

**DISPLAY Elektronik GmbH**

# DATA SHEET

**LCD MODULE**

## **DEM 40271 SYH-LY**

*Product Specification*

*Version : 1.1.0*

**10.09.2008**

# GENERAL SPECIFICATION

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MODULE NO. :

## DEM 40271 SYH-LY

VERSION NO.	CHANGE DESCRIPTION	DATE
0	ORIGINAL VERSION	13.05.2003
1	CHANGE PCB PIN	27.05.2003
1.1.0	CHANGE IC	23.01.2008

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DATE: 23.01.2008

APPROVED BY: MH

DATE: 10.09.2008

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**1. FUNCTIONS & FEATURES**

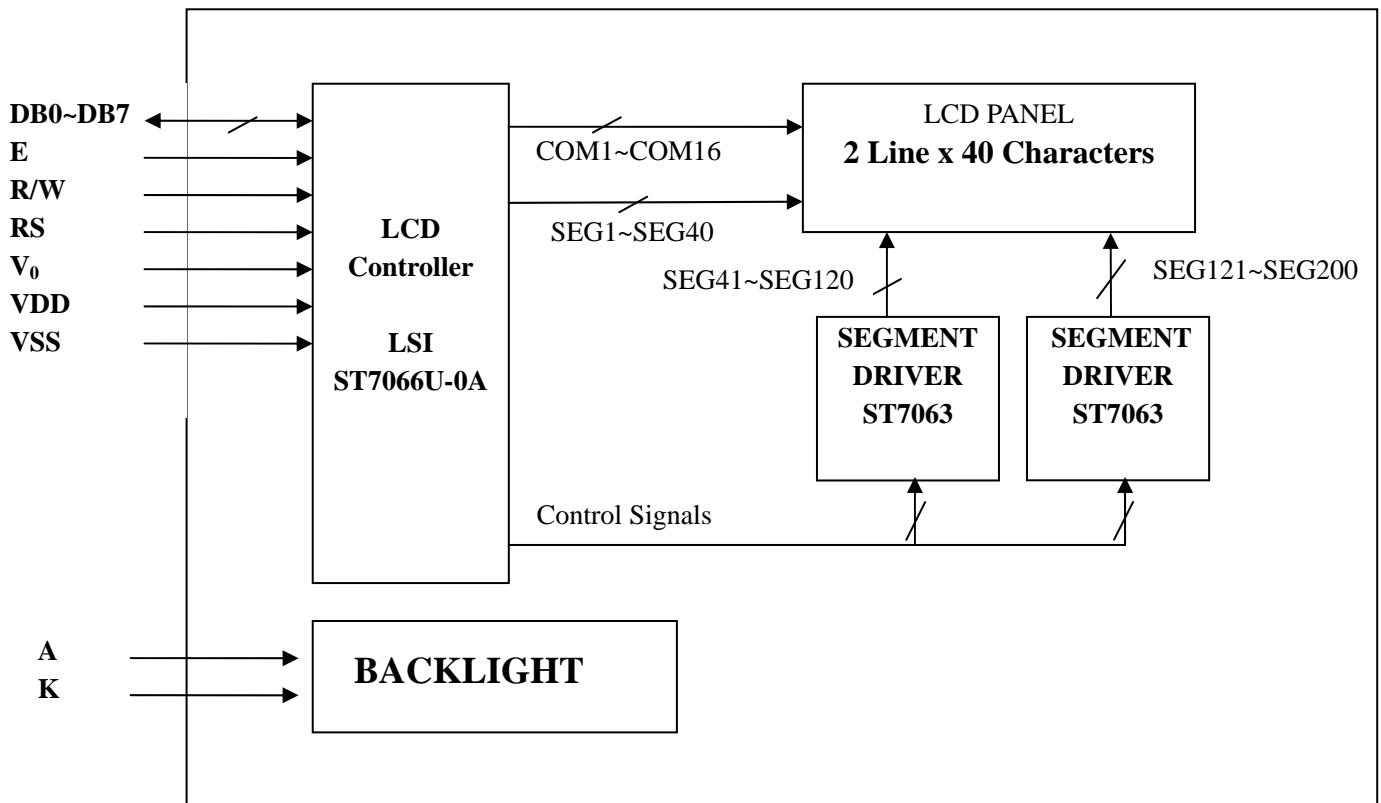
MODULE	LCD TYPE
DEM 40271 SYH-LY	STN Yellow Green Transflective Positive Mode

