

TRIACS

Silicon Bidirectional Thyristors

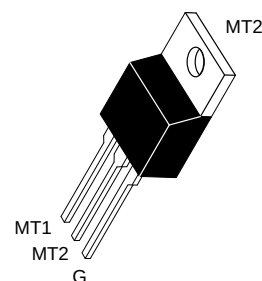
Designed for high performance full-wave ac control applications where high noise immunity and high commutating di/dt are required.

- Blocking Voltage to 800 Volts
- On-State Current Rating of 8.0 Amperes RMS at 100°C
- Uniform Gate Trigger Currents in Three Modes
- High Immunity to dv/dt — 500 V/μs minimum at 125°C
- Minimizes Snubber Networks for Protection
- Industry Standard TO-220AB Package
- High Commutating di/dt — 6.5 A/ms minimum at 125°C

MAC9 SERIES*

*Motorola preferred devices

TRIACS
8.0 AMPERES RMS
400 thru 800
VOLTS



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

MAXIMUM RATINGS (T_J = 25°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)	MAC9D MAC9M MAC9N 400 600 800	Volts
I _{T(RMS)}	On-State RMS Current (60 Hz, T _C = 100°C)	8.0	A
I _{TSM}	Peak Non-repetitive Surge Current (One Full Cycle, 60 Hz, T _J = 125°C)	80	A
I ² t	Circuit Fusing Consideration (t = 8.3 ms)	26	A ² sec
P _{GM}	Peak Gate Power (Pulse Width ≤ 1.0 μs, T _C = 80°C)	16	Watts
P _{G(AV)}	Average Gate Power (t = 8.3 ms, T _C = 80°C)	0.35	Watts
T _J	Operating Junction Temperature Range	–40 to +125	°C
T _{stg}	Storage Temperature Range	–40 to +150	°C

THERMAL CHARACTERISTICS

R _{θJC} R _{θJA}	Thermal Resistance — Junction to Case — Junction to Ambient	2.2 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.

MAC9 SERIES

ELECTRICAL CHARACTERISTICS ($T_J = 25^\circ\text{C}$ unless otherwise noted)

Symbol	Characteristic	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
I_{DRM}	Peak Repetitive Blocking Current ($V_D = \text{Rated } V_{\text{DRM}}$, Gate Open)	—	—	0.01	mA
	$T_J = 25^\circ\text{C}$	—	—	2.0	
	$T_J = 125^\circ\text{C}$	—	—		

ON CHARACTERISTICS

V_{TM}	Peak On-State Voltage* ($I_{\text{TM}} = \pm 11 \text{ A Peak}$)	—	1.2	1.6	Volts
I_{GT}	Continuous Gate Trigger Current ($V_D = 12 \text{ V}$, $R_L = 100 \Omega$) MT2(+), G(+) MT2(+), G(–) MT2(–), G(–)	10 10 10	16 18 22	50 50 50	mA
I_{H}	Hold Current ($V_D = 12 \text{ V}$, Gate Open, Initiating Current = $\pm 150 \text{ mA}$)	—	30	50	mA
I_{L}	Latch Current ($V_D = 24 \text{ V}$, $I_{\text{G}} = 50 \text{ mA}$) MT2(+), G(+); MT2(–), G(–) MT2(+), G(–)	— —	20 30	50 80	mA
V_{GT}	Gate Trigger Voltage ($V_D = 12 \text{ V}$, $R_L = 100 \Omega$) MT2(+), G(+) MT2(+), G(–) MT2(–), G(–)	0.5 0.5 0.5	0.69 0.77 0.72	1.5 1.5 1.5	Volts

DYNAMIC CHARACTERISTICS

$(di/dt)_C$	Rate of Change of Commutating Current* See Figure 10. ($V_D = 400 \text{ V}$, $I_{\text{TM}} = 4.4 \text{ A}$, Commutating $dv/dt = 18 \text{ V}/\mu\text{s}$, Gate Open, $T_J = 125^\circ\text{C}$, $f = 250 \text{ Hz}$, No Snubber)	6.5	—	—	A/ms
dv/dt	Critical Rate of Rise of Off-State Voltage ($V_D = \text{Rated } V_{\text{DRM}}$, Exponential Waveform, Gate Open, $T_J = 125^\circ\text{C}$)	500	—	—	V/ μs

*Indicates Pulse Test: Pulse Width $\leq 2.0 \text{ ms}$, Duty Cycle $\leq 2\%$.

