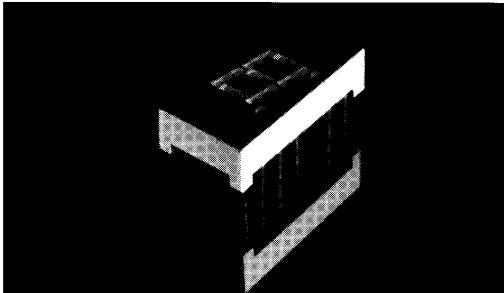




**0.400-INCH  
SEVEN SEGMENT DISPLAYS**

**HIGH EFFICIENCY GREEN MAN4400A SERIES  
ORANGE MAN4600A SERIES  
RED MAN4700A SERIES**



**DESCRIPTION**

The MAN4400, MAN4600, MAN4700 and MAN4800 Series provides superior brightness in a choice of color LED displays. Standard units are available in Red, Green, and Orange. They can be mounted in arrays with 0.400-inch (10.16 mm) center-to-center spacing. The Green displays are constructed with Grey face and neutral segment color. Red displays have Black faces and Red segment color. Others have face and segment color corresponding to the emitted light.

**FEATURES**

- Common anode or common cathode models
- Red, Green and Orange
- Fast switching—excellent for multiplexing
- Low power consumption
- Bold solid segments that are highly legible
- Solid state reliability—long operation life
- Impact resistant plastic construction
- Directly compatible with integrated circuits
- High brightness with high contrast
- Categorized for Luminous Intensity (See Note 6)
- Standard 14 pin dual-in-line package configuration
- Wide angle viewing . . . 150°
- Package size and lead configuration is the same as MAN50A/3600A/70A/80A Series

**APPLICATIONS**

- For industrial and consumer applications such as:
- Digital readout displays
  - Instrument panels
  - Point of sale equipment
  - Calculators
  - Digital clocks
  - High ambient light conditions

**MODEL NUMBERS**

| PART NUMBER | COLOR  | DESCRIPTION  | PACKAGE DRAWING | PIN OUT SPECIFICATION |
|-------------|--------|--|-----------------|-----------------------|
| MAN4410A    | Green  | Common Anode; Right Hand Decimal                           | A               | A                     |
| MAN4440A    | Green  | Common Cathode; Right Hand Decimal                         | A               | C                     |
| MAN4610A    | Orange | Common Anode; Right Hand Decimal                           | A               | A                     |
| MAN4630A    | Orange | Common Anode; Overflow $\pm 1$ ; Right Hand Decimal        | B               | B                     |
| MAN4640A    | Orange | Common Cathode; Right Hand Decimal                         | A               | C                     |
| MAN4705A    | Red    | Universal (CA or CC) Overflow $\pm 1$ ; Right Hand Decimal | B               | D                     |
| MAN4710A    | Red    | Common Anode; Right Hand Decimal                           | A               | A                     |
| MAN4740A    | Red    | Common Cathode; Right Hand Decimal                         | A               | C                     |



## 0.400-INCH SEVEN SEGMENT DISPLAYS

| <b>RECOMMENDED OPTICAL FILTER</b>   |  |  |  |
|---|--|--|--|
| For optimum ON and OFF contrast, one of the following filters or equivalents should be used over the display:   |  |  |  |
| DEVICE TYPE   | FILTER                                       | DEVICE TYPE                            | FILTER                                   |
| MAN4410A }<br>MAN4440A }  | Panelgraphic Green 48                        | MAN4705A }<br>MAN4710A }<br>MAN4740A } | Panelgraphic Red 60<br>Homalite 100-1605 |
| MAN4610A }<br>MAN4630A }<br>MAN4640A }  | Panelgraphic Scarlet 65<br>Homalite 100-1670 |  |  |
| NOTE: When using the Grey face MAN4480 or MAN4880 in situations of high ambient light, a neutral density filter can be used to achieve a greater contrast. The following or equivalent can be used: Panelgraphic Grey 10. |  |  |  |

