

DISPLAY Elektronik GmbH

DATA SHEET

LCD MODULE

DEM 128128A SYH-LY

Product specification

Version : 3

15/Jan/2007

GENERAL SPECIFICATION

MODULE NO. :

DEM 128128A SYH-LY

CUSTOMER P/N

VERSION NO.	CHANGE DESCRIPTION	DATE
0	ORIGINAL VERSION	23/10/2006
1	ADD PCB DRAWING	02/11/2006
2	CHANGED PIN ASSIGNMENT	03/11/2006
3	CHANGED DC/DC CONVERTER	04/01/2007

PREPARED BY: LMM

DATE: 04/01/2007

APPROVED BY: MH

DATE: 15/01/2007

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1. FUNCTIONS & FEATURES

- LCD TYPE:

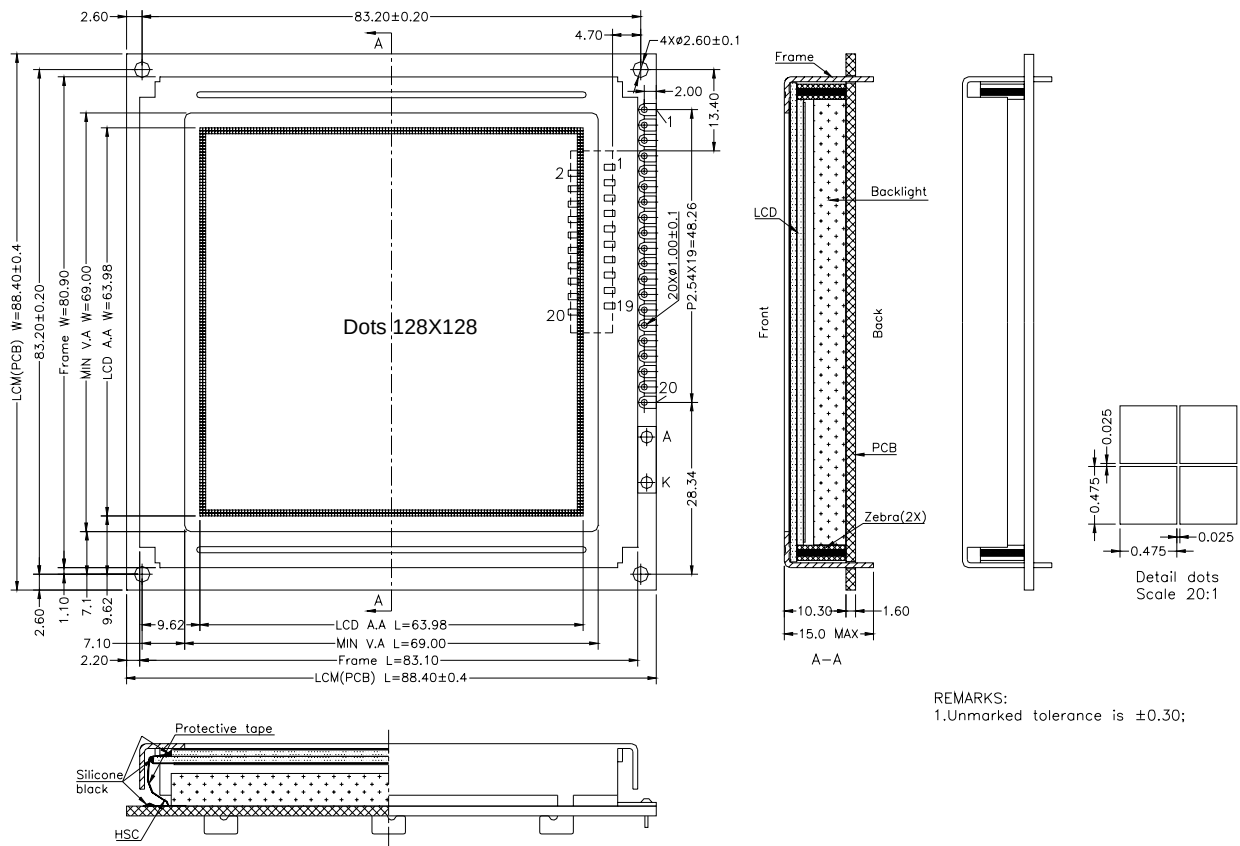
Module Model	LCD Type
DEM 128128A SYH-LY	STN Yellow Green Transflective Positive Mode

