
MODULE SPECIFICATION

ORIGINAL

OPTREX TYPE No.

DMF50081NB-FW

D-K # OP 320240

PREPARED BY OPTREX

APPROVED BY

ISSUED DATE : JUN. 24.1991

OPTREX CORPORATION

3-14-9, Yushima, Bunkyo-ku, Tokyo 113, Japan
Telephone: (03)5688-8265 Marketing Division
Telex: OPTREX J34323
Tele-Fax: (03)5688-8270 (G III · G II)

$$V_{SS} = 0V$$

Item	Symbol	Condition	min	max	Unit
Logic Supply Voltage	$V_{CC}-V_{SS}$	—	-0.3	7	V
LCD Supply Voltage	$V_{CC}-V_{EE}$	—	10.0	30	V
	$V_{CC}-V_{ADJ}$	—	10.0	30	
Input Voltage	V_i	—	-0.3	$V_{CC}+0.3$	V
Operating Temp.	T_{opr}	—	0	50	°C
Storage Temp.	T_{stg}	—	-20	60	°C

8 Electrical Characteristics

$$V_{CC}=5V\pm 5\%, T_a=25^\circ C$$

Item	Symbol	Condition	min	max	Unit
Logic Supply Voltage	$V_{CC}-V_{SS}$	—	4.5	5.5	V
LCD Supply Voltage	$V_{CC}-V_{EE}$	—	27.0	30.0	V
	$V_{CC}-V_{ADJ}$	—	10.0	28.0	V
Power Supply Current	I_{CC}	—	—	15	mA
	I_{EE}	—	—	10	mA
Input Voltage "H"Level	V_{IH}	—	$0.7V_{CC}$	V_{CC}	V
Input Voltage "L"Level	V_{IL}	—	0	$0.3V_{CC}$	V
Clock Frequency	f_{cp}	Duty=50%	—	6.0M	Hz

8.1 CCT Specification

Item	Symbol	Condition	min	max	Unit
Lamp Current	I_L	Supply Voltage $V_S = 900V_{AC}$ Lamp Voltage $V_L = 360V_{AC}$	4	6	mA

Recommendation Inverter : TDK CXA-L10L , CXA-L10A

9.1 Optical Specification

$\theta = 0^\circ, \phi = 90^\circ, T_a = 25^\circ\text{C}, V_{CC} \sim V_{ADJ} = 23.3\text{V}$

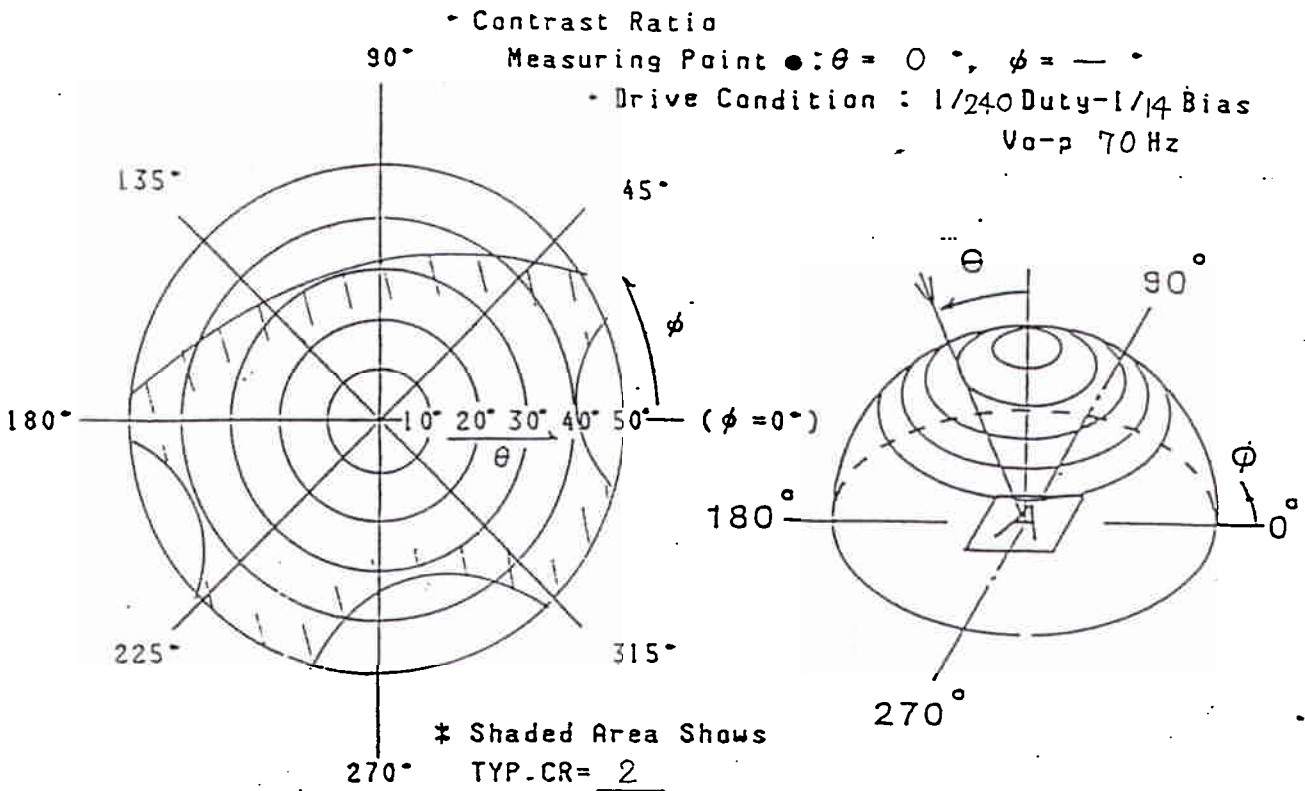
Item	Symbol	Condition	min	typ	max	Unit		
Recommened LCD Driving voltage (1/240 Duty)	$V_{CC} \sim V_{EE}$	$T_a = + 0^\circ\text{C}$	—	—	27.1	V		
		$T_a = + 25^\circ\text{C}$	—	23.3	—	V		
		$T_a = + 50^\circ\text{C}$	19.9	—	—	V		
Contrast Ratio	CR	—————	—	4	—			
Viewing Angle		Show in 9.2 (page 5)						
Responce Time	Rise	τ_r	Note 1	$T_a = 25^\circ\text{C}$	—	100	200	ms
	Decay	τ_d	Note 2	$T_a = 25^\circ\text{C}$	—	360	540	ms

