

TRIACS

Silicon Bidirectional Thyristors

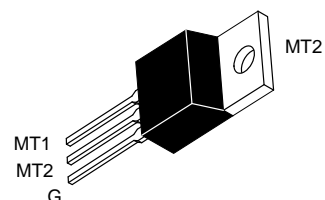
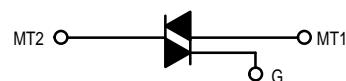
Designed for high performance full-wave ac control applications where high noise immunity and high commutating di/dt are required.

- 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 — 500 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

MAC16 SERIES*

*Motorola preferred devices

TRIACS
15 AMPERES RMS
400 thru 800
VOLTS



CASE 221A-09
(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)	MAC16D 400 MAC16M 600 MAC16N 800	Volts
I _{T(RMS)}	On-State RMS Current (60 Hz, T _C = 80°C)	15	A
I _{TSM}	Peak Non-repetitive Surge Current (One Full Cycle, 60 Hz, T _J = 125°C)	150	A
I ² t	Circuit Fusing Consideration (t = 8.3 ms)	93	A ² sec
P _{GM}	Peak Gate Power (Pulse Width ≤ 1.0 μs, T _C = 80°C)	20	Watts
P _{G(AV)}	Average Gate Power (t = 8.3 ms, T _C = 80°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 _{θJC} R _{θJA}	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.



MAC16 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)				mA
				0.01	
				2.0	

ON CHARACTERISTICS

V_{TM}	Peak On-State Voltage* ($I_{\text{TM}} = \pm 21 \text{ A Peak}$)	—	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 = $\pm 150 \text{ mA}$)	—	20	50	mA
I_{L}	Latch Current ($V_D = 24 \text{ V}$, $I_{\text{G}} = 50 \text{ mA}$) MT2(+), G(+) MT2(+), G(–) MT2(–), G(–)	— — —	33 36 33	50 80 50	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	0.75 0.72 0.82	1.5 1.5 1.5	Volts

DYNAMIC CHARACTERISTICS

$(di/dt)_C$	Rate of Change of Commutating Current* See Figure 10. ($V_D = 400 \text{ V}$, $I_{\text{TM}} = 6.0 \text{ A}$, Commutating $dv/dt = 24 \text{ V}/\mu\text{s}$, Gate Open, $T_J = 125^\circ\text{C}$, $f = 250 \text{ Hz}$, No Snubber)	9.0	—	—	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 $\leq 2\%$.

