



HITACHI

KAOSIUNG HITACHI

For _____

Date. FEB.06.'91

CUSTOMER'S ACCEPTANCE SPECIFICATIONS

LMG6411PLGE

CONTENTS

NO.	Item	Sheet No.	Page
1	COVER	3284PS 2501-LMG6411PLGE-4	1-1/1
2	RECORD OF REVISION	3284PS 2502-LMG6411PLGE-4	2-1/1
3	GENERAL SPECIFICATIONS	3284PS 2503-LMG6411PLGE-4	3-1/1
4	AND MECHANICAL DATA		
5	ABSOLUTE MAXIMUM RATINGS	3284PS 2504-LMG6411PLGE-4	4-1/1
6	ELECTRICAL CHARACTERISTICS	3284PS 2505-LMG6411PLGE-4	5-1/3
7	OPTICAL DATA		~3/3
8	BLOCK DIAGRAM	3284PS 2506-LMG6411PLGE-4	8-1/1
9	INTERFACE TIMING	3284PS 2507-LMG6411PLGE-4	7-1/3 ~ 3/3
10	DIMENSIONAL OUTLINE	3284PS 2508-LMG6411PLGE-4	B-1/2 ~ 2/2

電子デバイス事業部第二営業技術部



Accepted by; _____

Proposed by; W. J. Hwang

Kaohsiung Hitachi
Electronics Co., Ltd.

Sh.
No.

3284PS 2501 -LMG6411PLGE - 4

Page 1-1/1

RECORD OF REVISION

Date	Sheet No.	Summary
Oct.20.'90	3284PS 2506- LMG6411PLGE-2 PAGE 6-1/1	ADD: NOTE1SKT-100-05L
JAN.12.'91	3284PS 2505- LMG6411PLGE-3 PAGE 5-1/3	CHANGE LC DRIVING VOLTAGE VDD-V0 { 0°C(18.6) 16.9 25°C(17.5) ⇒ 15.8 40°C(16.7) 15.4
	3284PS 2508- LMG6411PLGE-3 PAGE 8-1/2 PAGE 8-2/2	ADD: RELATIVE SPEC FROM EL INPUT TERMINAL TO PCB EDGE. CHANGE: PIN NO.B6:D2 → N.C.
FEB.06.'91	3284PS 2503- LMG6411PLGE-4 PAGE 3-1/1	CHANGE: LCD: REFLECTIVE FILM B/W TYPE → NEW GRAY MODE, WITH EL BACKLIGHT.

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 × 9.0D(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 O'CLOCK
(7) LCD	NEW GRAY MODE, WITH EL BACKLIGHT
(8) DUTY	1/128
(9) EL	LIGHTING COLOR (WHITE) MODEL No. EGL-01-711 (MADE BY SUMITOMO CHEMICAL INDUSTRY Co., Ltd.)

5. ABSOLUTE MAXIMUM RATINGS

5.1 ELECTRICAL ABSOLUTE MAXIMUM RATINGS.

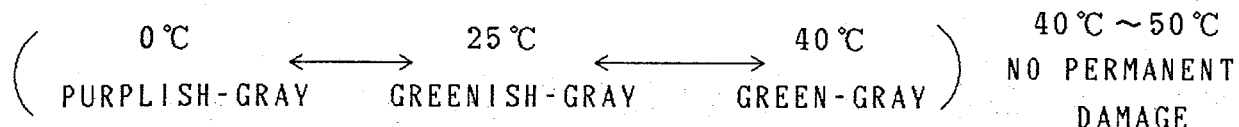
I T E M	SYMBOL	MIN.	MAX.	UNIT	COMMENT
LOGIC CIRCUIT POWER SUPPLY VOLTAGE	VDD-VSS	0	7.0	V	
LC DRIVING CIRCUIT POWER SUPPLY VOLTAGE	VDD-VEE	0	22.0	V	
INPUT VOLTAGE	VI	VSS	VDD	V	
STATIC ELECTRICITY	—	—	100	V	SEE NOTE
EL POWER SUPPLY VOLTAGE	VEL	—	AC150	Vrms	
FREQUENCY	FEL	50	1000	Hz	AC100Vrms

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℃	40℃	-20℃	60℃	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):Ta = -20℃ < 48HR.

