

# DIGITRON SEMICONDUCTORS

## MAC800,(A),(B) 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

Rating	Symbol	Value	Unit
<b>Peak repetitive off-state voltage</b> <sup>(1)</sup> ( $T_J = 125^\circ\text{C}$ ) MAC800-2, MAC800A-2, MAC800B-2 MAC800-5, MAC800A-5, MAC800B-5 MAC800-10, MAC800A-10, MAC800B-10 MAC800-20, MAC800A-20, MAC800B-20 MAC800-40, MAC800A-40, MAC800B-40 MAC800-60, MAC800A-60, MAC800B-60 MAC800-80, MAC800A-80, MAC800B-80	$V_{\text{DRM}}$	25 50 100 200 400 600 800	Volts
<b>RMS on-state current</b> (full sine wave, 50 to 60Hz, $T_C = 95^\circ\text{C}$ )	$I_{\text{T(RMS)}}$	4.0	Amps
<b>Peak non-repetitive surge current</b> (1 cycle, 60 Hz, $T_J = -40$ to $+125^\circ\text{C}$ )	$I_{\text{TSM}}$	40	Amps
<b>Circuit fusing considerations</b> ( $T_J = -40$ to $+125^\circ\text{C}$ , $t = 8.3\text{ms}$ )	$I^2t$	6.5	$\text{A}^2\text{s}$
<b>Peak gate power</b> ( $t \leq 10\mu\text{s}$ )	$P_{\text{GM}}$	10	Watts
<b>Average gate power</b>	$P_{\text{G(AV)}}$	0.5	Watts
<b>Peak gate voltage</b> (pulse width $\leq 10\mu\text{s}$ )	$V_{\text{GM}}$	5.0	Volts
<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	$^\circ\text{C}$

Note 1: Ratings apply for open gate conditions. Thyristor devices shall not be tested with a constant current source for blocking capability such that the voltage applied exceeds the rated blocking voltage.

\* Soldering temperatures shall not exceed  $200^\circ\text{C}$  for 10 seconds.

### THERMAL CHARACTERISTICS

Characteristic	Symbol	Maximum	Unit
<b>Thermal resistance, junction to case</b>	$R_{\theta\text{JC}}$	5.0	$^\circ\text{C}/\text{W}$
<b>Thermal resistance, junction to ambient</b>	$R_{\theta\text{JA}}$	150	$^\circ\text{C}/\text{W}$

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

Characteristic	Symbol	Min	Typ.	Max	Unit
<b>Peak blocking current</b> (either direction) (Rated $V_{\text{DRM}}$ @ $T_J = 125^\circ\text{C}$ , gate open)	$I_{\text{DRM}}$	-	0.5	2.0	mA
<b>Peak on-state voltage</b> (either direction) ( $I_{\text{TM}} = 6.0\text{A}$ peak, pulse width $\leq 300\mu\text{s}$ , duty cycle $\leq 2\%$ )	$V_{\text{TM}}$	-	-	2.0	Volts
<b>Gate trigger voltage</b> (continuous dc) ( $V_D = 12\text{V}$ , $R_L = 100\Omega$ , $T_J = 40^\circ\text{C}$ , minimum gate pulse width = 8.3ms) MT2(+),G(+); MT2(-),G(-), all types MT2(+),G(-); MT2(-),G(+), MAC800A, B ( $V_D = \text{Rated } V_{\text{DRM}}$ , $R_L = 10\text{k}\Omega$ , $T_J = 125^\circ\text{C}$ , minimum pulse width = 8.3ms) MT2(+),G(+); MT2(-),G(-), all types MT2(+),G(-); MT2(-),G(+), MAC800A, B	$V_{\text{GT}}$	- - 0.2 0.2	1.4 1.4 - -	2.5 2.5 - -	Volts
<b>Holding current</b> (either direction) ( $V_D = 12\text{V}$ , gate open, initiating current = 1.0A, $T_J = -40^\circ\text{C}$ ) MAC800 Series ( $V_D = 12\text{V}$ , gate open, initiating current = 1.0A, $T_J = -40^\circ\text{C}$ ) MAC800A, B Series ( $V_D = 12\text{V}$ , gate open, initiating current = 1.0A, $T_J = 25^\circ\text{C}$ ) MAC800 Series ( $V_D = 12\text{V}$ , gate open, initiating current = 1.0A, $T_J = 25^\circ\text{C}$ ) MAC800A, B Series	$I_{\text{H}}$	- - - -	- - - -	70 30 30 15	mA
<b>Gate controlled turn on time</b> ( $V_D = \text{rated } V_{\text{DRM}}$ , $I_{\text{TM}} = 14\text{A}$ peak, $I_{\text{GT}} = 100\text{mA}$ )	$t_{\text{gt}}$	-	1.0	2.0	$\mu\text{s}$

