

PRELIMINARY

MODULE SPECIFICATION

OPTREX TYPE No. : DMF-50357N-SE(B)

CLIENT TYPE No. : _____

This specification is subject to change.
Please consult OPTREX to verify whether any changes occur in the specification before starting your production.

ISSUED DATE : SEP . 6 . ' 93

OPTREX CORPORATION

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1. Scope

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

MELLARD

2. Product

Liquid Crystal Display (LCD) Module.

3. Type No.

CLIENT Type No. : _____

OPTREX Type No. : DMF-50357N-SEB.

4. General Specifications

Operating Temp. : min. 0°C ~ max. 50°C
Storage Temp. : min. -20°C ~ max. 60°C
Dot Pixels : 640 (W) × 200 (H) dots
Dot Size : 0.24 (W) × 0.30 (H) mm
Dot Pitch : 0.27 (W) × 0.33 (H) mm
Viewing Area : 175.2 (W) × 68.2 (H) mm
Outline Dimensions : 200.0 (W) × 90.1 (H) × 8.0 max.(D) mm
LCD Type : NTN / Neutral-mode / Transflective
Viewing angle : 6:00
Data Transfer : 4bit parallel data transfer
Back light : Electro Luminescence (EL) Color / Blue
Drawings : Dimensional Outline UE-34950
Circuit Diagram UE 21037

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)	$V_{CC} - V_{EE}$	-	-0.3	32.0	V
	$V_{CC} - V_{ADJ}$	-	0	30.0	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)	$V_{CC} - V_{EE}$	-	28.0		30.0	V
	$V_{CC} - V_{ADJ}$	Shown in 6.1				V
Input Voltage 'H' Level	V_{IH}	-	$0.7 \times V_{CC}$		V_{CC}	V
Input Voltage 'L' Level	V_{IL}	-	0	-	$0.3 \times V_{CC}$	V
Power Supply Current	I_{CC}	-	-	-	10.0	mA
	I_{EE}	-	-	-	1.0	mA
Clock Frequency	f_{OP}	Duty = 60%	-	-	8.0	MHz

5.3 Timing Characteristics

5.3.1 AC Electrical

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

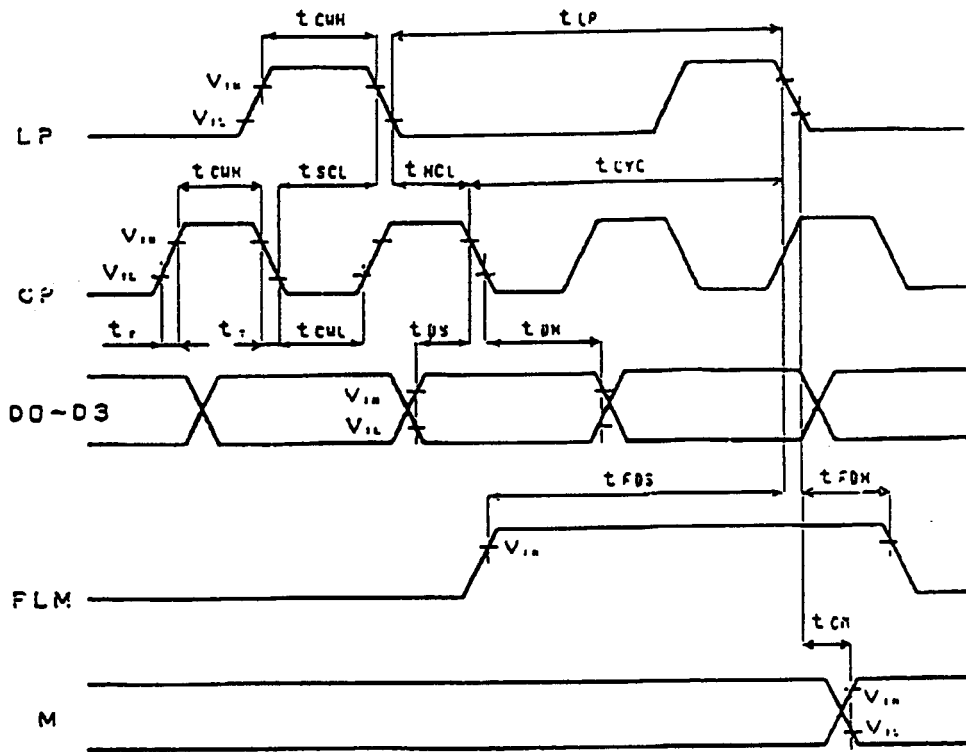
ITEM	SYMBOL	MIN.	MAX.	UNIT
Clock Cycle Time	t_{CYC}	125	-	n S
Load Cycle Time	t_{LP}	10	-	μ S
Clock High Level Width	t_{CWH}	45	-	n S
Clock Low Level Width	t_{CWL}	45	-	n S
Clock Set Up Time	t_{SCL}	80 *1	-	n S
Clock Hold Time	t_{HCL}	80	-	n S
Clock Rise / Fall Time	t_r, t_f	-	*2	n S
Data Set Up Time	t_{DS}	20	-	n S
Data Hold Time	t_{DH}	20	-	n S
Frame Data Set Up Time	t_{FDS}	100	-	n S
Frame Data Hold Time	t_{FDH}	100	-	n S
X Signal Phase Shift Time	t_{EM}	-	300	n S

