

Silicon Controlled Rectifiers

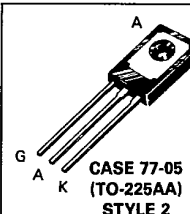
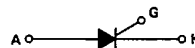
Reverse Blocking Triode Thyristors

... 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 2N4441 2N4442 2N4443 2N4444	V_{DRM} or V_{RRM}	50 200 400 600	Volts
*Non-Repetitive Peak Reverse Blocking Voltage ($t = 5 \text{ ms (max)}$ duration) 2N4441 2N4442 2N4443 2N4444	V_{RSM}	75 300 500 700	Volts
*RMS On-State Current (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 (1/2 cycle, 60 Hz preceded and followed by rated current and voltage)	I_{TSM}	80	Amps
Circuit Fusing ($T_J = -40 \text{ to } +100^\circ\text{C}$; $t = 1 \text{ to } 8.3 \text{ ms}$)	I^2t	25	A^2s
*Peak Gate Power	P_{GM}	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_{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	$R_{\theta JC}$	—	2.5	$^\circ\text{C/W}$
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	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 (Rated V_{DRM} or V_{RRM} , gate open) $T_J = 25^\circ\text{C}$ $T_J = 100^\circ\text{C}$	I_{DRM}, I_{RRM}	— —	— —	10 2	μA mA
Gate Trigger Current (Continuous dc) ($V_D = 7\text{ Vdc}$, $R_L = 100\text{ Ohms}$) $T_C = 25^\circ\text{C}$ * $T_C = -40^\circ\text{C}$	I_{GT}	—	7	30 60	mA
Gate Trigger Voltage (Continuous dc) ($V_D = 7\text{ Vdc}$, $R_L = 100\text{ Ohms}$) ($V_D = 7\text{ Vdc}$, $R_L = 100\text{ Ohms}$) ($V_D = \text{Rated } V_{DRM}$, $R_L = 100\text{ Ohms}$) $T_C = 25^\circ\text{C}$ $T_C = -40^\circ\text{C}$ $T_J = 100^\circ\text{C}$	V_{GT}	— — 0.2	0.75 — —	1.5 2.5 —	Volts
Peak On-State Voltage (Pulse Width = 1 to 2 ms, Duty Cycle $\leq 2\%$) ($I_{TM} = 5\text{ A peak}$) *($I_{TM} = 15.7\text{ A peak}$)	V_{TM}	— —	1 —	1.5 2	Volts
Holding Current ($V_D = 7\text{ Vdc}$, gate open) $T_C = 25^\circ\text{C}$ * $T_C = -40^\circ\text{C}$	I_H	— —	6 —	40 70	mA
Gate Controlled Turn-On Time ($I_{TM} = 5\text{ A}$, $I_{GT} = 20\text{ mA}$, $V_D = \text{Rated } V_{DRM}$)	t_{gt}	—	1	—	μs
Circuit Commutated Turn-Off Time ($I_{TM} = 5\text{ A}$, $I_R = 5\text{ A}$) ($I_{TM} = 5\text{ A}$, $I_R = 5\text{ A}$, $T_J = 100^\circ\text{C}$)	t_q	— —	15 20	— —	μs
Critical Rate of Rise of Off-State Voltage ($V_D = \text{Rated } V_{DRM}$, Exponential Waveform, $T_J = 100^\circ\text{C}$, 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

