

**CHINA DISPLAY TECHNOLOGY CO., LTD.**

深圳市新深辉显示技术有限公司

# **SPECIFICATION**

Product No.: **SVM160105CSGWJ-4**

Customer: \_\_\_\_\_

Issue Date: **February2, 2007**

<b>CHINA DISPLAY TECH.</b>		
<b>APPROVED</b>	<b>CHECKED</b>	<b>PREPARED</b>

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Data	Sheet No.	Summary
		NEW

Table Of Contents

<b>Section/Sub Section</b>	<b>Pages</b>	<b>Rev.</b>
1 General Description	3	0
2 Mechanical Diagram	4	0
3 I/O Terminal	5	0
3.1 Pin Description	5	0
3.2 Block Diagram	5	0
4. Timing Characteristics	6	0
5.1 Code Description	6	0
6.1 Electro-Optical Characteristics Test	7	0
6.2 Definition of Operating Voltage, Vop	8	0
6.3 Definition of Optical Response Time	8	0
6.4 Definition of Viewing Angle $\theta$ and $\varphi$	9	0
6.5 Definition of Contrast ratio, CR	9	0
6.6 Reliability Test	9	0
7 Precautions for Using LCD Module	10	0
7.1 Handling Precautions	10	0
7.2 Others	11	0
8.1 Electro-Static Discharge Control	11	0
8.2Precaution For Soldering To The LCM	12	0
8.3 Precaution For Operation	12	0
8.4 Storage	12	0
8.5 Safety	13	0
9.1 Reference Program	13	0

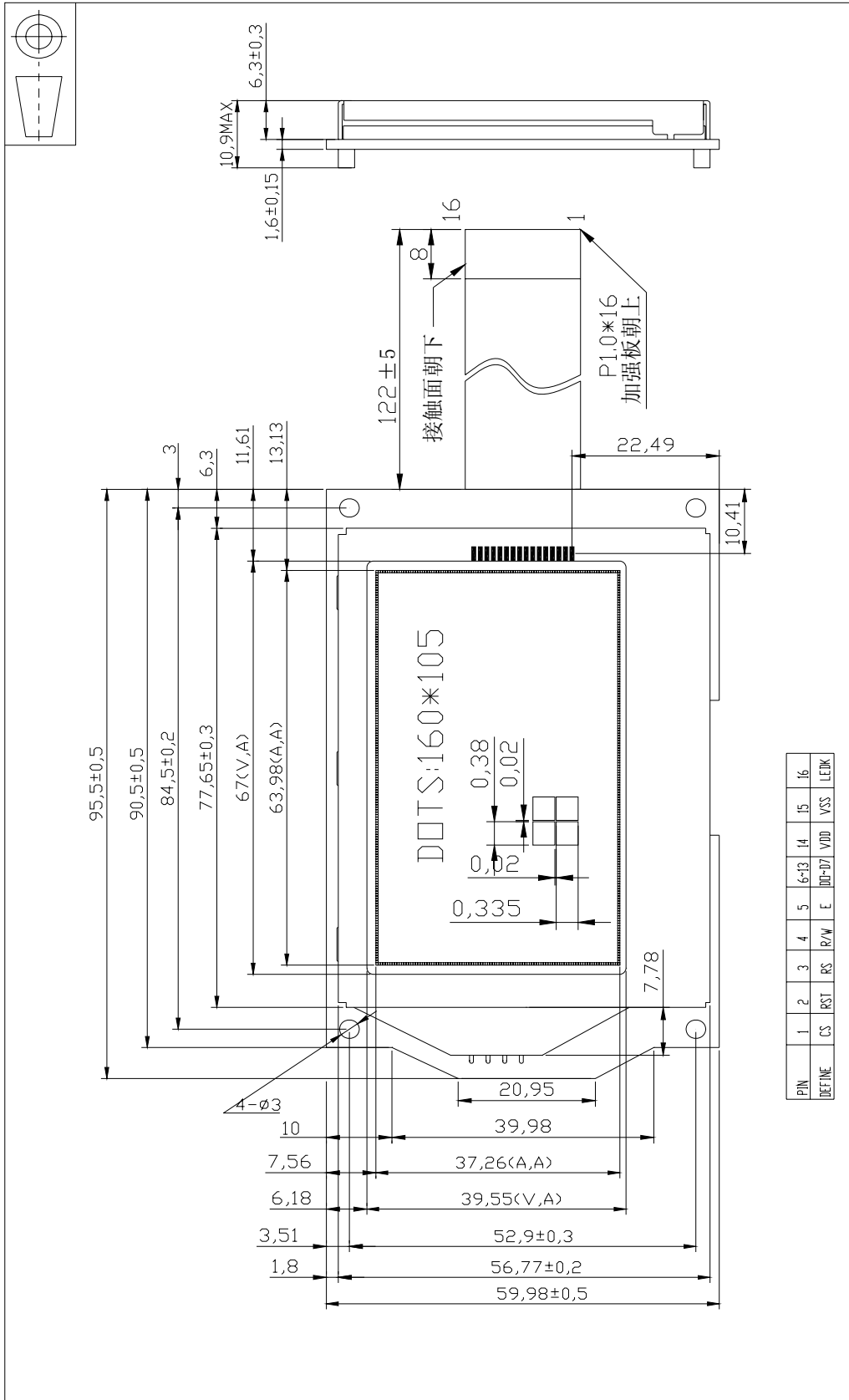
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## **1 General Description**