NOTE(3):Ta ≤ 40℃:85%RH MAX.

Ta > 40℃:ABSOLUTE HUMIDITY MUST BE LOWER THAN THE
HUMIDITY OF 85%RH AT 40℃

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	—
NOTE 1.							
RECOMMENDED LC DRIVING VOLTAGE NOTE 2.	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	—
EL POWER SUPPLY	VEL	FEL=400Hz	—	100	—	Vrms	—
	IEL	VEL=100Vrms FEL=400Hz	—	—	160	mA rms	—
NOTE3							

NOTE1: fFLM=75.0HZ, VDD-V0= 15.8 V, D =GND(VSS)

NOTE2: RECOMMENDED LC DRIVING VOLTAGE MAY FLUCTUATE ABOUT $\pm 0.5V$ BY EACH MODULE

NOTE3: RECOMMEND EL TNVERTER: SKT-100-05L

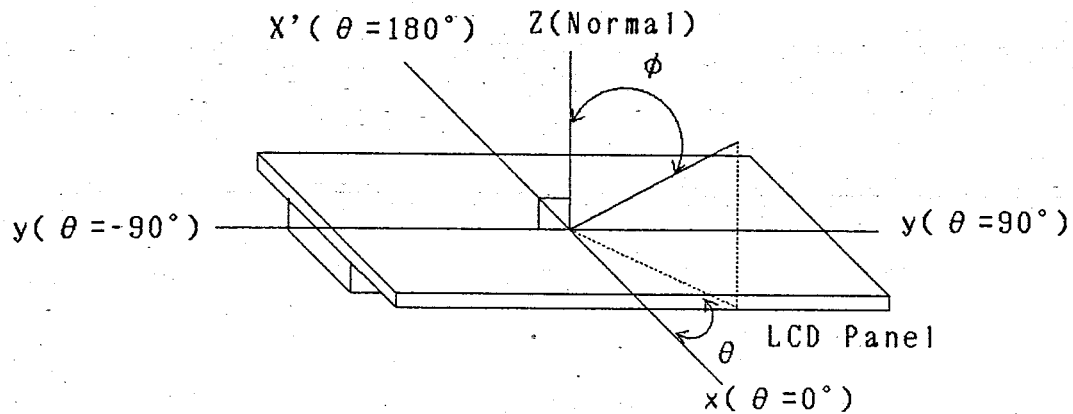
7. OPTICAL DATA

Ta=25 °C, VDD-V0= 15.8 V

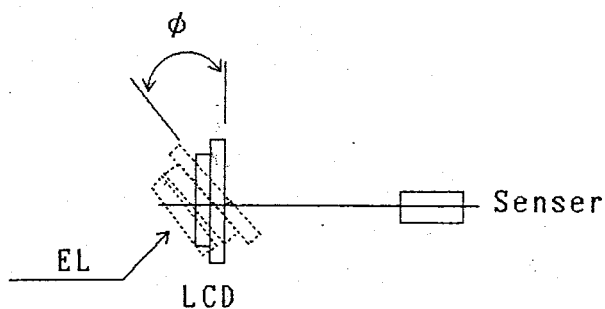
ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
VIEWING ANGLE RANGE	$\phi 2 - \phi 1$	K=1.4	-	40	-	deg	1,2
CONTRAST RATIO	K	$\phi=10^\circ, \theta=0^\circ$	-	(3)	-	-	3
RESPONSE TIME	tr(rise)	$\phi=10^\circ, \theta=0^\circ$	-	250	400	ms	4
	tf(fall)	$\phi=10^\circ, \theta=0^\circ$	-	300	450	ms	4
EL CONTRAST RATIO		$\phi=10^\circ, \theta=0^\circ$	-	10	-	cd/m ²	5

NOTE(5) IT'S MEASURED ON CENTER OF THE EFFECTIVE DISPLAY AREA IN DARK ROOM.

