

**DISPLAY Elektronik GmbH**

**DATA SHEET**

**LCD MODULE**

**DEM 128064B FGH-PW**

*Product Specification*

*Version : 2.1.1*

**30.09.2008**



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## 1. FUNCTIONS & FEATURES

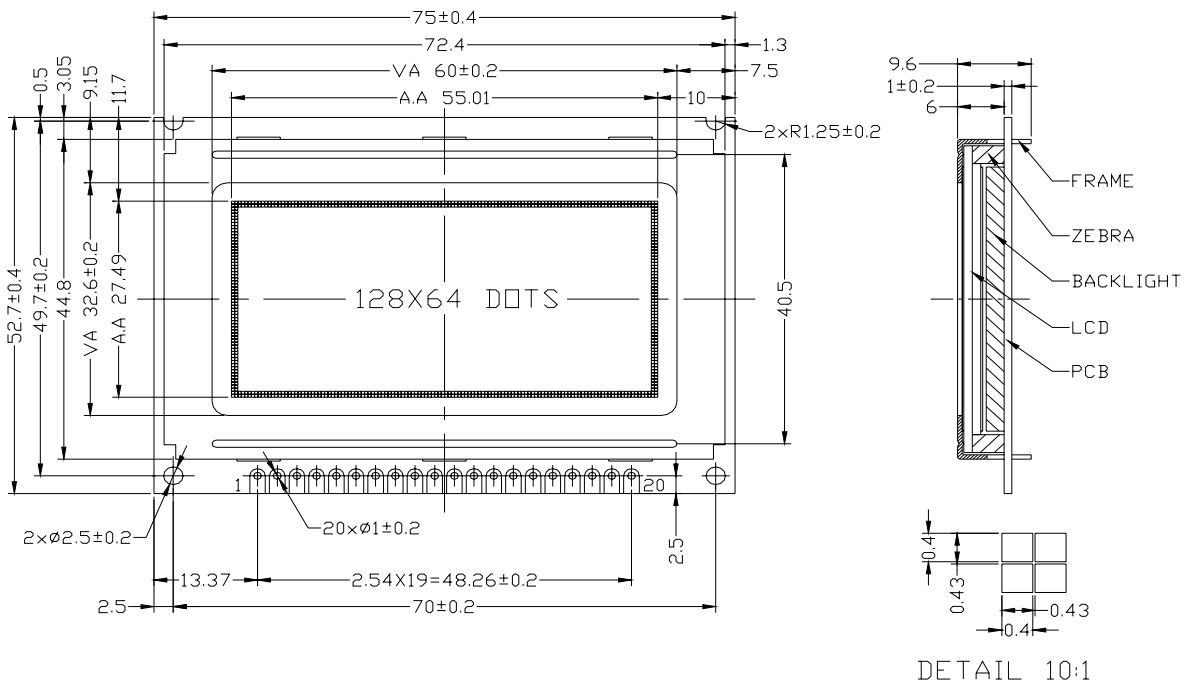
MODULE	LCD TYPE
DEM 128064B FGH-PW	FSTN Transflective Positive Mode

- Viewing Direction : 6 O'clock
- Driving Scheme : 1/64 Duty Cycle, 1/9 Bias
- Power Supply Voltage : 5.0 V (typ.)
- V<sub>LCD</sub> Adjustable For Best Contrast : 12.9 V (typ.)
- Display contents : 128 x 64 Dots
- Operating Temperature : - 20°C to + 70°C
- Storage Temperature : - 30°C to + 80°C
- Interface RAM : 512 bytes (4096 bits)
- Interface : 8 bit parallel display data from MPU

