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# PRODUCT SPECIFICATIONS

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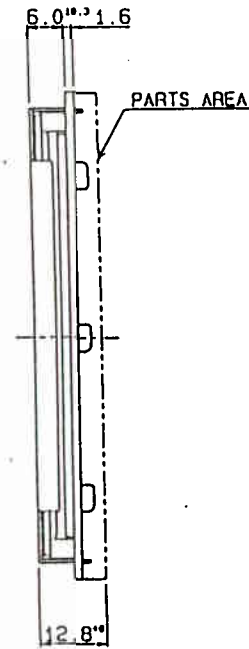
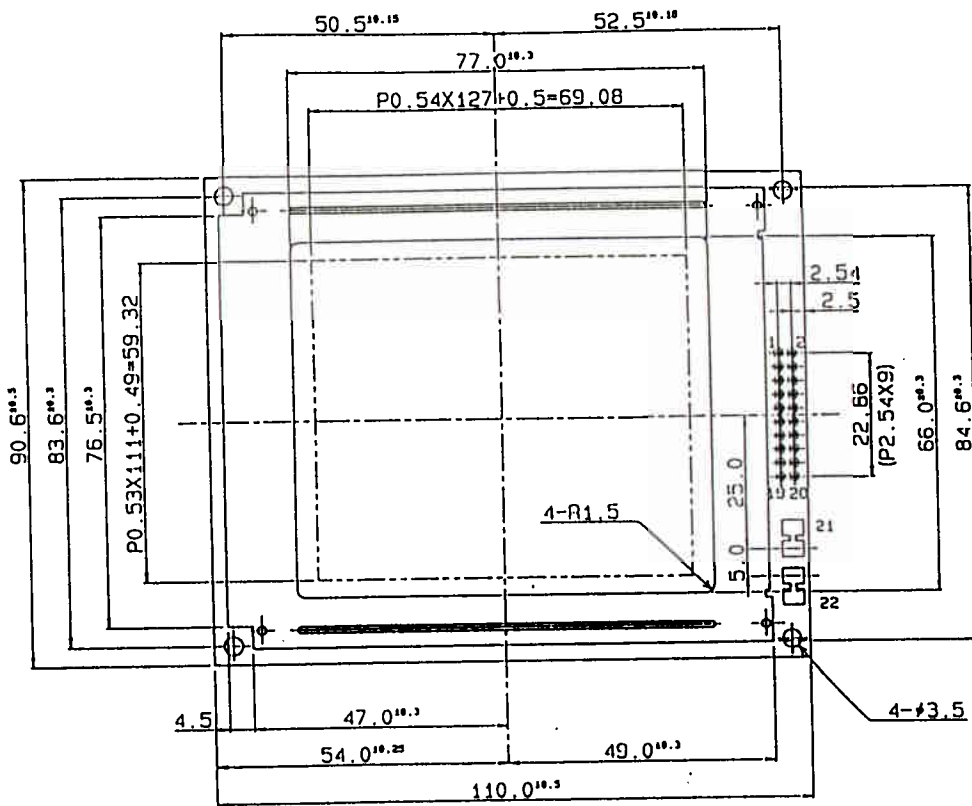
OPTREX TYPE No. : DMF-50268NCU-FW-11

AL 19<sup>th</sup>

<p>This specification is subject to change.  Please consult OPTREX to verify whether any changes  occur in the specification before starting your production.</p>
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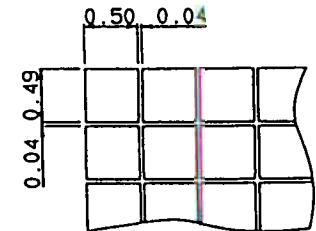
REVISION No. 1 : JAN. 25. '95.

