深圳市睿显熙电子有限公司

认　　可　　书

SPECIFICATION　FOR　APPROVAL

客户名称

CUSTOMER ：

客户型号

CLIENT TYPE ：

产品编号

PRODUCTION NO.：ENH-DG128064-185-YFNTKF

出品日期

SHIPMENT DATE：2020 年 12 月 18 日

客户确认签章: VALIDATED:

	签名 SIGNATURE	日期 DATE
拟制 PREPARED	Carl	2020.12.18
审核 CHECKED	Steven	2020.12.18
批准 APPROVED	Steven	2020.12.18

该产品符合 ROHS 标准，检验执行 GB2828 标准；

1. ONTENTS

2. RECORDS OF REVISION

DATE	REVISED NO.	REVISED DESCRIPTIONS	PREPARED	CHECKED	APPROVED
2020.12.18	01	FIRST ISSUE.			

3. GENERAL SPECIFICATIONS：

3.1 SCOPE:

This specification covers the delivery requirements for the liquid crystal display delivered by QUALITY to Customer.

3.2 PRODUCTS:

Liquid Crystal Display Module (LCM)

3.3 MODULE NAME:

ENH-DG128064-185-YFNTKF

4. FEATURES：

(1) Display Type: DFSTN, 12 O'CLOCK, TRANSMISSIVE, NEGATIVE
(2) Driving Method: 1/65DUTY, 1/9BIAS
(3) Built-in controller: ST7567
(4) VDD:3.3V　Vop：TBD
(5) LED Backlight: 3 PCS WHITE LED Blacklight,If=45mA & Vf=3.0±0.2V