- Viewing Direction : 6 oclock
- Driving Scheme : 1/128 Duty, 1/12 Bias
- Power Supply for logic : 5.0 Volt (typ.)
- Backlight Color : LED, Yellow-Green, Lightbox
- Display Content : 128 x 128 Dots
- V_{LCD} : 15.5 Volt (typ. 25°C)
- Operating Temperature : -20°C to +70°C
- Storage Temperature : -30°C to +80°C
- LCD-Controller : T6963C (Toshiba)

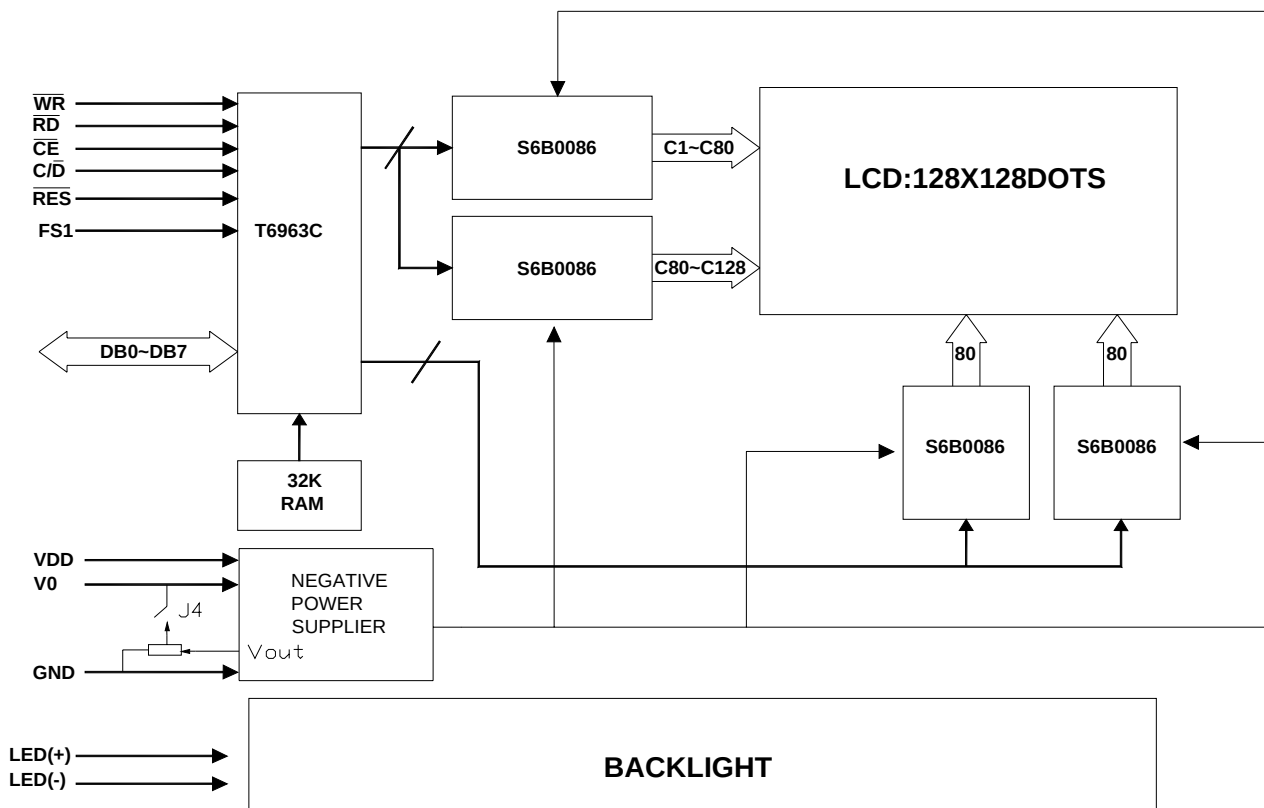
2. MECHANICAL SPECIFICATIONS

- Module Size : 88.4 x 88.4 x 15.0 mm
- Viewing Area : 69.0 x 69.0 mm
- Dot Size : 0.475 x 0.475 mm
- Dot Gap : 0.025 x 0.025 mm

