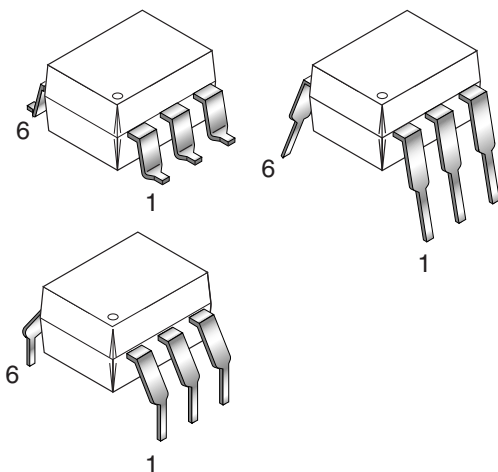




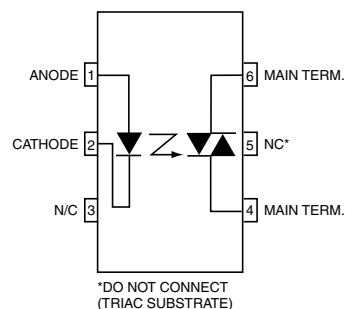
# 6-PIN DIP RANDOM-PHASE OPTOISOLATORS TRIAC DRIVER OUTPUT (250/400 VOLT PEAK)

MOC3010M MOC3011M MOC3012M MOC3020M MOC3021M MOC3022M MOC3023M

## PACKAGE



## SCHEMATIC



## DESCRIPTION

The MOC301XM and MOC302XM series are optically isolated triac driver devices. These devices contain a GaAs infrared emitting diode and a light activated silicon bilateral switch, which functions like a triac. They are designed for interfacing between electronic controls and power triacs to control resistive and inductive loads for 115 VAC operations.

## FEATURES

- Excellent  $I_{FT}$  stability—IR emitting diode has low degradation
- High isolation voltage—minimum 5300 VAC RMS
- Underwriters Laboratory (UL) recognized—File #E90700
- Peak blocking voltage
  - 250V-MOC301XM
  - 400V-MOC302XM
- VDE recognized (File #94766)
  - Ordering option V (e.g. MOC3023VM)

## APPLICATIONS

- Industrial controls
- Traffic lights
- Vending machines
- Solid state relay
- Lamp ballasts
- Solenoid/valve controls
- Static AC power switch
- Incandescent lamp dimmers
- Motor control

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| ABSOLUTE MAXIMUM RATINGS (T <sub>A</sub> = 25°C unless otherwise noted)           |                  |                                     |                |         |
|-----------------------------------------------------------------------------------|------------------|-------------------------------------|----------------|---------|
| Parameters                                                                        | Symbol           | Device                              | Value          | Units   |
| TOTAL DEVICE                                                                      |                  |                                     |                |         |
| Storage Temperature                                                               | T <sub>STG</sub> | All                                 | -40 to +150    | °C      |
| Operating Temperature                                                             | T <sub>OPR</sub> | All                                 | -40 to +85     | °C      |
| Lead Solder Temperature                                                           | T <sub>SOL</sub> | All                                 | 260 for 10 sec | °C      |
| Junction Temperature Range                                                        | T <sub>J</sub>   | All                                 | -40 to +100    | °C      |
| Isolation Surge Voltage <sup>(1)</sup><br>(peak AC voltage, 60Hz, 1 sec duration) | V <sub>ISO</sub> | All                                 | 7500           | Vac(pk) |
| Total Device Power Dissipation @ 25°C<br>Derate above 25°C                        | P <sub>D</sub>   | All                                 | 330            | mW      |
|                                                                                   |                  |                                     | 4.4            | mW/°C   |
| EMITTER                                                                           |                  |                                     |                |         |
| Continuous Forward Current                                                        | I <sub>F</sub>   | All                                 | 60             | mA      |
| Reverse Voltage                                                                   | V <sub>R</sub>   | All                                 | 3              | V       |
| Total Power Dissipation 25°C Ambient<br>Derate above 25°C                         | P <sub>D</sub>   | All                                 | 100            | mW      |
|                                                                                   |                  |                                     | 1.33           | mW/°C   |
| DETECTOR                                                                          |                  |                                     |                |         |
| Off-State Output Terminal Voltage                                                 | V <sub>DRM</sub> | MOC3010M/1M/2M<br>MOC3020M/1M/2M/3M | 250<br>400     | V       |
| Peak Repetitive Surge Current (PW = 1 ms, 120 pps)                                | I <sub>TSM</sub> | All                                 | 1              | A       |
| Total Power Dissipation @ 25°C Ambient<br>Derate above 25°C                       | P <sub>D</sub>   | All                                 | 300            | mW      |
|                                                                                   |                  |                                     | 4              | mW/°C   |

