

MOC3031M MOC3032M MOC3033M MOC3041M MOC3042M MOC3043M

#### DESCRIPTION

The MOC303XM and MOC304XM devices consist of a AlGaAs infrared emitting diode optically coupled to a monolithic silicon detector performing the function of a zero voltage crossing bilateral triac driver.

They are designed for use with a triac in the interface of logic systems to equipment powered from 115 VAC lines, such as teletypewriters, CRTs, solid-state relays, industrial controls, printers, motors, solenoids and consumer appliances, etc.

#### FEATURES

- Simplifies logic control of 115 VAC power
- Zero voltage crossing
- dv/dt of 2000 V/μs typical, 1000 V/μs guaranteed
- VDE recognized (File # 94766) -ordering option V (e.g., MOC3043VM)

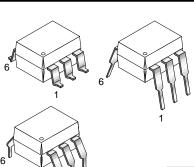
### **APPLICATIONS**

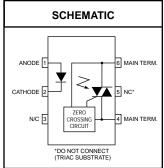
- Solenoid/valve controls
- Lighting controls
  AC motor drives
- Static power switchesTemperature controls
- E.M. contactors
- AC motor starters
- Solid state relays

| ABSOLUTE MAXIMUM RATINGS (T <sub>A</sub> = 25°C unless otherwise noted)        |                  |                |                |         |  |
|--|------------------|----------------|----------------|---------|--|
| Parameters   | Symbol           | Device         | Value          | Units   |  |
| TOTAL DEVICE   | Ŧ                | All            | 10 10 110      | °C      |  |
| 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   | Т <sub>Ј</sub>   | All            | -40 to +100    | °C      |  |
| Isolation Surge Voltage <sup>(1)</sup> (peak AC voltage, 60Hz, 1 sec duration) | V <sub>ISO</sub> | All            | 7500           | Vac(pk) |  |
| Total Device Power Dissipation @ 25°C  | P                | All            | 250            | mW      |  |
| Derate above 25°C  | P <sub>D</sub>   |                | 2.94           | mW/°C   |  |
| EMITTER  |                  | All            | 60             | mA      |  |
| Continuous Forward Current   | ١ <sub>F</sub>   |                | 00             |         |  |
| Reverse Voltage  | V <sub>R</sub>   | All            | 6              | V       |  |
| Total Power Dissipation 25°C Ambient   | Р                | All            | 120            | mW      |  |
| Derate above 25°C  | PD               | All            | 1.41           | mW/°C   |  |
| DETECTOR   | N                | MOC3031M/2M/3M | 250            |         |  |
| Off-State Output Terminal Voltage  | V <sub>DRM</sub> | MOC3041M/2M/3M | 400            | V       |  |
| Peak Repetitive Surge Current (PW = 100 µs, 120 pps)                           | I <sub>TSM</sub> | All            | 1              | А       |  |
| Total Power Dissipation @ 25°C Ambient   | Р                | All            | 150            | mW      |  |
| Derate above 25°C  | PD               | All            | 1.76           | mW/°C   |  |

#### Note

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







MOC3031M M0

MOC3032M MOC3033M

MOC3041M

MOC3042M MOC3043M

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

### INDIVIDUAL COMPONENT CHARACTERISTICS

|  |   |                   |        | -    |      |     |       |
|--|---|-------------------|--------|------|------|-----|-------|
| Parameters                                 | Test Conditions                         | Symbol            | Device | Min  | Тур  | Max | Units |
| EMITTER                                    | L 00 A                                  |                   | A 11   |      | 4.05 | 4.5 |       |
| Input Forward Voltage                      | I <sub>F</sub> = 30 mA                  | V <sub>F</sub>    | All    |      | 1.25 | 1.5 | V     |
| Reverse Leakage Current                    | V <sub>R</sub> = 6 V                    | I <sub>R</sub>    | All    |      | 0.01 | 100 | μA    |
| DETECTOR                                   |   |                   |        |      |      |     |       |
| Peak Blocking Current, Either Direction    | Rated $V_{DRM'}$ , $I_F = 0$ (note 1)   | I <sub>DRM1</sub> | All    |      |      | 100 | nA    |
| Peak On-State Voltage, Either Direction    | $I_{TM} = 100 \text{ mA peak}, I_F = 0$ | V <sub>TM</sub>   | All    |      | 1.8  | 3   | V     |
| Critical Rate of Rise of Off-State Voltage | $I_F = 0$ (figure 9, note 3)            | dv/dt             | All    | 1000 |      |     | V/µs  |

