

# Advance Information

## TRIACS

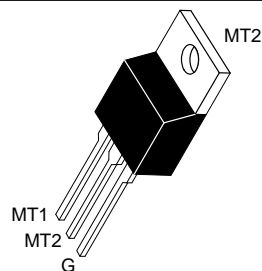
### Silicon Bidirectional Thyristors

## MAC8S SERIES

**TRIACS**  
**8 AMPERES RMS**  
**400 THRU 800**  
**VOLTS**

Designed for industrial and consumer applications for full wave control of ac loads such as appliance controls, heater controls, motor controls, and other power switching applications.

- Sensitive Gate Allows Triggering by Microcontrollers and other Logic Circuits
- High Immunity to  $dv/dt$  — 25 V/ $\mu$ s Minimum at 110°C
- High Commutating  $di/dt$  — 8.0 A/ms Minimum at 110°C
- Minimum and Maximum Values of  $I_{GT}$ ,  $V_{GT}$  and  $I_H$  Specified for ease of Design
- On-State Current Rating of 8 Amperes RMS at 70°C
- High Surge Current Capability — 70 Amperes
- Blocking Voltage to 800 Volts
- Rugged, Economical TO220AB Package



**CASE 221A-06**  
**(TO-220AB)**  
**STYLE 4**

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

Parameter	Symbol	Value	Unit
Peak Repetitive Off-State Voltage (1) ( $T_J = -40$ to $110^\circ\text{C}$ , Sine Wave, 50 to 60Hz, Gate Open)	$V_{DRM}$	400 600 800	Volts
On-State RMS Current (Full Cycle Sine Wave, 60Hz, $T_J = 70^\circ\text{C}$ )	$I_{T(RMS)}$	8	A
Peak Non-repetitive Surge Current (One Half Cycle, 60Hz, $T_J = 110^\circ\text{C}$ )	$I_{TSM}$	70	A
Circuit Fusing Consideration ( $t = 8.3$ ms)	$I^2t$	20	$\text{A}^2\text{sec}$
Peak Gate Power (Pulse Width $\leq 1.0\mu\text{s}$ , $T_C = 70^\circ\text{C}$ )	$P_{GM}$	16	Watts
Average Gate Power ( $t = 8.3\text{ms}$ , $T_C = 70^\circ\text{C}$ )	$P_{G(AV)}$	0.35	Watts
Operating Junction Temperature Range	$T_J$	$-40$ to $+110$	$^\circ\text{C}$
Storage Temperature Range	$T_{stg}$	$-40$ to $+150$	$^\circ\text{C}$

#### THERMAL CHARACTERISTICS

Thermal Resistance — Junction to Case — Junction to Ambient	$R_{\theta JC}$ $R_{\theta JA}$	2.2 62.5	$^\circ\text{C/W}$
Maximum Lead Temperature for Soldering Purposes 1/8" from Case for 5 Seconds	$T_L$	260	$^\circ\text{C}$

(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.

# MAC8S SERIES

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

Characteristic	Symbol	Min	Typ	Max	Unit
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### OFF CHARACTERISTICS

Peak Repetitive Blocking Current (V <sub>D</sub> = Rated V <sub>DRM</sub> , Gate Open)	I <sub>DRM</sub>	—	—	0.01 2.0	mA
		T <sub>J</sub> = 25°C			
		T <sub>J</sub> = 110°C			

### ON CHARACTERISTICS

Peak On-State Voltage* (I <sub>TM</sub> = ±11A)	V <sub>TM</sub>	—	—	1.85	Volts
Continuous Gate Trigger Current (V <sub>D</sub> = 12 V, R <sub>L</sub> = 100Ω)	I <sub>GT</sub>	.8	2.0	5.0	mA
MT2(+), G(+)		.8	3.0	5.0	
MT2(+), G(-)		.8	3.0	5.0	
MT2(-), G(-)					
Hold Current (V <sub>D</sub> = 12V, Gate Open, Initiating Current = ±150mA)	I <sub>H</sub>	1.0	3.0	10	mA
Latching Current (V <sub>D</sub> = 24V, I <sub>G</sub> = 5mA)	I <sub>L</sub>	2.0	5.0	15	mA
MT2(+), G(+)		2.0	10	20	
MT2(-), G(-)		2.0	5.0	15	
MT2(+), G(-)					
Gate Trigger Voltage (Continuous dc) (V <sub>D</sub> = 12 V, R <sub>L</sub> = 100Ω)	V <sub>GT</sub>	0.45	0.62	1.5	Volts
MT2(+), G(+)		0.45	0.60	1.5	
MT2(+), G(-)		0.45	0.65	1.5	
MT2(-), G(-)					

