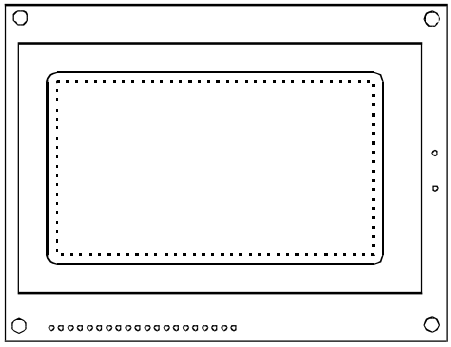
HANTRONIX

PRODUCT SPECIFICATION

HDM64GS12

128 x 64 GRAPHICS
LCD DISPLAY MODULE



HANTRONIX, INC. 10080 BUBB RD. CUPERTINO, CA 95014	**Q.A.:** JB	**REV.:** 2.0	HDM64GS12	SHEET 1 OF 16 **DATE:** 9/1/00

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

HANTRONIX, INC. 10080 BUBB RD. CUPERTINO, CA 95014	**Q.A.:** JB	**REV.:** 2.0	HDM64GS12	SHEET 2 OF 16 **DATE:** 9/1/00

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−VO	Duty= 1/64 Bias= 1/9	0°C	–	13.3	13.8	V
			25°C	11.7	12.5	13.1	
			50°C	10.8	11.4	–	
Recommended LC Driving Voltage (Wide Temp. LCM)	VDD−VO	Duty= 1/64 Bias= 1/9	−10°C	–	11.7	12.8	V
			25°C	11.2	12.0	13.0	
			70°C	10.4	11.1	–	
Power Supply Current	IDD	FLM=79 Hz VDD=5.0 V VDD−VO=12.5 V PATTERN : ■□■□■□ □■□■□■		–	10.0	–	mA
EL Power Supply Current	I_{EL}	V_{BL}= 110 Vrms 400 Hz (R_{BL}= 0 Ω)		–	–	5.0	mA_{rms}
LED Power Supply Current (LMC97X005X)	I_{LED}	V_{BL}= 5.0 V (R_{BL}= 5 Ω)		–	200	–	mA
LED Power Supply Current (LMC97X005X5)		V_{BL}= 10.0 V (R_{BL}= 10 Ω)		–	200	–	

OPTICAL CHARACTERISTICS

Optical Char. of Normal Temp. Mode

AT V_{OP}

ITEM / MODE		Cr(Contrast Ratio) 25°C MIN.	Cr(Contrast Ratio) 25°C TYP.	θ(Viewing Angle) 25°C MIN.	θ(Viewing Angle) 25°C TYP.	ø(Viewing Angle) 25°C MIN.	ø(Viewing Angle) 25°C 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 ø=0° θ=0°

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

Optical Char. of Wide Temp. Mode

AT V_{OP}

ITEM / MODE		Cr(Contrast Ratio) 25°C MIN.	Cr(Contrast Ratio) 25°C TYP.	θ(Viewing Angle) 25°C MIN.	θ(Viewing Angle) 25°C TYP.	φ(Viewing Angle) 25°C MIN.	φ(Viewing Angle) 25°C 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			

