Triacs
Silicon Bidirectional Triode Thyristors

MAC223FP Series
**MAC223AFP Series**

. . . 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)
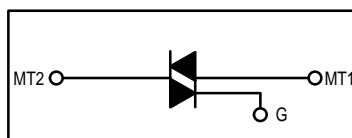
ISOLATED TRIACs
THYRISTORS
25 AMPERES RMS
200 thru 800 VOLTS

MT2 ○—————○ MT1
○ G

CASE 221C-02
STYLE 3
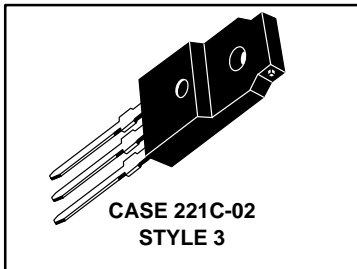
MAXIMUM RATINGS (T_J = 25° unless otherwise noted.)

Rating	Symbol	Value	Unit
Peak Repetitive Off-State Voltage[1] (T_J = –40 to +125°C, 1/2 Sine Wave 50 to 60 Hz, Gate Open)	V_{DRM}		Volts
MAC223-4FP, MAC223A4FP		200	
MAC223-6FP, MAC223A6FP		400	
MAC223-8FP, MAC223A8FP		600	
MAC223-10FP, MAC223A10FP		800	
On-State RMS Current (T_C = +80°C) Full Cycle Sine Wave 50 to 60 Hz[2]	$I_{T(RMS)}$	25	Amps
Peak Nonrepetitive Surge Current (One Full Cycle, 60 Hz, T_C = 80°C, preceded and followed by rated current)	I_{TSM}	250	Amps
Circuit Fusing (t = 8.3 ms)	I^2t	260	A^2s
Peak Gate Power (t ⩽ 2 µs)	P_{GM}	20	Watts
Average Gate Power (T_C = +80°C, t ⩽ 8.3 ms)	$P_{G(AV)}$	0.5	Watt
Peak Gate Current (t ⩽ 2 µs)	I_{GM}	2	Amps
Peak Gate Voltage (t ⩽ 2 µs)	V_{GM}	±10	Volts
RMS Isolation Voltage (T_A = 25°C, Relative Humidity ⩽ 20%)	$V_{(ISO)}$	1500	Volts
Operating Junction Temperature	T_J	–40 to +125	°C
Storage Temperature Range	T_{stg}	–40 to +150	°C
Mounting Torque	—	8	in. lb.

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.
2. The case temperature reference point for all T_C measurements is a point on the center lead of the package as close as possible to the plastic body.
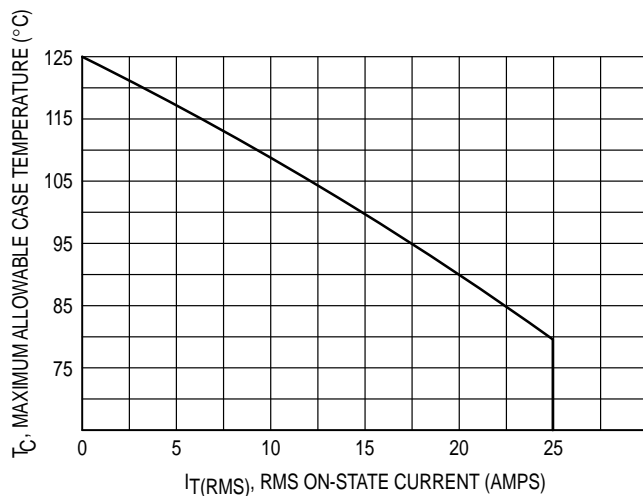
THERMAL CHARACTERISTICS

| Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	1.2	°C/W
Thermal Resistance, Case to Sink	$R_{\theta CS}$	2.2	°C/W
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	60	°C/W

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MAC223FP Series MAC223AFP Series

ELECTRICAL CHARACTERISTICS (T_C = 25°C and either polarity of MT2 to MT1 voltage unless otherwise noted.)

