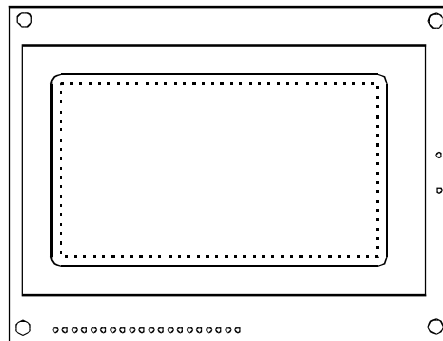




## PRODUCT SPECIFICATION

# HDM64GS12

128 x 64 GRAPHICS  
LCD DISPLAY MODULE



<b>HANTRONIX, INC.</b> 10080 BUBB RD. CUPERTINO, CA 95014	Q.A.: JB	REV.: 2.0	HDM64GS12	SHEET 1 OF 16
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# MECHANICAL DATA

(1) Part Name **HDM 64GS12 - - F**

(2) Module Size 93.0(W)mm X 70.0(H)mm X MAX8.5(D)mm  
(W/O,EL B/L)  
93.0(W)mm X 70.0(H)mm X MAX14.0(D)mm  
(5.2mm LED B/L ,LMC97X005X)  
93.0(W)mm X 70.0(H)mm X MAX12.5(D)mm  
(4.0mm LED B/L ,LMC97X005X8)

(3) Dot Size 0.48 (W)mm x 0.48 (H)mm

(4) Dot Pitch 0.52 (W)mm x 0.52 (H)mm

(5) Number of Dots 128 (W) x 64 (H)Dots

(6) Duty 1/64

(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: ☐ Reflective ☐ Transflective ☐ Transmissive

(8) Viewing Direction ☐ 6 O'clock ☐ 12 O'clock ☐ \_\_\_\_O'clock

(9) Backlight ☐ W/O ☐ EL B/L ☐ LED B/L

(10) Weight W/O B/L: 53.0 g  
EL B/L: 57.5 g  
LED B/L: 78.5 g

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# ELECTRICAL CHARACTERISTICS

( VDD = 5V±10% )

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Input Voltage	VIH	H level	0.7VDD	—	VDD	V
	VIO	L level	0	—	0.3VDD	V
Recommended LC Driving Voltage (Normal Temp. LCM)	VDD-V0	Duty= 1/64	0°C	—	13.3	V
		Bias= 1/9	25°C	11.7	12.5	
			50°C	10.8	11.4	
Recommended LC Driving Voltage (Wide Temp. LCM)	VDD-V0	Duty= 1/64	-10°C	—	11.7	V
		Bias= 1/9	25°C	11.2	12.0	
			70°C	10.4	11.1	
Power Supply Current	IDD	FLM=79 Hz VDD=5.0 V VDD-V0=12.5 V  PATTERN : <div> <div>□</div> <div>■</div> <div>□</div> <div>■</div> <div>□</div> <div>■</div> </div> <div> <div>■</div> <div>□</div> <div>■</div> <div>□</div> <div>■</div> <div>□</div> </div>	—	10.0	—	mA
EL Power Supply Current	I <sub>EL</sub>	V <sub>BL</sub> = 110 Vrms 400 Hz (R <sub>BL</sub> = 0 Ω)	—	—	5.0	mA <sub>rms</sub>
LED Power Supply Current (LMC97X005X)	I <sub>LED</sub>	V <sub>BL</sub> = 5.0 V (R <sub>BL</sub> = 5 Ω)	—	200	—	mA
LED Power Supply Current (LMC97X005X5)		V <sub>BL</sub> = 10.0 V (R <sub>BL</sub> = 10 Ω)	—	200	—	

