

# TRIACS

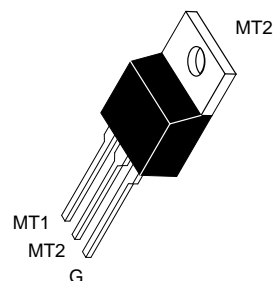
## Silicon Bidirectional Thyristors

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<sub>J</sub> = 25°C unless otherwise noted)

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

### THERMAL CHARACTERISTICS

R <sub>θJC</sub> R <sub>θJA</sub>	Thermal Resistance — Junction to Case — Junction to Ambient	2.0 62.5	°C/W
T <sub>L</sub>	Maximum Lead Temperature for Soldering Purposes 1/8" from Case for 10 Seconds	260	°C

(1) V<sub>DRM</sub> 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%.

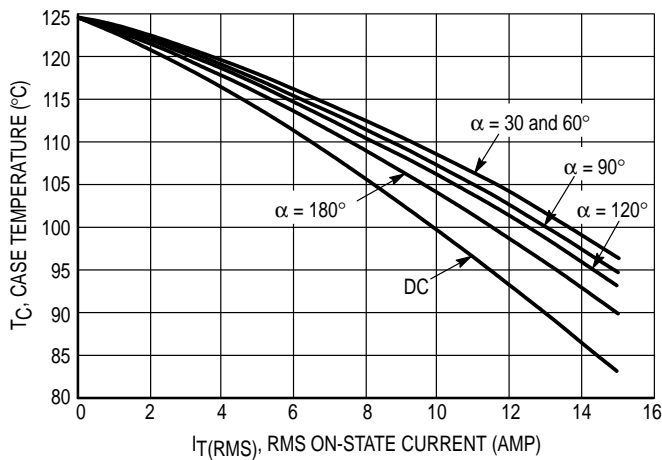


Figure 1. RMS Current Derating

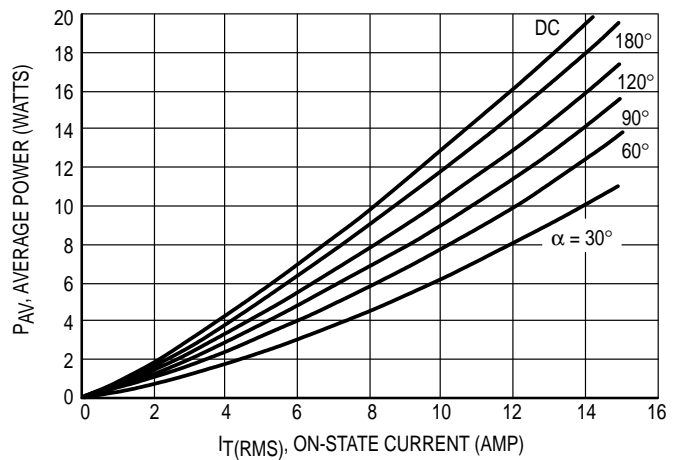


Figure 2. On-State Power Dissipation

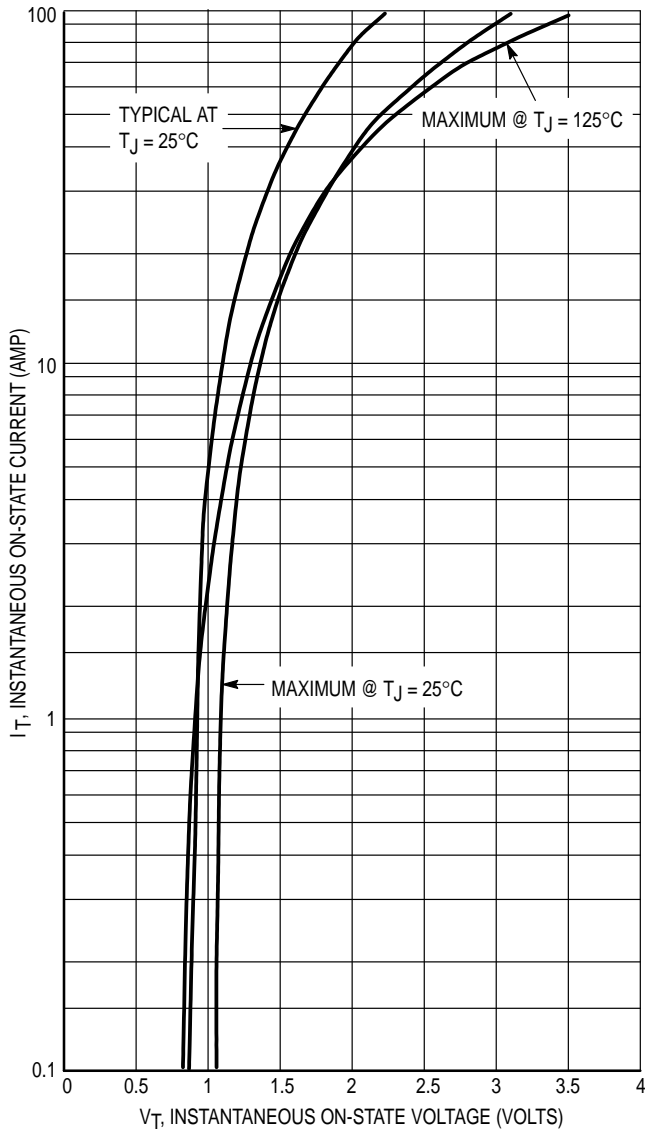


Figure 3. On-State Characteristics

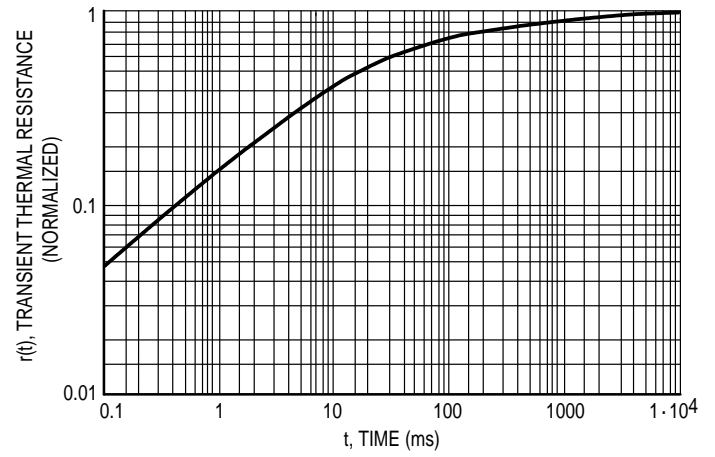


Figure 4. Thermal Response

