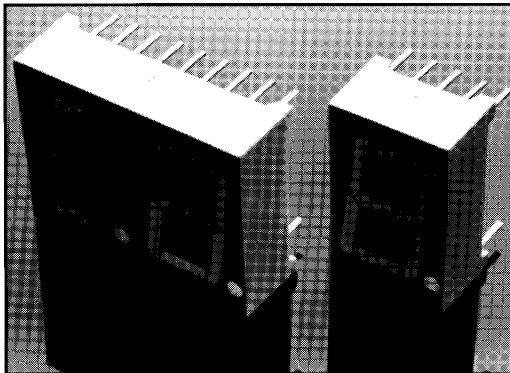




## 0.560-INCH SEVEN SEGMENT DISPLAYS

### HIGH EFFICIENCY GREEN MAN6400 SERIES



#### DESCRIPTION

The MAN6400 Series is a family of large digits which includes double and single digits. The series features the sculptured font which minimizes "gappiness" at the segment intersections. All models have right hand decimal points and are available in common anode or common cathode configuration. This device has a Grey face and clear segment to enhance ON and OFF contrast.

#### FEATURES

- High Efficiency Green nitrogen-doped GaAsP on GaP
- Large, easy to read, digits
- Common anode or common cathode models
- Fast switching — excellent for multiplexing
- Low power consumption
- Bold solid segments that are highly legible
- Solid state reliability — long operation life
- Rugged plastic construction
- Directly compatible with integrated circuits
- High brightness with high contrast
- Categorized for Luminous Intensity (See Note 5)
- Wide angle viewing... 150°
- Low forward voltage
- Two-digit package simplifies alignment and assembly

#### APPLICATIONS

- For industrial and consumer applications such as:
- Digital readout displays
  - Instrument panels
  - Point of sale equipment
  - Digital clocks
  - TV and radios

#### MODEL NUMBERS

| PART NUMBER | COLOR           | DESCRIPTION                                    | PACKAGE DRAWING | PIN OUT SPECIFICATION |
|-------------|-----------------|--|-----------------|-----------------------|
| MAN6410     | High Eff. Green | 2 Digit; Common Anode; Rt. Hand Decimal        | A               | A                     |
| MAN6440     | High Eff. Green | 2 Digit; Common Cathode; Rt. Hand Decimal      | A               | B                     |
| MAN6460     | High Eff. Green | Single Digit; Common Anode; Rt. Hand Decimal   | B               | C                     |
| MAN6480     | High Eff. Green | Single Digit; Common Cathode; Rt. Hand Decimal | B               | D                     |

#### RECOMMENDED OPTICAL FILTERS

For optimum ON and OFF contrast, one of the following filters or equivalents should be used over the display:

| DEVICE TYPE    | FILTER                  |
|----------------|-------------------------|
| MAN6400 Series | Panelgraphic Green 48   |
|                | Homalite 100-1440 Green |
|                | Panelgraphic Grey 10    |
|                | Homalite 100-1266 Grey  |



