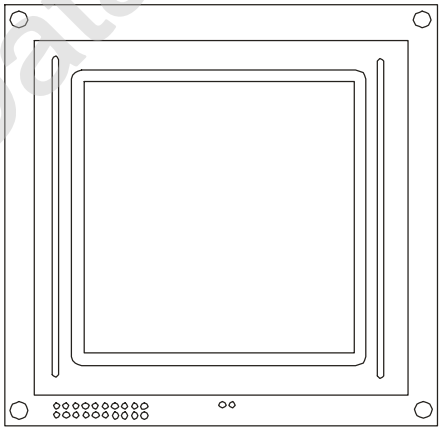
HANTRONIX

PRODUCT SPECIFICATION

HDM128GS12-3

128 x 128 GRAPHICS
LCD DISPLAY MODULE



HANTRONIX, INC. 10080 BUBB RD. CUPERTINO, CA 95014	**Q.A.:** JB	**REV.:** 1.0	HDM128GS12-3	SHEET 1 OF 15 **DATE:** 2/22/01

MECHANICAL DATA

(1) Product No.	HDM128GS12_-3
(2) Module Size	92.0 (W)mm x 106.0 (H)mm x MAX12.0(D)mm (W/O,EL B.L.) 92.0 (W)mm x 106.0 (H)mm x MAX15.0(D)mm (LED B.L.)
(3) Dot Size	0.5 (W)mm x 0.5 (H)mm
(4) Dot Pitch	0.55 (W)mm x 0.55 (H)mm
(5) Number of Characters	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 B/L ☐ EL B/L
(10) LCD Controller	T6963C
(11) Weight	W/O B/L: 90.4g EL B/L: 96.5g LED B/L: 120.5g

ABSOLUTE MAXIMUM RATINGS

(1) ELECTRICAL ABSOLUTE RATINGS

Vss=0V

	SYMBOL	MIN	MAX	UNIT	COMMENT
Power Supply for Logic	VDD−VSS	−0.3	5.5	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 2,4		Note 3,4		Note 4,5		Note 4,6	

Note 2 Ta≦50°C : 85%RH max
Ta>50°C : Absolute humidity must be lower than the humidity of 85%RH at 50°C

Note 3 Ta at −20°C will be < 48hrs, at 70°C will be < 120hrs

Note 4 Background color changes slightly depending on ambient temperature. This phenomenon is reversible.

Note 5 Ta≦70°C : 75%RH max
Ta>70°C : Absolute humidity must be lower than the humidity of 75%RH at 70°C

Note 6 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 LC Driving Voltage (NORMAL TEMP. LCM)	VDD−V0	DUTY= 1/128 Bias= 1/12	0°C	18.4	19.4	–	V
			25°C	17.2	18.2	19.2	
			50°C	15.4	16.7	–	
Recommended LC Driving Voltage (WIDE TEMP. LCM)	VDD−V0		−20°C	16.8	17.2	17.6	V
			0°C	15.7	16.1	16.5	
			25°C	15.6	16.0	16.4	
			50°C	15.3	15.7	16.1	
			70°C	15.1	15.5	15.9	
Power Supply Current for LCM	IDD	VDD = 5.0V		17	22	29	mA
Power Supply Current for LED	ILED	VBL = 5.0V RBL = 0Ω		95	101	111	mA
Power Supply Current for EL	IEL	VBL = 110Vac 400Hz RBL = 0Ω		–	–	10	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	–	–	–	–	–	–
	C	–	7	–	60	–	28
	J	–	8	–	60	–	35
S	A	–	–	–	–	–	–
	C	–	6	–	50	–	25
	J	–	–	–	–	–	–
T	E	–	–	–	–	–	–
	G	–	–	–	–	–	–
NOTE		FIG 6		FIG 5			

NOTE :

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

AT $\phi=0°$ $\theta=0°$

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
Response Time (rise)	Tr	0℃	–	270	540	ms	FIG 2
		25℃	–	140	280		
		50℃	–	50	120		
Response Time (fall)	Tf	0℃	–	760	1500	ms	FIG 2
		25℃	–	210	420		
		50℃	–	120	240		

