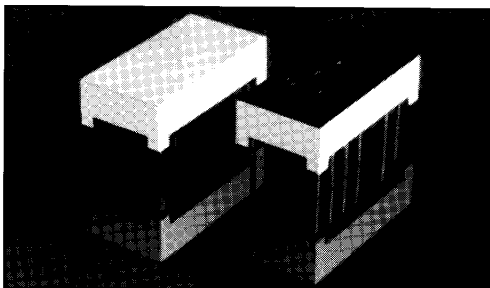


**HIGH EFFICIENCY GREEN MAN3480A
ORANGE MAN3680A**

**RED MAN78A
YELLOW MAN3880A
HIGH EFFICIENCY RED MAN3980A**



DESCRIPTION

The MAN3480A, MAN3680A, MAN78A, MAN3880A and MAN3980A are common cathode displays which provide a choice of color of LED displays. They are pin and functional replacements for the 0.300-inch Hewlett-Packard common cathode displays. The series is complementary to the MAN3400A, MAN3600A, MAN70A, MAN3800A and MAN3900A families of displays. They can be mounted in arrays with 0.400-inch (10.16 mm) center-to-center spacing. Yellow and High Efficiency 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

- Hewlett-Packard compatible common cathode displays
- Red, Yellow, Green, Orange and High Efficiency Red
- 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 10 pin dual-in-line package configuration
- Wide viewing angle...150°

APPLICATIONS

- Digital readout displays
- Instrument panels
- Point of sale terminals
- Calculators
- Digital clocks

MODEL NUMBERS

| PART NO. | COLOR | DESCRIPTION |
|----------|-----------------------|------------------------------------|
| MAN3480A | High Efficiency Green | Common Cathode; Right Hand Decimal |
| MAN3680A | Orange | Common Cathode; Right Hand Decimal |
| MAN78A | Red | Common Cathode; Right Hand Decimal |
| MAN3880A | Yellow | Common Cathode; Right Hand Decimal |
| MAN3980A | High Efficiency Red | Common Cathode; Right Hand Decimal |

| 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 | DEVICE TYPE | FILTER |
| MAN3480A | Panelgraphic Green 48 Homalite 100-1440 Green | MAN3980A MAN78A | Panelgraphic Red 60 Homalite 100-1605 |
| MAN3680A | Panelgraphic Scarlet 65 Homalite 100-1670 | MAN3880A | Panelgraphic Yellow 25 or Amber 23 Homalite 100-1720 or 100-1726 Panelgraphic Grey 10 Homalite 100-1266 Grey |