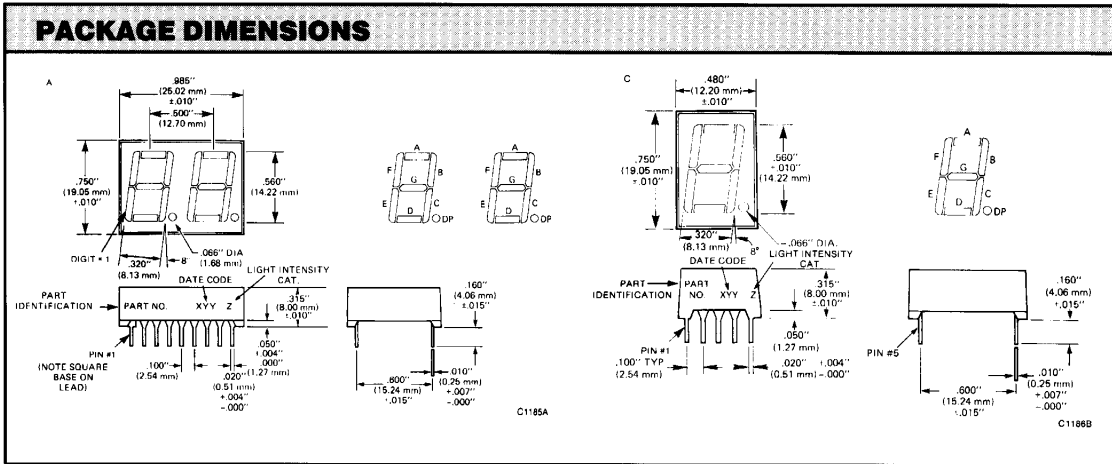
## 0.560-INCH SEVEN SEGMENT DISPLAYS

| <b>ELECTRO-OPTICAL CHARACTERISTICS</b><br>(Per Diode at 25°C Free Air Temperature Unless Otherwise Specified) |      |      |      |          |                 |
|---|------|------|------|----------|-----------------|
|   | MIN. | TYP. | MAX. | UNITS    | TEST CONDITIONS |
| Luminous Intensity, digit average<br>(See Note 1)   | 510  | 2200 |      | $\mu$ cd | $I_f = 10$ mA   |
| Peak emission wavelength  |      | 630  |      | nm       |                 |
| Spectral line half width  |      | 40   |      | nm       |                 |
| Forward voltage   |      |      |      |          |                 |
| Segment   |      |      | 2.5  | V        | $I_f = 20$ mA   |
| Decimal point   |      |      | 2.5  | V        | $I_f = 20$ mA   |
| Dynamic resistance  |      |      |      |          |                 |
| Segment   |      | 26   |      | $\Omega$ | $I_f = 20$ mA   |
| Decimal point   |      | 26   |      | $\Omega$ | $I_f = 20$ mA   |
| Capacitance   |      |      |      |          |                 |
| Segment   |      | 35   |      | pF       | V=0             |
| Decimal point   |      | 35   |      | pF       | V=0             |
| Reverse current   |      |      |      |          |                 |
| Segment   |      |      | 100  | $\mu$ A  | $V_R = 3.0$ V   |
| Decimal point   |      |      | 100  | $\mu$ A  | $V_R = 3.0$ V   |
| Ratio $I_c$   |      |      | 2:1  | —        | $I_f = 10$ mA   |

| <b>ABSOLUTE MAXIMUM RATINGS</b>                          |                    |                    |                    |                    |  |
|--|--------------------|--------------------|--------------------|--------------------|--|
|  | MAN6610<br>MAN6640 | MAN6630<br>MAN6650 | MAN6660<br>MAN6680 | MAN6675<br>MAN6695 |  |
| Power dissipation at 25°C ambient . . . . .              | 1200 mW            | 1050 mW            | 600 mW             | 375 mW             |  |
| Derate linearly from 50°C . . . . .                      | -17 mW/°C          | -15.0 mW/°C        | -8.6 mW/°C         | -5.4 mW/°C         |  |
| Storage and operating temperature . . . . .              | -40°C to +85°C     | -40°C to +85°C     | -40°C to +85°C     | -40°C to +85°C     |  |
| Continuous forward current                               |                    |                    |                    |                    |  |
| Total . . . . .  | 480 mA             | 420 mA             | 240 mA             | 150 mA             |  |
| Per segment . . . . .                                    | 30 mA              | 30 mA              | 30 mA              | 30 mA              |  |
| Decimal point . . . . .                                  | 30 mA              | 30 mA              | 30 mA              | 30 mA              |  |
| Reverse voltage  |                    |                    |                    |                    |  |
| Per segment . . . . .                                    | 6.0 V              | 6.0 V              | 6.0 V              | 6.0 V              |  |
| Decimal point . . . . .                                  | 6.0 V              | 6.0 V              | 6.0 V              | 6.0 V              |  |
| Soldering time at 260°C<br>(See Notes 3 and 4) . . . . . | 5 sec.             | 5 sec.             | 5 sec.             | 5 sec.             |  |

| <b>TYPICAL THERMAL CHARACTERISTICS</b>                          |            |
|---|------------|
| Thermal resistance junction to free air $\Phi_{JA}$ . . . . .   | 160°C/W    |
| Wavelength temperature coefficient (case temperature) . . . . . | 1.0Å/°C    |
| Forward voltage temperature coefficient . . . . .               | -2.0 mV/°C |

- NOTES**
1. The digit average Luminous Intensity is obtained by summing the Luminous Intensity of each segment and dividing by the total number of segments. Intensity will not vary more than  $\pm 33.3\%$  between all segments within a digit.
  2. The curve in Figure 3 is normalized to the brightness at 25°C to indicate the relative efficiency over the operating temperature range.
  3. Leads of the device immersed to 1/16 inch from the body. Maximum device surface temperature is 140°C.
  4. For flux removal, Freon TF, Freon TE, Isoproponal or water may be used up to their boiling points.
  5. All displays are categorized for Luminous Intensity. The Intensity category is marked on each part as a suffix letter to the part number.



