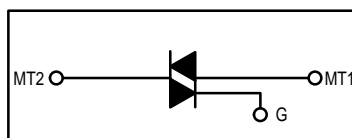


# Triacs

## Silicon Bidirectional Triode Thyristors

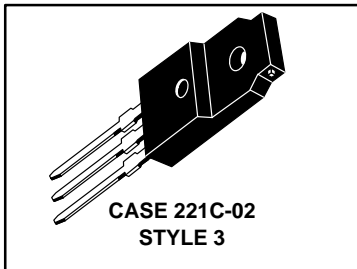
... designed primarily for full-wave ac control applications, such as lighting systems, heater controls, motor controls and power supplies; or wherever full-wave silicon-gate-controlled devices are needed.

- Off-State Voltages to 800 Volts
- All Diffused and Glass Passivated Junctions for Parameter Uniformity and Stability
- Small, Rugged Thermowatt Construction for Thermal Resistance and High Heat Dissipation
- Gate Triggering Guaranteed in Three Modes (MAC223FP Series) or Four Modes (MAC223AFP Series)



**MAC223FP  
Series  
MAC223AFP  
Series**

**ISOLATED TRIACS  
THYRISTORS  
25 AMPERES RMS  
200 thru 800 VOLTS**



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

Rating	Symbol	Value	Unit
Peak Repetitive Off-State Voltage <sup>(1)</sup> (T <sub>J</sub> = -40 to +125°C, 1/2 Sine Wave 50 to 60 Hz, Gate Open)	V <sub>DRM</sub>	200 400 600 800	Volts
On-State RMS Current (T <sub>C</sub> = +80°C) Full Cycle Sine Wave 50 to 60 Hz <sup>(2)</sup>	I <sub>T(RMS)</sub>	25	Amps
Peak Nonrepetitive Surge Current (One Full Cycle, 60 Hz, T <sub>C</sub> = 80°C, preceded and followed by rated current)	I <sub>TSM</sub>	250	Amps
Circuit Fusing (t = 8.3 ms)	I <sup>2</sup> t	260	A <sup>2</sup> s
Peak Gate Power (t ≤ 2 μs)	P <sub>GM</sub>	20	Watts
Average Gate Power (T <sub>C</sub> = +80°C, t ≤ 8.3 ms)	P <sub>G(AV)</sub>	0.5	Watt
Peak Gate Current (t ≤ 2 μs)	I <sub>GM</sub>	2	Amps
Peak Gate Voltage (t ≤ 2 μs)	V <sub>GM</sub>	±10	Volts
RMS Isolation Voltage (T <sub>A</sub> = 25°C, Relative Humidity ≤ 20%)	V <sub>(ISO)</sub>	1500	Volts
Operating Junction Temperature	T <sub>J</sub>	-40 to +125	°C
Storage Temperature Range	T <sub>stg</sub>	-40 to +150	°C
Mounting Torque	—	8	in. lb.

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.
2. The case temperature reference point for all T<sub>C</sub> measurements is a point on the center lead of the package as close as possible to the plastic body.

### THERMAL CHARACTERISTICS

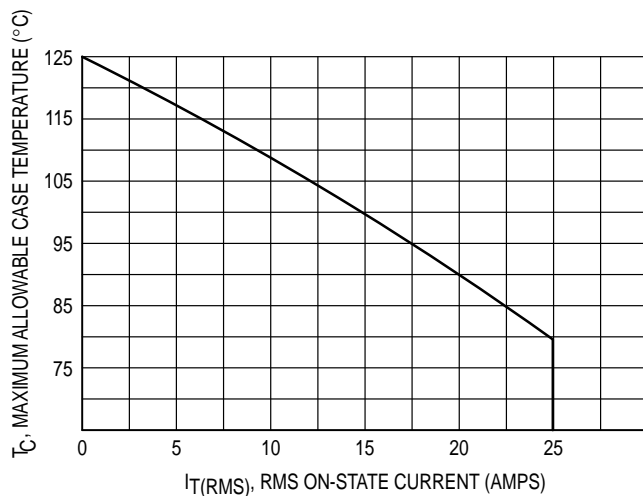
Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	R <sub>θJC</sub>	1.2	°C/W
Thermal Resistance, Case to Sink	R <sub>θCS</sub>	2.2	°C/W
Thermal Resistance, Junction to Ambient	R <sub>θJA</sub>	60	°C/W

# MAC223FP Series MAC223AFP Series

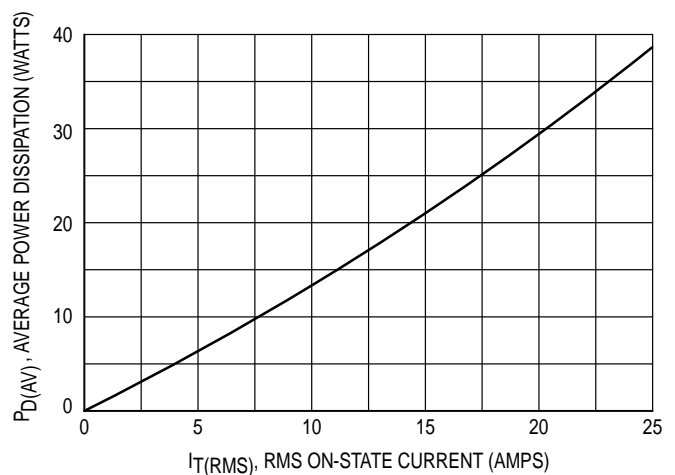
**ELECTRICAL CHARACTERISTICS** ( $T_C = 25^\circ\text{C}$  and either polarity of MT2 to MT1 voltage unless otherwise noted.)

