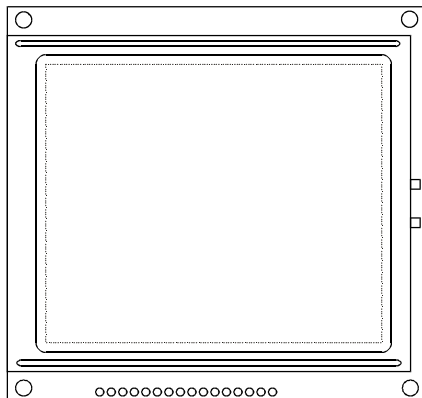




PRODUCT SPECIFICATION

HDM240200

240x200 GRAPHICS
LCD DISPLAY MODULE



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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 \leq 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	3.0	3.15	V
			3.40	3.3V	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

OPTICAL CHARACTERISTICS

AT V_{OP}

ITEM		Cr(Contrast Ratio)		θ (Viewing Angle)		ϕ (Viewing Angle)	
		25 τ		25 τ		25 τ	
MODE		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 τ	—	—	—	ms	NOTE 2
		25 τ	—	130	260		
		50 τ	—	—	—		
Response Time (fall)	Tf	0 τ	—	—	—	ms	NOTE 2
		25 τ	—	220	440		
		50 τ	—	—	—		

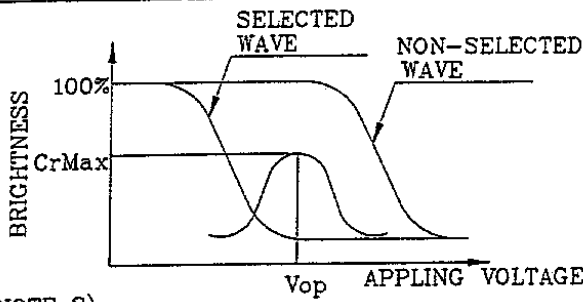
note:

S: TRANSFLECTIVE
A: GRAY

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(NOTE 1)

Definition of Operation Voltage(Vop)



*Conditions

Viewing Angle :0

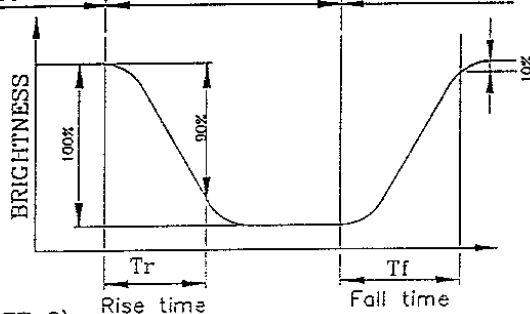
Frame Frequency:70Hz

Appling Waveform: 1/N duty 1/a bias

(NOTE 2)

Definition of Response Time(Tr,Tf)

