

## Triacs

### Silicon Bidirectional Triode Thyristors

... designed primarily for industrial and military applications for the control of ac loads in applications such as light dimmers, power supplies, heating controls, motor controls, welding equipment and power switching systems; or wherever full-wave, silicon gate controlled solid-state devices are needed.

- Glass Passivated Junctions and Center Gate Fire
- Isolated Stud for Ease of Assembly
- Gate Triggering Guaranteed In All 4 Quadrants

**2N5444  
thru  
2N5446**

**TRIACs  
40 AMPERES RMS  
200 thru 600 VOLTS**



**CASE 263-04  
STYLE 2  
2N5444 thru 2N5446**

#### MAXIMUM RATINGS ( $T_J = 25^\circ\text{C}$ unless otherwise noted.)

| Rating                                                                                                                                                          | Symbol            | Value           | Unit             |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|-----------------|------------------|
| *Peak Repetitive Off-State Voltage<br>( $T_J = -65$ to $+110^\circ\text{C}$ ) (Note 1)<br>1/2 Sine Wave 50 to 60 Hz, Gate Open                                  | $V_{DRM}$         |                 | Volts            |
| *Peak Principal Voltage                                                                                                                                         |                   |                 |                  |
| 2N5444                                                                                                                                                          |                   | 200             |                  |
| 2N5445                                                                                                                                                          |                   | 400             |                  |
| 2N5446                                                                                                                                                          |                   | 600             |                  |
| *RMS On-State Current<br>( $T_C$ per Figure 2)<br>( $T_C = +100^\circ\text{C}$ )<br>Full Sine Wave, 50 to 60 Hz                                                 | $I_T(\text{RMS})$ | 40<br>20        | Amps             |
| *Peak Non-Repetitive Surge Current<br>(One Full Cycle of surge current at 60 Hz,<br>preceded and followed by a 40 A RMS current,<br>$T_C = 100^\circ\text{C}$ ) | $I_{TSM}$         | 300             | Amps             |
| *Peak Gate Power<br>(Pulse Width = 10 $\mu\text{s}$ Max)                                                                                                        | $P_{GM}$          | 40              | Watts            |
| *Average Gate Power                                                                                                                                             | $P_{G(AV)}$       | 0.75            | Watt             |
| *Peak Gate Current (10 $\mu\text{s}$ Max)                                                                                                                       | $I_{GM}$          | 4               | Amps             |
| *Peak Gate Voltage                                                                                                                                              | $V_{GM}$          | 30              | Volts            |
| *Operating Junction Temperature Range                                                                                                                           | $T_J$             | $-65$ to $+110$ | $^\circ\text{C}$ |
| *Storage Temperature Range                                                                                                                                      | $T_{stg}$         | $-65$ to $+150$ | $^\circ\text{C}$ |
| *Stud Torque                                                                                                                                                    | —                 | 30              | in. lb.          |

#### THERMAL CHARACTERISTICS

| Characteristic                                                  | Symbol          | Max | Unit               |
|-----------------------------------------------------------------|-----------------|-----|--------------------|
| *Thermal Resistance, Junction to Case<br>2N5444, 2N5445, 2N5446 | $R_{\theta JC}$ | 0.9 | $^\circ\text{C/W}$ |

\*Indicates JEDEC Registered Data.

Note 1.  $V_{DRM}$  for all types can be applied on a continuous basis. Blocking voltages shall not be tested with a constant current source such that the voltage ratings of the devices are exceeded.

## 2N5444 thru 2N5446

ELECTRICAL CHARACTERISTICS ( $T_C = 25^\circ\text{C}$ , and either polarity of MT2 to MT1 voltage, unless otherwise noted.)

