FAIRCHILD
SEMICONDUCTOR™

GlobalOptoisolator™

VDE | UL | CSA | SETI | SEMKO | DEMKO | NEMKO | BABT

# MOC8100

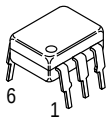
# 6-Pin DIP Optoisolator Transistor Output

The MOC8100 device consists of a gallium arsenide infrared emitting diode optically coupled to a monolithic silicon phototransistor detector. It is designed for applications requiring higher output collector current ($I_C$) with lower input drive current ($I_F$).

- Current Transfer Ratio Guaranteed to be > 50% at 1 mA LED Drive Level
- ***To order devices that are tested and marked per VDE 0884 requirements, the suffix "V" must be included at end of part number. VDE 0884 is a test option.***

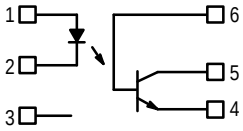
### Applications

- Appliances, Measuring Instruments
- General Purpose Switching Circuits
- Programmable Controllers
- Portable Electronics
- Interfacing and coupling systems of different potentials and impedances
- Low Power Logic Circuits
- Telecommunications Equipment




**STANDARD THRU HOLE**

**SCHEMATIC**




PIN 1. LED ANODE
2. LED CATHODE
3. N.C.
4. EMITTER
5. COLLECTOR
6. BASE

**MAXIMUM RATINGS** ($T_A$ = 25°C unless otherwise noted)

| Rating | Symbol | Value | Unit |
|---|---|---|---|
| **INPUT LED** | | | |
| Reverse Voltage | $V_R$ | 6 | Volts |
| Forward Current — Continuous | $I_F$ | 60 | mA |
| LED Power Dissipation @ $T_A$ = 25°C<br>with Negligible Power in Output Detector<br>Derate above 25°C | $P_D$ | 120<br><br>1.41 | mW<br><br>mW/°C |
| **OUTPUT TRANSISTOR** | | | |
| Collector–Emitter Voltage | $V_{CEO}$ | 30 | Volts |
| Emitter–Base Voltage | $V_{EBO}$ | 7 | Volts |
| Collector–Base Voltage | $V_{CBO}$ | 70 | Volts |
| Collector Current — Continuous | $I_C$ | 150 | mA |
| Detector Power Dissipation @ $T_A$ = 25°C<br>with Negligible Power in Input LED<br>Derate above 25°C | $P_D$ | 150<br><br>1.76 | mW<br><br>mW/°C |
| **TOTAL DEVICE** | | | |
| Isolation Surge Voltage(1)<br>(Peak ac Voltage, 60 Hz, 1 sec Duration) | $V_{ISO}$ | 7500 | Vac(pk) |
| Total Device Power Dissipation @ $T_A$ = 25°C<br>Derate above 25°C | $P_D$ | 250<br>2.94 | mW<br>mW/°C |
| Ambient Operating Temperature Rang | $T_A$ | –55 to +100 | °C |
| Storage Temperature Range | $T_{stg}$ | –55 to +150 | °C |
| Soldering Temperature (10 sec, 1/16″ from case) | $T_L$ | 260 | °C |

1. Isolation surge voltage is an internal device dielectric breakdown rating.
For this test, Pins 1 and 2 are common, and Pins 4, 5 and 6 are common.

