

液晶之友 电话: 020-33819057

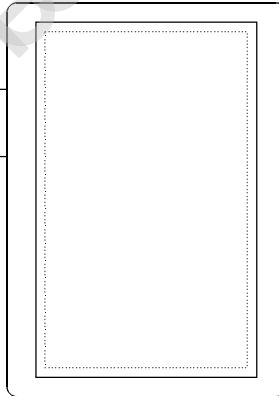
[Http://www.lcdfriends.com](http://www.lcdfriends.com)

HANTRONIX

PRODUCT SPECIFICATION

HDM2432TS-T

240x320 GRAPHICS
LCD DISPLAY MODULE



HANTRONIX, INC. 10080 BUBB RD. CUPERTINO, CA 95014	Q.A.: JB	REV.: 1.0	HDM2432TS-T	SHEET 1 OF 15
				DATE: 4/9/99

1.MECHANICAL DATA

- (1) Product No.
(2) Module Size 73.28 (W)mm X 92.18 (H)mm X 6.5 (D)mm
(3) Dot Size 0.225 (W)mm X 0.225 (H)mm
(4) Dot Pitch 0.24 (W)mm X 0.24 (H)mm
(5) Number of Dots 240 (W) X 320 (H) Dots
(6) Duty 1/240
(7) LCD Display Mode FSTN: ☐ Black and White(Normally White/Positive Image)
☐ Black and White(Normally White,Paper White /Positive Image)
Rear Polarizer: ☐ Transflective(Normal)
☐ Transflective(High Transparency)
(8) Viewing Direction 6 O'clock
(9) Backlight EL B/L
(10) Weight 52g(Included the EL B/L)
(11) Controller Excluded
(12) DC/DC Converter Excluded
(13) EL B/L inverter Ckt Built-in

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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	
Power Supply for LC Drive	VEE-VSS	-0.3	30.0	V	
Input Voltage	VI	-0.3	VDD	V	
Static Electricity	-	-	-	-	Note 1

(2) ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

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

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 $T_a \leq 70^{\circ}\text{C}$: 75%RH max
 $T_a > 70^{\circ}\text{C}$: Absolute humidity must be lower
than the humidity of 75%RH at 70°C

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

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ELECTRICAL CHARACTERISTICS

(VDD= 3.3V ± 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 (WIDE TEMP. LCM)	VEE-VSS (Vop) (NOTE1)	1/240 Duty 1/13 Bias	-20°C	24.2	24.6	25.0	V
			0°C	22.9	23.0	23.4	
			25°C	22.3	22.7	23.1	
			50°C	21.1	21.5	21.9	
			70°C	20.3	20.7	21.1	
Power Supply Current	IDD	VDD= 3.3V VSS= 0V VEE-VSS=22.7V FLM=70Hz PATTERN : □ ■ □ ■ □ ■ ■ □ ■ □ ■ □		—	0.2	0.5	mA
	IEE			—	6.3	10.0	
EL Power Supply Current	IEL	VEL= 3.3V VELG= 0V BLE=3.3V		—	30	40	mA

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OPTICAL CHARACTERISTICS

AT V_{OP}

ITEM MODE		Cr(Contrast Ratio)						θ (Viewing Angle)		ϕ (Viewing Angle)	
		0°C		25°C		50°C		25°C		25°C	
		MIN.	TYP.	MIN.	TYP.	MIN.	TYP.	MIN.	TYP.	MIN.	TYP.
S	J	—	9.0	—	9.0	—	6.0	—	66	—	83
H	L	—	9.0	—	10.0	—	7.0	—	84	—	79
NOTE		NOTE 6						NOTE 5			

NOTE :

S: TRANSFLECTIVE(NORMAL)
H: TRANSFLECTIVE(HIGH TRANSPARENCY)
J: NORMALLY WHITE
L: NORMALLY WHITE(PAPER WHITE)

