CHINA DISPLAY TECHNOLOGY CO., LTD.

深圳市新深辉显示技术有限公司

SPECIFICATION

Product No.: **SVM240128BSGWJ-2**

Customer: _____

Issue Date: **AUGUST 9, 2005**

CHINA DISPLAY TECH.		
APPROVED	CHECKED	PREPARED

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Data	Sheet No.	Summary
		NEW

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1 General Description

Item	Standard Value	Unit
Display Format	Graphic 240x128Dot-matrix	
LCD Driving Method	1/128 Duty ,1/11 Bias	
Viewing Direction	6 O'clock	
Power Supply Voltage	5.0	V
Dimensional Outline (W*H*D)	144*104*14	mm
Viewing Area (W*H)	114*64	mm
Active Area (W*H)	107.95*57.55	mm
Dots Size (W*H)	0.4 *0.4	mm
Dots Pitch (W*H)	0.45* 0.45	mm
Backlight Tpye & Color	Side , White	
Display Mode	STN Negative	
Driver IC	T6963C、S6B0086X01	
Operation Temperature	T_{OPL} = -20 ,T_{OPH} = 70	℃
Storage Temperature	T_{STL} = -30 ,T_{STH} = 80	℃

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2 Mechanical Diagram

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3　I/O Terminal
3.1 Pin Description

| No.	Symbol	I/O	Function
1	FG		Frame ground
2	VSS		Logical ground
3	VDD		Logical power, 5V
4	V0	I	LCD driver voltage, be sure to use a 10K resistance between VEE and V0. /Logical ground
5	/WR	I	Write ata pin　　LOW selection
6	/RD	I	Read data pin　　LOW selection
7	/CE	I	Chip select signal
8	C/D	I	Data or Instruction select signal
9	RST	I	L　　Reset
10~17	DB0~DB7	I/O	8bit data bus
18	FS		H/L　　Font selection
19	BL+	5V	LED- supply voltage.
20	VEE		Operating voltage for LCD (variable)

