

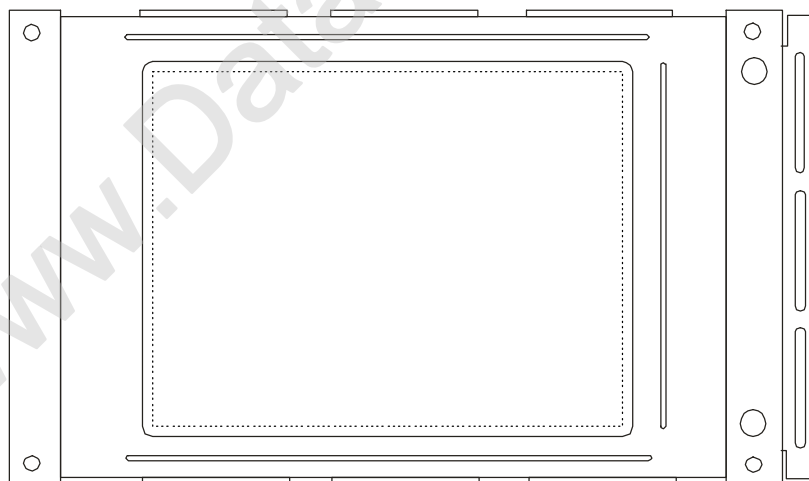
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Http://www.lcdfriends.com

HANTRONIX

PRODUCT SPECIFICATION

HDM3224ATS-1

320X240 (1/4 VGA) GRAPHICS
LCD DISPLAY MODULE
WITH TOUCH SCREEN



HANTRONIX, INC. 10080 BUBB RD. CUPERTINO, CA 95014	Q.A.: JK	REV.: 1.0	HDM3224ATS-1	SHEET 1 OF 17
				DATE: 06/29/01

1.MECHANICAL DATA

(1) Product No.	HDM3224ATS-1
(2) Module Size	167.1 (W)mm x 109.0 (H)mm x MAX 12.5 (D)mm (CCFT B.L.)
(3) Dot Size	0.33 (W)mm x 0.33 (H)mm
(4) Dot Pitch	0.36 (W)mm x 0.36 (H)mm
(5) Number of Dots	320 (W) x 240 (H)Dots
(6) Duty	1/240
(7) LCD Display Mode	FSTN: Black and White(Normally White)
	Rear Polarizer: Transmissive
(8) Viewing Direction	6 O'clock
(9) Backlight	CCFT
(10) Recommended CCFL Inverter	TDK CORP. CXA-L10L
(11) Weight	237.0 g(approx.)

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2.ABSOLUTE MAXIMUM RATINGS

(1) ELECTRICAL ABSOLUTE RATINGS

VSS=0V STANDARD

ITEM	SYMBOL	MIN	MAX	UNIT	COMMENT
Power Supply for Logic	VDD-VSS	-0.3	7.0	V	
Power Supply for LCM	VDD-VEE	0	30.0	V	
Input Voltage	VI	-0.3	VDD	V	
CCFL Driving Voltage	VFL	0	500	Vrms	
CCFL Input Current	IFL	-	7.0	mA _{rms}	
Static Electricity	-	-	-	-	Note 1

(2) ENVIRONMENTAL ABSOLUTE MAXIMUM RATINGS

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

Note 1 LCM should be grounded during handling LCM.

Note 2 Ta ≤ 70°C : 75%RH max

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

Note 3 Ta at -30°C will be < 48hrs, at 80°C will be < 120hrs

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

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3. ELECTRICAL CHARACTERISTICS

(VDD = 5V±5%)

ITEM		SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Power Supply for Logic		VDD-VSS	—	4.75	5.0	5.25	V
Recommended LC Driving Voltage (High Contrast Ratio LC LCM)		VDD-VO	Duty=1/240 Bias=1/13	-20°C	24.2	24.6	25.0
				0°C	22.9	23.3	23.7
				25°C	22.1	22.5	22.9
				50°C	21.2	21.6	22.0
				70°C	20.2	20.6	21.0
Input Voltage		V _H	H level	0.8VDD	—	VDD	V
		V _L	L level	0	—	0.2VDD	V
Power Supply Current		I _{DD}	FLM = 70 Hz VDD = 5.0 V VEE = -24.0 V VDD-VO = 22.5V	—	5.0	8.0	mA
		I _{EE}	PATTERN : □ ■ □ ■ □ ■ ■ □ ■ □ ■ □	—	4.5	7.0	mA
CCFL LAMP	Starting Voltage	V _s	—	—	450	1000	V _{rms}
	Lamp Voltage	V _L		—	260	—	V _{rms}
	Lamp Current	I _L		4	5	6	mA _{rms}
	Lamp Consumption	P _L		—	1.3	—	W
	Lamp Frequency	F _L		—	35	—	KHz
	Lamp Life	L _L		—	60000	—	hr
LCM	Surface Luminance	L	ALL ON	—	33.2	—	cd/m ²
			ALL OFF	—	109.5	—	

