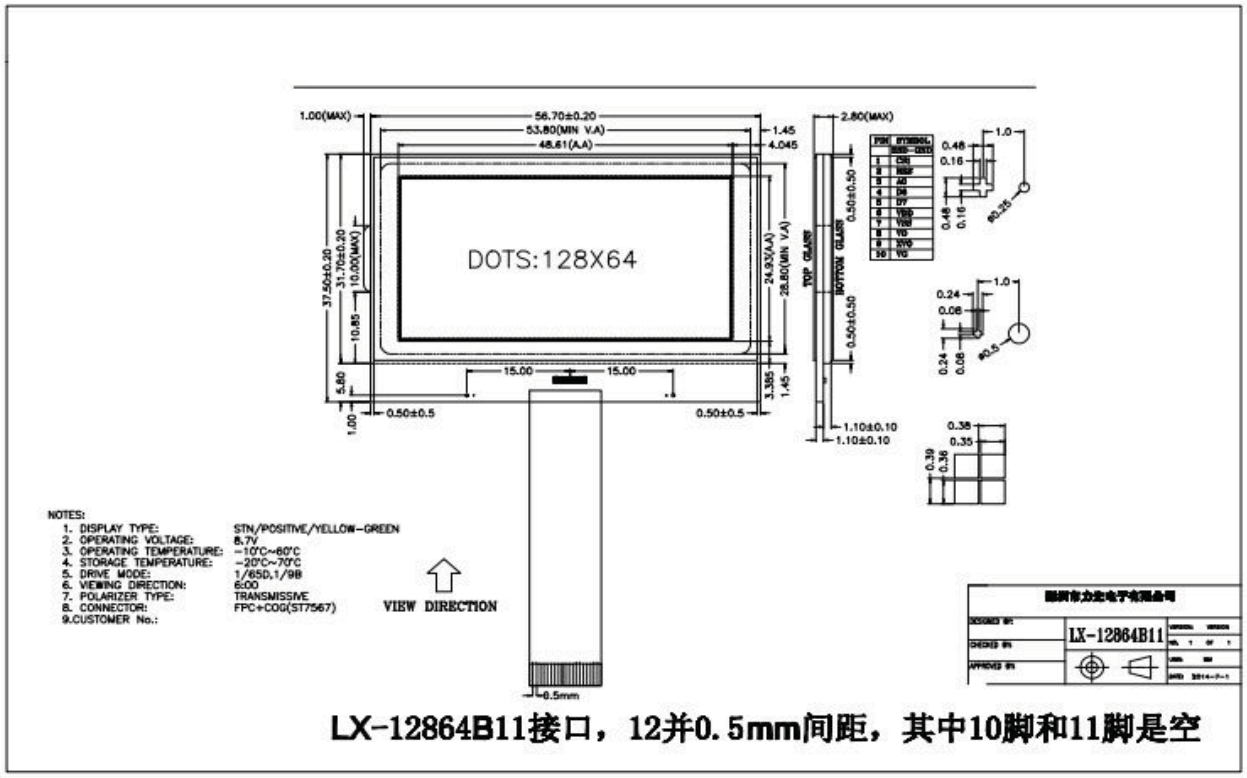
1. PHYSICAL DATA

Item	Contents	Unit
LCD type	STN/黄绿/正显	---
LCD duty	1/64	---
LCD bias	1/9	---
Viewing direction	6	o'clock
Module size (W×H×T)	56.7×38.6×2.7	mm
Number of dots(W×H)	128 × 64	dots
Dot Size(W×H))	0.35×0.36	mm
Dot Pitch(W×H))	0.38×0.39	mm
工作温度	-10 ℃ -- +60℃	
存储温度	-20 ℃ -- +70℃	

