

# TRIACS

## Silicon Bidirectional Thyristors

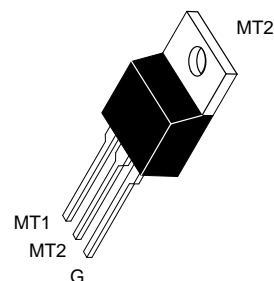
Designed for high performance full-wave ac control applications where high noise immunity and high commutating di/dt are required.

- Blocking Voltage to 800 Volts
- On-State Current Rating of 15 Amperes RMS at 80°C
- Uniform Gate Trigger Currents in Three Modes
- High Immunity to dv/dt — 250 V/μs minimum at 125°C
- Minimizes Snubber Networks for Protection
- Industry Standard TO-220AB Package
- High Commutating di/dt — 9.0 A/ms minimum at 125°C

### MAC15 SERIES\*

\*Motorola preferred devices

TRIACS  
15 AMPERES RMS  
400 thru 800  
VOLTS



CASE 221A-06  
(TO-220AB)  
Style 4

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

Symbol	Parameter	Value	Unit
$V_{DRM}$	Peak Repetitive Off-State Voltage (1) (-40 to 125°C, Sine Wave, 50 to 60 Hz, Gate Open)	MAC15D MAC15M MAC15N 400 600 800	Volts
$I_{T(RMS)}$	On-State RMS Current (60 Hz, $T_C = 80^\circ\text{C}$ )	15	A
$I_{TSM}$	Peak Non-repetitive Surge Current (One Full Cycle, 60 Hz, $T_J = 125^\circ\text{C}$ )	150	A
$I^2t$	Circuit Fusing Consideration ( $t = 8.3$ ms)	93	A <sup>2</sup> sec
$P_{GM}$	Peak Gate Power (Pulse Width $\leq 1.0$ μs, $T_C = 80^\circ\text{C}$ )	20	Watts
$P_{G(AV)}$	Average Gate Power ( $t = 8.3$ ms, $T_C = 80^\circ\text{C}$ )	0.5	Watts
$T_J$	Operating Junction Temperature Range	-40 to +125	°C
$T_{stg}$	Storage Temperature Range	-40 to +150	°C

#### THERMAL CHARACTERISTICS

$R_{\theta JC}$ $R_{\theta JA}$	Thermal Resistance — Junction to Case — Junction to Ambient	2.0 62.5	°C/W
$T_L$	Maximum Lead Temperature for Soldering Purposes 1/8" from Case for 10 Seconds	260	°C

(1)  $V_{DRM}$  for all types can be applied on a continuous basis. 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

# MAC15 SERIES

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

Symbol	Characteristic	Min	Typ	Max	Unit	
<b>OFF CHARACTERISTICS</b>						
I <sub>DRM</sub>	Peak Repetitive Blocking Current (V <sub>D</sub> = Rated V <sub>DRM</sub> , Gate Open)	T <sub>J</sub> = 25°C	—	—	0.01	mA
		T <sub>J</sub> = 125°C	—	—	2.0	

## ON CHARACTERISTICS

V <sub>TM</sub>	Peak On-State Voltage* (I <sub>TM</sub> = ±21 A Peak)	—	1.2	1.6	Volts
I <sub>GT</sub>	Continuous Gate Trigger Current (V <sub>D</sub> = 12 V, R <sub>L</sub> = 100 Ω) MT2(+), G(+) MT2(+), G(-) MT2(-), G(-)	5.0	13	35	mA
		5.0	16	35	
		5.0	18	35	
I <sub>H</sub>	Hold Current (V <sub>D</sub> = 12 V, Gate Open, Initiating Current = ±150 mA)	—	20	40	mA
I <sub>L</sub>	Latch Current (V <sub>D</sub> = 24 V, I <sub>G</sub> = 35 mA) MT2(+), G(+) MT2(+), G(-) MT2(-), G(-)	—	33	50	mA
		—	36	80	
		—	33	50	
V <sub>GT</sub>	Gate Trigger Voltage (V <sub>D</sub> = 12 V, R <sub>L</sub> = 100 Ω) MT2(+), G(+) MT2(+), G(-) MT2(-), G(-)	0.5	0.75	1.5	Volts
		0.5	0.72	1.5	
		0.5	0.82	1.5	

