All Shore Industries, Inc.
p/n ASI-R-12864LS-DE-EWH/A

DATA SHEET

VERSION	APPROVER	CHECKER	ENGINEER

Approved by_____

Records of Revision

Revision	Revision Date	Contents	Approved
A 2	007/05/28	Initial Release and Issue Full Specification	KEVIN_LIN

CONTENTS

1. SCOPE

This specification covers the engineering requirements for this liquid crystal module.

2. PRODUCT SPECIFICATIONS

2.1 General

- 128 × 64 dot matrix LCD
- STN (BLUE) , Negative mode LCD panel
- Transmissive , Wide temperature type
- 6 o'clock
- Back light: Edge LED White (Local dice)
- Multiplexing driving : 1/64duty, 1/9bias
- Include Touch panel
- COG ST7565
- ROHS

2.2 Mechanical Characteristics

Item	Characteristic
Dot configuration	128 × 64
Dot dimensions(mm)	0.48 × 0.48
Dot spacing (mm)	0.04
Module dimensions (Horizontal × Vertical × Thickness, mm)	87.0 × 53.0 × 7.0 max.
Viewing area (Horizontal × Vertical, mm)	70.7 × 38.8
Active area (Horizontal × Vertical, mm)	66.52 × 33.24

2.3 Absolute Maximum Ratings (Without LED back-light)

Characteristic	Symbol	Unit	Value
Operating Voltage (logic)	V_{DD}	V	-0.3 to +3.3
Input Voltage	V_{IN} V		-0.3 to V_{DD}

Note 1: Referenced to V_{SS}=0V

2.4 Electrical Characteristics (Without LED back-light)

Characteristic	Symbol	Condition	Min.	Typ.	Max.	Unit
Operating Voltage(logic)	V_{DD}-V_{SS} --		3.0	3.3	3.6	V
Input Voltage	V_{IH} --		0.8V_{DD} --		V_{DD}	V
	V_{IL} --		V_{SS} --		0.2V_{DD}	
Output Voltage	V_{OH}	I_{OH}=-0.1mA 0.	8V_{DD} --		V_{DD}	V
	V_{HL}	I_{OL}=0.1mA V	$_{SS}$ --		0.2V_{DD}	
Current Consumption	I_{DD}	V_{IN}=V_{DD} --		0.05	1	mA

2.5 Optical Characteristics Absolute maximum ratings

Item Sym	bol	Rating	Unit
Operating temperature range	Top	-20~70	°C
Storage temperature range	Tst	-30~80	°C

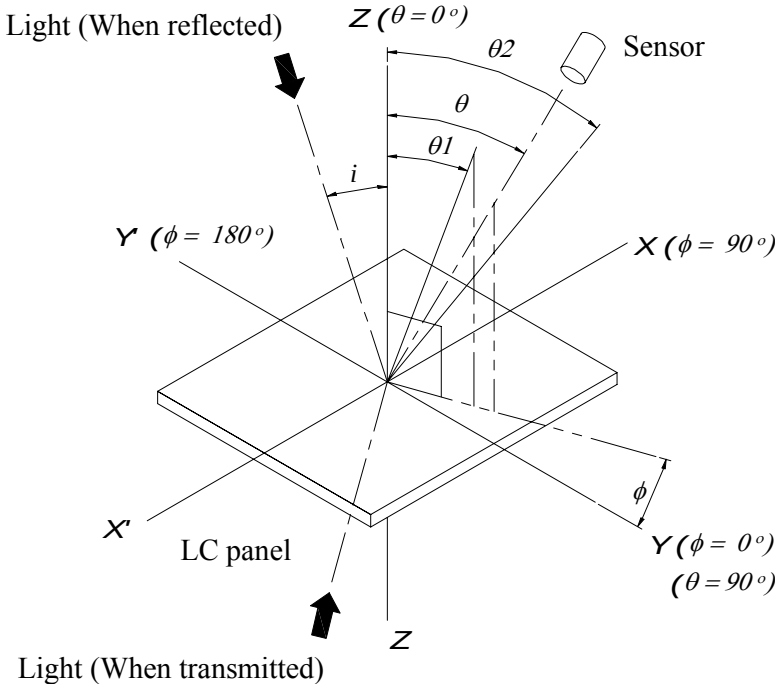
2.6 Optical Characteristics

1/64 duty, 1/9bias

Item Sym	bol	Temp.	Min.	Typ.	Max.	Unit
Driving voltage	Vop	25 °C 10.1		10.3	10.5	V
Contrast K		θ=0° ϕ=0°	2 6.93		--	--
Frame freq.	fF	--	--	70	--	Hz
Viewing angle*	θ_2-θ_1	25 °C	30 120		--	deg.
	ϕ		60 120		--	
Response tim e	t_{on} --	25 °C		114	250	ms
	t_{off}		-- 1	11	250	

