ (tCYC8 – tCCLW – tCCHW) is specified.
- All timing is specified using 20% and 80% of VDD1 as the reference.
- tCCLW is specified as the overlap between CSB being “L” and /WR being at the “L” level.

6800 Series MPU

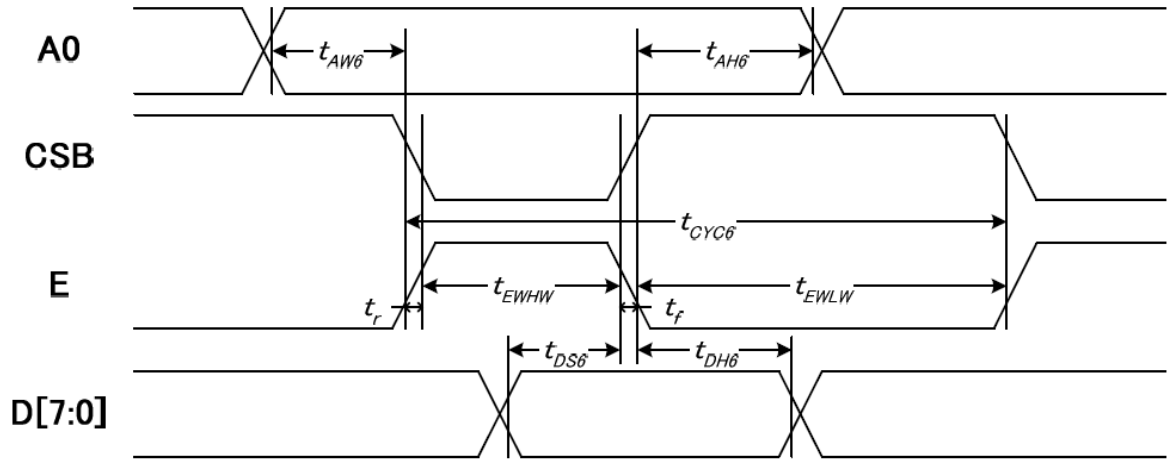


Fig. 32

(VDD1 = 1.8V~3.3V, Ta =-30~85°C)

Item	Signal	Symbol	Condition	Rating		Units
				Min.	Max.	
Address hold time	A0	tAH6		0	—	ns
Address setup time		tAW6		0	—	
System cycle time	E	tCYC6		500	—	
Enable L pulse width (Write)		tEWLW		250	—	
Enable H pulse width (Write)		tEWHW		250	—	
WRITE Data setup time	DB[7:0]	tDS6		80	—	
WRITE Data hold time		tDH6		30	—	

- The input signal rise time and fall time (tr, tf) is specified at 15 ns or less. When the system cycle time is extremely fast, (tr + tf) ≤ (tCYC6 – tEWLW – tEWHW) is specified.
- All timing is specified using 20% and 80% of VDD1 as the reference.
- tEWLW is specified as the overlap between CSB being “H” and E being “L”.
- R/W signal is always “H”.

Serial 4-Line Interface

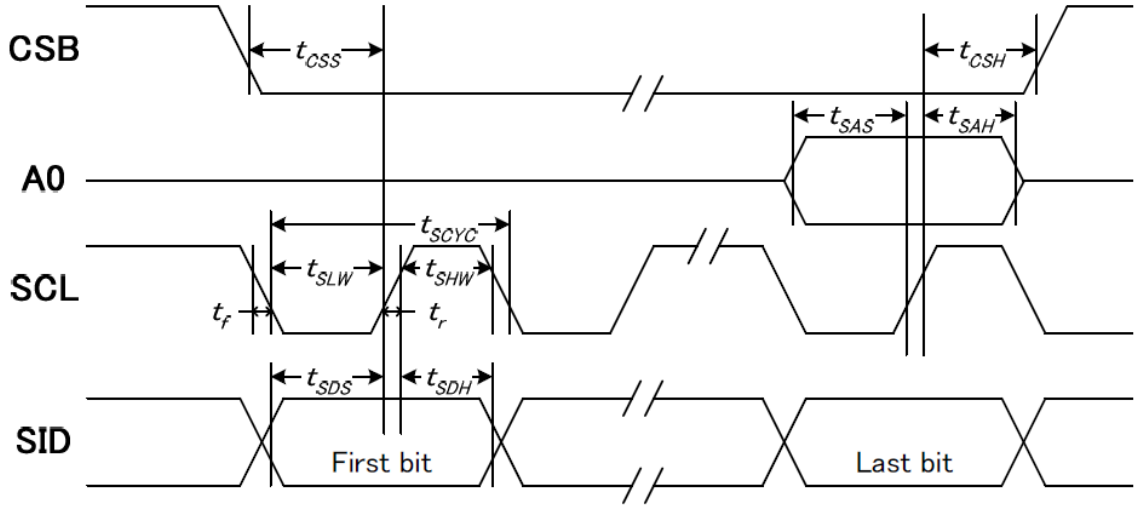


Fig. 33

(VDD1 = 1.8V~3.3V, Ta =-30~85°C)

Item	Signal	Symbol	Condition	Rating		Units
				Min.	Max.	
Serial Clock Period	SCL	tSCYC		200	—	ns
SCL "H" pulse width		tSHW		80	—	
SCL "L" pulse width		tSLW		80	—	
Address setup time	A0	tSAS		60	—	
Address hold time		tSAH		30	—	
Data setup time	SID	tSDS		60	—	
Data hold time		tSDH		30	—	
CS-SCL time	CSB	tCSS		40	—	
CS-SCL time		tCSH		100	—	

- The input signal rise and fall time (tr, tf) are specified at 15 ns or less.
- All timing is specified using 20% and 80% of VDD1 as the standard.

Serial 3-Line Interface

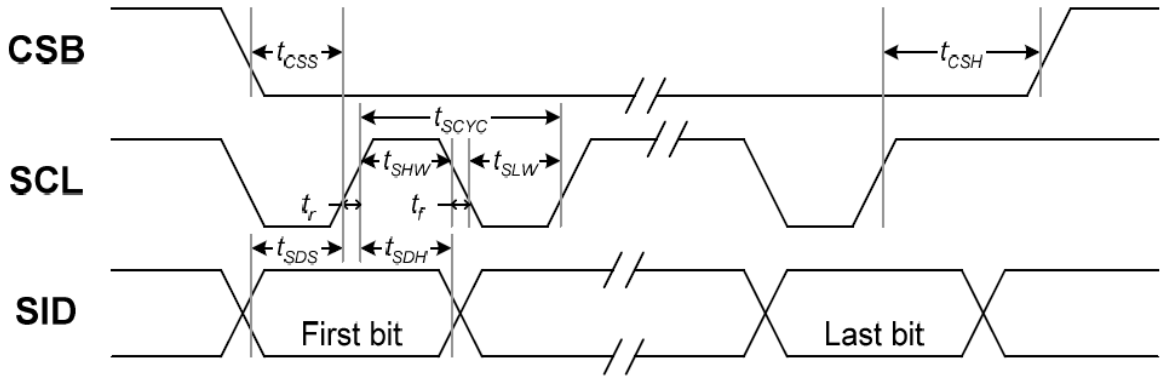


Fig. 34

(VDD1 = 1.8V~3.3V, Ta =-30~85°C)

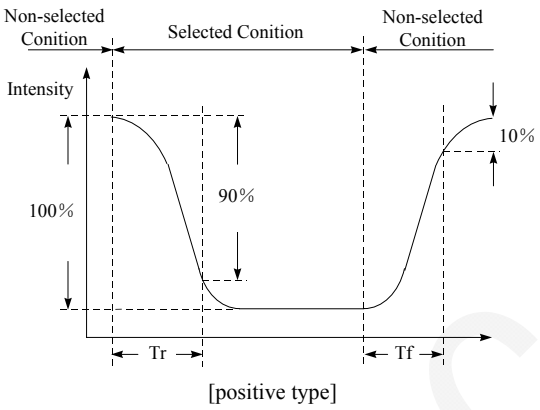
Item	Signal	Symbol	Condition	Rating		Units
				Min.	Max.	
Serial Clock Period	SCL	tSCYC		200	—	ns
SCL "H" pulse width		tSHW		80	—	
SCL "L" pulse width		tSLW		80	—	
Data setup time	SID	tSDS		60	—	
Data hold time		tSDH		30	—	
CS-SCL time	CSB	tCSS		40	—	
CS-SCL time		tCSH		100	—	

- The input signal rise and fall time (tr, tf) are specified at 15 ns or less.
- All timing is specified using 20% and 80% of VDD1 as the standard.

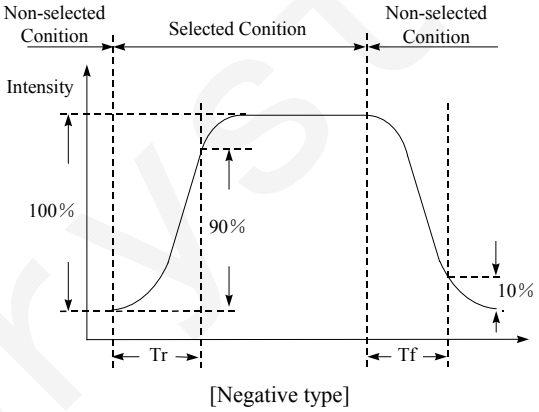
7. ELECTRO-OPTICAL CHARACTERISTICS

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	note
Viewing angle range	θ_f (12 o'clock)	When Cr≧2	---	15	---	Degree	Note 2 Note 3 Note 4
	θ_b (6 o'clock)		---	45	---		
	θ_l (9 o'clock)		---	30	---		
	θ_r (3 o'clock)		---	30	---		
Rise Time	T_r	V0-VSS=13.5V Ta=25℃		112		mS	Note 1
Fall Time	T_f			250			
Contrast	Cr		---	5. 4	---		

[Note 1] Definition of Response Time (Tr, Tf)



[positive type]



