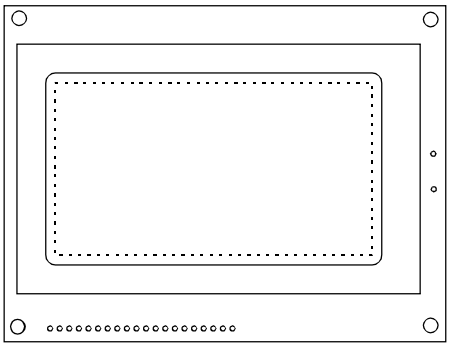
HANTRONIX

PRODUCT SPECIFICATION

HDM64GS12L-4

128 x 64 GRAPHICS
LCD DISPLAY MODULE



HANTRONIX, INC. 10080 BUBB RD. CUPERTINO, CA 95014	**Q.A.:** JK	**REV.:** 1.1	HDM64GS12L-4	SHEET 1 OF 15 **DATE:** 2/14/02

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

2. ABSOLUTE MAXIMUM RATINGS

(1) ELECTRICAL ABSOLUTE RATINGS

VSS=0V Standard

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

Note 1 LCM should be grounded during handling LCM.

(2) ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

ITEM	WIDE TEMP.			
	OPERATING		STORAGE	
	MIN.	MAX.	MIN.	MAX.
Ambient Temperature	0	50	−20	70
Humidity (Without Condensation)	Note 2,3		Note 2,4	

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

Note 3 Ta ≤ 50°C : 85%RH max

Ta > 50°C : Absolute humidity must be lower than the humidity of 85%RH at 70°C

Note 4 Ta at −20°C will be < 48hrs, at 70°C will be < 120hrs

3. ELECTRICAL CHARACTERISTICS

(VDD= 5.0±10%V)

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 (Low Voltage LC and Wide Temp. LCM)	VDD–VO	Duty= 1/64 Bias= 1/9	0°C	8.5	9.0	9.7	V
			25°C	8.0	8.7	9.3	
			50°C	7.5	8.2	8.4	
Power Supply Current	IDD	FLM=79 Hz VDD=5.0 V VDD–VO=8.6 V PATTERN :		–	2.0	5.0	mA
LED B/L Supply Current	ILED	VLED=5.0 V R7=R8=10Ω (R7=10Ω)		–	150 (89)	200	mA

4.OPTICAL CHARACTERISTICS

(For Normal Temperature Mode LCM)

AT V_{OP}

ITEM / MODE		Cr(Contrast Ratio) 25℃ MIN.	Cr(Contrast Ratio) 25℃ TYP.	θ(Viewing Angle) 25℃ MIN.	θ(Viewing Angle) 25℃ TYP.	ϕ(Viewing Angle) 25℃ MIN.	ϕ(Viewing Angle) 25℃ TYP.
S	C	–	6.0	–	67	–	71
note		NOTE6		NOTE5			

note:

S: TRANSFLECTIVE

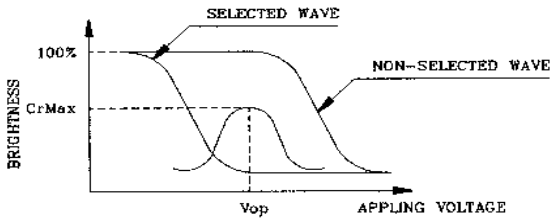
C: YELLOW

AT $\phi=0°$ $\theta=0°$

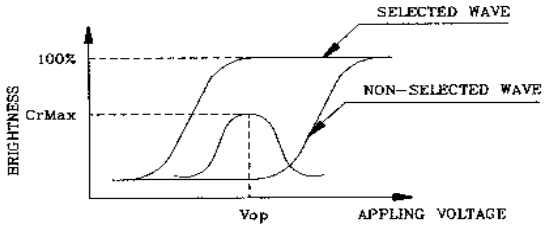
ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
Response Time (rise)	Tr	0℃	–	1550	1710	ms	NOTE2
		25℃	–	410	460		
		50℃	–	165	180		
Response Time (fall)	Tf	0℃	–	750	820	ms	NOTE2
		25℃	–	140	160		
		50℃	–	85	100		

(NOTE 1)

Definition of Operation Voltage(Vop)



(positive type)