Note1 : The time required which the blacking ratio of segment becoms 90% from 0% when waveform is switched to selected one from nonselected one.

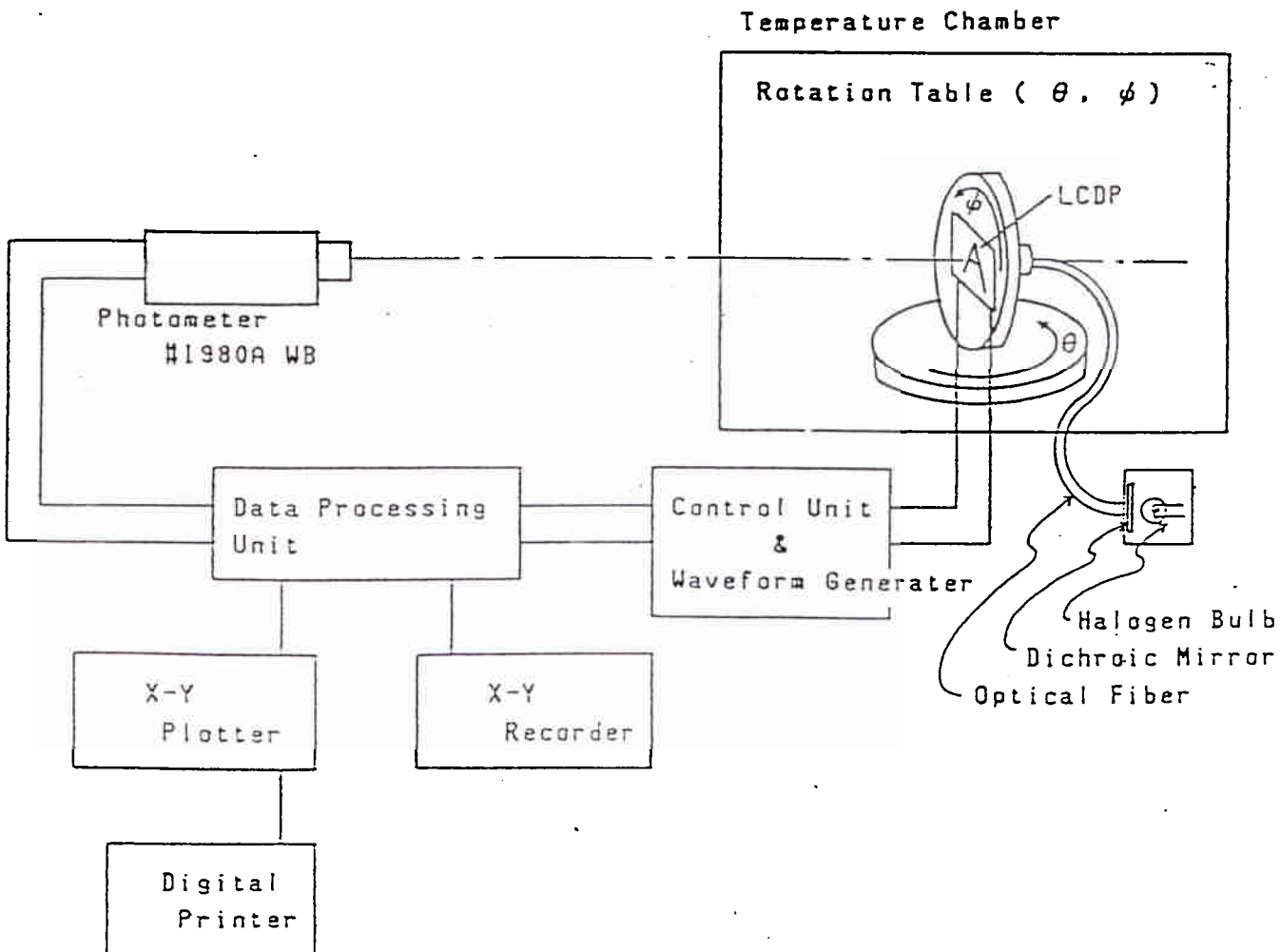
Note2 : The time required which the blacking ratio of segment becoms 10% from 100% when waveform is switched to selected one from nonselected one.