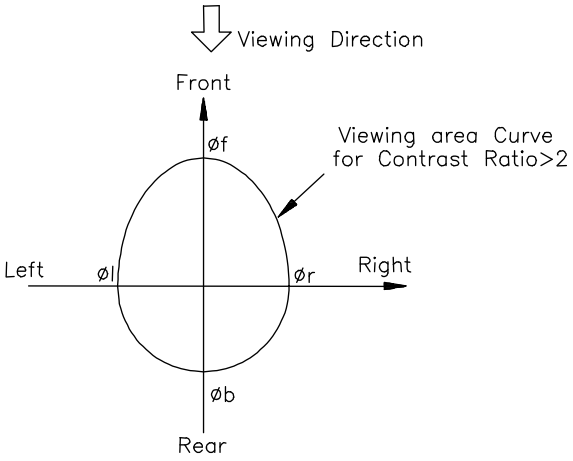
[Negative type]

Conditions:

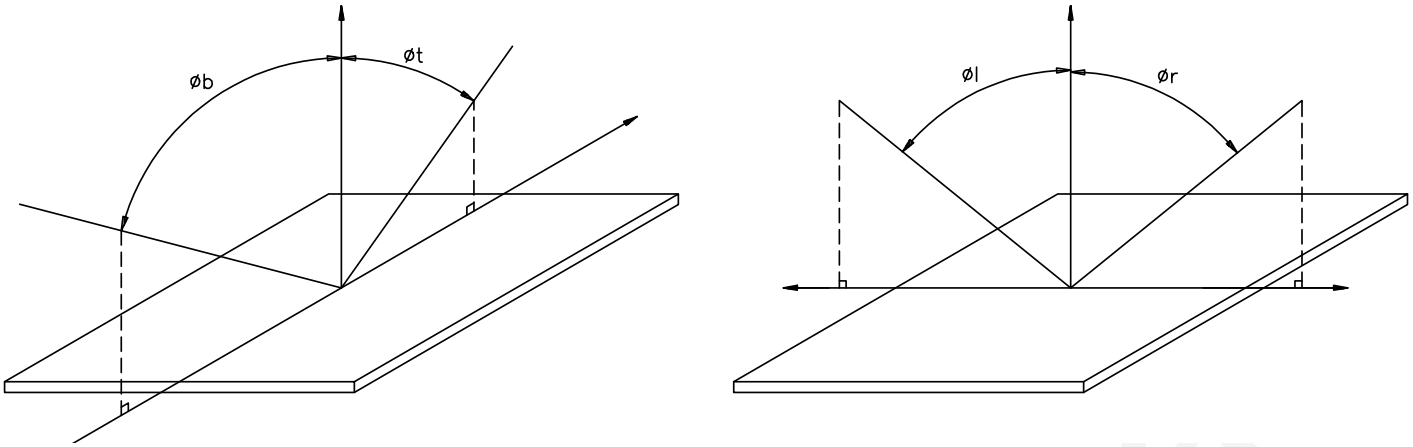
Operating Voltage : Vop — Viewing Angle(θ , φ): 0° , 0°

Frame Frequency : 64 Hz — Driving Wave form : 1/N duty, 1/a bias

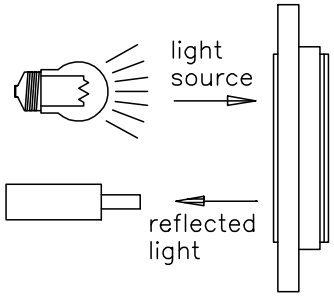
[Note 2] Definition of Viewing Direction



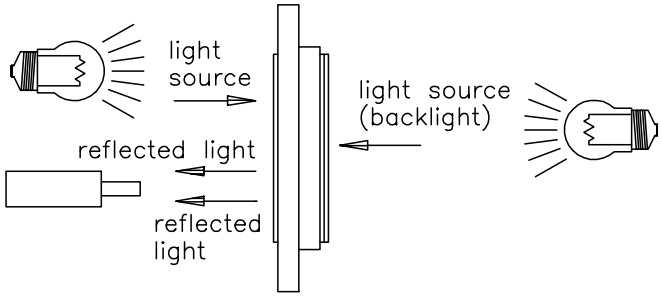
[Note 3] Definition of viewing angle



[Note 4] Description of Measuring Equipment



Reflective type



Transflective type

8. OPERATING PRINCIPLES & METHODS

Instruction	A0	R/W	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0	Description	Section
Set Mode	0	0	0	0	1	1	1	0	0	0	2-byte instruction FR[3:0]: Set frame frequency BE[1:0]: Set booster efficiency	9.1.1
	0	0	FR3	FR2	FR1	FR0	BE1	BE0	--	0		
Write Display Data	1	0	Write data								Write data into DDRAM	9.1.2
Set Icon	0	0	1	0	1	0	0	0	1	ION	ION=0: Disable Icon function ION=1: Enable Icon function and set Page Address = 16	9.1.3
Set Page Address	0	0	1	0	1	1	P3	P2	P1	P0	Set Page Address	9.1.4
Set Column Address (MSB)	0	0	0	0	0	1	0	X7	X6	X5	Set MSB of Column Address	9.1.5
Set Column Address (LSB)	0	0	0	0	0	0	X4	X3	X2	X1	Set LSB of Column Address	9.1.6
Display ON/OFF	0	0	1	0	1	0	1	1	1	D	D=0: Display OFF D=1: Display ON	9.1.7
Set Display Start Line	0	0	0	1	0	0	0	0	--	--	2-byte instruction. Specify Line Address for the 1st display line of DDRAM (vertical scrolling).	9.1.8
	0	0	--	S6	S5	S4	S3	S2	S1	S0		
Set COM0	0	0	0	1	0	0	0	1	--	--	2-byte instruction. Specify a COM pin to be COM0 (moving partial display window).	9.1.9
	0	0	--	C6	C5	C4	C3	C2	C1	C0		
Set Display Duty	0	0	0	1	0	0	1	0	--	--	2-byte instruction. Set display duty	9.1.10
	0	0	L7	L6	L5	L4	L3	L2	L1	L0		
Set N-line Inversion	0	0	0	1	0	0	1	1	--	--	2-byte instruction. Set N-line inversion counter	9.1.11
	0	0	--	--	--	N4	N3	N2	N1	N0		
Release N-line Inversion	0	0	1	1	1	0	0	1	0	0	Exit N-line inversion mode	9.1.12
Reverse Display	0	0	1	0	1	0	0	1	1	REV	REV=0: Normal display REV=1: Reverse display	9.1.13
Entire Display ON	0	0	1	0	1	0	0	1	0	EON	EON=0: Normal display EON=1: Entire display ON	9.1.14

Instruction	A0	R/W	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0	Description	Section
Power Control	0	0	0	0	1	0	1	VC	VR	VF	Set internal power ON/OFF	9.1.15
Select Regulator Register	0	0	0	0	1	0	0	R2	R1	R0	Select internal Regulator resistor	9.1.16
Set Contrast	0	0	1	0	0	0	0	0	0	1	2-byte instruction. Select EV for internal Regulator's reference	9.1.17
	0	0	--	--	EV5	EV4	EV3	EV2	EV1	EV0		
Select LCD bias	0	0	0	1	0	1	0	B2	B1	B0	Select LCD bias	9.1.18
Set COM Scan Direction	0	0	1	1	0	0	MY	--	--	--	Set COM scan direction: MY=0: Normal direction MY=1: Reverse direction	9.1.19
Set SEG Scan Direction	0	0	1	0	1	0	0	0	0	MX	Set SEG scan direction: MX=0: Normal direction MX=1: Reverse direction	9.1.20
Oscillator ON	0	0	1	0	1	0	1	0	1	1	Turn ON internal Oscillator	9.1.21
Set Power-Save Mode	0	0	1	0	1	0	1	0	0	P	P=0: Normal mode P=1: Enable Power-Save mode	9.1.22
Release Power-Save Mode	0	0	1	1	1	0	0	0	0	1	Exit Power-Save mode	9.1.23
RESET	0	0	1	1	1	0	0	0	1	0	Software reset	9.1.24
Set Display Data Length	--	--	1	1	1	0	1	0	0	0	2-byte instruction. Set the data counter in 3-Line SPI only	9.1.25
	--	--	DL7	DL6	DL5	DL4	DL3	DL2	DL1	DL0		
NOP	0	0	1	1	1	0	0	0	1	1	No operation	9.1.26
Reserved	0	0	1	1	1	0	0	0	0	0	Do NOT use	--
Reserved	0	0	1	1	1	0	1	1	1	0	Do NOT use	--
Reserved	0	0	1	1	1	1	--	--	--	--	Reserved for testing	--
Extension Command Set1	0	0	1	1	1	1	1	1	0	TE1	TE1=1: Enter extension Mode1	9.1.27
Extension Command Set2	0	0	1	1	0	1	0	0	0	TE2	TE2=1: Enter extension Mode2	9.1.28
Extension Command Set3	0	0	0	1	1	1	1	0	1	TE3	TE3=1: Enter extension Mode3	9.1.29

Instruction	A0	R/W	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0	Description
EXTENSION COMMAND SET 1											
Increase Vop offset	0	0	0	1	0	1	0	0	0	1	Increase vop offset by 1step
Decrease Vop offset	0	0	0	1	0	1	0	0	1	0	Decrease vop offset by 1 step
Return normal mode	0	0	0	0	0	0	0	0	0	0	Return normal mode
EXTENSION COMMAND SET 2											
Disable autoread	0	0	1	0	1	0	1	0	1	0	Disable autoread
Enter EEPROM mode	0	0	0	0	0	1	0	0	1	1	Enter EEPROM mode
Enable read mode	0	0	0	0	1	0	0	0	0	0	Enable read mode
Set read pulse	0	0	0	1	1	1	0	0	0	1	Set read pulse width
Exit EEPROM mode	0	0	1	0	0	0	0	0	1	1	Exit EEPROM mode
Enable erase mode	0	0	0	1	0	0	1	0	1	0	Enable erase mode
Set erase pulse	0	0	0	1	0	1	0	1	0	1	Set erase pulse width
Enable write mode	0	0	0	0	1	1	0	1	0	1	Enable write mode
Set write pulse	0	0	0	1	1	0	1	0	1	0	Set write pulse width
Return normal mode	0	0	0	0	0	0	0	0	0	0	Return normal mode
EXTENSION COMMAND SET 3											
Set Color Mode	0	0	0	0	0	1	0	0	0	B/G	Select Black/White or Gray mode B/G=1: Black/White mode; B/G=0: Gray mode (default)
Return normal mode	0	0	0	0	0	0	0	0	0	0	Return normal mode

Note: Do NOT use non-specified instructions in any extension command mode.

