

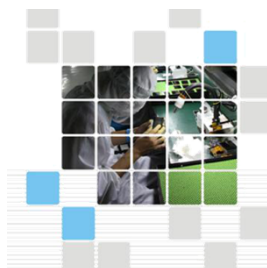
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SPECIFICATION

VXT280QSA-07C

☐ Preliminary Specification

☐ Final Specification



Approved By:

Date:

2. Revision Record

Date	Rev.No.	Page	Revision Items	Prepared
2025.4.18	V00		The first release	Solon

3. General Specifications

VXT280QSA-07C is a Capacitive touch TFT-LCD module. It is composed of a TFT-LCD panel, driver IC, FPC, a back light and CTP unit. The 2.8" display area contains 240x320 pixels and can display up to 16.7M colors. This product accords with RoHS environmental criterion.

3.1 LCD Parameter

Item	Contents	Unit	Note
LCD Type	TFT	-	
Display color	262K		1
Viewing Direction	ALL	O'Clock	
Operating temperature	-20~+70	°C	
Storage temperature	-30~+80	°C	
Module size	57.2X77.6X3.4	mm	2
Active Area(W×H)	43.20X57.60	mm	
Number of Dots	240×320	dots	
Controller	ST7789T3	-	
Power Supply Voltage	2.8	V	
Backlight	8-LEDs (white)	pcs	
Weight	---	g	
Interface	SPI	-	

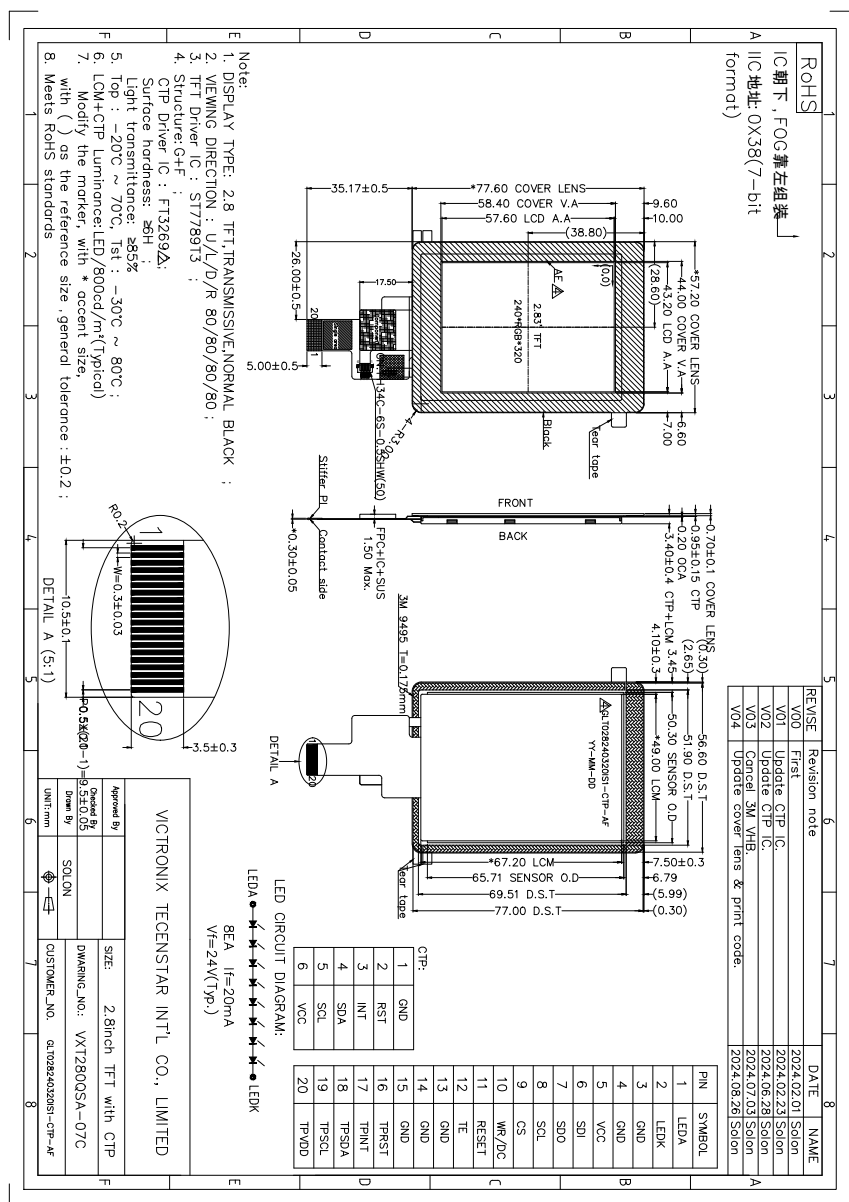
Note 1: Color tune is slightly changed by temperature and driving voltage.