- Viewing Direction : 6 O'clock
- Driving Scheme : 1/16 Duty Cycle, 1/5 Bias
- Power Supply Voltage : 5.0 V (typ.)
- V<sub>LCD</sub> Adjustable For Best Contrast : 4.6 V (opt.)
- Display contents : 40 x 2 Characters
- Operation temperature : -20°C to +70°C
- Storage temperature : -30°C to +80°C
- Internal Memory : CGROM (10,080 bits)
- : CGRAM (64 x 8 bits)
- : DDRAM (80 x 8 bits)
- CGROM : CGROM of the ST7066U-0A
- Interface : Easy Interface with 4-bit or 8-bit MPU

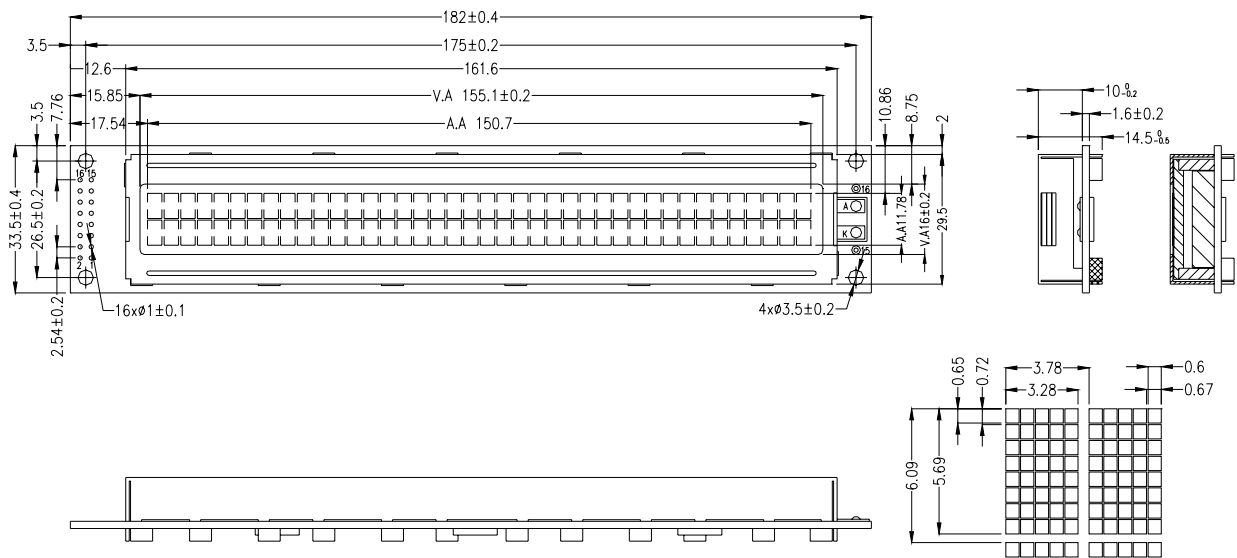
**2. MECHANICAL SPECIFICATIONS**

- Module Size : 182.00 x33.50 x14.50 mm
- Character Pitch : 3.78 x 6.09 mm
- Character Size : 3.28 x 5.69 mm
- Character Font : 5 x 8 dots
- Dot Size : 0.60 x 0.65 mm
- Dot Pitch : 0.07 mm

