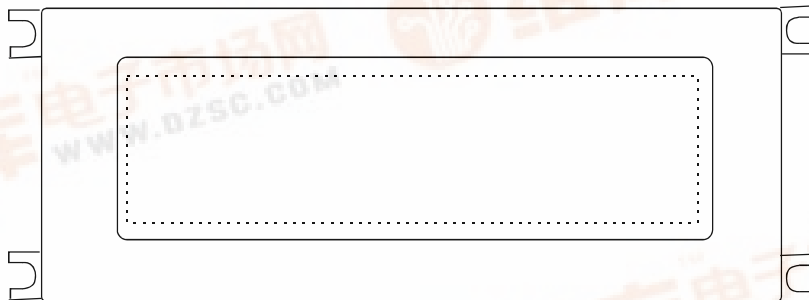


HANTRONIX

PRODUCT SPECIFICATION

HDM64GS24C

240x64 COLOR GRAPHICS
LCD DISPLAY MODULE



HANTRONIX, INC.
10080 BUBB RD.
CUPERTINO, CA 95014

Q.A.:
JK

REV.:
1.0

HDM64GS24C

SHEET 1 OF 19

DATE:
9/19/02



1.MECHANICAL DATA

(1) Product No.	HDM64GS24C
(2) Module Size	180.0 (W)mm x 59.6 (H)mm x 14.0 (D)mm
(3) Dot Size	0.161 (W)mm x 0.515 (H)mm
(4) Dot Pitch	0.176 (W)mm x 0.53 (H)mm
(5) Number of Dots	240x3[R.G.B](W) x 64 (H)DOTS
(6) Duty	1/64
(7) LCD	F-STN:Color STN module Rear Polarizer:Color Transmissive Type
(8) Viewing Direction	12 O'clock
(9) Backlight	CCFL
(10) Controller	Included (SED1353)
(11) DC/DC Converter	Included
(12) CCFL Inverter	Included
(13) Weight	125 g(approx.)

2. ABSOLUTE MAXIMUM RATINGS

(1) ELECTRICAL ABSOLUTE RATINGS

VSS=0V

ITEM	SYMBOL	MIN	MAX	UNIT	COMMENT
Power Supply for Logic	VCC1-VSS VCC2-VSS	0	6.0	V	Ta=25°C
Input Voltage	VI	-0.3	VCC1+0.3	V	Ta=25°C
Vcon Voltage	Vcont-Vss	0	VCC1	V	Ta=25°C
Static Electricity	-	-	-	-	Note 1

(2) ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

ITEM	OPERATING		STORAGE	
	MIN.	MAX.	MIN.	MAX.
Ambient Temperature	0	50	-20	70
Humidity (Without Condensation)	Note 2,4		Note 3,4	
Vibration	Note 5			

Note 1 LCM should be grounded during handling LCM.

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 < 48 hrs, at 70°C will be < 120 hrs

Note 4 Background color will change slightly depending on ambient temperature.
That phenomenon is reversible.

Note 5

Frequency	5 Hz~13.95 Hz	13.95 Hz~33 Hz	33 Hz~51 Hz	51 Hz~500 Hz
Vibration Level	-	2X9.8 m/s ²	-	5x9.8 m/s ²
Vibration Width	0.2 inch	-	0.036 inch	-
Vibration Direction	X/Y/Z			
Vibration Time	20 min/cycle X 3 directions			

3. ELECTRICAL CHARACTERISTICS

3-1. ELECTRICAL CHARACTERISTICS OF LCM

Ta=25°C, Vss=0V

ITEM		SYMBOL	CONDITION		MIN.	TYP.	MAX.	UNIT
Logic Circuit Power Supply		VCC1-VSS VCC2-VSS	Ta=25°C		4.5	5.0	5.5	V
Input Voltage		VIH	VCC1=5.5V		2.0	-	-	V
		VIL	VCC1=4.5V		-	-	0.8	V
Contrast Adjust Voltage		Vcont-VSS	Duty=1/64 VCC1=5.0V	Ta=0°C	0.6	-	-	V
				Ta=25°C	-	1.2	-	
				Ta=50°C	-	-	2.2	
Supply Current for Logic		ICC (=ICC1+ICC2)	VCC1-VSS=5.0V Ta=25°C PATTERN : ■ □ ■ □ ■ □ ■ □ □ ■ □ ■ □ ■ □ ■		-	38	57	mA
LCM	Surface Luminance	L	VCC1-VSS=5.0V Ta=25°C IL=5.0mA rms	PATTERN: (Dots All On of White Color) □ □ □ □ □ □ □ □	-	187	-	cd/m²
				PATTERN: (Dots All Off) ■ ■ ■ ■ ■ ■ ■ ■	-	2.4	-	

