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PART NO : LM6302FWE
FOR MESSRS : _____

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Accepted by : _____

Proposed by :  _____

Date : 03,21,2002

RECORD OF REVISION

DATE	PAGE	SUMMARY
84.08.14	11	Page Change
84.10.06	4	5. ELECTRICAL CHARACTERISTICS LCD DRIVER CIRCUIT POWER SUPPLY VOLTAGE IDD→VEE-VSS
85.11.05	9,10,	ALL CHANGE
2002,02,07	ALL 04 05 06 09 12 13	Change TEL,FAX,ADDRESS & COMP. 4.2 ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS. OPERATING TEMP. 40°C→50°C. STORAGE SHOCK 490.0m/s ² (50G)→ 49.0m/s ² (5G) 5. ELECTRICAL CHARACTERISTICS. LCD DRIVER CIRCUIT POWER SUPPLY VOLTAGE VEE-VSS MIN -21.5→----- TYP. -21.0→13.7 MAX -20.5 →----- LOGIC CIRCUIT POWER SUPPLY CURRENT VEE-VSS= -21.0V→VDD-VO=-18.7 IDD=5.0→7.0 IEE=4.0→5.3 RECOMMENDED LCD DRIVING VOLTAGE Ta=40°C→50°C VDD-VO Ta=0°C (19.5)→(19.7) Ta=25°C (19.0)→18.7 Ta=50°C (18.5)→(17.7) ADD COLOR (CIE)FOR EL 6. OPTICAL CHARACTERISTICS CONTRAST RATIO K MIN. 1.4→ ----- TYP. 3→ 2.1 B MIN 4.0→ ----- TYP.----- →5.5 8.1 INTERFACE TIMING T→62.5μ s ≤ 71μ s 200XT→200*T 9.2 DISPLAY PATTERN ADD TOLERANCE 10. POWER SUPPLY FOR LCD MODULE VEE=-21.0V→ -18.7V CHANGE 10.1 POWER SUPPLY FOR EL CHANGE 10.2 POWER AND INTERFACE TIMING SEQUENCE
2002,03,20	03	(08)LCD TYPE ----- F-STN,B/W mode TRANSMISSIVE →(08)LCD TYPE ----- F-STN,B/W mode TRANSFLECTIVE

3. GENERAL SPECIFICATIONS AND MECHANICAL DATA

3.1 GENERAL SPECIFICATIONS

PLEASE REFER TO:

”CUSTOMER ACCEPTANCE STANDARD SPECIFICATIONS (SP-10-001)”.

3.2 THIS INDIVIDUAL SPECIFICATIONS IS PRIOR TO GENERAL SPECIFICATIONS.

3.3 MECHANICAL DATA

- | | |
|-----------------------------|--|
| (1) NUMBER OF DOTS ----- | 320W*200H DOTS |
| (2) MODULE SIZE ----- | 122.8W*79.0H*7.8+1.0 / -0.5 D mm |
| (3) VIEWING AREA----- | 99.5W*63.0H mm |
| (4) ACTIVE AREA ----- | 95.97W*59.97H mm |
| (5) DOT SIZE ----- | 0.27W*0.27H mm |
| (6) DOT PITCH ----- | 0.30W*0.30H mm |
| (7) VIEWING DIRECTION ----- | 6 O’CLOCK |
| (8) LCD TYPE ----- | F-STN,B/W mode TRANSFLECTIVE
POSITIVE |
| (9) EL COLOR ----- | WHITE |

4. ABSOLUTE MAXIMUM RATINGS

4.1 ELECTRICAL ABSOLUTE MAXIMUM RATINGS.

ITEM	SYMBOL	MIN.	MAX.	UNIT	COMMENT
POWER SUPPLY FOR LOGIC	VDD-VSS	0	6.0	V	
POWER SUPPLY FOR LCD DRIVER	VDD-VEE	0	27.0	V	
INPUT VOLTAGE	VI	VSS	VDD	V	
STATIC ELECTRICITY	-----	-----	100	V	NOTE (1)
POWER SUPPLY FOR EL	VEL	-----	AC200	Vrms	fEL=1.0KHZ 60 SEC.MAX
	fEL	-----	2.0	KHZ	AC115 Vrms 60 SEC.MAX

NOTE(1) : TEST METHOD AND CONDITIONS AFTER CHARGING UP 200 PF CAPACITOR BY STATED VOLTAGE , THE CAPACITOR IS CONNECTED WITH INTERFACE PINS OF THE MODULE.

4.2 ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS.

