RONGEN TECHNOLOGY CO.,LIMITED

RG19264-4317

STN DOTS LCD MODULE

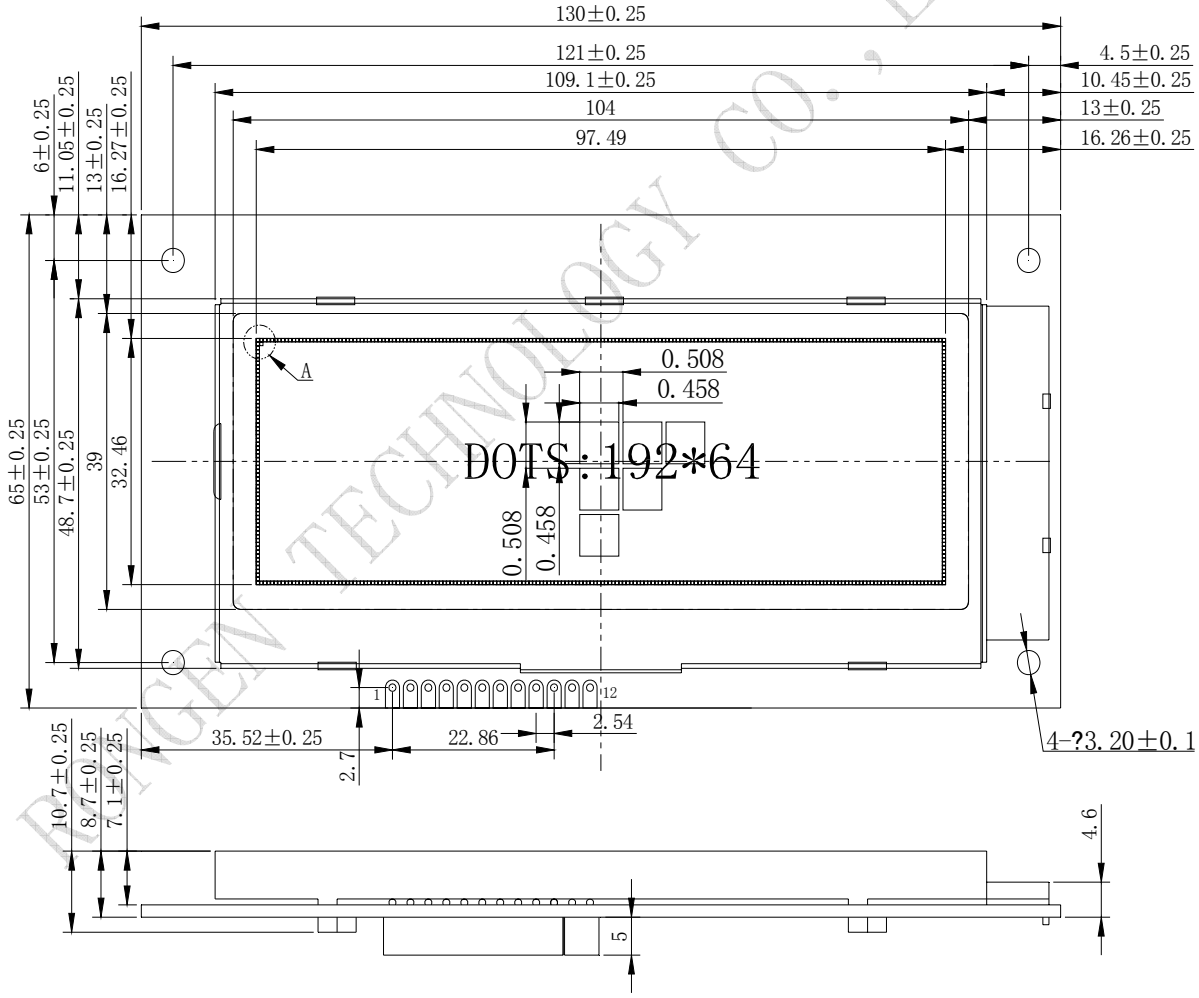
SPECIFICATION

Standard code	Department	Rev No.
	R&D	A/0
Checked by	**Written by**	**Date**
		2015-05

1、 GENERAL SPECIFICATIONS

Type	STN
Display color	Display color：Blue Background color：White
View angle direction	6'clock
Driver mode	1/64 DUTY 1/9BIAS
Backlight	LED
Controller IC	ST7525
Number of Dots	192*64
Dot size	0.458*0.458mm
Dot pitch	0.508*0.508mm
Viewing size	104.0*39.0mm
Active area	97.49*32.46mm
Outline dimension	130.0*65.0*10.7mm MAX