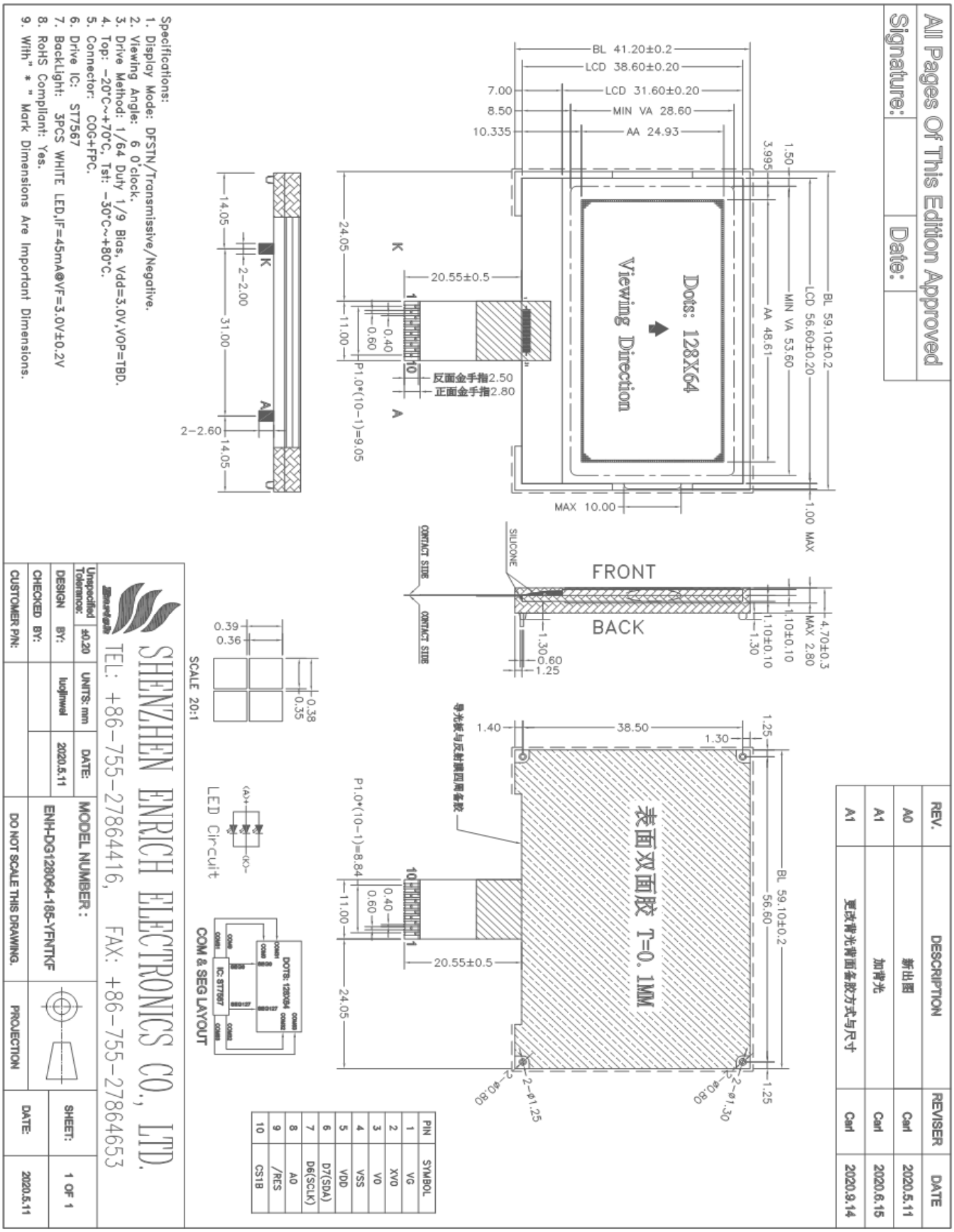
5. MACHANICAL SPECIFICATIONS：

ITEM	SPECIFICATIONS UNIT	
MODULE SIZE	59.1(W)x41.2(H)x4.7(D)	mm
VIEWING AREA	53.6(W) x28.6(H)	mm
ACTIVE AREA (DOT)	48.61(W) x24.93(H)	mm
DOT SIZE	0.35(W) x0.0.36(H)	mm
DOT PITCH	0.38(W) x0.39(H)	mm
BACKLIGHT	WHITE	
ASSY.TYPE	COG	---
WEIGHT	TBD	

NOTES:

LCM should be grounded during handling LCM.

6. OUTLINE DIMENSIONS



PIN	SYMBOL
1	VG
2	XV0
3	V0
4	VSS
5	VDD
6	D7(SDA)
7	D6(SCLK)
8	A0
9	/RES
10	CS1B

7. ABSOLUTE MAXIMUM RATING

Characteristic	Symbol	Standard Value			Unit
		MIN	TYP	MAX	
Power Supply Voltage(1)	VDD	-0.3	3.0	+3.6	V
Power Supply Voltage(2)	LCD	-0.3	TBD	16	V
Operating Temperature	TOPR	-20	-	+70	^{0}C
Storage Temperature	TSTG	-30	-	+80	^{0}C
Input Voltage	VIN	-0.3	-	VDD+0.3	V

