

## Silicon Controlled Rectifiers Reverse Blocking Thyristors

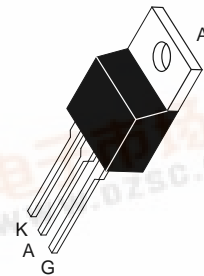
Designed primarily for half-wave ac control applications, such as motor controls, heating controls, and power supplies; or wherever half-wave, silicon gate-controlled devices are needed.

- 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

### MCR16 SERIES\*

\*Motorola preferred devices

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



**CASE 221A-06**  
**(TO-220AB)**  
**Style 3**

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

Parameter	Symbol	Value	Unit
Peak Repetitive Off-State Voltage (1)	$V_{DRM}$		Volts
Peak Repetitive Reverse Voltage ( $T_J = -40$ to $125^\circ\text{C}$ )	$V_{RRM}$		
		400	
		600	
		800	
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	$R_{\theta JC}$	1.5	$^\circ\text{C/W}$
— Junction to Ambient	$R_{\theta JA}$	62.5	
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.

MCR16 SERIES

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

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Peak Forward Blocking Current	I <sub>DRM</sub>	—	—	0.01	mA
Peak Reverse Blocking Current (V <sub>AK</sub> = Rated V <sub>DRM</sub> or V <sub>RRM</sub> , Gate Open)	I <sub>RRM</sub>	—	—	2.0	mA
ON CHARACTERISTICS					
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
DYNAMIC CHARACTERISTICS					
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%.

