

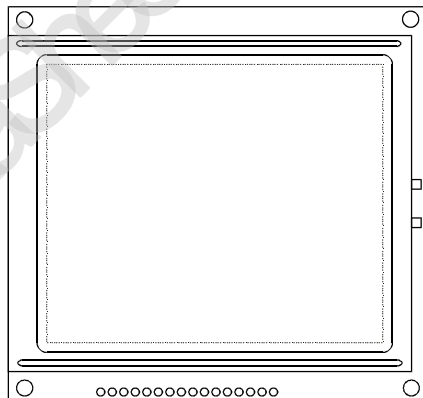
液晶之友 电话: 020-33819057
Http://www.lcdfriends.com

HANTRONIX

PRODUCT SPECIFICATION

HDM240200

240x200 GRAPHICS
LCD DISPLAY MODULE



HANTRONIX, INC. 10080 BUBB RD. CUPERTINO, CA 95014	Q.A.: JB	REV.: 1.0	HDM240200	SHEET 1 OF 16
				DATE: 9/11/98

MECHANICAL DATA

(1) Part Name
 (2) Module Size 88.0 (W)mm X 85.0 (H)mm X MAX 9.5 (D)mm
 (3) Dot Size 0.28 (W)mm x 0.28 (H)mm
 (4) Dot Pitch 0.30 (W)mm x 0.30 (H)mm
 (5) Number of Dots 240 (W) x 200 (H)Dots
 (6) Duty 1/200
 (7) LCD Display Mode STN: ☒ Gray Mode ☐ Yellow Mode ☐ Blue Mode
 FSTN: ☐ Black and White(Normal White/Positive Image)
☐ Black and White(Normal Black/Negative Image)
 Rear Polarizer: ☒ Transflective ☐ Transmissive
 (8) Viewing Direction ☒ 6 O'clock ☐ 12 O'clock ☐ ____ O'clock
 (9) Backlight EL

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ABSOLUTE MAXIMUM RATINGS

(1) ELECTRICAL ABSOLUTE RATINGS

VSS=0V

ITEM	SYMBOL	MIN	MAX	UNIT	COMMENT
Power Supply for Logic	VDD-VSS	0	7.0	V	
Power Supply for LC Drive	VDD-VEE	0	28.0	V	
Input Voltage	VI	VSS	VDD	V	
Static Electricity	—	—	—	—	Note 1

Note 1 LCM should be grounded during handling LCM.

(2) ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

ITEM	OPERATING		STORAGE	
	MIN.	MAX.	MIN.	MAX.
Ambient Temperature	0	50	-20	70
Humidity(Without Condensation)	Note 1,3		Note 2,3	

Note 1 Ta ≤ 50°C : 85%RH max

Ta > 50°C : Absolute humidity must be lower
than the humidity of 85%RH at 50°C

Note 2 Ta at -20°C will be < 48hrs, at 70°C will be < 120hrs

Note 3 Background color changes slightly depending on ambient temperature.
This phenomenon is reversible.

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ELECTRICAL CHARACTERISTICS

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Logic Circuit Power Supply	VDD-VSS	—	2.85 3.40	3.0 3.3V	3.15 3.5	V ✓
LCD Driver Power Supply	VDD-VO	1/13 Bics 25°C	—	20.2	—	V
Input Voltage	VIH	H level	0.7VDD	VDD	—	V
	VIL	L level	—	VSS	0.3VDD	V
Supply Current for Logic	IDD	VDD = 3.0V	—	—	10.0	mA
Supply Current for LCD	IEE	VDD-VO = 20.2V	—	—	5.0	mA
EL Power Supply Current	IEL	VEL=110V(AC) 400Hz	—	—	10.0	mA

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OPTICAL CHARACTERISTICS

AT V_{OP}

ITEM MODE		Cr(Contrast Ratio)		θ (Viewing Angle)		ϕ (Viewing Angle)	
		25℃		25℃		25℃	
		MIN.	TYP.	MIN.	TYP.	MIN.	TYP.
S	A	4	8	—	50	—	40
note		NOTE6		NOTE5			

AT $\phi=0^\circ$ $\theta=0^\circ$

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
Response Time (rise)	Tr	0℃	—	—	—	ms	NOTE 2
		25℃	—	130	260		
		50℃	—	—	—		
Response Time (fall)	Tf	0℃	—	—	—	ms	NOTE 2
		25℃	—	220	440		
		50℃	—	—	—		

note:

S: TRANSFLECTIVE
A: GRAY

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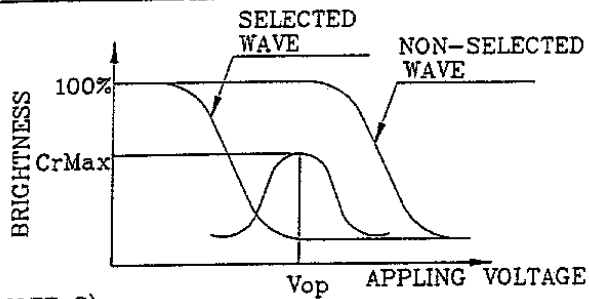
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(NOTE 1)

Definition of Operation Voltage(V_{op})



*Conditions

Viewing Angle : 0

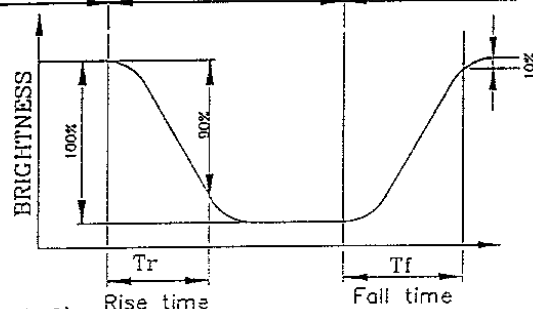
Frame Frequency: 70Hz

Applying Waveform: 1/N duty 1/a bias

(NOTE 2)

Definition of Response Time(T_r, T_f)

NON-SELECTED CONDITION SELECTED CONDITION NON-SELECTED CONDITION



*Conditions

Operating Voltage: V_{op}

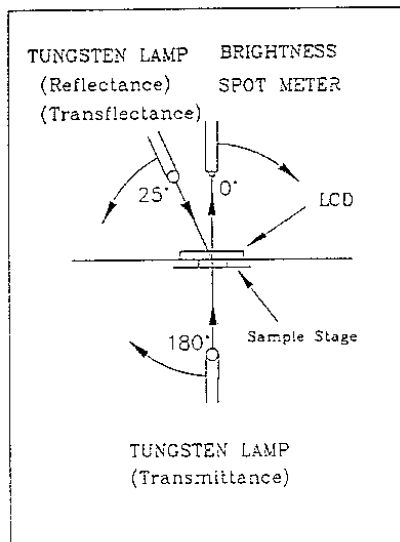
Viewing Angle: 0

Frame Frequency: 70Hz

Applying Waveform: 1/N duty 1/a bias

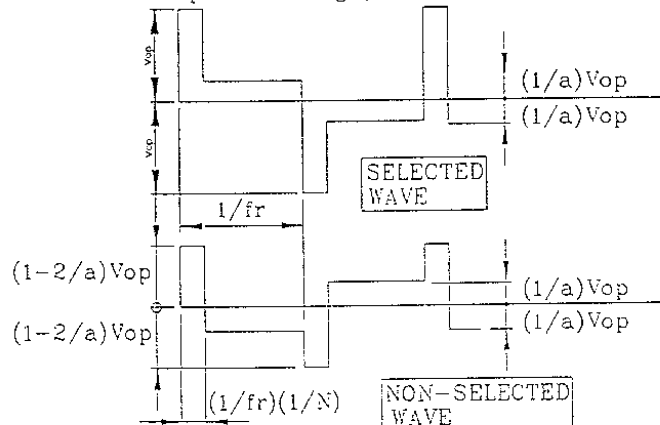
(NOTE 3)

Description of Measuring Equipment and Driving Waveforms



CONST.
TEMP.
CHAMBER

Multiplex Driving (1/N duty 1/a bias)



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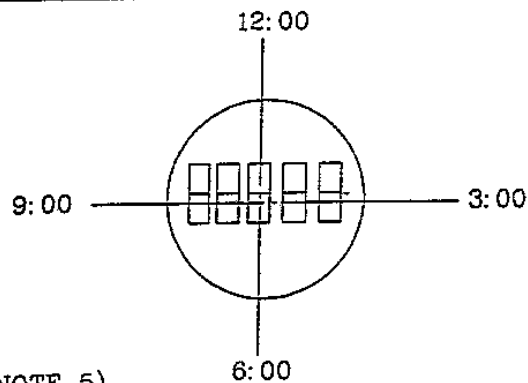
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(NOTE 4)