Characteristic	Symbol	Min	Typ	Max	Unit
Peak Blocking Current <sup>(1)</sup> ( $V_D = \text{Rated } V_{DRM}$ , Gate Open)	$I_{DRM}$	—	—	10	$\mu\text{A}$ mA
				2	
Peak On-State Voltage ( $I_{TM} = 35 \text{ A Peak}$ , Pulse Width $\leq 2 \text{ ms}$ , Duty Cycle $\leq 2\%$ )	$V_{TM}$	—	1.4	1.85	Volts
Gate Trigger Current (Continuous dc) ( $V_D = 12 \text{ V}$ , $R_L = 100 \Omega$ ) MT2(+), G(+); MT2(-), G(-); MT2(+), G(-) MT2(-), G(+) "A" SUFFIX ONLY	$I_{GT}$	—	20	50	mA
		—	30	75	
Gate Trigger Voltage (Continuous dc) ( $V_D = 12 \text{ V}$ , $R_L = 100 \Omega$ ) MT2(+), G(+); MT2(-), G(-); MT(+), G(-) MT2(-), G(+) "A" SUFFIX ONLY ( $V_D = \text{Rated } V_{DRM}$ , $T_J = 125^\circ\text{C}$ , $R_L = 10 \text{ k}$ ) MT(+), G(+); MT2(-), G(-); MT2(+), G(-) MT2(-), G(+) "A" SUFFIX ONLY	$V_{GT}$	—	1.1	2	Volts
		—	1.3	2.5	
		0.2	0.4	—	
		0.2	0.4	—	
Holding Current ( $V_D = 12 \text{ V}$ , $I_{TM} = 200 \text{ mA}$ , Gate Open)	$I_H$	—	10	50	mA
Gate Controlled Turn-On Time ( $V_D = \text{Rated } V_{DRM}$ , $I_{TM} = 35 \text{ A Peak}$ , $I_G = 200 \text{ mA}$ )	$t_{gt}$	—	1.5	—	$\mu\text{s}$
Critical Rate of Rise of Off-State Voltage ( $V_D = \text{Rated } V_{DRM}$ , Exponential Waveform, $T_C = 125^\circ\text{C}$ )	$dv/dt$	—	40	—	$\text{V}/\mu\text{s}$
Critical Rate of Rise of Commutation Voltage ( $V_D = \text{Rated } V_{DRM}$ , $I_{TM} = 35 \text{ A Peak}$ , Commutating $di/dt = 12.6 \text{ A/ms}$ , Gate Unenergized, $T_C = 80^\circ\text{C}$ )	$dv/dt(c)$	—	5	—	$\text{V}/\mu\text{s}$

1. Ratings apply for open gate conditions. Devices shall not be tested with a constant current source for blocking voltage such that the voltage applied exceeds the rated blocking voltage.