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



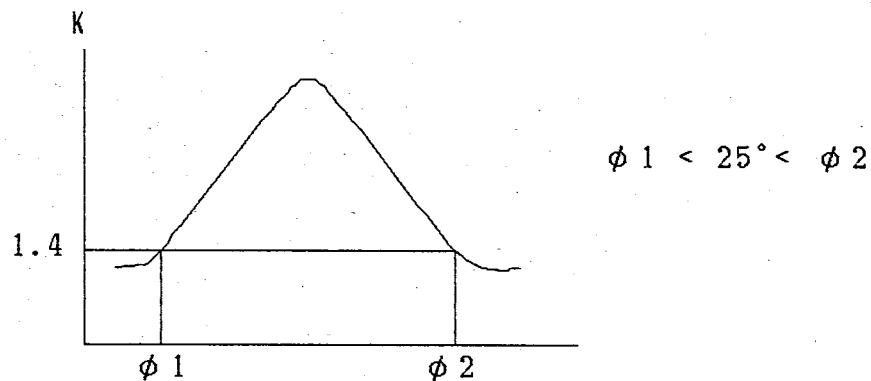
(b) POSITION OF LIGHT:
(VIEWING ANGLE)



$\theta = 0^\circ$

Measurement point
is center of LCD

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

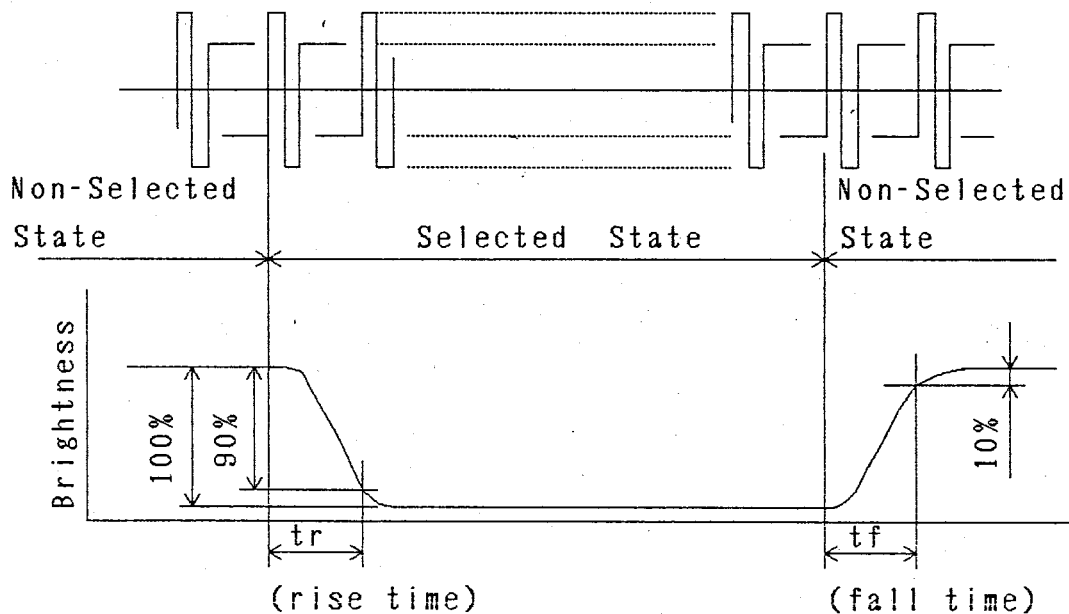


Contrast Ratio K VS Viewing Angle ϕ

NOTE3: THE DEFINITION OF CONTRAST RATIO K ;

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

NOTE4: THE DEFINITION OF OPTICAL RESPONSE TIME:



8. BLOCK DIAGRAM

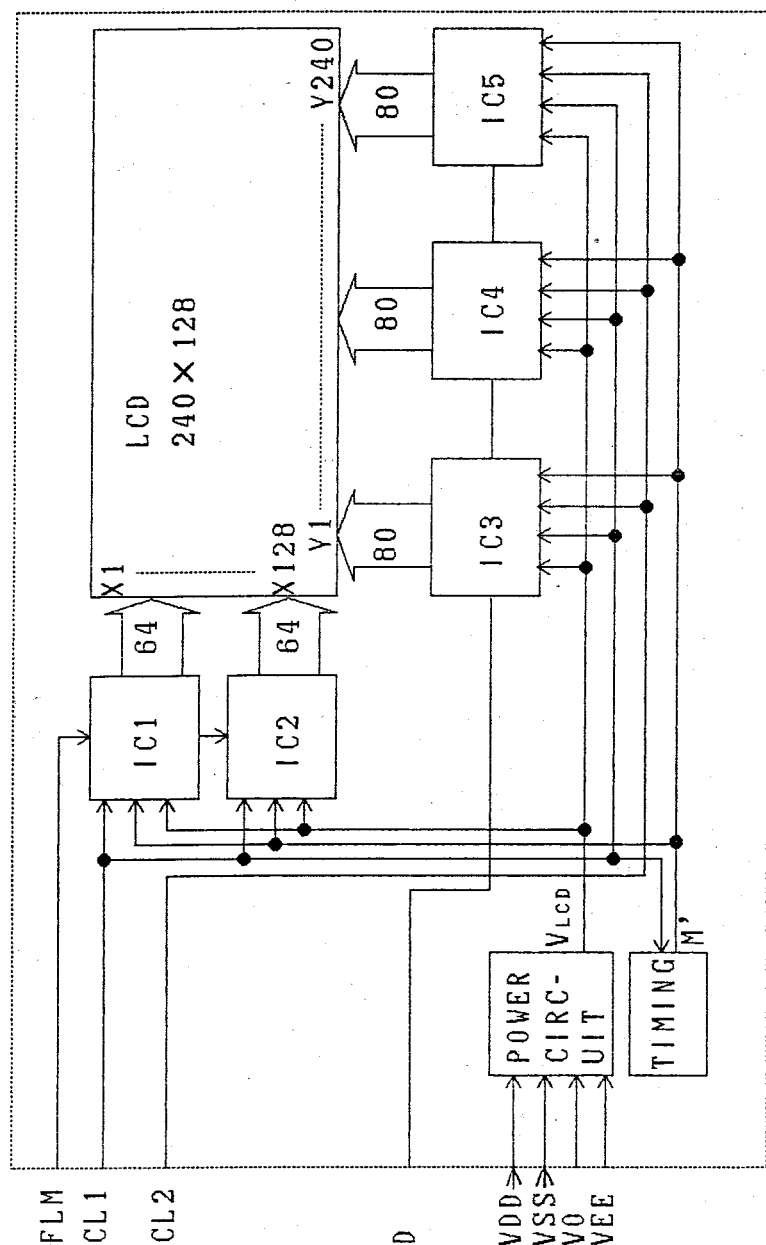
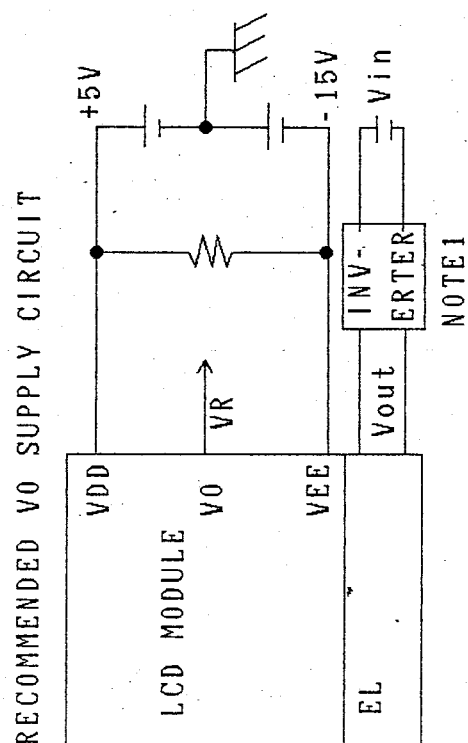


FIG. 2-1 LMG6410PLGR BLOCK DIAGRAM.



