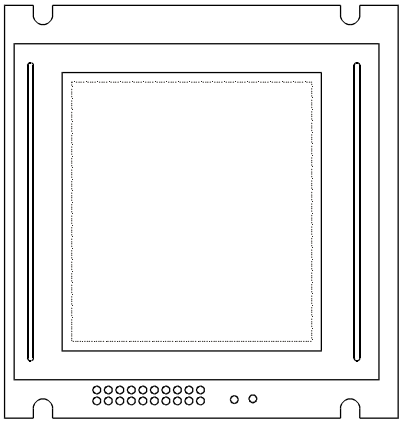
HANTRONIX

PRODUCT SPECIFICATION

HDM128GS12

128x128 GRAPHICS
LCD DISPLAY MODULE



HANTRONIX, INC. 10080 BUBB RD. CUPERTINO, CA 95014	**Q.A.:** JB	**REV.:** 1.0	HDM128GS12	SHEET 1 OF 15 **DATE:** 9/18/98

MECHANICAL DATA

(1) Product No.		
(2) Module Size		85.0 (W)mm x 100.0 (H)mm x MAX14.0 (D)mm (EL B.L.)
(3) Dot Size		0.39 (W)mm x 0.39 (H)mm
(4) Dot Pitch		0.43 (W)mm x 0.43 (H)mm
(5) Number of Dots		128 (W) x 128 (H)Dots
(6) Duty		1/128
(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 ☐ LED ☐ EL ☐ CCFT
(10) Weight		EL B/L: 126g

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ABSOLUTE MAXIMUM RATINGS

(1) ELECTRICAL ABSOLUTE RATINGS

Vss=0V

ITEM	SYMBOL	MIN	MAX	UNIT	COMMENT
Power Supply for Logic	VDD−VSS	−0.3	7.0	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	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

ELECTRICAL CHARACTERISTICS

(VDD=5V±10%)

ITEM	SYMBOL	CONDITION		MIN.	TYP.	MAX.	UNIT
Input Voltage	VIH	H level		0.8VDD	–	VDD	V
	VIO	L level		0	–	0.2VDD	V
Recommended LCD Driving Voltage (Normal Temp. LCM)	VDD-VO	Duty= 1/128 Bias= 1/11	0℃	–	18.9	19.5	V
			25℃	16.9	17.5	18.1	
			50℃	15.6	16.0	–	
Recommended LCM Driving Voltage (Wide Temp. LCM)	VDD-VO		-20℃	–	–	–	V
			0℃	–	–	–	
			25℃	–	–	–	
			50℃	–	–	–	
			70℃	–	–	–	
Power Supply Current	IDD	VDD = 5.0V PATTERN: 		–	18.5	30	mA
LED Power Supply Current	I LED	V_{BL} = 2.2Vdc (R_{BL} = 0Ω)		–	–	–	mA
EL Power Supply Current	I EL	V_{EL} = 110V_{AC} 400Hz		–	–	6.0	mA

OPTICAL CHARACTERISTICS

(For Normal Temperature Mode LCM)

AT Vop

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.
R	A	3.0	4.0	30	40	20	30
	C	–	–	–	–	–	–
	J	–	–	–	–	–	–
S	A	2.5	3.5	25	35	20	30
	C	–	–	–	–	–	–
	J	–	–	–	–	–	–
T	E	–	–	–	–	–	–
	G	–	–	–	–	–	–
note		NOTE6		NOTE5			

AT ϕ=0° θ=0°

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
Response Time (rise)	Tr	0℃	–	450	900	ms	NOTE 2
		25℃	–	110	220		
		50℃	–	65	130		
Response Time (fall)	Tf	0℃	–	650	1100	ms	NOTE 2
		25℃	–	135	250		
		50℃	–	80	150		

note :

