

液晶之友 电话: 020-33819057

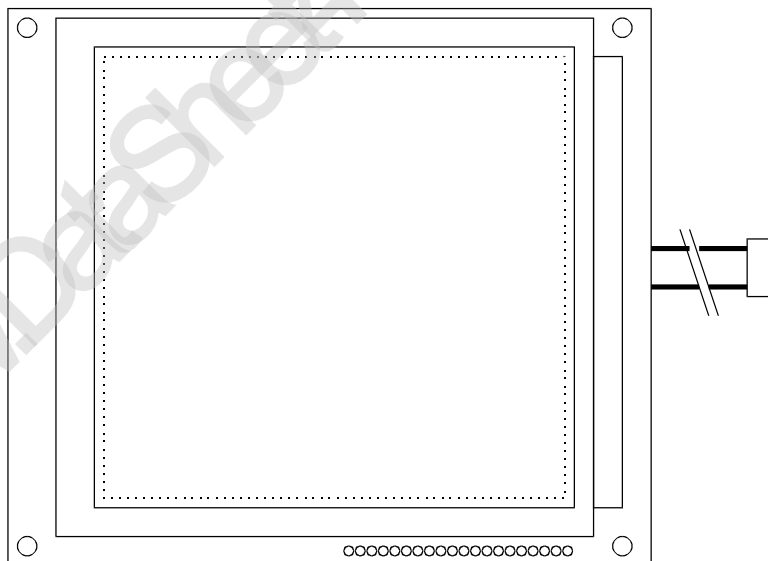
Http://www.lcdfriends.com

HANTRONIX

PRODUCT SPECIFICATION

HDM3224-7

320x240 GRAPHICS
LCD DISPLAY MODULE



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

Q.A.:

JB

REV.:

1.0

HDM3224-7

SHEET 1 OF 17

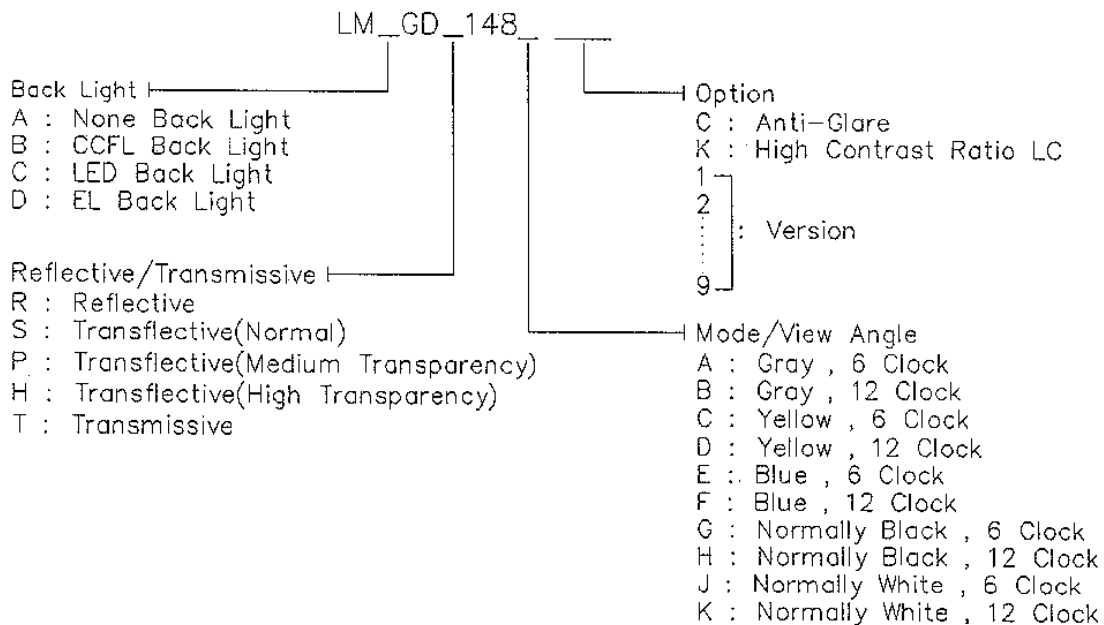
DATE:

12/11/97

MECHANICAL DATA

- (1) Product No.
 (2) Module Size 166.0 (W)mm x 134.0(H)mm x MAX 15:1 (D)mm (CCFL B/L)
 (3) Dot Size 0.32 (W)mm x 0.39 (H)mm
 (4) Dot Pitch 0.36 (W)mm x 0.43 (H)mm
 (5) Number of Dots 320 (W) x 240 (H)Dots
 (6) Duty 1/240
 (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 ☐ CCFL B/L
 (10) Weight CCFL B/L 350 g(approx.)
 (11) Controller Without
 (12) DC/DC Converter Whitout

Note :



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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	VDD-VLC	-0.3	30.0	V	
Input Voltage	VI	0	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 1,3		Note 2,3		Note 3,4		Note 3,5	

Note 1 $T_a \leq 50^\circ\text{C}$: 85%RH max.

$T_a > 50^\circ\text{C}$: Absolute humidity must be lower
than the humidity of 85%RH at 50°C

Note 2 T_a at -20°C will be < 48hrs, at 70°C will be < 120hrs

Note 3 Background color changes slightly depending on ambient temperature.
This phenomenon is reversible.