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3.2 Block Diagram
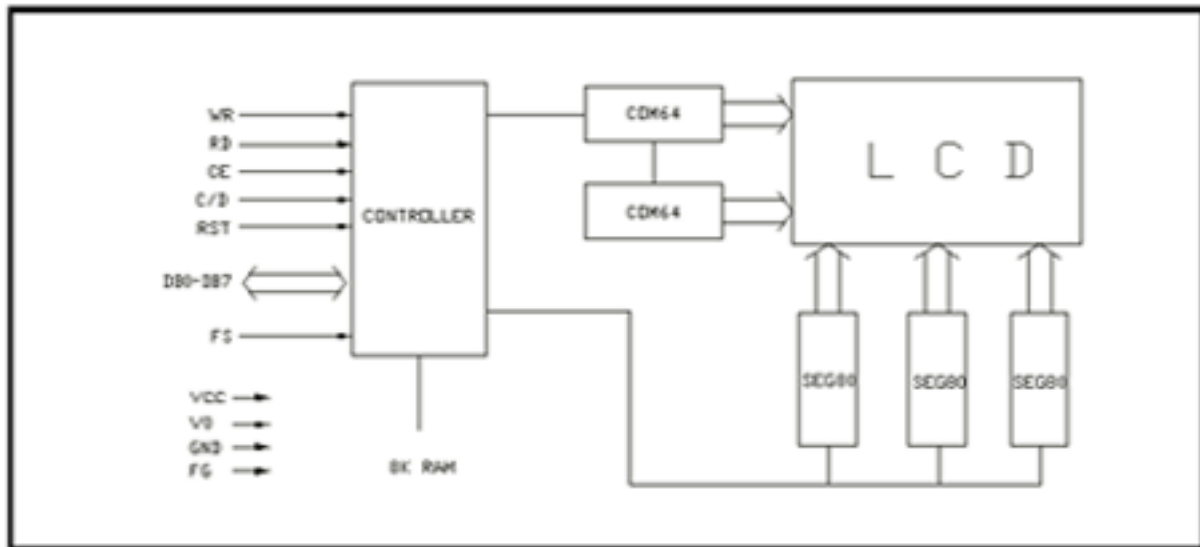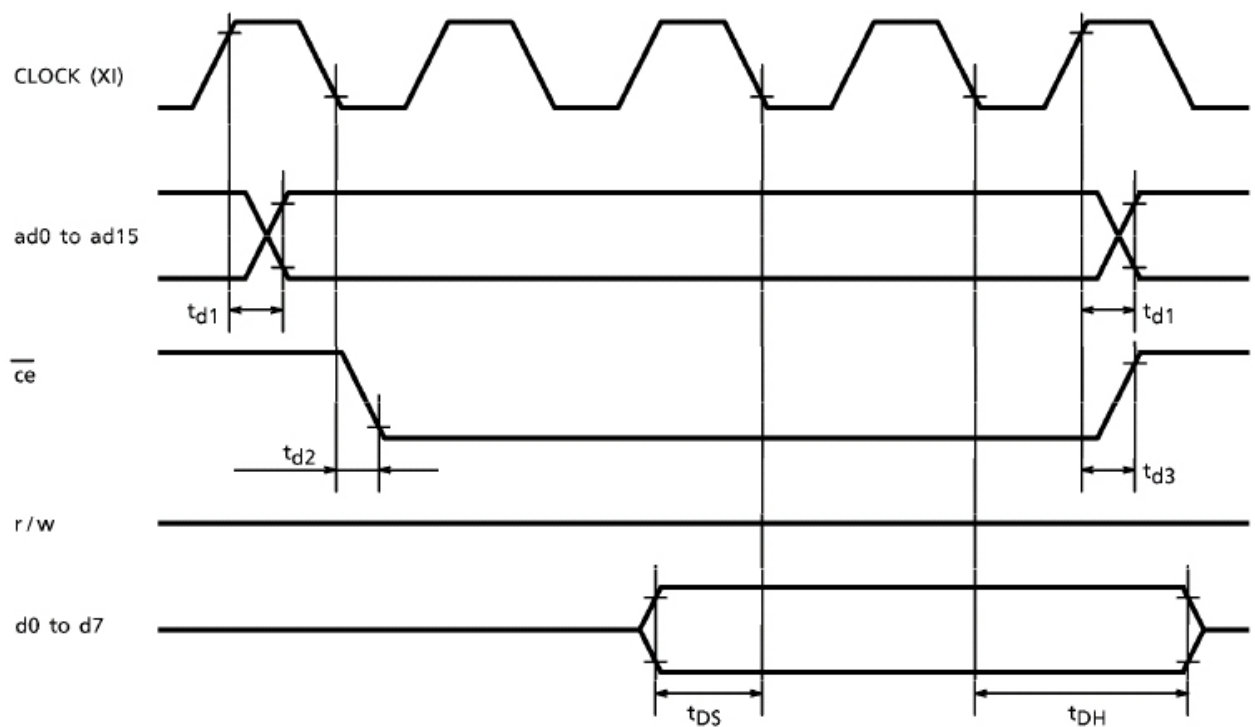

