LM052L
LM052LN (EL Backlit Version)

- 16 character x 2 lines
- Controller LSI HD44780 is built-in (See page 115).
- +5V single power supply

MECHANICAL DATA (Nominal dimensions)

Module size	80W x 36H x 11T (max.) mm
Effective display area	64.5W x 13.8H mm
Character size (5 x 7 dots)	2.95W x 3.8H mm
Character pitch	3.65 mm
Dot size	0.55W x 0.5H mm
Weight	about 25 g

ABSOLUTE MAXIMUM RATINGS

	min.	max.
Power supply for logic ($V_{DD}-V_{SS}$)	0	6.5 V
Power supply for LCD drive ($V_{DD}-V_O$)	0	6.5 V
Input voltage (Vi)	V_{SS}	V_{DD} V
Operating temperature (Ta)	0	50°C
Storage temperature (Tstg)	−20	70°C

EL Power Supply (when fitted)

Voltage (VEL)	AC 150 Vms
Frequency (fEL) (at 100 Vms)	1kHz

ELECTRICAL CHARACTERISTICS

Ta = 25°C, V_{DD} = 5.0 V ± 0.25 V

Input "high" voltage (Vi_H)	2.2 V min.
Input "low" voltage (Vi_L)	0.6 V max.
Output "high" voltage (V_{OH}) ($-I_{OH}$ = 0.2 mA)	2.4 V min.
Output "low" voltage (V_{OL}) (I_{OL} = 1.2 mA)	0.4 V max.
Power supply current (I_{DD}) (V_{DD} = 5.0 V)	1.0 mA typ.
	3.0 mA max.

Power supply for LCD drive (Recommended) ($V_{DD}-V_O$)

Duty = 1/16

Range of $V_{DD}-V_{SS}$	1.5~5.25 V
Ta = 0°C	4.2 V typ.
Ta = 25°C	4.0 V typ.
Ta = 50°C	3.6 V typ.

Power Supply for EL (when fitted)

VEL (typ. at 400Mz)	100 Vms
fEL (max at VEL 100V, fEL 400Hz)	9.5mA

OPTICAL DATA ..... See page 5.

INTERNAL PIN CONNECTION

Pin No.	Symbol	Level	Function	
1	V_{SS}	–	0V	Power supply
2	V_{DD}	–	+5V	
3	V_O	–	–	
4	RS	H/L	L: Instruction code input H: Data input	
5	R/W	H/L	H: Data read (LCD module→MPU) L: Data write (LCD module←MPU)	
6	E	H, H→L	Enable signal	
7	DB0	H/L	Data bus line Note (1), (2)	
8	DB1	H/L		
9	DB2	H/L		
10	DB3	H/L		
11	DB4	H/L		
12	DB5	H/L		
13	DB6	H/L		
14	DB7	H/L		

Luminescent output of EL (where fitted) at Ø = 25°C, Ø = 0°C - 13cd / m^2 typ.

Notes:

In the HD44780, the data can be sent in either 4-bit 2-operation or 8-bit 1-operation so that it can interface to both 4 and 8 bit MPU's.

(1) When interface data is 4 bits long, data is transferred using only 4 buses of DB_4~DB_7 and DB_0~DB_3 are not used. Data transfer between the HD44780 and the MPU completes when 4-bit data is transferred twice. Data of the higher order 4 bits (contents of DB_4~DB_7 when interface data is 8 bits long) is transferred first and then lower order 4 bits (contents of DB_0~DB_3 when interface data is 8 bits long).

(2) When interface data is 8 bits long, data is transferred using 8 data buses of DB_0~DB_7.