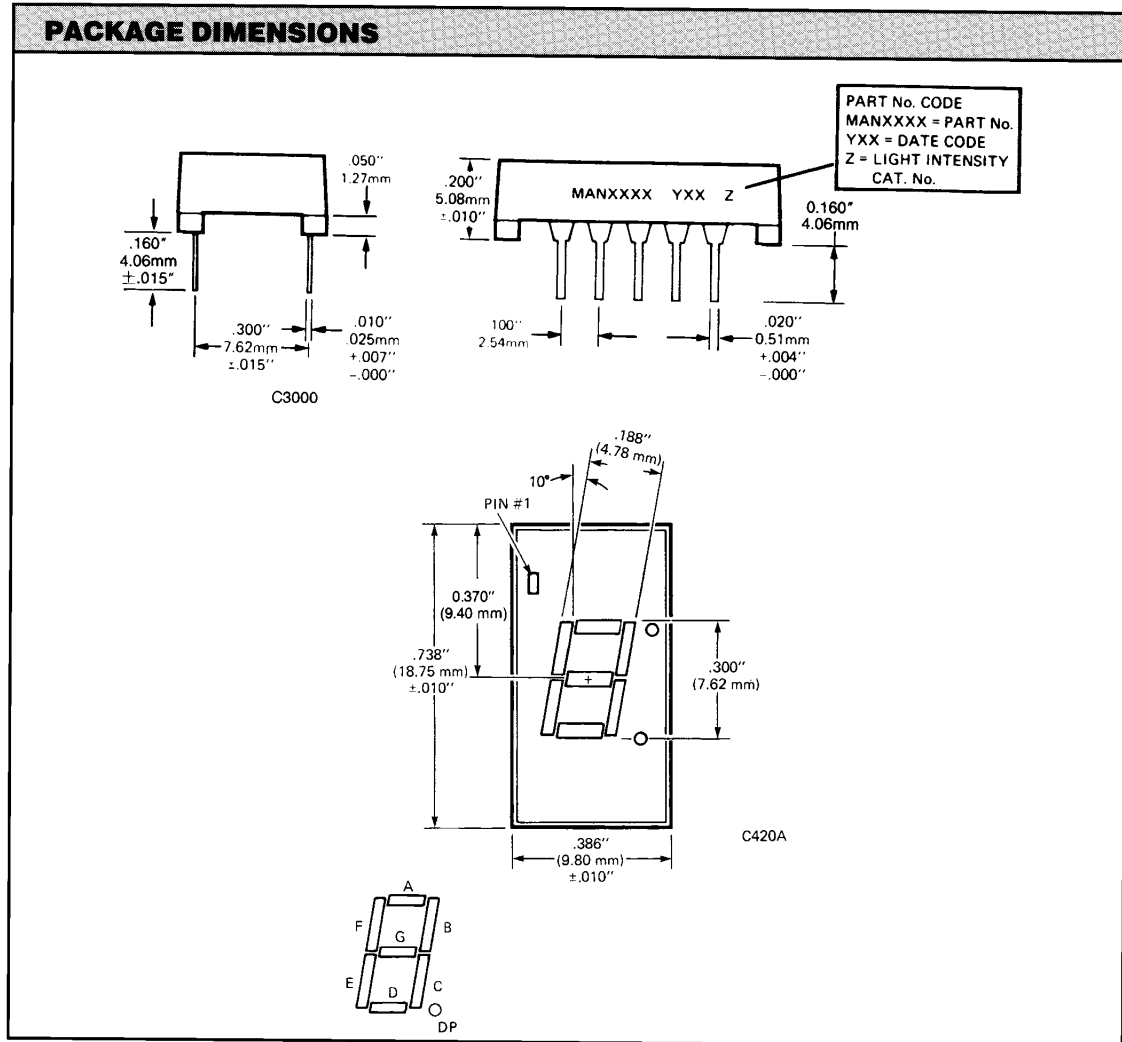
| ELECTRO-OPTICAL CHARACTERISTICS (25°C Free Air Temperature Unless Otherwise Specified) | | | | | |
|--|------------|--------------|------|----------------------|---|
| | MIN. | TYP. | MAX. | UNITS | TEST CONDITIONS |
| MAN3480A | | | | | |
| Luminous Intensity, digit average (See Notes 1 and 3) | 750 900 | 3200 4000 | | μ cd μ cd | $I_f=10$ mA $I_f=60$ mA peak, 1:6 DF |
| Peak emission wavelength | | 562 | | nm | |
| Spectral line half width | | 30 | | nm | |
| Forward voltage | | | | | |
| Segment | | 2.2 | 3.0 | V | $I_f=20$ mA |
| Decimal point | | 2.2 | 3.0 | V | $I_f=20$ mA |
| Dynamic resistance | | | | | |
| Segment | | 12 | | Ω | $I_f=20$ mA |
| Decimal point | | 12 | | Ω | $I_f=20$ mA |
| Capacitance | | | | | |
| Segment | | 40 | | pF | V=0 |
| Decimal point | | 40 | | pF | V=0 |
| Reverse current | | | | | |
| Segment | | | 100 | μ A | $V_R=5.0$ V |
| Decimal point | | | 100 | μ A | $V_R=5.0$ V |
| MAN3680A | | | | | |
| Luminous Intensity, digit average (See Note 1 and 3) | 510 | 1800 | | μ 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 | | Ω | $I_f=20$ mA |
| Decimal point | | 26 | | Ω | $I_f=20$ mA |
| Capacitance | | | | | |
| Segment | | 35 | | pF | V=0 |
| Decimal point | | 35 | | pF | V=0 |
| Reverse current | | | | | |
| Segment | | | 100 | μ A | $V_R=5.0$ V |
| Decimal point | | | 100 | μ A | $V_R=5.0$ V |

