

DIGITRON SEMICONDUCTORS

MAC97,(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
Peak repetitive off-state voltage ⁽¹⁾ ($T_J = -40$ to $+110^\circ\text{C}$, $\frac{1}{2}$ sine wave 50 to 60Hz, gate open) MAC97-1, MAC97A-1, MAC97B-1 MAC97-2, MAC97A-2, MAC97B-2 MAC97-3, MAC97A-3, MAC97B-3 MAC97-4, MAC97A-4, MAC97B-4 MAC97-5, MAC97A-5, MAC97B-5 MAC97-6, MAC97A-6, MAC97B-6 MAC97-7, MAC97A-7, MAC97B-7 MAC97-8, MAC97A-8, MAC97B-8	V_{DRM}	30 60 100 200 300 400 500 600	Volts
RMS on-state current (full sine wave, 50 to 60Hz, $T_C = 50^\circ\text{C}$)	$I_{\text{T(RMS)}}$	0.6	Amps
Peak non-repetitive surge current (1 cycle, 60 Hz, $T_C = 110^\circ\text{C}$)	I_{TSM}	8.0	Amps
Circuit fusing considerations ($T_J = -40$ to $+110^\circ\text{C}$, $t = 8.3\text{ms}$)	I^2t	0.26	A^2s
Peak gate voltage ($t \leq 2.0\mu\text{s}$)	V_{GM}	5.0	Volts
Peak gate power ($t \leq 2.0\mu\text{s}$)	P_{GM}	5.0	Watts
Average gate power ($T_C = 80^\circ\text{C}$, $t = 8.3\text{ms}$)	$P_{\text{G(AV)}}$	0.1	Watts
Peak gate current ($t \leq 2.0\mu\text{s}$)	I_{GM}	1.0	Amps
Operating junction temperature range	T_J	-40 to +110	$^\circ\text{C}$
Storage temperature range	T_{stg}	-40 to +150	$^\circ\text{C}$

Note 1: V_{DRM} for all types can be applied on a continuous basis. Blocking voltage 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	$R_{\theta\text{JC}}$	75	$^\circ\text{C}/\text{W}$
Thermal resistance, junction to ambient	$R_{\theta\text{JA}}$	200	$^\circ\text{C}/\text{W}$

ELECTRICAL CHARACTERISTICS ($T_C = 25^\circ\text{C}$ and either polarity of MT2 to MT1 voltage, unless otherwise noted)

Characteristic	Symbol	Min	Typ.	Max	Unit
Peak blocking current ⁽²⁾ (Rated V_{DRM} @ $T_J = 110^\circ\text{C}$)	I_{DRM}	-	-	0.1	mA
Peak on-state voltage (either direction) ($I_{\text{TM}} = 0.85\text{A}$ peak, pulse width ≤ 2 ms, duty cycle $\leq 2\%$)	V_{TM}	-	-	1.9	Volts
Gate trigger voltage (continuous dc) ($V_D = 12\text{V}$, $R_L = 100\Omega$) MT2(+),G(+) MT2(+),G(-) MT2(-),G(-) MT2(-),G(+) ($V_D = \text{Rated } V_{\text{DRM}}$, $R_L = 10\text{k}\Omega$, $T_J = 110^\circ\text{C}$) MT2(+),G(+); MT2(+),G(-); MT2(-),G(-) MT2(-),G(+)	V_{GT}	- - - - 0.1 0.1	- - - - - -	2.0 2.0 2.0 2.5	Volts
Holding current (either direction) ($V_D = 12\text{V}$, gate open, $I_T = 200\text{mA}$)	I_H	-	-	10	mA

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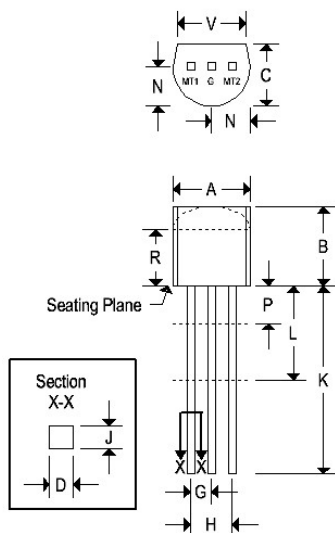
Characteristic	Symbol	Min	Typ.	Max	Unit
Gate controlled turn on time ($V_D = \text{rated } V_{DRM}, I_{TM} = 1.0A \text{ peak}, I_G = 25mA$)	t_{gt}	-	2.0	-	μs
Critical rate of rise of commutation voltage ($V_D = \text{Rated } V_{DRM}, I_{TM} = 0.84\mu A \text{ peak}, \text{commutating } di/dt = 0.32A/ms, \text{ gate unenergized}, T_C = 50^\circ C$)	$dv/dt(c)$	-	5	-	$V/\mu s$
Critical rate of rise of off-state voltage ($V_D = \text{Rated } V_{DRM}, \text{ exponential waveform}, T_C = 110^\circ C$)	dv/dt	-	25	-	$V/\mu s$