**3. BLOCK DIAGRAM**



**4. EXTERNAL DIMENSIONS**



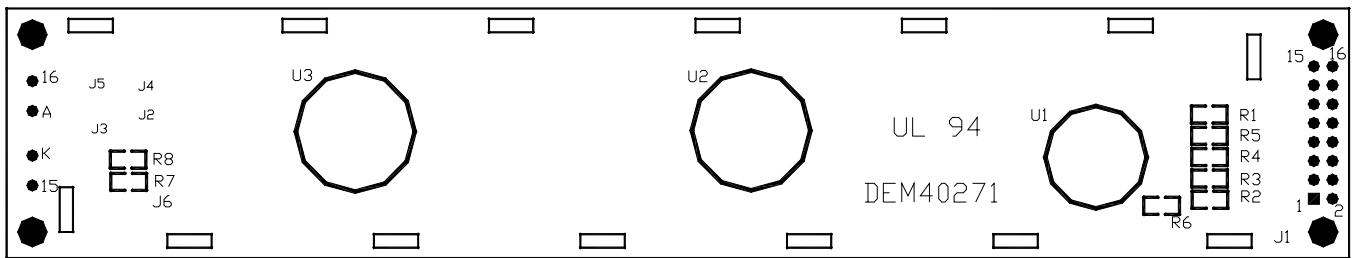
SCALE 5:1

REMARKS:  
UNMARKED TOLERANCE IS ±0.4,

**5. PIN ASSIGNMENT**

Pin No.	Symbol	Function
1	V <sub>SS</sub>	Ground terminal of module.
2	V <sub>DD</sub>	Power terminal of module 5.0V.
3	V <sub>0</sub>	Power Supply for liquid crystal drive.
4	RS	Register select RS = 0...Instruction register RS = 1...Data register
5	R/W	Read /Write R/W = 1...Read R/W = 0...Write
6	E	Read/Write Enable Signal
7	DB0	Bi-directional data bus, data transfer is performed once, thru DB0 to DB7, in the case of interface data. Length is 8-bits; and twice, thru DB4 to DB7 in the case of interface data length is 4-bits. Upper four bits first then lower four bits.
8	DB1	
9	DB2	
10	DB3	
11	DB4	
12	DB5	
13	DB6	
14	DB7	
15	LED – (K)	Please also refer to 6. PCB drawing and description.
16	LED + (A)	

**6. PCB DRAWING AND DESCRIPTION.**



**DESCRIPTION:**

**6-1-1.The polarity of the pin 15 and the pin 16 :**

symbol	symbol state	J3,J5	J2,J4	LED Polarity	
				15 Pin	16 Pin
J2,J4	Each solder-bridge	Each open	Each closed	Anode	Cathode
J3,J5	Each solder-bridge	Each closed	Each open	Cathode	Anode

Note : In application, J3, J5 should be closed , and J2 ,J4 should be open.

**6-1-2.The metal-bezel is set be on ground when the J1 is closed . .**

Note: In application ,J1 should be closed.

**6-1-3.The LED resistor should can be bridged when the J6 is closed.**

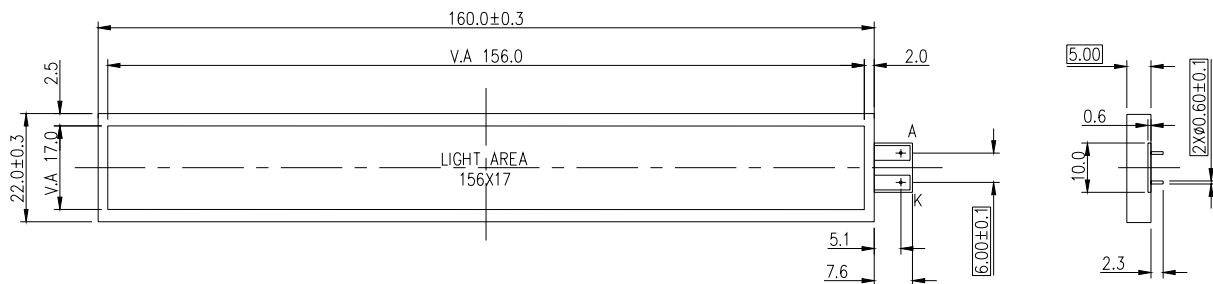
Note: In application J6 should be opened.

**6-1-4.The R7 and the R8 are the LED resistor.**

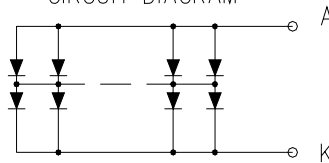
Note: In application, R7=R8=10 Ohm

**7. BACKLIGHT VOLTAGE & CURRENT (Ta=-20~+70°C)**

Item	Symbol	MIN.	TYP.	MAX.	Unit	Condition
Forward Voltage	Vf	3.9	4.1	4.3	V	If= 260 mA
Forward Current	If		390		mA	
Power Dissipation	Pd		1.68		W	
Reverse Voltage	VR		10.0		V	
Reverse Current	IR		0.26		mA	VR=10V
Luminous Intensity	L	160	180		cd/m <sup>2</sup>	If= 260 mA
Luminous Uniformity	ΔL		80		%	If= 260 mA
Emission Wavelength	λP	569	572	575	nm	If= 260 mA
Spectral Range	Δλ		30			