4 Timing sequence

(1) Write Timing
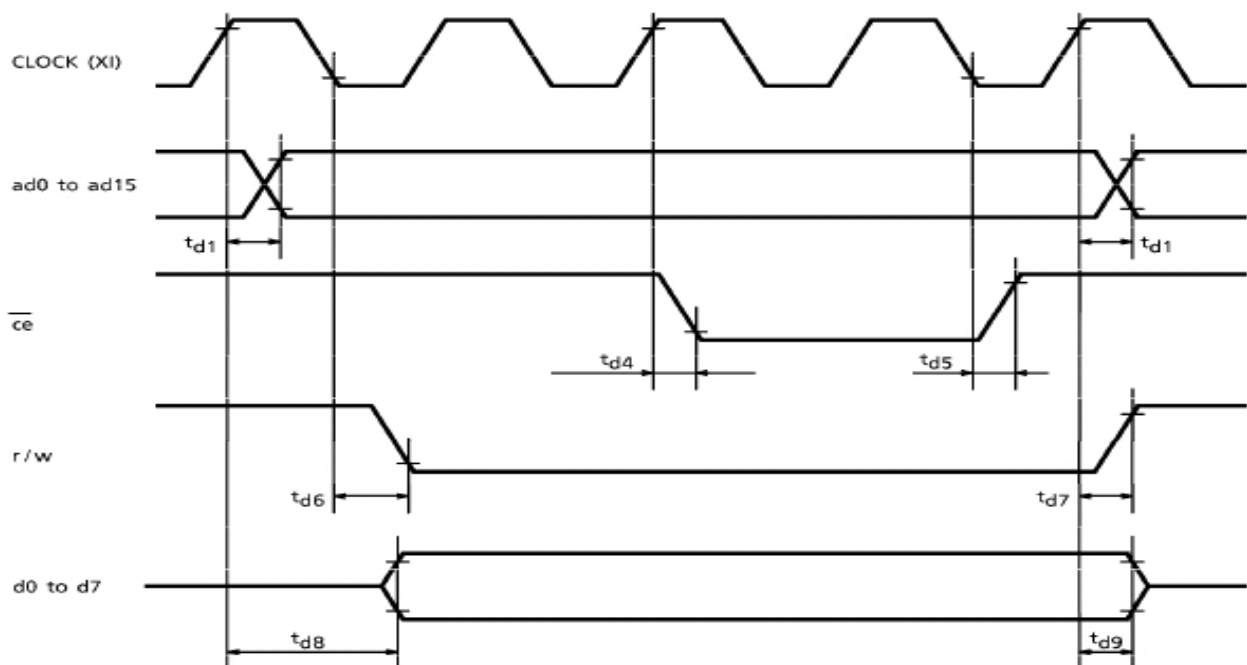
(2) read timing

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(3) timing parameters table

ITEM	SYMBOL	TEST CONDITIONS	MIN	MAX	UNIT
Address Delay Time	t_{d1}	—	—	250	ns
ce Fall Delay Time (Read)	t_{d2}	—	—	180	ns
ce Rise Delay Time (Read)	t_{d3}	—	—	180	ns
Data Set-up Time	t_{DS}	—	0	—	ns
Data Hold Time	t_{DH}	—	30	—	ns
ce Fall Delay Time (Write)	t_{d4}	—	—	200	ns
ce Rise Delay Time (Write)	t_{d5}	—	—	200	ns
r/w Fall Delay Time	t_{d6}	—	—	180	ns
r/w Rise Delay Time	t_{d7}	—	—	180	ns
Data Stable Time	t_{d8}	—	—	450	ns
Data Hold Time	t_{d9}	—	—	200	ns

5 CODE DESCRIPTION

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COMMAND	CODE	D1	D2	FUNCTION
REGISTERS SETTING	00100001	X address	Y address	Set Cursor Pointer
	00100010	Data	00H	Set Offset Register
	00100100	Low address	High address	Set Address Pointer
SET CONTROL WORD	01000000	Low address	High address	Set Text Home Address
	01000001	Columns	00H	Set Text Area
	01000010	Low address	High address	Set Graphic Home Address
	01000011	Columns	00H	Set Graphic Area
MODE SET	1000X000	—	—	OR mode
	1000X001	—	—	EXOR mode
	1000X011	—	—	AND mode
	1000X100	—	—	Text Attribute mode
	10000XXX	—	—	Internal CG ROM mode
	10001XXX	—	—	External CG RAM mode
DISPLAY MODE	10010000	—	—	Display off
	1001XX10	—	—	Cursor on, blink off
	1001XX11	—	—	Cursor on, blink on
	100101XX	—	—	Text on, graphic off
	100110XX	—	—	Text off, graphic on
	100111XX	—	—	Text on, graphic on
CURSOR PATTERN SELECT	10100000	—	—	1-line cursor
	10100001	—	—	2-line cursor
	10100010	—	—	3-line cursor
	10100011	—	—	4-line cursor
	10100100	—	—	5-line cursor
	10100101	—	—	6-line cursor
	10100110	—	—	7-line cursor
	10100111	—	—	8-line cursor
DATA AUTO READ/ WRITE	10110000	—	—	Set Data Auto Write
	10110001	—	—	Set Data Auto Read
DATA READ/WRITE	11000000	Data	—	Data Write and increment ADP
	11000001	—	—	Data Read and Increment ADP
	11000010	Data	—	Data Write and Decrement ADP
	11000011	—	—	Data Read and Decrement ADP
	11000100	Data	—	Data Write and Nonvariable ADP
	11000101	—	—	Data Read and Nonvariable ADP
SCREEN PEEK	11100000	—	—	Screen Peek