OPTICAL CHARACTERISTICS

(FOR WIDE 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	–	3.8	–	–	–	–
	C	–	4.1	–	–	–	–
	J	–	6.5	–	26	–	33
S	A	–	4.0	–	46	–	25
	C	–	–	–	–	–	–
	J	–	–	–	–	–	–
T	A	–	2.5	–	–	–	–
NOTE		FIG 6		FIG 5			

NOTE :

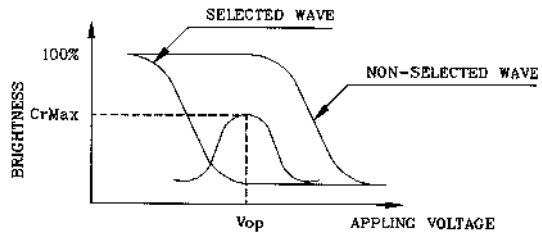
R: REFLECTIVE
S: TRANSFLECTIVE
T: TRANSMISSIVE
A: GRAY
C: YELLOW
E: BLUE
G: NORMALLY BLACK
J: NORMALLY WHITE

AT $\phi=0°$ $\theta=0°$

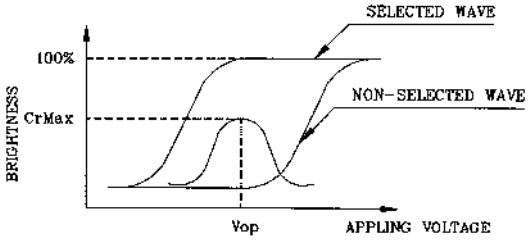
ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
Response Time (rise)	Tr	-20℃	–	1620	2400	ms	FIG 2
		0℃	–	350	520		
		25℃	–	120	180		
		50℃	–	70	105		
		70℃	–	55	80		
Response Time (fall)	Tf	-20℃	–	1330	2000	ms	FIG 2
		0℃	–	640	900		
		25℃	–	200	300		
		50℃	–	80	120		
		70℃	–	35	50		

(FIG 1)

Definition of Operation Voltage(Vop)



(positive type)



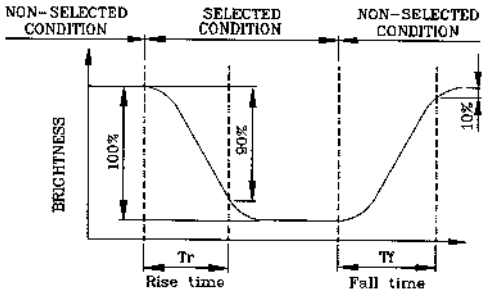
(negative type)

*Conditions

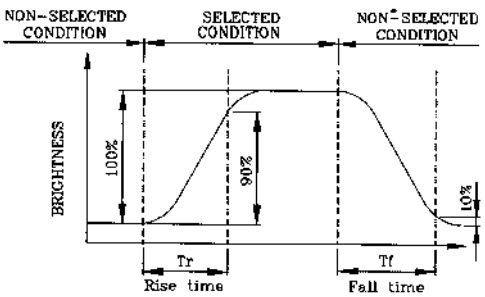
Viewing Angle : 0
Frame Frequency : 70Hz
Appling Waveform : I/N duty 1/a bias

(FIG 2)

Definition of Response Time(Tr,Tf)



(positive type)



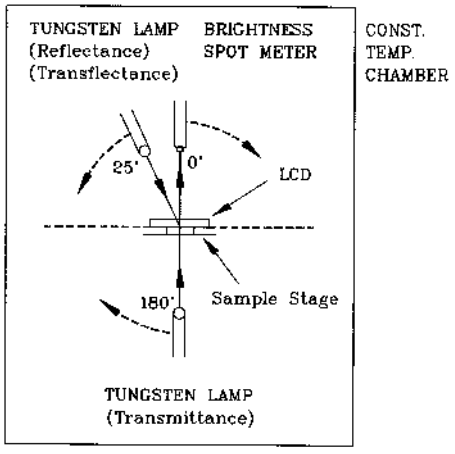
(negative type)