## 2. MECHANICAL SPECIFICATIONS

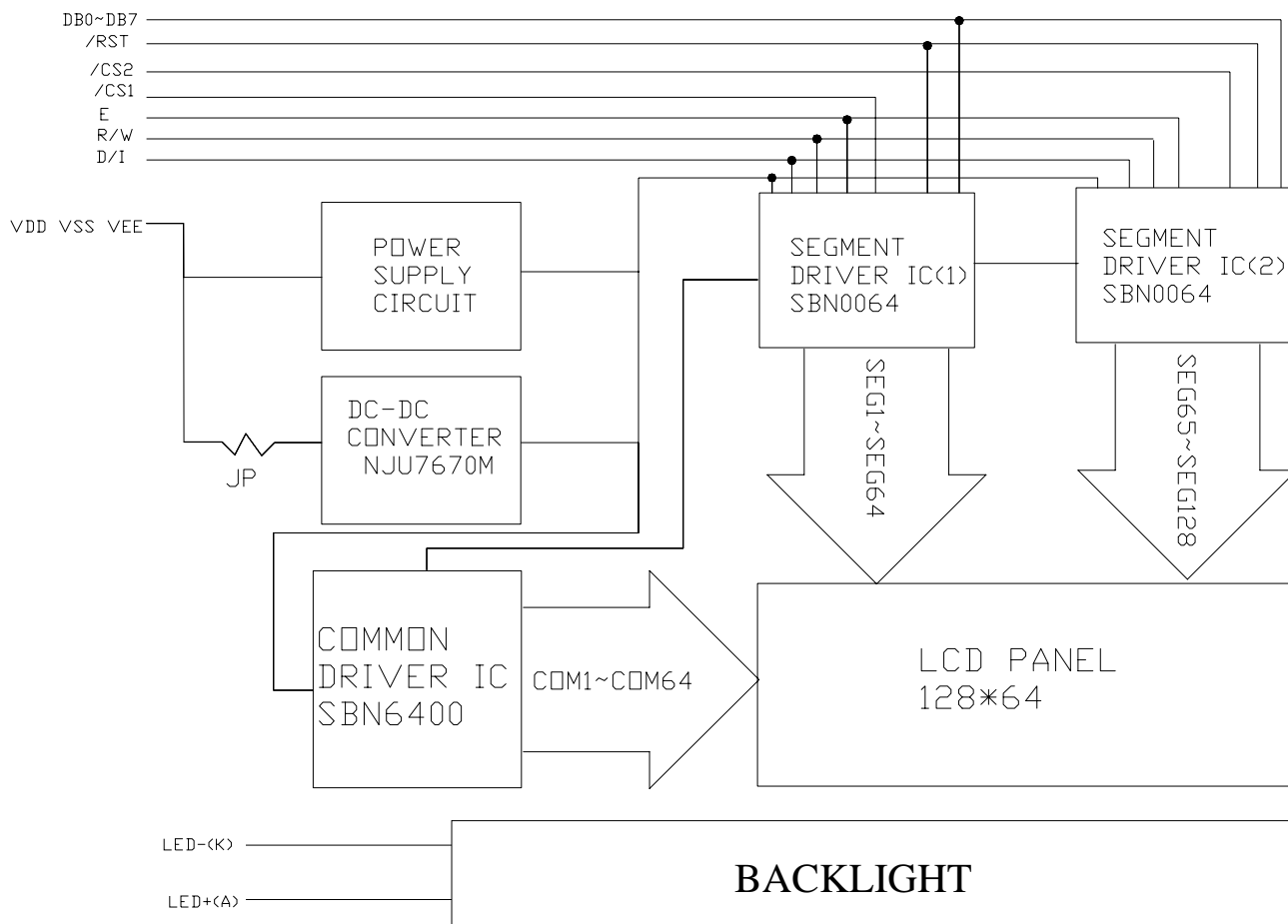
- Module Size : 75.00 x 52.70 x 9.60 mm
- Viewing Area : 60.00 x 32.60 mm
- Dot Size : 0.40 x 0.40 mm
- Dot Pitch : 0.43 x 0.43 mm

## 3. EXTERNAL DIMENSIONS



REMARKS:  
 1.UNMARKED TOLERANCE IS ±0.3;  
 2.ALL MATERIAL COMPLY WITH ROHS.  
 3.THE LCD AA SHOULD NOT BE SHIFTER/ANGLED.

