Silicon Controlled Rectifier

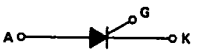
Reverse Blocking Triode Thyristor

MCR3818 Series
MCR3918 Series

SCRs
25 AMPERES RMS
50 thru 800 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 174-04
(TO-203)
STYLE 1
MCR3818 Series

CASE 175-03
STYLE 1
MCR3918 Series

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Peak Repetitive Forward and Reverse Voltage, Note 1 MCR3818, MCR3918-2 -3 -4 -6 -8 -10	V_{DRM} or V_{RRM}	 50 100 200 400 600 800	Volts
Non-Repetitive Reverse Blocking Voltage MCR3818, MCR3918-2 -3 -4 -6 -8 -10	V_{RSM}	 75 150 300 500 700 900	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)	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

Note 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. These devices should not be tested with a constant current source for forward or reverse blocking capability such that the voltage applied exceeds the rated blocking voltage.

MAXIMUM RATINGS — continued

Rating	Symbol	Value	Unit
Peak Gate Voltage	V_{GM}	10	Volts
Operating Junction Temperature Range	T_J	−40 to +125	°C
Storage Temperature Range	T_{stg}	−40 to +150	°C
Stud Torque		30	in. lb.

THERMAL CHARACTERISTICS

Characteristic	Symbol	Typ	Max	Unit
Thermal Resistance, Junction to Case Pressfit Package Stud Package	$R_{\theta JC}$	 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) (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}	 — —	 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

3

EFFECT OF TEMPERATURE UPON TYPICAL TRIGGER CHARACTERISTICS

FIGURE 1 – GATE TRIGGER CURRENT

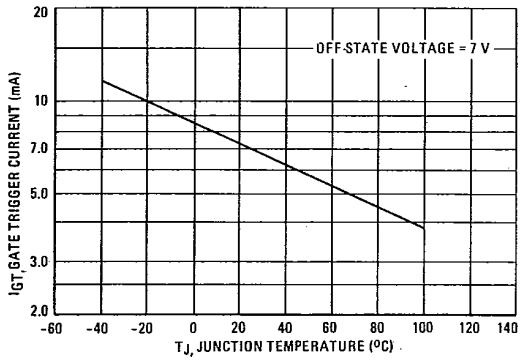
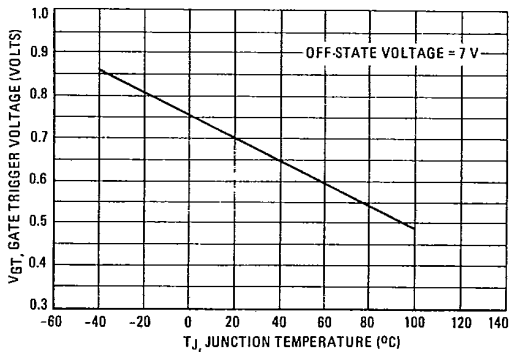


FIGURE 2 – GATE TRIGGER VOLTAGE



MAXIMUM ALLOWABLE NON-REPETITIVE SURGE CURRENT

FIGURE 3 – 60 Hz SURGES

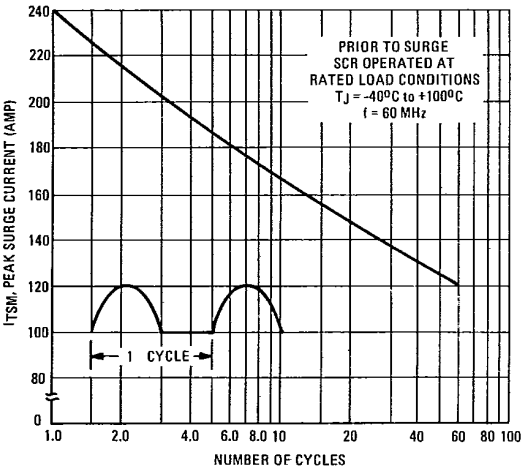
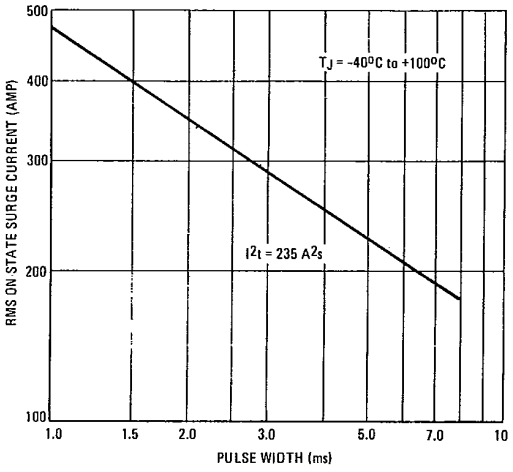


