

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} V. |
| 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) ($V_{DD} - V_0$)

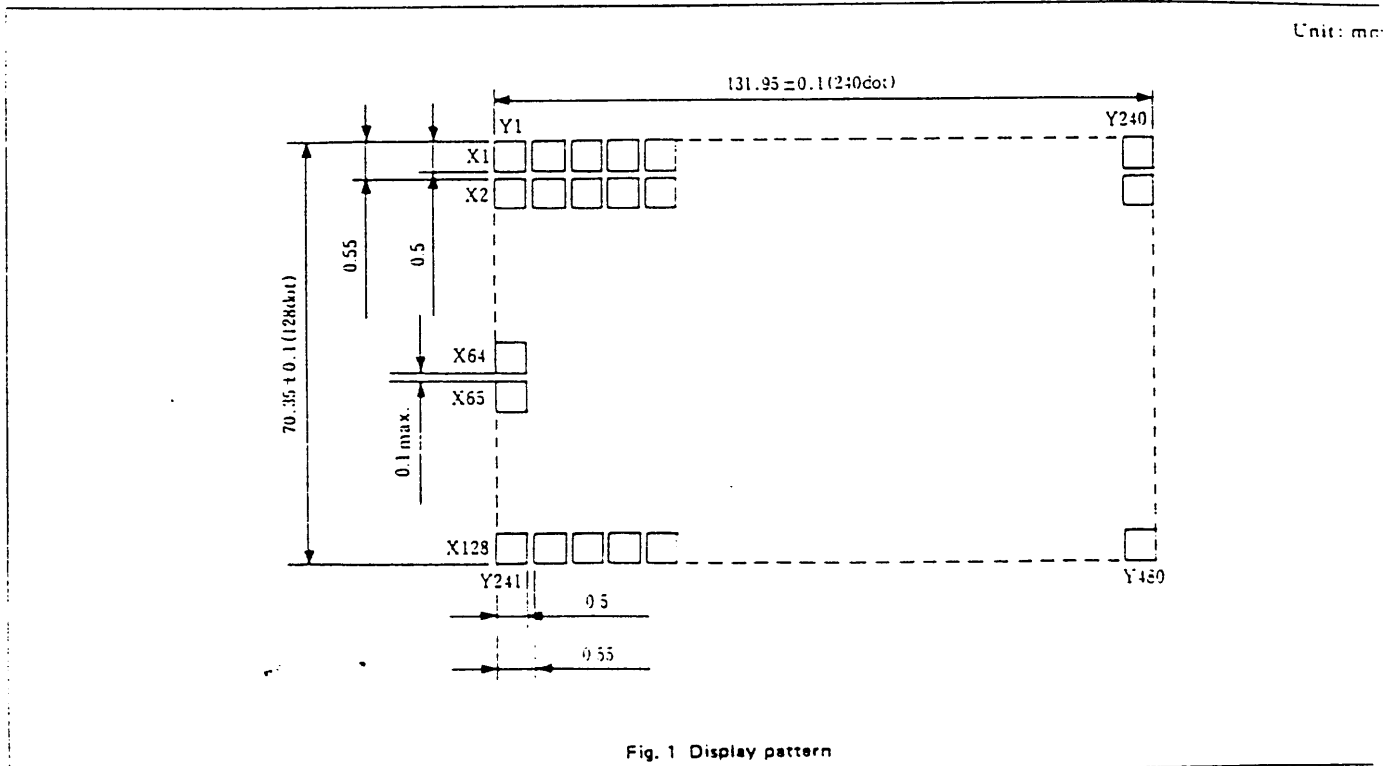
| | |
|--------------------------|-------------|
| | Duty = 1/6 |
| $T_a = 0^\circ\text{C}$ | 14.9 V typ. |
| $T_a = 25^\circ\text{C}$ | 13.5 V typ. |
| $T_a = 40^\circ\text{C}$ | 11.9 V typ. |

OPTICAL DATA

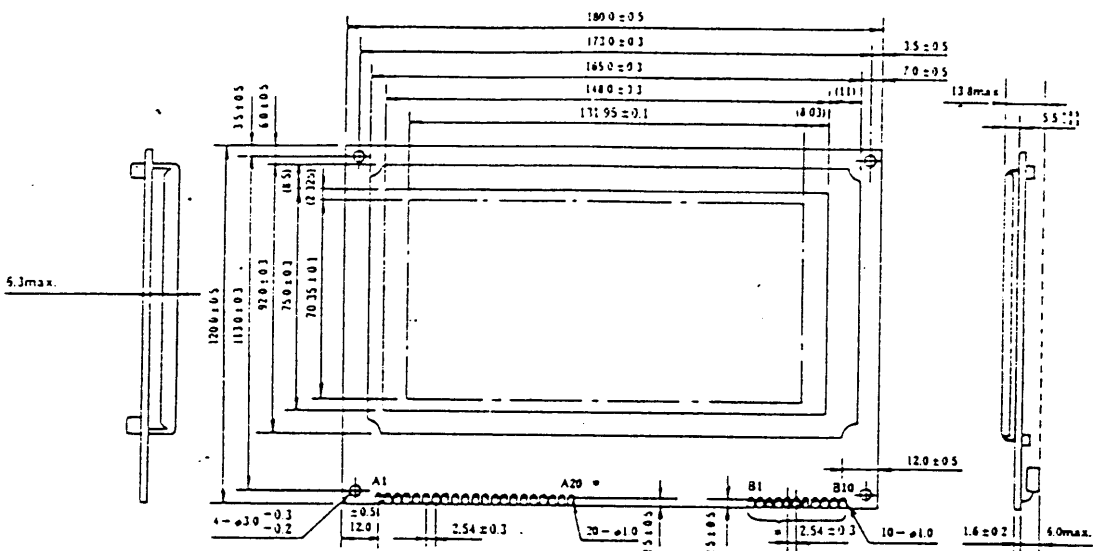
Notes 1. Applied to CL1, CL2, D1 ~ D2, M, FLM.