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# OPTICAL CHARACTERISTICS

## Optical Char. of Normal Temp. Mode

AT Vop

ITEM MODE		Cr(Contrast Ratio)		$\theta$ (Viewing Angle)		$\phi$ (Viewing Angle)	
		25°C		25°C		25°C	
		MIN.	TYP.	MIN.	TYP.	MIN.	TYP.
R	A	3.5	4.5	50	75	20	30
	C	6.0	9.0	60	85	20	35
	J	4.5	7.5	55	80	20	35
S	A	3.0	4.2	50	75	20	30
	C	5.0	8.0	55	85	20	35
	J	4.0	7.0	50	75	20	35
T	E						
	G						
note		NOTE6		NOTE5			

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

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
Response Time (rise)	Tr	0°C	—	600	1200	ms	NOTE 2
		25°C	—	110	220		
		50°C	—	50	100		
Response Time (fall)	Tf	0°C	—	900	1500	ms	NOTE 2
		25°C	—	250	360		
		50°C	—	100	150		

note:

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

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# Optical Char. of Wide Temp. Mode

AT V<sub>OP</sub>

ITEM MODE		Cr(Contrast Ratio)		$\theta$ (Viewing Angle)		$\phi$ (Viewing Angle)	
		25°C		25°C		25°C	
		MIN.	TYP.	MIN.	TYP.	MIN.	TYP.
R	A	3.5	4.2	50	68	20	30
	C	5.0		50		30	35
	J	6.0	8.0	50	70	20	38
S	A	3.5	4.0	50	65	20	30
	C	5.0		50		25	35
	J	5.0	7.0	50		25	35
T	E						
	G						
note		NOTE6		NOTE5			

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

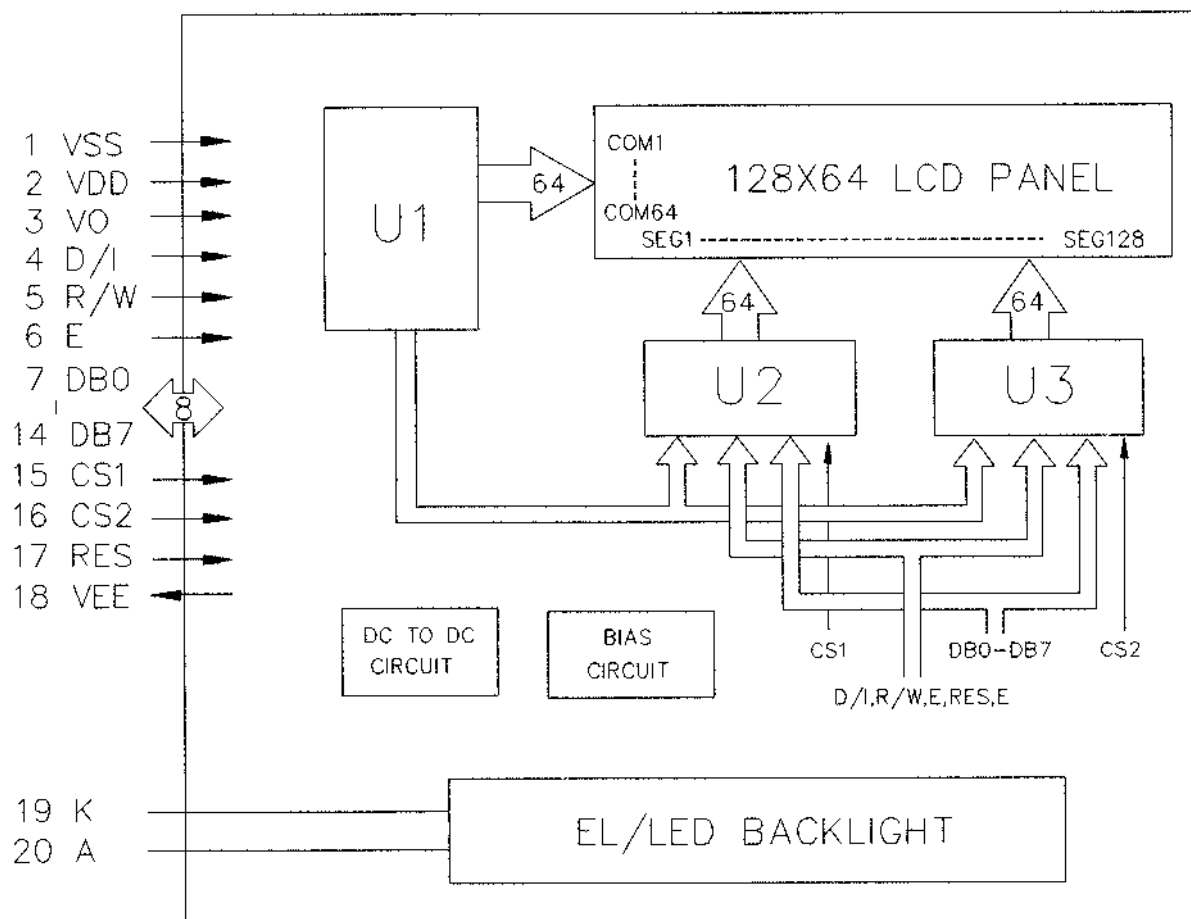
ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
Response Time (rise)	Tr	-10°C	-	600	1200	ms	NOTE 2
		25°C	-	90	200		
		70°C	-	40	100		
Response Time (fall)	Tf	-10°C	-	1200	2400	ms	NOTE 2
		25°C	-	180	360		
		70°C	-	60	120		

