Sino Sources Holding

Hunan Huayuan display technology CO.,LTD

GH12864-2701

STN DOTS LCD MODULE

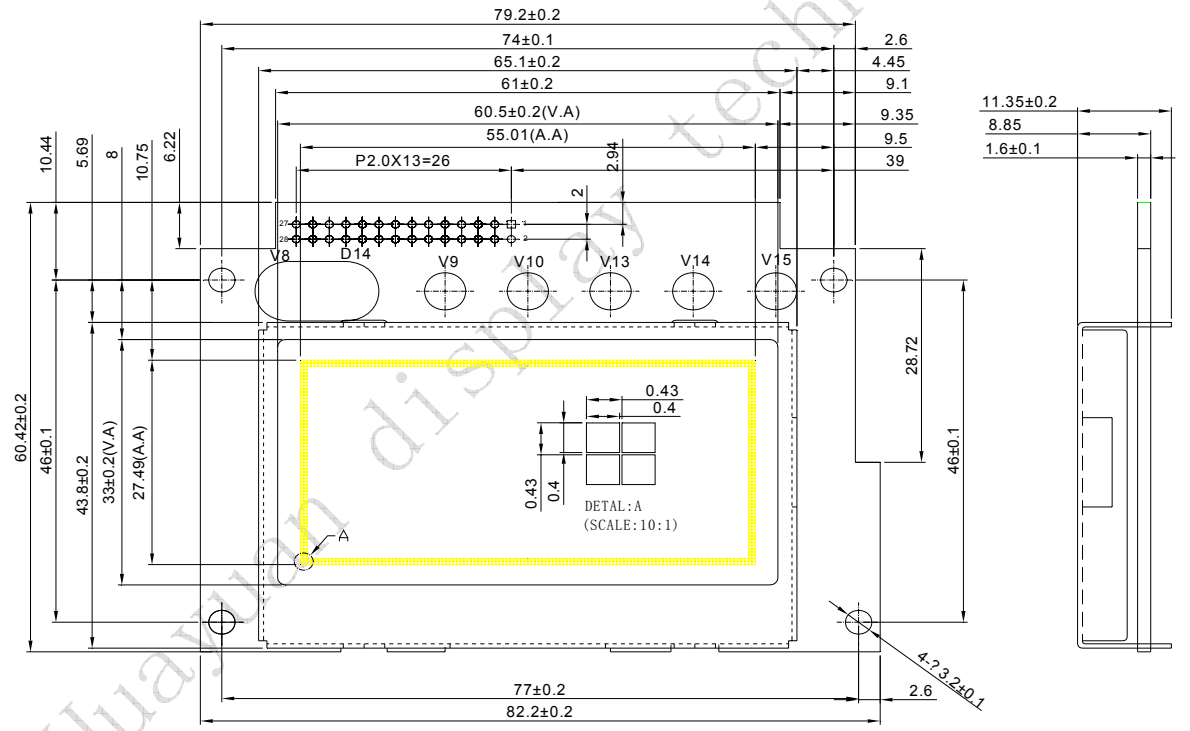
SPECIFICATION

Standard code	Department	Rev No.
LYA11003B	R&D	A/0
Checked by	**Written by**	**Date**
		2014-02

1、 GENERAL SPECIFICATIONS

Screen size	2.7”(Diagonal)
Display color	Display color：Black Background color：Y/G
Type	STN
View angle direction	6’clock
Driver mode	1/64 DUTY 1/9BIAS
Backlight	LED Y/G
Driver IC	ST7565R or compatible IC
Number of Dots	128 x 64
Dot size	0.4 x 0.4mm
Dot pitch	0.43 x 0.43mm
Viewing size	60.5 x 33.0mm
Active area	55.01x 27.49mm
Outline dimension	82.20 x 60.42x 11.35mm Max.

2、 EXTERNAL DIMENSIONS



3、 ELECTRICAL CHARACTERISTICS

Parameter	Symbol		Min	Type	Max	Unit
Supply voltage for logic	V_{DD}–V_{SS}		3.2	3.3	3.4	V
Supply Voltage for LCD Driving	V_{ss}–V_0	Ta=0 °C	-	-	-	
		Ta=25 °C	-	-9.0	-	
		Ta=50 °C	-	-	-	
Input Voltage	V_{IH}		$0.8V_{DD}$	-	V_{DD}	
	V_{IL}		0	-	$0.2V_{DD}$	
Supply current	I_{DD}	Backlight	-	7	15	mA
		Backlight off	-	46	65	mA
Supply Voltage for LED	V_{LED}		-	3.3	3.5	V
Supply Current for LED	I_{LED}		-	40	50	mA

4、 ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Min	Max	Unit	Remark
Supply voltage for logic	V_{DD}–V_{SS}	-0.3	5.0	V	
Supply Voltage for LCD Driving	V_{LCD}–V_{ss}	-0.3	-10		
Operating temperature	T_{OP}	-20	+70	°C	
Storage temperature	T_{ST}	-30	+80		
Humidity	RH:	90%	50		Max