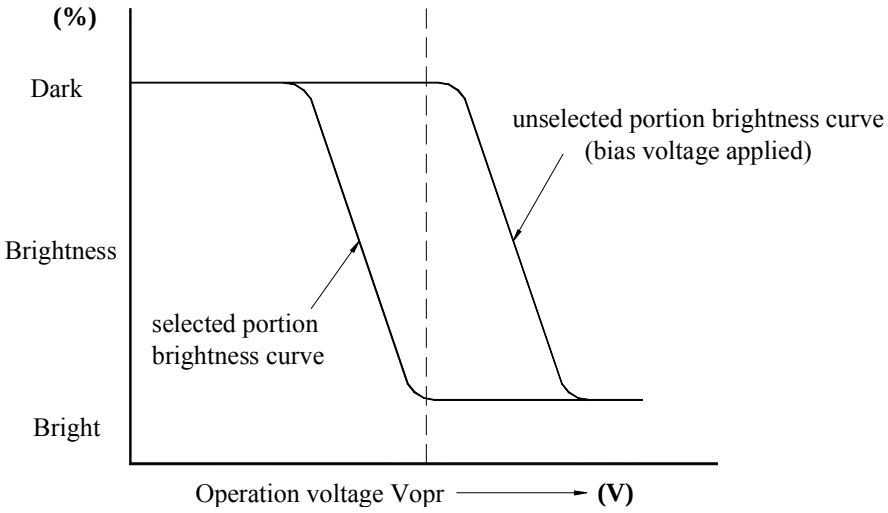
2.6.1 Definition of optical characteristics

* Definition of angles ϕ and θ

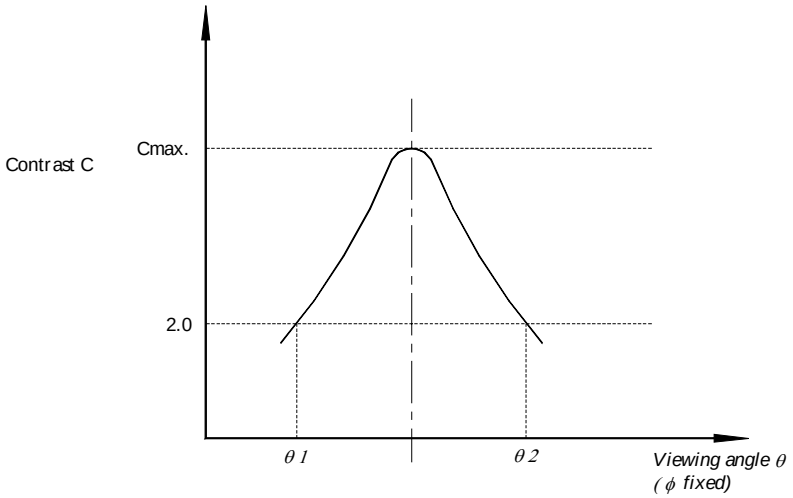


*Definition of contrast C

$$C = \frac{B1}{B2} = \frac{\text{Brightness of selected portion}}{\text{Brightness of unselected portion}}$$