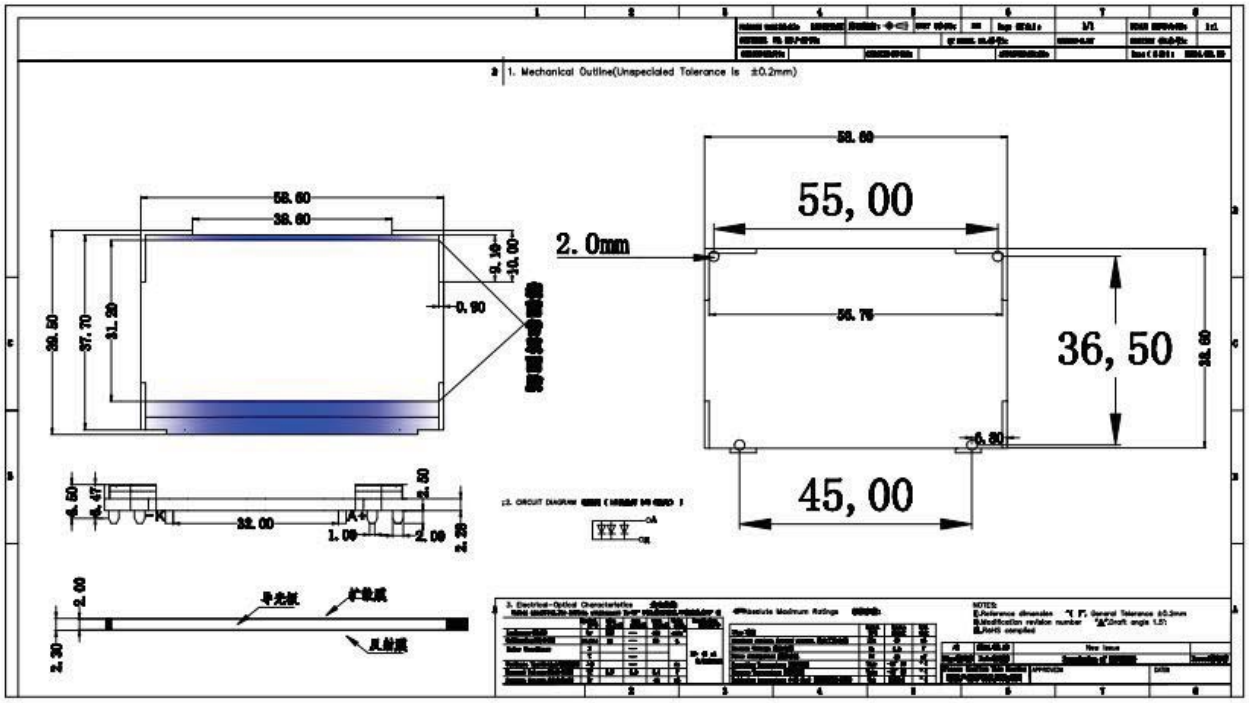
Item	Contents	Unit	
背光电压	2.9V-3.1V		
背光电流	25ma--35ma-		

