

LM238XB

- 240 dot (W) x 128 dot (H) graphic and alpha-numeric display
- Controller LSI HD61830 is built-in. (see page 132).

MECHANICAL DATA (Nominal dimensions)

Module size	180W x 120H x 13.8T (max.) mm
Effective display area	148W x 75.0H mm
Number of dots	240W x 128H dot
Dot size	0.50W x 0.50H mm
Dot pitch	0.55W x 0.55H mm
Weight	about 220 g

ABSOLUTE MAXIMUM RATINGS

	min.	max.
Power supply for logic ($V_{DD} - V_{SS}$)	0	7.0V
Power supply for LCD drive ($V_{DD} - V_{EE}$)	0	19.0 V
Input voltage (V_i) (Note 1)	V_{SS}	V_{DD}
Operating temperature (T_a)	0	40°C
Storage temperature (T_{stg})	-20	60°C

ELECTRICAL CHARACTERISTICS

$T_a = 25^\circ\text{C}$, $V_{DD} - V_{SS} = 5.0\text{V} \pm 0.25\text{V}$,
 $V_{EE} - V_{SS} = -13.5\text{V} \pm 0.25\text{V}$

Input "high" voltage (V_{IH})	2.2 V min.
Input "low" voltage (V_{IL})	0.8 V max.
Power supply current (I_{DD})	34 mA typ.
(I_{EE})	3 mA typ.
Clock frequency (f_{CL2}) (Internal clock)	1.2 MHz max.
Input leak current (I_{IN})	-5 ~ 5 μA
Output leak current (I_{OUT})	-10 ~ 10 μA
Power consumption	250 mW max.

($V_{DD} = 5\text{V}$, $T_a = 25^\circ\text{C}$, $V_{DD} - V_0 = 13.7\text{V}$)

Power supply for LCD drive (Recommended) ($V_{DD} - V_0$)

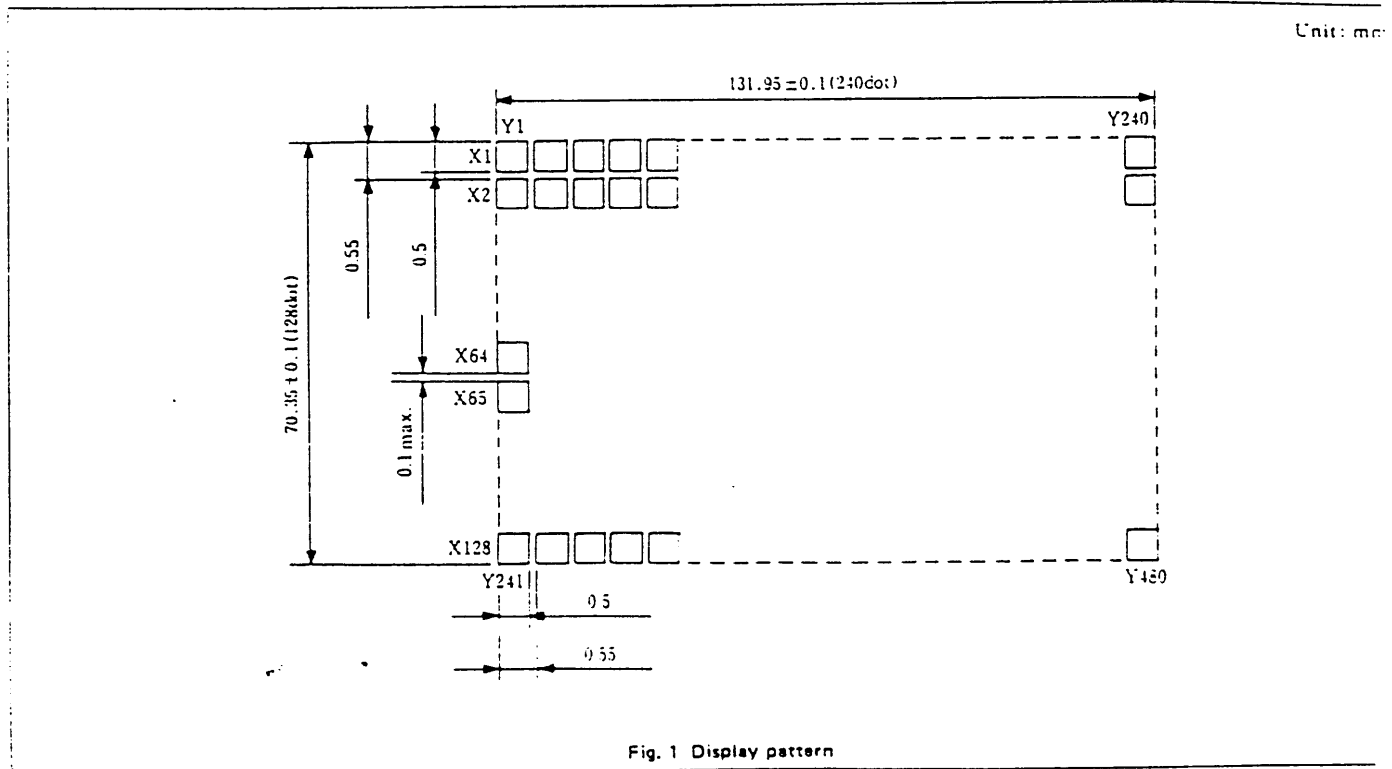
	Duty = 1/6
$T_a = 0^\circ\text{C}$	14.9 V typ.
$T_a = 25^\circ\text{C}$	13.5 V typ.
$T_a = 40^\circ\text{C}$	11.9 V typ.