NON-SELECTED CONDITION SELECTED CONDITION NON-SELECTED CONDITION



*Conditions

Operating Voltage: Vop

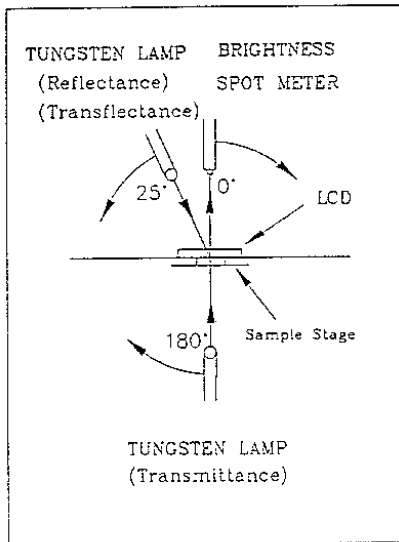
Viewing Angle:0

Frame Frequency:70Hz

Appling Waveform: 1/N duty 1/a bias

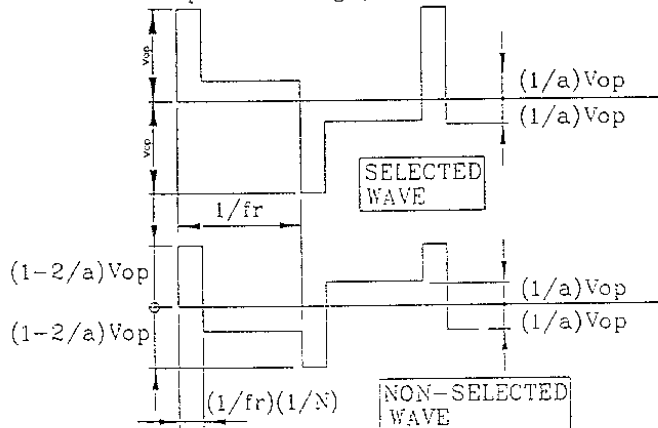
(NOTE 3)

Description of Measuring Equipment and Driving Waveforms



CONST.
TEMP.
CHAMBER

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



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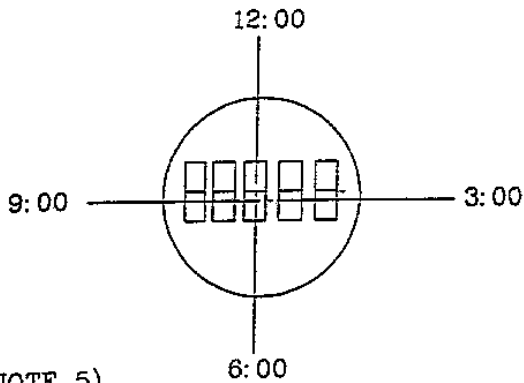
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(NOTE 4)

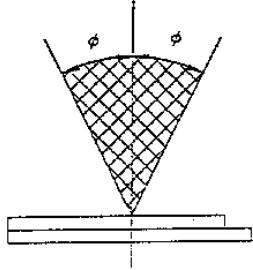
Definition of Viewing Direction



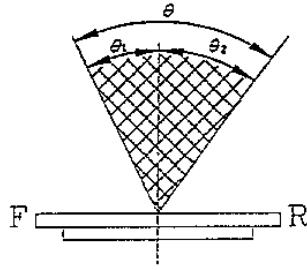
(NOTE 5)

