ILLUMINANT 北極光企業有限公司

PRODUCT SPECIFICATION FOR TFT LCM

CUSTOMER:	
MODEL NO:	**I1513-6SEN1212A**
ACCEPTED BY:	

APPROVED BY:	CHECKED BY:	ORGANIZED BY:
LCM產品部 2012.12.3 Zhang	LCM產品部 2012.12.3 He	LCM產品部 2012.12.3 Han

Note **1. Version of Specifications : 2.0**

2. Others : ROHS Compliant

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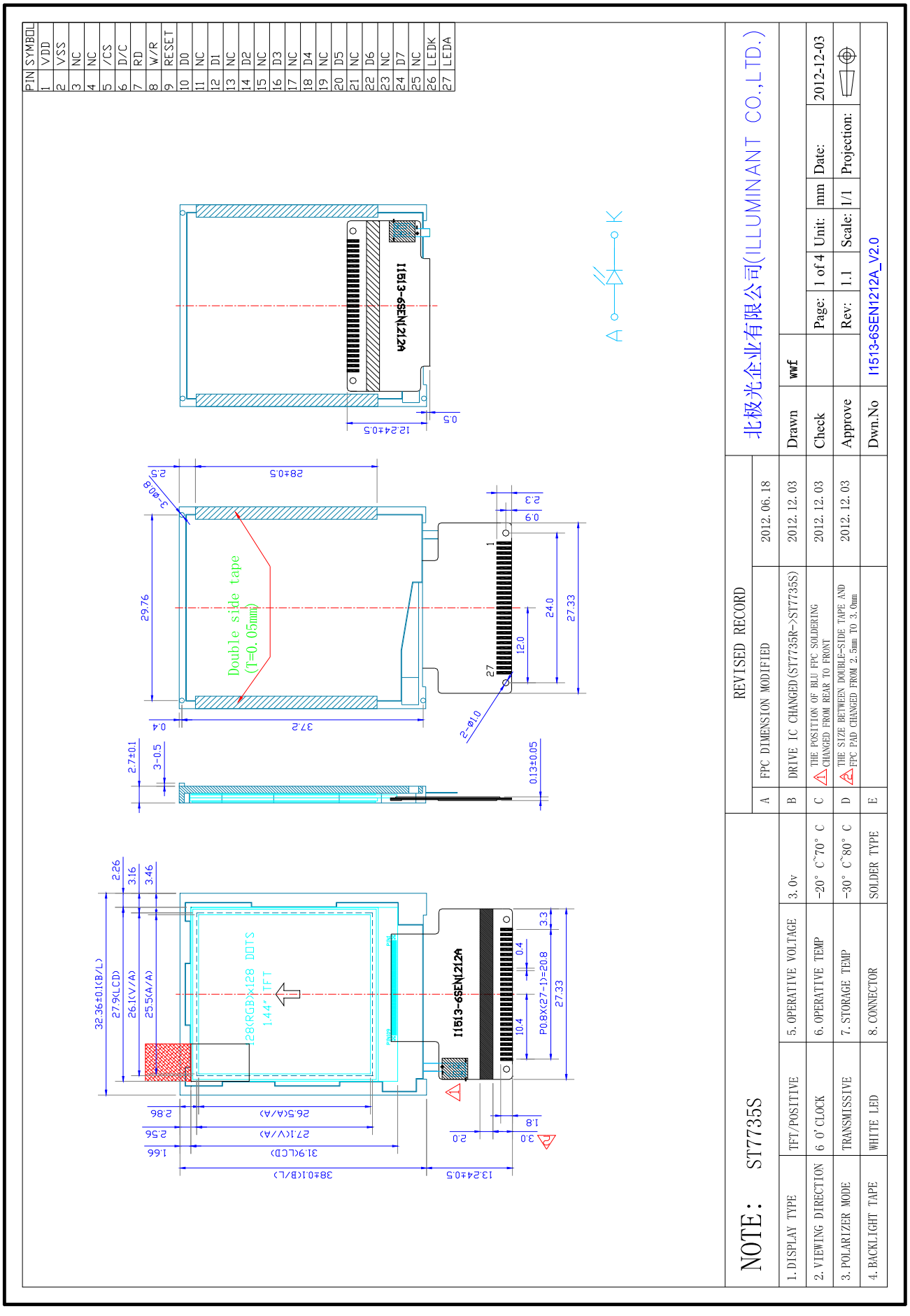
RECORD OF REVISION