CIRCUIT DIAGRAM



LED 26\*2=52 PCS

REMARKS:

1. UNMARKED TOLERANCE IS ±0.3;
2. ALL MATERIAL COMPLY WITH ROHS.

**8. MAXIMUM ABSOLUTE POWER RATINGS ( Ta=-20°C ~ +70°C)**

Item	Symbol	Standard value	Unit
Power supply voltage (1)	V <sub>DD</sub>	-0.3~+7.0	V
Power supply voltage (2)	V <sub>0</sub>	V <sub>DD</sub> -15.0~V <sub>DD</sub> +0.3	V
Input voltage	V <sub>IN</sub>	-0.3~V <sub>DD</sub> +0.3	V
Operating temperature	T <sub>opr</sub>	-20~+70	°C
Storage temperature	T <sub>stg</sub>	-30~+80	°C

\*Voltage greater than above may damage to the Circuit.

$$V_{DD} > V_1 > V_2 > V_3 > V_4 > V_5$$

**9. ELECTRICAL CHARACTERISTICS**

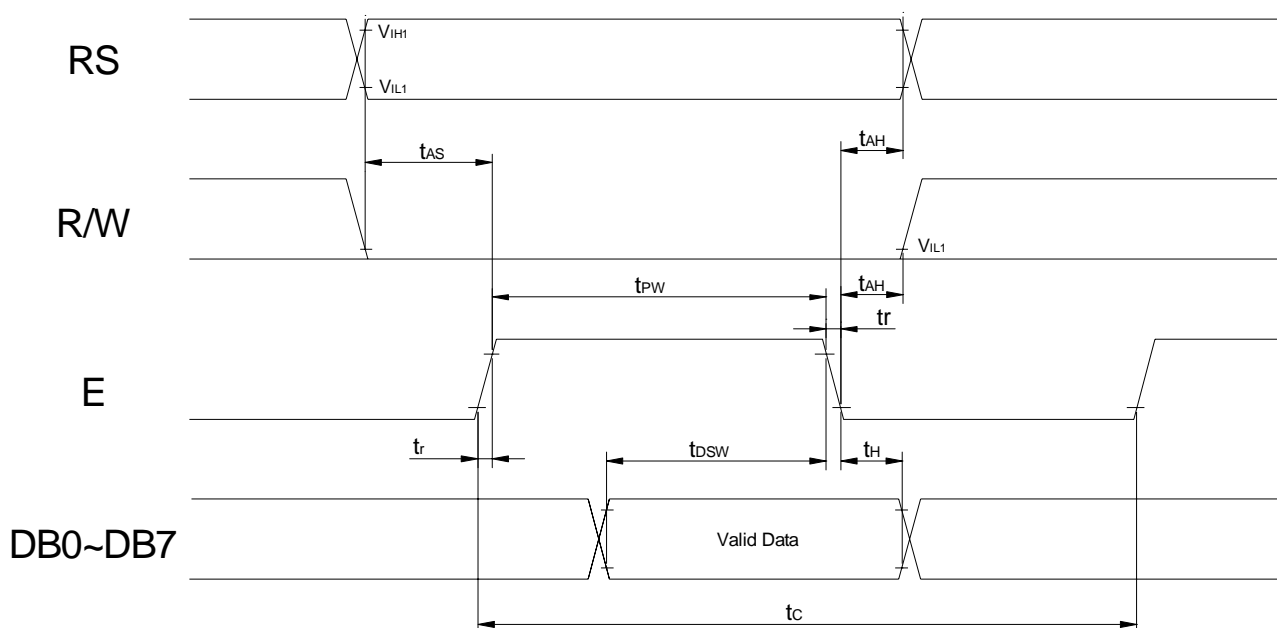
**9-1 DC Characteristics (V<sub>DD</sub>=4.5V~5.5V, T<sub>a</sub>=-20~+70°C)**