**ELECTRICAL CHARACTERISTICS** ($T_A$ = 25°C unless otherwise noted)(1)

| Characteristic | | Symbol | Min | Typ(1) | Max | Unit |
|---|---|---|---|---|---|---|
| **INPUT LED** | | | | | | |
| Forward Voltage ($I_F$ = 10 mA) | $T_A$ = 0–70°C<br>$T_A$ = –55°C<br>$T_A$ = 100°C | $V_F$ | —<br>—<br>— | 1.15<br>1.3<br>1.05 | 1.4<br>—<br>— | Volts |
| Reverse Leakage Current ($V_R$ = 6 V) | | $I_R$ | — | 0.05 | 10 | µA |
| Capacitance (V = 0 V, f = 1 MHz) | | $C_J$ | — | 18 | — | pF |
| **OUTPUT TRANSISTOR** | | | | | | |
| Collector–Emitter Dark Current ($V_{CE}$ = 5 V, $T_A$ = 25°C) | | $I_{CEO}$ | — | 3 | 25 | nA |
| ($V_{CB}$ = 30 V, $T_A$ = 70°C) | | $I_{CEO}$ | — | 0.05 | 50 | µA |
| Collector–Base Dark Current ($V_{CB}$ = 5 V) | | $I_{CBO}$ | — | 0.2 | 10 | nA |
| Collector–Emitter Breakdown Voltage ($I_C$ = 1 mA) | | $V_{(BR)CEO}$ | 30 | 45 | — | Volts |
| Collector–Base Breakdown Voltage ($I_C$ = 100 µA) | | $V_{(BR)CBO}$ | 70 | 100 | — | Volts |
| Emitter–Base Breakdown Voltage ($I_E$ = 100 µA) | | $V_{(BR)EBO}$ | 7 | 7.8 | — | Volts |
| DC Current Gain ($I_C$ = 1 mA, $V_{CE}$ = 5 V) (Typical Value) | | $h_{FE}$ | — | 600 | — | — |
| Collector–Emitter Capacitance (f = 1 MHz, $V_{CE}$ = 0) | | $C_{CE}$ | — | 7 | — | pF |
| Collector–Base Capacitance (f = 1 MHz, $V_{CB}$ = 0) | | $C_{CB}$ | — | 19 | — | pF |
| Emitter–Base Capacitance (f = 1 MHz, $V_{EB}$ = 0) | | $C_{EB}$ | — | 9 | — | pF |
| **COUPLED** | | | | | | |
| Output Collector Current<br>($I_F$ = 1 mA, $V_{CE}$ = 5 V)<br>($I_F$ = 1 mA, $V_{CE}$ = 5 V, $T_A$ = 0 to +70°C) | | $I_C$ (CTR)(2) | <br>0.5 (50)<br>0.3 (30) | <br>1 (100)<br>0.6 (60) | <br>—<br>— | mA (%) |
| Collector–Emitter Saturation Voltage ($I_C$ = 100 µA, $I_F$ = 1 mA) | | $V_{CE(sat)}$ | — | 0.22 | 0.5 | Volts |
| Turn–On Time ($I_C$ = 2 mA, $V_{CC}$ = 10 V, $R_L$ = 100 Ω)(3) | | $t_{on}$ | — | 9 | 20 | µs |
| Turn–Off Time ($I_C$ = 2 mA, $V_{CC}$ = 10 V, $R_L$ = 100 Ω)(3) | | $t_{off}$ | — | 7 | 20 | µs |
| Rise Time ($I_C$ = 2 mA, $V_{CC}$ = 10 V, $R_L$ = 100 Ω)(3) | | $t_r$ | — | 3.8 | — | µs |
| Fall Time ($I_C$ = 2 mA, $V_{CC}$ = 10 V, $R_L$ = 100 Ω)(3) | | $t_f$ | — | 5.6 | — | µs |
| Isolation Voltage (f = 60 Hz, t = 1 sec)(4) | | $V_{ISO}$ | 7500 | — | — | Vac(pk) |
| Isolation Resistance (V = 500 V)(4) | | $R_{ISO}$ | $10^{11}$ | — | — | Ω |
| Isolation Capacitance (V = 0 V, f = 1 MHz)(4) | | $C_{ISO}$ | — | 0.2 | 2 | pF |

1. Always design to the specified minimum/maximum electrical limits (where applicable).
2. Current Transfer Ratio (CTR) = $I_C/I_F$ x 100%.
3. For test circuit setup and waveforms, refer to Figure 11.
4. For this test, Pins 1 and 2 are common, and Pins 4, 5 and 6 are common.