| <b>ELECTRO-OPTICAL CHARACTERISTICS</b><br>(25°C Free Air Temperature Unless Otherwise Specified) |      |      |      |                |                       |
|--|------|------|------|----------------|-----------------------|
|  | MIN. | TYP. | MAX. | UNITS          | TEST CONDITIONS       |
| <b>MAN4410A/4440A</b>  |      |      |      |                |                       |
| Luminous Intensity, digit average<br>(See Note 1 and 3)  | 750  | 3200 |      | $\mu\text{cd}$ | $I_f = 10 \text{ mA}$ |
| Peak emission wavelength   |      | 562  |      | nm             |                       |
| Forward voltage  |      |      |      |                |                       |
| Segment  |      | 2.2  | 3.0  | V              | $I_f = 20 \text{ mA}$ |
| Decimal point  |      | 2.2  | 3.0  | V              | $I_f = 20 \text{ mA}$ |
| Dynamic resistance   |      |      |      |                |                       |
| Segment  |      | 12   |      | $\Omega$       | $I_f = 20 \text{ mA}$ |
| Decimal point  |      | 12   |      | $\Omega$       | $I_f = 20 \text{ mA}$ |
| Capacitance  |      |      |      |                |                       |
| Segment  |      | 40   |      | pF             | $V = 0$               |
| Decimal point  |      | 40   |      | pF             | $V = 0$               |
| Reverse current  |      |      |      |                |                       |
| Segment  |      |      | 100  | $\mu\text{A}$  | $V_R = 5.0 \text{ V}$ |
| Decimal point  |      |      | 100  | $\mu\text{A}$  | $V_R = 5.0 \text{ V}$ |
| <b>MAN4610A/4630A/4640A</b>  |      |      |      |                |                       |
| Luminous Intensity, digit average<br>(See Note 1 and 3)  | 510  | 1800 |      | $\mu\text{cd}$ | $I_f = 10 \text{ mA}$ |
| Peak emission wavelength   |      | 630  |      | nm             |                       |
| Forward voltage  |      |      |      |                |                       |
| Segment  |      | 2.2  | 2.5  | V              | $I_f = 20 \text{ mA}$ |
| Decimal point  |      | 2.2  | 2.5  | V              | $I_f = 20 \text{ mA}$ |
| Dynamic resistance   |      |      |      |                |                       |
| Segment  |      | 26   |      | $\Omega$       | $I_f = 20 \text{ mA}$ |
| Decimal point  |      | 26   |      | $\Omega$       | $I_f = 20 \text{ mA}$ |
| Capacitance  |      |      |      |                |                       |
| Segment  |      | 35   |      | pF             | $V = 0$               |
| Decimal point  |      | 35   |      | pF             | $V = 0$               |
| Reverse current  |      |      |      |                |                       |
| Segment  |      |      | 100  | $\mu\text{A}$  | $V_R = 5.0 \text{ V}$ |
| Decimal point  |      |      | 100  | $\mu\text{A}$  | $V_R = 5.0 \text{ V}$ |



