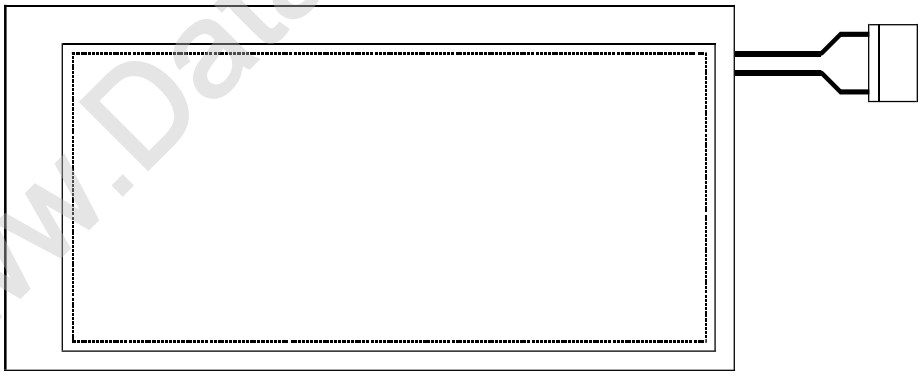
HANTRONIX

PRODUCT SPECIFICATION

HDM6424-C

640 x 240 COLOR GRAPHICS
LCD DISPLAY MODULE



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MECHANICAL DATA

(2) Module Size		173.0 (W)mm x 73.0 (H)mm x 6.7 (D)mm
(3) Dot Size		0.065 (W)mm x 0.225 (H)mm
(4) Dot Pitch		0.08 (W)mm x 0.24 (H)mm
(5) Number of Dots		640(W) x RGB x 240 (H)DOTS
(6) Duty		1/244
(7) LCD	F-STN:	Color STN module
	Rear Polarizer:	Color Transmissive Type
(8) Viewing Direction		6 O'clock
(9) Backlight		CCFL
(10) Controller		Excluded
(11) DC/DC Converter		Included
(12) Weight		123 g(approx.)

ABSOLUTE MAXIMUM RATINGS

(1) ELECTRICAL ABSOLUTE RATINGS

VSS=0V

ITEM	SYMBOL	MIN	MAX	UNIT	COMMENT
Power Supply for Logic	VDD−VSS	0	6.0	V	Ta=25°C
Input Voltage	VI	−0.3	VDD+0.3	V	Ta=25°C
Vcon Voltage	Vcon	0	VDD	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/s²	−	5x9.8 m/s²
Vibration Width	0.2 inch	−	0.036 inch	−
Vibration Direction	X/Y/Z			
Vibration Time	20 min/cycle X 3 directions			

ELECTRICAL CHARACTERISTICS

ELECTRICAL CHARACTERISTICS OF LCM

VDD=3.3V±10%, Ta=25°C

ITEM		SYMBOL	CONDITION		MIN.	TYP.	MAX.	UNIT
Logic Circuit Power Supply		VDD−VSS	Ta=25°C		3.0	3.3	3.6	V
Input Voltage		VIH	H level		0.8VDD	−	VDD	V
		VIL	L level		0	−	0.2VDD	V
Contrast Adjust Voltage		Vcon−VSS	Duty=1/244 VDD=3.3V	Ta=0°C	0.8	−	−	V
				Ta=25°C	−	1.95	−	
				Ta=50°C	−	−	2.8	
Supply Current for Logic		IDD	VDD−VSS=3.3V Ta=25°C PATTERN : ■□■□■□■□ □■□■□■□■		−	60	150	mA
LCM	Surface Luminance	L	VDD−VSS =3.3V Ta=25°C I_L=1.5mArms	PATTERN: (Dots All On of White Color) □□□□ □□□□	−	77	−	cd/m²
				PATTERN: (Dots All Off) ■■■■ ■■■■	−	2	−	

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ELECTRICAL CHARACTERISTICS OF BACKLIGHT

Used lamp : Rating

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	REMARK
Lamp Voltage	V_L	–	468	–	Vrms	I_L = 1.5mArms
Lamp current	I_L	1.0	1.5	2.5	mArms	(*1)
Lamp power consumption	P_L	–	0.7	–	W	(*2)
Lamp frequency	F_L	40	50	60	KHz	
Lamp life time	L_L	10000	–	–	hrs	

(*1) It is recommended that I_L be not more than 2.5 mArms so that heat radiation of CCFT backlight may least affect the display quality .

(*2) Power consumption excluded inverter loss .

