FAIRCHILD
SEMICONDUCTOR™

GlobalOptoisolator™

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

# 6-Pin DIP Zero-Cross Optoisolators Triac Driver Output
## (800 Volts Peak)

**MOC3081**
**MOC3082**
**MOC3083**

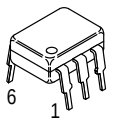
The MOC3081, MOC3082 and MOC3083 devices consist of gallium arsenide infrared emitting diodes optically coupled to monolithic silicon detectors performing the function of Zero Voltage Crossing bilateral triac drivers.

They are designed for use with a triac in the interface of logic systems to equipment powered from 240 Vac lines, such as solid–state relays, industrial controls, motors, solenoids and consumer appliances, etc.

- Simplifies Logic Control of 240 Vac Power
- Zero Voltage Crossing
- dv/dt of 1500 V/µs Typical, 600 V/µs Guaranteed
- ***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.***

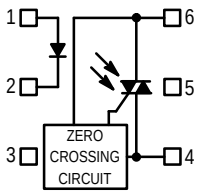
**Recommended for 240 Vac(rms) Applications:**

- Solenoid/Valve Controls
- Lighting Controls
- Static Power Switches
- AC Motor Drives
- Temperature Controls
- E.M. Contactors
- AC Motor Starters
- Solid State Relays




**STANDARD THRU HOLE**

**COUPLER SCHEMATIC**




1. ANODE
2. CATHODE
3. NC
4. MAIN TERMINAL
5. SUBSTRATE
   DO NOT CONNECT
6. MAIN TERMINAL

### MAXIMUM RATINGS

| Rating | Symbol | Value | Unit |
|---|---|---|---|
| **INPUT LED** | | | |
| Reverse Voltage | $V_R$ | 6 | Volts |
| Forward Current — Continuous | $I_F$ | 60 | mA |
| Total Power Dissipation @ $T_A$ = 25°C<br>Negligible Power in Output Driver<br>Derate above 25°C | $P_D$ | 120<br><br>1.41 | mW<br><br>mW/°C |
| **OUTPUT DRIVER** | | | |
| Off–State Output Terminal Voltage | $V_{DRM}$ | 800 | Volts |
| Peak Repetitive Surge Current<br>(PW = 100 µs, 120 pps) | $I_{TSM}$ | 1 | A |
| Total Power Dissipation @ $T_A$ = 25°C<br>Derate above 25°C | $P_D$ | 150<br>1.76 | mW<br>mW/°C |
| **TOTAL DEVICE** | | | |
| Isolation Surge Voltage(1)<br>(Peak ac Voltage, 60 Hz, 1 Second Duration) | $V_{ISO}$ | 7500 | Vac(pk) |
| Total Power Dissipation @ $T_A$ = 25°C<br>Derate above 25°C | $P_D$ | 250<br>2.94 | mW<br>mW/°C |
| Junction Temperature Range | $T_J$ | –40 to +100 | °C |
| Ambient Operating Temperature Range | $T_A$ | –40 to +85 | °C |
| Storage Temperature Rang | $T_{stg}$ | –40 to +150 | °C |
| Soldering Temperature (10 s) | $T_L$ | 260 | °C |

1. Isolation surge voltage, $V_{ISO}$, 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)

| Characteristic | | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| **INPUT LED** | | | | | | |
| Reverse Leakage Current ($V_R$ = 6 V) | | $I_R$ | — | 0.05 | 100 | μA |
| Forward Voltage ($I_F$ = 30 mA) | | $V_F$ | — | 1.3 | 1.5 | Volts |
| **OUTPUT DETECTOR** ($I_F$ = 0) | | | | | | |
| Leakage with LED Off, Either Direction ($V_{DRM}$ = 800 V(1)) | | $I_{DRM1}$ | — | 80 | 500 | nA |
| Critical Rate of Rise of Off–State Voltage(3) | | dv/dt | 600 | 1500 | — | V/μs |
| **COUPLED** | | | | | | |
| LED Trigger Current, Current Required to Latch Output (Main Terminal Voltage = 3 V(2)) | MOC3081 | $I_{FT}$ | — | — | 15 | mA |
| | MOC3082 | | — | — | 10 | |
| | MOC3083 | | — | — | 5 | |
| Peak On–State Voltage, Either Direction ($I_{TM}$ = 100 mA, $I_F$ = Rated $I_{FT}$) | | $V_{TM}$ | — | 1.8 | 3 | Volts |
| Holding Current, Either Direction | | $I_H$ | — | 250 | — | μA |
| Inhibit Voltage (MT1–MT2 Voltage above which device will not trigger) ($I_F$ = Rated $I_{FT}$) | | $V_{INH}$ | — | 5 | 20 | Volts |
| Leakage in Inhibited State ($I_F$ = Rated $I_{FT}$, $V_{DRM}$ = 800 V, Off State) | | $I_{DRM2}$ | — | 300 | 500 | μA |