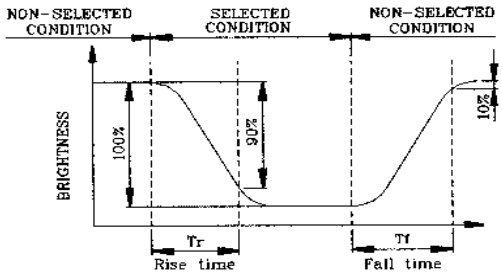
(negative type)

*Conditions

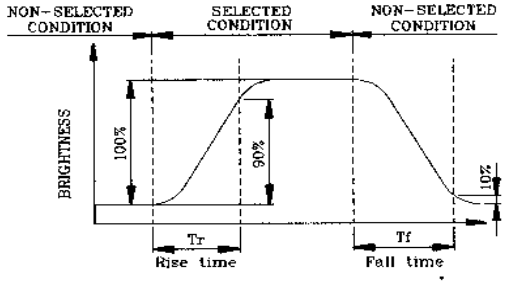
Viewing Angle : 0
Frame Frequency : 70Hz
Appling Waveform : I/N duty 1/a bias

(NOTE 2)

Definition of Response Time(Tr,Tf)



(positive type)



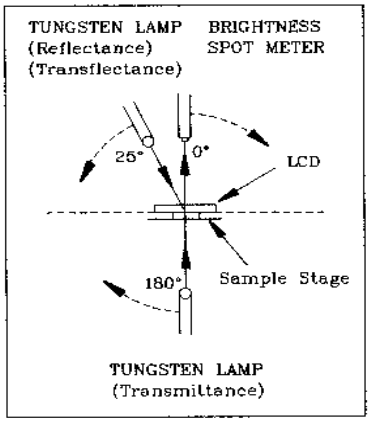
(negative type)

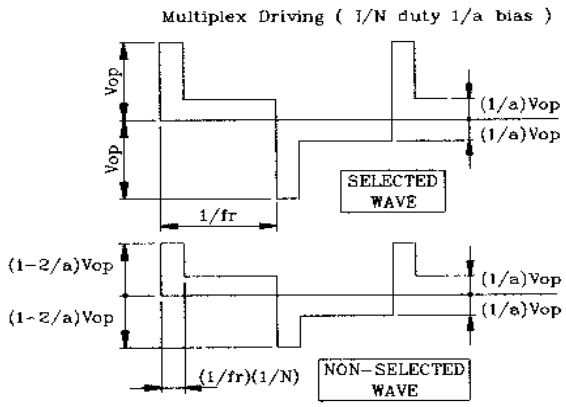
*Conditions

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

(NOTE 3)

Description of Measuring Equipment and Driving Waveforms





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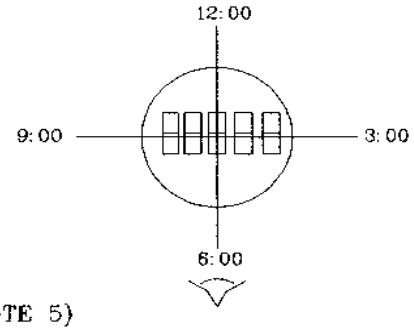
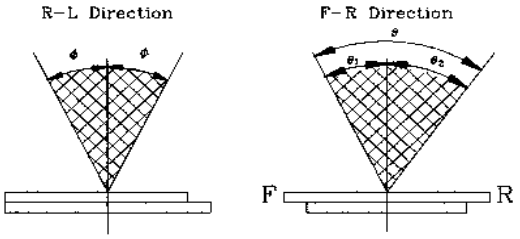
(NOTE 4)

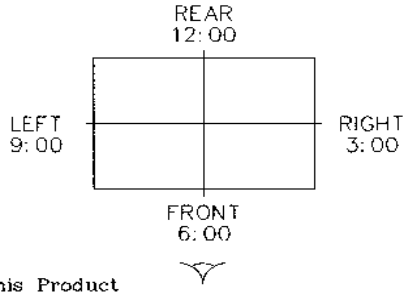
Definition of Viewing Direction



(NOTE 5)

Definition of Viewing Angle





*For This Product

The Viewing Direction Is 6 O'clock

So $\theta 1 > \theta 2$

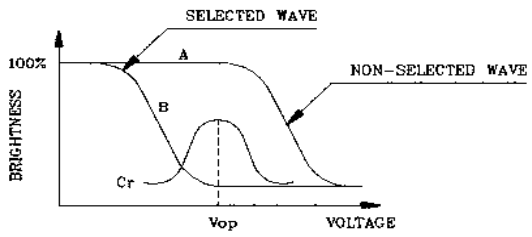
$\theta = \theta_1 + \theta_2$

*Conditions

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

(NOTE 6)