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

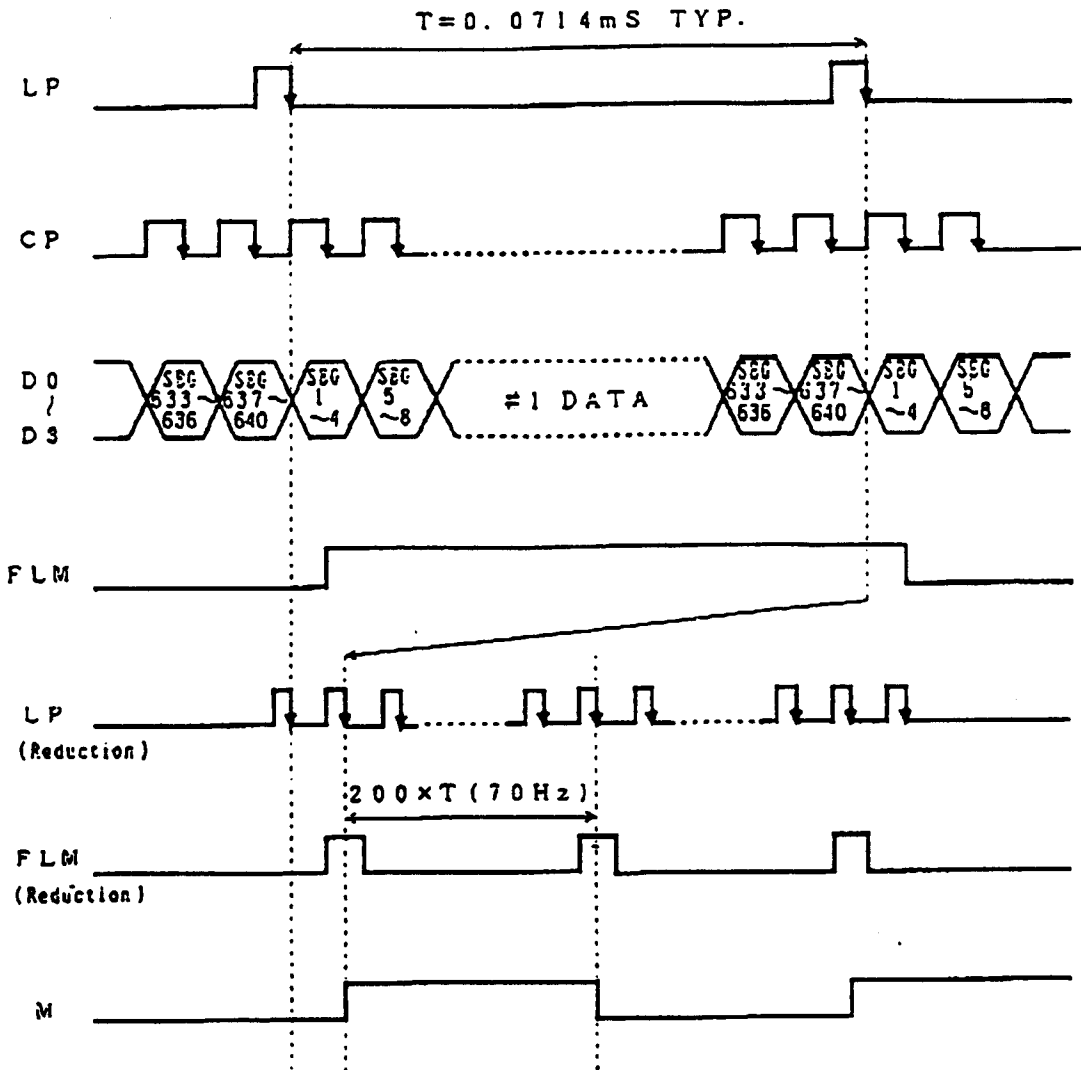
*2 Clock Rise, Fall Time(t_r, t_f) is should be satisfy following [1],[2] be in both condition at the same time.