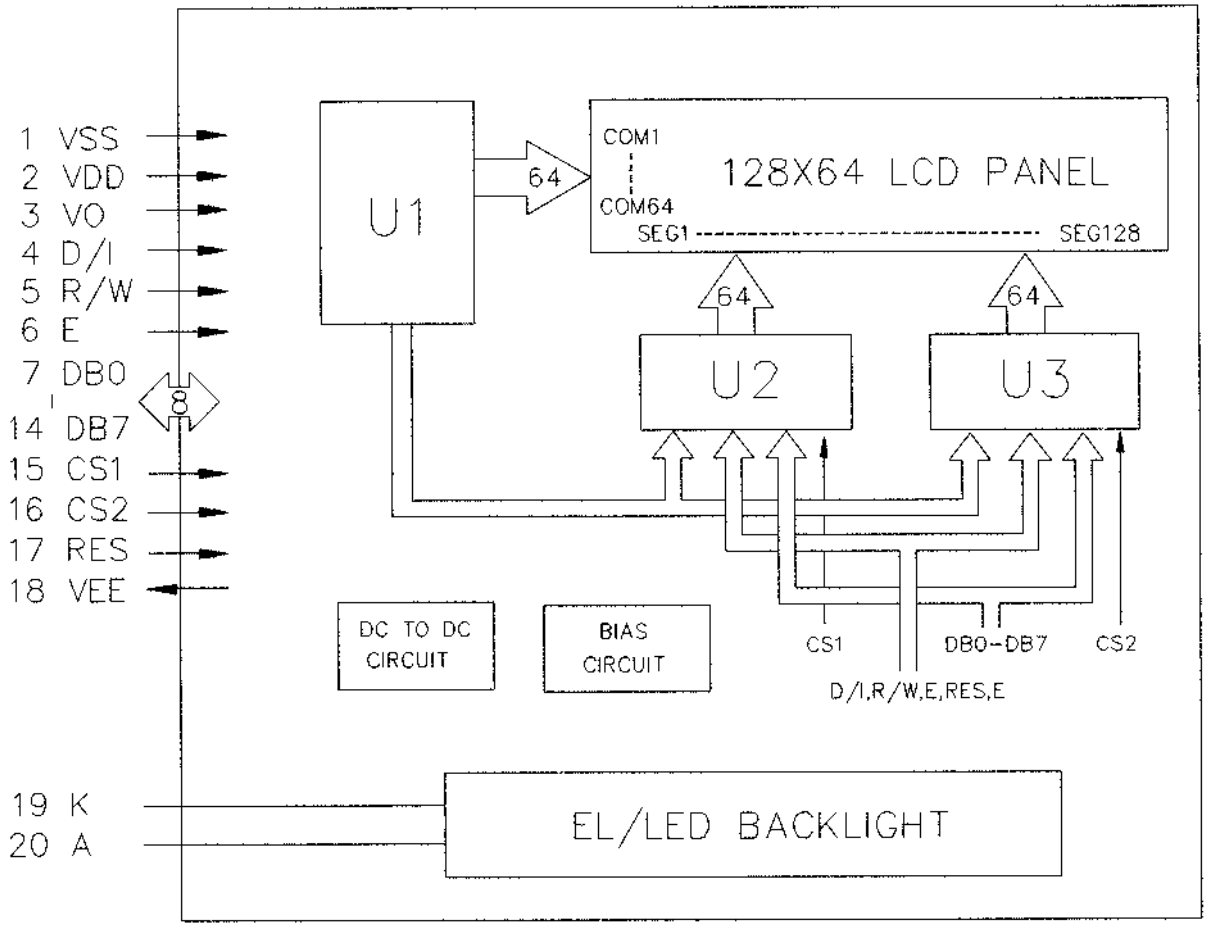
AT $\phi=0°$ $\theta=0°$

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

BLOCK DIAGRAM

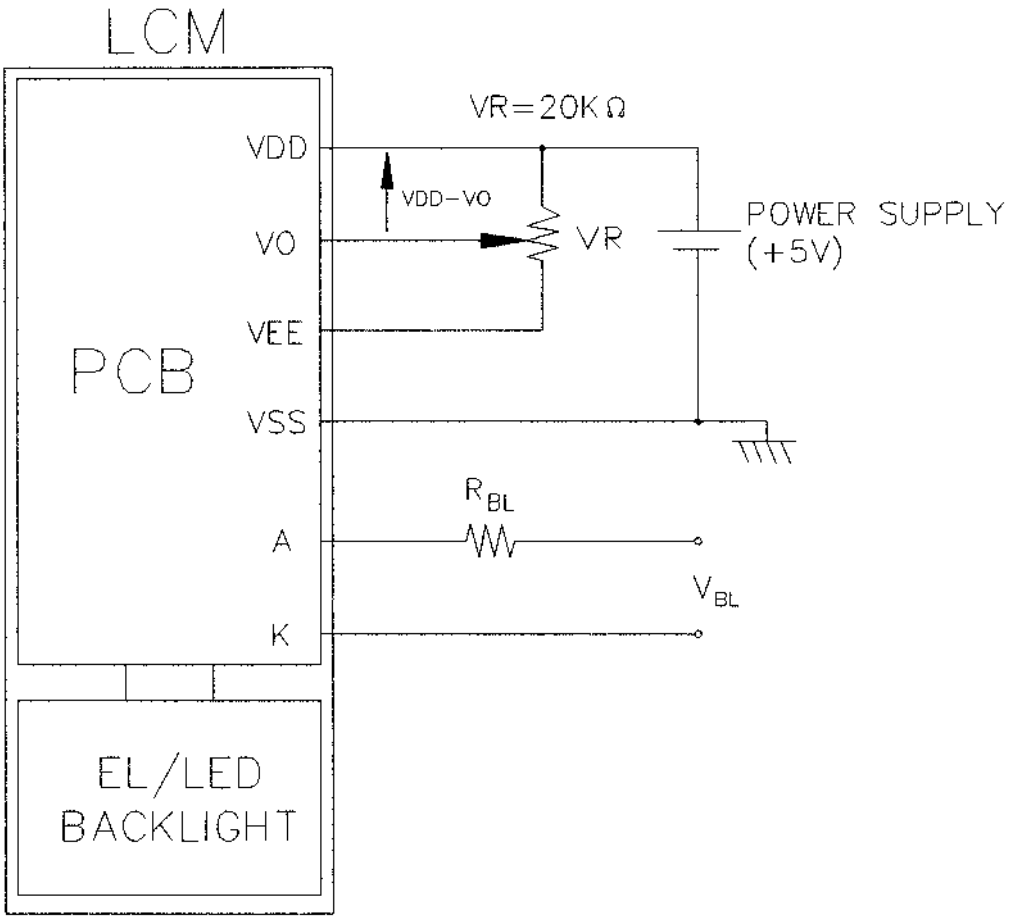


HANTRONIX, INC. 10080 BUBB RD. CUPERTINO, CA 95014	**Q.A.:** JB	**REV.:** 2.0	HDM64GS12	SHEET 6 OF 16 **DATE:** 9/1/00

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	

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

HANTRONIX, INC. 10080 BUBB RD. CUPERTINO, CA 95014	**Q.A.:** JB	**REV.:** 2.0	HDM64GS12	SHEET 8 OF 16 **DATE:** 9/1/00

TIMING CHARACTERISTICS

INTERFACE TIMING