Item	Standard Value	Unit
Display Format	160*105Dots	
LCD Driving Method	1/105Duty ,1/11Bias	
Viewing Direction	6 O'clock	
Power Supply Voltage	3.3	V
Supply Current	40(Max)	mA
Dimensional Outline (W*H*D)	95.5*60*10.9	mm
Viewing Area (W*H)	67*39.55	mm
Active Area (W*H)	63.98*37.26	mm
Dots Size (W*H)	0.38*0.335	mm
Dots Pitch (W*H)	0.40*0.355	mm
Display Mode	Transmissive, STN, Positive, Blue	
Backlight Type & Color	Side , White	
Driver IC	S6B0719X01-B0CT	
Interface Type	Parallel 6800 MPU	
Operation Temperature	T <sub>OPL</sub> = -20 , T <sub>OPH</sub> = 70	°C
Storage Temperature	T <sub>STL</sub> = -30 , T <sub>STH</sub> = 80	°C
J1 Jump: use the external resistors, R <sub>b</sub> = R5 + R6, R <sub>a</sub> = R3    R4. (refer S6B0719 Specification)		
J2 Jump: use the internal resistors.		
J3 Jump: 6800-series MPU interface.		
J4 Jump: 8080-series MPU interface.		
J1 and J2 (J3 and J4) NOT Jump at the same time.		

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## 2 Mechanical Diagram



VER.		REVISED RECORD	DATE	LCM SPECIFICATION				APPROVED BY	UNMARKED TOLERANCE
A0	NEW	ISSUE	07.01.22	1.DISPLAY TYPE	STN/BLUE/NEGATIVE	5.VDD	3.3V	CUSTOM NO.	±0.2
A1				2.VIEWING DIRECTION	6:00	6.OPERATION TEMP.	-20°C~70°C	DESIGN NO.& (VERSION)	mm
A2				3.POLARIZER MODE	TRANSMISSIVE	7.STORAGE TEMP.	-30°C~80°C	MODEL NO.	SVMI60105CSGWJ-4
A3				4.DRIVE METHOD	1/10SDUTY.1/1BIAS	8.CONNECTOR	COG	YXZ	07.01.22
				REMARK				SHEET 1 OF 1	
								FAX NO:0755-8262915	