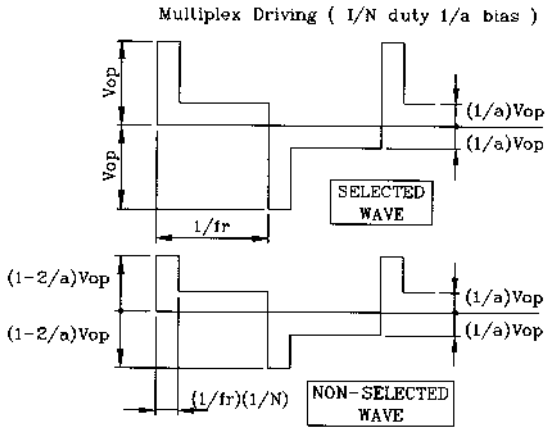
*Conditions

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

(FIG 3)

Description of Measuring Equipment and Driving Waveforms





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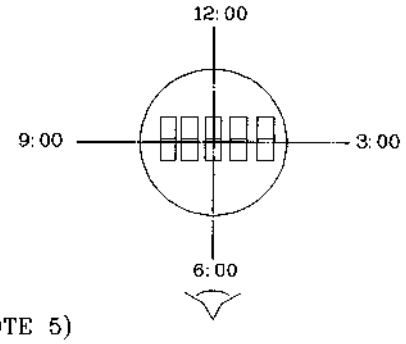
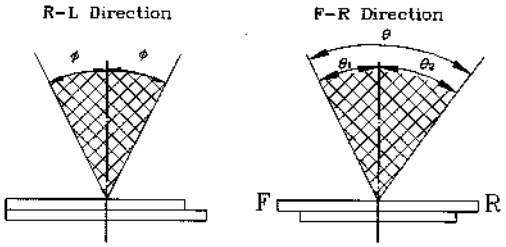
(NOTE 4)

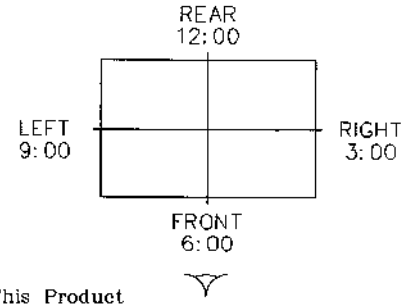
Definition of Viewing Direction



(NOTE 5)

Definition of Viewing Angle





*For This Product

The Viewing Direction Is 6 O'clock

So $\theta 1 > \theta 2$

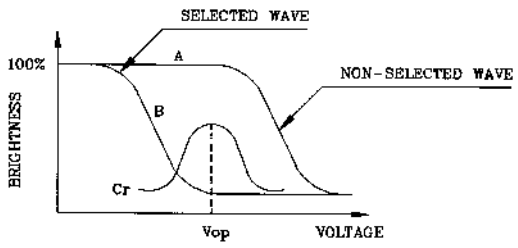
$\theta = \theta_1 + \theta_2$

*Conditions

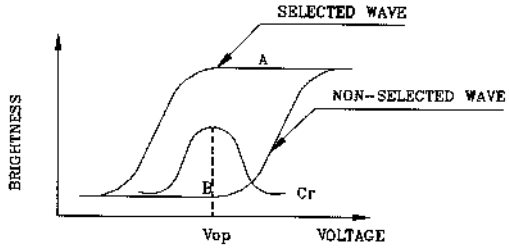
Operating Voltage : Vop
Frame Frequency : 70Hz
Appling Waveform : 1/N duty 1/a bias
Contrast Ratio : larger than 2

(NOTE 6)

Definition of Contrast Ratio (Cr)