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4.OPTICAL CHARACTERISTICS

AT Vop

ITEM MODE		Cr(Contrast Ratio)										θ (Viewing Angle)		θ (Viewing Angle)	
		-20℃		0℃		25℃		50℃		70℃		25℃		25℃	
		MIN.	TYP.	MIN.	TYP.	MIN.	TYP.	MIN.	TYP.	MIN.	TYP.	MIN.	TYP.	MIN.	TYP.
R	A	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	C	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	J	-	-	-	-	-	-	-	-	-	-	-	-	-	-
S	A	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	C	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	J	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T	E,F	-	3.8	-	6.4	9.2	10.8	-	8.5	-	7.3	35	65	20	30
	G,H	-	20.7	-	30.4	48	56	-	13.5	-	9.21	40	70	25	35
NOTE		NOTE 6										NOTE 5			

NOTE :

R : REFLECTIVE

S : TRANSFLECTIVE

T : TRANSMISSIVE

A : GRAY

C : YELLOW

E,F : BLUE

G,H : NORMALLY BLACK

J : NORMALLY WHITE

* The Constrast Ratio Is Measured Not Include Touch Panel.

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

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
Response Time (rise)	Tr	-20℃	-	1000	2000	ms	NOTE 2
		0℃	-	820	1640		
		25℃	-	200	400		
		50℃	-	160	320		
		70℃	-	80	160		
Response Time (fall)	Tf	-20℃	-	500	1000	ms	NOTE 2
		0℃	-	360	720		
		25℃	-	210	420		
		50℃	-	70	140		
		70℃	-	50	100		

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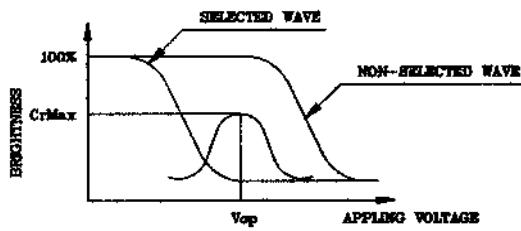
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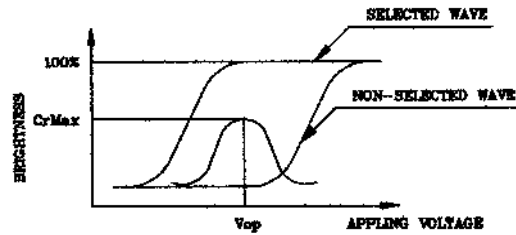
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(NOTE 1)

Definition of Operation Voltage(Vop)



(positive type)



(negative type)

*Conditions

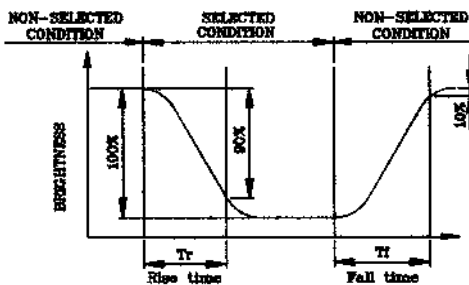
Viewing Angle : 0

Frame Frequency : 70Hz

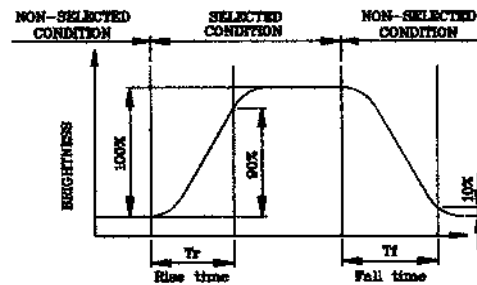
Applying Waveform : 1/N duty 1/a bias

(NOTE 2)

Definition of Response Time(Tr,Tf)



(positive type)



(negative type)

*Conditions

Operating Voltage : Vop

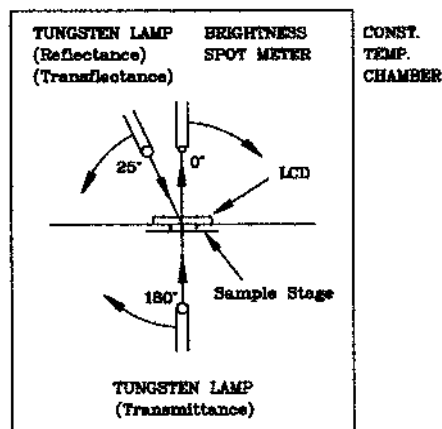
Viewing Angle (θ,φ) : (0,0)

Frame Frequency : 70Hz

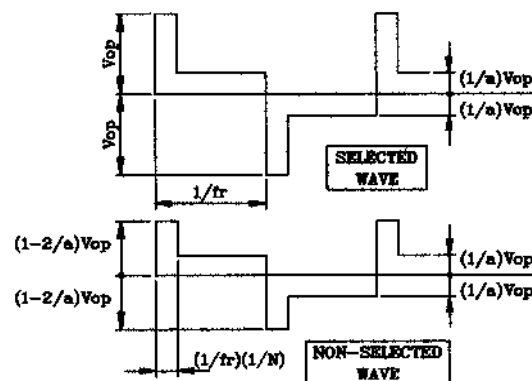
Applying Waveform : 1/N duty 1/a bias

(NOTE 3)