Definition of Viewing Angle

R-L Direction



F-R Direction



*Conditions

Operating Voltage: V_{op}

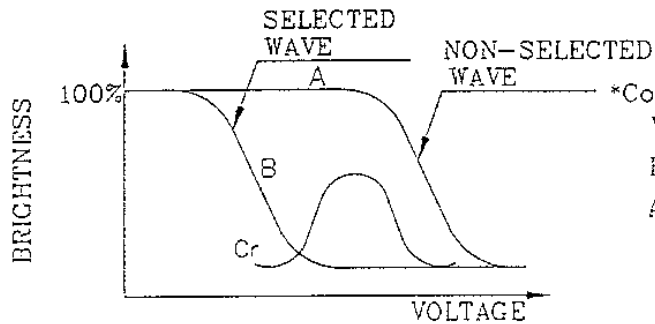
Frame Frequency: 70Hz

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

Contrast Ratio : $Cr = A/B$

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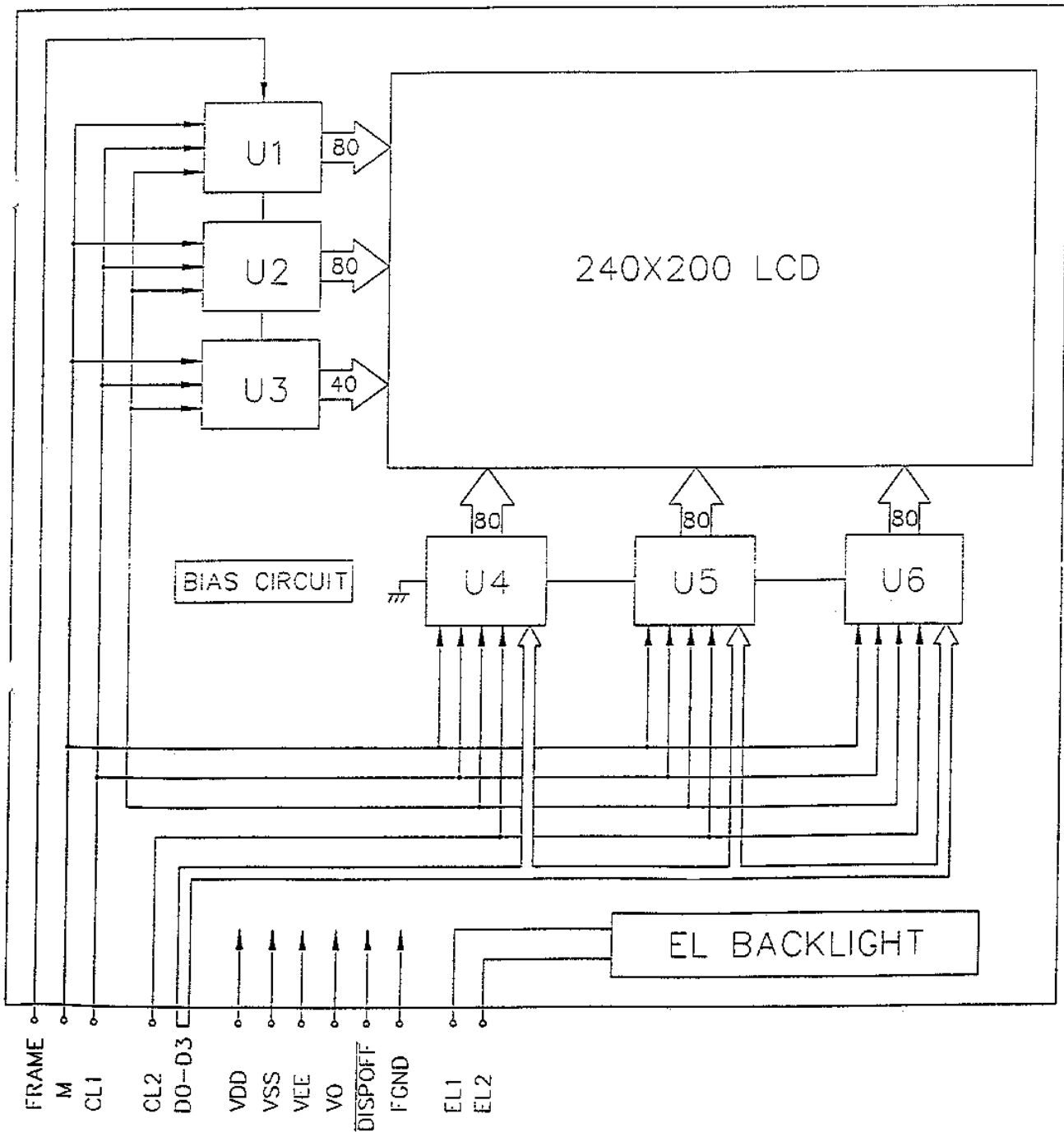
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BLOCK DIAGRAM



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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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JB