## DYNAMIC CHARACTERISTICS

(di/dt) <sub>C</sub>	Rate of Change of Commutating Current* See Figure 10. (V <sub>D</sub> = 400 V, I <sub>TM</sub> = 6.0 A, Commutating dv/dt = 24 V/μs, Gate Open, T <sub>J</sub> = 125°C, f = 250 Hz, No Snubber)	9.0	—	—	A/ms
dv/dt	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> = 125°C)	250	—	—	V/μs

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

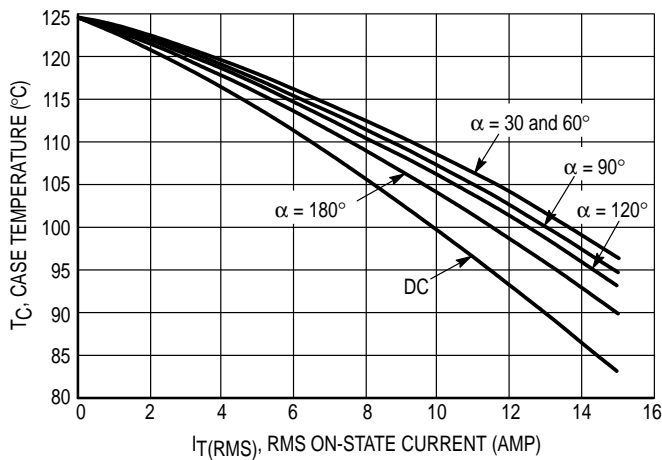


Figure 1. RMS Current Derating