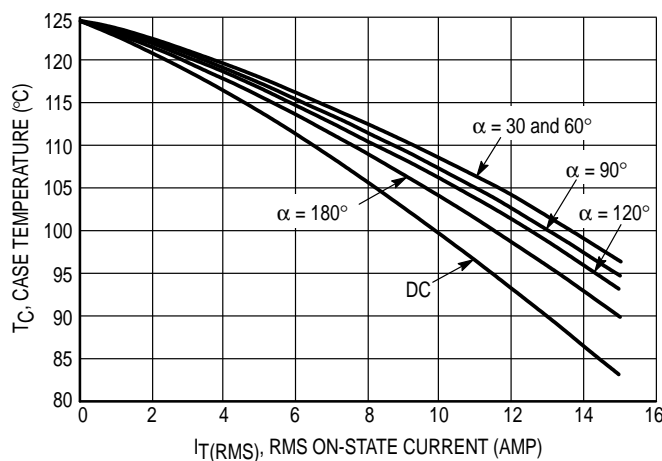


Figure 1. RMS Current Derating

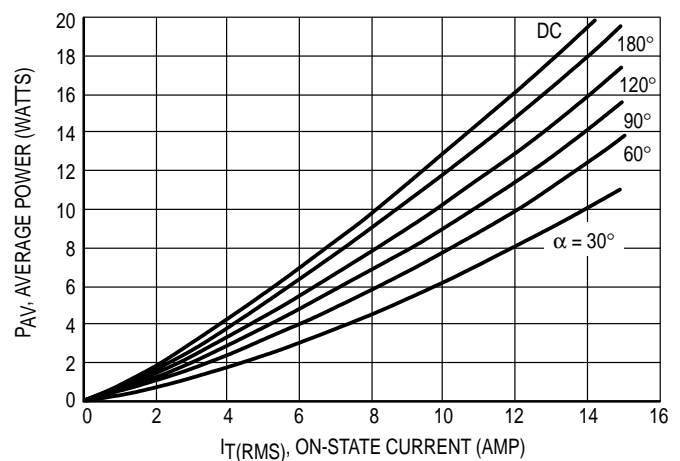


Figure 2. On-State Power Dissipation

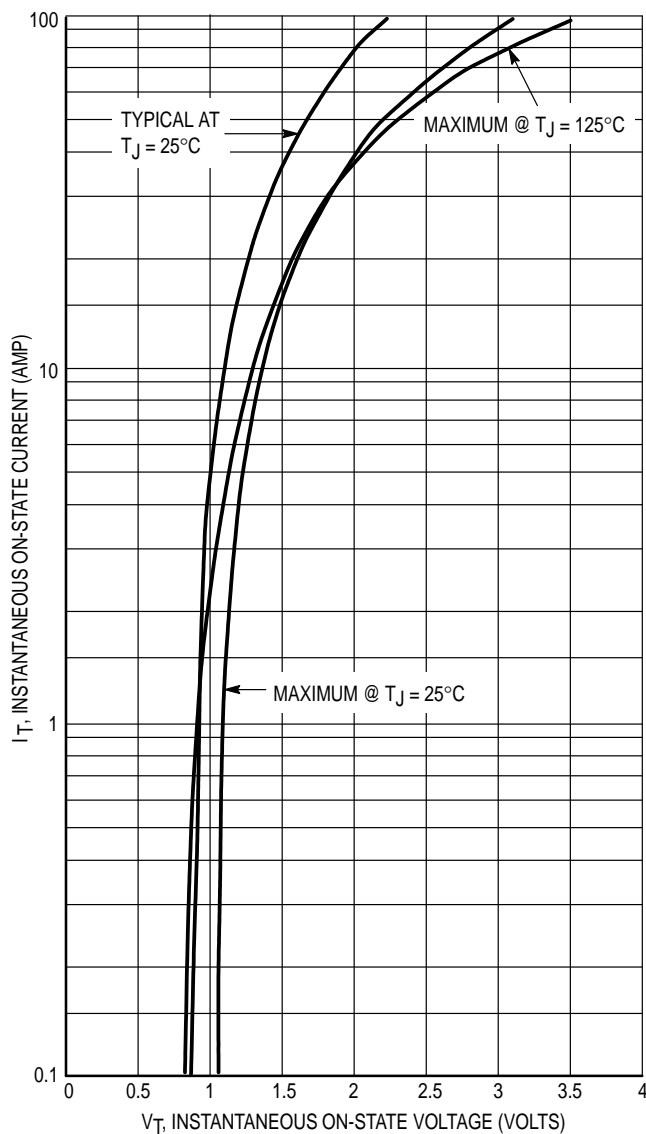


Figure 3. On-State Characteristics

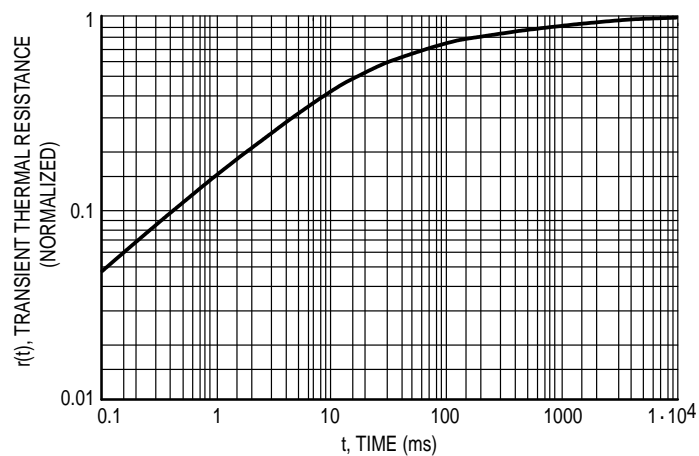


Figure 4. Thermal Response

