

# 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 $\mu\text{A}$
Output leak current ( $I_{OUT}$ )	-10 ~ 10 $\mu\text{A}$
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) ( $V_{DD} - V_0$ )

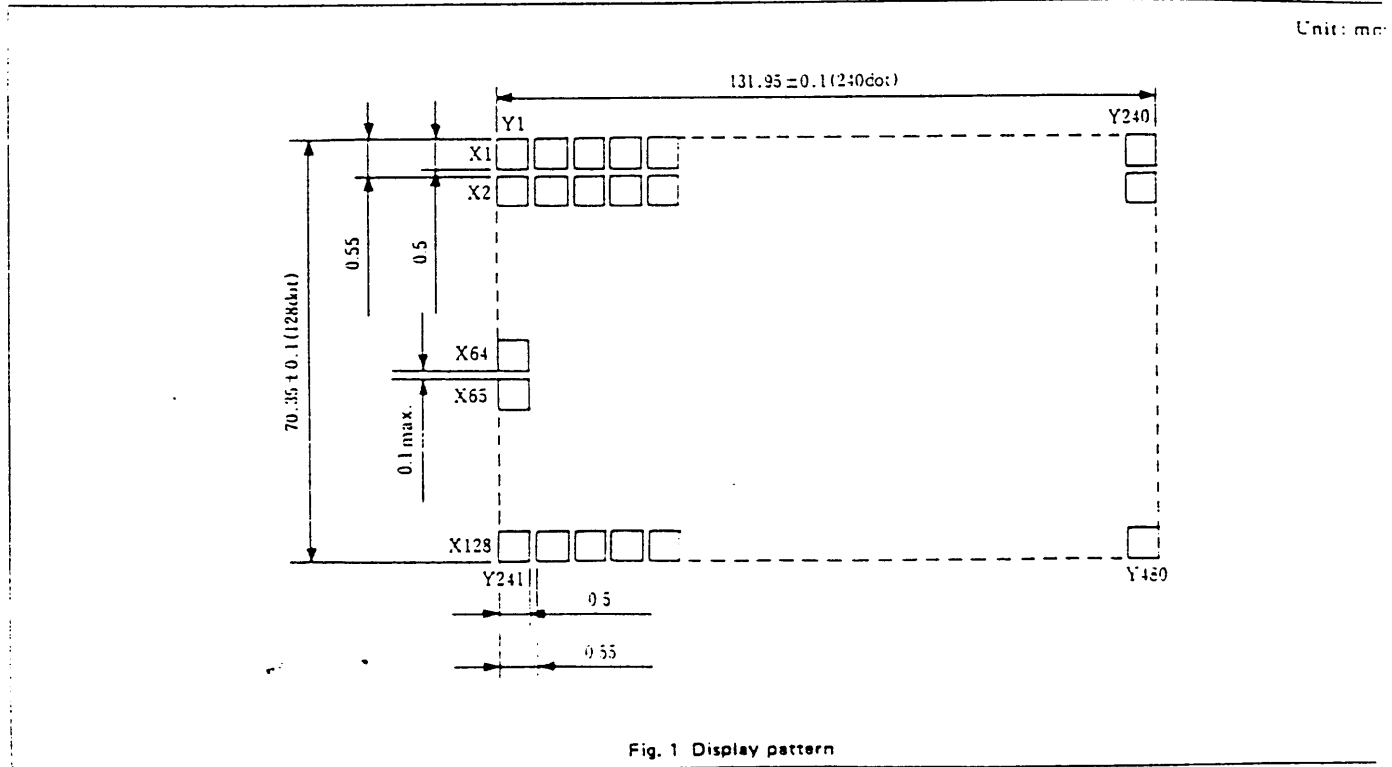
	Duty = 1/8
$T_a = 0^\circ\text{C}$	14.9 V typ.
$T_a = 25^\circ\text{C}$	13.5 V typ.
$T_a = 40^\circ\text{C}$	11.9 V typ.

## OPTICAL DATA

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

## 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	DB0 ~ DB7	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





TIMING CHARACTERISTICS

Item	Symbol	Min.	Typ.	Max.	Unit
Enable cycle time	$t_{CYC}$	1.0	—	—	$\mu s$
Enable pulse width	H level	$t_{WEH}$	0.45	—	$\mu s$
	L level	$t_{WEL}$	0.45	—	$\mu s$
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

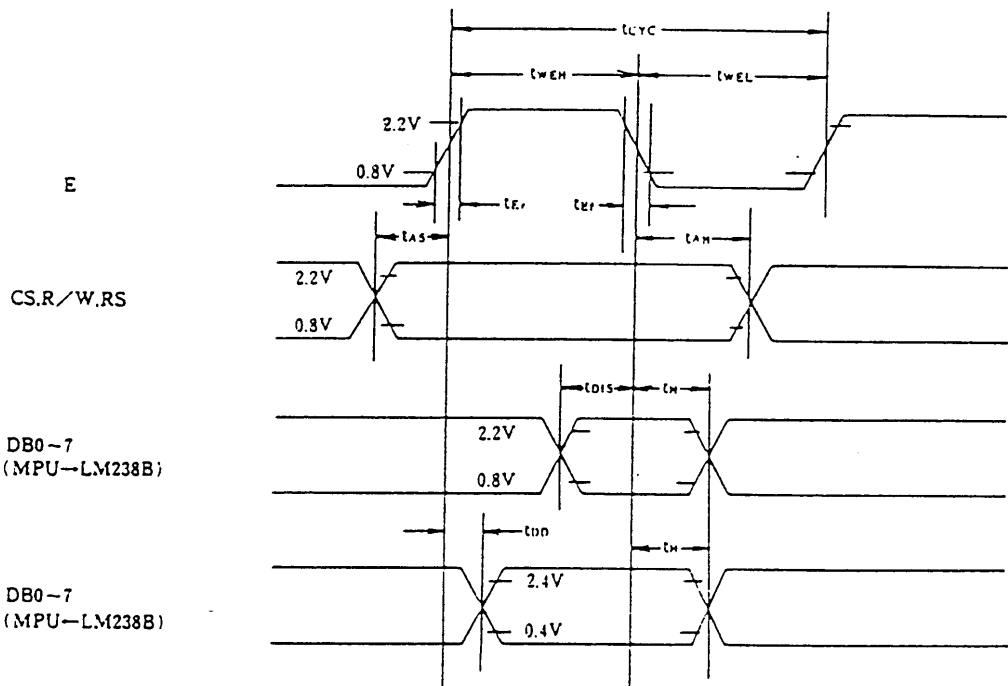


Fig. 5 Interface timing (MPU  $\leftrightarrow$  LM238B)