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

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
Response Time (rise)	Tr	-20°C	—	3000	4500	ms	NOTE 2
		0°C	—	1100	1650		
		25°C	—	300	450		
		50°C	—	150	225		
		70°C	—	100	150		
Response Time (fall)	Tf	-20°C	—	2800	4200	ms	NOTE 2
		0°C	—	500	800		
		25°C	—	200	300		
		50°C	—	100	150		
		70°C	—	80	120		

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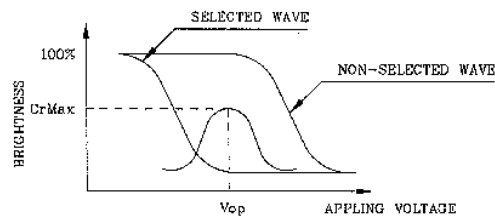
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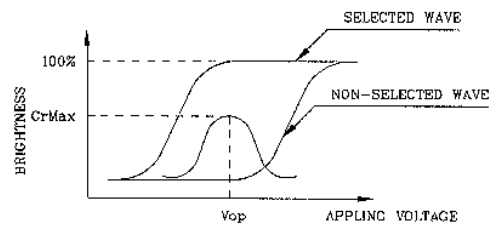
DATE:
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(NOTE 1)

Definition of Operation Voltage(V_{op})



(positive type)



(negative type)

*Conditions

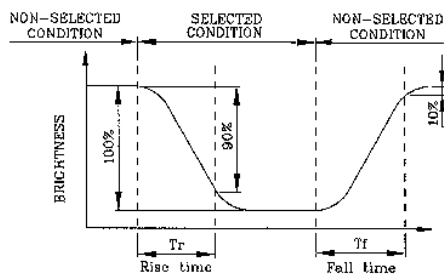
Viewing Angle : 0

Frame Frequency : 70Hz

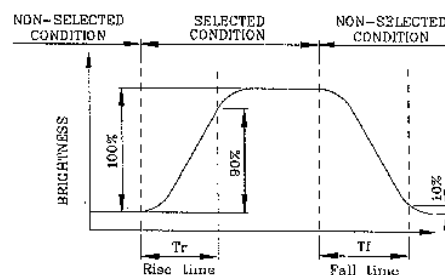
Applying Waveform : 1/N duty 1/a bias

(NOTE 2)

Definition of Response Time(T_r, T_f)



(positive type)



(negative type)

*Conditions

Operating Voltage : V_{op}

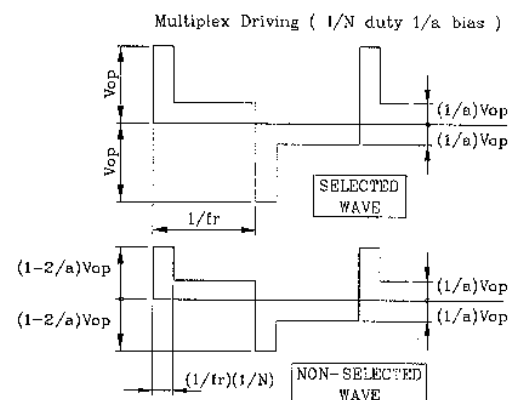
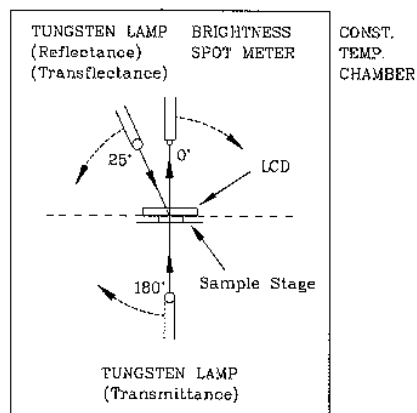
Viewing Angle (θ, ϕ) : (0,0)

Frame Frequency : 70Hz

Applying Waveform : 1/N duty 1/a bias

(NOTE 3)