## TYPICAL CHARACTERISTICS

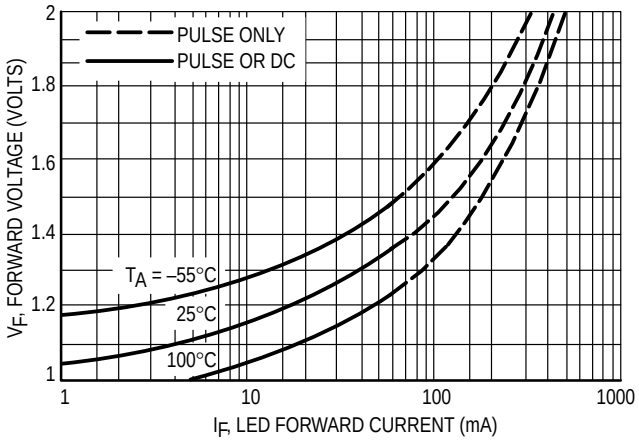



**Figure 1. LED Forward Voltage versus Forward Current**

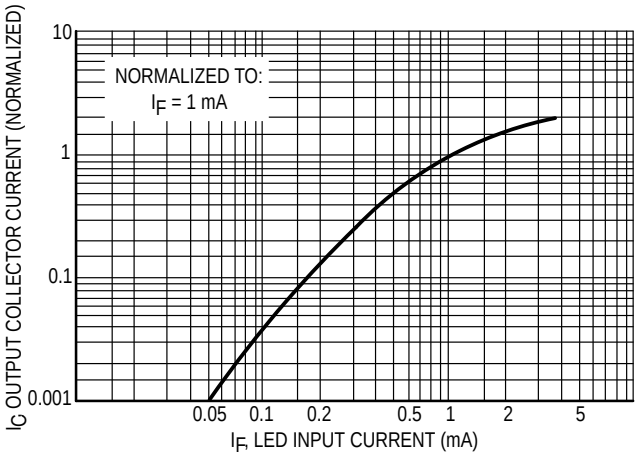



**Figure 2. Output Current versus Input Current**

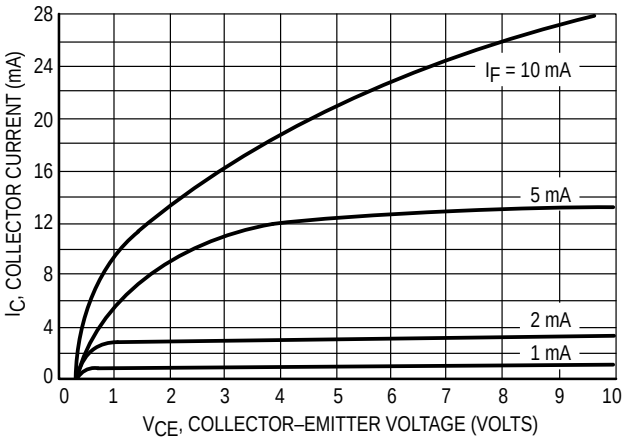



**Figure 3. Collector Current versus Collector–Emitter Voltage**

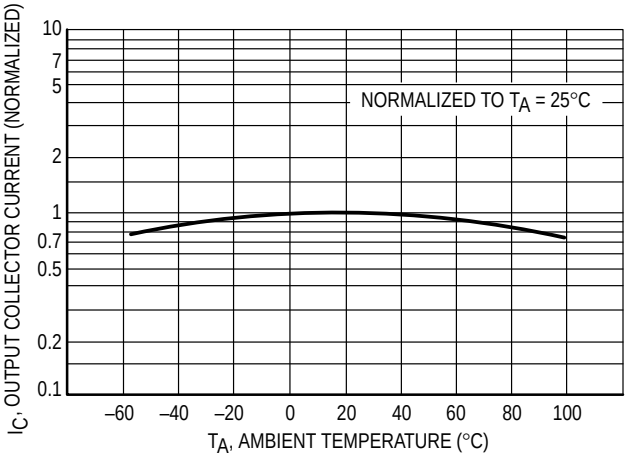



