ELFA

Datum 981130

# PRODUKTINFORMATION


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ELFA artikelnr.

Antal sidor: 12

75-541-65 DMF5001NY-LY grafisk LCD

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# PRODUCT SPECIFICATIONS

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OPTREX TYPE No. : D M F 5 0 0 1 N Y - L Y

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

REVISION No. 1 : APR. 12.'94

# 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.

## 2. Product

Liquid Crystal Display (LCD) Module.

## 3. Type No.

CLIENT Type No. : _____

OPTREX Type No. : DMF50011NY-LY

## 4. General Specifications

| | | |
|---|---|---|
| Operating Temp. : | min. 0°C ~ | max. 50 °C |
| Storage Temp. : | min. -20°C ~ | max. 60 °C |
| Dot Pixels | 160 (W) x | 128 (H) dots |
| Dot Size | 0.54 (W) x | 0.54 (H) mm |
| Dot Pitch | 0.58 (W) x | 0.58 (H) mm |
| Viewing Area : | 101.0 (W) x | 82.0 (H) mm |
| Outline Dimensions : | 129.0 (W) x | 102.0 (H) x 19.2 MAX.(D) mm |
| LCD Type | NTN / Yellow-mode / Transmissive | |
| Viewing angle : | 6:00 | |
| Contlor LSI | T6963C-0101 (Producted by TOSHIBA) | |
| Back-light | LED / Yellow-green | |
| Drawings | Dimensional Outline UE-34487A | |

## 5. Electnical Specifications

### 5.1 Absolute Maximum Rating

Vss= 0V

| ITEM | SYMBOL | CONDITION | MIN. | MAX. | UNIT |
|---|---|---|---|---|---|
| Supply Voltage (Logic) | $V_{CC}$ - Vss | - | -0.3 | 7.0 | V<br>V |
| Supply Voltage (LCD Drive) | Vcc - $V_{EE}$ | | -0.3 | 30.0 | V |
| | Vcc - $V_{ADJ}$ | - | 0 | 28.0 | V |
| Input Voltage | $V_I$ | - | -0.3 | $V_{CC.}$ +0.3 | V |

### 5.2 Electrical Characteristics

Ta=25°C , Vcc=5.0V± 10% , Vss=0V

| ITEM | SYMBOL | CONDITION | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|
| Supply Voltage (Logic) | Vcc - Vss | - | 4.5 | - | 5.5 | V |
| Supply Voltage (LCD Drive) | Vcc - VEE | - | 23.0 | - | 26.0 | V |
| | Vcc - $V_{ADJ}$ | Shown in 6.2 | | | | V |
| Input Voltage 'H' Level | $V_{IH}$ | - | Vcc -2.2 | - | Vcc | V |
| Input Voltage 'L' Level | $V_{IL}$ | - | 0 | - | 0.8 | V |
| Output Voltage 'H' Level | $V_{OH}$ | $I_{OH}$= -750 u A | Vcc -0.3 | - | Vcc | V |
| Output Voltage 'L' Level | $V_{OL}$ | $I_{OH}$= -750 uA | 0 | - | 0 . 3 | V |
| Power Supply Current | Icc | - | - | - | 30.0 | mA |
| | $I_{EE}$ | - | - | - | 20.0 | mA |
| Clock Freqency | $f_{CP}$ | Duty = 50% | - | - | 4.91 | MHz |