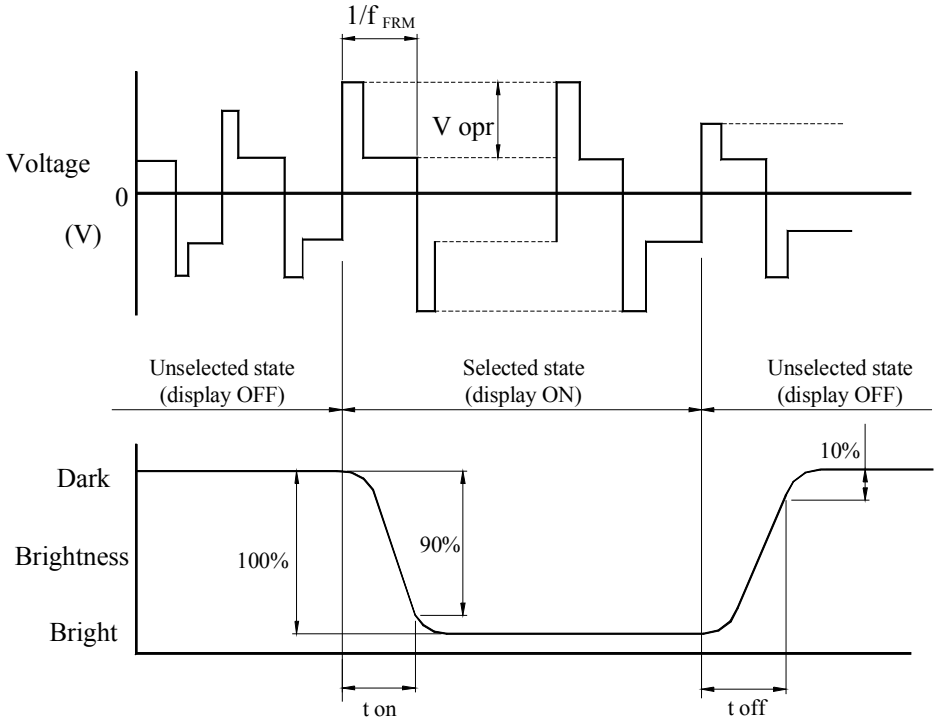


* Definition of viewing angles θ1 and θ2



Note : Optimum vision with the naked eye and viewing angle θ at Cmax above are not always the same.

* Definition of response time



Vopr : Operating voltage (V)

fFRM : Frame frequency (Hz)

Ton : Response time (rise) (ms)

Toff : Response time (fall) (ms)

2.7 LED Back-light Characteristics

2.7.1 Electrical / optical specifications

Ta = 25°C

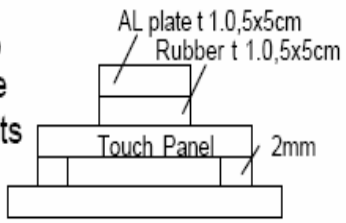
Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Forward voltage	V_f	If=125mA, White	3.0	3.6	3.8	V
Luminous Tolerance	--	If=125mA, White	70	--	--	%
Luminous Intensity	I_V	If=125mA, White	200	--	--	cd/m^2
*Chromaticity coordinate	x	If=125mA, White	0.28	0.31	0.33	

Note: * Measured at the bare LED back-light unit.

2.7.2 LED Maximum Operating Range

Item	Symbol	Yellow Green	Unit
Power Dissipation	P_{AD} 475		mW
Forward Current	I_F 125		mA
Reverse Voltage	V_R 5		V

3. TOUCH PANEL SPECIFICATION

Item	Specification
Input Method	Finger or stylus pen
ITO Glass	T=1.1mm , 500Ω/□ ±120Ω
ITO Film	T=0.175mm ,400Ω/□ ±120Ω Clear surface
Operating Temperature Range	-20℃~+70℃,20~90%RH (Except for dew gathering.)
Storage Temperature Range	-30℃~+80℃,20~80%RH (Except for dew gathering.)
Surface Hardness	3H- pressure 150 gf , 45deg.
Hitting Durability	1,000,000 times min. (Tip R 8 mm)
Pen Sliding Durability	100,000 times min. (Tip R0.8mm)
Insulation Impedance	DC25V,20MΩ min
Light Transparency	82% TYP.
Linearity	±1.5% (±3.0% After environmental and life test)
Linearity Force	80g less Input with stylus pen (R0.8mm)
Activation Force	30g less individual point on with stylus pen (R0.8mm)
Bouncing	<15ms at ON and OFF
Impact Resistance	No damage when ϕ9mm steel ball is dropped on the surface from 30 cm height at 1 time.
Flexible Pattern Heat Seal Peeling Strength	500g/cm (peeling upward by 90 deg.)
Flexible Pattern Bending Resistance	Bending 3 times by bending radius R1.0 mm. The requirements in 4-2 shall be satisfied
Flexible Pattern Insert/Pull Out Resistance	5 times at least. The requirements in 4-2 shall be satisfied.
Vibration Resistance	Not in operation: The requirements in 3 to 4 shall be satisfied after sweep vibration of 2G 10~55Hz(1 min.) is given for 30 min. each in the directions of X, Y, Z.
Package Drop	No damage to the product.(1corner edge, 2 ridges, 4 surfaces, drop from 50 cm height)
Static load resistance	After 4.5Kg load is applied to The center area(25cm²)of the Touch panel, the requirements in 3 and 4,shall be satisfied. 

