PRODUCT SPECIFIICATION

GS12864C-D-BSNTSWW-00

V1.0

December 31 ,2004

Easterntronic LCD Group

REVISION RECORD

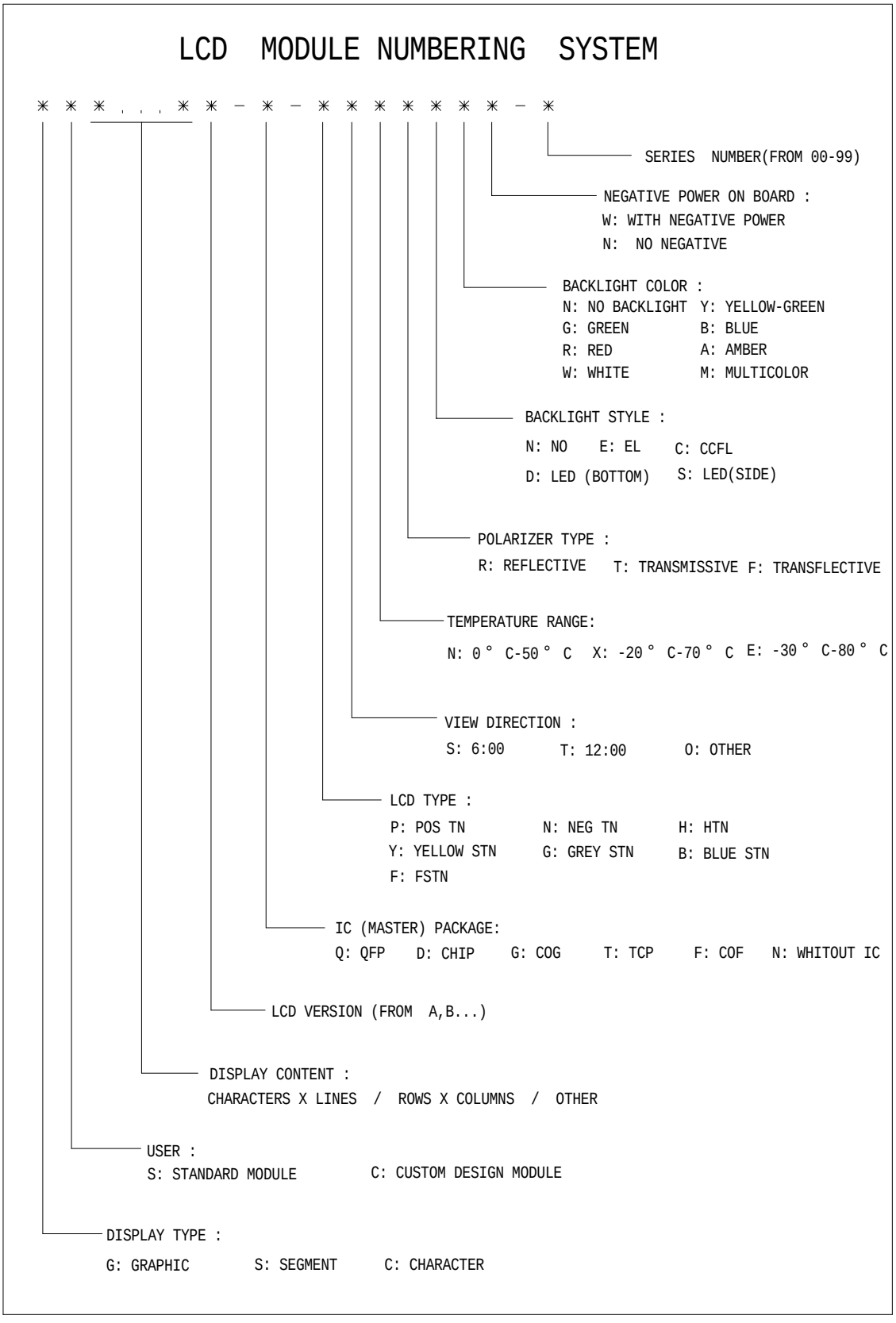
REV	DESCRIPTION	DATA
V1.0		December 31,2004