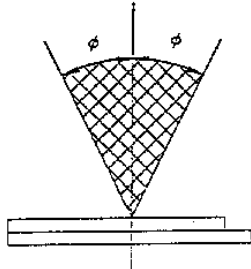
Definition of Viewing Direction



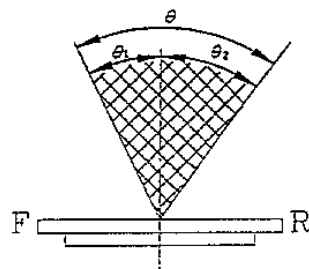
(NOTE 5)

Definition of Viewing Angle

R-L Direction



F-R Direction



*Conditions

Operating Voltage: V_{op}

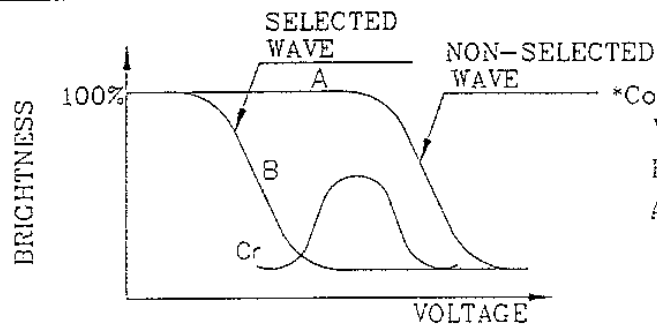
Frame Frequency: 70Hz

Applying Waveform: 1/N duty 1/a bias

$$\theta = \theta_1 + \theta_2$$

(NOTE 6)

Definition of Contrast Ratio (Cr)



*Conditions

Viewing Angle : 0

Frame Frequency: 70Hz

Applying Waveform: 1/N duty 1/a bias

$$\text{Contrast Ratio : } Cr = A/B$$

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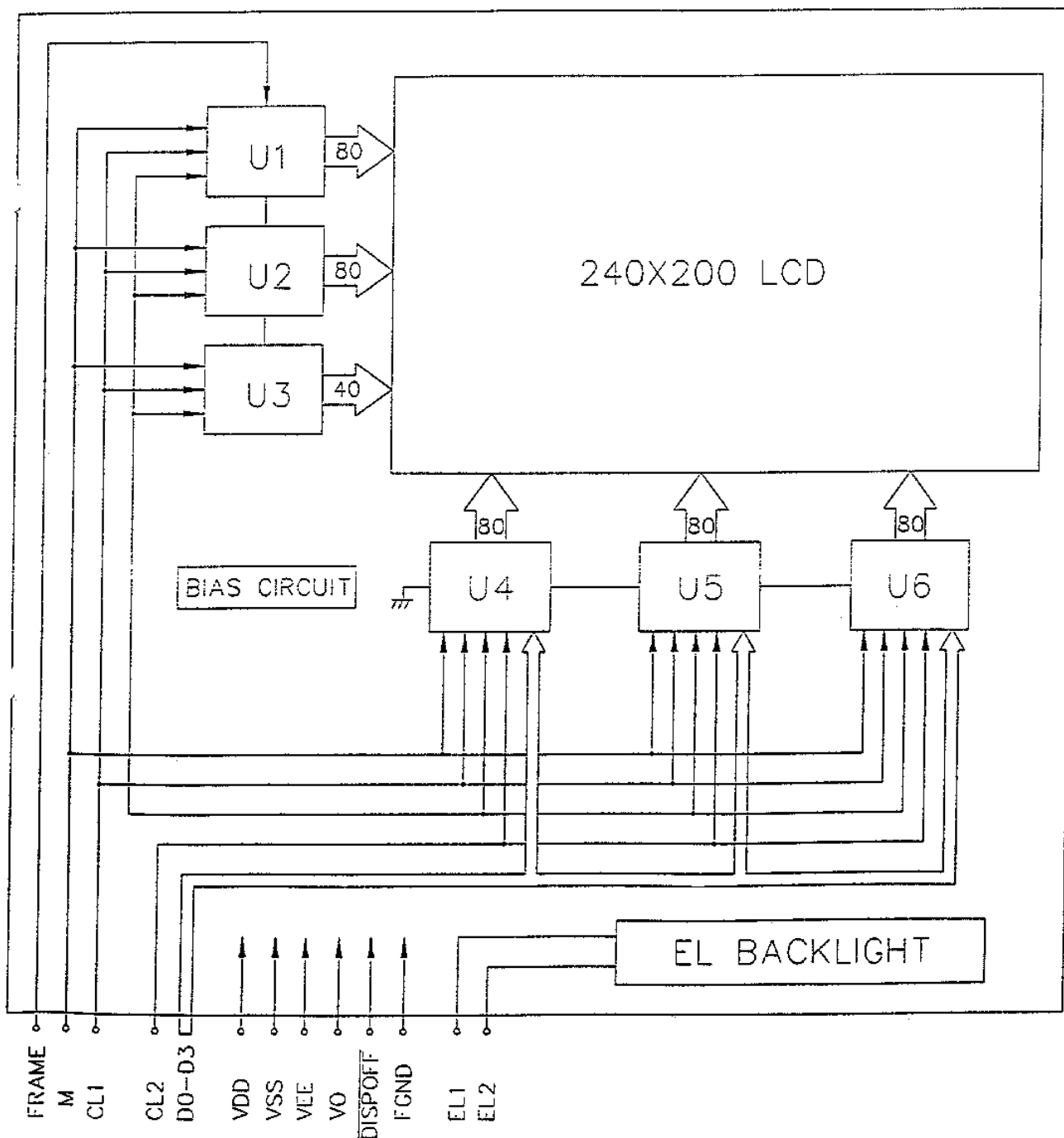
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BLOCK DIAGRAM



