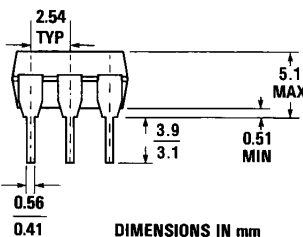
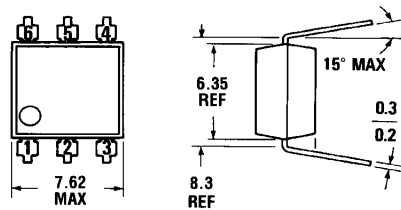


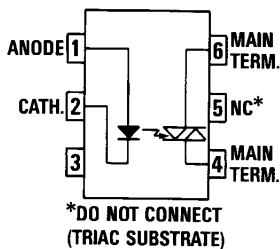
**MOC3009 MOC3010  
MOC3011 MOC3012**

**PACKAGE DIMENSIONS**



DIMENSIONS IN mm  
PACKAGE CODE E

ST1603-02



Equivalent Circuit

C2081

**DESCRIPTION**

The MOC3009, MOC3010, MOC3011 and MOC3012 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. This series is designed for interfacing between electronic controls and power triacs to control resistive and inductive loads for 120 VAC operations.

**FEATURES**

- Low input current required (typically 5mA—MOC3011)
- High isolation voltage—minimum 7500 VAC peak
- Underwriters Laboratory (UL) recognized—File E90700

**APPLICATIONS**

- Triac driver
- Industrial controls
- Traffic lights
- Vending machines
- Motor control
- Solid state relay

**ABSOLUTE MAXIMUM RATINGS**

|  |                          |
|--|--------------------------|
| <b>TOTAL PACKAGE</b>                         |                          |
| Storage temperature .....                    | -55°C to 150°C           |
| Operating temperature .....                  | -40°C to 100°C           |
| Lead temperature<br>(soldering 10 sec) ..... | 260°C                    |
| Withstand test voltage ...                   | 7500 VAC Peak (50-60 Hz) |

|   |            |
|---|------------|
| <b>INPUT DIODE</b>                                  |            |
| Forward DC current .....                            | 50 mA      |
| Reverse voltage .....                               | 3 V        |
| Peak forward current<br>(1 μs pulse, 300 pps) ..... | 3.0 A      |
| Power dissipation (25°C ambient) .....              | 100 mW     |
| Derate linearly (above 25°C) .....                  | 1.33 mW/°C |

|  |           |
|--|-----------|
| <b>OUTPUT DRIVER</b>   |           |
| Off-state output terminal voltage .....                      | 250 volts |
| On-state RMS current $T_A=25^\circ\text{C}$ .....            | 100 mA    |
| (Full cycle, 50 to 60 Hz) $T_A=70^\circ\text{C}$ .....       | 50 mA     |
| Peak nonrepetitive surge current<br>(PW=10 ms, DC=10%) ..... | 1.2 A     |
| Total power dissipation @ $T_A=25^\circ\text{C}$ .....       | 300 mW    |
| Derate above 25°C .....                                      | 4.0 mW/°C |



## NON-ZERO-CROSSING TRIACS

### ELECTRO-OPTICAL CHARACTERISTICS (25°C Temperature Unless Otherwise Specified)

#### INDIVIDUAL COMPONENT CHARACTERISTICS

| CHARACTERISTIC  | SYMBOL    | MIN. | TYP. | MAX. | UNITS         | TEST CONDITIONS                        |
|---|-----------|------|------|------|---------------|--|
| <b>INPUT DIODE</b>  |           |      |      |      |               |  |
| Forward voltage   | $V_F$     |      | 1.2  | 1.50 | V             | $I_F = 10 \text{ mA}$                  |
| Junction capacitance                                      | $C_J$     |      | 50   |      | pF            | $V_F = 0 \text{ V}, f = 1 \text{ MHz}$ |
| Reverse leakage current                                   | $I_R$     |      |      | 100  | $\mu\text{A}$ | $V_R = 3.0 \text{ V}$                  |
| <b>OUTPUT DETECTOR</b>                                    |           |      |      |      |               |  |
| Peak blocking current, either direction                   | $I_{DRM}$ | —    |      | 100  | nA            | $V_{DRM} = 250 \text{ V}$ , Note 1     |
| Peak on-state voltage, either direction                   | $V_{TM}$  | —    | 2.0  | 3.0  | Volts         | $I_{TM} = 100 \text{ mA Peak}$         |
| Note 1. Test voltage must be applied within dv/dt rating. |           |      |      |      |               |  |