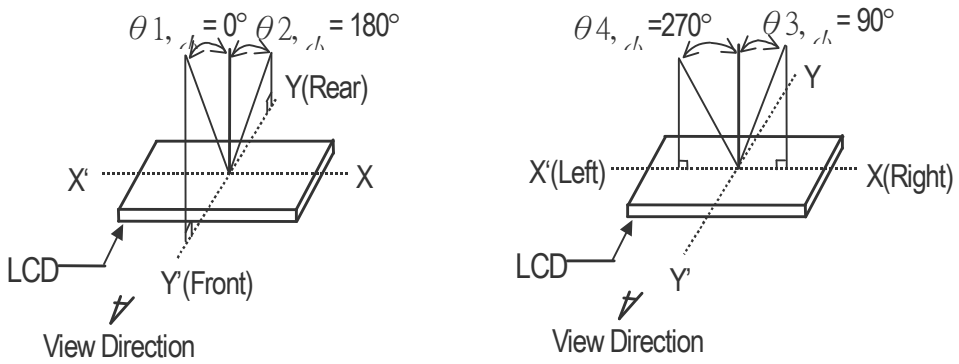
8. ELECTRICAL CHARACTERISTICS

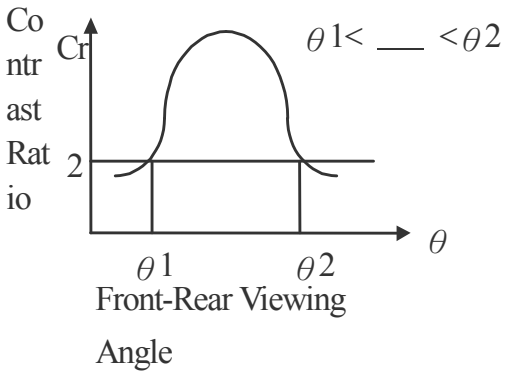
VDD1=1.8V to 3.3V, VSS=0V; Tamb = -30°C to +85°C; unless otherwise specified.

Item	Symbol	Condition		Rating			Unit	Applicable Pin
				Min.	Typ.	Max.		
Operating Voltage (1)	VDD1			1.8	—	3.3	V	VDD1
Operating Voltage (2)	VDD2			2.4	—	3.3	V	VDD2
Operating Voltage (3)	VDD3			2.4	—	3.3	V	VDD3
Input High-level Voltage	V_{IHC}			0.7 x VDD1	—	VDD1	V	MPU Interface
Input Low-level Voltage	V_{ILC}			VSS1	—	0.3 x VDD1	V	MPU Interface
Output High-level Voltage	V_{OHC}	I_{OUT}=1mA, VDD1=1.8V		0.8 x VDD1	—	VDD1	V	D[7:0]
Output Low-level Voltage	V_{OLC}	I_{OUT}=-1mA, VDD1=1.8V		VSS1	—	0.2 x VDD1	V	D[7:0]
Input Leakage Current	I_{LI}			-1.0	—	1.0	μA	MPU Interface
Output Leakage Current	I_{LO}			-3.0	—	3.0	μA	MPU Interface
Liquid Crystal Driver ON Resistance	R_{ON}	Ta=25°C	Vop=8.5V, ΔV=0.85V	—	0.6	0.8	KΩ	COMx
			VG=1.9V, ΔV=0.19V	—	1.3	1.5	KΩ	SEGx
Frame Frequency	FR	Duty=1/65, Vop=8.5V Ta = 25℃		70	75	80	Hz	