**Figure 4. Output Current versus Ambient Temperature**

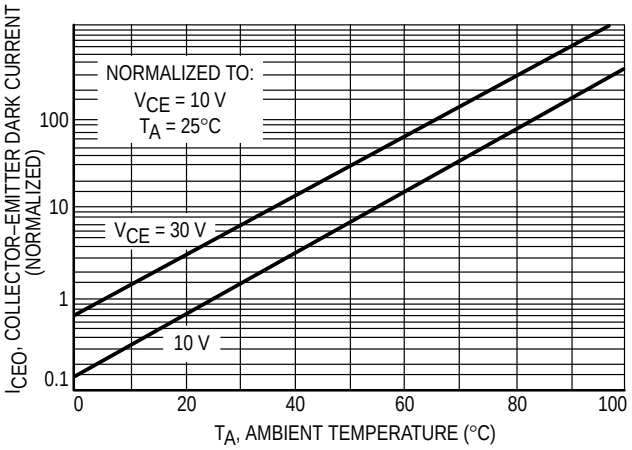



**Figure 5. Dark Current versus Ambient Temperature**

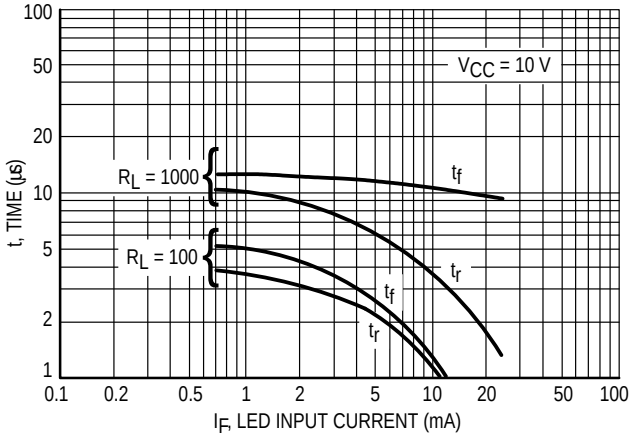



**Figure 6. Rise and Fall Times (Typical Values)**

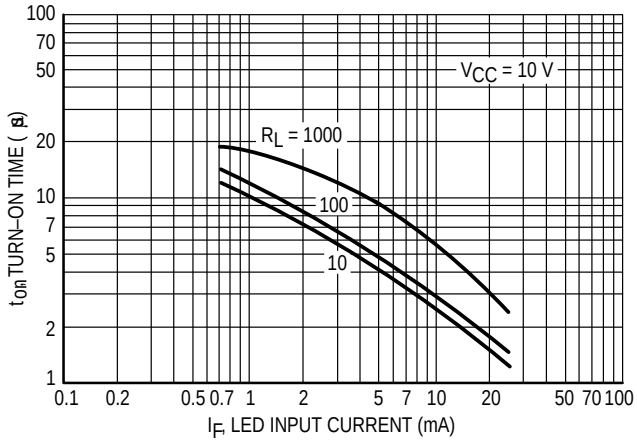