9.2 Electro-Optical characteristics measuring method

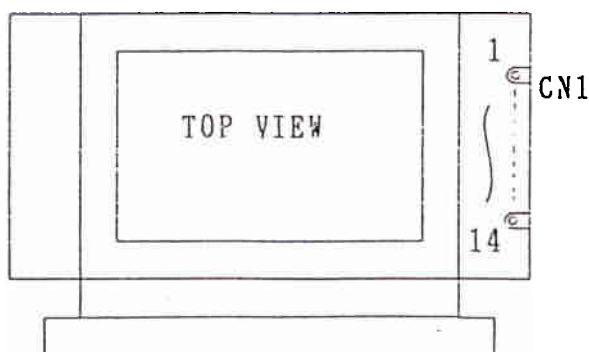
9.2.1 defination of viewing angle and optimum viewing area



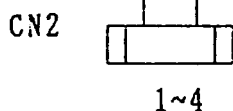
9.2.2 System Diagram



10.1 Pin No.layout



IL-G-4S-S3C2
(JAE)



10.2 Pin Assignment

CN 1

Pin No	Symbol	Level	Function
1	FLM	H	Frame Signal
2	LP	H → L	Data Latch Signal
3	CP	H → L	Clock Signal for Shifting Serial Data
4	M	H / L	Alternate Signal for LCD Driving
5	V _{ADJ}	—	Power Supply for LCD Control
6	V _{CC}	—	Power Supply for Logic (+5V)
7	V _{SS}	—	Power Supply (0V, GND)
8	V _{EE}	—	Power Supply for LCD Driving
9	D0	H / L	Display data 0
10	D1	H / L	Display data 1
11	D2	H / L	Display data 2
12	D3	H / L	Display data 3
13	$\overline{\text{DISPOFF}}$	H / L	H:DISPLAY ON L:DISPLAYOFF(22KΩ PULL UP)
14	HC		NO CONNECTION

NO.	Symbol	Level	Function
1	FC		Power supply for cct driving (HOT)
2	NC		No. Connection
3	NC		No. Connection
4	FL GND		Power supply for CCT driving (GND)

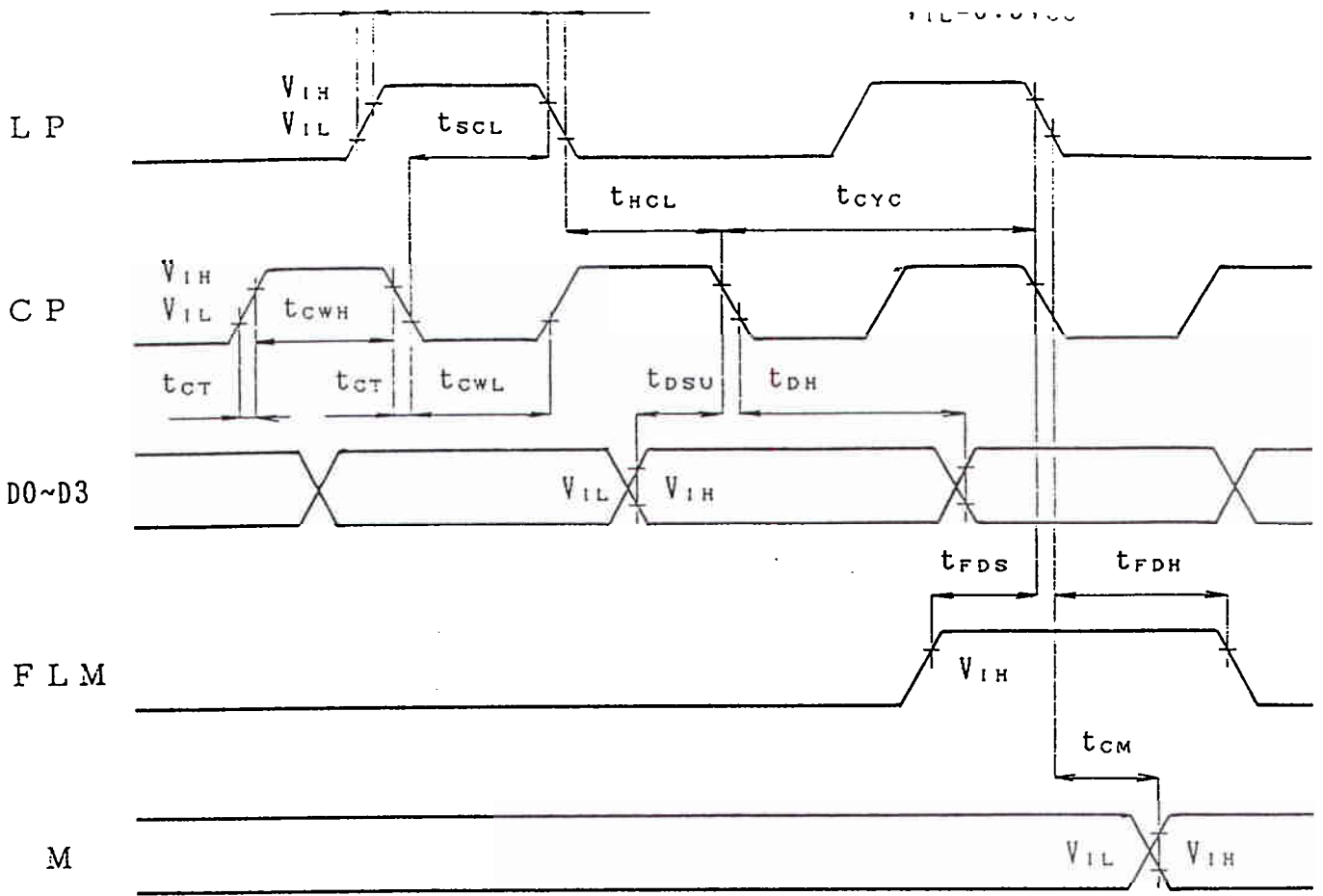
Mating Connector : IL-G-4P-S3C2-SA (JAE)
 or IL-G-4P-S3L2-SA (JAE)