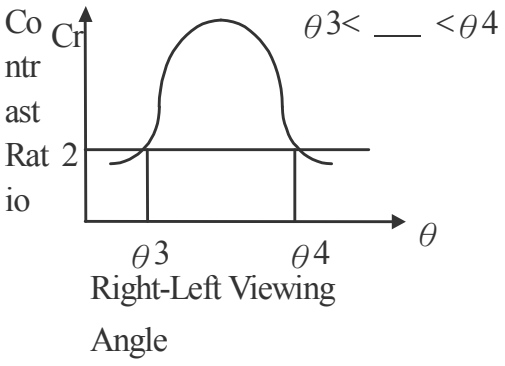
9. OPTICAL CHARACTERISTICS

(1) DEFINITION OF VIEWING ANGLE





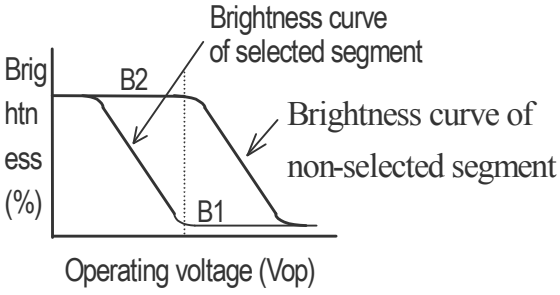
Front-Rear Viewing Angle



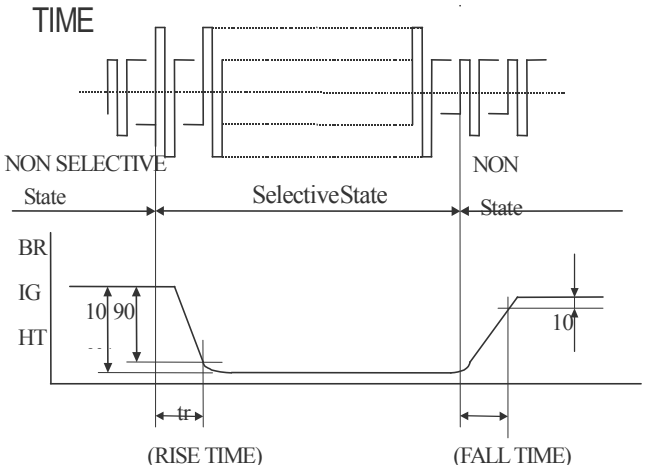
Right-Left Viewing Angle

(2) DEFINITION OF CONTRAST RATIO

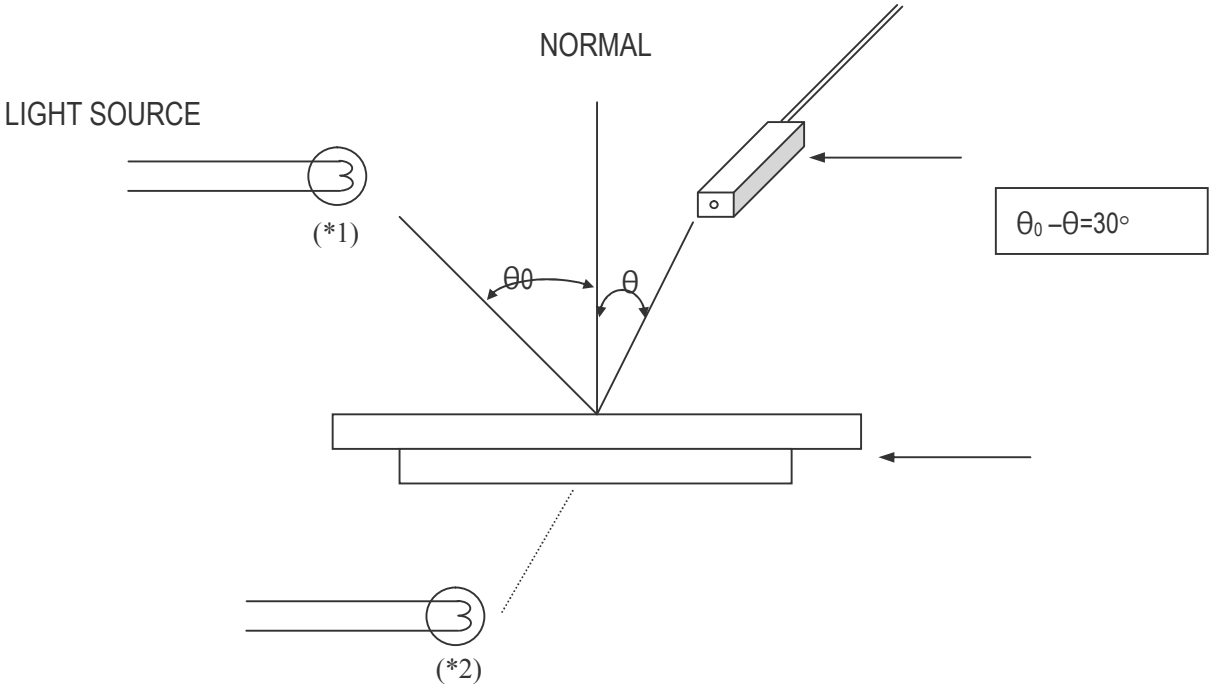
$$C.R = \frac{\text{Brightness of non-selected segment (B2)}}{\text{Brightness of selected segment}}$$