Item	Symbol	Test condition	Min.	Typ.	Max.	Unit
Enable cycle time	t_{cyc}	Fig.a , Fig.b	1000	–	–	ns
E high level width	P_{WEH}	Fig.a , Fig.b	450	–	–	ns
E low level width	P_{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_{AS}	Fig.a , Fig.b	140	–	–	ns
Address hold time	t_{AH}	Fig.a , Fig.b	10	–	–	ns
Data delay time	t_{DDR}	Fig.b	–	–	320	ns
Data set up time	t_{DSW}	Fig.a	200	–	–	ns
Data hold time (WR)	t_{DHW}	Fig.a	10	–	–	ns
Data hold time (RD)	t_{DHR}	Fig.b	20	–	–	ns

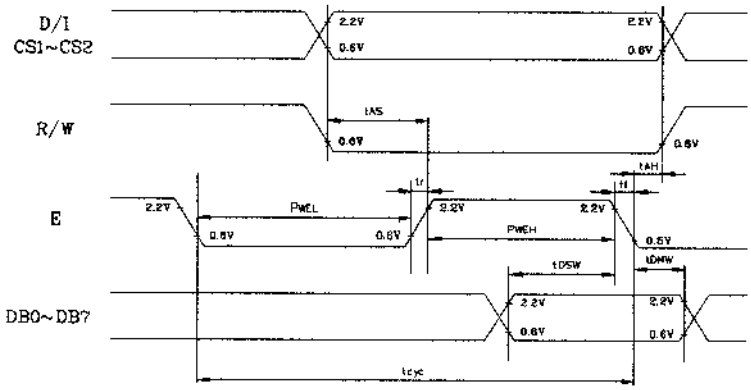


Fig . a Interface timing (data write)

