

# Silicon Controlled Rectifiers

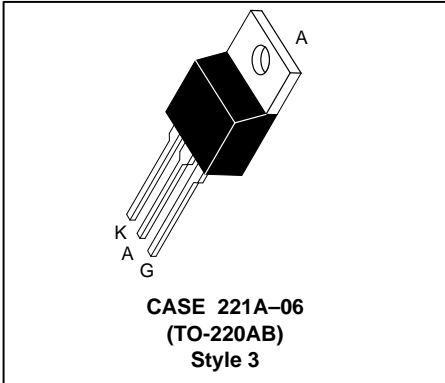
## Reverse Blocking Thyristors

**MCR16  
SERIES\***  
\*Motorola preferred devices

**SCRs**  
**16 AMPERES RMS**  
**400 thru 800**  
**VOLTS**

Designed primarily for half-wave ac control applications, such as motor controls, heating controls, and power supplies; or wherever half-wave, silicon gate-controlled devices are needed.

- Blocking Voltage to 800 Volts
- On-State Current Rating of 16 Amperes RMS
- High Surge Current Capability — 160 Amperes
- Industry Standard TO-220AB Package for Ease of Design
- Glass Passivated Junctions for Reliability and Uniformity



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

Parameter	Symbol	Value	Unit
Peak Repetitive Off-State Voltage (1) Peak Repetitive Reverse Voltage ( $T_J = -40$ to $125^\circ\text{C}$ )	$V_{DRM}$ $V_{RRM}$	400 600 800	Volts
On-State RMS Current (All Conduction Angles)	$I_T(\text{RMS})$	16	A
Peak Non-repetitive Surge Current (One Half Cycle, 60 Hz, $T_J = 125^\circ\text{C}$ )	$I_{TSM}$	160	A
Circuit Fusing Consideration ( $t = 8.3$ ms)	$I^2t$	106	$\text{A}^2\text{sec}$
Peak Gate Power (Pulse Width $\leq 1.0$ $\mu\text{s}$ , $T_C = 80^\circ\text{C}$ )	$P_{GM}$	5.0	Watts
Average Gate Power ( $t = 8.3$ ms, $T_C = 80^\circ\text{C}$ )	$P_{G(AV)}$	0.5	Watts
Peak Gate Current (Pulse Width $\leq 1.0$ $\mu\text{s}$ , $T_C = 80^\circ\text{C}$ )	$I_{GM}$	2.0	A
Operating Junction Temperature Range	$T_J$	-40 to +125	$^\circ\text{C}$
Storage Temperature Range	$T_{stg}$	-40 to +150	$^\circ\text{C}$

**THERMAL CHARACTERISTICS**

Thermal Resistance — Junction to Case — Junction to Ambient	$R_{\theta JC}$ $R_{\theta JA}$	1.5 62.5	$^\circ\text{C}/\text{W}$
Maximum Lead Temperature for Soldering Purposes 1/8" from Case for 10 Seconds	$T_L$	260	$^\circ\text{C}$

(1)  $V_{DRM}$  and  $V_{RRM}$  for all types can be applied on a continuous basis. Ratings apply for zero or negative gate voltage; positive gate voltage shall not be applied concurrent with negative potential on the anode. Blocking voltages shall not be tested with a constant current source such that the voltage ratings of the devices are exceeded.

Preferred devices are Motorola recommended choices for future use and best overall value.