3-2.ELECTRICAL CHARACTERISTICS OF BACKLIGHT

Used lamp : Rating

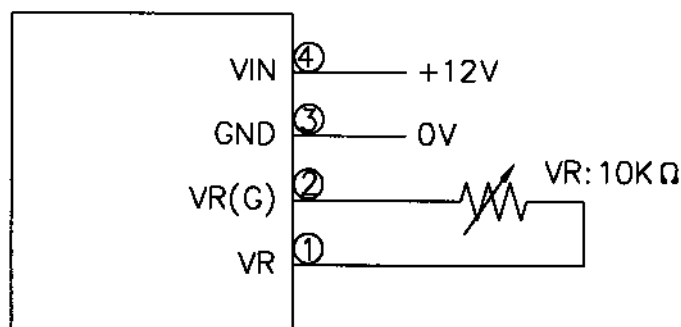
PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	REMARK
Start Voltage	V _s	—	—	600	Vrms	
Lamp Voltage	V _L	—	400	—	Vrms	—
Lamp current	I _L	4.0	5.0	6.0	mA _{rms}	—
Lamp power consumption	P _L	—	2.0	—	W	(*1)
Lamp frequency	F _L	55	65	75	KHz	—
Lamp life time	L _L	—	20000	—	hrs	(*2) I _L = 5.0mA _{rms}

(*1) Power consumption excluded inverter loss .

(*2) Lamp life time is defined as follow: The final brightness is at 50% of original brightness.

3-3.ELECTRICAL CHARACTERISTICS OF INERTER

CCFL INVERTER



4.OPTICAL CHARACTERISTICS

4-1.Optical Char. of Normal Temp. Mode

AT Vop

ITEM MODE		Cr(Contrast Ratio)						θ (Viewing Angle)		ϕ (Viewing Angle)	
		0℃		25℃		50℃		25℃		25℃	
		MIN.	TYP.	MIN.	TYP.	MIN.	TYP.	MIN.	TYP.	MIN.	TYP.
T	Y	23	28	45	55	15	20	-	100	-	(L)55 (R)40
note		NOTE 6						NOTE 5			

note:

T: TRANSMISSIVE

Y: FOR 12 O'CLOCK COLOR STN MODULE

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

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
Response Time (rise)	Tr	0℃	90	110	160	ms	NOTE 2
		25℃	40	50	75		
		50℃	55	70	100		
Response Time (fall)	Tf	0℃	400	500	750	ms	NOTE 2
		25℃	70	85	120		
		50℃	25	30	45		

