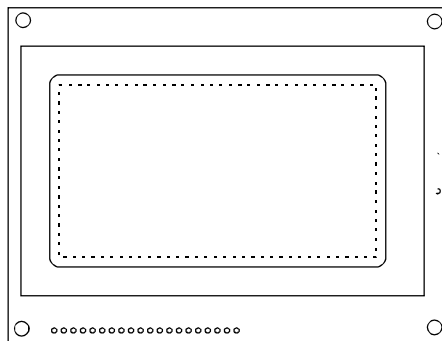




# PRODUCT SPECIFICATION

## HDM64GS12L-4

128 x 64 GRAPHICS  
LCD DISPLAY MODULE



<b>HANTRONIX, INC.</b> 10080 BUBB RD. CUPERTINO, CA 95014	<b>Q.A.:</b>	<b>REV.:</b>	<b>HDM64GS12L-4</b>	<b>SHEET 1 OF 16</b>
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# 1. MECHANICAL DATA

(1) Product No.	HDM64GS12L-4
(2) Module Size	75.0(W)mm X 52.7(H)mm X MAX9.5(D)mm (LED B/L)
(3) Dot Size	0.40 (W)mm x 0.40 (H)mm
(4) Dot Pitch	0.43 (W)mm x 0.43 (H)mm
(5) Number of Dots	128 (W) x 64 (H)Dots
(6) Duty	1/64
(7) LCD Display Mode	STN: Yellow Mode
	Rear Polarizer: Transflective
(8) Viewing Direction	6 O'clock
(9) Backlight	LED B/L
(10) Weight	LED B/L : 35.6g(approx.)
(11) DC/DC Converter	Built-in

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## 2. ABSOLUTE MAXIMUM RATINGS

### (1) ELECTRICAL ABSOLUTE RATINGS

VSS=0V

	SYMBOL	MIN	MAX	UNIT	COMMENT
Power Supply for Logic	VDD-VSS	-0.3	7.0	V	
Power Supply for LCM	VDD-VSS	0	21.0	V	
Input Voltage	VDD	-0.3	VDD	V	
Static Electricity	-	-	-	-	Note 1

### (2) ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

ITEM	OPERATING		STORAGE	
	MIN.	MAX.	MIN.	MAX.
Ambient Temperature	-20	70	-30	80
Humidity (Without Condensation)	Note 2,3		Note 2,4	

Note 1 LCM should be grounded during handling LCM.

Note 2 Background color changes slightly depending on ambient temperature.  
This phenomenon is reversible.

Note 3 To  $\leq$  70°C : 75%RH max  
To > 70°C : Absolute humidity must be lower  
than the humidity of 75%RH at 70°C

Note 4 To at -30°C will be < 48hrs, at 80°C will be < 120hrs

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### 3. ELECTRICAL CHARACTERISTICS

( VDD= 5.0±10%V )

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	
Input Voltage	V <sub>IH</sub>	H level	0.7VDD	-	VDD	V	
	V <sub>IO</sub>	L level	0	-	0.3VDD	V	
Recommended LC Driving Voltage (Low Voltage LC and Wide Temp. LCM)	VDD-V <sub>O</sub>	Duty= 1/64  Bias= 1/9	-20°C	9.8	10.1	10.4	V
			0°C	8.7	9.0	9.3	
			25°C	8.4	8.7	9.0	
			50°C	7.9	8.2	8.5	
			70°C	7.5	7.8	8.1	
Power Supply Current	I <sub>DD</sub>	FLM=79 Hz VDD=5.0 V VDD-V <sub>O</sub> =8.7 V PATTERN : □ ■ □ ■ □ ■ ■ □ ■ □ ■ □	-	2.0	5.0	mA	
LED B/L Supply Current	I <sub>LED</sub>	V <sub>LED</sub> =5.0 V R7=R8=10Ω (R7=10Ω)	-	150 (89)	200	mA	

# 4.OPTICAL CHARACTERISTICS

(For Wide Temperature Mode LCM)