Description of Measuring Equipment and Driving Waveforms

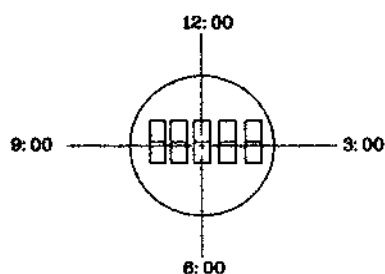


Multiplex Driving (1/N duty 1/a bias)



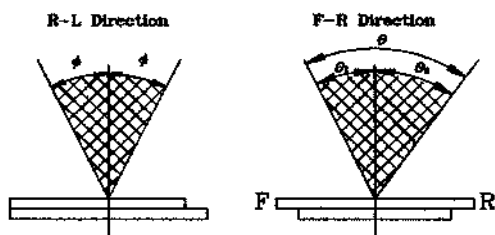
(NOTE 4)

Definition of Viewing Direction



(NOTE 5)

Definition of Viewing Angle



*For This Product

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

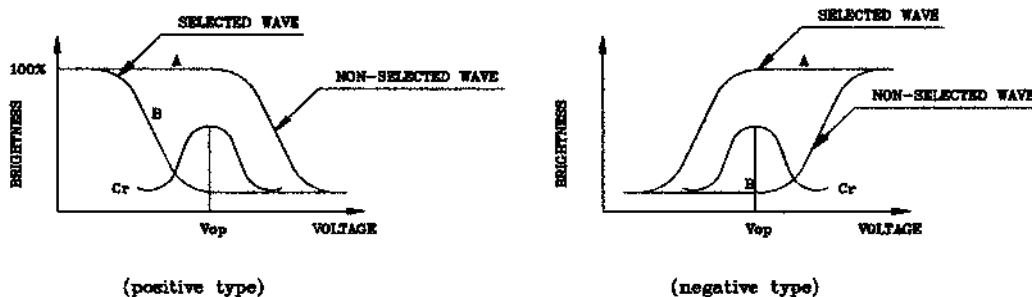
$$\theta = \theta_1 + \theta_2$$

*Conditions

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

(NOTE 6)

Definition of Contrast Ratio (Cr)



Contrast Ratio : $Cr = A/B$

*Conditions

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

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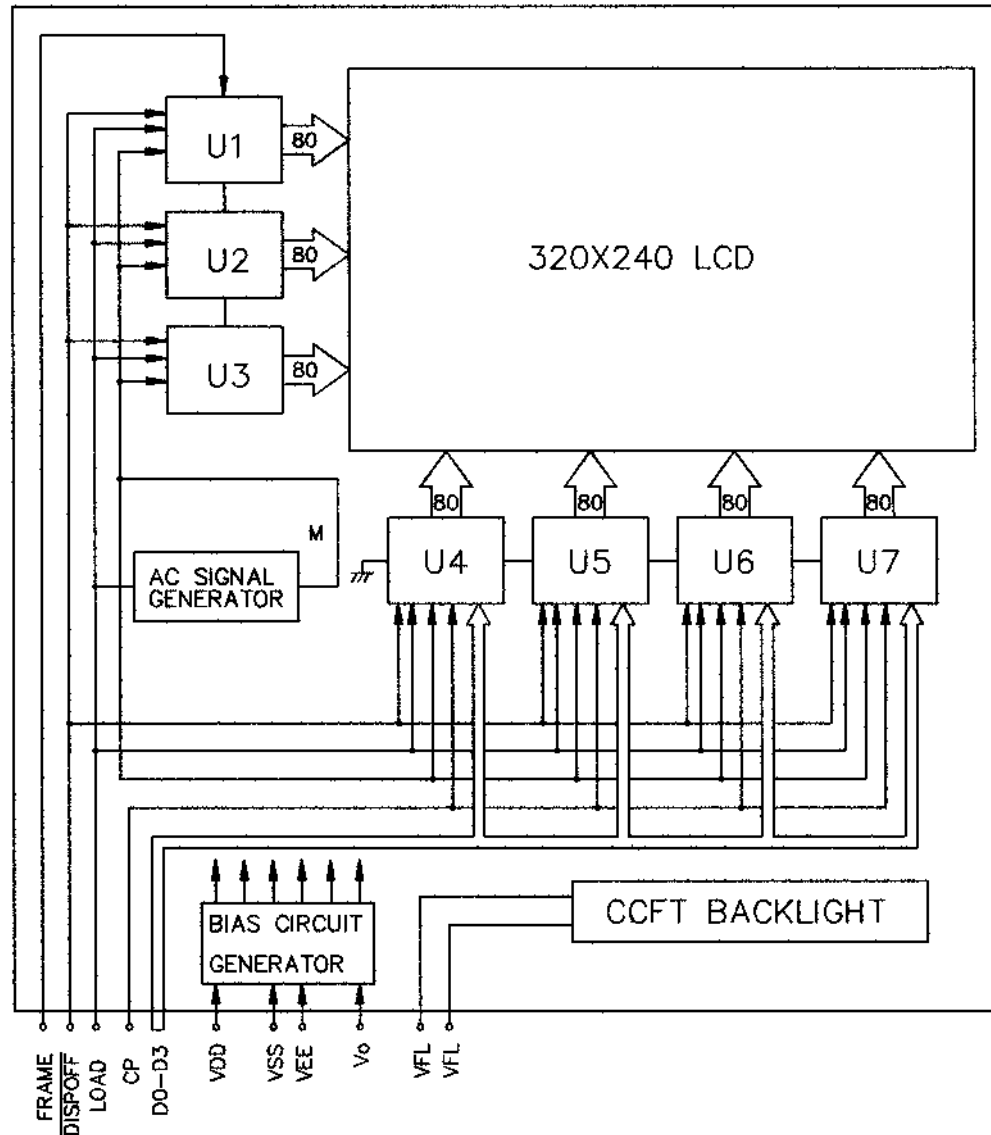
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5. BLOCK DIAGRAM