Description of Measuring Equipment and Driving Waveforms



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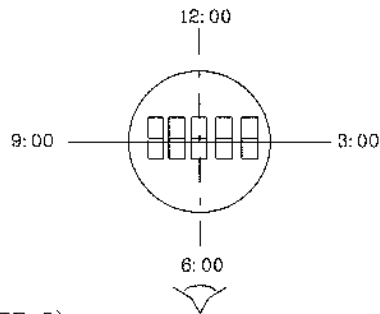
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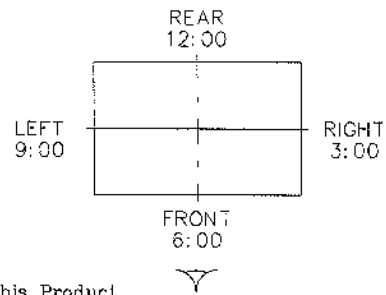
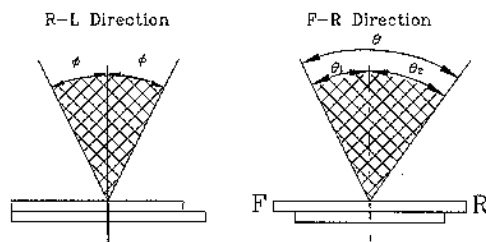
(NOTE 4)

Definition of Viewing Direction



(NOTE 5)

Definition of Viewing Angle



*For This Product

The Viewing Direction Is 6 O'clock
So $\theta_1 > \theta_2$

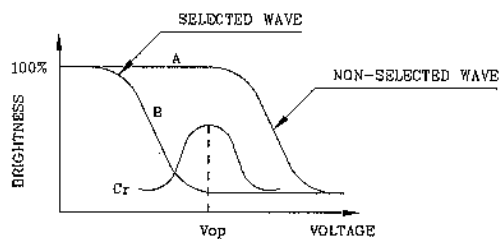
$$\theta = \theta_1 + \theta_2$$

*Conditions

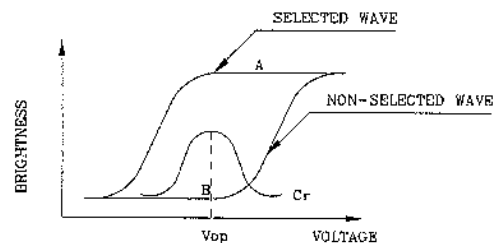
Operating Voltage : V_{op}
Frame Frequency : 70Hz
Applying Waveform : 1/N duty 1/a bias
Contrast Ratio : larger than 2