(3) DEFINITION OF RESPONSE TIME



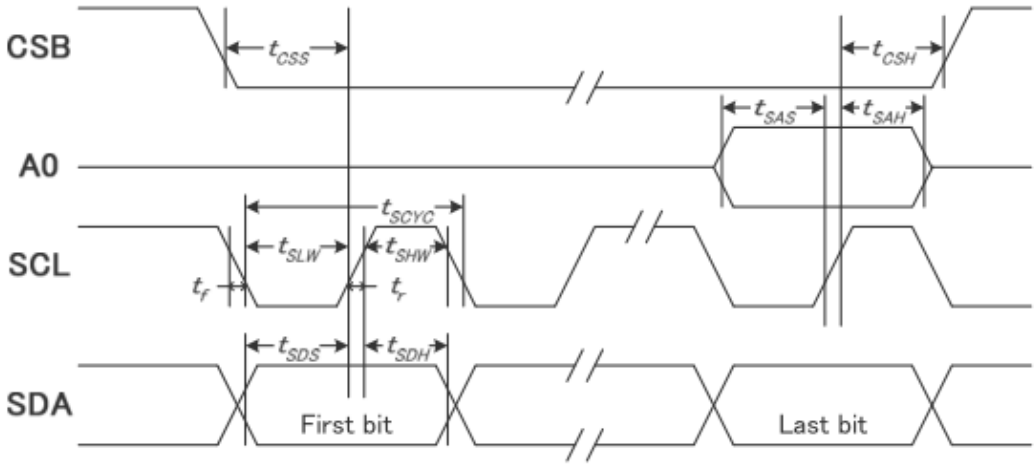
(3) Measuring Instruments For Electro-optical Characteristics



*1.Light source position for measuring the reflective type of LCD panel

*2.Light source position for measuring the transflective / transmissive types of LCD panel

10. TIMING CHARACTERISTICS



(VDD1 = 3.3V , Ta =25°C)

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	—	
CSB-SCLK time	CSB	tCSS		20	—	
CSB-SCLK time		tCSH		40	—	

(VDD1 = 2.8V , Ta =25°C)