* AC SIGNAL SETTING

J1	J2	J3	J4	J5	J6	J7	J8
L	H	H	L	L	L	L	L

6.INTERNAL PIN CONNECTION

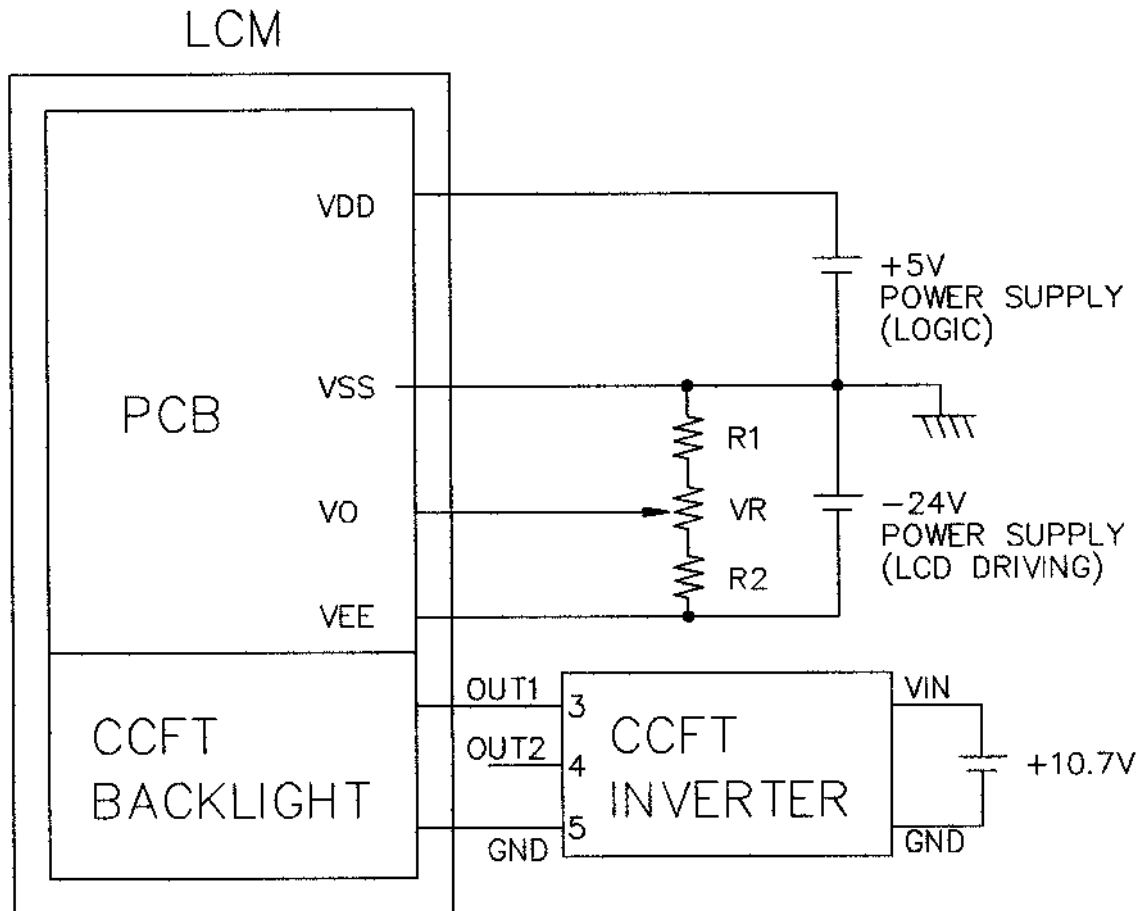
INTERFACE CONNECTOR : FFC PITCH 1.25mm

PIN NO.	SYMBOL	LEVEL	FUNCTION
1	D0	H/L	DISPLAY DATA SIGNAL
2	D1		
3	D2		
4	D3		
5	DISPOFF	H/L	H: ON/L: OFF
6	FRAME	H	SCAN START-UP SIGNAL
7	NC	--	NO CONNECTION
8	LOAD	H→L	INPUT DATA LATCH SIGNAL
9	CP	H→L	DATA INPUT CLOCK SIGNAL
10	VDD	--	POWER SUPPLY FOR LOGIC(+5V)
11	VSS	--	SIGNAL GROUND(0V)
12	VEE	--	POWER SUPPLY FOR LCD
13	VO	--	LCD CONTRAST ADJUST VOLTAGE
14	FGND	--	FRONT PANEL GROUND