R: REFLECTIVE
S: TRANSFLECTIVE
T: TRANSMISSIVE
A/B: GRAY
C/D: YELLOW
E/F: BLUE
G/H: NORMALLT BLACK
J/K: NORMALLY WHITE

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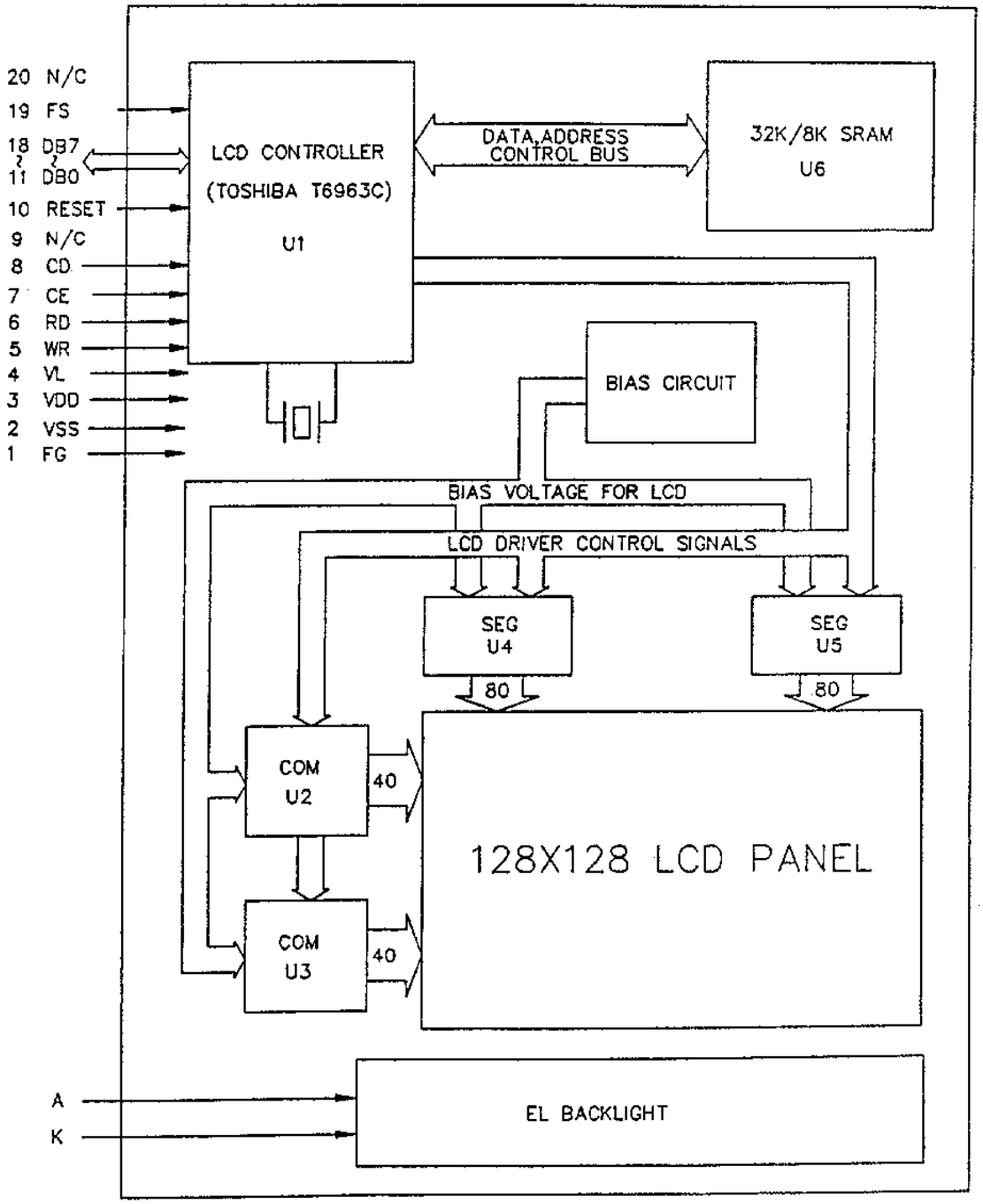
BLOCK DIAGRAM