AT Vop

ITEM		Cr(Contrast Ratio)										θ(Viewing Angle)		θ(Viewing Angle)	
		-20°C		0°C		25°C		50°C		70°C		25°C		25°C	
		MIN.	TYP.	MIN.	TYP.	MIN.	TYP.	MIN.	TYP.	MIN.	TYP.	MIN.	TYP.	MIN.	TYP.
S	C	2.0	4.5	3.5	5.5	5.0	6.0	3.5	5.5	2.0	5.0	-	67	-	26-45
NOTE		NOTE 6										NOTE 5			

NOTE :

S : TRANSFLECTIVE  
C : YELLOW

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

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
Response Time (rise)	Tr	-20°C	5500	11000	16500	ms	NOTE 2
		0°C	800	1600	2400		
		25°C	200	400	600		
		50°C	80	160	240		
		70°C	55	110	165		
Response Time (fall)	Tf	-20°C	3500	7000	10500	ms	NOTE 2
		0°C	400	800	1200		
		25°C	75	150	225		
		50°C	40	80	120		
		70°C	35	70	105		

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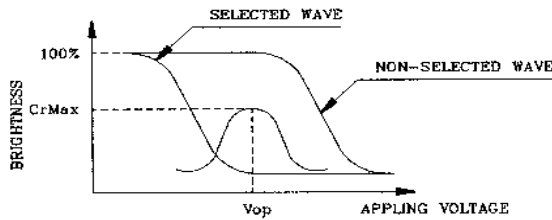
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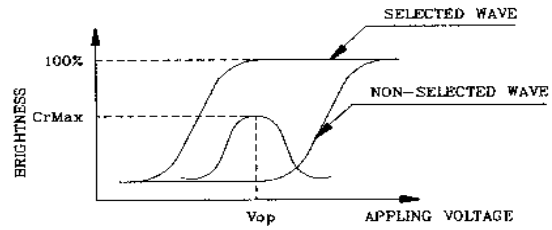
DATE:  
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(NOTE 1)

Definition of Operation Voltage(Vop)



(positive type)



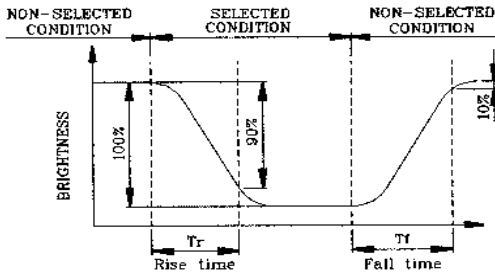
(negative type)

\*Conditions

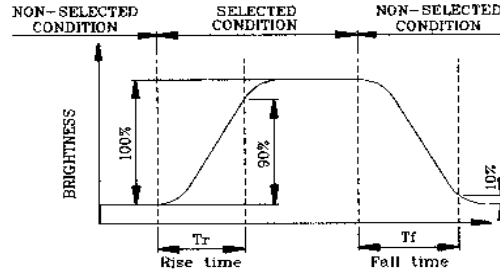
Viewing Angle : 0  
 Frame Frequency : 70Hz  
 Applying Waveform : 1/N duty 1/a bias

(NOTE 2)

Definition of Response Time(Tr,Tf)



(positive type)



