All Shore Industries, Inc.
P/N ASI-R-12864L1S-DE-CYD/A

DATA SHEET

ISSUE	VERSION	APPROVER	CHECKER	ENGINEER
YC_Jao	**A**	Scott	Michael	Kevin_lin

Records of Revision

Revision	Revision Date	Contents	Approved
A	2006/7/21	Initial Release and Issue Full Specification	KEVIN_LIN

CONTENTS

1. SCOPE

This specification covers the engineering requirements for the ASI-R-12864L1S-DE-CYD/A liquid crystal module.

2. PRODUCT SPECIFICATIONS

2.1   General

- 128 × 64 dot matrix LCD
- STN (Yellow-green) , Positive mode LCD panel
- Transflective , Wide temperature type
- 6 o'clock
- Back light: Edge LED (Yellow-green)
- Multiplexing driving : 1/64duty, 1/9bias
- COG SED1565

. 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)	86.2 × 53.0 × 5.5 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 +5.5
Input Voltage	V_{IN}	V	-0.3 to $V_{DD+0.3}$

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}	--	2.1	3.0	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	Symbol	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	Symbol	Temp.	Min.	Typ.	Max.	Unit
Driving voltage	Vop	25 °C	8.6	9.2	9.7	V
Contrast	K	θ=0° ϕ=0°	2	2.8	8.3	--
Frame freq.	fF	--	--	70	--	Hz
Viewing angle*	θ_2-θ_1	25 °C	30	80	--	deg.
	ϕ		60	75	--	
Response tim e	t_{on}	25 °C	--	47	250	ms
	t_{off}		--	77	250	

2.6.1 Definition of optical characteristics

* Definition of angles ϕ and θ

Light (When reflected)

$Z (\theta = 0°)$

Sensor

$\theta2$

θ

$\theta1$

i

$Y' (\phi = 180°)$

$X (\phi = 90°)$

ϕ

X'

LC panel

$Y (\phi = 0°)$
$(\theta = 90°)$

Z

Light (When transmitted)
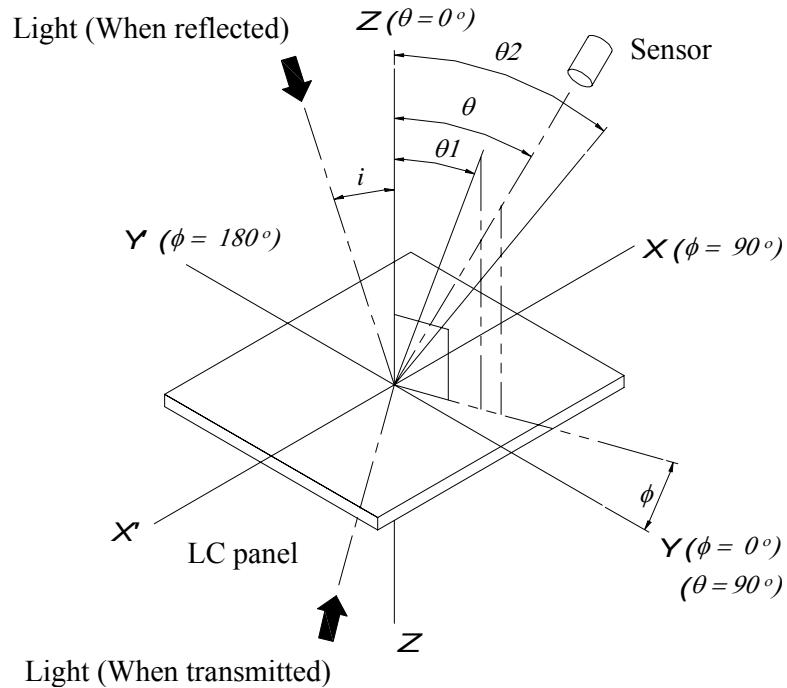
*Definition of contrast C

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

(%)

Dark

unselected portion brightness curve
(bias voltage applied)