NOTE: For more detail information, please refer to the ST7571's specification.

9. Display Data RAM (DDRAM)

The Display Data RAM stores pixel data for the LCD. It is 129-row by 128-column addressable array. Each pixel can be selected when the page and column addresses are specified. The 129 rows are divided into 16 pages of 8 lines and the 17th page with a single line (DB0 only). Data is written to the 8 lines of each page directly through DB0 to DB7. The display data of DB0 to DB7 from the microprocessor correspond to the LCD common lines. The LCD controller and MPU interface operate independently, data can be written into RAM at the same time when data is being displayed without flicker on LCD.

Page Address Circuit

It incorporates 4-bit Page Address register changed by only the “Set Page” instruction. Page Address 16 is a special RAM area for the icons and display data DB0 is only valid. The page address is set from 0 to 15, and Page 16 is for Icon page.

Line Address Circuit

This circuit assigns DDRAM a Line Address corresponding to the first line (COM0) of the display. Therefore, by setting Line Address repeatedly, it is possible to realize the screen scrolling and page switching without changing the contents of on-chip RAM. It incorporates 7-bit Line Address register changed by only the initial display line instruction and 7-bit counter circuit. At the beginning of each LCD frame, the contents of register are copied to the line counter which is increased by CL signal and generates the line address for transferring the 128-bit RAM data to the display data latch circuit. When icon is enabled by setting icon control register, display data of icons are not scrolled because the MPU can not access Line Address of icons.

Column Address Circuit

When set Column Address MSB / LSB instruction is issued, 7-bit (X[7:1]) are set and lowest bit (X0) is set to “0”. The internal column address (X[7:0]) is increased by 1 automatically after each byte of data access (write data). After sequential access twice, the column address (X[7:1]) will point to the next column address. Please refer to Fig. 12.

Segment Control Circuit

This circuit controls the display data by the display ON / OFF, reverse display ON / OFF and entire display ON / OFF instructions without changing the data in the Display Data RAM.

SEG Output	SEG 0		SEG 1		SEG 2		SEG 3		…	SEG 124		SEG 125		SEG 126		SEG 127	
Column Address X[7:1]	00H		01H		02H		03H		…	7CH		7DH		7EH		7FH	
Internal column address X[7:0]	00	01	02	03	04	05	06	07	…	F8	F9	FA	FB	FC	FD	FE	FF
Display Data (MX=0)	1	1	1	0	0	1	0	0	…	1	1	1	0	0	1	0	0
LCD panel display									…								
Display data (MX=1)	0	0	0	1	1	0	1	1	…	0	0	0	1	1	0	1	1
LCD panel display									…								

10. RELIABILITY

Environmental Test				
No.	**Test Item**	**Content of Test**	**Test Condition**	**Applicable Standard**
1	High temperature storage	Endurance test applying the high storage temperature for a long time.	80 °C 200 hrs	------
2	Low temperature storage	Endurance test applying the low storage temperature for a long time.	-30 °C 200 hrs	------
3	High temperature operation	Endurance test applying the electric stress (Voltage & Current) and the thermal stress to the element for a long time.	70 °C 200 hrs	------
4	Low temperature operation	Endurance test applying the electric stress under low temperature for a long time.	-20 °C 200 hrs	------
5	High temperature / Humidity storage	Endurance test applying the high temperature and high humidity storage for a long time.	70 °C , 90 %RH 96 hrs	MIL-202E-103B JIS-C5023
6	High temperature / Humidity operation	Endurance test applying the electric stress (Voltage & Current) and temperature / humidity stress to the element for a long time.	50 °C , 90 %RH 96 hrs	MIL-202E-103B JIS-C5023
7	Temperature cycle	Endurance test applying the low and high temperature cycle. -10°C ⇌ 25°C ⇌ 60°C 30min 5min 30min 1 cycle	-10°C / 60°C 10 cycles	------
Mechanical Test				
8	Vibration test	Endurance test applying the vibration during transportation and using.	10~22Hz → 1.5mmp-p 22~500Hz → 1.5G Total 0.5hrs	MIL-202E-201A JIS-C5025 JIS-C7022-A-10
9	Shock test	Constructional and mechanical endurance test applying the shock during transportation.	50G half sign wave 11 msedc 3 times of each direction	MIL-202E-213B
10	Atmospheric pressure test	Endurance test applying the atmospheric pressure during transportation by air.	115 mbar 40 hrs	MIL-202E-105C
Others				
11	Static electricity test	Endurance test applying the electric stress to the terminal.	VS=800V , RS=1.5 kΩ CS=100 pF 10 time	MIL-883B-3015.1

Inspection after test: Inspection after 2～4 hours storage at room temperature ,the sample shall be free from defects:

1. Air bubble in the LCD.
2. Sealleak
3. Non-display.
4. Missing segments.
5. Glass crack.
6. Current Idd is twice higher than initial value.

11. QUALITY GUARANTEE

No	Item	Criteria
1	inclusions (black spot, white spot, dust)	(1)round type diameter mm(a*) no of defect* a≦0.20 neglect 0.20＜a≦0.35 5max 0.35＜a none (2)linear type length mm(l) width mm(W) no. of defect na W≦0.03 neglect l≦3 0.03＜W≦0.08 6 3＜l 0.08＜W none
2	scratch	1.scratch on protective film is permitted. 2.scratch on polarizer shall be as follow: (1)round type diameter mm(a*) no of defect a≦0.15 neglect 0.15＜a≦0.20 2 max 0.20＜a none (2)linear type be judged bye 1.-(2) linear type
3	dent	diameter ＜ 1.5mm
4	bubble	not exceeding 0.5mm average diameter is acceptable between glass and polarizing film
5	pin hole	(a+b)/2 ≦ 0.15mm maximum number: ignored 0.15＜(a+b)/2≦0.20mm maximum number:10
6	dot width	design width ±15%
7	dot defect	(a+b)/2≦0.20mm maximum number: ignored 0.20＜(a+b)/2≦0.30mm maximum number:5 x=width
8	contrast irregularity(spot)	diameter spec no of defect a≦0.50mm neglect 0.50＜a≦0.75 5 0.75＜a≦1.00 3 1.00＜a none
9	color tone and uniformity	obvious uneven color is not permitted

12. POWER SUPPLY FOR LCM MODULE

The pinning of the ST7571 is optimized for single plane wiring e.g. for chip-on-glass display modules.

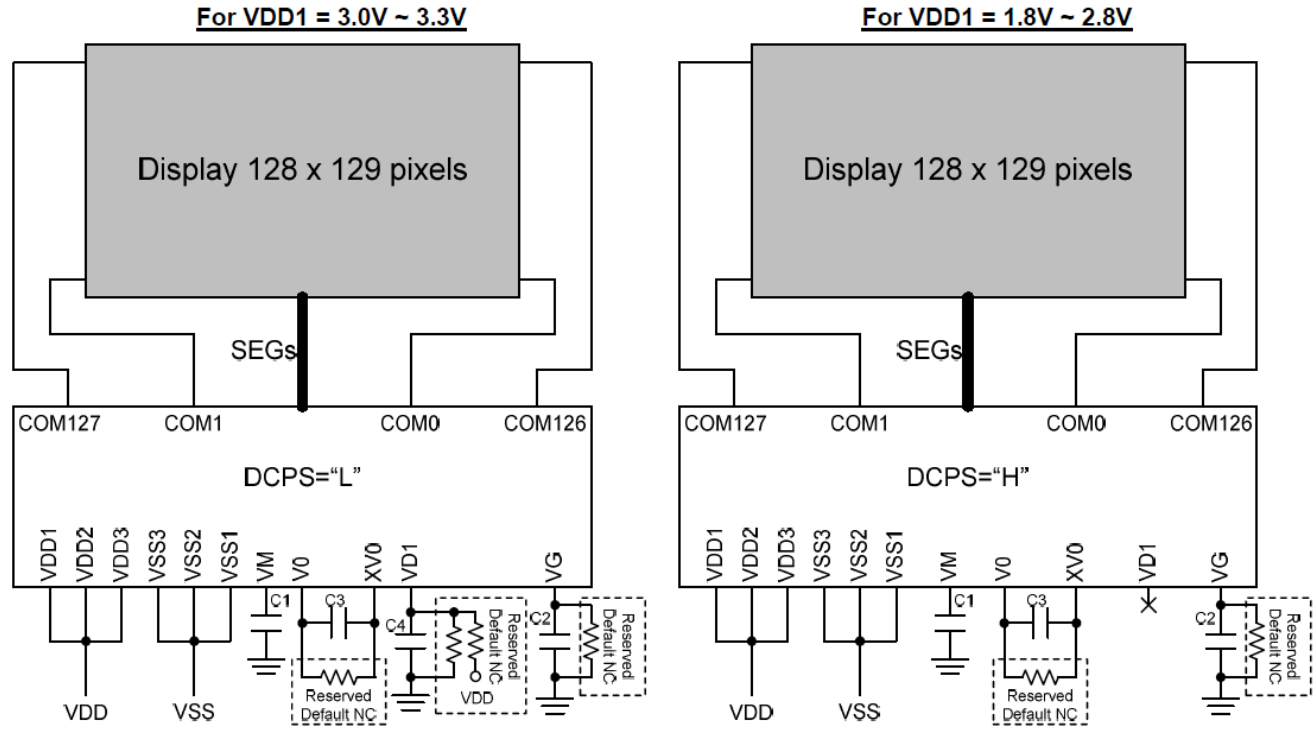


Fig. 37 External Components

Note:

1. The resistors are reserved only. Please reserve the space for them on FPC (or system).
2. The capacitors in these 2 cases are not same. C4 is not used if VDD1 is 1.8V ~ 2.8V.