4-2. Color of CIE Coordinate

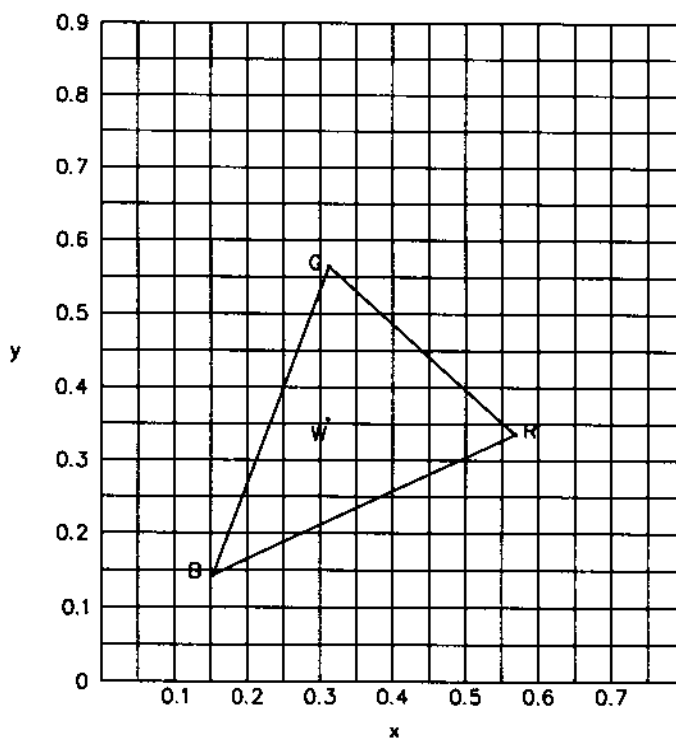
Ta = 25°C

ITEM		SYMBOL	CONDITION	VALUE	NOTE
Color of CIE Coordinate	Red	X	$\phi=0^\circ, \theta=0^\circ$	(0.576)	Note*
		y		(0.339)	
	Green	X	$\phi=0^\circ, \theta=0^\circ$	(0.314)	
		y		(0.572)	
	Blue	X	$\phi=0^\circ, \theta=0^\circ$	(0.155)	
		y		(0.143)	
	White	X	$\phi=0^\circ, \theta=0^\circ$	(0.319)	
		y		(0.357)	

Note* CIE chromaticity diagram shown on Fig.1

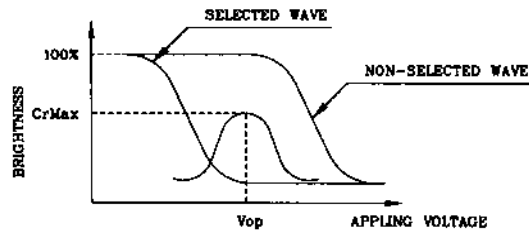
Tolerance : ± 0.05

Fig.1

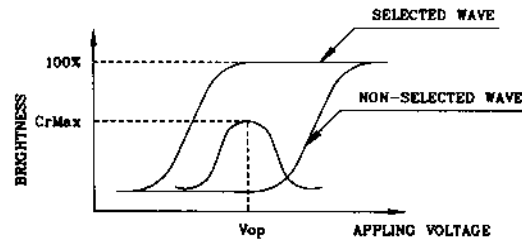


(NOTE 1)

Definition of Operation Voltage(Vop)



(positive type)



(negative type)

*Conditions

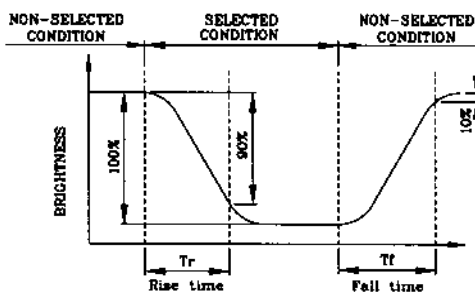
Viewing Angle : 0

Frame Frequency : 70Hz

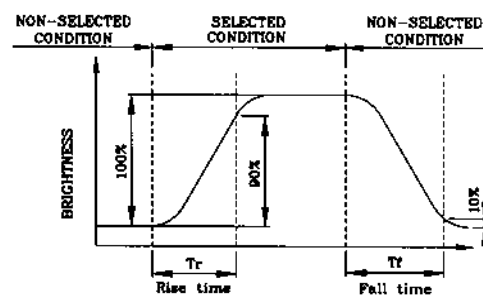
Appling Waveform : 1/N duty 1/a bias

(NOTE 2)

Definition of Response Time(Tr,Tf)



(positive type)



(negative type)

