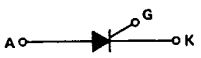
Silicon Controlled Rectifiers
Reverse Blocking Triode Thyristor

2N5164 thru 2N5171

SCRs
20 AMPERES RMS
50 thru 600 VOLTS

... designed for industrial and consumer applications such as power supplies, battery chargers, temperature, motor, light and welder controls.

- Supplied in Either Pressfit or Stud Package
- High Surge Current Rating — I_{TSM} = 240 Amps
- Low On-State Voltage — 1.2 V (Typ) @ I_{TM} = 20 Amps
- Practical Level Triggering and Holding Characteristics — 40 mA (Max) and 50 mA (Max) @ T_C = 25°C



CASE 263-04
STYLE 1
2N5168 thru 2N5171

CASE 310-02
STYLE 1
2N5164 thru 2N5167

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
*Peak Forward and *Repetitive Reverse Blocking Voltage, Notes 1 and 2 2N5164, 2N5168 2N5165, 2N5169 2N5166, 2N5170 2N5167, 2N5171	V_{DRM} or V_{RRM}	 50 200 400 600	Volts
*Non-Repetitive Peak Reverse Blocking Voltage 2N5164, 2N5168 2N5165, 2N5169 2N5166, 2N5170 2N5167, 2N5171	V_{RSM}	 75 300 500 700	Volts
On-State Current RMS	$I_{T(RMS)}$	20	Amps
Average On-State Current (T_C = 67°C)	$I_{T(AV)}$	13	Amps
Circuit Fusing (T_J = −40 to +100°C, t ≤ 8.3 ms)	I^2t	235	A^2s
*Peak Non-Repetitive Surge Current (One cycle, 60 Hz, T_J = −40 to +100°C) Preceded and followed by rated current and voltage	I_{TSM}	240	Amps
*Peak Gate Power (Maximum Pulse Width = 10 μs)	P_{GM}	5	Watts
*Average Gate Power	$P_{G(AV)}$	0.5	Watt
*Peak Forward Gate Current (Maximum Pulse Width = 10 μs)	I_{GM}	2	Amps
Peak Gate Voltage	V_{GM}	10	Volts
*Operating Junction Temperature Range	T_J	−40 to +100	°C
*Storage Temperature Range	T_{stg}	−40 to +150	°C
Stud Torque 2N5168–2N5171		30	in. lb.

*Indicates JEDEC registered data.

Notes: 1. V_{DRM} for all types can be applied on a continuous dc basis without incurring damage. Ratings apply for zero or negative gate voltage. Devices should not be tested for blocking capability in a manner such that the voltage applied exceeds the rated blocking voltage.

2. Devices should not be operated with a positive bias applied to the gate concurrent with a negative potential applied to the anode.

2N5164 thru 2N5171

THERMAL CHARACTERISTICS

Characteristic	Symbol	Typ	Max	Unit
*Thermal Resistance, Junction to Case 2N5164, 65, 66, 67 2N5168, 69, 70, 71	$R_{\theta JC}$	 1 1.1	 1.5 1.6	°C/W

ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted.)

Characteristic	Symbol	Min	Max	Unit
*Peak Forward or Reverse Blocking Current (Rated V_{DRM} or V_{RRM}, gate open) T_J = 25°C T_J = 100°C	I_{DRM}, I_{RRM}	 — —	 10 5	 μA mA
Gate Trigger Current (Continuous dc), Note 1 (V_D = 7 Vdc, R_L = 100 Ω) *(V_D = 7 Vdc, R_L = 100 Ω, T_C = −40°C)	I_{GT}	 — —	 40 75	mA
Gate Trigger Voltage (Continuous dc) (V_D = 7 Vdc, gate open) *(V_D = 7 Vdc, R_L = 100 Ω, T_C = −40°C) *(V_D = Rated V_{DRM}, R_L = 100 Ω, T_J = 100°C)	V_{GT}	 — — 0.2	 1.5 2.5 —	Volts
Peak On-State Voltage (Pulse Width = 1 ms max, duty cycle ≤ 1%) (I_{TM} = 20 A) *(I_{TM} = 41 A)	V_{TM}	 — 8	 1.5 1.7	Volts
Holding Current (V_D = 7 Vdc, gate open) *(V_D = 7 Vdc, gate open, T_C = −40°C)	I_H	 — —	 50 90	mA
Gate Controlled Turn-On Time (t_d + t_r) (I_{TM} = 20 A, I_{GT} = 40 mAdc, V_D = Rated V_{DRM})	t_{gt}	Typical 1		μs
Circuit Commutated Turn-Off Time (I_{TM} = 10 A, I_R = 10 A) (I_{TM} = 10 A, I_R = 10 A, T_J = 100°C) (V_D = V_{DRM} = rated voltage) (dv/dt = 30 V/μs)	t_q	 20 30		μs
Critical Rate of Rise of Off-State Voltage (V_D = Rated V_{DRM}, Exponential Wave Form, Gate open, T_J = 100°C)	dv/dt	50		V/μs

*Indicates JEDEC registered data.