2、 EXTERNAL DIMENSIONS



3、 ELECTRICAL CHARACTERISTICS

Parameter	Symbol		Min	Type	Max	Unit
Supply voltage for logic	V_{DD}–V_{SS}		3.1	3.3	3.5	V
Supply Voltage for LCD Driving	V_{DD}–V_0	Ta=0 °C	-	-	-	
		Ta=25 °C	-	12.0	-	
		Ta=50 °C	-	-	-	
Input Voltage	V_{IH}		V_{DD}-2.2	-	V_{DD}	
	V_{IL}		0	-	0.8	
Supply current	I_{DD}	Backlight	-	-	5	mA
		Backlight off	-	60	75	mA
Supply Voltage for LED	V_{LED}		-	3.3	3.5	V
Supply Current for LED	I_{LED}		-	60	70	mA

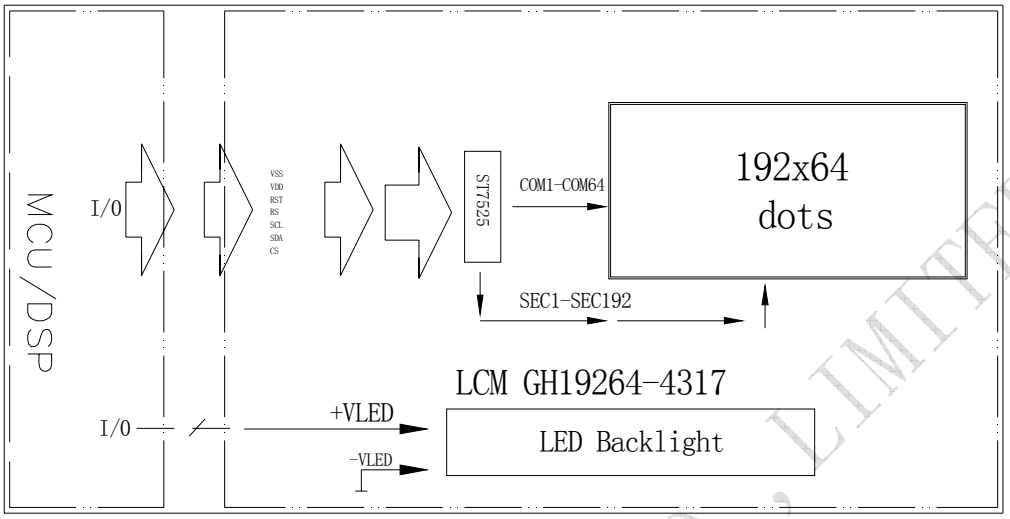
4、 ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Min	Max	Unit	Remark
Supply voltage for logic	V_{DD}–V_{SS}	-0.3	5	V	
Supply Voltage for LCD Driving	V_{LCD}–V_{DD}	-0.3	-12		
Operating temperature	T_{OP}	-20	+70	°C	
Storage temperature	T_{ST}	-30	+80		
Humidity	RH:	90%	50		Max

5、 INTERFACE DESCRIPTION

PIN	DESC	Function
1	VSS	Ground
2	VDD	Power supply for Logic circuit and LCD
3	NC	--
4	RST	Reset signal
5	RS	Command/Data Select 1：Data 0：Command
6	SCL	The serial clock input
7	SDA	Serial data input
8	CS	Chip select
9-10	NC	--
11	A	LED+
12	K	LED-

