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For Messrs.

Date. JAN. 12. '91

CUSTOMER'S ACCEPTANCE SPECIFICATIONS

LMG6400PLGR

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Accepted by: _____

Proposed by: W. B. Song

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RECORD OF REVISION

Date	Sheet No.	Summary
Oct.20.'90	3284PS 2503- LMG6400PLGR-2 PAGE 3-1/1	CHANGE MODULE SIZE 159.4W×101.0H×9.0D(MAX)mm →159.4W×101.0H×9.5D(MAX)mm
	3284PS 2508- LMG6400PLGR-2 PAGE 8-1/2	CHANGE MODULE HEIGHT 9.0 MAX→9.5 MAX
JAN.12.'91	3284PS 2505- LMG6400PLGR-3 PAGE 5-1/3	CHANGE LC DRIVING VOLTAGE / 0℃(18.6) 16.9 VDD-V0 < 25℃(17.5) ⇒ 15.8 40℃(16.7) 15.4

3. GENERAL SPECIFICATIONS

3.1 STANDARD SPECIFICATIONS.

3284PS 2501-234-1

THIS INDIVIDUAL SPECIFICATION IS PRIOR TO GENERAL SPECIFICATION.

4. MECHANICAL DATA

(1) NUMBER OF DOTS	240W × 128H DOTS
(2) MODULE SIZE	159.4W × 101.0H × 9.5D(MAX)mm
(3) EFFECTIVE DISPLAY AREA	126.0W × 71.0H mm
(4) DOT SIZE	0.47W × 0.47H mm
(5) DOT PITCH	0.5W × 0.5H mm
(6) VIEWING DIRECTION	6 0'CLOCK
(7) LCD	NEW GRAY MODE, REFLECTIVE
(8) DUTY	1/128

5. ABSOLUTE MAXIMUM RATINGS

5.1 ELECTRICAL ABSOLUTE MAXIMUM RATINGS.

I T E M	SYMBOL	MIN.	MAX.	UNIT	COMMENT
LOGIC CIRCUIT POWER SUPPLY VOLTAGE	VDD-VSS	0	7.0	V	
LC DRIVING CIRCUIT POWER SUPPLY VOLTAGE	VDD-VEE	0	22.0	V	
INPUT VOLTAGE	VI	VSS	VDD	V	
STATIC ELECTRICITY	—	—	100	V	SEE NOTE

NOTE: ELECTRO-STATIC DISCHARGE RESISTANCE IS TESTED BY CHARGING A CONDENSER WITH A CAPACITY OF 200PF AND DISCHARGING IT BY CONTACT WITH AN INTERFACE CONNECTOR PIN.

5.2 ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS.

I T E M	OPERATING		STORAGE		C O M M E N T
	MIN.	MAX.	MIN.	MAX.	
AMBIENT TEMPERATURE	0°C	40°C	-20°C	80°C	NOTE(1)(2)
HUMIDITY	NOTE(3)		NOTE(3)		WITHOUT CONDENSATION
VIBRATION	—	4.9m/s ² (0.5 G)	—	19.6m/s ² (2 G)	
SHOCK	—	29.4m/s ² (3 G)	—	490.0m/s ² (50 G)	XYZ 3 DIRECTIONS
CORROSIVE GAS	NOT ACCEPTABLE		NOT ACCEPTABLE		

NOTE(1): BACKGROUND COLOR OF LCD CHANGES DEPENDING ON TEMPERATURE AS FOLLOW.



NOTE(2): $T_a = -20^\circ\text{C} < 48\text{HR.}$

NOTE(3): $T_a \leq 40^\circ\text{C} : 85\% \text{RH MAX.}$

$T_a > 40^\circ\text{C} : \text{ABSOLUTE HUMIDITY MUST BE LOWER THAN THE HUMIDITY OF } 85\% \text{RH AT } 40^\circ\text{C}$

6. ELECTRICAL CHARACTERISTICS

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
LOGIC CIRCUIT POWER SUPPLY VOLTAGE	VDD-VSS	—	4.75	5.0	5.25	V	—
LC DRIVER CIRCUIT POWER SUPPLY VOLTAGE	VEE-VSS	—	-14.5	-15.0	-15.5	V	—
INPUT VOLTAGE	VI	H LEVEL	0.8VDD	—	VDD	V	—
		L LEVEL	0	—	0.2VDD	V	—
POWER SUPPLY CURRENT	IDD	VDD-VSS=5.0V VDD-V0= 15.8V	—	-6	—	mA	—
	IEE	VDD-VSS=5.0V VDD-V0= 15.8V	—	4	—	mA	—
RECOMMENDED LC DRIVING VOLTAGE NOTE	VDD-V0	1/128 Ta=0 °C	—	16.9	—	V	—
		DUTY Ta=25 °C	—	15.8	—	V	—
		$\phi = 10^\circ$ Ta=40 °C	—	15.4	—	V	—
FRAME FREQUENCY	FFLM		—	75.0	—	HZ	—