REV 1

# MCR16 SERIES

## ELECTRICAL CHARACTERISTICS (T<sub>J</sub> = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
<b>OFF CHARACTERISTICS</b>					
Peak Forward Blocking Current Peak Reverse Blocking Current (V <sub>AK</sub> = Rated V <sub>DRM</sub> or V <sub>RRM</sub> , Gate Open)	T <sub>J</sub> = 25°C T <sub>J</sub> = 125°C I <sub>DRM</sub> I <sub>RRM</sub>	— —	— —	0.01 2.0	mA
<b>ON CHARACTERISTICS</b>					
Peak On-State Voltage* (I <sub>TM</sub> = 32 A)	V <sub>TM</sub>	—	—	1.7	Volts
Gate Trigger Current (Continuous dc) (V <sub>D</sub> = 12 V, R <sub>L</sub> = 100 Ω)	I <sub>GT</sub>	2.0	8.0	20	mA
Gate Trigger Voltage (Continuous dc) (V <sub>D</sub> = 12 V, R <sub>L</sub> = 100 Ω)	V <sub>GT</sub>	0.5	0.65	1.0	Volts
Hold Current (Anode Voltage = 12 V)	I <sub>H</sub>	4.0	25	40	mA
<b>DYNAMIC CHARACTERISTICS</b>					
Critical Rate of Rise of Off-State Voltage (V <sub>D</sub> = Rated V <sub>DRM</sub> , Exponential Waveform, Gate Open, T <sub>J</sub> = 25°C)	dv/dt	50	200	—	V/μs

\*Indicates Pulse Test: Pulse Width ≤ 2.0 ms, Duty Cycle ≤ 2%.