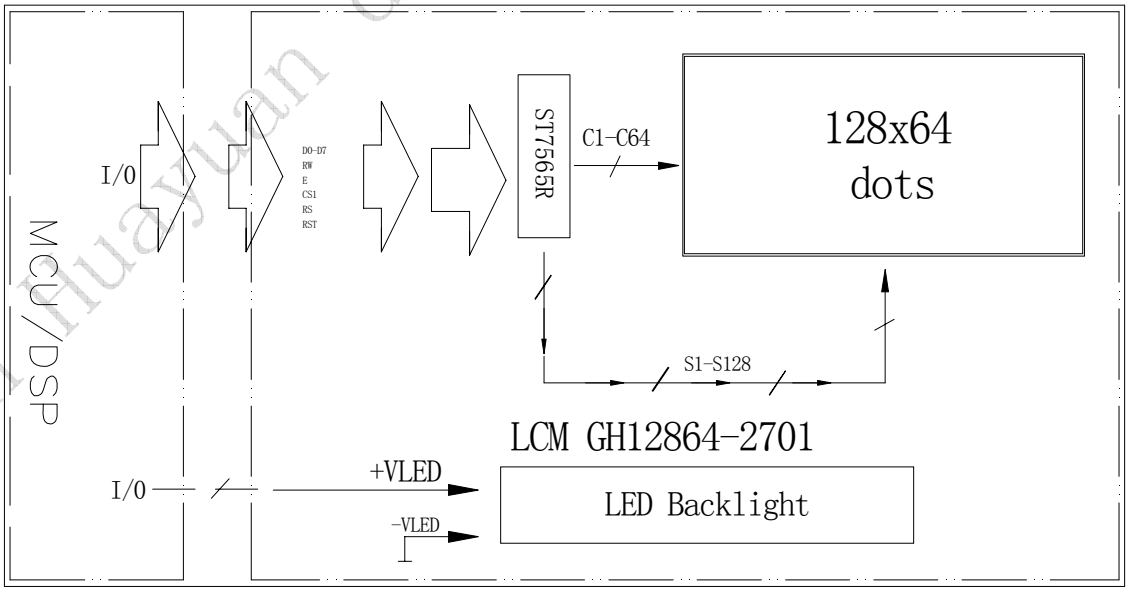
5、 OPTICAL CHARACTERISTICS

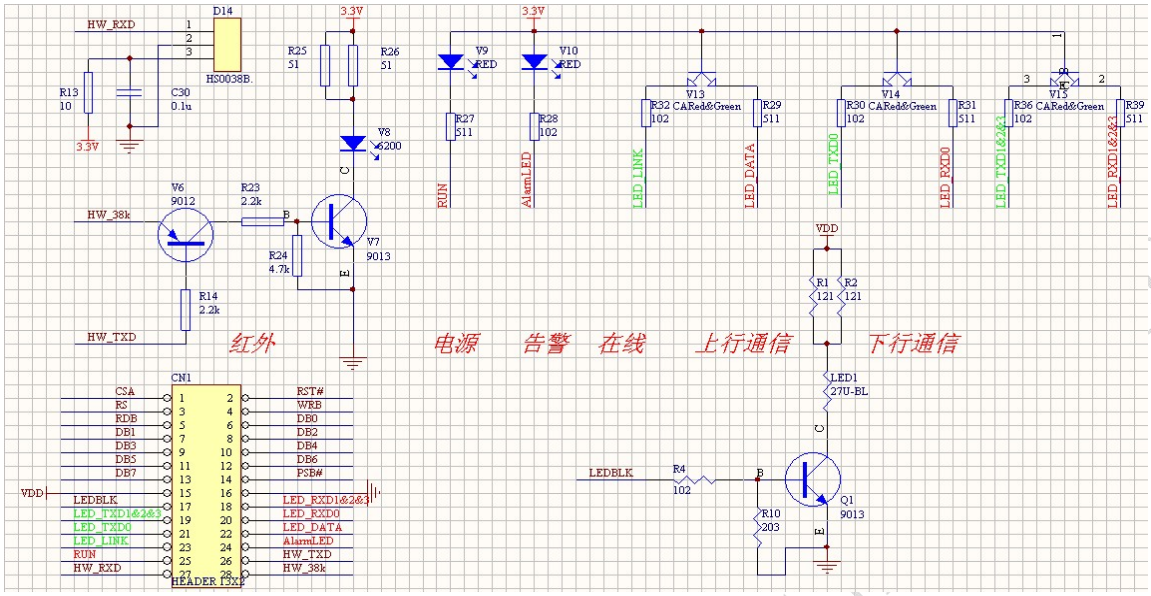
Item	Symbol	Condition	Typ.	Unit	Remark
Viewing angle	Øf	C_R≥2	40	Radian	Øf
	Øb		30		Øb
	Øl		30		Øl
	Ør		30		Ør
Response time	T_R	TA=25 °C	120	ms	
	T_F		130		
Frame Frequency	F_{RM}		64	Hz	
Contrast ratio	C_R		6.0	-	