## OPTREX CORPORATION



**PIN ASSIGNMENT**

PIN NO	SYMBOL
1	FG
2	VSS
3	VCC
4	VADJ
5	VEE
6	WR
7	RD
8	CE
9	C/D
10	HALT
11	RESET
12	D0
13	D1
14	D2
15	D3
16	D4
17	D5
18	D6
19	D7
20	NC
21, 22	EL



**DOT DETAIL (SCALE 20/1)**

NOTE: EL TYPE ONLY

TOLERANCE			
MEASURE	A	B	C
1<16	±0.1	±0.3	±1
16<153	±0.2	±0.5	±1.5
53<1250	±0.3	±0.8	±2
250<1500	±0.5	±1.2	±3
500<11000	±0.8	±2	±4

ANGLE			
ANGLE	130	11	12
130	11	12	

ISSUE	DATE	REVISIONS	NAME	MATERIAL	FINISH	Q'ty	NOTE
6							
5							
4							
3							
2							
1							
				3rd ANGLE PROJECTION	TOLERANCE CLASS: A	SCALE: 1/1	
				APPROVED 1/28.5.19.. M. P. S.	MODEL DMF5002N SERIES		
				CHECKED 1/28.12.19. H. Miyano	TITLE DIMENSIONAL OUTLINE		
				DRAWN 1/29.5.24... H. MIYANO	CODE		
				DESIGNED 1/29.5.24... H. MIYANO	DRAWING No.	UE-35450	

**OPTREX CORPORATION**

## 1. Scope

This specification covers the technical data of the undermentioned Liquid Crystal Display(LCD)Module which is delivered from Optrex Corporation to Messrs.

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## 2. Product

Liquid Crystal Display (LCD) Module.

## 3. Type No.

CLIENT Type No. : \_\_\_\_\_

OPTREX Type No. : DMF-50268NCU-FW-11

NOTE

NOTE : High Contrast Type

## 4. General Specifications

Operating Temp. : min. 10°C ~ max. 40°C  
Storage Temp. : min. -20°C ~ max. 60°C  
Dot Pixels : 320 × 3 (R.G.B) (W) × 240 (H) dots  
Dot Size : 0.09 (W) × 0.33 (H) mm  
Dot Pitch : 0.12 (W) × 0.36 (H) mm  
Viewing Area : 119.0 (W) × 90.0 (H) mm  
Outline Dimensions : 172.5<sup>\*1</sup> (W) × 117.0 (H) × 12.5<sup>\*2</sup> MAX. (D) mm  
\*1 Without CFL Cable.  
\*2 Without Connector.  
Weight : 370 (g)  
LCD Type : CTD-11975  
[ Color mode ( Film Type ) ]  
Viewing angle : 12:00  
Data Transfer : 8-bit parallel data transfer  
Back-light : Cold cathode Fluorescent Lamp (CFL) × 2  
Drawings : Dimensional Outline NE-34379C

### 5. Electrical Specifications

#### 5.1 Absolute Maximum Rating

$V_{SS} = 0V$

ITEM	SYMBOL	CONDITION	MIN.	MAX.	UNIT
Supply Voltage (Logic)	$V_{CC}$ $- V_{SS}$	-	-0.3	7.0	V
Supply Voltage (LCD Drive)	$V_{CC}$ $- V_{SS}$	-	0	30.0	V
	$V_{CC}$ $- V_{ADJ}$	-	0	29.0	V
Input Voltage	$V_I$	-	-0.3	$V_{CC}$ +0.3	V

#### 5.2 Electrical Characteristics

$T_a = 25^\circ C, V_{CC} = 5.0V \pm 10\%, V_{SS} = 0V$

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Supply Voltage (Logic)	$V_{CC}$ $- V_{SS}$	-	4.5	-	5.5	V
Supply Voltage (LCD Drive)	$V_{CC}$ $- V_{SS}$	-	28.0 (26.0)	-	29.0 (28.0)	V
	$V_{CC}$ $- V_{ADJ}$	-	Shown in 5.1			V
Input Voltage "H" Level	$V_{IH}$	-	$V_{CC}$ -0.3	-	$V_{CC}$	V
Input Voltage "L" Level	$V_{IL}$	-	0	-	0.8	V
Power Supply Current	$I_{CC}$	-	-	-	20.0	mA
	$I_{CC}$	-	-	-	15.0	mA
Clock Frequency	$f_{CLK}$	Duty = 50%	-	-	8.0	MHz