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COMMAND	CODE	D1	D2	FUNCTION
BIT SET/RESET	11110XXX	—	—	Bit Reset
	11111XXX	—	—	Bit Set
	1111X000	—	—	Bit 0 (LSB)
	1111X001	—	—	Bit 1
	1111X010	—	—	Bit 2
	1111X011	—	—	Bit 3
	1111X100	—	—	Bit 4
	1111X101	—	—	Bit 5
	1111X110	—	—	Bit 6
	1111X111	—	—	Bit 7 (MSB)

6   Electro-Optical Characteristics

Item	Symbol	Condition	Temp	Min	Typ	Max	Units	Note
Operating Volt.	V_{LCD}	$\theta = \phi = 0$	-10℃	----	----	----	V	
			25℃	----	10.5	----		
			60℃	----	----	----		
Response Time	Rise Time (Tr)	$\theta = \phi = 0$	-10℃	----	----	----	msec	
	Decay Time (Td)			----	----	----		
	Rise Time (Tr)		25℃	----	----	240		
	Decay Time (Td)			----	----	240		
	Rise Time (Tr)		60℃	----	----	----		
	Decay Time (Td)			----	----	----		
Viewing Angle Range	θ	$\phi = 0°$	25℃	----	----	30	Deg	$CR \geqq 2$
		$\phi = 90°$		----	----	30		
		$\phi = 180°$		----	----	30		
		$\phi = 270°$		----	----	30		
Contrast Ratio	Cr	$\theta = \phi = 0$	25℃	3	4.5	----	---	

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6.1 Electro-Optical Characteristics Test Method

Response Time →

Photo-detector →

Light Source for
Reflective Type

θ o θ

Polarizer →

Liquid Crystal
Panel

Light Source for
Transmission Type
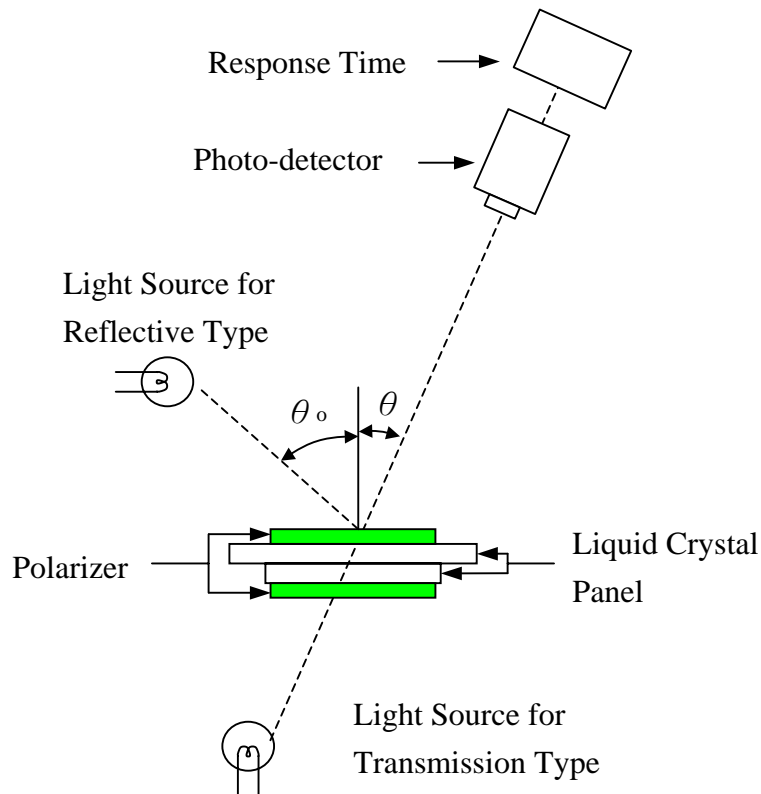
6.2 Definition of Operating Voltage, Vop

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

Brightness Curve for Selected Segment

Brightness Curve for
Non-selected Segment

Brightness (%)