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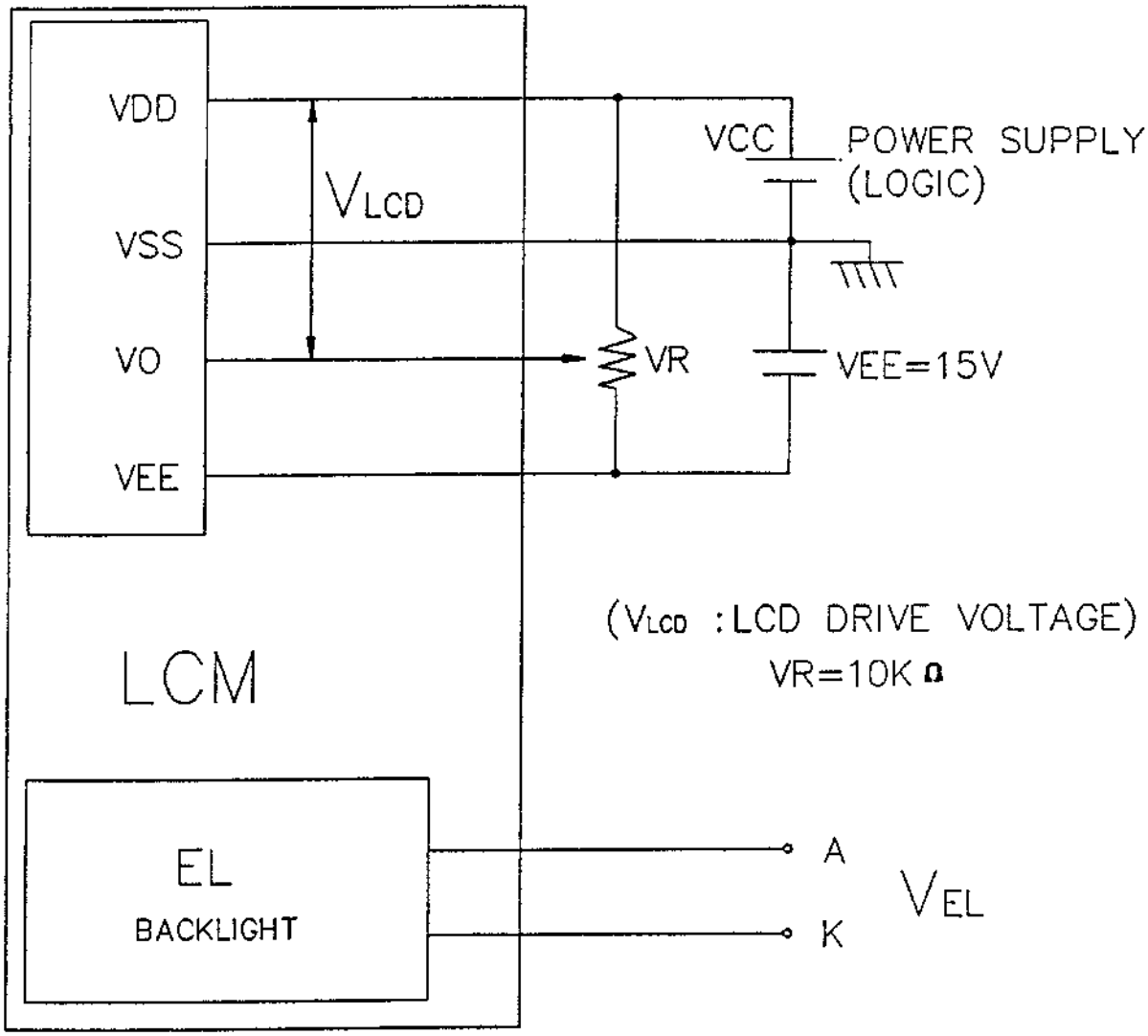
INTERNAL PIN CONNECTION

