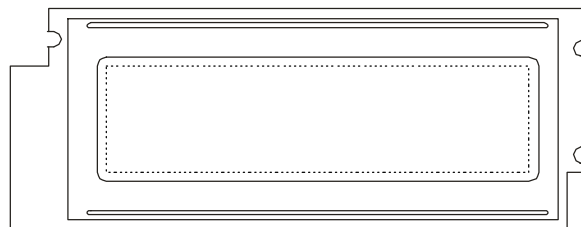




PRODUCT SPECIFICATION

HDM150GS32

150x32 GRAPHICS
LCD DISPLAY MODULE



HANTRONIX, INC. 10080 BUBB RD. CUPERTINO, CA 95014	Q.A.: JK	REV.: 1.1	HDM150GS32	SHEET 1 OF 14
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1. MECHANICAL DATA

(1) Product No. HDM150GS32
 (2) Module Size 116.50 (W)mm x 42.0 (H)mm x MAX15.0 (D)mm
 (LED B.L.)
 116.50 (W)mm x 42.0 (H)mm x MAX9.5 (D)mm
 (W/O B.L.)
 (3) Dot Size 0.50 (W)mm x 0.55 (H)mm
 (4) Dot Pitch 0.55 (W)mm x 0.60 (H)mm
 (5) Duty 1/32
 (6) 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: ☐ Reflective ☐ Transflective ☐ Transmissive
 (7) Viewing Direction ☐ 6 O'clock ☐ 12 O'clock ☐ ____O'clock
 (8) Backlight ☐ W/O ☐ LED ☐ EL
 (9) Weight LED B/L: 70.0 g
 W/O B/L: 54.5 g

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2. ABSOLUTE MAXIMUM RATINGS

(1) ELECTRICAL ABSOLUTE RATINGS

V_{SS}=0V

	SYMBOL	MIN	MAX	UNIT	COMMENT
Power Supply for Logic	VDD-VSS	-0.3	6.5	V	
Input Voltage	V _I	-0.3	VDD	V	
Static Electricity	-	-	-	-	Note 1

Note 1 LCM should be grounded during handling LCM.

(2) ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

ITEM	NORMAL TEMP.				WIDE TEMP.			
	OPERATING		STORAGE		OPERATING		STORAGE	
	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.	MIN.	MAX.
Ambient Temperature	0	50	-20	70	-20	70	-30*	80
Humidity (Without Condensation)	Note 1,3		Note 2,3		Note 3,4		Note 3,5	

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.

Note 4 Ta ≤ 70°C : 75%RH max

Ta > 70°C : Absolute humidity must be lower
than the humidity of 75%RH at 70°C

Note 5 Ta at -30°C will be < 48hrs, at 80°C will be < 120hrs

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3. ELECTRICAL CHARACTERISTICS

(VDD=5V±10%)

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Input Voltage	V _{IH}	H level	0.8VDD	—	VDD	V
	V _{IO}	L level	0	—	0.2VDD	V
Recommended LC Driving Voltage (NORMAL TEMP. LCM)	VDD-V _O	0℃	—	7.5	8.0	V
		25℃	6.3	6.8	7.3	
		50℃	5.6	6.1	—	
Recommended LC Driving Voltage (WIDE TEMP. LCM)	VDD-V _O	-20℃	8.1	8.5	8.9	V
		0℃	7.9	8.3	8.7	
		25℃	7.6	8.0	8.4	
		50℃	7.3	7.7	8.1	
		70℃	6.7	7.1	7.5	
Power Supply Current	I _{DD}	VDD = 5.0V	—	—	5.0	mA
LED Power Supply Current	I _{LED}	V _{BL} = 5.0V _{DC} R _{LED} = 5.0Ω	—	170	—	mA

4.1 OPTICAL CHARACTERISTICS

(FOR NORMAL TEMPERATURE MODE LCM)