90%

100%

10%

$V_{10,ON}$ $V_{90,OFF}$ Driving Voltage
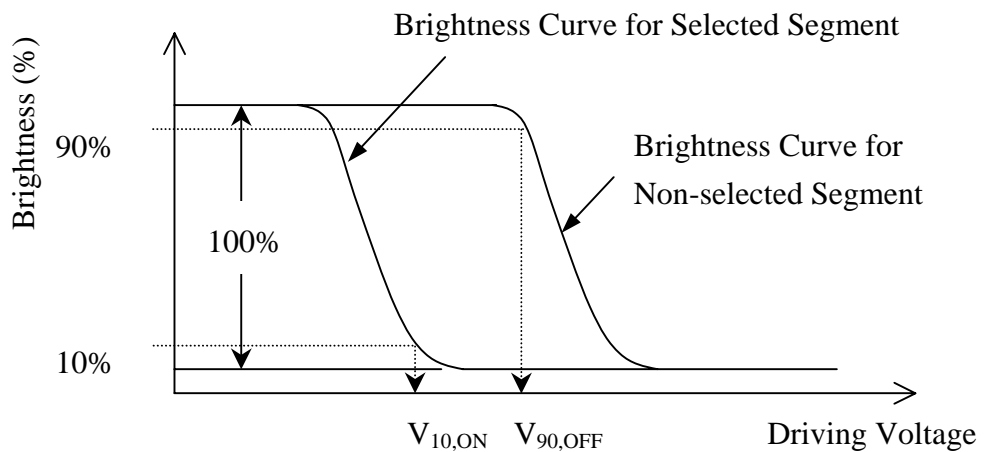
6.3 Definition of Optical Response Time

