DIGITRON™ Semiconductors

High-reliability discrete products
and engineering services since 1977

MAC223(A) SERIES

SILICON BIDIRECTIONAL THYRISTORS

FEATURES

- Available as "HR" (high reliability) screened per MIL-PRF-19500, JANTX level. Add "HR" suffix to base part number.
- Available as non-RoHS (Sn/Pb plating), standard, and as RoHS by adding "-PBF" suffix.

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Peak repetitive off-state voltage[1] (T_J = -40 to +125°C, ½ sine wave, 50 to 60Hz, gate open)			
MAC223-3, MAC223A-3	V_{DRM}	100	Volts
MAC223-4, MAC223A-4		200	
MAC223-5, MAC223A-5		300	
MAC223-6, MAC223A-6		400	
MAC223-7, MAC223A-7		500	
MAC223-8, MAC223A-8		600	
MAC223-9, MAC223A-9		700	
MAC223-10, MAC223A-10		800	
RMS on-state current (Full cycle sine wave, 50 to 60Hz, T_C = 80°C)	$I_{T(RMS)}$	25	Amps
Peak non-repetitive surge current (1 cycle, 60Hz, T_C = 80°C, preceded and followed by rated current)	I_{TSM}	250	Amps
Circuit fusing considerations (t = 8.3ms)	I^2t	260	A^2s
Peak gate current (t ≤ 2µs)	I_{GM}	2.0	Amps
Peak gate voltage (t ≤ 2µs)	V_{GM}	±10	Volts
Peak gate power (t ≤ 2µs)	P_{GM}	20	Watts
Average gate power (T_C = 80°C, t ≤ 8.3ms)	$P_{G(AV)}$	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	In. lb.

Note 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

THERMAL CHARACTERISTICS

Characteristic	Symbol	Maximum	Unit
Thermal resistance, junction to case	$R_{\Theta JC}$	1.2	°C/W
Thermal resistance, junction to ambient	$R_{\Theta JA}$	60	°C/W

ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Typ.	Max	Unit
Peak blocking current [2]					
(V_D = Rated V_{DRM}, T_J = 25°C)	I_{DRM}	-	-	10	µA
(V_D = Rated V_{DRM}, T_J = 125°C)		-	-	2	mA
Peak on-state voltage (I_{TM} = 35A peak, pulse width ≤ 2ms, duty cycle ≤ 2%.)	V_{TM}	-	1.4	1.85	Volts
Gate trigger current (continuous dc) (V_D = 12V, R_L = 100Ω)					
MT2(+),G(+); MT2(+),G(-); MT2(-),G(-)	I_{GT}	-	20	50	mA
MT2(-),G(+) "A" suffix only		-	30	75	

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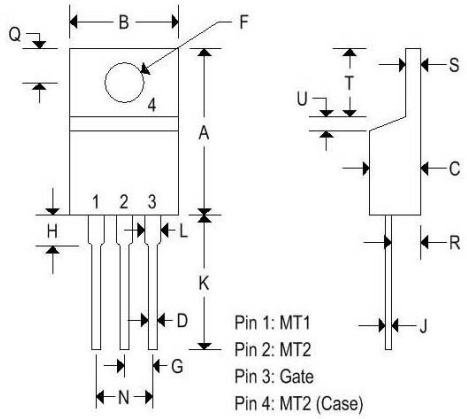
Gate trigger voltage (continuous dc) (V_D = 12V, R_L = 100Ω) MT2(+),G(+); MT2(+),G(-); MT2(-),G(-) MT2(-),G(+) "A" suffix only (V_D = Rated V_{DRM}, R_L = 10kΩ, T_J = 125°C) MT2(+),G(+); MT2(+),G(-); MT2(-),G(-) MT2(-),G(+) "A" suffix only	V_{GT}	- - 0.2 0.2	1.1 1.3 0.4 0.4	2.0 2.5 - -	Volts
Holding current (V_D = 12V, I_{TM} = 200mA, gate open)	I_H	-	10	50	mA
Gate controlled turn-on time (V_D = Rated V_{DRM}, I_{TM} = 35A, I_G = 200mA)	t_{gt}	-	1.5	-	µs
Critical rate of rise of off-state voltage (V_D = Rated V_{DRM}, exponential waveform, gate open, T_C = 125°C)	dv/dt	-	40	-	V/µs
Critical rate of rise of commutation voltage (V_D = Rated V_{DRM}, I_{TM} = 35A peak, commutating di/dt = 12.6A/ms, gate unenergized, T_C = 80°C)	dv/dt(c)	-	5	-	V/µs

Note 2: Ratings apply for open gate conditions. Devices shall not be tested with a constant current source for blocking voltages such that the voltage applied exceeds the rated blocking voltage