AT Vop

MODE	ITEM	Cr(Contrast Ratio)		θ (Viewing Angle)		ϕ (Viewing Angle)	
		25℃		25℃		25℃	
		MIN.	TYP.	MIN.	TYP.	MIN.	TYP.
R	A	2.5	3.4	30	40	20	30
	C	4.0	8.0	40	60	25	40
	J						
S	A						
	C	4.0	7.0	40	60	25	35
	J						
T	E						
	C	3.0	6.0	40	50	20	35
NOTE		NOTE6		NOTE5			

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

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
Response Time (rise)	Tr	0℃	—	470	940	ms	NOTE 2
		25℃	—	140	300		
		50℃	—	70	150		
Response Time (fall)	Tf	0℃	—	520	1000	ms	NOTE 2
		25℃	—	180	350		
		50℃	—	110	220		

NOTE :

R: REFLECTIVE
 S: TRANSFLECTIVE
 T: TRANSMISSIVE
 A: GRAY
 C: YELLOW
 E: BLUE
 G: NORMALLY BLACK
 J: NORMALLY WHITE

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4.2 OPTICAL CHARACTERISTICS

(FOR WIDE NORMAL TEMPERATURE MODE LCM)

AT Vop

ITEM MODE		Cr(Contrast Ratio)		θ (Viewing Angle)		ϕ (Viewing Angle)	
		25℃		25℃		25℃	
		MIN.	TYP.	MIN.	TYP.	MIN.	TYP.
R	A						
	C						
	J						
S	A						
	C	—	6.5	—	60	—	90
	J						
T	E						
	C						
NOTE		NOTE6		NOTE5			

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

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
Response Time (rise)	Tr	-20℃	—	1800	2700	ms	NOTE 2
		0℃	—	400	600		
		25℃	—	150	230		
		50℃	—	70	110		
		70℃	—	70	110		
Response Time (fall)	Tf	-20℃	—	1060	1590	ms	NOTE 2
		0℃	—	250	380		
		25℃	—	105	160		
		50℃	—	65	100		
		70℃	—	60	90		

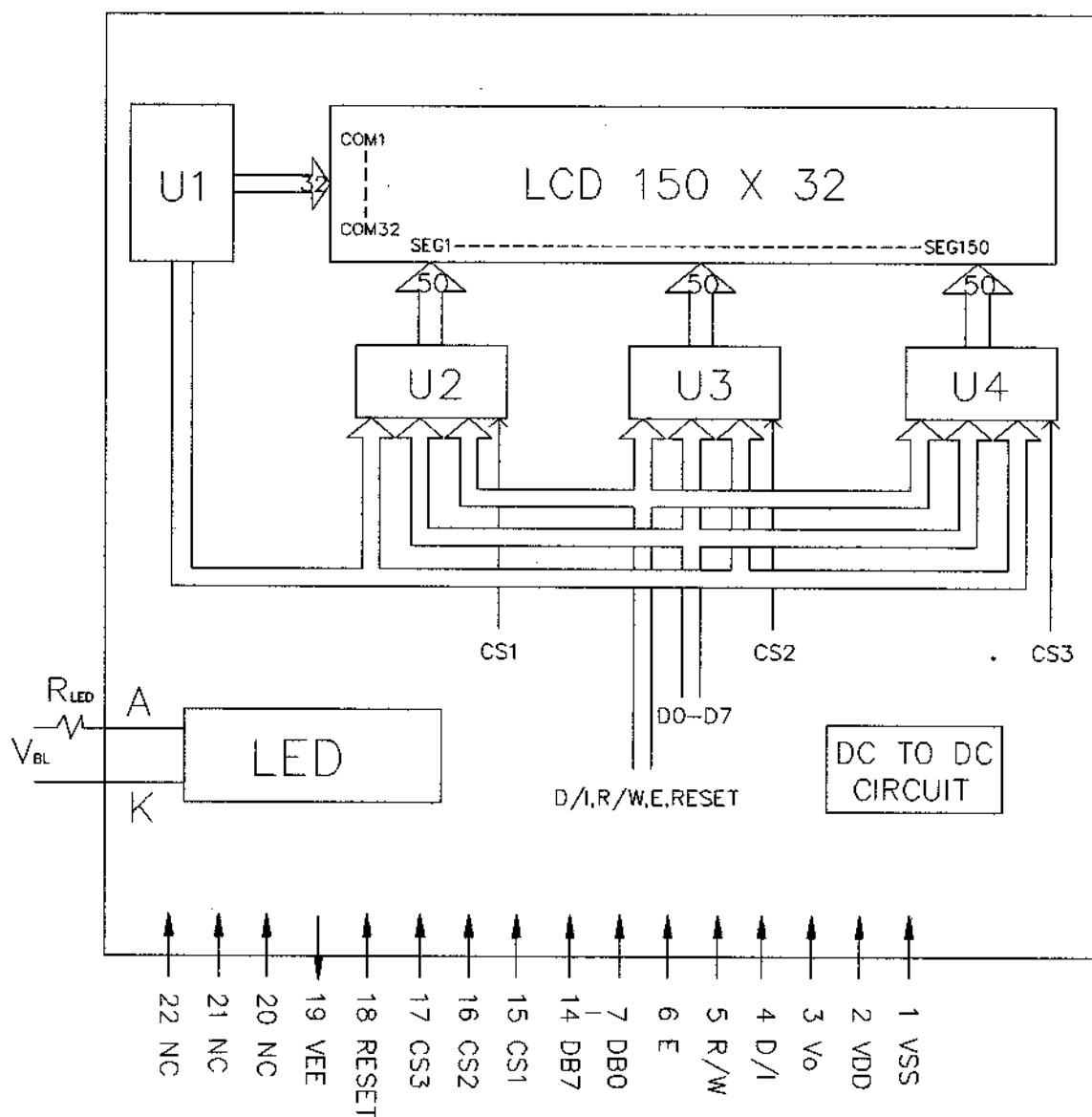
NOTE :

