

# MAC228A Series

Preferred Device

## Sensitive Gate Triacs

### Silicon Bidirectional Thyristors

Designed primarily 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 Triggering in 3 Modes for AC Triggering on Sinking Current Sources
- Four Mode Triggering for Drive Circuits that Source Current
- All Diffused and Glass–Passivated Junctions for Parameter Uniformity and Stability
- Small, Rugged, Thermowatt Construction for Low Thermal Resistance and High Heat Dissipation
- Center Gate Geometry for Uniform Current Spreading
- Device Marking: Logo, Device Type, e.g., MAC228A4, Date Code

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

Rating	Symbol	Value	Unit
Peak Repetitive Off–State Voltage <sup>(1)</sup> (T <sub>J</sub> = –40 to 110°C, Sine Wave, 50 to 60 Hz, Gate Open)	V <sub>DRM</sub> , V <sub>RRM</sub>	200 400 600 800	Volts
On–State RMS Current (T <sub>C</sub> = 80°C) Full Cycle Sine Wave 50 to 60 Hz	I <sub>T(RMS)</sub>	8.0	Amps
Peak Non–Repetitive Surge Current (One Full Cycle Sine Wave, 60 Hz, T <sub>J</sub> = 110°C)	I <sub>TSM</sub>	80	Amps
Circuit Fusing Considerations (t = 8.3 ms)	I <sup>2</sup> t	26	A <sup>2</sup> s
Peak Gate Current (t ≤ 2 μs, T <sub>C</sub> = 80°C)	I <sub>GM</sub>	± 2.0	Amps
Peak Gate Voltage (t ≤ 2 μs, T <sub>C</sub> = 80°C)	V <sub>GM</sub>	± 10	Volts
Peak Gate Power (t ≤ 2 μs, T <sub>C</sub> = 80°C)	P <sub>GM</sub>	20	Watts
Average Gate Power (t ≤ 8.3 ms, T <sub>C</sub> = 80°C)	P <sub>G(AV)</sub>	0.5	Watt
Operating Junction Temperature Range	T <sub>J</sub>	–40 to 110	°C
Storage Temperature Range	T <sub>stg</sub>	–40 to 150	°C
Mounting Torque	—	8.0	in. lb.

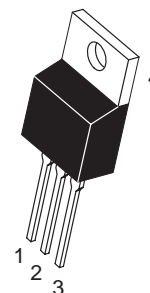
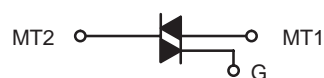
(1) V<sub>DRM</sub> and V<sub>RRM</sub> for all types can be applied on a continuous basis. Blocking voltages shall not be tested with a constant current source such that the voltage ratings of the devices are exceeded.



**ON Semiconductor**

<http://onsemi.com>

**TRIACS**  
**8 AMPERES RMS**  
**200 thru 800 VOLTS**



**TO–220AB**  
**CASE 221A**  
**STYLE 4**

PIN ASSIGNMENT	
1	Main Terminal 1
2	Main Terminal 2
3	Gate
4	Main Terminal 2

#### ORDERING INFORMATION

Device	Package	Shipping
MAC228A4	TO220AB	500/Box
MAC228A6	TO220AB	500/Box
MAC228A8	TO220AB	500/Box
MAC228A10	TO220AB	500/Box

**Preferred** devices are recommended choices for future use and best overall value.

## MAC228A Series

### THERMAL CHARACTERISTICS

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

### ELECTRICAL CHARACTERISTICS ( $T_C = 25^{\circ}C$ unless otherwise noted; Electricals apply in both directions)

Characteristic	Symbol	Min	Typ	Max	Unit
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### OFF CHARACTERISTICS

Peak Repetitive Blocking Current ( $V_D = \text{Rated } V_{DRM}, V_{RRM}$ ; Gate Open)	$I_{DRM}$	—	—	10	$\mu A$
	$I_{RRM}$	—	—	2.0	mA

### ON CHARACTERISTICS

Peak On-State Voltage ( $I_{TM} = \pm 11$ A Peak, Pulse Width $\leq 2$ ms, Duty Cycle $\leq 2\%$ )	$V_{TM}$	—	—	1.8	Volts
Gate Trigger Current (Continuous dc) ( $V_D = 12$ V, $R_L = 100 \Omega$ ) MT2(+), G(+); MT2(+), G(-); MT2(-), G(-) MT2(-), G(+)	$I_{GT}$	—	—	5.0 10	mA
Gate Trigger Voltage (Continuous dc) ( $V_D = 12$ V, $R_L = 100 \Omega$ ) MT2(+), G(+); MT2(+), G(-); MT2(-), G(-) MT2(-), G(+)	$V_{GT}$	—	—	2.0 2.5	Volts
Gate Non-Trigger Voltage (Continuous dc) ( $V_D = 12$ V, $T_C = 110^{\circ}C$ , $R_L = 100 \Omega$ ) All Four Quadrants	$V_{GD}$	0.2	—	—	Volts
Holding Current ( $V_D = 12$ Vdc, Initiating Current = $\pm 200$ mA, Gate Open)	$I_H$	—	—	15	mA
Gate-Controlled Turn-On Time ( $V_D = \text{Rated } V_{DRM}, I_{TM} = 16$ A Peak, $I_G = 30$ mA)	$t_{gt}$	—	1.5	—	$\mu s$