Note 4 $T_a \leq 70^\circ\text{C}$: 75%RH max

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

Note 5 T_a at -30°C will be < 48hrs, at 80°C will be < 120hrs

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ELECTRICAL CHARACTERISTICS

ITEM		SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Logic Circuit Power Supply		VDD-VSS	-	4.75	5.0	5.25	V
Recommended LCD Driving Voltage		VDD-V0	Duty=1/240 VDD=5.0V	-20°C	-	24.5	V
				0°C	-	23.1	
				25°C	-	22.2	
				50°C	-	21.4	
				70°C	-	20.3	
Input Voltage		V _H	H level	0.8VDD	-	VDD	V
		V _L	L level	0	-	0.2VDD	V
Supply Current for Logic		I _{DD}	VDD = 5.0V V0 = -18.7V	1.9	4.3	-	mA
Supply Current for LCD		I _O	PATTERN : □ ■ □ ■ □ ■ □ ■ □ ■ □ ■ □ ■ □	1.7	4.1	-	mA
CCFL B/L	Open Voltage	V _{OPEN}	Lamp Current = 5 mArms Frequency = 30 KHz	-	-	1500	Vrms
	Lamp Voltage	V _L		-	260	-	Vrms
	Brightness	B		-	350	-	cd/m ²
	Color Degree	X		-	0.331	-	-
		Y		-	0.377	-	

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OPTICAL CHARACTERISTICS

AT Vop

ITEM MODE		Cr(Contrast Ratio)		θ (Viewing Angle)		ϕ (Viewing Angle)	
		25℃		25℃		25℃	
		MIN.	TYP.	MIN.	TYP.	MIN.	TYP.
R	A,B	—	—	—	—	—	—
	C,D	—	—	—	—	—	—
	J	—	—	—	—	—	—
S	J	—	4.1	—	30	—	50
note		NOTE6		NOTE5			

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

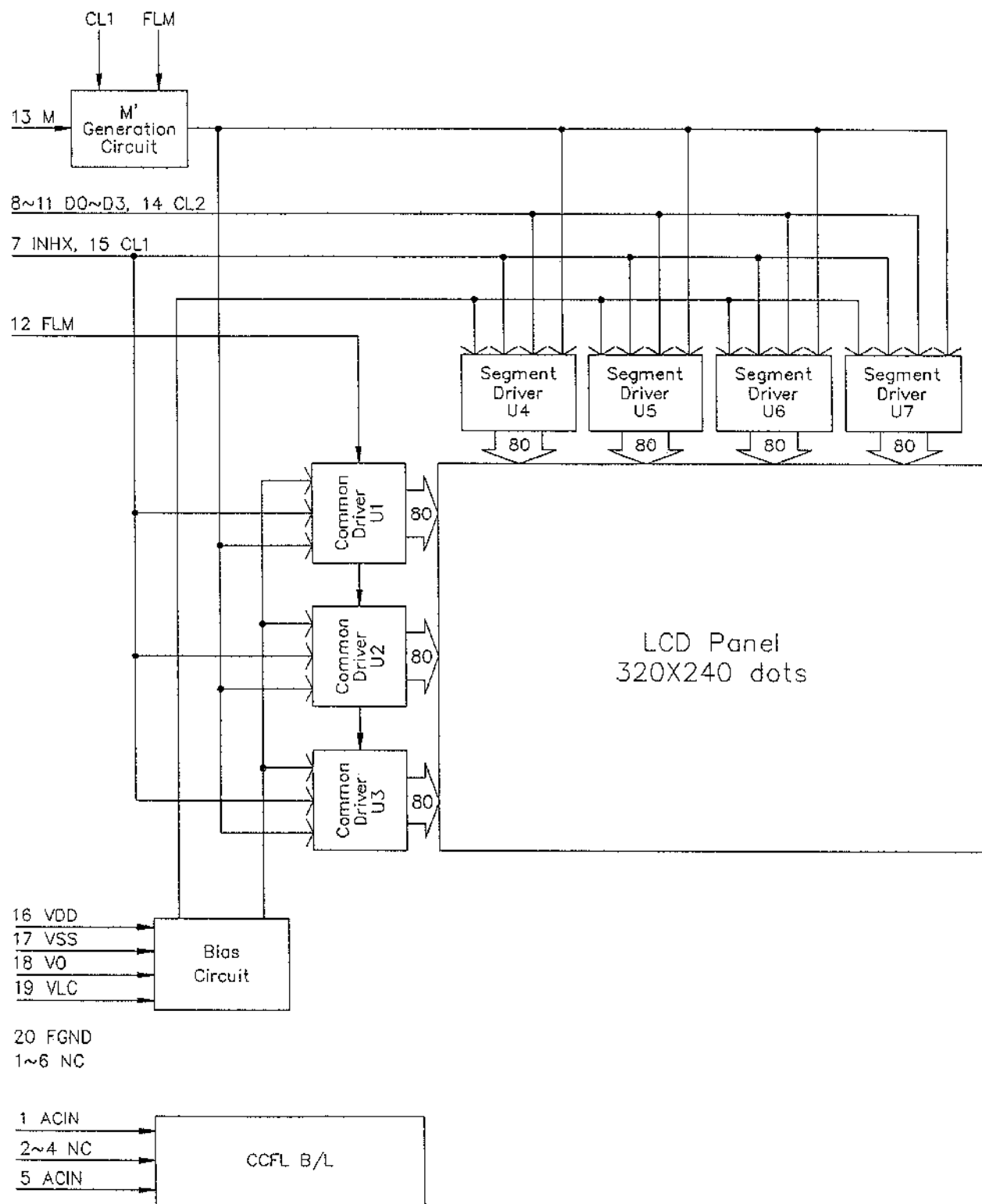
ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	NOTE
Response Time (rise)	Tr	-20℃	—	3460	—	ms	NOTE 2
		0℃	—	725	1200		
		25℃	—	245	400		
		50℃	—	140	200		
		70℃	—	80	150		
Response Time (fall)	Tf	-20℃	—	3000	—	ms	NOTE 2
		0℃	—	1290	2100		
		25℃	—	430	700		
		50℃	—	200	400		
		70℃	—	130	250		

note:

R: REFLECTIVE
S: TRANSFLECTIVE
A,B: GRAY
C,D: YELLOW
J: NORMALLY WHITE

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BLOCK DIAGRAM



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INTERNAL PIN CONNECTION

LCD

Pin No.	Symbol	Function
1	NC	Not Connected
2	NC	Not Connected
3	NC	Not Connected
4	NC	Not Connected
5	NC	Not Connected
6	NC	Not Connected
7	INHx	Display ON/OFF Control Signal : 1=ON 0=OFF
8	D0	Display Data Input
9	D1	Display Data Input
10	D2	Display Data Input
11	D3	Display Data Input
12	FLM	First Line Marker
13	M	Liquid Crystal AC Drive Control Signal
14	CL2	Data Shift Clock
15	CL1	Data Latch Clock
16	VDD	Logic Power Supply (+)
17	VSS	GND (0V)
18	V0	Liquid Crystal Contrast Adjustment
19	VLC	Liquid Crystal Drive Voltage
20	FGND	Frame Ground

CCFL B/L

Pin No.	Symbol	Function
1	AC IN	AC Power Input
2	NC	Not Connected
3	NC	Not Connected
4	NC	Not Connected
5	AC IN	AC Power Input

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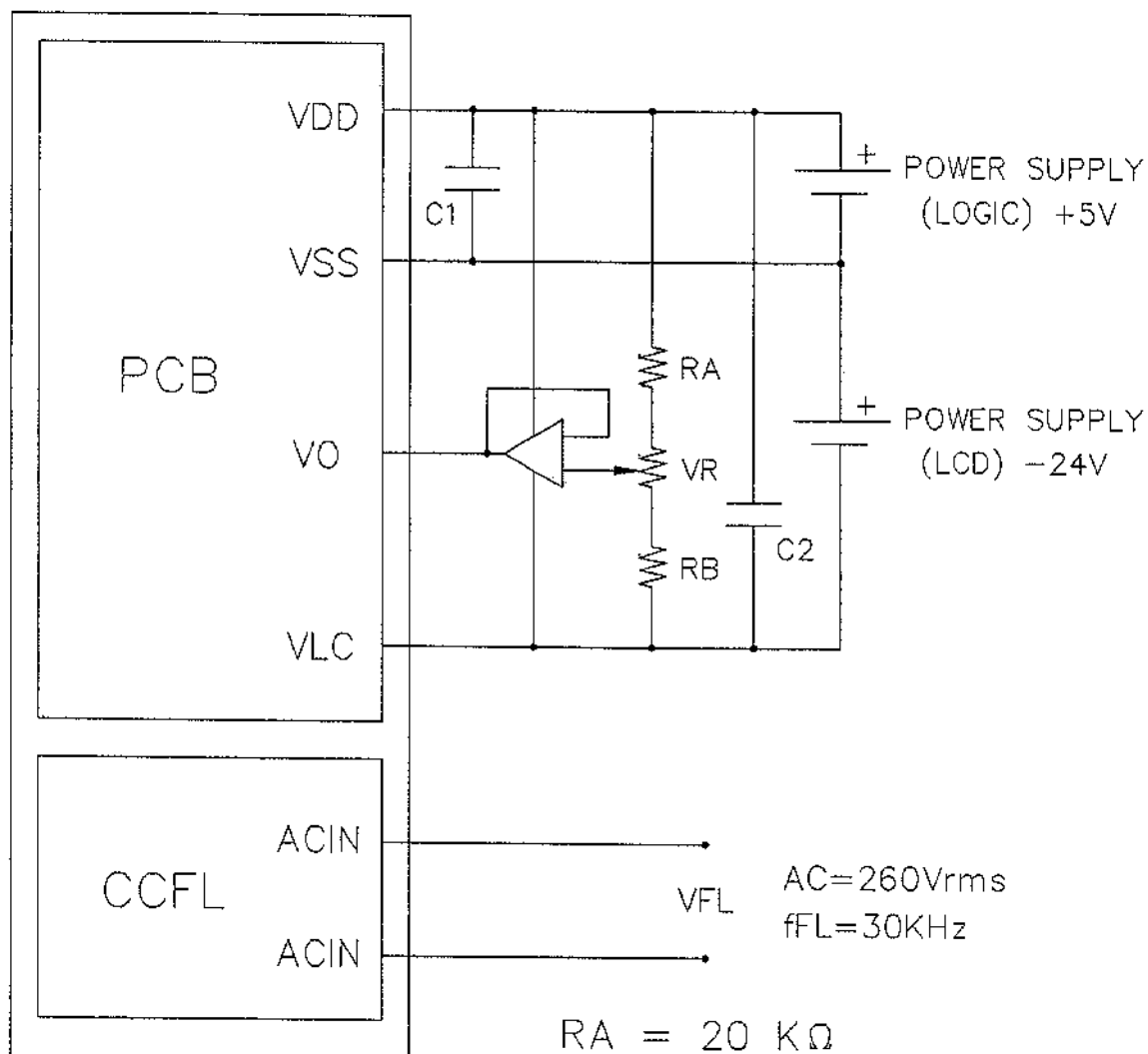
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POWER SUPPLY

