

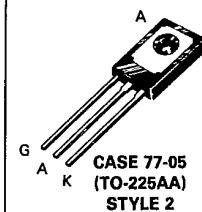
## Silicon Controlled Rectifiers Reverse Blocking Triode Thyristors

... designed for high-volume consumer phase-control applications such as motor speed, temperature, and light controls and for switching applications in ignition and starting systems, voltage regulators, vending machines, and lamp drivers requiring:

- Small, Rugged, Thermopad Construction — for Low Thermal Resistance, High Heat Dissipation, and Durability
- Practical Level Triggering and Holding Characteristics @ 25°C  
 $I_{GT} = 7 \text{ mA (Typ)}$   
 $I_H = 6 \text{ mA (Typ)}$
- Low "On" Voltage —  $V_{TM} = 1 \text{ Volt (Typ) @ 5 Amps @ 25°C}$
- High Surge Current Rating —  $I_{TSM} = 80 \text{ Amps}$

**2N4441  
thru  
2N4444**

**SCRs  
8 AMPERES RMS  
50 thru 600 VOLTS**



### MAXIMUM RATINGS ( $T_J = 100^\circ\text{C}$ unless otherwise noted.)

| Rating   | Symbol                       | Value                   | Unit                 |
|--|------------------------------|-------------------------|----------------------|
| Peak Repetitive Forward and Reverse Blocking Voltage, Note 1<br>2N4441<br>2N4442<br>2N4443<br>2N4444                           | $V_{DRM}$<br>or<br>$V_{RRM}$ | 50<br>200<br>400<br>600 | Volts                |
| *Non-Repetitive Peak Reverse Blocking Voltage<br>( $t = 5 \text{ ms (max) duration}$ )<br>2N4441<br>2N4442<br>2N4443<br>2N4444 | $V_{RSM}$                    | 75<br>300<br>500<br>700 | Volts                |
| *RMS On-State Current<br>(All Conduction Angles)   | $I_T(\text{RMS})$            | 8                       | Amps                 |
| Average On-State Current, $T_C = 73^\circ\text{C}$   | $I_T(\text{AV})$             | 5.1                     | Amps                 |
| *Peak Non-Repetitive Surge Current<br>(1/2 cycle, 60 Hz preceded and followed by rated current and voltage)                    | $I_{TSM}$                    | 80                      | Amps                 |
| Circuit Fusing<br>( $T_J = -40 \text{ to } +100^\circ\text{C}; t = 1 \text{ to } 8.3 \text{ ms}$ )                             | $I^2t$                       | 25                      | $\text{A}^2\text{s}$ |
| *Peak Gate Power   | PGM                          | 5                       | Watts                |
| *Average Gate Power  | $P_G(\text{AV})$             | 0.5                     | Watt                 |
| *Peak Forward Gate Current   | $I_{GM}$                     | 2                       | Amps                 |
| *Peak Reverse Gate Voltage   | $V_{RGM}$                    | 10                      | Volts                |

\*Indicates JEDEC Registered Data.

(cont.)

Note 1. Ratings apply for zero or negative gate voltage but positive gate voltage shall not be applied concurrently with a negative potential on the anode. When checking forward or reverse blocking capability, thyristor devices should not be tested with a constant current source in a manner that the voltage applied exceeds the rated blocking voltage.

## 2N4441 thru 2N4444

MAXIMUM RATINGS — continued ( $T_J = 100^\circ\text{C}$  unless otherwise noted.)

| Rating                                | Symbol           | Value       | Unit             |
|---------------------------------------|------------------|-------------|------------------|
| *Operating Junction Temperature Range | $T_J$            | -40 to +100 | $^\circ\text{C}$ |
| *Storage Temperature Range            | $T_{\text{stg}}$ | -40 to +150 | $^\circ\text{C}$ |
| Mounting Torque (6-32 screw), Note 1  | —                | 8           | in. lb.          |

