

# Triacs

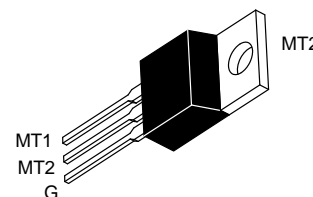
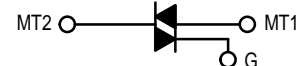
## Silicon Bidirectional Thyristors

... designed primarily for full-wave ac control applications, such as light dimmers, motor controls, heating controls and power supplies; or wherever full-wave silicon gate controlled solid-state devices are needed. Triac type thyristors switch from a blocking to a conducting state for either polarity of applied anode voltage with positive or negative gate triggering.

- Blocking Voltage to 600 Volts
- All Diffused and Glass Passivated Junctions for Greater Parameter Uniformity and Stability
- Small, Rugged, Thermowatt Construction for Low Thermal Resistance, High Heat Dissipation and Durability
- Gate Triggering Guaranteed in Four Modes

**MAC210A8**

**TRIACs**  
**10 AMPERES RMS**  
**600 VOLTS**



**CASE 221A-07**  
**(TO-220AB)**  
**Style 4**

### MAXIMUM RATINGS (T<sub>J</sub> = 25°C unless otherwise noted.)

Rating	Symbol	Value	Unit
Repetitive Peak Off-State Voltage <sup>(1)</sup> (T <sub>J</sub> = -40 to +125°C, 1/2 Sine Wave 50 to 60 Hz, Gate Open)      MAC210A8	V <sub>DRM</sub>	600	Volts
On-State Current RMS (T <sub>C</sub> = +70°C) Full Cycle Sine Wave 50 to 60 Hz	I <sub>T(RMS)</sub>	10	Amps
Peak Non-repetitive Surge Current (One Full Cycle, 60 Hz, T <sub>C</sub> = +70°C) Preceded and followed by Rated Current	I <sub>TSM</sub>	100	Amps
Circuit Fusing Considerations (t = 8.3 ms)	I <sup>2</sup> t	40	A <sup>2</sup> s
Peak Gate Power (T <sub>C</sub> = +70°C, Pulse Width = 10 μs)	P <sub>GM</sub>	20	Watts
Average Gate Power (T <sub>C</sub> = +70°C, t = 8.3 ms)	P <sub>G(AV)</sub>	0.35	Watt
Peak Gate Current (T <sub>C</sub> = +70°C, Pulse Width = 10 μs)	I <sub>GM</sub>	2	Amps
Operating Junction Temperature Range	T <sub>J</sub>	-40 to +125	°C
Storage Temperature Range	T <sub>stg</sub>	-40 to +125	°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.

# MAC210A8

## THERMAL CHARACTERISTICS

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

## ELECTRICAL CHARACTERISTICS ( $T_C = 25^{\circ}C$ unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
Peak Blocking Current ( $V_D = \text{Rated } V_{DRM}$ , Gate Open) $T_J = 25^{\circ}C$ $T_J = +125^{\circ}C$	$I_{DRM}$	— —	— —	10 2	$\mu A$ mA
Peak On-State Voltage (Either Direction) ( $I_{TM} = 14$ A Peak; Pulse Width = 1 to 2 ms, Duty Cycle $\leq 2\%$ )	$V_{TM}$	—	1.2	1.65	Volts
Gate Trigger Current (Continuous dc) (Main Terminal Voltage = 12 Vdc, $R_L = 100$ Ohms) MT2(+), G(+) MT2(+), G(-) MT2(-), G(-) MT2(-), G(+)	$I_{GT}$	— — — —	12 12 20 35	50 50 50 75	mA
Gate Trigger Voltage (Continuous dc) (Main Terminal Voltage = 12 Vdc, $R_L = 100$ Ohms) MT2(+), G(+) MT2(+), G(-) MT2(-), G(-) MT2(-), G(+) (Main Terminal Voltage = Rated $V_{DRM}$ , $R_L = 10$ k ohms, $T_J = +125^{\circ}C$ ) MT2(+), G(+); MT2(-), G(-); MT2(+), G(-) MT2(-), G(+)	$V_{GT}$	— — — — 0.2 0.2	0.9 0.9 1.1 1.4 — —	2 2 2 2.5 — —	volts
Holding Current (Either Direction) (Main Terminal Voltage = 12 Vdc, Gate Open, Initiating Current = 500 mA, $T_C = +25^{\circ}C$ )	$I_H$	—	6	50	mA
Turn-On Time (Rated $V_{DRM}$ , $I_{TM} = 14$ A) ( $I_{GT} = 120$ mA, Rise Time = 0.1 $\mu s$ , Pulse Width = 2 $\mu s$ )	$t_{gt}$	—	1.5	—	$\mu s$
Critical Rate of Rise of Commutation Voltage ( $V_D = \text{Rated } V_{DRM}$ , $I_{TM} = 14$ A, Commutating $di/dt = 5.0$ A/ms, Gate Unenergized, $T_C = 70^{\circ}C$ )	$dv/dt(c)$	—	5	—	V/ $\mu s$
Critical Rate of Rise of Off-State Voltage ( $V_D = \text{Rated } V_{DRM}$ , Exponential Voltage Rise, Gate Open, $T_C = +70^{\circ}C$ )	$dv/dt$	—	100	—	V/ $\mu s$