Brightness

selected portion
brightness curve

Bright

Operation voltage Vopr ⟶ **(V)**
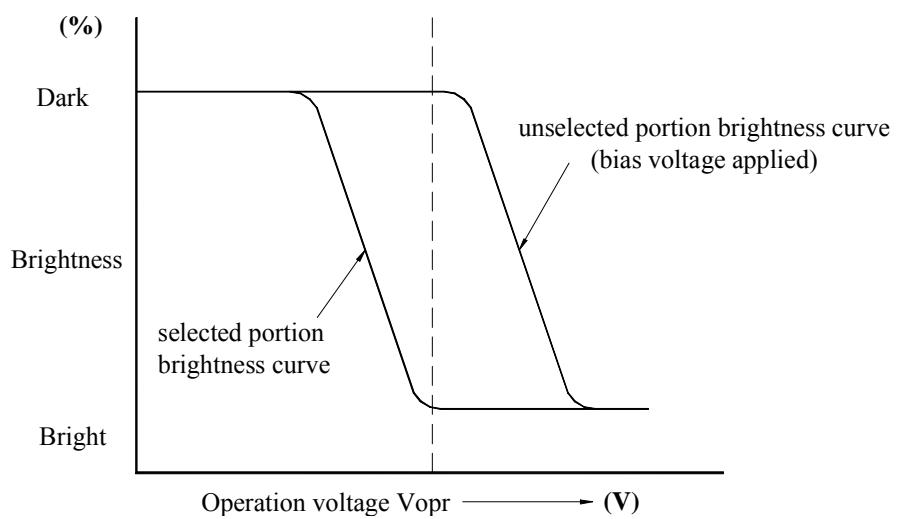
* Definition of viewing angles θ1 and θ2

Contrast C

Cmax.

2.0

θ 1   θ 2

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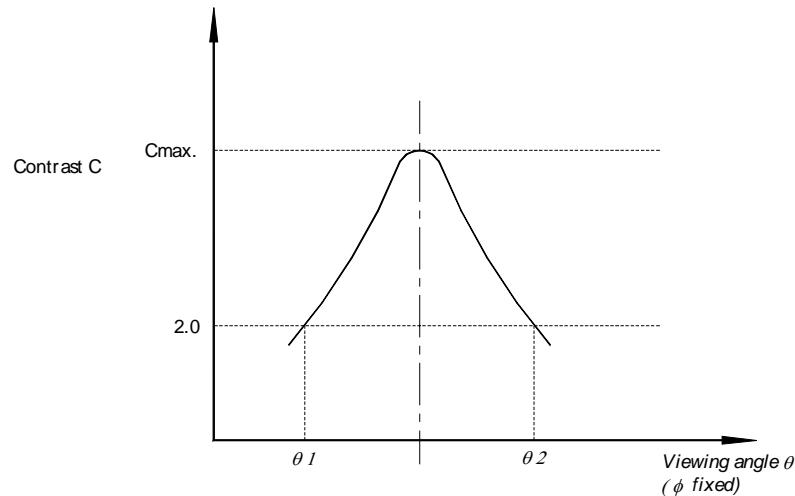
Note : Optimum vision with the naked eye and viewing angle θ at Cmax above are not always the same.

* Definition of response time

$1/f_{FRM}$

V opr

Voltage

0

(V)

Unselected state
(display OFF)

Selected state
(display ON)

Unselected state
(display OFF)

Dark

10%

Brightness

100%   90%

Bright

t on   t off
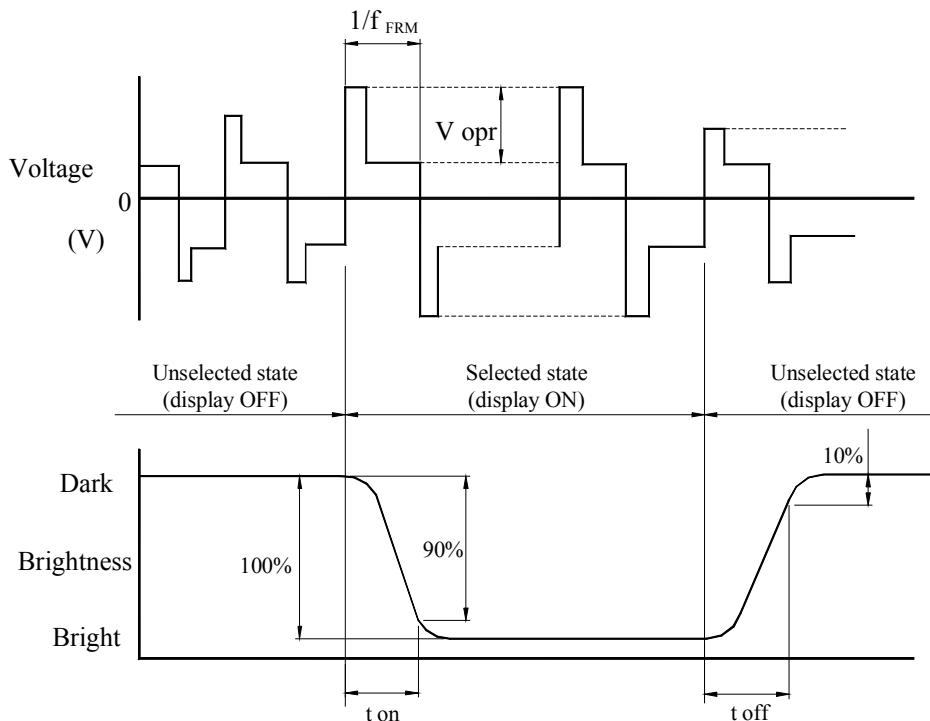
Vopr : Operating voltage (V)   Ton : Response time (rise) (ms)