OPTICAL CHARACTERISTICS

Optical Char. of Normal Temp. Mode

AT V_{OP}

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	M	–	43	–	22	–	5.1	–	110	–	±54
T	MC	–	51	–	24	–	5.3	–	110	–	±54
note		NOTE 6						NOTE 5			

note:

T: TRANSMISSIVE

M: FOR 6 O'CLOCK COLOR STN MODULE

MC: FOR 6 O'CLOCK COLOR STN MODULE,POLARIZER WITH ANTI-GLARE

AT $\phi=0°$ $\theta=0°$

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
Response Time (rise)	Tr	0℃	–	660	770	ms	NOTE 2
		25℃	–	240	270		
		50℃	–	90	100		
Response Time (fall)	Tf	0℃	–	240	250	ms	NOTE 2
		25℃	–	80	90		
		50℃	–	60	70		

Color of CIE Coordinate

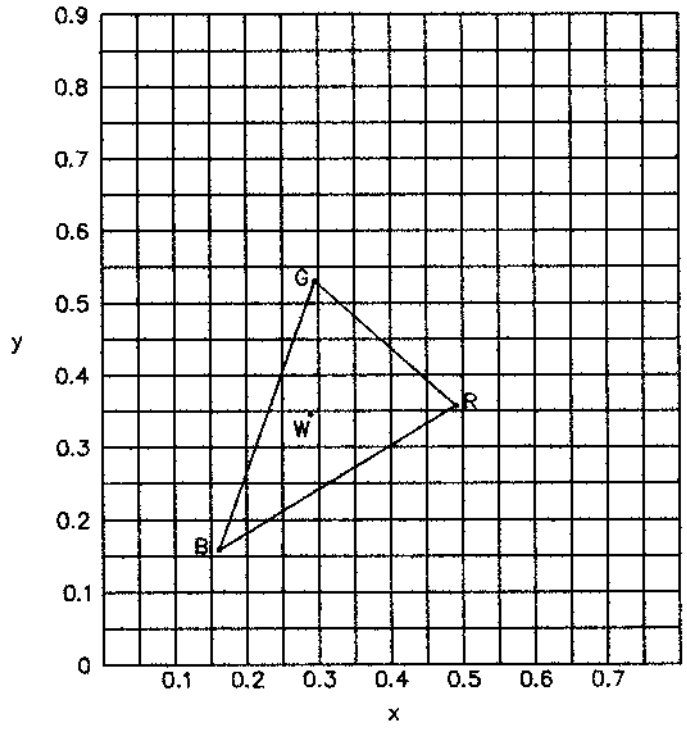
Ta = 25°C

ITEM		SYMBOL	CONDITION	VALUE	NOTE
Color of CIE Coordinate	Red	X	$\phi=0°$, $\theta=0°$	0.482	Note✱
		y		0.354	
	Green	X	$\phi=0°$, $\theta=0°$	0.292	
		y		0.530	
	Blue	X	$\phi=0°$, $\theta=0°$	0.158	
		y		0.165	
	White	X	$\phi=0°$, $\theta=0°$	0.279	
		y		0.349	

Tolerance : ±0.05

Note✱ CIE chromaticity diagram shown on Fig.1

Fig.1



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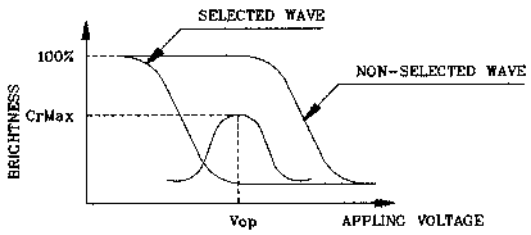
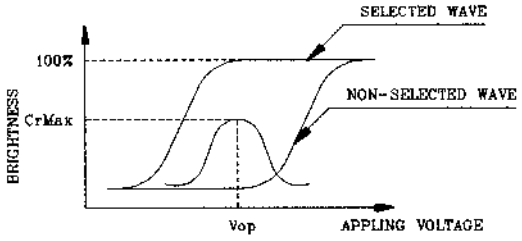
(NOTE 1)

Definition of Operation Voltage(Vop)



(positive type)



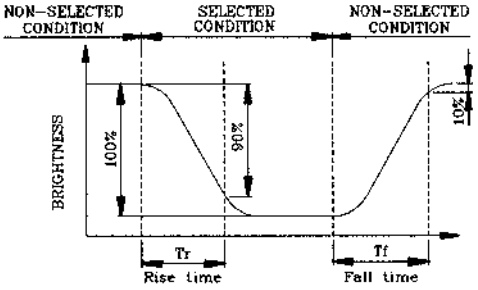
(negative type)

*Conditions

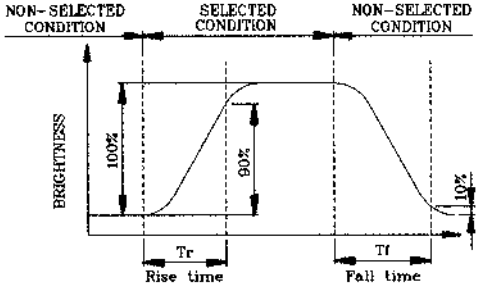
Viewing Angle : 0
Frame Frequency : 70Hz
Appling Waveform : 1/N duty 1/a bias