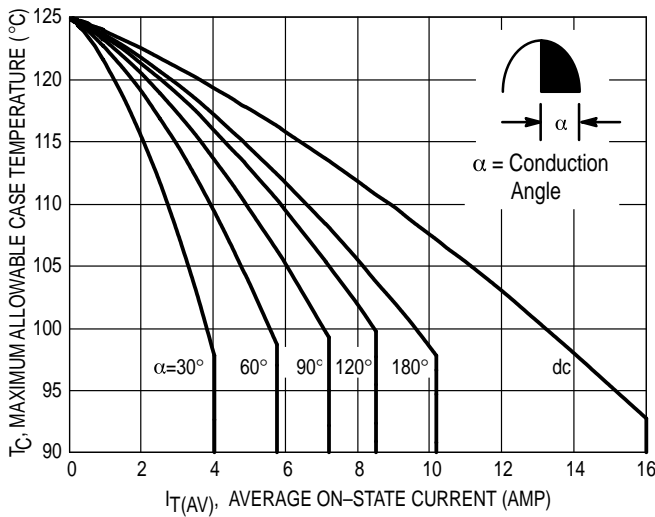


Figure 1. Average Current Derating

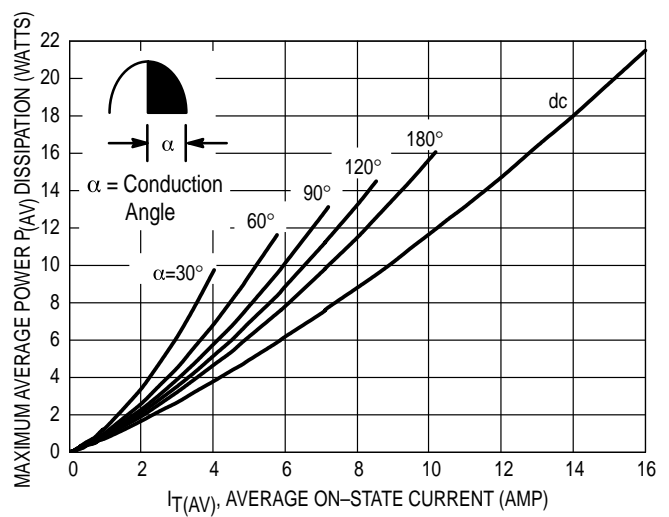


Figure 2. Maximum On-State Power Dissipation

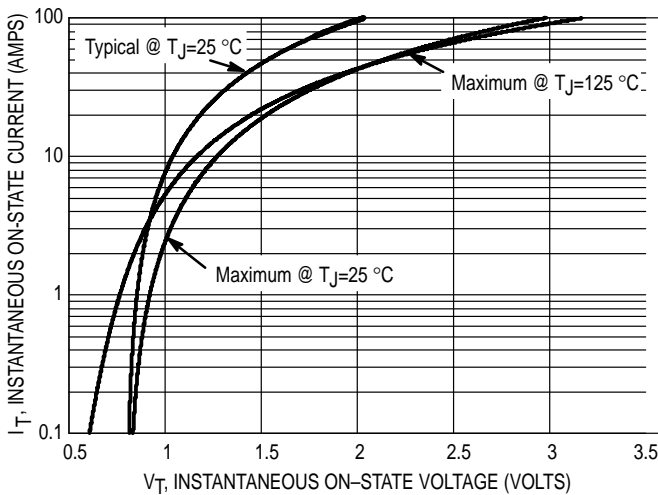


Figure 3. On-State Characteristics

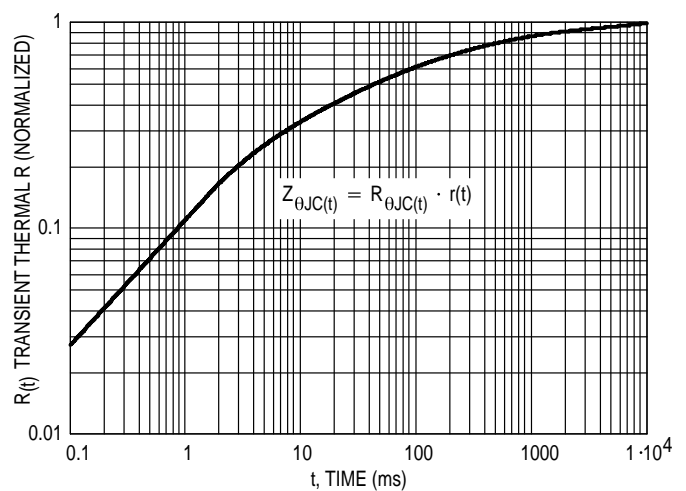


Figure 4. Transient Thermal Response

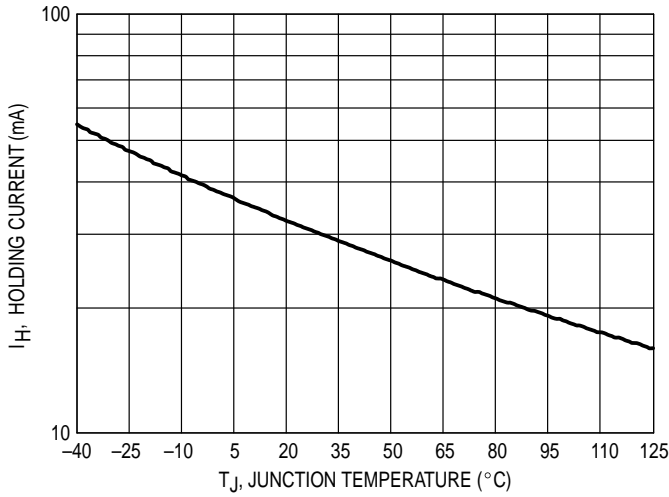


Figure 5. Typical Holding Current Versus Junction Temperature