Recommend Value: (for typical 1.6" LCD panel)

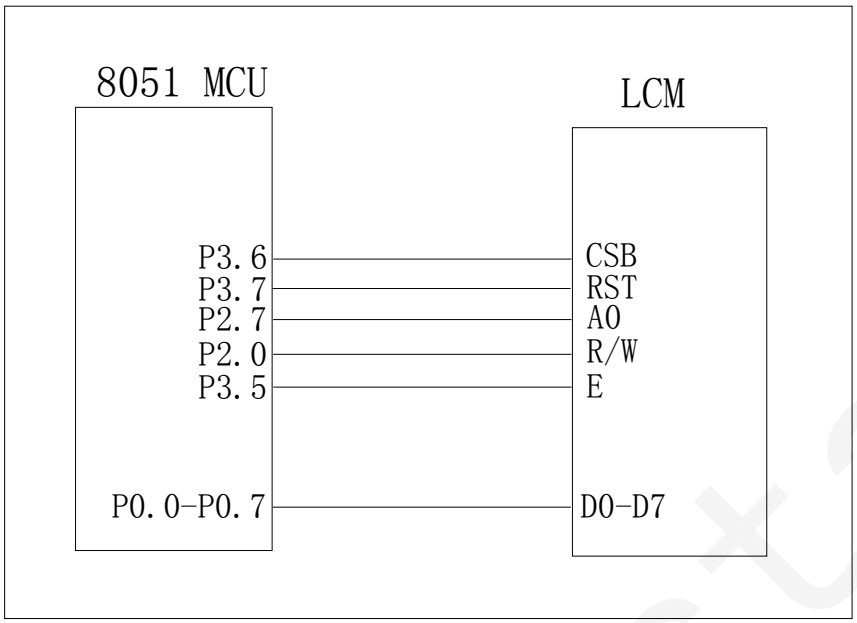
- C1~C3: 1uF ~ 4.7uF
- C4: 0.1uF ~ 1uF

Components selection notes:

- Higher capacitor values are recommended for ripple reduction.
- In order to avoid the characteristic differences of the LCD panel. The capacitor values should be verified according to the display performance on LCD panel.
- If the display panel is larger (> 2"), higher capacitor (C1~C3) values are recommended.
- If the display panel is smaller (< 1"), lower capacitor (C1~C3) values can be used.
- The resistor is reserved for discharge in the worse case, when VDD suddenly drops to 0.

13.EXAMPLE

1) Application Ciuruit (6800 Series Parallel)



