

04/Aug/2005

# **GENERAL SPECIFICATION**

# MODULE NO. : DEM 240064C SYH-LY CUSTOMER P/N

VERSION NO.	CHANGE DESCRIPTION	DATE
10	CHANGED PCB DRAWING	14/07/2005
	AND DESCRIPTION	

PREPARED BY:	CHJ	DATE: 14/07/2005
APPROVED BY:	MH	DATE: 04/08/2005

# CONTENTS

1. FUNCTIONS & FEATURES	-2
2. MODULE ARTWORK	-2
3. EXTERNAL DIMENSIONS	-3
4. BLOCK DIAGRAM	-3
5. PIN ASSIGNMENT	-4
6. POWER SUPPLY	-4
7. PCB DRAWING AND DESCRIPTION	-5
8. ABSOLUTE MAXIMUM RATINGS	-6
9. ELECTRICAL CHARACTERISTICS	-7
10. ELECTRO-OPTICAL CHARACTERISTICS	9
11. BACKLIGHT DRAWING AND CHARACTERISTIC	-10
12. PRECAUTION FOR USING LCM	-11
13. LCD MODULES HANDLING PRECAUTIONS	-13
14. OTHERS	-13

# **1. FUNCTIONS & FEATURES**

•	I CD TYPE
•	LUD ITTE.

	Module Model	LCD Technology	LCD Mode		
	DEM 240064C SYH-LY	STN Yellow/Green	Transflective Positive		
•	Viewing Direction	: 6 o'c	lock		
•	Driving Scheme	: 1/64	Duty, 1/9 Bias		
•	Power Supply for logic	: 5.0 V	/olt (typ.)		
•	Display Content	: 240 x 64 Dots			
•	V <sub>LCD</sub>	: 12.6	Volt (typ.)		
•	Backlight:	: LED	, Yellow/Green, Lightbox		
•	Weight	: 200g	(typ.)		
•	Operation Temperature	: -20°C	C +70°C		
•	Storage temperature	: -30°C	C +80°C		
•	LCD-Controller	: T696	3C (Toshiba)		

### 2. MODULE ARTWORK

•	Module Size	: 180.0 x 65.0 mm
•	Dot Size	: 0.49 x 0.49 mm
•	Dot Gap	: 0.04 mm

### **3. EXTERNAL DIMENSIONS**



Untolerance is ± 0.3mm



### 4. BLOCK DIAGRAM

## **5. PIN ASSIGNMENT**

NO.	SYMBOL	FUNCTION
1	FG	Frame ground (see mote 1)
2	VSS	Ground (0V)
3	VDD	Power Supply (+5V)
4	V0	Power Supply for LCD Drive
5	/WR	Data write. Write data to controller T6963C when "L"
6	/RD	Data read. Read data from controller T6963C when "L"
7	CE	Chip enable of controller when "L"
8	C/ /D	Command/Data read/write. "H" for command read/write and
9	NC	No connection
10	/RST	Controller reset when "L"
11	DB0	Data input/output (LSB)
12	DB1	Data input/output
13	DB2	Data input/output
14	DB3	Data input/output
15	DB4	Data input/output
16	DB5	Data input/output
17	DB6	Data input/output
18	DB7	Data input/output (MSB)
19	FS	Font select. "H" for 6x8 font & "L" for 8x8 font
20	N.C	No Connection
21	LED+(A)	Anode of LED backlight
22	LED- (K)	Cathode of LED backlight

Note: This pin is electrically connected to the metal bezel (frame), but, is otherwise not connected. User can choose to connect this pin to ground or leave it open.

### 6. POWER SUPPLY



### DEM 240064C SYH-LY 7. PCB DRAWING AND DESCRIPTION

### 7.1 PCB DRAWING

### 7.1.1 TOP Layer



### 7.1.2 Bottom Layer



### 7.2 DESCRIPTION:

7-2-1. The polarity of the pin 21 and the pin 22:

	symbol	12 15	14 16	LED Polarity		
symbol	state			21 Pin	22 Pin	
J4, J6	Each solder-bridge	Each open	Each closed	Anode	Cathode	
J3, J5	Each solder-bridge	Each closed	Each open	Cathode	Anode	

Note: In application module, J3=J5= open, J4=J6= closed

7-2-2. The metal-bezel is set on ground when the J1 is closed.

Note: In application module, J1=closed

7-2-3. The LED resistor can be bridged when the J2 is closed

Note: In application module, J2=6,2 Ohm.

7-2-4. The R8, R9 and R10 are the LED resistors.

Note: In application module R8 = R9 = R10 = 6.2 Ohm.

# 7.3 Example application

7-3-1. The 21 pin is the anode and the 22 pin is the cathode as following.



7-3-2. The 21 pin is the cathode and the 22 pin is the anode as following.