$$[1] t_r, t_f < \frac{t_{CYC} - t_{CWH} - t_{CWL}}{2}$$

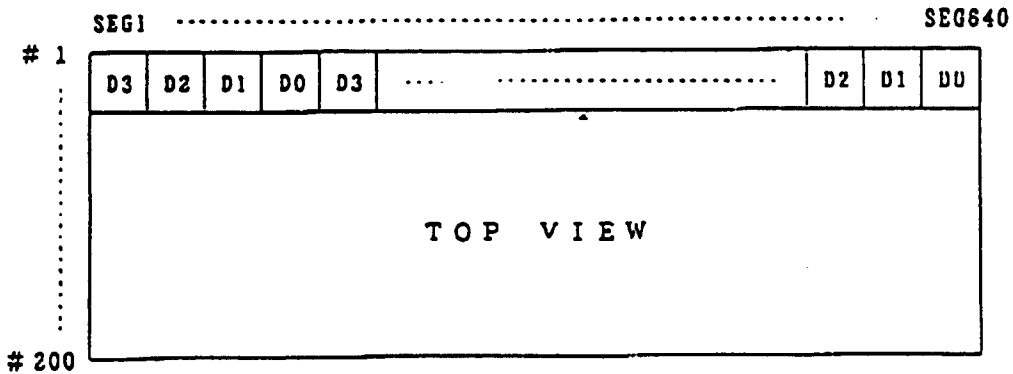
$$[2] t_r, t_f \leq 50$$



5.3.2 Timing Chart

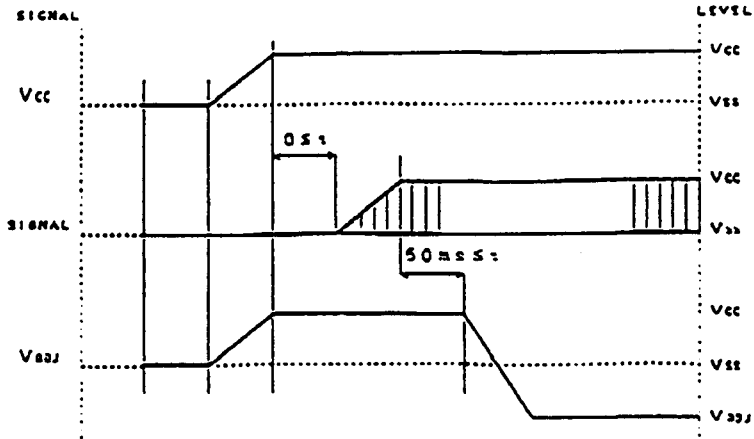


5.3.3 Comparison of Display and Data

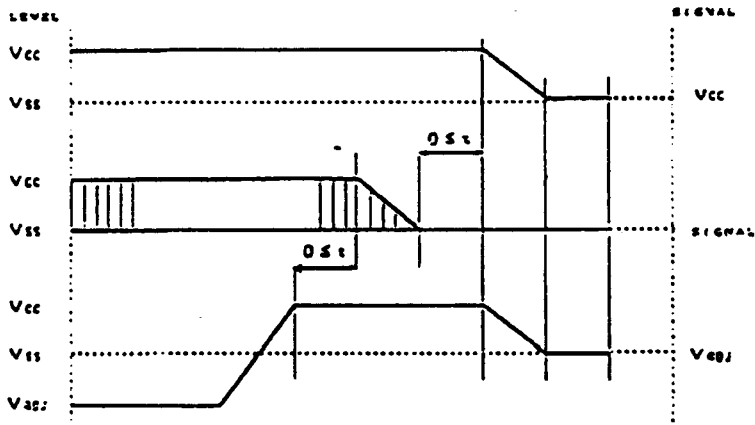


5.4 Power Supply ON/OFF Timing

5.4.1 ON Timing



5.4.2 OFF Timing



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_{ADJ} is supplied to the module, DC component will be supplied to the LCD panel.

This may cause damage the LCD module.