fFRM : Frame frequency (Hz)   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=100mA, Yellow Green	--	4.2	4.4	V
*Luminous Intensity	I_V	If=100mA, Yellow Green	25	32	--	cd/m^2
Peak Emission Wavelength	λP	If=100mA, Yellow Green	--	570	--	nm
Spectrum Radiation Bandwidth	$\Delta\lambda$	If=100mA, Yellow Green	--	30	--	nm
Reverse Current	I_R	VR=8V, Yellow Green	--	--	100	µA

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}	0.8	W
Forward Current	I_F	200	mA
Reverse Voltage	V_R	8	V

3. RELIABILITY

3.1   Reliability

Test item	Test condition	Evaluation and assessment
Operation at high temperature and humidity	$40\,^{o}C\pm2\,^{o}C$ 90%RH for 500hours	No abnormalities in functions* and appearance**
Operation at high temperature	$60\,^{o}C\pm2\,^{o}C$ for 500 hours	No abnormalities in functions* and appearance**
Heat shock	$-20\pm \sim +60\,^{o}C$ Left for 1 hour at each temperature, transition time 5 min, repeated 10times	No abnormalities in functions* and appearance**
Low temperature	$-20\pm2\,^{o}C$ 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

3.2   Liquid crystal panel service life

100,000 hours minimum at $25\,^{o}C\pm10\,^{o}C$

3.3   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

4. OPERATING INSTRUCTIONS

4.1 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. W hen serial m ode 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 capacito r between this term inal and the VSS
17	CAP3-	Connect a capacito r between this term inal and the CAP1+
18	CAP1+	Connect a capacito r between this term inal and the VSS
19	CAP1-	Connect a capacito r between this term inal and the VSS
20	CAP2-	Connect a capacito r between this term inal and the VSS
21	CAP2+	Connect a capacito r between this term inal and the VSS
22~26	V1~V5	This is a multi-level power supp ly f or the liquid crystal drive. $VDD(=V0) \geq V1 \geq V2 \geq V3 \geq V4 \geq V5$

