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MAC223A6, MAC223A8, MAC223A10

Preferred Device

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
- Device Marking: Logo, Device Type, e.g., MAC223A6, Date Code

MAXIMUM RATINGS (T_J = 25°C unless otherwise noted)

Rating	Symbol	Value	Unit
Peak Repetitive Off–State Voltage(1) (T_J = –40 to 125°C, Sine Wave 50 to 60 Hz, Gate Open) MAC223A6 MAC223A8 MAC223A10	V_{DRM}, V_{RRM}	 400 600 800	Volts
On–State Current RMS Full Cycle Sine Wave 50 to 60 Hz (T_C = 80°C)	$I_{T(RMS)}$	25	A
Peak Non–repetitive Surge Current (One Full Cycle, 60 Hz, T_C = 80°C) Preceded and followed by rated current	I_{TSM}	250	A
Circuit Fusing (t = 8.3 ms)	I^2t	260	A^2s
Peak Gate Current (t ≤ 2.0 μsec; T_C = +80°C)	I_{GM}	2.0	A
Peak Gate Voltage (t ≤ 2.0 μsec; T_C = +80°C)	V_{GM}	±10	Volts
Peak Gate Power (t ≤ 2.0 μsec; T_C = +80°C)	P_{GM}	20	Watts
Average Gate Power (T_C = 80°C, t = 8.3 ms)	$P_{G(AV)}$	0.5	Watts
Operating Junction Temperature Range	T_J	–40 to 125	°C
Storage Temperature Range	T_{stg}	–40 to 150	°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.

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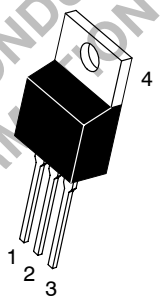
TRIACS
25 AMPERES RMS
400 thru 800 VOLTS



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
MAC223A6	TO220AB	500/Box
MAC223A8	TO220AB	500/Box
MAC223A10	TO220AB	500/Box

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

THERMAL CHARACTERISTICS

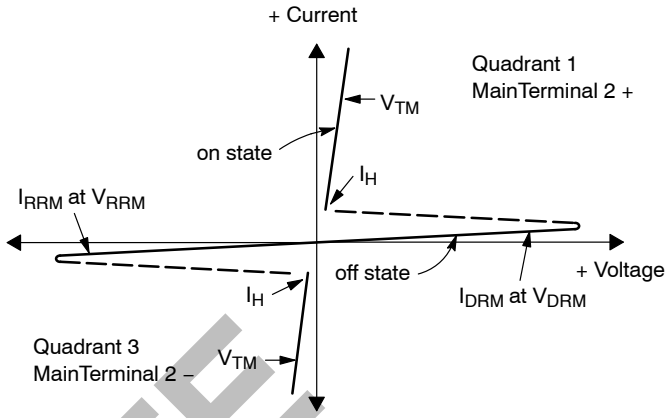
Characteristic	Symbol	Value	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	1.2	°C/W
Thermal Resistance, Junction to Ambient	$R_{\theta JA}$	60	°C/W
Maximum Lead Temperature for Soldering Purposes 1/8″ from Case for 10 Seconds	T_L	260	°C

ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise indicated; Electricals apply in both directions)