## THERMAL CHARACTERISTICS

| Characteristic                          | Symbol                | Typ | Max | Unit               |
|---|-----------------------|-----|-----|--------------------|
| *Thermal Resistance, Junction to Case   | $R_{\theta\text{JC}}$ | —   | 2.5 | $^\circ\text{C/W}$ |
| Thermal Resistance, Junction to Ambient | $R_{\theta\text{JA}}$ | 40  | —   | $^\circ\text{C/W}$ |

ELECTRICAL CHARACTERISTICS ( $T_C = 25^\circ\text{C}$  unless otherwise noted.)

| Characteristic  | Symbol                           | Min           | Typ            | Max             | Unit                         |
|---|----------------------------------|---------------|----------------|-----------------|------------------------------|
| Peak Forward or Reverse Blocking Current<br>(Rated $V_{\text{DRM}}$ or $V_{\text{RRM}}$ , gate open)<br>$T_J = 25^\circ\text{C}$<br>$T_J = 100^\circ\text{C}$   | $I_{\text{DRM}}, I_{\text{RRM}}$ | —<br>—        | —<br>—         | 10<br>2         | $\mu\text{A}$<br>$\text{mA}$ |
| Gate Trigger Current (Continuous dc)<br>( $V_D = 7 \text{ Vdc}$ , $R_L = 100 \text{ Ohms}$ )<br>$T_C = 25^\circ\text{C}$<br>$*T_C = -40^\circ\text{C}$  | $I_{\text{GT}}$                  | —             | 7              | 30<br>60        | $\text{mA}$                  |
| Gate Trigger Voltage (Continuous dc)<br>( $V_D = 7 \text{ Vdc}$ , $R_L = 100 \text{ Ohms}$ )<br>( $V_D = 7 \text{ Vdc}$ , $R_L = 100 \text{ Ohms}$ )<br>( $V_D = \text{Rated } V_{\text{DRM}}$ , $R_L = 100 \text{ Ohms}$ )<br>$T_C = 25^\circ\text{C}$<br>$T_C = -40^\circ\text{C}$<br>$T_J = 100^\circ\text{C}$ | $V_{\text{GT}}$                  | —<br>—<br>0.2 | 0.75<br>—<br>— | 1.5<br>2.5<br>— | Volts                        |
| Peak On-State Voltage<br>(Pulse Width = 1 to 2 ms, Duty Cycle $\leq 2\%$ )<br>( $I_{\text{TM}} = 5 \text{ A peak}$ )<br>$*I_{\text{TM}} = 15.7 \text{ A peak}$  | $V_{\text{TM}}$                  | —<br>—        | 1<br>—         | 1.5<br>2        | Volts                        |
| Holding Current<br>( $V_D = 7 \text{ Vdc}$ , gate open)<br>$T_C = 25^\circ\text{C}$<br>$*T_C = -40^\circ\text{C}$   | $I_{\text{H}}$                   | —<br>—        | 6<br>—         | 40<br>70        | $\text{mA}$                  |
| Gate Controlled Turn-On Time<br>( $I_{\text{TM}} = 5 \text{ A}$ , $I_{\text{GT}} = 20 \text{ mA}$ , $V_D = \text{Rated } V_{\text{DRM}}$ )  | $t_{\text{gt}}$                  | —             | 1              | —               | $\mu\text{s}$                |
| Circuit Commutated Turn-Off Time<br>( $I_{\text{TM}} = 5 \text{ A}$ , $I_{\text{R}} = 5 \text{ A}$ )<br>( $I_{\text{TM}} = 5 \text{ A}$ , $I_{\text{R}} = 5 \text{ A}$ , $T_J = 100^\circ\text{C}$ )  | $t_{\text{q}}$                   | —<br>—        | 15<br>20       | —<br>—          | $\mu\text{s}$                |
| Critical Rate of Rise of Off-State Voltage<br>( $V_D = \text{Rated } V_{\text{DRM}}$ , Exponential Waveform,<br>$T_J = 100^\circ\text{C}$ , Gate Open)  | $dv/dt$                          | —             | 50             | —               | $\text{V}/\mu\text{s}$       |

\*Indicates JEDEC Registered Data.