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

| DC Characteristics                | Test Conditions                     | Symbol          | Device            | Min | Тур | Max | Units |
|-----------------------------------|-------------------------------------|-----------------|-------------------|-----|-----|-----|-------|
|                                   |                                     |                 | MOC3031M/MOC3041M |     |     | 15  |       |
| LED Trigger Current               | Main terminal voltage = 3V (note 2) | I <sub>FT</sub> | MOC3032M/MOC3042M |     |     | 10  | mA    |
|                                   |                                     |                 | MOC3033M/MOC3043M |     |     | 5   |       |
| Holding Current, Either Direction |                                     | Ι <sub>Η</sub>  | All               |     | 400 |     | μA    |

| <b>ZERO CROSSING CHARACTERISTICS</b> (T <sub>A</sub> = 25°C Unless otherwise specified.) |   |                   |        |     |     |     |       |
|--|---|-------------------|--------|-----|-----|-----|-------|
| Characteristics  | Test Conditions                                   | Symbol            | Device | Min | Тур | Max | Units |
|  | $I_F$ = rated $I_{FT}$ , MT1-MT2 voltage above    | V                 | All    |     |     | 20  | V     |
| Inhibit Voltage  | which device will not trigger off-state           | V <sub>IH</sub>   | All    |     |     | 20  | v     |
| Leakage in Inhibited State   | $I_F$ = rated $I_F$ , rated $V_{DRM}$ , off-state | I <sub>DRM2</sub> | All    |     |     | 500 | μA    |

Note

1. Test voltage must be applied within dv/dt rating.

 All devices are guaranteed to trigger at an I<sub>F</sub> value less than or equal to max I<sub>FT</sub>. Therefore, recommended operating I<sub>F</sub> lies between max I<sub>FT</sub> (15 mA for MOC3031M & MOC3041M, 10 mA for MOC3032M & MOC3042M, 5 mA for MOC3033M & MOC3043M) and absolute max I<sub>F</sub> (60 mA).

3. This is static dv/dt. See Figure 9 for test circuit. Commutating dv/dt is a function of the load-driving thyristor(s) only.



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MOC3032M MOC3033M

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MOC3043M

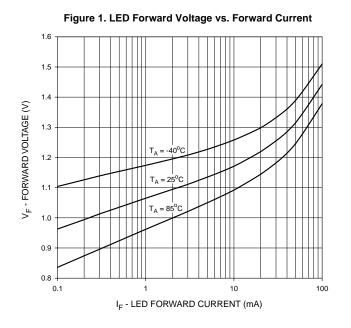


Figure 2. On-State Characteristics

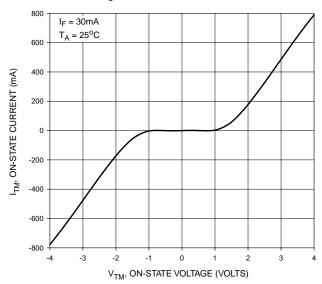


Figure 3. Trigger Current vs. Temperature

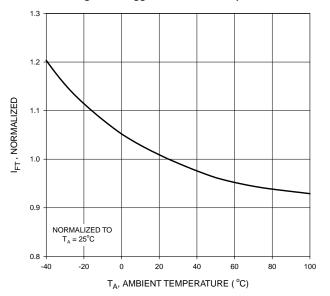
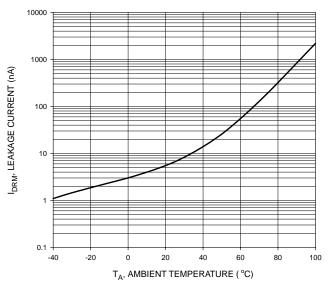


Figure 4. Leakage Current, IDRM vs. Temperature





MOC3031M

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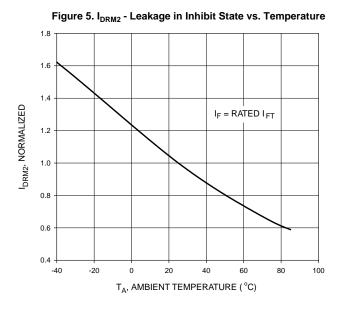