### DYNAMIC CHARACTERISTICS

Critical Rate of Rise of Off-State Voltage (V <sub>D</sub> = 400V, I <sub>TM</sub> = 3.5A, Commutating dv/dt = 10V/μsec, Gate Open, T <sub>J</sub> = 110°C, f = 500 Hz, Snubber: C <sub>S</sub> = 0.01 μF, R <sub>S</sub> = 15Ω, see Figure 16.)	(dv/dt) <sub>c</sub>	8.0	10	—	A/ms
Critical Rate of Rise of Off-State Voltage (V <sub>D</sub> = Rate V <sub>DRM</sub> , Exponential Waveform, R <sub>GK</sub> = 510Ω, T <sub>J</sub> = 110°C)	dv/dt	25	75	—	V/μs

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

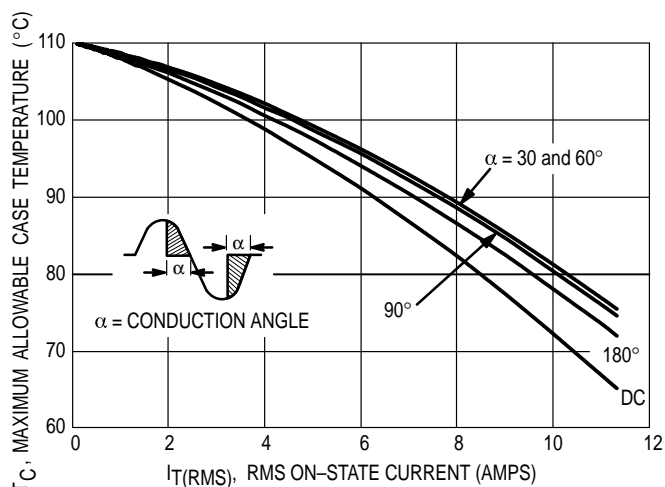


Figure 1.0 RMS Current Derating

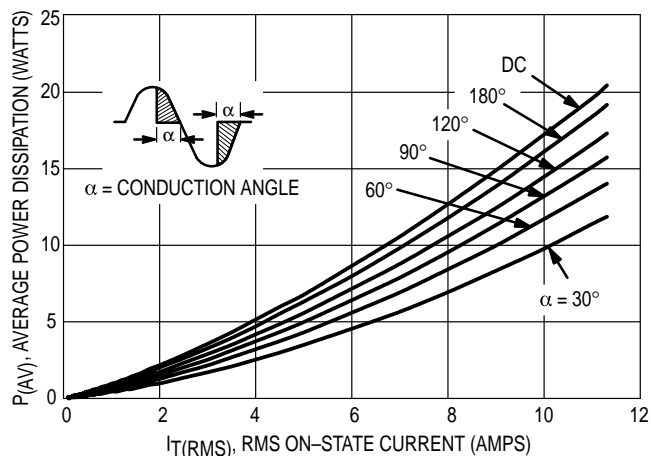
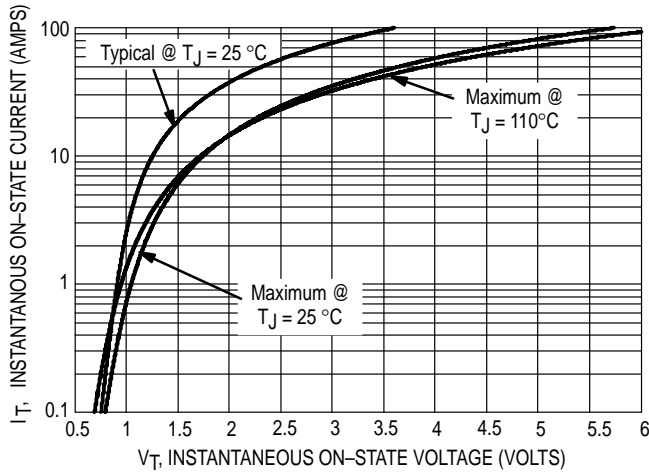
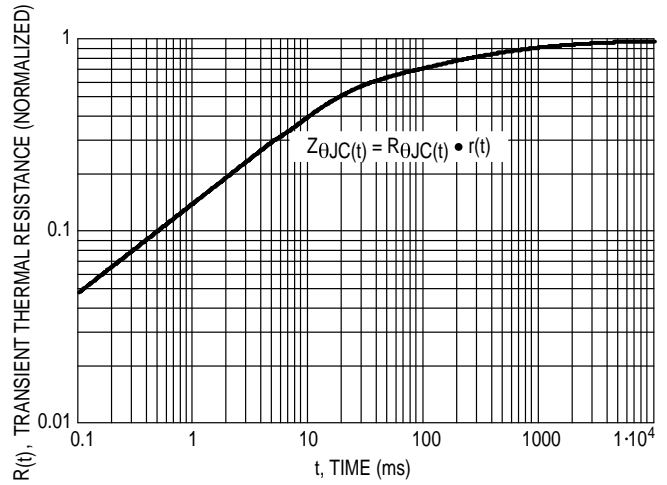