Version	Date	Contents
1.0	2011/5/18	New Release
1.1	2012/6/18	FPC Dimension Modified
2.0	2012/12/3	1. Driver IC Changed (ST7735R->ST7735S) 2. The position of BLU FPC soldering changed from rear to front 3. The size between double-side tape and FPC Pad changed from 2.5mm to 3.0mm

CONTENTS

1. Mechanical Specification:

Item	Standard Value	Unit
Display Size	1.44 (Diagonal)	inch
Number of Dots	128RGB*128	Dots
Module Dimension	32.36(W)*38.00(H)*2.70(D)	mm
Active Area	25.4976(W)*26.496(H)	mm
Viewing Direction	6H	-
Driver	ST7735S	
Interface	8080 system 8bit	
Backlight Type	White LED *1	-
Touch Panel	Without	



2. Absolute Maximum Ratings:

Item	Symbol	Min.	Typ.	Max.	Unit	Remark
Supply Voltage for Logic	V_{DD}-V_{SS}	-0.3		4.0	V	
	V_{DD2}	-0.3		4.0		
Power Supply for LCD	V_{LCD}	-0.3		19.8	V	
Logic Input Voltage	V_{IN}	-0.4		V_{DD}+0.5	V	-
Operating Temperature	T_{OP}	-20		+70	℃	-
Storage Temperature	T_{ST}	-30		+80	℃	

3. Electrical Characteristics:

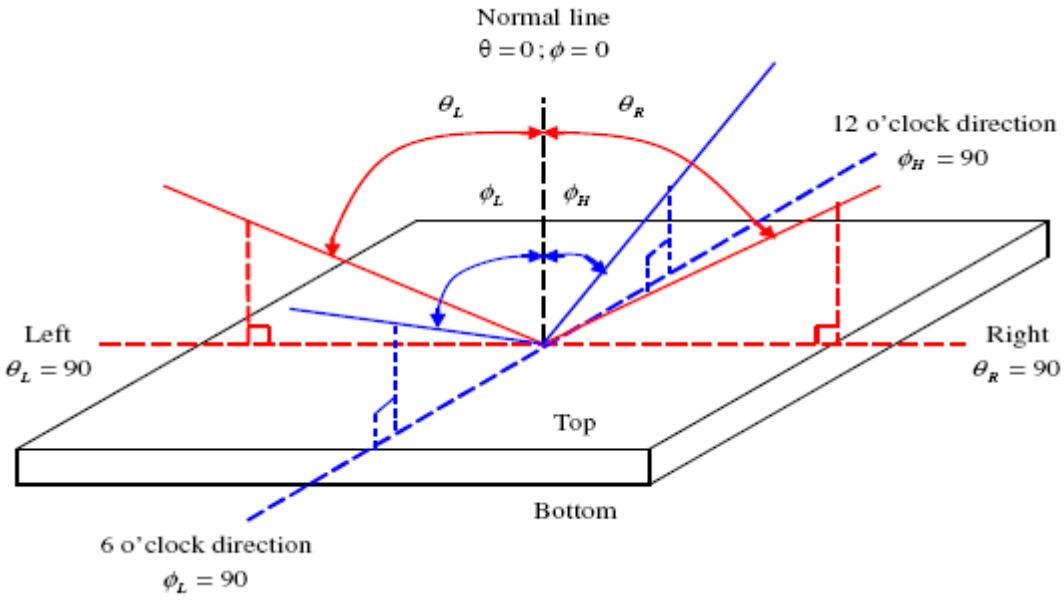
Item		Symbol	Min.	Typ.	Max.	Unit	Note
Supply Voltage Logic		V_{DD}	2.4	3.0	3.4	V	
Input Voltage	H Level	V_{IH}	0.8V_{DD}	-	V_{DD}	V	
	L Level	V_{IL}	V_{SS}	-	0.2V_{DD}	V	
Backlight Input Voltage		V_{LED}	3.0	3.2	3.3	V	
Backlight Current		I_{BL}	-	18	-	mA	-