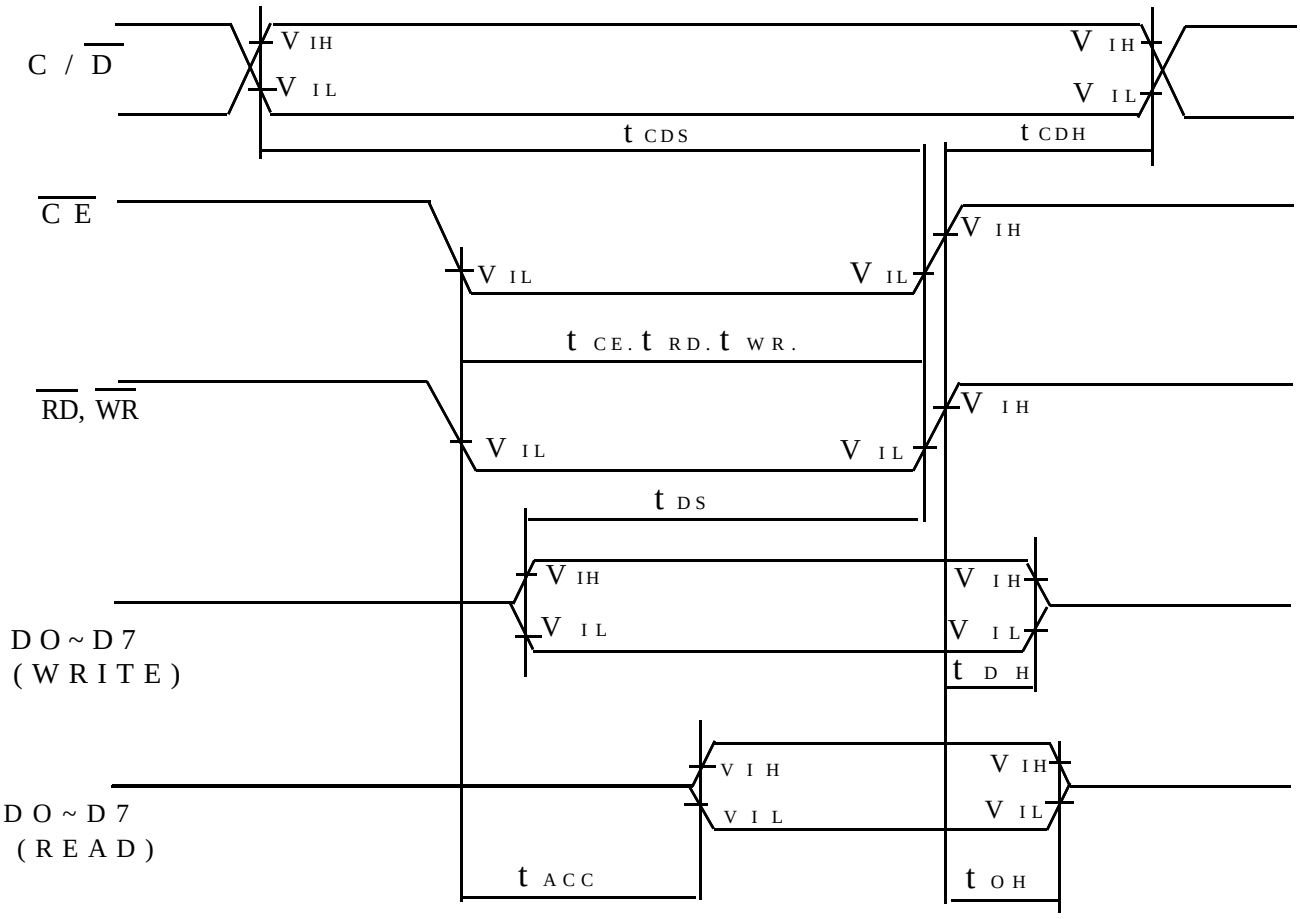
5.3 Timing Characteristics

5.3.1 AC Electrical

vcc=5v ± 10%

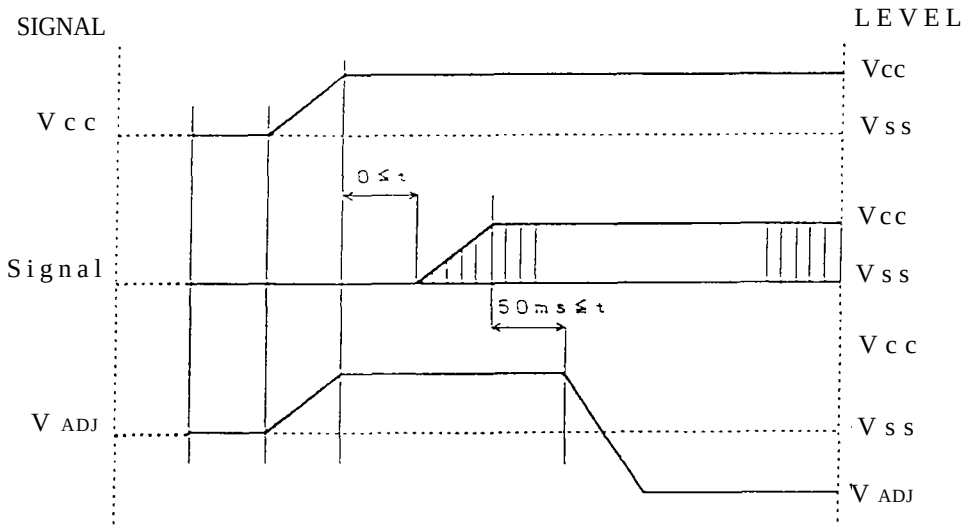
| ITEM | SYMBOL | MIN. | MAX, | UNIT |
|---|---|---|---|---|
| C/D Set Up Time | $t_{CDS}$ | 100 | - | ns |
| C/D Hold Time | $t_{CDH}$ | 10 | - | ns |
| CE, RD, WR Pulse Width | $t_{CE}$, $t_{RD}$ $t_{WR}$ | 80 | - | ns |
| Data Set up Time | $t_{DS}$ | 80 | - | ns |
| Data Hold Time | $t_{DH}$ | 40 | - | ns |
| Access Time | $t_{ACC}$ | - | 150 | ns |
| Output Hold Time | $t_{OH}$ | 10 | 50 | ns |