note:

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

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# BLOCK DIAGRAM



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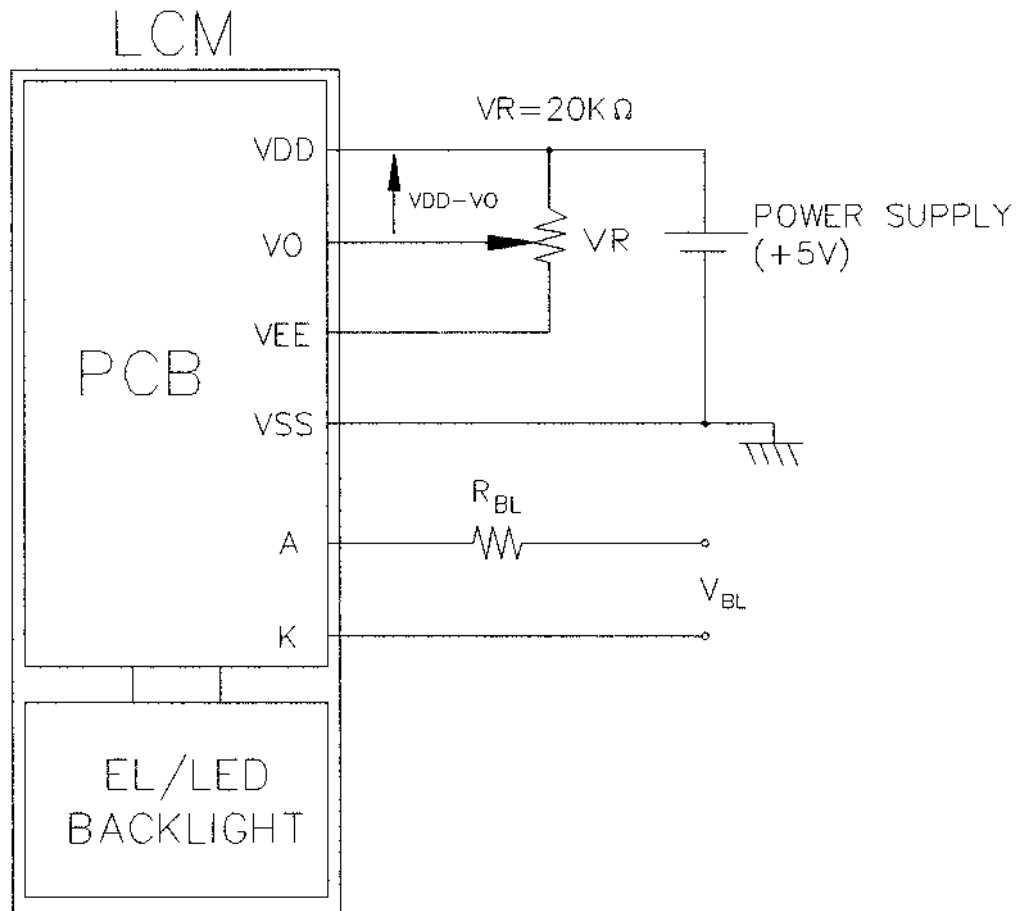
DATE:  
9/1/00