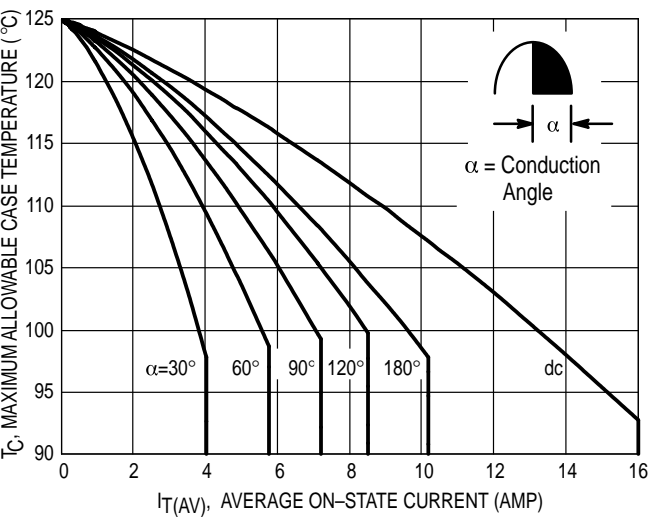


Figure 1. Average Current Derating

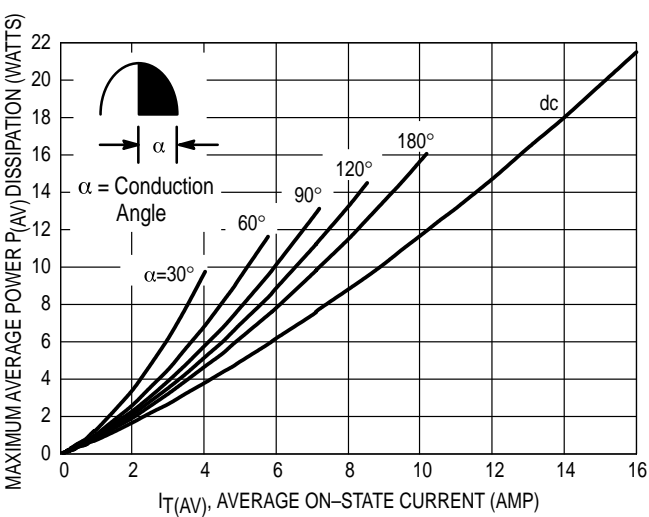


Figure 2. Maximum On-State Power Dissipation

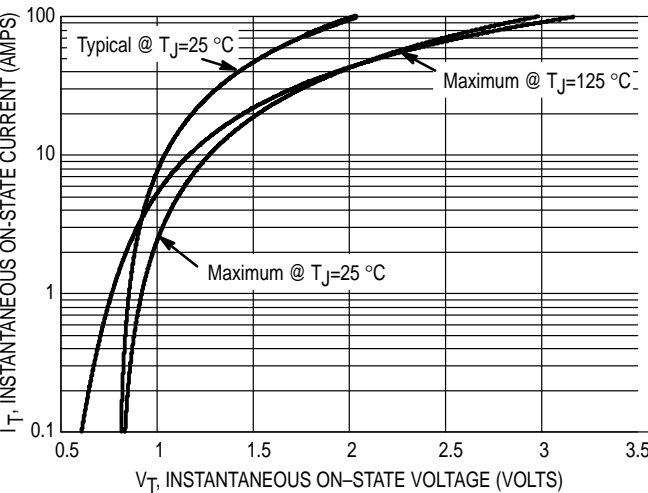


Figure 3. On-State Characteristics

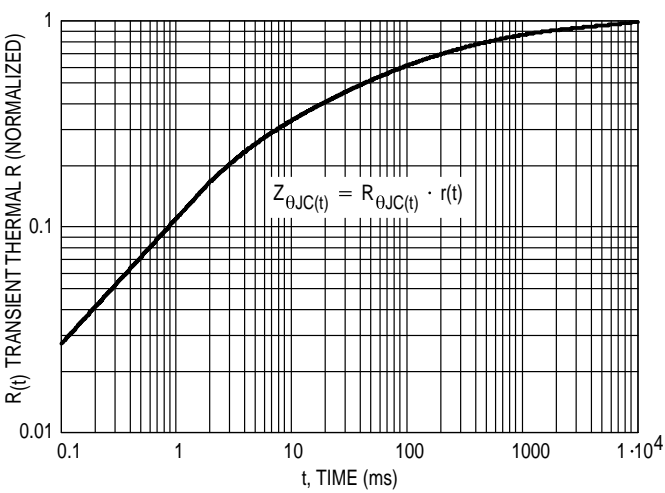
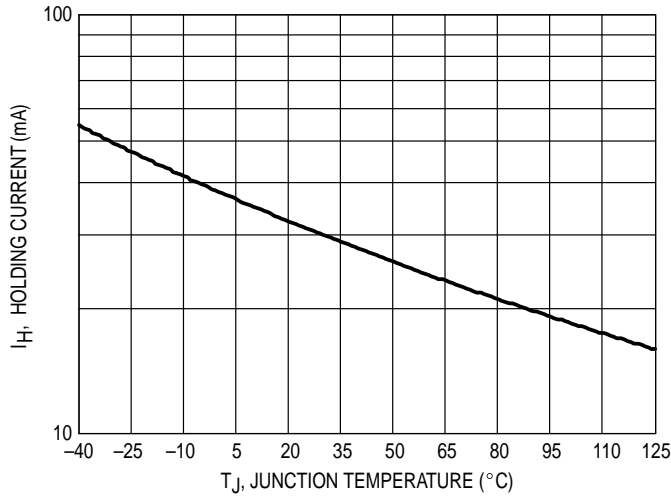
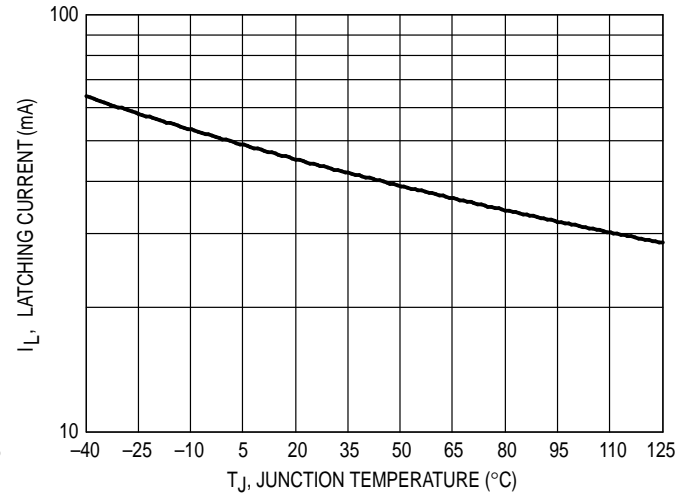