Figure 6. LED Current Required to Trigger vs. LED Pulse Width

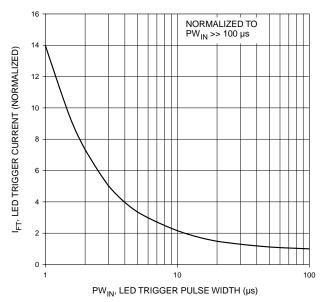


Figure 7. Holding Current, I<sub>H</sub> vs. Temperature

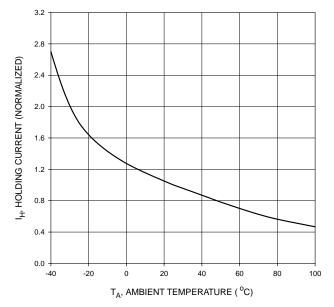
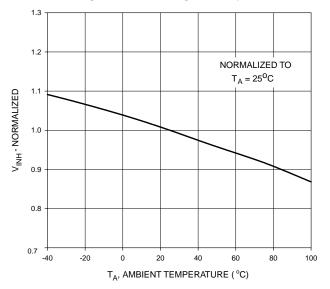
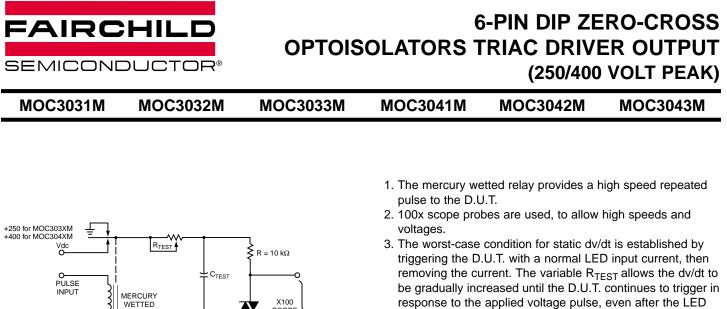
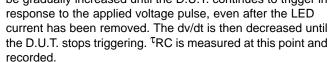
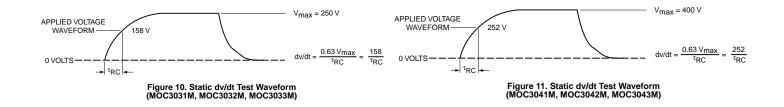


Figure 8. Inhibit Voltage vs. Temperature









SCOPE

PROBE

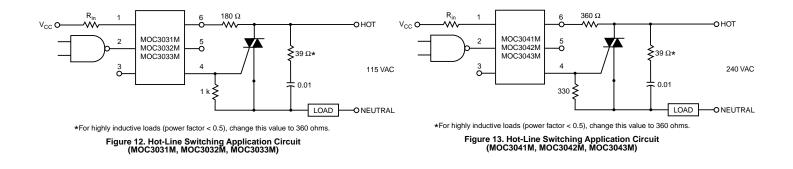
D.U.T.

RELAY

Figure 9. Static dv/dt Test Circuit

Typical circuit (Fig 12, 13) 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.

Rin is calculated so that I<sub>F</sub> is equal to the rated I<sub>FT</sub> of the part, 5 mA for the MOC3033M and MOC3043M, 10 mA for the MOC3032M and MOC3042M, or 15 mA for the MOC3031M and MOC3041M. 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.





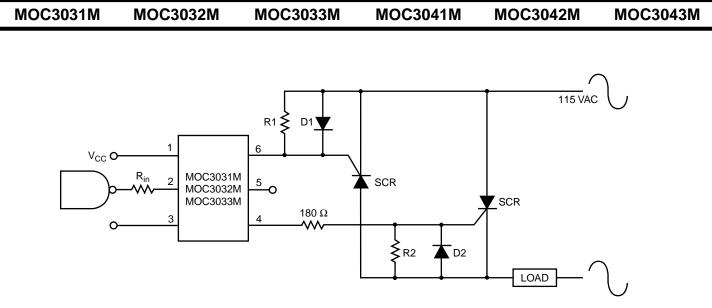
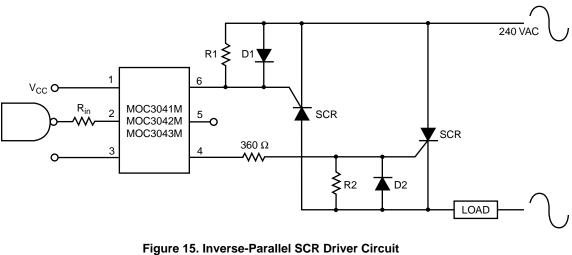


Figure 14. Inverse-Parallel SCR Driver Circuit (MOC3031M, MOC3032M, MOC3033M)

Suggested method of firing two, back-to-back SCR's with a Fairchild triac driver. Diodes can be 1N4001; resistors, R1 and R2, are optional 1 k ohm.