1. Test voltage must be applied within dv/dt rating.
2. All devices are guaranteed to trigger at an $I_F$ value less than or equal to max $I_{FT}$. Therefore, recommended operating $I_F$ lies between max $I_{FT}$ (15 mA for MOC3081, 10 mA for MOC3082, 5 mA for MOC3083) and absolute max $I_F$ (60 mA).
3. This is static dv/dt. See Figure 7 for test circuit. Commutating dv/dt is a function of the load–driving thyristor(s) only.

## TYPICAL CHARACTERISTICS

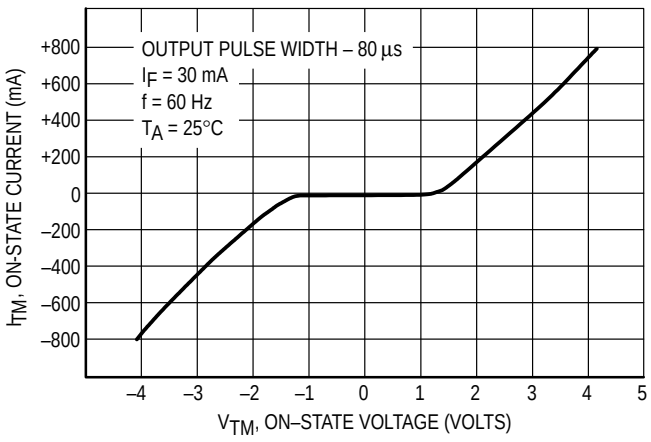



**Figure 1. On–State Characteristics**

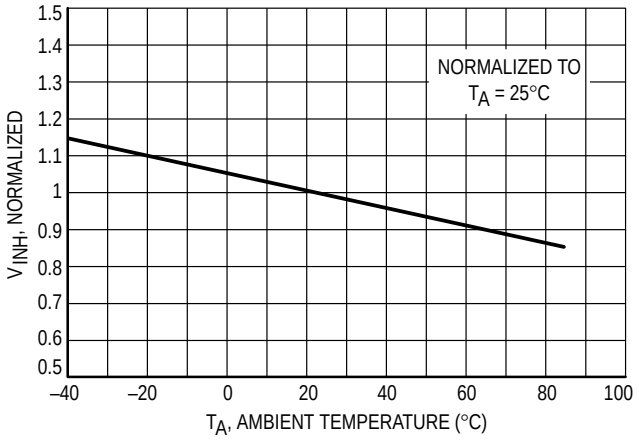



**Figure 2. Inhibit Voltage versus Temperature**

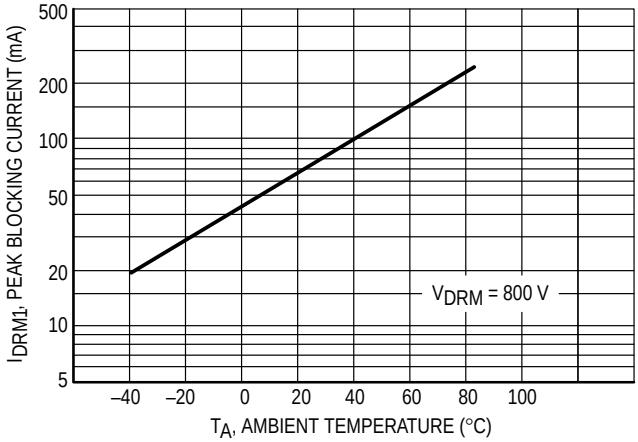



**Figure 3. Leakage with LED Off versus Temperature**

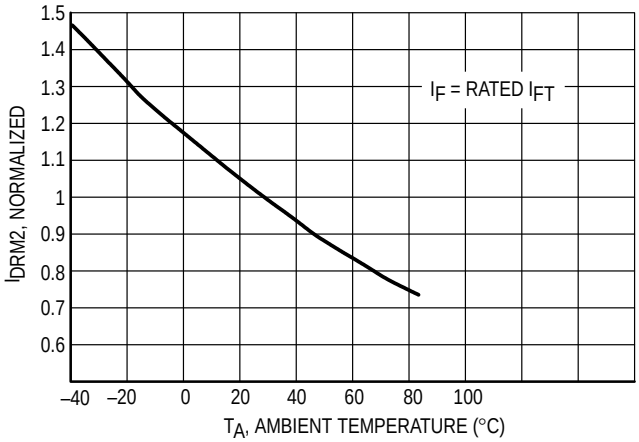



**Figure 4. $I_{DRM2}$, Leakage in Inhibit State versus Temperature**

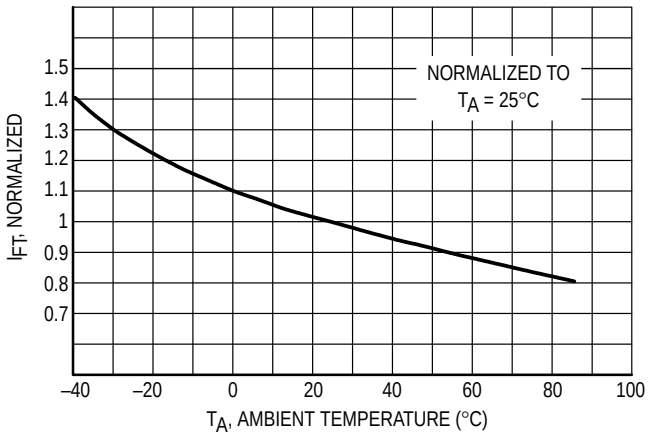



