

MAC223A6FP, MAC223A8FP, MAC223A10FP

Preferred Device



ON Semiconductor

<http://onsemi.com>

Triacs

Silicon Bidirectional 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 Four Modes
-  Indicates UL Registered — File #E69369
- Device Marking: Logo, Device Type, e.g., MAC223A6FP, Date Code

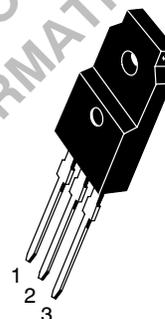
MAXIMUM RATINGS ($T_J = 25^\circ\text{C}$ unless otherwise noted)

Rating	Symbol	Value	Unit
Peak Repetitive Off-State Voltage ⁽¹⁾ ($T_J = -40$ to $+125^\circ\text{C}$, Sine Wave 50 to 60 Hz, Gate Open)	V_{DRM} , V_{RRM}		Volts
	MAC223A6FP	400	
	MAC223A8FP	600	
	MAC223A10FP	800	
On-State RMS Current ($T_C = +80^\circ\text{C}$) ⁽²⁾ Full Cycle Sine Wave 50 to 60 Hz	$I_{T(RMS)}$	25	Amps
Peak Non-repetitive Surge Current (One Full Cycle, 60 Hz, $T_C = 80^\circ\text{C}$) Preceded and followed by rated current	I_{TSM}	250	Amps
Circuit Fusing ($t = 8.3$ ms)	I^2t	260	A^2s
Peak Gate Power ($t \leq 2$ μsec ; $T_C = +80^\circ\text{C}$)	P_{GM}	20	Watts
Average Gate Power ($t = 8.3$ ms; $T_C = +80^\circ\text{C}$)	$P_{G(AV)}$	0.5	Watt
Peak Gate Current ($t \leq 2$ μsec ; $T_C = +80^\circ\text{C}$)	I_{GM}	2.0	Amps
Peak Gate Voltage ($t \leq 2$ μsec ; $T_C = +80^\circ\text{C}$)	V_{GM}	± 10	Volts
RMS Isolation Voltage ($T_A = 25^\circ\text{C}$, Relative Humidity $\leq 20\%$) 	$V_{(ISO)}$	1500	Volts
Operating Junction Temperature	T_J	-40 to +125	$^\circ\text{C}$
Storage Temperature Range	T_{stg}	-40 to +150	$^\circ\text{C}$
Mounting Torque	—	8.0	in. lb.

(1) V_{DRM} and V_{RRM} 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.

ISOLATED TRIAC 
25 AMPERES RMS
400 thru 800 VOLTS



ISOLATED TO-220 Full Pack
CASE 221C
STYLE 3

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

ORDERING INFORMATION

Device	Package	Shipping
MAC223A6FP	ISOLATED TO220FP	500/Box
MAC223A8FP	ISOLATED TO220FP	500/Box
MAC223A10FP	ISOLATED TO220FP	500/Box

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

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Thermal Characteristics

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	1.2	$^{\circ}C/W$
Thermal Resistance, Case to Sink	$R_{\theta CS}$	2.2	$^{\circ}C/W$
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	60	$^{\circ}C/W$
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 ($V_D = \text{Rated } V_{DRM}, V_{RRM}; \text{ Gate Open}$)	$T_J = 25^{\circ}C$	I_{DRM}	—	—	10	μA
	$T_J = 125^{\circ}C$	I_{RRM}	—	—	2.0	mA

ON CHARACTERISTICS

Peak On-State Voltage ($I_{TM} = \pm 35 \text{ A Peak, Pulse Width} \leq 2 \text{ ms; Duty Cycle} \leq 2\%$)	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(+)	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(-); MT2(+), G(-) MT2(-), G(+)	V_{GT}	—	1.1	2.0	Volts
		—	1.3	2.5	
Gate Non-trigger Voltage ($V_D = 12 \text{ V, } T_J = 125^{\circ}C, R_L = 100 \Omega$) All Quadrants	V_{GD}	0.2	0.4	—	Volts
Holding Current ($V_D = 12 \text{ Vdc, Gate Open, Initiating Current} = \pm 200 \text{ mA}$)	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	—	μs