ITEM	OPERATING		STORAGE		COMMENT
	MIN.	MAX.	MIN.	MAX.	
AMBIENT TEMPERATURE	0°C	50°C	-20°C	60°C	NOTE (2)
HUMIDITY	NOTE (3)		NOTE (3)		WITHOUT CONDENSATION
VIBRATION	--	4.9 m/s ² (0.5G)	--	19.6 m/s ² (2G)	10~300HZ XYZ DIRECTIONS 1 Hr.EACH
SHOCK	--	29.4 m/s ² (3G)	--	49.0 m/s ² (5G)	10 mSEC XYZ DIRECTIONS 1 TIME EACH
CORROSIVE GAS	NOT ACCEPTABLE		NOT ACCEPTABLE		

NOTE(2) : Ta AT -20°C : 48HR MAX.
60°C : 168HR MAX.

NOTE(3) : Ta ≤ 40°C : 90% RH MAX.
Ta > 40°C : ABSOLUTE HUMIDITY MUST BE LOWER THAN THE HUMIDITY OF 90%RH AT 40°C. (50% RH AT 50°C)

5. ELECTRICAL CHARACTERISTICS

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	
LOGIC CIRCUIT POWER SUPPLY VOLTAGE	VDD-VSS	-----	4.75	5.0	5.25	V	
LCD DRIVER CIRCUIT POWER SUPPLY VOLTAGE	VEE-VSS	-----	-----	-13.7	-----	V	
INPUT VOLTAGE NOTE (1)	VIH	H LEVEL	0.8*VDD		VDD	V	
	VIL	L LEVEL	0		0.8VDD	V	
LOGIC CIRCUIT POWER SUPPLY CURRENT NOTE(2)	IDD	VDD-VSS=5.0V VDD-VO=-18.7V	-----	6.5	-----	mA	
LCD DRIVER CIRCUIT POWER SUPPLY CURRENT NOTE (2)	IEE	VDD-VSS=5.0V VDD-VO=-18.7V	-----	5.3	-----	mA	
RECOMMENDED LCD DRIVING VOLTAGE NOTE (3)	VDD-VO $\Phi = 10^\circ \theta = 0^\circ$ DUT = 1/200	Ta= 0°C	-----	(19.7)	-----	V	
		Ta= 25°C	-----	(18.7)	-----	V	
		Ta= 50°C	-----	(16.7)	-----	V	
FLM FREQUENCY	fFLM	-----	70	75	80	HZ	
THE POWER SUPPLY FOR EL	VEL	fFL=400HZ	-----	100	-----	Vrms	
COLOR (CIE)FOR EL	-----	F _{EL} =400Hz V _{EL} =100Vrms	X	0.26	0.29	0.32	
			Y	0.34	0.38	0.42	

NOTE(1) : APPEND TO TERMINALS M , FLM , CL1 ,CL2 , DO ~ D3

NOTE(2) : THE DISPLAY PATTERN IS ALL "Q"