MECHANICAL CHARACTERISTICS

Case	TO-220AB
Marking	Alpha-numeric
Pin out	See below



	TO-220AB			
	Inches		Millimeters	
	Min	Max	Min	Max
A	0.575	0.620	14.600	15.750
B	0.380	0.405	9.650	10.290
C	0.160	0.190	4.060	4.820
D	0.025	0.035	0.640	0.890
F	0.142	0.147	3.610	3.730
G	0.095	0.105	2.410	2.670
H	0.110	0.155	2.790	3.930
J	0.014	0.022	0.360	0.560
K	0.500	0.562	12.700	14.270
L	0.045	0.055	1.140	1.390
N	0.190	0.210	4.830	5.330
Q	0.100	0.120	2.540	3.040
R	0.080	0.110	2.040	2.790
S	0.045	0.055	1.140	1.390
T	0.235	0.255	5.970	6.480
U	-	0.050	-	1.270
V	0.045	-	1.140	-
Z	-	0.080	-	2.030

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FIGURE 1 – RMS CURRENT DERATING

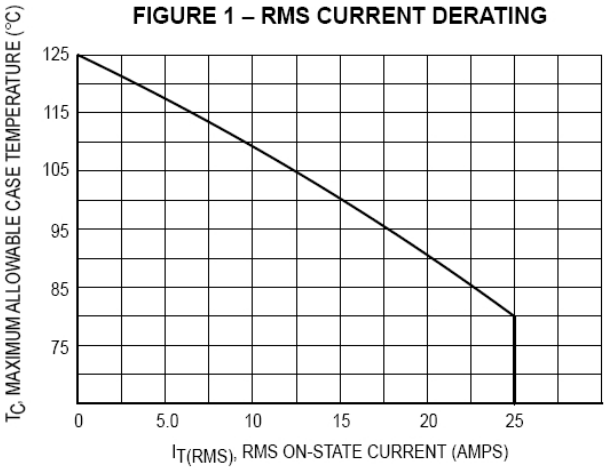

FIGURE 2 – ON-STATE POWER DISSIPATION

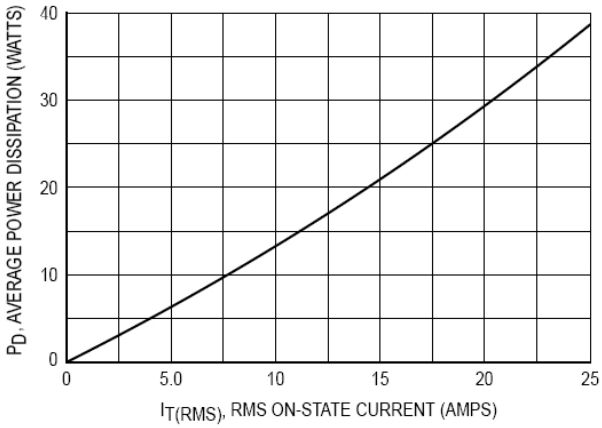

FIGURE 3 – GATE TRIGGER CURRENT

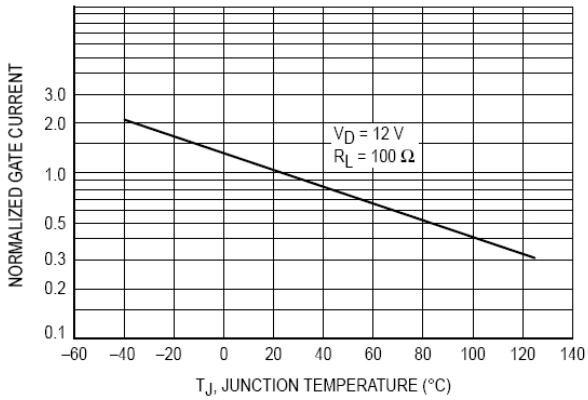

FIGURE 4 – GATE TRIGGER VOLTAGE

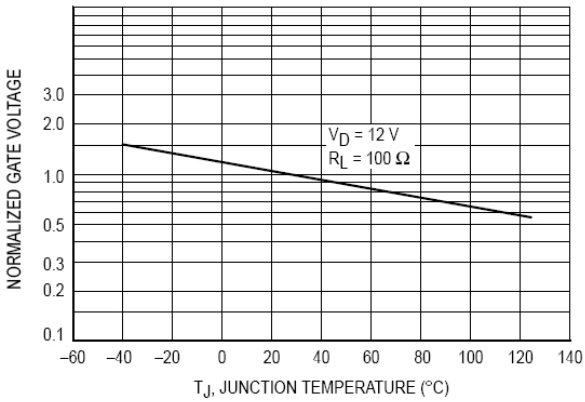

FIGURE 5 – HOLD CURRENT

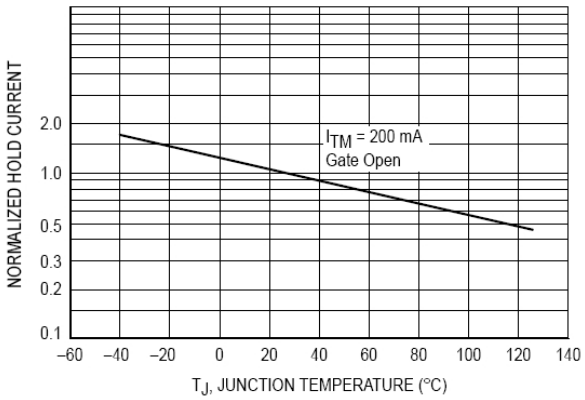

FIGURE 6 – TYPICAL ON-STATE CHARACTERISTICS