Note 1. Torque rating applies with use of torque washer (Shakeproof WD19522 #6 or equivalent). Mounting torque in excess of 8 in. lbs. does not appreciably lower case-to-sink thermal resistance. Anode lead and heatsink contact pad are common.

For soldering purposes (either terminal connection or device mounting), soldering temperatures shall not exceed  $+225^\circ\text{C}$ .

FIGURE 1 - ON-STATE CHARACTERISTICS

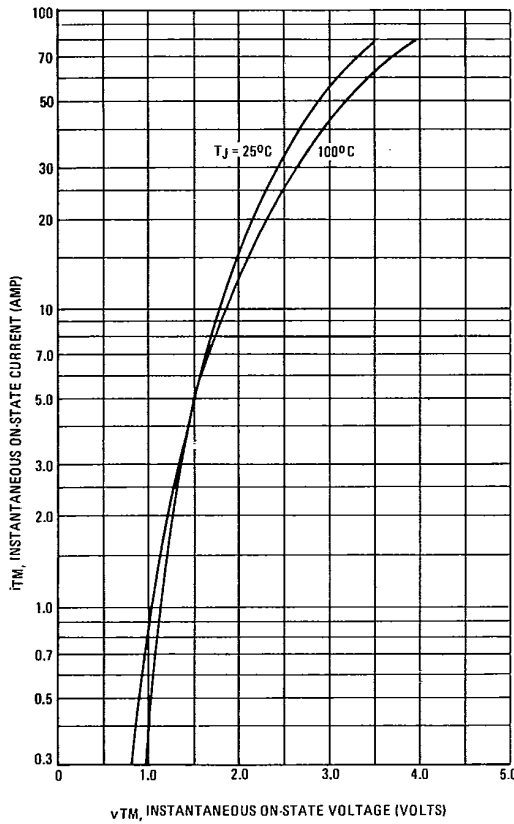


FIGURE 2 - MAXIMUM ON-STATE POWER DISSIPATION

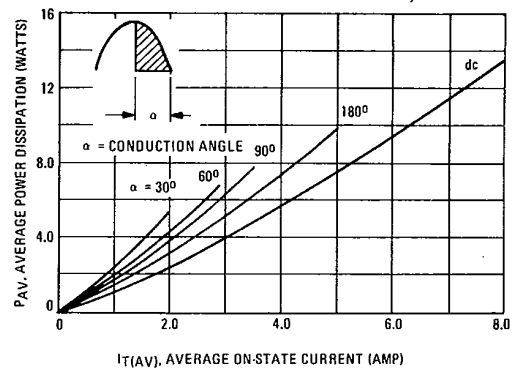


FIGURE 3 - AVERAGE CURRENT DERATING

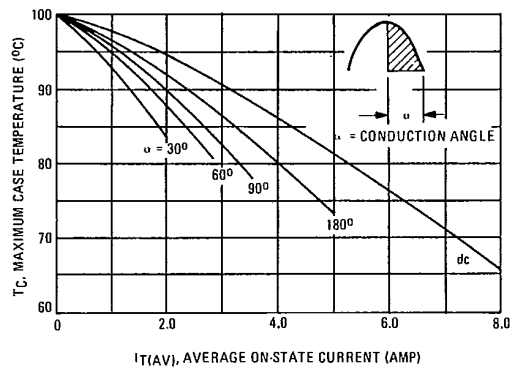
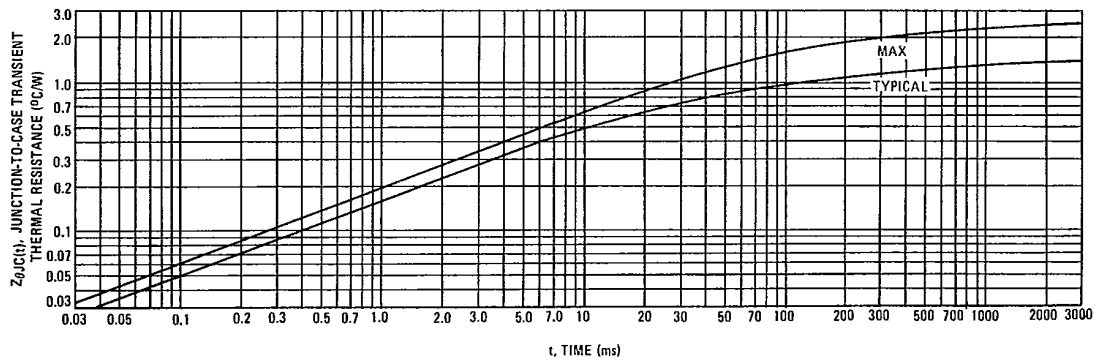