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

Quadrant and polarity	MAC SERIES			Unit
	97	97A	97B	
I MT2(+), G(+)	10	5.0	3.0	mA
II MT2(+), G(-)	10	5.0	3.0	mA
III MT2(-), G(-)	10	5.0	3.0	mA
IV MT2(-), G(+)	10	7.0	5.0	mA

MECHANICAL CHARACTERISTIC

Case	TO-92
Marking	Body painted, alpha-numeric
Pin out	See below



	TO-92			
	Inches		Millimeters	
	Min	Max	Min	Max
A	0.175	0.205	4.450	5.200
B	0.170	0.210	4.320	5.330
C	0.125	0.165	3.180	4.190
D	0.016	0.022	0.410	0.550
F	0.016	0.019	0.410	0.480
G	0.045	0.055	1.150	1.390
H	0.095	0.105	2.420	2.660
J	0.015	0.020	0.390	0.500
K	0.500	-	12.700	-
L	0.250	-	6.350	-
N	0.080	0.105	2.040	2.660
P	-	0.100	-	2.540
R	0.115	-	2.930	-
V	0.135	-	3.430	-

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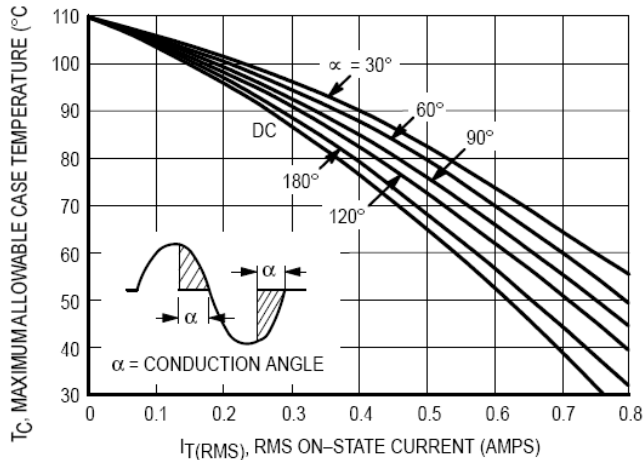