R: REFLECTIVE
S: TRANSFLECTIVE
T: TRANSMISSIVE
A: GRAY
C: YELLOW

E: BLUE
G: NORMALLY BLACK
J: NORMALLY WHITE

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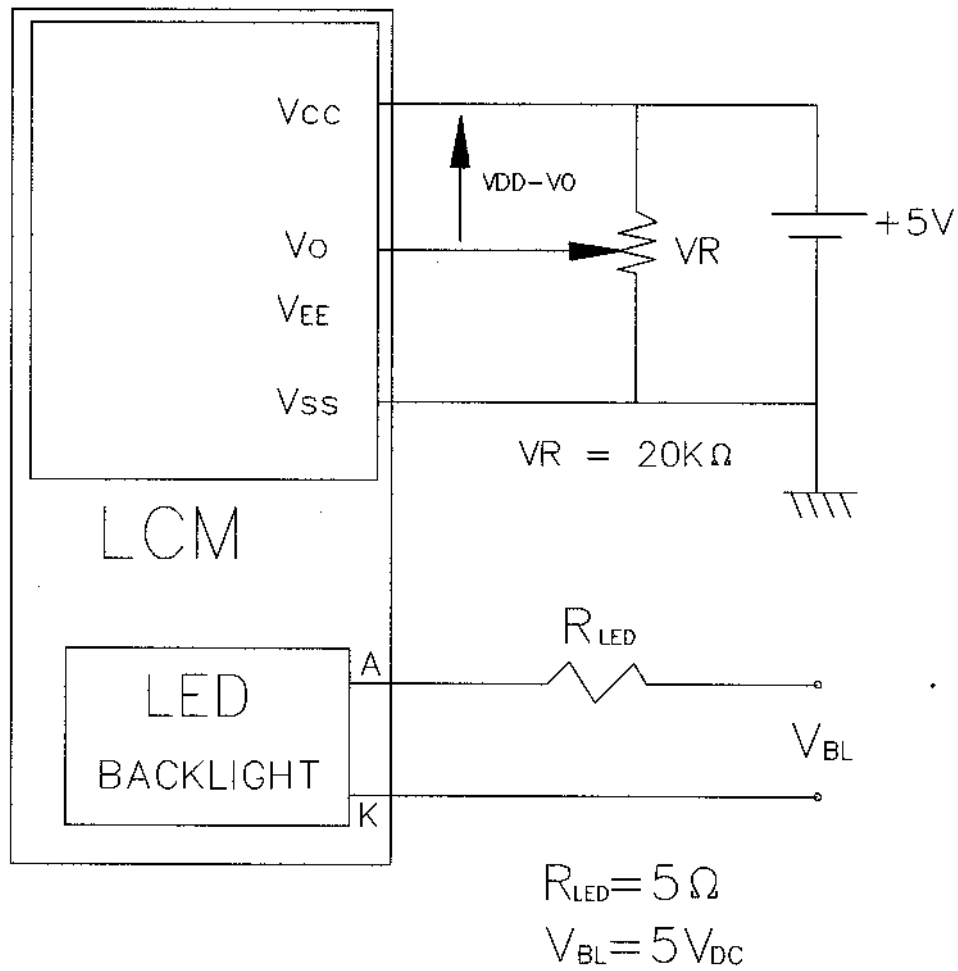
5.BLOCK DIAGRAM