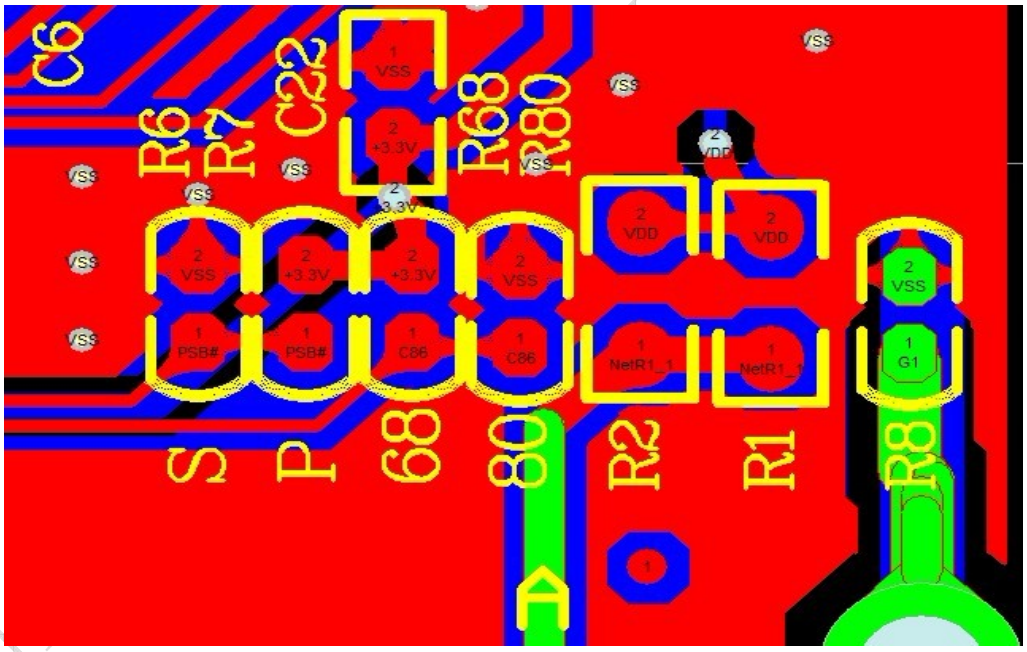
6、 INTERFACE DESCRIPTION

PIN	DESC	Function	PIN	DESC	Function
1	CS1	Chip Select	18	LED_RXD2&3	
2	RESET	Reset signal	19	LED_TXD1&2&3	
3	A0	Command/Data Select	20	LED_RXD1	
4	WR	Read/Write Control Signal。R/W=1,Read。R/W=0,Write 。（R/W：Serial ports）	21	LED_TXD0	
5	RD	Read and write enable	22	LED_DATA	
6-11	D0-D5	Data Bus	23	LED_LINK	
12	D6	Data Bus 。(SCL：Serial ports)	24	AlarmLED	
13	D7	Data Bus 。(SI：Serial ports)	25	RUN	
14	PSB	H: Parallel data input. L：Serial data input.	26	HW_TXD	
15	VDD	Power supply for Logic circuit and LCD	27	HW_RXD	
16	VSS	Ground	28	HW_38k	
17	LEDBLK	Backlight control 1：Open 0：Close			

7、 BLOCK DIAGRAM







Note: Please refer to the physical

Short circuit S product works for serial position;

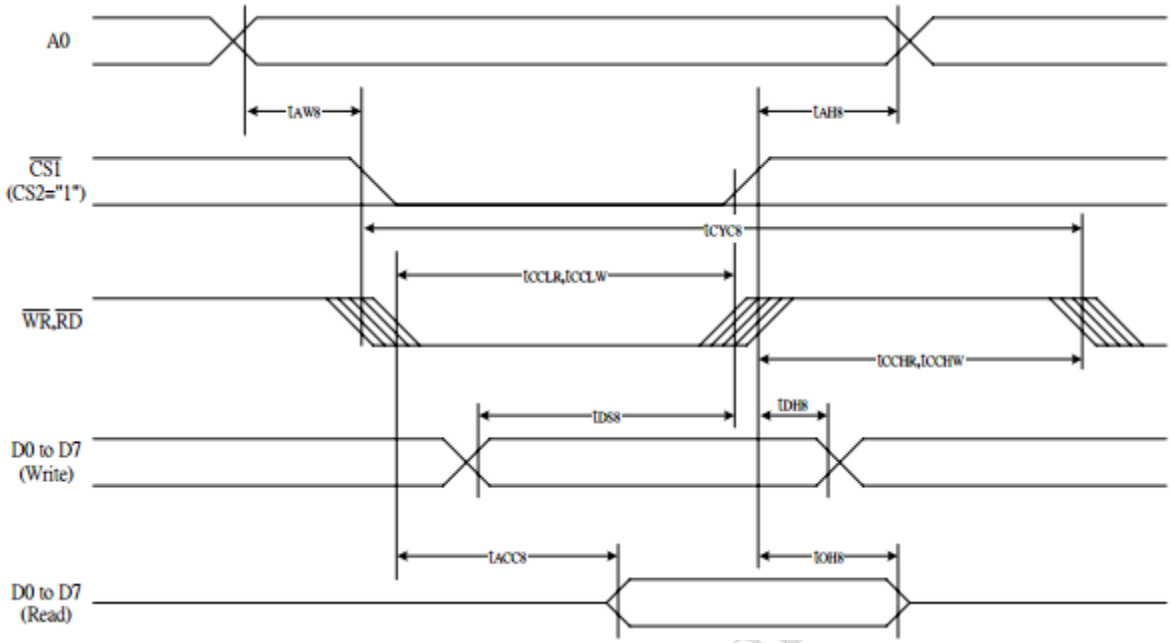
Short circuit P position products for parallel work;