#### TRANSFER CHARACTERISTICS

| DC CHARACTERISTICS  | SYMBOL  | MIN.     | TYP. | MAX. | UNITS         | TEST CONDITIONS  |   |
|---|---------|----------|------|------|---------------|------------------|---|
| LED trigger current<br>(current required to latch output) | MOC3009 | $I_{FT}$ | —    | 15.0 | 30            | mA               | Main terminal<br>voltage = 3.0 V, $R_L = 150\Omega$ |
|   | MOC3010 | $I_{FT}$ | —    | 10.0 | 15            | mA               |   |
|   | MOC3011 | $I_{FT}$ | —    | 5    | 10            | mA               |   |
|   | MOC3012 | $I_{FT}$ | —    | —    | 5             | mA               |   |
| Holding current   | $I_H$   | —        | 100  | —    | $\mu\text{A}$ | Either direction |   |

#### TRANSFER CHARACTERISTICS

| CHARACTERISTICS  | SYMBOL | MIN. | TYP. | MAX. | UNITS            | TEST CONDITIONS   |
|--|--------|------|------|------|------------------|---|
| <b>AC dv/dt RATING</b><br>Critical rate of rise of off-state voltage | dv/dt  | —    | 12.0 | —    | V/ $\mu\text{s}$ | Static dv/dt<br>(see Fig. 4)                                    |
| Critical rate of rise of commutating voltage                         | dv/dt  | —    | 0.2  | —    | V/ $\mu\text{s}$ | Commutating dv/dt<br>$I_{LOAD} = 15 \text{ mA}$<br>(see Fig. 4) |

#### ISOLATION CHARACTERISTICS

| CHARACTERISTICS       | SYMBOL    | MIN.      | TYP. | MAX. | UNITS         | TEST CONDITIONS                         |
|-----------------------|-----------|-----------|------|------|---------------|---|
| Isolation voltage     | $V_{iso}$ | 5300      |      |      | $V_{AC,RMS}$  | $I_{I,O} \leq 1 \mu\text{A}$ , 1 Minute |
|                       | $V_{iso}$ | 7500      |      |      | $V_{AC,PEAK}$ | $I_{I,O} \leq 1 \mu\text{A}$ , 1 Minute |
| Isolation resistance  | $R_{iso}$ | $10^{11}$ |      |      | ohms          | $V_{I,O} = 500 \text{ VDC}$             |
| Isolation capacitance | $C_{iso}$ |           | 0.5  |      | pF            | $f = 1 \text{ MHz}$                     |