3. EXTERNAL DIMENSIONS



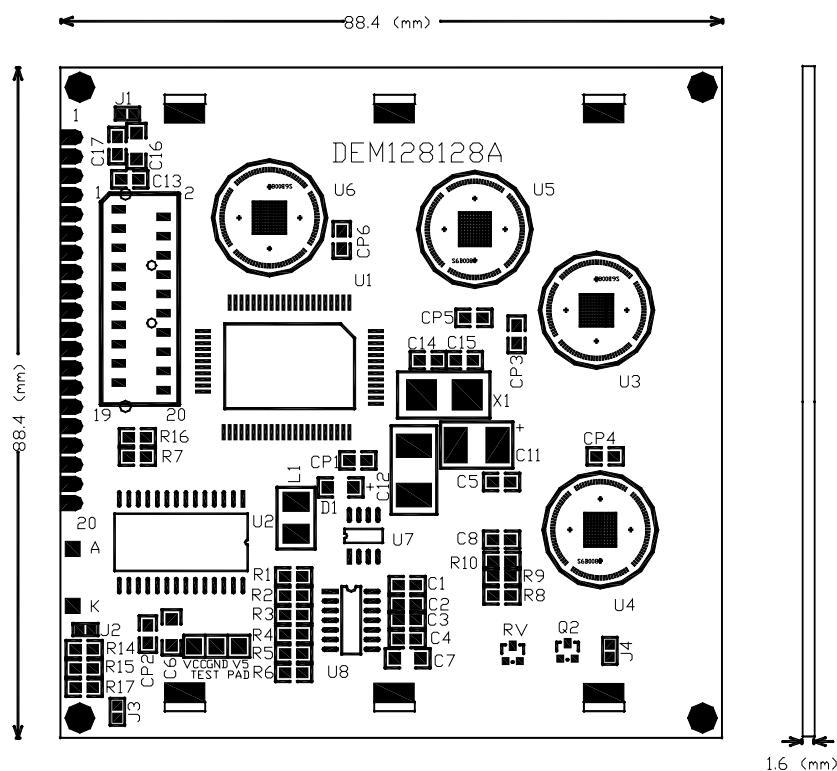
4. BLOCK DIAGRAM



5. PIN ASSIGNMENT

NO.	SYMBOL	FUNCTION
1	FGND	Frame GND
2	VSS	Ground (0V)
3	VDD	Power Supply(+5V)
4	V0	Voltage level for LCD control adjustment Volt . If J4 is opened the contrast is supplied by external. If J4 is closed it is supplied by integrated DC/DC converter (left this Interface open).
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	Write mode H: Command write L: Data write
9	/RES	Controller reset when “L”
10	DB0	Data input/output(LSB)
11	DB1	Data input/output
12	DB2	Data input/output
13	DB3	Data input/output
14	DB4	Data input/output
15	DB5	Data input/output
16	DB6	Data input/output
17	DB7	Data input/output(MSB)
18	FS1	Font select. “H” for 6x8 font & “L” for 8x8 font
19	LED+(A)	Anode of LED backlight (+5Volt)
20	LED - (K)	Cathode of LED backlight (0 Volt)

6. PCB DRAWING AND DESCRIPTION



7. PCB DESCRIPTION**7-1. The J1 is metal-bezel GND to module GND.**

Note: In application module, J1=closed.

7-2.The LED resistor should be bridged when J2 is closed.

Note: In application module, J2=open

7-3.The R14 and the R15, R17 are the LED resistor.