Definition of Contrast Ratio (Cr)



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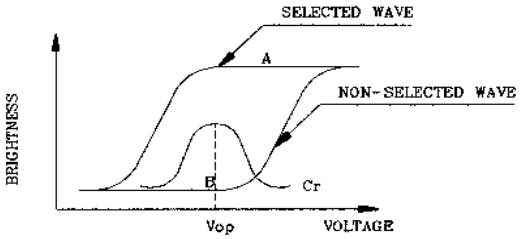

(negative type)

Contrast Ratio : Cr=A/B

*Conditions

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

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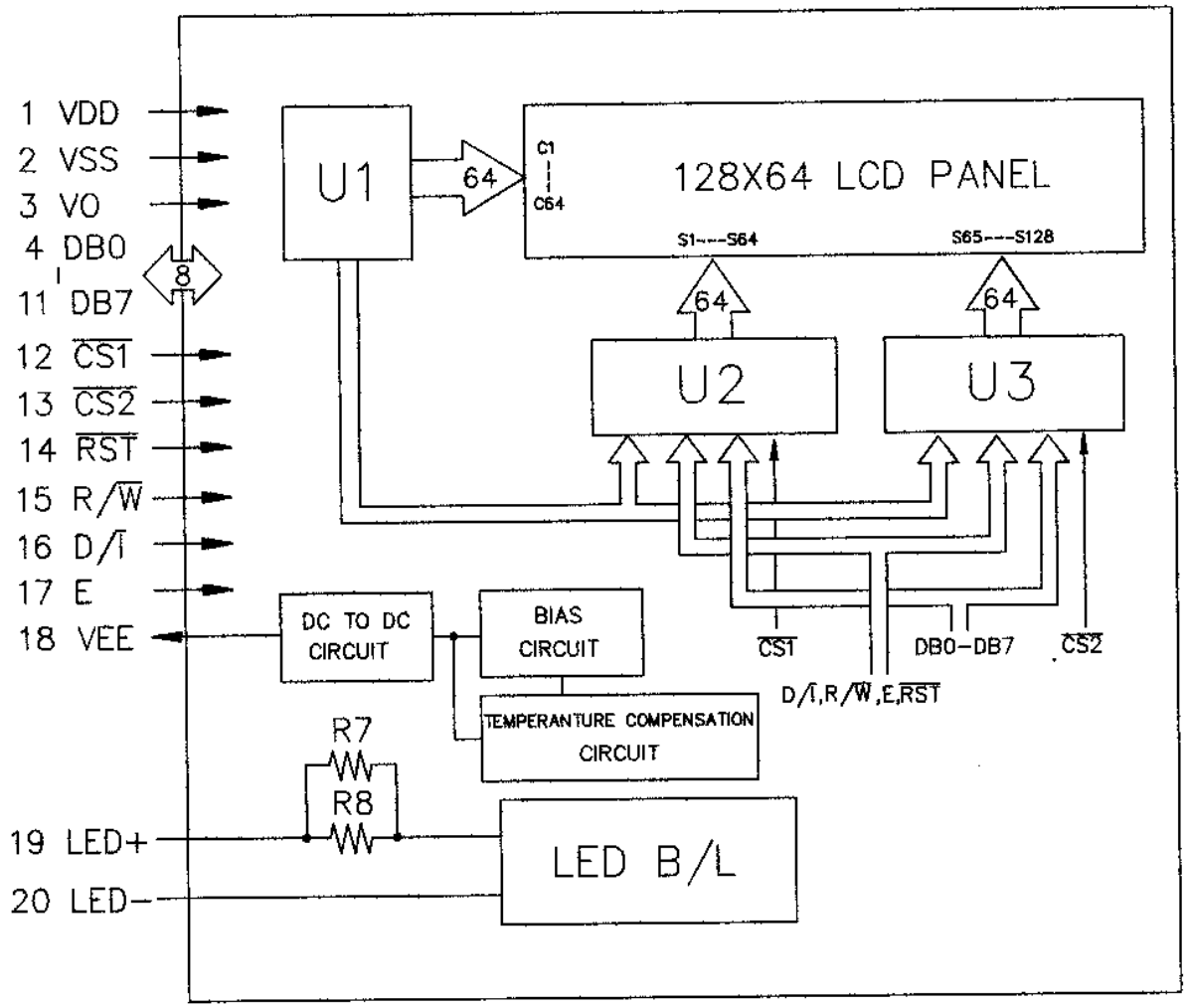
5. BLOCK DIAGRAM