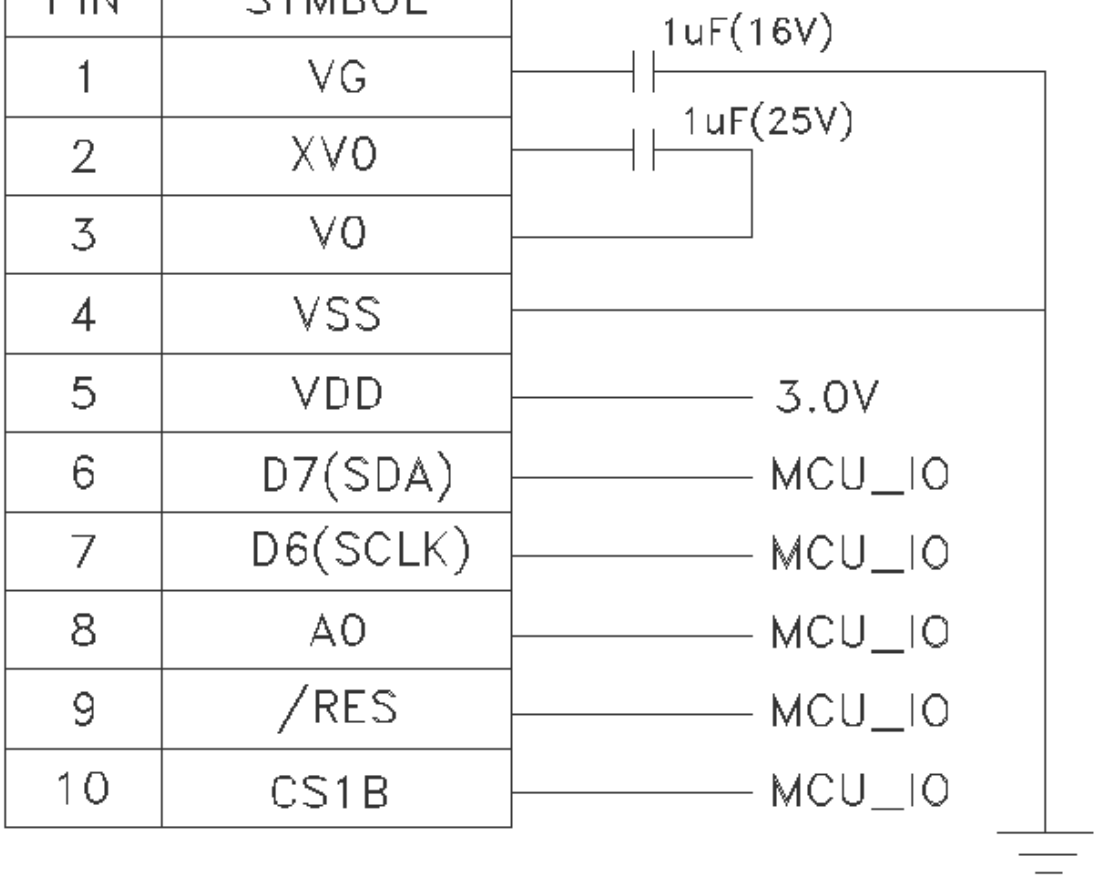
Item	Signal	Symbol	Condition	Min.	Max.	Unit
Serial clock period	SCLK	tSCYC		100	—	ns
SCLK "H" pulse width		tSHW		50	—	
SCLK "L" pulse width		tSLW		50	—	
Address setup time	A0	tSAS		30	—	
Address hold time		tSAH		20	—	
Data setup time	SDA	tSDS		30	—	
Data hold time		tSDH		20	—	
CSB-SCLK time	CSB	tCSS		30	—	
CSB-SCLK time		tCSH		60	—	

11. PIN ASSIGNMENT

PIN NO.	FUNCTION DESCRIPTIONS	SYMBOL
1	Voltage converter.	VG
2	Voltage converter.	XV0
3	Voltage converter.	V0
4	GROUND.	VSS
	POWER.	VDD
	Serial data input	D7(SDA)
7	Serial clock input.	D6(SCLK)
8	Data or Command select.	A0
9	Hardware reset input pin.	/RES
10	Chip Select input pin.	CS1B

12. PERIPHERAL REFERENCE CIRCUIT DIAGRAM

PIN	SYMBOL
1	VG
2	XV0
3	V0
4	VSS
5	VDD
6	D7(SDA)
7	D6(SCLK)
8	A0
9	/RES
10	CS1B



13. INSTRUCTIONS

INSTRUCTION	A0	R/W (RWR)	COMMAND BYTE D7	D6	D5	D4	D3	D2	D1	D0	DESCRIPTION
(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 (at 1/65 duty)
(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	Software 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) Set EV	0	0	1	0	0	0	0	0	0	1	Double command!! Set electronic volume (EV) level
	0	0	0	0	EV5	EV4	EV3	EV2	EV1	EV0	
(19) Set Booster	0	0	1	1	1	1	1	0	0	0	Double command!! Set booster level: 00=4X, 01=5X, 10=6X
	0	0	0	0	0	0	0	0	BL1	BL0	
(20) Power Save	0	0	Compound Command								Display OFF + All Pixel ON
(21) NOP	0	0	1	1	1	0	0	0	1	1	No operation
(22) Test	0	0	1	1	1	1	1	1	1	-	Do NOT use. Reserved for testing.

Note: Symbol "-" means this bit can be "H" or "L".