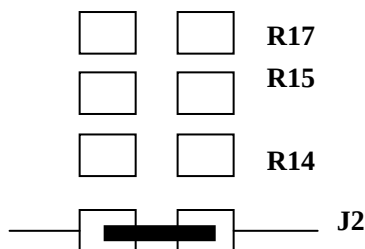
Note: In application module, R14=R15=R17=12 Ω

7-4. The mounting holes is set on ground when the J3 is closed.

Note: In application module, J3=closed.

7-5. The module use internal contrast regulation when J4 is closed.

Note: In application module, J4 is open.

8. EXAMPLE APPLICATION**8-1. The LED resistor should be bridged as following.****8-2. The metal-bezel is on ground as following.****8-3. The mounting holes is on ground as following.****8-4. The module use internal contrast regulation as following.**

9. STANDARD CHARACTER PATTERN

MSB \ LSB	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
0		!	"	#	\$	%	&	'	(	)	*	+	,	-	.	/
1	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
2	a	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
3	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
4	'	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
5	p	q	r	s	t	u	v	w	x	y	z	{		}	~	
6	Ç	ü	é	à	á	â	ã	ä	å	ê	ë	ì	í	î	ï	Ä
7	É	æ	Æ	ö	ó	ô	õ	ö	ü	ö	ü	ø	ø	ø	ø	ø

10. COMMAND DEFINITIONS

Command	Code	D1	D2	Function
REGISTERS SETTING	00100001 00100010 00100100	X address Data Low address	Y address 00H High address	Set Cursor Pointer Set Offset Register Set Address Pointer
SET CONTROL WORD	01000000 01000001 01000010 01000011	Low address Columns Low address Columns	High address 00H High address 00H	Set Text Home Address Set Text Area Set Graphic Home Address Set Graphic Area
MODE SET	1000X000 1000X001 1000X011 1000X100 10000XXX 10001XXX	— — — — — —	— — — — — —	OR mode EXOR mode AND mode Text Attribute mode Internal CG ROM mode External CG RAM mode
DISPLAY MODE	10010000 1001XX10 1001XX11 100101XX 100110XX 100111XX	— — — — — —	— — — — — —	Display off Cursor on, blink off Cursor on, blink on Text on, graphic off Text off, graphic on Text on, graphic on
CURSOR PATTERN SELECT	10100000 10100001 10100010 10100011 10100100 10100101 10100110 10100111	— — — — — — — —	— — — — — — — —	1-line cursor 2-line cursor 3-line cursor 4-line cursor 5-line cursor 6-line cursor 7-line cursor 8-line cursor
DATA AUTO READ / WRITE	10110000 10110001 10110010	— — —	— — —	Set Data Auto Write Set Data Auto Read Auto Reset
DATA READ / WRITE	11000000 11000001 11000010 11000011 11000100 11000101	Data — Data — Data —	— — — — — —	Data Write and Increment ADP Data Read and Increment ADP Data Write and Decrement ADP Data Read and Decrement ADP Data Write and Nonvariable ADP Data Read and Nonvariable ADP
SCREEN PEEK	11100000	—	—	Screen Peek
SCREEN COPY	11101000			Screen Copy

11. MAXIMUM ABSOLUTE POWER RATINGS

Item	Symbol	Standard value	Unit
Power supply voltage	V_{DD}	-0.3~+7.0	V
Input voltage	V_{IN}	-0.3 to $V_{DD}+0.3$	V
Operating temperature	T_{OPR}	-20~+70	°C
Storage temperature	T_{STR}	-30~+80	°C