Note 2: Without FPC and Solder.

3.2 CTP Parameter

Item	Contents	Unit	Note
Cover View Area	44.0(H)X58.4(V)		
CTP Resolution	240x320	dots	
Interface Mode	IIC	-	
Touch Mode	5 Human fingers multi-touch	-	
Surface hardness	$\geq 6H$	-	
Transparency	$\geq 85\%$	-	
Accuracy	Centre $\pm 1.5\text{mm}$, Edge $\pm 2.5\text{mm}$	mm	
CTP Controller	FT3269	-	
Power Supply Voltage	3.3	V	

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5. Absolute Maximum Ratings(Ta=25°C)

5.1 Electrical Absolute Maximum Ratings.(V_{ss}=0V ,Ta=25°C)

Item	Symbol	Min.	Max.	Unit	Note
Power Supply Voltage	V _{CC}	-0.3	4.6	V	1, 2
CTP Power Supply Voltage	V _{DD}	2.8	3.3	V	1, 2

Notes:

1. If the module is above these absolute maximum ratings. It may become permanently damaged. Using the module within the following electrical characteristic conditions are also exceeded, the module will malfunction and cause poor reliability.
2. V_{DD} > V_{SS} must be maintained.
3. Please be sure users are grounded when handling LCD Module.

5.2 Environmental Absolute Maximum Ratings.

Item	Storage		Operating	
	MIN.	MAX.	MIN.	MAX.
Ambient Temperature	-30°C	80°C	-20°C	70°C
Humidity	-	-	-	-

1. The response time will become lower when operated at low temperature.
2. Background color changes slightly depending on ambient temperature.

The phenomenon is reversible.

3. Ta≤40°C:85%RH MAX.

Ta>=40°C:Absolute humidity must be lower than the humidity of 85%RH at 40°C.

6. Electrical Specifications and Instruction Code

6.1 Electrical characteristics($V_{ss}=0V$, $T_a=25^{\circ}C$)

Parameter		Symbol	Condition	Min	Typ	Max	Unit	Note
Power supply		VCC	$T_a=25^{\circ}C$	2.5	2.8	3.3	V	
Input voltage	‘H’	V_{IH}	VCC=1.8V	$0.7*VCC$	-	VCC	V	
	‘L’	V_{IL}	VCC=1.8V	0	-	$0.3*VCC$	V	

Note: If one of the above items is exceeded its maximum limitation momentarily, the quality of the product may be degraded. Absolute maximum limitation, therefore, specify the values exceeding which the product may be physically damaged. Be sure to use the product within the recommend range.

6.2 LED backlight specification($V_{SS}=0V$, $T_a=25^{\circ}C$)

Item	Symbol	Condition	Min	Typ	Max	Unit	Note
Supply voltage	V_f	$I_f=20mA$		24		V	
Life Time	time	$I_f=20mA$		30K		hours	1

Note 1: Life concept: When the LED luminous intensity attenuation to 50% at the beginning of the luminous intensity of time at ambient temperature $T_A=25^{\circ}C$