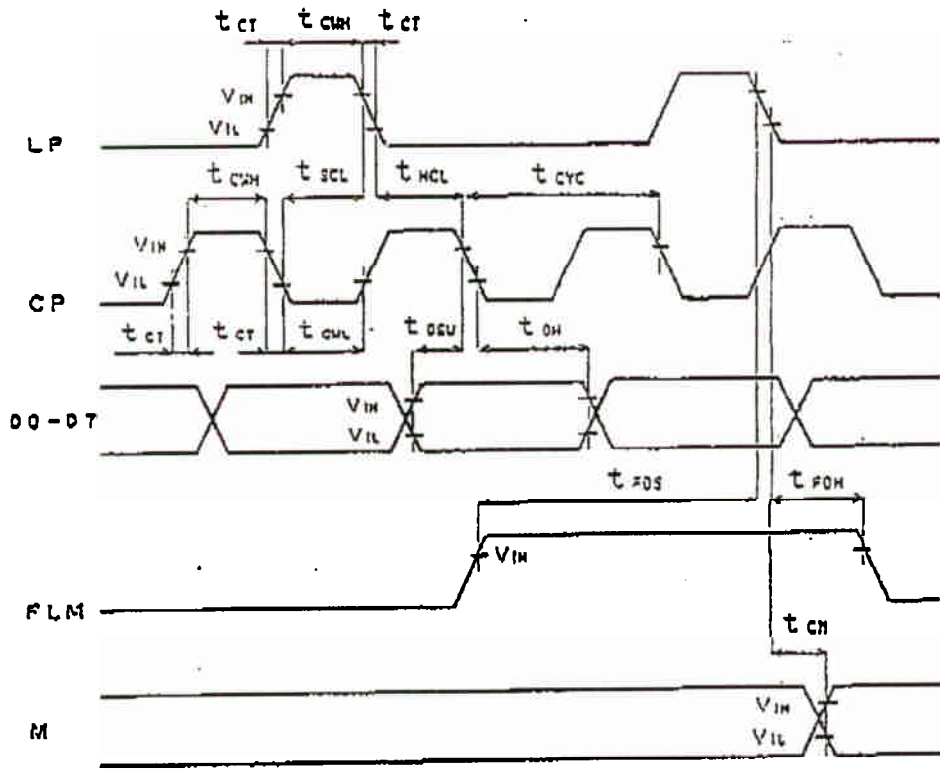
### 5.3 Timing Characteristics

#### 5.3.1 AC Electrical

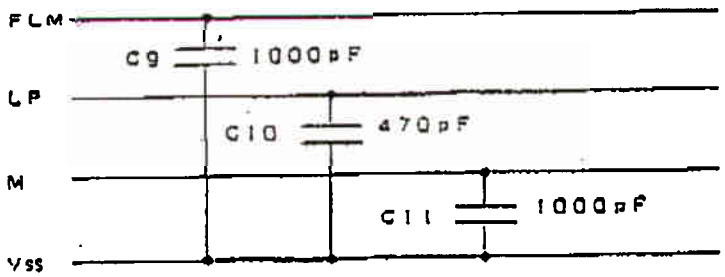
$V_{CC}=5V \pm 10\%$

ITEM	SYMBOL	MIN.	MAX.	UNIT
Clock Cycle Time	$t_{cyc}$	82	—	ns
Clock High Level Width	$t_{cwh}$	20	—	ns
Clock Low Level Width	$t_{cwl}$	20	—	ns
Clock Set Up Time	$t_{scu}$	15	—	ns
Clock Hold Time	$t_{hcl}$	15	—	ns
Clock Rise / Fall Time	$t_{cr}$	—	50	ns
Data Set Up Time	$t_{dsu}$	15	—	ns
Data Hold Time	$t_{doh}$	15	—	ns
Frame Data Signal Set Up Time	$t_{fcs}$	100	—	ns
Frame Data Signal Hold Time	$t_{fch}$	100	—	ns
H Signal Phase Shift Time	$t_{cm}$	—	300	ns