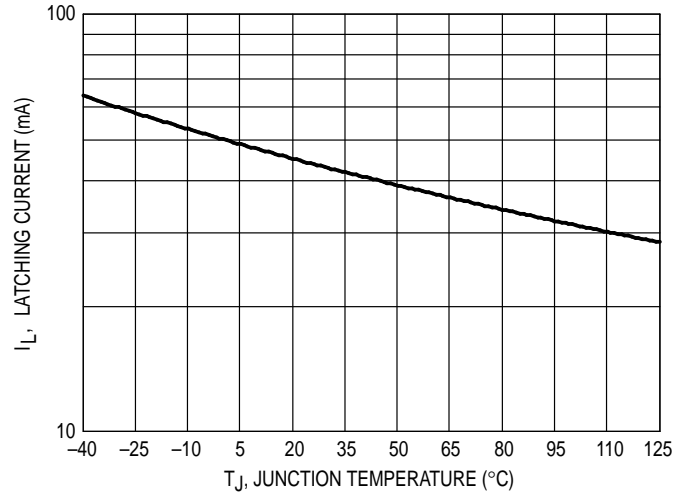


Figure 6. Typical Latching Current Versus Junction Temperature

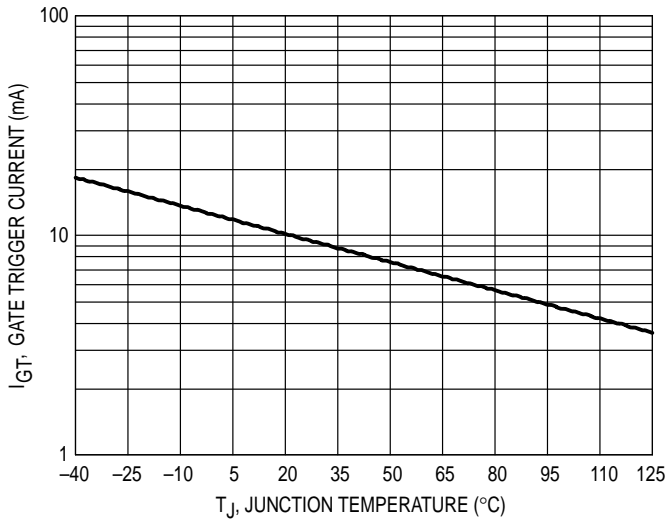


Figure 7. Typical Gate Trigger Current Versus Junction Temperature

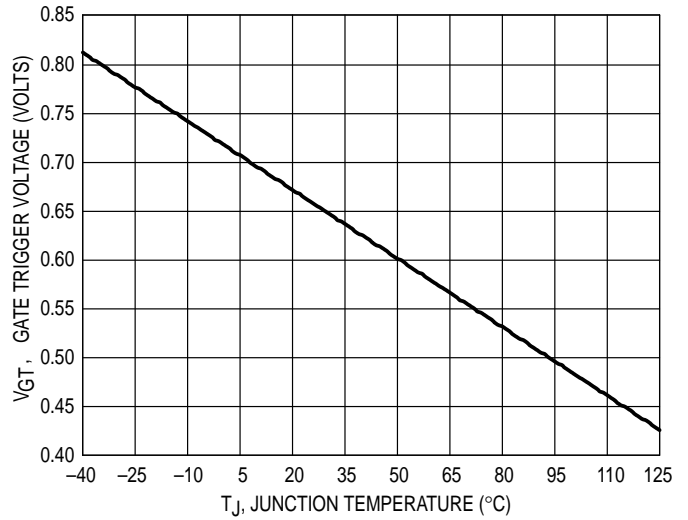


Figure 8. Typical Gate Trigger Voltage Versus Junction Temperature

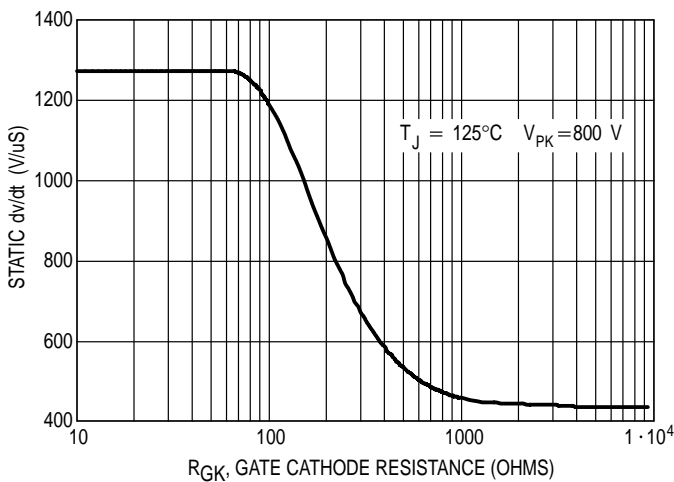


Figure 9. Typical Exponential Static  $dv/dt$  Versus Gate Cathode Resistance.