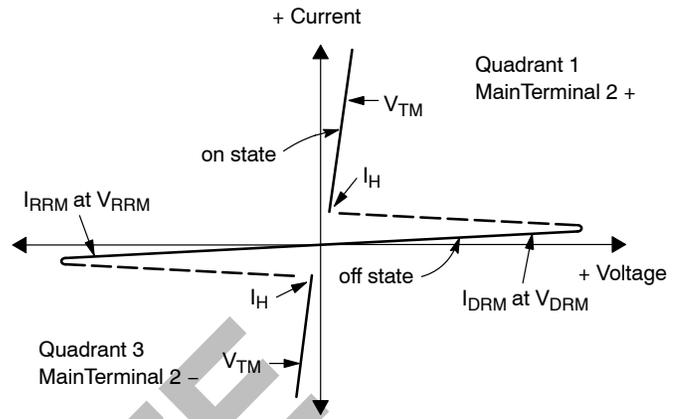
DYNAMIC CHARACTERISTICS

Critical Rate of Rise of Off-State Voltage ($V_D = \text{Rated } V_{DRM}, \text{ Exponential Waveform, } T_C = 125^{\circ}C$)	dv/dt	—	40	—	V/ μs
Critical Rate of Rise of Commutation Voltage ($V_D = \text{Rated } V_{DRM}, I_{TM} = 35 \text{ A Peak, Commutating } di/dt = 12.6 \text{ A/ms, Gate Unenergized, } T_C = 80^{\circ}C$)	dv/dt(c)	—	5.0	—	V/ μs

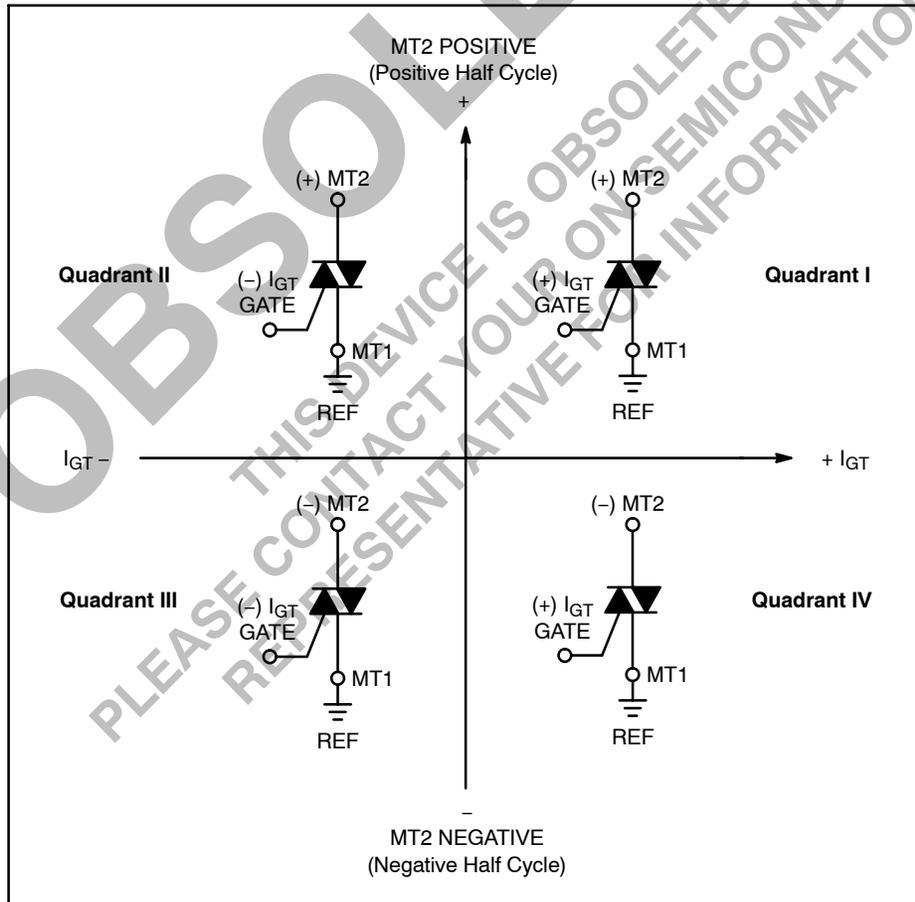
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Voltage Current Characteristic of Triacs (Bidirectional Device)

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.