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INTERNAL PIN CONNECTION

Pin No.	Symbol	Function	Level
1	VDD	Power Supply for Logic (+5V)	
2	VSS	Signal GND(0V)	
3	FRAME	Frame Signal	H
4	CL1	Display Data Latch Clock	H → L
5	CL2	Display Data Shift Clock	H → L
6	M	Control Signal for AC Driving	H/L
7	D0	Display Data	H/L
8	D1	Display Data	H/L
9	D2	Display Data	H/L
10	D3	Display Data	H/L
11	$\overline{\text{DISPOFF}}$	Display Off	L
12	FGND	Frame GND	
13	VEE	Power Supply for LCD Driving	
14	VO	Power Supply for LCD Driving	
15	EL1	Power Supply for EL B/L	
16	EL2	Power Supply for EL B/L	

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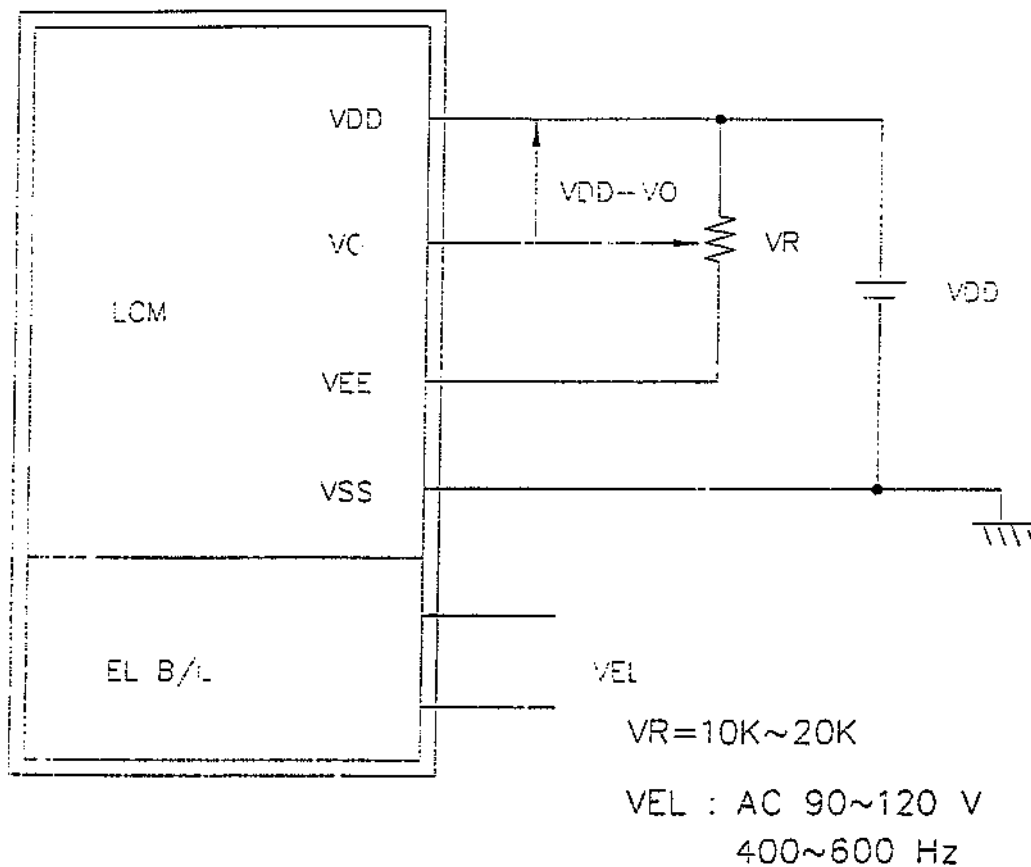
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POWER SUPPLY