Characteristic		Symbol	Min	Typ	Max	Unit
Peak Blocking Current[1]	T_J = 25°C	I_{DRM}	—	—	10	µA
(V_D = Rated V_{DRM}, Gate Open)	T_J = 125°C		—	—	2	mA
Peak On-State Voltage (I_{TM} = 35 A Peak, Pulse Width $\leq$ 2 ms, Duty Cycle $\leq$ 2%)		V_{TM}	—	1.4	1.85	Volts
Gate Trigger Current (Continuous dc) (V_D = 12 V, R_L = 100 Ω) MT2(+), G(+); MT2(−), G(−); MT2(+), G(−) MT2(−), G(+) "A" SUFFIX ONLY		I_{GT}	 — —	 20 30	 50 75	mA

Gate Trigger Voltage (Continuous dc)
(V_D = 12 V, R_L = 100 Ω)
  MT2(+), G(+); MT2(−), G(−); MT(+), G(−)
  MT2(−), G(+) "A" SUFFIX ONLY
(V_D = Rated V_{DRM}, T_J = 125°C, R_L = 10 k)
  MT(+), G(+); MT2(−), G(−); MT2(+), G(−)
  MT2(−), G(+) "A" SUFFIX ONLY
		V_{GT}	
			
			—
			—
			0.2
			
			0.2
				
				1.1
				1.3
				0.4
				
				0.4
					
					2
					2.5
					—
					
					—
						Volts

Holding Current (V_D = 12 V, I_{TM} = 200 mA, Gate Open)		I_H	—	10	50	mA
Gate Controlled Turn-On Time (V_D = Rated V_{DRM}, I_{TM} = 35 A Peak, I_G = 200 mA)		t_{gt}	—	1.5	—	µs
Critical Rate of Rise of Off-State Voltage (V_D = Rated V_{DRM}, Exponential Waveform, T_C = 125°C)		dv/dt	—	40	—	V/µs
Critical Rate of Rise of Commutation Voltage (V_D = Rated V_{DRM}, I_{TM} = 35 A Peak, Commutating di/dt = 12.6 A/ms, Gate Unenergized, T_C = 80°C)		dv/dt(c)	—	5	—	V/µs

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
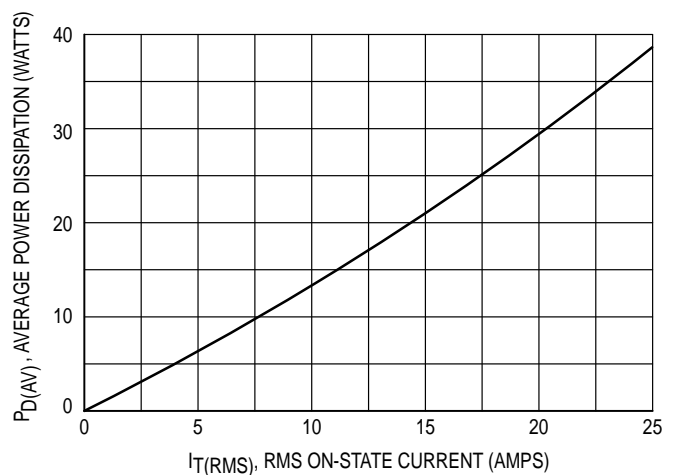
Figure 2. On-State Power Dissipation
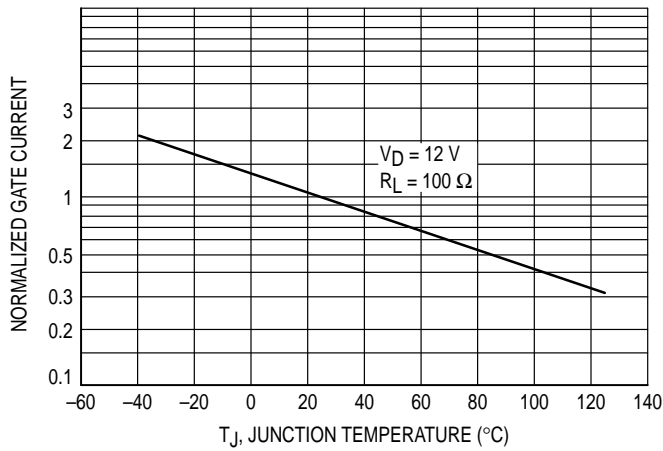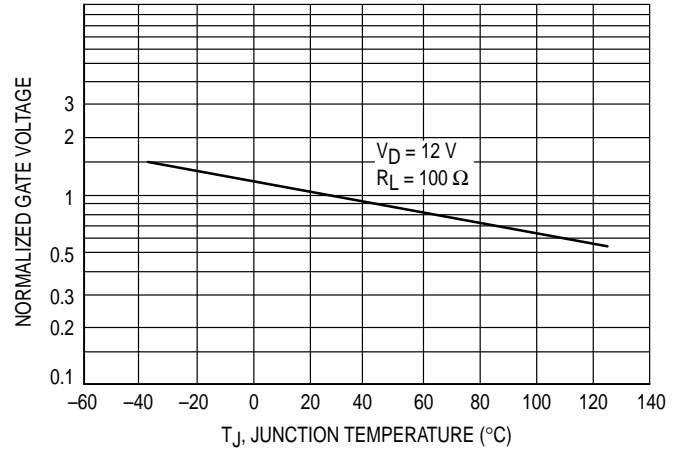
TYPICAL CHARACTERISTICS