4. Optical Characteristics:

Item	Symbol	Conditions	Specifications			Unit	Note
			Min.	Typ.	Max.		
Contrast Ratio	CR	At optimized view angle		350	-	-	
Luminous Intensity	IV	Center		100		Cd/m2	
Response Time(T_R+T_F)		Θ=0	-	25		ms	
Viewing Angle	Top	CR≥10	-	20		Deg.	
	Bottom		-	30			
	Left		-	45			
	Right		-	45			

*Note

(1) Definition of Viewing Angle:

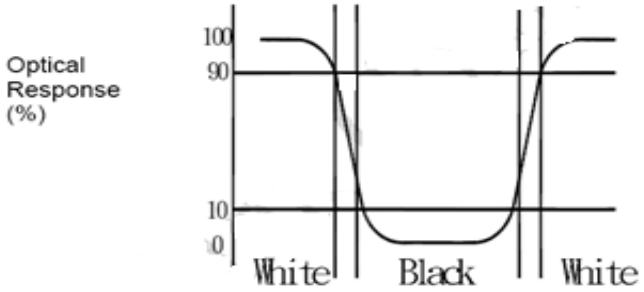


(2) Definition of Contrast Ratio

$$\text{Contrast Ratio (CR)} = \frac{\text{Brightness measured when LCD is at "white state"}}{\text{Brightness measured when LCD is at "black state"}}$$

(3) Definition of Response Time : Tr and Tf

The response time is defined as the following figure and shall be measured by switching the input signal for "black" and "white".