R7=R8=10Ω

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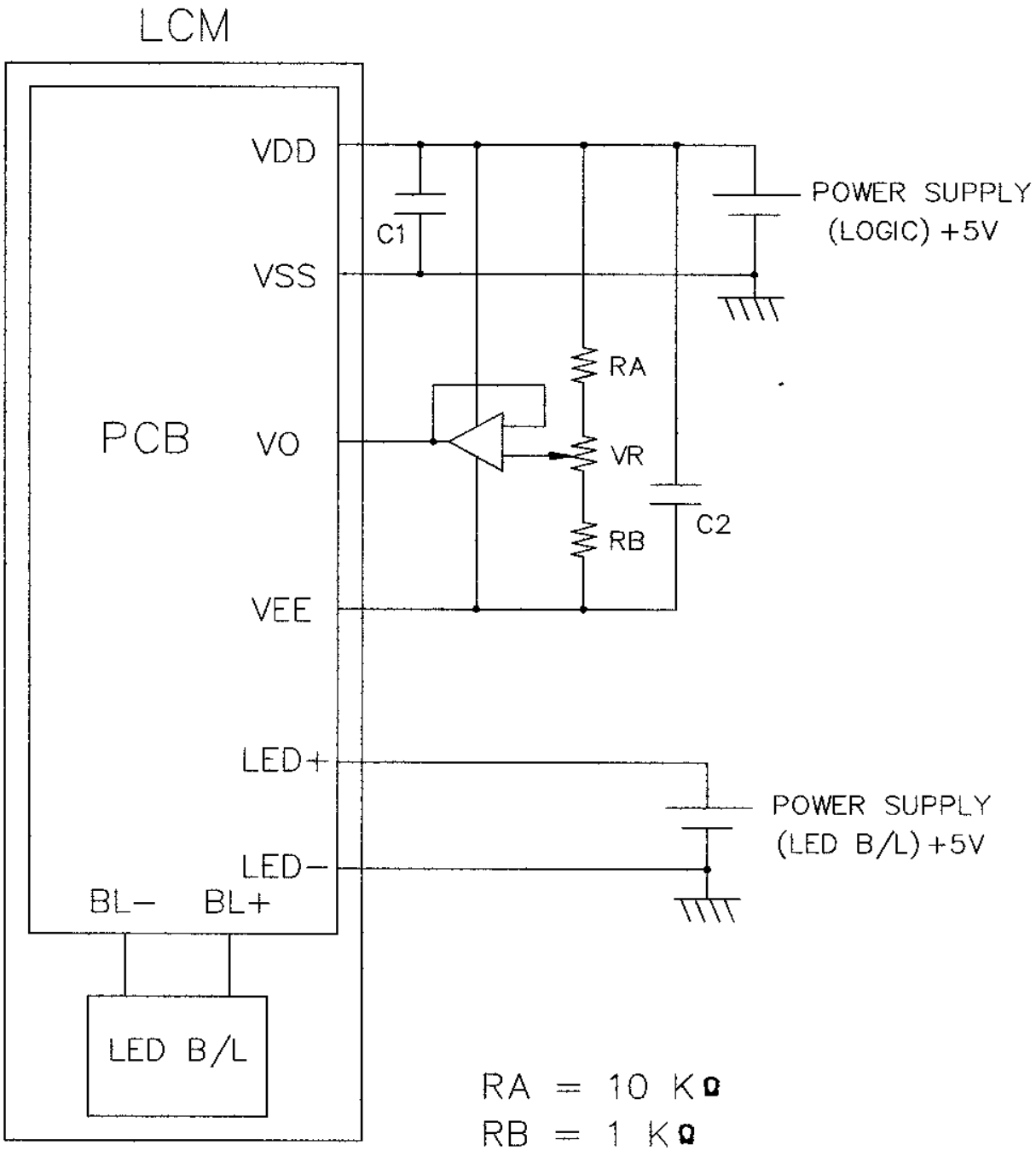
6. INTERNAL PIN CONNECTION

Pin No.	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	
6	DB2	H/L	
7	DB3	H/L	DATA BUS LINE
8	DB4	H/L	
9	DB5	H/L	
10	DB6	H/L	
11	DB7	H/L	(MSB)
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