W R I T E - R E A D

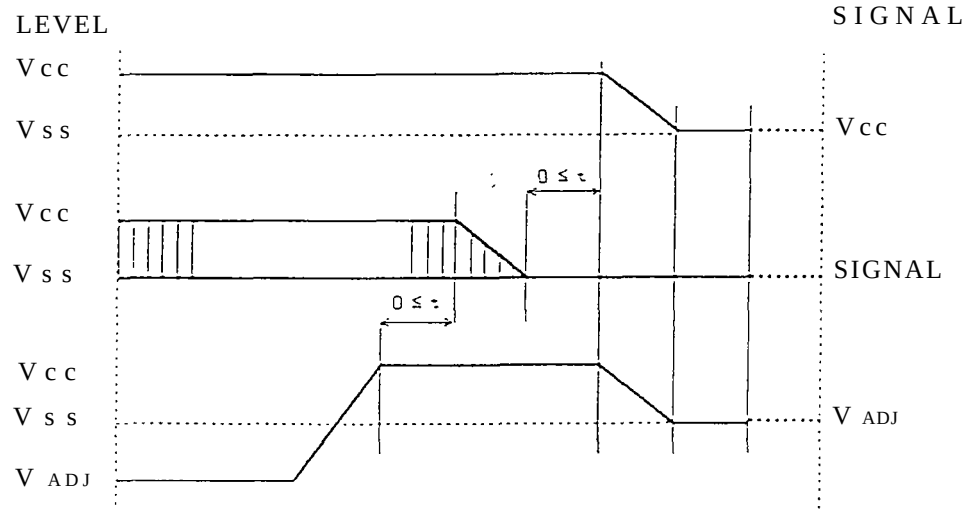


## 5.4 Power Supply ON/OFF Timing

### 5.4.1 ON Timing




### 5.4.2 OFF Timing




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

While alternate signal for LCD driving (FR internal signal) is unstable if VADJ is supplied onto the module, DC component will be supplied onto the LCD panel,and this will become the cause of inferiority and error of the display.

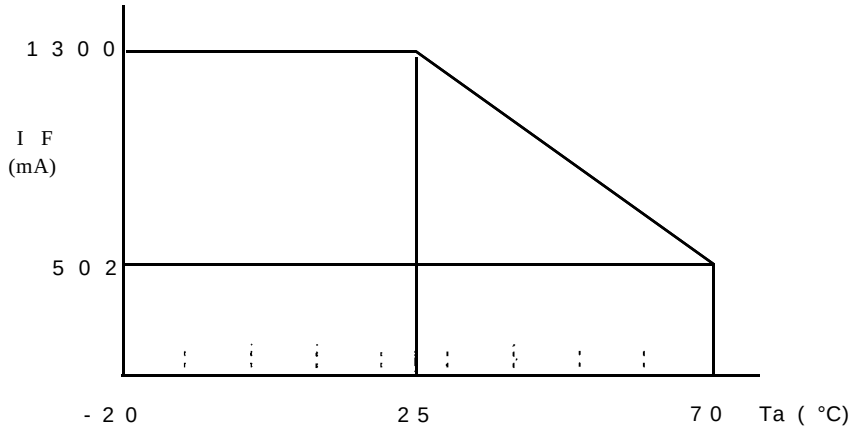
## 5.5 LED Specification

### 5.5.1 Absolute Maximum Rating

T a = 25 °C

| ITEM | SYMBOL | CONDITION | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|
| Foward Current | $I_F$ | NOTE1 | - | - | 1300 | mA |
| Reverse Voltage | $V_R$ | - | - | - | 8 | V |
| LED Power Dissipation | $P_D$ | - | - | - | 5.7 | W |

NOTE l: Refer to the Foward current Reduction Specification.