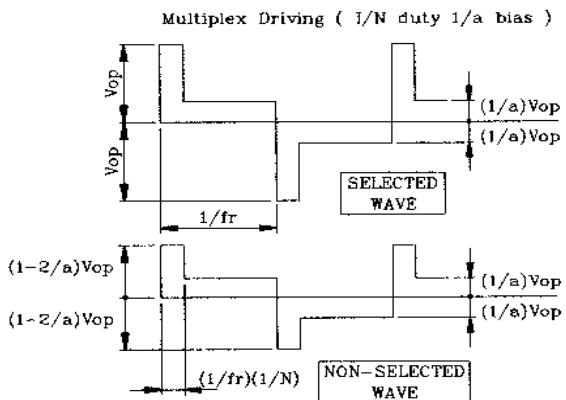
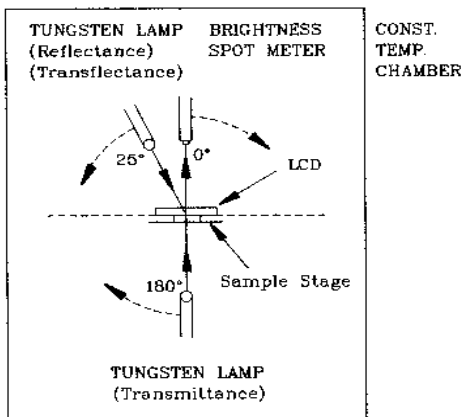
(negative type)

\*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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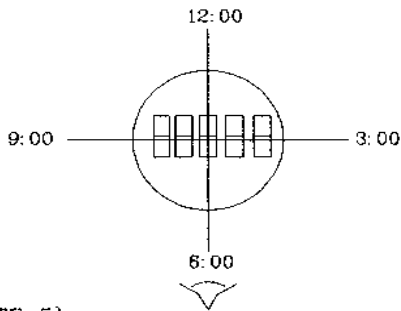
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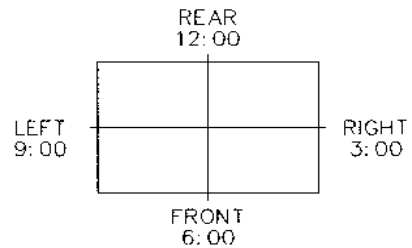
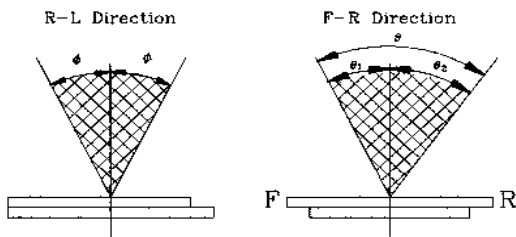
(NOTE 4)

Definition of Viewing Direction



(NOTE 5)

Definition of Viewing Angle



\*For This Product  
The Viewing Direction Is 6 O'clock  
So  $\theta_1 > \theta_2$

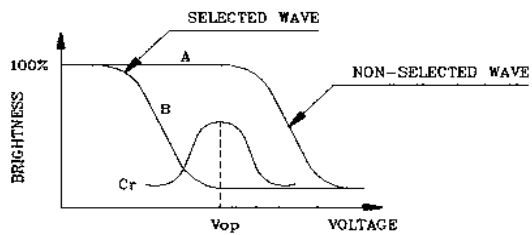
$$\theta = \theta_1 + \theta_2$$

\*Conditions

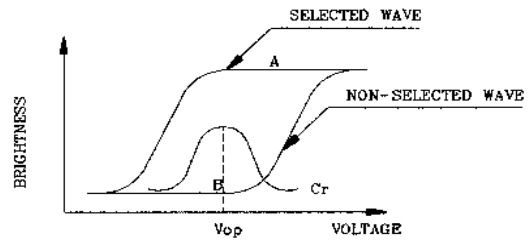
Operating Voltage :  $V_{op}$   
Frame Frequency : 70Hz  
Applying Waveform : 1/N duty 1/a bias  
Contrast Ratio : larger than 2

(NOTE 6)

Definition of Contrast Ratio (Cr)



(positive type)



(negative type)