NOTE(3) : RECOMMENDED LCD DRIVING VOLTAGE MAY FLUCTATE
ABOUT $\pm 0.5V$ BY EACH MODULE

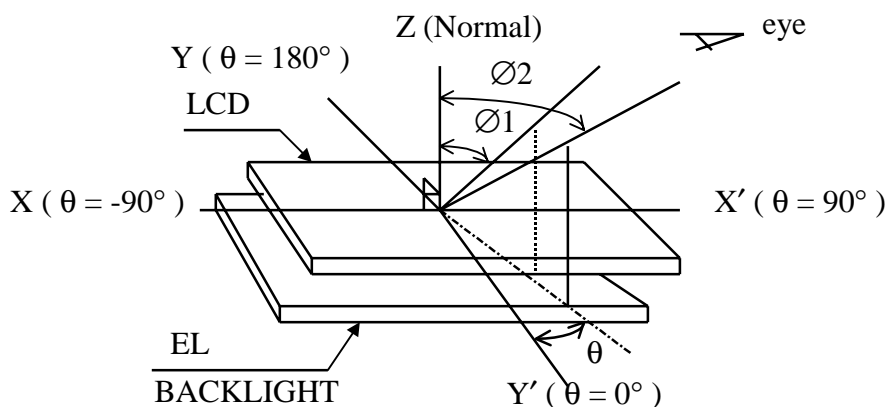
6. OPTICAL CHARACTERISTICS

 $T_a = 25^\circ\text{C}$
 $V_{DD} = 5.0\text{V}$

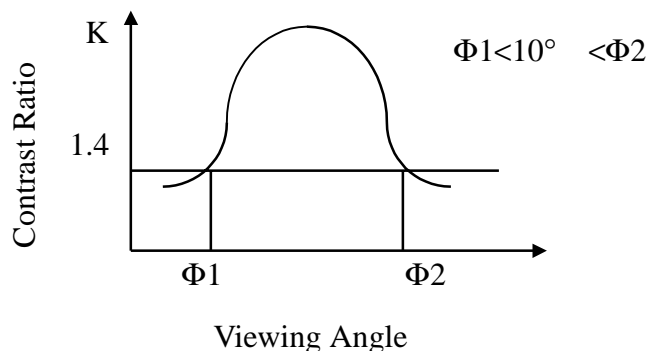
ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
VIEWING ANGLE	$\Phi 2 - \Phi 1$	$K = 1.4$	-----	40	-----	deg.	1,2
CONTRAST RATIO	K	$\Phi = 10^\circ$ $\theta = 0^\circ$	-----	2.1	-----	-----	3
RESPONSE TIME	tr(rise)	$\Phi = 10^\circ$ $\theta = 0^\circ$	-----	250	-----	ms	4
	tf(fall)	$\Phi = 10^\circ$ $\theta = 0^\circ$	-----	400	-----	ms	4
THE BRIGHTNESS OF BACKLIGHTING SOURCE	B	(*) $\Phi = 0^\circ$ $\theta = 0^\circ$	-----	5.5	-----	cd/m ²	

(* Under normal temperature and humidity in a dark room)

NOTE (1) : DEFINITION OF θ AND Φ

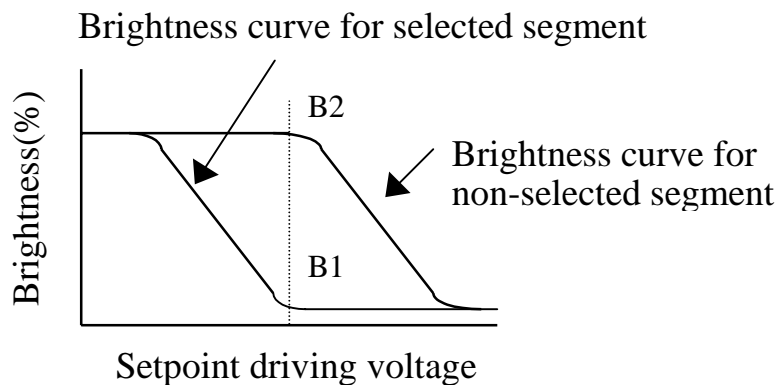


NOTE (2) : DEFINITION OF VIEWING ANGLE $\Phi 1$ AND $\Phi 2$

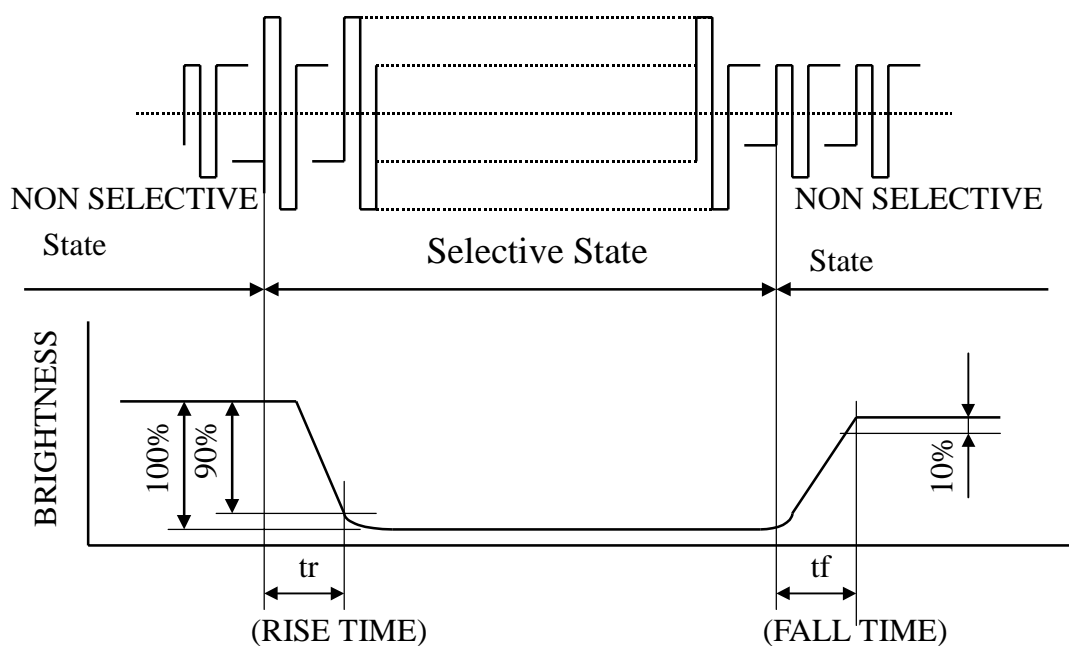


NOTE (3) : DEFINITION OF CONTRAST“K”