PIN NO.	SYMBOL	FUNCTION
1	FG	To Frame PAD
2	VSS	0V — Power Supply
3	VDD	+5V — Power Supply
4	VL	LCD Contrast Voltage Input
5	WR	Command and Data Write
6	RD	Data and Status Read
7	CE	Chip Enable
8	CD	WR="L",C/D="H" :Command Write C/D="L" :Data Write RD="L",C/D="H" :Status Read C/D="L" :Data Read
9	N/C	NO CONNECTION
10	RESET	Reset Signal
11	DB0	(LSB)
12	DB1	DATA BUS LINE
13	DB2	DATA BUS LINE
14	DB3	DATA BUS LINE
15	DB4	DATA BUS LINE
16	DB5	DATA BUS LINE
17	DB6	DATA BUS LINE
18	DB7	(MSB)
19	FS	Pins For Selection of Font (6X8 or 8X8)
20	N/C	NO CONNECTION

POWER SUPPLY



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INTERFACE TIMING CHARACTERISTICS

(VDD=5.0V±10%, VSS=0V, Ta=−20 To 75°C)

ITEM	SYMBOL	CONDITION	MIN.	MAX.	UNIT
C/D SET UP TIME	t_{CDS}	Fig.	100	–	ns
C/D HOLD TIME	t_{CDH}	Fig.	10	–	ns
$\overline{CE}$, $\overline{RD}$, $\overline{WR}$ CLOCK WIDTH	t_{CE}, t_{RD}, t_{WR}	Fig.	80	–	ns
DATA SET UP TIME	t_{DS}	Fig.	80	–	ns
DATA HOLD TIME	t_{DH}	Fig.	40	–	ns
ACCESS TIME	t_{ACC}	Fig.	–	150	ns
DATA OUTPUT HOLD TIME	t_{OH}	Fig.	10	50	ns