OPTICAL DATA

Notes 1. Applied to CL1, CL2, D1 ~ D2, M, FLM.

INTERNAL PIN CONNECTION

Pin No.	Symbol	Function
A1	V_{SS} (0V)	Ground
A2	V_{DD} (+5V)	Power supply for logic
A3	V_0	Power supply for LCD drive
A4	RS	Register select
A5	R/W	Read/write
A6	E	Enable
A7 ~ 14	D80 ~ D87	Data bus
A15	$\overline{\text{CS}}$	Chip select
A16	$\overline{\text{RES}}$	Reset
A17	V_{EE} (-13.5V)	Power supply for LCD drive
A18 ~ 20	N.C	No connection



Unit: mm

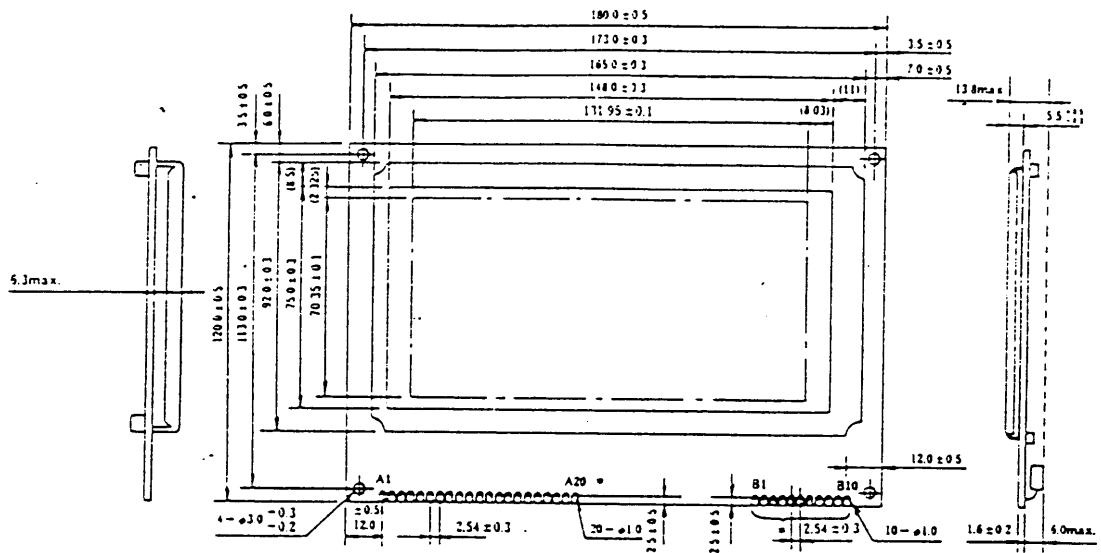


Fig. 2 External dimension

*B1 ~ B10 pads should not be used for LM238XB. Do not connect any signals to these pads. Use A1 ~ A20 for interface.