Figure 2.0 Maximum On-State Power Dissipation

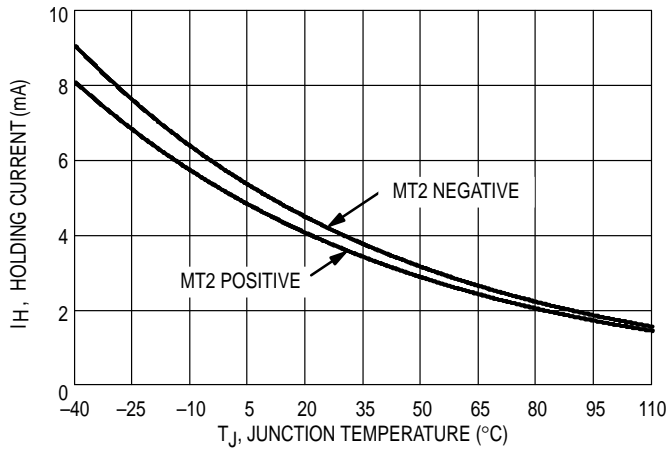
# MAC8S SERIES



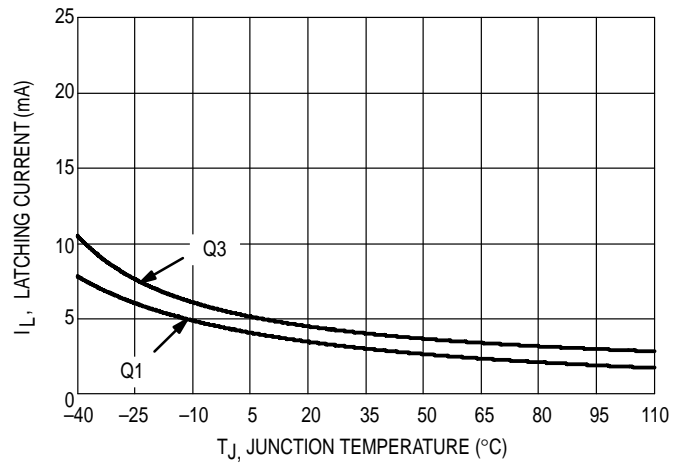
**Figure 3.0 On-State Characteristics**



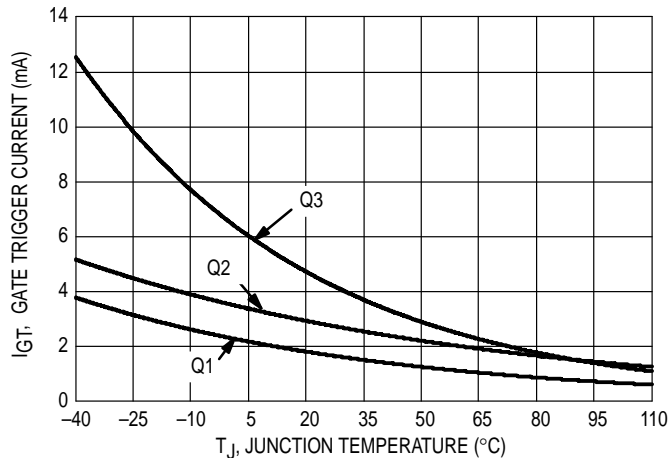
**Figure 4.0 Transient Thermal Response**