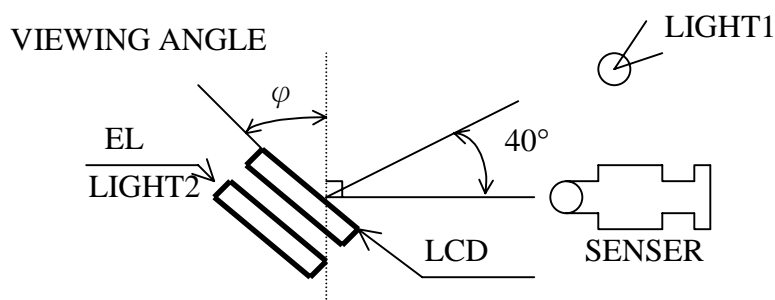
$$K = \frac{\text{Brightness of non-selected segment (B2)}}{\text{Brightness of selected segment (B1)}}$$



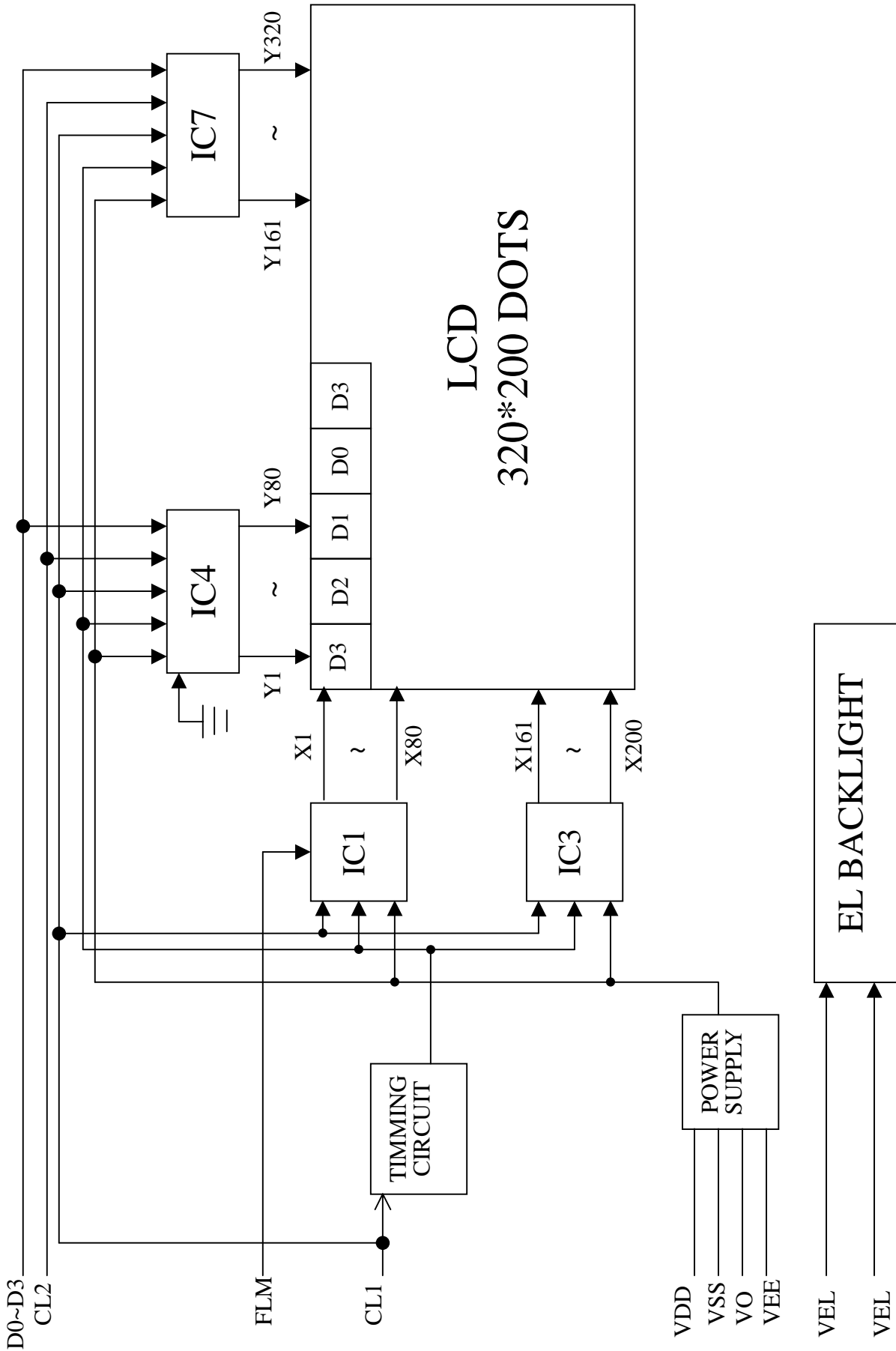
NOTE(4) : THE DEFINITION OF OPTICAL RESPONSE