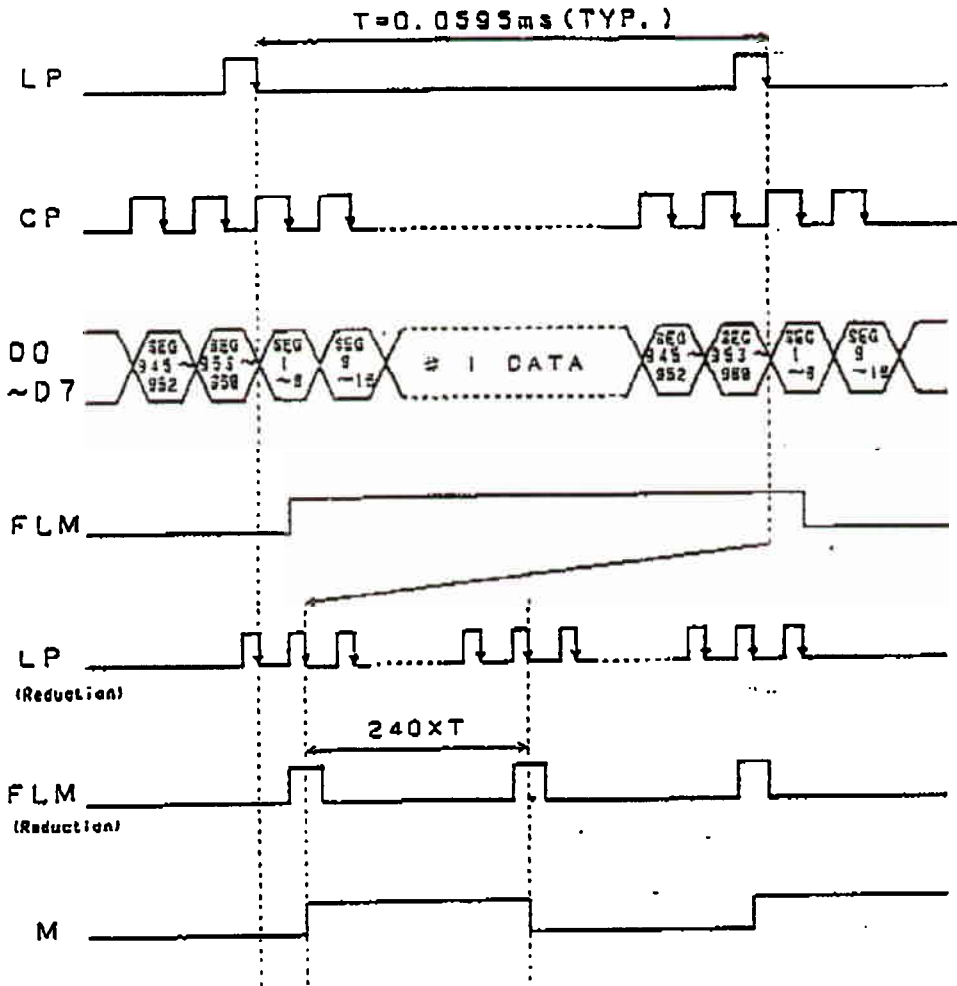
\* During Latch-Plus is "H" level, Please make sure to keep Clock Pulse in "L" level.



This Module contain these capacitors. Please be careful about Timing Characteristics.