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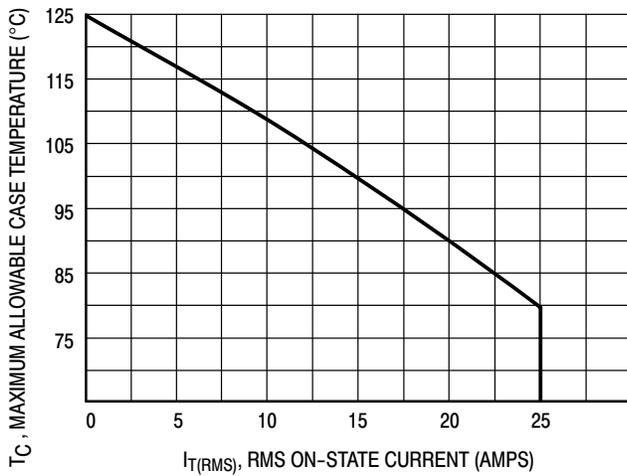


Figure 1. RMS Current Derating

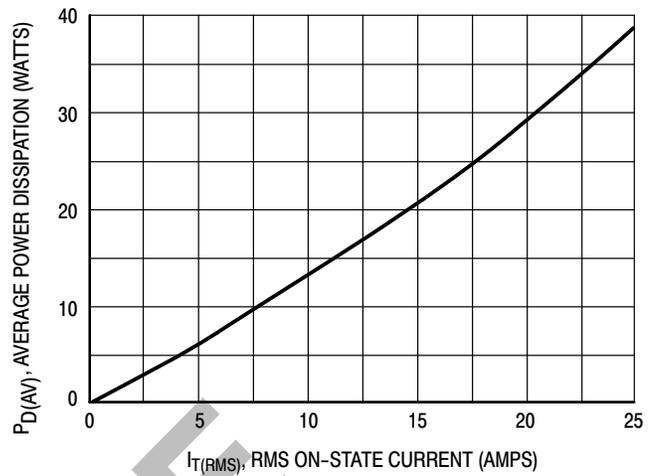


Figure 2. On-State Power Dissipation

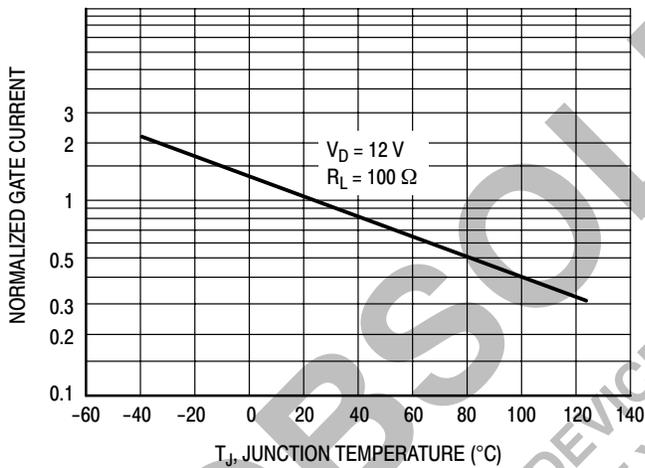


Figure 3. Typical Gate Trigger Current

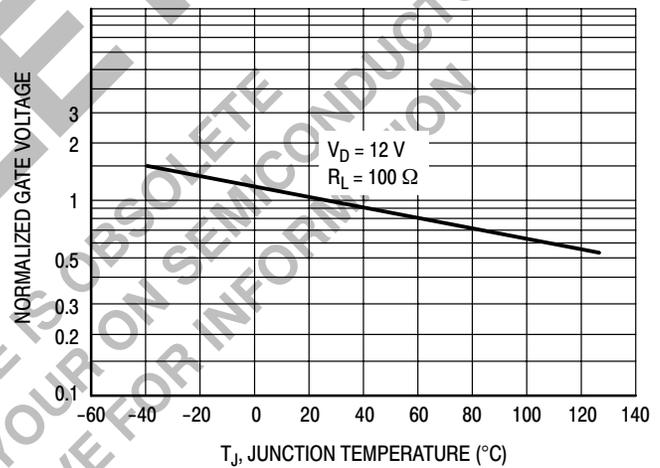


Figure 4. Typical Gate Trigger Voltage

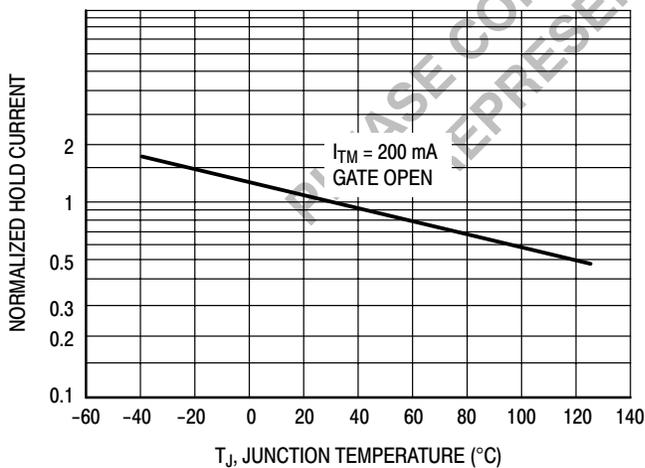