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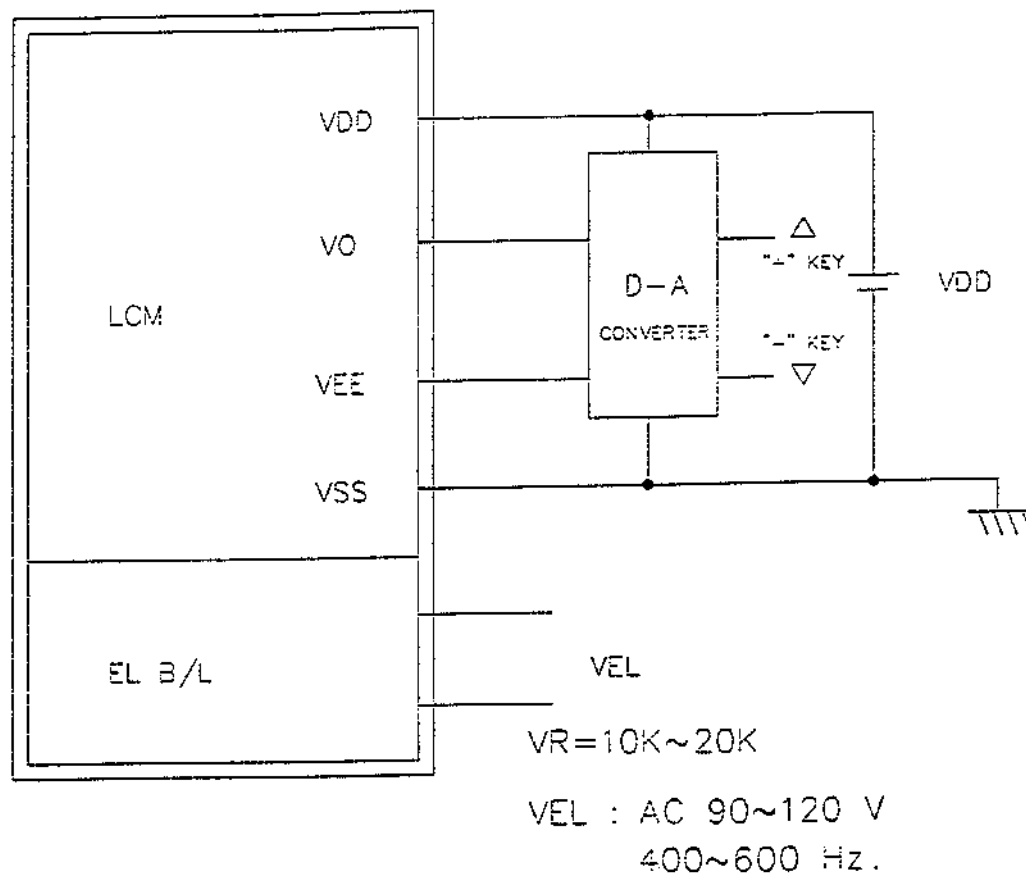
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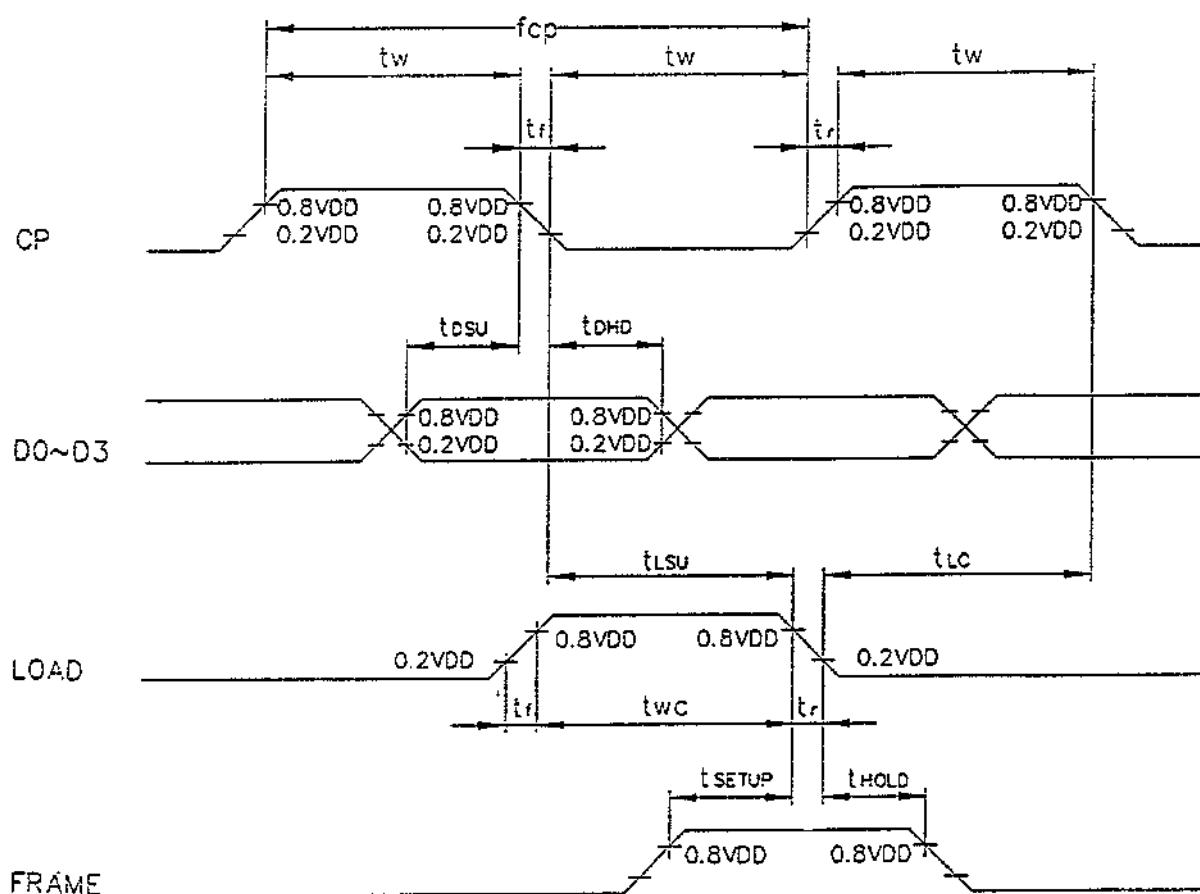
POWER SUPPLY