Figure 1. RMS Current Derating

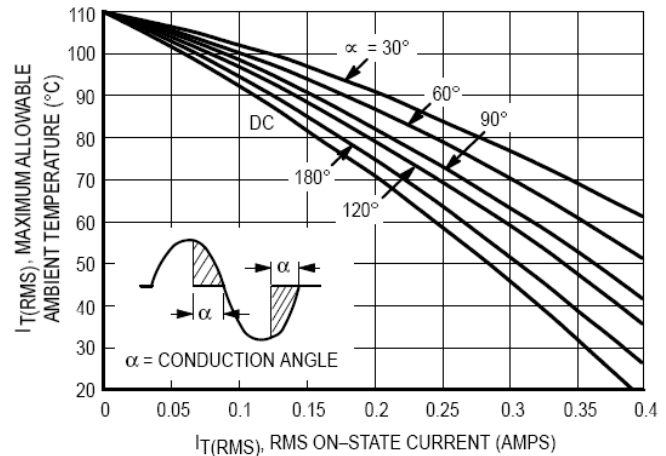


Figure 2. RMS Current Derating

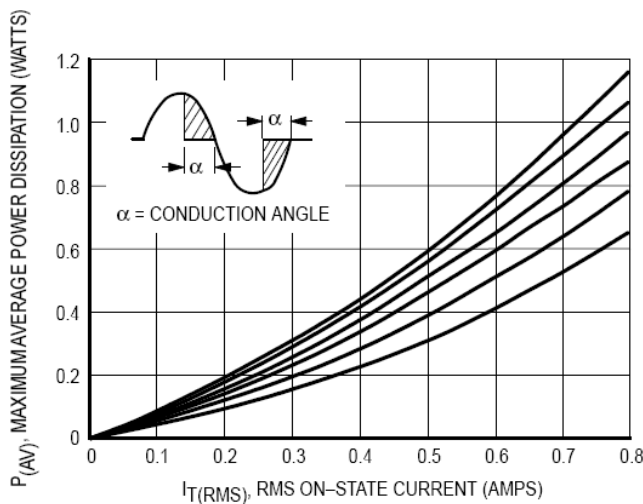


Figure 3. Power Dissipation

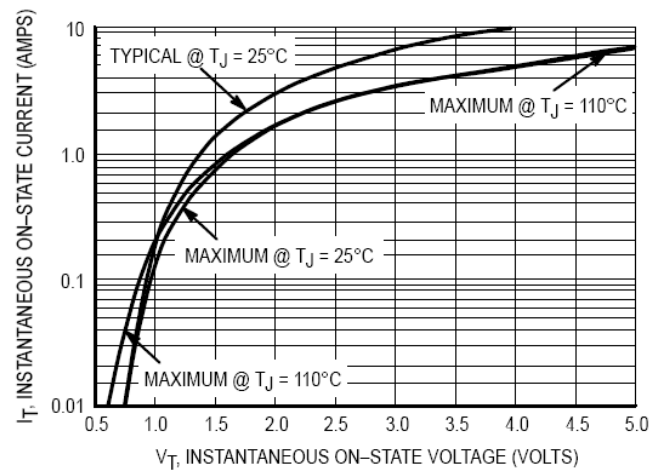


Figure 4. On-State Characteristics

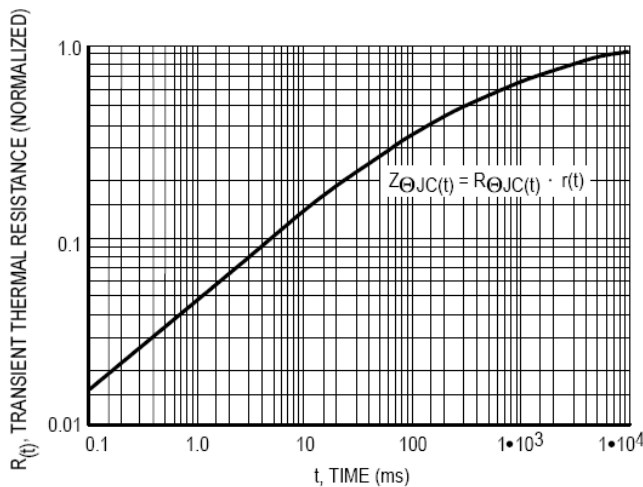


Figure 5. Transient Thermal Response

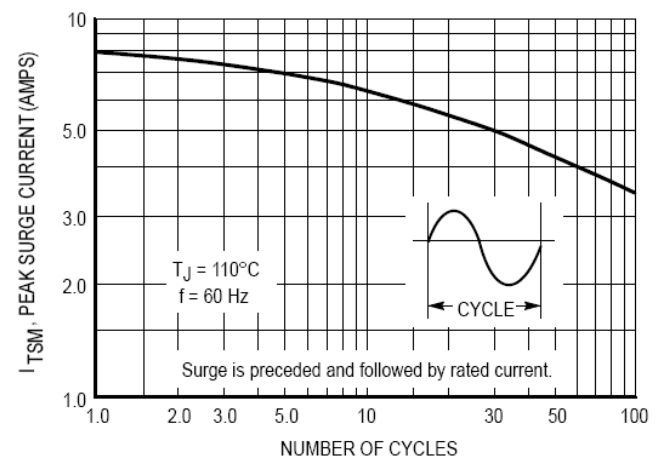


Figure 6. Maximum Allowable Surge Current

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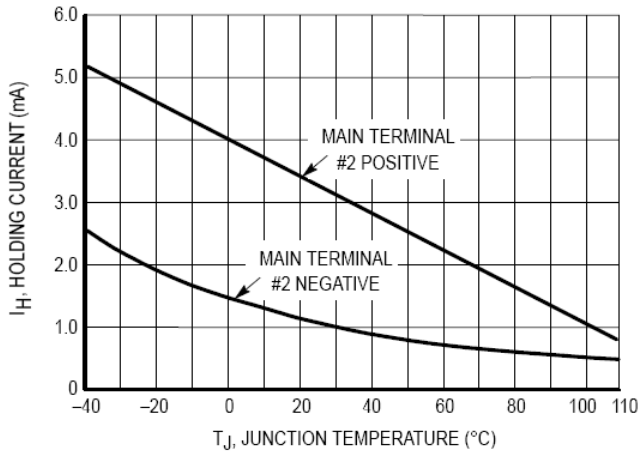