LCM



$$RA = 20 \text{ K}\Omega$$

$$RB = 0.1 \text{ K}\Omega$$

$$VR = 10 \text{ K}\Omega(\text{VARIABLE})$$

$$C1, C2 = 10 \text{ }\mu\text{F}$$

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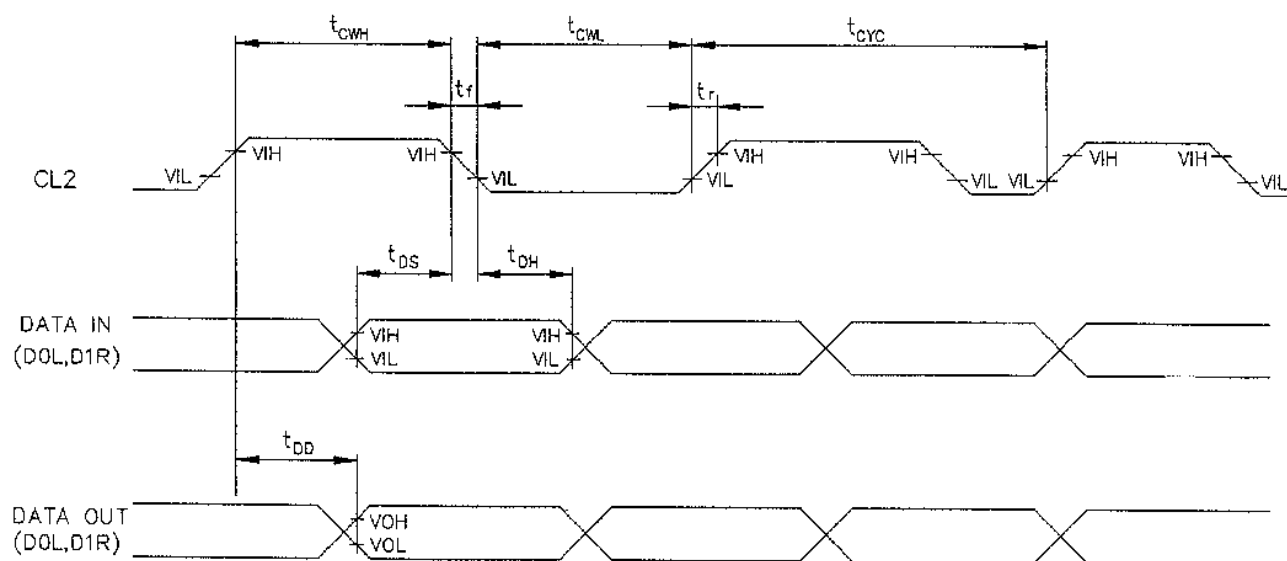
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TIMING CHARACTERISTICS

8-1 COMMON DRIVER OPERATION TIMING

VDD=2.7~4.5V

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT
CLOCK CYCLE TIME	t_{cyc}	10	—	—	μs
CLOCK HIGH LEVEL WIDTH	t_{cwh}	80	—	—	ns
CLOCK LOW LEVEL WIDTH	t_{cwl}	1.0	—	—	μs
CLOCK RISE/FALL TIME	t_r, t_f	—	—	30	ns
DATA SETUP TIME	t_{ds}	100	—	—	ns
DATA HOLD TIME	t_{dh}	100	—	—	ns
DATA OUTPUT DELAY TIME	t_{dd}	—	—	7.0	μs



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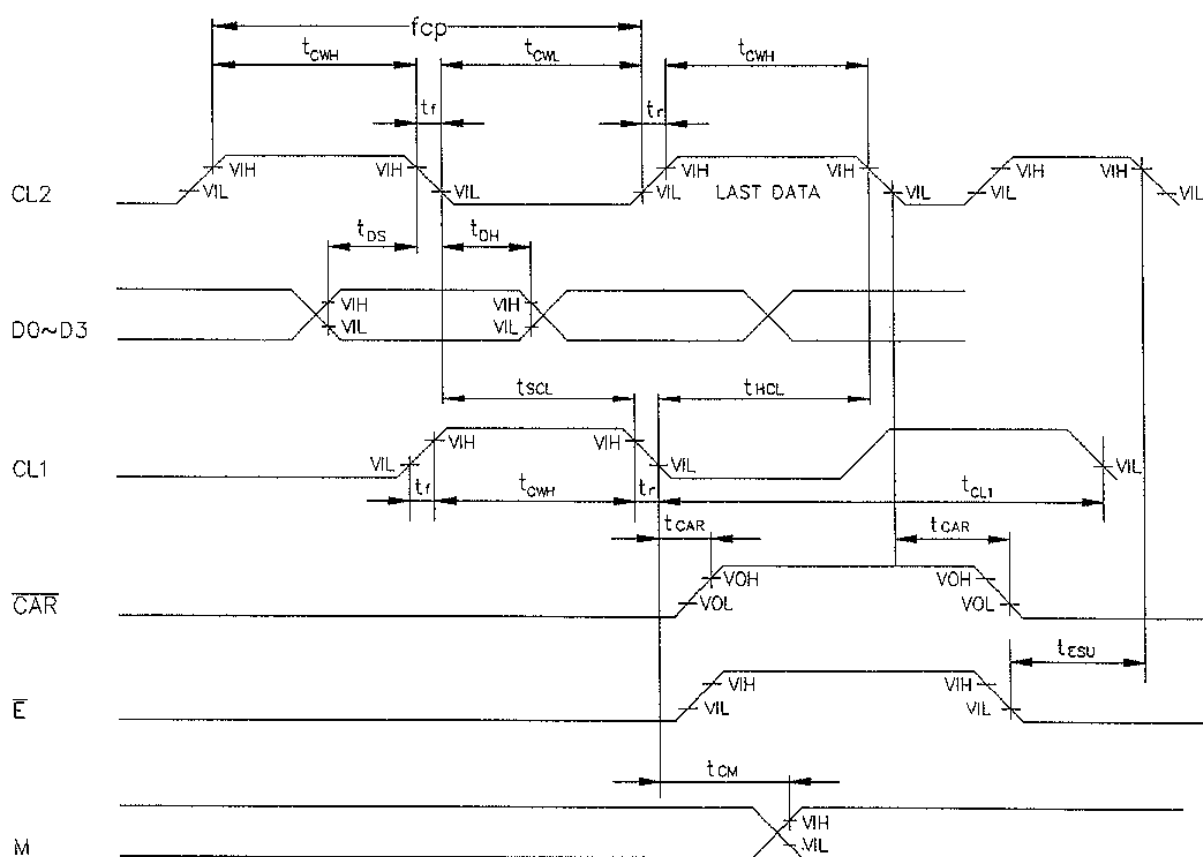
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SEGMENT DRIVER OPERATION TIMING