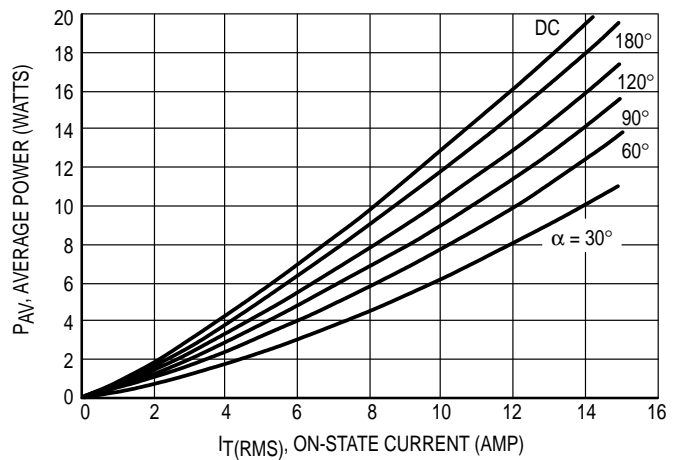


Figure 2. On-State Power Dissipation

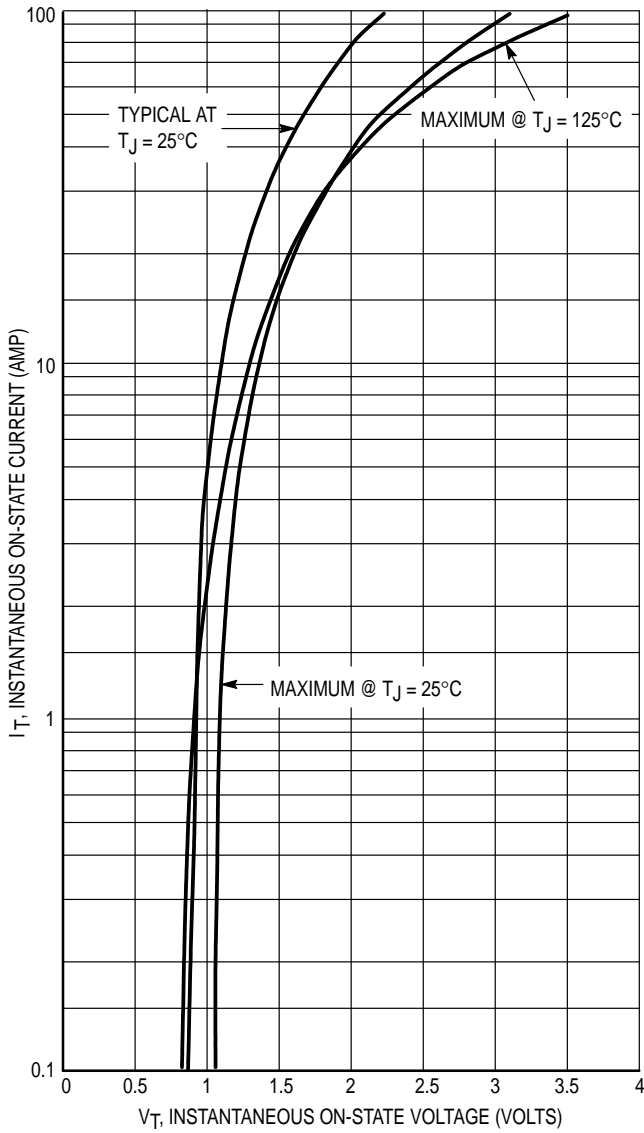


Figure 3. On-State Characteristics

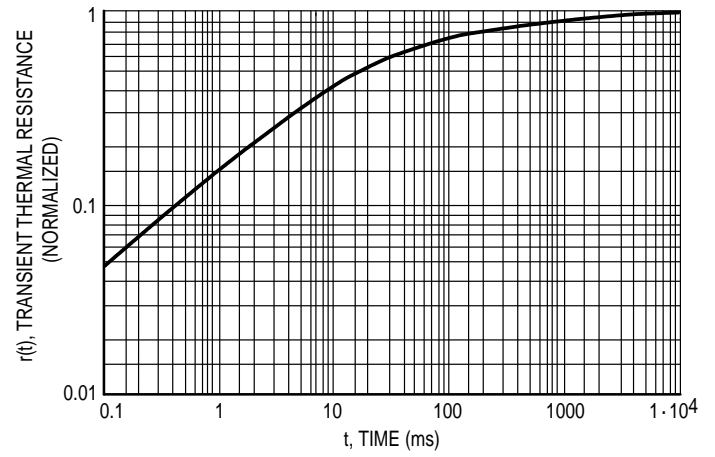


Figure 4. Thermal Response

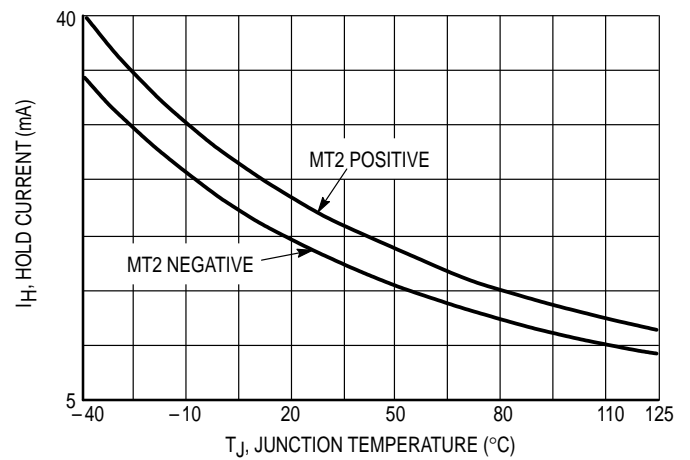


Figure 5. Hold Current Variation

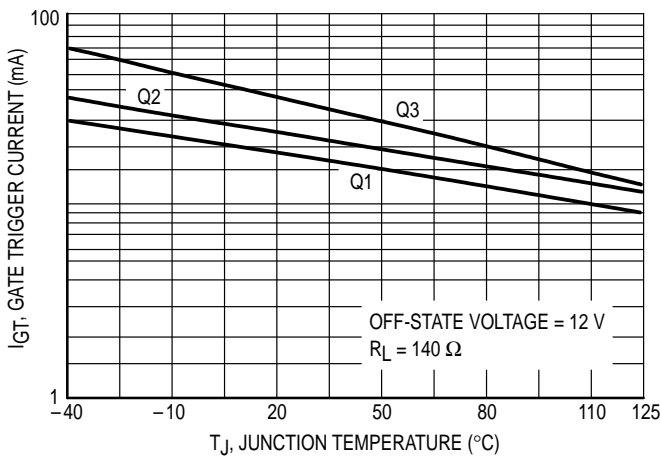


Figure 6. Gate Trigger Current Variation

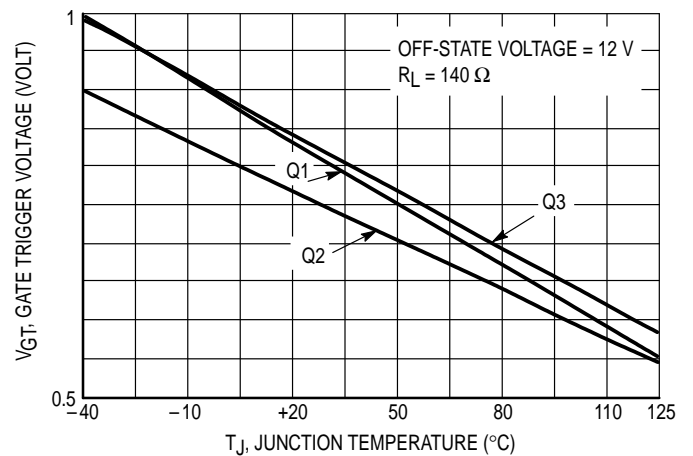
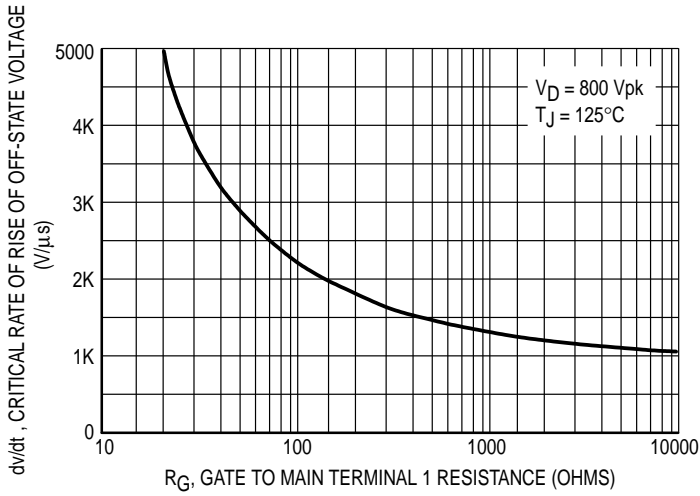