CCFL CONNECTOR : J.A.E./IL-G-4S-S3C2

PIN NO.	SYMBOL	LEVEL	FUNCTION
1	HV	--	POWER SUPPLY FOR CCFT BACKLIGHT
2	NC	--	--
3	NC	--	--
4	GND	--	GND FOR CCFT BACKLIGHT

7. POWER SUPPLY

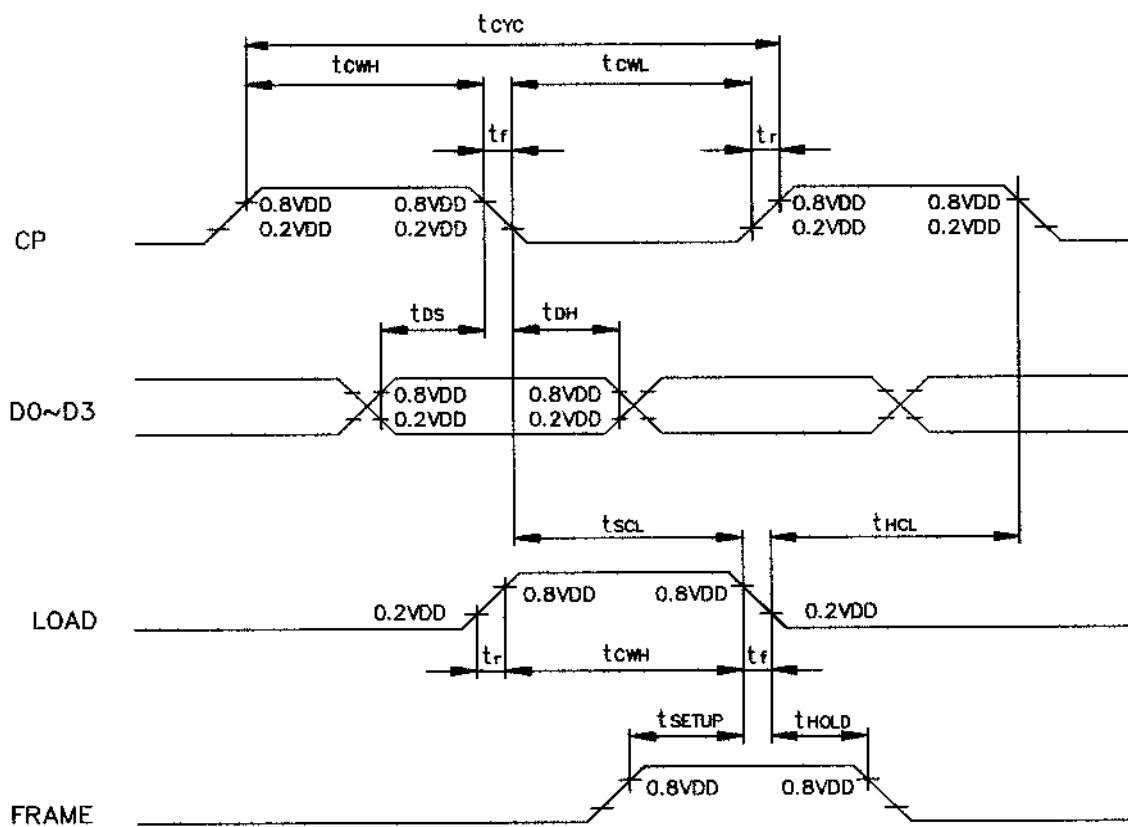


1. $R1 + VR + R2 = 10K \sim 20K \Omega$

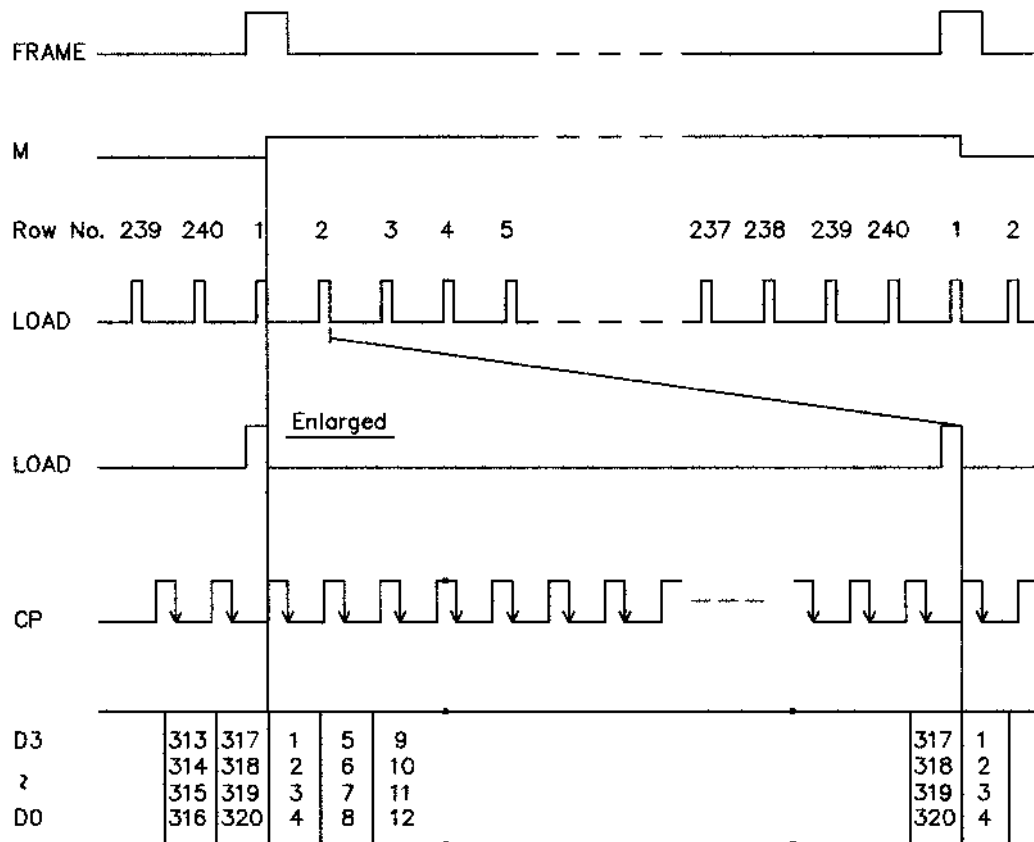
2. RECOMMENDED CCFT INVERTER : CXA-L10L(TDK)
(OPERATING TEMP. $-10^{\circ} \sim 60^{\circ}C$)

8-1. TIMING CHARACTERISTICS

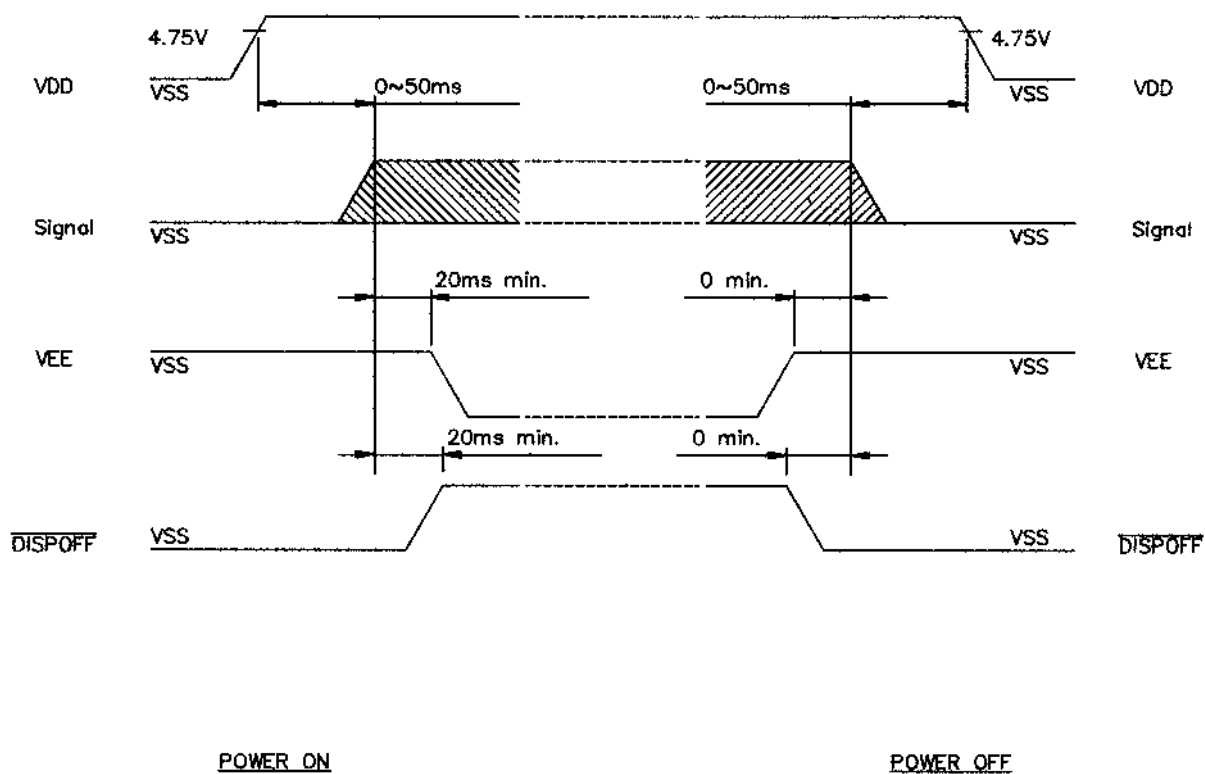
ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT
CLOCK CYCLE TIME	t_{CYC}	125	—	—	ns
CLOCK HIGH LEVEL WIDTH	t_{CWH}	45	—	—	ns
CLOCK LOW LEVEL WIDTH	t_{CWL}	45	—	—	ns
CLOCK RISE TIME	t_r	—	—	30	ns
CLOCK FALL TIME	t_f	—	—	30	ns
DATA SETUP TIME	t_{DS}	30	—	—	ns
DATA HOLD TIME	t_{DH}	30	—	—	ns
CLOCK SETUP TIME	t_{SCL}	80	—	—	ns
CLOCK HOLD TIME	t_{HCL}	80	—	—	ns
FRAME SETUP TIME	t_{SETUP}	30	—	—	ns
FRAME HOLD TIME	t_{HOLD}	30	—	—	ns