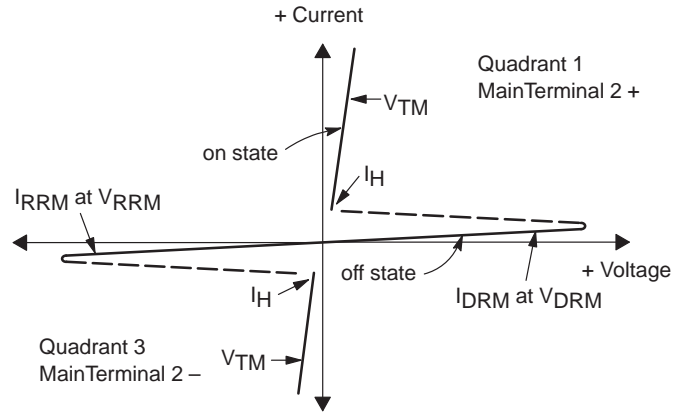
### DYNAMIC CHARACTERISTICS

Critical Rate of Rise of Off-State Voltage ( $V_D = \text{Rated } V_{DRM}$ , Exponential Waveform, $T_C = 110^{\circ}C$ )	dv/dt	—	25	—	V/ $\mu s$
Critical Rate of Rise of Commutation Voltage ( $V_D = \text{Rated } V_{DRM}, I_{TM} = 11.3$ A, Commutating di/dt = 4.1 A/ms, Gate Unenergized, $T_C = 80^{\circ}C$ )	dv/dt(c)	—	5.0	—	V/ $\mu s$