**4. BLOCK DIAGRAM**

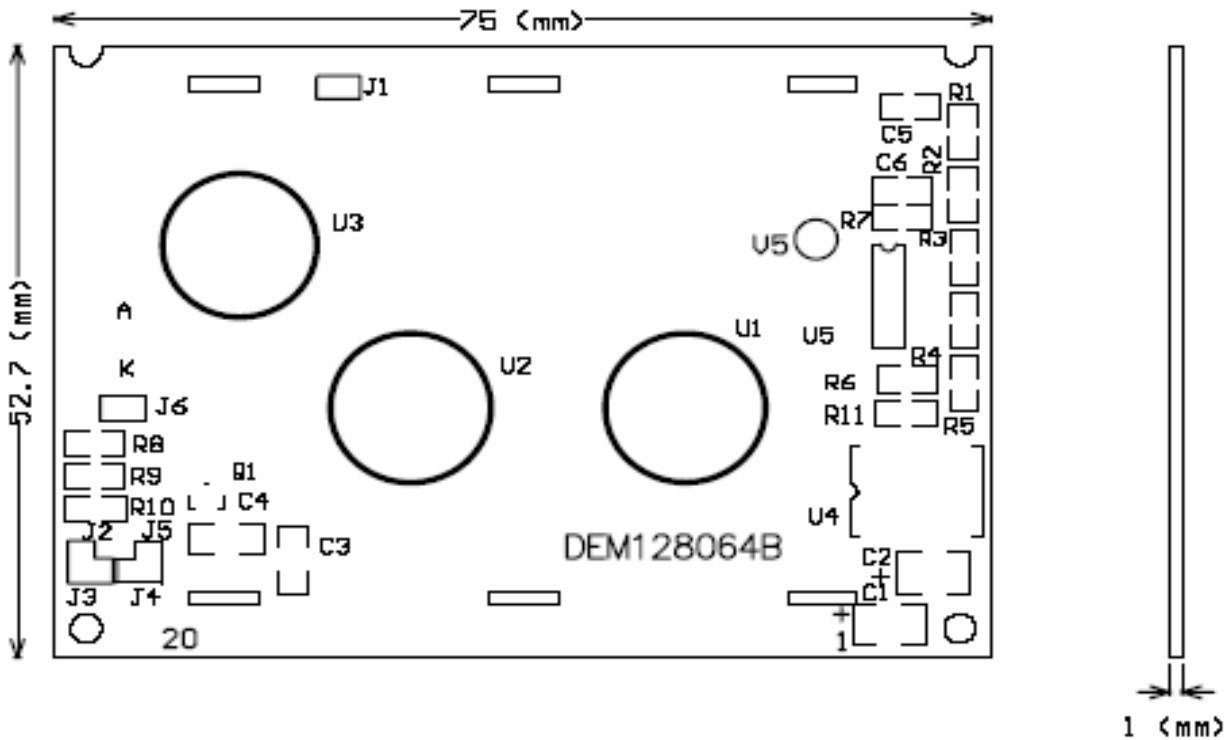


**5. PIN ASSIGNMENT**

Pin No.	Symbol	Function
1	V <sub>DD</sub>	Power supply for logic circuit
2	V <sub>SS</sub>	Ground
3	V <sub>0</sub>	Operation voltage for LCD driving
4 - 11	DB0-DB7	Data bus Three state I/O port.
12	CS1	Chip select signal for IC1
13	CS2	Chip select signal for IC2
14	/RST	Reset signal
15	R/W	H: data read (LCM→ MPU) L: data write (LCM→ MPU)
16	D/I	H: data code input; L: instruction code input
17	E	enable signal
18	VEE	Power supply for LCD driving
19	LED + (A)	Anode of LED backlight(5V)
20	LED - (K)	Cathode of LED backlight

**6. PCB DRAWING AND DESCRIPTION**

**6.1. PCB DRAWING AND SILKSCREEN**



Note: The part no. DEM128064B is printed on the PCB.

**6.2 PCB DESCRIPTION**

**6-2-1. The polarity of the pin 19 and the pin 20:**

symbol state	J2,J4	J3, J5	LED Polarity	
			19 Pin	20 Pin
Each solder-bridge	Each closed	Each open	Anode	Cathode
Each solder-bridge	Each open	Each closed	Cathode	Anode

Note: In application module, J2=J4=0Ω , J3=J5=open.

**6-2-2. The J1 is metal-bezel GND to module GND.**

Note: In application module, J1=0Ω .

**6-2-3. The J7 is mounting holes GND to module GND.**

Note: In application module, J7=OPEN.