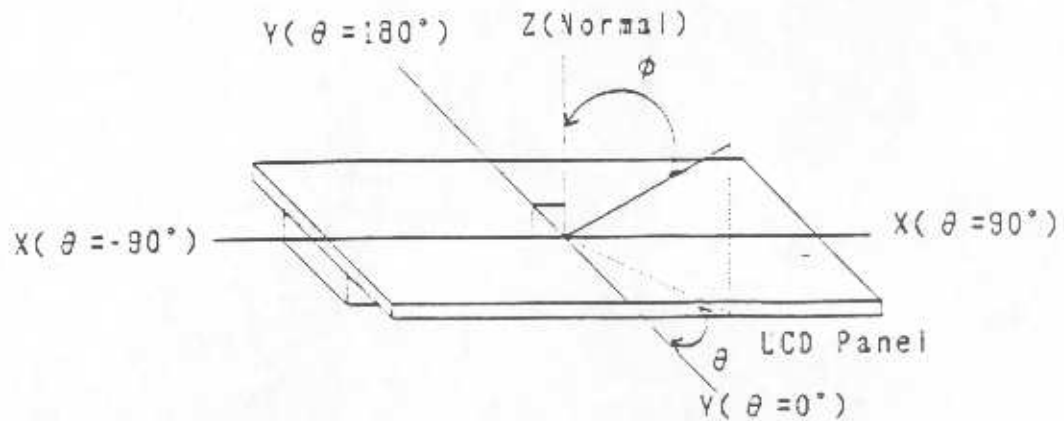
NOTE: RECOMMENDED LC DRIVING VOLTAGE MAY FLUCTUATE ABOUT $\pm 0.5V$
BY EACH MODULE

7. OPTICAL DATA

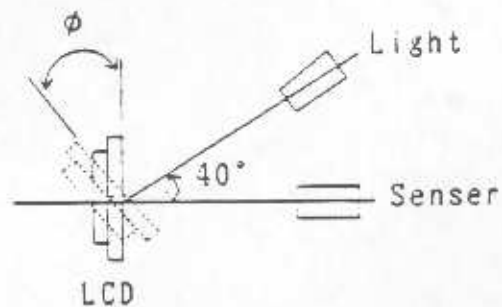
Ta=25 °C, VDD-V0= 15.8 V

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
VIEWING ANGLE RANGE	$\phi 2 - \phi 1$	K=1.4	-	40	-	deg	1, 2
CONTRAST RATIO	K	$\phi = 10^\circ, \theta = 0^\circ$	-	(3)	-	-	3
RESPONSE TIME	tr(rise)	$\phi = 10^\circ, \theta = 0^\circ$	-	250	400	ms	4
	tf(fall)	$\phi = 10^\circ, \theta = 0^\circ$	-	300	450	ms	4

NOTE1: (a) THE DEFINITION OF VIEWING ANGLE ϕ AND θ



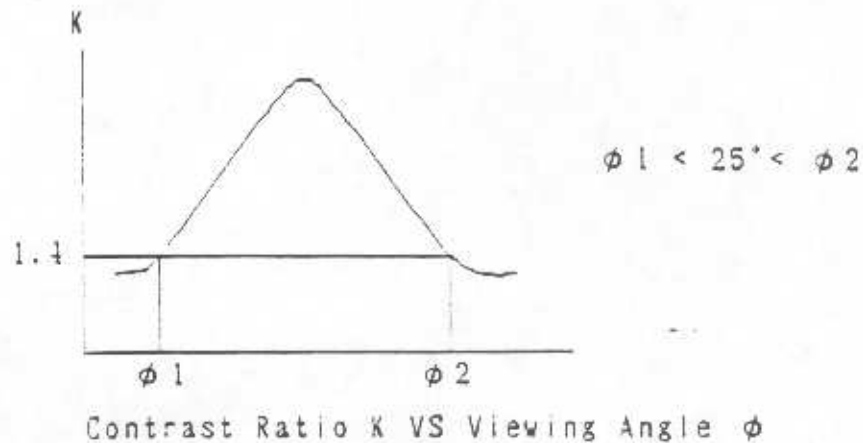
(b) POSITION OF LIGHT:
(VIEWING ANGLE)