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TIMING CHARACTERISTICS

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT
CLOCK FREQUENCY	f _{cp}	—	—	6.5	MHZ
CLOCK PULSE WIDTH	t _w	63	—	—	ns
CLOCK RISE,FALL TIME	t _r , t _f	—	—	20	ns
DATA SET UP TIME	t _{osU}	50	—	—	ns
DATA HOLD TIME	t _{oHd}	50	—	—	ns
LOAD SET UP TIME	t _{lS_U}	80	—	—	ns
LOAD — CLOCK TIME	t _{lC}	80	—	—	ns
"FRAME" SET UP TIME	t _{SETUP}	100	—	—	ns
"FRAME" HOLD TIME	t _{HOLD}	100	—	—	ns
"LOAD" PULSE WIDTH	t _{wc}	125	—	—	ns



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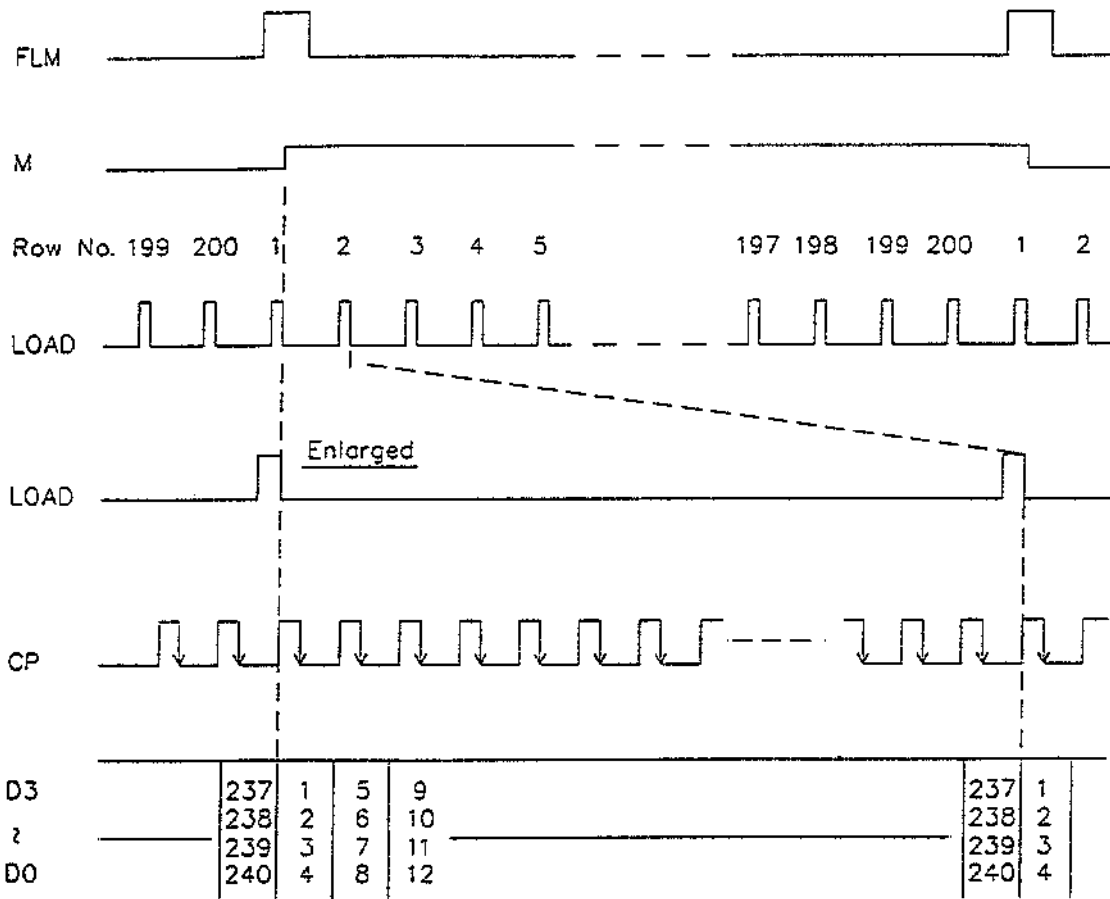
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TIMING CHART OF INPUT SIGNALS



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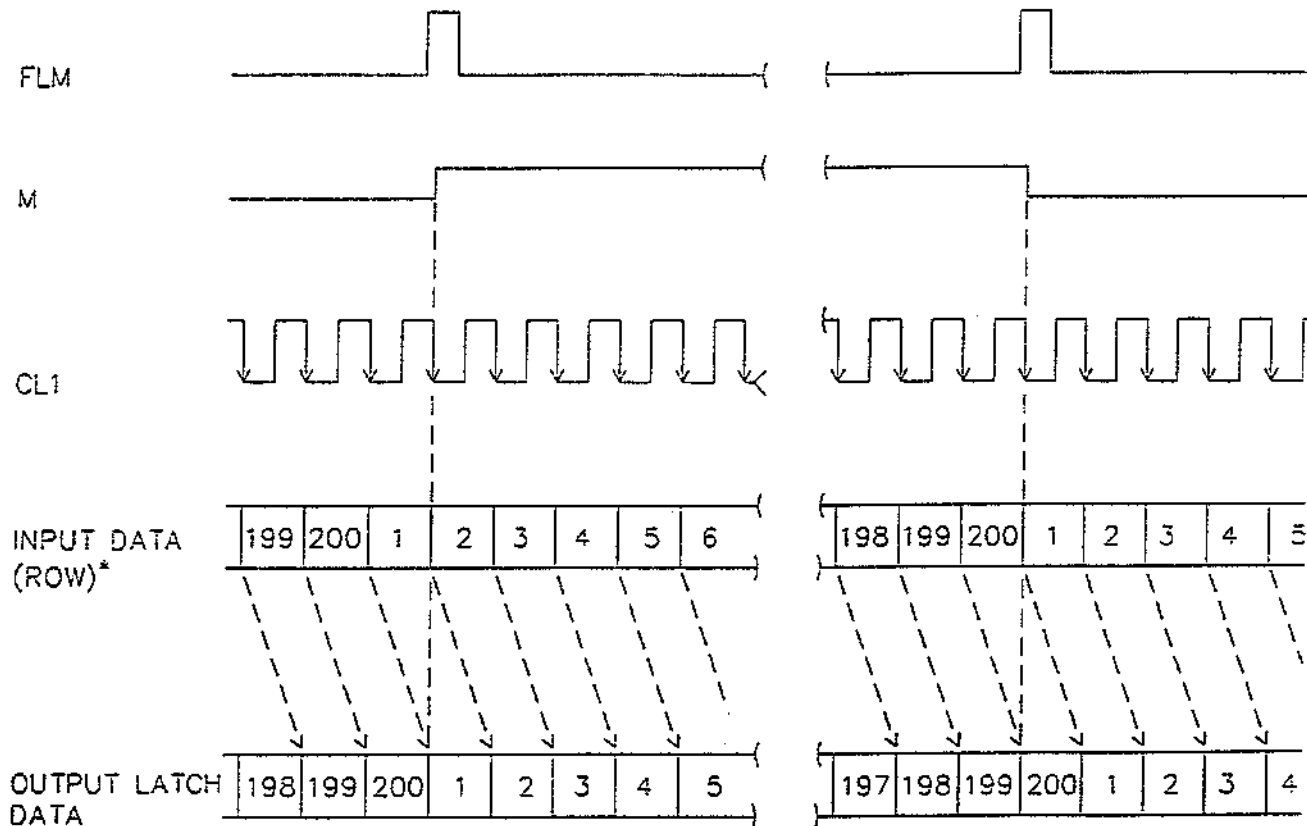
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RELATION OF INPUT DATA AND OUTPUT LATCH DATA