11 Timing Characteristics

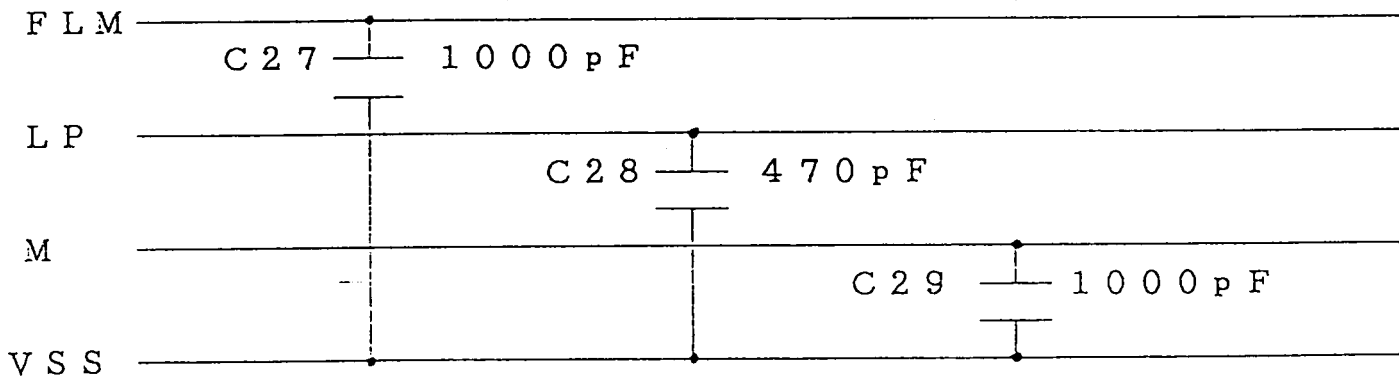
11.1 Timing Characteristics $V_{CC} = 5V \pm 5\%$, $T_a = 25^\circ C \pm 2^\circ C$

Item	Symbol	min	typ	max	Unit
Clock Cycle Time	t_{cyc}	166	—	—	ns
Clock Pulse Width (H Level)	t_{cwh}	50	—	—	ns
Clock Pulse Width (L Level)	t_{cwl}	50	—	—	ns
Clock Set Up Time	t_{scl}	80	—	—	ns
Clock Hold Time	t_{hcl}	80	—	—	ns
Clock Rise/Fall Time	t_{ct}	—	—	30	ns
Data Set Up Time	t_{dsu}	30	—	—	ns
Data Hold time	t_{dh}	30	—	—	ns
Frame Data Set Up Time	t_{fds}	100	—	—	ns
Frame Data Hold Time	t_{fdh}	100	—	—	ns
M Delay Time	t_{cm}	—	—	300	ns