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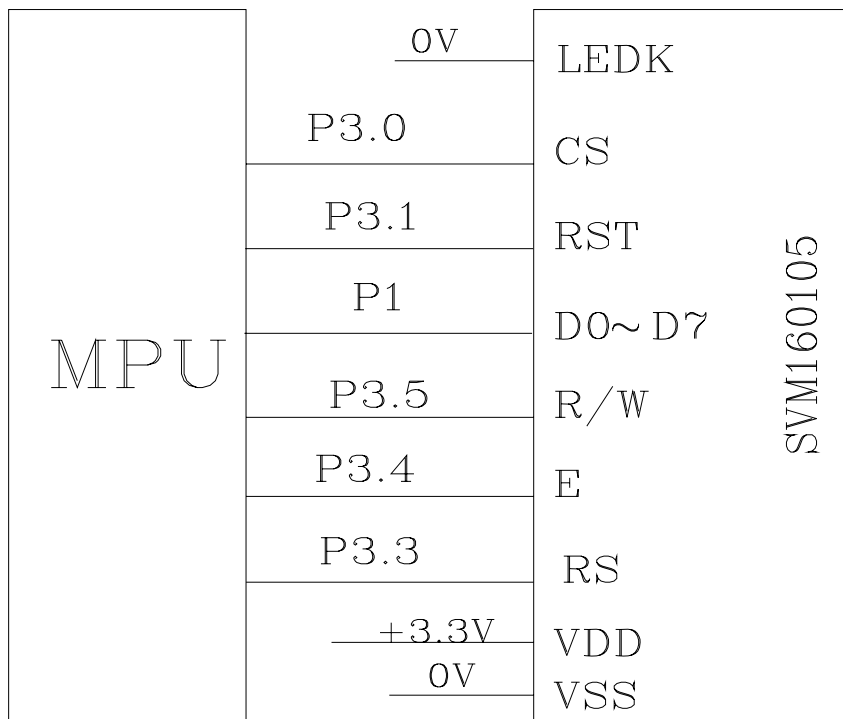
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**3 I/O Terminal**

**3.1 Pin Description**

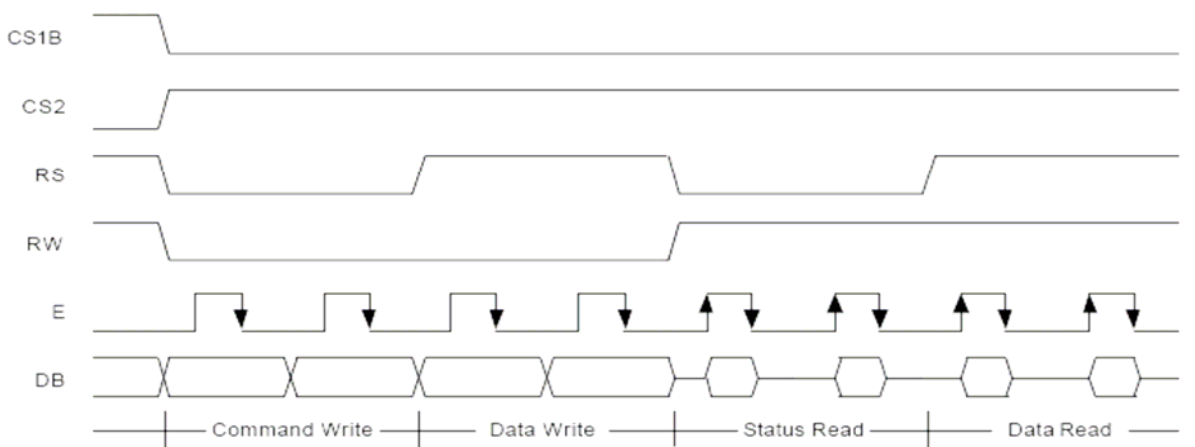
NO.	SYMBOL	I/O	FUNCTION
1	CS	I	This is the chip select signal. When CS="L", then chip select becomes active, and data/command I/O is enabled.
2	RST	I	Reset at low level Reset signal result to close display and set line to 1.
3	RS	I	Register select input pin
4	R/W	I	Read/write selection
5	E	I	Read/write execution control pin
6~13	DB0~DB7	I/O	8 bit data bus.
14	VDD	Supply	Logical power, 3.3V.
15	VSS	Supply	Logical ground. 0V.
16	LEDK	Supply	Backlight power(-)0V

**3.2 Block Diagram**



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## 4 Timing sequence 6800-Series MPU Interface protocol (PS="H", C68="H")