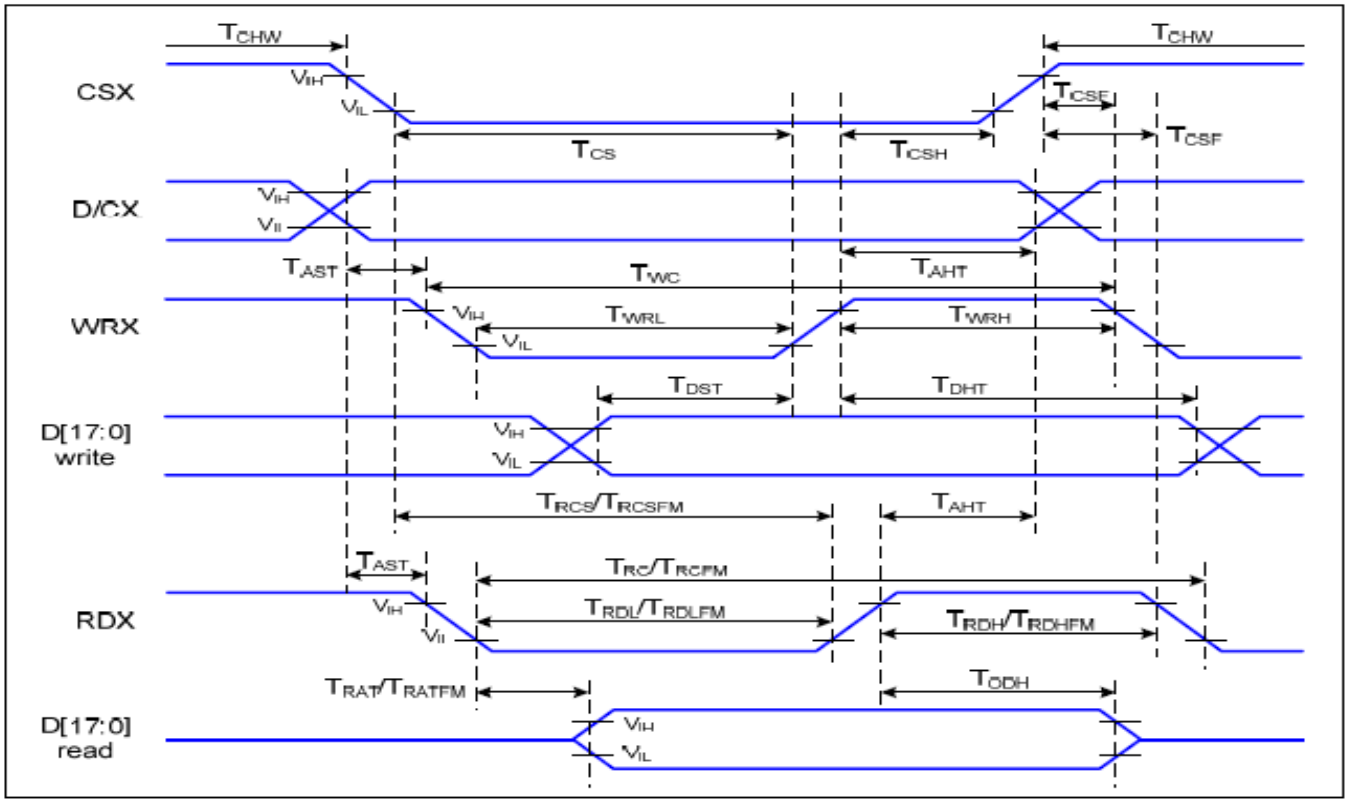


5. Interface:

Pin No	Symbol	Description
1	VDD	Power Supply for Logic (2.8~3.3V)
2	VSS	System Ground
3	NC	No Connection
4	NC	No Connection
5	/CS	Chip Select Input Pins
6	D/C	D/C="L" :Control Data D/C="H" :Display Data
7	RD	Read Execution Control Pin
8	W/R	Write Execution Control Pin
9	/RESET	When /RESET is "L", initialization is executed
10	D0	Data Bus
11	NC	No Connection
12	D1	Data Bus
13	NC	No Connection
14	D2	Data Bus
15	NC	No Connection
16	D3	Data Bus
17	NC	No Connection
18	D4	Data Bus
19	NC	No Connection
20	D5	Data Bus
21	NC	No Connection
22	D6	Data Bus
23	NC	No Connection
24	D7	Data Bus
25	NC	No Connection
26	LEDK	LED Power Supply
27	LEDA	LED Power Supply

6. Timing Control:

Parallel Interface Timing Characteristics (8080-series MCU Interface)