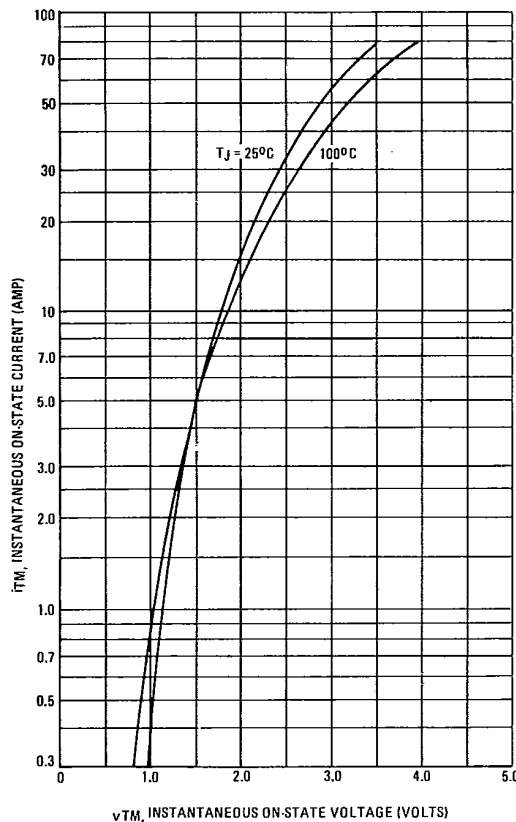


FIGURE 2 - MAXIMUM ON-STATE POWER DISSIPATION

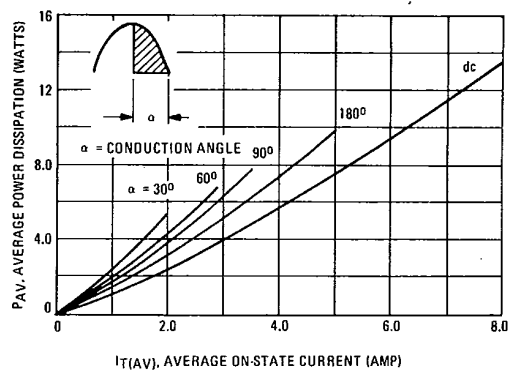


FIGURE 3 - AVERAGE CURRENT DERATING

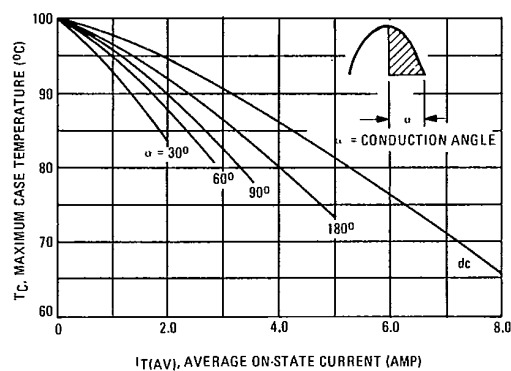
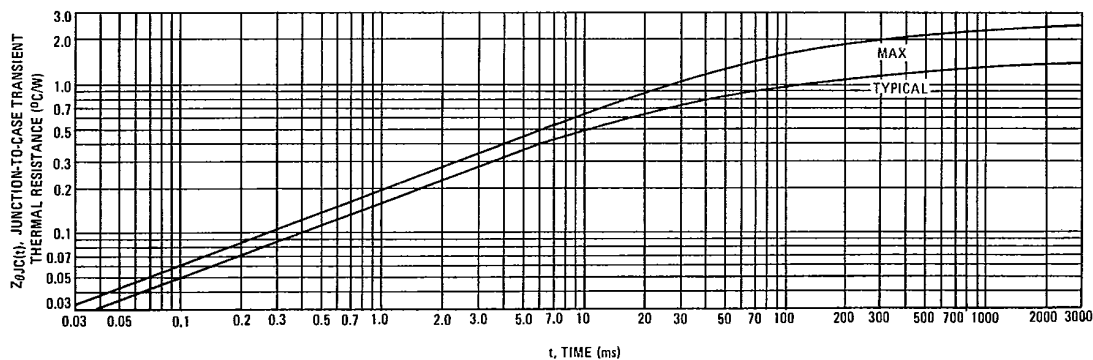


FIGURE 4 - THERMAL RESPONSE



2N4441 thru 2N4444

FIGURE 5 - MAXIMUM NON-REPETITIVE SURGE CURRENT

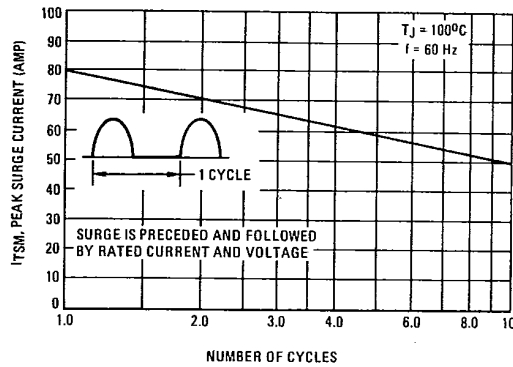


FIGURE 6 - TYPICAL HOLDING CURRENT

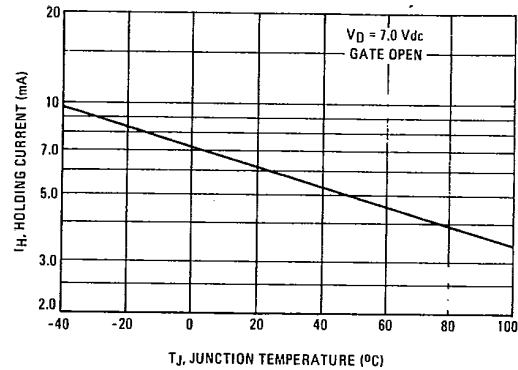


FIGURE 7 - TYPICAL GATE TRIGGER CURRENT

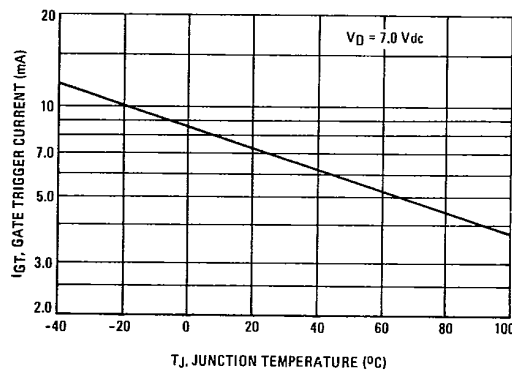


FIGURE 8 - TYPICAL GATE TRIGGER VOLTAGE