2.EXTERNAL DIMENSIONS



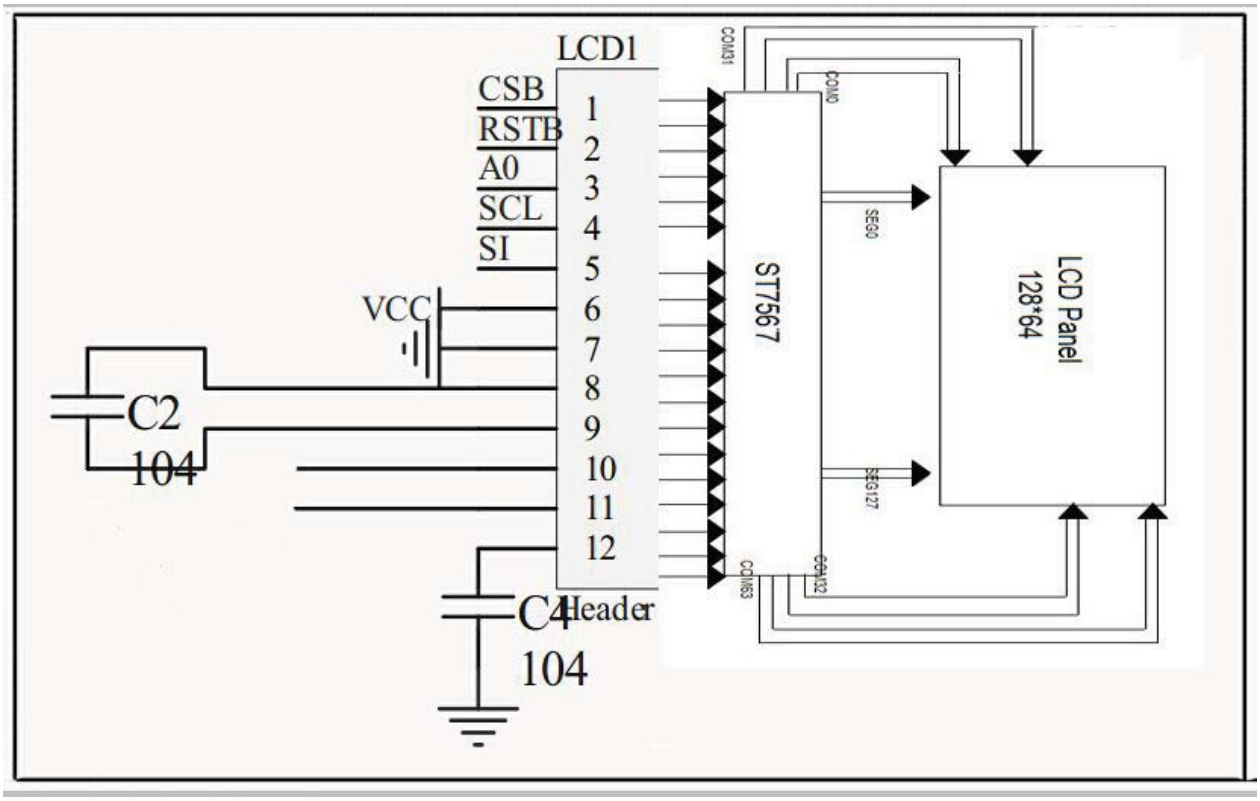
特别注明，按以上图看正面，右边为第一脚（CS)

背光结构图



3. BLOCK DIAGRAM

外围电路



注：以上图外围电路原理串口

4. 以下引脚是并口和串口（SPI)，LX-12864B11 以串口为准

PIN NO.	Symbol	Level	Description
1	NC		NC
2	CS	H/L	Chip select.
3	RES	H/L	Reset pin.
4	A0	H/L	A0="H": data. A0="L": Instruction command.
5	/WR	---	When Bus Mode is 6800, R/W=R/W When Bus Mode is 8080, R/W=/RW
6	/RD	H/L	When Bus Mode is 6800, E=E When Bus Mode is 8080, E =/RD
7	DB0	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 (SPI-4) is selected (P/S = "L") : D7 : serial data input (SI) ; D6 : the serial clock input (SCL). D0 to D5 should be connected to VDD or floating.
8	DB1		
9	DB2		
10	DB3		
11	DB4		
12	DB5		
13	DB6（SCL）		
14	DB7（SI）		
15	VDD	---	Power supply.
16	VSS	---	Ground.
17	VOUT	---	Negative power for LCD.
18	C3+	---	DC/DC voltage converter. Connect a capacitor between this terminal and the CAP2N terminal.
19	C1+	---	DC/DC voltage converter. Connect a capacitor between this terminal and the CAP1N terminal.
20	C1-		DC/DC voltage converter. Connect a capacitor between this terminal and the CAP1P terminal.
21	C2+		DC/DC voltage converter. Connect a capacitor between this terminal and the CAP1N terminal. Reset signal.
22	C2-		DC/DC voltage converter. Connect a capacitor between this terminal and the CAP2N terminal.
23~26	V1~V4	---	This is a multi-level power supply for the liquid crystal drive.
27	V0	---	Contrast adjustment input.
28	C86	H/L	C86 = "H": 6800 Series MPU interface. C86 = "L": 8080 Series MPU interface.
39	P/S	H/L	P/S = "H": Parallel data input/output. P/S = "L": Serial data input.
30	NC	---	NC

4. ABSOLUTE MAXIMUM RATINGS

(1)Electrical Absolute Ratings

Item	Symbol	Min.	Max.	Unit	Note
Power Supply for Logic	V_{DD}-V_{SS}	0	3.47	Volt	Note 1
Power Supply for LCD	V_{LCD}	0	13.0	Volt	
Input Voltage	V_I	0	V_{DD}	Volt	

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%.