2) Demo Program (6800 Series Parallel)

```
//    SC128128012-V01 并口 6800 时序测试程序
//*************************************************************
//*  Create by :刘俊(liujun)    Email: 13510533847@126.com      *
//*************************************************************
//说明:  CPU=STC11L60XE(1T)    CPUClock=22.1184Mhz              *
//*************************************************************
#include <reg52.h>
#include <intrins.h>

#define LcmXPixel 128   //横向宽度
#define LcmYPixel 128   //纵向高度
#define MIN(A,B) ((A)<(B)?(A):(B))
#define Uchar unsigned char
#define Uint  unsigned int

sbit CS  = P3^6;
sbit RES = P3^7;
sbit RS  = P2^7;    //RS=A0
sbit RW  = P2^0;
sbit E   = P3^5;
sbit Key = P2^1;    //测试架按键
#define LcmDataBus P0

Uchar code bmp1[];
Uchar code ASCIIchardot[];

//函数功能: 延时函数
//入口参数: 需要延时的毫秒数(MS)
//出口参数: 无
void DelayMS(unsigned int MS)
{   //For 40M STC89C516    : usn=9  us=182
    //For 22.1184 STC11F60 : usn=45 us=182
```

```
    unsigned char us,usn,i;
    while(MS!=0)
    {
        usn = 45;
        while(usn!=0)
        {
            us=182;
            while (us!=0){us--;};
            usn--;
        }
        for(i=0;i<3;i++);
        MS--;
    }
}

//函数功能: 按键延时函数,不按键则延时,按键则立即跳过
//入口参数: 需要延时的?.?秒(Second.MS100)
//出口参数: 无
void DelayKey(unsigned int Second , unsigned int MS100)
{                       //输入精确到 0.1S,是用,
    unsigned int i;
    for(i=0;i<Second*100+MS100*10;i++)
    {
        if(Key==0)
        {
            DelayMS(20);
            while(Key==0) {DelayMS(20);}
            break;
        }
        else DelayMS(10);
    }
}

//函数功能: 复位函数
//入口参数: 无
//出口参数: 无
void LcmRESET( void )
{
    RES = 0;
    DelayMS(80);
    RES = 1;
    DelayMS(5);
}

//函数功能: 底层写命令函数
//入口参数: 命令字 CmdByte
//出口参数: 无
void LcmWrCmd( Uchar CmdByte )
{
    RS = 0;     //0 是指令,1 是数据
    CS = 0;
    RW = 0;     //0 是写,1 是读
    E  = 1;
    _nop_();
    _nop_();
    _nop_();
    LcmDataBus = CmdByte;
    E  = 0;
    _nop_();
    CS = 1;
}
```

```
//函数功能: 底层写数据函数
//入口参数: 数据字 DataByte
//出口参数: 无
void LcmWrDat( Uchar DataByte )
{
    RS = 1;     //0 是指令,1 是数据
    CS = 0;
    RW = 0;     //0 是写,1 是读
    E  = 1;
    _nop_();
    _nop_();
    _nop_();
    LcmDataBus = DataByte;
    E  = 0;
    _nop_();
    CS = 1;
}

//函数功能:液晶屏初始化函数
//入口参数:无
//出口参数:无
void LcmInit( void )
{
    LcmWrCmd(0xE2); //RESET
    DelayMS(10);    //等待 10 毫秒
    LcmWrCmd(0xAE); //Display OFF
    LcmWrCmd(0x38); //Set Mode
    LcmWrCmd(0xB8); //FR=85Hz,BE=10=level 3
    LcmWrCmd(0x48); //Set Duty
    LcmWrCmd(128);  //1/(128+1),+1 是 ICON
    LcmWrCmd(0xA1); //ADC=1,SEG127---SEG0
    LcmWrCmd(0xC8); //SHL=1,COM127---COM0
    LcmWrCmd(0x44); //Set Initial COM0
    LcmWrCmd(0);    //Initial COM0 Register = COM0
    LcmWrCmd(0xAB); //Start Oscillator
    DelayMS(10);    //等待 10 毫秒
    LcmWrCmd(0x27); //Regulator register (1+Rb/Ra)=7.2
    LcmWrCmd(0x81); //Set Electronic Volume
    LcmWrCmd(40);   //Electronic Volume     //客户原来的是 50
    LcmWrCmd(0x57); //Bias=1/12
    LcmWrCmd(0x2C); //VC=1,VR=0,VF=0,wait 90% rising for VOUT
    DelayMS(200);
    LcmWrCmd(0x2E); //VC=1,VR=1,VF=0,wait for > 1ms
    DelayMS(200);
    LcmWrCmd(0x2F); //VC=1,VR=1,VF=1
    DelayMS(10);
    LcmWrCmd(0x40); //Set Initial Display Line.
    LcmWrCmd(0x00); //Initial Display Line=0
    LcmWrCmd(0xAF); //Display ON
}

//函数功能: 用填充数据的方式来清屏
//入口参数: 填充数据 FillData
//出口参数: 无
void LcmClear( FillData )
{
    Uchar i,j;
    for(i=0;i<(LcmYPixel/8);i++)
    {
        LcmWrCmd(0xB0|i);   //Set Page Address
```

```
        LcmWrCmd(0x10);     //Set Column Address = 0
        LcmWrCmd(0x00);     //Colum from 0 -> 127 auto add
        for(j=0;j<LcmXPixel;j++)
        {
            LcmWrDat( FillData );
            LcmWrDat( FillData );
        }
    }
}

//函数功能: 显示一幅图片(黑白模式,无灰度)
void LcmPutBmp( Uchar *puts )
{
    Uchar i,j;
    Uint X=0;
    for(i=0;i<(LcmYPixel/8);i++)        //共 12Page
    {
        LcmWrCmd(0xB0|i);   //Set Page Address
        LcmWrCmd(0x10);     //Set Column Address = 0
        LcmWrCmd(0x00);     //Colum from 0 -> 127 auto add
        for(j=0;j<LcmXPixel;j++)
        {
            LcmWrDat( puts[X] );
            LcmWrDat( puts[X] );
            X++;
        }
    }
}

//显示 ASICC 字符的函数
void LcmPutChar(Uchar col,Uchar page,Uchar Order)
{
    Uchar i;
    Uint x;
    x = (Order-0x20)*0x10;      //ASICC 字符从 0x20 开始,每个 16 byte
    LcmWrCmd(0xB0|page);        //Set Page Address
    LcmWrCmd( (col>>4) | 0x10); //Set Column Address High Byte
    LcmWrCmd( col&0x0F );       //Low Byte  Colum from 0 -> 127 auto add
    for(i=0;i<8;i++)
    {                           //因为字符取模已经倒序
        LcmWrDat( ASCIIchardot[x] );
        LcmWrDat( ASCIIchardot[x] );
        x++;
    }
    page++;                     //下半字符 page+1
    LcmWrCmd(0xB0|page);        //Set Page Address
    LcmWrCmd( (col>>4) | 0x10); //Set Column Address High Byte
    LcmWrCmd( col&0x0F );       //Low Byte  Colum from 0 -> 127 auto add

    for(i=0;i<8;i++)
    {               //因为字符取模已经倒序
        LcmWrDat( ASCIIchardot[x] );
        LcmWrDat( ASCIIchardot[x] );
        x++;
    }
    page--;                     //写完一个字符 page 还原
}

//显示 2 位数的数值
void LcmPutNum(Uchar col,Uchar page,Uchar Num)
{
```

```
    Uchar a,b,c;
    a=Num/100;
    b=(Num%100)/10;
    c=Num%10;
    if(a==0) { } //LcmPutChar(col,page,0x20); //首位为 0 跳过去不写
      else LcmPutChar(col,page,a+0x30);

    if(a==0 && b==0) { } //LcmPutChar(col+8,page,0x20); //首位第二位都为 0 跳过去不写
      else LcmPutChar(col+8,page,b+0x30);

    LcmPutChar(col+16,page,c+0x30);
}

//显示字符串的函数
void LcmPutStr(Uchar col,Uchar page,Uchar *puts)
{
    while(*puts != '\0')         //判断字符串时候显示完毕
    {

        if(col>(LcmXPixel-8))    //判断行末空间是否足够放一个字符,自动换行
        {
            page=page+2;
            col=0;
        }
        if(page>(LcmYPixel/8-2))//到了屏幕最下角,自动返回左上角
        {
            page=0;
            col=0;
        }
        LcmPutChar(col,page,*puts);
        puts++;
        col=col+8;               //下一个字符 8 列之后
    }
}

void main( void )
{
    Uchar i;
    LcmRESET();     //复位
    LcmInit();      //初始化
    LcmClear(0);    //清屏
    while(1)
    {
        LcmPutBmp(bmp1);
        DelayKey(100,0);

        LcmClear(0);
        LcmPutStr(0,0,"SinoCrystal (SHEN ZHEN) Technology Co.,LTD.  TEL:86-755-81452160");
        DelayKey(1,0);
    }
}

/* ASICC 字库代码 8x16 点阵 */
unsigned char code ASCIIchardot[16*96] = {  //倒序/*--  文字:      --*/
/*--  Fixedsys12;  此字体下对应的点阵为：宽 x 高=8x16   --*/
0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,
/*--  文字:  !  --*/
/*--  Fixedsys12;  此字体下对应的点阵为：宽 x 高=8x16   --*/
0x00,0x00,0x70,0xF8,0xF8,0x70,0x00,0x00,0x00,0x00,0x00,0x0D,0x0D,0x00,0x00,0x00,
/*--  文字:  "  --*/
/*--  Fixedsys12;  此字体下对应的点阵为：宽 x 高=8x16   --*/
```

```
0x00,0x38,0x38,0x00,0x00,0x38,0x38,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,
/*--  文字:  #  --*/
/*--  Fixedsys12;  此字体下对应的点阵为：宽 x 高=8x16   --*/
0x00,0x20,0xF8,0xF8,0x20,0xF8,0xF8,0x20,0x00,0x02,0x0F,0x0F,0x02,0x0F,0x0F,0x02,
/*--  文字:  $  --*/
/*--  Fixedsys12;  此字体下对应的点阵为：宽 x 高=8x16   --*/
0x00,0x30,0x78,0xCE,0x8E,0x18,0x10,0x00,0x00,0x04,0x0C,0x38,0x39,0x0F,0x06,0x00,