(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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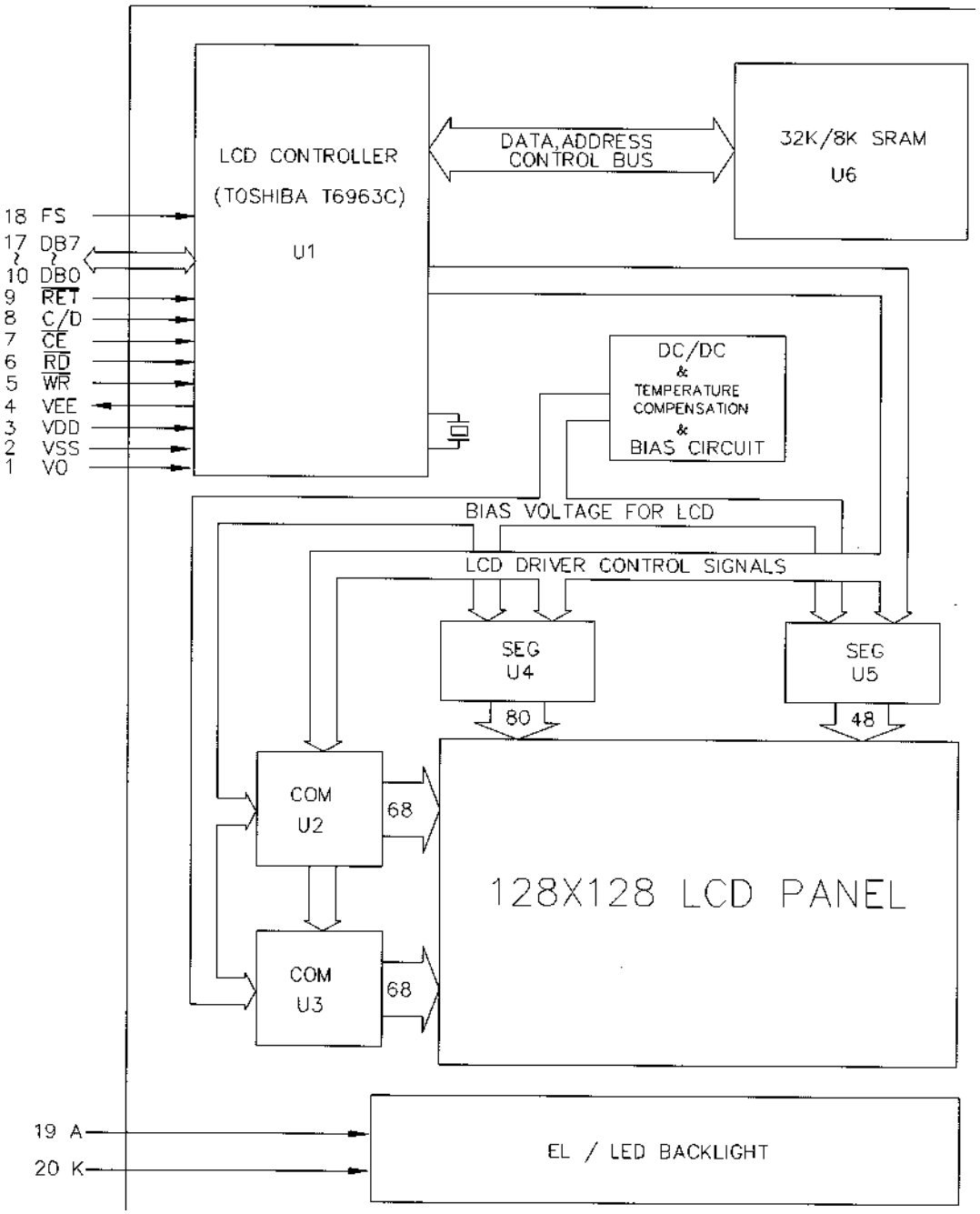
BLOCK DIAGRAM