# INTERNAL PIN CONNECTION

Pin No.	Symbol	Level	Function	
1	VSS	—	0V	Power Supply
2	VDD	—	+5V	
3	Vo	—	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 (LCM TO MPU) L: DATA WRITE (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	RES	L	RESET ACTIVE "L"	
18	VEE	—	NEGATIVE VOLTAGE OUTPUT	
19	K	—	CATHODE FOR EL/LED BACKLIGHT	
20	A	—	ANODE FOR EL/LED BACKLIGHT	

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# POWER SUPPLY



Recommended Value for  $R_{BL}$  and  $V_{BL}$

ITEM Back Light Interface	$R_{BL}$			$V_{BL}$		
	EL	LED		EL	LED	
19,20 PIN	0Ω	5Ω	10Ω	110 Vac 400Hz	5Vdc	10Vdc

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# TIMING CHARACTERISTICS

## INTERFACE TIMING

Item	Symbol	Test condition	Min.	Typ	Max.	Unit
Enable cycle time	$t_{\text{cyc}}$	Fig.a , Fig.b	1000	—	—	ns
E high level width	$P_{\text{WEH}}$	Fig.a , Fig.b	450	—	—	ns
E low level width	$P_{\text{WEL}}$	Fig.a , Fig.b	450	—	—	ns
E rise/fall time	$t_r, t_f$	Fig.a , Fig.b	—	—	25	ns
Address set up time	$t_{\text{AS}}$	Fig.a , Fig.b	140	—	—	ns
Address hold time	$t_{\text{AH}}$	Fig.a , Fig.b	10	—	—	ns
Data delay time	$t_{\text{DDR}}$	Fig.b	—	—	320	ns
Data set up time	$t_{\text{DSW}}$	Fig.a	200	—	—	ns
Data hold time (WR)	$t_{\text{DHW}}$	Fig.a	10	—	—	ns
Data hold time (RD)	$t_{\text{DHR}}$	Fig.b	20	—	—	ns

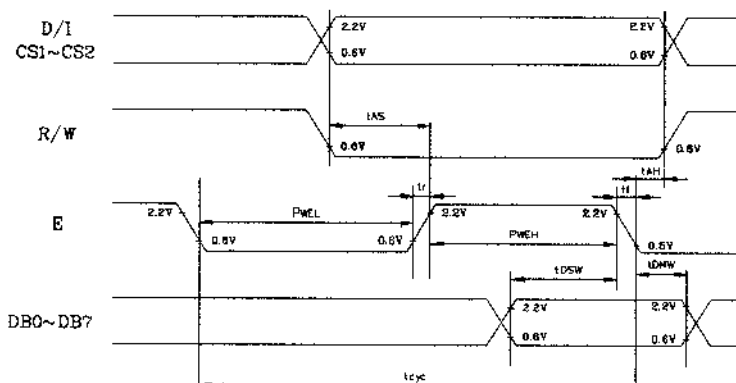


Fig . a Interface timing (data write)