5. ELECTRICAL CHARACTERISTICS

DC Characteristics (VDD=3.3V;VSS=0V； Ta=-20～70℃)

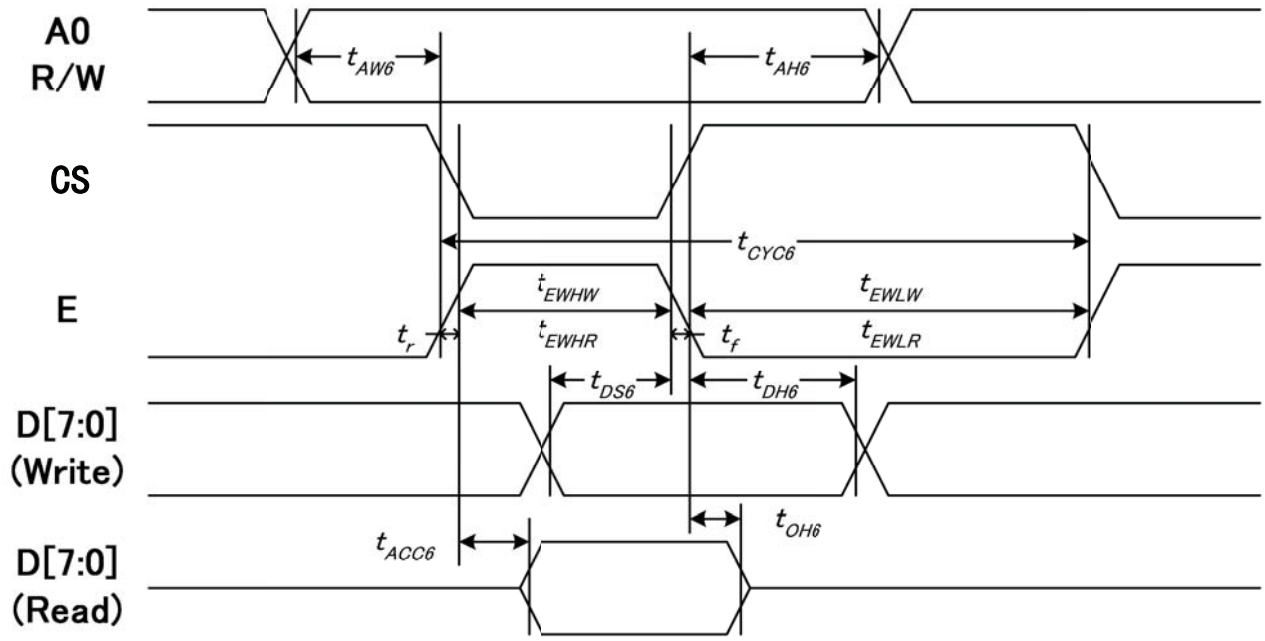
Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Power Supply for Logic	V_{DD}-V_{SS}	---	3.14	3.3	3.47	Volt
Input Voltage	V_{IL}	---	VSS	---	0.2V_{DD}	Volt
	V_{IH}	---	0.8V_{DD}	---	V_{DD}	Volt
Output Voltage	V_{OH}	I_{OL} =-0.5mA	0.8V_{DD}	---	V_{DD}	Volt
	V_{OL}	I_{OL} = +0.5mA	VSS	---	0.2V_{DD}	Volt
LCM Recommend LCD Module	V_{LCD}	T_a＝0℃	---	---	---	Volt

Driving Voltage		T_a＝25℃	9.15	9.35	9.6	
		T_a＝50℃	---	---	---	
Power Supply Current for LCM	$I_{DD(B/L\ OFF)}$	---	---	---	TBD	mA

AC Characteristics
System Bus Timing for 6800 Series MPU

(VDD=3.3V, Ta=25℃)