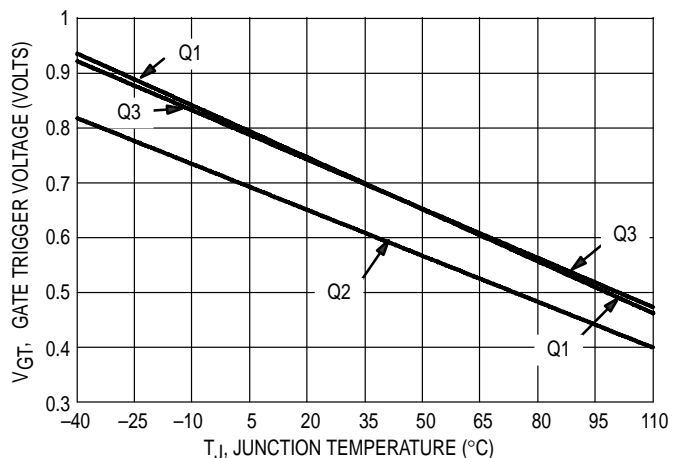
**Figure 5.0 Typical Holding Current Versus Junction Temperature**



**Figure 6.0 Typical Latching Current Versus Junction Temperature**

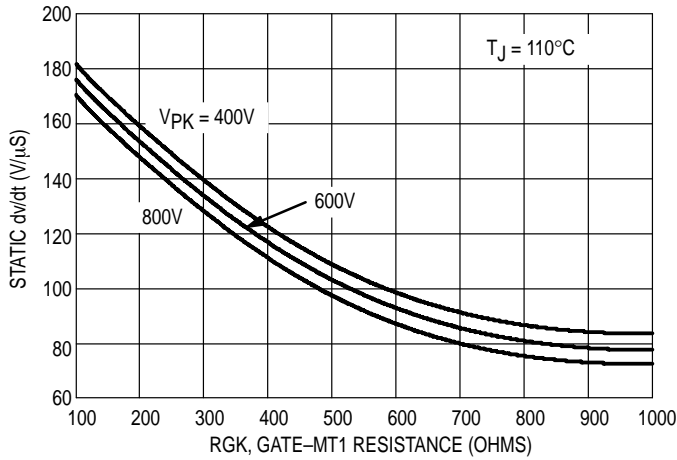


**Figure 7.0 Typical Gate Trigger Current Versus Junction Temperature**

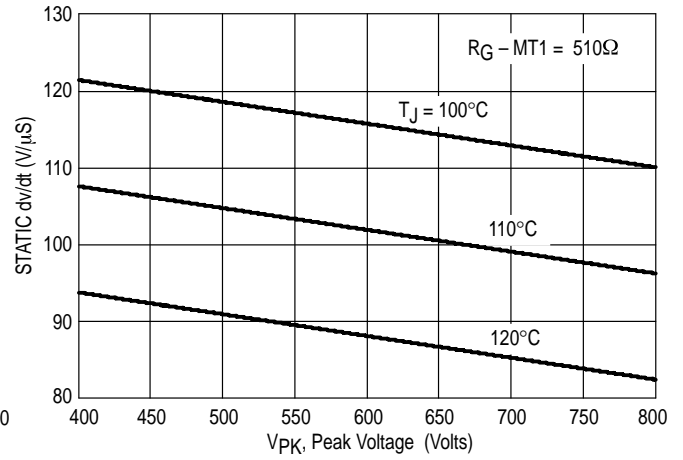


**Figure 8.0 Typical Gate Trigger Voltage Versus Junction Temperature**

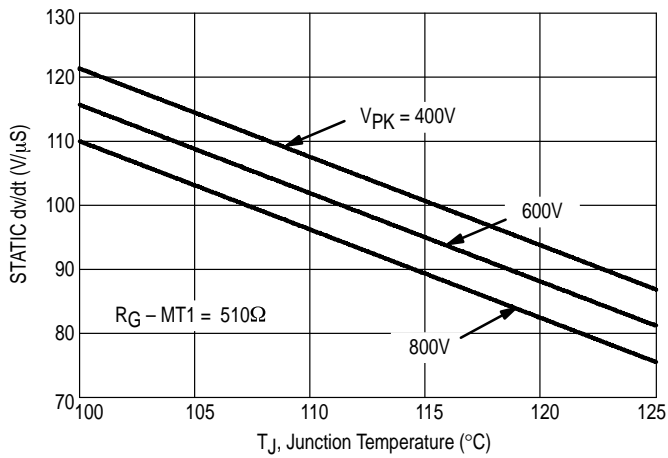