FIGURE 4 - THERMAL RESPONSE



2N4441 thru 2N4444

FIGURE 5 - MAXIMUM NON-REPETITIVE SURGE CURRENT

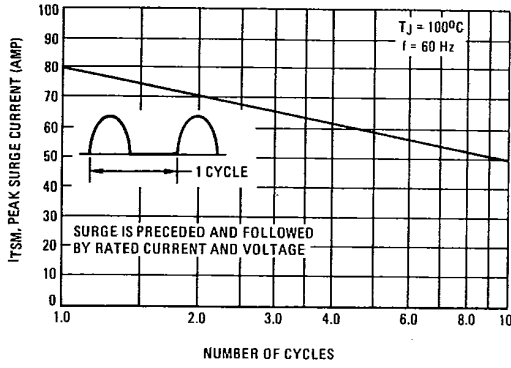


FIGURE 6 - TYPICAL HOLDING CURRENT

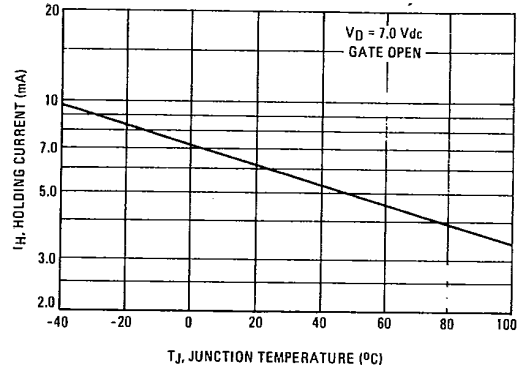


FIGURE 7 - TYPICAL GATE TRIGGER CURRENT

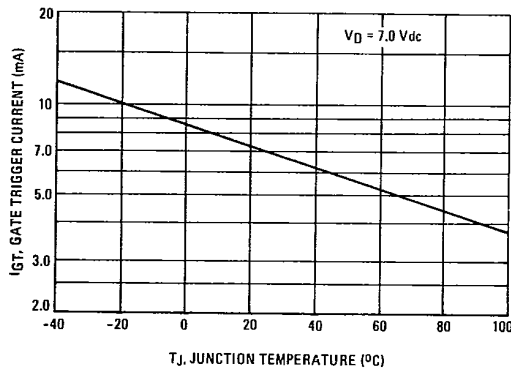
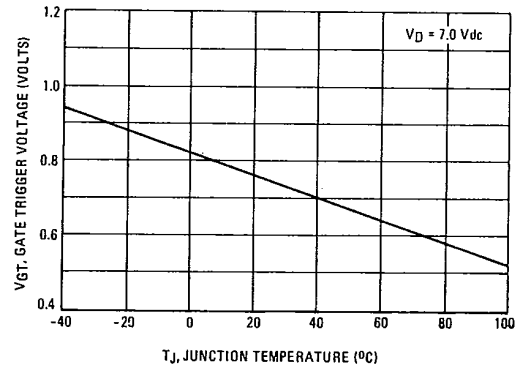


FIGURE 8 - TYPICAL GATE TRIGGER VOLTAGE



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