(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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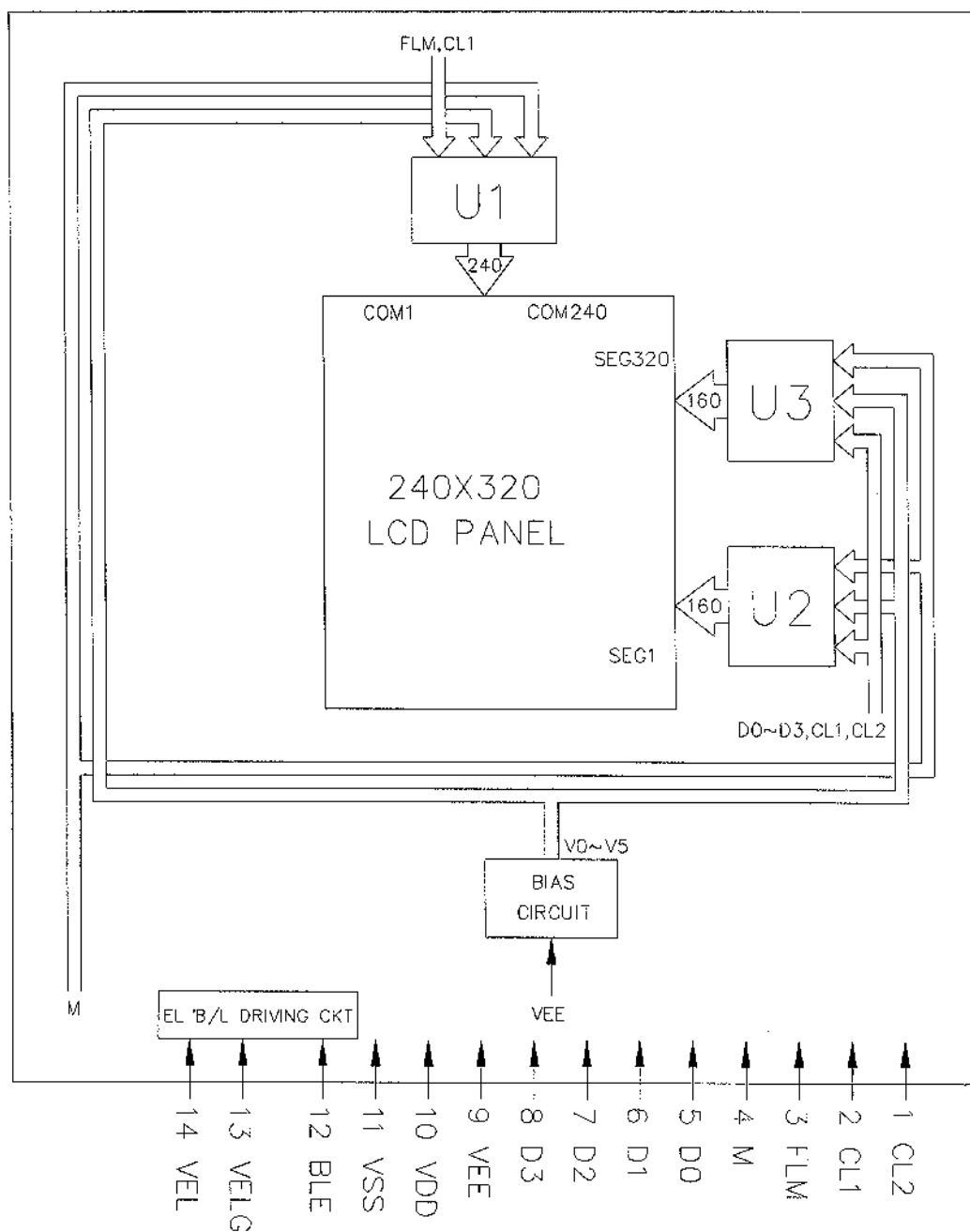
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BLOCK DIAGRAM