Figure 4. Transient Thermal Response

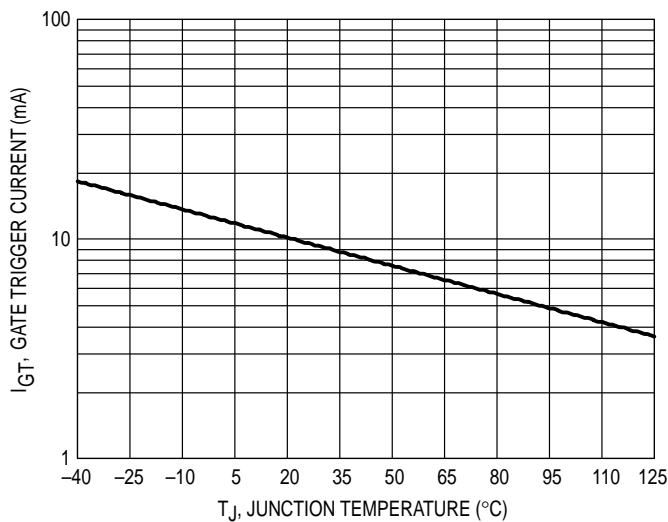
## MCR16 SERIES



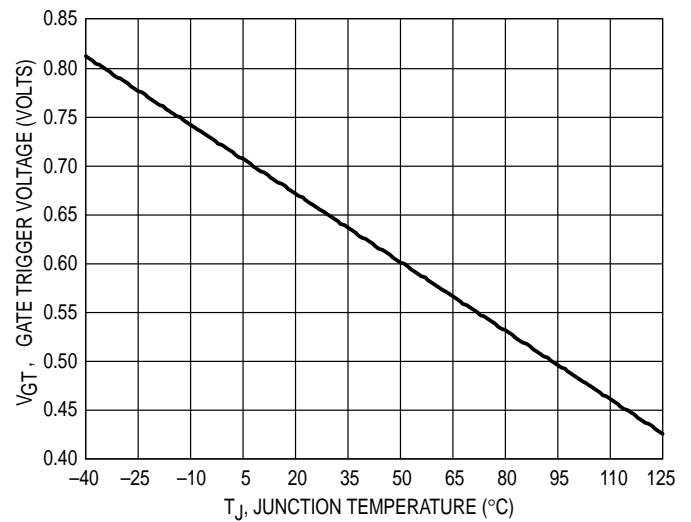
**Figure 5. Typical Holding Current Versus Junction Temperature**



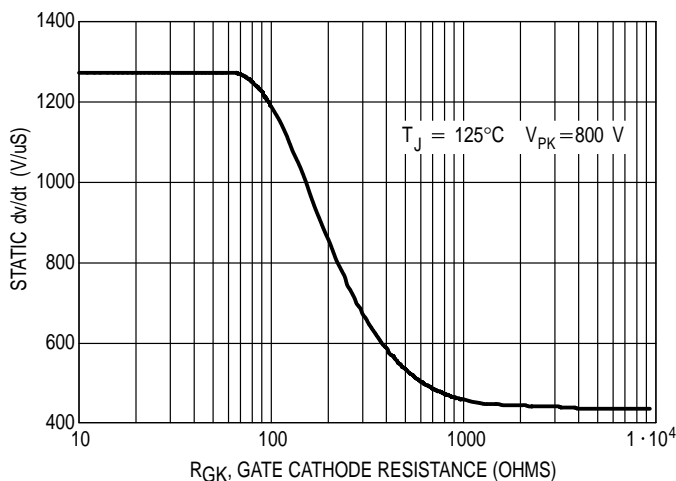
**Figure 6. Typical Latching Current Versus Junction Temperature**



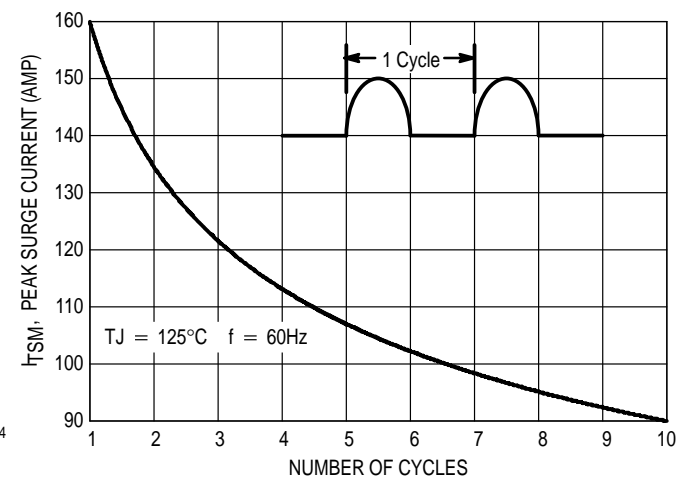
**Figure 7. Typical Gate Trigger Current Versus Junction Temperature**



**Figure 8. Typical Gate Trigger Voltage Versus Junction Temperature**



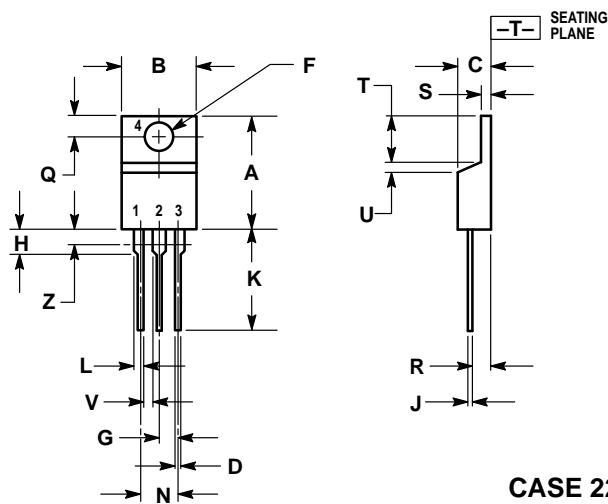
**Figure 9. Typical Exponential Static dv/dt Versus Gate Cathode Resistance.**



**Figure 10. Maximum Non-Repetitive Surge Current**

MCR16 SERIES

PACKAGE DIMENSIONS




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

CASE 221A-06  
(TO-220AB)

- 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

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