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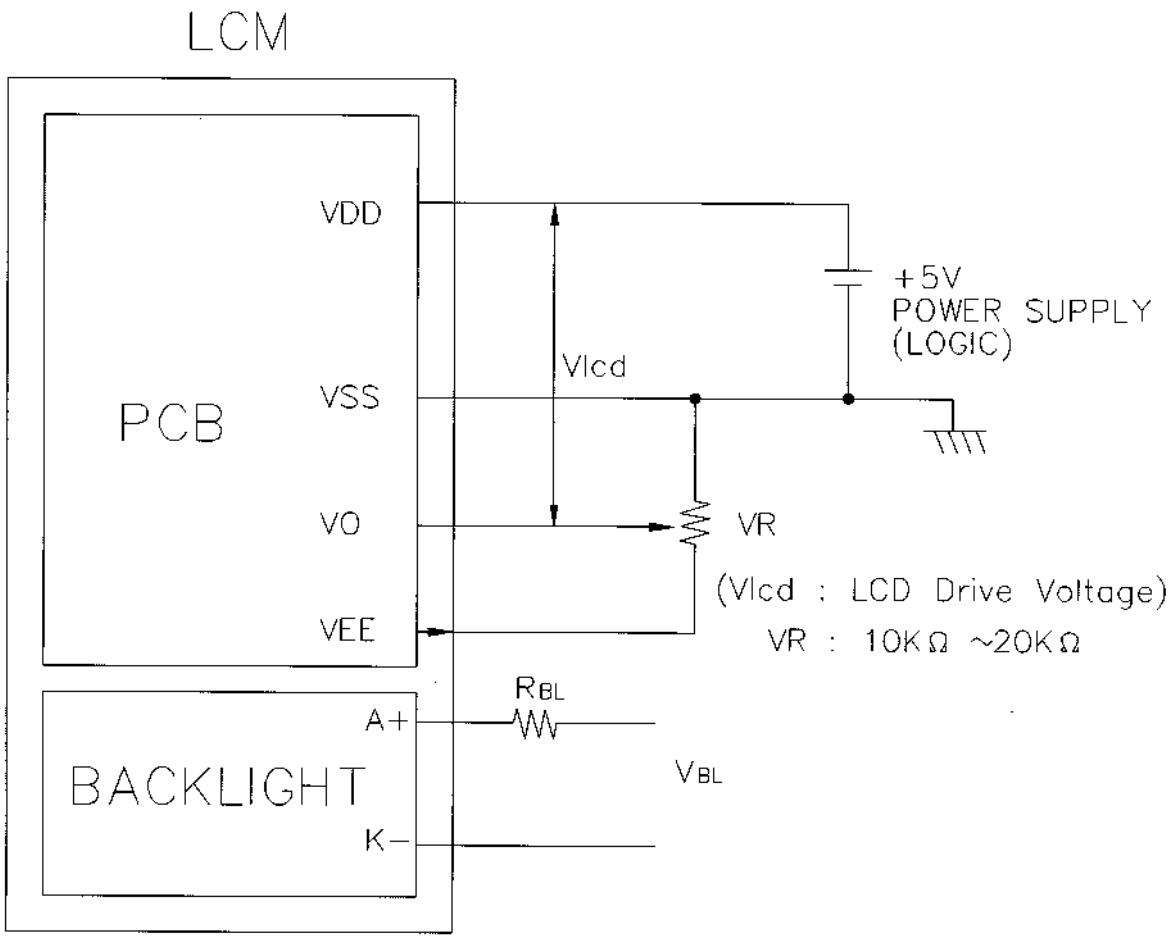
INTERNAL PIN CONNECTION