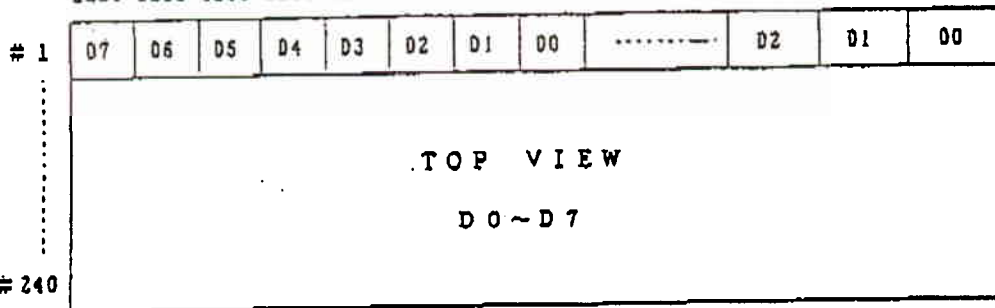


### 5.3.2 Timing Chart



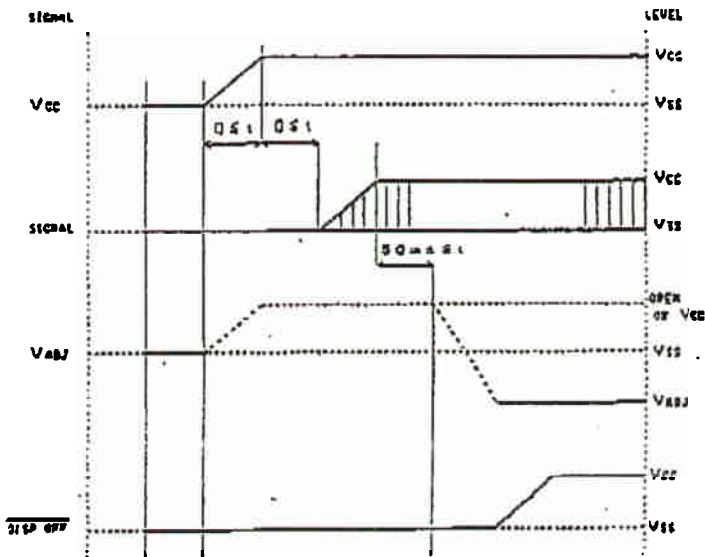
### 5.3.3 Comparison of Display and Data

(R) (G) (B) (R) (G) (B) (R) (G) (R) (G) (B)  
 SEG1 SEG2 SEG3 SEG4 SEG5 SEG6 SEG7 SEG8 ..... SEG958 SEG959 SEG960

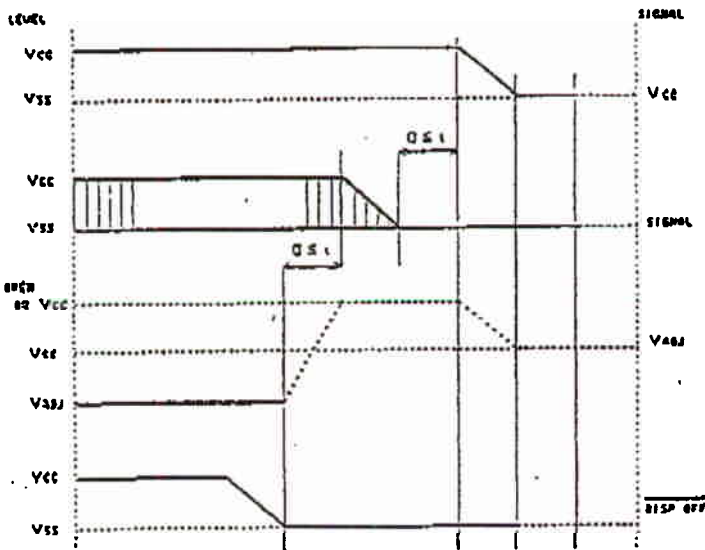


## 5.4 Power Supply ON/OFF sequence

### 5.4.1 ON sequence



### 5.4.2 OFF sequence



Please maintain the above sequence when turning on and off the power supply of the module.