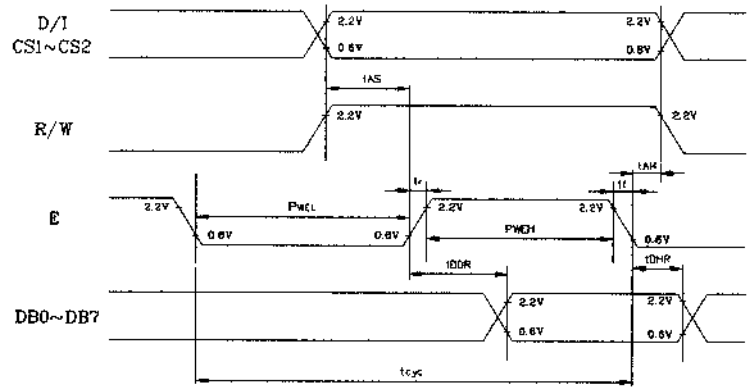
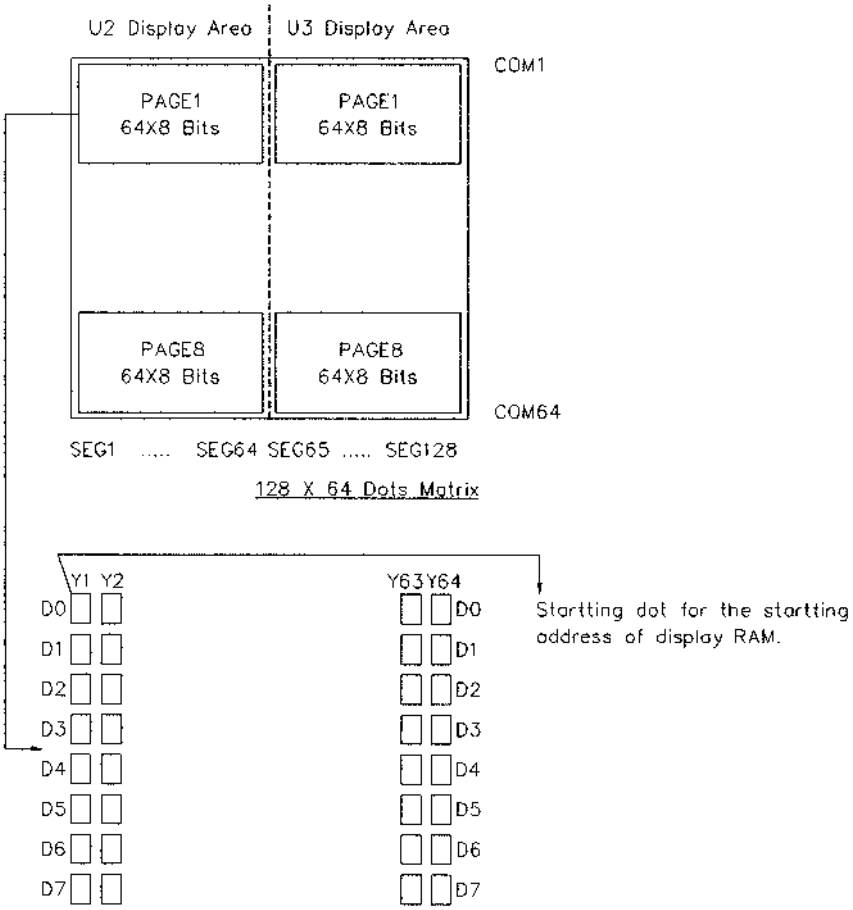