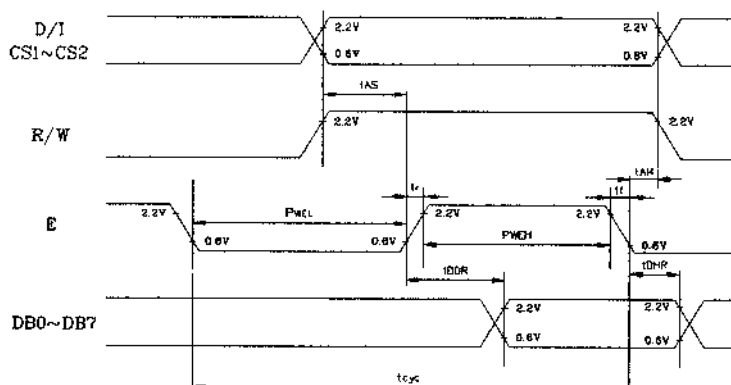
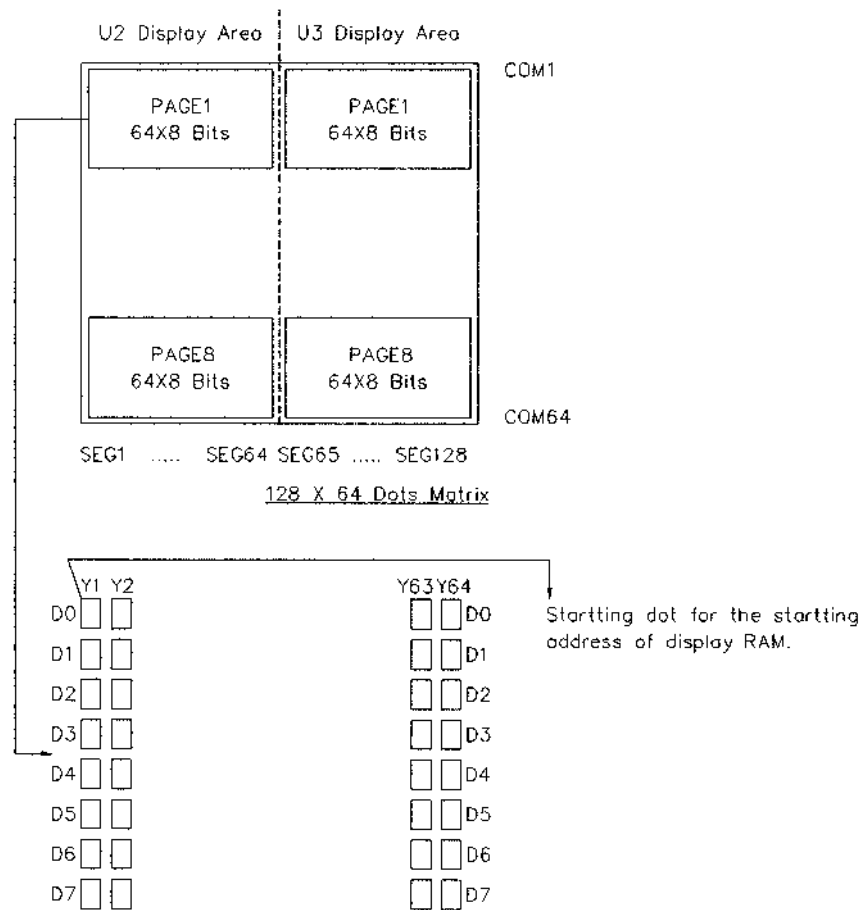


Fig . b Interface timing (data read)

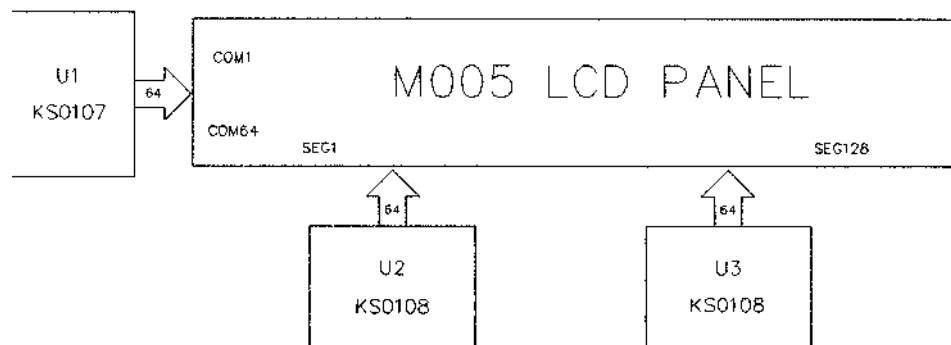
Fig. b Interface timing (data read)