While alternate signal for LCD driving (M signal) is unstable if  $V_{ABJ}$  is supplied to the module, DC component will be supplied to the LCD panel.

This may cause damage the LCD module.



## 5.5 Lighting Specification

### 5.5.1 CFL Specification

Measurement Condition  $T_a=25^{\circ}\text{C}$  after 3 min.power on.

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Lamp Voltage	$V_L$	-	-	315	-	$V_{rms}$
Lamp Current	$I_L$	-	4.7	5.0	5.3	$\text{mA}_{rms}$
Starting Voltage	$V_s$	-	780	-	-	$V_{rms}$

### 5.5.2 Module Surface Brightness

Measurement Condition  $T_a=25^{\circ}\text{C}$  after 20 min.power on.

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Surface Brightness	B	$I_L=5.0\text{ mA}$	100	-	-	$\text{cd}/\text{m}^2$
Lifetime	L	$I_L=5.0\text{ mA}$	-	10000	-	Hrs

1) Surface brightness is the initial measurement of brightness on the surface of the LCDP.( Measurent point at center of display. )

#### 2) Definition

##### a. Lifetime

CFL life is defined as the point at which brightness reaches 50%.

Lifetime shall refer to module surface brightness being least 50% of the initial value.

##### b. Lamp Voltage( $V_L$ )

The voltage to maintain the electric discharge of the lamp  $V_{rms}$  is measured at three minutes after the lamp is thuned ON.

##### c. Lamp Current( $I_L$ )

The lamp current of three minutes after the lamp is turned ON.

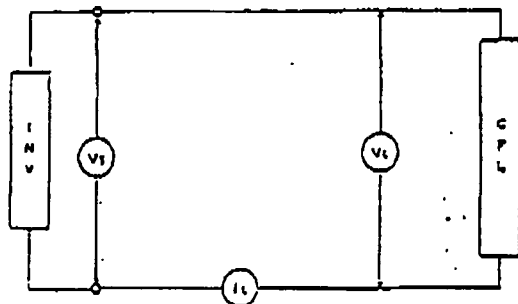
##### d. Starting Voltage( $V_s$ )

The voltage at starting the electric discharge when the voltage is increased gradually from 0V.

Recommended Inverter : CXA-N10A (Product by TDK)  
CXA-N10L (Product by TDK)

Suitable Connector : H60-04-30-110P (Straight type / Product by MITUMI)  
H60-04-30-130P (Angle type / Product by MITUMI)

### 5.5.3 CFL Testing Circuit



## 6. Optical Specifications

### 6.1 Optical Specifications

$T_a=25^{\circ}\text{C}$ ,  $V_{CC}-V_{ADJ}=25.0\text{V}$  :  $\theta=0^{\circ}$ ,  $\phi=-^{\circ}$

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	
Recommended LCD Driving voltage (1/240 Duty)	$V_{CC}-V_{ADJ}$	$T_a = 10^{\circ}\text{C}$	-	25.5 (24.3)	27.2 (26.0)	V	
		$T_a = 25^{\circ}\text{C}$	-	25.0 (24.1)	-	V	
		$T_a = 40^{\circ}\text{C}$	21.9 (20.7)	24.4 (23.1)	-	V	
Contrast Ratio	CR	Note1	-	20 (17)	-	-	
Chromaticity (at display center)	Red	x	—	0.46	-	-	
		y	—	0.31	-	-	
	Green	x	—	0.25	-	-	
		y	—	0.56	-	-	
	Blue	x	—	0.13	-	-	
		y	—	0.15	-	-	
	White	x	—	0.26	-	-	
		y	—	0.34	-	-	
	Black	x	—	0.19	-	-	
		y	—	0.21	-	-	
Viewing Angle	Shown in 6.2						
Response Time	rise	r r	Note2 $T_a=25^{\circ}\text{C}$	-	240 (190)	360 (290)	ms
	Decay	r d	Note3 $T_a=25^{\circ}\text{C}$	-	220 (170)	330 (260)	ms