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

\*Conditions

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

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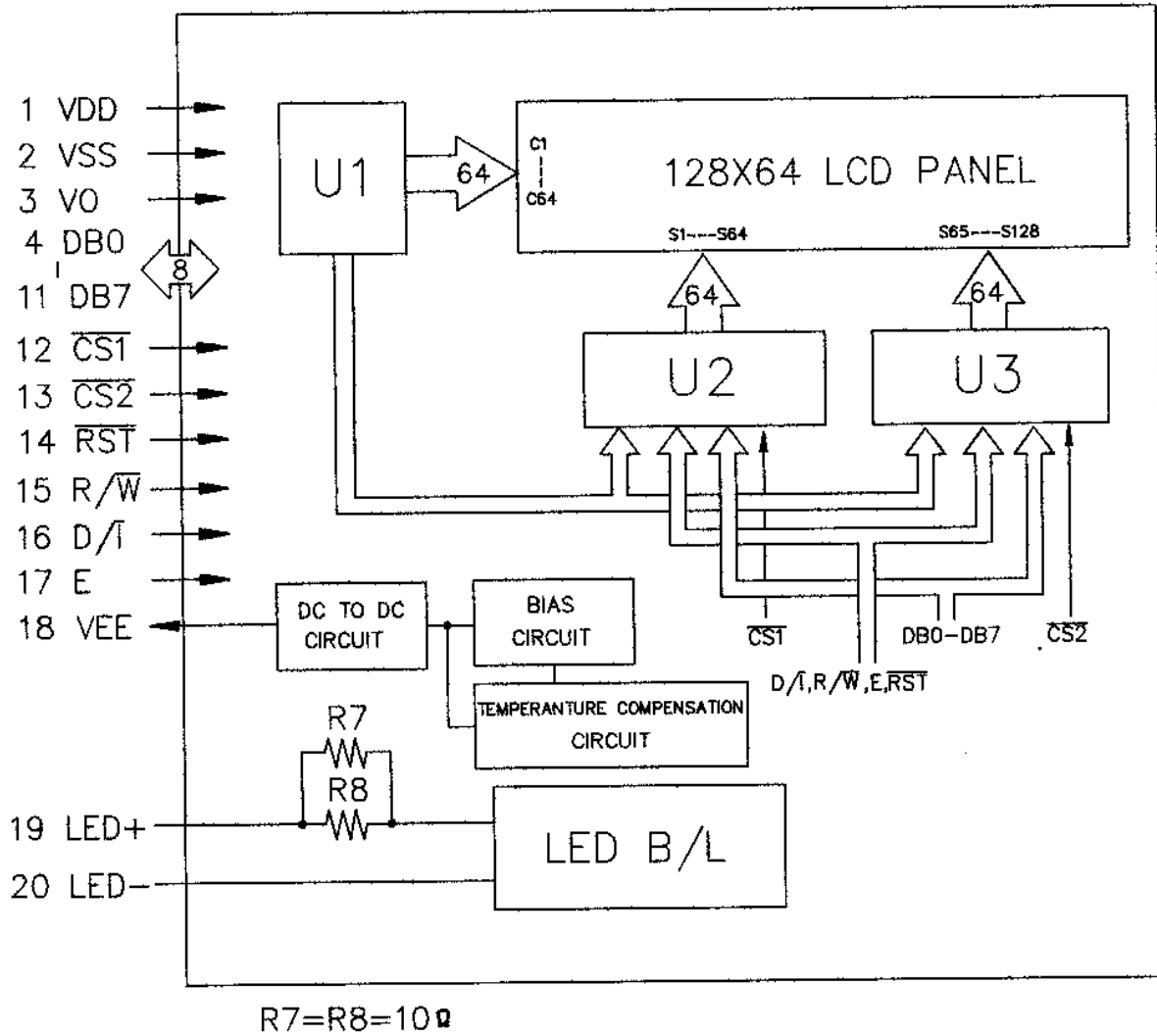
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# 5. BLOCK DIAGRAM



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## 6.INTERNAL PIN CONNECTION