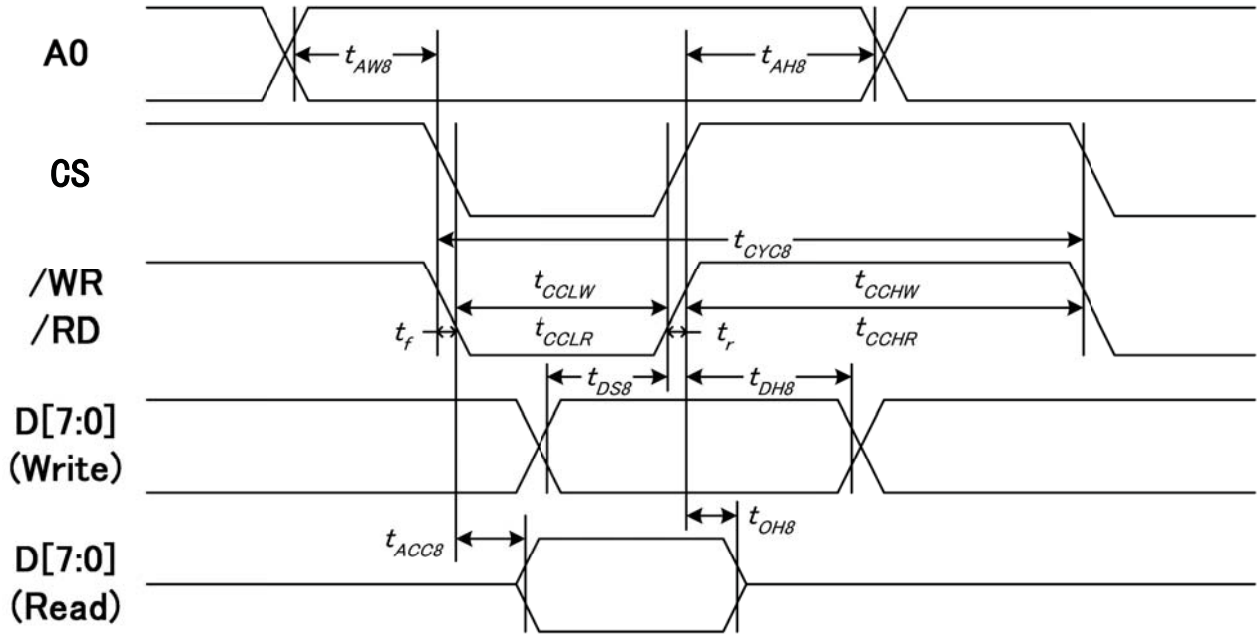
Item	Signal	Symbol	Condition	Min.	Max.	Unit
Address setup time	A0	tAW6		0	—	ns
Address hold time		tAH6		0	—	
System cycle time	E	tCYC6		240	—	
Enable L pulse width (WRITE)		tEWLW		80	—	
Enable H pulse width (WRITE)		tEWHW		80	—	
Enable L pulse width (READ)		tEWLR		80	—	
Enable H pulse width (READ)		tEWHR		80		
Write data setup time	D[7:0]	tDS6		30	—	
Write data hold time		tDH6		10	—	
Read data access time		tACC6	CL = 100 pF	—	70	
Read data output disable time		tOH6	CL = 100 pF	10	50	



System Bus Timing for 8080 Series MPU

(VDD=3.3V, Ta=25℃)