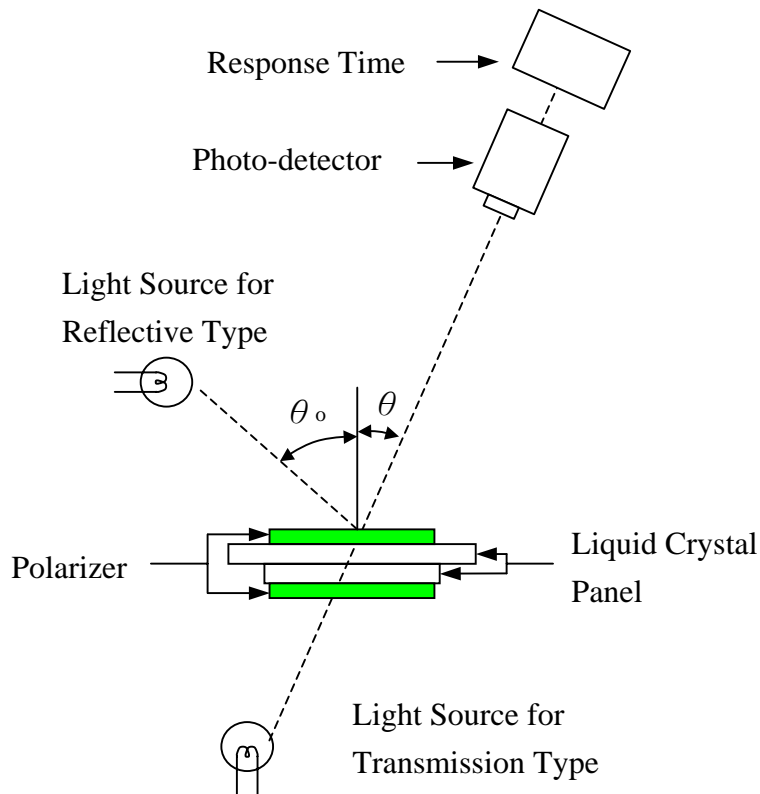
## 5 .1 CODE DESCRIPTION

Instruction	RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0	Description
Read display data	1	1	Read data								Read data from DDRAM
Write display data	1	0	Write data								Write data into DDRAM
Read status	0	1	BUSY	ADC	ON	RES	0	0	0	0	Read the internal status
Set page address	0	0	1	0	1	1	P3	P2	P1	P0	Set page address
Set column address MSB	0	0	0	0	0	1	Y7	Y6	Y5	Y4	Set column address MSB
Set column address LSB	0	0	0	0	0	0	Y3	Y2	Y1	Y0	Set column address LSB
Set modify-read	0	0	1	1	1	0	0	0	0	0	Set modify-read mode
Reset modify-read	0	0	1	1	1	0	1	1	1	0	release modify-read mode
Display ON / OFF	0	0	1	0	1	0	1	1	1	D	D = 0: display OFF D = 1: display ON
Set initial display line register	0	0	0	1	0	0	0	0	x	x	2-byte instruction to specify the initial display line to realize vertical scrolling
	0	0	x	S6	S5	S4	S3	S2	S1	S0	
Set initial COM0 register	0	0	0	1	0	0	0	1	x	x	2-byte instruction to specify the initial COM0 to realize window scrolling
	0	0	x	C6	C5	C4	C3	C2	C1	C0	
Set partial display duty ratio	0	0	0	1	0	0	1	0	x	x	2-byte instruction to set partial display duty ratio
	0	0	x	D6	D5	D4	D3	D2	D1	D0	
Set N-line inversion	0	0	0	1	0	0	1	1	x	x	2-byte instruction to set n-line inversion register
	0	0	x	x	x	N4	N3	N2	N1	N0	
Release N-line inversion	0	0	1	1	1	0	0	1	0	0	Release N-line Inversion mode
Reverse display ON / OFF	0	0	1	0	1	0	0	1	1	REV	REV = 0: normal display REV = 1: reverse display
Entire display ON / OFF	0	0	1	0	1	0	0	1	0	EON	EON = 0: normal display EON = 1: entire display ON

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Instruction	RS	RW	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0	Description
Power control	0	0	0	0	1	0	1	VC	VR	VF	Control power circuit operation
Select DC-DC step-up	0	0	0	1	1	0	0	1	DC1	DC0	Select the step-up of the internal voltage converter
Select regulator resistor	0	0	0	0	1	0	0	R2	R1	R0	Select internal resistance ratio of the regulator resistor
Set electronic volume register	0	0	1	0	0	0	0	0	0	1	2-byte instruction to specify the electronic volume register
	0	0	x	x	EV5	EV4	EV3	EV2	EV1	EV0	
Select LCD bias	0	0	0	1	0	1	0	B2	B1	B0	Select LCD bias
SHL select	0	0	1	1	0	0	SHL	x	x	x	COM bi-directional selection SHL = 0: normal direction SHL = 1: reverse direction
ADC select	0	0	1	0	1	0	0	0	0	ADC	SEG bi-directional selection ADC = 0: normal direction ADC = 1: reverse direction
Set static indicator mode	0	0	1	0	1	0	1	1	0	SM	2-byte instruction to specify the static indicator mode
Set static indicator register	0	0	x	x	x	x	x	x	S1	S0	
Oscillator ON start	0	0	1	0	1	0	1	0	1	1	Start the built-in oscillator
Set power save mode	0	0	1	0	1	0	1	0	0	P	P = 0: standby mode P = 1: sleep mode
Release power save mode	0	0	1	1	1	0	0	0	0	1	Release power save mode
Reset	0	0	1	1	1	0	0	0	1	0	Initialize the internal functions
NOP	0	0	1	1	1	0	0	0	1	1	<u>No operation</u>
Test instruction	0	0	1	1	1	1	x	x	x	x	<u>Don't use this instruction.</u>