PinNo.	Symbol	Level	Function
1	VDD	—	POWER SUPPLY FOR LOGIC CIRCUIT
2	VSS	—	GND
3	VO	—	OPERATING VOLTAGE FOR LCD DRIVING
4	DB0	H/L	(LSB)
5	DB1	H/L	DATA BUS LINE
6	DB2	H/L	
7	DB3	H/L	
8	DB4	H/L	
9	DB5	H/L	
10	DB6	H/L	
11	DB7	H/L	
12	$\overline{CS1}$	L	CHIP SELECTION U2
13	$\overline{CS2}$	L	CHIP SELECTION U3
14	$\overline{RST}$	L	RESET ACTIVE "L"
15	R/ $\overline{W}$	H/L	H: DATA READ (FROM LCM TO MPU) L: DATA WRITE (FROM MPU TO LCM)
16	D/ $\overline{I}$	H/L	H: DATA INPUT L: INSTRUCTION CODE INPUT
17	E	H, H→L	ENABLE SIGNAL
18	VEE	—	NEGATIVE VOLTAGE OUTPUT
19	LED(+)	—	ANODE FOR LED BACKLIGHT
20	LED(-)	—	CATHODE FOR LED BACKLIGHT

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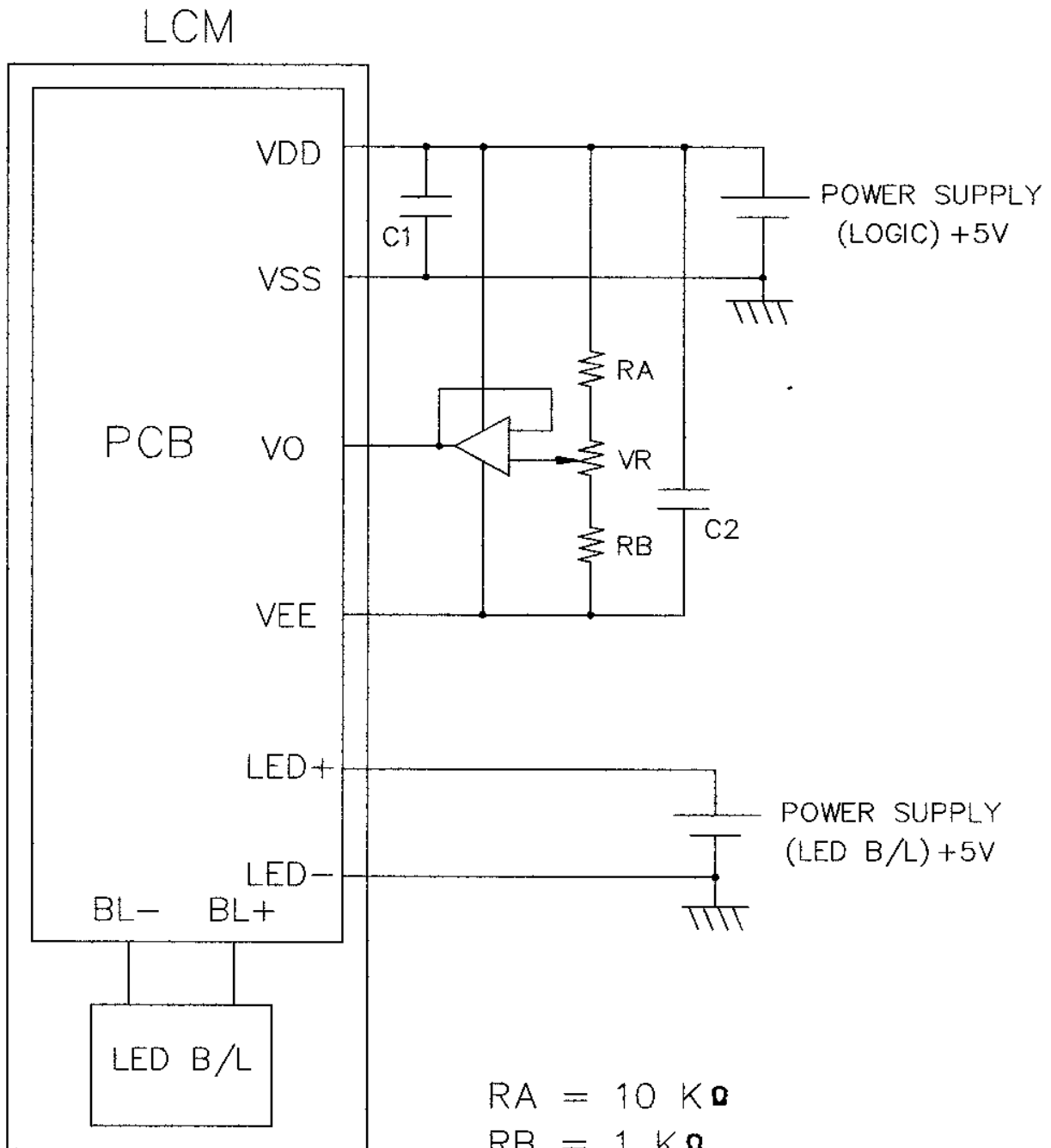
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# 7. POWER SUPPLY