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

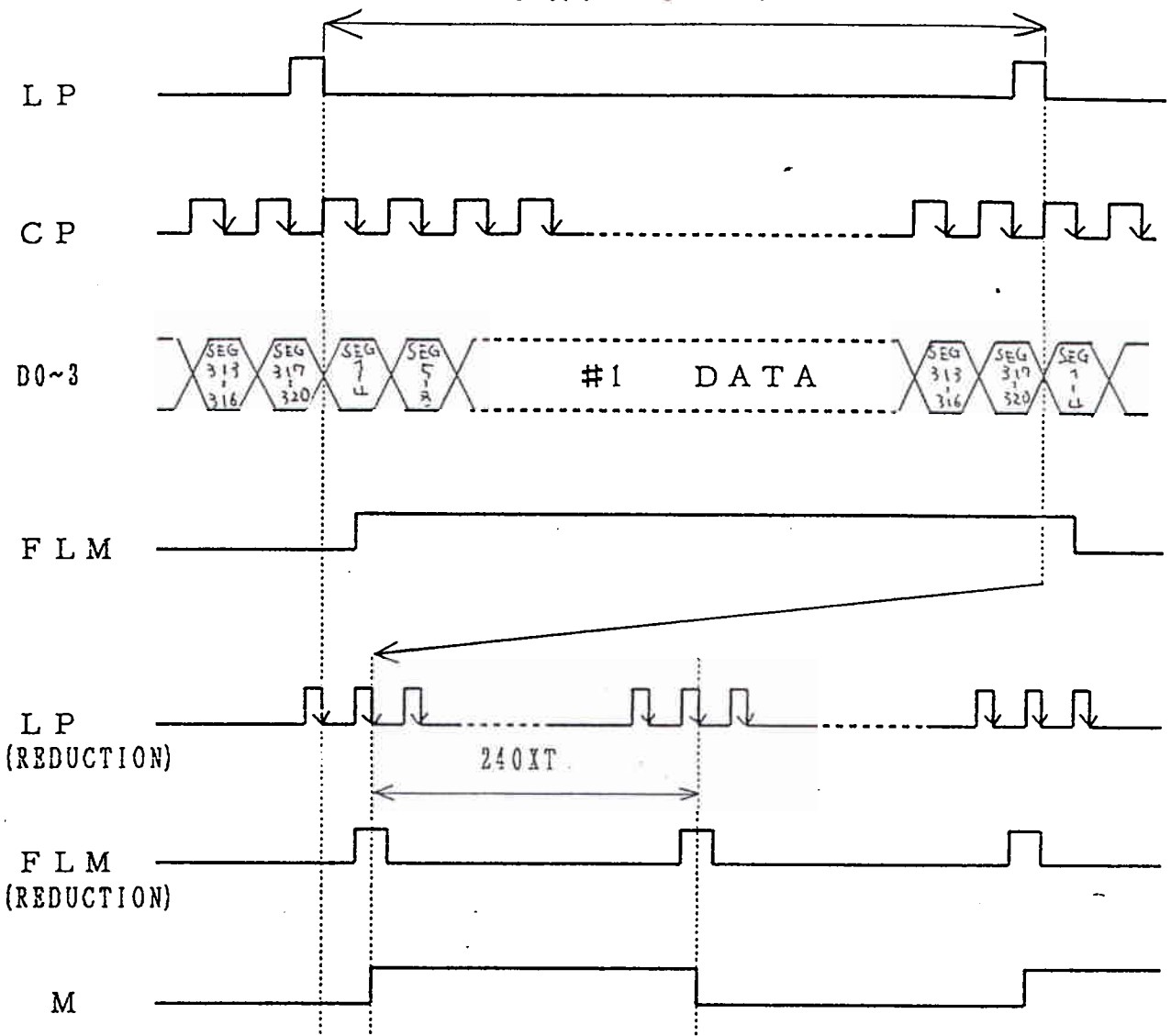


11.2 Interface circuit

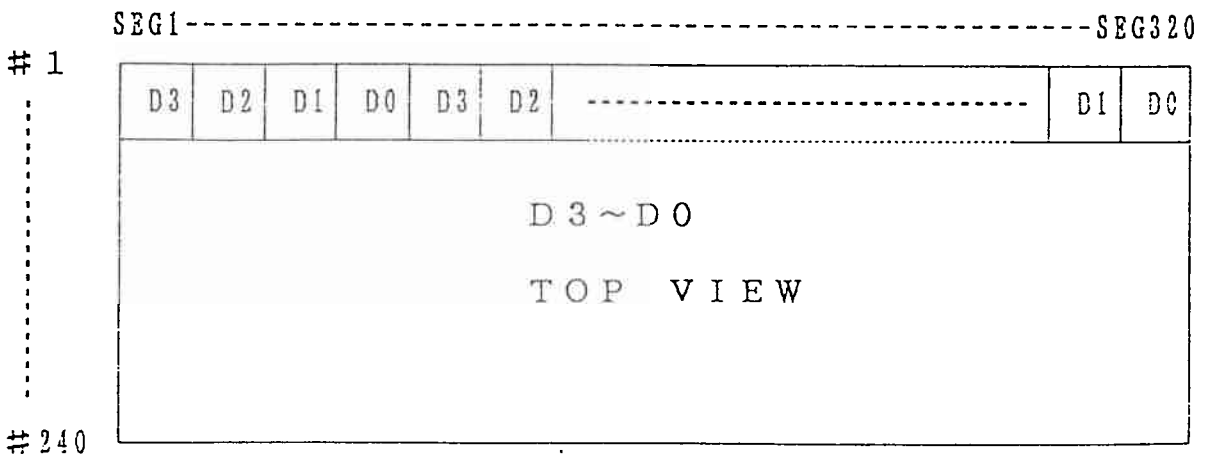


This module is inserted these capacitors. Please be careful about timing characteristics.

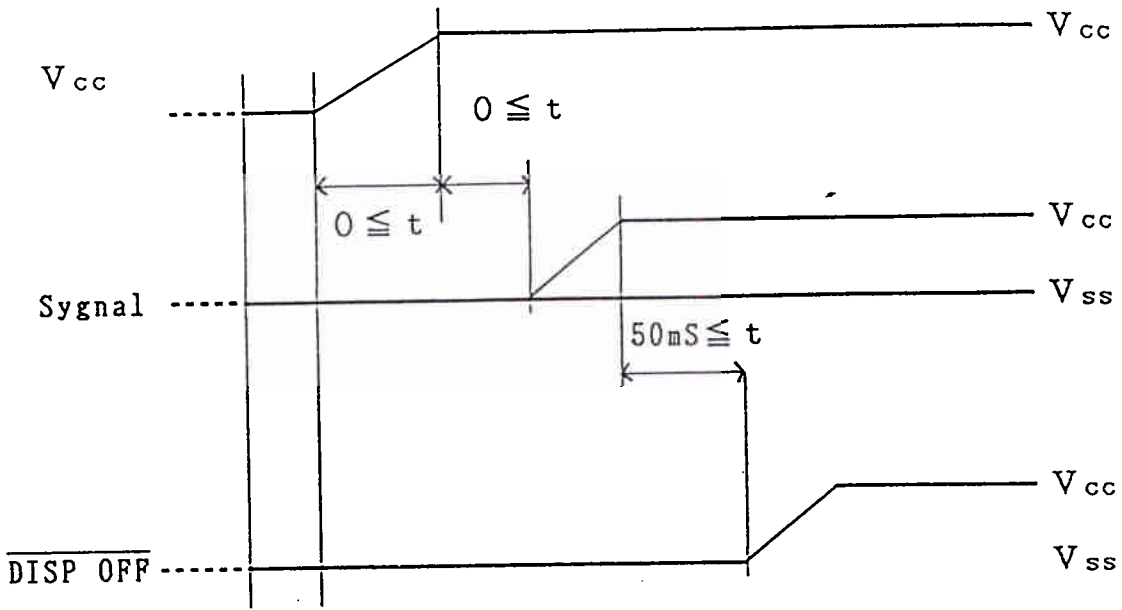
T=0.0595mS TYP.