## 0.400-INCH SEVEN SEGMENT DISPLAYS

### ELECTRO-OPTICAL CHARACTERISTICS (25°C Free Air Temperature Unless Otherwise Specified)

|   | MIN. | TYP. | MAX. | UNITS    | TEST CONDITIONS |
|---|------|------|------|----------|-----------------|
| <b>MAN4705A/4710A/4740A</b>                             |      |      |      |          |                 |
| Luminous Intensity, digit average<br>(See Note 1 and 3) | 125  | 350  |      | $\mu$ cd | $I_f = 10$ mA   |
| Peak emission wavelength                                |      | 660  |      | nm       |                 |
| Forward voltage   |      |      |      |          |                 |
| Segment   |      | 1.6  | 2.0  | V        | $I_f = 20$ mA   |
| Decimal point   |      | 1.6  | 2.0  | V        | $I_f = 20$ mA   |
| Dynamic resistance                                      |      |      |      |          |                 |
| Segment   |      | 2    |      | $\Omega$ | $I_f = 20$ mA   |
| Decimal point   |      | 2    |      | $\Omega$ | $I_f = 20$ mA   |
| Capacitance   |      |      |      |          |                 |
| Segment   |      | 35   | 80   | pF       | V=0             |
| Decimal point   |      | 35   | 80   | pF       | V=0             |
| Reverse current   |      |      |      |          |                 |
| Segment   |      |      | 100  | $\mu$ A  | $V_R = 5.0$ V   |
| Decimal point   |      |      | 100  | $\mu$ A  | $V_R = 5.0$ V   |

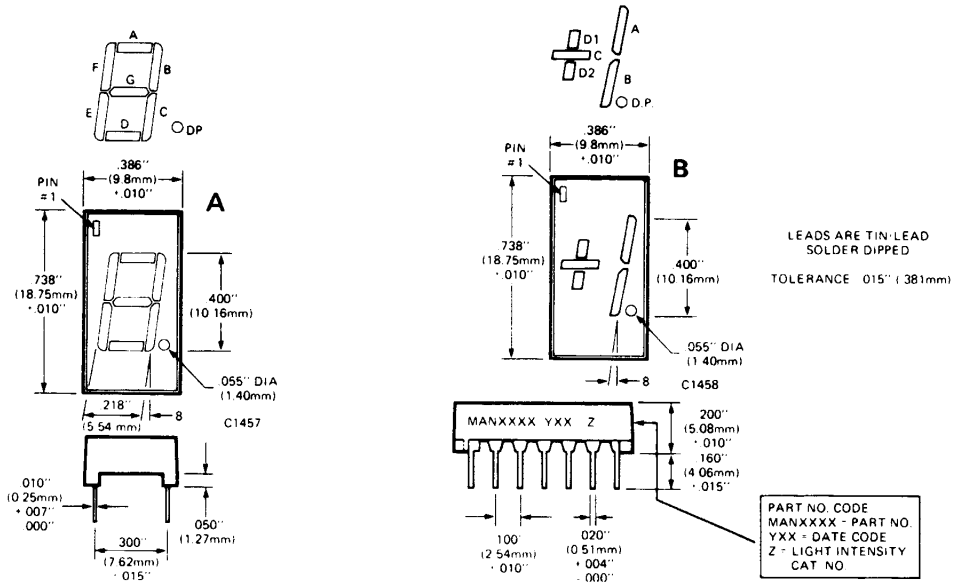
### ABSOLUTE MAXIMUM RATINGS

|   | MAN4410A<br>MAN4440A | MAN4705A       | MAN4710A<br>MAN4740A |
|---|----------------------|----------------|----------------------|
| Power dissipation at 25°C ambient           | 600 mW               | 360 mW         | 480 mW               |
| Derate linearly from 50°C                   | -12 mW/°C            | -5.2 mW/°C     | -6.9 mW/°C           |
| Storage and operating temperature           | -40°C to +85°C       | -40°C to +85°C | -40°C to +85°C       |
| Continuous forward current                  |                      |                |                      |
| Total                                       | 240 mA               | 180 mA         | 240 mA               |
| Per segment                                 | 30 mA                | 30 mA          | 30 mA                |
| Decimal point                               | 30 mA                | 30 mA          | 30 mA                |
| Reverse voltage                             |                      |                |                      |
| Per segment                                 | 6.0 V                | 6.0 V          | 6.0 V                |
| Decimal point                               | 6.0 V                | 6.0 V          | 6.0 V                |
| Soldering time at 260°C (See Notes 4 and 5) | 5 sec.               | 5 sec.         | 5 sec.               |
|   |                      | MAN4630A       | MAN4610A<br>MAN4640A |
| Power dissipation at 25°C ambient           |                      | 450 mW         | 600 mW               |
| Derate linearly from 50°C                   |                      | -6.4 mW/°C     | -8.6 mW/°C           |
| Storage and operating temperature           |                      | -40°C to +85°C | -40°C to +85°C       |
| Continuous forward current                  |                      |                |                      |
| Total                                       |                      | 180 mA         | 240 mA               |
| Per segment                                 |                      | 30 mA          | 30 mA                |
| Decimal point                               |                      | 30 mA          | 30 mA                |
| Reverse voltage                             |                      |                |                      |
| Per segment                                 |                      | 6.0 V          | 6.0 V                |
| Decimal point                               |                      | 6.0 V          | 6.0 V                |
| Soldering time at 260°C (See Notes 4 and 5) |                      | 5 sec.         | 5 sec.               |