RA = 10 K $\Omega$

RB = 1 K $\Omega$

VR = 10 K $\Omega$ (VARIABLE)

C1,C2 = 10  $\mu$ F

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# 8. TIMING CHARACTERISTICS

## 8-1 INTERFACE TIMING

Item	Symbol	Test condition	Min.	Typ.	Max.	Unit
Enable cycle time	$t_{\text{ECC}}$	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

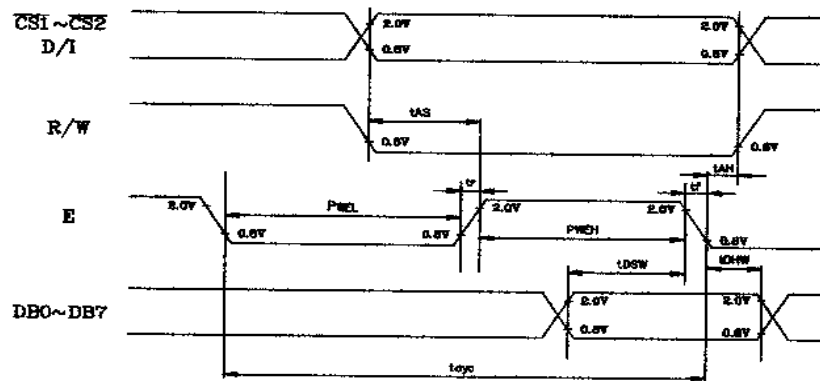


Fig . a Interface timing (data write)

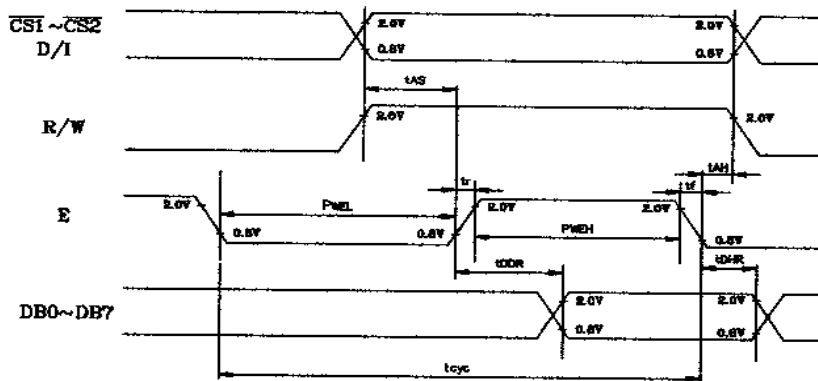


Fig . b Interface timing (data read)