CONTENTS

1. Type Number and Description

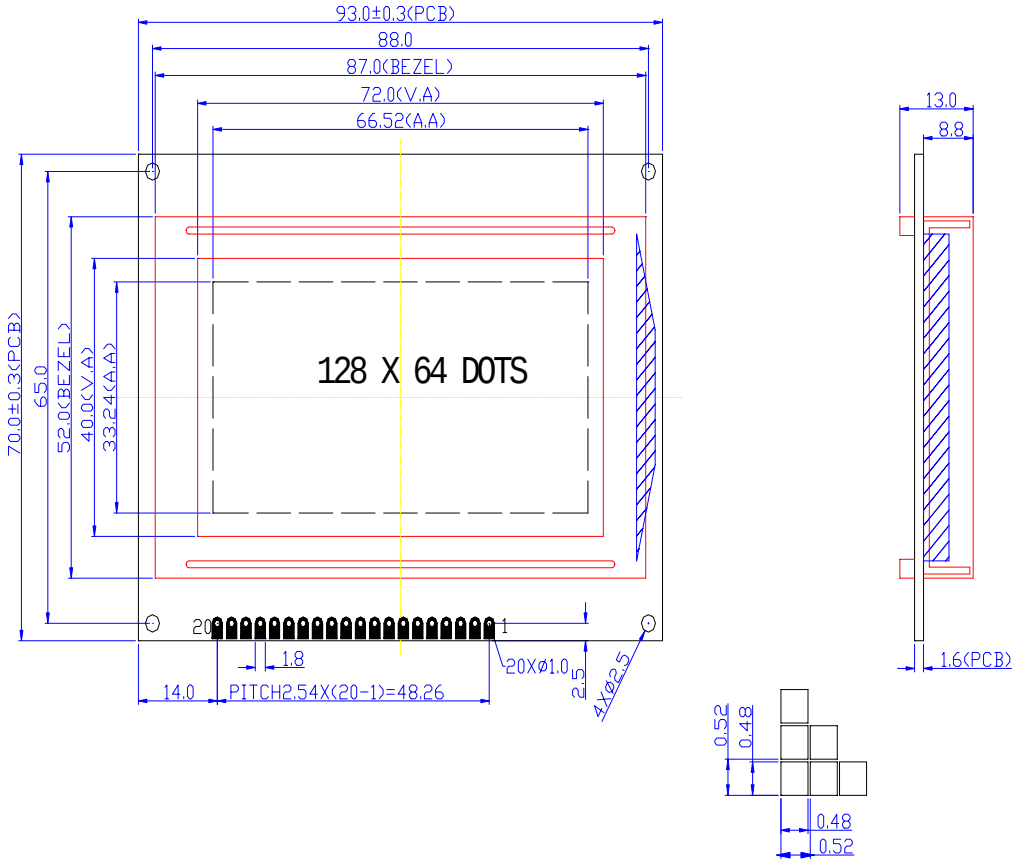
Type Number:	GS12864C-D-BSNTSWW-00
Description:	128 X 64 dots
LCD Panel:	STN ,Blue,Transmissive, Negative
Operating Temperature:	0 ^{0}C – 50 ^{0}C
Storage Temperature:	-10 ^{0}C – 60 ^{0}C
Viewing angle:	6H
Backlight Voltage:	5.0V
BackLight Mode:	Side
BackLight Color:	White
Controller:	KS0107 OR Equivalent
IC Package:	Bonding
Logic Voltage:	5.0V

2. LCD Module Numbering System



3. Mechanical Specifications:

ITEM	STANDARD VALUE	UNIT
DISPLAY CONTENT	128H X 64V DOTS	
MODULE DIMENSION	93.0(W) X 70.0(H) X 13.0(T)	mm
EFFECTTVE DISPLAY AREA	72.0(W) X 40.0(H)	mm
DOT SIZE	0.48(W) X 0.48(H)	mm
DOT PITCH	0.52(W) X 0.52(H)	mm
APPROX WEIGHT	100	g
LCD TYPE	Blue,Negative	
DUTY AND BIAS	1/64 DUTY; 1/9 BIAS	
VIEWING DIRECTION	6:00	
BACK LIGHT	WHITE LED	