8-2. TIMING CHART OF INPUT SIGNALS

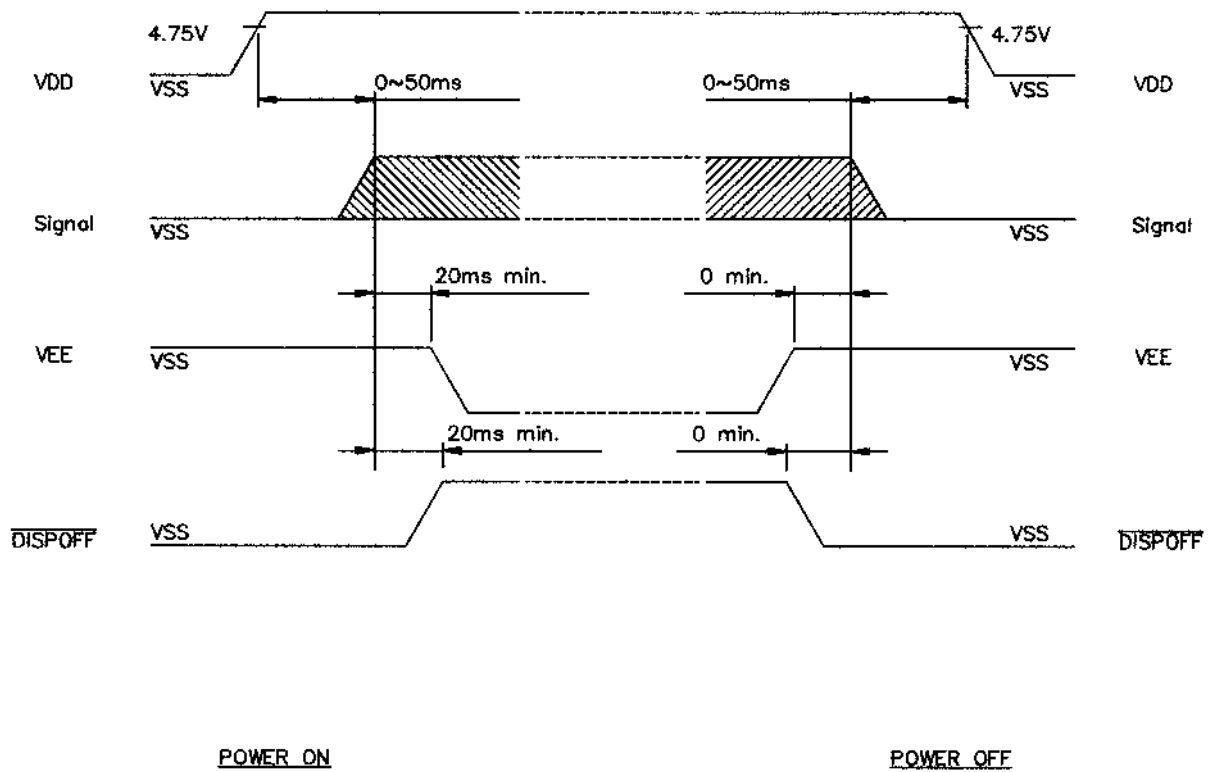


8-4. POWER ON/OFF TIMING



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

8-4. POWER ON/OFF TIMING



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

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9.RELIABILITY TEST

NO	ITEM	CONDITION			STANDARD	NOTE
1	High Temp. Storage	70°C	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 → 25°C.5min → 70°C, 30min → 25°C.5min (1cycle)			Appearance without defect	5 cycles

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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 $25^{\circ}\text{C}\pm 5^{\circ}\text{C}$ 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.