8、 INSTRUCTION

Command	Command Code											Function
	A0	$\overline{RD}$	$\overline{WR}$	D7	D6	D5	D4	D3	D2	D1	D0	
(1) Display ON/OFF	0	1	0	1	0	1	0	1	1	1	0 1	LCD display ON/OFF 0: OFF, 1: ON
(2) Display start line set	0	1	0	0	1	Display start address						Sets the display RAM display start line address
(3) Page address set	0	1	0	1	0	1	1	Page address				Sets the display RAM page address
(4) Column address set upper bit Column address set lower bit	0 0	1 1	0 0	0 0	0 0	0 0	1 0	Most significant column address Least significant column address				Sets the most significant 4 bits of the display RAM column address. Sets the least significant 4 bits of the display RAM column address.
(5) Status read	0	0	1	Status				0	0	0	0	Reads the status data
(6) Display data write	1	1	0	Write data								Writes to the display RAM
(7) Display data read	1	0	1	Read data								Reads from the display RAM
(8) ADC select	0	1	0	1	0	1	0	0	0	0	0 1	Sets the display RAM address SEG output correspondence 0: normal, 1: reverse
(9) Display normal/ reverse	0	1	0	1	0	1	0	0	1	1	0 1	Sets the LCD display normal/ reverse 0: normal, 1: reverse
(10) Display all points ON/OFF	0	1	0	1	0	1	0	0	1	0	0 1	Display all points 0: normal display 1: all points ON
(11) LCD bias set	0	1	0	1	0	1	0	0	0	1	0 1	Sets the LCD drive voltage bias ratio 0: 1/9 bias, 1: 1/7 bias (ST7565S)
(12) Read/modify/write	0	1	0	1	1	1	0	0	0	0	0	Column address increment At write: +1 At read: 0
(13) End	0	1	0	1	1	1	0	1	1	1	0	Clear read/modify/write
(14) Reset	0	1	0	1	1	1	0	0	0	1	0	Internal reset
(15) Common output mode select	0	1	0	1	1	0	0	0 1	*	*	*	Select COM output scan direction 0: normal direction 1: reverse direction
(16) Power control set	0	1	0	0	0	1	0	1	Operating mode			Select internal power supply operating mode
(17) V_5 voltage regulator internal resistor ratio set	0	1	0	0	0	1	0	0	Resistor ratio			Select internal resistor ratio(Rb/Ra) mode
(18) Electronic volume mode set Electronic volume register set	0	1	0	1 0	0 0	0 Electronic volume value	0	0	0	0	1	Set the V_5 output voltage electronic volume register
(19) Static indicator ON/OFF Static indicator register set	0	1	0	1 0	0 0	1 0	0 0	1 0	1 0	0 0	0 1 Mode	0: OFF, 1: ON Set the flashing mode
(20) Booster ratio set	0	1	0	1 0	1 0	1 0	1 0	1 0	0 0	0 step-up value	0	select booster ratio 00: 2x, 3x, 4x 01: 5x 11: 6x
(21) Power saver												Display OFF and display all points ON compound command
(22) NOP	0	1	0	1	1	1	0	0	0	1	1	Command for non-operation