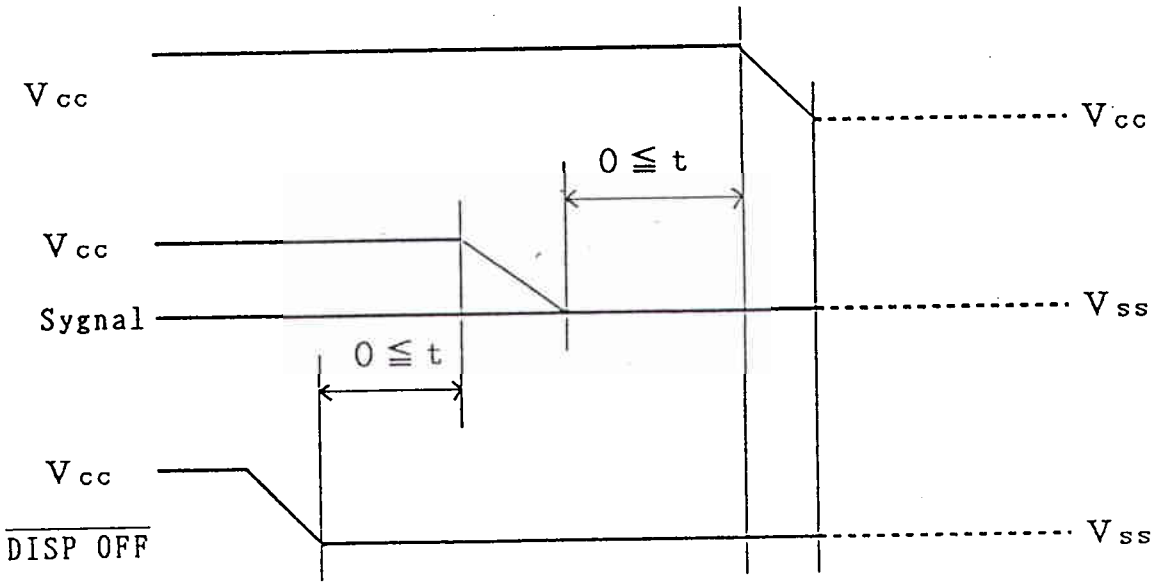
13 Comparison of Display and Data



14.1 ON Timing



14.2 Off Timing



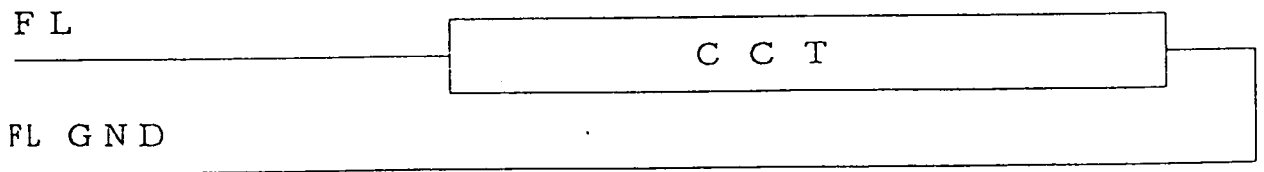
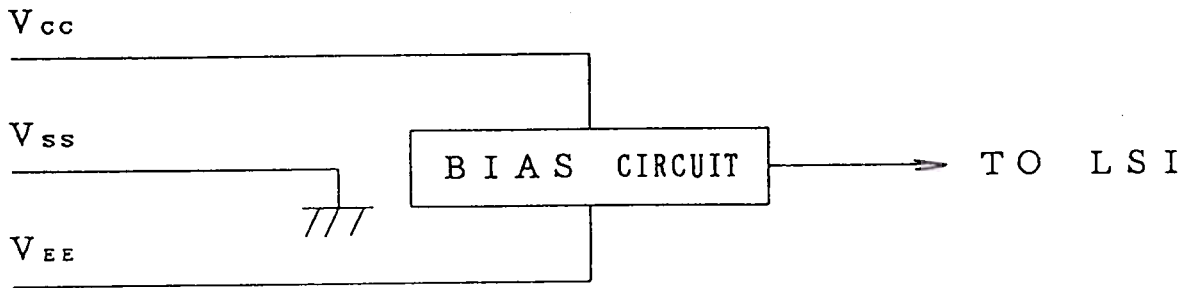
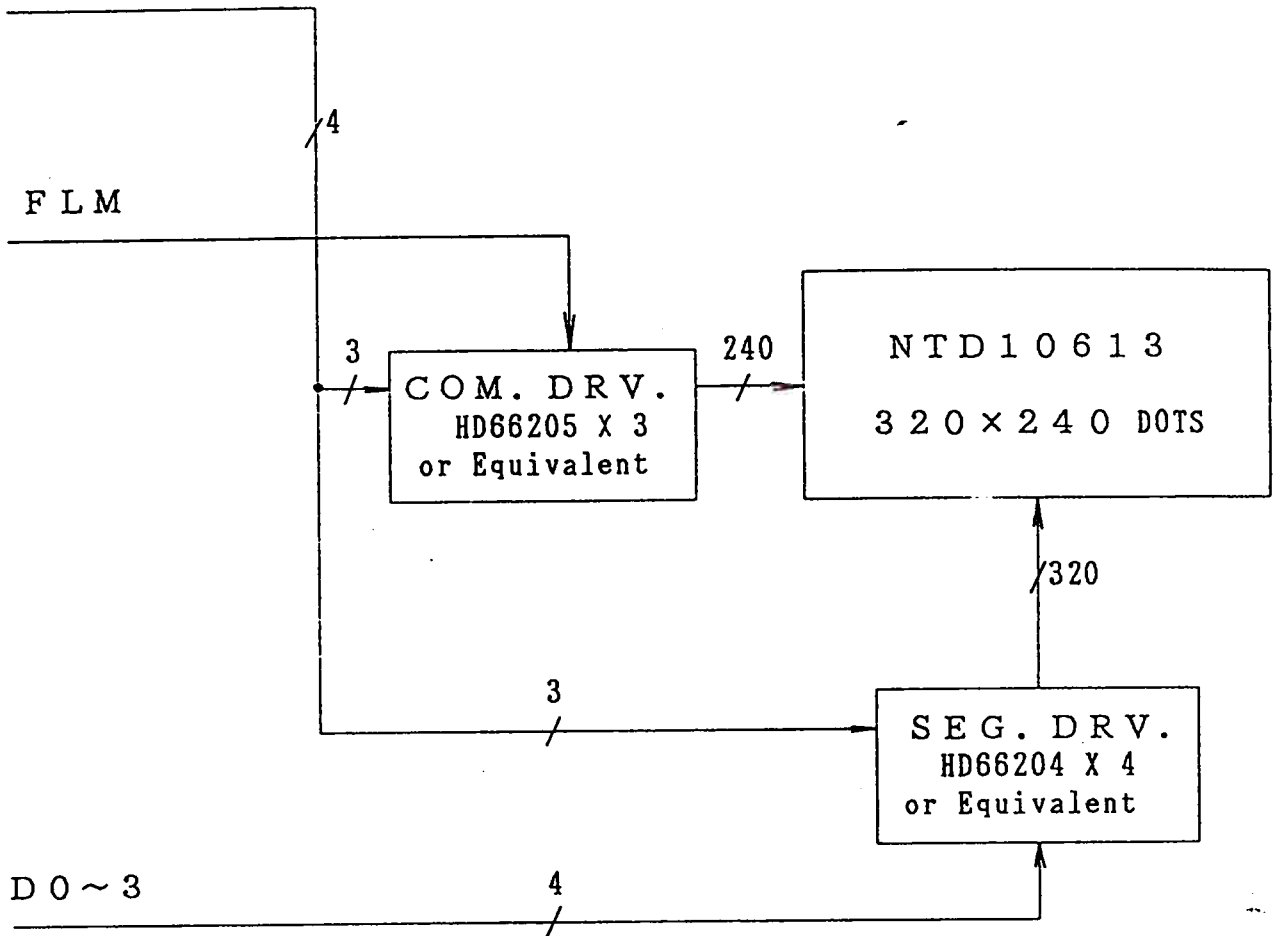
Observe the above sequencing when turning on and off the power supply of the module.

While alternate signal for LCD driving(M) is unstable, if V_{ADJ} is supplied onto the module, DC component will be applied onto the LCD panel, and this will become the cause of inferiority and error of the display.

Note that YAMAHA controller V6366 will not produce alternate signal without proper software programming.

15 Block Diagram

LP, CP, M, DISP OFF



16.1 Temperature Range

Item	Symbol	Condition	Regulation
Operating Temperature Range	T _{opr}	0 °C ~ 50 °C	No change on display and in operation under the test-conditions 17.2.1, 17.2.2.
Storage Temperature Range	T _{stg}	- 20 °C ~ 60 °C	No change on display and in operation under the test conditions 17.2.3, 17.2.4.

16.2 Others

Item	Condition	Reguration
Vibration	17.2.5	No change on display and in operation under the test conditions.
Shock	17.2.6	No change on display and in operation under the test conditions.
Damp Proof	17.2.6	No change on display and in operation under the test conditions.(Note)

Note: Except Polarizer

17 Test

17.1 Test Condition

17.1.1 Temperature and Humidity

Unless specified otherwise, test will be conducted under the following condition.

Temperature : 20 ± 5 °C
Humidity : 65 ± 5 % RH

17.1.2 Operation

Unless specified otherwise, test will be conducted under functioning state.

17.1.3 Container

Unless specified otherwise, vibration and shock test will be conducted on the product itself without putting it in a container.

17.1.4 Test Frequency

In case of test related to deterioration such as shock test. It will be conducted only once.

17.2.1 High Temperature Operation

96 ~ 100 Hrs in an environment temperature $50 \pm 2 \text{ }^\circ\text{C}$ to be measured under same condition.