NOTE (5) : POSITION OF LIGHT

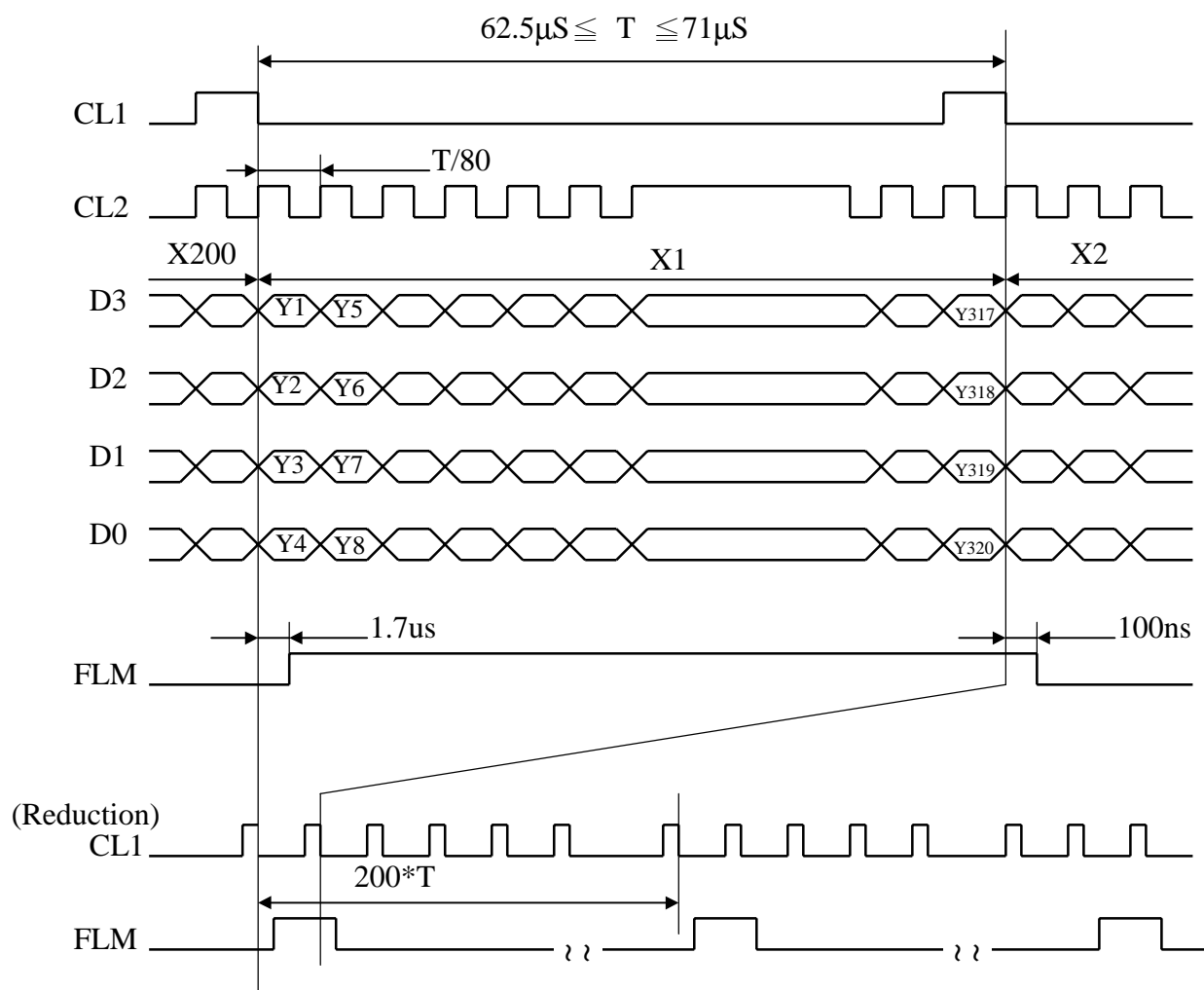


7.BLOCK DIAGRAM



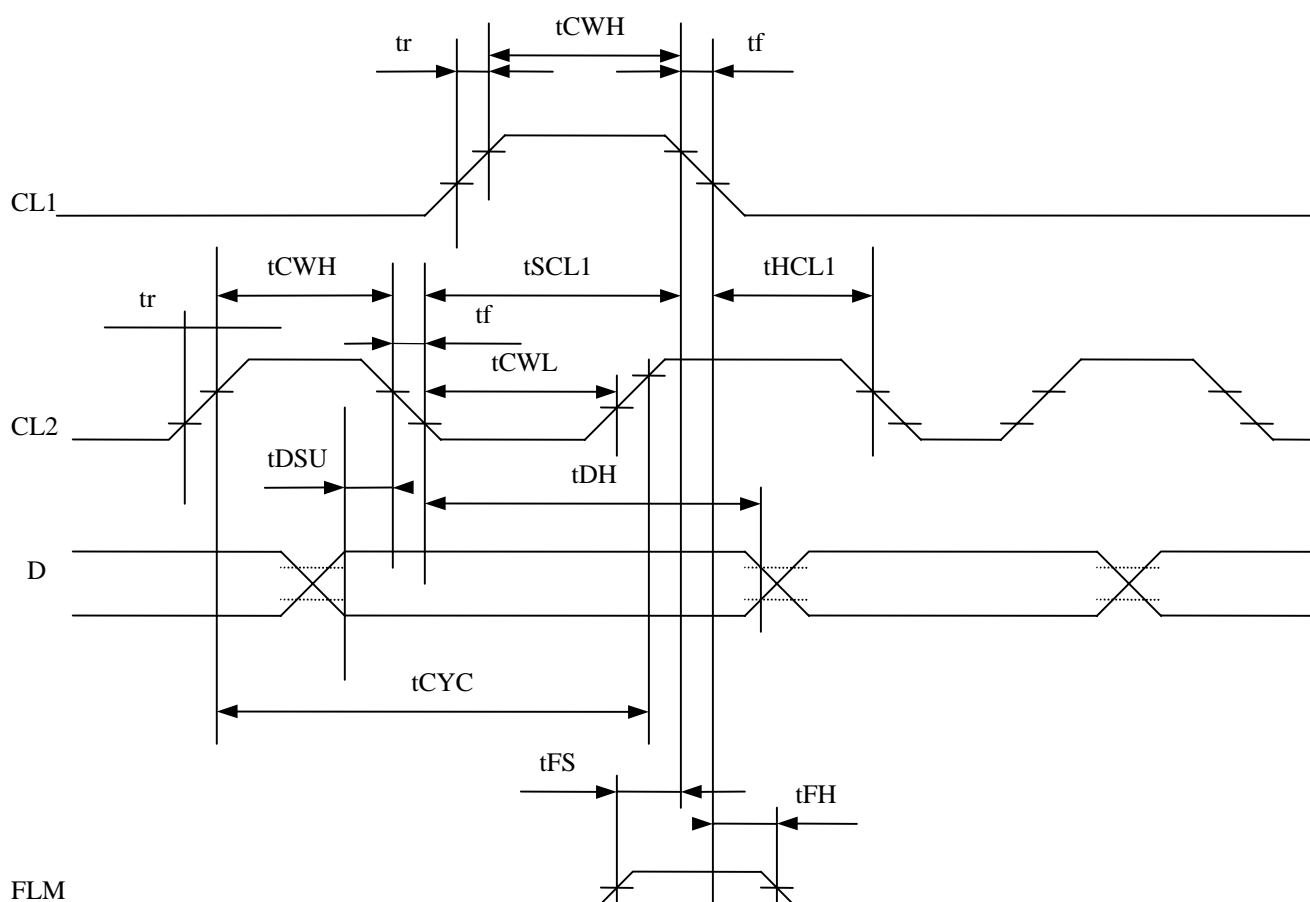
8. TIMING CHARACTERISTICS

8.1 INTERFACE TIMING

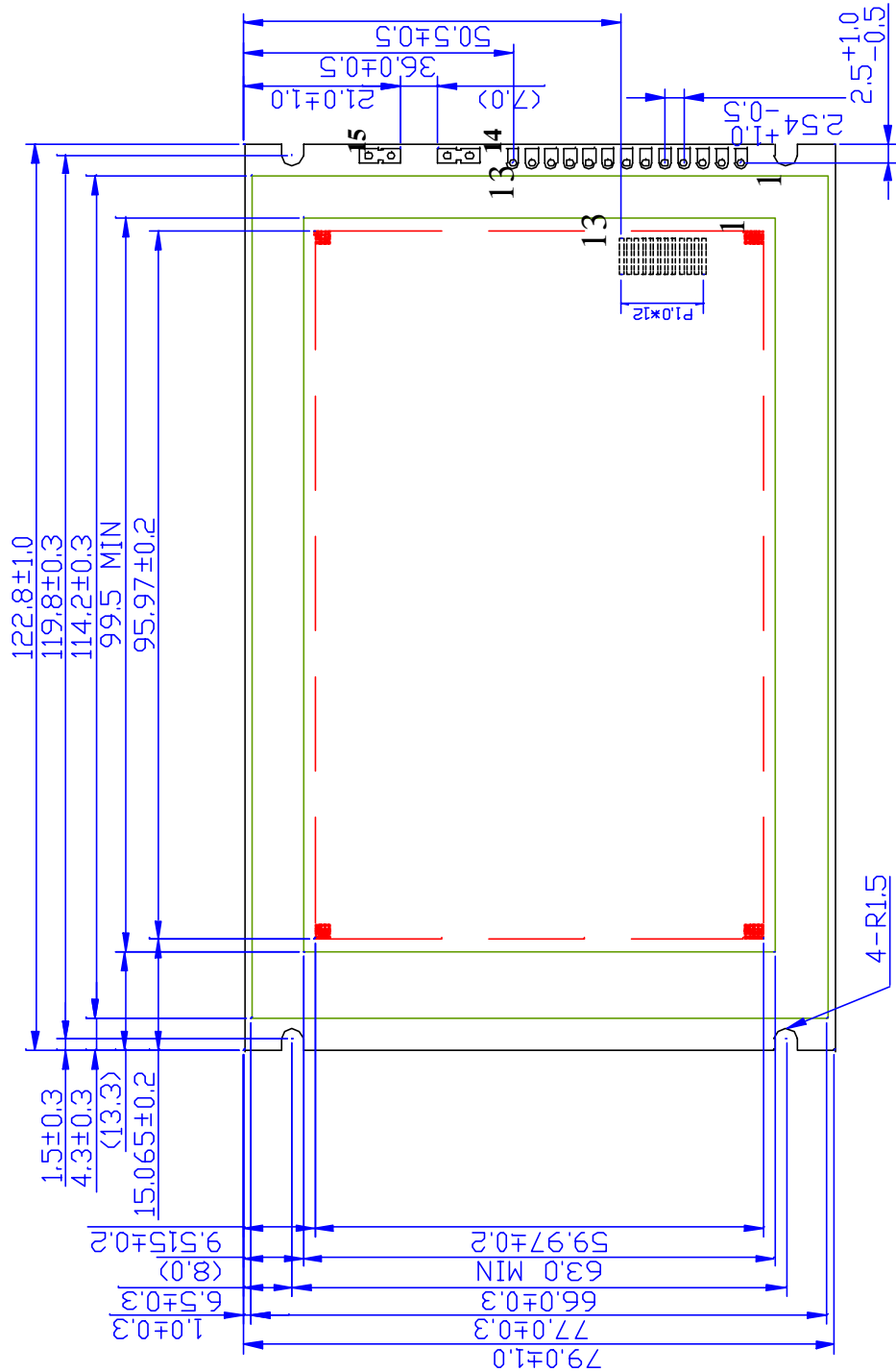


8.2 TIMING CHARACTERISTICS

ITEM	SYMBOL	MIN.	TYP	MAX.	UNIT
CL2 cycle time	tCYC	300	-----	-----	ns
CL2 pulse width (H)	tCWH	100	-----	-----	ns
CL2 pulse width (L)	tCWL	100	-----	-----	ns
CL1 set up time (1)	tSCL1	100	-----	-----	ns
CL1 hold time (2)	tHCL1	100	-----	-----	ns
CLOCK rise/fall time	tr , tf	-----	-----	50	ns
Data set up time	tDSU	80	-----	-----	ns
Data hold time	tDH	80	-----	-----	ns
FLM set up time	tFS	-----	-----	200	ns
FLM hold time	tFH	-----	-----	200	ns