6.3 Interface signals

6.3.1 LCM PIN

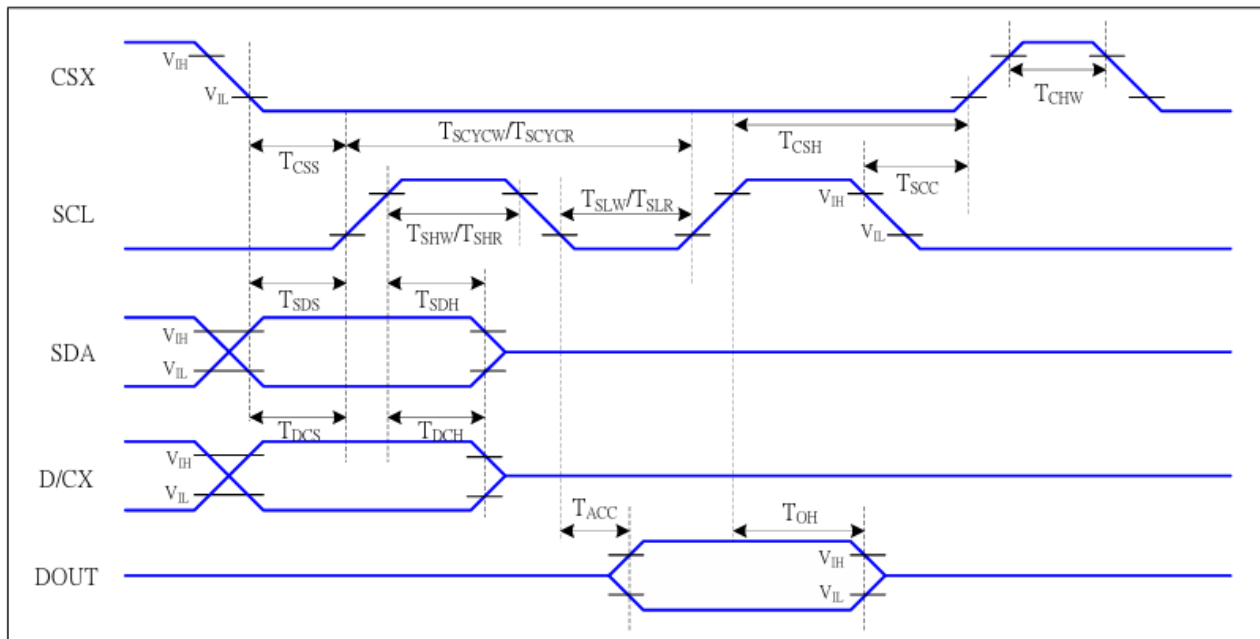
Pin No	Symbol	I/O	Function
1	LEDA	P	LED anode
2	LEDK	P	LED cathode
3-4	GND	P	Ground
5	VCC	P	Power Supply for logic
6	SDI	I	Serial Input /output data bus
7	SD0	I	Data clock
8	SCL	I	Display data/command selection pin in parallel interface. This pin is used to be serial interface clock
9	CS	I	Chip select input pin
10	WR/DC	I	8080-I/8080-II system: serves as a write signal an MCU write data at the rising edge. 4-line system:serves as Data or Command select. In serial interface “2-data-lane data” transfers mode, serves as a second
11	RESET	I	Reset signal,Signal is active low
12	TE	O	Tearing effect signal is used to synchronize MCU to frame memory
13-15	GND	P	Ground
16	TPRST	I	Reset the display of CTP
17	TPINT	O	External Interrupt to the IC of CTP
18	TPSDA	I	Serial Input/output data bus of CTP
19	TPSCL	I	Serial clock of CTP
20	TPVDD	P	Power for CTP 3.3V

CTP interface

Pin No.	Symbol	I/O	Function
1	GND	P	Ground.
2	RST	I	Reset signal
3	INT	I	External Interrupt pin
4	SDA	I/O	Serial input/output data bus
5	SCL	I	Serial interface clock
6	VCC	P	Power supply

6.4 AC Characteristics

Serial Interface Characteristics (4-line serial):



$V_{DDI}=1.65$ to $3.3V$, $V_{DD}=2.4$ to $3.3V$, $AGND=DGND=0V$, $T_a=25^{\circ}C$

Signal	Symbol	Parameter	MIN	MAX	Unit	Description
CSX	T_{CSS}	Chip select setup time (write)	15		ns	
	T_{CSH}	Chip select hold time (write)	15		ns	
	T_{CSS}	Chip select setup time (read)	60		ns	
	T_{SCC}	Chip select hold time (read)	65		ns	
	T_{CHW}	Chip select "H" pulse width	40		ns	
SCL	T_{SCYCW}	Serial clock cycle (Write)	16		ns	-write command & data ram
	T_{SHW}	SCL "H" pulse width (Write)	7		ns	
	T_{SLW}	SCL "L" pulse width (Write)	7		ns	
	T_{SCYCR}	Serial clock cycle (Read)	150		ns	-read command & data ram
	T_{SHR}	SCL "H" pulse width (Read)	60		ns	
	T_{SLR}	SCL "L" pulse width (Read)	60		ns	
D/CX	T_{DCS}	D/CX setup time	10		ns	
	T_{DCH}	D/CX hold time	10		ns	
SDA (DIN)	T_{SDS}	Data setup time	7		ns	
	T_{SDH}	Data hold time	7		ns	
DOUT	T_{ACC}	Access time	10	50	ns	For maximum $CL=30pF$
	T_{OH}	Output disable time	15	50	ns	For minimum $CL=8pF$

Table 6 4-line serial Interface Characteristics

Note1 : The rising time and falling time (T_r , T_f) of input signal are specified at 15 ns or less. Logic high and low levels are specified as

30% and 70% of VDDI for Input signals

Note2: In the read sequence of serial interface, the 500nsec delay time is needed between read command and first read clock.