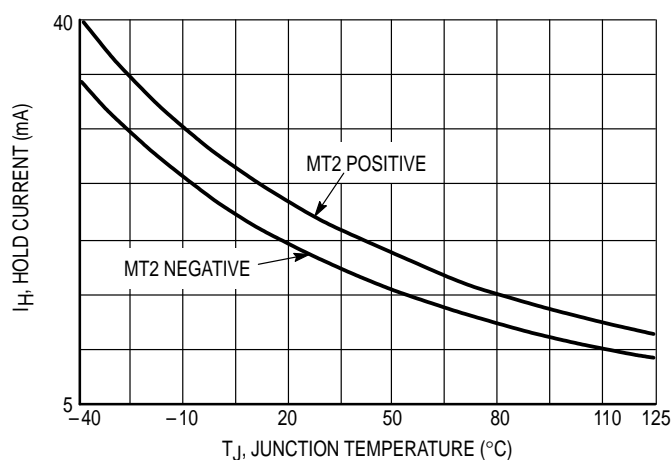


Figure 5. Hold Current Variation

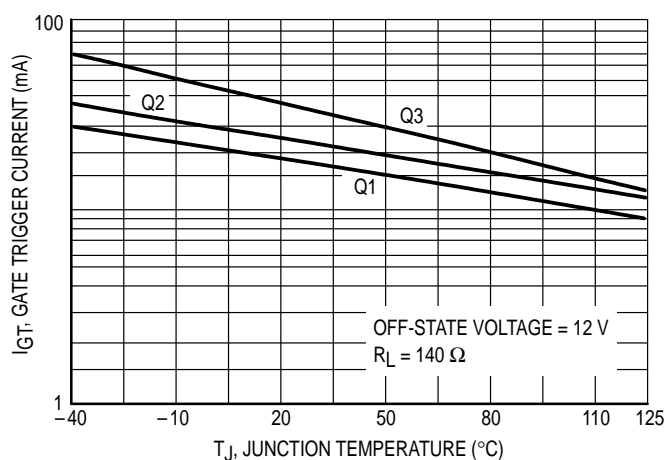


Figure 6. Gate Trigger Current Variation

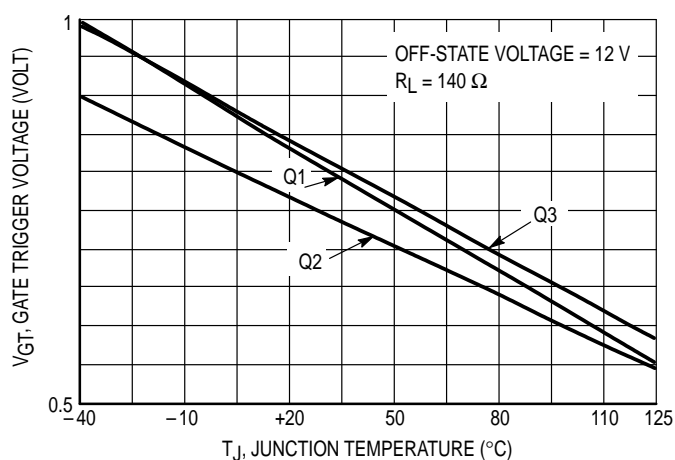


Figure 7. Gate Trigger Voltage Variation

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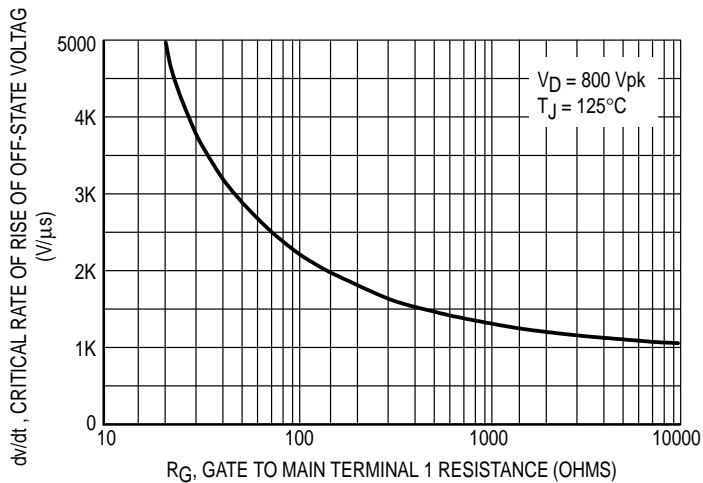