$\theta = 0^\circ$

Measurement point
is center of LCD

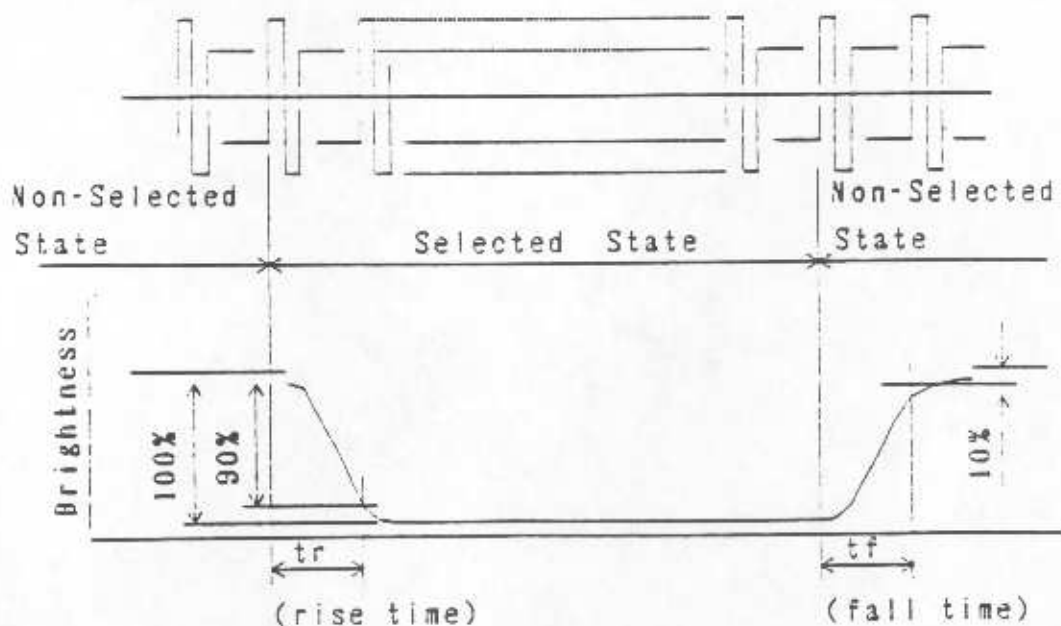
NOTE2: THE DEFINITION OF VIEWING ANGLE $\phi 1$ AND $\phi 2$



NOTE3: THE DEFINITION OF CONTRAST RATIO K :

$$\text{CONTRAST RATIO } K = \frac{\text{BRIGHTNESS OF NON-SELECTIVE DOT}}{\text{BRIGHTNESS OF SELECTIVE DOT}}$$

NOTE4: THE DEFINITION OF OPTICAL RESPONSE TIME:



B. BLOCK DIAGRAM

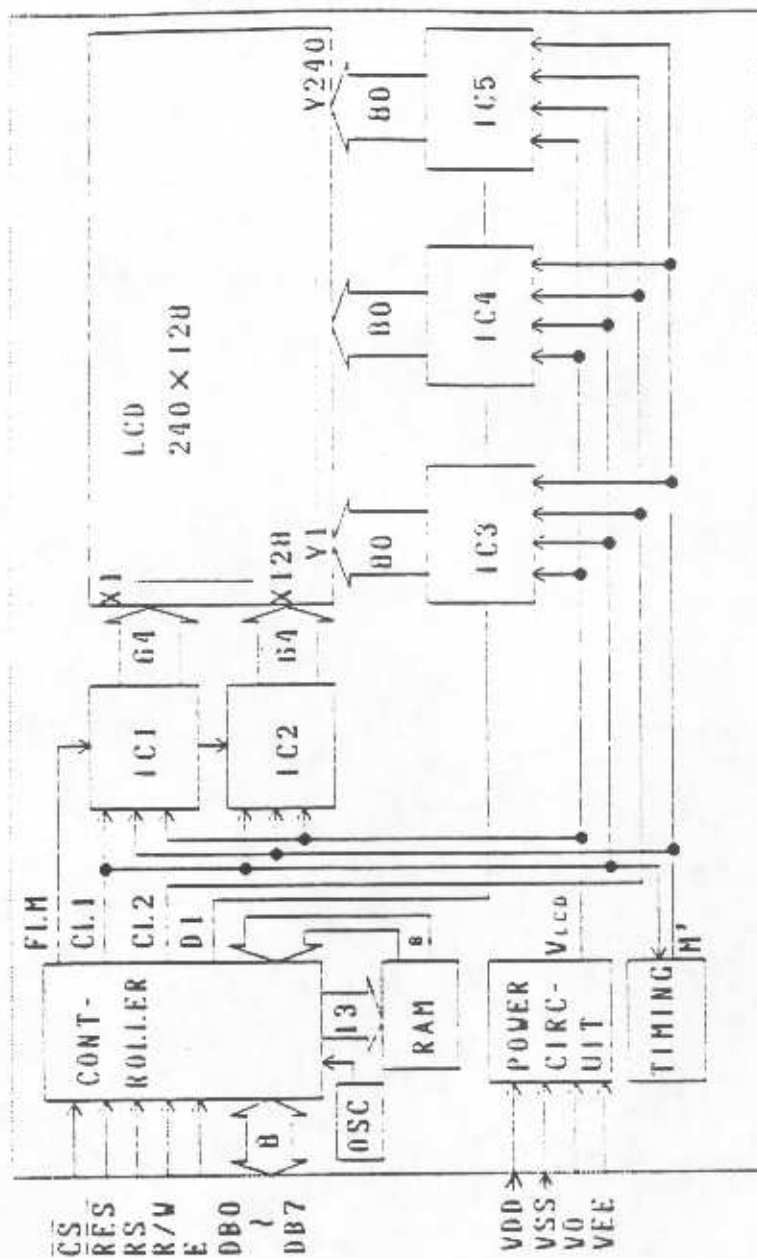
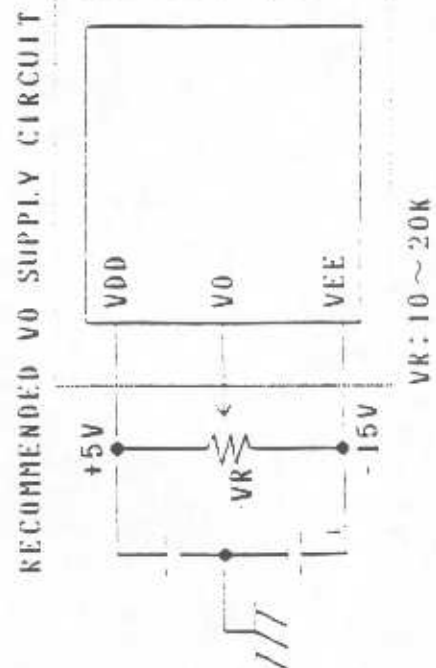


FIG. 2-1 LMG6400PLGR BLOCK DIAGRAM.



3. INTERFACE TIMING

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 RIST 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
DATA HOLD TIME	t_{DH}	20	-	-	ns