Note 1. Devices should not be operated with a positive bias applied to the gate concurrent with a negative potential applied to the anode.

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EFFECT OF TEMPERATURE UPON TYPICAL TRIGGER CHARACTERISTICS

FIGURE 1 – GATE TRIGGER CURRENT

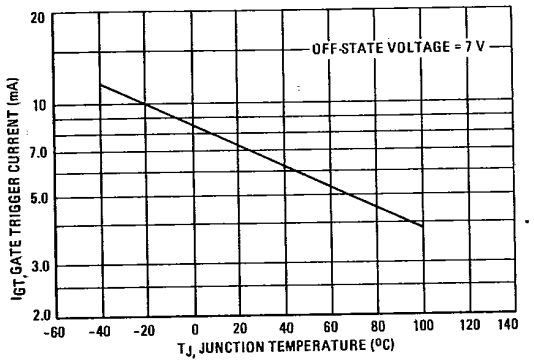
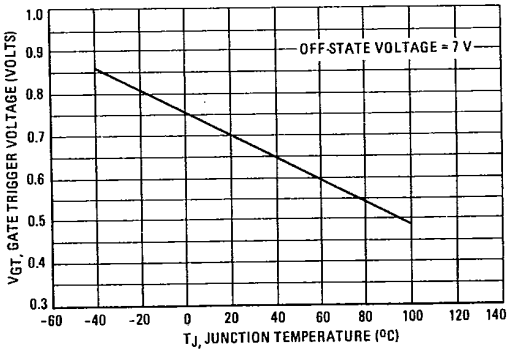


FIGURE 2 – GATE TRIGGER VOLTAGE



MAXIMUM ALLOWABLE NON-REPETITIVE SURGE CURRENT

FIGURE 3 – 60 Hz SURGES

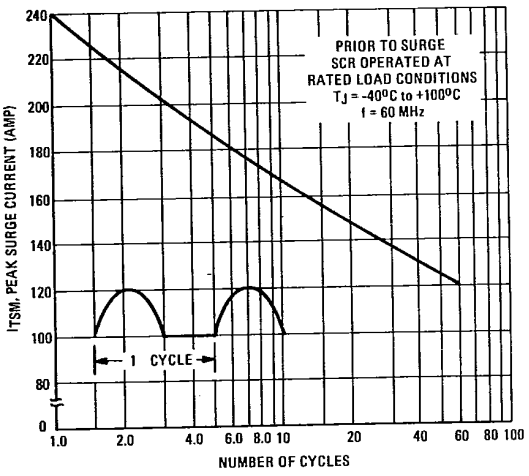


FIGURE 4 – SUB-CYCLE SURGES

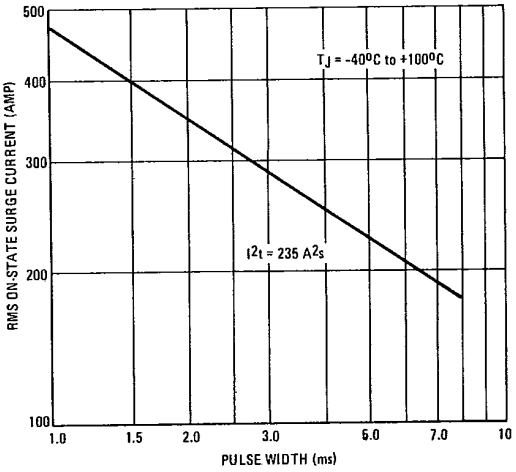


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FIGURE 5 – GATE TRIGGER CHARACTERISTICS

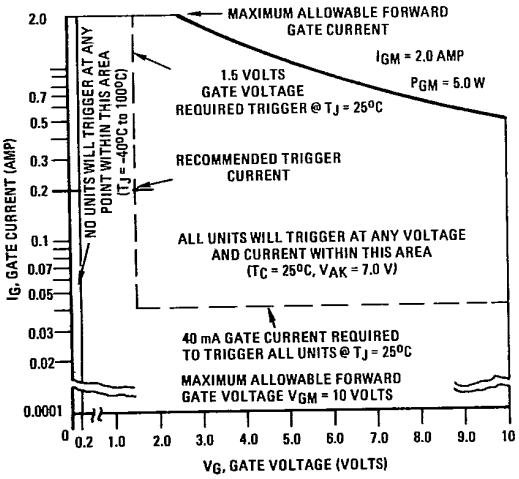
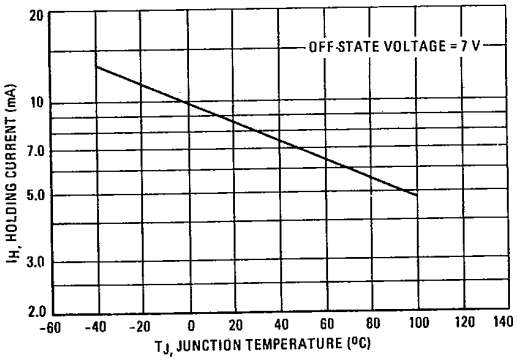