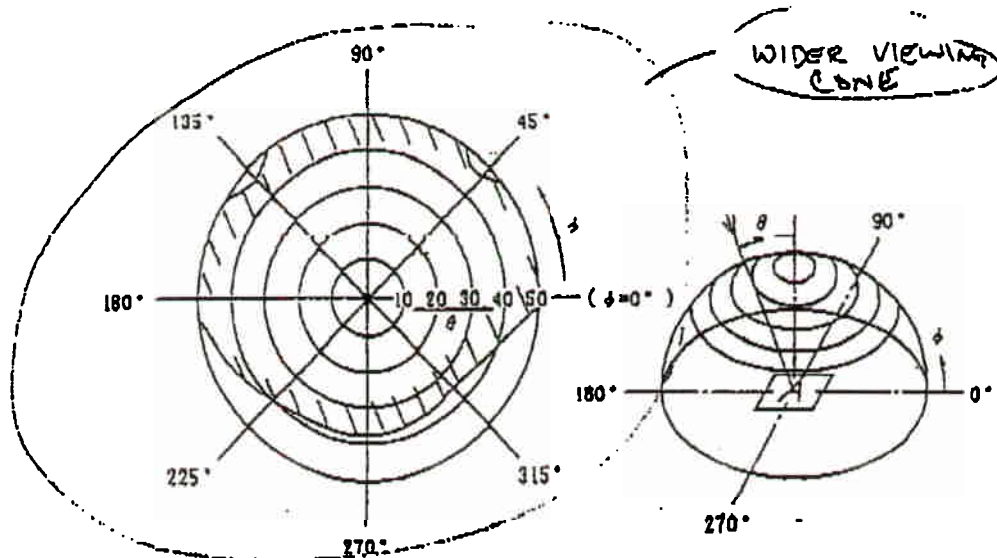
Note1 : Definition of Contrast Ratio  
 When brightness of non-selected signal was A and brightness of selected signal was B, contrast ratio defined  
 $CR=A/B$  (Positive Case)  
 $CR=A/B$  (Negative Case)

Note2 : The time of that the brightness level reaches 90% level of the saturation level from 0% level when ON signal is applied.

Note3 : The time of that the brightness level reaches 10% level of the saturation level from 100% level when OFF signal is applied.

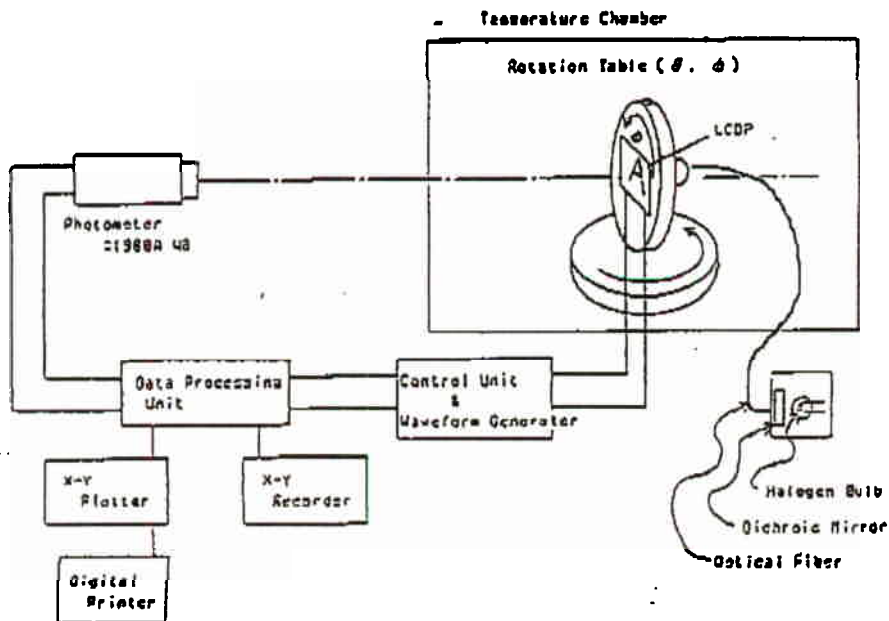
## 6.2 Definition of Viewing Angle and Optimum Viewing Area