* M SIGNAL SHOULD BE SUPPLIED BY USERS

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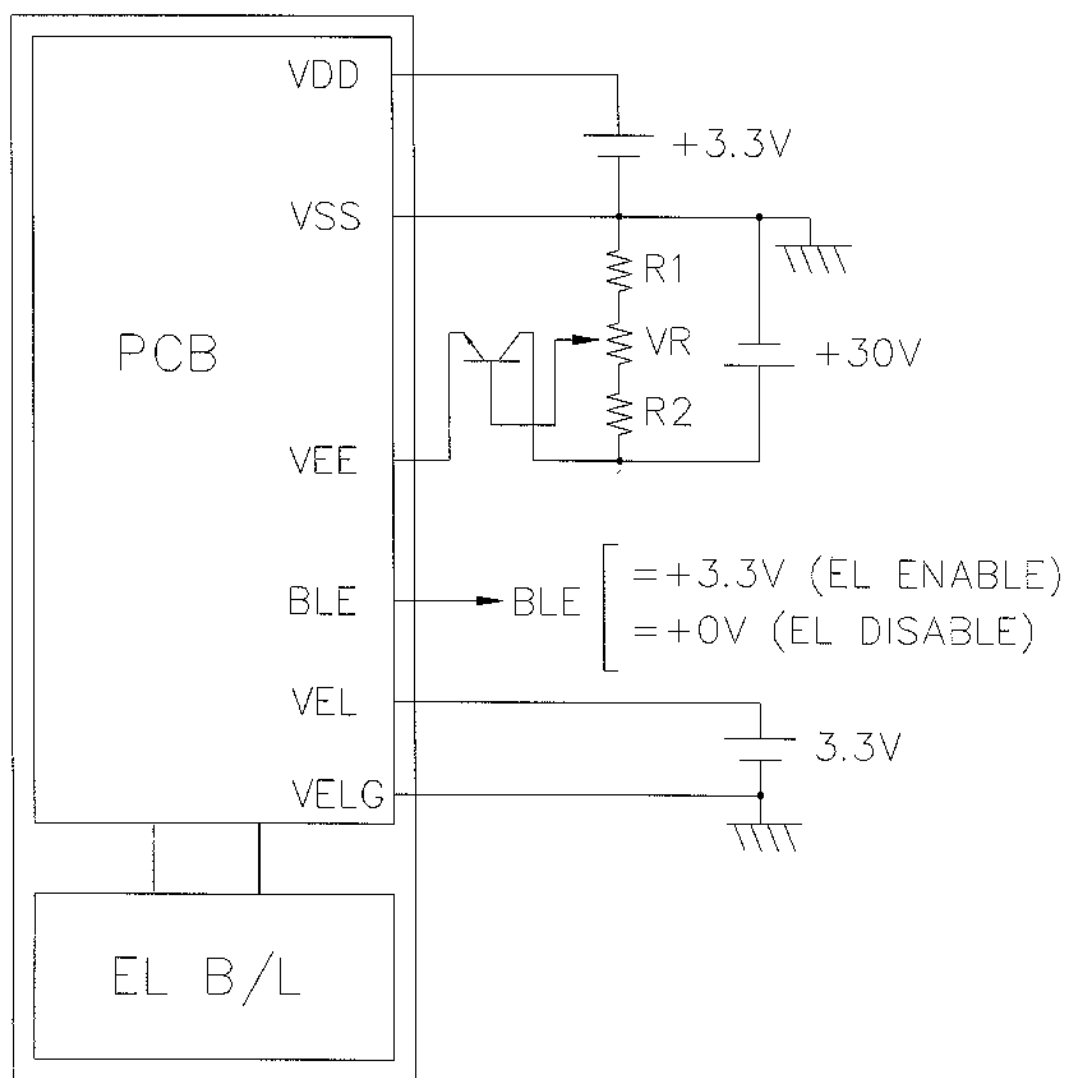
INTERNAL PIN CONNECTION

Pin No.	Symbol	Level	Function
1	CL2	H/L	Data Shift Clock Signal
2	CL1	H/L	Data Latch Clock Signal
3	FLM	H/L	Frame Signal
4	M	H/L	Alternate Signal
5	D0	H/L	Display Data
6	D1	H/L	
7	D2	H/L	
8	D3	H/L	
9	VEE	—	Power Supply for LCD (+V)
10	VDD	—	Power Supply for Logic
11	VSS	—	Power Supply (0V)
12	BLE	H/L	H: EL Enable ; L: EL Disable
13	VELG	—	Power Supply for EL (GND,0V)
14	VEL	—	Power Supply for EL (+)
15	Xp	—	Touch Panel Connection
16	Ym	—	
17	Xm	—	
18	Yp	—	