**6-2-4. The LED resistor should be bridged when J6 is closed.**

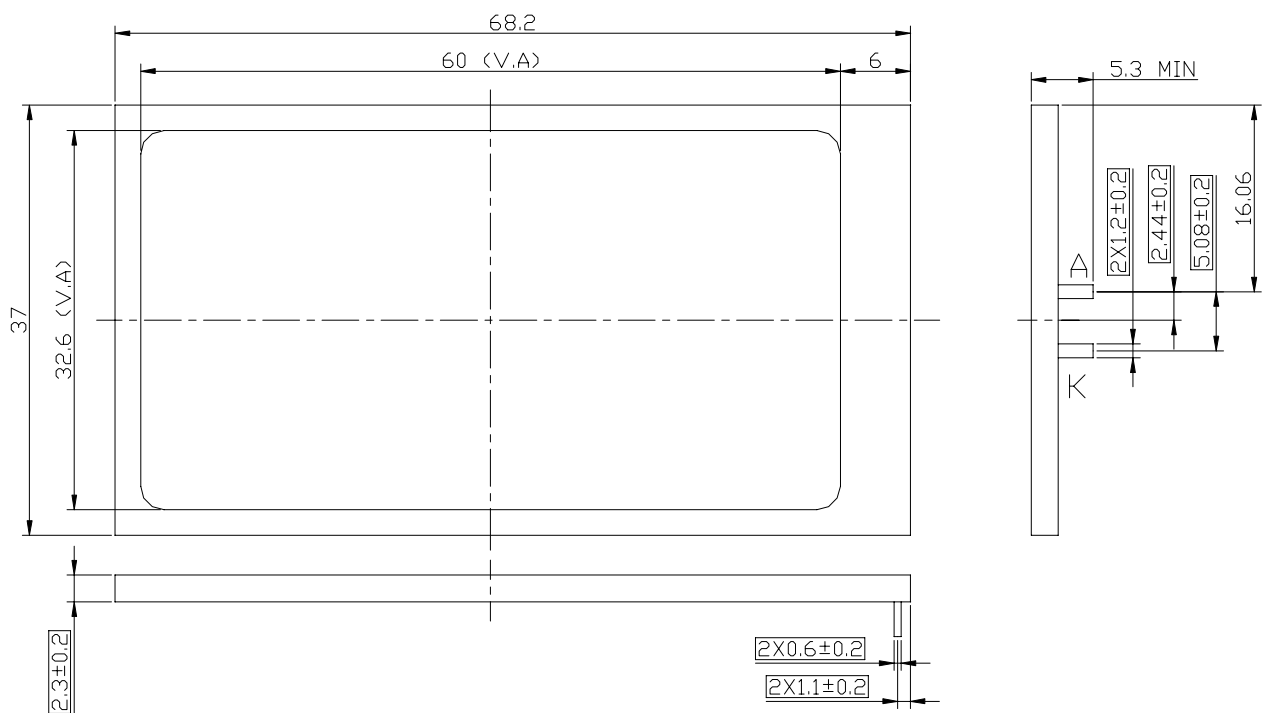
Note: In application module, J6= open

**6-2-5. The R8 and the R9, R10 are the LED resistor.**

Note: In application module, R8= R9=91Ω , R10= open.

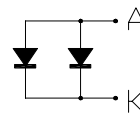
**7. BACKLIGHT CHARACTERISTICS**

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Forward voltage	V <sub>F</sub>	I <sub>F</sub> =20*2mA	3.0	3.2	3.4	V
Reverse current	I <sub>r</sub>	V <sub>r</sub> =5V			0.20	mA
Luminous intensity	I <sub>v</sub>	I <sub>F</sub> =20*2mA	130	150		cd/m <sup>2</sup>
Emission wavelength	λ <sub>P</sub>	I <sub>F</sub> =20*2mA	x=0.29±0.03 y=0.3±0.03			nm
Spectral line half width	Δλ	I <sub>F</sub> =20*2mA				nm
Illuminance power deviation	ΔEH	I <sub>F</sub> =20*2mA	75			%



REMARKS:  
 1.UNMARKED TOLERANCE IS ±0.3;  
 2.THE MATERIAL COMPLY WITH ROHS;  
 3.COLOR:WHITE.