5.5.2 Operating Characteristics

Ta = 25 °C

| ITEM | SYMBOL | CONDITION | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|
| Foward Voltage | $V_F$ | $I_F$- 650mA | 3.7 | 4.1 | 4.4 | V |
| Brightness | L | $I_F$= 650mA *1 | 40 | - | - | $cd/m^2$ |

*l : Take measurement at LED unit only.

6.1 Optical Specification

Ta=25°C VCC-VADJ:19.2V, q = 0° ,Ø=-°

| ITEM | | SYMBOL | CONDITION | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|---|
| Recommended LCD Driving Voltage (l/128 Duty) | | Vcc-V ADJ | T a = 0 °C | - | - | 22.3 | V |
| | | | T a= 2 5 ° C | - | 19.2 | - | V |
| | | | T a = 50 °C | 16.4 | - | - | V |
| Contrast Ratio | | CR | Notel q = 0 ° , Ø = - ° | - | 6 | - | |
| Viewing Angle | | | Shown in 6.2 | | | | |
| Responce Time | Rise | τ r | Note 2 Ta=25°C | - | 180 | 270 | 1 m S |
| | Decay | τ r | Note 3 Ta=25°C | - | 240 | 360 | 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 required which a segment blackening ratio deepens 90% from 0% when waveform is switched to selected one from non-selected one.

Note3 : The time required which a segment blackening ratio lightens 10% from 100% when waveform is switched to selected one from non-selected one.

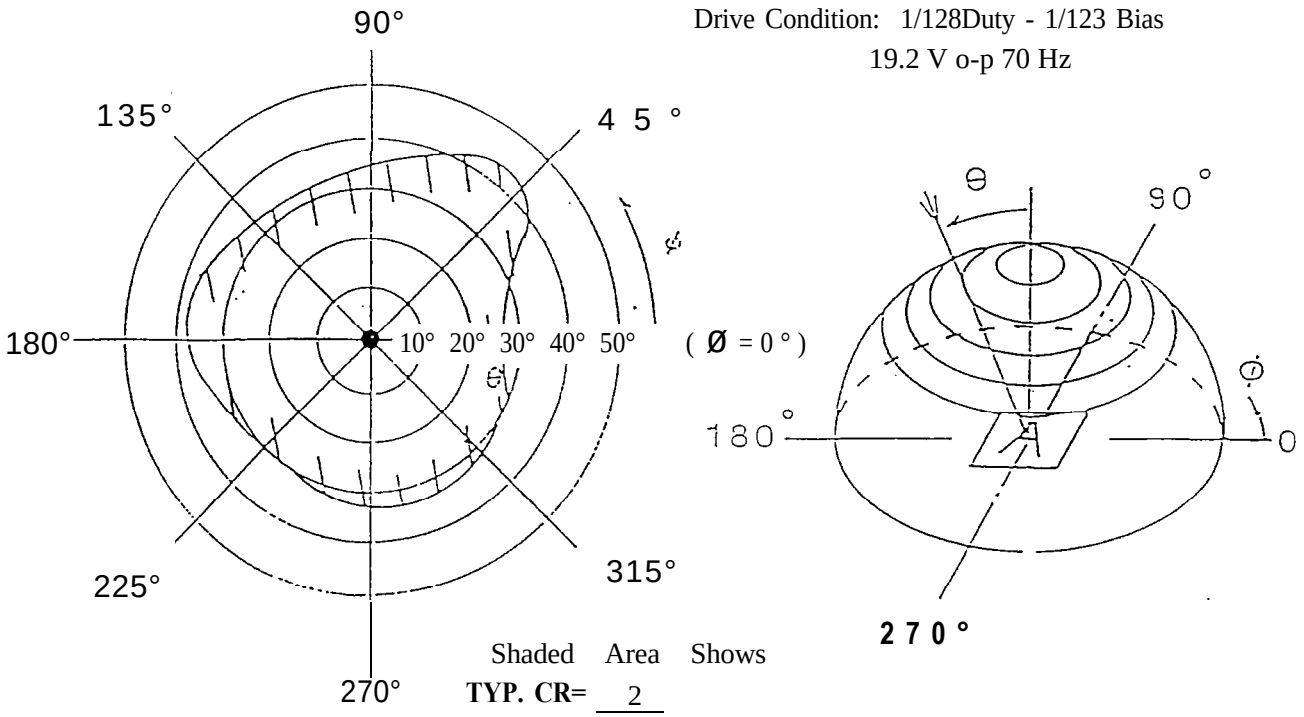
## 6.2 Definition of Viewing Angle and Optimum Viewing Area

