

# Triacs

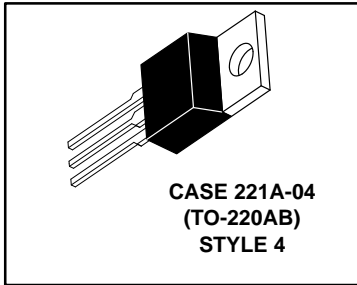
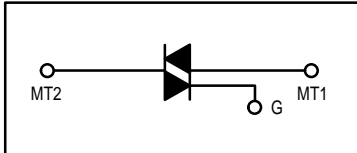
## Silicon Bidirectional Triode Thyristors

... 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 (MAC228 Series)
- Four Mode Triggering for Drive Circuits that Source Current (MAC228A Series)
- 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

**MAC228  
Series  
MAC228A  
Series**

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



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

Rating	Symbol	Value	Unit
Peak Repetitive Off-State Voltage <sup>(1)</sup> ( $T_J = -40$ to $110^\circ\text{C}$ 1/2 Sine Wave 50 to 60 Hz, Gate Open) MAC228-4, MAC228A4 MAC228-6, MAC228A6 MAC228-8, MAC228A8 MAC228-10, MAC228A10	$V_{\text{DRM}}$	200 400 600 800	Volts
On-State RMS Current ( $T_C = 80^\circ\text{C}$ ) Full Cycle Sine Wave 50 to 60 Hz	$I_{\text{T(RMS)}}$	8	Amps
Peak Non-repetitive Surge Current (One Full Cycle 60 Hz, $T_J = 110^\circ\text{C}$ )	$I_{\text{TSM}}$	80	Amps
Circuit Fusing ( $t = 8.3$ ms)	$I^2t$	26	$\text{A}^2\text{s}$
Peak Gate Current ( $t \leq 2 \mu\text{s}$ )	$I_{\text{GM}}$	$\pm 2$	Amps
Peak Gate Voltage ( $t \leq 2 \mu\text{s}$ )	$V_{\text{GM}}$	$\pm 10$	Volts
Peak Gate Power ( $t \leq 2 \mu\text{s}$ )	$P_{\text{GM}}$	20	Watts

1.  $V_{\text{DRM}}$  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. (continued)

# MAC228 Series MAC228A Series

## MAXIMUM RATINGS — continued

Rating	Symbol	Value	Unit
Average Gate Power ( $T_C = 80^\circ\text{C}$ , $t \leq 8.3$ ms)	$P_{G(AV)}$	0.5	Watts
Operating Junction Temperature Range	$T_J$	-40 to 110	$^\circ\text{C}$
Storage Temperature Range	$T_{stg}$	-40 to 150	$^\circ\text{C}$
Mounting Torque		8	in. lb.

## THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	2.2	$^\circ\text{C/W}$
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	60	$^\circ\text{C/W}$

## ELECTRICAL CHARACTERISTICS ( $T_C = 25^\circ\text{C}$ and either polarity of MT2 to MT1 voltage unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
Peak Blocking Current ( $V_D = \text{Rated } V_{DRM}$ ) $T_J = 25^\circ\text{C}$ $T_J = 110^\circ\text{C}$	$I_{DRM}$	— —	— —	10 2	$\mu\text{A}$ mA
Peak On-State Voltage ( $I_{TM} = 11$ 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(+) "A" Suffix Only	$I_{GT}$	— —	— —	5 10	mA
Gate Trigger Voltage (Continuous dc) ( $V_D = 12$ V, $R_L = 100 \Omega$ ) MT2(+), G(+); MT2(+), G(-); MT2(-), G(-) MT2(-), G(+) "A" Suffix Only ( $V_D = \text{Rated } V_{DRM}$ , $T_C = 110^\circ\text{C}$ , $R_L = 10$ k) MT2(+), G(+); MT2(+), G(-); MT2(-), G(-) MT2(-), G(+) "A" Suffix Only	$V_{GT}$	— — 0.2 0.2	— — — —	2 2.5 — —	Volts
Holding Current ( $V_D = 12$ Vdc, $I_{TM} = 200$ 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	—	$\mu\text{s}$
Critical Rate of Rise of Off-State Voltage ( $V_D = \text{Rated } V_{DRM}$ , Exponential Waveform, $T_C = 110^\circ\text{C}$ )	dv/dt	—	25	—	V/ $\mu\text{s}$
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, $T_C = 80^\circ\text{C}$ )	dv/dt(c)	—	5	—	V/ $\mu\text{s}$