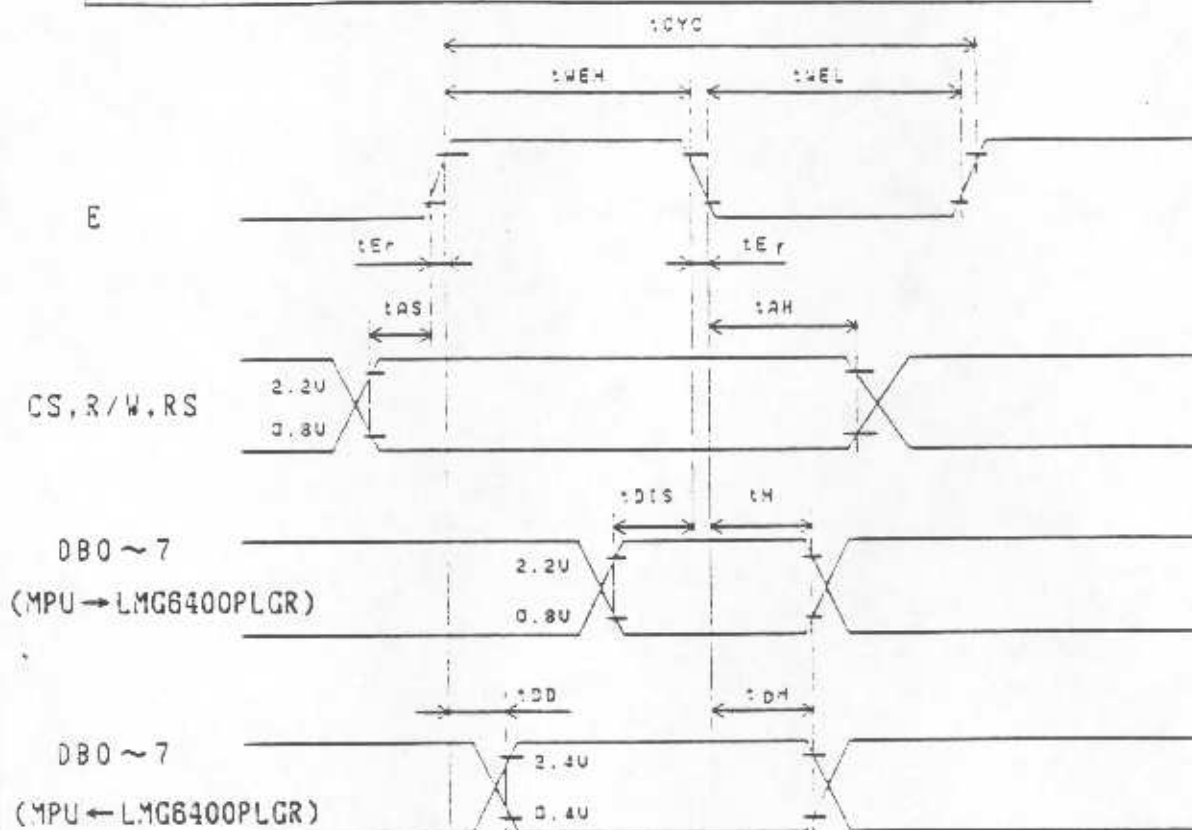
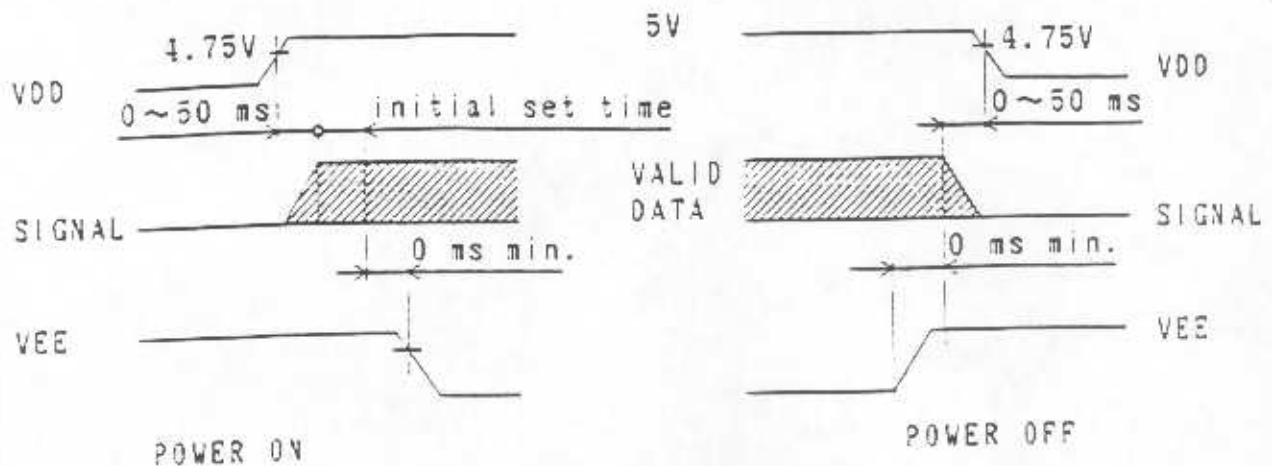


FIG.5 INTERFACE TIMING (MPU ↔ LMG6400PLGR)