6.INTERNAL PIN CONNECTION

Pin No.	Symbol	Level	Function	
1	VSS	—	0V	POWER SUPPLY
2	VDD	—	+5V	
3	V ₀	—	OPERATING VOLTAGE FOR LCD DRIVING	
4	D/I	H/L	H: DATA INPUT L: INSTRUCTION CODE INPUT	
5	R/W	H/L	H: DATA READ (FROM LCM TO MPU) L: DATA WRITE (FROM MPU TO LCM)	
6	E	H, H→L	ENABLE SIGNAL	
7	DB0	H/L	DATA BUS LINE	
8	DB1	H/L		
9	DB2	H/L		
10	DB3	H/L		
11	DB4	H/L		
12	DB5	H/L		
13	DB6	H/L		
14	DB7	H/L		
15	CS1	H	CHIP SELECT FOR IC1	
16	CS2	H	CHIP SELECT FOR IC2	
17	CS3	H	CHIP SELECT FOR IC3	
18	RESET	L	" L " ACTIVE	
19	VEE	—	POWER SUPPLY FOR LCD DRIVING	
20	NC	—	NONE CONNECTION	
21	NC	—	NONE CONNECTION	
22	NC	—	NONE CONNECTION	

7. POWER SUPPLY



8. TIMING CHARACTERISTICS

Item	Symbol	Test condition	Min	Typ	Max	Unit
Enable cycle time	t_{cyc}	Fig. a, Fig. b	500	—	—	ns
E high level width	P_{VEH}	Fig. a, Fig. b	220	—	—	ns
E low level width	P_{VEL}	Fig. a, Fig. b	220	—	—	ns
E rise/fall time	t_r, t_f	Fig. a, Fig. b	—	—	20	ns
Address set up time	t_{AS}	Fig. a, Fig. b	40	—	—	ns
Address hold time	t_{AH}	Fig. a, Fig. b	10	—	—	ns
Data delay time	t_{DDR}	Fig. b	—	—	140	ns
Data set up time	t_{DSW}	Fig. a	60	—	—	ns
Data hold time (WR)	t_{DHW}	Fig. a	10	—	—	ns
Data hold time (RD)	t_{DHR}	Fig. b	20	—	—	ns

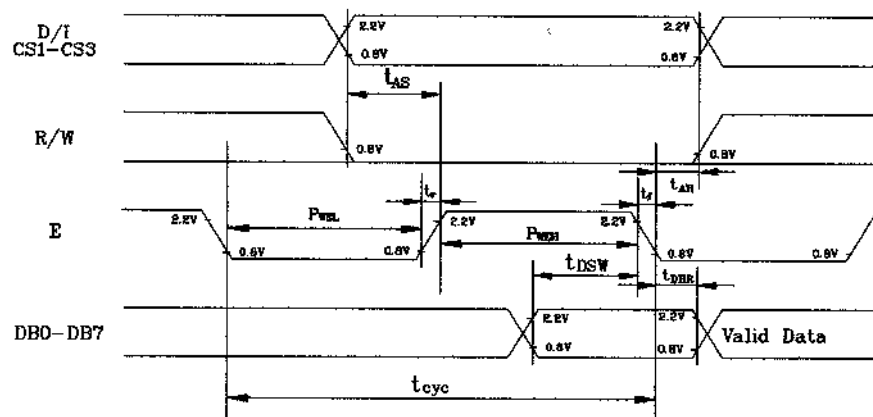


Fig. a Interface timing (data write)