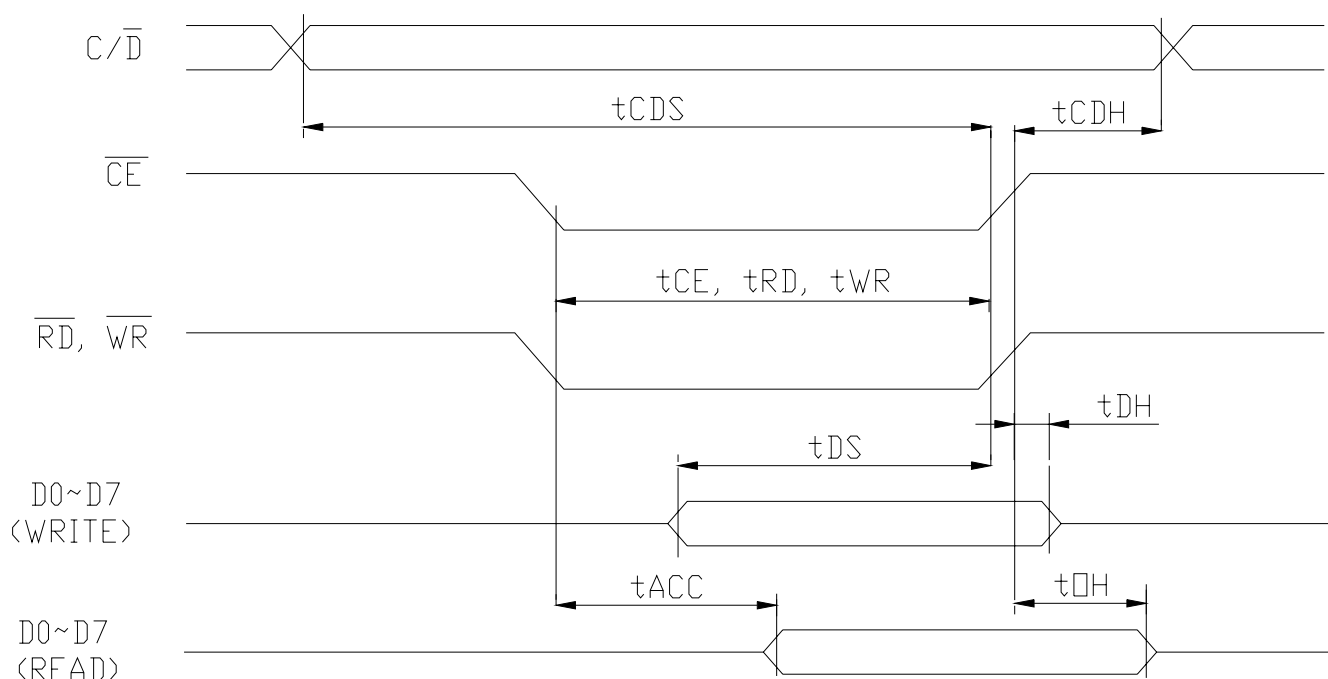
12. ELECTRICAL CHARACTERISTICS

1). DC Characteristics

Item	Symbol	Standard Value			Test Condition	Unit
		MIN	TYP	MAX		
Operating Voltage	V_{DD}	4.7	5.0	5.3	-----	V
LCD Voltage	V_{LCD}	15.0	15.5	16.0	$V_{DD} - V_5$	V
Supply Current	I_{DD}	---	TBD	TBD	$V_{DD}=5V$, $f_{osc}=3MHz$	mA