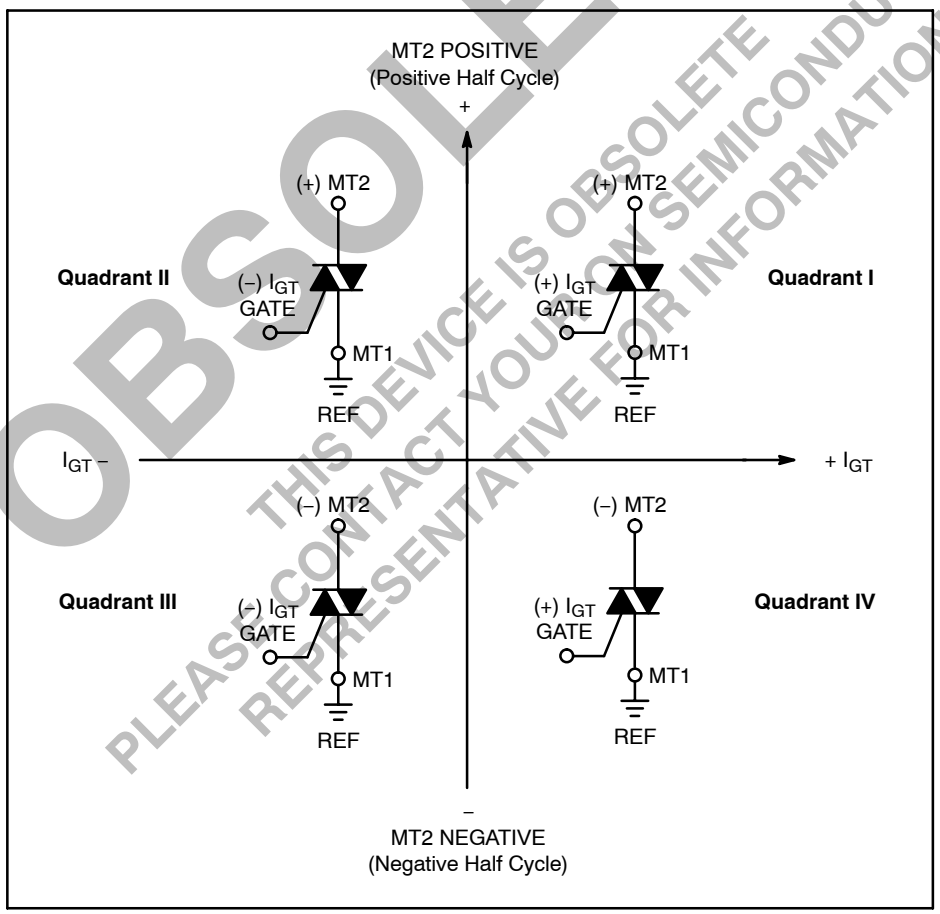
Characteristic		Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Peak Repetitive Blocking Current	T_J = 25°C	I_{DRM},	—	—	10	μA
(V_D = Rated V_{DRM}, V_{RRM}; Gate Open)	T_J = 125°C	I_{RRM}	—	—	2.0	mA
ON CHARACTERISTICS						
Peak On−State Voltage (I_{TM} = ±35 A Peak, Pulse Width ≤ 2 ms, Duty Cycle ≤ 2%)		V_{TM}	—	1.4	1.85	Volts
Gate Trigger Current (Continuous dc) (V_D = 12 V, R_L = 100 Ω)		I_{GT}				mA
MT2(+), G(+); MT2(−), G(−); MT(+), G(−)			—	20	50	
MT2(−), G(+)			—	30	75	
Gate Trigger Voltage (Continuous dc) (V_D = 12 V, R_L = 100 Ω)		V_{GT}				Volts
MT2(+), G(+); MT2(−), G(−); MT(+), G(−)			—	1.1	2.0	
MT2(−), G(+)			—	1.3	2.5	
Gate Non−trigger Voltage (V_D = 12 V, T_J = 125°C, R_L = 100 Ω) All Quadrants		V_{GD}	0.2	0.4	—	Volts
Holding Current (V_D = 12 Vdc, Gate Open, Initiating Current = ±200 mA)		I_H	—	10	50	mA
Turn−On Time (V_D = Rated V_{DRM}, I_{TM} = 35 A Peak, I_G = 200 mA)		t_{gt}	—	1.5	—	μs
DYNAMIC CHARACTERISTICS						
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)	—	5.0	—	V/μs

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.