FIGURE 1 — CURRENT DERATING

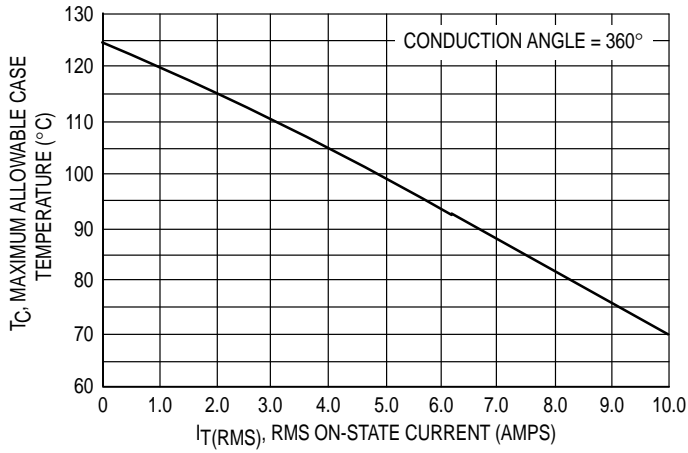


FIGURE 2 — POWER DISSIPATION

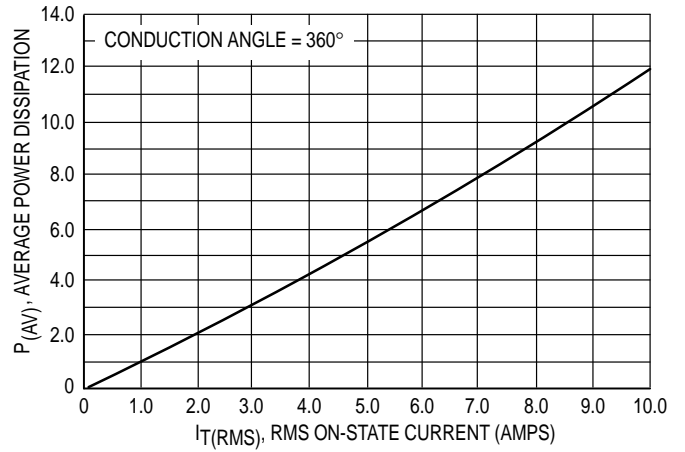


FIGURE 3 — MAXIMUM ON-STATE CHARACTERISTICS