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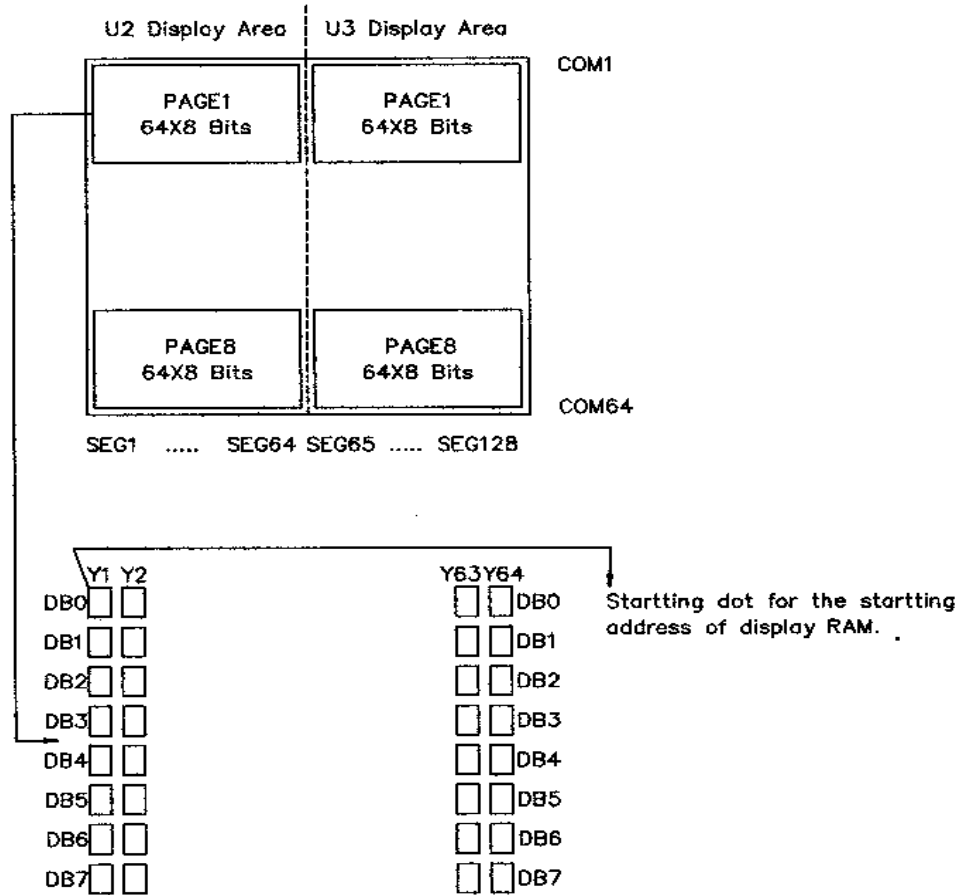
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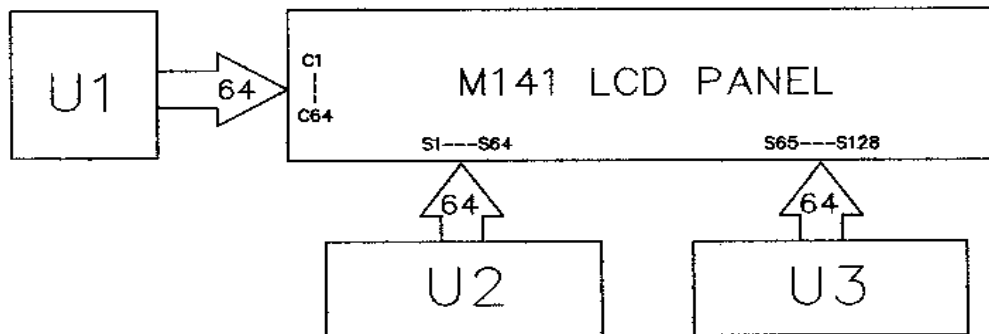
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# 8-2 DISPLAY PATTERN



Each segment driver has 8 pages RAM , and each page has 64 x 8 bits RAM .  
 DB0~DB7 are 8 bits transmitted data , where DB0 is LSB and DB7 is MSB .



## 8-3 DISPLAY CONTROL INSTRUCTION

The display control instructions control the internal state of the KS0108B. Instructions is received from MPU to HCD61202U for the display control.