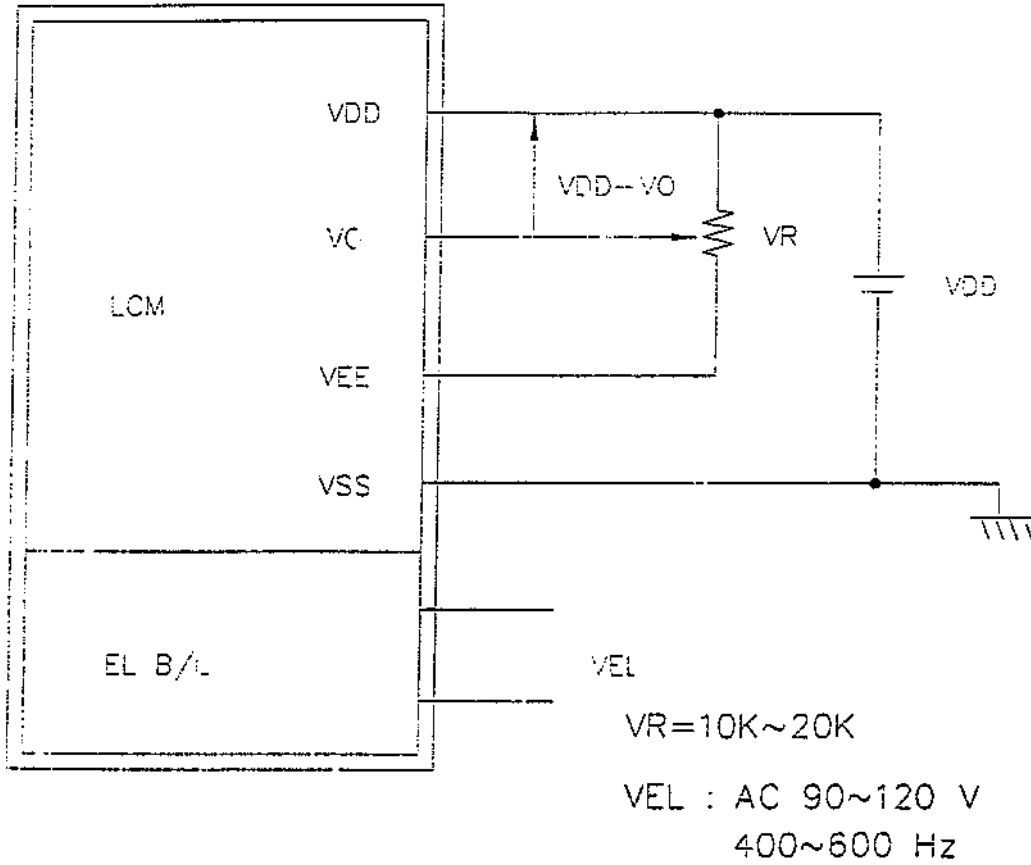
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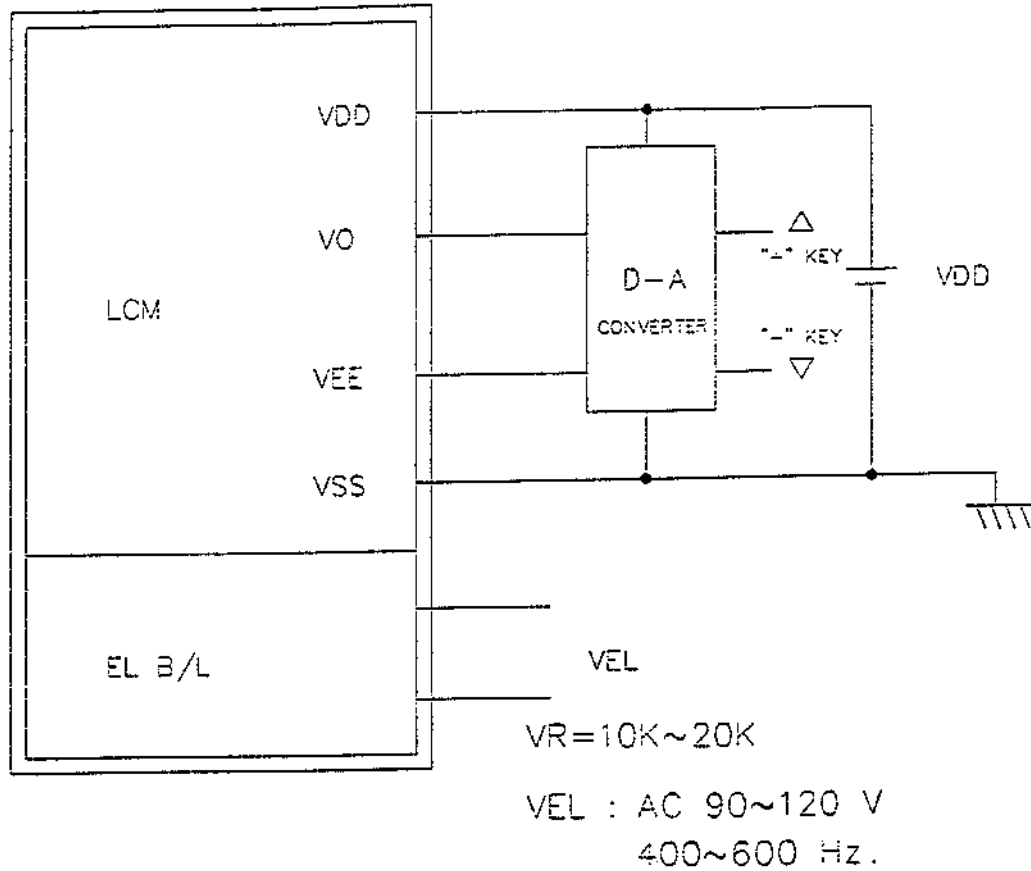
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POWER SUPPLY