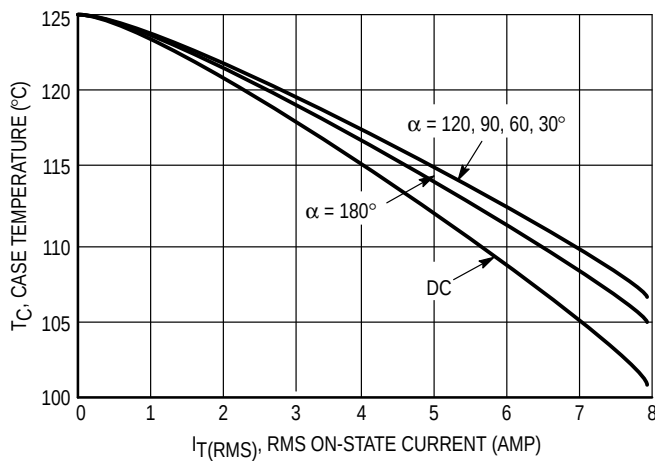


Figure 1. RMS Current Derating

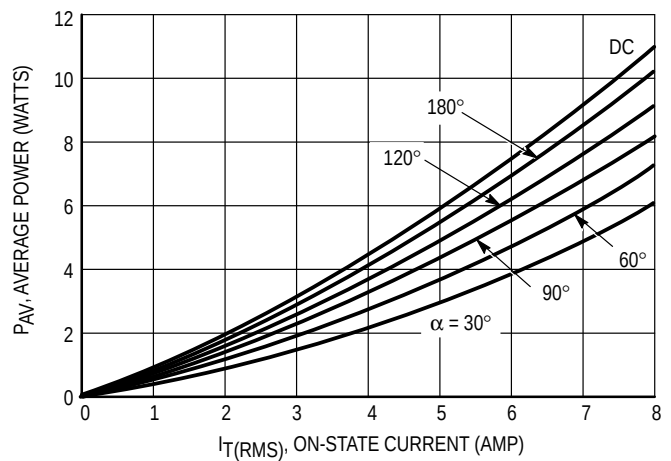


Figure 2. On-State Power Dissipation

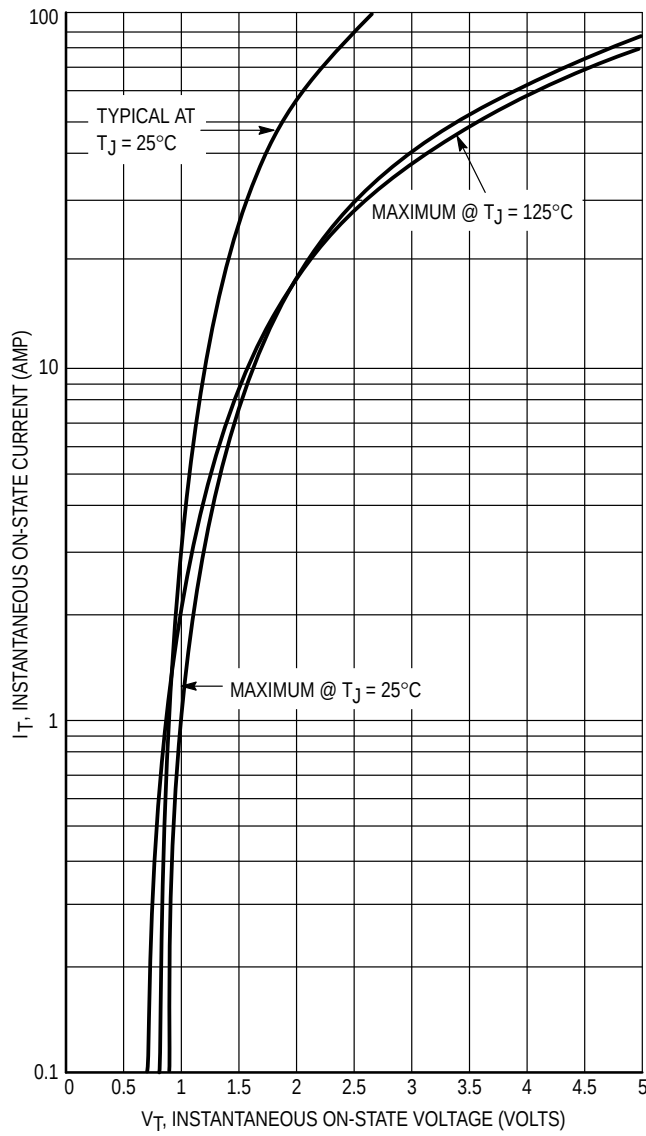


Figure 3. On-State Characteristics

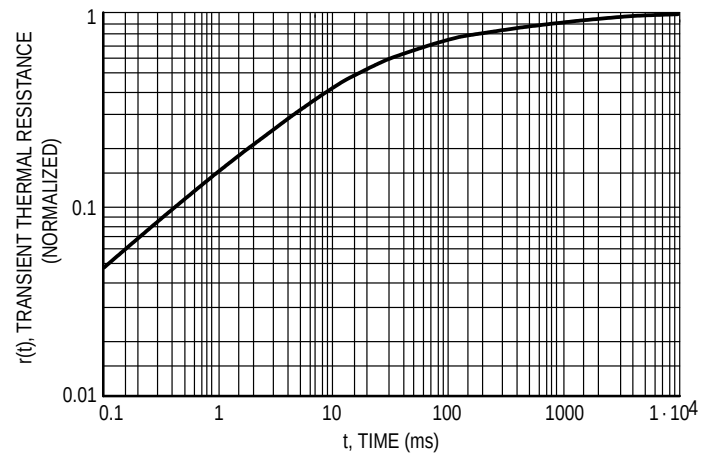


Figure 4. Thermal Response