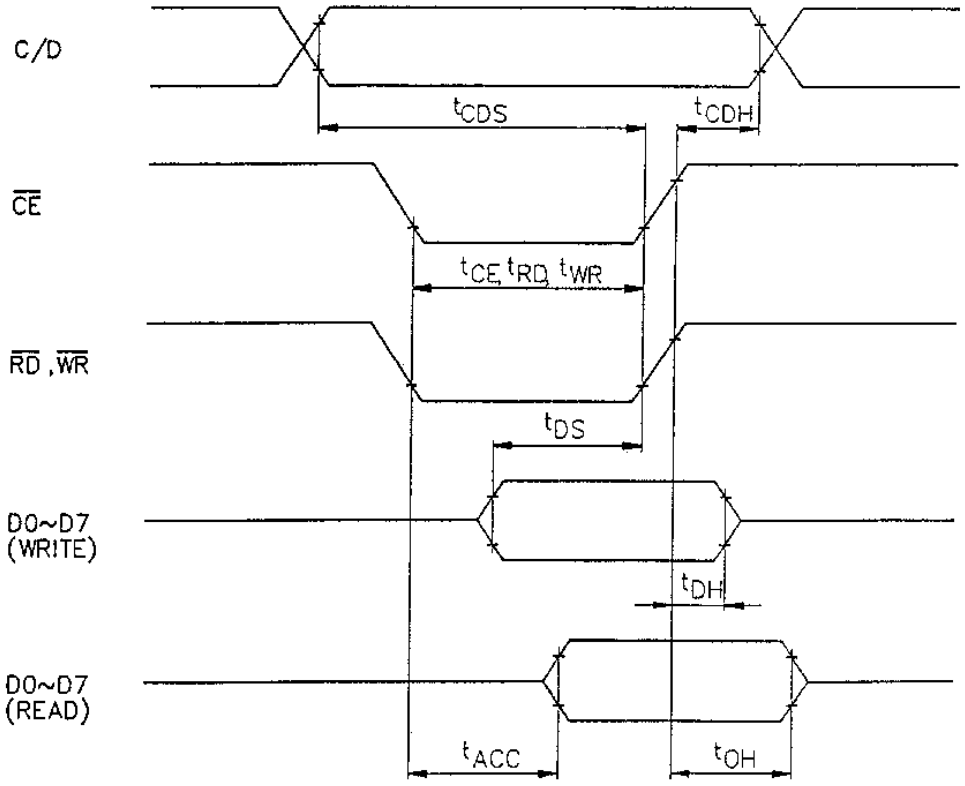

Fig. INTERFACE TIMING CHART

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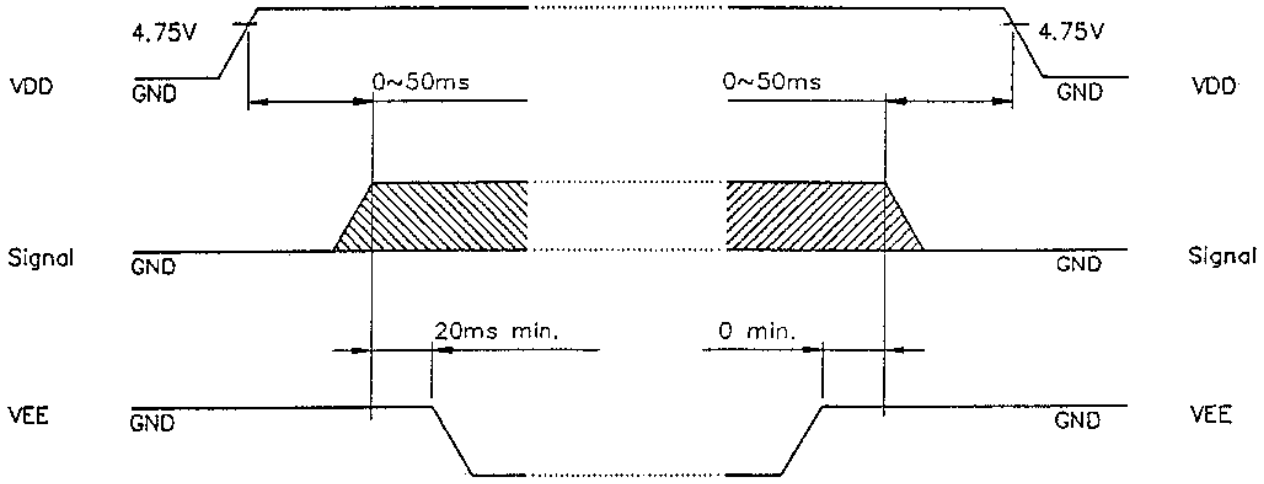
POWER ON/OFF TIMING CHARACTERISTICS



POWER ON POWER OFF

The missing pixels may occur when the LCM is driven beyond above power interface timing sequence.