Contrast Ratio

Measuring Point o : θ = 0 ° , ø =-- °

Drive Condition: 1/128Duty - 1/123 Bias

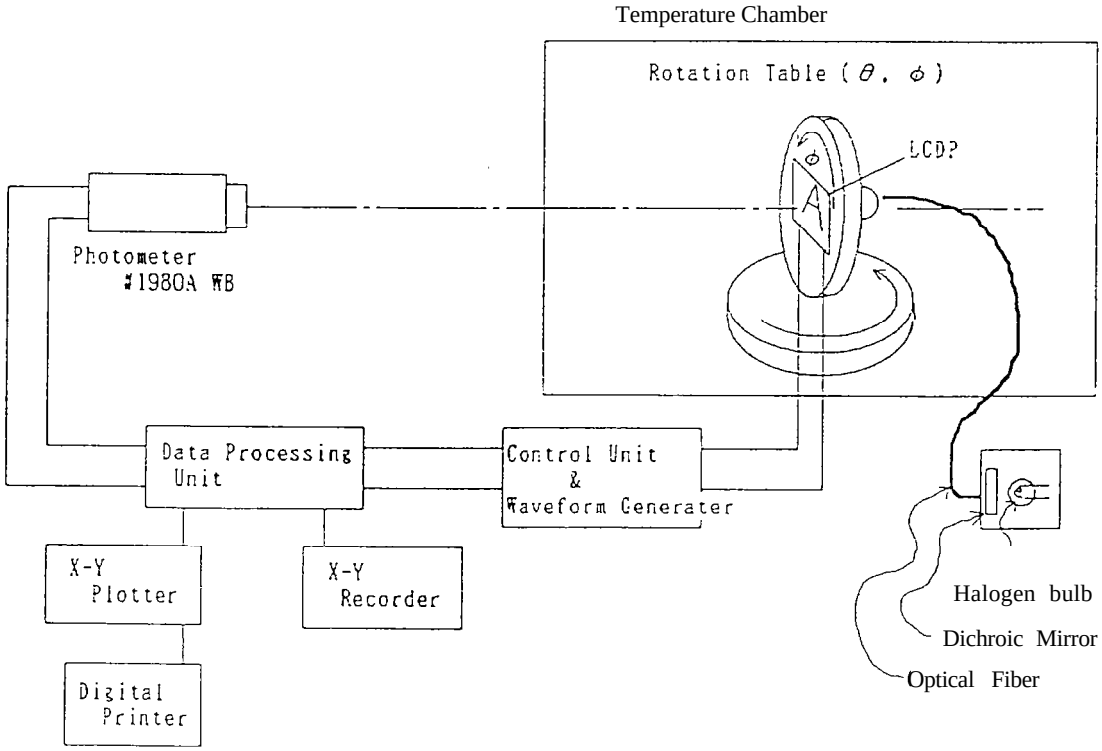
19.2 V o-p 70 Hz




Shaded Area Shows

**TYP. CR=** 2

## 6.3 System Block Diagram

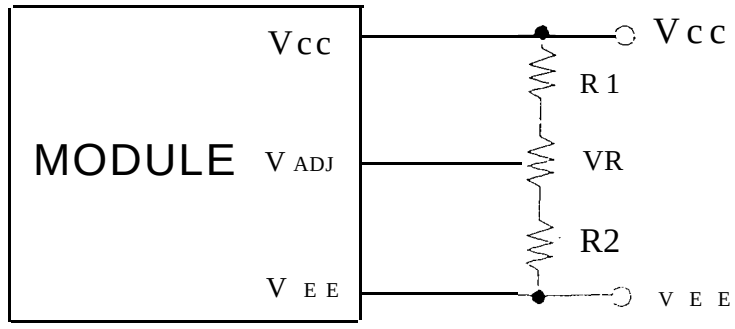


## 7. I/O Terminal

### 7.1 Pin Assignment

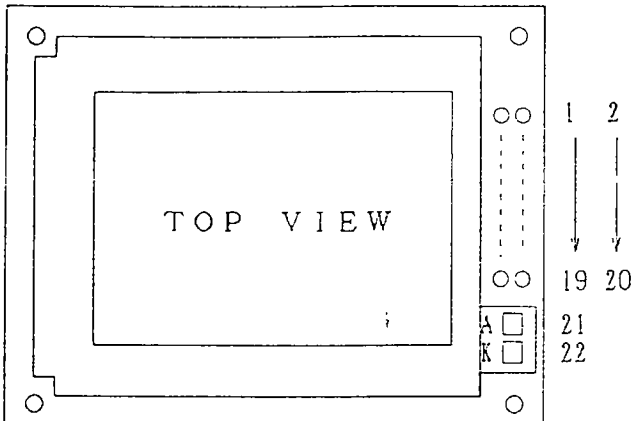
| PIN NO. | SYMBOL | LEVEL | FUNCTION |
|---|---|---|---|
| 1 | F G | - | Frame Ground |
| 2 | Vss | - | Power Supply (GND) |
| 3 | V cc | - | Power Supply for Logic |
| 4 | V ADJ | - | Voltage Level for LCD Contrast Adjust |
| 5 | V EE | - | Power Supply for LCD Driving |
| 6 | WR | H / L | Command and Data Write Signal |
| 7 | $\overline{\text{R D}}$ | H / L | Data and Status Read Signal |
| 8 | $\overline{\text{C E}}$ | H / L | Chip Enable Signal |
| 9 | C / $\overline{\text{D}}$ | H / L | WRITE: H-Command write, L-Data Write<br>READ : H-Status Read, L-Data Read |
| 10 | $\overline{\text{H A L T}}$ | H / L | Clock Operating Stop Signal |
| 11 | $\overline{\text{RESET}}$ | H / L | Reset Signal |
| 12 | D O | H / L | Data Bus |
| 13 | D 1 | H / L | Data Bus |
| 14 | D 2 | H / L | Data Bus |
| 15 | D 3 | H / L | Data Bus |
| 16 | D 4 | H / L | Data Bus |
| 17 | D 5 | H / L | Data Bus |
| 18 | D 6 | H / L | Data Bus |
| 19 | D 7 | H / L | Data Bus |
| 20 | N C | - | Non Connection |
| 21 | LED A | - | Power Supply for LED Anode |
| 22 | LED K | - | Power Supply for LED Cathode |