VDD=2.7~4.5V

ITEM	SYMBOL	MIN.	TYP.	MAX.	UNIT
CLOCK FREQUENCY	f_{cl2}	—	—	6.5	MHZ
CLOCK CYCLE TIME	t_{cyc}	152	—	—	ns
CLOCK PULSE WIDTH	t_{cwh}, t_{cwl}	65	—	—	ns
CLOCK RISE, FALL TIME	t_r, t_f	—	—	1	ns
CLOCK SETUP TIME	t_{scl}	80	—	—	ns
CLOCK HOLD TIME	t_{hcl}	120	—	—	ns
DATA SETUP TIME	t_{ds}	50	—	—	ns
DATA HOLD TIME	t_{dh}	50	—	—	ns
ENABLE SETUP TIME	t_{esu}	30	—	—	ns
CARRY OUTPUT DELAY TIME	t_{car}	—	—	100	ns
M PHASE DIFFERENCE	t_{cm}	—	—	300	ns
CL1 CYCLE TIME	t_{cl1}	$t_{cyc} \times 50$	—	—	ns



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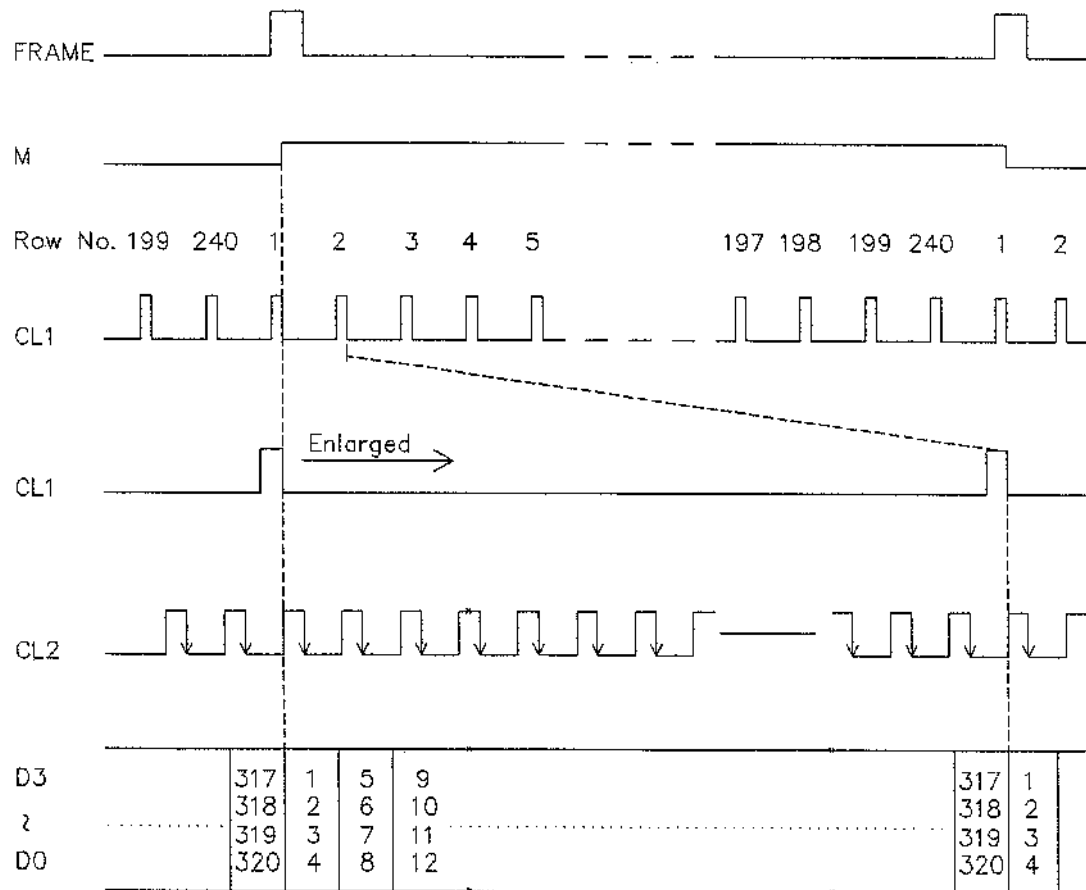
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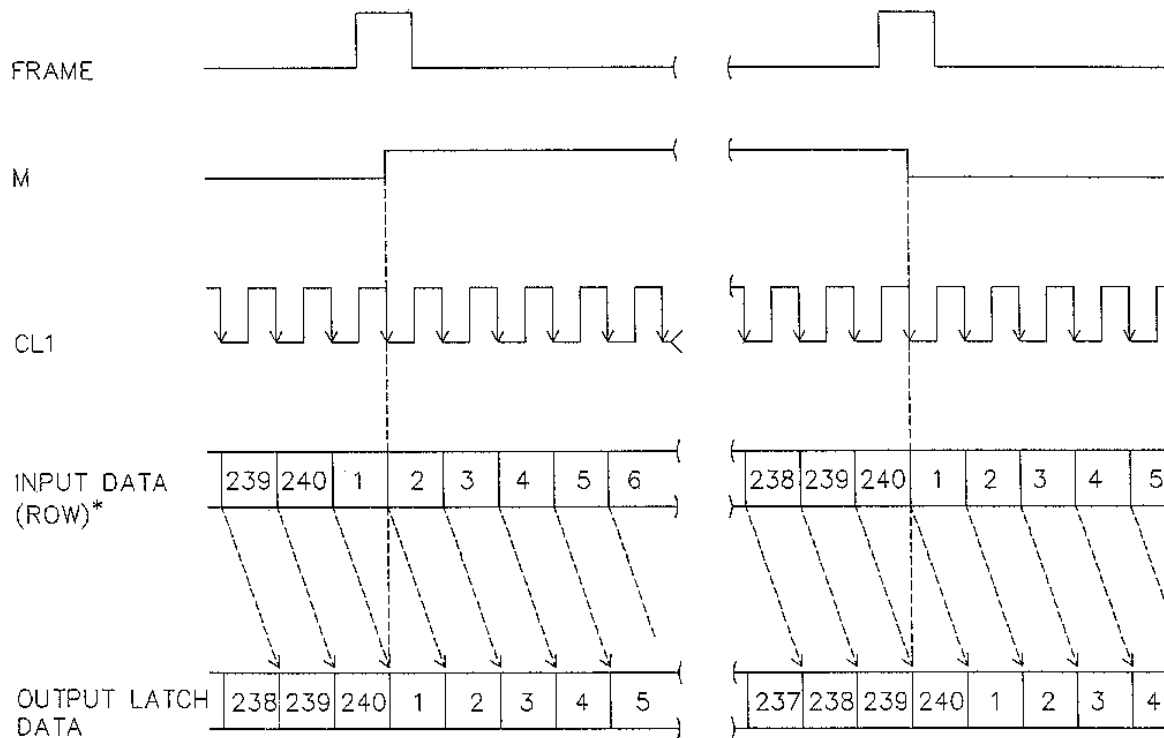
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RELATION OF INPUT DATA AND OUTPUT LATCH DATA



* ONE ROW DATA INCLUDE 80 COLUMN DATA,
ONE COLUMN DATA INCLUDE 4 BIT DATA

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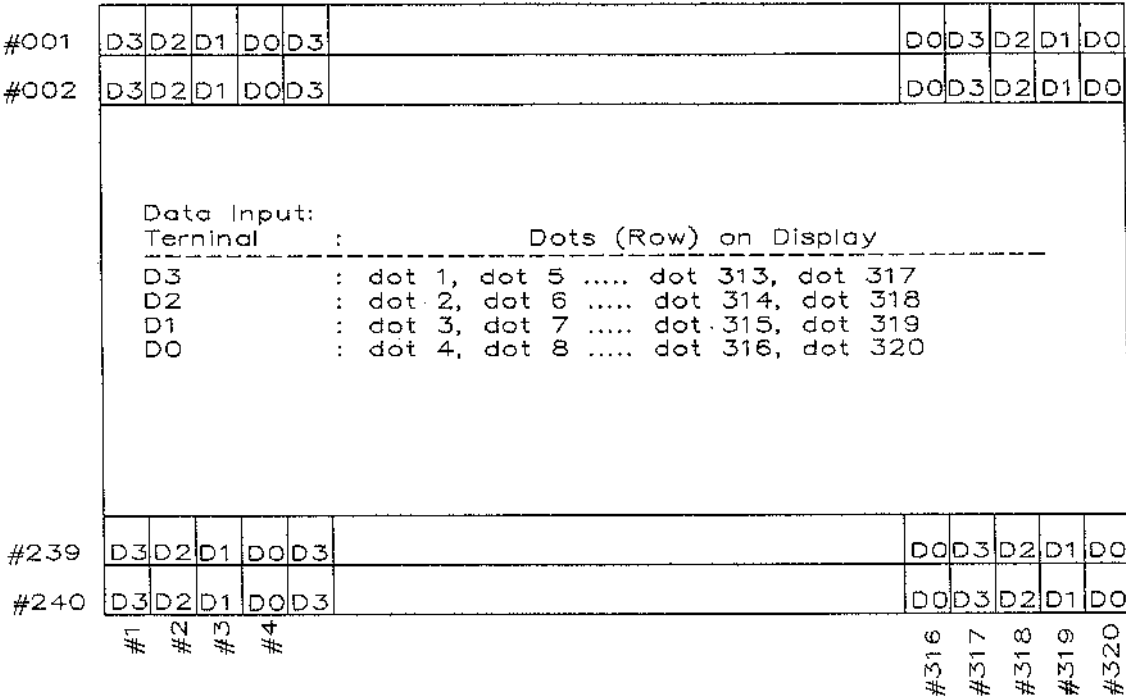
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DISPLAY PATTERN