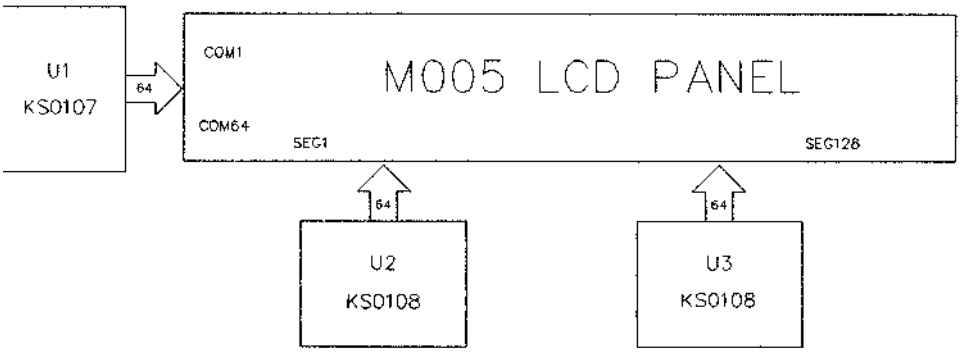
Fig . b Interface timing (data read)

Fig. b Interface timing (data read)

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 .



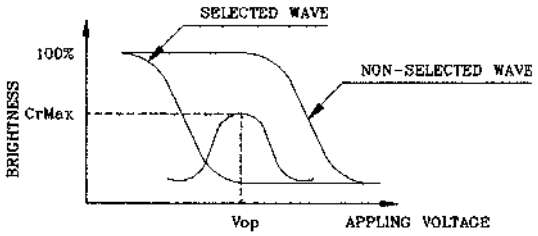
HANTRONIX, INC. 10080 BUBB RD. CUPERTINO, CA 95014	**Q.A.:** JB	**REV.:** 2.0	HDM64GS12	SHEET 10 OF 16 **DATE:** 9/1/00

RELIABILITY TEST

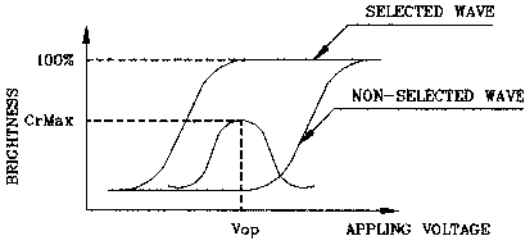
NO	ITEM	CONDITION			STANDARD	NOTE
1	High Temp. Leaving	70°C	120HR		Appearance without defect	
2	Low Temp. Leaving	−20°C	120HR		Appearance without defect	
3	High Temp. & High Humi. Leaving	40°C 90%RH	120HR		Appearance without defect	
4	Thermal Shock	−20°C,30min→25°C,5min →60°C, 30min→25°C,5min (1cycle)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

(NOTE 1)

Definition of Operation Voltage(Vop)



(positive type)



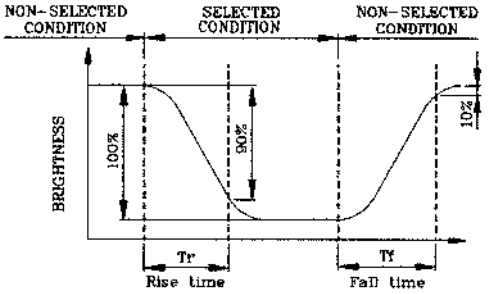
(negative type)

*Conditions

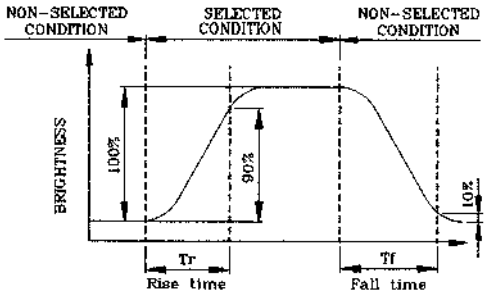
Viewing Angle : 0
Frame Frequency : 70Hz
Appling Waveform : I/N duty 1/a bias

(NOTE 2)

Definition of Response Time(Tr,Tf)



(positive type)



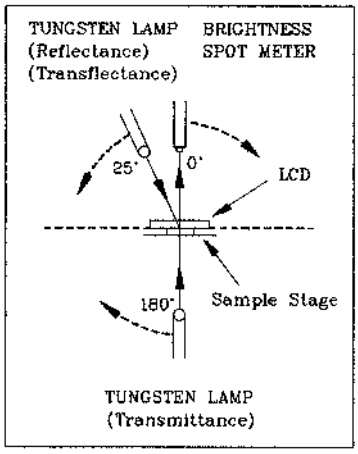
(negative type)