*Conditions

Operating Voltage : Vop

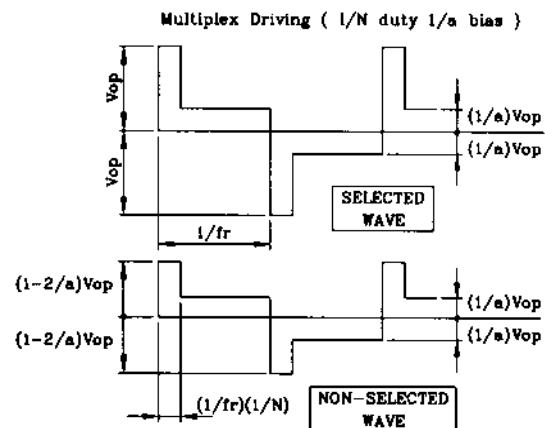
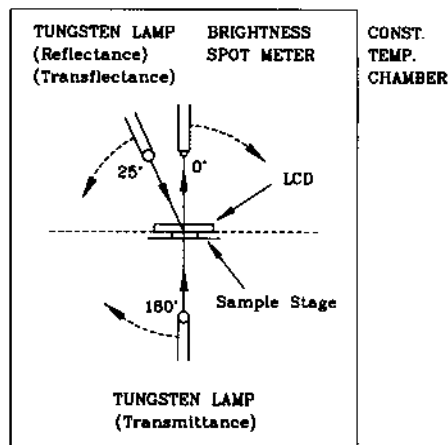
Viewing Angle (θ,φ) : (0,0)

Frame Frequency : 70Hz

Appling Waveform : 1/N duty 1/a bias

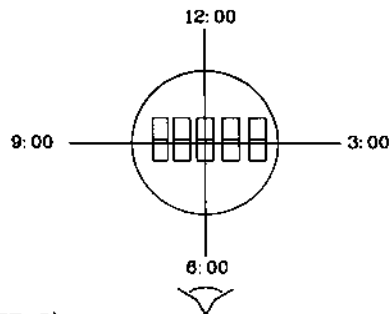
(NOTE 3)

Description of Measuring Equipment and Driving Waveforms



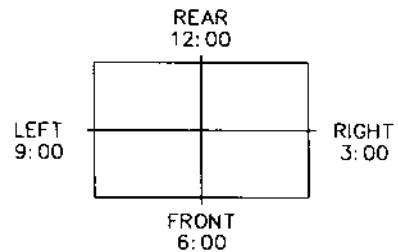
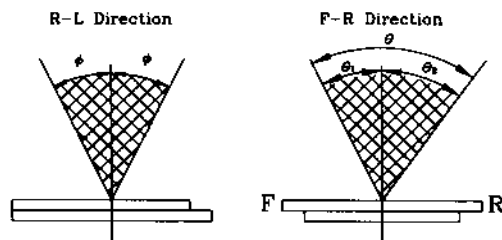
(NOTE 4)

Definition of Viewing Direction



(NOTE 5)

Definition of Viewing Angle



*For This Product

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

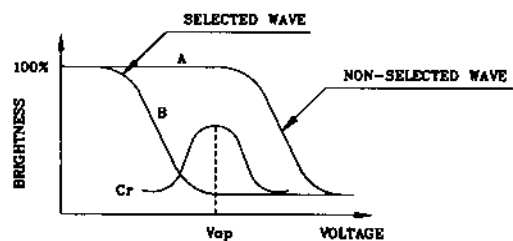
$$\theta = \theta_1 + \theta_2$$

*Conditions

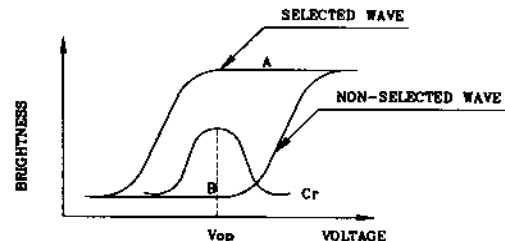
Operating Voltage : V_{op}
Frame Frequency : 70Hz
Applying Waveform : 1/N duty 1/a bias
Contrast Ratio : larger than 2

(NOTE 6)

Definition of Contrast Ratio (Cr)



(positive type)