Rise Time, Tr   Decay Time, Td
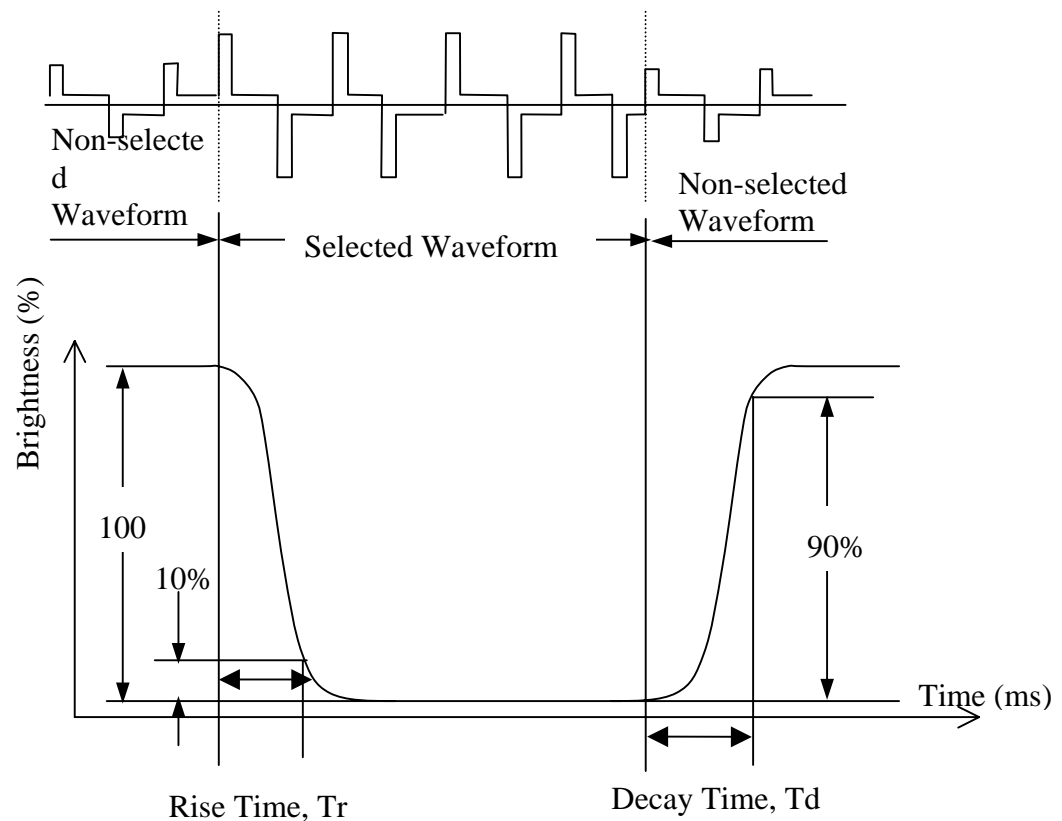
6.4 Definition of Viewing Angle θ and φ
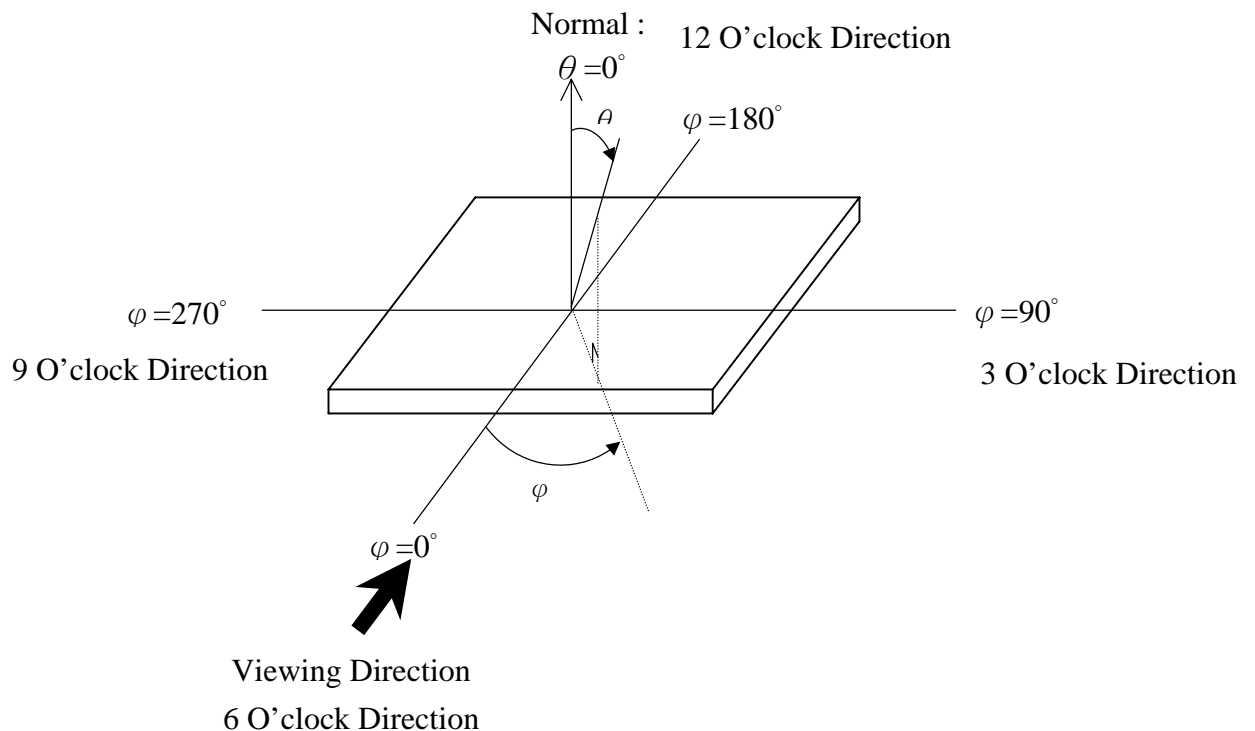
6.5 Definition of Contrast ratio, CR