(NOTE 2)

Definition of Response Time(Tr,Tf)



(positive type)



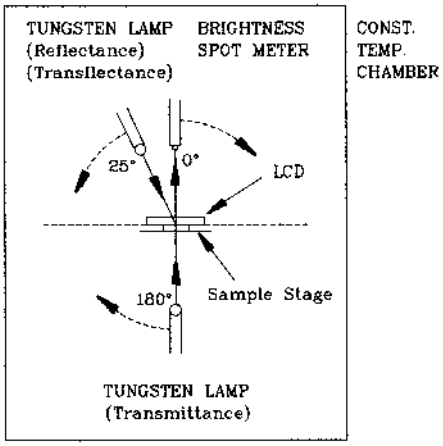
(negative type)

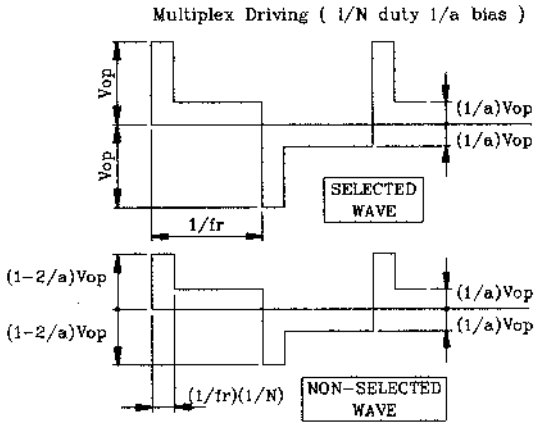
*Conditions

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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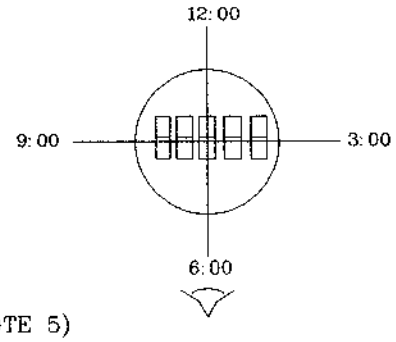
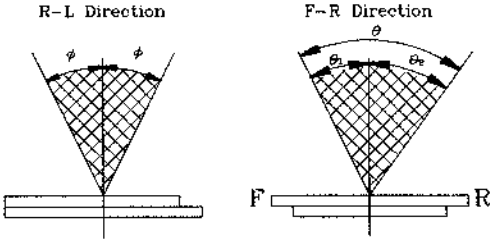
(NOTE 4)

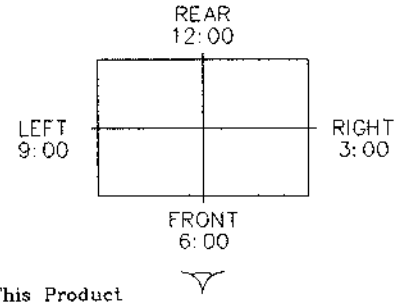
Definition of Viewing Direction



(NOTE 5)

Definition of Viewing Angle





*For This Product

The Viewing Direction Is 6 O'clock

So $\theta 1 > \theta 2$

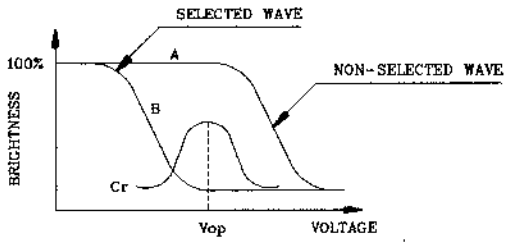
$\theta = \theta_1 + \theta_2$

*Conditions

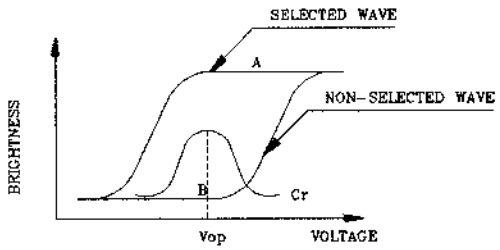
Operating Voltage : Vop
Frame Frequency : 70Hz
Appling Waveform : 1/N duty 1/a bias
Contrast Ratio : larger than 2