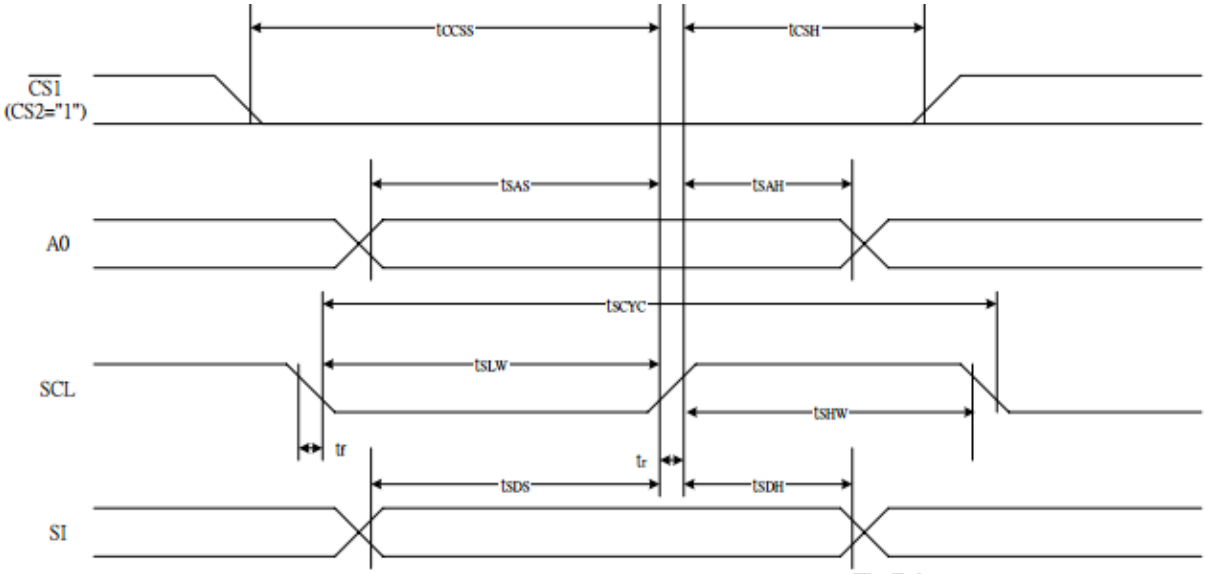
9、 TIMING DIAGRAMS

Parallel Interface



Item	Signal	Symbol	Condition	Rating		Units
				Min.	Max.	
Address hold time	A0	t_{AH8}		0	—	Ns
Address setup time		t_{AW8}		0	—	
System cycle time		t_{CYC8}		240	—	
Enable L pulse width (WRITE)	WR	t_{CCLW}		80	—	
Enable H pulse width (WRITE)		t_{CCHW}		80	—	
Enable L pulse width (READ)	RD	t_{CCLR}		140	—	
Enable H pulse width (READ)		t_{CCHR}		80		
WRITE Data setup time	D0 to D7	t_{DS8}		40	—	
WRITE Address hold time		t_{DH8}		0	—	
READ access time		t_{ACC8}	C_L = 100 pF	—	70	
READ Output disable time		t_{OH8}	C_L = 100 pF	5	50	

SPI Interface



Item	Signal	Symbol	Condition	Rating		Units
				Min.	Max.	
Serial Clock Period	SCL	T_{scyc}		50	—	ns
SCL "H" pulse width		T_{shw}		25	—	
SCL "L" pulse width		T_{SLW}		25	—	
Address setup time	A0	T_{SAS}		20	—	
Address hold time		T_{sah}		10	—	
Data setup time	SI	T_{sds}		20	—	
Data hold time		T_{SDH}		10	—	
CS-SCL time	CS	T_{css}		20	—	
CS-SCL time		T_{csh}		40	—	

10、 RELIABILITY TEST

NO	Test Project	Test Condition	Remark
1	High temperature	60℃±2℃ 24H	After testing, the appearance and electrical performance deficiencies should not happen.
2	Low temperature	-20℃±2℃ 24H	
3	High temperature and humidity test	40℃±5℃×90%RH/24H	
4	Hot and cool shock test	-10℃±2→ 25℃→ 70℃±2 (30min) (5min) (30min) 10 cycles	
5	Vibration test	10Hz-50Hz-10Hz Amplitude 1.5mm X、Y、Z each 3H	

Remark：

1.Above test number is 2 piece.

2.Do moistureproof test, should use the pure water (10M Ω resistor ").

3.individual products caused by electrostatic discharge failure damage, if the products will be reset after the restore to the normal state as a good use.

When the panel protective film LCM, Tear down the labels slowly (more than a second recommendation).

4 Please use the automatic switching menu (or scroll) test mode, test mode of operation.

5 Suggestions Use the menu to adjust the contrast model.

11、 LIQUID CRYSTAL MODULE USE MATTERS NEEDING ATTENTION

1. When using the liquid crystal module you design your product, pay attention to the liquid crystal perspective and uses your consistent.
2. The LCD screen is the glass based, dropping or with a hard object impact will cause cracking or crushing the LCD screen. Especially in the corner.
3. In spite of the polarizer, liquid crystal surface can inhibit the reflective surface, should be careful not to scratch the surface, generally recommend using the protective screen of transparent plastic material in the liquid crystal surface.
4. If the LCD module storage in the following below the required temperature, liquid crystal material condenses and performance deterioration. If the LCD module storage above the specified temperature, molecular crystal orientation will be transformed into liquid, may not be restored to the original state. Beyond the temperature and humidity range, will cause the polarizer peeling or foaming. Therefore, the LCD module should be stored at the specified temperature range.
5. Such as liquid crystal surface in slobber or drop, should immediately erase, avoid long time after induced color changes or leave a stain. The water vapor will cause erosion of ITO electrode
6. If you need to clean the surface of the LCD screen, should use cotton or soft cloth lightly wipe, is still not clear, smooth and then wipe.
7. LCD module driver shall comply with the provisions of the rating index, and avoid the fault and permanent damage. DC voltage applied to the liquid crystal materials, liquid crystal materials will cause rapid deterioration, should ensure the continuous application of M signal to provide AC waveform. Especially, when a power switch shall comply with the order of power supply, avoid driving latch and DC added directly to the LCD screen.
8. Machine Matters needing attention

a) The LCD module is arranged on the high precision of the debugging. To avoid the impact of external force, do not modify or change
b) Do not tamper with Any prominent part of the metal frame
c) Don't punch a hole in PCB or change in shape, do not move or modify elements.
d) Don't touch the conductive rubber, especially in the insert backlight board. (such as EL backlight).
e) In the installation of the LCD module, ensure that the PCB was not affected by the twisting or bending force force. Conductive rubber contact is very precise, dislocation slightly in the original basis will lead to the missing pixels.
f) To avoid pressure on the metal clamping part, otherwise it will lead to the conductive rubber deformation and lost contact, causing the missing pixels.