No	Symbol	Function	
1	Vo	Adjust LCD Contrast	
2	VSS	0V	Ground
3	VDD	+5V	Power Supply for Logic
4	VEE	LCD Contrast Voltage Output	
5	$\overline{WR}$	L	Data Write
6	$\overline{RD}$	L	Data Read
7	$\overline{CE}$	L	Chip Enable
8	C/D	H/L	H=Command ; L=Data
9	$\overline{RST}$	L	Reset
10	DB0	H/L	(LSB)
11	DB1	H/L	
12	DB2	H/L	
13	DB3	H/L	
14	DB4	H/L	Data Bus
15	DB5	H/L	
16	DB6	H/L	
17	DB7	H/L	(MSB)
18	FS	H/L	Font Select
19	A(+)	Power Supply for LED/EL	
20	K(−)	Power Supply for LED/EL	

POWER SUPPLY



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

ITEM / B.L. / VALUE	V_{BL}	R_{BL}
LED	5V	0Ω
EL	110VAC 400HZ	0Ω

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TIMING CHARACTERISTICS

INTERFACE TIMING

ITEM	ITEM	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_{CP},t_{RP},t_{WP}	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

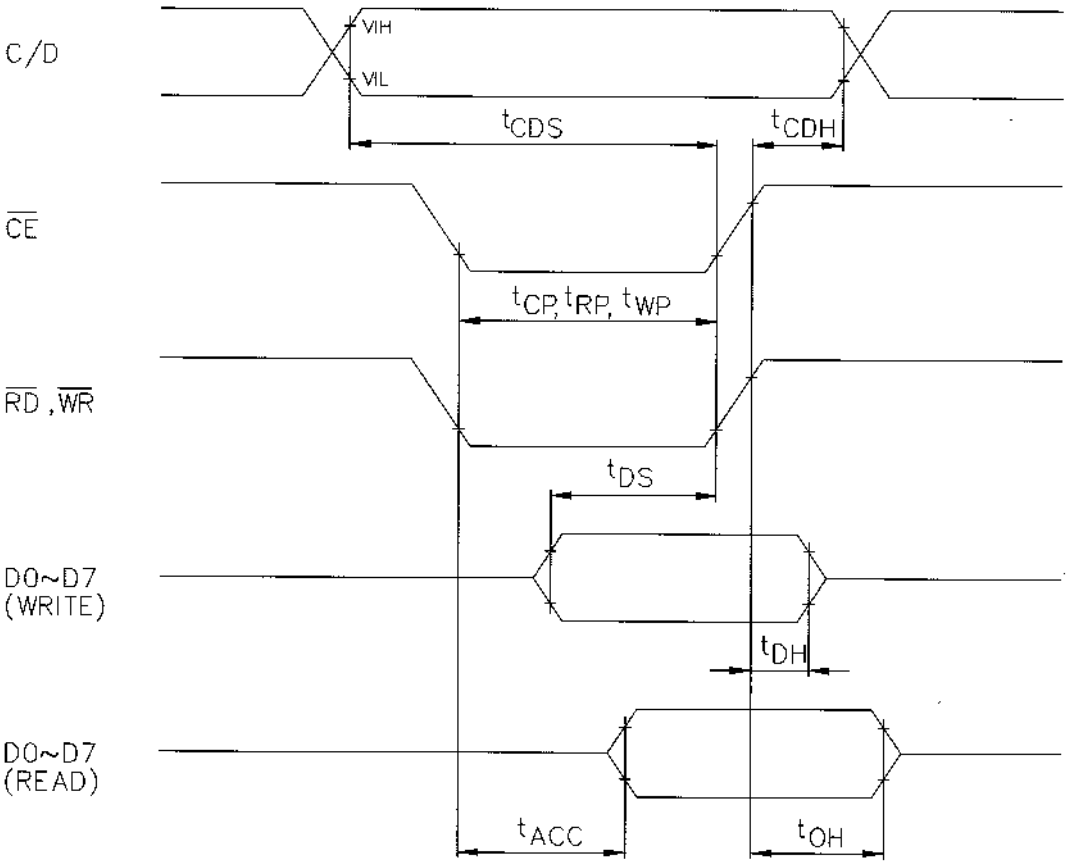

Fig. INTERFACE TIMING CHART

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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

(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.