(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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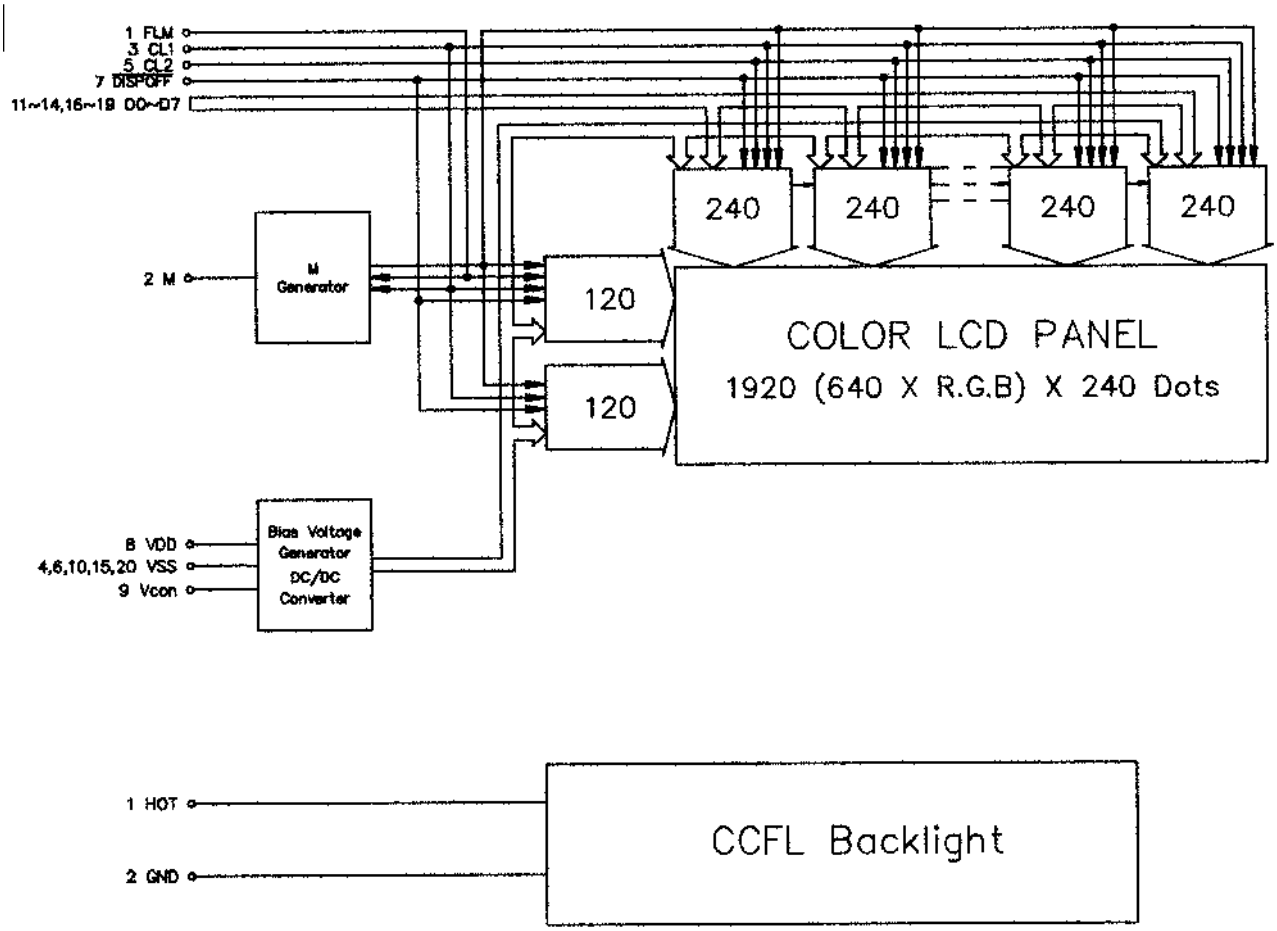
BLOCK DIAGRAM



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INTERFACE PIN CONNECTION

LCD

Pin No.	Symbol	Level	Function
1	FLM	"H"	Scan start-up signal
2	M	–	Control signal for AC driving
3	CL1	"H" → "L"	Input data latch signal
4	VSS	–	GND
5	CL2	"H" → "L"	Shift clock for input data
6	VSS	–	GND
7	DISP	H(ON),L(OFF)	Display control signal
8	VDD	–	Power Supply for logic (+3.3V)
9	Vcon	–	Contrast adjustment voltage
10	VSS	–	GND
11	D0	H(ON),L(OFF)	Display Data signal
12	D1	H(ON),L(OFF)	Display Data signal
13	D2	H(ON),L(OFF)	Display Data signal
14	D3	H(ON),L(OFF)	Display Data signal
15	VSS	–	GND
16	D4	H(ON),L(OFF)	Display Data signal
17	D5	H(ON),L(OFF)	Display Data signal
18	D6	H(ON),L(OFF)	Display Data signal
19	D7	H(ON),L(OFF)	Display Data signal
20	VSS	–	GND

CN1 : FH12-20S-0.5SH(HIROSE)