7. POWER SUPPLY



RA = 10 KΩ
RB = 1 KΩ
VR = 10 KΩ(VARIABLE)
C1,C2 = 10 μF

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8. TIMING CHARACTERISTICS

8-1 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

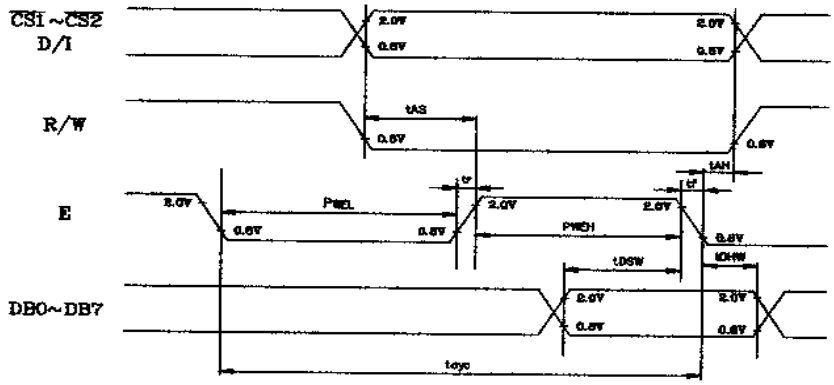

Fig . a Interface timing (data write)

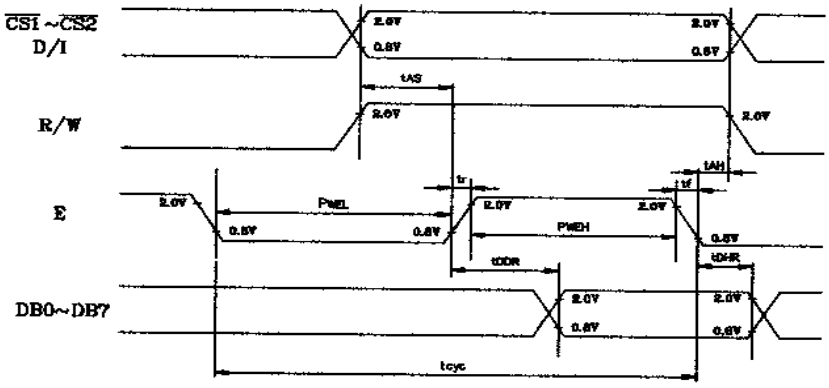

Fig . b Interface timing (data read)

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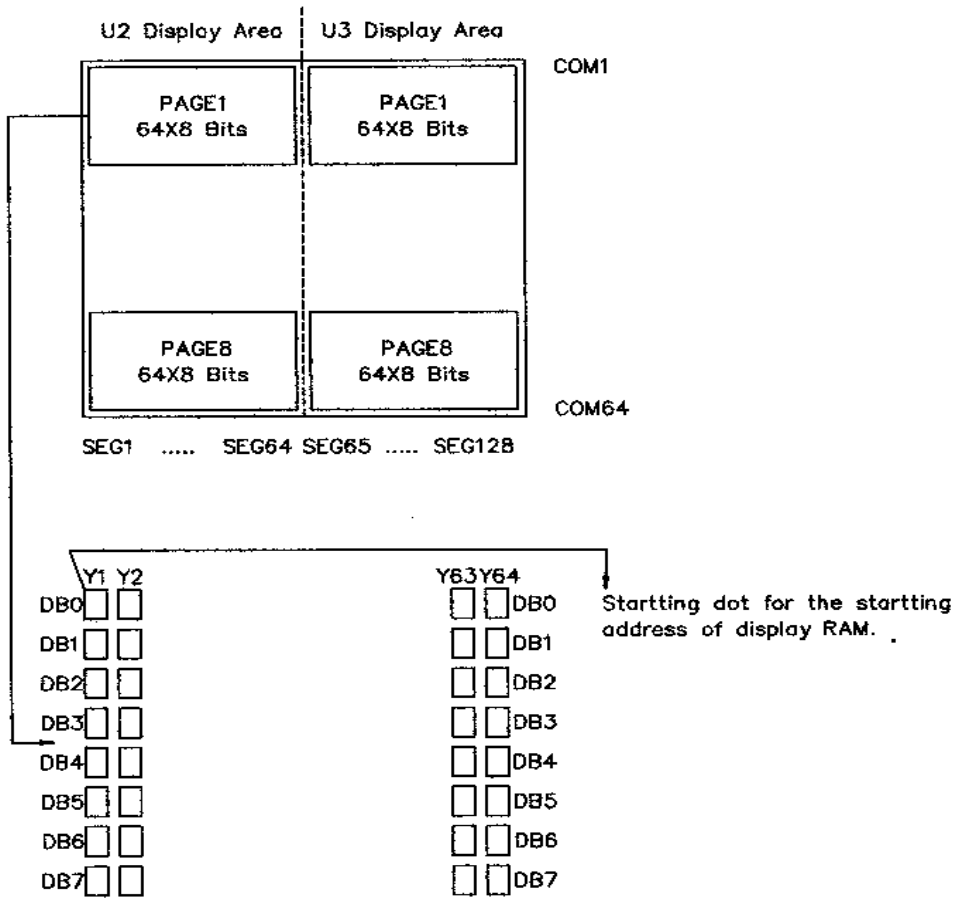
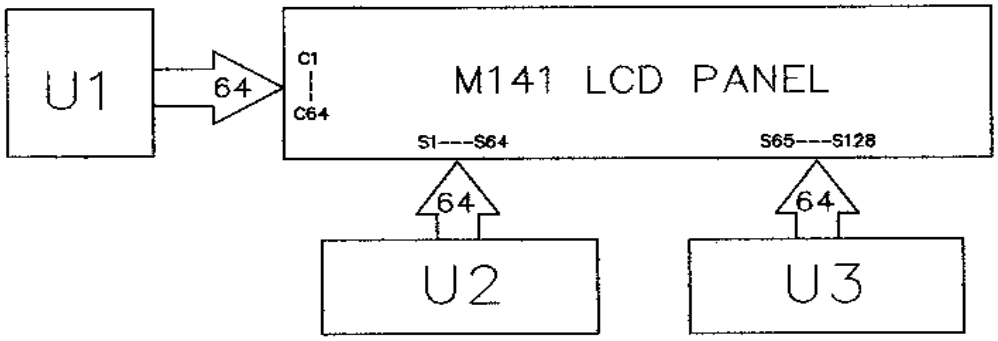
8-2 DISPLAY PATTERN