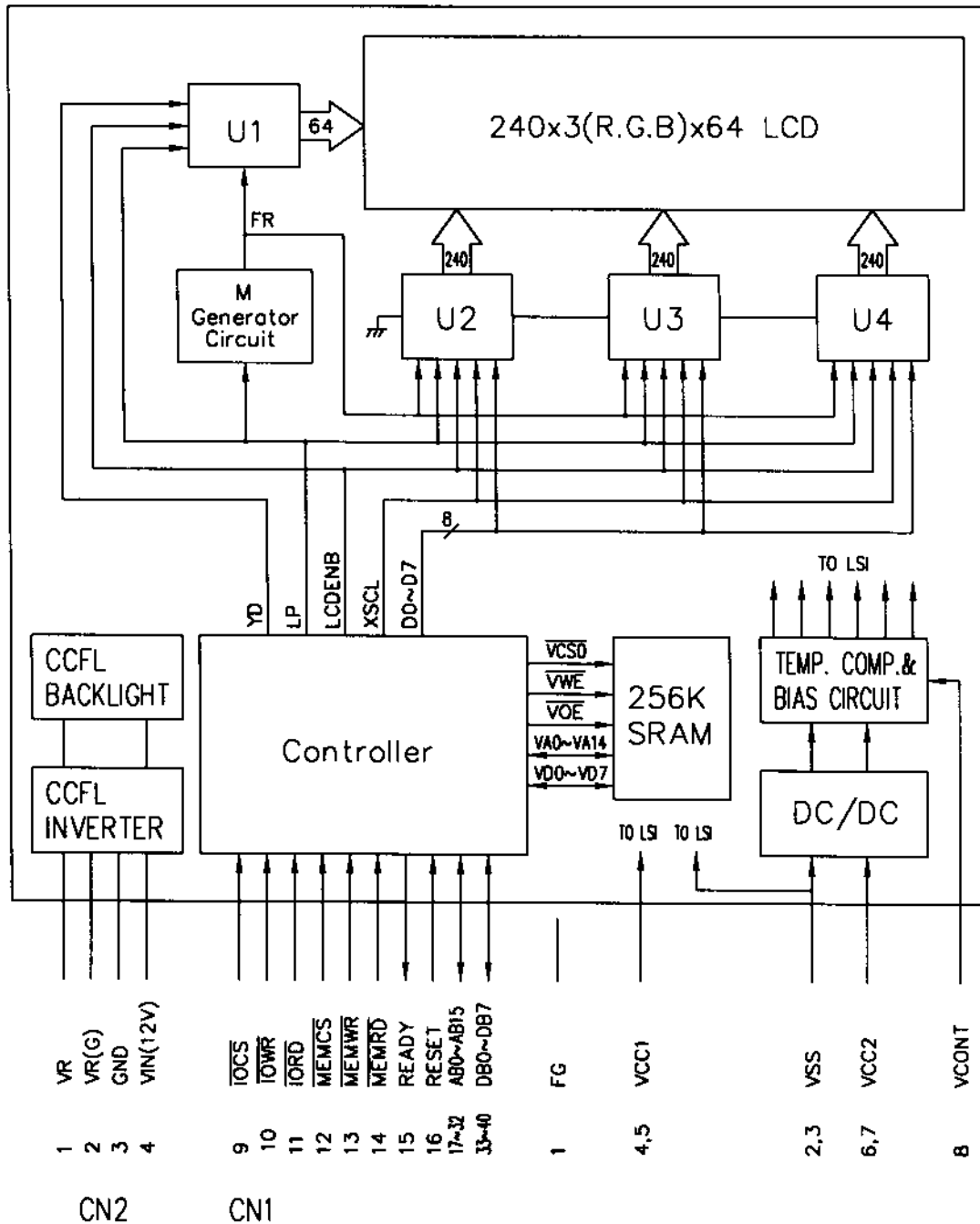
(negative type)