### 7.2 Example of Power Supply

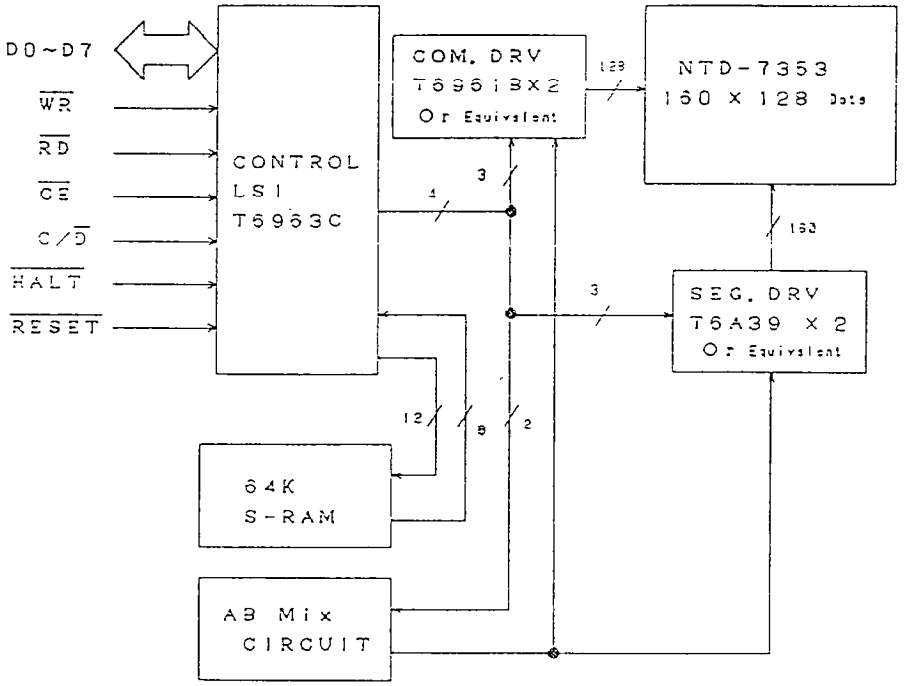


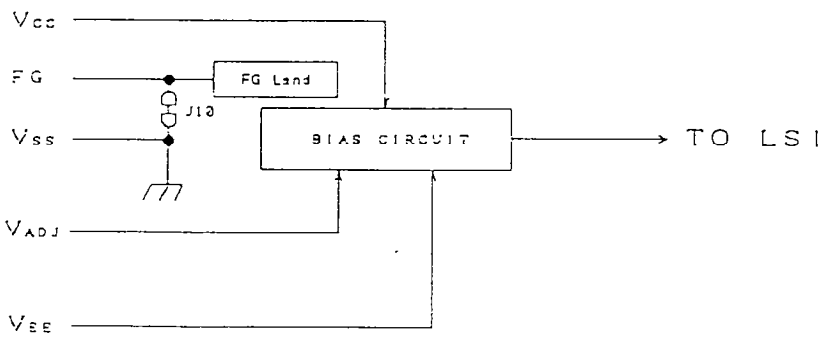

R 1+ R 2 + V R = 1 0 - 2 0 K Ω

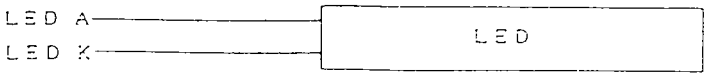
## 7.3 Pin No. Layout

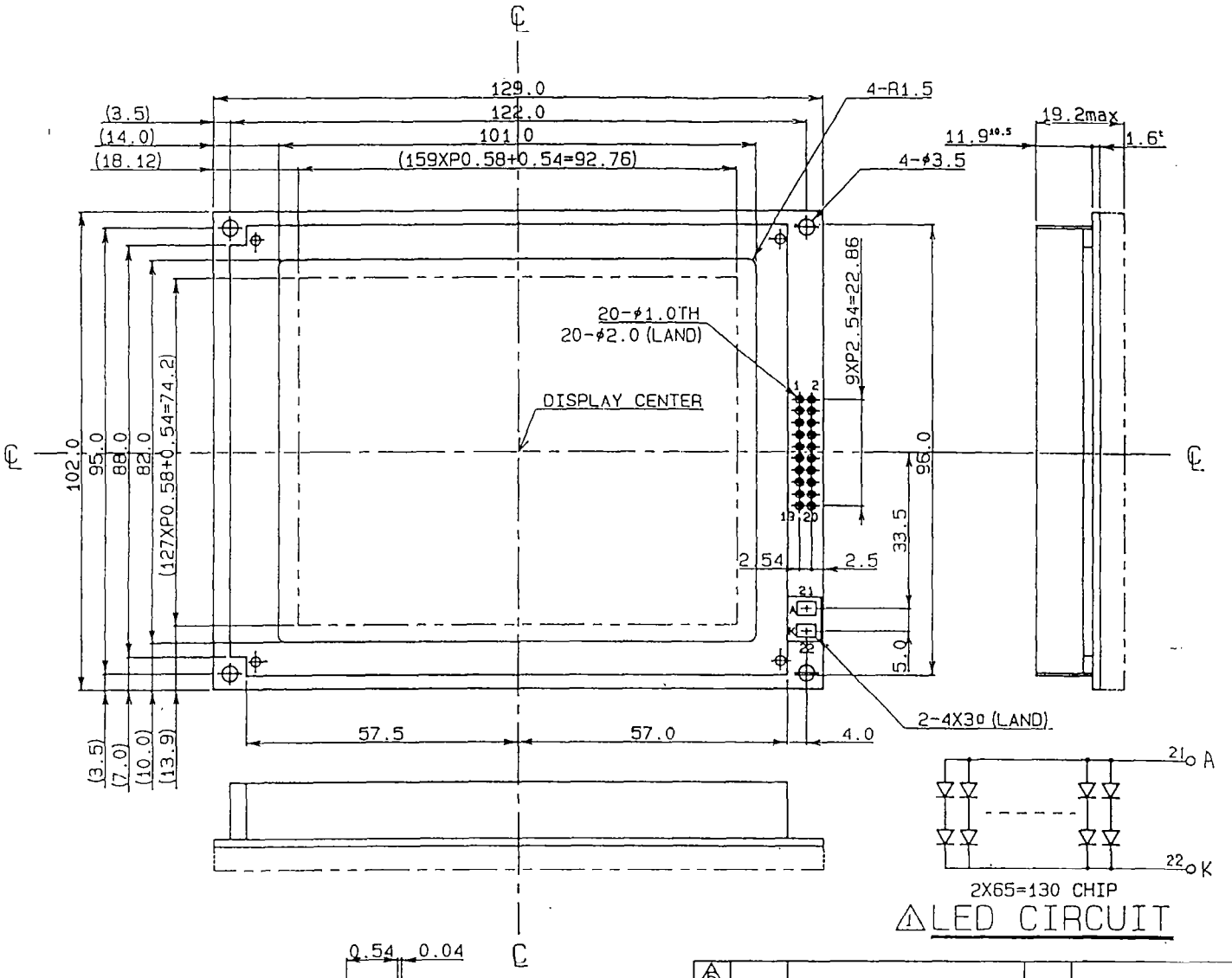



## 7.4 Block Diagram



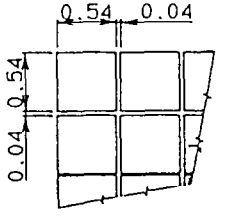






## ⚠LED CIRCUIT

## PINASSIGNMENT

| No | SYMBOL |
|---|---|
| 1 | F G |
| 2 | VSS |
| 3 | VCC |
| 4 | VADJ |
| 5 | VEE |
| 6 | $\overline{W\ R}$ |
| 7 | $\overline{R\ D}$ |
| 8 | $\overline{C\ E}$ |
| 9 | C/$\overline{D}$ |
| 10 | $\overline{HALT}$ |
| 11 | $\overline{RESET}$ |
| 12 | D 0 |
| 13 | D 1 |
| 14 | D 2 |
| 15 | D 3 |
| 16 | D 4 |
| 17 | D 5 |
| 18 | D 6 |
| 19 | D 7 |
| 20 | N C |
| 21 | LED A |
| 22 | LED K |




DOT DETALE
SCALE 20/1