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# DISPLAY PATTERN



Each segment driver has 8 pages RAM , and each page has 64 x 8 bits RAM .  
D0~D7 are 8 bits transmitted data , where D0 is LSB and D7 is MSB .



# 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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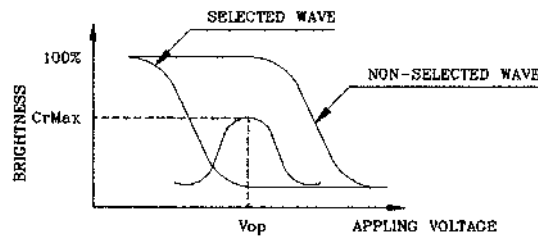
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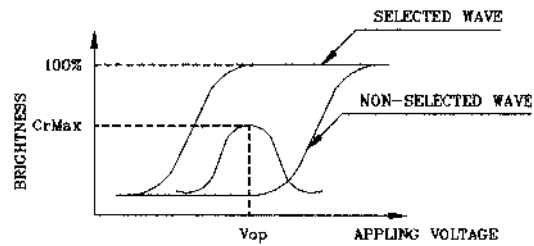
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(NOTE 1)

Definition of Operation Voltage(Vop)



(positive type)



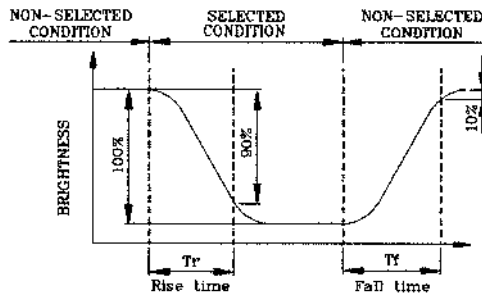
(negative type)

\*Conditions

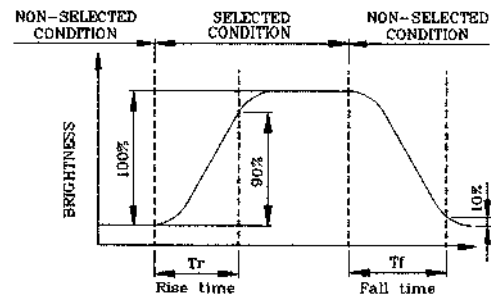
Viewing Angle : 0  
Frame Frequency : 70Hz  
Applying Waveform : 1/N duty 1/a bias

(NOTE 2)

Definition of Response Time(Tr,Tf)



(positive type)



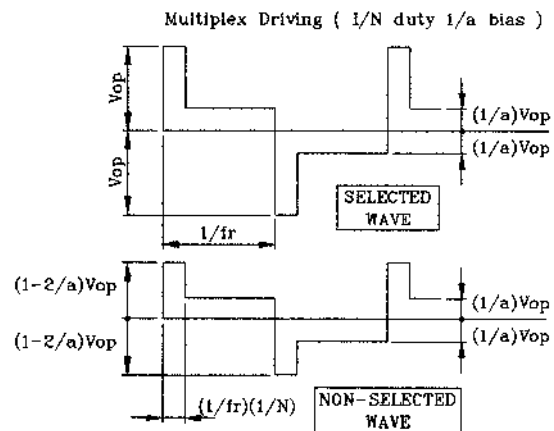
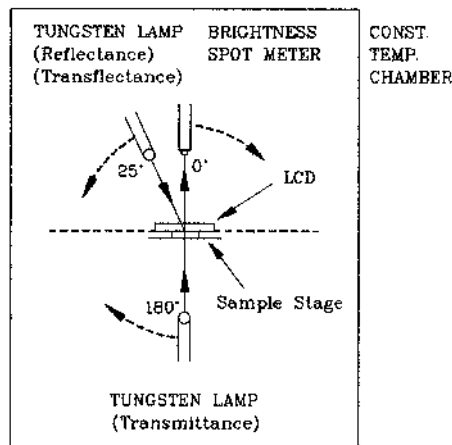
(negative type)