MATING CABLE : FFC or FPC,N20,PITCH 0.5mm, WIDTH 10.5mm,THICKNESS 0.3mm

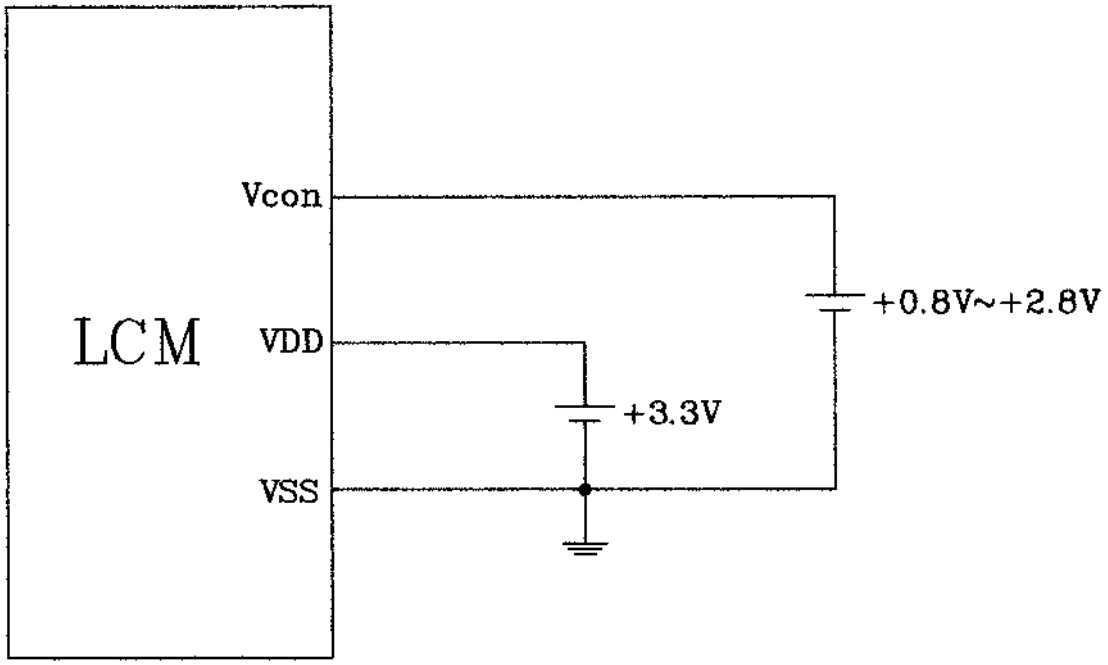
CCFL

PIN NO.	SYMBOL	LEVEL	FUNCTION
1	HV	–	High Voltage Line
2	GND	–	Ground Line

FLCN : HV-2S-C1(JAE)

MATING CONNECTOR : HV-2P-HF-E1400(JAE) or COMPATIBLE

POWER SUPPLY



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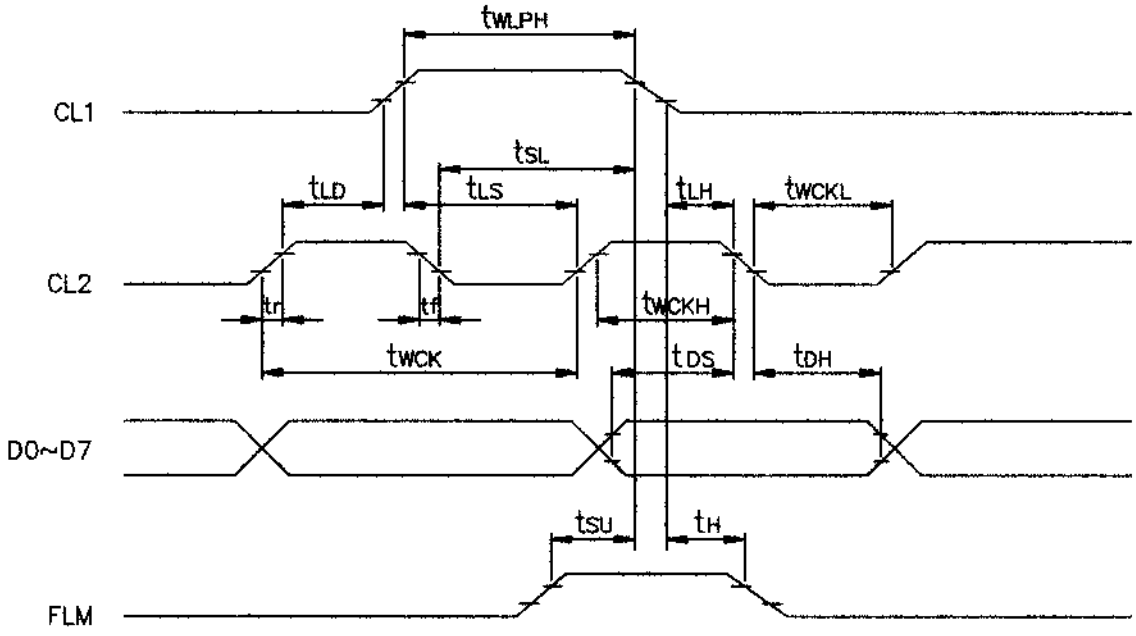
TIMING CHARACTERISTICS