**Figure 7. Turn–On Switching Times**

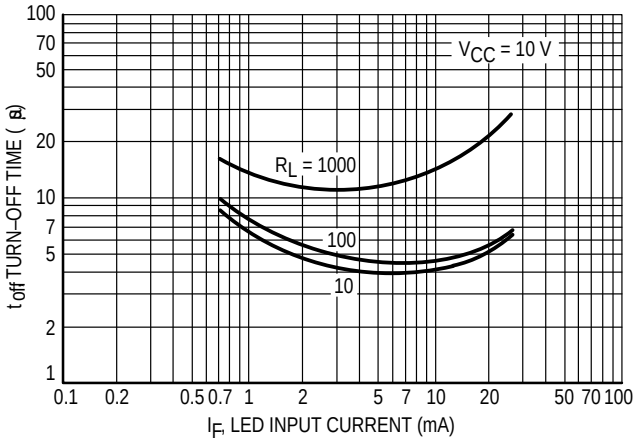



**Figure 8. Turn–Off Switching Times**

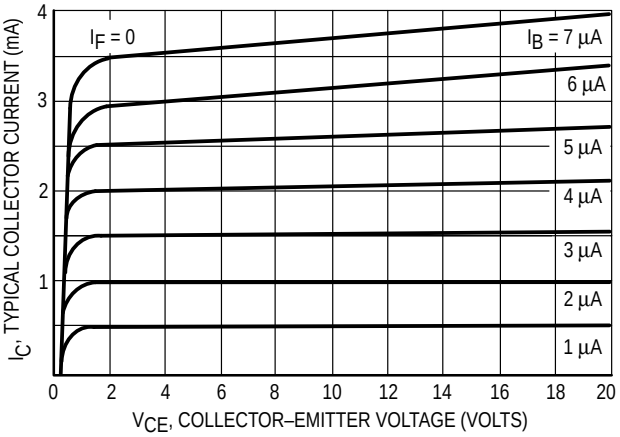



**Figure 9. DC Current Gain (Detector Only)**

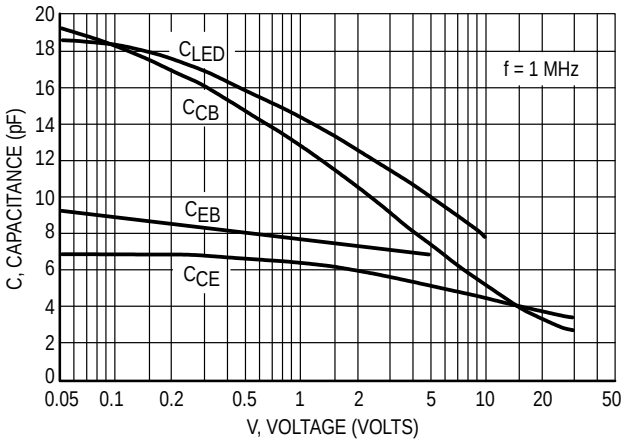



**Figure 10. Capacitances versus Voltage**

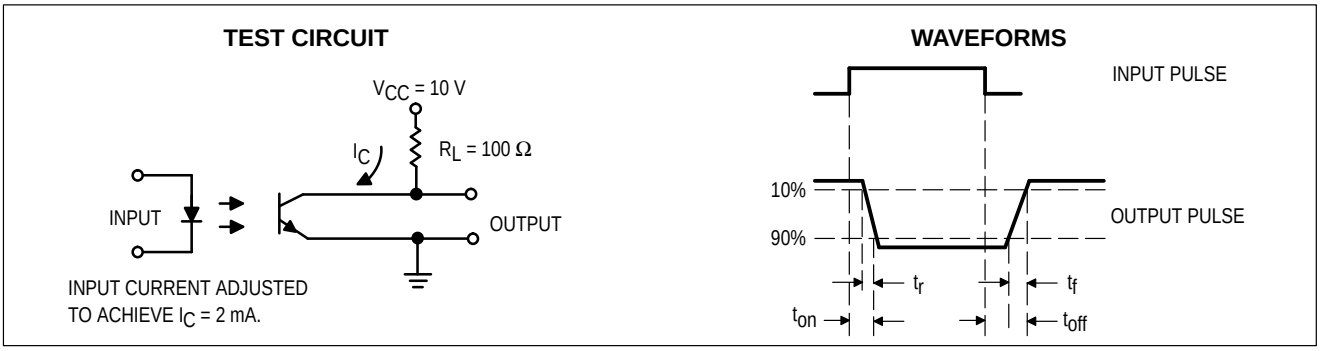
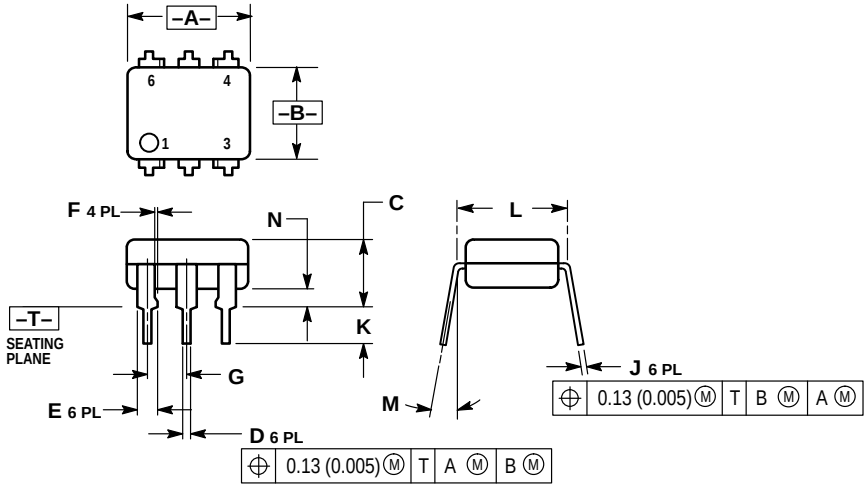