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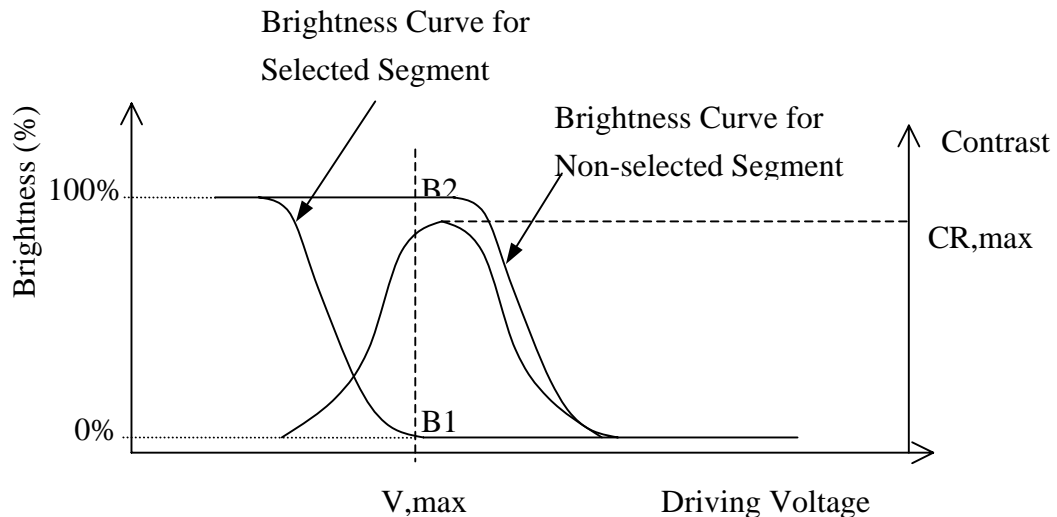
6.6 Reliability Test

6.6.1Content of Reliability Test

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

6.6.2Failure 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.

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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
- 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 he 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.

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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 Using LCD Modules
8.1 Liquid Crystal Display Modules

LCD is composed of glass and polarizer. Pay attention to the following items when handling.

(1) Please keep the temperature within specified range for use and storage. Polarization degradation, bubble generation or polarizer peel-off may occur with high temperature and high humidity.

(2) Do not touch, push or rub the exposed polarizers with anything harder than a HB pencil lead (glass, tweezers, etc).

(3) N-hexane is recommended for cleaning the adhesives used to attach front/rear polarizers and reflectors made of organic substances, which will be damaged by chemicals such as acetone, toluene, toluene, ethanol and isopropyl alcohol.

(4) When the display surface becomes dusty, wipe gently with absorbent cotton or other soft material like chamois soaked in petroleum ether. Do not scrub hard to avoid damaging the display surface.

(5) Wipe off saliva or water drops immediately, contact with water over a long period of time may cause deformation or color fading.

(6) Avoid contacting oil and fats.

(7) Condensation on the surface and contact with terminals due to cold will damage, stain or polarizers. After products are tested at low temperature they must be warmed up in a container before coming is contacting with room temperature air.

(8) Do not put or attach anything on the display area to avoid leaving marks on.

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(9) Do not touch the display with bare hands. This will stain the display area and degrade insulation between terminals (some cosmetics are determinate to the polarizers).

(10) As glass is fragile, it tends to become or chipped during handling especially on the edges. Please avoid dropping or jarring.

8.2 InstallingLCD Module

Attend to the following items when installing the LCM.

(1) Cover the surface with a transparent protective plate to protect the polarizer and LC cell.

(2) When assembling the LCM into other equipment, the spacer to the bit between the LCM and the fitting plate should have enough height to avoid causing stress to the module surface, refer to the individual specifications for measurements. The measurement tolerance should be ±0.1mm.

8.3 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 handing 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.

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

8.4 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 ±10°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 the 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

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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.

8.5 Precaution For Operation

Viewing angle varies with the change of liquid crystal driving voltage (Vo). Adjust Vo 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°C, 50% RH.

(6) When turning the power on, input each signal after the positive/negative voltage becomes stable.

8.6 Storage

When storing LCDS as spares for some years, the following precaution are necessary.

(1) Store them in a sealed polyethylene bag. If properly scaled, 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°C and 35°C.

(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.

8.7 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.

8.8 Limited Warranty

Unless agreed between China Display Technology and customer, China Display Technology will replace or repair any of its LCD and modules which are found to be functionally defective when inspected in accordance with China Display Technology LCD acceptance standards (copies available upon request) for a period of one year from date of shipments. Cosmetic/visual defects must be returned to China Display Technology within 90 days of shipment. Confirmation of such

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date shall be based on freight documents. The warranty liability of China Display Technology is limited to repair and/or replacement on the terms set forth above. China Display Technology will not be responsible for any subsequent or consequential events.