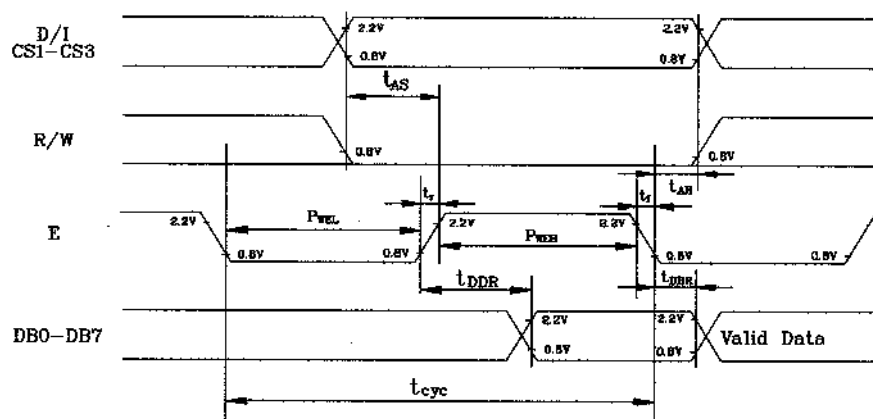


Fig. b Interface timing (data read)

9. RELIABILITY TEST

NO	ITEM	CONDITION			STANDARD	NOTE
1	High Temp. Leaving	70°C	120HR		Appearance without defect	
2	Low Temp. Leaving	-20°C	120HR		Appearance without defect	
3	High Temp. & High Humi. Leaving	40°C 90%RH	120HR		Appearance without defect	
4	Thermal Shock	-20°C, 30min → 25°C, 5min → 60°C, 30min → 25°C, 5min (1cycle)			Appearance without defect	5 cycles

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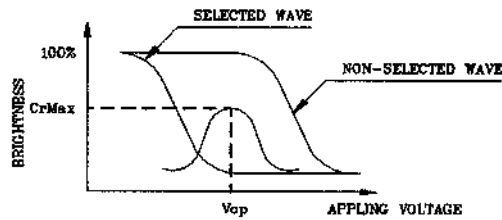
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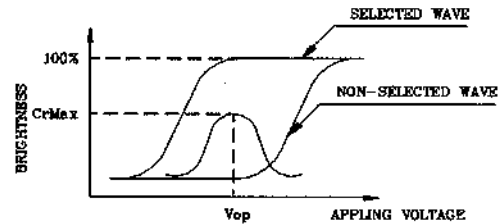
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(NOTE 1)

Definition of Operation Voltage(Vop)



(positive type)



(negative type)

*Conditions

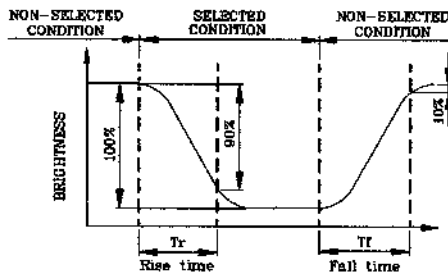
Viewing Angle : 0

Frame Frequency : 70Hz

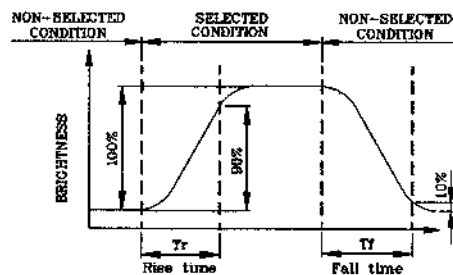
Applying Waveform : 1/N duty 1/a bias

(NOTE 2)