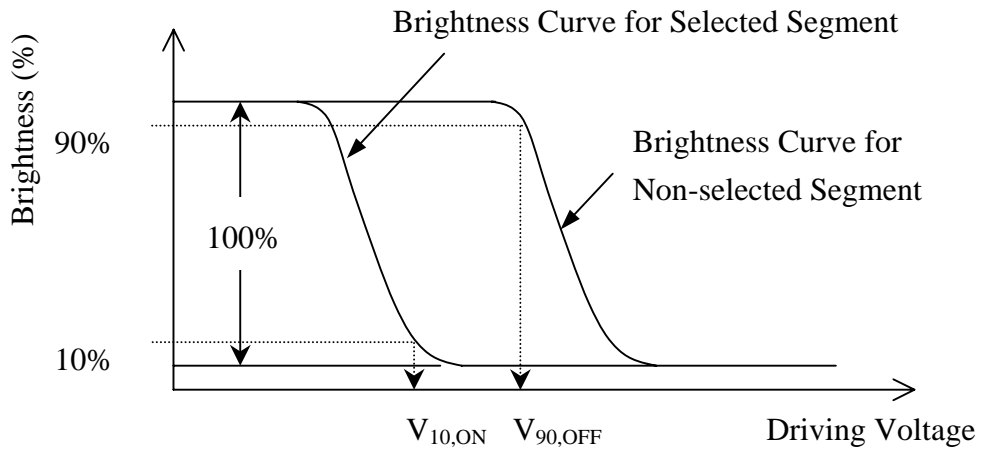
## 6.1 Electro-Optical Characteristics Test Method



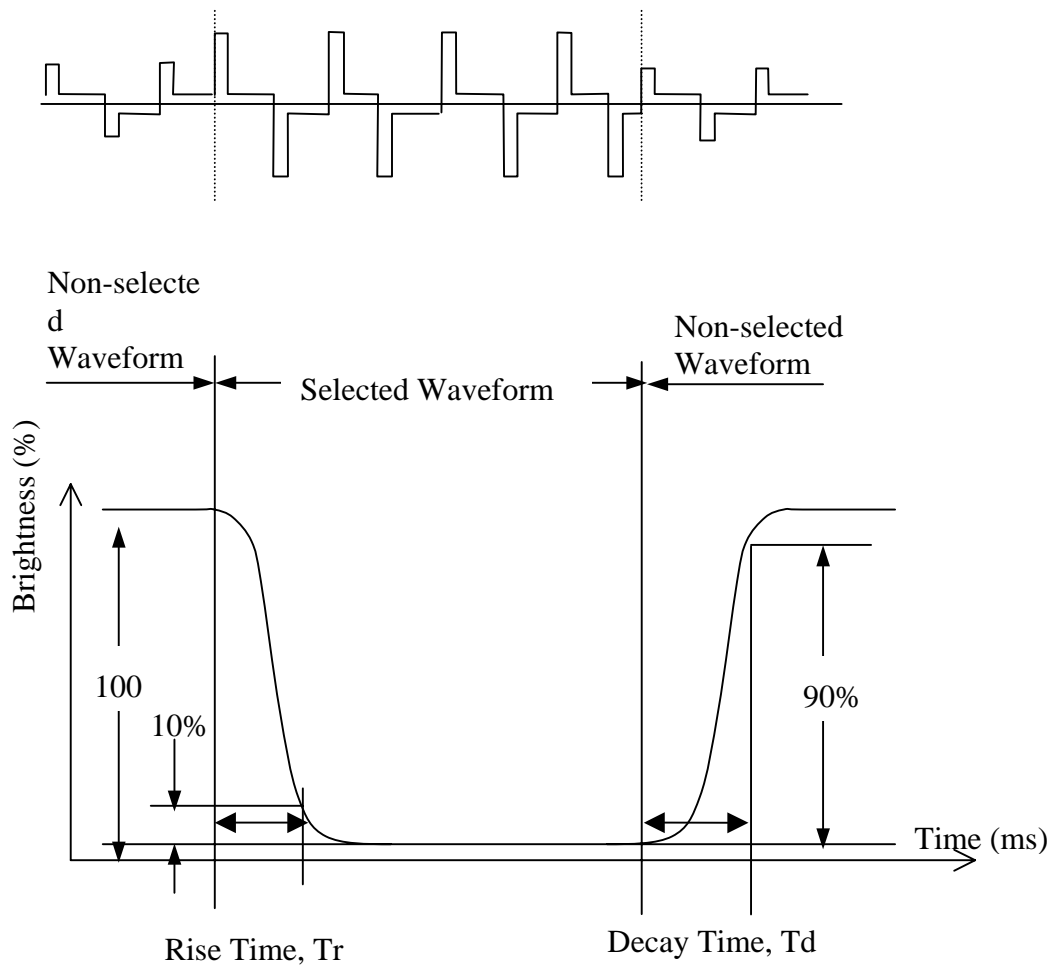
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## 6.2 Definition of Operating Voltage, Vop