**ELECTRICAL CONNECTIONS**

| Pin No. | ELECTRICAL CONNECTIONS |                 |              |                |
|---------|------------------------|-----------------|--------------|----------------|
|         | A<br>MAN6410           | B<br>MAN6440    | C<br>MAN6460 | D<br>MAN6480   |
| 1       | Cathode E 1            | Anode E 1       | Cathode E    | Anode E        |
| 2       | Cathode D 1            | Anode D 1       | Cathode D    | Anode D        |
| 3       | Cathode C 1            | Anode C 1       | Common Anode | Common Cathode |
| 4       | Cathode D.P. 1         | Anode D.P. 1    | Cathode C    | Anode C        |
| 5       | Cathode E 2            | Anode E 2       | Cathode D.P. | Anode D.P.     |
| 6       | Cathode D 2            | Anode D 2       | Cathode B    | Anode B        |
| 7       | Cathode G 2            | Anode G 2       | Cathode A    | Anode A        |
| 8       | Cathode C 2            | Anode C 2       | Common Anode | Common Cathode |
| 9       | Cathode D.P. 2         | Anode D.P. 2    | Cathode F    | Anode F        |
| 10      | Cathode B 2            | Anode B 2       | Cathode G    | Anode G        |
| 11      | Cathode A 2            | Anode A 2       |              |                |
| 12      | Cathode F 2            | Anode F 2       |              |                |
| 13      | Anode Digit 2          | Cathode Digit 2 |              |                |
| 14      | Anode Digit 1          | Cathode Digit 1 |              |                |
| 15      | Cathode B 1            | Anode B 1       |              |                |
| 16      | Cathode A 1            | Anode A 1       |              |                |
| 17      | Cathode G 1            | Anode G 1       |              |                |
| 18      | Cathode F 1            | Anode F 1       |              |                |

**TYPICAL CHARACTERISTIC CURVES**

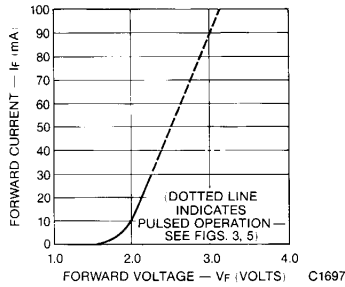


Fig. 1. Forward Current vs. Forward Voltage

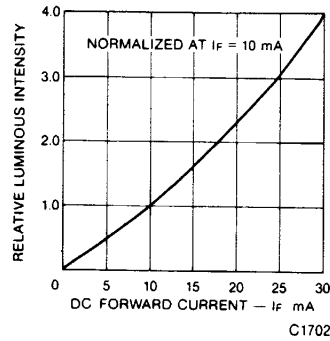


Fig. 2. Relative Luminous Intensity vs. DC Forward Current

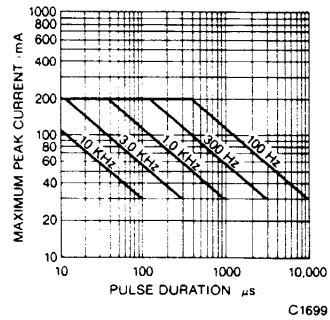


Fig. 3. Maximum Peak Current vs. Pulse Duration

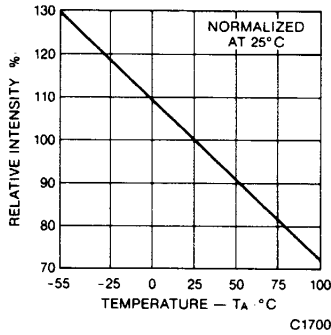


Fig. 4. Relative Luminous Intensity vs. Temperature

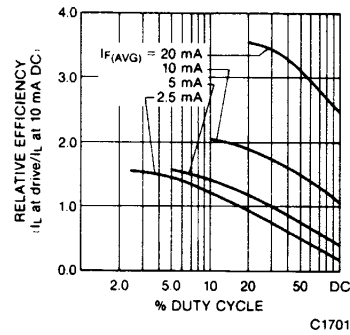


Fig. 5. Relative Efficiency vs. Duty Cycle

**INTERNAL CONNECTIONS**