Figure 8. Critical Rate of Rise of Off-State Voltage (Exponential)

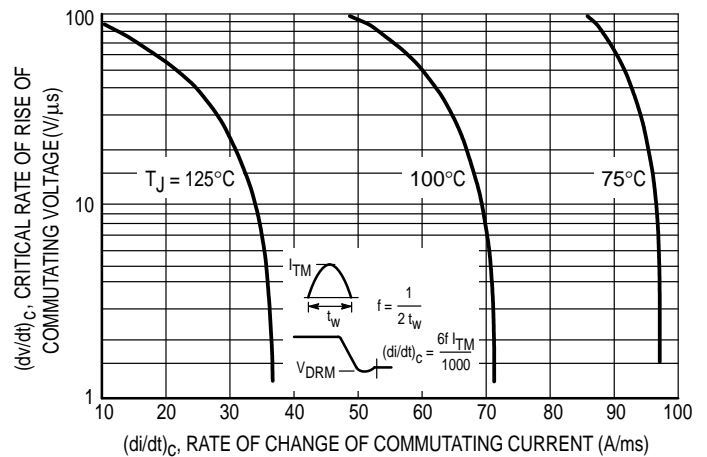
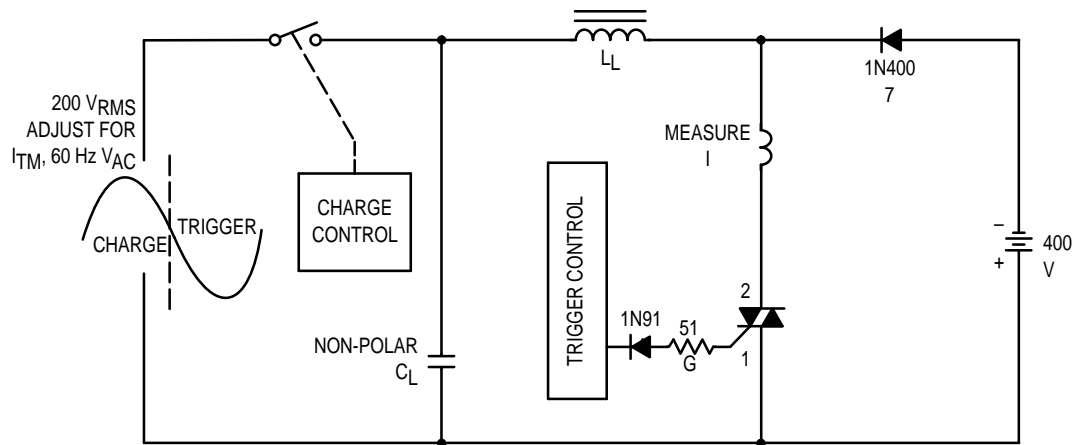


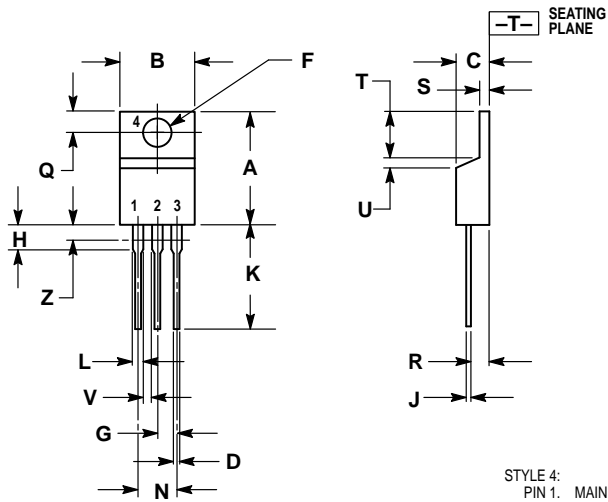
Figure 9. Critical Rate of Rise of Commutating Voltage



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

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

**CASE 221A-09
(TO-220AB)
ISSUE Z**

NOTES

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