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 .



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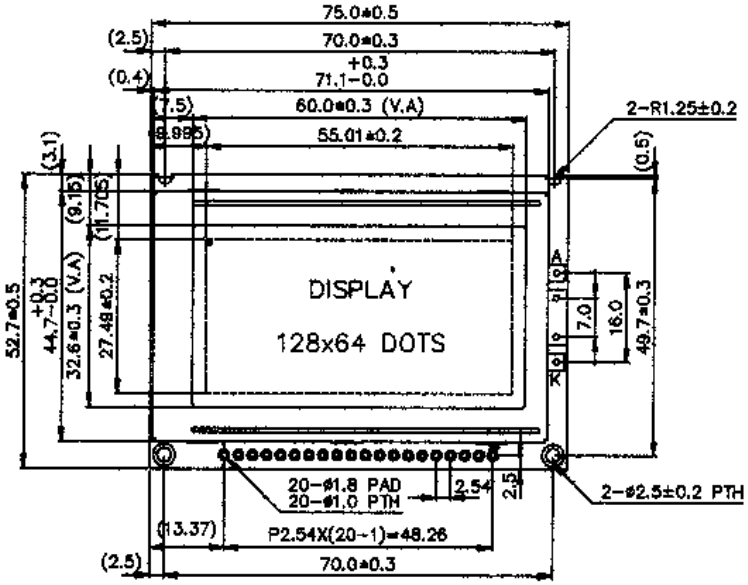
8-3 DISPLAY CONTROL INSTRUCTION

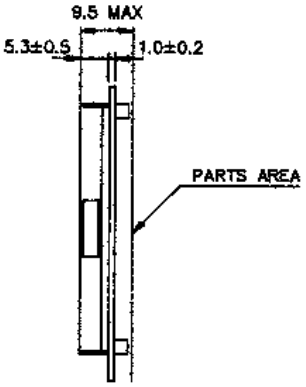
The display control instructions control the internal state of the KS0108B. Instructions is received from MPU to HCD61202U for the display control.

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.

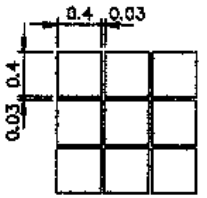
9. RELIABILITY TEST

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

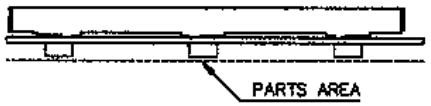




(LED B/L)



DETAIL DOTS



(LED B/L)

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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