

- 20 Character x 2 lines
- Built-in control LSI HD44780 type (see page 23)
- +5V single power supply

MECHANICAL DATA (Nominal dimensions)

Module size	116W x 39H (max.) x 13D (max.) mm
Effective display area	83W x 18.6H mm
Character size (5 x 7 dots)	3.2W x 4.85H mm
Pitch	3.7 mm
Dot size	0.6W x 0.65H mm
Weight	about 50 g

ABSOLUTE MAXIMUM RATINGS

ABSOLUTE MAXIMUM RATINGS		min.	max.
Power supply for logic ($V_{DD}-V_{SS}$)	0	7.0 V	
Power supply for LCD drive ($V_{DD}-V_O$)	0	13.5 V	
Input voltage (V_i)	V_{SS}	V_{DD} V	
Operating temperature (T_a)	0	50°C	
Storage temperature (T_{stg})	-20	70°C	

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}) ($-I_{OH} = 0.2\text{ mA}$)	2.4 V min.
Output low voltage (V_{OL}) ($I_{OL} = 1.2\text{ mA}$)	0.4 V 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) ($V_{DD} - V_O$)	
Du=1/16	
at $T_a = 0^\circ\text{C}$	4.8 V typ.
at $T_a = 25^\circ\text{C}$	4.4 V typ.
at $T_a = 50^\circ\text{C}$	3.6 V typ.

OPTICAL DATA See page 8

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), Note (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	

Note:

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 $DB_0 \sim DB_7$.