9. Static electricity：Because the liquid crystal module internal assembly CMOS circuit, must take the following measures to prevent electrostatic

a) The operator

1. Wear anti-static clothing, otherwise the body will produce static electricity.
2. Any part of the body of the time should not be exposed conductive parts and modules, such as: integrated circuit pin, copper wire PCB, terminal interface part.

b) Equipment

1. The detachment or friction may cause the equipment to generate static electricity, such as personnel, iron, table etc.

2. the equipment connected to the appropriate resistance (1x108 ohm).
3. Just only Reasonable grounding soldering iron can use
4. If the use of electric screwdriver, electric batch should be well grounded and adapter (brush) isolation
5. normally Should be observed overalls, anti static measurement work benches, for work bench, recommend the use of conductive rubber pad

c) Floor

1. The floor is the electrostatic equipment and personnel are an important part of the release. May be due to electrostatic floor insulation cannot release. Set the floor to ground (1x108 Ohm)

d) Humidity

1. Probability of proper humidity can reduce static electricity. General relative humidity should be maintained at more than 50%.

e) Transportation and storage

1. Because people and packaging materials may be separated or friction caused by static electricity, packaging materials need antistatic treatment. Module should be stored in anti-static bag or other ESD container.

f) Welding

1. Welding of I/O terminal only. Use only the reasonable grounding and no leakage of iron. Low temperature tin wire filled with solder paste.
2. If the use of flux, should cover the liquid crystal surface, prevent solder spatter. After the removal of flux residues.
3. The welding temperature: 280 ° C+10 ° C
4. Welding time: 3-4 seconds.

g) Other: with the protective film attached to the surface of the liquid crystal screen and to prevent scratches on the surface or pollution, in stripping the protective film, should use the static eliminator. Static eliminator should also be installed in the table, from static to prevent

10. operating

1). The drive voltage should be controlled within a specified range, beyond the range will shorten the service life of the liquid crystal

2). Liquid crystal response time will increase with the decrease of temperature

3). When the temperature is higher than the operating temperature range, the liquid crystal display will turn black or dark blue, which may lead to "break" column. No matter what, do not squeeze the display area

4) Mechanical disturbance during operation (such as in the display region extrusion) may lead to "break" column

11. If the outflow of liquid glass layer damaged, wash thoroughly with soap and water come into contact with the body, although very low toxicity, still need to remind the attention

12. Dismantling the LCD module can cause permanent damage, should be strictly prohibited

13. Liquid crystal with image retention afterglow, in order to avoid image afterglow don't long time display fixed pattern. Image persistence is not liquid crystal deterioration, when the display pattern changes will automatically eliminate

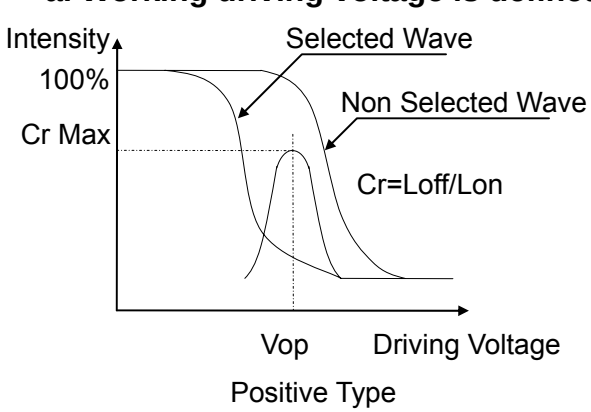
14. Do not use a volatile epoxy resin and silicone adhesives, to prevent the resulting Polaroid color

15. To avoid the liquid crystal module long time exposure to sunlight or ultraviolet irradiation

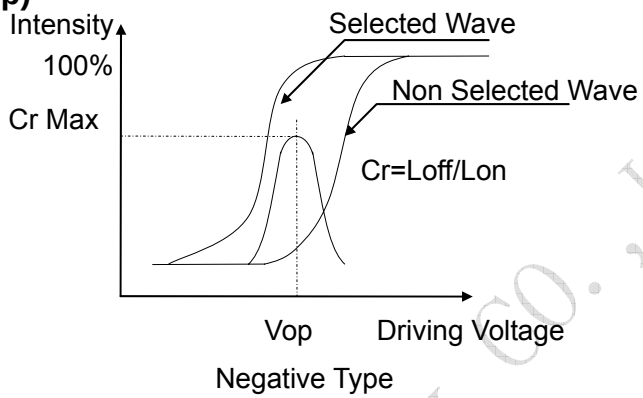
16. Brightness of the LCD module may be due to the coupling of shunt CCFL lead to the metal shell of the

affected. Inverter design should take full account of this part of the leakage. It is necessary to fully assess the LCD module and the inverter is installed in the host apparatus, ensure the requirement of brightness

a. Working driving voltage is defined (Vop)