| Characteristic                                                                                                                                                                                                                                                                                                          | Symbol     | Min                          | Typ                        | Max                                 | Unit                   |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|------------------------------|----------------------------|-------------------------------------|------------------------|
| *Peak Blocking Current<br>(Gate Open, $V_D = \text{Rated } V_{DRM}$ ) $T_C = 25^\circ\text{C}$<br>$T_C = 100^\circ\text{C}$                                                                                                                                                                                             | $I_{DRM}$  | —<br>—                       | —<br>0.5                   | 10<br>4                             | $\mu\text{A}$<br>mA    |
| *Peak On-State Voltage<br>( $I_{TM} = 56 \text{ A Peak}$ , Pulse Width $\leq 1 \text{ ms}$ , Duty Cycle $\leq 2\%$ )                                                                                                                                                                                                    | $V_{TM}$   | —                            | 1.65                       | 1.85                                | Volts                  |
| Gate Trigger Current (Continuous dc), Note 1<br>(Main Terminal Voltage = 12 Vdc, $R_L = 50 \text{ Ohms}$ )<br>MT2(+), G(+)<br>MT2(+), G(-)<br>MT2(-), G(-)<br>MT2(-), G(+)<br>*MT2(+), G(+); MT2(-), G(-) $T_C = -65^\circ\text{C}$<br>*MT2(+), G(-); MT2(-), G(+ ) $T_C = -65^\circ\text{C}$                           | $I_{GT}$   | —<br>—<br>—<br>—<br>—        | —<br>—<br>—<br>—<br>—      | 70<br>70<br>70<br>100<br>125<br>240 | mA                     |
| *Gate Trigger Voltage (Continuous dc)<br>(Main Terminal Voltage = 12 Vdc, $R_L = 50 \text{ Ohms}$ )<br>MT2(+), G(+)<br>MT2(+), G(-)<br>MT2(-), G(-)<br>MT2(-), G(+)<br>*All Quadrants, $T_C = -65^\circ\text{C}$<br>*Main Terminal Voltage = Rated $V_{DRM}$ , $R_L = 10 \text{ k ohms}$ ,<br>$T_C = 100^\circ\text{C}$ | $V_{GT}$   | —<br>—<br>—<br>—<br>—<br>0.2 | —<br>—<br>—<br>—<br>—<br>— | 2<br>2<br>2<br>2.5<br>3.4<br>—      | Volts                  |
| *Holding Current<br>(Main Terminal Voltage = 12 Vdc, Gate Open)<br>(Initiating Current = 150 mA) $T_C = 25^\circ\text{C}$<br>* $T_C = -65^\circ\text{C}$                                                                                                                                                                | $I_H$      | —<br>—                       | —<br>—                     | 70<br>100                           | mA                     |
| *Turn-On Time<br>(Main Terminal Voltage = Rated $V_{DRM}$ , $I_{TM} = 56 \text{ A}$ ,<br>Gate Source Voltage = 12 V, $R_S = 12 \text{ Ohms}$ , Rise Time = $0.1 \mu\text{s}$ ,<br>Pulse Width = $2 \mu\text{s}$ )                                                                                                       | $t_{gt}$   | —                            | 1                          | 2                                   | $\mu\text{s}$          |
| *Critical Rate-of-Rise of Commutation Voltage<br>(Rated $V_{DRM}$ , $I_{TM} = 40 \text{ A}$ , Commutating $di/dt = 20 \text{ A/ms}$ ,<br>gate unenergized)<br>$T_C = 65^\circ\text{C}$                                                                                                                                  | $dv/dt(c)$ | 5                            | 30                         | —                                   | $\text{V}/\mu\text{s}$ |
| Critical Rate-of-Rise of Off State Voltage<br>(Rated $V_{DRM}$ , Exponential Voltage Rise, Gate Open, $T_C = 110^\circ\text{C}$ )<br>2N5444<br>2N5445<br>2N5446                                                                                                                                                         | $dv/dt$    | 50<br>30<br>20               |                            |                                     | $\text{V}/\mu\text{s}$ |

\*Indicates JEDEC Registered Data for 2N5441 thru 2N5446.

Note 1. All voltage polarities referenced to main terminal 1.