$$V_{op} = (V_{10,ON} + V_{90,OFF})/2$$

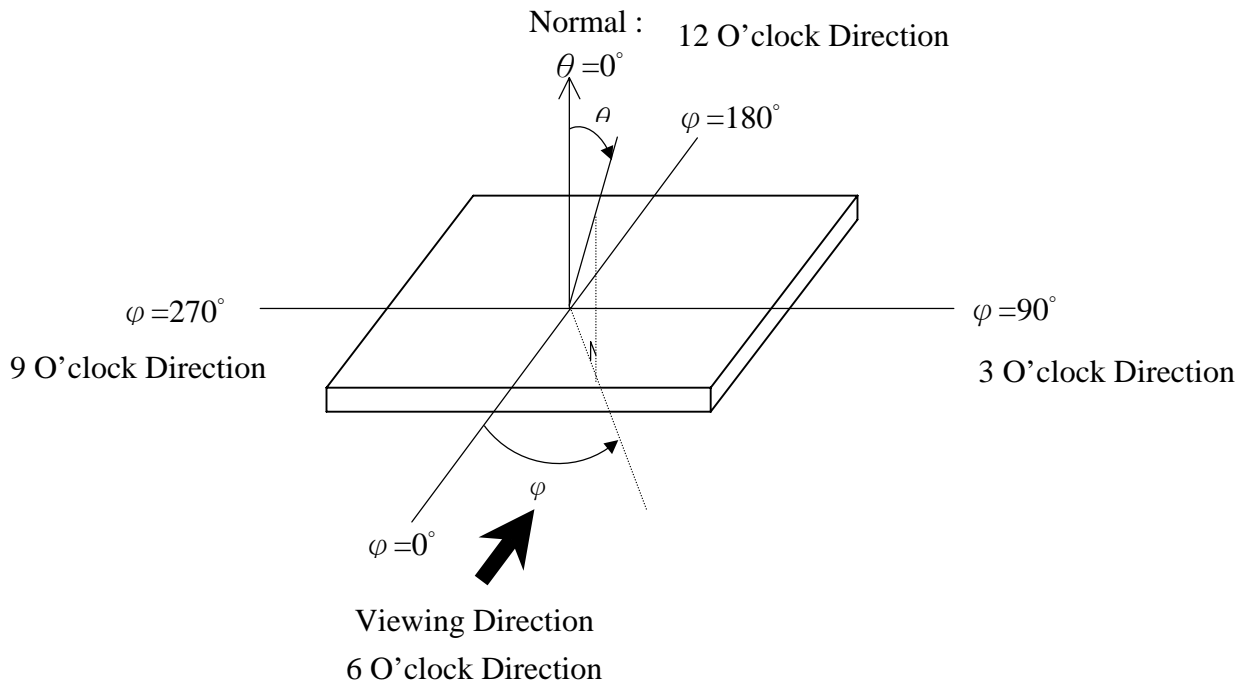


## 6.3 Definition of Optical Response Time



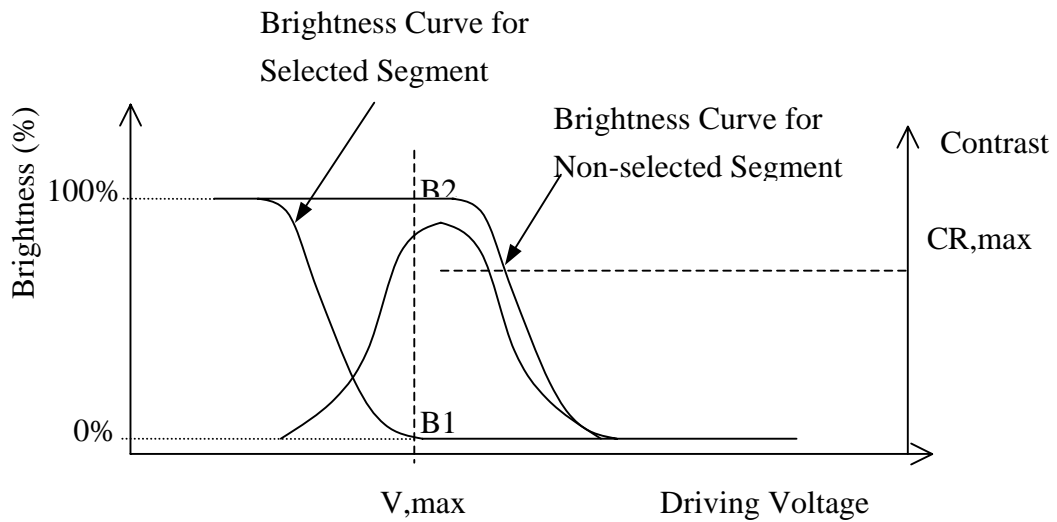
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**6.4 Definition of Viewing Angle  $\theta$  and  $\varphi$**



**6.5 Definition of Contrast ratio, CR**

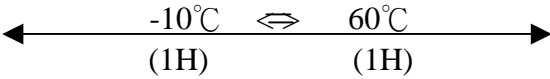
$$CR = \frac{\text{Brightness of Non-selected Segment (B2)}}{\text{Brightness of Selected Segment (B1)}}$$



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## **6.6 Reliability Test**

### **6.6.1 Content of Reliability Test**

No.	Test Item	Content of Test	Condition
<b>Environmental Test</b>			
1	High Temperature Storage	Endurance test applying the high temperature for a long time	60°C 120H
2	Low Temperature Storage	Endurance test applying the low temperature for a long time	-10°C 120H
3	High Temperature/Humidity Storage	Endurance test applying the high temperature and high humidity for a long time	40°C & 90% RH 100H
4	Heat Shock	Endurance test applying The low and high temperature cycles  1 Cycle	-10 / 60°C 5 cycle

### **6.6.2 Failure Judgement Criterion**

After the above-mentioned test

There should not exist conspicuous failure of display quality and appearance.

No degradation of the display readability.

There should not have any abnormality of function.

## **7 Precautions for Using LCD Module**

### **7.1 Handing Precautions**

- (1) The display panel is made of glass. Do not subject it to a mechanical shock or impact by dropping it.
- (2) If the display panel is damaged and the liquid crystal substance leaks out, be sure not to get any in your mouth. If the substance contacts your skin or clothes, wash it off using soap and water.