Figure 5. Typical Hold Current

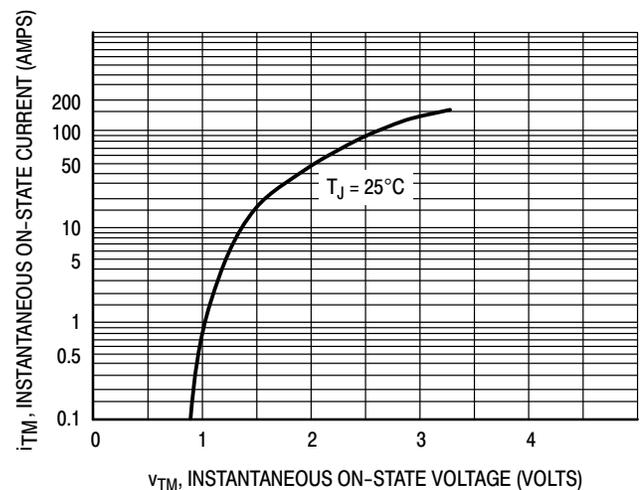
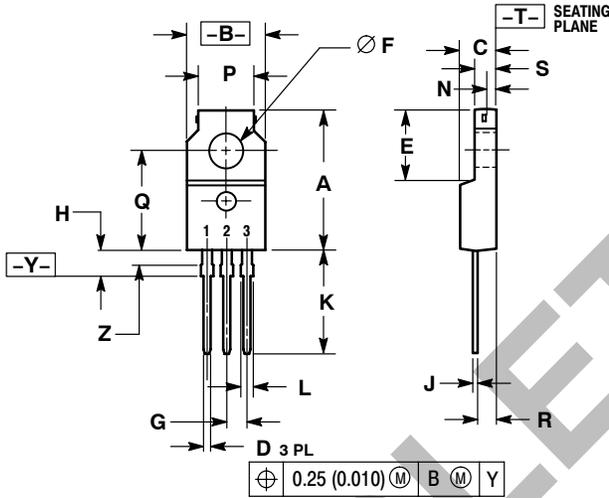


Figure 6. Typical On-State Characteristics

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PACKAGE DIMENSIONS

ISOLATED TO-220 Full Pack CASE 221C-02 ISSUE C



- 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

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

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