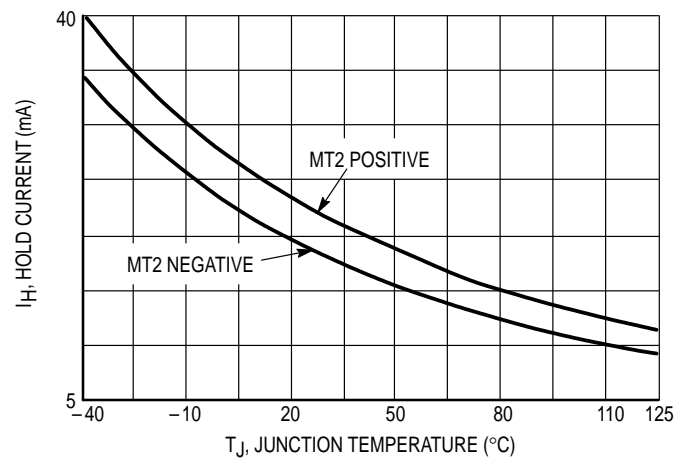


Figure 5. Hold Current Variation

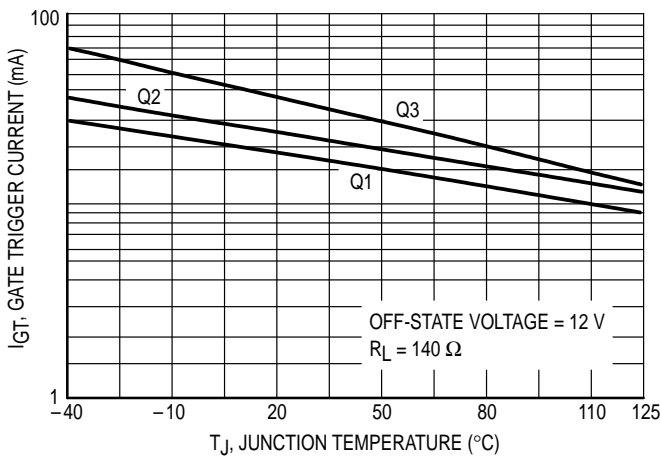


Figure 6. Gate Trigger Current Variation

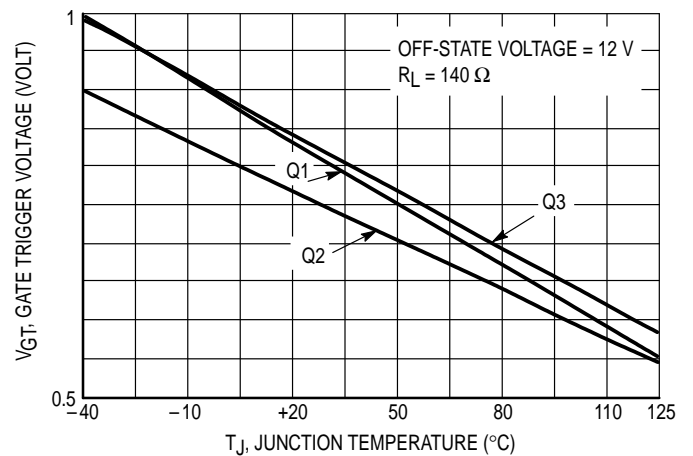
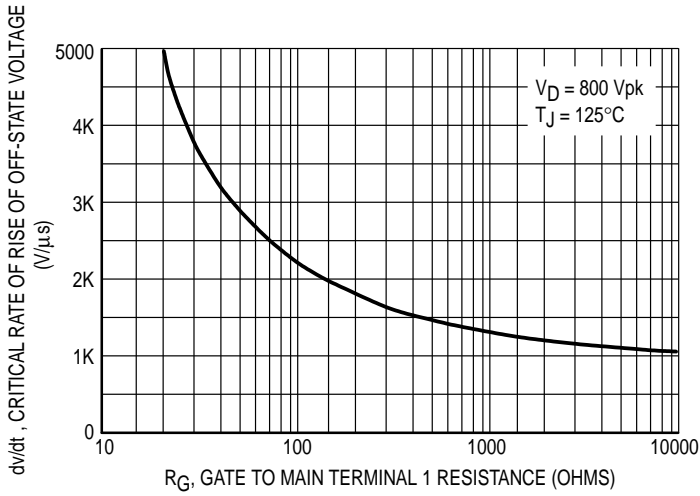
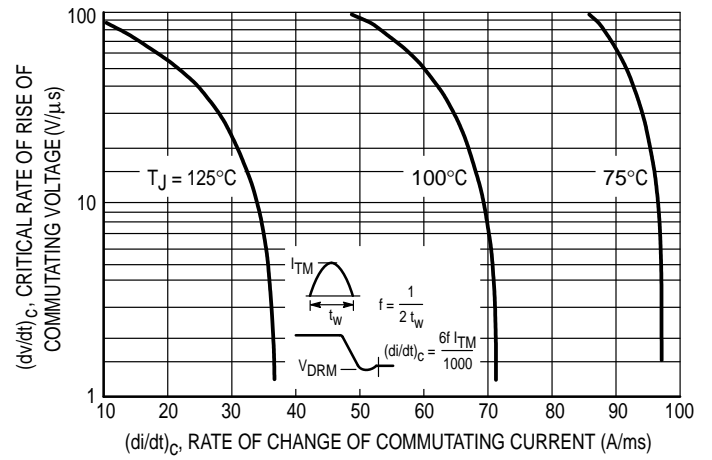


Figure 7. Gate Trigger Voltage Variation

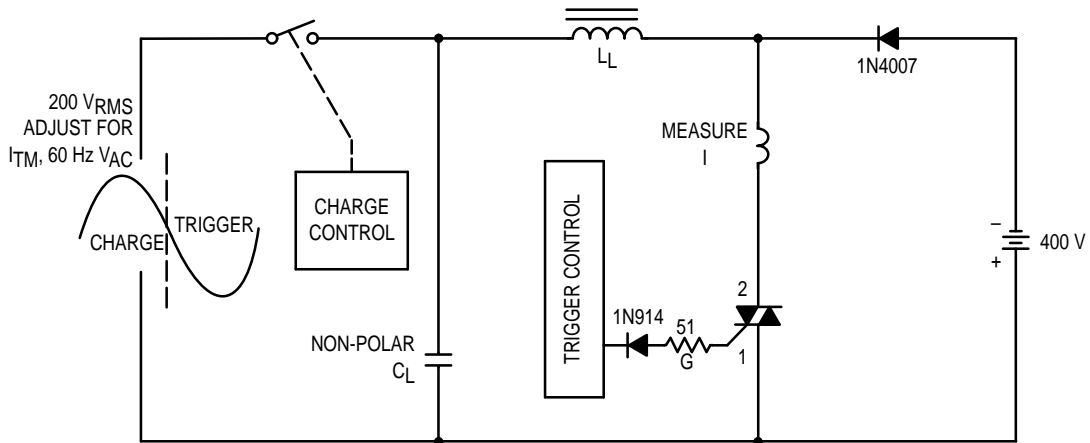
**MAC15 SERIES**



**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**