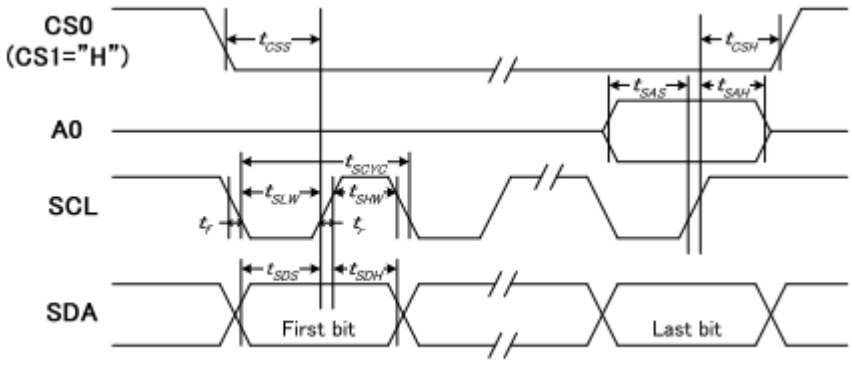
6、 BLOCK DIAGRAM



7、 INSTRUCTIONS

COMMAND TABLE											
INSTRUCTION	A0	R/W (RWR)	COMMAND BYTE								DESCRIPTION
			D7	D6	D5	D4	D3	D2	D1	D0	
Write Data	1	0	D7	D6	D5	D4	D3	D2	D1	D0	Write data to DDRAM
Read Data	1	1	D7	D6	D5	D4	D3	D2	D1	D0	Read data from DDRAM Only for parallel interface and I²C
Read Status Byte (parallel interface)	0	1	ID0	MX	MY	WA	DE	0	0	0	Read status byte Only for parallel interface
			0	0	0	0	0	o	ID2	ID1	
Set Column Address LSB	0	0	0	0	0	0	CA3	CA2	CA1	CA0	Set column address of RAM
Set Column Address MSB	0	0	0	0	0	1	CA7	CA6	CA5	CA4	
Set Scroll Line	0	0	0	1	SL5	SL4	SL3	SL2	SL1	SL0	Specify line address for the 1st display line of DDRAM (vertical scrolling)
Set Page Address	0	0	1	0	1	1	PA3	PA2	PA1	PA0	Set page address of RAM
Set Contrast	0	0	1	0	0	0	0	0	0	1	2-byte instruction. Set Vop voltage
			EV7	EV6	EV5	EV4	EV3	EV2	EV1	EV0	
Set Partial Screen Mode	0	0	1	0	0	0	0	1	0	PS	PS=1: Enable partial mode
Set RAM Address Control	0	0	1	0	0	0	1	AC2	AC1	AC0	Set column and page address behavior
Set Frame Rate	0	0	1	0	1	0	0	0	FR1	FR0	Set frame frequency
Set All Pixel ON	0	0	1	0	1	0	0	1	0	AP	Set all display segments on
Set Inverse Display	0	0	1	0	1	0	0	1	1	INV	Set inverse display
Set Display Enable	0	0	1	0	1	0	1	1	1	PD	PD=0: Chip is in power down mode
Scan Direction	0	0	1	1	0	0	0	MY	MX	0	Set COM and SEG scan direction
Software Reset	0	0	1	1	1	0	0	0	1	0	Set software reset
NOP	0	0	1	1	1	0	0	0	1	1	No operation
Set Bias	0	0	1	1	1	0	1	0	BR1	BR0	Set internal bias circuit
Set COM End	0	0	1	1	1	1	0	0	0	1	2-byte instruction. Set display duty
			--	--	CEN5	CEN4	CEN3	CEN2	CEN1	CEN0	
Partial Start Address	0	0	1	1	1	1	0	0	1	0	Set partial start for partial display screen
			--	--	DST5	DST 4	DST 3	DST 2	DST 1	DST 0	
Partial End Address	0	0	1	1	1	1	0	0	1	1	Set partial end for partial display screen
			--	--	DEN5	DEN4	DEN3	DEN2	DEN1	DEN0	
Test Control	0	0	1	1	1	1	0	0	0	0	Set test command table
			--	--	--	--	--	--	H1	H0	

8、 TIMING DIAGRAMS



(VDD1 = 1.8V ~ 3.3V, Ta =25°C)

Item	Signal	Symbol	Condition	Min.	Max.	Unit
Serial clock period	SCL	tSCYC		110	-	ns
SCL "H" pulse width		tSHW		40	-	
SCL "L" pulse width		tSLW		40	-	
Address setup time	A0	tSAS		10	-	
Address hold time		tSAH		10	-	
Data setup time	SDA	tSDS		20	-	
Data hold time		tSDH		10	-	
CS0 setup time	CS0	tCSS		20	-	
CS0 hold time		tCSH		10	-	

Note :

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

9、 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.

10、 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

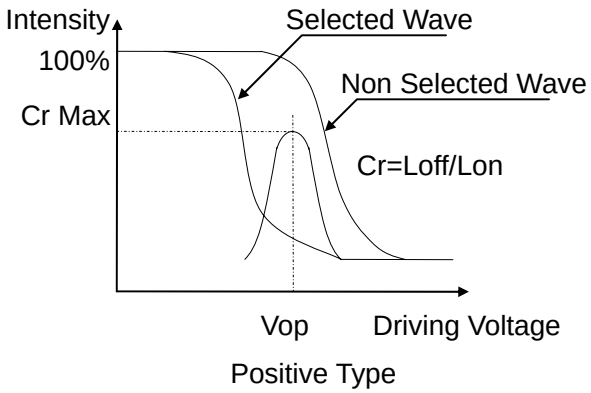
13. Liquid crystal with image retention afterglow, in order to avoid image afterglow don't long time display fixed pattern. Image persistence is not liquid crystal deterioration, when the display pattern changes will automatically eliminate