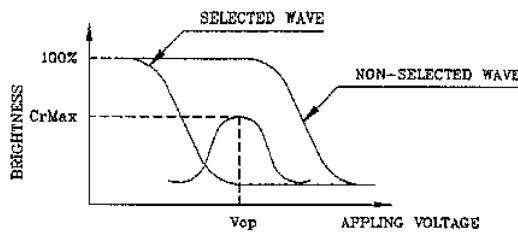


320 DOTS

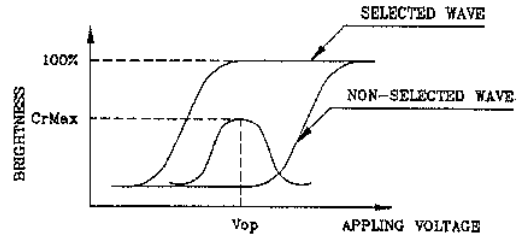
240 DOTS

(NOTE 1)

Definition of Operation Voltage(Vop)



(positive type)



(negative type)

*Conditions

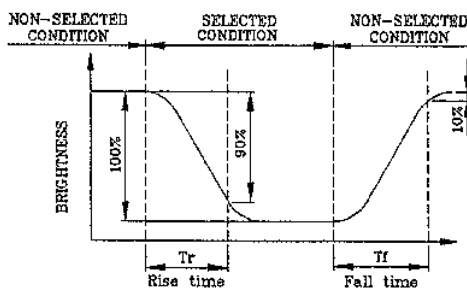
Viewing Angle : 0

Frame Frequency : 70Hz

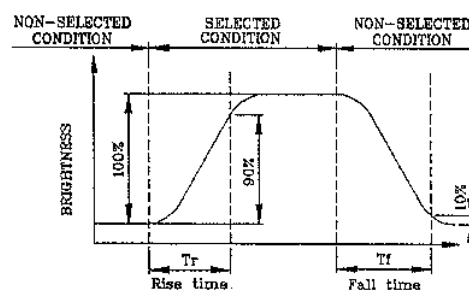
Applying Waveform : 1/N duty 1/a bias

(NOTE 2)

Definition of Response Time(Tr,Tf)



(positive type)



(negative type)

*Conditions

Operating Voltage : Vop

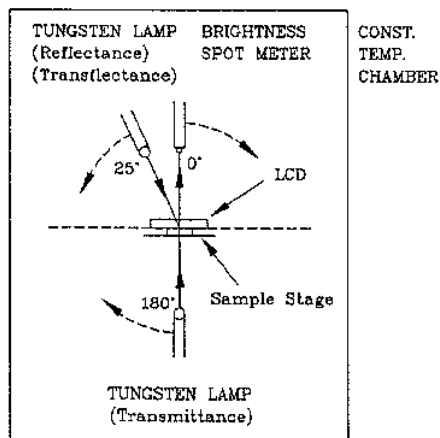
Viewing Angle (θ) : (0,0)

Frame Frequency : 70Hz

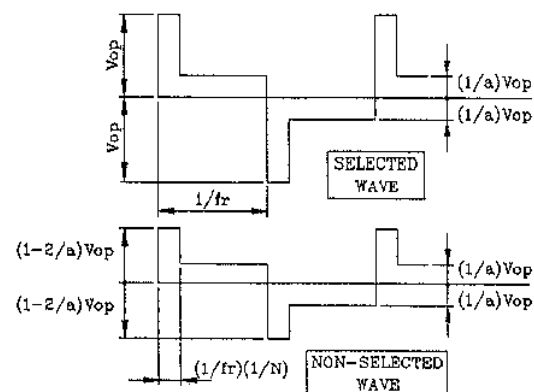
Applying Waveform : 1/N duty 1/a bias

(NOTE 3)

Description of Measuring Equipment and Driving Waveforms



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



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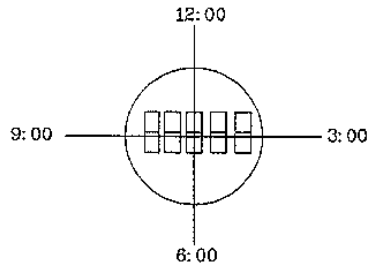
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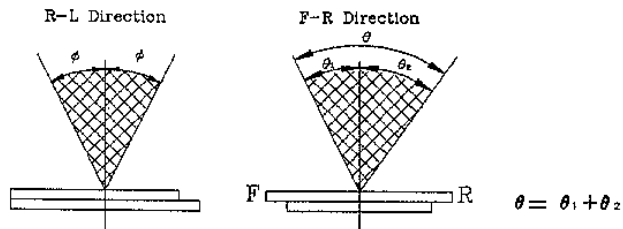
(NOTE 4)

Definition of Viewing Direction



(NOTE 5)