Circuit diagram



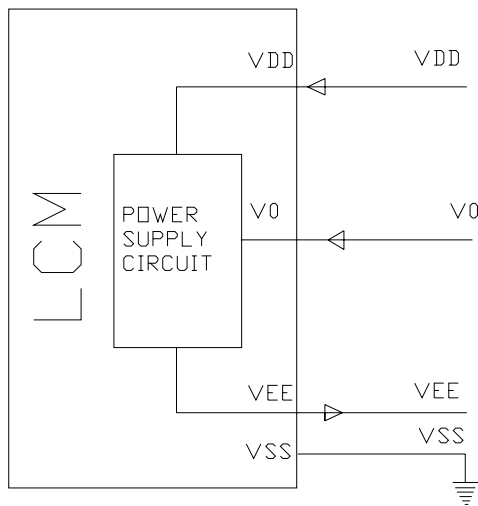
1x2=2 dices

**8. ABSOLUTE MAXIMUM RATINGS ( Ta=25°C)**

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT
Supply voltage for logic	$V_{DD} - V_{SS}$	-0.3	---	7.0	V
Supply voltage for LCD	$V_{DD} - V_0$	-0.3	---	19.0	V
Input voltage	$V_I$	$V_{SS}$	---	$V_{DD}$	V
Operation temperature	$T_{OP}$	-20	---	+70	°C
Storage temperature	$T_{ST}$	-30	---	+80	°C
Static electricity	Be sure that you are grounded when handing LCM				

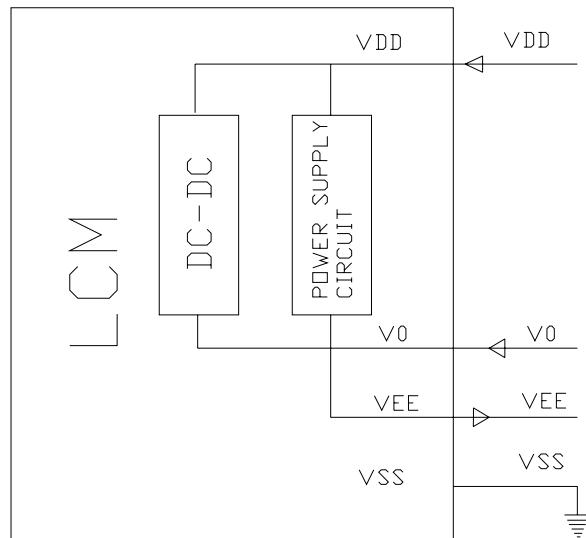
**9. POWER SUPPLY FOR LCD MODULE**

**9.1 External power supply circuit**



$V_{DD}-V_0(V_{LCD})$ :LCD Driving voltage

**9.2 Internal power supply circuit**



$V_{DD}-V_0(V_{LCD})$ :LCD Driving voltage

**10. ELECTRICAL CHARACTERISTICS**

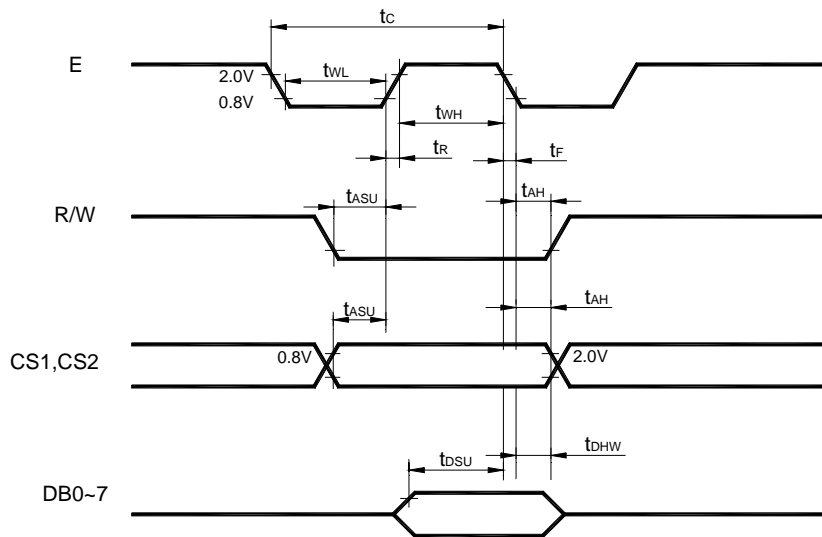
**10-1 DC Characteristics ( $V_{DD}=+5\pm 10\% V_{SS}=0V$ )**