| TOLERANCE | | | | | | |
|---|---|---|---|---|---|---|
| MEASURE | A | (B) | C | ANGLE | | |
| 1≤16 | ±0.1 | ±0.3 | ±1 | | | |
| 16<1≤63 | ±0.2 | ±0.5 | ±1.5 | | | |
| 63<1≤250 | ±0.3 | ±0.8 | ±2 | | | |
| 250<1≤500 | ±0.5 | ±1.2 | ±3 | ±30' | ±1° | ±2° |
| 500<1≤1000 | ±0.8 | ±2 | ±4 | | | |

| ISSUE | DATE | REVISIONS | NAME |
|---|---|---|---|
| 1 | JUL.21'93 | ADDITION OF LED CIRCUIT | T.OKA |

OPTREX CORPORATION

| | | | |
|---|---|---|---|
| MATERIAL | FINISH | Q'ty | NOTE |
| 3rd ANGLE PROJECTION | TOLERANCE CLASS: B | SCALE: 1/1 | |
| APPROVED Jul 21 '93 K.Kiwabara | MODEL | DMF5001 LED Seires | |
| CHECKED JUL.21.93 S.Sasabuchi | TITLE | DIMENSIONAL OUTLINE | |
| DRAWN JUL.21.'93 Toka | CODE | | |
| DESIGNED JUL.21.'93 T.Oka | DRAWING No. | UE-34487A | |