(MOC3041M, MOC3042M, MOC3043M)

Suggested method of firing two, back-to-back SCR's with a Fairchild triac driver. Diodes can be 1N4001; resistors, R1 and R2, are optional 330 ohm.

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



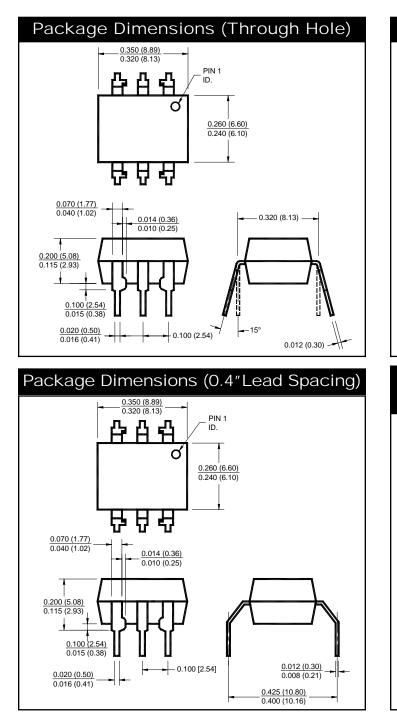
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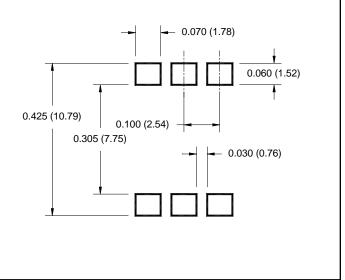
MOC3042M

MOC3043M



#### Package Dimensions (Surface Mount) 0.350 (8.89) 0.320 (8.13) PIN 1 ID. ቢ ቢ ቢ Q 0.390 (9.90) 0.332 (8.43) 0.260 (6.60) 0.240 (6.10) 둮 57 0.070 (1.77) 0.320 (8.13) 0.014 (0.36) 0.010 (0.25) 0.200 (5.08) 0.012 (0.30) 0.008 (0.20) 0.115 (2.93) 0.025 (0.63) 0.020 (0.51) - 0.100 [2.54] 0.035 (0.88) 0.020 (0.50) 0.016 (0.41)

### Recommended Pad Layout for Surface Mount Leadform



#### NOTE

All dimensions are in inches (millimeters)



MOC3032M

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

MOC3031M

MOC3033M

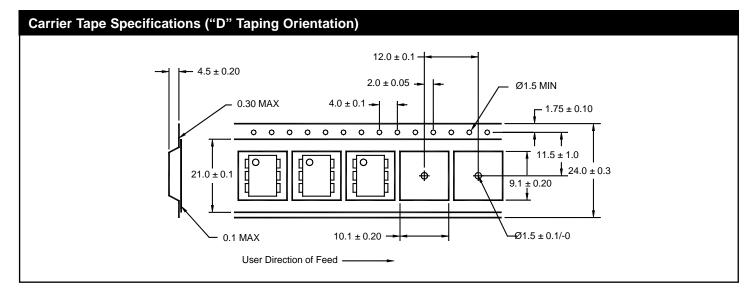
MOC3041M

MOC3042M MC

MOC3043M

#### **ORDERING INFORMATION**

| Option | Order Entry Identifier | Description                          |  |  |  |
|--------|------------------------|--------------------------------------|--|--|--|
| S      | S                      | Surface Mount Lead Bend              |  |  |  |
| SR2    | SR2                    | Surface Mount; Tape and reel         |  |  |  |
| Т      | Т                      | 0.4" Lead Spacing                    |  |  |  |
| V      | V                      | VDE 0884                             |  |  |  |
| TV     | TV                     | VDE 0884, 0.4" Lead Spacing          |  |  |  |
| SV     | SV                     | VDE 0884, Surface Mount              |  |  |  |
| SR2V   | SR2V                   | VDE 0884, Surface Mount, Tape & Reel |  |  |  |



#### NOTE

All dimensions are in inches (millimeters)



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