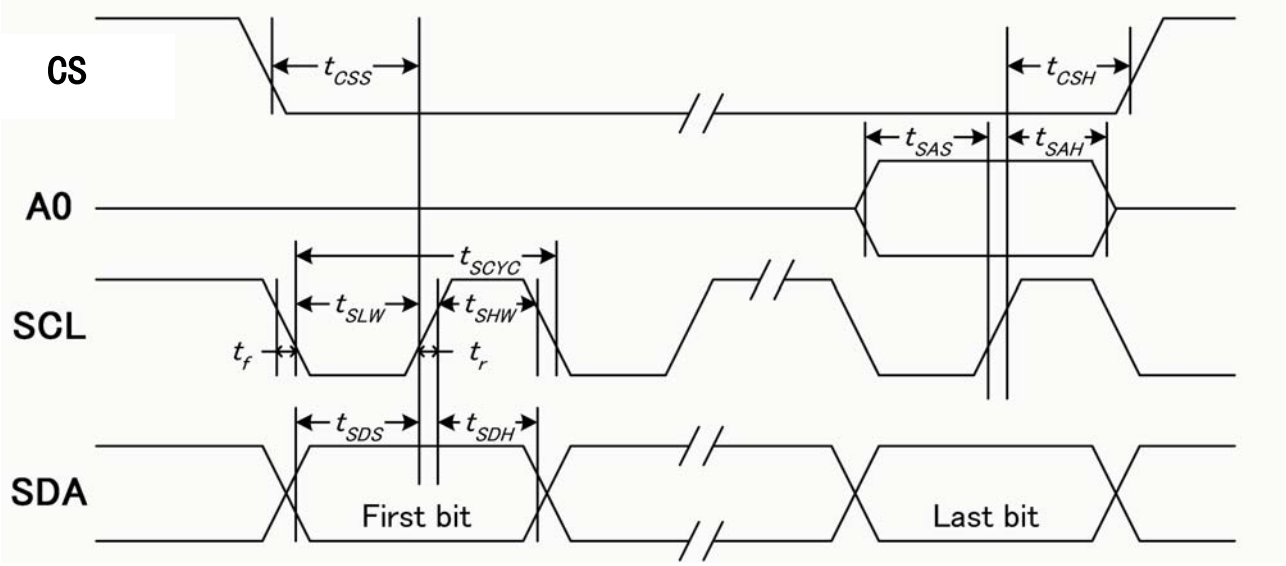
Item	Signal	Symbol	Condition	Min.	Max.	Unit
Address setup time	A0	tAW8		0	—	ns
Address hold time		tAH8		0	—	
System cycle time	/WR	tCYC8		240	—	
/WR L pulse width (WRITE)		tCCLW		80	—	
/WR H pulse width (WRITE)		tCCHW		80	—	
/RD L pulse width (READ)	RD	tCCLR		80	—	
/RD H pulse width (READ)		tCCHR		80		
WRITE Data setup time	D[7:0]	tDS8		30	—	
WRITE Data hold time		tDH8		10	—	
READ access time		tACC8	CL = 100pF	—	70	
READ Output disable time		tOH8	CL = 100pF	5	50	



System Bus Timing for 4-Line Serial Interface

(VDD=3.3V, Ta=25℃)

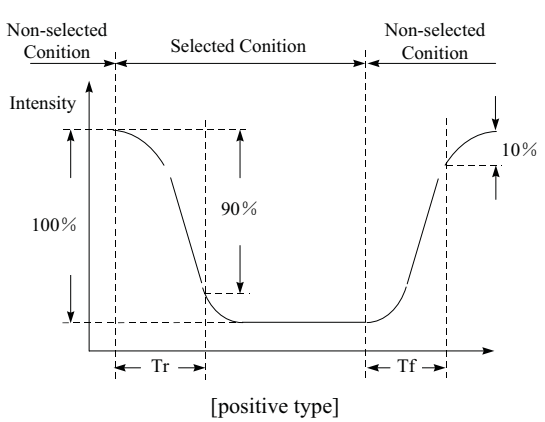
Item	Signal	Symbol	Condition	Min.	Max.	Unit
Serial clock period	SCLK	tSCYC		50	---	ns
SCLK “H” pulse width		tSHW		25	---	
SCLK “L” pulse width		tSLW		25	---	
Address setup time	A0	tSAS		20	---	
Address hold time		tSAH		10	---	
Data setup time	SDA	tSDS		20	---	
Data hold time		tSDH		10	---	
CS-SCLK time	CS	tCSS		20	---	
CS-SCLK time		tCSH		40	---	



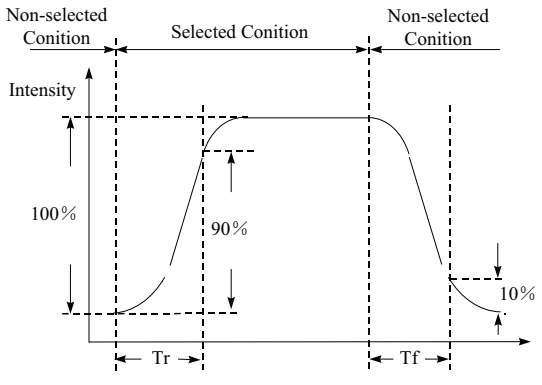
6. ELECTRO-OPTICAL CHARACTERISTICS

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	note
Viewing angle range	θ_f (12 o'clock)	When Cr≧2	35	---	---	Degree	Note 2 Note 3 Note 4
	θ_b (6 o'clock)		30	---	---		
	θ_l (9 o'clock)		30	---	---		
	θ_r (3 o'clock)		30	35	---		
Rise Time	T_r	V_{DD}-V_0=8.7V 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]