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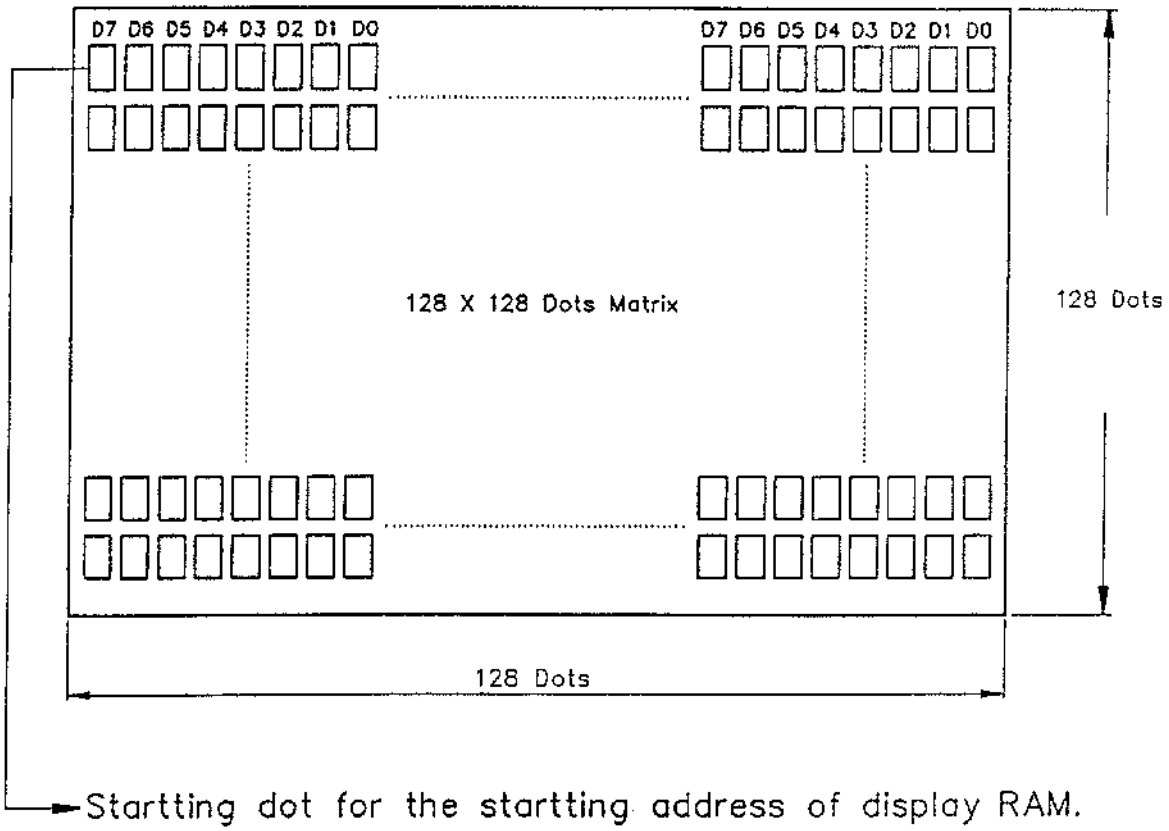
DISPLAY PATTERN



DB0~DB7 are 8 bits transmitted data ,where DB0 is LSB and DB7 is MSB.

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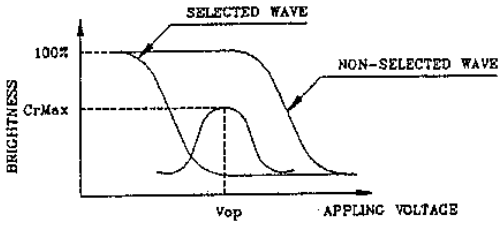
RELIABILITY TEST

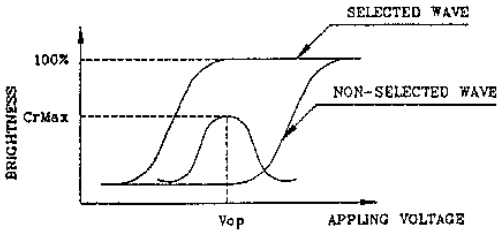
NO	ITEM	CONDITION			STANDARD	NOTE
1	High Temp. Leaving	70°C	120HR		Appearance without defect	
2	Low Temp. Leaving	−20°C	120HR		Appearance without defect	
3	High Temp. & High Humi. Leaving	40°C 90%RH	120HR		Appearance without defect	
4	Thermal Shock	−20°C,30min→25°C,5min →60°C,30min→25°C,5min (1cycle)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

(NOTE 1)

Definition of Operation Voltage(Vop)



(positive type)