FIGURE 6 – EFFECT OF TEMPERATURE ON TYPICAL HOLDING CURRENT



DERATING AND DISSIPATION FOR RESISTIVE AND INDUCTIVE LOADS (f = 60 to 400 Hz, SINE WAVE)

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FIGURE 7 – AVERAGE CURRENT DERATING

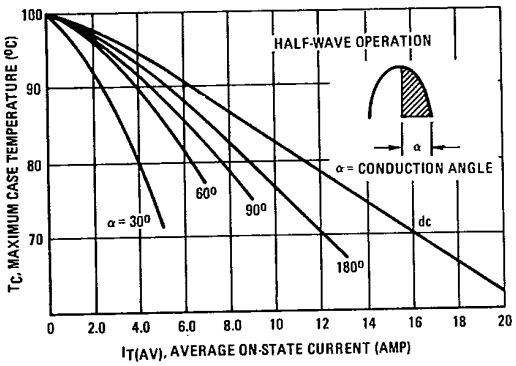


FIGURE 8 – ON-STATE POWER DISSIPATION

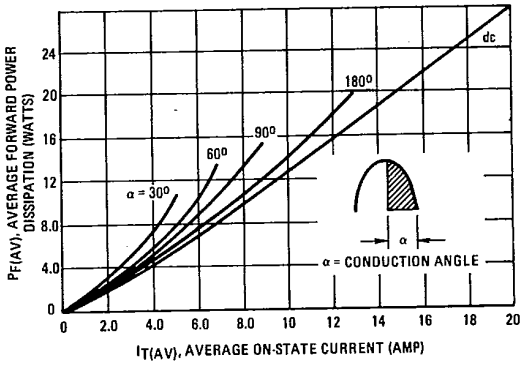


FIGURE 9 – ON-STATE CHARACTERISTICS

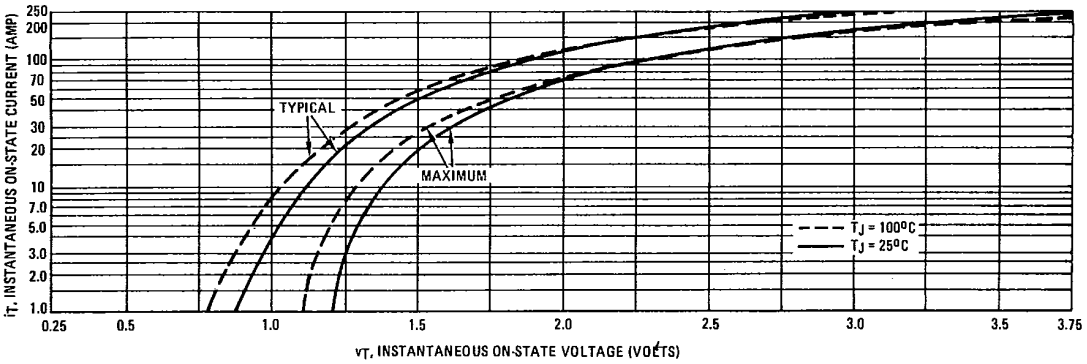


FIGURE 10 – TYPICAL THERMAL RESISTANCE OF PLATES

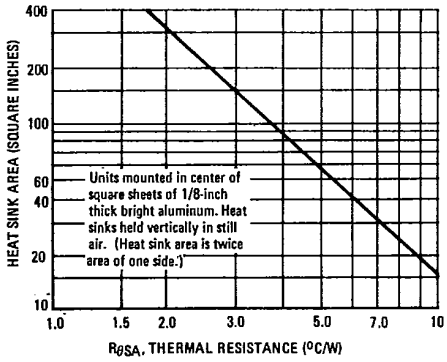
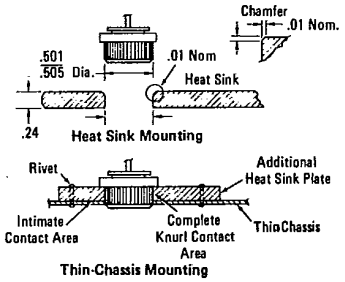


FIGURE 11 – MOUNTING DETAILS FOR PRESSFIT THYRISTORS



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