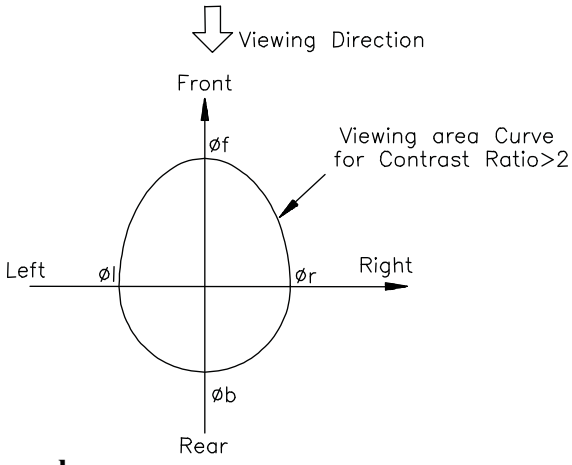
[Negative type]

Conditions:

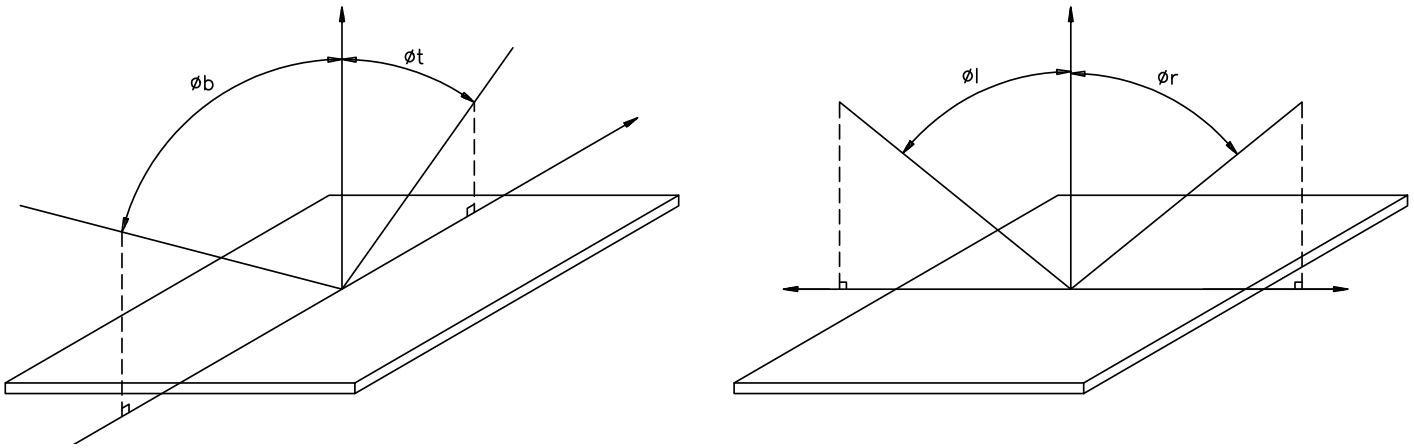
Operating Voltage : Vop　　Viewing Angle(θ , φ): 0° , 0°

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

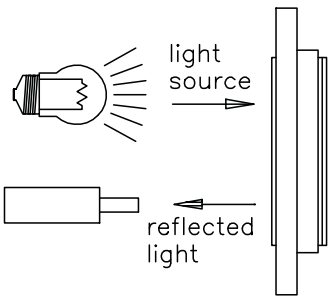
[Note 2] Definition of Viewing Direction