Definition of Viewing Angle

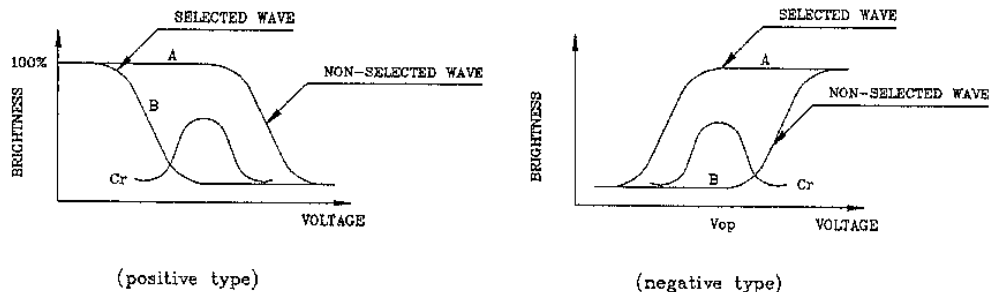


*Conditions

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)



Contrast Ratio : $Cr = A/B$

*Conditions

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

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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

LED : 50,000HR
EL : 5,000HR
CCFT : 10,000HR

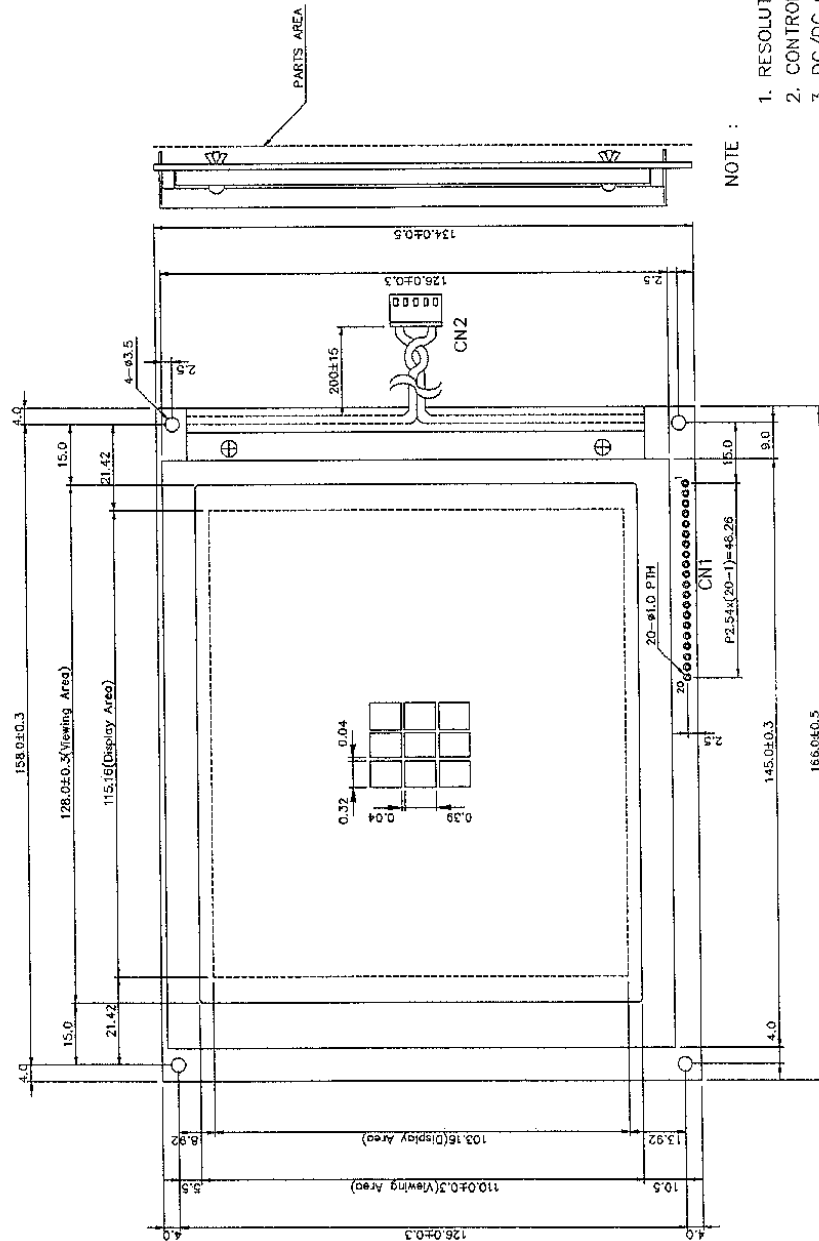
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CN1 PIN CONNECTION

NO.	Symbol	NO.	Symbol
1	NC	11	D3
2	NC	12	FLM
3	NC	13	M
4	NC	14	CL2
5	NC	15	CL1
6	NC	16	VDD
7	INH	17	VSS
8	D0	18	V0
9	D1	19	VLC
10	D2	20	FGND

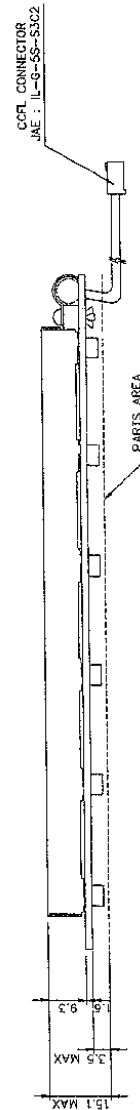
CN2 CCFL PIN CONNECTION

NO.	Symbol
1	AC IN
2	NC
3	NC
4	NC
5	AC IN



NOTE :

1. RESOLUTIONS : 320 x 240 DOTS
2. CONTROLLER : WITHOUT
3. DC/DC CONVERTER : WITHOUT
4. TOLERANCE NO SPECIFIED : ±0.5 mm



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