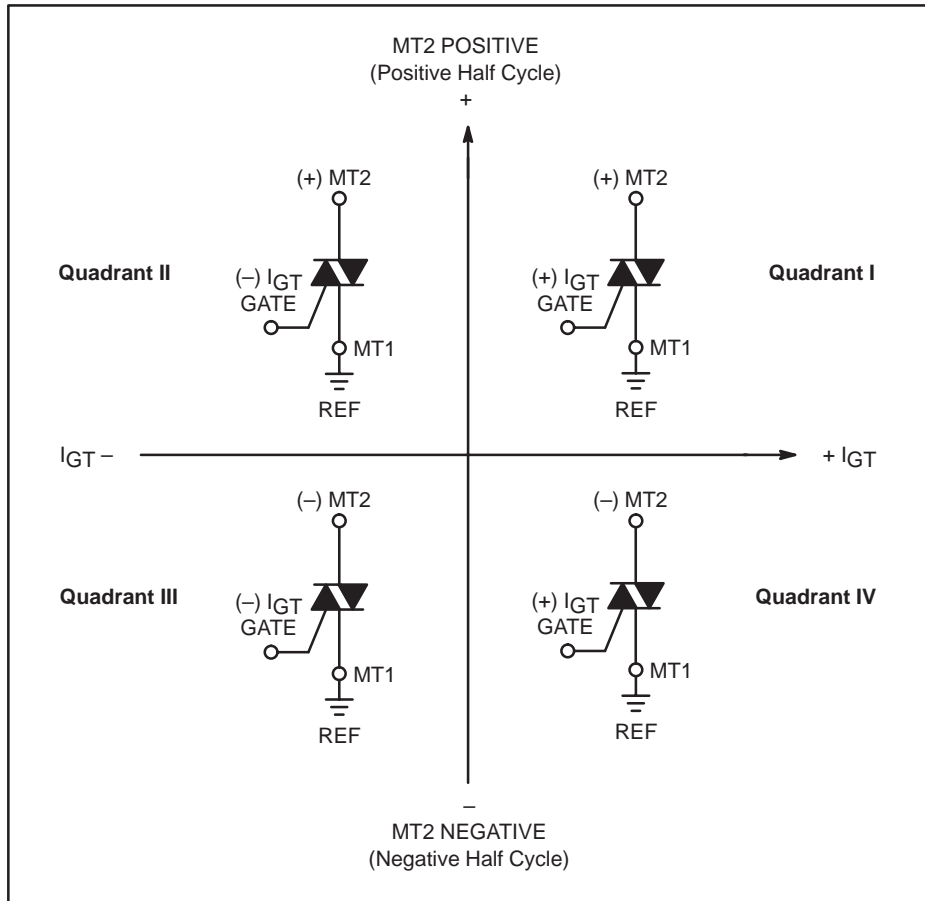
# MAC228A Series

## Voltage Current Characteristic of Triacs (Bidirectional Device)

Symbol	Parameter
$V_{DRM}$	Peak Repetitive Forward Off State Voltage
$I_{DRM}$	Peak Forward Blocking Current
$V_{RRM}$	Peak Repetitive Reverse Off State Voltage
$I_{RRM}$	Peak Reverse Blocking Current
$V_{TM}$	Maximum On State Voltage
$I_H$	Holding Current

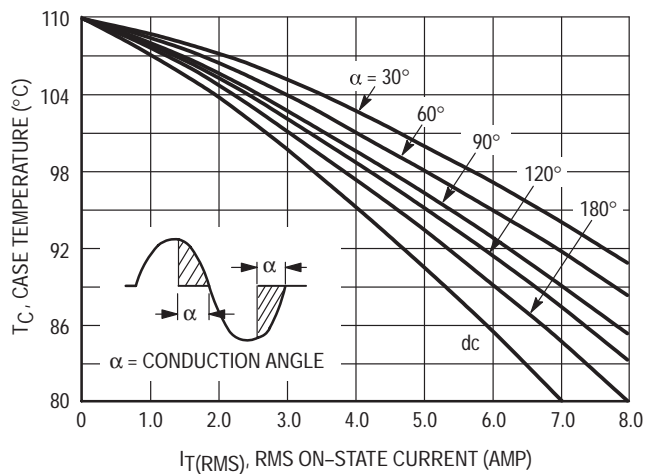


### Quadrant Definitions for a Triac

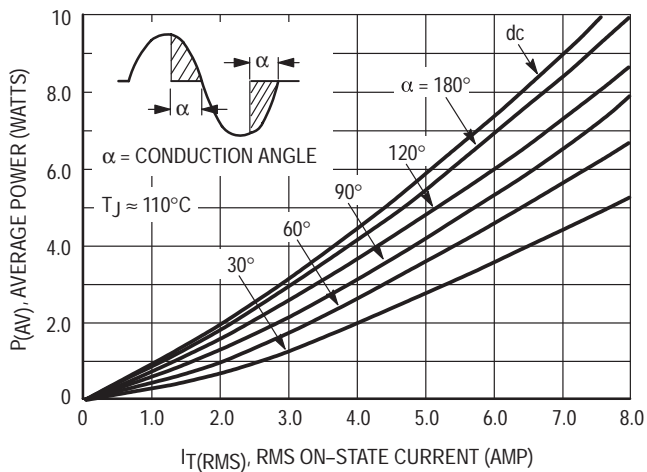


All polarities are referenced to MT1.  
With in-phase signals (using standard AC lines) quadrants I and III are used.

# MAC228A Series



**Figure 1. RMS Current Derating**

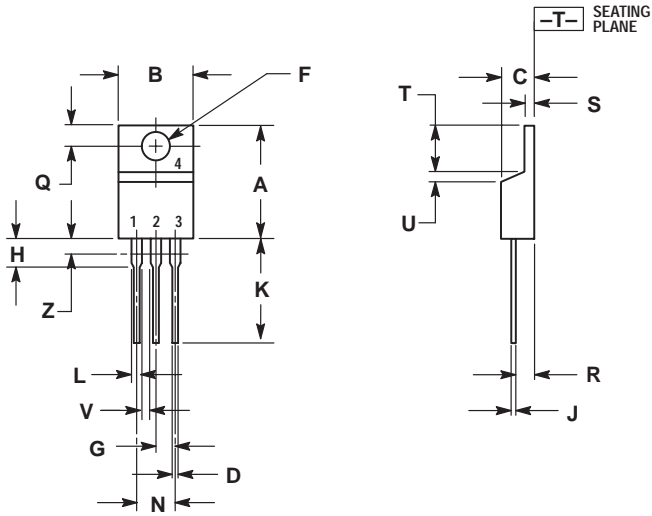


**Figure 2. On-State Power Dissipation**

# MAC228A Series

## PACKAGE DIMENSIONS

TO-220AB  
CASE 221A-07  
ISSUE Z



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

STYLE 4:

- PIN 1. MAIN TERMINAL 1
2. MAIN TERMINAL 2
3. GATE
4. MAIN TERMINAL 2

**Notes**

**Notes**

# MAC228A Series

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