## Note

1. Isolation surge voltage,  $V_{\text{ISO}}$ , is an internal device dielectric breakdown rating. For this test, Pins 1 and 2 are common, and Pins 4, 5 and 6 are common.

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## ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ Unless otherwise specified)

### INDIVIDUAL COMPONENT CHARACTERISTICS

| Parameters                              | Test Conditions                                  | Symbol           | Device | Min | Typ  | Max | Units         |
|-----------------------------------------|--------------------------------------------------|------------------|--------|-----|------|-----|---------------|
| <b>EMITTER</b>                          |                                                  |                  |        |     |      |     |               |
| Input Forward Voltage                   | $I_F = 10\text{ mA}$                             | $V_F$            | All    |     | 1.15 | 1.5 | V             |
| Reverse Leakage Current                 | $V_R = 3\text{ V}$ , $T_A = 25^\circ\text{C}$    | $I_R$            | All    |     | 0.01 | 100 | $\mu\text{A}$ |
| <b>DETECTOR</b>                         |                                                  |                  |        |     |      |     |               |
| Peak Blocking Current, Either Direction | Rated $V_{\text{DRM}}$ , $I_F = 0$ (note 1)      | $I_{\text{DRM}}$ | All    |     | 10   | 100 | nA            |
| Peak On-State Voltage, Either Direction | $I_{\text{TM}} = 100\text{ mA peak}$ , $I_F = 0$ | $V_{\text{TM}}$  | All    |     | 1.8  | 3   | V             |

## TRANSFER CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ Unless otherwise specified.)

| DC Characteristics                | Test Conditions       | Symbol          | Device   | Min | Typ | Max | Units         |
|-----------------------------------|-----------------------|-----------------|----------|-----|-----|-----|---------------|
| LED Trigger Current               | Voltage = 3V (note 3) | $I_{\text{FT}}$ | MOC3020M |     |     | 30  | mA            |
|                                   |                       |                 | MOC3010M |     |     | 15  |               |
|                                   |                       |                 | MOC3021M |     |     | 15  |               |
|                                   |                       |                 | MOC3011M |     |     | 10  |               |
|                                   |                       |                 | MOC3022M |     |     | 10  |               |
|                                   |                       |                 | MOC3012M |     |     | 5   |               |
|                                   |                       |                 | MOC3023M |     |     | 5   |               |
| Holding Current, Either Direction |                       | $I_H$           | All      |     | 100 |     | $\mu\text{A}$ |

### Note

1. Test voltage must be applied within dv/dt rating.
2. This is static dv/dt. See Figure 5 for test circuit. Commutating dv/dt is a function of the load-driving thyristor(s) only.
3. All devices are guaranteed to trigger at an  $I_F$  value less than or equal to max  $I_{\text{FT}}$ . Therefore, recommended operating  $I_F$  lies between max  $I_{\text{FT}}$  (30 mA for MOC3020M, 15 mA for MOC3010M and MOC3021M, 10 mA for MOC3011M and MOC3022M, 5 mA for MOC3012M and MOC3023M) and absolute max  $I_F$  (60 mA).