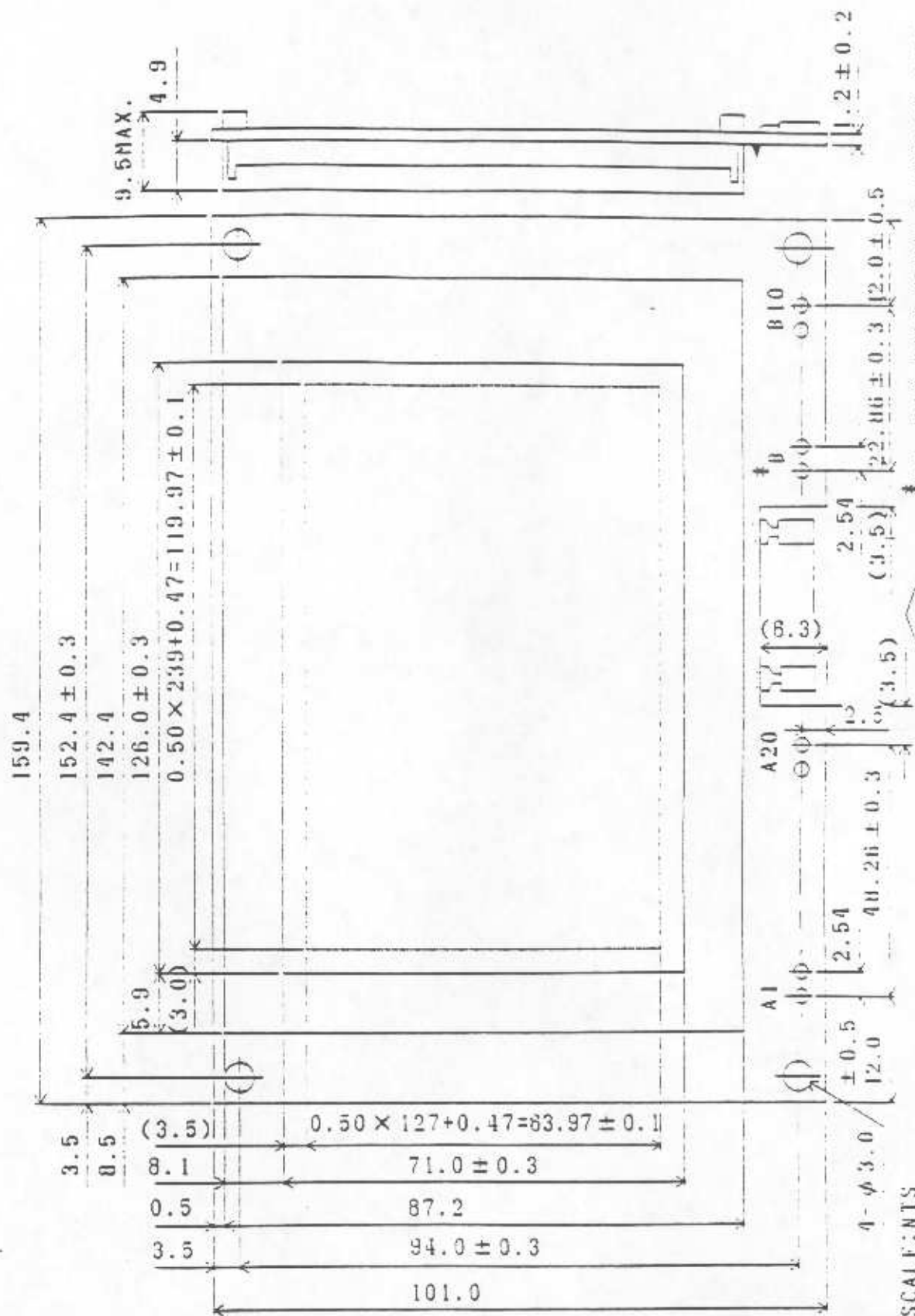
9.2 POWER AND INTERFACE TIMING SEQUENCE



NOTE: INITIAL SET TIME - THE TIME IS INITIAL INSTRUCTIONS SET TIME OF CONTROLLER HD61830.

- (INITIAL INSTRUCTIONS):
- ① MODE CONTROL
 - ② SET CHARACTER PITCH
 - ③ SET NUMBER OF CHARACTER
 - ④ SET NUMBER OF TIME DIVISION.

10. DIMENSIONAL OUTLINE



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NOTE: INTERNAL PIN CONNECTION

PIN No.	Symbol	Function
A1	VSS(0V)	Ground
A2	VDD(+5V)	Power supply for logic
A3	V0	Power supply for LCD drive
A4	RS	Register select
A5	R/W	Read/write
A6	E	Enable
A7~14	DB0~DB7	Data bus
A15	CS	Chip select
A16	RES	Reset
A17	VEE(-15.0V)	Power supply for LCD drive
A18~20	N.C	No connection