4. RELIABILITY

4.1 Reliability

Test item	Test condition	Evaluation and assessment
Operation at high temperature and humidity	40 °C±2 °C 90%RH for 500hours	No abnormalities in functions* and appearance**
Operation at high temperature	60 °C±2 °C for 500 hours	No abnormalities in functions* and appearance**
Heat shock	-20± ~ +60 °C Left for 1 hour at each temperature, transition time 5 min, repeated 10times	No abnormalities in functions* and appearance**
Low temperature	-20±2 °C for 500 hours	No abnormalities in functions* and appearance**
Vibration	Sweep for 1 min at 10 Hz, 55Hz, 10Hz, amplitude 1.5mm 2 hrs each in the X,Y and Z directions	No abnormalities in functions* and appearance**
Drop shock	Dropped onto a board from a height of 10cm	No abnormalities in functions* and appearance**

* Dissipation current, contrast and display functions

** Polarizing filter deterioration, other appearance defects

4.2 Liquid crystal panel service life

100,000 hours minimum at 25 °C±10 °C

4.3 definition of panel service life

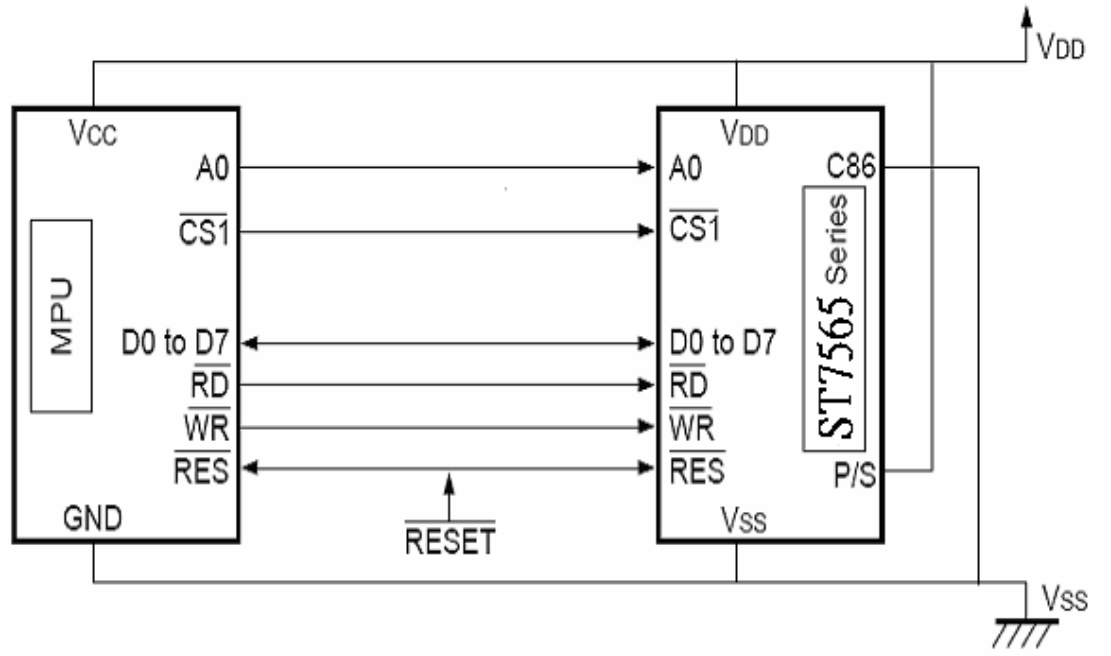
- Contrast becomes 30% of initial value
- Current consumption becomes three times higher than initial value
- Remarkable alignment deterioration occurs in LCD cell layer
- Unusual operation occurs in display functions