# 2N5444 thru 2N5446

FIGURE 1 — ON-STATE POWER DISSIPATION

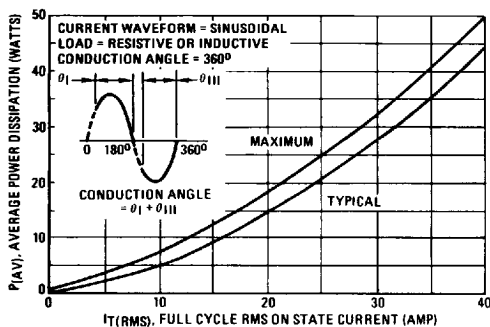


FIGURE 2 — RMS CURRENT DERATING

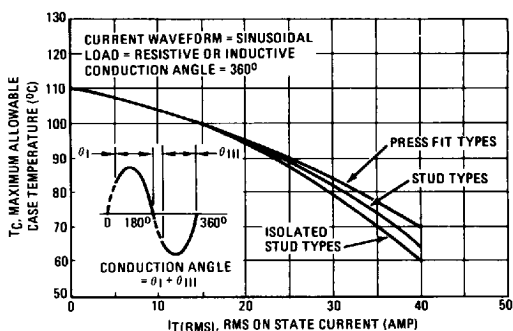


FIGURE 3 — TYPICAL GATE TRIGGER VOLTAGE

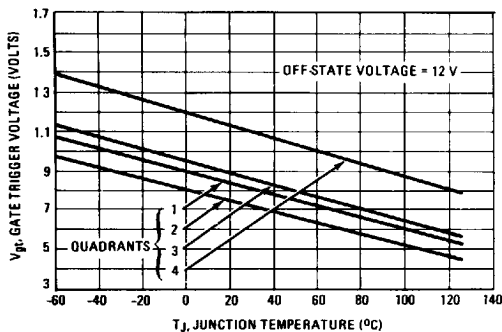


FIGURE 4 — TYPICAL GATE TRIGGER CURRENT

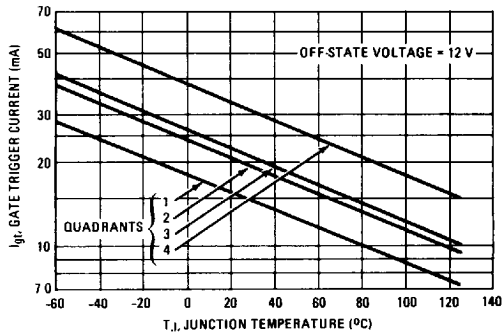
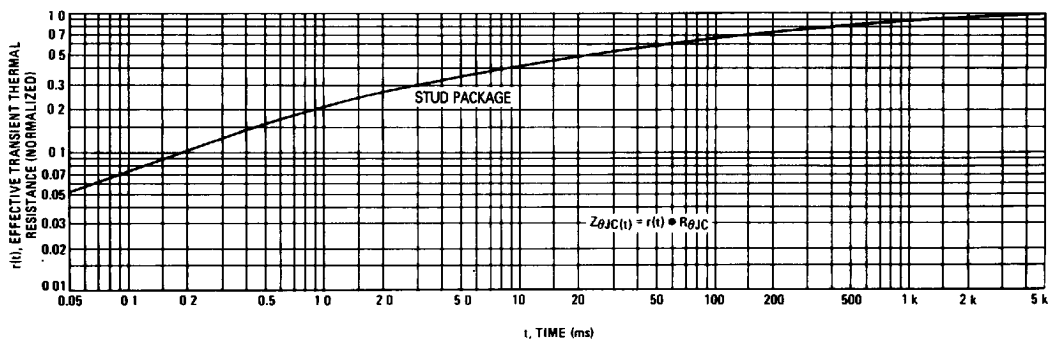


FIGURE 5 — TYPICAL THERMAL RESPONSE



2N5444 thru 2N5446

FIGURE 6 - ON-STATE CHARACTERISTICS

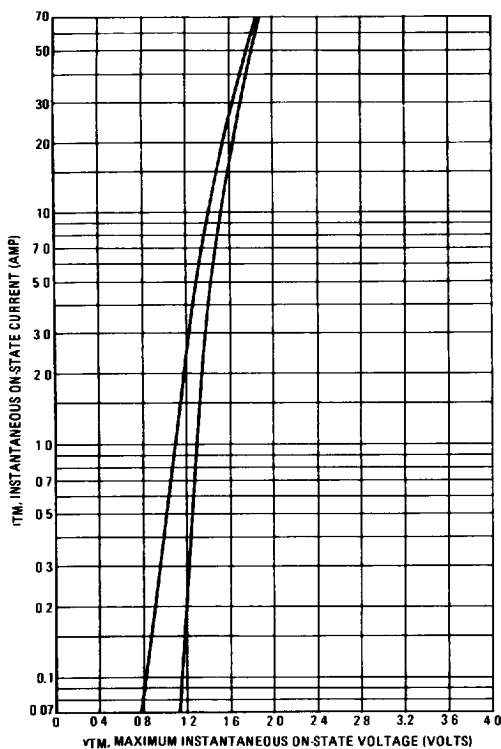


FIGURE 7 - TYPICAL HOLDING CURRENT

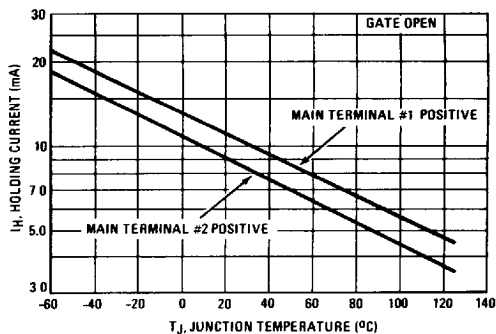


FIGURE 8 - MAXIMUM ALLOWABLE SURGE CURRENT