- (3) Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary.
- (4) The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully.
- (5) If the display surface becomes contaminated, breathe on the surface and gently wipe it with a soft dry cloth. If it is heavily contaminated, moisten a cloth with one of the following solvents:
  - Isopropyl alcohol
  - Ethyl alcohol
- (6) Solvents other than those above mentioned may damage the polarizer. Especially, do not use the following:
  - Water
  - Ketone

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- Aromatic solvents

- (7) Extra care to minimize corrosion of the electrode. Water droplets, moisture condensation or a current flow in a high-humidity environment accelerates corrosion of the electrode.
- (8) Install the LCD Module by using the mounting holes. When mounting the LCD Module, make sure it is free of twisting, warping and distortion. In particular, do not forcibly pull or bend the I/O cable or the backlight cable.
- (9) Do not attempt to disassemble or process the LCD Module.
- (10) NC terminal should be open. Do not connect anything.
- (11) If the logic circuit power is off, do not apply the input signals.
- (12) To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.
  - Be sure to ground the body when handling the LCD Module.
  - Tools required for assembling, such as soldering irons, must be properly grounded.
  - To reduce the amount of static electricity generated, do not conduct assembling and other work under dry conditions.
  - The LCD Module is coated with a film to protect the display surface. Exercise care when peeling off this protective film since static electricity may be generated.