### TYPICAL THERMAL CHARACTERISTICS

|   |            |
|---|------------|
| <b>GREEN/YELLOW</b>                                   |            |
| Thermal resistance junction to free air $\Phi_{JA}$   | 160°C/W    |
| Wavelength temperature coefficient (case temperature) | 1.0 Å/°C   |
| Forward voltage temperature coefficient               | -1.5 mV/°C |
| <b>RED/ORANGE</b>                                     |            |
| Thermal resistance junction to free air $\Phi_{JA}$   | 160°C/W    |
| Wavelength temperature coefficient (case temperature) | 1.0 Å/°C   |
| Forward voltage temperature coefficient               | -2.0 mV/°C |

**PACKAGE DIMENSIONS**



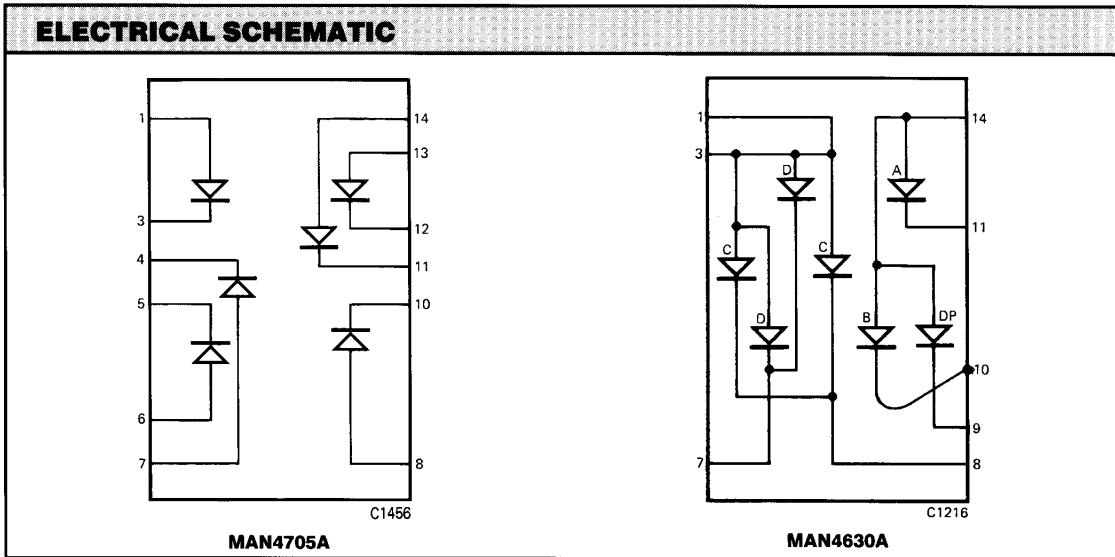
**NOTES**

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 Figures 3, 6, 9, and 12 is normalized to the brightness at 25°C to indicate the relative Luminous Intensity over the operating temperature range.
3. The decimal point is designed to have the same surface brightness as the segments, therefore, the Luminous Intensity of the decimal point is .3 times the Luminous Intensity of the segments, since the area of the decimal point is .3 times the area of the average segment.
4. Leads of the device immersed to 1/16 inch from the body. Maximum device surface temperature is 140°C.
5. For flux removal, Freon TF, Freon TE, Isoproponal or water may be used up to their boiling points.
6. All displays are categorized for Luminous Intensity. The Intensity category is marked on each part as a suffix letter to the part number.