Definition of Response Time(Tr,Tf)



(positive type)



(negative type)

*Conditions

Operating Voltage : Vop

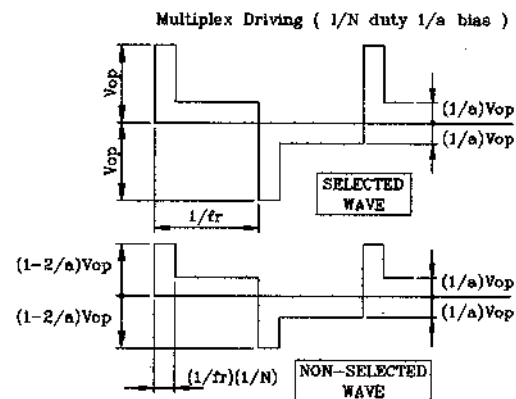
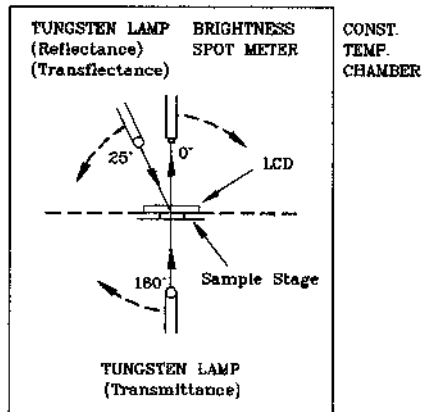
Viewing Angle (θ.φ) : (0,0)

Frame Frequency : 70Hz

Applying Waveform : 1/N duty 1/a bias

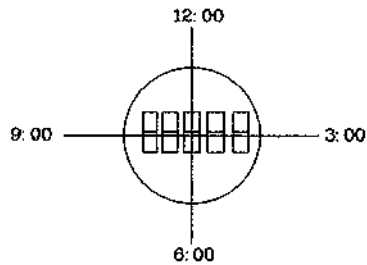
(NOTE 3)

Description of Measuring Equipment and Driving Waveforms



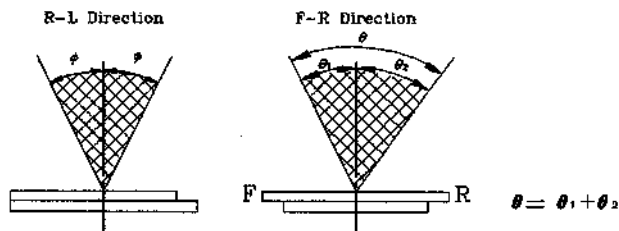
(NOTE 4)

Definition of Viewing Direction



(NOTE 5)

Definition of Viewing Angle

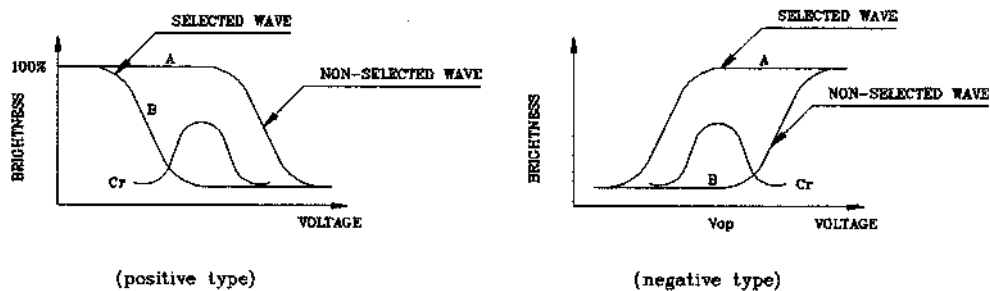


*Conditions

Operating Voltage : Vop
Frame Frequency : 70Hz
Applying Waveform : 1/N duty 1/a bias
Contrast Ratio : larger than 2

(NOTE 6)

Definition of Contrast Ratio (Cr)



*Conditions

Viewing Angle : 0
Frame Frequency : 70Hz
Applying Waveform : 1/N duty 1/a bias

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