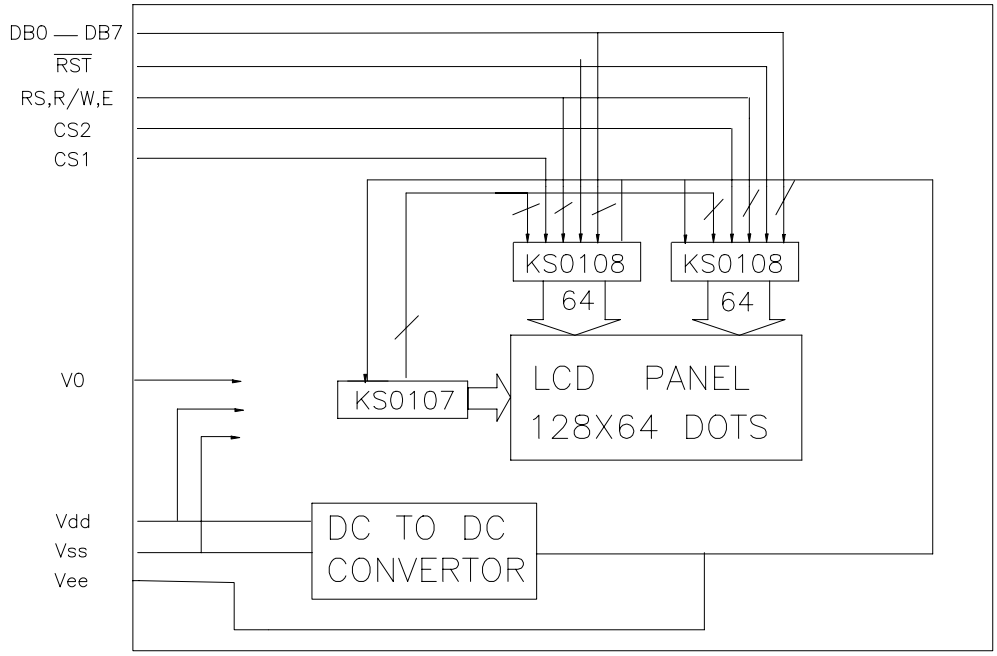


4. ELECTRICAL BLOCK DIAGRAM/PINS DEFINITION

4.1 PINS DEFINITION

PIN	SYMBOL	FUNCTION
1	Vss	Power Supply(GND)
2	Vdd	Power Supply(+5V)
3	Vo	Contrast Adjust
4	D/I	Data(H)/Instruction(L) Code input
5	R/W	Read(MPU→LCM)/Write(MPU→LCM) Control
6	E	Enable Signal
7-14	DB0-DB7	Data Bus Line
15	CS1	Chip selection for IC1
16	CS2	Chip selection for IC2
17	RST	Reset
18	Vee	Negative Voltage output(-10V)
19	LED+	Power Supply for LED B/L(+)
20	LED-	Power Supply for LED B/L(-)

4.2 ELECTRICAL BLOCK DIAGRAM



5. ABSOLUTE MAXIMUM RATINGS

5.1 Electrical Maximum Ratings (Ta=25deg C)

ITEM	SYMBOL	CONDITION	MIN	MAX	UNIT
Supply Voltage (Logic)	Vdd – Vss	25 C	0	7.0	V
Supply Voltage (LCD Drive)	Vdd – Vee	25 C	-	18.0	V
Input Voltage	Vi	-	-0.3	Vdd +0.3	V

5.2 Environmental Conditions

ITEM	SYMBOL	CONDITION	MIN	MAX	UNIT
Operating Temp	Topr	-	0	50	deg C
Storage Temp	Ttsg	-	-10	60	deg C
Humidity Endurance	RH	no ondensation Ta</=40 deg	-	95	%
Vibration	-	3 directions	see note (a), page 3		-
Shock	-	3 directions	see note (b), page 3		-

note (a): frequency : varying from 10 Hz in a 1-minute cycle
amplitude : 1.5mm
duration : 120 cycles, each lasting 1 minute,
for each of the 3 directions, x,y,z

note (b): nutually perpendicular directions
direction normal to surface of LCD glass
80G, half-sine pulse of duration 11ms
other 2 directions
100G, half-sine pulse of duration 11ms