Figure 7. Typical Holding Current Variation

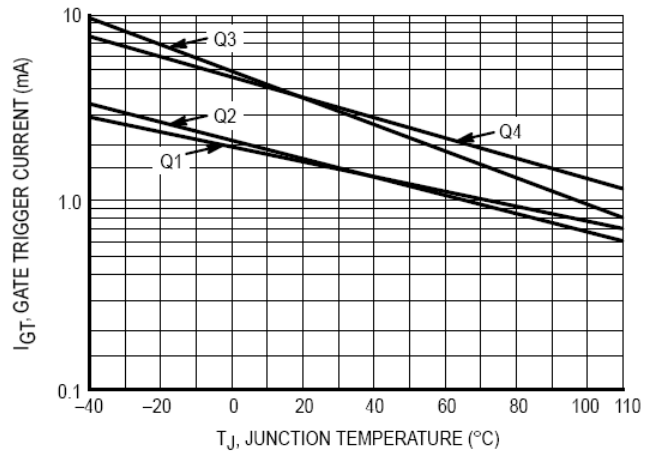


Figure 8. Typical Gate Trigger Current Variation

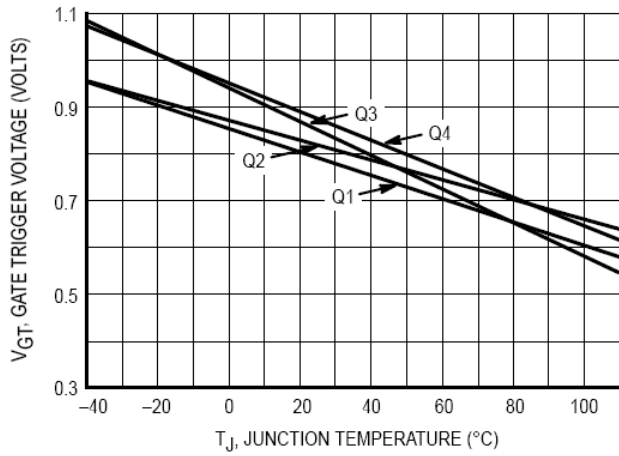


Figure 9. Gate Trigger Voltage Variation

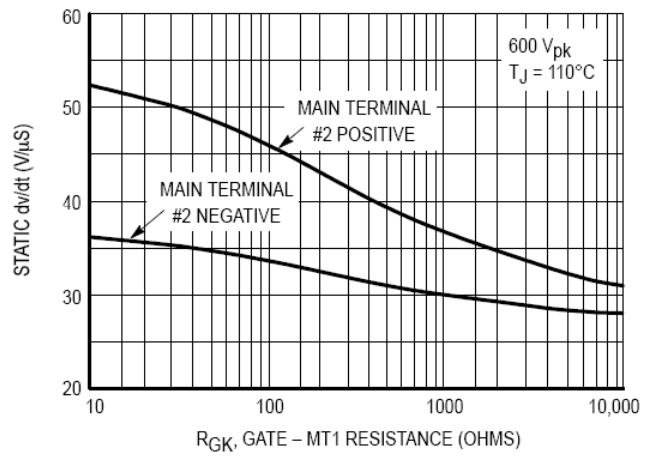


Figure 10. Exponential Static dv/dt versus Gate - MT1 Resistance

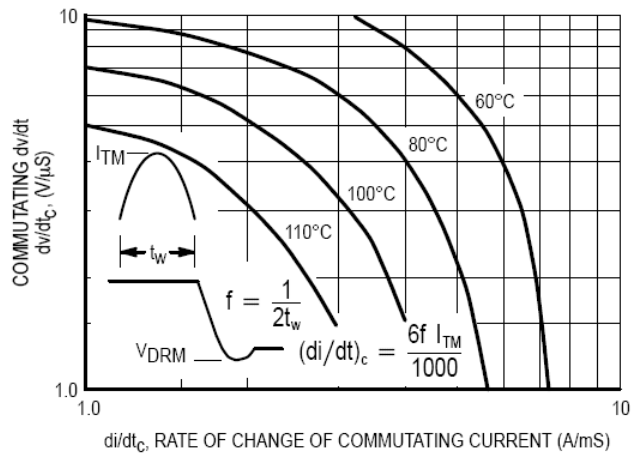


Figure 11. Typical Commutating dv/dt versus Current Crossing Rate and Junction Temperature

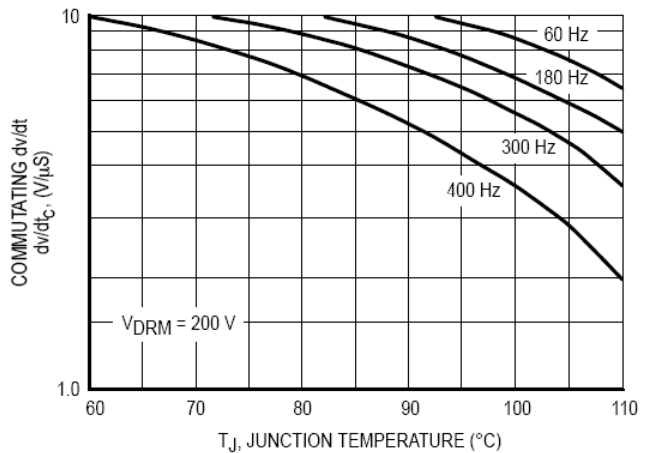


Figure 12. Typical Commutating dv/dt versus Junction Temperature at 0.8 Amps RMS