## 0.400-INCH SEVEN SEGMENT DISPLAYS

| <b>ELECTRICAL CONNECTIONS</b> |                           |                    |                           |               |
|-------------------------------|---------------------------|--------------------|---------------------------|---------------|
| PIN NO.                       | ELECTRICAL CONNECTIONS    |                    |                           |               |
|                               | A<br>MAN4410A/4610A/4710A | B<br>MAN4630A      | C<br>MAN4440A/4640A/4740A | D<br>MAN4705A |
| 1                             | Cathode A                 | Anode C, D         | Anode F                   | Anode D1      |
| 2                             | Cathode F                 | No Pin             | Anode G                   | No Pin        |
| 3                             | Common Anode              | Anode C, D         | No Pin                    | Cathode D1    |
| 4                             | No Pin                    | No Pin             | Common Cathode            | Cathode C     |
| 5                             | No Pin                    | No Pin             | No Pin                    | Cathode D2    |
| 6                             | No Pin                    | No Connection      | Anode E                   | Anode D2      |
| 7                             | Cathode E                 | Cathode D          | Anode D                   | Anode C       |
| 8                             | Cathode D                 | Cathode C          | Anode C                   | Anode D.P.    |
| 9                             | Cathode D.P.              | Cathode D.P.       | Anode D.P.                | No Pin        |
| 10                            | Cathode C                 | Cathode B          | No Pin                    | Cathode D.P.  |
| 11                            | Cathode G                 | Cathode A          | No Connection             | Cathode B     |
| 12                            | No Pin                    | No Pin             | Common Cathode            | Cathode A     |
| 13                            | Cathode B                 | No Pin             | Anode B                   | Anode A       |
| 14                            | Common Anode              | Anode A, B, & D.P. | Anode A                   | Anode B       |