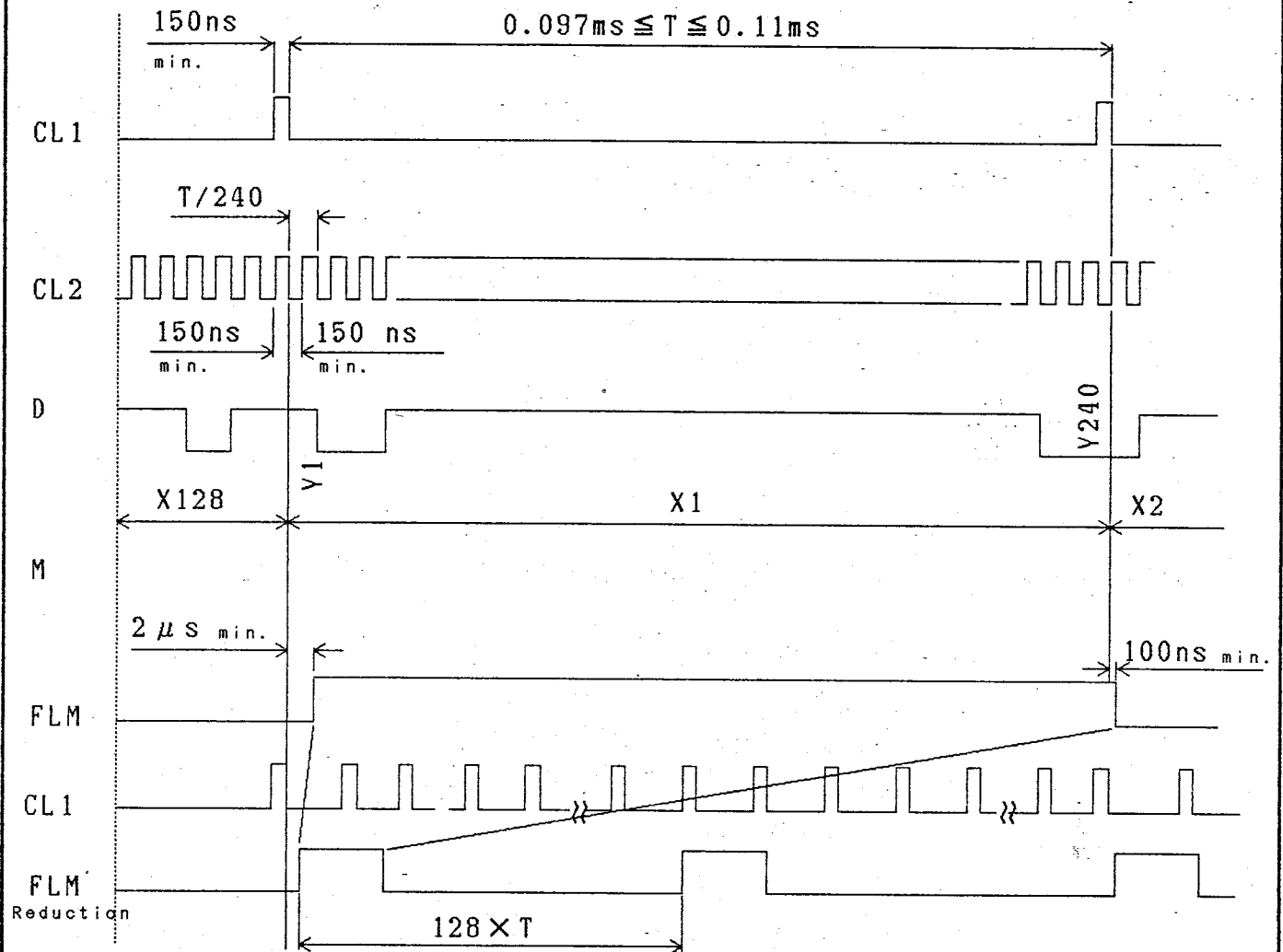
VR: 10 ~ 20K

VDD-V0:LCD DRIVING VOLTAGE

NOTE1:SKT-100-05L

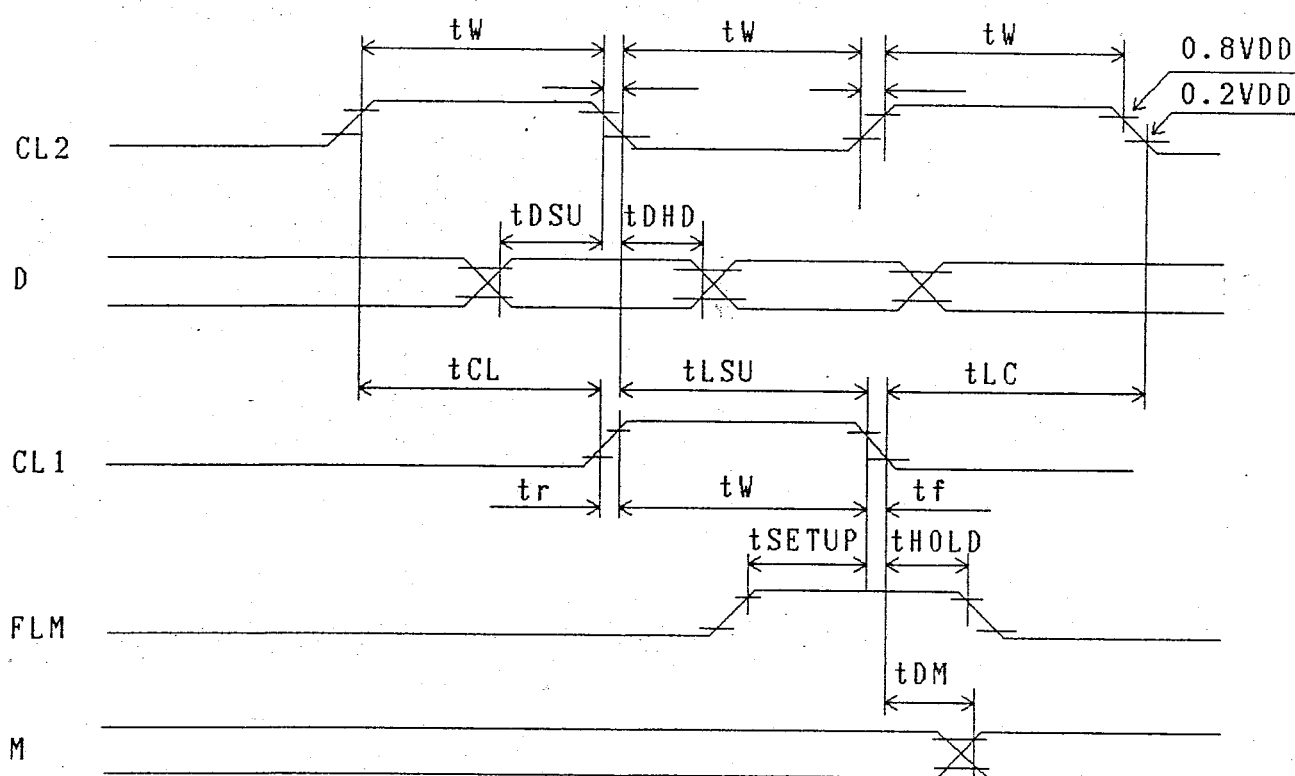