Item	Symbol	Standard Value			Test Condition	Unit
		MIN	TYP	MAX		
Operating Voltage	V <sub>DD</sub>	4.5	5	5.5	-----	V
Supply Current	I <sub>DD1</sub>	----	0.35	0.6	V <sub>DD</sub> =5V, f <sub>osc</sub> =270kHz	mA
LCD Driving Voltage	VLCD	3.0	4.6	13.0	V <sub>DD</sub> -V5 (1/5,1/4 Bias)	V

**9-2 AC Characteristics (V<sub>DD</sub>=4.5V~5.5V, T<sub>a</sub>=-20~+70°C)**

**9-2-1. Write mode (writing data from MPU to module)**

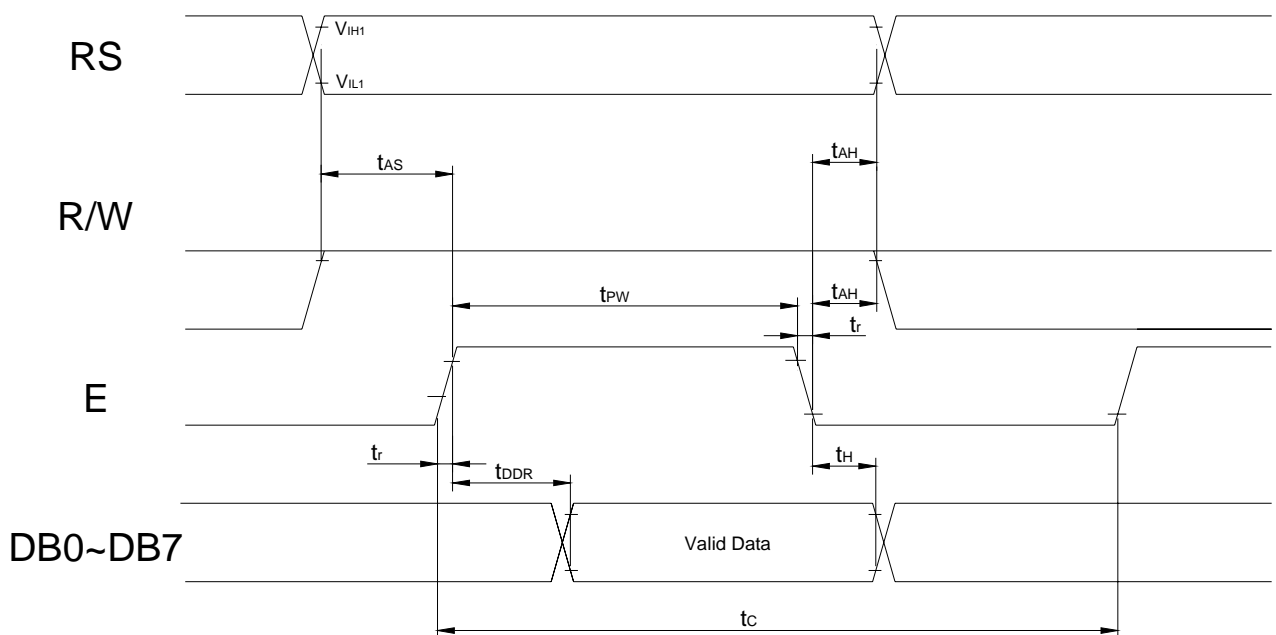
Characteristic	Symbol	Min	Typ	Max	Unit	Test PIN
E Cycle Time	t <sub>c</sub>	1200			ns	E
E Rise Time	t <sub>R</sub>			25	ns	E
E Fall Time	t <sub>F</sub>			25	ns	E
E Pulse width (High, Low)	t <sub>w</sub>	140			ns	E
R/W and RS Set-up Time	t <sub>SU1</sub>	0			ns	R/W, RS
R/W and RS Hold Time	t <sub>H1</sub>	10			ns	R/W, RS
Data Set-up Time	t <sub>SU2</sub>	40			ns	DB0~DB7
Data Hold Time	t <sub>H2</sub>	10			ns	DB0~DB7





**9-2-2.Read mode (Reading data from module to MPU)**

Characteristic	Symbol	Min	Typ	Max	Unit	Test PIN
E Cycle Time	$t_c$	1200			ns	E
E Rise Time	$t_R$			25	ns	E
E Fall Time	$t_F$			25	ns	E
E Pulse width (High, Low)	$t_W$	140			ns	E
R/W and RS Set-up Time	$t_{SU}$	0			ns	R/W, RS
R/W and RS Hold Time	$t_H$	10			ns	R/W, RS
Data output Delay Time	$t_D$			100	ns	DB0~DB7
Data Hold Time	$t_{DH}$	5			ns	DB0~DB7