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POWER SUPPLY

LCM



$$R1 + VR + R2 = 10 \sim 20K \Omega$$

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TIMING CHARACTERISTICS

8-1 INTERFACE TIMING

@ VDD=3.3V±10%, To=-20~70℃

Item	Symbol	Test condition	Min.	Typ.	Max.	Unit
Clock Cycle	tC	Fig.a	500	—	—	ns
SCP Pulse Width	tSWH,tSWL	Fig.a	240	—	—	ns
Data Set Up Time	tDSU	Fig.a , Fig.b	240	—	—	ns
Data Hold Time	tDHD	Fig.a , Fig.b	240	—	—	ns
SCP Rise/Fall Time	tr,tf	Fig.a , Fig.b	—	—	50	ns
LP Rise Time	tLRP	Fig.a	240	—	—	ns
LP Fall Time	tLFP	Fig.a	240	—	—	ns
LP Pulse Width	tLW	Fig.a	240	—	—	ns
SCP To LP Delay Time	tSL	Fig.a	50	—	—	ns
LP To SCP Delay Time	tLS	Fig.a	100	—	—	ns
LP "H" Pulse Width	tCWH	Fig.b	40	—	—	ns
LP "L" Pluse Width	tCWL	Fig.b	170	—	—	ns

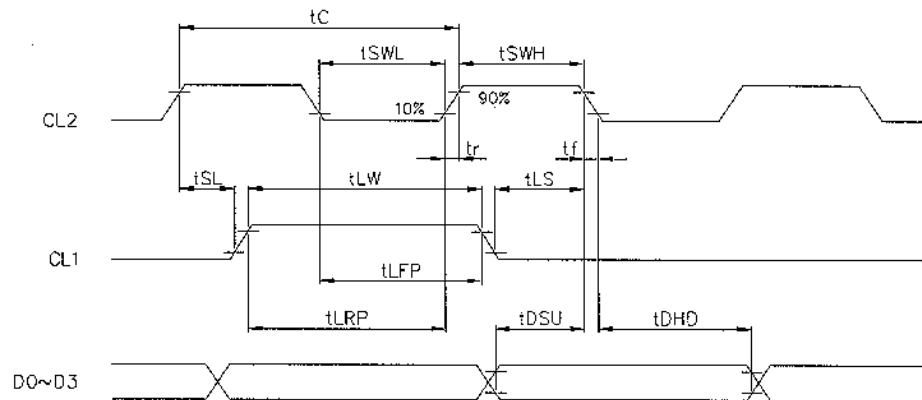


Fig a Interface timing (SEGMENT)

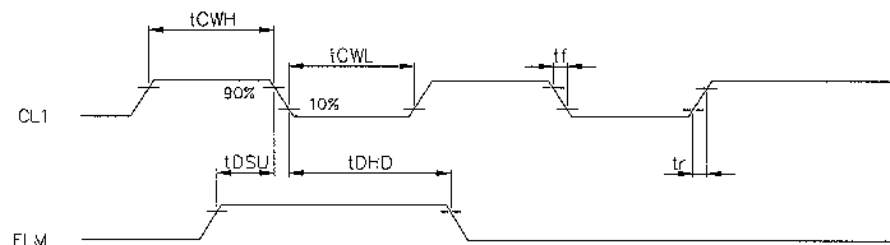


Fig . b Interface timing (COMMON)