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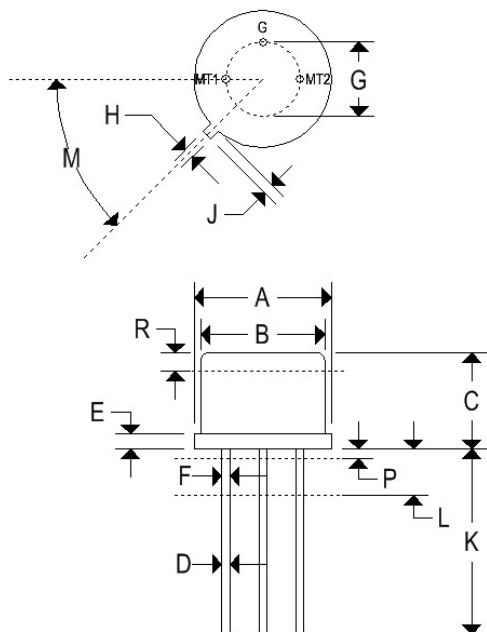
SILICON BIDIRECTIONAL THYRISTORS

Characteristic	Symbol	Min	Typ.	Max	Unit
<b>Critical rate of rise of off-state voltage</b> ( $V_D = \text{Rated } V_{DRM}$ , exponential waveform, $T_c = 95^\circ\text{C}$ , gate open)	dv/dt	-	5.0	-	V/ $\mu\text{s}$

Characteristic	Symbol	QUADRANT				
		I mA	II mA	III mA	IV mA	
<b>Peak gate trigger current</b> ( $V_D = 12\text{V}$ , $R_L = 100\Omega$ , minimum gate pulse width = 8.3ms)	MAC800 SERIES $T_J = 25^\circ\text{C}$	$I_{GT}$	30	-	30	-
	MAC800 SERIES $T_J = -40^\circ\text{C}$		60	-	60	-
	MAC800A SERIES $T_J = 25^\circ\text{C}$		5.0	5.0	5.0	10
	MAC800A SERIES $T_J = -40^\circ\text{C}$		20	20	20	30
	MAC800B SERIES $T_J = 25^\circ\text{C}$		3.0	3.0	3.0	5.0
	MAC800B SERIES $T_J = -40^\circ\text{C}$		15	15	15	20

## MECHANICAL CHARACTERISTIC

<b>Case</b>	TO-39
<b>Marking</b>	Body painted, alpha-numeric
<b>Pin out</b>	See below

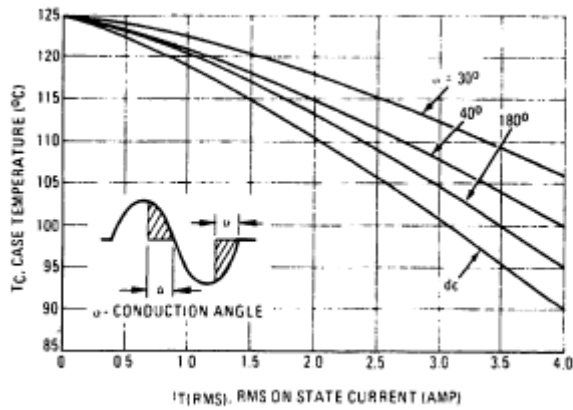


	TO-39			
	Inches		Millimeters	
	Min	Max	Min	Max
A	0.335	0.370	8.510	9.390
B	0.305	0.335	7.750	8.500
C	0.240	0.260	6.100	6.600
D	0.016	0.021	0.410	0.530
E	0.009	0.041	0.230	1.040
F	0.016	0.019	0.410	0.480
G	0.200 BSC		5.080 BSC	
H	0.028	0.034	0.720	0.860
J	0.029	0.045	0.740	1.140
K	0.500	0.750	12.700	19.050
L	0.250	-	6.350	-
M	45° BSC		45° BSC	
P	-	0.050	-	1.270
R	0.100	-	2.540	-

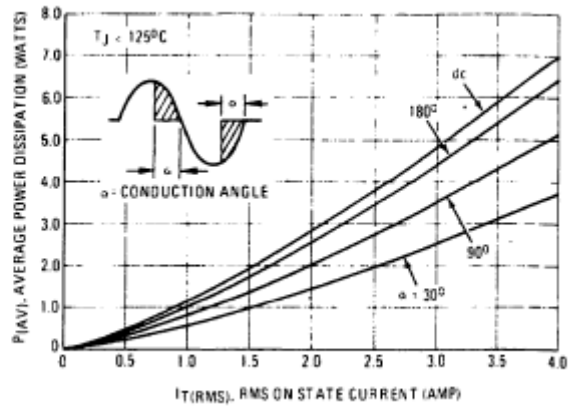
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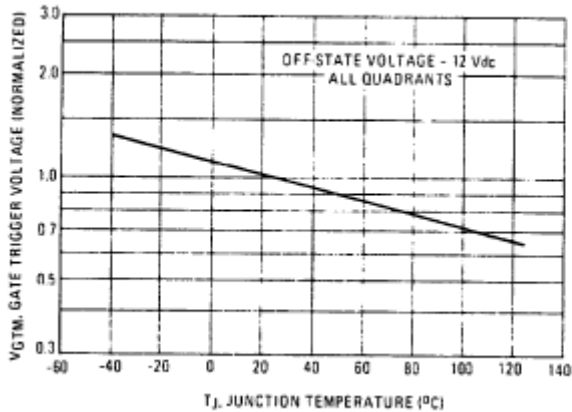
**FIGURE 1 – RMS CURRENT DERATING**