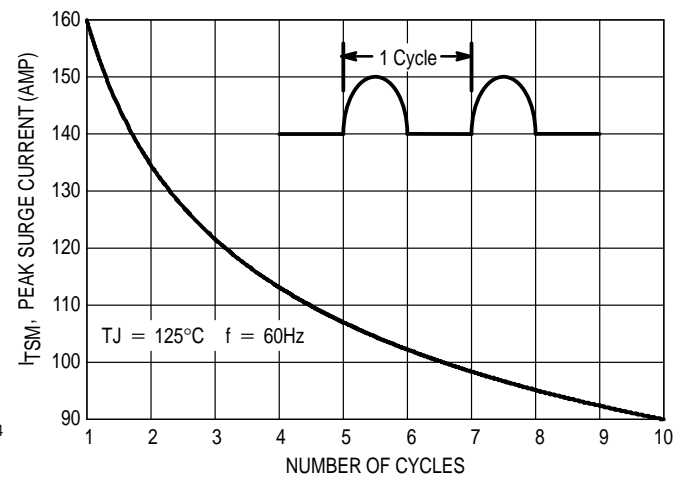
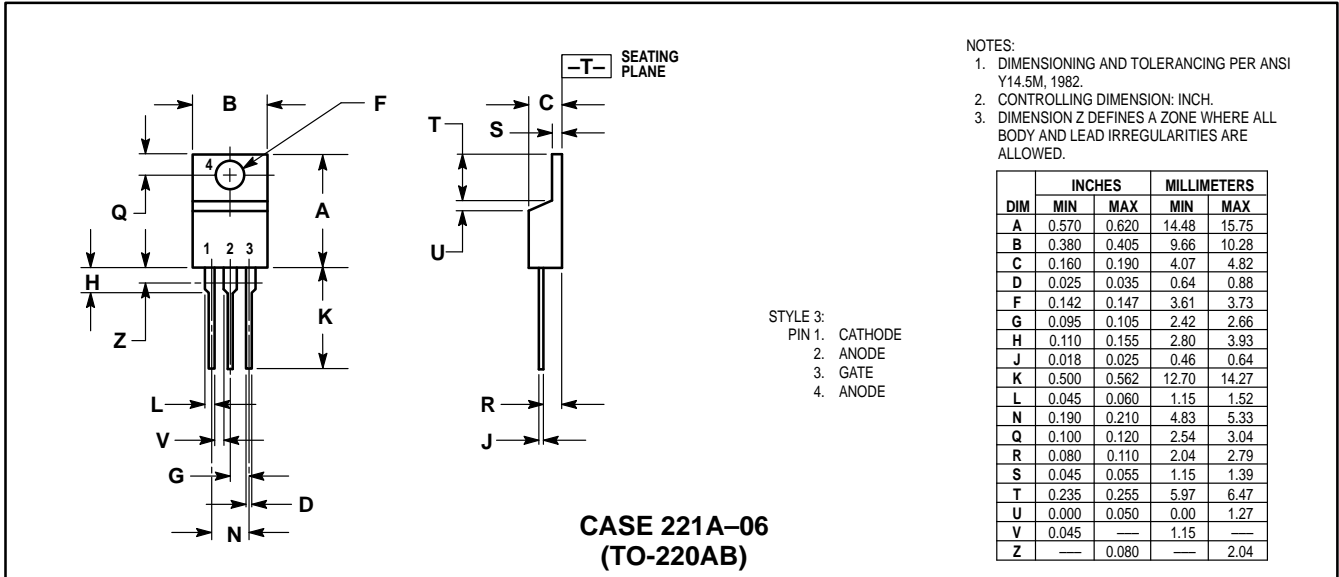


Figure 10. Maximum Non-Repetitive Surge Current

**MCR16 SERIES**


**PACKAGE DIMENSIONS**



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: INCH.
  3. DIMENSION Z DEFINES A ZONE WHERE ALL BODY AND LEAD IRREGULARITIES ARE ALLOWED.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.570	0.620	14.48	15.75
B	0.380	0.405	9.66	10.28
C	0.160	0.190	4.07	4.82
D	0.025	0.035	0.64	0.88
F	0.142	0.147	3.61	3.73
G	0.095	0.105	2.42	2.66
H	0.110	0.155	2.80	3.93
J	0.018	0.025	0.46	0.64
K	0.500	0.562	12.70	14.27
L	0.045	0.060	1.15	1.52
N	0.190	0.210	4.83	5.33
Q	0.100	0.120	2.54	3.04
R	0.080	0.110	2.04	2.79
S	0.045	0.055	1.15	1.39
T	0.235	0.255	5.97	6.47
U	0.000	0.050	0.00	1.27
V	0.045	—	1.15	—
Z	—	0.080	—	2.04

STYLE 3:  
PIN 1. CATHODE  
2. ANODE  
3. GATE  
4. ANODE

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