/*--  文字:  %  --*/
/*--  Fixedsys12;  此字体下对应的点阵为：宽 x 高=8x16   --*/
0x18,0x3C,0x24,0xBC,0xD8,0x60,0x30,0x00,0x00,0x06,0x03,0x0D,0x1E,0x12,0x1E,0x0C,
/*--  文字:  &  --*/
/*--  Fixedsys12;  此字体下对应的点阵为：宽 x 高=8x16   --*/
0x00,0xB0,0xF8,0x48,0x78,0x30,0x00,0x00,0x00,0x07,0x0F,0x08,0x09,0x07,0x0F,0x09,
/*--  文字:  ’  --*/
/*--  Fixedsys12;  此字体下对应的点阵为：宽 x 高=8x16   --*/
0x00,0x00,0x00,0x38,0x38,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,
/*--  文字:  (  --*/
/*--  Fixedsys12;  此字体下对应的点阵为：宽 x 高=8x16   --*/
0x00,0x00,0xC0,0xF0,0x38,0x08,0x00,0x00,0x00,0x00,0x07,0x1F,0x38,0x20,0x00,0x00,
/*--  文字:  )  --*/
/*--  Fixedsys12;  此字体下对应的点阵为：宽 x 高=8x16   --*/
0x00,0x00,0x08,0x38,0xF0,0xC0,0x00,0x00,0x00,0x00,0x20,0x38,0x1F,0x07,0x00,0x00,
/*--  文字:  *  --*/
/*--  Fixedsys12;  此字体下对应的点阵为：宽 x 高=8x16   --*/
0x00,0x80,0xA0,0xE0,0xC0,0xE0,0xA0,0x80,0x00,0x00,0x02,0x03,0x01,0x03,0x02,0x00,
/*--  文字:  +  --*/
/*--  Fixedsys12;  此字体下对应的点阵为：宽 x 高=8x16   --*/
0x00,0x80,0x80,0xE0,0xE0,0x80,0x80,0x00,0x00,0x00,0x00,0x03,0x03,0x00,0x00,0x00,
/*--  文字:  ,  --*/
/*--  Fixedsys12;  此字体下对应的点阵为：宽 x 高=8x16   --*/
0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x2C,0x3C,0x1C,0x00,0x00,
/*--  文字:  -  --*/
/*--  Fixedsys12;  此字体下对应的点阵为：宽 x 高=8x16   --*/
0x00,0x80,0x80,0x80,0x80,0x80,0x80,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,
/*--  文字:  .  --*/
/*--  Fixedsys12;  此字体下对应的点阵为：宽 x 高=8x16   --*/
0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x0C,0x0C,0x0C,0x00,0x00,
/*--  文字:  /  --*/
/*--  Fixedsys12;  此字体下对应的点阵为：宽 x 高=8x16   --*/
0x00,0x00,0x00,0x80,0xE0,0x78,0x18,0x00,0x00,0x18,0x1E,0x07,0x01,0x00,0x00,0x00,
/*--  文字:  0  --*/
/*--  Fixedsys12;  此字体下对应的点阵为：宽 x 高=8x16   --*/
0x00,0x00,0xF0,0xF8,0x08,0x68,0xF8,0xF0,0x00,0x00,0x07,0x0F,0x0B,0x08,0x0F,0x07,
/*--  文字:  1  --*/
/*--  Fixedsys12;  此字体下对应的点阵为：宽 x 高=8x16   --*/
0x00,0x20,0x20,0x30,0xF8,0xF8,0x00,0x00,0x00,0x00,0x00,0x00,0x0F,0x0F,0x00,0x00,
/*--  文字:  2  --*/
/*--  Fixedsys12;  此字体下对应的点阵为：宽 x 高=8x16   --*/
0x00,0x30,0x38,0x08,0x88,0xF8,0x70,0x00,0x00,0x0C,0x0E,0x0B,0x09,0x08,0x08,0x00,
/*--  文字:  3  --*/
/*--  Fixedsys12;  此字体下对应的点阵为：宽 x 高=8x16   --*/
0x00,0x30,0x38,0x88,0x88,0xF8,0x70,0x00,0x00,0x06,0x0E,0x08,0x08,0x0F,0x07,0x00,
/*--  文字:  4  --*/
/*--  Fixedsys12;  此字体下对应的点阵为：宽 x 高=8x16   --*/
0x00,0x00,0xF8,0xF8,0x00,0xE0,0xE0,0x00,0x00,0x03,0x03,0x02,0x02,0x0F,0x0F,0x02,
/*--  文字:  5  --*/
/*--  Fixedsys12;  此字体下对应的点阵为：宽 x 高=8x16   --*/
0x00,0xF8,0xF8,0x88,0x88,0x88,0x08,0x00,0x00,0x08,0x08,0x08,0x0C,0x07,0x03,0x00,
/*--  文字:  6  --*/
/*--  Fixedsys12;  此字体下对应的点阵为：宽 x 高=8x16   --*/
0x00,0xC0,0xE0,0x78,0x58,0xC8,0x80,0x00,0x00,0x07,0x0F,0x08,0x08,0x0F,0x07,0x00,
```

```
/*--  文字:  7  --*/
/*--  Fixedsys12;  此字体下对应的点阵为：宽 x 高=8x16   --*/
0x00,0x08,0x08,0x88,0xE8,0x78,0x18,0x00,0x00,0x00,0x0E,0x0F,0x01,0x00,0x00,0x00,
/*--  文字:  8  --*/
/*--  Fixedsys12;  此字体下对应的点阵为：宽 x 高=8x16   --*/
0x00,0x70,0xF8,0xC8,0x88,0xF8,0x70,0x00,0x00,0x07,0x0F,0x08,0x09,0x0F,0x07,0x00,
/*--  文字:  9  --*/
/*--  Fixedsys12;  此字体下对应的点阵为：宽 x 高=8x16   --*/
0x00,0xF0,0xF8,0x08,0x08,0xF8,0xF0,0x00,0x00,0x00,0x09,0x0D,0x0F,0x03,0x01,0x00,
/*--  文字:  :  --*/
/*--  Fixedsys12;  此字体下对应的点阵为：宽 x 高=8x16   --*/
0x00,0x00,0x00,0x60,0x60,0x60,0x00,0x00,0x00,0x00,0x00,0x0C,0x0C,0x0C,0x00,0x00,
/*--  文字:  ;  --*/
/*--  Fixedsys12;  此字体下对应的点阵为：宽 x 高=8x16   --*/
0x00,0x00,0x00,0x60,0x60,0x60,0x00,0x00,0x00,0x00,0x00,0x2C,0x3C,0x1C,0x00,0x00,
/*--  文字:  <  --*/
/*--  Fixedsys12;  此字体下对应的点阵为：宽 x 高=8x16   --*/
0x00,0x80,0xC0,0x60,0x30,0x18,0x08,0x00,0x00,0x00,0x01,0x03,0x06,0x0C,0x08,0x00,
/*--  文字:  =  --*/
/*--  Fixedsys12;  此字体下对应的点阵为：宽 x 高=8x16   --*/
0x00,0x40,0x40,0x40,0x40,0x40,0x40,0x00,0x00,0x01,0x01,0x01,0x01,0x01,0x01,0x00,
/*--  文字:  >  --*/
/*--  Fixedsys12;  此字体下对应的点阵为：宽 x 高=8x16   --*/
0x00,0x08,0x18,0x30,0x60,0xC0,0x80,0x00,0x00,0x08,0x0C,0x06,0x03,0x01,0x00,0x00,
/*--  文字:  ?  --*/
/*--  Fixedsys12;  此字体下对应的点阵为：宽 x 高=8x16   --*/
0x00,0x30,0x38,0x88,0xC8,0x78,0x30,0x00,0x00,0x00,0x00,0x0D,0x0D,0x00,0x00,0x00,
/*--  文字:  @  --*/
/*--  Fixedsys12;  此字体下对应的点阵为：宽 x 高=8x16   --*/
0xF0,0xF8,0x08,0x88,0xC8,0x48,0xF8,0xF0,0x07,0x0F,0x08,0x09,0x0B,0x0A,0x0B,0x0B,
/*--  文字:  A  --*/
/*--  Fixedsys12;  此字体下对应的点阵为：宽 x 高=8x16   --*/
0x00,0xE0,0xF0,0x18,0x18,0xF0,0xE0,0x00,0x00,0x0F,0x0F,0x01,0x01,0x0F,0x0F,0x00,
/*--  文字:  B  --*/
/*--  Fixedsys12;  此字体下对应的点阵为：宽 x 高=8x16   --*/
0x00,0xF8,0xF8,0x88,0x88,0xF8,0x70,0x00,0x00,0x0F,0x0F,0x08,0x08,0x0F,0x07,0x00,
/*--  文字:  C  --*/
/*--  Fixedsys12;  此字体下对应的点阵为：宽 x 高=8x16   --*/
0x00,0xF0,0xF8,0x08,0x08,0x38,0x30,0x00,0x00,0x07,0x0F,0x08,0x08,0x0E,0x06,0x00,
/*--  文字:  D  --*/
/*--  Fixedsys12;  此字体下对应的点阵为：宽 x 高=8x16   --*/
0x00,0xF8,0xF8,0x08,0x18,0xF0,0xE0,0x00,0x00,0x0F,0x0F,0x08,0x0C,0x07,0x03,0x00,
/*--  文字:  E  --*/
/*--  Fixedsys12;  此字体下对应的点阵为：宽 x 高=8x16   --*/
0x00,0xF8,0xF8,0x88,0x88,0x88,0x08,0x00,0x00,0x0F,0x0F,0x08,0x08,0x08,0x08,0x00,
/*--  文字:  F  --*/
/*--  Fixedsys12;  此字体下对应的点阵为：宽 x 高=8x16   --*/
0x00,0xF8,0xF8,0x88,0x88,0x88,0x08,0x00,0x00,0x0F,0x0F,0x00,0x00,0x00,0x00,0x00,
/*--  文字:  G  --*/
/*--  Fixedsys12;  此字体下对应的点阵为：宽 x 高=8x16   --*/
0x00,0xF0,0xF8,0x08,0x08,0x38,0x30,0x00,0x00,0x07,0x0F,0x08,0x09,0x0F,0x0F,0x00,
/*--  文字:  H  --*/
/*--  Fixedsys12;  此字体下对应的点阵为：宽 x 高=8x16   --*/
0x00,0xF8,0xF8,0x80,0x80,0xF8,0xF8,0x00,0x00,0x0F,0x0F,0x00,0x00,0x0F,0x0F,0x00,
/*--  文字:  I  --*/
/*--  Fixedsys12;  此字体下对应的点阵为：宽 x 高=8x16   --*/
0x00,0x00,0x08,0xF8,0xF8,0x08,0x00,0x00,0x00,0x00,0x08,0x0F,0x0F,0x08,0x00,0x00,
/*--  文字:  J  --*/
/*--  Fixedsys12;  此字体下对应的点阵为：宽 x 高=8x16   --*/
0x00,0x00,0x00,0x00,0x00,0xF8,0xF8,0x00,0x00,0x06,0x0E,0x08,0x08,0x0F,0x07,0x00,
/*--  文字:  K  --*/
```

```
/*--  Fixedsys12;  此字体下对应的点阵为：宽 x 高=8x16   --*/
0x00,0xF8,0xF8,0x80,0xE0,0x78,0x18,0x00,0x00,0x0F,0x0F,0x00,0x03,0x0F,0x0C,0x00,
/*--  文字:  L  --*/
/*--  Fixedsys12;  此字体下对应的点阵为：宽 x 高=8x16   --*/
0x00,0xF8,0xF8,0x00,0x00,0x00,0x00,0x00,0x00,0x0F,0x0F,0x08,0x08,0x08,0x08,0x00,
/*--  文字:  M  --*/
/*--  Fixedsys12;  此字体下对应的点阵为：宽 x 高=8x16   --*/
0x00,0xF8,0xF8,0x20,0xC0,0x20,0xF8,0xF8,0x00,0x0F,0x0F,0x00,0x01,0x00,0x0F,0x0F,
/*--  文字:  N  --*/
/*--  Fixedsys12;  此字体下对应的点阵为：宽 x 高=8x16   --*/
0x00,0xF8,0xF8,0x60,0xC0,0x80,0xF8,0xF8,0x00,0x0F,0x0F,0x00,0x00,0x01,0x0F,0x0F,
/*--  文字:  O  --*/
/*--  Fixedsys12;  此字体下对应的点阵为：宽 x 高=8x16   --*/
0x00,0xF0,0xF8,0x08,0x08,0xF8,0xF0,0x00,0x00,0x07,0x0F,0x08,0x08,0x0F,0x07,0x00,
/*--  文字:  P  --*/
/*--  Fixedsys12;  此字体下对应的点阵为：宽 x 高=8x16   --*/
0x00,0xF8,0xF8,0x88,0x88,0xF8,0x70,0x00,0x00,0x0F,0x0F,0x00,0x00,0x00,0x00,0x00,
/*--  文字:  Q  --*/
/*--  Fixedsys12;  此字体下对应的点阵为：宽 x 高=8x16   --*/
0x00,0xF0,0xF8,0x08,0x08,0xF8,0xF0,0x00,0x00,0x07,0x0F,0x08,0x18,0x3F,0x27,0x00,
/*--  文字:  R  --*/
/*--  Fixedsys12;  此字体下对应的点阵为：宽 x 高=8x16   --*/
0x00,0xF8,0xF8,0x88,0x88,0xF8,0x70,0x00,0x00,0x0F,0x0F,0x00,0x01,0x0F,0x0E,0x00,
/*--  文字:  S  --*/
/*--  Fixedsys12;  此字体下对应的点阵为：宽 x 高=8x16   --*/
0x00,0x30,0x78,0xC8,0x88,0x18,0x10,0x00,0x00,0x04,0x0C,0x08,0x09,0x0F,0x06,0x00,
/*--  文字:  T  --*/
/*--  Fixedsys12;  此字体下对应的点阵为：宽 x 高=8x16   --*/