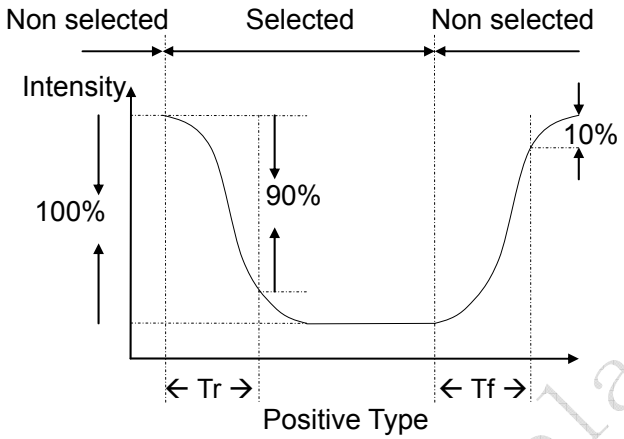


Positive Type

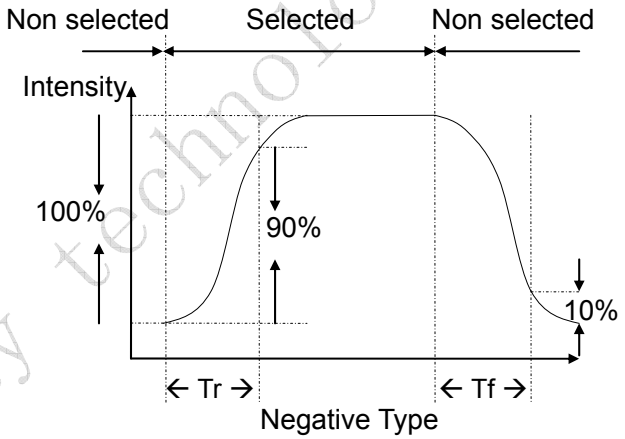


Negative Type

b. The liquid crystal response time is defined (Tr, Tf)



Positive Type



Negative Type

Conditions:

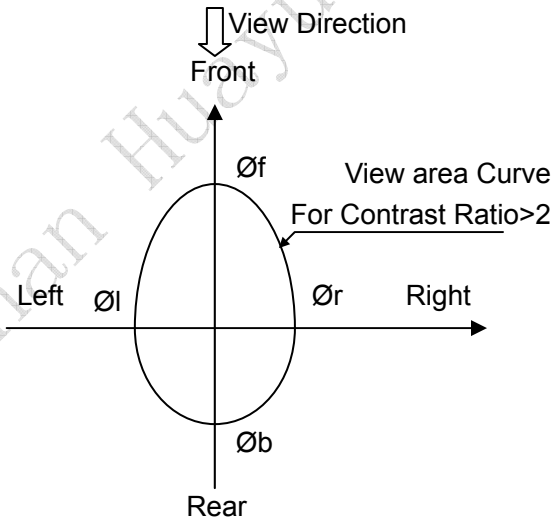
Operating Voltage : Vop

Frame Frequency : 64 Hz

Viewing Angle: 0°

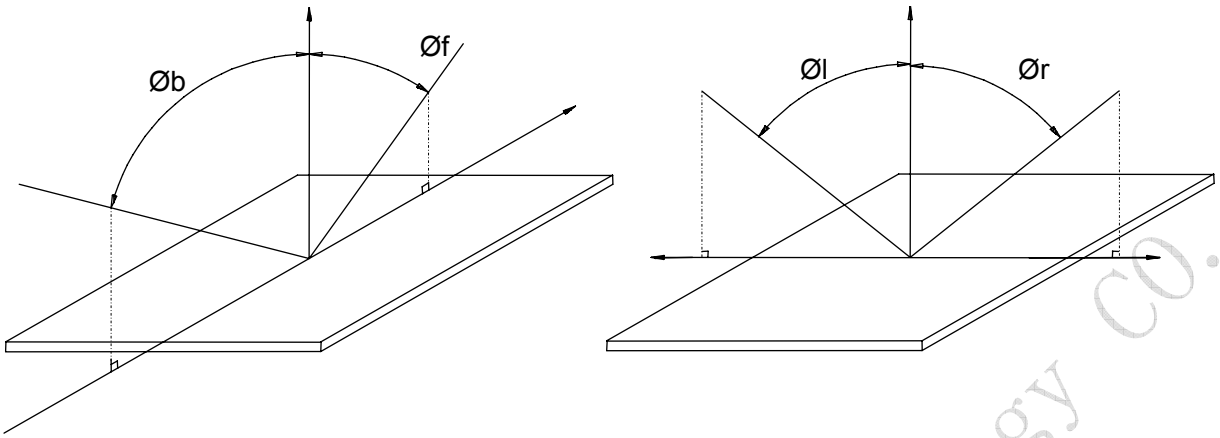
Driving Wave form : 1/N duty, 1/a bias

c. Definition Viewing Angle

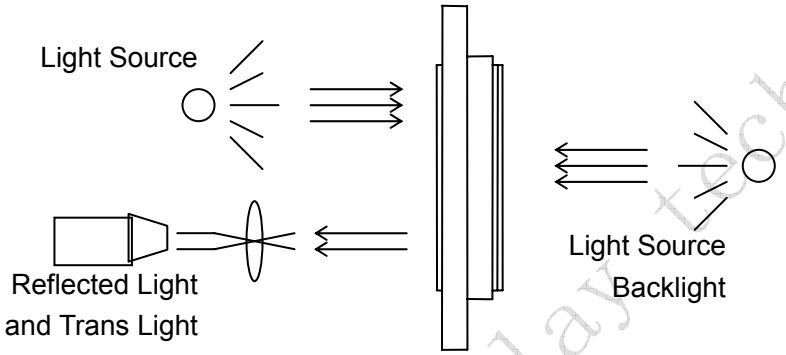


Item	Symbol	Condition	Type	Unit
View Angle Range	Øf	Contrast>2	40	Degree
	Øb		30	
	Øl		30	
	Ør		30	

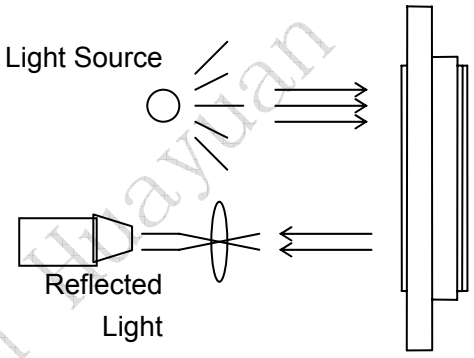
d. Perspective Definition



e. Measurement Method Described



TransFlective Type



ReFlective Type

12、 REFERENCE PROGRAM

```
void init()
{
    E=0;
    CS=0;
    write_cmd(LCD_RESET);
    write_cmd(LCD_SELECT_INVERSE_ORIENTATION);
    write_cmd(LCD_SHL_NORMAL);
    write_cmd(LCD_BIAS_0);
    write_cmd(LCD_VOLTAGE_FOLLOWER_ON);
    write_cmd(LCD_RESISTOR_SELECT6);
    write_cmd(LCD_VOLTAGE_REFERENCE_SELECT);
    write_cmd(10);
    write_cmd(LCD_ON);
}
void clear(uchar dat)
{
    unsigned char i=0,j=0;
    for(i=0;i<8;i++)
    {
        write_cmd(LCD_SET_PAGE0+i);
        write_cmd(0x10);
        write_cmd(0x04);
        for(j=0;j<128;j++)
        {
            write_dat(dat);
        }
    }
}
void lcd_mode0(unsigned char *image)
{
    unsigned char i=0,j=0;
    for(i=0;i<8;i++)
    {
            write_cmd(0xb0+i);
            write_cmd(0x10);
        write_cmd(0x04);
            for(j=0;j<128;j++)
            {
                write_dat(*(image++));
            }
    }
```

```
}
void lcd_mode1(unsigned char *image)
{
    static unsigned char flagpage=0;
    unsigned char i=0;
    image=image+flagpage*128;
    write_cmd(0xb0+flagpage);
    write_cmd(0x10);
    write_cmd(0x04);
    for(i=0;i<128;i++)
    {
        write_dat(*(image++));
    }
    flagpage++;
    if(flagpage>7)
    {
        flagpage=0;
    }
}
void lcd_mode3(unsigned char *image)
{
    static unsigned char flagaddress=0;
    unsigned char i=0,j=0;
    unsigned char *imagetemp;
    imagetemp=image;
    for(i=0;i<8;i++)
    {
    image=imagetemp+128*i+127-flagaddress;
            write_cmd(0xb0+i);
            write_cmd(0x10);
        write_cmd(0x04);
                for(j=0;j<=flagaddress;j++)
                {
                    write_dat(*(image++));
                }
    }
    flagaddress++;
    if(flagaddress>127)
    {
        flagaddress=0;
    }
}
```

```
void main()
{
    uchar i=0,j=0;

    while(1)
    {
            init();
    clear(0);
        for(i=0;i<128;i++)
        {
            lcd_mode3(&table0[0]);
            delayms();
        }
        for(i=0;i<250;i++)
            delayms();
        clear(0);
        for(i=0;i<8;i++)
        {
            lcd_mode1(&table1[0]);
            for(j=0;j<50;j++)
                delayms();
        }
        for(i=0;i<250;i++)
            delayms();
        clear(0);
        lcd_mode0(&table2[0]);
        for(j=0;j<250;j++)
            delayms();
        clear(0);
    }
}
```