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

*Conditions

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

5. BLOCK DIAGRAM



6.INTERFACE PIN CONNECTION

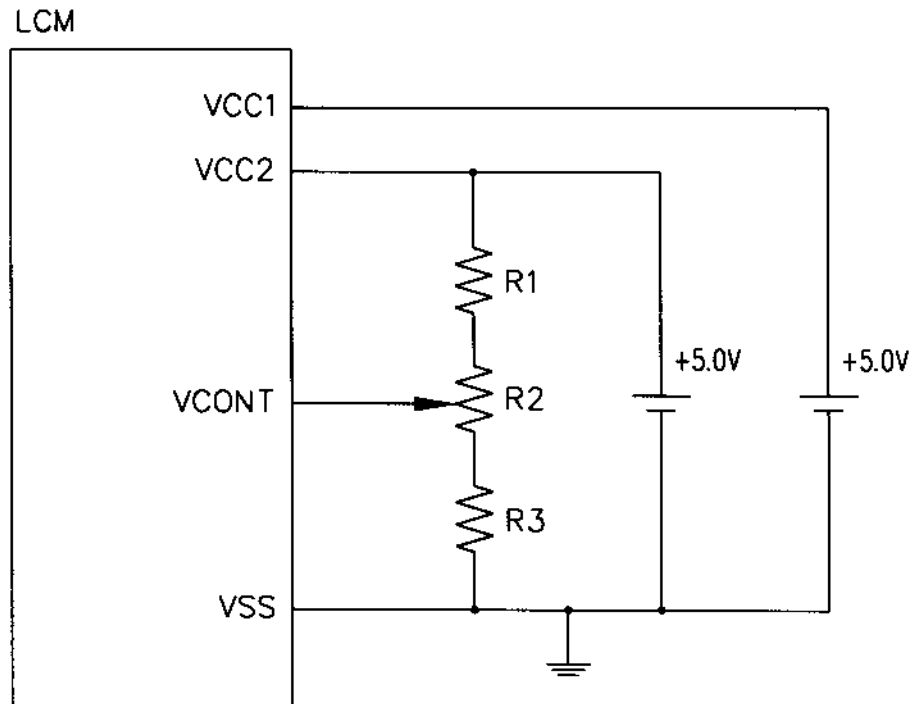
CN1: ELCO / 08-6210-040-340-800 OR Compatible

Pin No.	Symbol	Level	Function
1	FG	—	Frame GND
2	Vss	—	Power Supply (0V, GND)
3	Vss		
4	Vcc1	—	Power Supply for Logic
5	Vcc1		
6	Vcc2	—	Power Supply for LCD
7	Vcc2		
8	Vcont	—	Voltage Level for LCD Contrast Adjustment
9	$\overline{\text{IOCS}}$	H/L	Control Register Chip Select Signal L: Active
10	$\overline{\text{IOWR}}$	H/L	Control Register Write Signal L: Active
11	$\overline{\text{IORD}}$	H/L	Control Register Read Signal L: Active
12	$\overline{\text{MEMCS}}$	H/L	Memory Chip Select Signal L: Active
13	$\overline{\text{MEMWR}}$	H/L	Memory Write Signal L: Active
14	$\overline{\text{MEMRD}}$	H/L	Memory Read Signal L: Active
15	READY	H/L	Ready Signal
16	RESET	H/L	Reset Signal H: Reset
17	AB0	H/L	Address Bus Line
?	?		
32	AB15		
33	DB0	H/L	Data Bus Line
?	?		
40	DB7		

CN2: CCFL Inverter Connector Molex 53261-0490 or Compatible

Pin No.	Symbol	Level	Function
1	VR	—	CFL Compensation Terminal (10k Ω)
2	VR(G)	—	CFL Compensation Terminal (G)
3	GND	—	Power Supply for CFL Inverter (GND)
4	VN(12V)	—	Power Supply for CFL Inverter (+12V)