Item	Symbol	Standard Value			Test Condition	Unit
		MIN	TYP	MAX		
Supply current for logic	$V_{DD}$	4.5	5.0	5.5	-----	V
Supply current for logic	$I_{DD}$	----	2.62	4	-----	mA
Operating Voltage for LCD	$V_{DD}-V_0$	13.4	14.1	14.8	-20°C	V
		12.2	12.9	13.6	25°C	
		11.0	11.7	12.4	70°C	

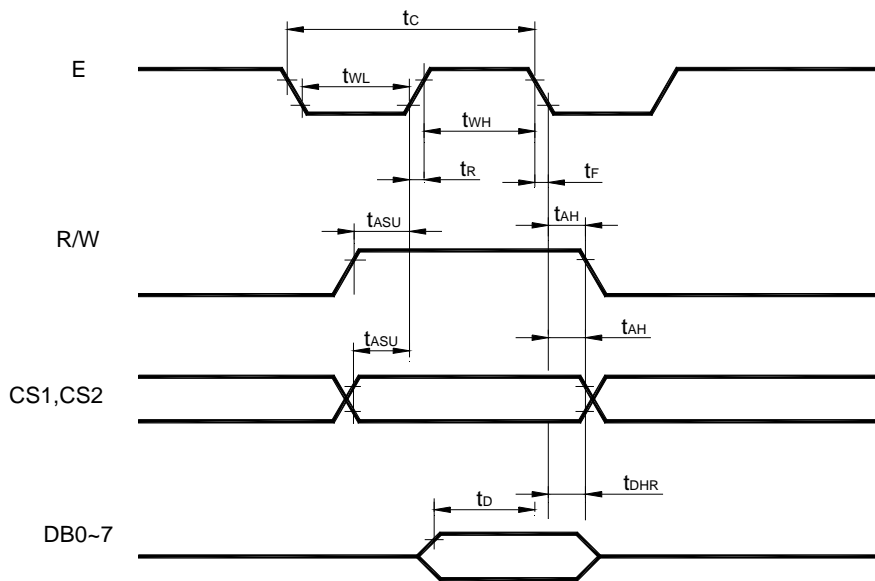


**10-2 AC Characteristics(VDD=+5±10% VSS=0V)**

Characteristic	Symbol	Min	Typ	Max	Unit
E Cycle	$t_C$	1000	-	-	ns
E Rise	$t_R$	-	-	25	ns
E Fall	$t_F$	-	-	25	ns
E High Level Width	$t_{WH}$	450	-	-	ns
E-Low Level Width	$t_{WL}$	450	-	-	ns
Address Set –Up Time	$t_{ASU}$	140	-	-	ns
Address Hold Time	$t_{AH}$	10	-	-	ns
Data Delay Time	$t_D$	-	-	320	ns
Data Set –Up Time	$t_{DSU}$	200	-	-	ns
Data Hold Time ( Write)	$t_{DHW}$	10	-	-	ns
Data Hold Time (Read)	$t_{DHR}$	20	-	-	ns



MPU Write timing



MPU Read timing

### 11. DISPLAY CONTROL INSTRUCTION

The display control instructions the internal state of the SBN0064. Instruction is received from MPU to SBN0064 for the display control. The following table shows various instructions.

Instruction	RS	R/W	DB7	DB 6	DB 5	DB4	DB3	DB2	DB1	DB0	Function	
Display ON/OFF	L	L	L	L	H	H		H	H	L/H	Controls the display on or off. Internal status and display RAM data is not affected. 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)			Sets the X address At the X address counter	
Display Start line (Z address)	L	L	H	H	Display start line (0~63)						Indicates the display data RAM displayed at the top of the screen.	
Status Read	L	H	B U S Y	L	O N / O F F	R E S E T	L	L	L	L	Read 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 Date									Writes data (DB0:7) into display data RAM . After writing instruction, Y address is increased by 1 automatically.
Read Display data	H	H	Read Date									Reads data (DB0:7) From display data RAM to the data bus.

**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