7. Optical Characteristics

Item	Symbol		Condition	Min.	Typ.	Max.	Unit	Note
Brightness	Bp		$\theta=0^{\circ}$ $\Phi=0^{\circ}$	-	800	-	Cd/m ²	1
Uniformity	Δ Bp			75	80	-	%	1,2
Viewing Angle	3:00		Cr $\geq$ 10	-	80	-	Deg	3
	6:00			-	80	-		
	9:00			-	80	-		
	12:00			-	80	-		
Contrast Ratio	Cr		$\theta=0^{\circ}$ $\Phi=0^{\circ}$	-	1000	-	-	4
Response Time	T _r +T _f			-	30	35	ms	5
Color of CIE Coordinate	W	x	$\theta=0^{\circ}$ $\Phi=0^{\circ}$	-0.05	TBD	+0.05	-	1,6
		y			TBD		-	
	R	x			TBD		-	
		y			TBD		-	
	G	x			TBD		-	
		y			TBD		-	
	B	x			TBD		-	
		y			TBD		-	

NTSC Ratio	S		-	55	-	%	
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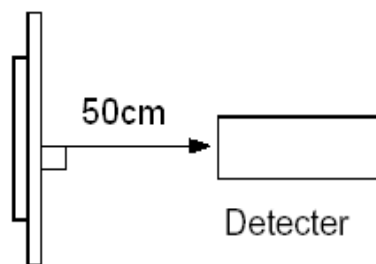
Note: The parameter above is slightly changed by temperature, driving voltage and materiel

Note 1: The data are measured after LEDs are turned on for 5 minutes. LCM displays full white. The brightness is the average value of 9 measured spots. Measurement equipment BM-7 (Φ5mm)

Measuring condition:

- Measuring surroundings: Dark room.
- Measuring temperature: Ta=25°C.
- Adjust operating voltage to get optimum contrast at the center of the display.

Measured value at the center point of LCD panel after more than 5 minutes while backlight turning on.

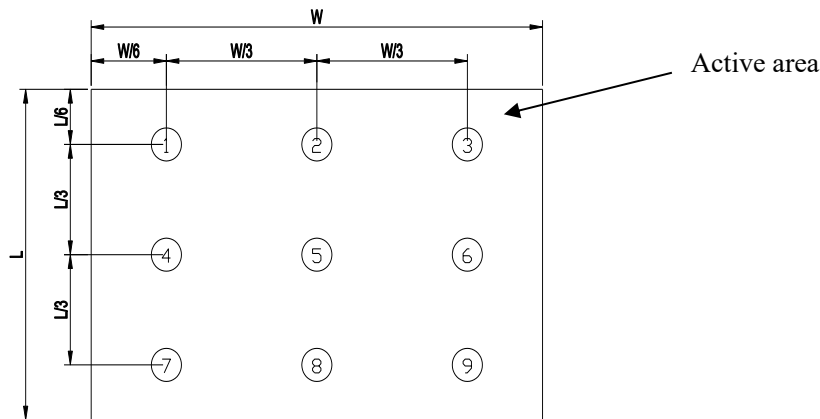


Note 2: The luminance uniformity is calculated by using following formula.

$$\Delta Bp = Bp \text{ (Min.)} / Bp \text{ (Max.)} \times 100 \text{ (\%)}$$

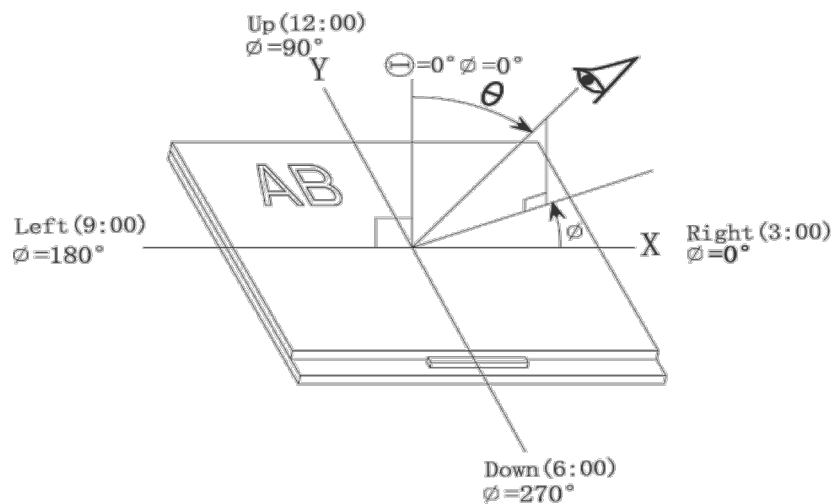
Bp (Max.) = Maximum brightness in 9 measured spots

Bp (Min.) = Minimum brightness in 9 measured spots.