7. POWER SUPPLY

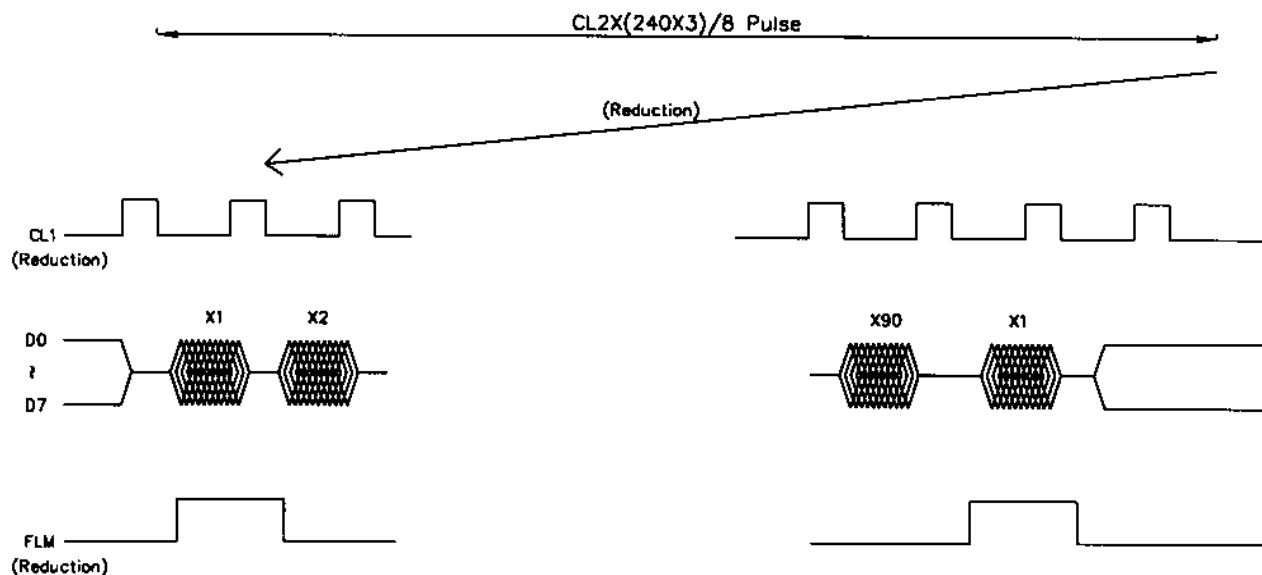
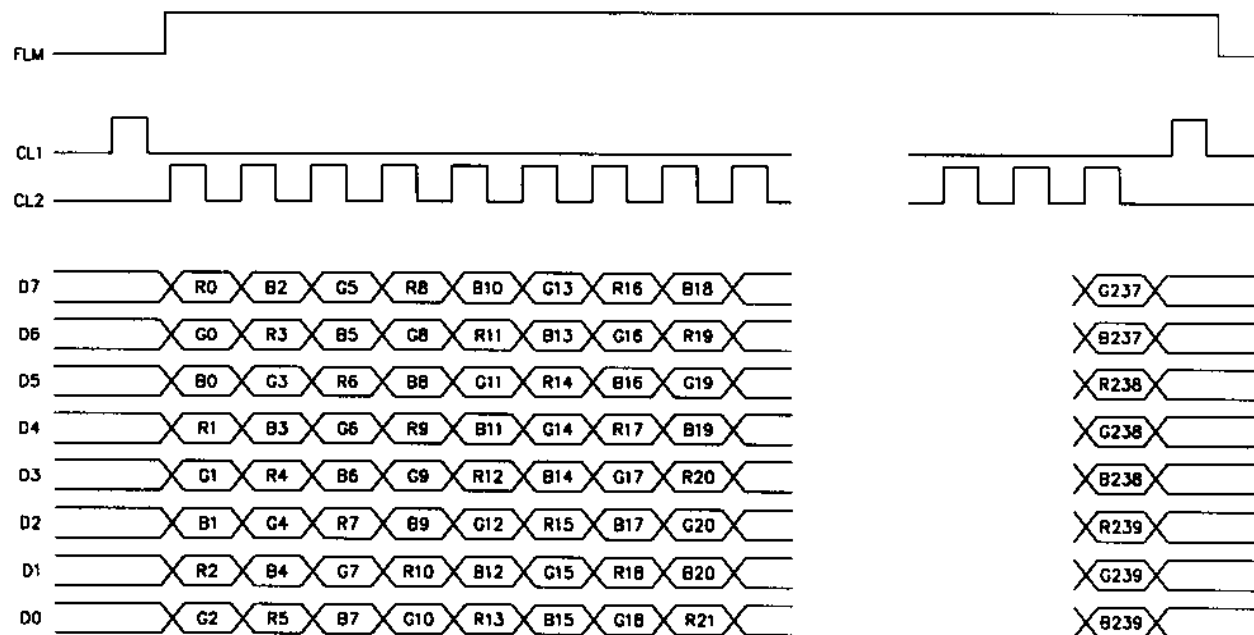