*Conditions

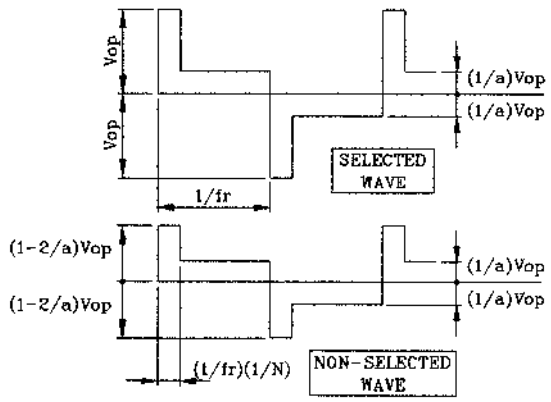
Operating Voltage : Vop
Viewing Angle (θ,ϕ) : (0,0)
Frame Frequency : 70Hz
Appling Waveform : I/N duty 1/a bias

(NOTE 3)

Description of Measuring Equipment and Driving Waveforms



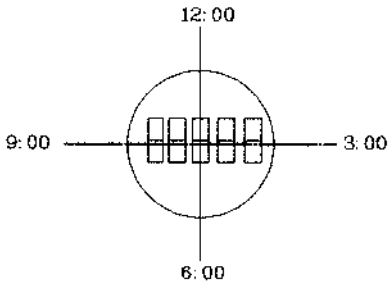
Multiplex Driving (1/N duty 1/a bias)



HANTRONIX, INC. 10080 BUBB RD. CUPERTINO, CA 95014	**Q.A.:** JB	**REV.:** 2.0	HDM64GS12	SHEET 12 OF 16 **DATE:** 9/1/00

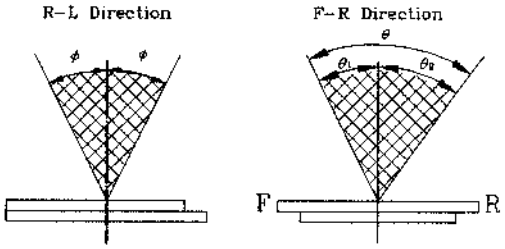
(NOTE 4)

Definition of Viewing Direction



(NOTE 5)

Definition of Viewing Angle



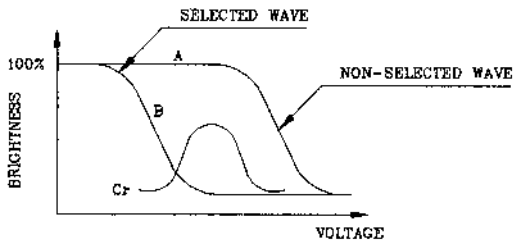
$\theta = \theta_1 + \theta_2$

*Conditions

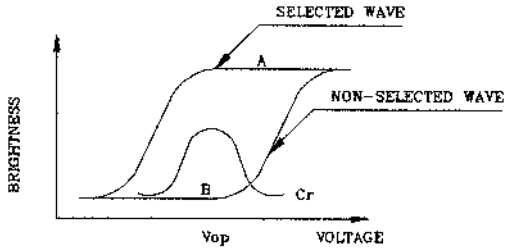
Operating Voltage : Vop
Frame Frequency : 70Hz
Appling Waveform : 1/N duty 1/a bias
Contrast Ratio : larger than 2

(NOTE 6)

Definition of Contrast Ratio (Cr)



(positive type)



(negative type)

Contrast Ratio : Cr=A/B

*Conditions

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

(2) NOTE:

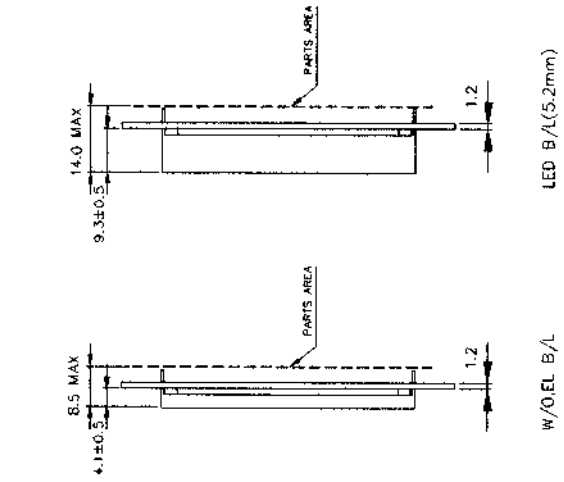
- SAFETY
  1. If the LCD panel breaks, be careful not to get the liquid crystal to touch your skin.
  2. If the liquid crystal touches your skin or clothes, please wash it off immediately by using soap and water.

- 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°C±5°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.

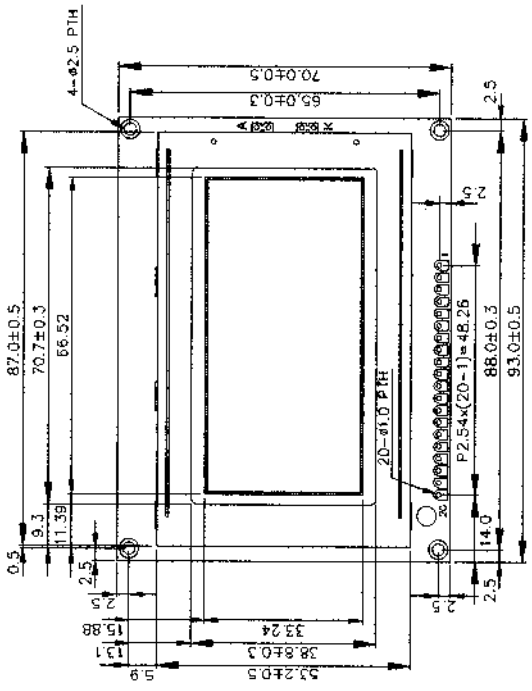
- TERMS OF WARRANT
  1. Acceptance inspection period
     The period is within one month after the arrival of contracted commodity at the buyer's factory site.
  2. Applicable warrant period
     The period is within twelve months since the date of shipping out under normal using and storage conditions.

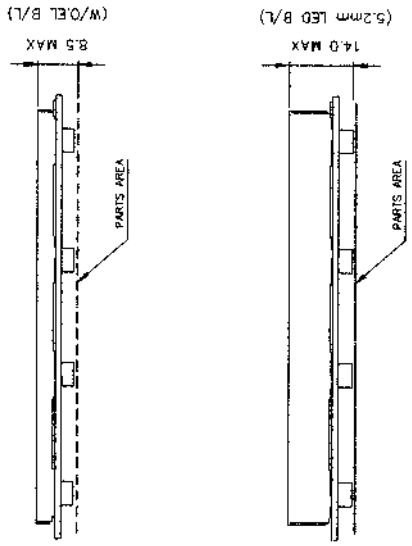
- THE OPERATING LIFE TIME OF BACK LIGHT
  LED : 50,000HR
  EL : 5,000HR
  CCFT : 10,000HR

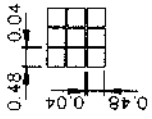


NOTE :