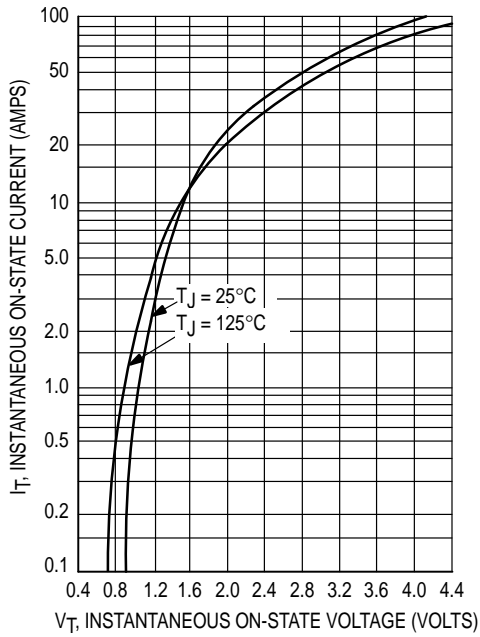


FIGURE 4 — MAXIMUM NON-REPETITIVE SURGE CURRENT

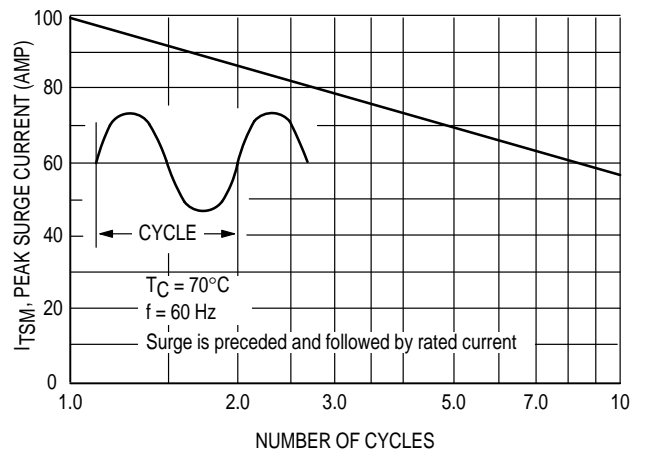
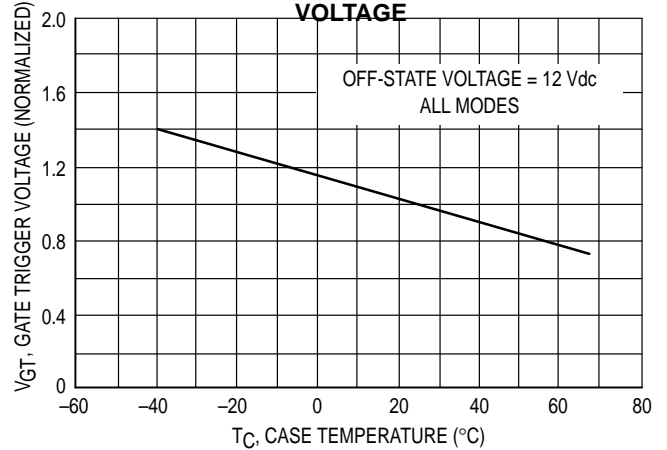
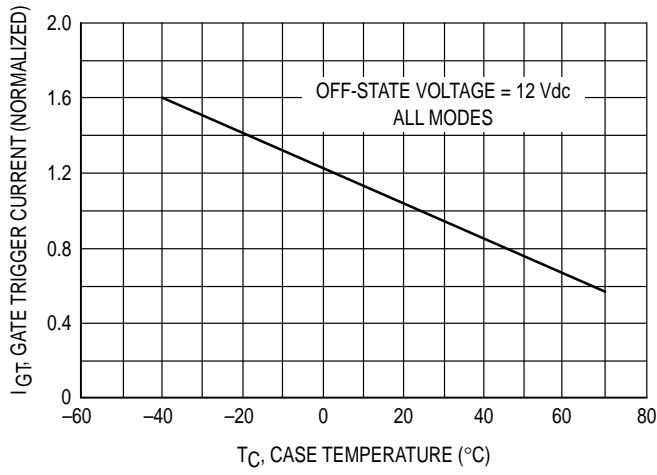