**TYPICAL CHARACTERISTIC CURVES**

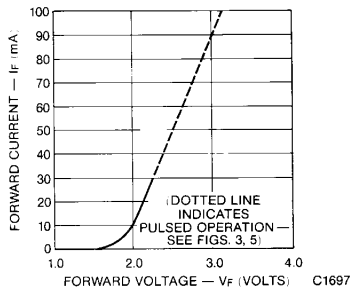


Fig. 1. Forward Current vs. Forward Voltage

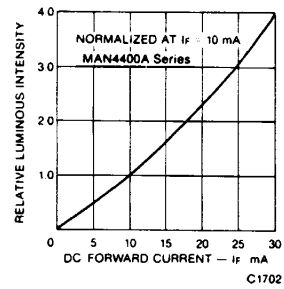


Fig. 2. Luminous Intensity vs. Forward Current

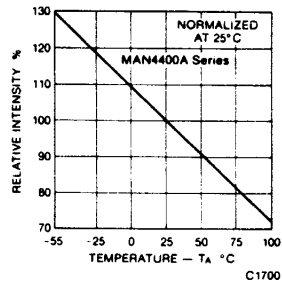


Fig. 3. Relative Luminous Intensity vs. Temperature

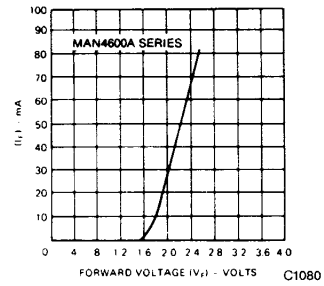


Fig. 4. Forward Current vs. Forward Voltage

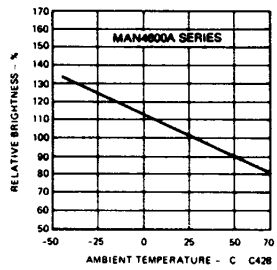


Fig. 5. Relative Luminous Intensity vs. Temperature

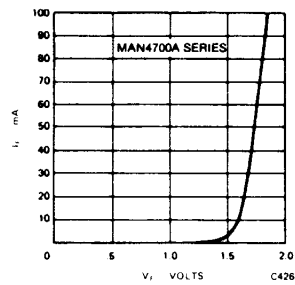


Fig. 6. Forward Current vs. Forward Voltage

**TYPICAL CHARACTERISTIC CURVES (Cont'd)**

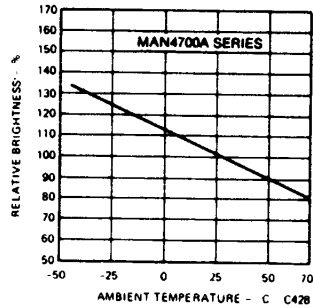


Fig. 7. Relative Luminous Intensity vs. Temperature

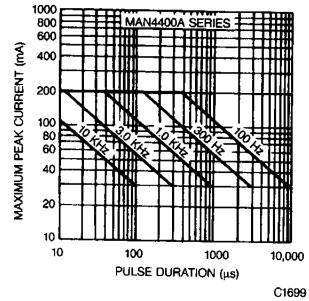


Fig. 8. Max Peak Current vs. Duty Cycle

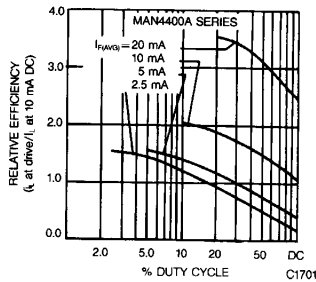


Fig. 9. Relative Luminous Intensity vs. Duty Cycle

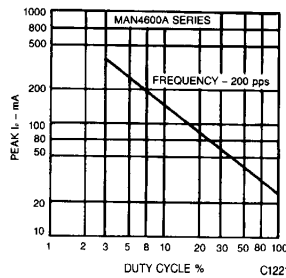


Fig. 10. Max Peak Current vs. Duty Cycle

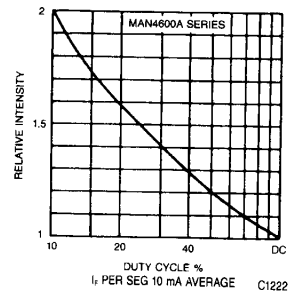


Fig. 11. Relative Luminous Intensity vs. Duty Cycle

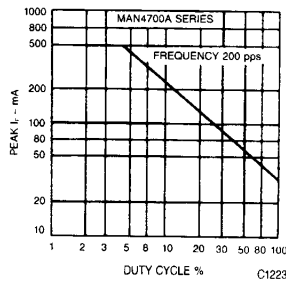


Fig. 12. Max Peak Current vs. Duty Cycle

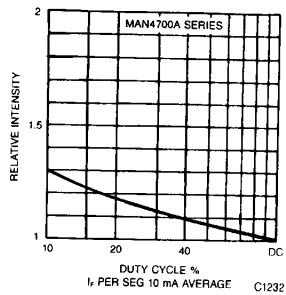


Fig. 13. Relative Luminous Intensity vs. Duty Cycle

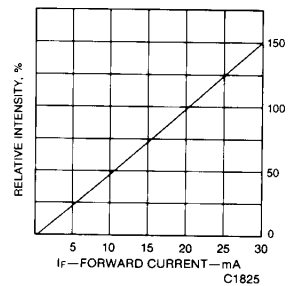


Fig. 14. Relative Luminous Intensity vs. Forward Current