

7-4101

LM032L LM032LN (EL Version)

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

MECHANICAL DATA (Nominal dimensions)

Module size 116W x 39H (max.) x 13T (max.) mm
 Effective display area 83W x 18.6H mm
 Character size (5 x 7 dots) 3.2W x 4.85H mm
 Character pitch 3.7 mm
 Dot size 0.6W x 0.65H mm
 Weight about 50 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 (V_i)	V_{SS}	V_{DD} V
Operating temperature (T_a)	0	50°C
Storage temperature (T_{stg})	-20	70°C

EL Power Supply (when fitted)

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

ELECTRICAL CHARACTERISTICS

$T_a = 25^\circ\text{C}$, $V_{DD} = 5.0 \text{ V} \pm 0.25 \text{ V}$

Input "high" voltage (V_{iH}) 2.2 V min.
 Input "low" voltage (V_{iL}) 0.6 V max.
 Output "high" voltage (V_{oH}) ($-I_{oH} = 0.2 \text{ mA}$) . 2.4V min.
 Output "low" voltage (V_{oL}) ($I_{oL} = 1.2 \text{ mA}$) . . 0.4V max.
 Power supply current (I_{DD}) ($V_{DD} = 5.0 \text{ V}$) . . 2.0 mA typ.
 3.0 mA max.

Power supply for LCD drive (Recommended) ($V_{DD}-V_O$)
 Duty = 1/16

Range of $V_{DD}-V_O$ 1.5~5.25 V

$T_a = 0^\circ\text{C}$ 4.6 V typ.
 $T_a = 25^\circ\text{C}$ 4.2 V typ.
 $T_a = 50^\circ\text{C}$ 3.5 V typ.

Power Supply for EL (when fitted)

VEL (typ. at 400Hz)	100 Vms
fEL (max at VEL 100V, fEL 400Hz)	16mA

OPTICAL DATA See page 5.

Luminescent output of EL (where fitted) at $\theta = 25^\circ\text{C}$, $\theta = 0^\circ\text{C}$ - 6cd / m² typ.

INTERNAL PIN CONNECTION

Pin No.	Symbol	Level	Function
1	V_{SS}	-	0V
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	

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 $DB_4 \sim DB_7$, and $DB_0 \sim DB_3$ 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 $DB_4 \sim DB_7$, when interface data is 8 bits long) is transferred first and then lower order 4 bits (contents of $DB_0 \sim DB_3$, when interface data is 8 bits long).
- (2) When interface data is 8 bits long, data is transferred using 8 data buses of $DB_0 \sim DB_7$.