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POWER SUPPLY



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Q.A.:
JB

REV.:
1.0

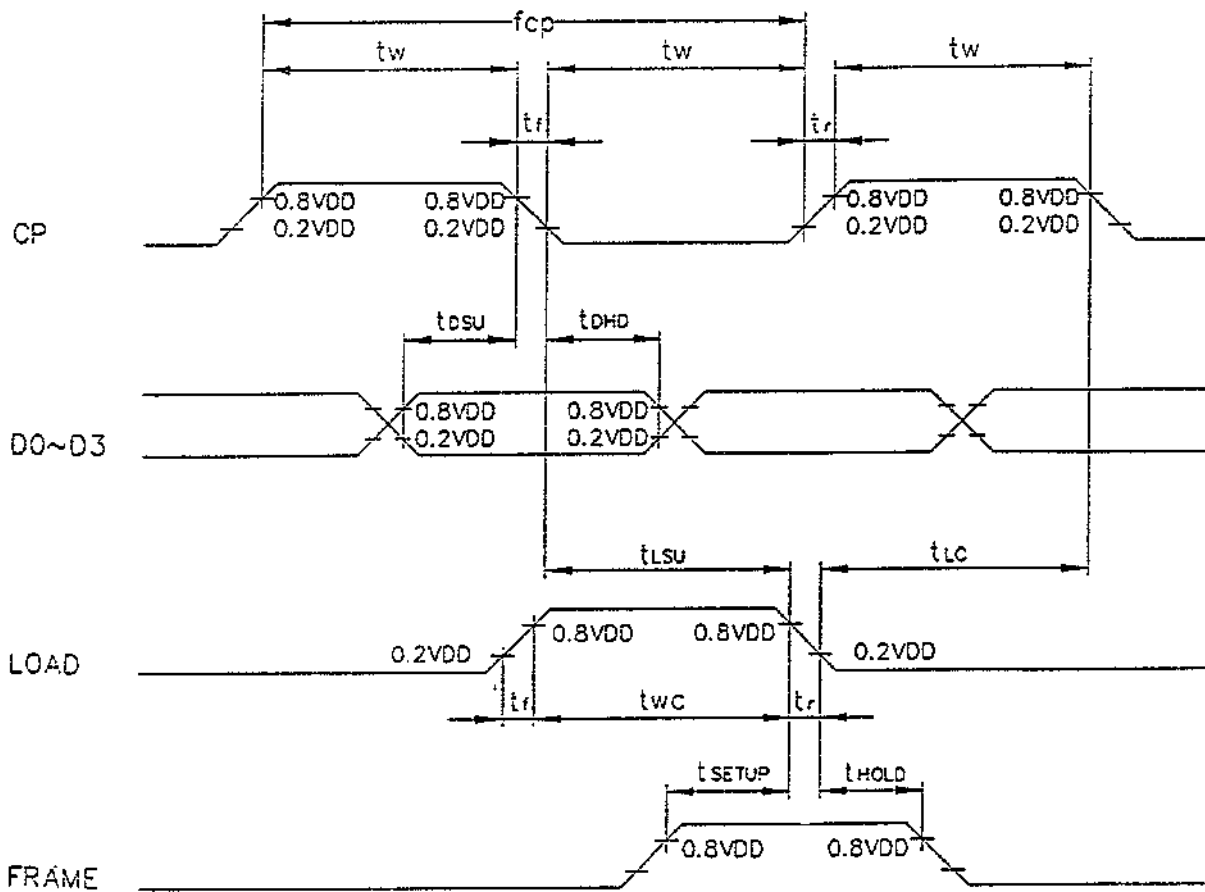
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TIMING CHARACTERISTICS