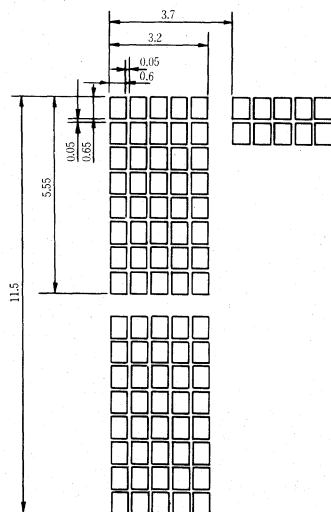


Fig. 1 Display pattern

Unit: mm

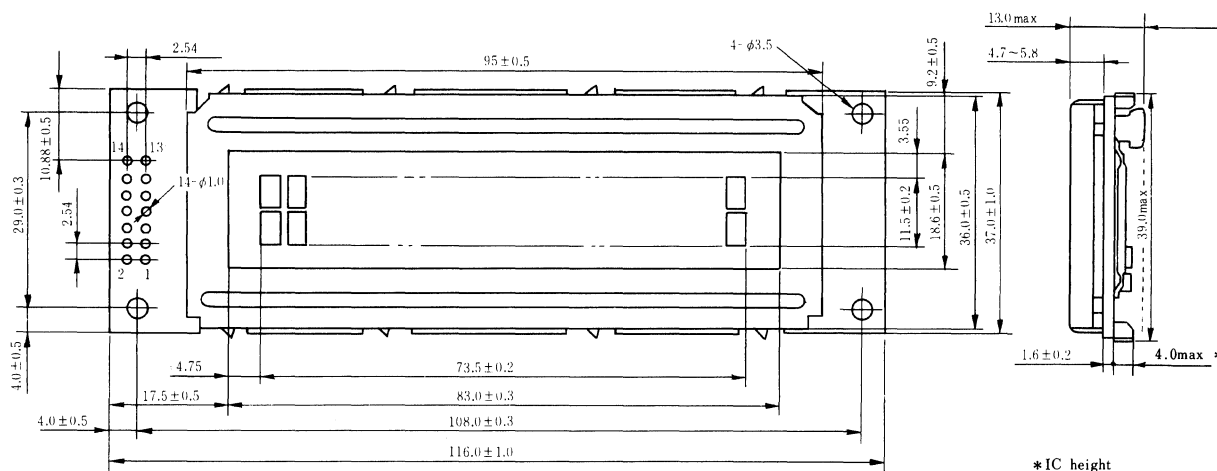


Fig. 2 External dimensions

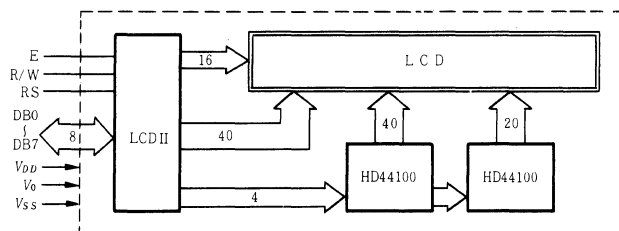


Fig. 3 Block diagram

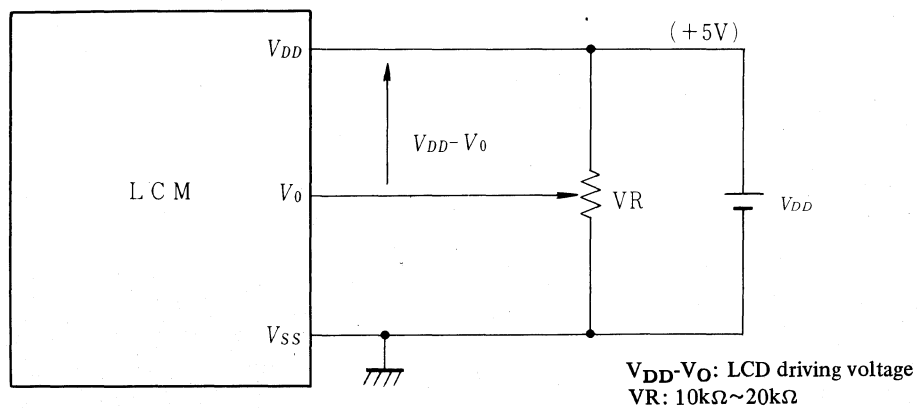


Fig. 4 Power supply

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	P_{WEH}	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

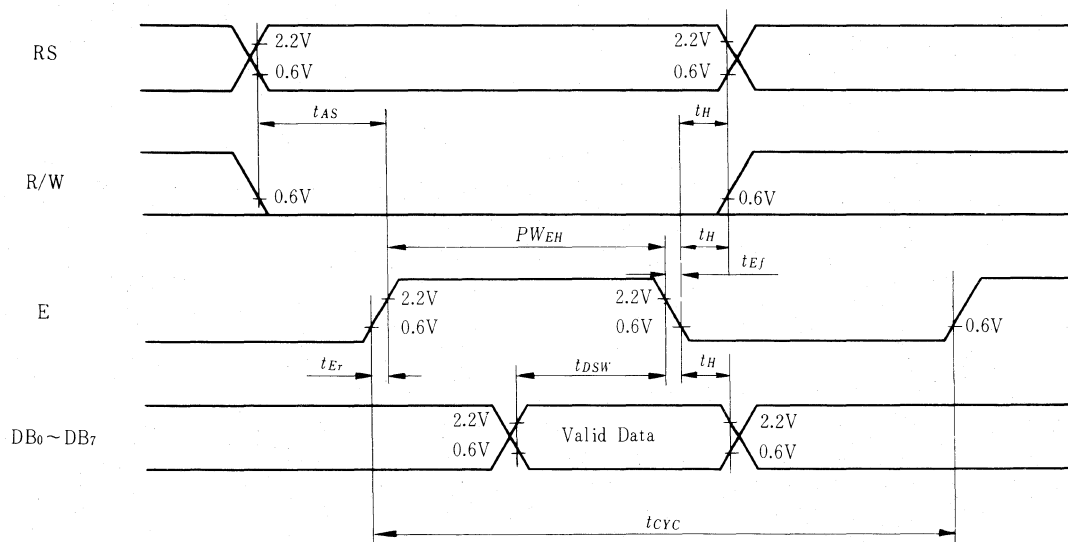


Fig. 5 Interface timing (data write)

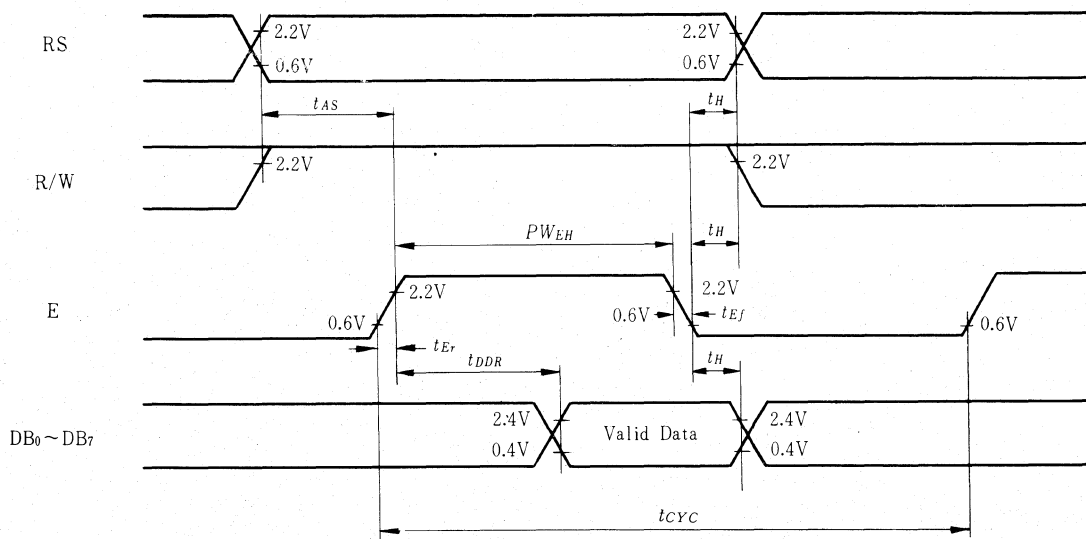


Fig. 6 Interface timing (data read)