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

5.5 EL Specification

5.5.1 Absolute Maximum Rating

T_a = 25 °C

ITEM	CONDITION	MIN.	TYP.	MAX.	UNIT
Input Voltage	-	-	-	150	V _{rms}
Input Frequency	-	-	-	800	Hz

5.5.2 Operating Characteristics

T_a = 25 °C

ITEM	CONDITION	MIN.	TYP.	MAX.	UNIT
Input Voltage	-	-	100	-	V _{rms}
Input Frequency	-	-	400	-	Hz
Current	AC100Vrms400Hz	-	18.0	-	mA
Life	AC100Vrms400Hz	2000	-	-	Hrs

Recommendation Inverter : NEC No. NEL-D32-50 (DC 5.0V±10%)

6. Optical Specification

6.1 Optical Specification

Ta=25°C, Vcc-V_{ADJ}:22.1V, θ = 0°, φ = -°

ITEM	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT	
Recommended LCD Driving Voltage (1/200 Duty)	V _{CC} - V _{ADJ}	T _a = 0 °C	-	-	25.7	V	
		T _a = 25 °C	-	22.1	-	V	
		T _a = 50 °C	18.9	-	-	V	
Contrast Ratio	CR	Note1 θ = 0°, φ = -°	-	3	-		
Viewing Angle		Shown in 6.2					
Response Time	Rise	τ _r	Note2 Ta=25°C	-	200	300	m S
	Decay	τ _d	Note3 Ta=25°C	-	280	420	m S

Note1 : Definition of Contrast Ratio

When brightness of non-selected signal was A and brightness of selected signal was B, contrast ratio defined

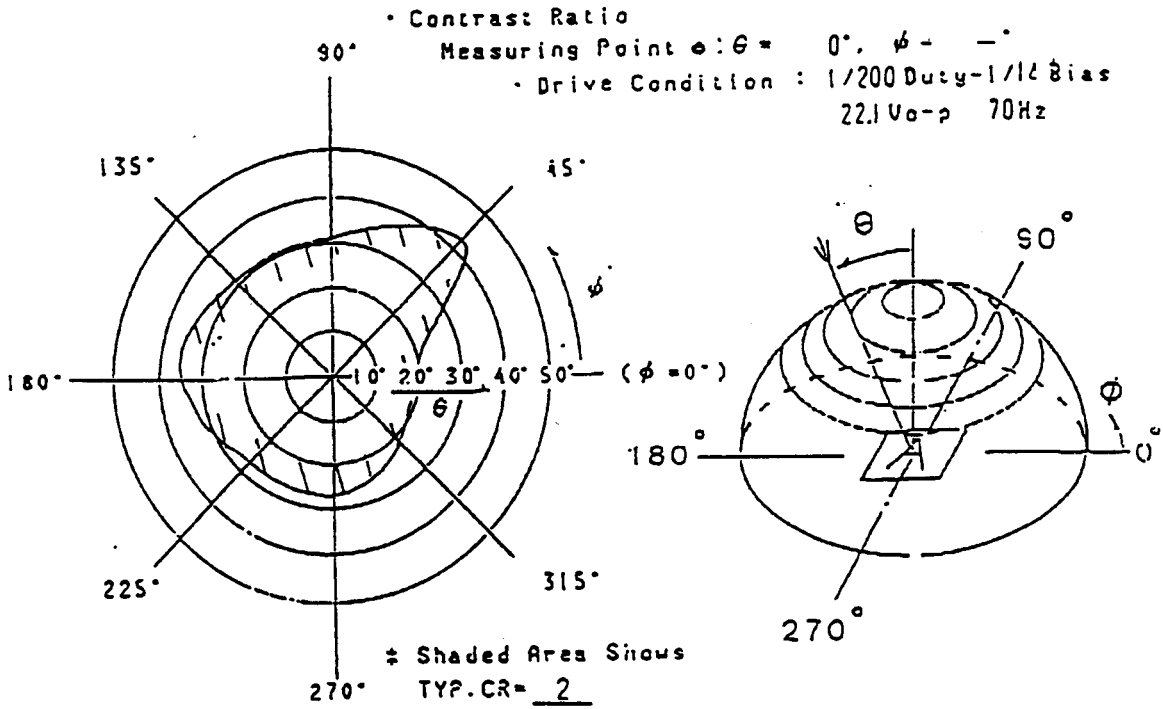
CR=A/B (Positive Case)

CR=A/B (Negative Case)