**Figure 5. Trigger Current versus Temperature**

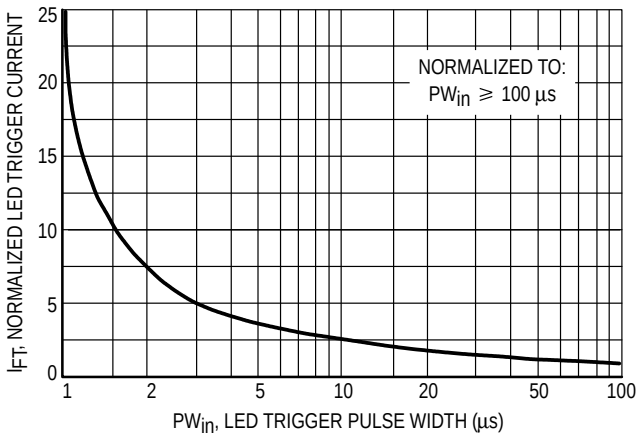
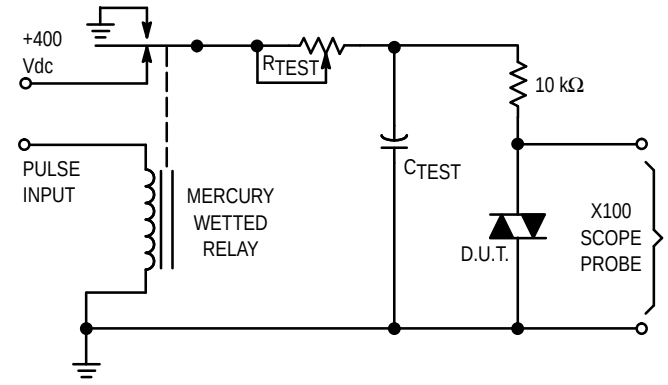



**Figure 6. LED Current Required to Trigger versus LED Pulse Width**




1. The mercury wetted relay provides a high speed repeated pulse to the D.U.T.
2. 100x scope probes are used, to allow high speeds and voltages.
3. The worst–case condition for static dv/dt is established by triggering the D.U.T. with a normal LED input current, then removing the current. The variable $R_{TEST}$ allows the dv/dt to be gradually increased until the D.U.T. continues to trigger in response to the applied voltage pulse, even after the LED current has been removed. The dv/dt is then decreased until the D.U.T. stops triggering. $\tau_{RC}$ is measured at this point and recorded.