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Fig. 1 LED Forward Voltage vs. Forward Current

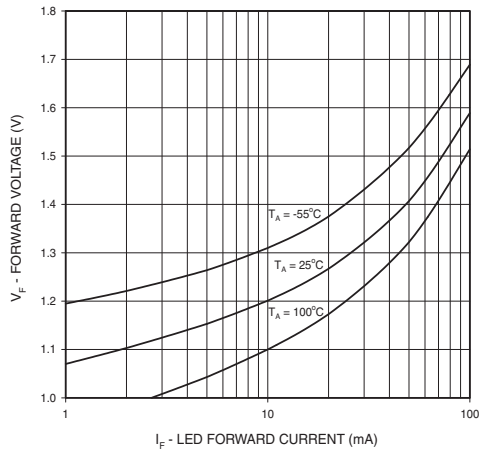


Fig. 2 On-State Characteristics

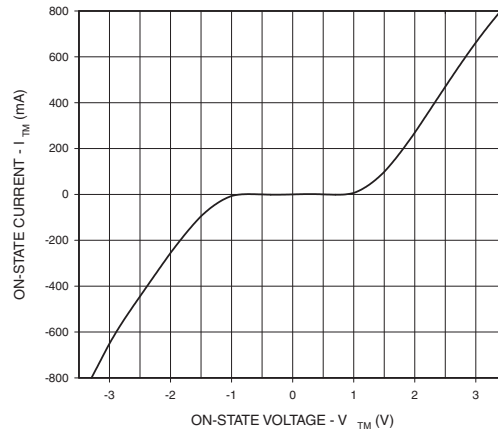


Fig. 3 Trigger Current vs. Ambient Temperature

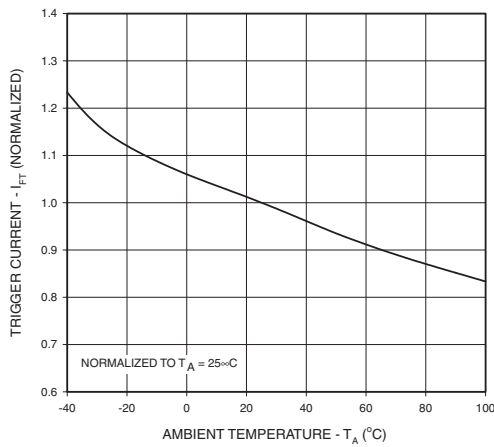


Fig. 4 LED Current Required to Trigger vs. LED Pulse Width

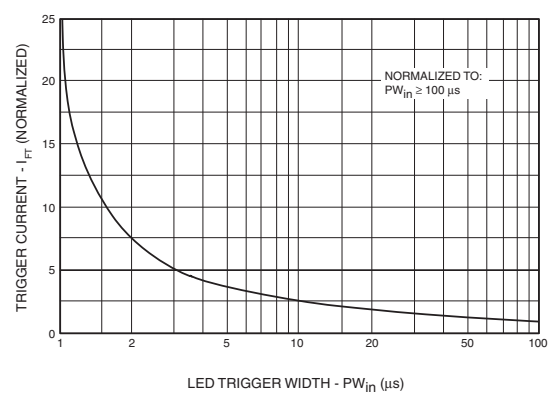


Fig. 5 dv/dt vs. Temperature

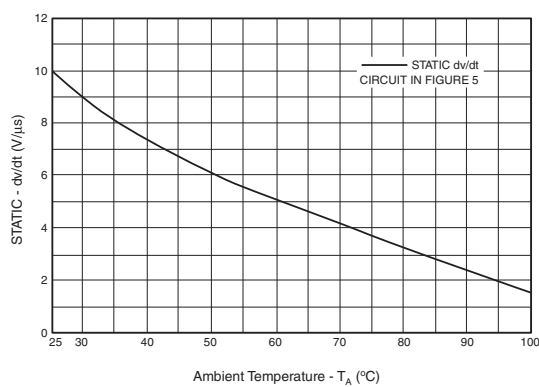


Fig. 6 Leakage Current,  $I_{DRM}$  vs. Temperature