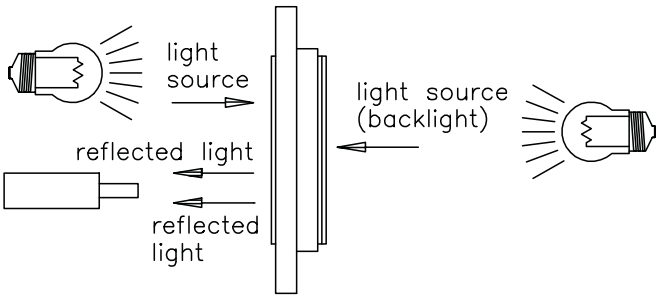
[Note 3] Definition of viewing angle



[Note 4] Description of Measuring Equipment



Reflective type



Transflective type

7. OPERATING PRINCIPLES & METHODS

INSTRUCTION	A0	R/W	COMMAND BYTE								DESCRIPTION
			D7	D6	D5	D4	D3	D2	D1	D0	
(1) Display ON/OFF	0	0	1	0	1	0	1	1	1	D	D=1, display ON D=0, display OFF
(2) Set Start Line	0	0	0	1	S5	S4	S3	S2	S1	S0	Set display start line
(3) Set Page Address	0	0	1	0	1	1	Y3	Y2	Y1	Y0	Set page address
(4) Set Column Address	0	0	0	0	0	1	X7	X6	X5	X4	Set column address (MSB)
	0	0	0	0	0	0	X3	X2	X1	X0	Set column address (LSB)
(5) Read Status	0	1	0	MX	D	RST	0	0	0	0	Read IC Status
(6) Write Data	1	0	D7	D6	D5	D4	D3	D2	D1	D0	Write display data to RAM
(7) Read Data	1	1	D7	D6	D5	D4	D3	D2	D1	D0	Read display data from RAM
(8) SEG Direction	0	0	1	0	1	0	0	0	0	MX	Set scan direction of SEG MX=1, reverse direction MX=0, normal direction
(9) Inverse Display	0	0	1	0	1	0	0	1	1	INV	INV =1, inverse display INV =0, normal display
(10) All Pixel ON	0	0	1	0	1	0	0	1	0	AP	AP=1, set all pixel ON AP=0, normal display
(11) Bias Select	0	0	1	0	1	0	0	0	1	BS	Select bias setting 0=1/9; 1=1/7
(12)Read-modify-Write	0	0	1	1	1	0	0	0	0	0	Column address increment: Read:+0 , Write:+1
(13) END	0	0	1	1	1	0	1	1	1	0	Exit Read-modify-Write mode
(14) RESET	0	0	1	1	1	0	0	0	1	0	Internal reset
(15) COM Direction	0	0	1	1	0	0	MY	-	-	-	Set output direction of COM MY=1, reverse direction MY=0, normal direction
(16) Power Control	0	0	0	0	1	0	1	VB	VR	VF	Control built-in power circuit ON/OFF
(17) Regulation Ratio	0	0	0	0	1	0	0	RR2	RR1	RR0	Select regulation resistor ratio
(18) Electronic volume mode set Electronic volume register set	0	0	1	0	0	0	0	0	0	1	Set the V0 output voltage electronic volume register
	0	0	0	0	EV5	EV4	EV3	EV2	EV1	EV0	
(19) Static indicator ON/OFF	0	0	1	0	1	0	1	1	0	0/1	0: OFF, 1: ON
Static indicator Register set	0	0	0	0	0	0	0	0	0	Mode	Set the flashing mode
(20) Page Blink	0	0	1	1	0	1	0	1	0	1	P7 - 0: 1 - blinking page 0 - no blinking, normal display
Page selection	0	0	P7	P6	P5	P4	P3	P2	P1	P0	
(21). Driving Mode Set	0	0	1	1	0	1	0	0	1	0	Set the driving mode register
Mode selection	0	0	0	0	0	0	0	0	0	D0	Driving capability (D0): (1)>(0)
(22) Power Save	0	0	Compound Command								Display OFF + All Pixel ON
(23) NOP	0	0	1	1	1	0	0	0	1	1	No operation
(24) Test	0	0	1	1	1	1	-	-	-	-	Do NOT use. Reserved for testing.
	0	0	1	1	0	1	0	1	0	0	
(25) Oscillator Frequency selection	0	0	1	1	1	0	0	1	0	0/1	20KHz/33KHz (Default) 16.4KHz/ 27.06KHz

8. 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 30min ⇌ 25°C 5min. ⇌ 60°C 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.

9. 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