FIGURE 1 – RMS CURRENT DERATING

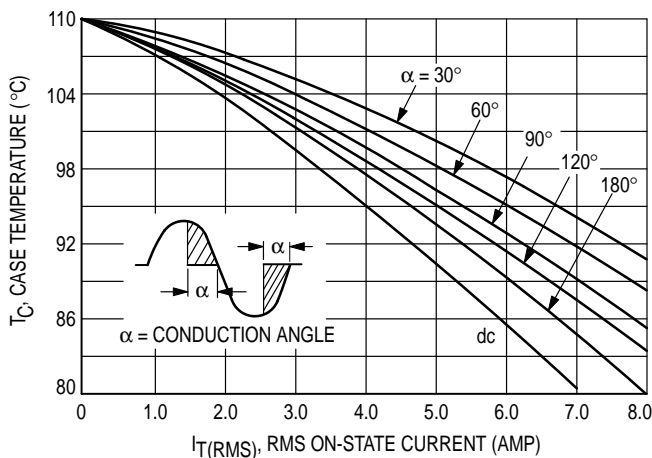
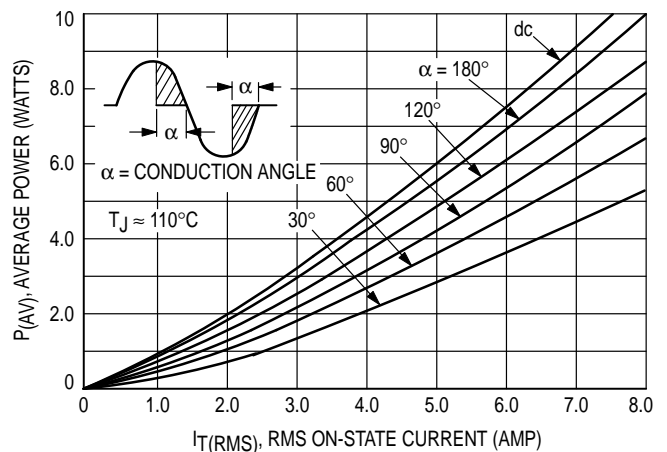
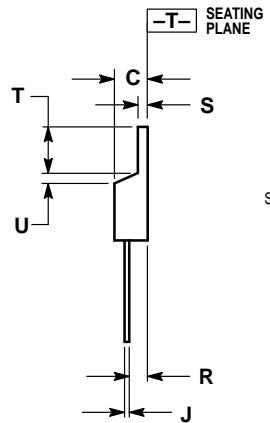
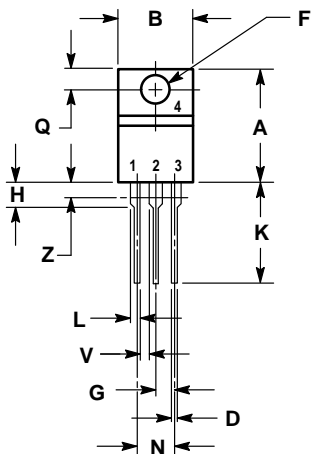


FIGURE 2 – ON-STATE POWER DISSIPATION



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	0.055	1.15	1.39
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-04  
 (TO-220AB)

## MAC228 Series MAC228A Series

Motorola reserves the right to make changes without further notice to any products herein. Motorola makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does Motorola assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation consequential or incidental damages. "Typical" parameters can and do vary in different applications. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. Motorola does not convey any license under its patent rights nor the rights of others. Motorola products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the Motorola product could create a situation where personal injury or death may occur. Should Buyer purchase or use Motorola products for any such unintended or unauthorized application, Buyer shall indemnify and hold Motorola and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that Motorola was negligent regarding the design or manufacture of the part. Motorola and <sup>®</sup> are registered trademarks of Motorola, Inc. Motorola, Inc. is an Equal Opportunity/Affirmative Action Employer.

### Literature Distribution Centers:

USA: Motorola Literature Distribution; P.O. Box 20912; Phoenix, Arizona 85036.

EUROPE: Motorola Ltd.; European Literature Centre; 88 Tanners Drive, Blakelands, Milton Keynes, MK14 5BP, England.

JAPAN: Nippon Motorola Ltd.; 4-32-1, Nishi-Gotanda, Shinagawa-ku, Tokyo 141, Japan.

ASIA PACIFIC: Motorola Semiconductors H.K. Ltd.; Silicon Harbour Center, No. 2 Dai King Street, Tai Po Industrial Estate, Tai Po, N.T., Hong Kong.



MAC228/D