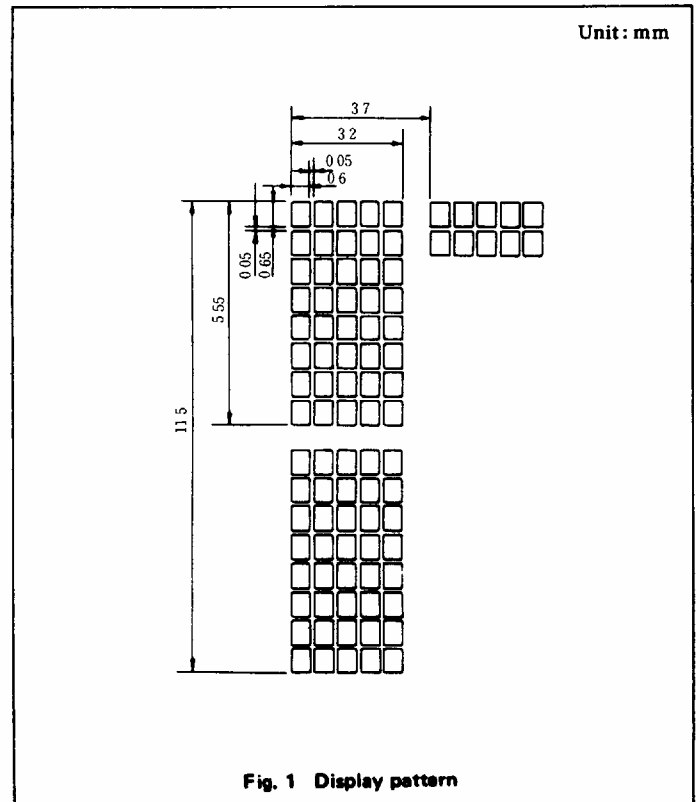


Fig. 1 Display pattern

Unit: mm

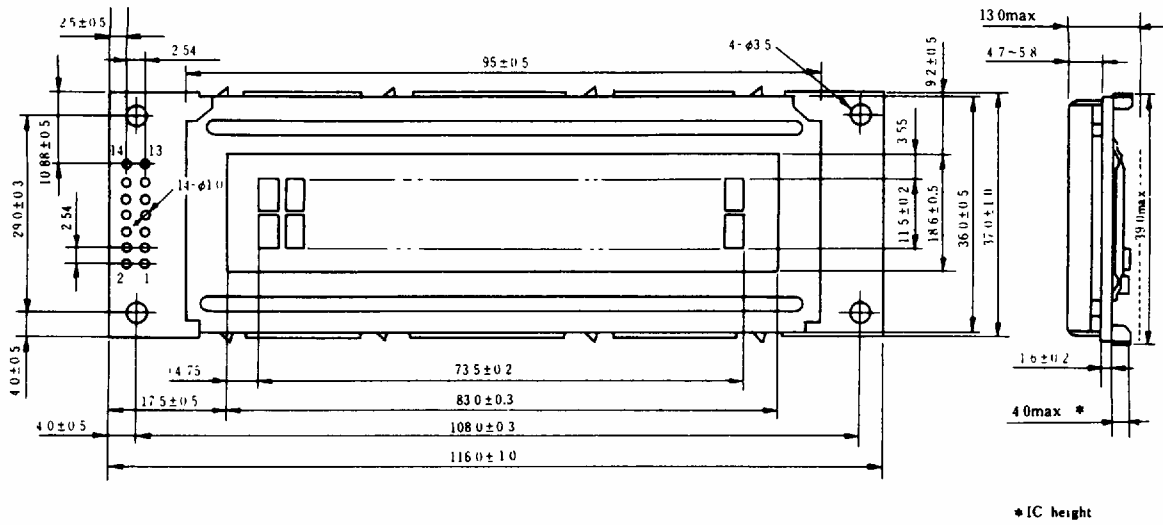


Fig. 2 External dimensions

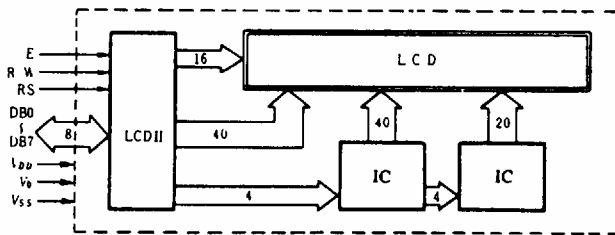


Fig. 3 Block diagram

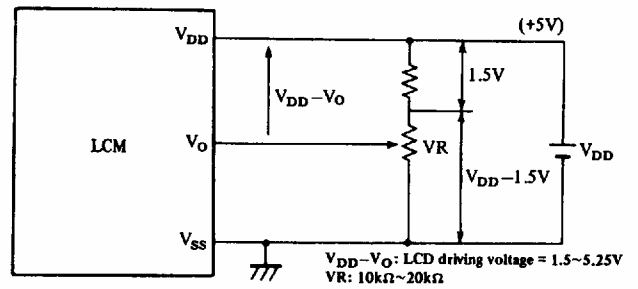
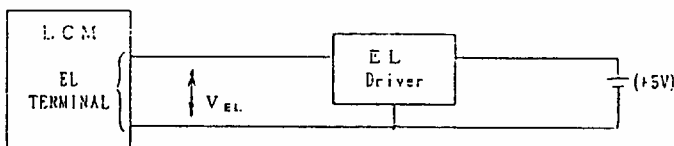