17.2.2 Low Temperature Operation

After storage of 96 ~ 100 Hrs in an environment of temperature $0 \pm 2 \text{ }^\circ\text{C}$ to be measured under the same condition.
No dew to be found.

17.2.3 High Temperature Storage

To be measured after storage of 96 ~ 100 Hrs under non-operation state in an environment of temperature $60 \pm 2 \text{ }^\circ\text{C}$ and returned to normal temperature humidity.

17.2.4 Low Temperature Storage

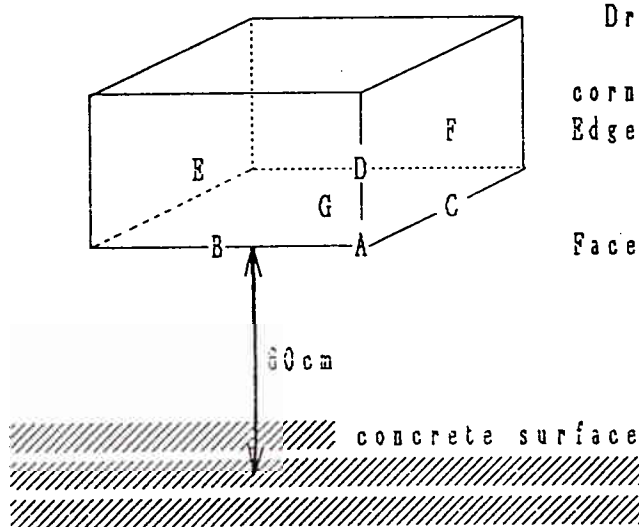
To be measured after storage of 96 ~ 100 Hrs under non-operation state in an environment of $-20 \pm 2 \text{ }^\circ\text{C}$ and after storage of 4 Hrs in an environment of normal temperature and humidity. No dew to be found.

17.2.5 Vibration Test

To be measured after subjecting to total fixed amplitude of 1.5mm, vibrating frequency of 10 to 55Hz, one cycle 60 seconds to 3 directions of X, Y, Z for each 15 minutes (Total 45 Minutes) and after removing vibration (Non-operation state).
measured under same condition.

17.2.6 Shock Test (Drop Test)

To be measured after dropping from 60cm high onto concrete surface in packing state.



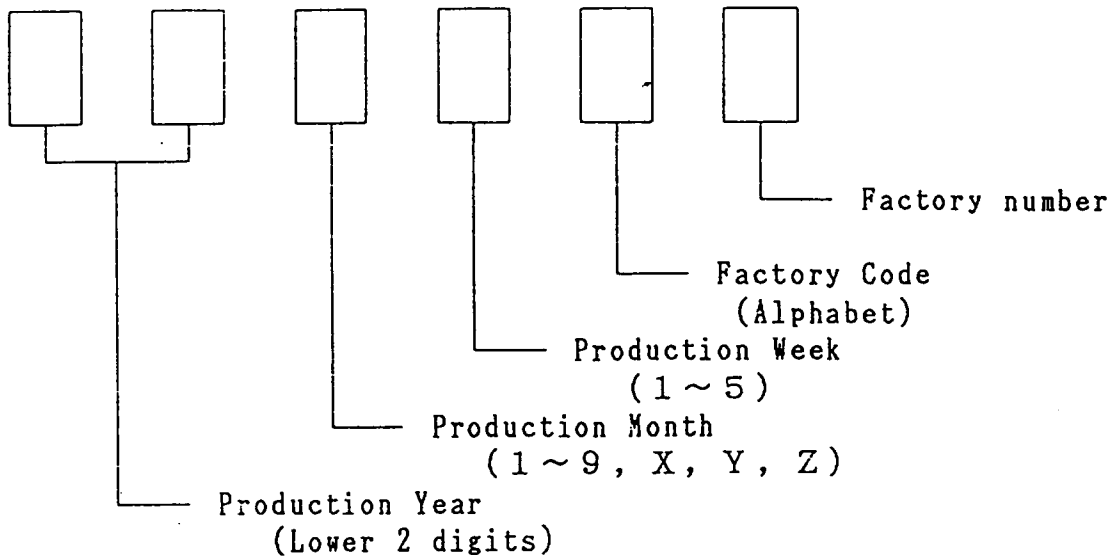
Dropping method

- corner dropping : A point : once
- Edge dropping : B edge : once
- : C edge : once
- : D edge : once
- Face dropping : E face : once
- : F face : once
- : G face : once

17.2.7 Damp Proof Test

To be measured after storage of 96 ~ 100 Hrs under temperature of $40 \pm 2 \text{ }^\circ\text{C}$ and 90-95 % humidity, then returned under normal temperature and humidity for 4 Hrs. No dew condensation to be found.

The production lot of MODULE is specified on the back of PWB as follows;



Example: 9 1 6 4 M 1 (1991. JUN. 4TH WEEK)

19 Appearance

No defects such as stain, scratch discoloration, weak soldering, which may spoil the appearance to be found on the LCDP surface on frontal side of holder/housing.

20 Functions

According to the regulation of functional inspection which is mutually agreed, every single piece is duly inspected.

21 Precaution for Power Supply Designing

The module is not contained excess current limiter. Please design-in limiter to cut excess current in your power supply circuit.

22 Notice of Application

In case of the following, to be settled by mutual discussion.

- 22.1 When questions arise concerning items of this specifications.
- 22.1 When new problems arise not specified in this specifications.