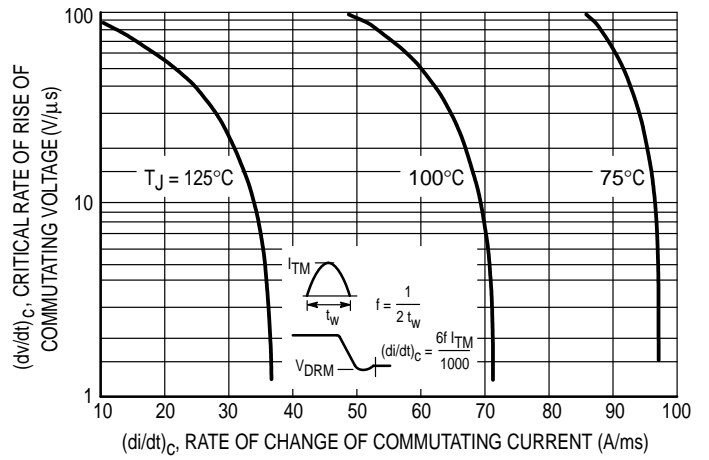


Figure 7. Gate Trigger Voltage Variation

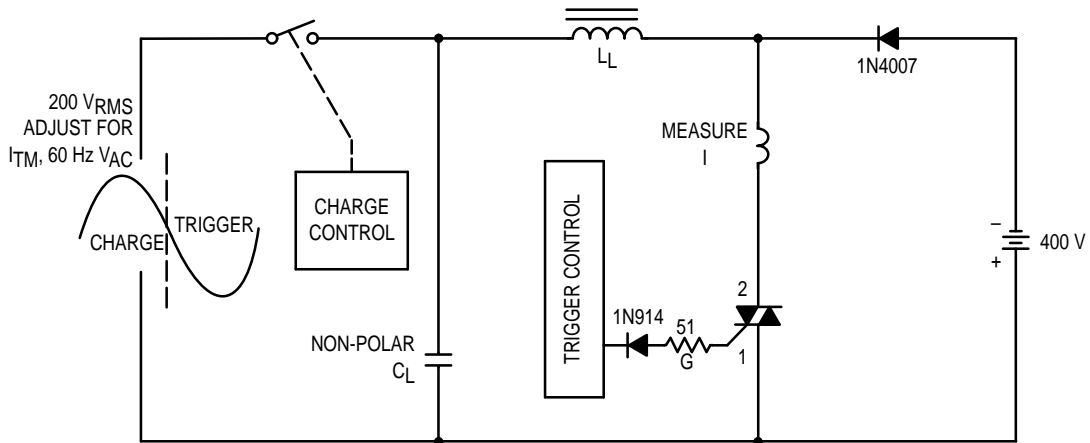
**MAC15 SERIES**



**Figure 8. Critical Rate of Rise of Off-State Voltage (Exponential)**



**Figure 9. Critical Rate of Rise of Commutating Voltage**



Note: Component values are for verification of rated  $(dv/dt)_c$ . See AN1048 for additional information.

**Figure 10. Simplified Test Circuit to Measure the Critical Rate of Rise of Commutating Voltage**