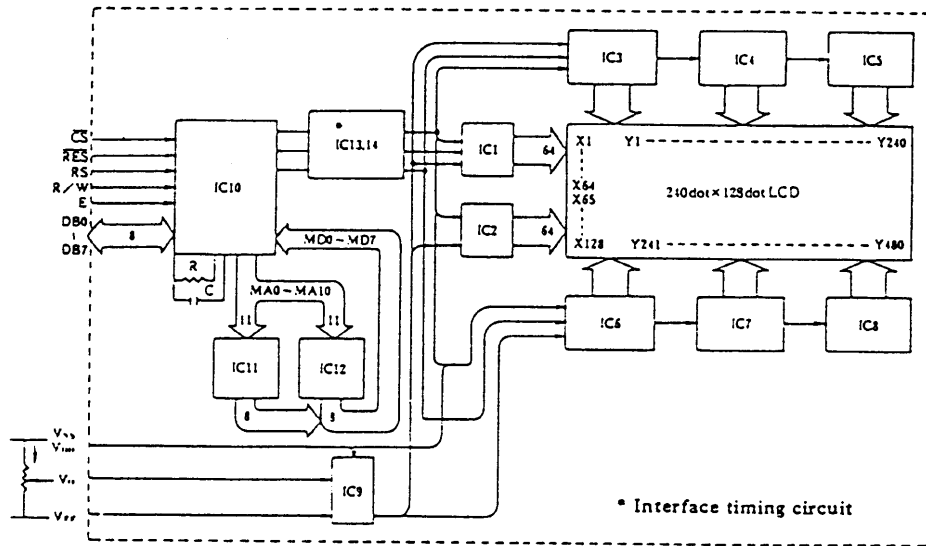


Fig. 3 Block diagram

V_{DD} - V₀: LCD driving voltage
VR: 10kΩ ~ 20kΩ

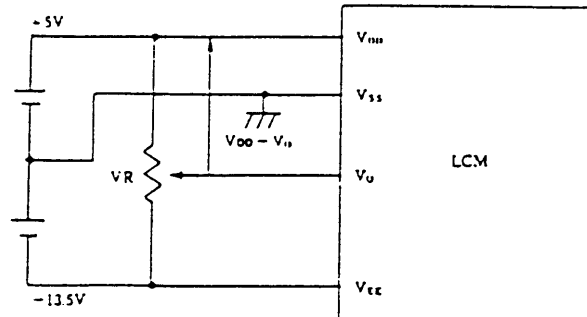


Fig. 4 Power supply

V_{DD} - V₀: LCD driving voltage
VR: 10kΩ ~ 20kΩ

TIMING CHARACTERISTICS

Item	Symbol	Min.	Typ.	Max.	Unit
Enable cycle time	t_{CYC}	1.0	-	-	μs
Enable pulse width	H level	t_{WEH}	0.45	-	μs
	L level	t_{WEL}	0.45	-	μs
Enable rise time	t_{Er}	-	-	25	ns
Enable fall time	t_{Ef}	-	-	25	ns
CS, R/W, RS set up time	t_{AS}	140	-	-	ns
Data set up time	t_{DIS}	225	-	-	ns
Data delay time	t_{DD}	-	-	225	ns
Data hold time	t_H	10	-	-	ns
CS, R/W, RS \rightarrow hold time	t_{AH}	10	-	-	ns

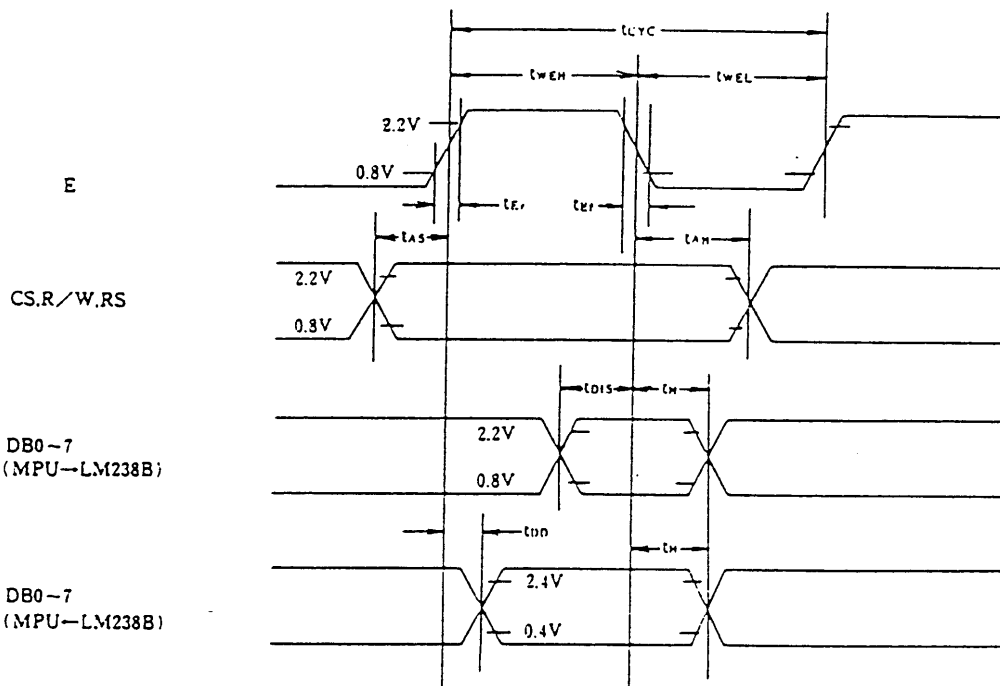


Fig. 5 Interface timing (MPU \leftrightarrow LM238XB)