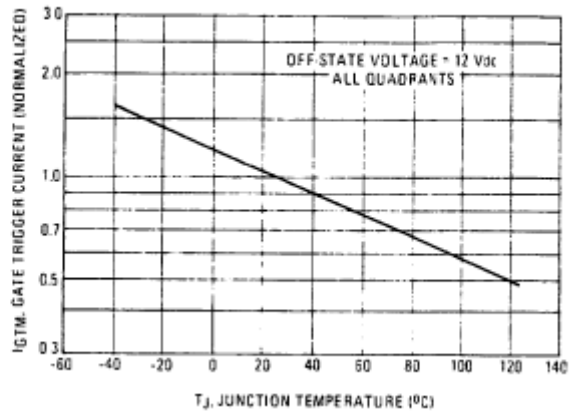
**FIGURE 2 – POWER DISSIPATION**



**FIGURE 3 – TYPICAL GATE-TRIGGER VOLTAGE**



**FIGURE 4 – TYPICAL GATE-TRIGGER CURRENT**



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FIGURE 5 – MAXIMUM ON-STATE CHARACTERISTICS

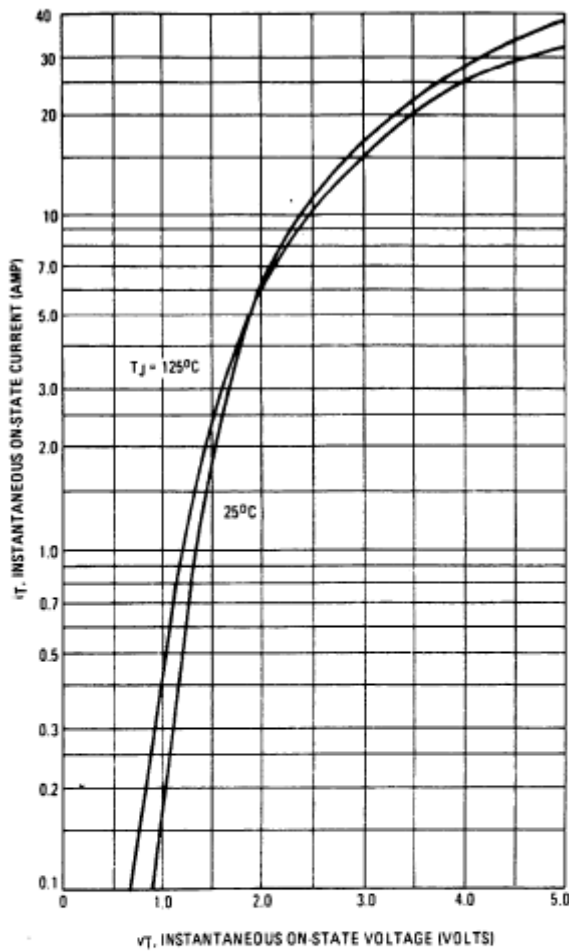


FIGURE 6 – TYPICAL HOLDING CURRENT

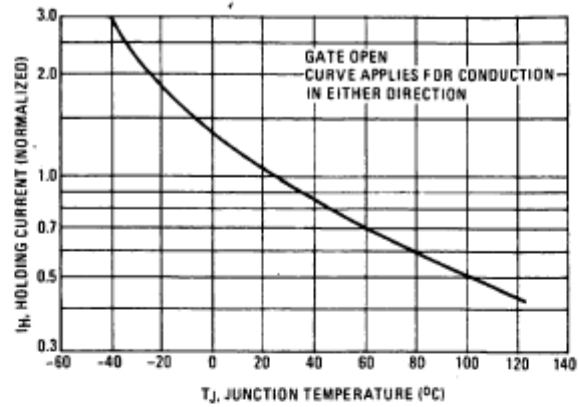


FIGURE 7 – MAXIMUM NON-REPETITIVE SURGE CURRENT

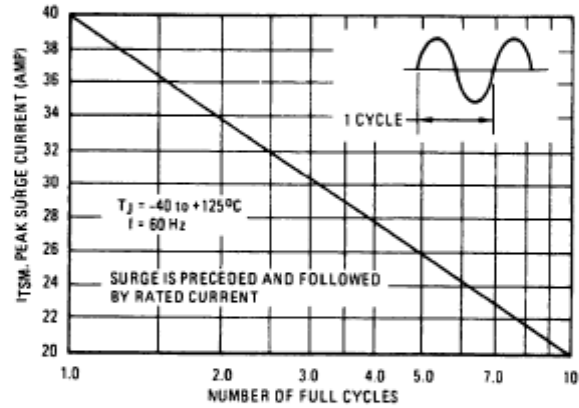


FIGURE 8 – THERMAL RESPONSE