\*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



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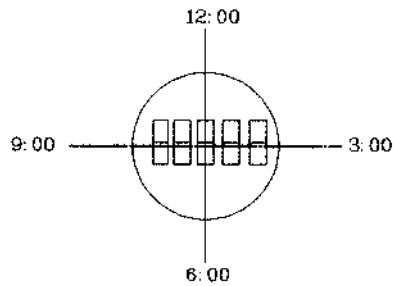
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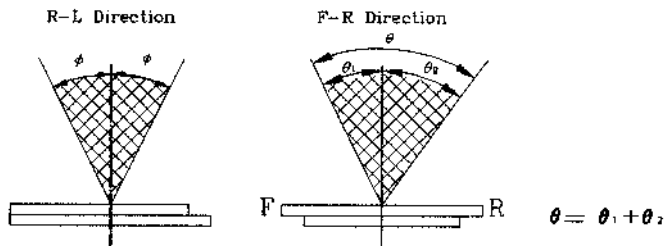
(NOTE 4)

Definition of Viewing Direction



(NOTE 5)

Definition of Viewing Angle

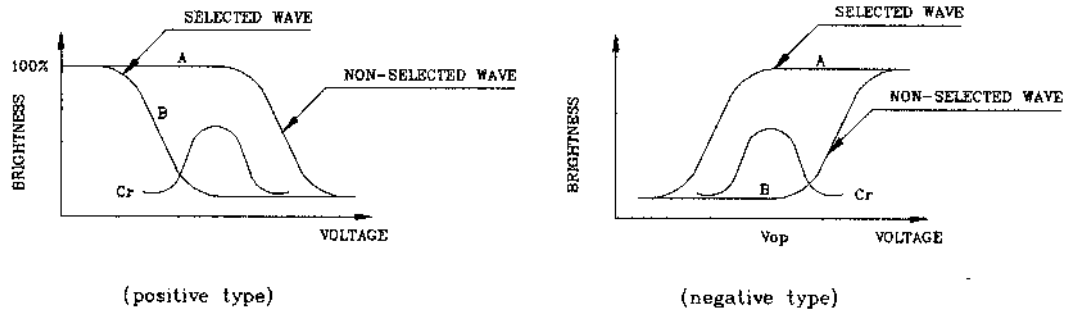


\*Conditions

Operating Voltage :  $V_{op}$   
Frame Frequency : 70Hz  
Applying Waveform : 1/N duty 1/a bias  
Contrast Ratio : larger than 2

(NOTE 6)

Definition of Contrast Ratio (Cr)



Contrast Ratio :  $Cr = A/B$

\*Conditions

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

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(2) NOTE:

- SAFETY

- 1.If the LCD panel breaks, be careful not to get the liquid crystal to touch your skin.
- 2.If the liquid crystal touches your skin or clothes, please wash it off immediately by using soap and water.

- HANDLING

- 1.Avoid static electricity which can damage the CMOS LSI.
- 2.Do not remove the panel or frame from the module.
- 3.The polarizing plate of the display is very fragile. So, please handle it very carefully.
- 4.Do not wipe the polarizing plate with a dry cloth, as it may easily scratch the surface of plate.
- 5.Do not use ketonics solvent & Aromatic solvent, use with a soft cloth soaked with a cleaning naphtha solvent.

- STORAGE

- 1.Store the panel or module in a dark place where the temperature is  $25^{\circ}\text{C}\pm 5^{\circ}\text{C}$  and the humidity is below 65% RH.
- 2.Do not place the module near organics solvents or corrosive gases.
- 3.Do not crush, shake, or jolt the module.