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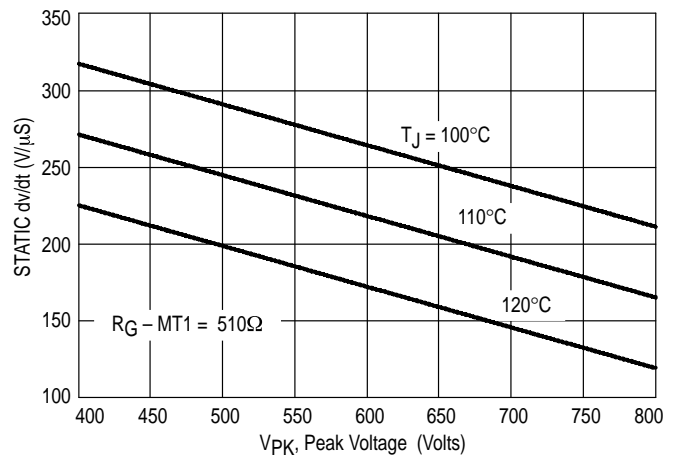
**Figure 9.0 Typical Exponential Static  $dv/dt$  Versus Gate-MT1 Resistance, MT2(+)**



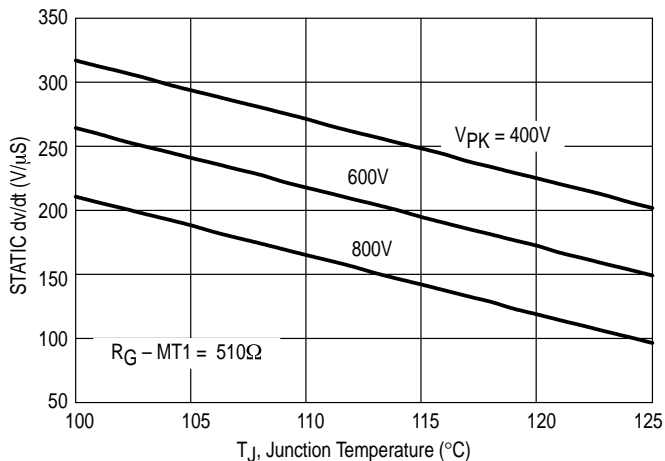
**Figure 10.0 Typical Exponential Static  $dv/dt$  Versus Peak Voltage, MT2(+)**



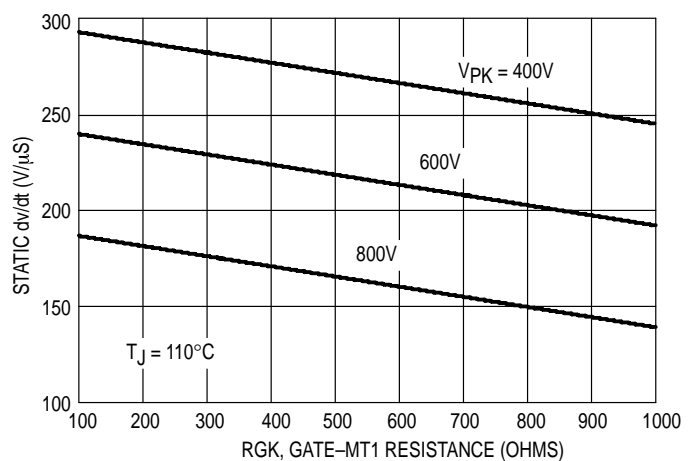
**Figure 11.0 Typical Exponential Static  $dv/dt$  Versus Junction Temperature, MT2(+)**