4.2   Voltage Generator Circuit
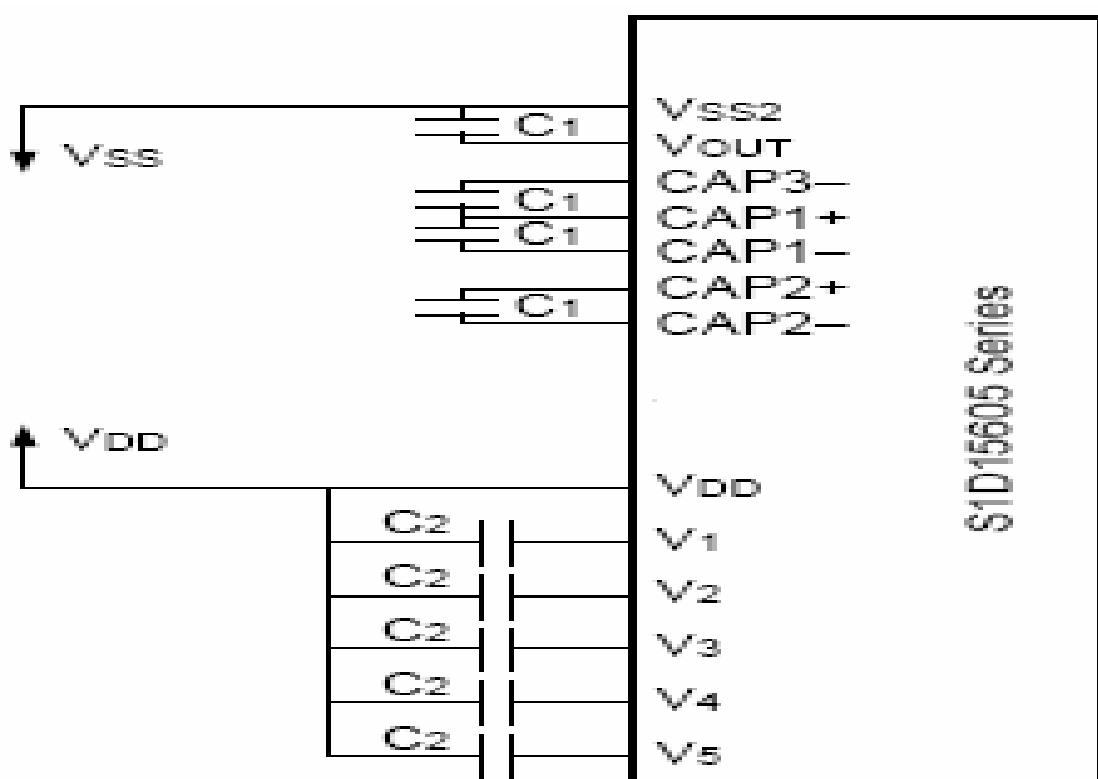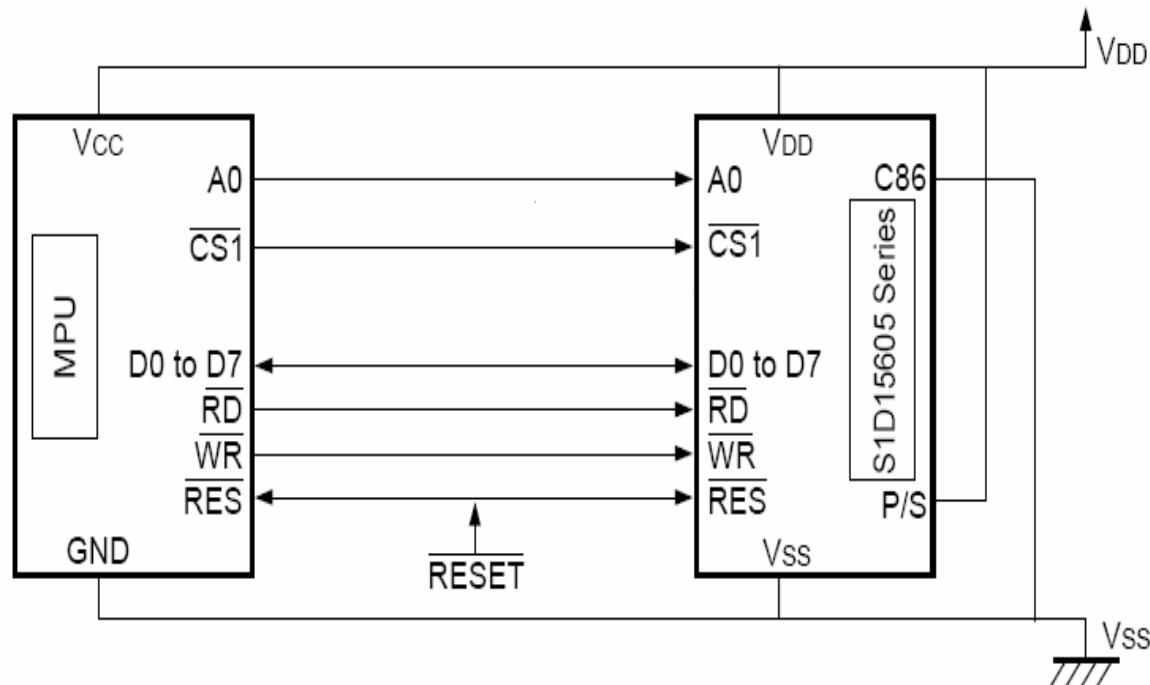
Item	Set value	Units
C_1	1.0 to 4.7	μF
C_2	0.01 to 1.0	μF

