

# DIGITRON SEMICONDUCTORS

## MAC223(A) SERIES

## SILICON BIDIRECTIONAL THYRISTORS

Available Non-RoHS (standard) or RoHS compliant (add PBF suffix).

Available as "HR" (high reliability) screened per MIL-PRF-19500, JANTX level. Add "HR" suffix to base part number.

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

Rating	Symbol	Value	Unit
<b>Peak repetitive off-state voltage</b> <sup>(1)</sup> ( $T_J = -40$ to $+125^\circ\text{C}$ , $\frac{1}{2}$ sine wave, 50 to 60Hz, gate open) MAC223-3, MAC223A-3 MAC223-4, MAC223A-4 MAC223-5, MAC223A-5 MAC223-6, MAC223A-6 MAC223-7, MAC223A-7 MAC223-8, MAC223A-8 MAC223-9, MAC223A-9 MAC223-10, MAC223A-10	$V_{\text{DRM}}$	100 200 300 400 500 600 700 800	Volts
<b>RMS on-state current</b> (Full cycle sine wave, 50 to 60Hz, $T_C = 80^\circ\text{C}$ )	$I_{\text{T(RMS)}}$	25	Amps
<b>Peak non-repetitive surge current</b> (1 cycle, 60Hz, $T_C = 80^\circ\text{C}$ , preceded and followed by rated current)	$I_{\text{TSM}}$	250	Amps
<b>Circuit fusing considerations</b> ( $t = 8.3\text{ms}$ )	$I^2t$	260	$\text{A}^2\text{s}$
<b>Peak gate current</b> ( $t \leq 2\mu\text{s}$ )	$I_{\text{GM}}$	2.0	Amps
<b>Peak gate voltage</b> ( $t \leq 2\mu\text{s}$ )	$V_{\text{GM}}$	$\pm 10$	Volts
<b>Peak gate power</b> ( $t \leq 2\mu\text{s}$ )	$P_{\text{GM}}$	20	Watts
<b>Average gate power</b> ( $T_C = 80^\circ\text{C}$ , $t \leq 8.3\text{ms}$ )	$P_{\text{G(AV)}}$	0.5	Watts
<b>Operating junction temperature range</b>	$T_J$	-40 to +125	$^\circ\text{C}$
<b>Storage temperature range</b>	$T_{\text{stg}}$	-40 to +150	$^\circ\text{C}$
<b>Mounting torque</b>		8	In. lb.

Note 1:  $V_{\text{DRM}}$  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
<b>Thermal resistance, junction to case</b>	$R_{\theta\text{JC}}$	1.2	$^\circ\text{C/W}$
<b>Thermal resistance, junction to ambient</b>	$R_{\theta\text{JA}}$	60	$^\circ\text{C/W}$

### ELECTRICAL CHARACTERISTICS ( $T_C = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Min	Typ.	Max	Unit
<b>Peak blocking current</b> <sup>(2)</sup> ( $V_D = \text{Rated } V_{\text{DRM}}$ , $T_J = 25^\circ\text{C}$ ) ( $V_D = \text{Rated } V_{\text{DRM}}$ , $T_J = 125^\circ\text{C}$ )	$I_{\text{DRM}}$	- -	- -	10 2	$\mu\text{A}$ mA
<b>Peak on-state voltage</b> ( $I_{\text{TM}} = 35\text{A}$ peak, pulse width $\leq 2\text{ms}$ , duty cycle $\leq 2\%$ .)	$V_{\text{TM}}$	-	1.4	1.85	Volts
<b>Gate trigger current</b> (continuous dc) ( $V_D = 12\text{V}$ , $R_L = 100\Omega$ ) MT2(+),G(+); MT2(+),G(-); MT2(-),G(-) MT2(-),G(+) "A" suffix only	$I_{\text{GT}}$	- -	20 30	50 75	mA
<b>Gate trigger voltage</b> (continuous dc) ( $V_D = 12\text{V}$ , $R_L = 100\Omega$ ) MT2(+),G(+); MT2(+),G(-); MT2(-),G(-) MT2(-),G(+) "A" suffix only ( $V_D = \text{Rated } V_{\text{DRM}}$ , $R_L = 10\text{k}\Omega$ , $T_J = 125^\circ\text{C}$ ) MT2(+),G(+); MT2(+),G(-); MT2(-),G(-) MT2(-),G(+) "A" suffix only	$V_{\text{GT}}$	- - 0.2 0.2	1.1 1.3 0.4 0.4	2.0 2.5 - -	Volts

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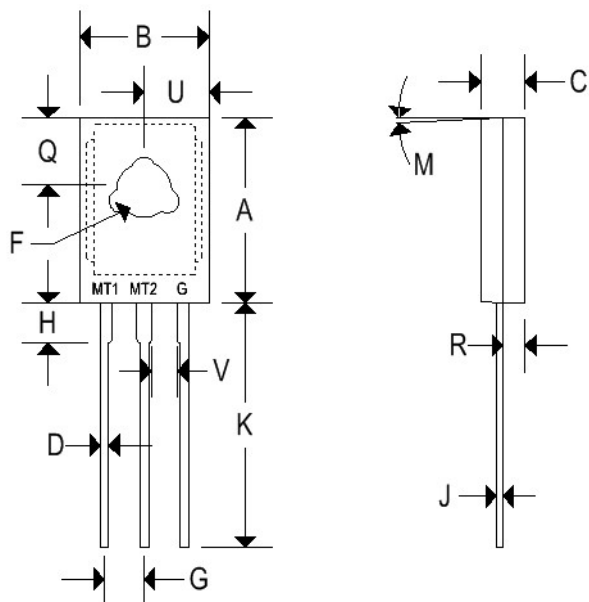
## SILICON BIDIRECTIONAL THYRISTORS

Characteristic	Symbol	Min	Typ.	Max	Unit
<b>Holding current</b> ( $V_D = 12V$ , $I_{TM} = 200mA$ , gate open)	$I_H$	-	10	50	mA
<b>Gate controlled turn-on time</b> ( $V_D = \text{Rated } V_{DRM}$ , $I_{TM} = 35A$ , $I_G = 200mA$ )	$t_{gt}$	-	1.5	-	$\mu s$
<b>Critical rate of rise of off-state voltage</b> ( $V_D = \text{Rated } V_{DRM}$ , exponential waveform, gate open, $T_C = 125^\circ C$ )	$dv/dt$	-	40	-	$V/\mu s$
<b>Critical rate of rise of commutation voltage</b> ( $V_D = \text{Rated } V_{DRM}$ , $I_{TM} = 35A$ peak, commutating $di/dt = 12.6A/ms$ , gate unenergized, $T_C = 80^\circ C$ )	$dv/dt(c)$	-	5	-	$V/\mu s$

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 CHARACTERISTIC

<b>Case</b>	TO-220AB
<b>Marking</b>	Alpha-numeric
<b>Pin out</b>	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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