**Figure 1. RMS Current Derating**



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

TYPICAL CHARACTERISTICS

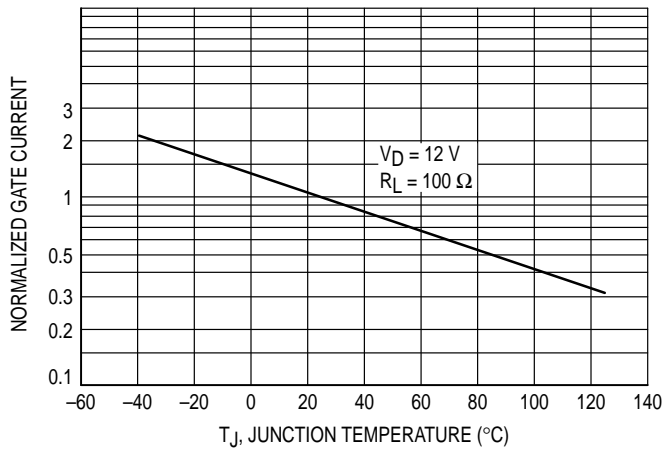


Figure 3. Gate Trigger Current

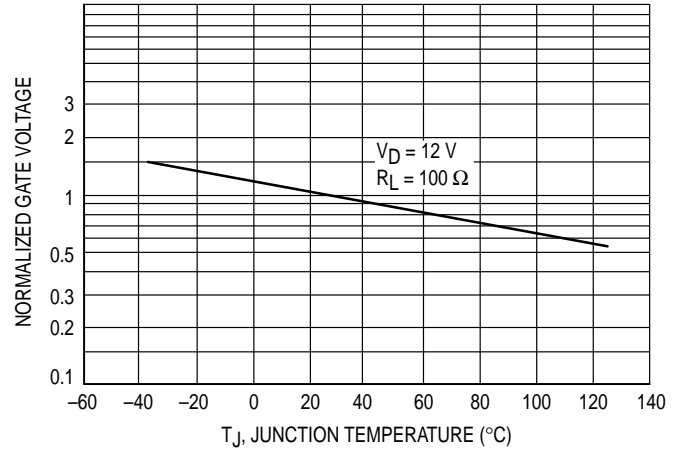


Figure 4. Gate Trigger Voltage

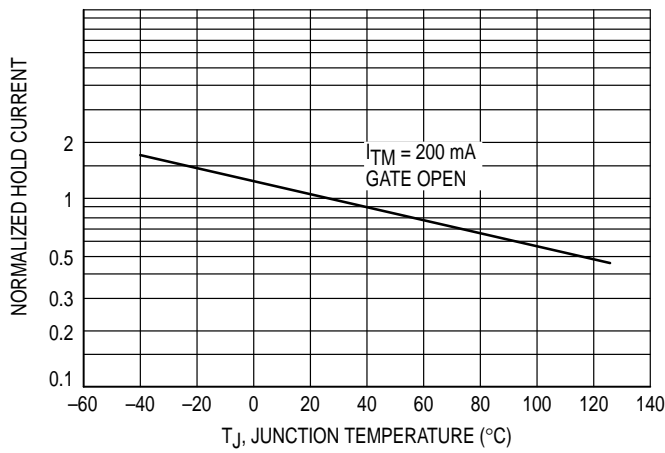


Figure 5. Hold Current

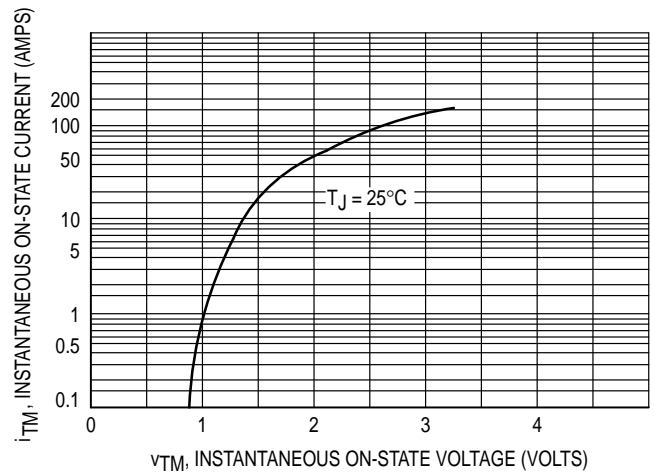
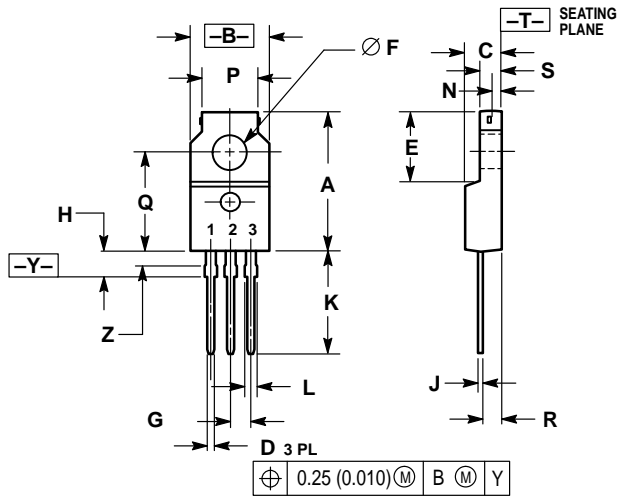


Figure 6. Typical On-State Characteristics

**MAC223FP Series MAC223AFP Series**

**PACKAGE DIMENSIONS**



STYLE 3:  
 PIN 1. MT 1  
 2. MT 2  
 3. GATE

- NOTES:  
 1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.  
 2. CONTROLLING DIMENSION: INCH.  
 3. LEAD DIMENSIONS UNCONTROLLED WITHIN DIMENSION Z.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.680	0.700	17.28	17.78
B	0.388	0.408	9.86	10.36
C	0.175	0.195	4.45	4.95
D	0.025	0.040	0.64	1.01
E	0.340	0.355	8.64	9.01
F	0.140	0.150	3.56	3.81
G	0.100	BSC	2.54	BSC
H	0.110	0.155	2.80	3.93
J	0.018	0.028	0.46	0.71
K	0.500	0.550	12.70	13.97
L	0.045	0.070	1.15	1.77
N	0.049	—	1.25	—
P	0.270	0.290	6.86	7.36
Q	0.480	0.500	12.20	12.70
R	0.090	0.120	2.29	3.04
S	0.105	0.115	2.67	2.92
Z	0.070	0.090	1.78	2.28

**CASE 221C-02**

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MAC223FP/D