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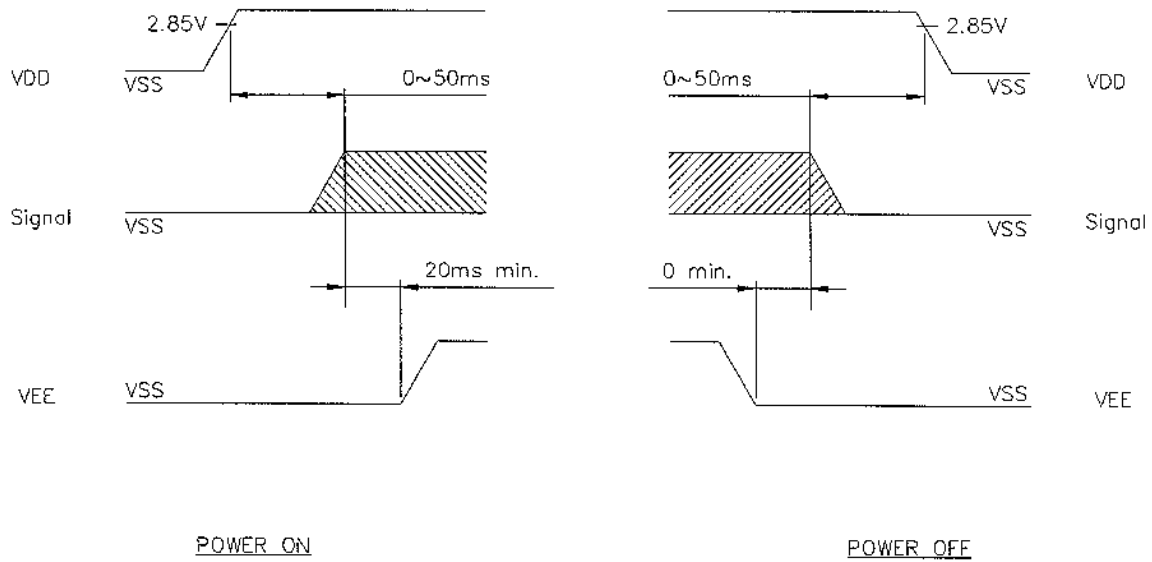
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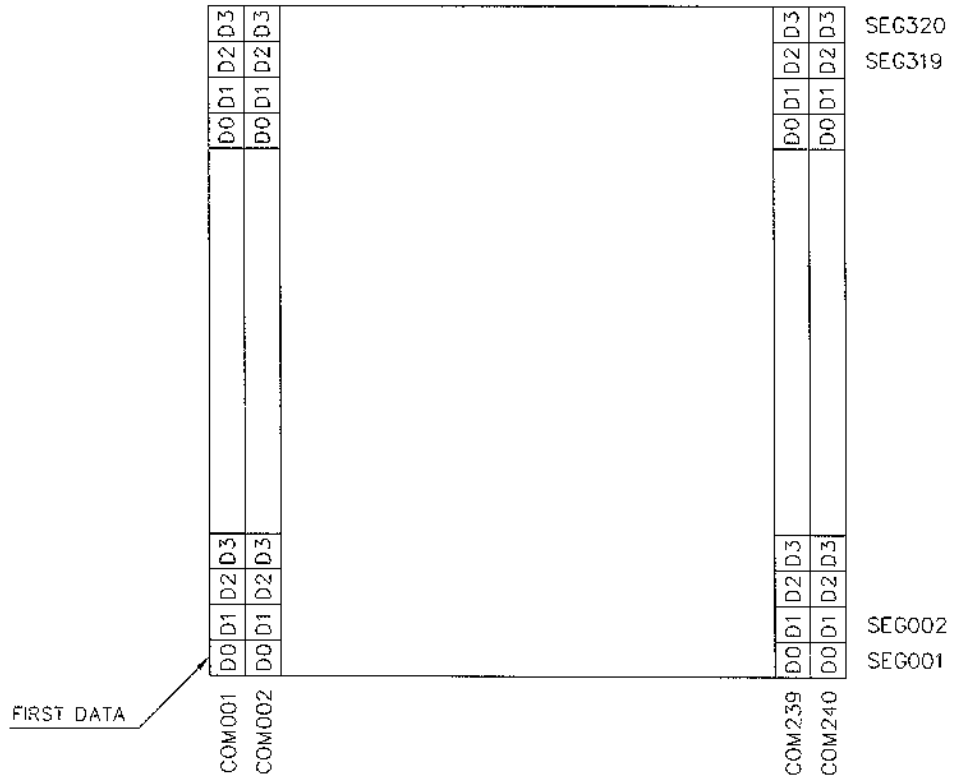
POWER ON/OFF TIMING



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

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DISPLAY PATTERN



240 X 320 Dots Matrix

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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.

• THE OPERATING LIFE TIME OF BACK LIGHT

EL : 1,700HR FOR AC 100 Vrms 400 Hz 20°C 60% RH

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