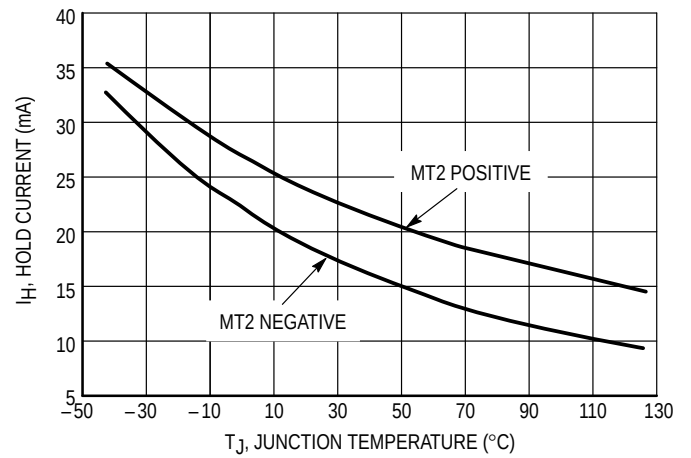


Figure 5. Hold Current Variation

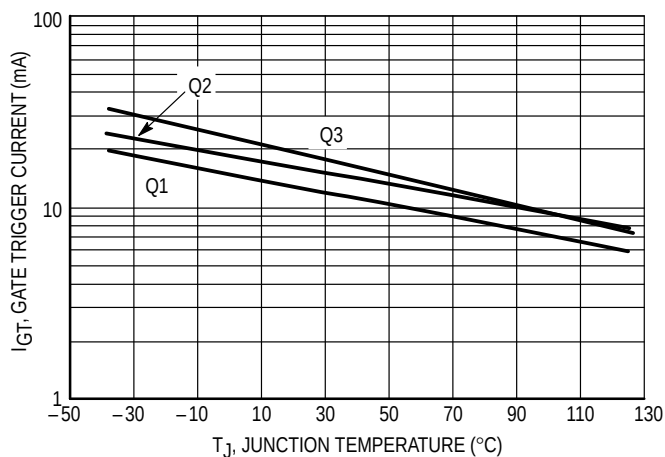


Figure 6. Gate Trigger Current Variation

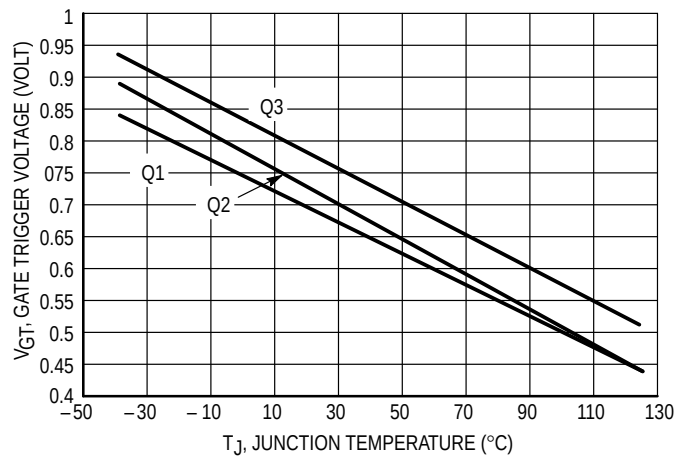


Figure 7. Gate Trigger Voltage Variation

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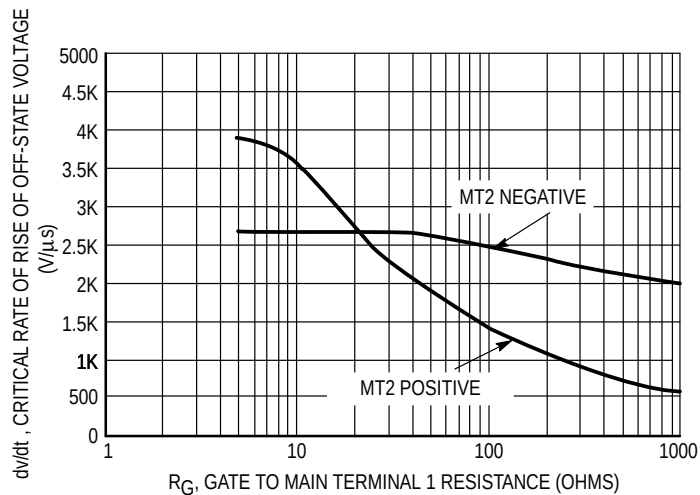