10. CONTROL AND DISPLAY COMMAND

Command	RS	R/W	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0	Execution time (fosc=270KHz)	Remark	
Clear Display	0	0	0	0	0	0	0	0	0	1	1.52ms	Write"20H" to DDRAM. And set DDRAM address to "00H" from AC	
Return home	0	0	0	0	0	0	0	0	0	1	x	1.52ms	Set DDRAM address to "00H" from AC and return cursor to its original position if shifted. The contents of DDRAM are not changed.
Entry mode Set	0	0	0	0	0	0	0	0	1	I/D	S	37us	Sets cursor move direction and specifies display shift. These operations are performed during data write and read.
Display on/off control	0	0	0	0	0	0	0	1	D	C	B	37us	D=1: entire display on C=1: cursor on B=1: cursor position on
Cursor or Display Shift	0	0	0	0	0	0	1	S/C	R/L	x	x	37us	Set cursor moving and display shift control bit, and the direction, without changing DDRAM data.
function Set	0	0	0	0	0	1	DL	N	F	x	x	37us	DL: interface data is 8/4 bits N: number of line is 2/1 F: font size is 5x11/5x8
Set CGRAM address	0	0	0	1	AC5	AC4	AC3	AC2	AC1	AC0		37us	Set CGRAM address in address counter
Set DDRAM address	0	0	1	AC6	AC5	AC4	AC3	AC2	AC1	AC0		37us	Set DDRAM address in address counter
Read busy flag& address	0	1	BF	AC6	AC5	AC4	AC3	AC2	AC1	AC0		0us	Whether during internal operation or not can be known by reading BF. The contents of address counter can also be read.
Write data to RAM	1	0	D7	D6	D5	D4	D3	D2	D1	D0		37us	Write data into internal RAM (DDRAM/CGRAM)
Read data from RAM	1	1	D7	D6	D5	D4	D3	D2	D1	D0		37us	Read data from internal RAM (DDRAM / CGRAM)

Note:

Be sure the ST7066U is not in the busy state (BF=00 before sending an instruction from the MPU to the ST7066U. If an instruction is sent without checking the busy flag, the time between the first instruction and next instruction will take much longer than the instruction time itself. Refer to instruction table for the list of each instruction execution time.

11. STANDARD CHARACTER PATTERN (ST7066U-0A)

Upper(4bit)		0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	10010	1011	1100	1101	1110	1111	
Lower(4bit)	CG RAM																	
	0000	(1)			0	1	2	3	4	5	6	7	8	9	A	B	C	D
	0001	(2)			E	F	G	H	I	J	K	L	M	N	O	P	Q	R
	0010	(3)			S	T	U	V	W	X	Y	Z	[	]	^	_	~	DEL
	0011	(4)			0	1	2	3	4	5	6	7	8	9	A	B	C	D
	0100	(5)			E	F	G	H	I	J	K	L	M	N	O	P	Q	R
	0101	(6)			S	T	U	V	W	X	Y	Z	[	]	^	_	~	DEL
	0110	(7)			0	1	2	3	4	5	6	7	8	9	A	B	C	D
	0111	(8)			E	F	G	H	I	J	K	L	M	N	O	P	Q	R
	1000	(1)			S	T	U	V	W	X	Y	Z	[	]	^	_	~	DEL
	1001	(2)			0	1	2	3	4	5	6	7	8	9	A	B	C	D
	1010	(3)			E	F	G	H	I	J	K	L	M	N	O	P	Q	R
	1011	(4)			S	T	U	V	W	X	Y	Z	[	]	^	_	~	DEL
	1100	(5)			0	1	2	3	4	5	6	7	8	9	A	B	C	D
	1101	(6)			E	F	G	H	I	J	K	L	M	N	O	P	Q	R
	1110	(7)			S	T	U	V	W	X	Y	Z	[	]	^	_	~	DEL
1111	(8)			0	1	2	3	4	5	6	7	8	9	A	B	C	D	

**12. 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 comes 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 polarizer 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.

**13 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