0x00,0x08,0x08,0xF8,0xF8,0x08,0x08,0x00,0x00,0x00,0x00,0x0F,0x0F,0x00,0x00,0x00,
/*--  文字:  U  --*/
/*--  Fixedsys12;  此字体下对应的点阵为：宽 x 高=8x16   --*/
0x00,0xF8,0xF8,0x00,0x00,0xF8,0xF8,0x00,0x00,0x07,0x0F,0x08,0x08,0x0F,0x07,0x00,
/*--  文字:  V  --*/
/*--  Fixedsys12;  此字体下对应的点阵为：宽 x 高=8x16   --*/
0x00,0xF8,0xF8,0x00,0x00,0xF8,0xF8,0x00,0x00,0x03,0x07,0x0C,0x0C,0x07,0x03,0x00,
/*--  文字:  W  --*/
/*--  Fixedsys12;  此字体下对应的点阵为：宽 x 高=8x16   --*/
0x00,0xF8,0xF8,0x00,0xC0,0x00,0xF8,0xF8,0x00,0x01,0x0F,0x0E,0x01,0x0E,0x0F,0x01,
/*--  文字:  X  --*/
/*--  Fixedsys12;  此字体下对应的点阵为：宽 x 高=8x16   --*/
0x00,0x18,0x38,0xE0,0xC0,0x38,0x18,0x00,0x00,0x0E,0x0F,0x00,0x01,0x0F,0x0E,0x00,
/*--  文字:  Y  --*/
/*--  Fixedsys12;  此字体下对应的点阵为：宽 x 高=8x16   --*/
0x00,0x78,0xF8,0x80,0x80,0xF8,0x78,0x00,0x00,0x00,0x00,0x0F,0x0F,0x00,0x00,0x00,
/*--  文字:  Z  --*/
/*--  Fixedsys12;  此字体下对应的点阵为：宽 x 高=8x16   --*/
0x00,0x08,0x08,0x88,0xC8,0x78,0x38,0x00,0x00,0x0E,0x0F,0x09,0x08,0x08,0x08,0x00,
/*--  文字:  [  --*/
/*--  Fixedsys12;  此字体下对应的点阵为：宽 x 高=8x16   --*/
0x00,0x00,0xF8,0xF8,0x08,0x08,0x00,0x00,0x00,0x00,0x7F,0x7F,0x40,0x40,0x00,0x00,
/*--  文字:  \  --*/
/*--  Fixedsys12;  此字体下对应的点阵为：宽 x 高=8x16   --*/
0x00,0x18,0x78,0xE0,0x80,0x00,0x00,0x00,0x00,0x00,0x00,0x01,0x07,0x1E,0x18,0x00,
/*--  文字:  ]  --*/
/*--  Fixedsys12;  此字体下对应的点阵为：宽 x 高=8x16   --*/
0x00,0x00,0x08,0x08,0xF8,0xF8,0x00,0x00,0x00,0x00,0x40,0x40,0x7F,0x7F,0x00,0x00,
/*--  文字:  ^  --*/
/*--  Fixedsys12;  此字体下对应的点阵为：宽 x 高=8x16   --*/
0x00,0x08,0x0C,0x06,0x06,0x0C,0x08,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,
/*--  文字:  _  --*/
/*--  Fixedsys12;  此字体下对应的点阵为：宽 x 高=8x16   --*/
```

```
0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x40,0x40,0x40,0x40,0x40,0x40,0x40,0x40,
/*-- 文字: ` --*/
/*-- Fixedsys12; 此字体下对应的点阵为：宽 x 高=8x16 --*/
0x00,0x00,0x02,0x06,0x0E,0x08,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,
/*-- 文字: a --*/
/*-- Fixedsys12; 此字体下对应的点阵为：宽 x 高=8x16 --*/
0x00,0x00,0x20,0x20,0x20,0xE0,0xC0,0x00,0x00,0x06,0x0F,0x09,0x09,0x0F,0x0F,0x00,
/*-- 文字: b --*/
/*-- Fixedsys12; 此字体下对应的点阵为：宽 x 高=8x16 --*/
0x00,0xF8,0xF8,0x20,0x20,0xE0,0xC0,0x00,0x00,0x0F,0x0F,0x08,0x08,0x0F,0x07,0x00,
/*-- 文字: c --*/
/*-- Fixedsys12; 此字体下对应的点阵为：宽 x 高=8x16 --*/
0x00,0xC0,0xE0,0x20,0x20,0x60,0x40,0x00,0x00,0x07,0x0F,0x08,0x08,0x0C,0x04,0x00,
/*-- 文字: d --*/
/*-- Fixedsys12; 此字体下对应的点阵为：宽 x 高=8x16 --*/
0x00,0xC0,0xE0,0x20,0x20,0xF8,0xF8,0x00,0x00,0x07,0x0F,0x08,0x08,0x0F,0x0F,0x00,
/*-- 文字: e --*/
/*-- Fixedsys12; 此字体下对应的点阵为：宽 x 高=8x16 --*/
0x00,0xC0,0xE0,0x20,0x20,0xE0,0xC0,0x00,0x00,0x07,0x0F,0x09,0x09,0x09,0x01,0x00,
/*-- 文字: f --*/
/*-- Fixedsys12; 此字体下对应的点阵为：宽 x 高=8x16 --*/
0x00,0x80,0xF0,0xF8,0x88,0x88,0x88,0x00,0x00,0x00,0x0F,0x0F,0x00,0x00,0x00,0x00,
/*-- 文字: g --*/
/*-- Fixedsys12; 此字体下对应的点阵为：宽 x 高=8x16 --*/
0x00,0xC0,0xE0,0x20,0x20,0xE0,0xE0,0x00,0x00,0x47,0x4F,0x48,0x48,0x7F,0x3F,0x00,
/*-- 文字: h --*/
/*-- Fixedsys12; 此字体下对应的点阵为：宽 x 高=8x16 --*/
0x00,0xF8,0xF8,0x20,0x20,0xE0,0xC0,0x00,0x00,0x0F,0x0F,0x00,0x00,0x0F,0x0F,0x00,
/*-- 文字: i --*/
/*-- Fixedsys12; 此字体下对应的点阵为：宽 x 高=8x16 --*/
0x00,0x20,0x20,0xEC,0xEC,0x00,0x00,0x00,0x00,0x08,0x08,0x0F,0x0F,0x08,0x08,0x00,
/*-- 文字: j --*/
/*-- Fixedsys12; 此字体下对应的点阵为：宽 x 高=8x16 --*/
0x00,0x00,0x20,0x20,0xEC,0xEC,0x00,0x00,0x00,0x40,0x40,0x40,0x7F,0x3F,0x00,0x00,
/*-- 文字: k --*/
/*-- Fixedsys12; 此字体下对应的点阵为：宽 x 高=8x16 --*/
0x00,0xF8,0xF8,0x00,0x80,0xE0,0x60,0x00,0x00,0x0F,0x0F,0x01,0x03,0x0E,0x0C,0x00,
/*-- 文字: l --*/
/*-- Fixedsys12; 此字体下对应的点阵为：宽 x 高=8x16 --*/
0x00,0x08,0x08,0xF8,0xF8,0x00,0x00,0x00,0x00,0x08,0x08,0x0F,0x0F,0x08,0x08,0x00,
/*-- 文字: m --*/
/*-- Fixedsys12; 此字体下对应的点阵为：宽 x 高=8x16 --*/
0x00,0xE0,0xE0,0x20,0xE0,0x20,0xE0,0xC0,0x00,0x0F,0x0F,0x00,0x07,0x00,0x0F,0x0F,
/*-- 文字: n --*/
/*-- Fixedsys12; 此字体下对应的点阵为：宽 x 高=8x16 --*/
0x00,0xE0,0xE0,0x20,0x20,0xE0,0xC0,0x00,0x00,0x0F,0x0F,0x00,0x00,0x0F,0x0F,0x00,
/*-- 文字: o --*/
/*-- Fixedsys12; 此字体下对应的点阵为：宽 x 高=8x16 --*/
0x00,0xC0,0xE0,0x20,0x20,0xE0,0xC0,0x00,0x00,0x07,0x0F,0x08,0x08,0x0F,0x07,0x00,
/*-- 文字: p --*/
/*-- Fixedsys12; 此字体下对应的点阵为：宽 x 高=8x16 --*/
0x00,0xE0,0xE0,0x20,0x20,0xE0,0xC0,0x00,0x00,0x7F,0x7F,0x08,0x08,0x0F,0x07,0x00,
/*-- 文字: q --*/
/*-- Fixedsys12; 此字体下对应的点阵为：宽 x 高=8x16 --*/
0x00,0xC0,0xE0,0x20,0x20,0xE0,0xE0,0x00,0x00,0x07,0x0F,0x08,0x08,0x7F,0x7F,0x00,
/*-- 文字: r --*/
/*-- Fixedsys12; 此字体下对应的点阵为：宽 x 高=8x16 --*/
0x00,0xE0,0xE0,0x80,0x40,0x60,0x60,0x00,0x00,0x0F,0x0F,0x00,0x00,0x00,0x00,0x00,
/*-- 文字: s --*/
/*-- Fixedsys12; 此字体下对应的点阵为：宽 x 高=8x16 --*/
0x00,0xC0,0xE0,0x20,0x20,0x20,0x20,0x00,0x00,0x08,0x09,0x09,0x09,0x0F,0x06,0x00,
```

```
/*--  文字:  t  --*/
/*--  Fixedsys12;  此字体下对应的点阵为：宽 x 高=8x16   --*/
0x00,0x20,0xF8,0xF8,0x20,0x20,0x20,0x00,0x00,0x00,0x07,0x0F,0x08,0x08,0x08,0x00,
/*--  文字:  u  --*/
/*--  Fixedsys12;  此字体下对应的点阵为：宽 x 高=8x16   --*/
0x00,0xE0,0xE0,0x00,0x00,0xE0,0xE0,0x00,0x00,0x07,0x0F,0x08,0x08,0x0F,0x0F,0x00,
/*--  文字:  v  --*/
/*--  Fixedsys12;  此字体下对应的点阵为：宽 x 高=8x16   --*/
0x00,0xE0,0xE0,0x00,0x00,0xE0,0xE0,0x00,0x00,0x03,0x07,0x0C,0x0C,0x07,0x03,0x00,
/*--  文字:  w  --*/
/*--  Fixedsys12;  此字体下对应的点阵为：宽 x 高=8x16   --*/
0x00,0xE0,0xE0,0x00,0xC0,0x00,0xE0,0xE0,0x00,0x03,0x0F,0x0C,0x03,0x0C,0x0F,0x03,
/*--  文字:  x  --*/
/*--  Fixedsys12;  此字体下对应的点阵为：宽 x 高=8x16   --*/
0x00,0x60,0xE0,0x80,0x80,0xE0,0x60,0x00,0x00,0x0C,0x0E,0x03,0x03,0x0E,0x0C,0x00,
/*--  文字:  y  --*/
/*--  Fixedsys12;  此字体下对应的点阵为：宽 x 高=8x16   --*/
0x00,0xE0,0xE0,0x00,0x00,0xE0,0xE0,0x00,0x40,0x47,0x4F,0x68,0x38,0x1F,0x07,0x00,
/*--  文字:  z  --*/
/*--  Fixedsys12;  此字体下对应的点阵为：宽 x 高=8x16   --*/
0x00,0x20,0x20,0x20,0xA0,0xE0,0x60,0x00,0x00,0x0C,0x0E,0x0B,0x09,0x08,0x08,0x00,
/*--  文字:  {  --*/
/*--  Fixedsys12;  此字体下对应的点阵为：宽 x 高=8x16   --*/
0x00,0x00,0x80,0xF0,0x78,0x08,0x00,0x00,0x00,0x01,0x03,0x1E,0x3C,0x20,0x00,0x00,
/*--  文字:  |  --*/
/*--  Fixedsys12;  此字体下对应的点阵为：宽 x 高=8x16   --*/
0x00,0x00,0x00,0xF8,0xF8,0x00,0x00,0x00,0x00,0x00,0x00,0x7F,0x7F,0x00,0x00,0x00,
/*--  文字:  }  --*/
/*--  Fixedsys12;  此字体下对应的点阵为：宽 x 高=8x16   --*/
0x00,0x00,0x08,0x78,0xF0,0x80,0x00,0x00,0x00,0x00,0x20,0x3C,0x1E,0x03,0x01,0x00,
/*--  文字:  ~  --*/
/*--  Fixedsys12;  此字体下对应的点阵为：宽 x 高=8x16   --*/
0x30,0x18,0x08,0x18,0x30,0x20,0x30,0x18,0x00,0x00,0x00,0x00,0x00,0x00,0x00,0x00,
/*--  文字:     --*/
/*--  Fixedsys12;  此字体下对应的点阵为：宽 x 高=8x16   --*/
0x00,0xF8,0xF8,0xF8,0xF8,0xF8,0xF8,0x00,0x00,0x0F,0x0F,0x0F,0x0F,0x0F,0x0F,0x00,
};

Uchar code bmp1[]={ //倒序
/*--  宽度 x 高度=128x128  --*/
0xFF,0x01,0x01,0x01,0x01,0x01,0x01,0x01,0x01,0x01,0x01,0x01,0x01,0x81,0x81,0xC1,
0xC1,0xE1,0xE1,0xE1,0xE1,0xF1,0xF1,0xF1,0xF1,0x71,0x71,0x79,0x79,0xF9,0xF9,0xF9,
0xF9,0xF9,0xF9,0xF9,0xF9,0xF9,0xF9,0xF9,0xF9,0xF1,0xF1,0xF1,0xF1,0xF1,0xF1,0xF1,
0xE1,0xE1,0xE1,0xE1,0xE1,0xC1,0xC1,0xC1,0xC1,0x81,0x81,0x81,0x01,0x01,0x01,0x01,
0x01,0x01,0x01,0x01,0x01,0x01,0x01,0x01,0x01,0x01,0x01,0x01,0x01,0x01,0x01,0x01,
0x01,0x01,0x01,0x01,0x01,0x01,0x01,0x01,0x01,0x01,0x01,0x01,0x01,0x01,0x01,0x01,
0x01,0x01,0x01,0x01,0x01,0x01,0x01,0x01,0x01,0x01,0x01,0x01,0x01,0x01,0x01,0x01,
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0x84, 0x80, 0x87, 0x80, 0x80, 0x81, 0x82, 0x87, 0x80, 0x90, 0x88, 0x87, 0x80, 0x80, 0x80, 0xFF,
};
```