FIGURE 4 – SUB-CYCLE SURGES



3

FIGURE 5 – GATE TRIGGER CHARACTERISTICS

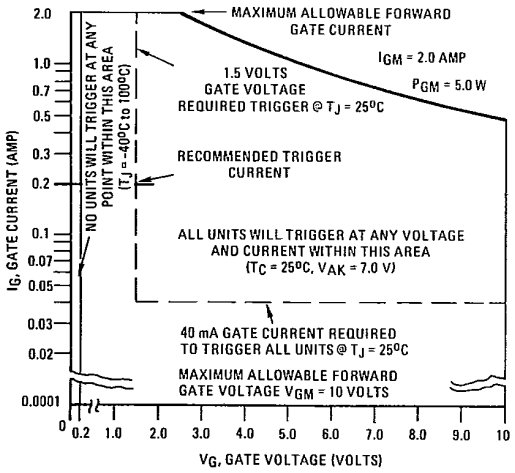
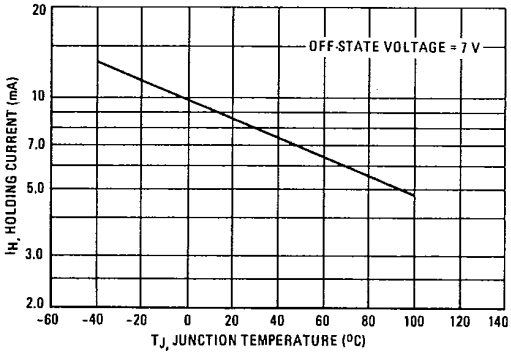


FIGURE 6 – EFFECT OF TEMPERATURE ON TYPICAL HOLDING CURRENT



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

FIGURE 7 – AVERAGE CURRENT DERATING

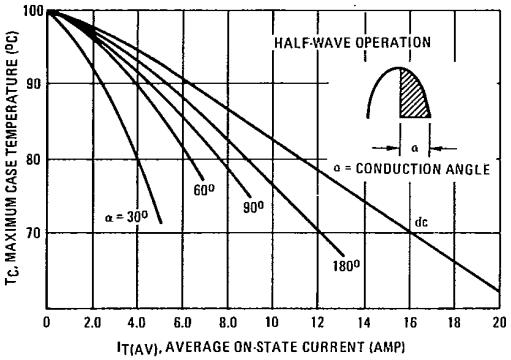


FIGURE 8 – ON-STATE POWER DISSIPATION

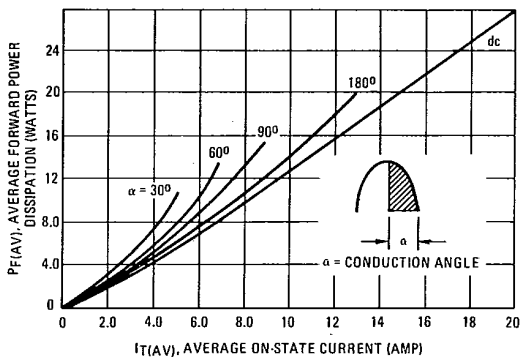


FIGURE 9 – ON-STATE CHARACTERISTICS

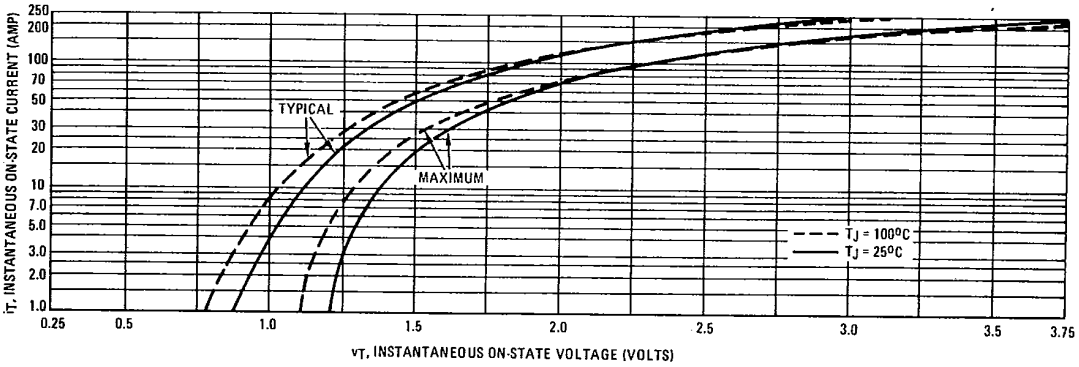


FIGURE 10 – TYPICAL THERMAL RESISTANCE OF PLATES

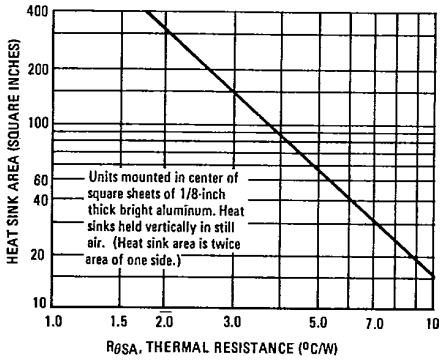
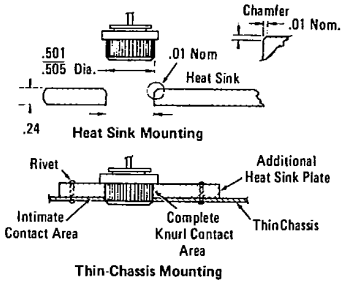


FIGURE 11 – MOUNTING DETAILS FOR PRESSFIT THYRISTORS



The hole edge must be chamfered as shown to prevent shearing off the knurled edge of the rectifier during press-in. The pressing force should be applied evenly on the shoulder ring to avoid tilting or canting of the rectifier case in the hole during the pressing operation. Also, the use of a thermal joint compound will be of considerable aid. The pressing force will vary from 250 to 1000 pounds, depending upon the heat sink material. Recommended hardnesses are: copper – less than 50 on the Rockwell F scale; aluminum – less than 65 on the Brinell scale. A heat sink as thin as 1/8" may be used, but the interface thermal resistance will increase in proportion to the reduction of contact area. A thin chassis requires the addition of a back-up plate.