FIGURE 5 — TYPICAL GATE TRIGGER VOLTAGE

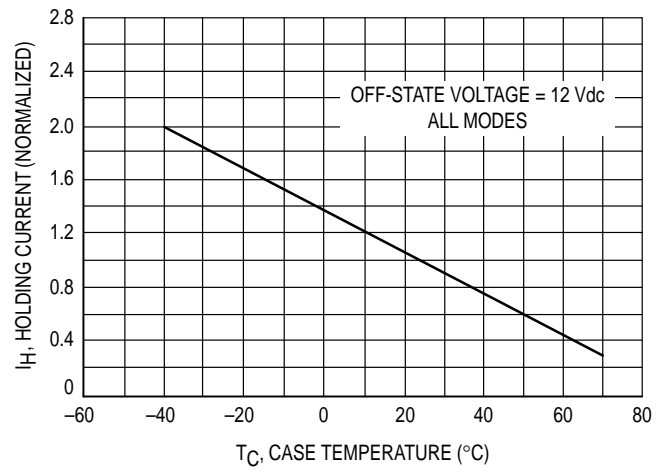


# MAC210A8

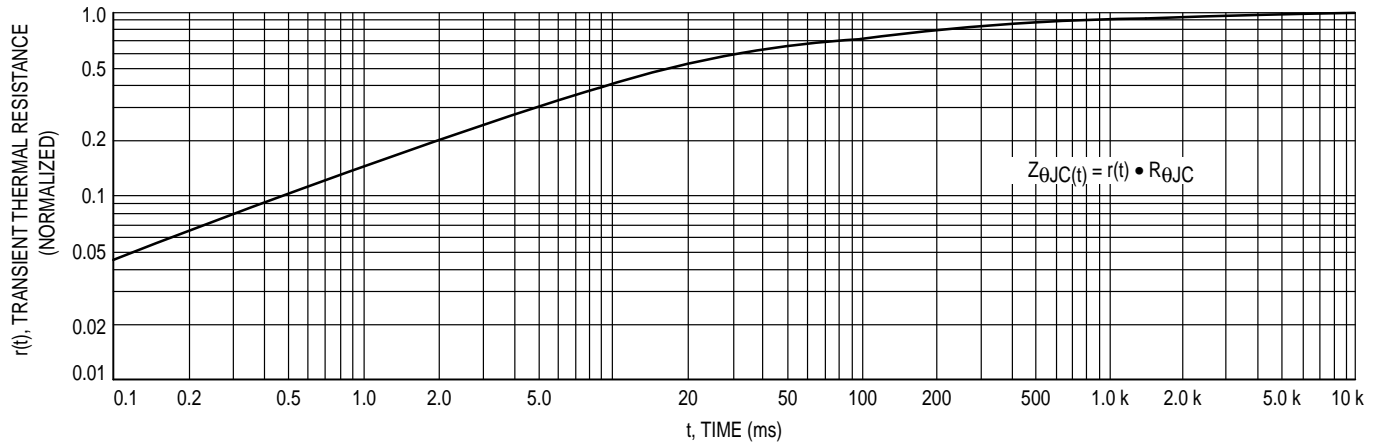
**FIGURE 6 — TYPICAL GATE TRIGGER CURRENT**



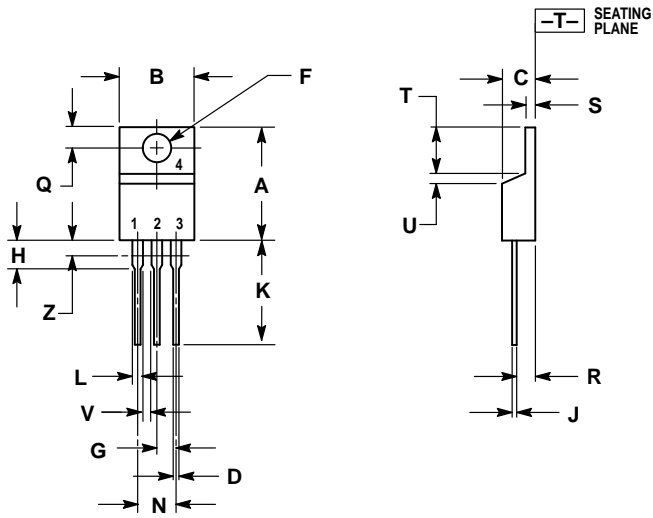
**FIGURE 7 — TYPICAL HOLDING CURRENT**



**FIGURE 8 — THERMAL RESPONSE**



PACKAGE DIMENSIONS



STYLE 4:  
 PIN 1. MAIN TERMINAL 1  
 2. MAIN TERMINAL 2  
 3. GATE  
 4. MAIN TERMINAL 2

- 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	0.014	0.022	0.36	0.55
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-07  
 (TO-220AB)  
 ISSUE Z

# NOTES

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