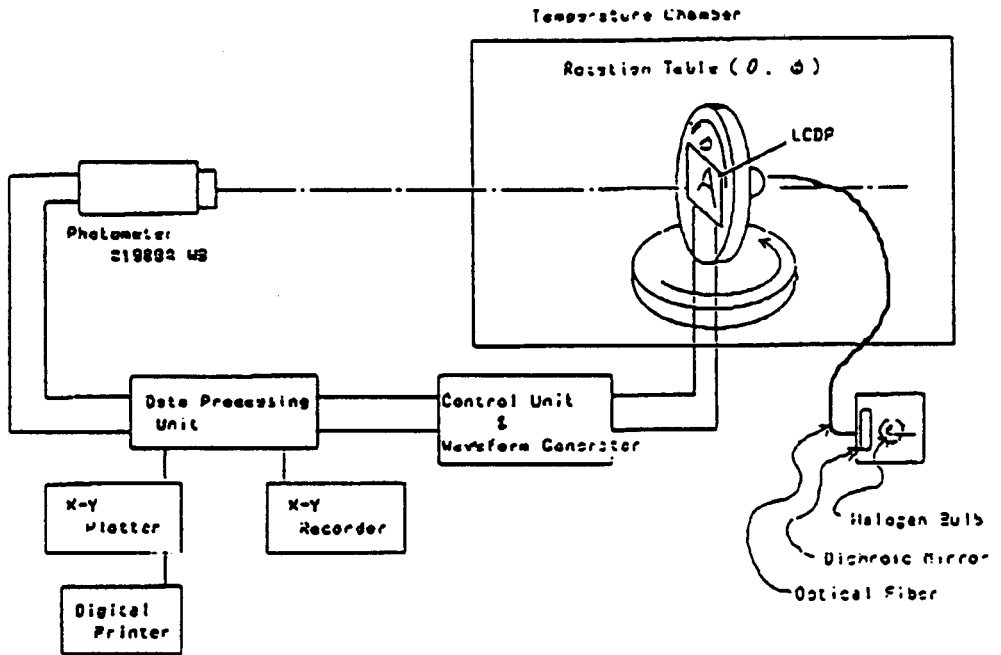
Note2 : The time of that the brightness level reaches 90% level of the saturation level from 0% level when ON signal is applied.

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



6.3 System Block Diagram



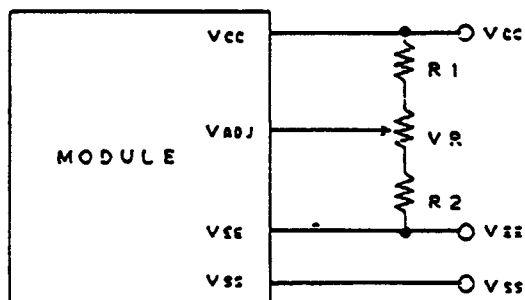
7. I/O Terminal

7.1 Pin Assignment

CN1

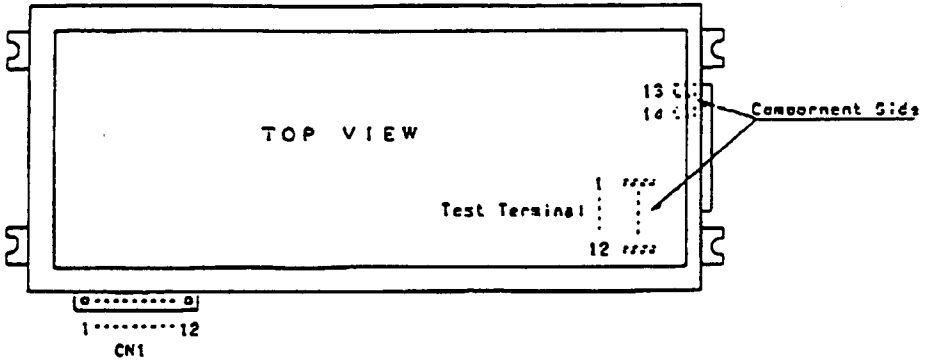
PIN NO.	SYMBOL	LEVEL	FUNCTION
1	FLM	H/L	First Line Marker
2	LP	H→L	Data Latch Signal
3	CP	H→L	Clock Signal for Shifting Data
4	M	H/L	Alternate Signal for LCD Drive
5	V _{ADJ}	—	Voltage Level for LCD Contrast Adjustment
6	V _{CC}	—	Power Supply for Logic (+5V)
7	V _{SS}	—	Power Supply (0V, GND)
8	V _{EE}	—	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	EL	—	Power supply for EL
14	EL	—	Power supply for EL

7.2 Example of Power Supply



$$R_1 + R_2 + V_R = 10 \sim 20 \text{ k}\Omega$$

7.3 Pin No. Layout



7.4 Block Diagram