INTERFACE TIMING

VDD=5.0V ± 10%

Parameter	SYMBOL	MIN.	MAX.	UNIT
CLOCK PULSE CYCLE TIME	t_{WCK}	50	–	ns
CLOCK PULSE HIGH LEVEL WIDTH	t_{WCKH}	15	–	ns
CLOCK PULSE LOW LEVEL WIDTH	t_{WCKL}	15	–	ns
LATCH PULSE HIGH LEVEL WIDTH	t_{WLPH}	20	–	ns
CL2→CL1 RISE TIME	t_{LD}	0	–	ns
CL2→CL1 FALL TIME	t_{SL}	25	–	ns
CL1→CL2 RISE TIME	t_{LS}	25	–	ns
CL1→CL2 FALL TIME	t_{LH}	25	–	ns
CLOCK PULSE RISE/FALL TIME	t_r , t_f	–	30	ns
DATA SETUP TIME	t_{DS}	10	–	ns
DATA HOLD TIME	t_{DH}	10	–	ns
FLM SETUP TIME	t_{SU}	100	–	ns
FLM HOLD TIME	t_H	30	–	ns



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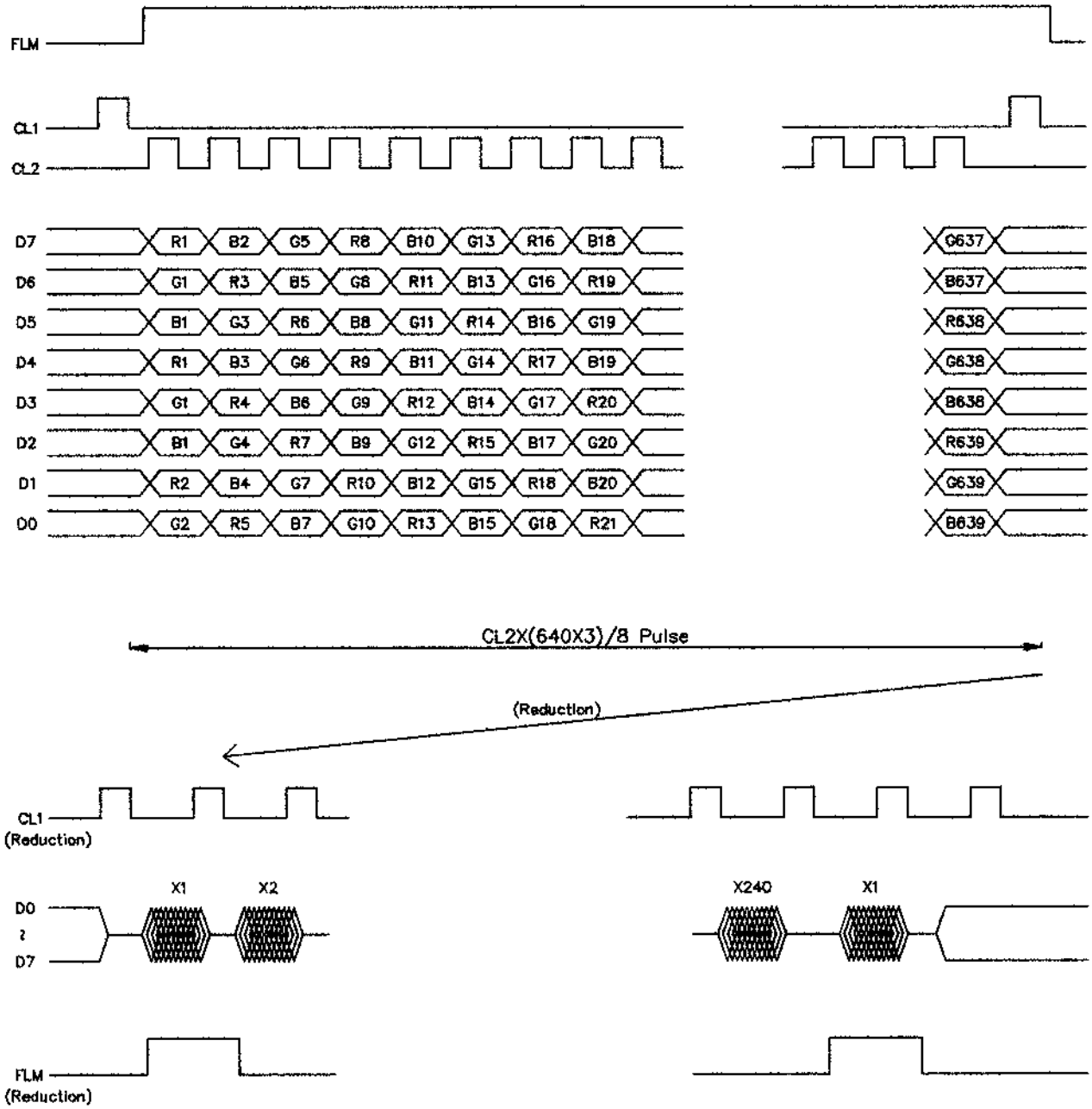
TIMING CHART