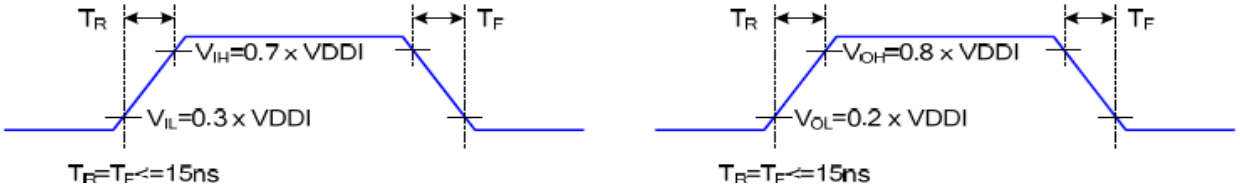


8080 Parallel Interface Characteristics

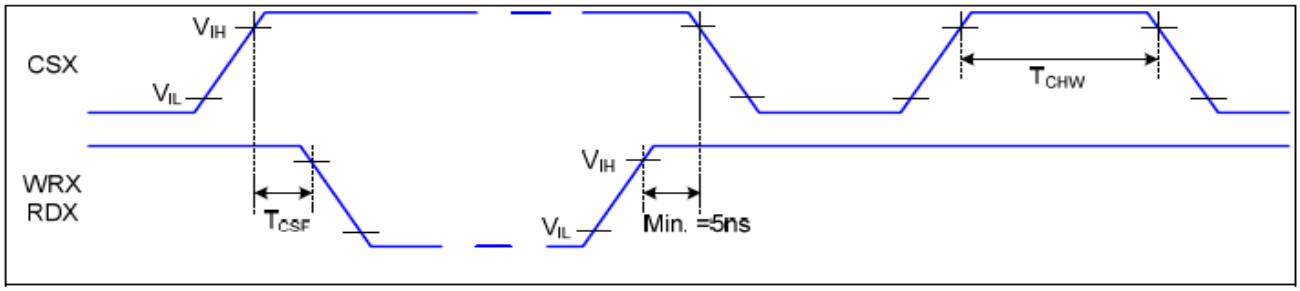
Ta=25 ℃, VDDI=1.65~3.7V, VDD=2.3~4.8V

Signal	Symbol	Parameter	Min	Max	Unit	Description
D/CX	TAST	Address setup time	10		ns	-
	TAHT	Address hold time (Write/Read)	10		ns	
CSX	TCHW	Chip select "H" pulse width	0		ns	-
	TCS	Chip select setup time (Write)	15		ns	
	TRCS	Chip select setup time (Read ID)	45		ns	
	TRCSFM	Chip select setup time (Read FM)	355		ns	
	TCSF	Chip select wait time (Write/Read)	10		ns	
	TCSH	Chip select hold time	10		ns	
WRX	TWC	Write cycle	66		ns	
	TWRH	Control pulse "H" duration	15		ns	
	TWRL	Control pulse "L" duration	15		ns	
RDX (ID)	TRC	Read cycle (ID)	160		ns	When read ID data
	TRDH	Control pulse "H" duration (ID)	90		ns	
	TRDL	Control pulse "L" duration (ID)	45		ns	
RDX (FM)	TRCFM	Read cycle (FM)	450		ns	When read from frame memory
	TRDHFM	Control pulse "H" duration (FM)	90		ns	
	TRDLFM	Control pulse "L" duration (FM)	355		ns	
D[17:0]	TDST	Data setup time	10		ns	For CL=30pF
	TDHT	Data hold time	10		ns	
	TRAT	Read access time (ID)		40	ns	
	TRATFM	Read access time (FM)		340	ns	
	TODH	Output disable time	20	80	ns	

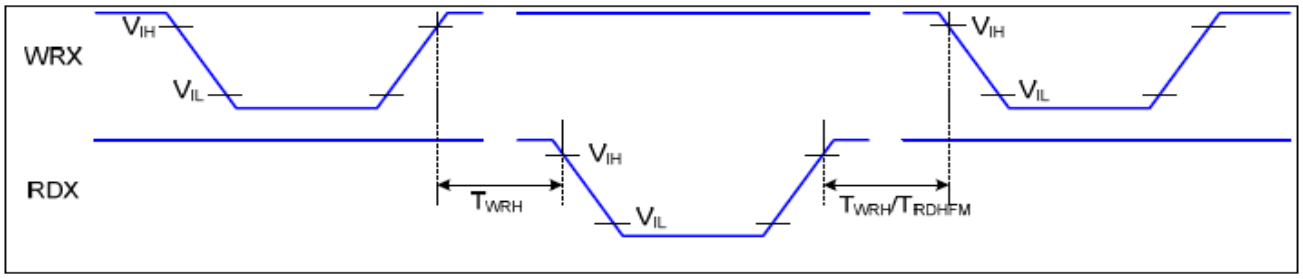
Rising and Falling Timing for Input and Output Signal



Chip Selection (CSX) Timing



Write to Read and Read to Write Timing



Note: The rising time and falling time (Tr, Tf) 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.