| ELECTRO-OPTICAL CHARACTERISTICS (25°C Free Air Temperature Unless Otherwise Specified) (Cont'd) | | | | | |
|---|------|------|------|-------|--------------------------|
| | MIN. | TYP. | MAX. | UNITS | TEST CONDITIONS |
| MAN78A | | | | | |
| Luminous Intensity, digit average (See Note 1 and 3) | 125 | 350 | | μcd | I _F = 10 mA |
| Peak emission wavelength | | 660 | | nm | |
| Spectral line half width | | 20 | | nm | |
| Forward voltage Segment | | | 2.0 | V | I _F = 20 mA |
| Decimal point | | | 2.0 | V | I _F = 20 mA |
| Dynamic resistance Segment | | 2 | | Ω | I _{pk} = 100 mA |
| Decimal point | | 2 | | Ω | I _{pk} = 100 mA |
| Capacitance Segment | | 35 | 80 | pF | V = 0 |
| Decimal point | | 35 | 80 | pF | V = 0 |
| Reverse current Segment | | | 100 | μA | V _R = 5.0 V |
| Decimal point | | | 100 | μA | V _R = 5.0 V |
| MAN3880A | | | | | |
| Luminous Intensity, digit average (See Note 1 and 3) | 450 | 1700 | | μcd | I _F = 10 mA |
| Peak emission wavelength | | 585 | | nm | |
| Spectral line half width | | 40 | | nm | |
| Forward voltage Segment | | | 3.0 | V | I _F = 20 mA |
| Decimal point | | | 3.0 | V | I _F = 20 mA |
| Dynamic resistance Segment | | 26 | | Ω | I _F = 20 mA |
| Decimal point | | 26 | | Ω | I _F = 20 mA |
| Capacitance Segment | | 35 | | pF | V = 0 |
| Decimal point | | 35 | | pF | V = 0 |
| Reverse current Segment | | | 100 | μA | V _R = 5.0 V |
| Decimal point | | | 100 | μA | V _R = 5.0 V |
| MAN3980A | | | | | |
| Luminous Intensity, digit average (See Note 1 and 3) | 450 | 1900 | | μcd | I _F = 10 mA |
| Peak emission wavelength | | 635 | | 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 | | Ω | I _F = 20 mA |
| Decimal point | | 26 | | Ω | I _F = 20 mA |
| Capacitance Segment | | 35 | | pF | V = 0 |
| Decimal point | | 35 | | pF | V = 0 |
| Reverse current Segment | | | 100 | μA | V _R = 5.0 V |
| Decimal point | | | 100 | μA | V _R = 5.0 V |

| ABSOLUTE MAXIMUM RATINGS | | | |
|---|------------------------|----------------|--|
| | HIGH EFF. GREEN | RED | ORANGE YELLOW HIGH EFF. RED |
| | MAN3480A | MAN78A | MAN3680A MAN3680A MAN3980A |
| Power dissipation at 25°C ambient | 600 mW | 480 mW | 600 mW |
| Derate linearly from 50°C | -12 mW/°C | -6.9 mW/°C | -10.3 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 | 240 mA | 200 mA |
| Per segment | 30 mA | 30 mA | 25 mA |
| Decimal point | 30 mA | 30 mA | 25 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. |

| TYPICAL THERMAL CHARACTERISTICS | |
|---|------------|
| GREEN/YELLOW | |
| Thermal resistance junction to free air Φ_{JA} | 160°C/W |
| Wavelength temperature coefficient (case temperature) | 1.0Å/°C |
| Forward voltage temperature coefficient | -1.5 mV/°C |
| RED/ORANGE/HIGH EFFICIENCY RED | |
| Thermal resistance junction to free air Φ_{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 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.



ELECTRICAL CONNECTIONS

| PIN NO. | ELECTRICAL CONNECTIONS |
|---------|------------------------|
| 1 | Common Cathode |
| 2 | Anode F |
| 3 | Anode G |
| 4 | Anode E |
| 5 | Anode D |
| 6 | Common Cathode |
| 7 | Anode D.P. |
| 8 | Anode C |
| 9 | Anode B |
| 10 | Anode A |

TYPICAL CHARACTERISTIC CURVES

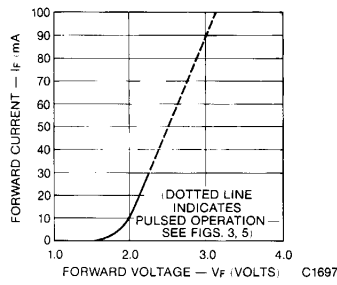


Fig. 1. Forward Current vs. Forward Voltage

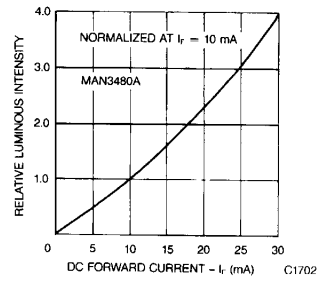


Fig. 2. Relative Luminous Intensity vs. DC Forward Current

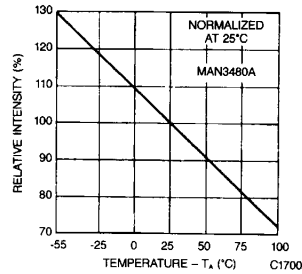


Fig. 3. Relative Luminous Intensity vs. Temperature

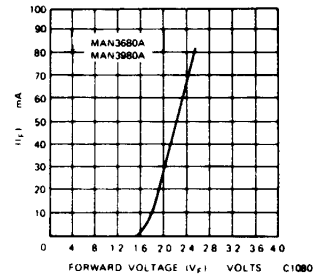


Fig. 4. Forward Current vs. Forward Voltage

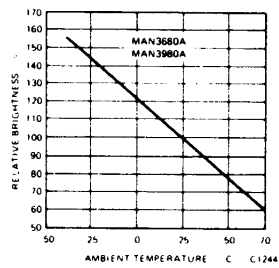


Fig. 5. Relative Luminous Intensity vs. Temperature

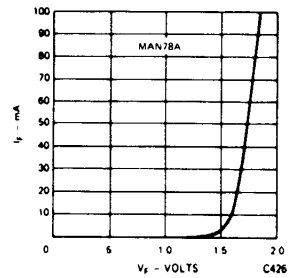


Fig. 6. Forward Current vs. Forward Voltage

TYPICAL CHARACTERISTIC CURVES (Cont'd)