Figure 3. Gate Trigger Current
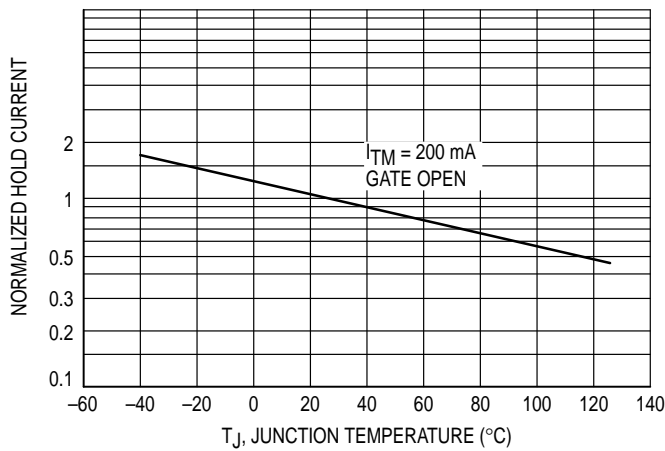

Figure 4. Gate Trigger Voltage

Figure 5. Hold Current
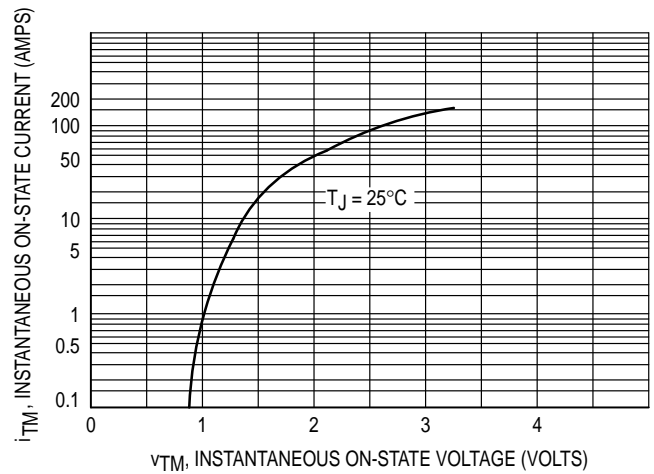
Figure 6. Typical On-State Characteristics
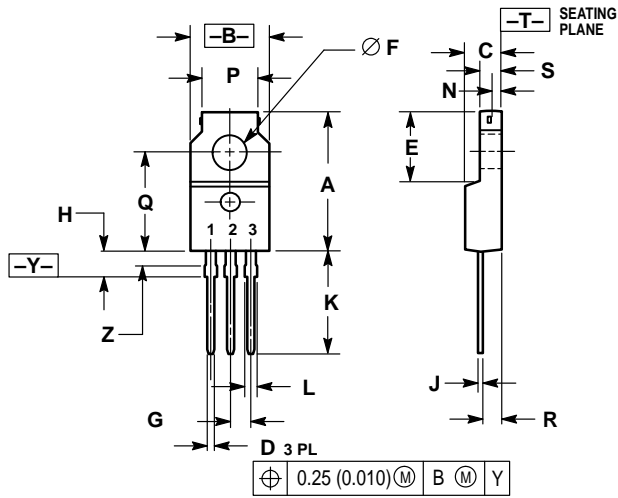
Motorola Thyristor Device Data

PACKAGE DIMENSIONS

```
                                        SEATING
                              −T−       PLANE
       −B−          ∅ F           C
        P                         S
                                  N
                        E
                                                    NOTES:
   H       Q                                        1. DIMENSIONING AND TOLERANCING PER ANSI
                  A                                     Y14.5M, 1982.
           1 2 3                                     2. CONTROLLING DIMENSION: INCH.
  −Y−                          STYLE 3:              3. LEAD DIMENSIONS UNCONTROLLED WITHIN
           K                     PIN 1.  MT 1           DIMENSION Z.
   Z                                  2. MT 2
                                      3. GATE
           L
  G                        J
                     R
        D  3 PL
  ⊕  0.25 (0.010) Ⓜ  B Ⓜ  Y
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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