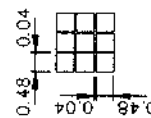
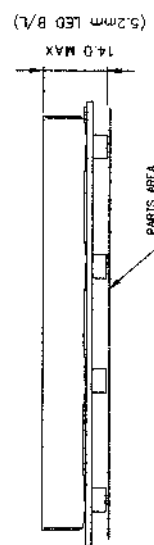
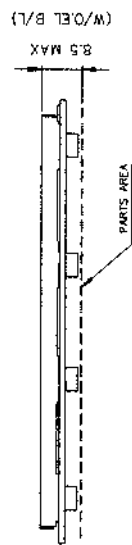
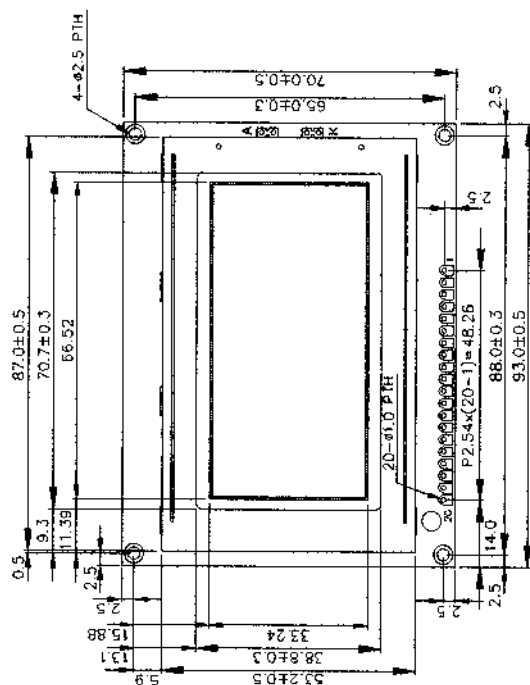
- TERMS OF WARRANT

- 1.Acceptance inspection period  
The period is within one month after the arrival of contracted commodity at the buyer's factory site.
- 2.Applicable warrant period  
The period is within twelve months since the date of shipping out under normal using and storage conditions.

- THE OPERATING LIFE TIME OF BACK LIGHT

LED : 50,000HR  
EL : 5,000HR  
CCFT : 10,000HR

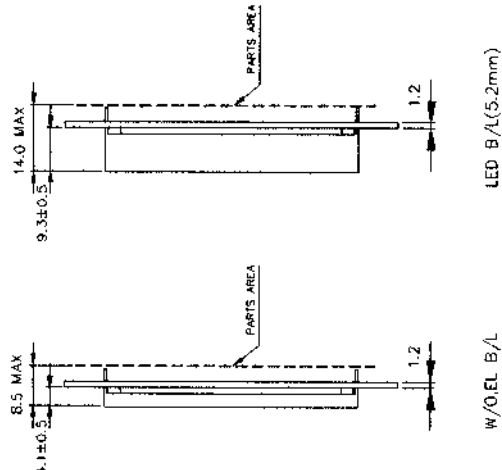
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DOT AREA (128 X 64)

NOTE :

1. RESOLUTION : 128 X 64 DOTS
2. CONTROLLER : WITHOUT
3. DC/DC CONVERTER : BUILT-IN
4. GENERAL TOLERANCE :  $\pm 0.5 \text{ mm}$



W/O EL B/L

LED B/L (5.2mm)

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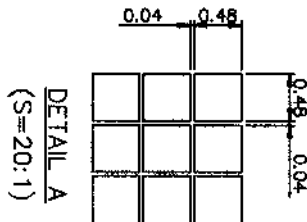
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1.RESOLUTION: 128X64 DOTS  
2.BACKLIGHT: LED (WHITE )  
3.DC/DC CONVERTER: BUILT-IN

DATE: 9/1/00