1. RESOLUTION : 128 X 64 DOTS
2. CONTROLLER : WITHOUT
3. DC/DC CONVERTER : BUILT-IN
4. GENERAL TOLERANCE : ±0.5 mm

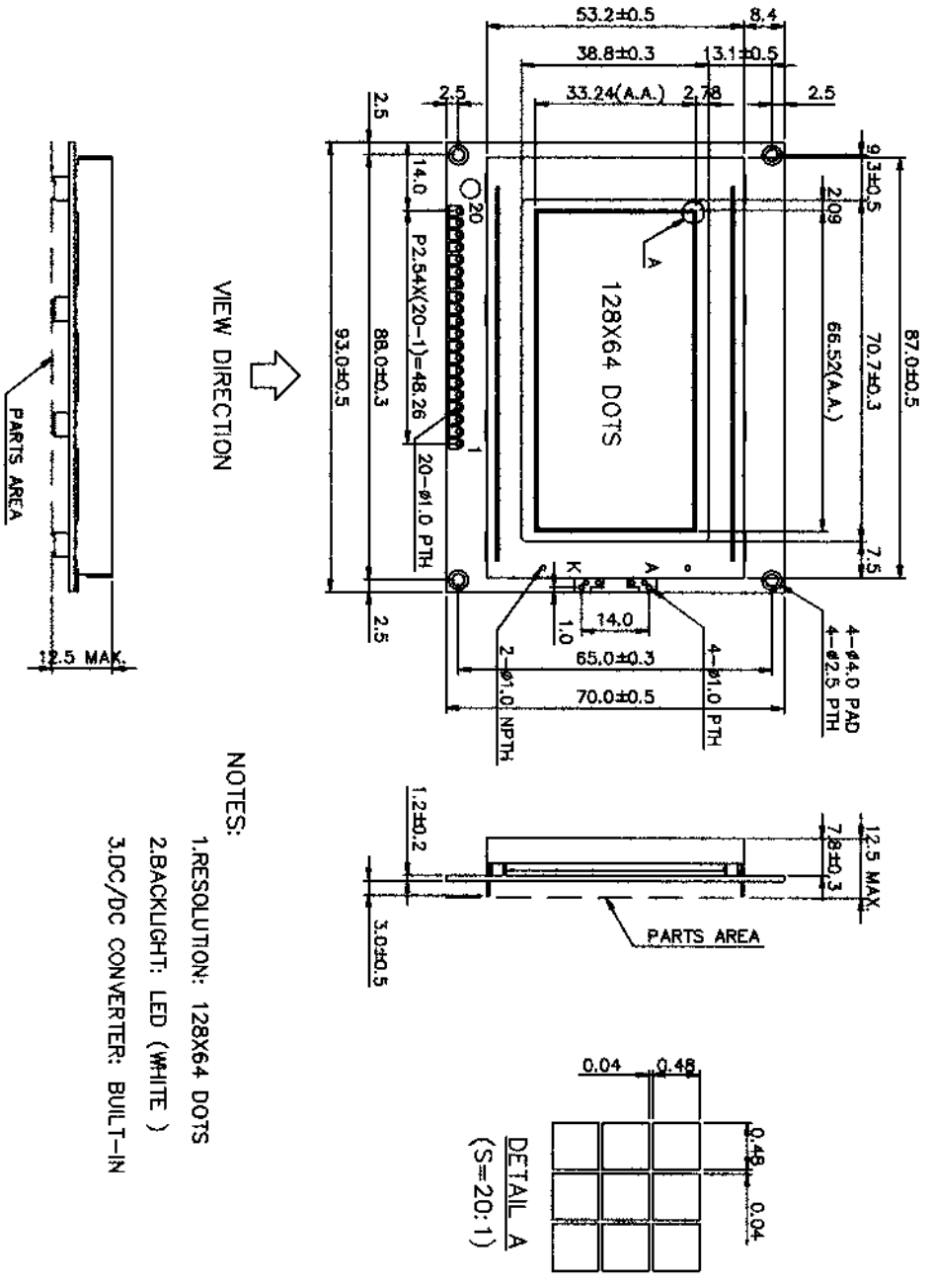






DOT AREA(128 X 64)

HANTRONIX, INC. 10080 BUBB RD. CUPERTINO, CA 95014	**Q.A.:** JB	**REV.:** 2.0	HDM64GS12	SHEET 15 OF 16 **DATE:** 9/1/00



NOTES:

1.RESOLUTION: 128X64 DOTS

2.BACKLIGHT: LED (WHITE)

3.DC/DC CONVERTER: BUILT-IN

HANTRONIX, INC. 10080 BUBB RD. CUPERTINO, CA 95014	**Q.A.:** JB	**REV.:** 2.0	HDM64GS12	SHEET 16 OF 16 **DATE:** 9/1/00