$$R1+R2+R3 = 10K\Omega \sim 20K\Omega$$

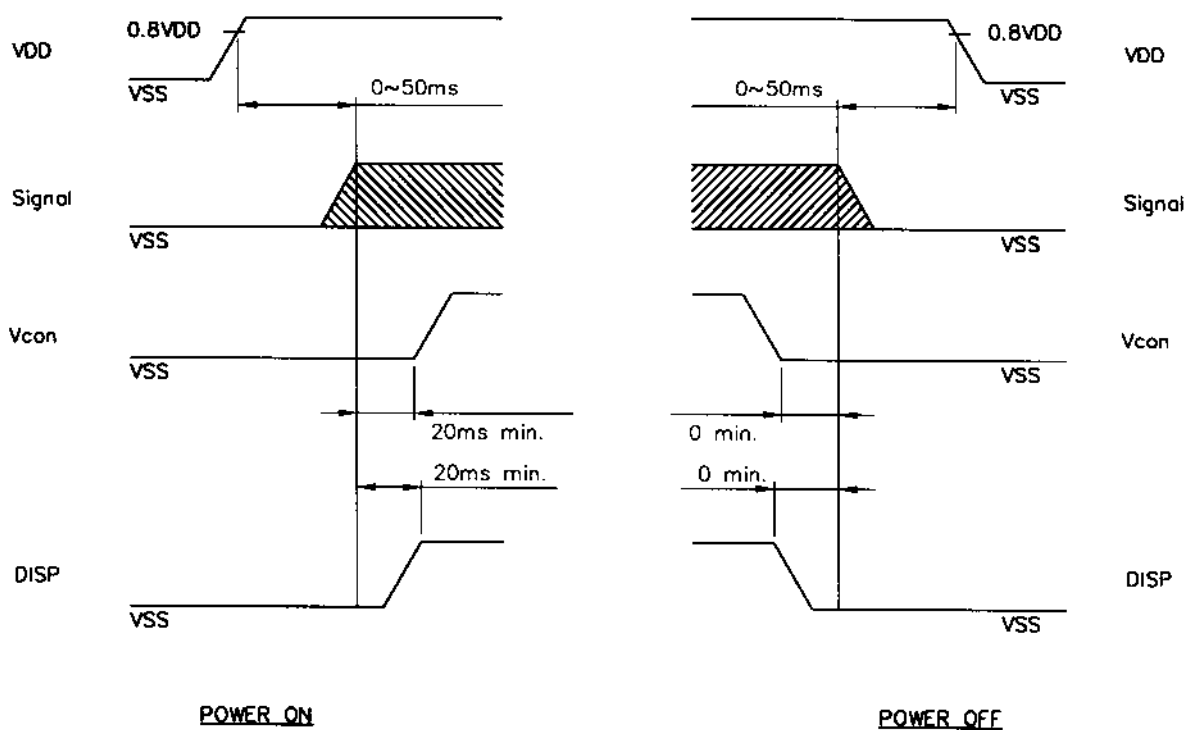
8. TIMING CHARACTERISTICS

PLEASE REFER TO LH1530F & LH1548F SPEC.

8-2.TIMING CHART



8-3. POWER ON/OFF TIMING



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

8-4.DISPLAY PATTERN

	1	2	3	4	5	6	7	8
1	R0	G0	B0	R1	G1	B1	R2	G2
	D7	D6	D5	D4	D3	D2	D1	D0
2	R0	G0	B0	R1	G1	B1	R2	G2
	D7	D6	D5	D4	D3	D2	D1	D0

COLUMN

	713	714	715	716	717	718	719	720
	G237	B237	R238	G238	B238	R239	G239	B239
	07	D6	D5	D4	D3	D2	D1	D0
	G237	B237	R238	G238	B238	R239	G239	B239
	07	D6	D5	D4	D3	D2	D1	D0

ROW

63	R0 D7	G0 D6	B0 D5	R1 D4	G1 D3	B1 D2	R2 D1	G2 D0	
64	R0 D7	G0 D6	B0 D5	R1 D4	G1 D3	B1 D2	R2 D1	G2 D0	

	G237 D7	B237 D6	R238 D5	G238 D4	B238 D3	R239 D2	G239 D1	B239 D0
	G237 D7	B237 D6	R238 D5	G238 D4	B238 D3	R239 D2	G239 D1	B239 D0

9.RELIABILITY TEST

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

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.

HANTRONIX, INC. 10080 BUBB RD. CUPERTINO, CA 95014	Q.A.: JK	REV.: 1.0	HDM64GS24C	SHEET 18 OF 19
				DATE: 9/19/02