6. ELECTRICAL SPECIFICATIONS

6.1 Electrical Characteristics at Ta=25 deg C, Vdd = 5V + / - 5%

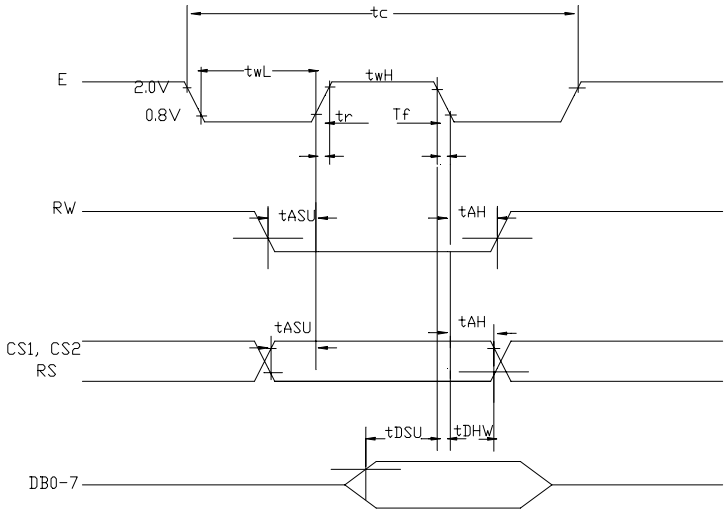
ITEM	SYMBOL	CONDITION	MIN	TYP	MAX	UNIT
Supply Voltage (logic)	Vdd-Vss	-	4.5	5.0	5.5	V
Supply Voltage (LCD)	Vdd-V0	Vdd = 5V	--	13.0	--	V
Input signal voltage (for E, DB0-7,R/W,RS)	Vih	“H” level	2.4	-	Vdd	V
	Vil	“L” level	0	-	0.6	V
Output voltage for Logic	Voh	-Ioh=0.6mA	Vdd-0.4	-	Vdd	V
	Vol	Iol=1.6mA	0	-	0.4	
Supply Current	Idd	-	--	8.0	10.0	mA
Supply Voltage (LED)	V-bl	see note 1	2.9	3.2	3.5	V
Supply Current (LED)	I-bl	see note 1		15 x 2		mA

Note 1: LED backlight chips are arranged in two branches of 2 in series

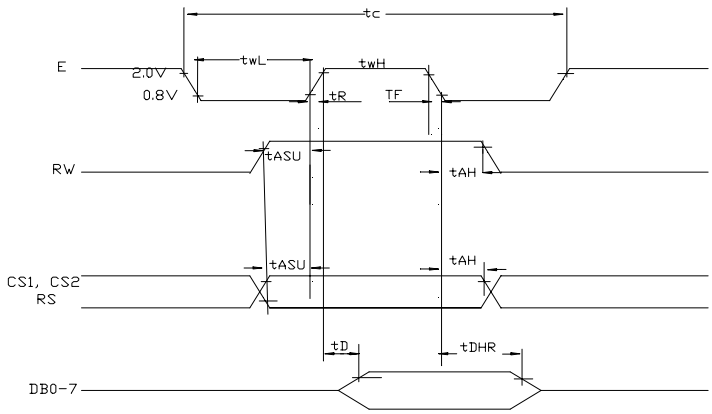
6.2 TIMING SPECIFICATIONS at Ta = 25 deg C, Vdd = 5V+/-10%, Vss =0V

ITEM	SYMBOL	MIN	MAX	UNIT
E Cycle Time	tc	1000	-	ns
E High Level Width	tWH	450		ns
E Low Level Width	tWL	450		ns
E rise time	tR	-	25	ns
E fall time	tF	-	25	ns
Address Set-Up Time	tASU	140	-	ns
Address Hold Time	tAH	10	-	ns
Data Set-up Time	tDSU	200	-	ns
Data Delay Time	tD	-	320	ns
Data Hold Time(Write)	tDHW	10		ns
Data Hold Time(Read)	tDHR	20		ns