**TYPICAL ELECTRICAL CHARACTERISTIC CURVES**  
(25°C Free Air Temperature Unless Otherwise Specified)

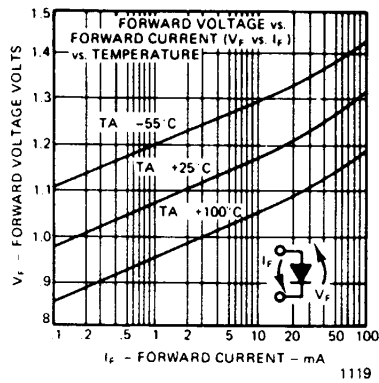


Fig. 1. Forward Voltage Drop vs. Forward Current

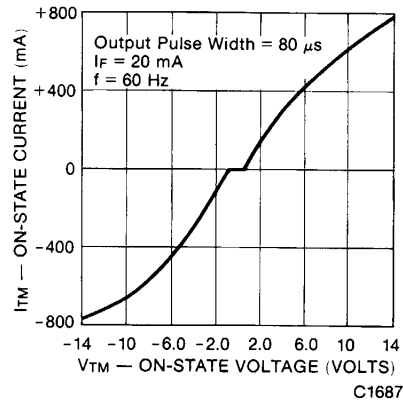


Fig. 2. On-State Characteristics

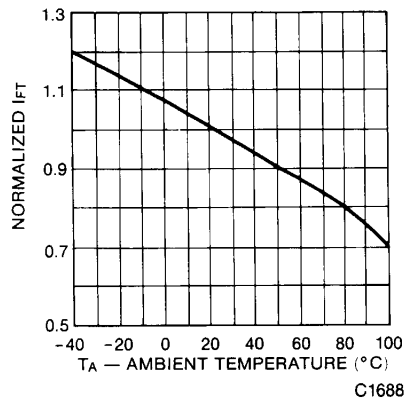


Fig. 3. Trigger Current vs. Temperature

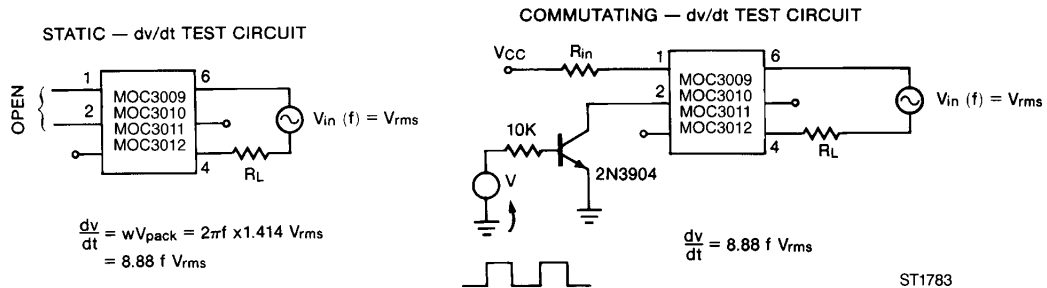


Fig. 4. dv/dt Test Circuits

**TYPICAL ELECTRICAL CHARACTERISTIC CURVES**  
(25°C Free Air Temperature Unless Otherwise Specified) (Cont'd)

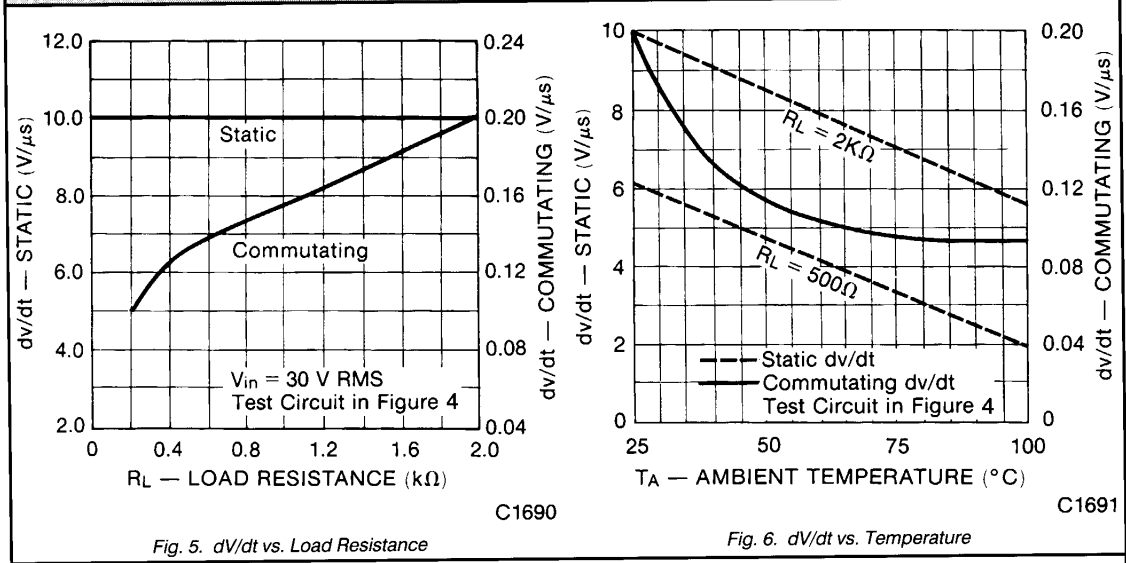


Fig. 5.  $dV/dt$  vs. Load Resistance

Fig. 6.  $dV/dt$  vs. Temperature

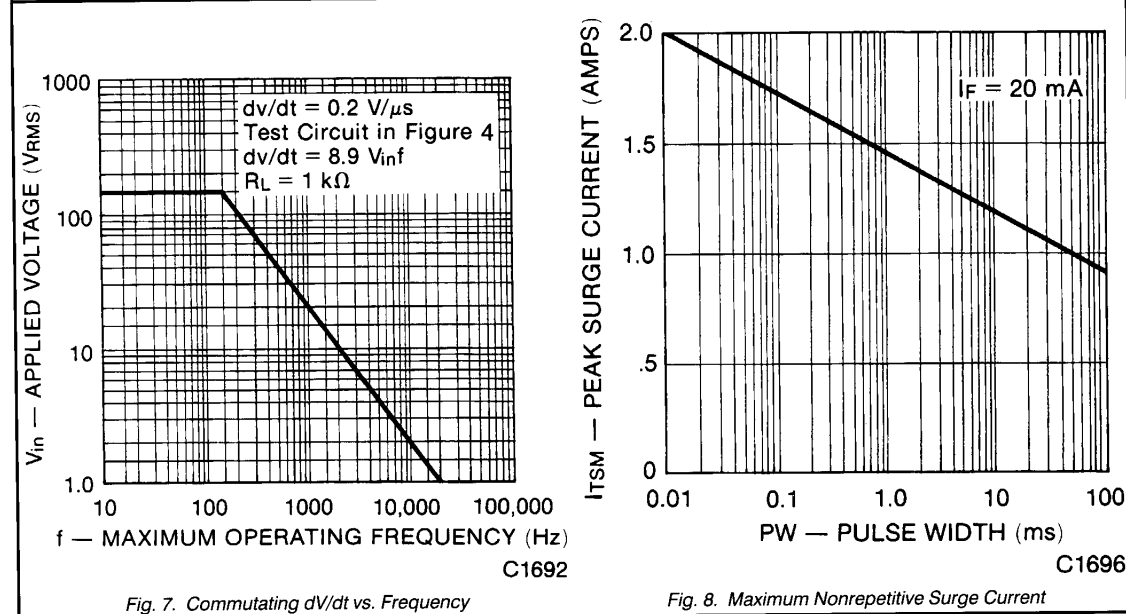


Fig. 7. Commutating  $dV/dt$  vs. Frequency

Fig. 8. Maximum Nonrepetitive Surge Current