9. INTERFACE TIMING

9.1 TIMING CHART

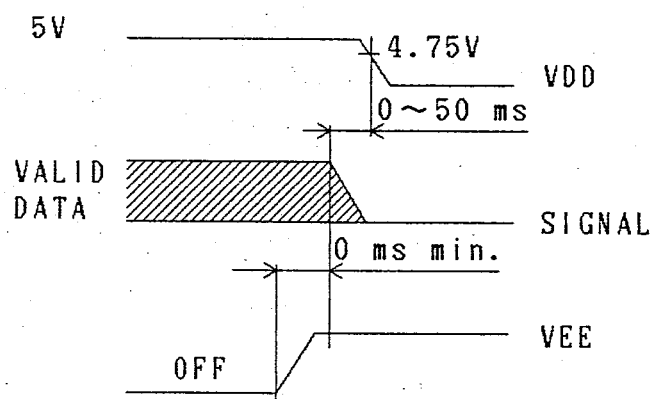
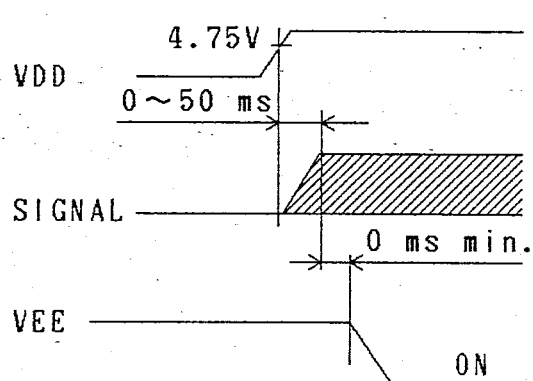