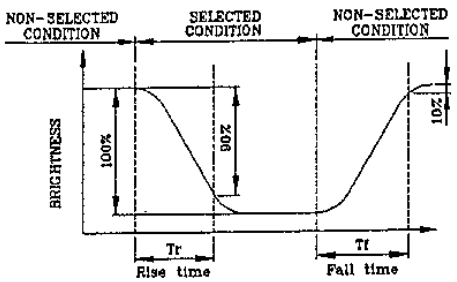
(negative type)

*Conditions

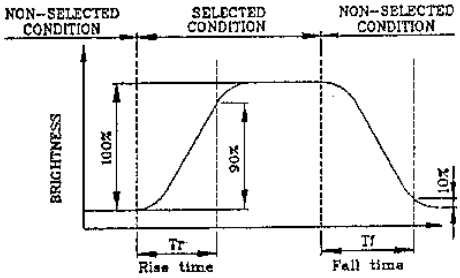
Viewing Angle : 0
Frame Frequency : 70Hz
Appling Waveform : 1/N duty 1/a bias

(NOTE 2)

Definition of Response Time(Tr,Tf)



(positive type)



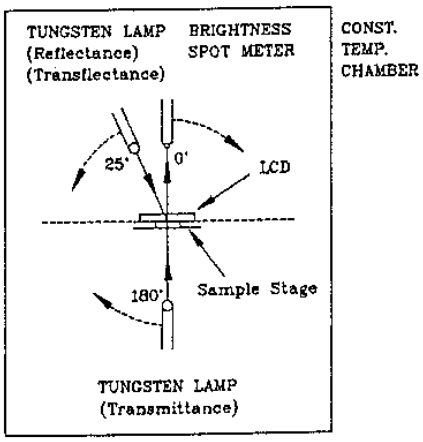
(negative type)

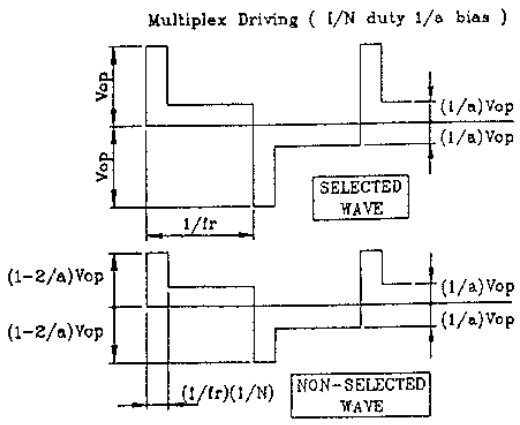
*Conditions

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

(NOTE 3)

Description of Measuring Equipment and Driving Waveforms





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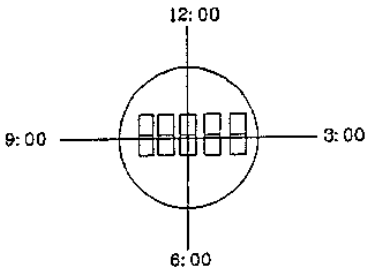
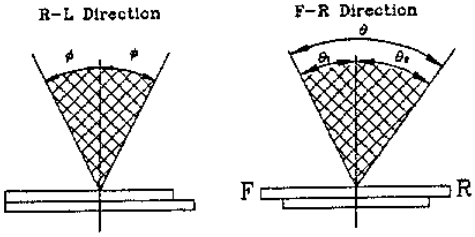
(NOTE 4)

Definition of Viewing Direction



(NOTE 5)