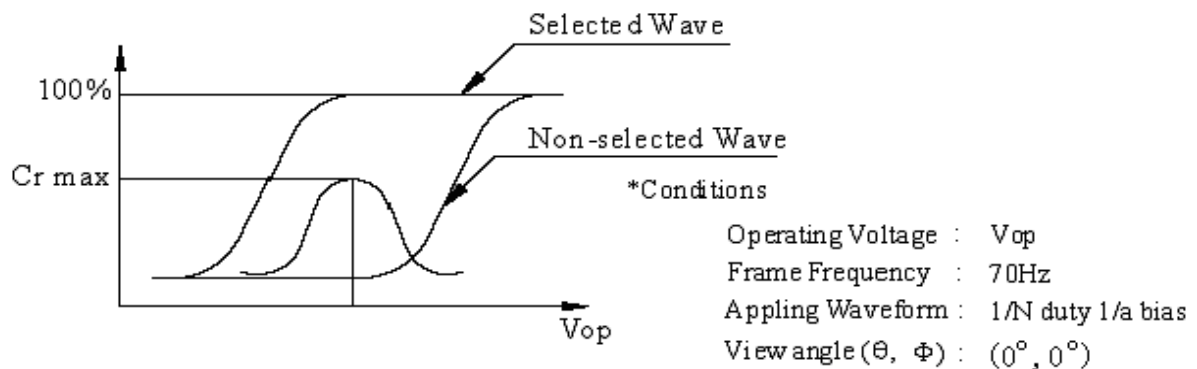


Note 3: The definition of viewing angle:

Refer to the graph below marked by θ and Φ



Note 4: Definition of contrast ratio.(Test LCD using CA310)



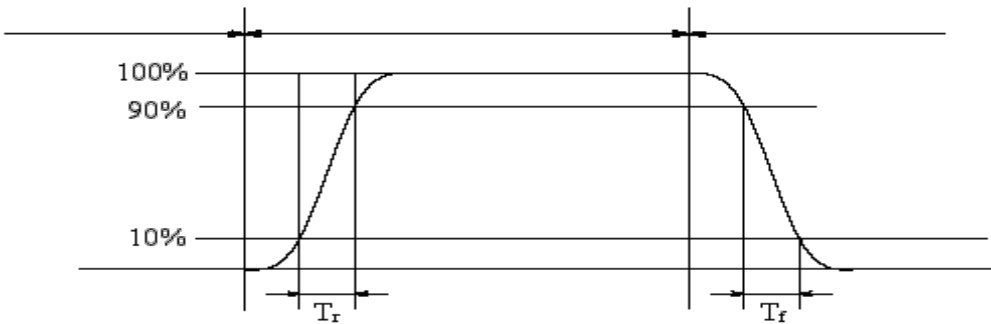
$$\text{Contrast ratio}(Cr) = \frac{\text{Brightness of selected dots}}{\text{Brightness of non-selected dots}}$$

Note 5: Definition of Response time. (Test LCD using DMS501):

The output signals of photo detector are measured when the input signals are changed from “black” to “white”(falling time) and from “white” to “black”(rising time),

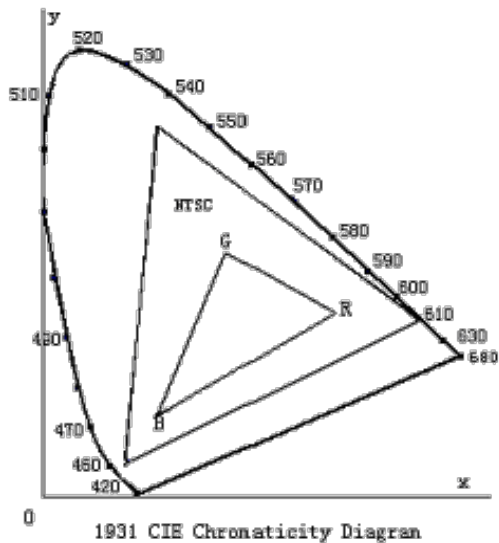
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respectively. The response time is defined as the time interval between the 10% and 90% of amplitudes. Refer to figure as below.