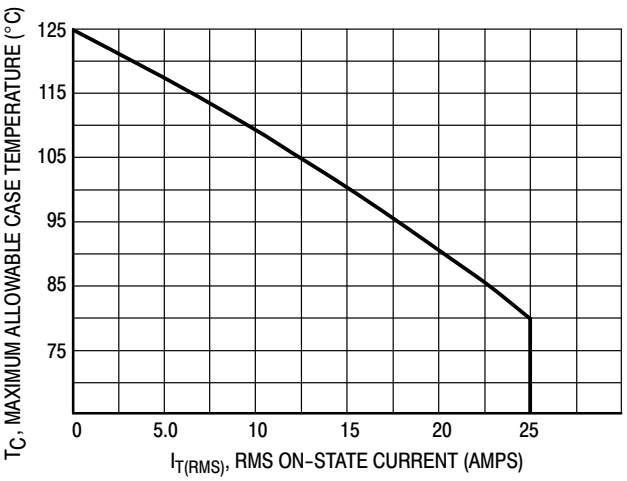


Figure 1. RMS Current Derating

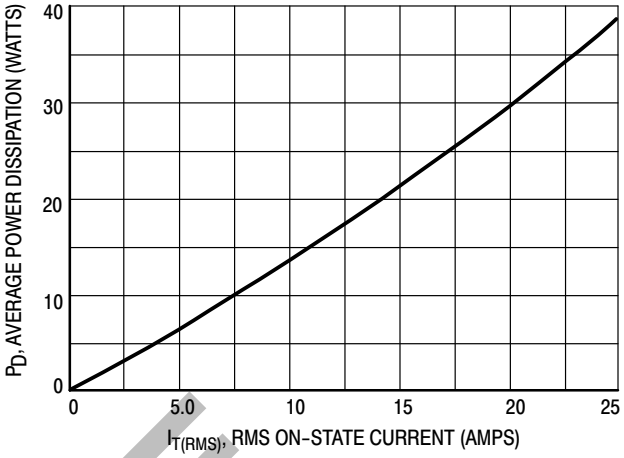


Figure 2. On−State Power Dissipation

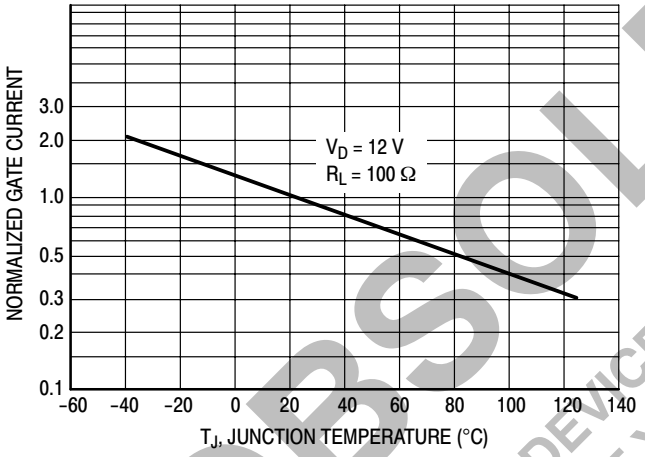


Figure 3. Typical Gate Trigger Current

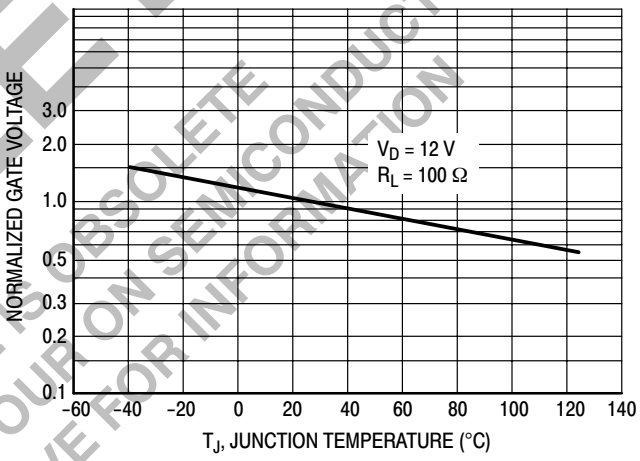


Figure 4. Typical Gate Trigger Voltage

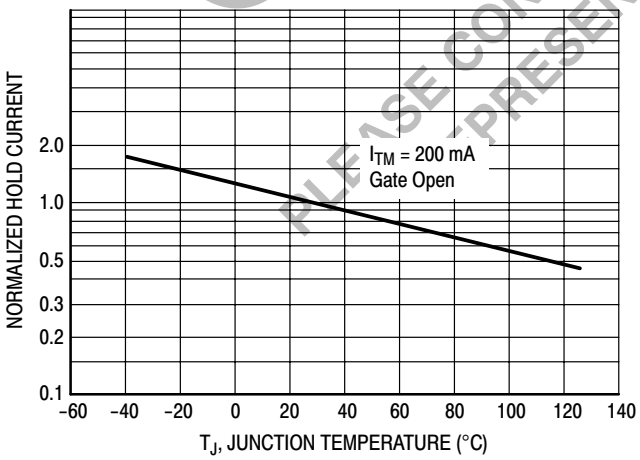


Figure 5. Typical Hold Current

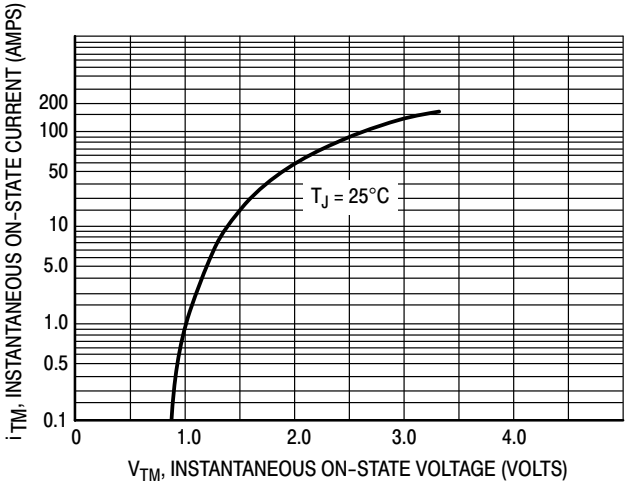
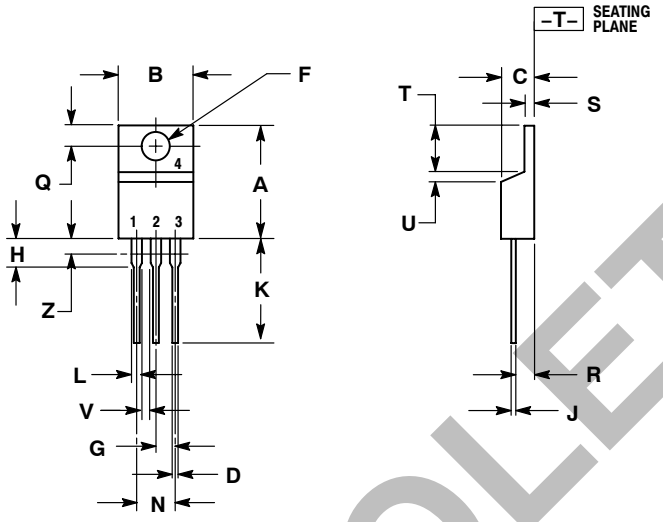


Figure 6. Typical On−State Characteristics

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.

	INCHES		MILLIMETERS	
DIM	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

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
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MAC223A/D