- Point ● show the point where contrast ratio measured.  $\therefore \theta = 0^\circ$ ,  $\phi = 0^\circ$
- Driving condition 1/240 Duty, 1/14 Bias, 25.0 Vo-p, 70.0Hz



\* Shaded Area Shows TYP. CR  $\geq 2$

## 6.3 System Block Diagram



## 7. I/O Terminal

### 7.1 Pin Assignment

CN1

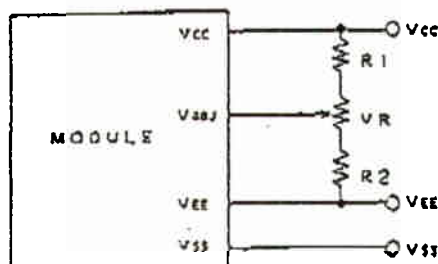
PIN NO.	SYMBOL	LEVEL	FUNCTION
1	FLM	H/L	First Line Marker
2	LP	H→L	Data Latch Signal
3	CP	H→L	Clock Signal for Shifting Data
4	M	H/L	Alternate Signal for LCD Drive
5	V <sub>adj</sub>	—	Voltage Level for LCD Contrast Adjustment
6	V <sub>cc</sub>	—	Power Supply for Logic (+5V)
7	V <sub>ss</sub>	—	Power Supply (0V,GND)
8	V <sub>zz</sub>	—	Power Supply for LCD Drive
9	D0	H/L	Display Data
10	D1	H/L	Display Data
11	D2	H/L	Display Data
12	D3	H/L	Display Data
13	D4	H/L	Display Data
14	D5	H/L	Display Data
15	D6	H/L	Display Data
16	D7	H/L	Display Data
17	DISP OFF	H/L	H:Display On L:Display Off (22KΩ Pull Up)
18	NC	OPEN	Non-Connection
19	NC	OPEN	Non-Connection
20	NC	OPEN	Non-Connection

H:V<sub>cc</sub> Level L:V<sub>ss</sub> Level

CN2, CN3

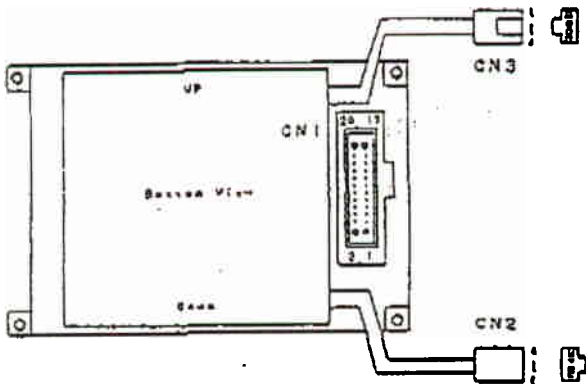
1	CFL(GND)	—	Power supply for CFL (GND)
2	NC	OPEN	Non-Connection
3	NC	OPEN	Non-Connection
4	CFL(HOT)	~	Power supply for CFL (HOT)

### 7.2 Example of Power Supply



$$R1 + R2 + VR = 10 \sim 20 \text{ k}\Omega$$

### 7.3 Pin No. Layout



CN1: HIF3FC-20PA-2, 5406A (HRS)  
 CN2: 3:MS3MS3-04 (MITUMI)

### 7.4 Block Diagram