**Figure 12.0 Typical Exponential Static  $dv/dt$  Versus Peak Voltage, MT2(-)**

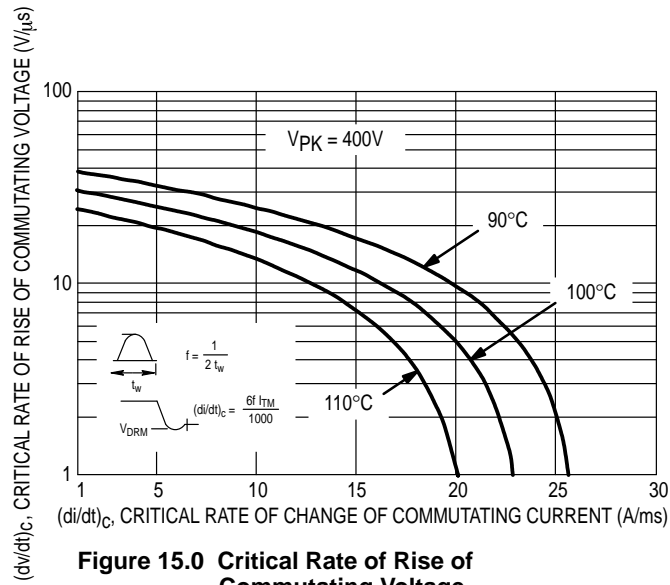


**Figure 13.0 Typical Exponential Static  $dv/dt$  Versus Junction Temperature, MT2(-)**

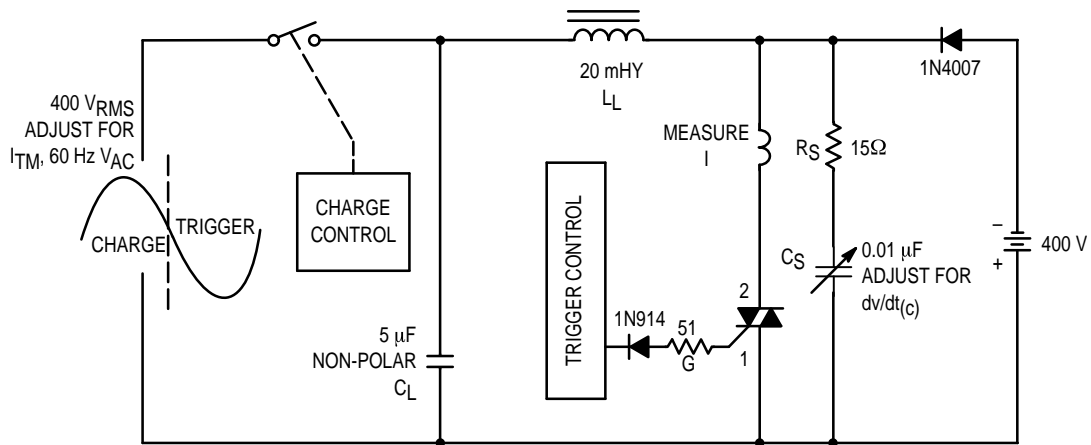


**Figure 14.0 Typical Exponential Static  $dv/dt$  Versus Gate-MT1 Resistance, MT2(-)**

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**Figure 15.0 Critical Rate of Rise of Commutating Voltage**



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

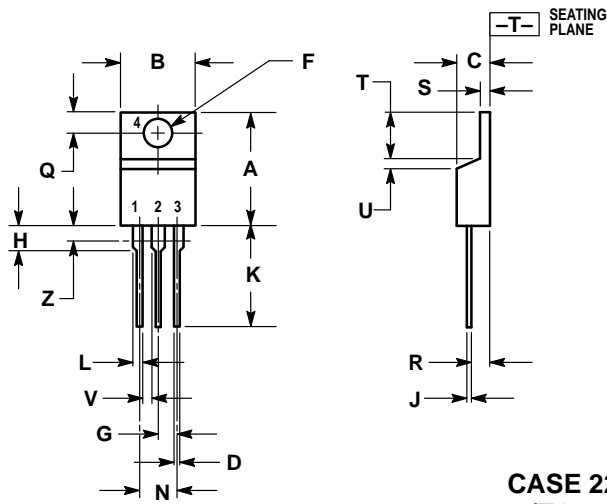
**Figure 16.0 Simplified Test Circuit to Measure the Critical Rate of Rise of Commutating Voltage**

# NOTES

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# MAC8S SERIES


## PACKAGE DIMENSIONS



**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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MAC8S/D