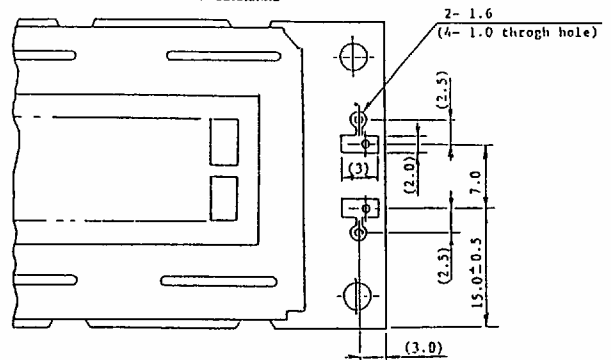
Fig. 4 Power supply

9.2 POWER SUPPLY FOR EL



THE EL BACKLIGHTING IS: NEC'S NEL-SLL-420-C
THE EL DRIVER IS: NEC'S NEL-D32-46.

DIMENSION OF EL ATTACHMENT TERMINAL



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

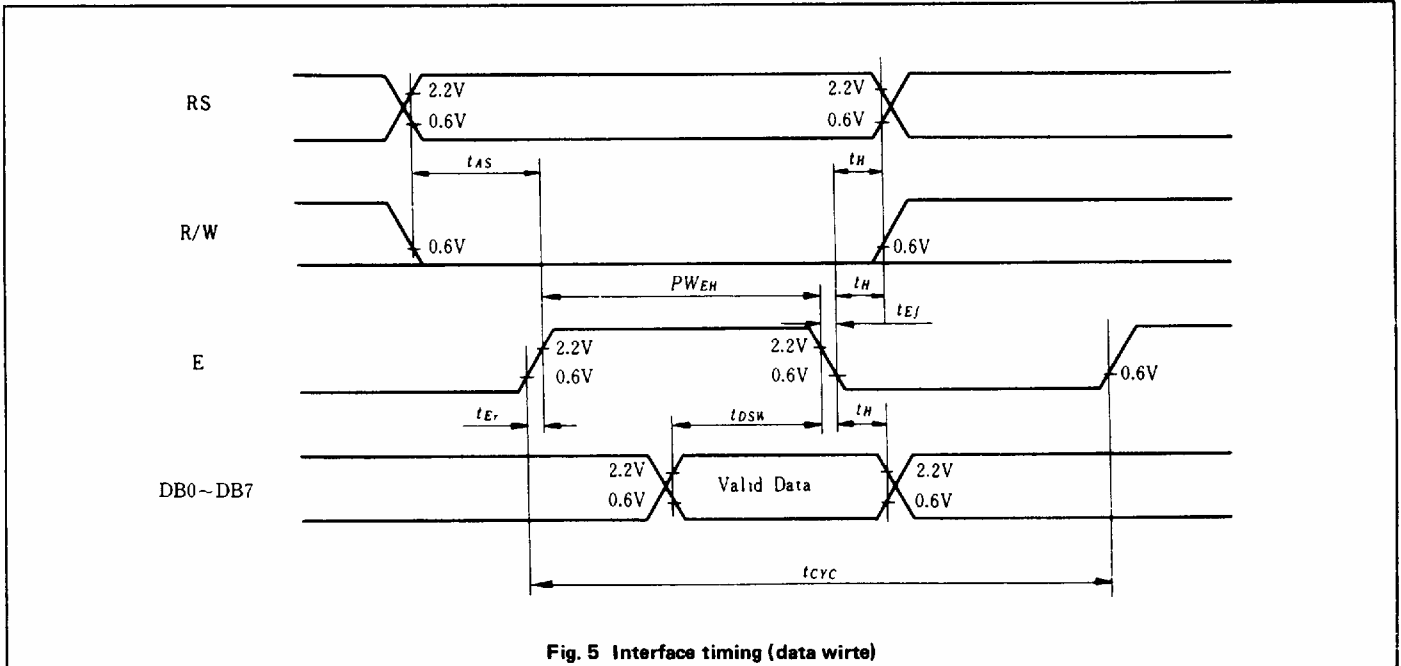


Fig. 5 Interface timing (data write)