Unit: mm

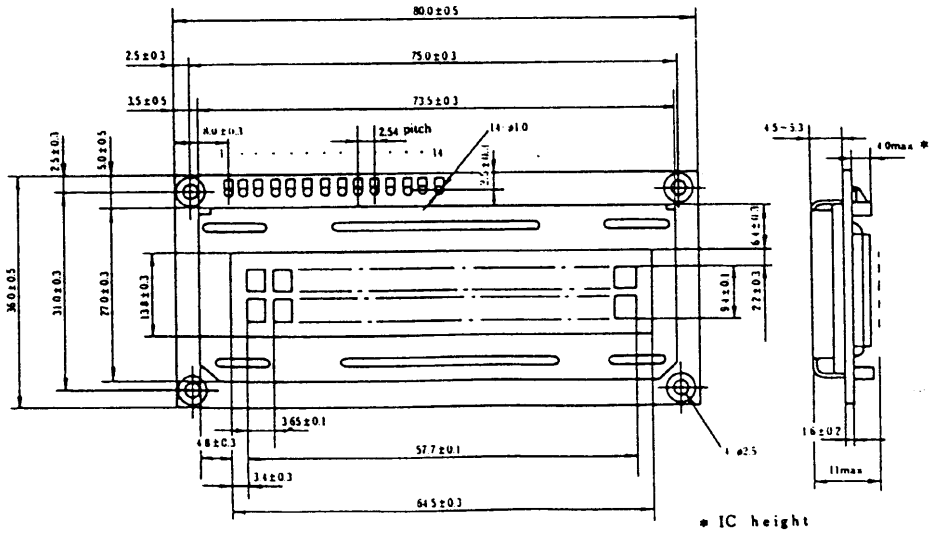


Fig. 1 External dimensions

Unit: mn

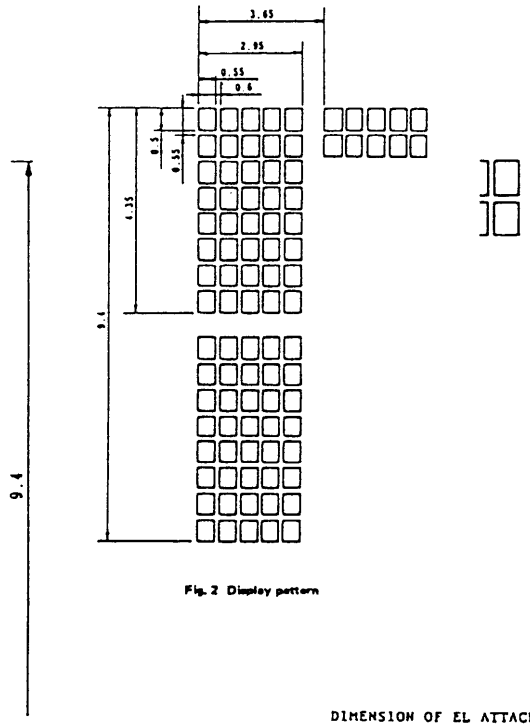
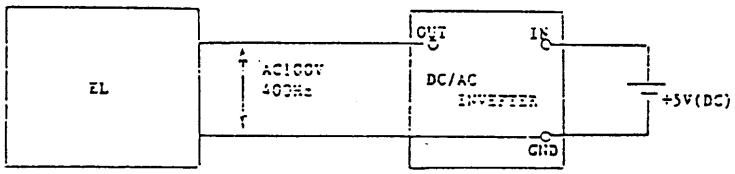
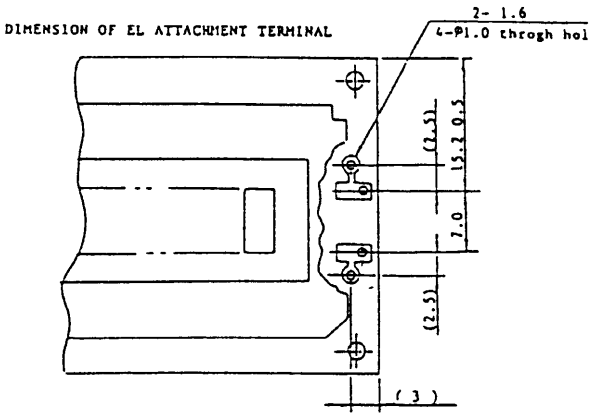


Fig. 2 Display pattern



Recommended DC/AC INVERTER : NEL-D32-45
(Made by NEC)

POWER SUPPLY for EL



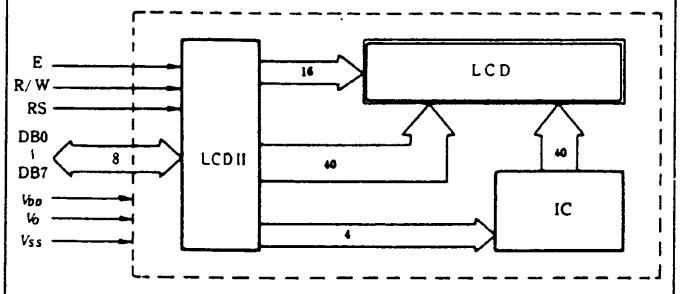


Fig. 3 Block diagram

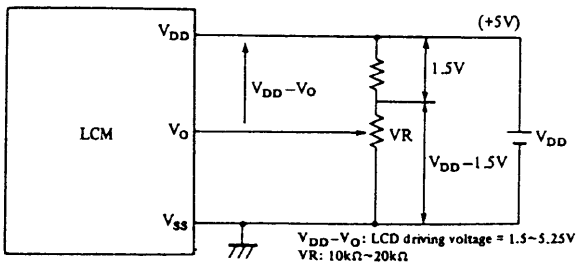


Fig. 4 Power supply

TIMING CHARACTERISTICS

Item	Symbol	Test condition	Min.	Typ.	Max.	Unit
Enable cycle time	t_{cyc}	Fig. 5, Fig. 6	1.0	–	–	μs
Enable pulse width	PW_{EH}	Fig. 5, Fig. 6	450	–	–	ns
Enable rise/fall time	t_{Er}, t_{Ef}	Fig. 5, Fig. 6	–	–	25	ns
RS, R/W set up time	t_{AS}	Fig. 5, Fig. 6	140	–	–	ns
Data delay time	t_{DDR}	Fig. 6	–	–	320	ns
Data set up time	t_{DSW}	Fig. 5	195	–	–	ns
Hold time	t_H	Fig. 5, Fig. 6	20	–	–	ns