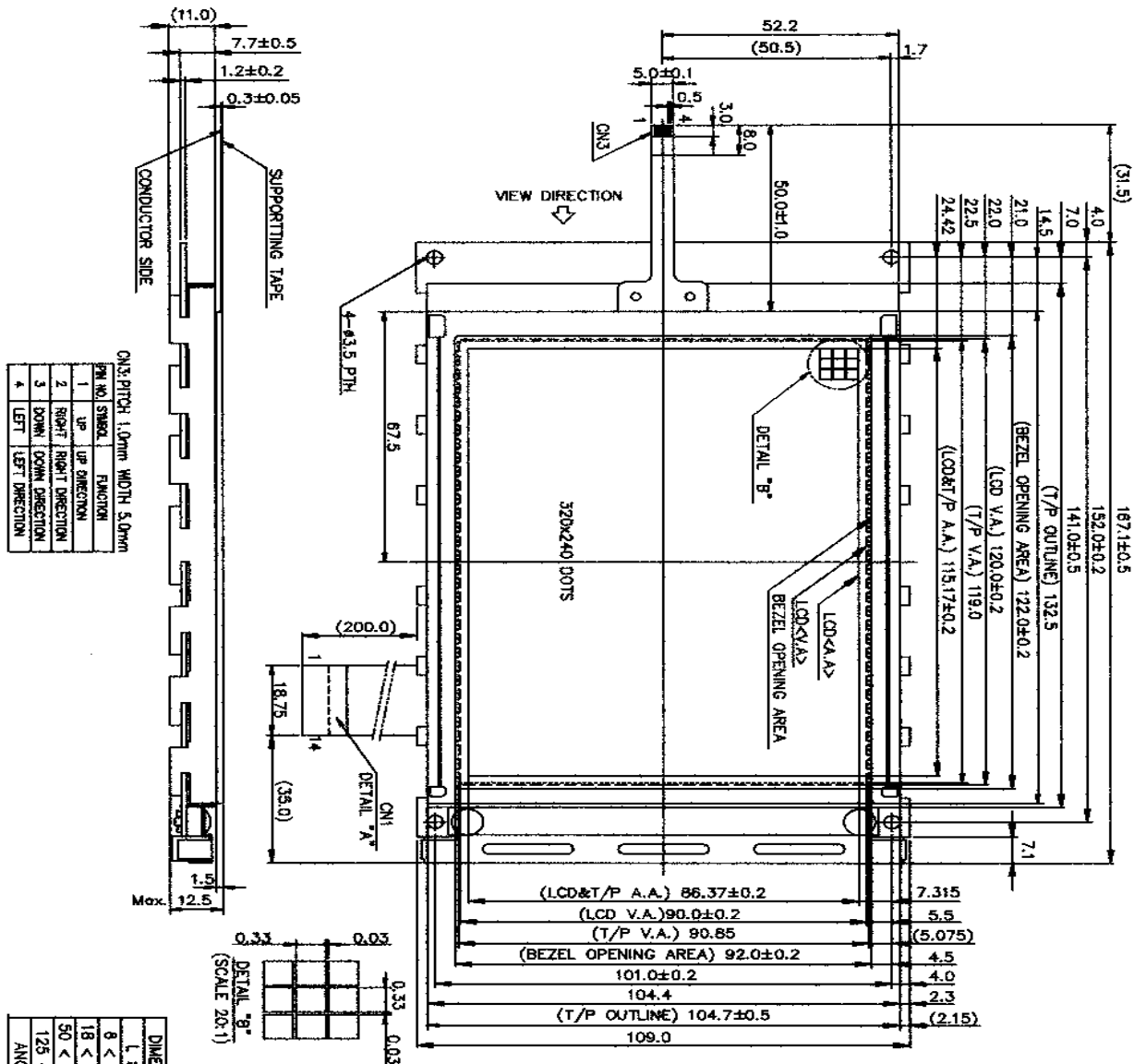
• TERMS OF WARRANTY

- 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.

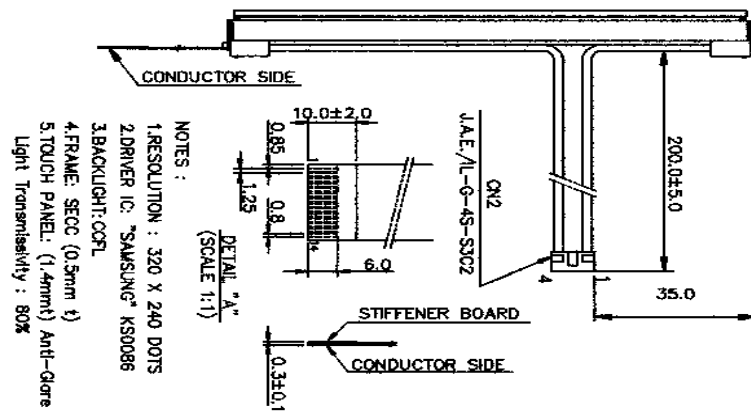
• THE OPERATING LIFE TIME OF BACK LIGHT

- CCFT : 20,000hrs for lamp—current 5mA, 35KHz, 25°C
(Operating life time is defined as follows : The final brightness is at 50% of original brightness.)

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DIMENSION	TOLERANCE
L ≤ 6	±0.25 (mm)
6 < L ≤ 18	±0.3 (mm)
18 < L ≤ 50	±0.4 (mm)
50 < L ≤ 125	±0.5 (mm)
125 < L	±0.6 (mm)
ANGLE	±1° (DEG)



- NOTES:
1. RESOLUTION: 320 X 240 DOTS
 2. DRIVER IC: "SAMSUNG" KS0086
 3. BACKLIGHT: CCFL
 4. FRAME: SECC (0.5mm ±)
 5. TOUCH PANEL: (1.4mm) Anti-dare
- Light Transmissivity: 80%

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