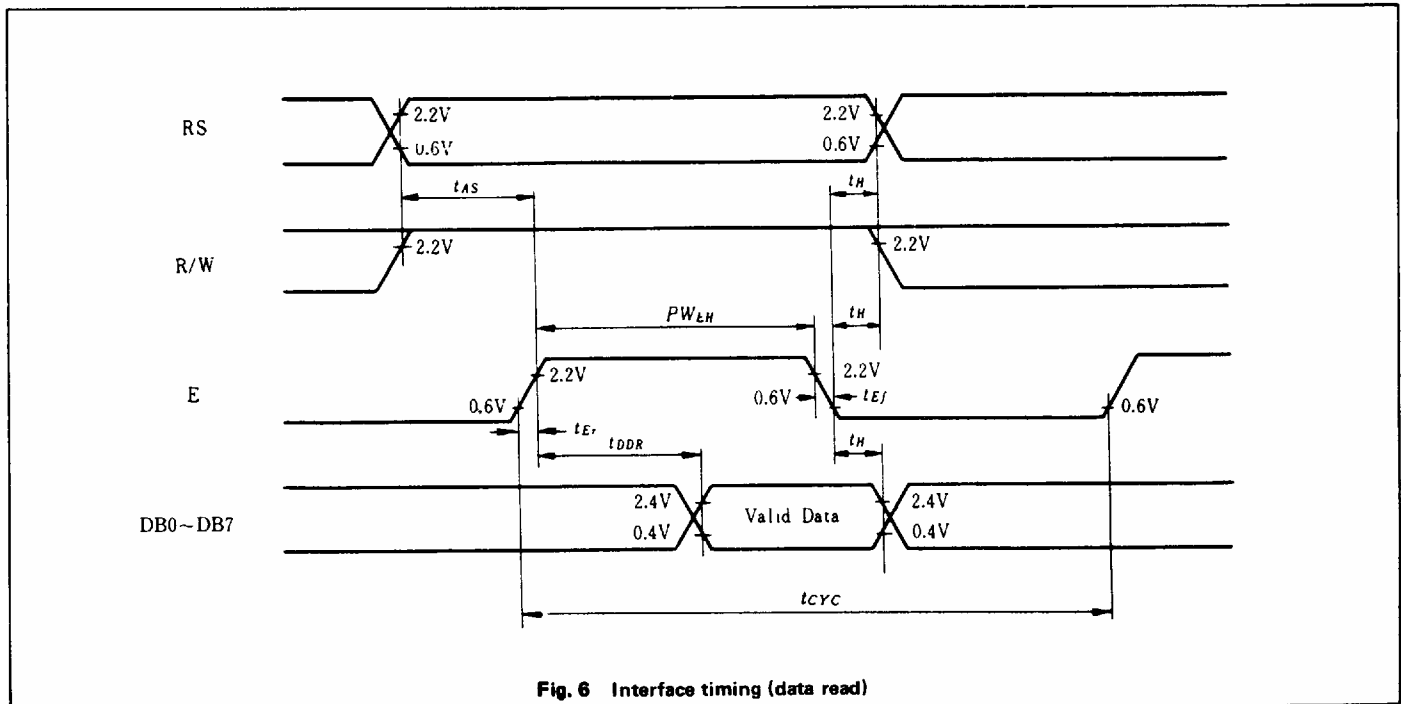


Fig. 6 Interface timing (data read)