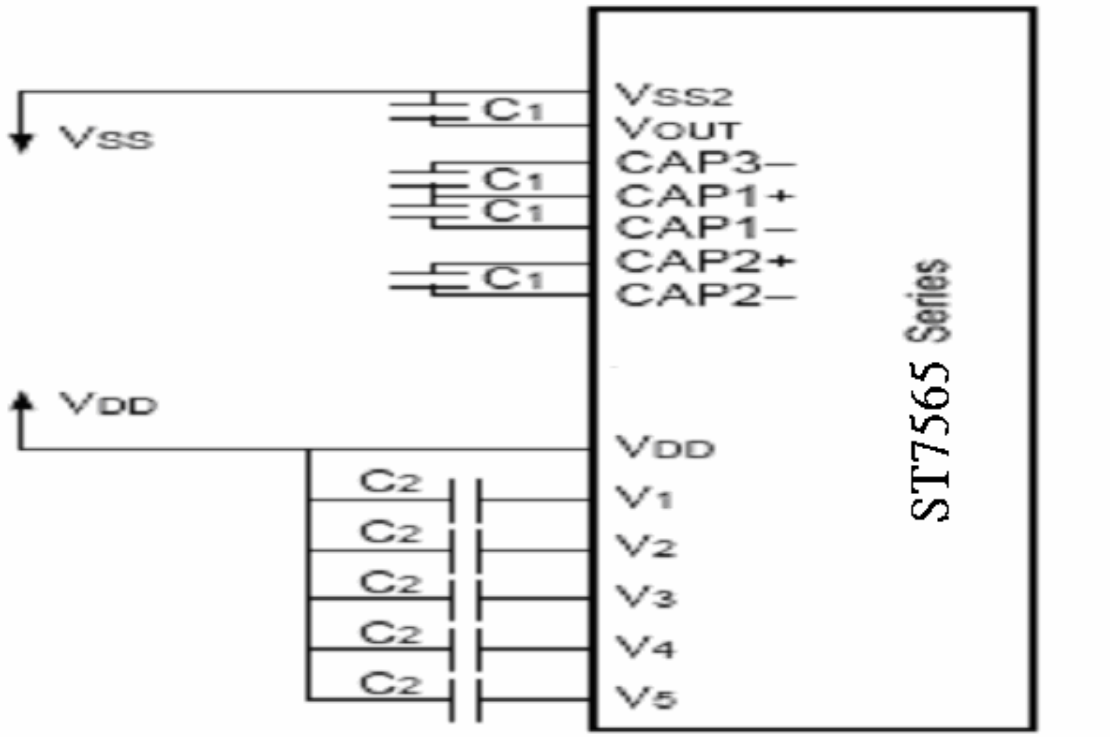
5. OPERATING INSTRUCTIONS

5.1 Input signal Function

NO.	Symbol	Function
1	/CS1	Chip select signal
2	/RESET	RESET
3	A0	H: display data, L: control data
4	W/R	8080 series MPU : Writes the display data.
5	R/D	8080 series MPU : Read the display data.
6~13	D0~D7	This pins are the 8-bit bi-direction data bus to be connected to the microprocessor in parallel interface mode. D7 is the MSB while D0 is the LSB. When serial mode is selected, D7 is the serial data input (SDA) and D6 is the serial clock input (SCK).
14	VDD	Power supply for logic (5V)
15	VSS	Ground
16	VOUT	Connect a capacitor between this terminal and the VSS
17	CAP3-	Connect a capacitor between this terminal and the CAP1+
18	CAP1+	Connect a capacitor between this terminal and the VSS
19	CAP1-	Connect a capacitor between this terminal and the VSS
20	CAP2-	Connect a capacitor between this terminal and the VSS
21	CAP2+	Connect a capacitor between this terminal and the VSS
22~26	V1~V5	This is a multi-level power supply for the liquid crystal drive. VDD(=V0)≥V1≥V2≥V3≥V4≥V5