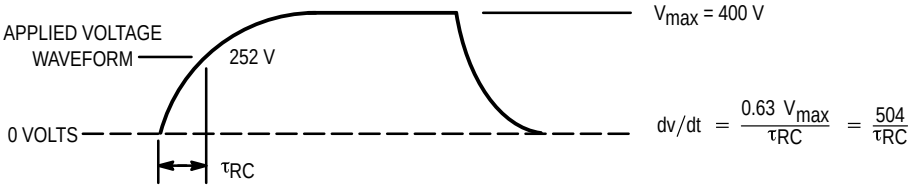
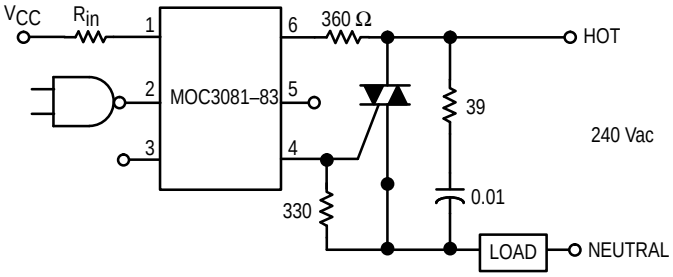



**Figure 7. Static dv/dt Test Circuit**

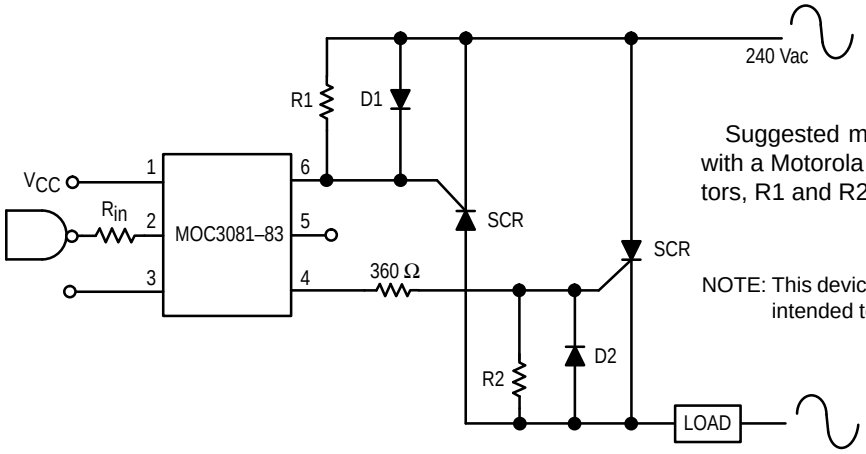



* For highly inductive loads (power factor < 0.5), change this value to 360 ohms.

Typical circuit for use when hot line switching is required. In this circuit the “hot” side of the line is switched and the load connected to the cold or neutral side. The load may be connected to either the neutral or hot line.

$R_{in}$ is calculated so that $I_F$ is equal to the rated $I_{FT}$ of the part, 15 mA for the MOC3081, 10 mA for the MOC3082, and 5 mA for the MOC3083. The 39 ohm resistor and 0.01 µF capacitor are for snubbing of the triac and may or may not be necessary depending upon the particular triac and load used.