The definition of response time

Note 6: Definition of Color of CIE Coordinate and NTSC Ratio.

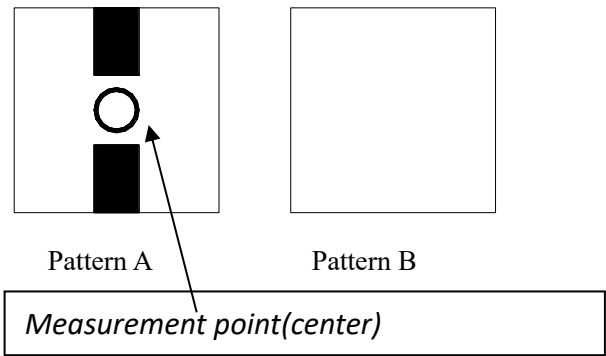


Color gamut:

$$S = \frac{\text{area of RGB triangle}}{\text{area of NTSC triangle}} \times 100\%$$

Note 7: Definition of cross talk.

$$\text{Cross talk ratio(\%)} = \frac{|\text{pattern A Brightness} - \text{pattern B Brightness}|}{\text{pattern A Brightness}} \times 100$$



$$\text{Electric volume value} = 3F \pm 3\text{Hex}$$

8. Reliability Test Items and Criteria

No	Test Item	Test condition	Criterion
1	High Temperature Storage	80°C±2°C 96H Restore 2H at 25°C Power off	1. After testing, cosmetic and electrical defects should not happen. 2. Total current consumption should not be more than twice of initial value.
2	Low Temperature Storage	-30°C±2°C 96H Restore 2H at 25°C Power off	
3	High Temperature Operation	70°C±2°C 96H Restore 2H at 25°C Power on	
4	Low Temperature Operation	-20°C±2°C 96H Restore 4H at 25°C Power on	
5	High Temperature/Humidity Operation	60°C±2°C 90%RH 96H Power on	
6	Temperature Cycle	-30°C←————→80°C 30min 5min 30min after 5 cycle, Restore 2H at 25°C Power off	

Note: Operation: Supply 3.3V for logic system.

The inspection terms after reliability test, as below

ITEM	Inspection
Contrast	CR>50%
IDD	IDD<200%
Brightness	Brightness>60%
Color Tone	Color Tone+/-0,05

9. Precautions for Use of LCD Modules

9.1 Handling Precautions

9.1.1 The display panel is made of glass. Do not subject it to a mechanical shock by dropping it from a high place, etc.

9.1.2 If the display panel is damaged and the liquid crystal substance inside it leaks out, be sure not to get any in your mouth, if the substance comes into contact with your skin or clothes, promptly wash it off using soap and water.

9.1.3 Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary.

9.1.4 The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarizer carefully.

9.1.5 If the display surface is contaminated, breathe on the surface and gently wipe it with a soft dry cloth. If still not completely clear, moisten cloth with one of the following solvents:

— Isopropyl alcohol — Ethyl alcohol

Solvents other than those mentioned above may damage the polarizer. Especially, do not use the following:

— Water — Ketone — Aromatic solvents

9.1.6 Do not attempt to disassemble the LCD Module.

9.1.7 If the logic circuit power is off, do not apply the input signals.

9.1.8 To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.

a. Be sure to ground the body when handling the LCD Modules.

b. Tools required for assembly, such as soldering irons, must be properly ground.

c. To reduce the amount of static electricity generated, do not conduct assembly and other work under dry conditions.

d. The LCD Module is coated with a film to protect the display surface. Be care when peeling off this protective film since static electricity may be generated.

9.2 Storage precautions

9.2.1 When storing the LCD modules, avoid exposure to direct sunlight or to the light of fluorescent lamps.

9.2.2 The LCD modules should be stored under the storage temperature range. If the LCD modules will be stored for a long time, the recommend condition is:

Temperature : $0^{\circ}\text{C} \sim 40^{\circ}\text{C}$

Relatively humidity: $\leq 80\%$

9.2.3 The LCD modules should be stored in the room without acid, alkali and harmful gas.

9.3 The LCD modules should be no falling and violent shocking during transportation, and also should avoid excessive press, water, damp and sunshine.

END