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

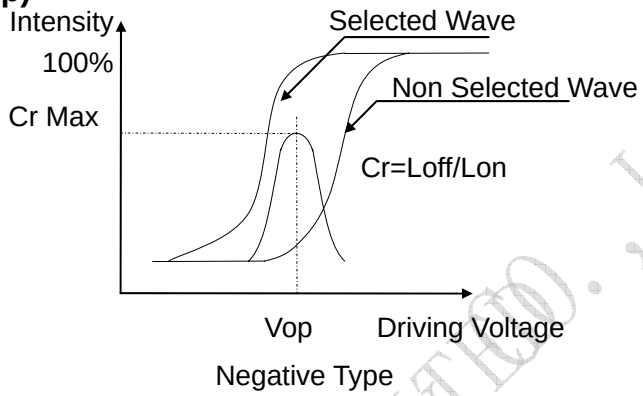
15. To avoid the liquid crystal module long time exposure to sunlight or ultraviolet irradiation

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)

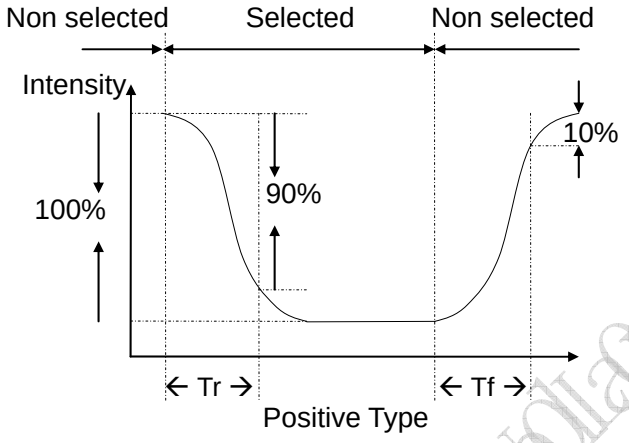


Positive Type

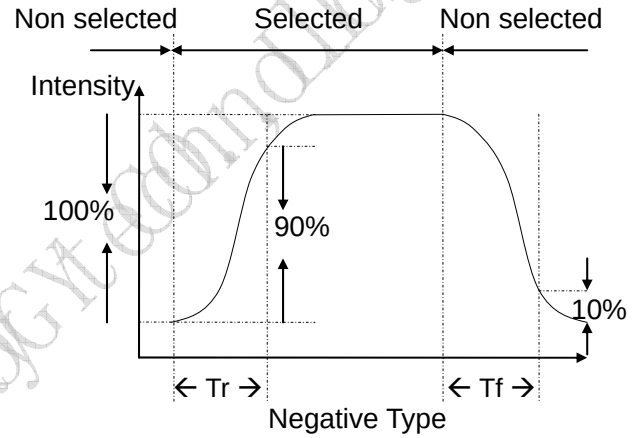


Negative Type

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



Positive Type



Negative Type

Conditions:

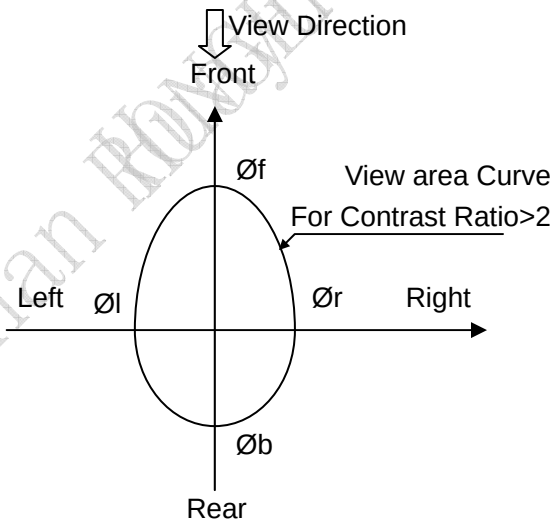
Operating Voltage : Vop

Frame Frequency : 64 Hz

Viewing Angle: 0°

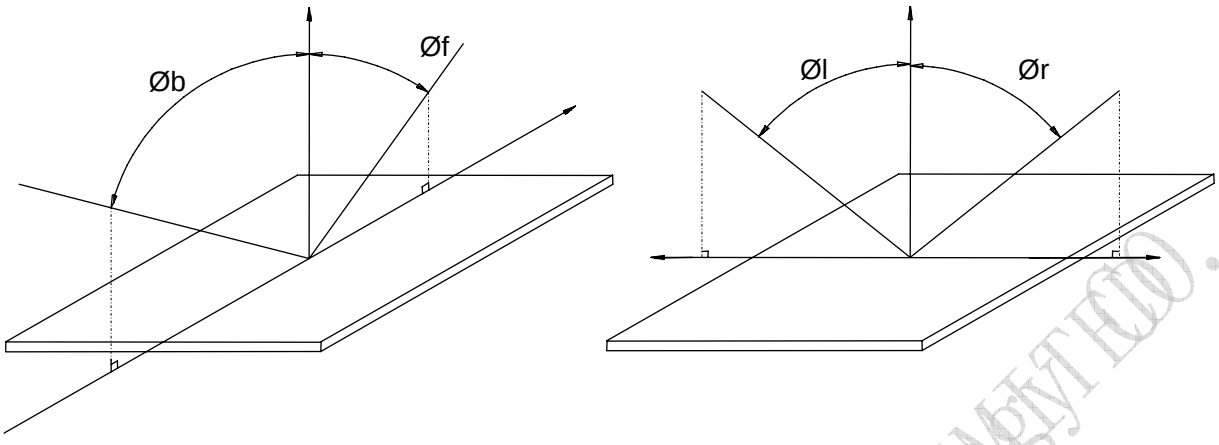
Driving Wave form : 1/N duty, 1/a bias

c. Definition Viewing Angle

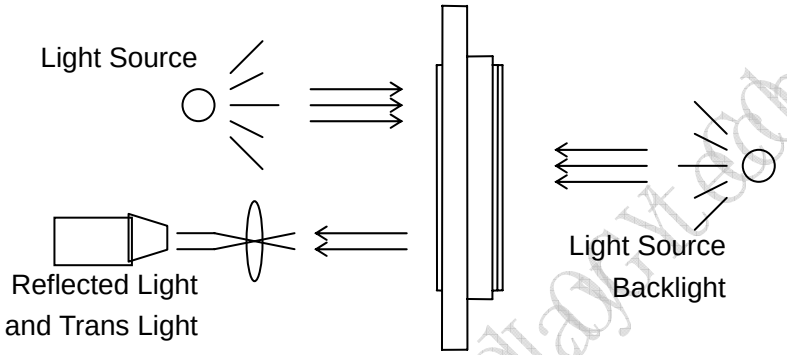


Item	Symbol	Condition	Type	Unit
View Angle Range	Øf	Contrast>2	40	Degree
	Øb		30	
	Øl		30	
	Ør		30	

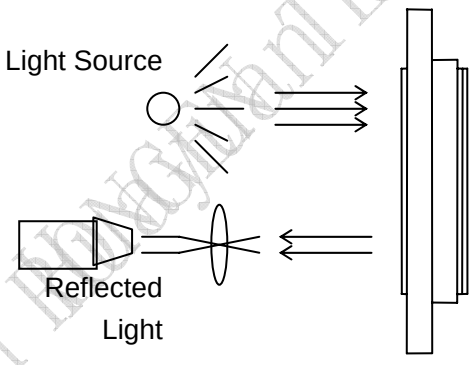
d. Perspective Definition



e. Measurement Method Described



TransFlective Type



ReFlective Type

11、 REFERENCE PROGRAM

```
void LCDWrite(uint8_t cd, uint8_t data)
{
    CS(0);
    A0(cd);
    HAL_SPI_Transmit(&hspi1, &data, 1, 1);
    CS(1);
}

void LCDInit()
{
    RST(0);
    HAL_Delay(30);
    RST(1);
    HAL_Delay(100);

    LCDWrite(CMD, 0x40); //Set scroll line = 0
    LCDWrite(CMD, 0x81); //Set Contrast = 9V
    LCDWrite(CMD, 105);
    LCDWrite(CMD, 0x88); //Set RAM address control
    LCDWrite(CMD, 0x40); //Set scroll line = 0
    LCDWrite(CMD, 0x88); //Set RAM address control
    LCDWrite(CMD, 0xa0); //Set frame rate = 76fps
    LCDWrite(CMD, 0xc4); //Set scan direction: COM63 -> COM0, SEG0 -> SEG191
    LCDWrite(CMD, 0xeb); //Set Bias = 1/9

    LCDWrite(CMD, 0xaf);  //Display on
    HAL_Delay(100);
}
```