4.3 T iming Diagram

System Bus Read/Write Characteristics for the 8080 series MPU
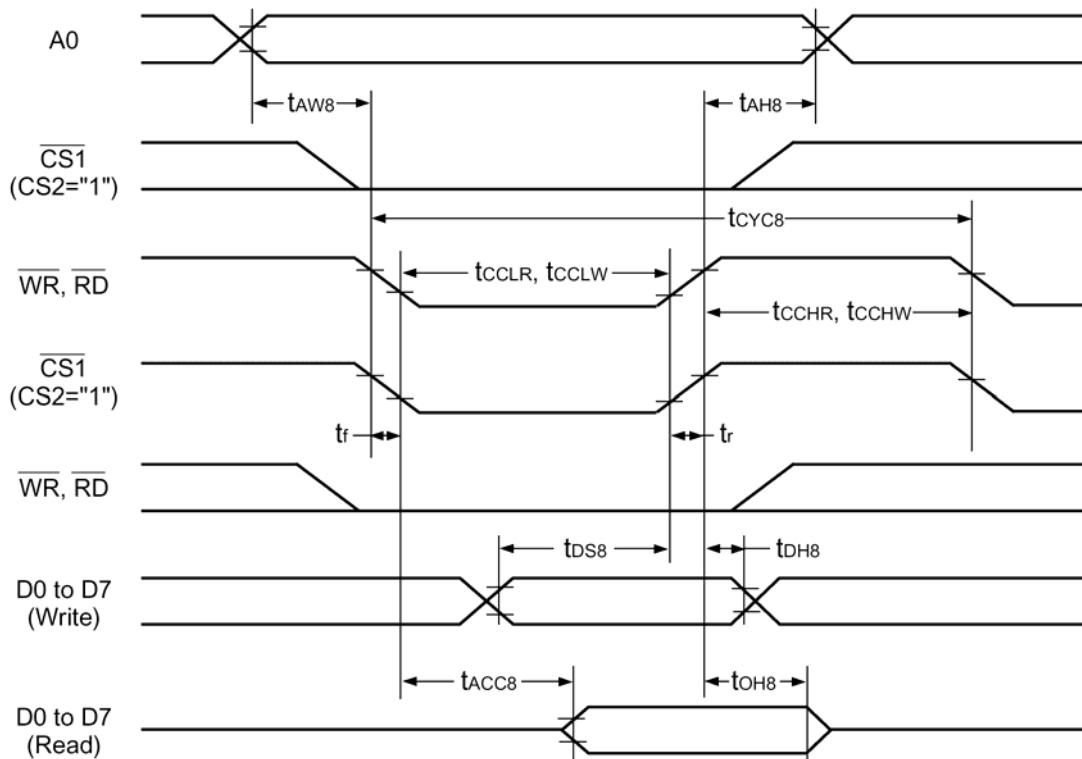
$(V_{DD}=2.7V$ to $4.5V$,Ta=-40 to 85°C)

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

5. 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 $25\,^{o}C\pm10\,^{o}C$ 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.

DOT DETAIL

DOT 128X64

Chip on Glass
ST7565P

Pin Assignment

No.	Symbol
1	CS1
2	RESET
3	A0
4	R/W
5	E
6	DB0
7	DB1
8	DB2
9	DB3
10	DB4
11	DB5
12	DB6
13	DB7
14	VDD
15	VSS
16	VOUT
17	CAP3-
18	CAP1+
19	CAP1-
20	CAP2-
21	CAP2+
22	V1
23	V2
24	V3
25	V4
26	V5

NOTE:TOLERANCE IS ±0.2 UNLESS OTHERWISE NOTED.

DWN.	Vic	DATE: 2/8/02'	TITLE	
CHK.	Michael	SCALE: 1:1		
APPD.		PAGE: 1/1		
		THIRD ANGLE PROJECTION	UNITS: mm	DWG.NO:	VER: 1.0

| | Michael | 12/30/05' | NEW RELEASE |
| | NAME | DATE | REVISION RECORD |

PART NUMBER   DESCRIPTION