**Figure 8. Hot–Line Switching Application Circuit**

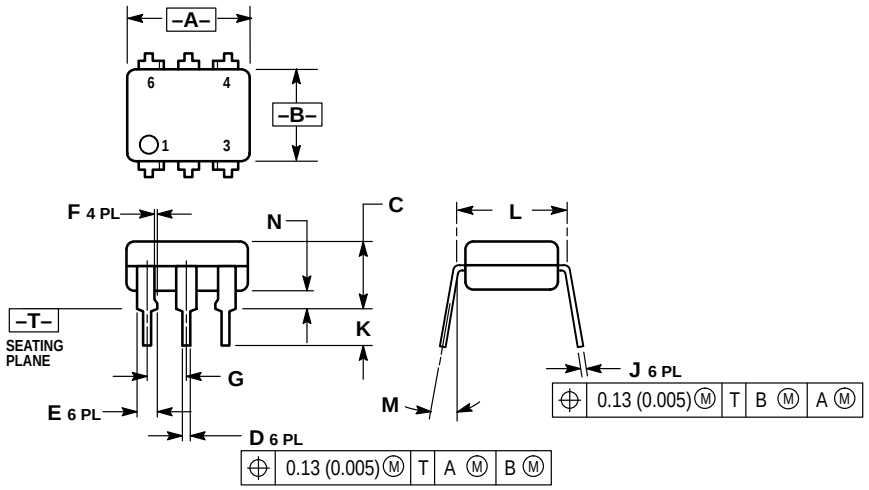



Suggested method of firing two, back–to–back SCR’s, with a Motorola triac driver. Diodes can be 1N4001; resistors, R1 and R2, are optional 330 ohms.

NOTE: This device should not be used to drive a load directly. It is intended to be a trigger device only.

**Figure 9. Inverse–Parallel SCR Driver Circuit**

## PACKAGE DIMENSIONS

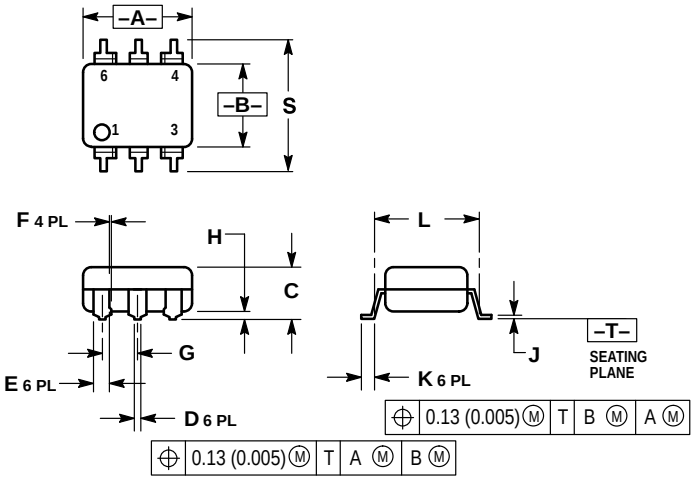



NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION L TO CENTER OF LEAD WHEN FORMED PARALLEL.

| | 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 6:
PIN 1. ANODE
2. CATHODE
3. NC
4. MAIN TERMINAL
5. SUBSTRATE
6. MAIN TERMINAL

### THRU HOLE

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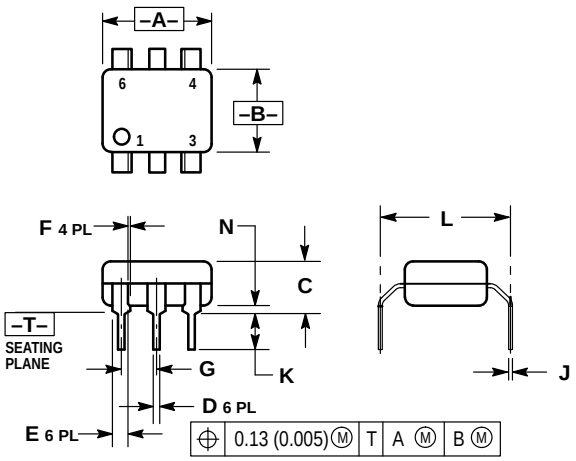
| C | 0.115 | 0.200 | 2.93 | 5.08 |
| D | 0.016 | 0.020 | 0.41 | 0.50 |
| E | 0.040 | 0.070 | 1.02 | 1.77 |
| F | 0.010 | 0.014 | 0.25 | 0.36 |
| G | 0.100 BSC | | 2.54 BSC | |
| H | 0.020 | 0.025 | 0.51 | 0.63 |
| J | 0.008 | 0.012 | 0.20 | 0.30 |
| K | 0.006 | 0.035 | 0.16 | 0.88 |
| L | 0.320 BSC | | 8.13 BSC | |
| S | 0.332 | 0.390 | 8.43 | 9.90 |

### SURFACE MOUNT

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|---|---|---|---|---|
| DIM | MIN | MAX | MIN | MAX |
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| 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 | 0.400 | 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.