14. USING LCD MODULES

14-1. Liquid Crystal Display Modules

LCD is composed of glass and polarizer. Pay attention to the following items when handling.

(1) Please keep the temperature within specified range for use and storage. Polarization degradation, bubble generation or polarizer peel-off may occur with high temperature and high humidity.

(2) Do not touch, push or rub the exposed polarizers with anything harder than an HB pencil lead (glass, tweezers, etc.).

(3) N-hexane is recommended for cleaning the adhesives used to attach front/rear polarizers and reflectors made of organic substances which will be damaged by chemicals such as acetone, toluene, ethanol and isopropylalcohol.

(4) When the display surface becomes dusty, wipe gently with absorbent cotton or other soft material like chamois soaked in petroleum benzin. Do not scrub hard to avoid damaging the display surface.

(5) Wipe off saliva or water drops immediately, contact with water over a long period of time may cause deformation or color fading.

(6) Avoid contacting oil and fats.

(7) Condensation on the surface and contact with terminals due to cold will damage, stain or dirty the polarizers. After products are tested at low temperature they must be warmed up in a container before coming is contacting with room temperature air.

(8) Do not put or attach anything on the display area to avoid leaving marks on.

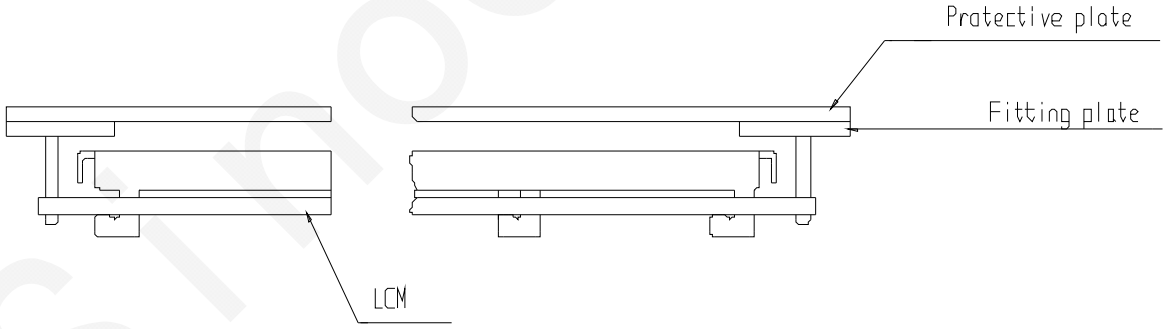
(9) Do not touch the display with bare hands. This will stain the display area and degradate insulation between terminals (some cosmetics are determinated to the polarizers).

(10) As glass is fragile. It tends to become or chipped during handling especially on the edges. Please avoid dropping or jarring.

14-2.Installing LCD Modules

The hole in the printed circuit board is used to fix LCM as shown in the picture below. Attend to the following items when installing the LCM.

(1) Cover the surface with a transparent protective plate to protect the polarizer and LC cell.



(2) When assembling the LCM into other equipment, the spacer to the bit between the LCM and the fitting plate should have enough height to avoid causing stress to the module surface, refer to the individual specifications for measurements. The measurement tolerance should be ±0.1mm.

14-3. Precaution for Handing LCD Modules

Since LCM has been assembled and adjusted with a high degree of precision, avoid applying excessive shocks to the module or making any alterations or modifications to it.

(1) Do not alter, modify or change the shape of the tab on the metal frame.

(2) Do not make extra holes on the printed circuit board, modify its shape or change the positions of components to be attached.

(3) Do not damage or modify the pattern writing on the printed circuit board.

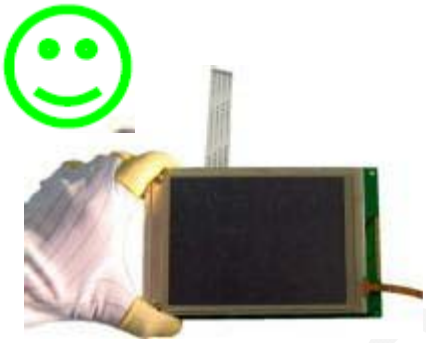
(4) Absolutely do not modify the zebra rubber strip (conductive rubber) or heat seal connector.

(5) Except for soldering the interface, do not make any alterations or modifications with a soldering iron.

(6) Do not drop, bend or twist LCM.

LCM is easy to be damaged. Please note below and be careful for handling.

Correct handling:



As above picture, please handle with anti-static gloves around LCM edges.

Incorrect handling:

Please don’t touch IC directly.

Please don’t stack LCM.

Please don’t hold the surface of panel.

Please don’t stretch interface of output, such as FPC cable.

Please don’t hold the surface of IC.

Please don’t operate with sharp stick such as pens。

14-4.Electro-Static Discharge Control

Since this module uses a CMOS LSI, the same careful attention should be paid to electrostatic discharge as for an ordinary CMOS IC.

(1) Make certain that you are grounded when handing LCM.

(2) Before remove LCM from its packing case or incorporating it into a set, be sure the module and your body have the same electric potential.

(3) When soldering the terminal of LCM, make certain the AC power source for the soldering iron does not leak.

(4) When using an electric screwdriver to attach LCM, the screwdriver should be of ground potentiality to minimize as much as possible any transmission of electromagnetic waves produced sparks coming from the commutator of the motor.

(5) As far as possible make the electric potential of your work clothes and that of the work bench the ground potential.

(6) To reduce the generation of static electricity be careful that the air in the work is not too dried. A relative humidity of 50%-60% is recommended.

14-5. Precaution for soldering to the LCM

(1) Observe the following when soldering lead wire, connector cable and etc. to the LCM.

- Soldering iron temperature : 280°C ± 10°C.
- Soldering time : 3-4 sec.
- Solder : eutectic solder.

If soldering flux is used, be sure to remove any remaining flux after finishing to soldering operation. (This does not apply in the case of a non-halogen type of flux.) It is recommended that you protect the LCD surface with a cover during soldering to prevent any damage dur to flux spatters.

(2) When soldering the electroluminescent panel and PC board, the panel and board should not be detached more than three times. This maximum number is determined by the temperature and time conditions mentioned above, though there may be some variance depending on the temperature of the soldering iron.

(3) When remove the electoluminescent panel from the PC board, be sure the solder has completely melted, the soldered pad on the PC board could be damaged.

14-6.Precautions for Operation

(1) Viewing angle varies with the change of liquid crystal driving voltage (VO). Adjust VO to show the best contrast.

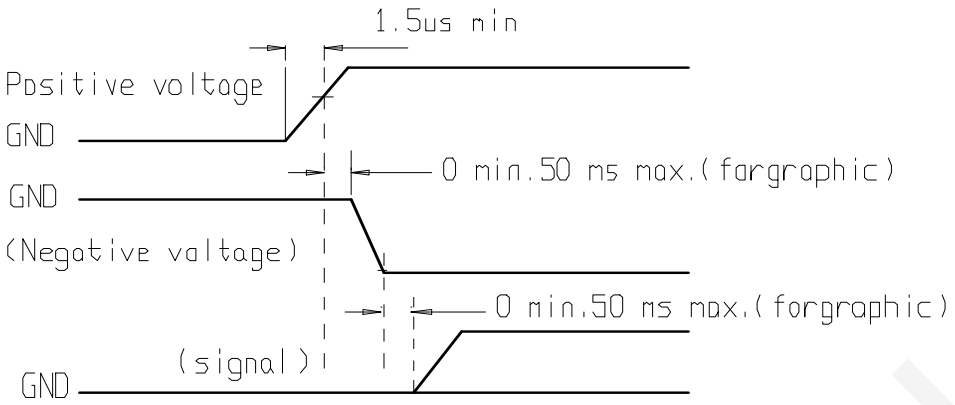
(2) Driving the LCD in the voltage above the limit shortens its life.

(3) Response time is greatly delayed at temperature below the operating temperature range. However, this does not mean the LCD will be out of the order. It will recover when it returns to the specified temperature range.

(4) If the display area is pushed hard during operation, the display will become abnormal. However, it will return to normal if it is turned off and then back on.

(5) Condensation on terminals can cause an electrochemical reaction disrupting the terminal circuit. Therefore, it must be used under the relative condition of 40°C , 50% RH.

(6) When turning the power on, input each signal after the positive/negative voltage becomes stable.



14-7. Storage

When storing LCDs as spares for some years, the following precaution are necessary.

(1) Store them in a sealed polyethylene bag. If properly sealed, there is no need for dessicant.

(2) Store them in a dark place. Do not expose to sunlight or fluorescent light, keep the temperature between 0°C and 35°C.

(3) The polarizer surface should not come in contact with any other objects. (We advise you to store them in the container in which they were shipped.)

(4) Environmental conditions :

- Do not leave them for more than 168hrs. at 60°C.
- Should not be left for more than 48hrs. at -20°C.

14-8. Safety

(1) It is recommended to crush damaged or unnecessary LCDs into pieces and wash them off with solvents such as acetone and ethanol, which should later be burned.

(2) If any liquid leakes out of a damaged glass cell and comes in contact with the hands, wash off thoroughly with soap and water.

14-9.Return LCM under warranty

No warranty can be granted if the precautions stated above have been disregarded. The typical examples of violations are :

- Broken LCD glass.
- PCB eyelet's damaged or modified.
- PCB conductors damaged.
- Circuit modified in any way, including addition of components.
- PCB tampered with by grinding, engraving or painting varnish.
- soldering to or modifying the bezel in any manner.

Module repairs will be invoiced to the customer upon mutual agreement. Modules must be returned with sufficient description of the failures or defects. Any connectors or cable installed by the customer must be removed completely without damaging the PCB eyelet's, conductors and terminals.