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_{lSU}	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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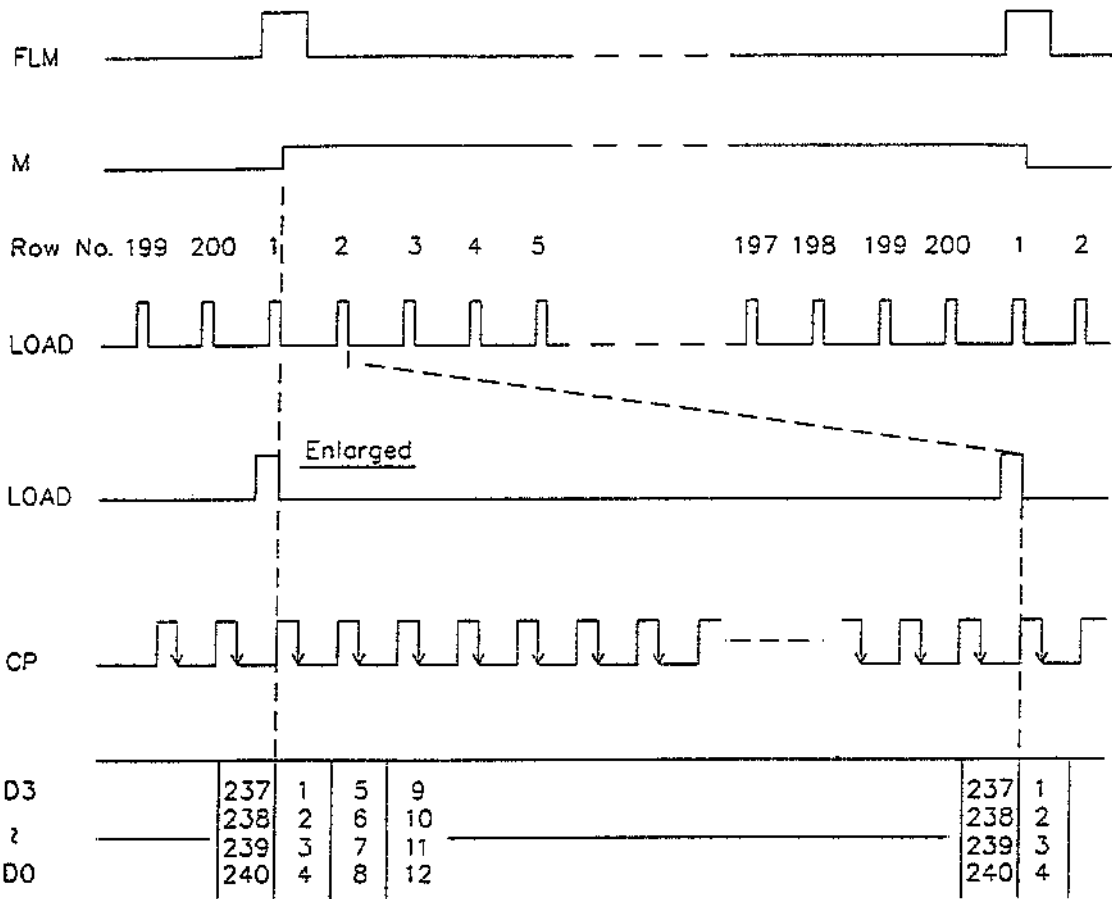
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TIMING CHART OF INPUT SIGNALS