### **7.2 Others**

- (1) Liquid crystals solidify under low temperature (below the storage temperature range) leading to defective orientation or the generation of air bubbles (black or white). Air bubbles may also be generated if the module is subject to a low temperature.
- (2) If the LCD Module have been operating for a long time showing the same display patterns the display patterns may remain on the screen as ghost images and a slight contrast irregularity may also appear. A normal operating status can be recovered by suspending use for some time. It should be noted that this phenomenon does not adversely affect performance reliability.
- (3) To minimize the performance degradation of the LCD Module resulting from destruction caused by static electricity etc. exercise care to avoid holding the following sections when handling the modules.
  - Exposed area of the printed circuit board.
  - Terminal electrode sections.

### **8.1 Electro-Static Discharge Control**

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

- (1) Make certain that you are grounded when handling LCM.
- (2) Before removing 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.

**SVM160105CSGWJ-4**

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- (4) When using an electric screwdriver to attach LCM, the screwdriver should be of ground potential 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 workbenches to 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.

### **8.2 Precaution For Soldering To The LCM**

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

-Soldering iron temperature:  $280 \pm 10^{\circ}\text{C}$ .

-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 due 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 removing the electroluminescent panel from the PC board, be sure the solder has completely melted, otherwise the soldered pad on the PC board could be damaged.

### **8.3 Precaution For Operation**

Viewing angle varies with the change of liquid crystal driving voltage ( $V_0$ ). Adjust  $V_0$  to show the best contrast.

- (1) Driving the LCD in the voltage above the limit will shorten its lifetime.
- (2) 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.
- (3) 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 on.
- (5) Condensation on terminals can cause an electrochemical reaction disrupting the terminal circuit. Therefore, it must be used under the relative condition of  $40^{\circ}\text{C}$ , 50% RH.
- (6) When turning the power on, input each signal after the positive/negative voltage becomes stable.

### **8.4 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 desiccant.
- (2) Store them in a dark place. Do not expose to sunlight or fluorescent light, keep the temperature between  $0^{\circ}\text{C}$  and  $35^{\circ}\text{C}$ .

**SVM160105CSGWJ-4**

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- (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.

### **8.5 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 leaks out of a damaged glass cell and comes in contact with the hands, wash off thoroughly with soap and water.

### **9.1 Reference Program**

```
void main(void)
{
    .....
    RST=0;
    Delay(200);
    RST=1;
    Delay(200);
    Delay(100);
    Wdata(0,0x55); //set duty
    Delay(10);
    Wdata(0,0x70);
    Delay(10);
    Wdata(0,0xa1); //ADC Select: SEG0-SEG160  A0:normal; A1:revers
    Delay(10);
    Wdata(0,0xC0); //SHL Select: COM0-COM105  C0:normal; C8:reverse
    Delay(10);
    Wdata(0,0x40); //set initial display line register
    Delay(10);
    Wdata(0,0x00);
    Delay(10);
    Wdata(0,0x44); //set Com0 register
    Delay(10);
    Wdata(0,0x00);
    Delay(10);
    Wdata(0,0xAB); // oscillator ON
    Delay(10);
```

**SVM160105CSGWJ-4**

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```
Wdata(0,0x66); //select DC-DC set up
Delay(10);
Delay(20);
Wdata(0,0x27); //Regulator Resistor Rang: 20-27
Delay(10);
Wdata(0,0x81); //Set The Reference VOLTAGE MODE
Delay(10);
Wdata(0,0x33); //CONTRAST Set Rang:0-3F
Delay(10);
Wdata(0,0x56); //LCD Bais Select
Delay(10);
Wdata(0,0x2F); //POWER Control: ALL ON VC,VR,VF
Delay(100);
Wdata(0,0xA6); //REVERSE DISPLAY A6: normal , A7 : reverse
Delay(10);
Wdata(0,0xA4); //Entire Display ON:A6 OFF:A7
Delay(10);

Wdata(0,0xAF); //Display ON

.....

}
```