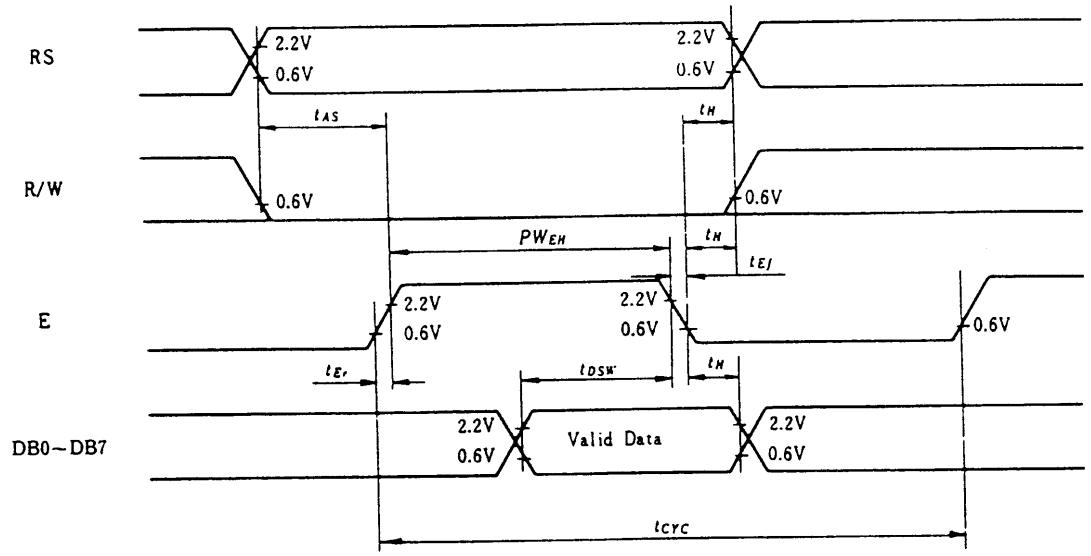


Fig. 5 Interface timing (data write)

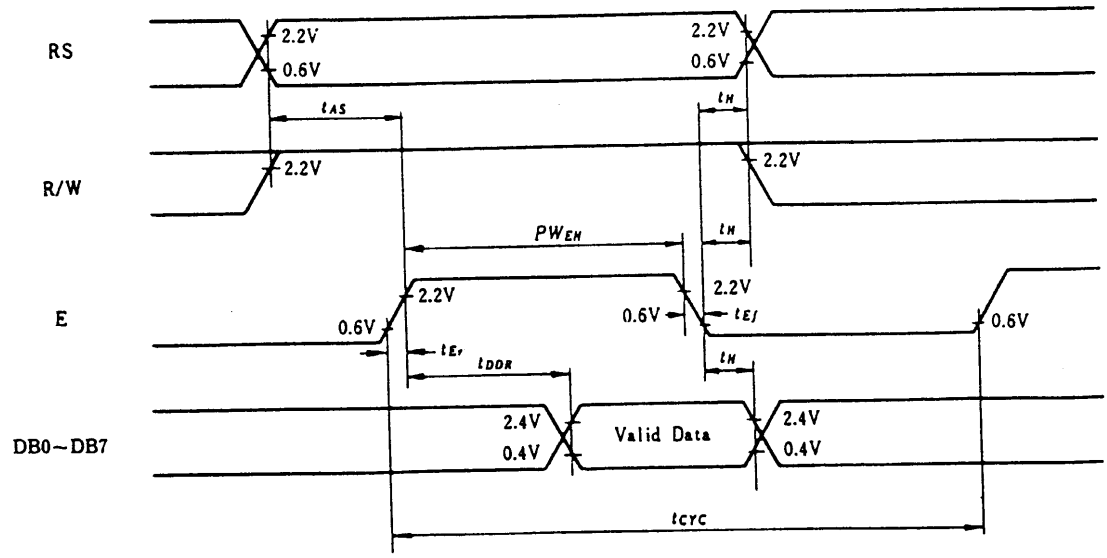


Fig. 6 Interface timing (data read)