MPU WRITE TIMING

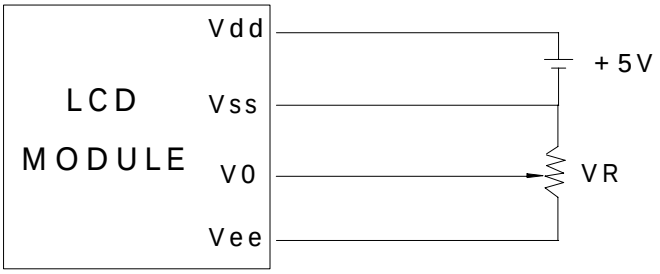


MPU READ TIMING



7. POWER SUPPLY FOR LCD MODULE

7.1 SINGLE SUPPLY VOLTAGE TYPE(for LCM with Negative Power on PCB)



Vdd-V0: LCD Driving Voltage
VR: 10K - 20K

8. ELECTRO-OPTICAL CHARACTERISTIC

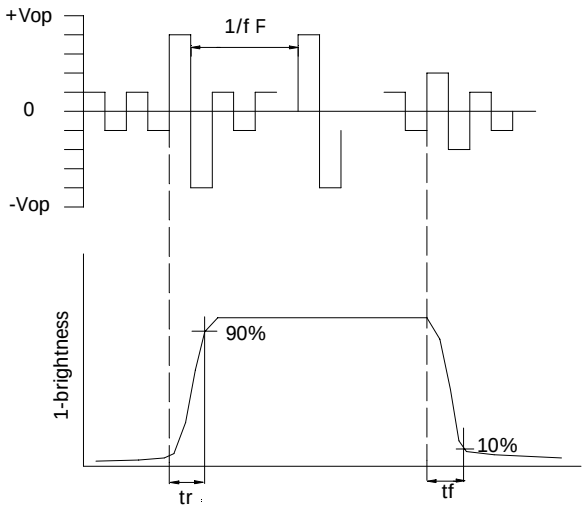
ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	REF.
Contrast	CR	25°C	--	12	--		Note1
Rise Time	tr	25°C	--	160	240	ms	Note2
Fall Time	tf	25°C	--	100	150	ms	note 2
Viewing Angle	θ1-θ2	25°C	--	--	60	DEG	Note 3
	Ø1, Ø2		-40	--	40		
Frame Frequency	Ff	25°C	--	70	--	Hz	note 2

Note(3): Contrast ratio is defined under the following condition:

CR= brightness of non-selected condition
brightness of non-selected condition

(a). Temperature----------25C
(b). Frame Frequency------64Hz
(c). Viewing angle---------- θ =0, Ø=0
(d). Operating Voltage---5.0V

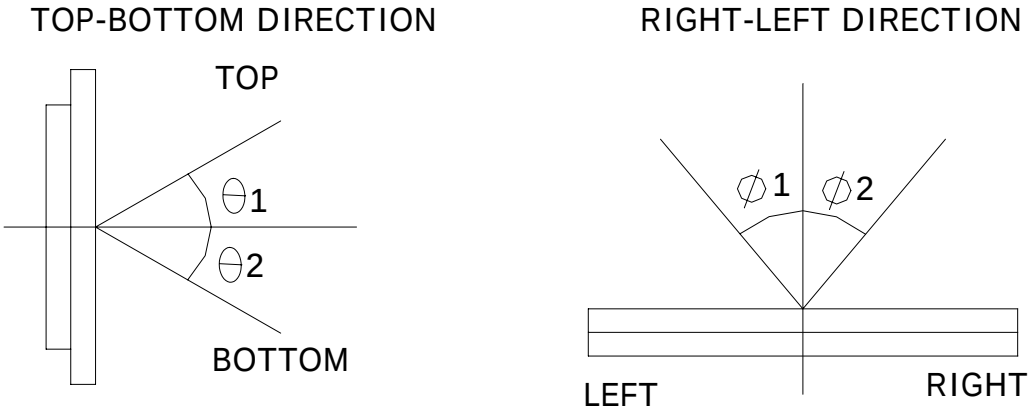
Note(1): definition of response time:



Condition:

(a). Temperature----------25C
(b). Frame Frequency------64Hz
(c). Viewing angle---------- θ =0, Ø=0
(d). Operating Voltage---5.0V

Note(2): definition of view angle:



9. INSTRUCTION TABLE

Function	RS	R/W	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0	Description
Display ON/OFF	L	L	L	L	H	H	H	H	H	L/H	Control the display on or off. L: OFF, H: ON
Set Address (Y address)	L	L	L	H	Y Address(0-63)						Sets the Y address in the Y address counter.
Set Page (X address)	L	L	H	L	H	H	H	PAGE(0-7)			Set the X address at the X address register.
Display Start Line (Z address)	L	L	H	H	Display Start Line(0-63)						Specify a RAM line displayed at the top line of the screen.
Status Read	L	H	BUSY	L	ON/OFF	RESET	L	L	L	L	Read the status. BUSY L: ready H: In operation ON/OFF L: display on H: display off RESET L: Normal H: Reset
Write Display Data	H	L	Write Data								Write data(DB0:7) into display data RAM. After writing, Y address in increased by 1 automatically.
Read Display Data	H	H	Read Data								Read data(DB0:7) from display data RAM to the data bus. After reading, Y address in increased by 1 automatically.