**Figure 11. Switching Time Test Circuit and Waveforms**

## PACKAGE DIMENSIONS

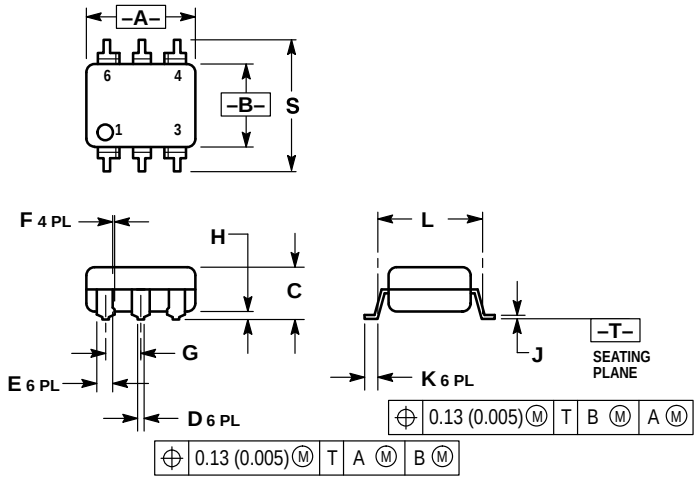



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION L TO CENTER OF LEAD WHEN FORMED PARALLEL.

| | INCHES | | MILLIMETERS | |
|---|---|---|---|---|
| DIM | MIN | MAX | MIN | MAX |
| A | 0.320 | 0.350 | 8.13 | 8.89 |
| B | 0.240 | 0.260 | 6.10 | 6.60 |
| C | 0.115 | 0.200 | 2.93 | 5.08 |
| D | 0.016 | 0.020 | 0.41 | 0.50 |
| E | 0.040 | 0.070 | 1.02 | 1.77 |
| F | 0.010 | 0.014 | 0.25 | 0.36 |
| G | 0.100 BSC | | 2.54 BSC | |
| J | 0.008 | 0.012 | 0.21 | 0.30 |
| K | 0.100 | 0.150 | 2.54 | 3.81 |
| L | 0.300 BSC | | 7.62 BSC | |
| M | 0 ° | 15 ° | 0 ° | 15 ° |
| N | 0.015 | 0.100 | 0.38 | 2.54 |

STYLE 1:
PIN 1. ANODE
2. CATHODE
3. NC
4. EMITTER
5. COLLECTOR
6. BASE

### THRU HOLE

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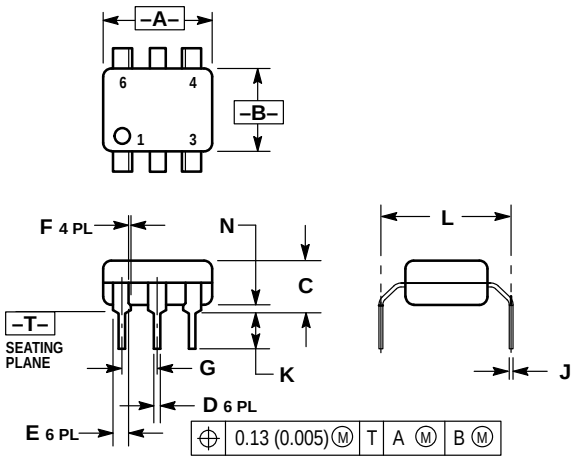
| E | 0.040 | 0.070 | 1.02 | 1.77 |
| F | 0.010 | 0.014 | 0.25 | 0.36 |
| G | 0.100 BSC | | 2.54 BSC | |
| H | 0.020 | 0.025 | 0.51 | 0.63 |
| J | 0.008 | 0.012 | 0.20 | 0.30 |
| K | 0.006 | 0.035 | 0.16 | 0.88 |
| L | 0.320 BSC | | 8.13 BSC | |
| S | 0.332 | 0.390 | 8.43 | 9.90 |

### SURFACE MOUNT

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| C | 0.115 | 0.200 | 2.93 | 5.08 |
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| E | 0.040 | 0.070 | 1.02 | 1.77 |
| F | 0.010 | 0.014 | 0.25 | 0.36 |
| G | 0.100 BSC | | 2.54 BSC | |
| J | 0.008 | 0.012 | 0.21 | 0.30 |
| K | 0.100 | 0.150 | 2.54 | 3.81 |
| L | 0.400 | 0.425 | 10.16 | 10.80 |
| N | 0.015 | 0.040 | 0.38 | 1.02 |

**0.4" LEAD SPACING**

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2. A critical component in any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.