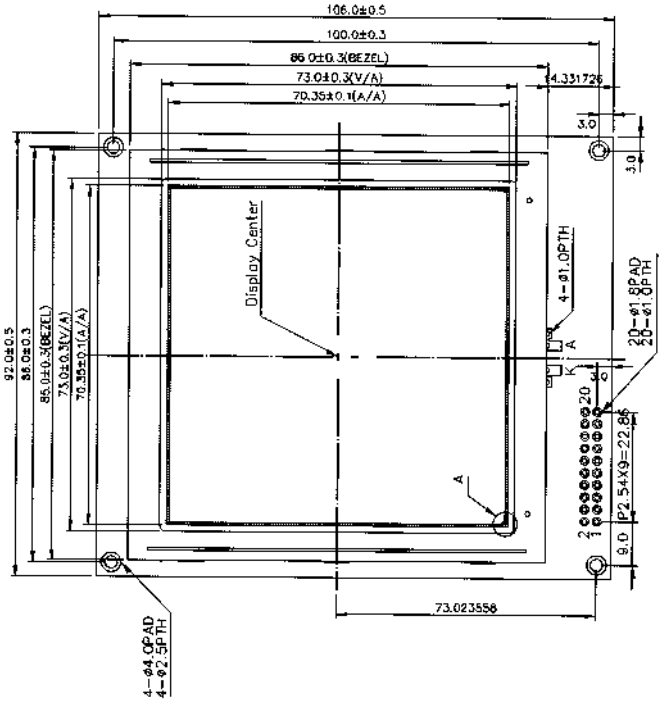
- STORAGE
  1. Store the panel or module in a dark place where the temperature is 25°C±5°C and the humidity is below 65% RH.
  2. Do not place the module near organics solvents or corrosive gases.
  3. Do not crush, shake, or jolt the module.

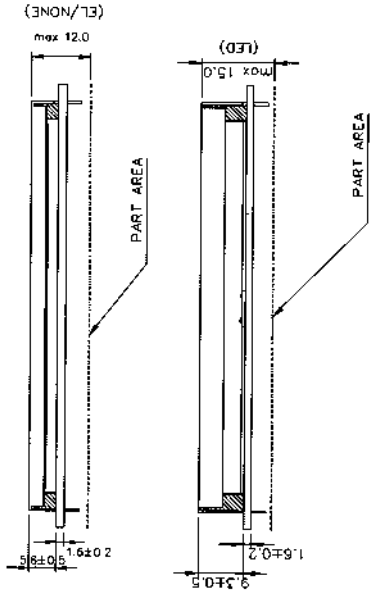
- TERMS OF WARRANT
  1. Acceptance inspection period
     The period is within one month after the arrival of contracted commodity at the buyer's factory site.
  2. Applicable warrant period
     The period is within twelve months since the date of shipping out under normal using and storage conditions.

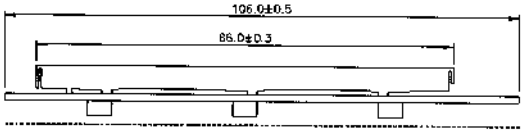
- THE OPERATING LIFE TIME OF BACK LIGHT
  LED : Decay 10%, Luminosity /1000 hrs.
  EL : 3000 hrs.

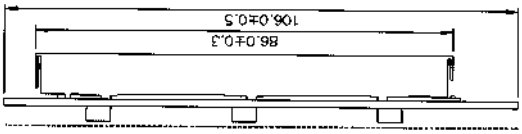
P/N : LMC9AX193X
LMA9AX193X
LMD9AX193X

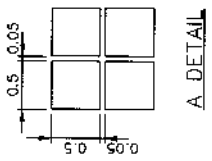
NOTE :
1.RESOLUTION : 128 X 128 Dots
2.GENERAL TOLERANCE : ±0.5mm
3.LOGIC VOLTAGE : 5V
4.CONTROLLER : T6963C
5.BACKLIGHT : LED AND EL/NONE
6.DC TO DC : Built-in
7.Temp. Comp. CKT : Built-in











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