9.2 TIMING CHARACTERISTICS

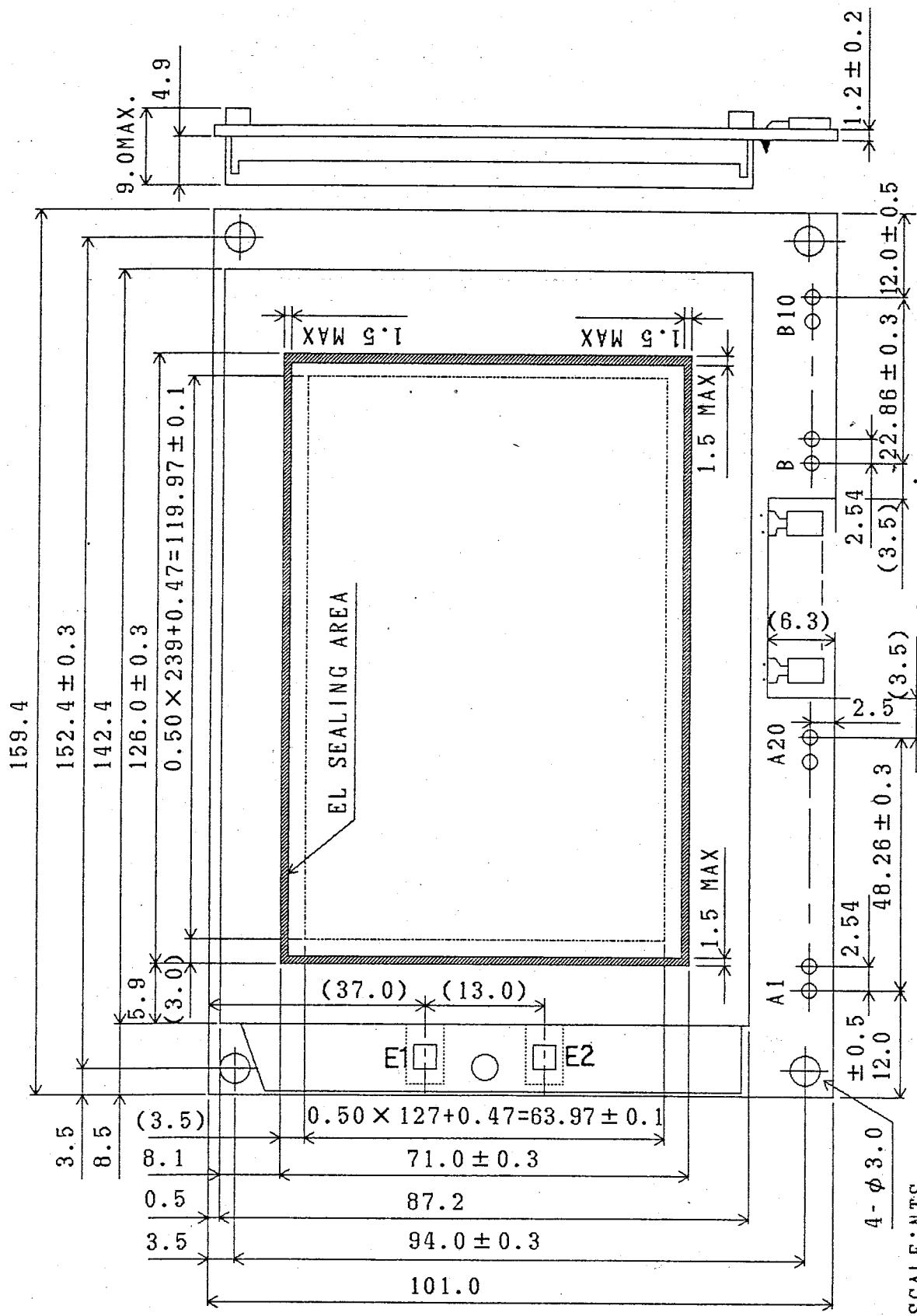
ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT
FREQUENCY OF CL2	fCL2	-	2.32	-	MHZ
CL1, CL2 PULSE WIDTH	tW	125	-	-	ns
RISE, FALL TIME	tr, tf	-	-	50	ns
DATA SET UP TIME	tDSU	80	-	-	ns
DATA HOLD TIME	tDHD	80	-	-	ns
CL2→CL1 TIME	tCL	0	-	-	ns
CL1 SET UP TIME	tLSU	100	-	-	ns
CL1→CL2 TIME	tLC	100	-	-	ns
FLM SET UP TIME	tSETUP	100	-	-	ns
FLM HOLD TIME	tHOLD	100	-	-	ns
M DELAY TIME	tDM	-	-	250	ns



9.2 POWER AND INTERFACE TIMING SEQUENCE



10. DIMENSIONAL OUTLINE



SCALE:NTS

UNIT : mm

NOT SPECIFIED TOLERANCE ± 0.5

VIEWING DIRECTION

* A1~A10 PADS SHOULD NOT BE USED
DO NOT CONNECT ANY SIGNALS TO THESE P
USE PIN NO.1~10 FOR INTERFACE.

NOTE 1. INTERFACE PIN CONNECTION

PIN NO.	SYMBOL	LEVEL	FUNCTION
B1	D	H/L	SERIAL ROW DATA
B2	FLM	H	THE FLM SIGNAL INDICATES THE BEGINNING OF EACH DISPLAY CYCLE
B3	M	H/L	CONTROL SIGNAL FOR AC DRIVING
B4	CL1	H→L	THE CL1 LATCHES THE SERIAL DATA IN THE SHIFT REGISTERS
B5	CL2	H→L	CLOCK SIGNAL FOR SHIFTING THE SERIAL DATA
B6	N.C.	—	—
B7	VDD	-	POWER SUPPLY FOR LOGIC CIRCUIT
B8	VSS	-	GROUND
B9	VEE	-	POWER SUPPLY FOR LC DRIVING
B10	V0	-	OPERATING VOLTAGE FOR LC DRIVING

E1	VEL	—	Power supply for EL drive
E2	VEL	—	"