10. Address Configuration of Display Data RAM

Y address **X address**

0 1 2 3 4----------59 60 61 62 63

DB0 DB7	PAGE 0	X=0
DB0 DB7	PAGE1	X=1
... ...	... ...	
DB0 DB7	PAGE 6	X=6
DB0 DB7	PAGE 7	X=7

11. Precaution For Using LCM

1. LIQUID CRYSTAL DISPLAY (LCD)

LCD is made up of glass, organic sealant, organic fluid, and polymer based polarizers. The following precautions should be taken when handing,

(1). Keep the temperature within range of use and storage. Excessive temperature and humidity could cause polarization degredation, polarizer peel off or bubble.

(2). Do not contact the exposed polarizers with anything harder than an HB pencil lead. To clean dust off the display surface. Wipe gently with cotton. Chamois or other soft material soaked in petroleum benzin.

(3). Wipe off saliva or water drops immediately. Contact with water over a long period of time may cause polarizer deformation or color fading, while an active LCD with water condensation on its surface will cause corrosion of ITO electrodes.

(4). Glass can be easily chipped or cracked from rough handing. especially at corners and edges.

(5). Do not drive LCD with DC voltage.

2. Liquid Crystal Display Modules

2.1 Mechanical Considerations

LCM are assembled and adjusted with a high degree of precision. Avoid excessive shocks and do not make any alterations or modifications. The following should be noted.

(1). Do not tamper in any way with the tabs on the tabs on the metal frame.

(2). Do not modify the PCB by drilling extra holes, changing its outline, moving its components or modifying its pattem.

(3). Do not touch the elastomer connector, especially insert an backlight panel (for example, EL).

(4). When mounting a LCM make sure that the PCB is not under any tress such as bending or twisting. Elastomer contacts are very delicate and missing pixels could result from slight dislocation of any of the elements.

(5). Avoid pressing on the metal bezel, otherwise the elastomer connector could be deformed and lose contact, resulting in missing piels.

2.2. Static Electricity

LCM contains CMOS LSI's and the same precaution for such devices should apply, namely

(1). The operator should be grounded whenever he/she comes into contact with the module. Never touch any of the conductive parts such as the LSI pads, the copper leads on the PCB and the interface terminals with any parts of the human body.

(2). The modules should be kept in antistatic bags or other containers resistant to static for storage.

(3). Only properly grounded soldering irons should be used.

(4). If an electric screwdriver is used, it should be well grounded and shielded from commutator sparks.

(5). The normal static prevention measures should be observed for work clothes and working benches; for the latter conductive (rubber) mat is recommended.

(6). Since dry air is inductive to statics, a relative humidity of 50-60% is recommended.

2.3. Soldering

(1). Solder only to the I/O terminals.

(2). Use only soldering irons with proper grounding and no leakage.

(3). Soldering temperature: 280 ℃±10℃

(4). Soldering time: 3 to 4 sec.

(5). Use eutectic solder with resin flux fill.

(6). If flux is used, the LCD surface should be covered to avoid flux spatters. Flux residue should be removed after wards.

2.4. Operation

(1). The viewing angle can be adjusted by varying the LCD driving voltage V0.

(2). Driving voltage should be kept within specified range; excess voltage shortens display life.

(3). Response time increases with decrease in temperature.

(4). Display may turn black or dark blue at temperatures above its operational range; this is (however not pressing on the viewing area) may cause the segments to appear "fractured".

(5). Mechanical disturbance during operation (such as pressing on the viewing area) nay cause the segments to appear "fractured".

2.5. Storage

If any fluid leaks out of a damaged glass cell, wash off any human part that comes into contact with soap and water. Never swallow the fluid. The toxicity is extremely low but caution should be exercised at all the time.

2.6. Limited Warranty

Unless otherwise agreed between EASTERNTRONIC and customer, EASTERNTRONIC will repiace or repair any of its LCD and LC, which is found to be defective electrically and visually when inspected in accordance with EASTERNTRONIC acceptance standards, for a period on one year fron data of shipment. Confirmation of such date shall be based on freight documents. The warranty liability of EASTERNTRONIC is limited to repair and/or replacement on the terms set forth above. EASTERNTRONIC will not responsible for any subsequent or consequential events.