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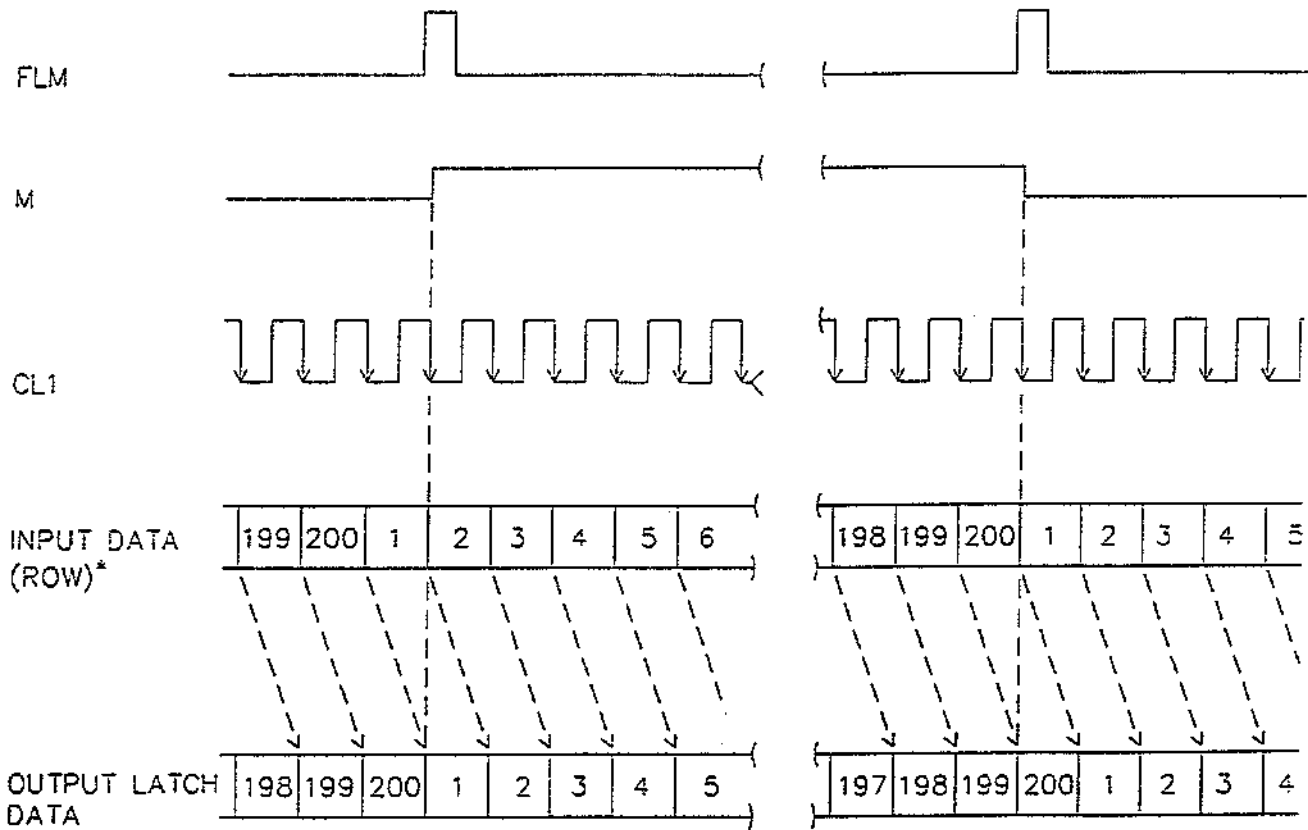
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RELATION OF INPUT DATA AND OUTPUT LATCH DATA