14. INIT CODE

```
void ST7567_initial()
{
    RST=0;
    delay_ms(10);
    RST=1;
    delay_ms(20);
    wr_cmd(0xA4); //ALL Point normal
    wr_cmd(0xA6); //Normal display
    wr_cmd(0xA0); //ADC,  0xA0:seg normal; 0xA1: seg reverse
    wr_cmd(0xC8); //SHL    0xC0:com normal; 0xC8: com reverse
    wr_cmd(0x40); //Initial display line for COM0

    wr_cmd(0x25); //SET Ra/Rb
   wr_cmd(0x81);  //SET Register
    wr_cmd(0x1B); //SET constrast
   wr_cmd(0xA2);  //SET BIAS when  Duty   1/65     1/55    1/49    1/33
                  //         Bias: 0xA2:     1/9     1/8    1/8    1/6
                  //               0xA3:     1/7     1/6    1/6    1/5
    wr_cmd(0x2C); //SET POWER CONTROL
    wr_cmd(0x2E);
     wr_cmd(0x2F);

    wr_cmd(0xaf); //dispaly on
}
```

15. ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

ITEM	SYMBOL	CONDITIONS	CRITERION
OPERATING TEMPERATURE	TOPR	-20℃ ~ +70℃	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION
STORAGE TEMPERATURE	TSTG	-30℃ ~ +80℃	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION

16. RELIABILITY

ITEM	CONDITIONS	CRITERION
OPERATING TEMPERATURE	HIGH TEMPERTURE +70℃ 96HRS	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION
	LOW TEMPERTURE -20℃ 96HRS	
STORAGE TEMPERATURE	HIGH TEMPERTURE +80℃ 96HRS	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION
	LOW TEMPERTURE - 30℃ 96HRS	
HUMIDITY	40℃ 90%RH 96HRS	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION
VIBRATION	· Operating Time: thirty minutes exposure for each direction (X,Y,Z) · Sweep Frequency: 10 ~ 55Hz (1 min) · Amplitude: 1.5mm	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION
THERMAL SHOCK	-20℃(30mins) ←→+70℃(30mins) 10 cycles	NO DEFECT IN DISPLAYING AND OPERATIONAL FUNCTION

NOTE:TEST CONDITION

(1) TEMPERATURE AND HUMIDITY: IF NO SPECIFICATION,TEMP.SET AT 25±2℃,HUMIDITY SET AT 60±5%RH

(2) OPERATING STATE:SAMPLES SUBJECT TO THE TESTS SHALL BE IN "OPERATING" CONDITION

17. PRECAUTION FOR USE

The following precautions should be followed, since this module contains precise parts.

(1) Do not store module for an extended periods of time under the conditions of high temperature and high humidity.

(2) Avoid using or storing the module in areas that expose it to direct sunlight or ultraviolet rays.

(3) Use protective finger covers when handling the module to avoid scratching or staining the module.

(4) Care should be taken not to expose the module to static electricity, because the module contains C-MOS LSI's.

(5) The LSI is sensitive to light.
The user's product should be designed so that LSI is not exposed to any light during operation.

(6) During installation, cover the display area with acrylic protection plates to protect the polarizer plate and LCD cells.

(7) Do not apply any excessive shocks to the module because the module contains sensitive LCD cells.
Do not use a module, which has experienced strong mechanical shock.

(8) Care should be taken when the power supply turns on as following.
(a) Do not apply any input signals before the supplying voltage is applied.
(b) Do not turn off the power supply while any input signals are applied.

Caution

(1) Dangerous. Do not shock glass because glass can break.

(2) If module breaks, do not touch it directly.
(Glass could stick or cut skin.)

(3) Do not swallow Liquid Crystal.
(In case of broken LCD panel, do not swallow liquid crystal even if there is no proof that liquid crystal is poisonous.)

(4) If liquid crystal is exposed to skin, wash the area thoroughly with alcohol or soap.

(5) When disposing of the product, please observe industrial waste disposal laws in each country and district.

(6) In case of injury, give immediate treatment and consult with a doctor.

(7) This product is constructed precisely. Don't disassemble or modify.

※ Neglecting this mark can cause injury to humans and damage to materials