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 |

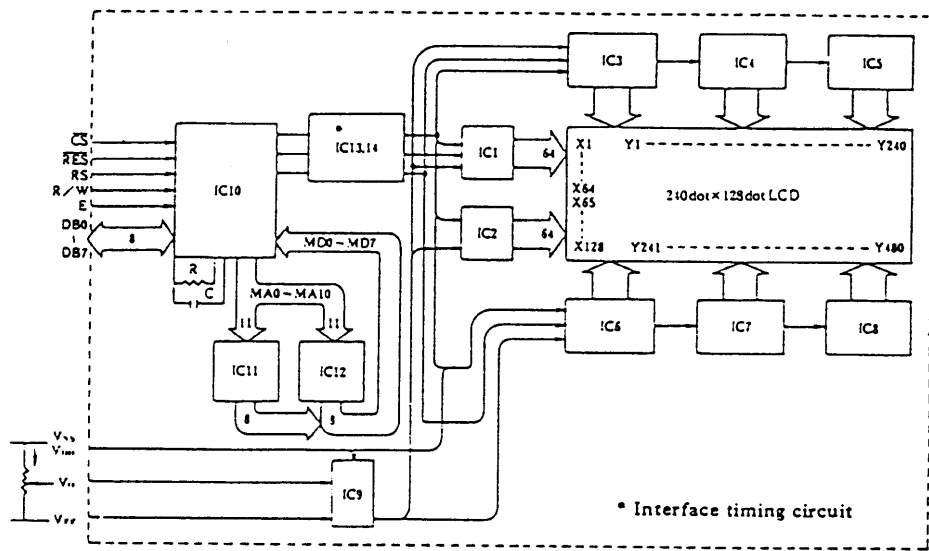


Unit: mm



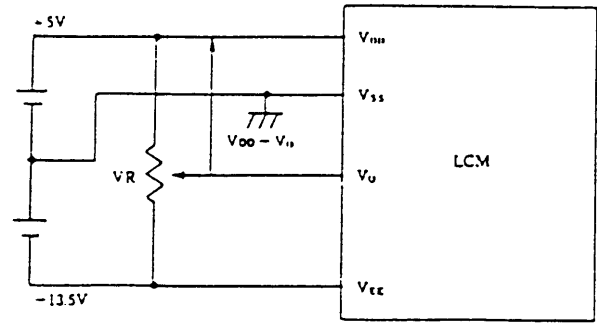
*B1 ~ B10 pads should not be used for LM238XB. Do not connect any signals to these pads. Use A1 ~ A20 for interface.

Fig. 2 External dimension



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

Fig. 3 Block diagram



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

Fig. 4 Power supply

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 |

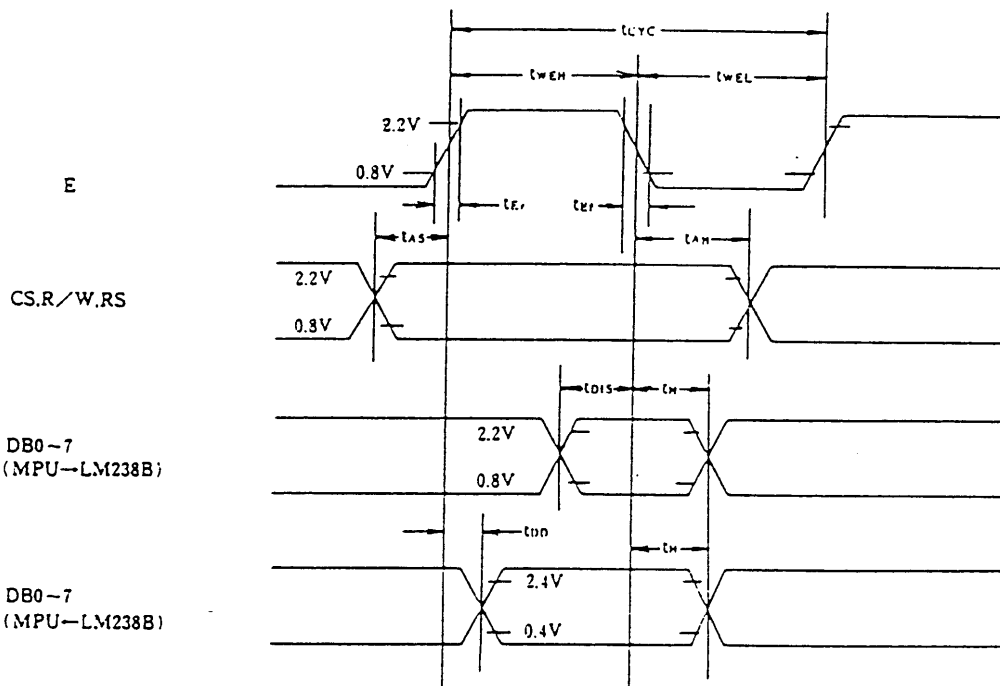


Fig. 5 Interface timing (MPU \leftrightarrow LM238XB)