Instruction	D/I	R/W	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0	FUNCTION
Display ON/OFF	0	0	0	0	1	1	1	1	1	0/1	Controls the display on or off. Internal status and display RAM data is not affected. 0: OFF , 1: ON
Set Address	0	0	0	1	Y address(0~63)						Sets the Y address in the Y address counter.
Set Page (X address)	0	0	1	0	1	1	1	Page(0~7)			Sets the X address at the X address register.
Display Start Line	0	0	1	1	Display start line(0~63)						Indicates the display data RAM displayed at the top of the the screen.
Status Read	0	1	BUSY	0	ON/OFF	RESET	0	0	0	0	Read status. BUSY 0: Ready 1: In operation ON/OFF 0: Display ON 1: Display OFF RESET 0: Normal 1: Reset
Write Display Data	1	0	Write Data								Writes data(DB0:7) into display data RAM. After writing instruction, Y address is increased by 1 automatically.
Read Display Data	1	1	Read Data								Reads data(DB0:7) from display data RAM to the data bus.

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## 9. RELIABILITY TEST

NO	ITEM	CONDITION			STANDARD	NOTE
1	High Temp. Storing	70°C	120HR		Appearance without defect	
2	Low Temp. Storing	-20°C	120HR		Appearance without defect	
3	High Temp. & High Humi. Storing	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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(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.

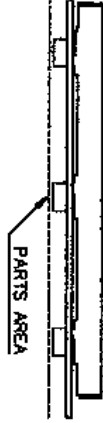
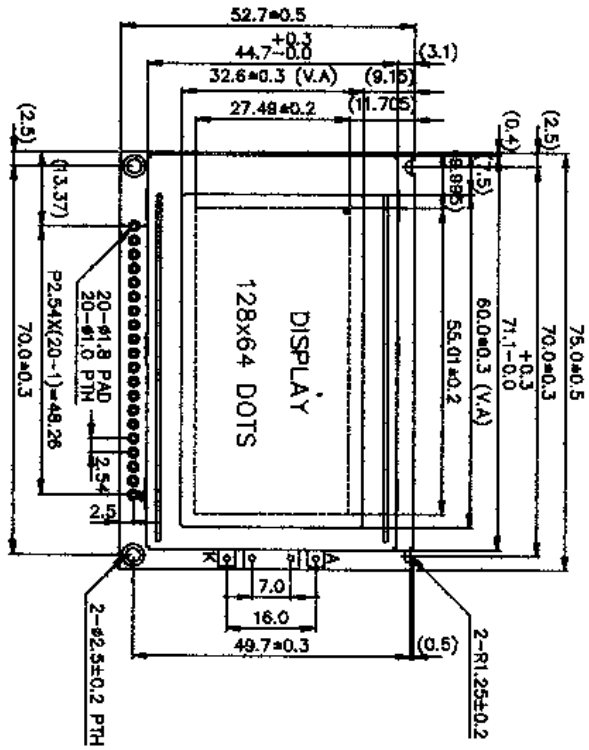
• STORAGE

- 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.

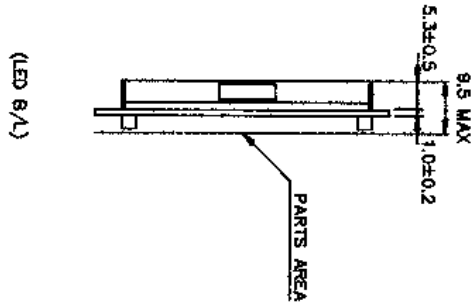
• TERMS OF WARRANT

- 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.

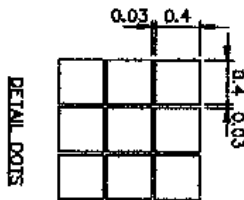
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(LED 8/L)



(LED 8/L)



DETAIL DOTS

NOTES :

1. RESOLUTION : 128 x 64 DOTS
2. TEMPERATURE COMPENSATION : BUILT-IN
3. TOLERANCE NO SPECIFIED : ±0.5 mm
4. COB PACKAGE STYLE

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