Definition of Viewing Angle



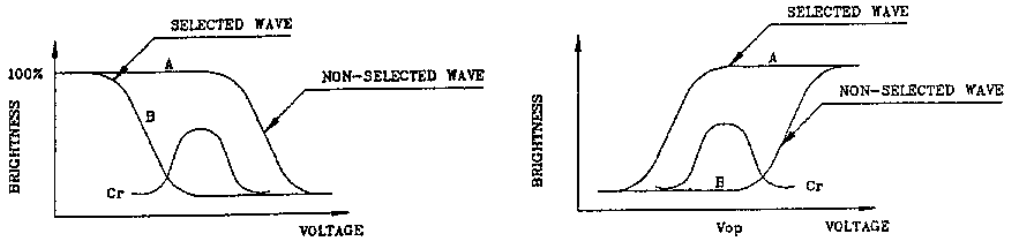
$\theta = \theta_1 + \theta_2$

*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

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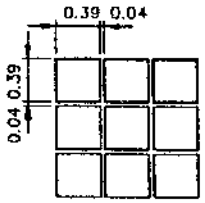
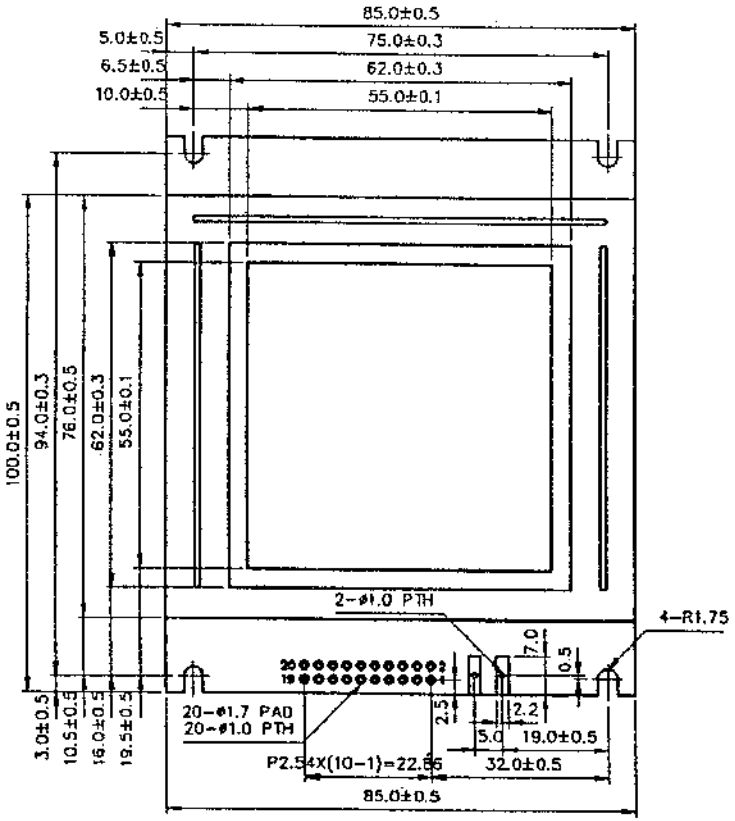
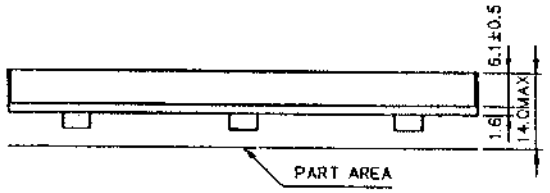
PIN NO.	SYMBOL	FUNCTION	
1	FG	FRAME GROUND	
2	VSS	0V	Ground
3	VDD	5V	Power Supply for Logic
4	VL	--	LCD Contrast Voltage Input
5	WR	L	Data write
6	RD	L	Data read
7	CE	L	Chip enable
8	CD	H/L	H=command, L=Data
9	N/C	NO CONNECTION	
10	RESET	L	Reset
11	DB0	H/L	(LSB)
12	DB1	H/L	
13	DB2	H/L	
14	DB3	H/L	Data Bus
15	DB4	H/L	
16	DB5	H/L	
17	DB6	H/L	
18	DB7	H/L	(MSB)
19	FS	H/L	Font select
20	N/C	NO CONNECTION	



128 X 128 DOTS





NOTES :

1. RESOLUTION : 128 X 128 DOTS
2. GENERAL TOLERANCE : ±0.5mm
3. BACKLIGHT : NONE/EL

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