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

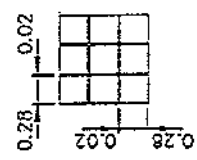
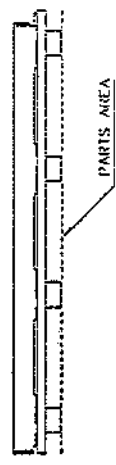
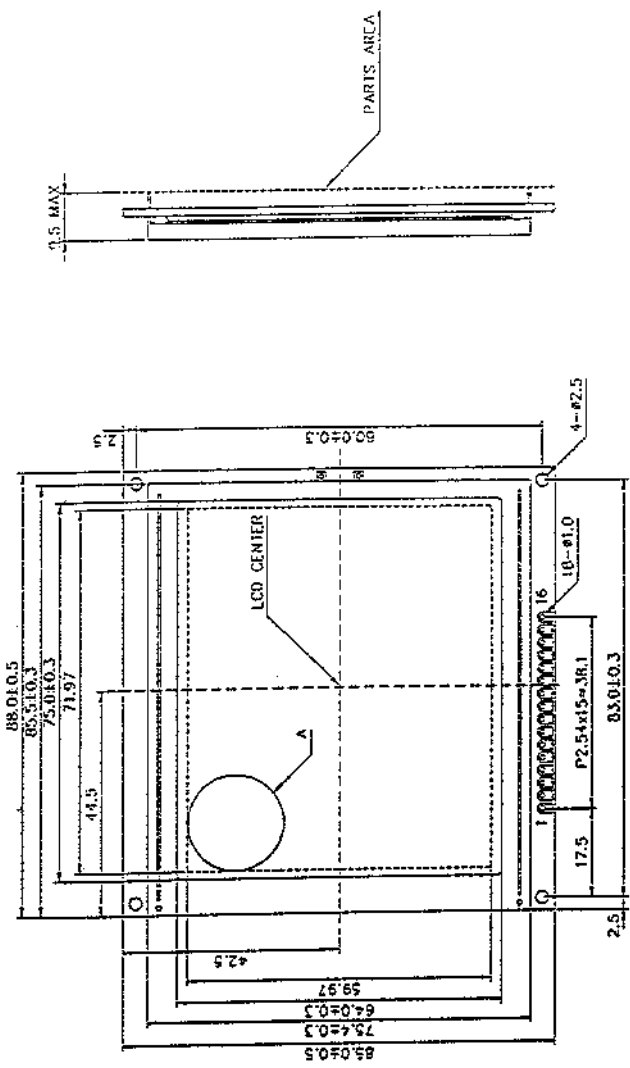
DISPLAY PATTERN

#001	D3	D2	D1	D0	D3					D0	D3	D2	D1	D0																																			
#002	D3	D2	D1	D0	D3					D0	D3	D2	D1	D0																																			
<p>Data Input:</p> <table border="0"> <thead> <tr> <th>Terminal</th> <th>:</th> <th colspan="4">Dots (Row) on Display</th> </tr> <tr> <th colspan="5">-----</th> </tr> </thead> <tbody> <tr> <td>D3</td> <td>:</td> <td>dot 1, dot 5</td> <td>.....</td> <td>dot 233, dot 237</td> <td></td> </tr> <tr> <td>D2</td> <td>:</td> <td>dot 2, dot 6</td> <td>.....</td> <td>dot 234, dot 238</td> <td></td> </tr> <tr> <td>D1</td> <td>:</td> <td>dot 3, dot 7</td> <td>.....</td> <td>dot 235, dot 239</td> <td></td> </tr> <tr> <td>D0</td> <td>:</td> <td>dot 4, dot 8</td> <td>.....</td> <td>dot 236, dot 240</td> <td></td> </tr> </tbody> </table>															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	
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



A DETAIL(240 X 200)

NOTES :

1. FRONT POLARIZER: Transmissive
2. REAR POLARIZER: Transflective
3. MODE: GRAY
4. EL BACKLIGHT TYPE
5. TOLERANCE NO SPECIFIED: ±0.5mm

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