#### 7.3 The Module NO.DEM240064C is printed on the PCB.



### 8. ABSOLUTE MAXIMUM RATINGS 8.1 ELECTRICAL ABSOLUTE MAXIMUM RATINGS

(Vss=0V, Ta=25°C)

PARAMETER	SYMBOL	Min.	Max.	UNIT
Supply Voltage (Logic)	$V_{DD}$ - $V_{SS}$	0	7	V
Supply Voltage (LCD Driver)	$V_{DD}$ - $V_{EE}$	0	19	V
Input voltage range	VI	$V_{SS}$	V <sub>DD</sub>	V

### 8.2 ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

Operating		Stor	rage	Comment	
(Min.)	(Max.)	(Min.) (Max.)			
-20	70	-25 75		Note(1)	
Note(2)		Note(2)		Without	
				Condensation	
	$4.9 M/S^{2}$	$19.6 M/S^2$		XYZ Direction	
	$29.4 \text{M/S}^2$	$490 \text{M/S}^2$		XYZ Direction	
	Oper (Min.) -20 Not	$\begin{tabular}{ c c c } \hline Operating & & & \\ \hline (Min.) & (Max.) & & \\ \hline -20 & 70 & & \\ \hline -20 & Note(2) & & \\ \hline & & & \\ \hline & & & \\ \hline & & & & \\ \hline & & & &$	$\begin{tabular}{ c c c c } \hline Operating & Store \\ \hline (Min.) & (Max.) & (Min.) \\ \hline -20 & 70 & -25 \\ \hline Note(2) & Note \\ \hline & & & & & & \\ \hline & & & & & & & \\ \hline & & & &$	$\begin{tabular}{ c c c c } \hline Operating & Storage \\ \hline (Min.) & (Max.) & (Min.) & (Max.) \\ \hline -20 & 70 & -25 & 75 \\ \hline -20 & 70 & -25 & 75 \\ \hline Note(2) & Note(2) \\ \hline & & & & & & & \\ \hline & & & & & & & \\ \hline & & & &$	

Note (1)  $Ta = 0^{\circ}C$ : 50Hr Max.

Note (2) Ta  $\leq 40^{\circ}$ C: 90% RH Max.

Ta  $\ge$  40°C:Absolute humidity must be lower than the humidity of 90% RH at 40°C.

# 9. ELECTRICAL CHARACTERISTICS

### 1). DC Characteristics

					Ta=25°C	, VSS=0V
Parameter	Symbol	Conditions	Min.	Тур.	Max.	Units
Supply Voltage (Logic)	$V_{DD}$ - $V_{SS}$	-	4.5	5.0	5.5	V
High Level Input Voltage	$V_{\mathrm{IH}}$	V <sub>DD</sub> =5.0V±10%	V <sub>DD</sub> -2.2	-	V <sub>DD</sub>	V
Low Level Input Voltage	$V_{IL}$	V <sub>DD</sub> =5.0V±10%	0	-	0.8	V
High Level Output Voltage	V <sub>OH</sub>	$I_{OH}=0.75 \text{mA}$	V <sub>DD</sub> -0.3	-	V <sub>DD</sub>	V
Low Level Output Voltage	V <sub>OL</sub>	$I_{OL}=0.75 \text{mA}$	0	-	0.3	V
Supply Current	I <sub>DD</sub>	$V_{DD}-V_{SS}=5.0V$	-	8.2	13.0	mA
Supply Cullent	$I_{EE}$	$V_{DD}$ - $V_{EE}$ =12.9V	-	2.8	5.0	mA

#### 2). AC Characteristics

VDD=5.0V±10% Parameter Symbol Units Min. Max. C/D Setup Time 100 ns t<sub>CDS</sub> C/D Hold Time 10 t<sub>CDH</sub> ns -CE, RD, WR Pulse Width  $t_{CE,}, t_{RD}, t_{WR}$ 80 ns Data Setup Time 80 ns t<sub>DS</sub> Data Hold Time 40 t<sub>DH</sub> ns -Access Time 150 ns t<sub>ACC</sub> Output Hold Time 10 50 ns  $t_{\rm OH}$ 



# <u>DEM 240064C SYH-LY</u>

### 3). Power Supply ON/OFF Sequence



#### • OFF Sequence



### • Reset Sequence



Please maintain the above sequence when turning on and off the power supply of the module. If VEE is supplied to the module while internal alternate signal for LCD driving (M) is unstable or RESET is active, DC component will be supplied to the LCD panel. This may cause damage to the LCD module.