7. Environmental / Reliability Tests:

No.	Test Item	Conditions	Judgment Criteria
1	High Temperature Operating	+70°C 120hrs	Per table in below
2	Low Temperature Operating	-20°C 120hrs	Per table in below
3	High Temperature Non-Operating	+80°C 120hrs	Per table in below
4	Low Temperature Non-Operating	-30°C 120hrs	Per table in below
5	High Temperature / High Humidity Storage	50°C ; 90%RH ; 120hrs	Per table in below (polarizer discoloration is excluded)
6	Thermal Shock (Non-Operating)	-30°C 30mins ~ +80°C 30mins Change Time:5mins, 10cycles	Per table in below
7	ESD (Operation)	C=150pF, R=330Ω, 5points/panel Air:±8KV, 5times; Contact:±4KV, 5times	Per table in below
8	Vibration (Non-Operating)	Frequency Range:10~55Hz, Stroke:1.5mm Sweep:10Hz~55Hz~10Hz 2hrs for each direction of X,Y,Z	Per table in below
9	Shock (Non-Operating)	60G 6ms, ±X, ±Y, ±Z 3times, for each direction	Per table in below
10	Package Drop Test	Height:80cm, 1 corner, 3 edges, 6 surfaces	Per table in below

Inspection	Criterion(After Test)
Appearance	No Crack on the FPC, on the LCD Panel
Alignment of LCD Panel	No Bubbles in the LCD Panel No other Defects of Alignment in Active Area
Electrical Current	Within Device Specifications
Function/Display	No Broken Circuit, No Short Circuit or No Black Line No Other Defects of Display

8. Precautions for Use:

8.1 Safety

(1) Do not swallow any liquid crystal, even if there is no proof that liquid crystal is poisonous.
(2) If the LCD panel breaks, be careful not to get liquid crystal to touch your skin.
(3) If skin is exposed to liquid crystal, wash the area thoroughly with alcohol or soap.

8.2 Storage Conditions

(1) Store the panel or module in a dark place where the temperature is 23±5°C and the humidity is below 50±20%RH.
(2) Store in anti-static electricity container.
(3) Store in clean environment, free from dust, active gas, and solvent.
(4) Do not place the module near organics solvents or corrosive gases.
(5) Do not crush, shake, or jolt the module.
(6) Do not exposed to direct sun light of fluorescent lamps.

8.3 Installing LCD Module

Attend to the following items when installing the LCM.

(1) Cover the surface with a transparent protective plate or touch panel 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.

8.4 Precautions For Operation

(1) Viewing angle varies with the change of liquid crystal driving voltage (Vo). Adjust Vo to show the best contrast.
(2) Driving the LCD in the voltage above the limit will shorten its lifetime.
(3) 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.
(4) When turning the power on, input each signal after the positive/negative voltage becomes stable.
(5) Do not apply water or any liquid on product which composed of T/P.

8.5 Handling Precautions

(1) Avoid static electricity which can damage the CMOS LSI; please wear the wrist strap when handling.
(2) The polarizing plate of the display is very fragile. so, please handle it very carefully.

(3) Do not give external shock.
(4) Do not apply excessive force on the surface; it may cause display abnormal .
(5) Do not wipe the polarizing plate with a dry cloth, as it may easily scratch the surface of plate.
(6) Do not use ketonics solvent & Aromatic solvent, use with a soft cloth soaked with a cleaning naphtha solvent.
(7) Do not operate it above the absolute maximum rating.
(8) Do not remove the panel or frame from the module.
(9) Do not apply water or any liquid on product, which composed of T/P.

8.6 Warranty
(1) The period is within 12 months since the date of shipping out under normal using and storage conditions.
(2) The warranty will be avoided in case of defect induced by customer.