9. OUTLINE DIMENSION

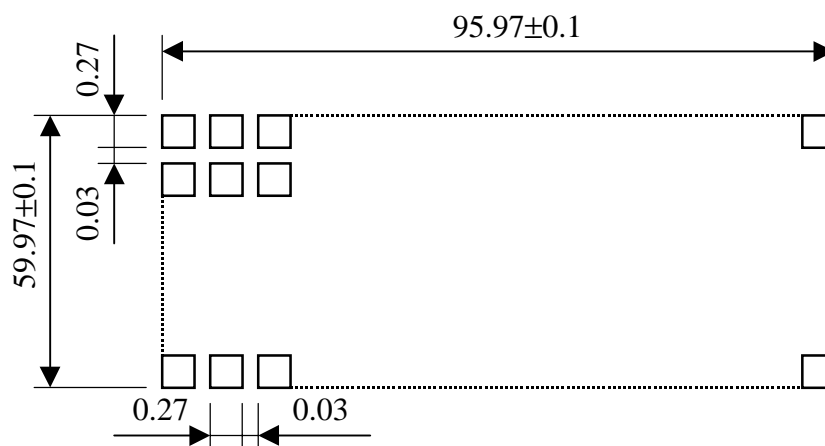


Unit: mm
 SCALE : NTS
 NO SPECIFIED TOLERANCE : ±0.5

9.1 INTERFACE PIN CONNECTION

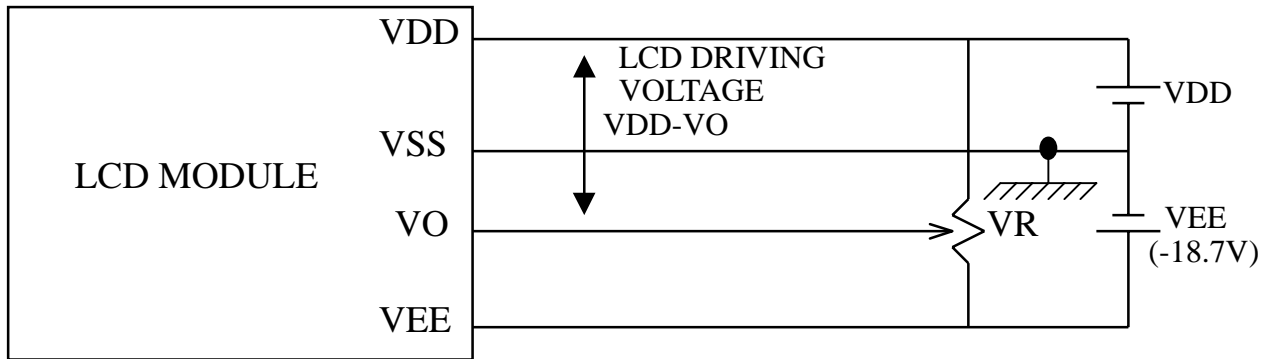
PIN NO	SYMBOL	LEVEL	FUNCTION
1	NC	-----	-----
2	FLM	H→L	THE FLM SIGNAL INDICATING THE BEGINNING OF EACH DISPLAY CYCLE
3	CL1	H→L	DISPLAY DATA LATCH
4	CL2	H→L	DISPLAY DATA SHIFT
5	VO	-----	OPERATING VOLTAGE FOR LCD DRIVING
6	VDD	-----	POWER SUPPLY FOR LOGIC CIRCUIT
7	VSS	-----	GROUND
8	VEE	-----	POWER SUPPLY FOR LCD DRIVING
9	D0	H/L	DISPLAY DATA
10	D1	H/L	
11	D2	H/L	
12	D3	H/L	
13	VSS	-----	GROUND
14	VEL	-----	POWER SUPPLY FOR EL BACKLIGHT
15	VEL	-----	POWER SUPPLY FOR EL BACKLIGHT

9.2 DISPLAY PATTERN.



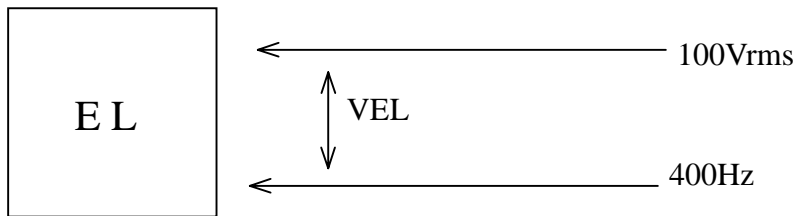
UNIT : mm
 SCALE : NTS
 NOT SPECIFIED TOLERANCE ± 0.01

10. POWER SUPPLY



VR : 10KΩ ~ 20KΩ

10.1 POWER SUPPLY FOR EL



10.2 POWER AND INTERFACE TIMING SEQUENCE