Figure 8. Critical Rate of Rise of Off-State Voltage (Exponential)

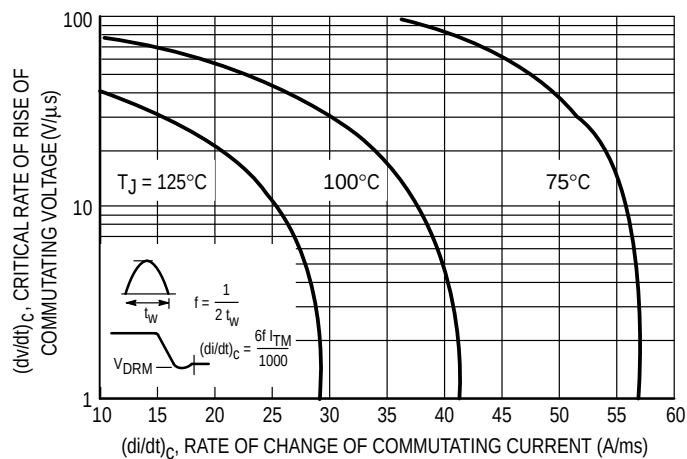
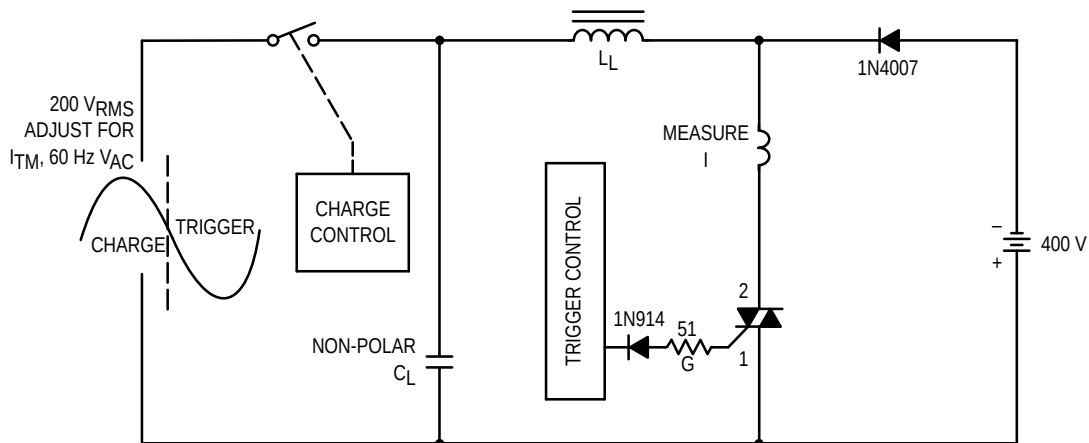


Figure 9. Critical Rate of Rise of Commutating Voltage



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