5.2 Voltage Generator Circuit

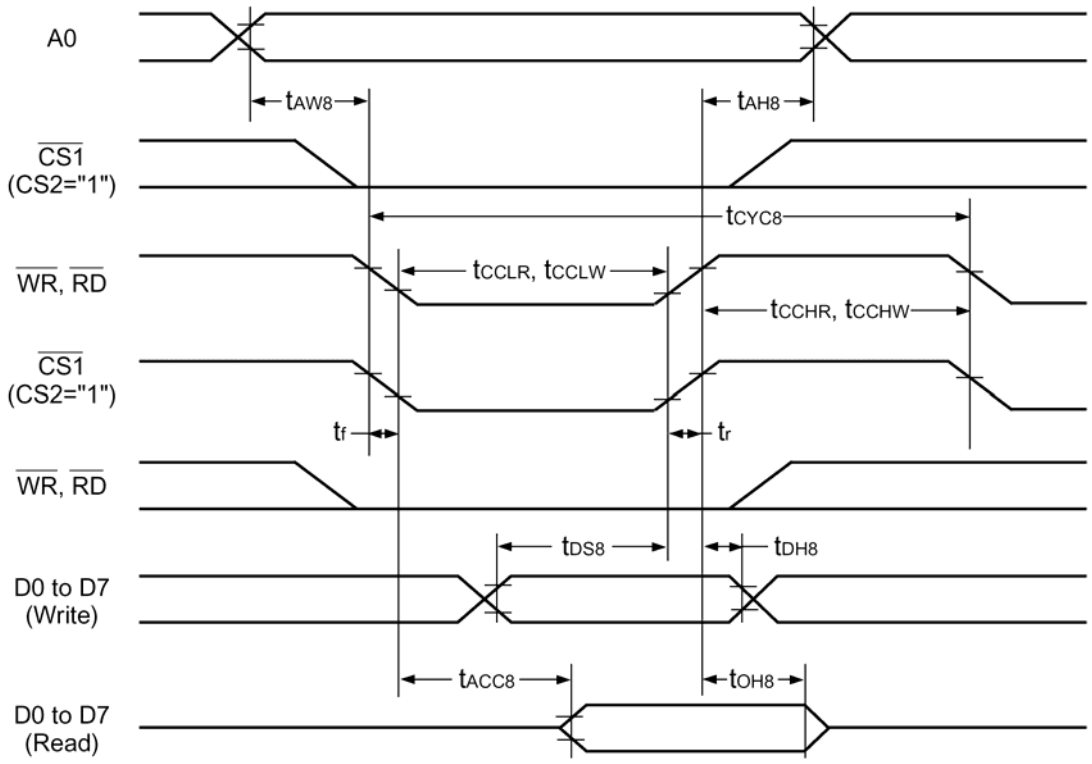




Item	Set value	Units
C1	1.0 to 4.7	µF
C2	0.01 to 1.0	µF

4.3 T iming Diagram

System Bus Read/Write Characteristics for the 8080 series MPU



(V_{DD}=2.7V to 4.5V,Ta=-40 to 85°C)

Item Signal		Symbol	Condition	Rating		Units
				Min	Max.	
Address hold time	A0	t_{AH8} 0	--		--	ns
Address setup time		t_{AW8}		0 --		ns
System cycle time	A0 t	$_{CYC8}$ --		300		
Control L pulse width (WR)	WR	t_{CCLW} 60	--		--	ns
Control L pulse width (RD)	RD	t_{CCLR} 120			--	ns
Control H pulse width (WR)	WR	t_{CCHW} 60			--	ns
Control H pulse width (WR)	RD	t_{CCHR}		60 --		ns
Data setup time	CS	t_{CSS} 100	--		--	ns
Address hold time		t_{CSH}		100 --		ns
RD access time	D0 to D7	t_{DS8} 40	--		--	ns
Output disable time		t_{DH8}		15 --		ns
		t_{ACC8} --	C_L=100pF		140	ns
		t_{OH8}		10 100		ns

6. NOTES

Safety

- If the LCD panel breaks, be careful not to get the liquid crystal in your mouth. If the liquid crystal touches your skin or clothes, wash it off immediately using soap and plenty of water.

Handling

- Avoid static electricity as this can damage the CMOS LSI.
- The LCD panel is plate glass; do not hit or crush it.
- Do not remove the panel or frame from the module.
- The polarizing plate of the display is very fragile; handle it very carefully

Mounting and Design

- Mount the module by using the specified mounting part and holes.
- To protect the module from external pressure, leave a small gap by placing transparent plates (e.g. acrylic or glass) on the display surface, frame, and polarizing plate
- Design the system so that no input signal is given unless the power-supply voltage is applied.
- Keep the module dry. Avoid condensation, otherwise the transparent electrodes may break.

Storage

- Store the module in a dark place where the temperature is 25 ^{o}C±10 ^{o}C and the humidity below 65% RH.
- Do not store the module near organic solvents or corrosive gases.
- Do not crush, shake, or jolt the module (including accessories).

Cleaning

- Do not wipe the polarizing plate with a dry cloth, as it may scratch the surface.
- Wipe the module gently with soft cloth soaked with a petroleum benzine.
- Do not use ketonic solvents (ketone and acetoe) or aromatic solvents (toluene and xylene), as they may damage the polarizing plate.

6. OPERATION PRECAUTIONS

Any changes that need to be made in this specification or any problems arising from it will be dealt with quickly by discussion between both companies.

7. LCM Dimension