2). AC Characteristics

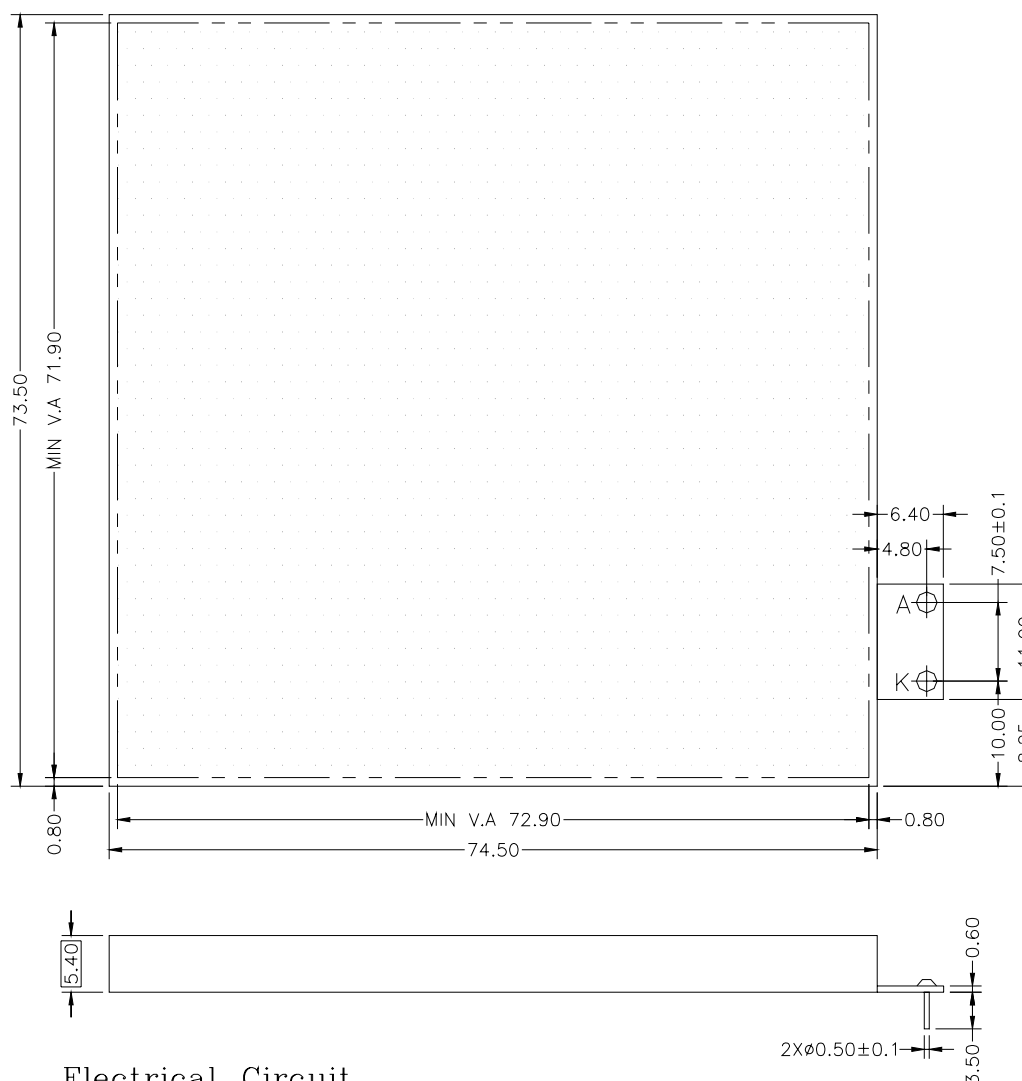
Parameter	Symbol	Min.	Max.	Units
C/D Setup Time	t_{CDS}	100	-	ns
C/D Hold Time	t_{CDH}	10	-	ns
CE, RD, WR Pulse Width	t_{CE}, t_{RD}, t_{WR}	80	-	ns
Data Setup Time	t_{DS}	80	-	ns
Data Hold Time	t_{DH}	40	-	ns
Access Time	t_{ACC}	-	150	ns
Output Hold Time	t_{OH}	10	50	ns



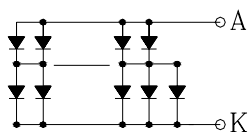
13. BACKLIGHT ELECTRICAL/OPTICAL SPECIFICATIONS

Electronics/Optical Specifications:

	SYMBOL	MIN.	TYP.	MAX.	UNIT	CONDITIONS
Forward Voltage	V_f	3.8	4.1	4.4	V	$I_f=600\text{mA}$
Forward Current	I_f		600		mA	
Power Dissipation	P_d			2.64	W	$I_f=600\text{mA}$
Reverse Voltage	V_R			10	V	
Reverse Current	I_R			6	mA	
Luminous Intensity	I_v	120			cd/m ²	$I_f=600\text{mA}$
Luminous Uniformity	ΔIV	80			%	$I_f=600\text{mA}$
Emission Wavelength	$\lambda \rho$	569		575	nm	$I_f=20\text{mA}$ $T_a=25^\circ\text{C}$ Each chip



Electrical Circuit



60*2+1=121 Pcs LED

REMARKS:

1. Unmarked tolerance: $\pm 0,3 \text{ mm}$.
2. The color of LED is Yellow-Green.

14. 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.

15. 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