* ONE ROW DATA INCLUDE 80 COLUMN DATA,
ONE COLUMN DATA INCLUDE 4 BIT DATA

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DISPLAY PATTERN

#001	D3	D2	D1	D0	D3							D0	D3	D2	D1	D0
#002	D3	D2	D1	D0	D3							D0	D3	D2	D1	D0
Data Input: Terminal : Dots (Row) on Display ----- D3 : dot 1, dot 5 dot 233, dot 237 D2 : dot 2, dot 6 dot 234, dot 238 D1 : dot 3, dot 7 dot 235, dot 239 D0 : dot 4, dot 8 dot 236, dot 240																
#199	D3	D2	D1	D0	D3							D0	D3	D2	D1	D0
#200	D3	D2	D1	D0	D3							D0	D3	D2	D1	D0
#1	#2	#3	#4									#236	#237	#238	#239	#240

200 DOTS

240 DOTS

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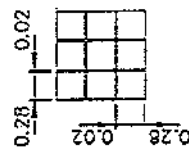
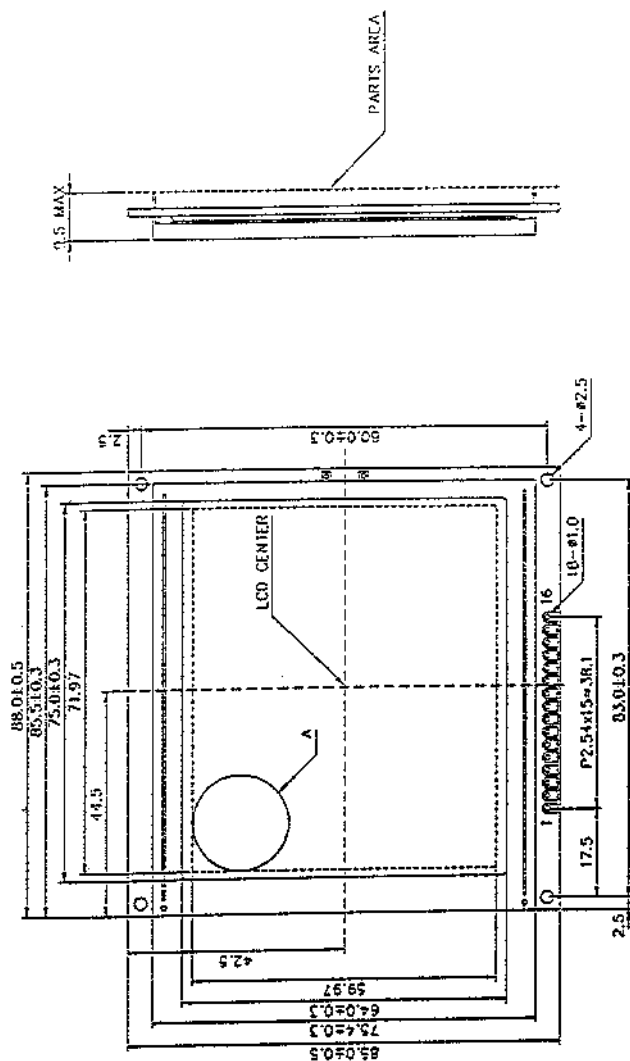
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NOTES :

1. FRONT POLARIZER: Transmissive
2. REAR POLARIZER: Transflective
3. MODE: GRAY
4. EL BACKLIGHT TYPE
5. TOLERANCE NO SPECIFIED: $\pm 0.5\text{mm}$

A DETAIL(240 X 200)

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