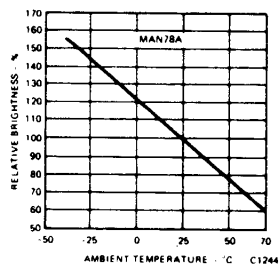


Fig. 7. Relative Luminous Intensity vs. Temperature

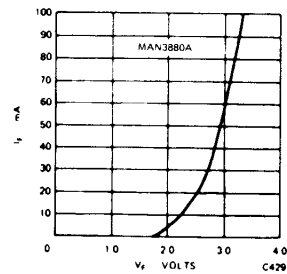


Fig. 8. Forward Current vs. Forward Voltage

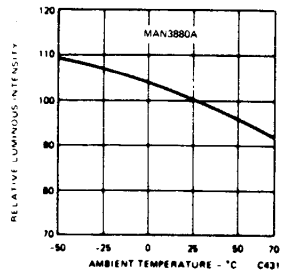


Fig. 9. Relative Luminous Intensity vs. Temperature

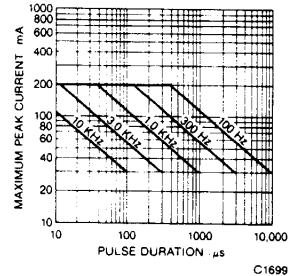


Fig. 10. Maximum Peak Current vs. Pulse Duration

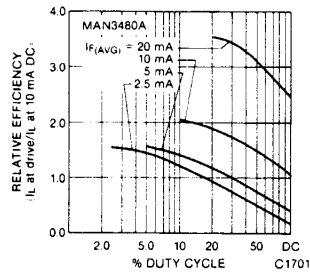


Fig. 11. Relative Efficiency vs. Duty Cycle

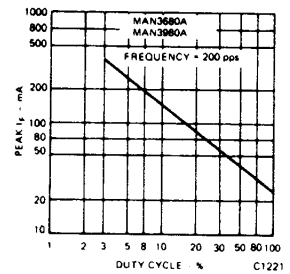


Fig. 12. Max Peak Current vs. Duty Cycle

TYPICAL CHARACTERISTIC CURVES (Cont'd)

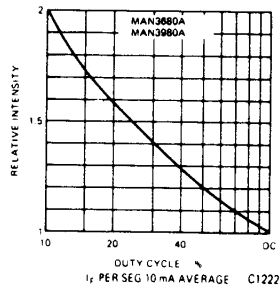


Fig. 13. Luminous Intensity vs. Duty Cycle

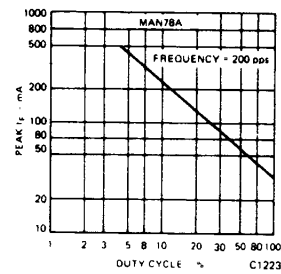


Fig. 14. Max Peak Current vs. Duty Cycle

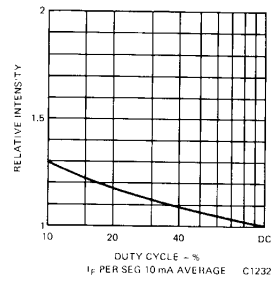


Fig. 15. Luminous Intensity vs. Duty Cycle

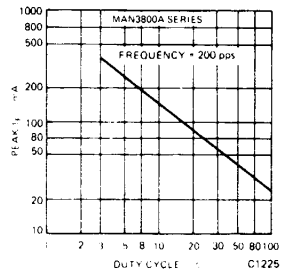


Fig. 16. Max Peak Current vs. Duty Cycle

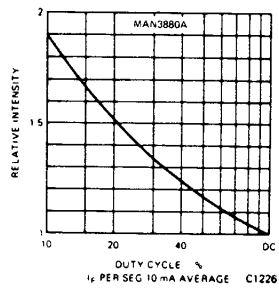


Fig. 17. Luminous Intensity vs. Duty Cycle

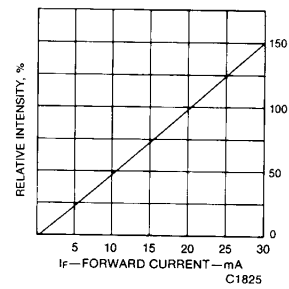


Fig. 18. Relative Luminous Intensity vs. Forward Current



0.300-INCH SEVEN SEGMENT DISPLAYS

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