# **Product Specification**

## **10. ELECTRO-OPTICAL CHARACTERISTICS**

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	REF.
Piso Timo	Tr	0°C		450	560	ma	
	11	25°C		140	210	1115	$N_{oto}(1)$
Fall Time	Тf	0°C		680	800	122.0	Note(1)
	11	25°C		220	330	ms	
Contrast	CR	25°C		2.7			Note(3)
View Angle	$\theta 1 \cdot \theta 2$	25°C &		-	80		Noto(2)
	φ1·φ2	$CR \ge 1.5$	-35	-	35		$\operatorname{NOIC}(2)$
Frame	Ef	25°C		64		Нz	
Frequency	1'1	25 C		04		11Z	

Note (1) & (2): See next page

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

Brightness of no-selected condition Brightness of selected condition

(a). Temperature -----25°C

- (b). Frame frequency -----64Hz
- (c). viewing angle -----  $\theta = 0^{\circ}, \phi = 0^{\circ}$
- (d). Operating voltage-----12V
- Note (1) Response time is measured as the shortest period of time possible Between the changes is state of an LCD segment as demonstrated below: Entire range.



# 11. BACKLIGHT ELECTRICAL/OPTICAL SPECIFICATIONS

### **11.1 Electro/Optical Characteristics**

Item	Symbol	Condition Min.		Тур.	Max.	Unit
Forward Voltage	$V_{\rm F}$	IF=450mA Yellow Green		4.1	4.5	V
Luminous intensity	Iv	IF=450mA Yellow Green	90	140		cd/m <sup>2</sup>
Peak Emission	λp	IF = 10mA Yellow Green		572		nm
Spectrum Radiation	Δλ	IF = 10mA Yellow Green		20		nm
Reverse Current	IR	VR = 10V Yellow Green			0.7	mA

ITEM	SYMBOL	YELLOW GREEN	UNIT
Power Dissipation	P <sub>AD</sub>	1.85	W
Forward Current	I <sub>AF</sub>	450	mA
Reverse Voltage	VR	10	V



BACKLIGHT

### DEM 240064C SYH-LY 12. PRECAUTION FOR USING LCM

# 1. LIQUID CRYSTAL DISPLAY (LCD)

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

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

(2). Do not contact the exposed polarizer 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 handling, 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 metal frame

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

- (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 stress 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 pixels.
- 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 static, 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:  $280^{\circ}C \pm 10^{\circ}C$
- (4). Soldering time: 3 to 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) may 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 DISPLAY and customer, DISPLAY will replace or repair any of its LCD and LCM which is found to be defective electrically and visually when inspected in accordance with DISPLAY acceptance standards, for a period on one year from date of shipment. Confirmation of such date shall be based on freight documents. The warranty liability of DISPLAY is limited to repair and/or replacement on the terms set forth above. DISPLAY will not responsible for any subsequent or consequential events.

### *DEM 240064C SYH-LY* 13. LCD MODULES HANDLING PRECAUTIONS

#### • Please remove the protection foil of polarizer before using.

- The display panel is made of glass. Do not subject it to a mechanical shock by dropping it from a high place, etc.
- If the display panel is damaged and the liquid crystal substance inside it leaks out, do not get any in your mouth. If the substance come into contact with your skin or clothes promptly wash it off using soap and water.
- Do not apply excessive force to the display surface or the adjoining areas since this may cause the color tone to vary.
- The polarizer covering the display surface of the LCD module is soft and easily scratched. Handle this polarize carefully.
- To prevent destruction of the elements by static electricity, be careful to maintain an optimum work environment.
  - -Be sure to ground the body when handling the LCD module.
  - -Tools required for assembly, such as soldering irons, must be properly grounded.
  - -To reduce the amount of static electricity generated, do not conduct assembly and other work under dry conditions.
  - -The LCD module is coated with a film to protect the display surface. Exercise care when peeling off this protective film since static electricity may be generated.
- Storage precautions

When storing the LCD modules, avoid exposure to direct sunlight or to the light of fluorescent lamps. Keep the modules in bags designed to prevent static electricity charging under low temperature / normal humidity conditions (avoid high temperature / high humidity and low temperatures below 0°C). Whenever possible, the LCD modules should be stored in the same conditions in which they were shipped from our company.

### **14. OTHERS**

- Liquid crystals solidify at low temperature (below the storage temperature range) leading to defective orientation of liquid crystal or the generation of air bubbles (black or white). Air bubbles may also be generated if the module is subjected to a strong shock at a low temperature.
- If the LCD modules have been operating for a long time showing the same display patterns may remain on the screen as ghost images and a slight contrast irregularity may also appear. Abnormal operating status can be resumed to be normal condition by suspending use for some time. It should be noted that this phenomena does not adversely affect performance reliability.
- To minimize the performance degradation of the LCD modules resulting from caused by static electricity, etc. exercise care to avoid holding the following sections when handling the modules:
  - Exposed area of the printed circuit board
  - Terminal electrode sections