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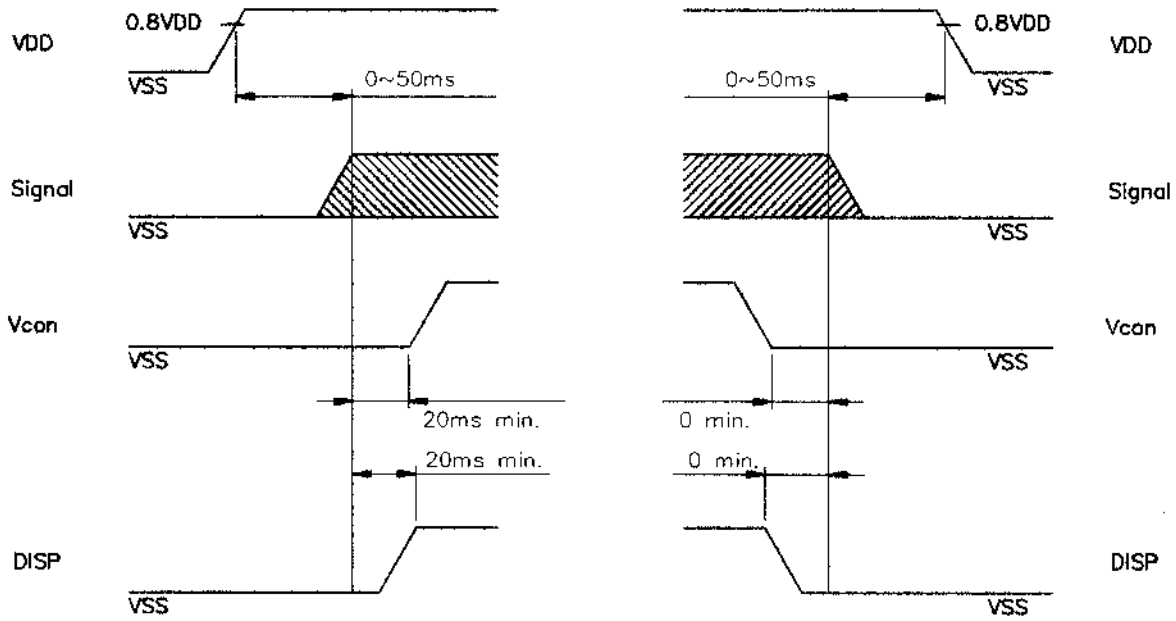
POWER ON/OFF TIMING



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

COLUMN

ROW	1	2	3	4	5	6	7	8	...	1913	1914	1915	1916	1917	1918	1919	1920
1	R0	G0	B0	R1	G1	B1	R2	G2		G637	B637	R638	G638	B638	R639	G639	B639
	D7	D6	D5	D4	D3	D2	D1	D0		D7	D6	D5	D4	D3	D2	D1	D0
2	R0	G0	B0	R1	G1	B1	R2	G2		G637	B637	R638	G638	B638	R639	G639	B639
	D7	D6	D5	D4	D3	D2	D1	D0		D7	D6	D5	D4	D3	D2	D1	D0
...																	
239	R0	G0	B0	R1	G1	B1	R2	G2		G637	B637	R638	G638	B638	R639	G639	B639
	D7	D6	D5	D4	D3	D2	D1	D0		D7	D6	D5	D4	D3	D2	D1	D0
240	R0	G0	B0	R1	G1	B1	R2	G2		G637	B637	R638	G638	B638	R639	G639	B639
	D7	D6	D5	D4	D3	D2	D1	D0		D7	D6	D5	D4	D3	D2	D1	D0

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NOTE:

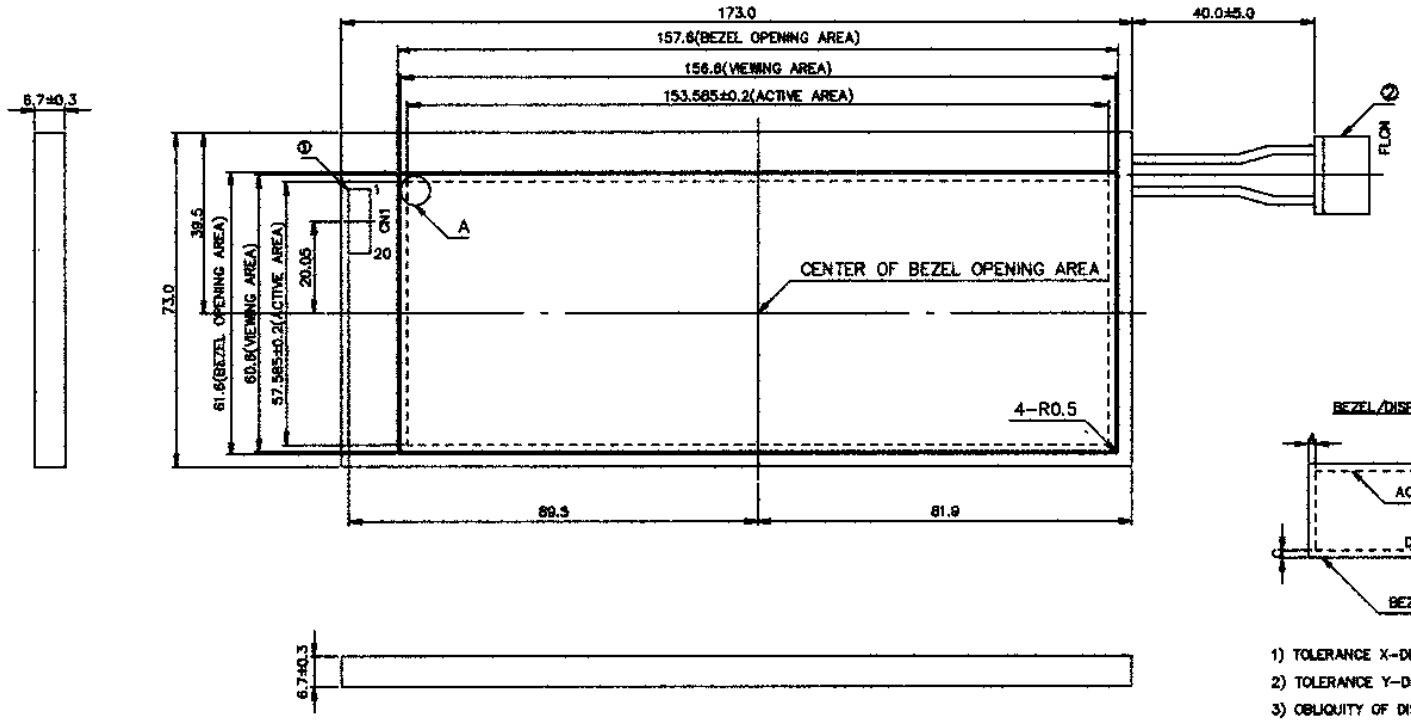
- SAFETY
  1. If the LCD panel breaks, be careful not to get the liquid crystal to touch your skin.
  2. If the liquid crystal touches your skin or clothes, please wash it off immediately by using soap and water.

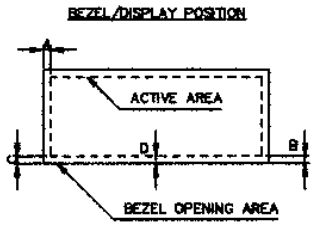
- HANDLING
  1. Avoid static electricity which can damage the CMOS LSI.
  2. Do not remove the panel or frame from the module.
  3. The polarizing plate of the display is very fragile. So, please handle it very carefully.
  4. Do not wipe the polarizing plate with a dry cloth, as it may easily scratch 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
  CCFT : 10,000HR

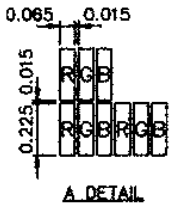




1) TOLERANCE X-DIRECTION : A=1.5±0.5
2) TOLERANCE Y-DIRECTION : B=1.5±0.5
3) OBLIQUITY OF DISPLAY AREA : |C-D|<0.5

② CCFT CONNECTOR
FLCN : HV-2S-C1(JAE)
MATING CONNECTOR :
HV-2P-HF-E1400(JAE) or COMPATIABLE

Pin No.	Symbol
1	HOT
2	GND



A DETAIL

NOTE :

1. RESOLUTION : 640 X 3(R.G.B.) X 240 DOTS
2. TOLERANCE NO SPECIFIED : ±0.5 mm

① INTERFACE CONNECTOR
CN1 : FH12-20S-0.5SH(HIROSE)
MATING CABLE : FFC or FPC,N20,PITCH 0.5mm,
WIDTH 10.5mm,THICKNESS 0.3mm

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