

DIGITRON SEMICONDUCTORS

MAC997 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
Peak repetitive off-state voltage ⁽¹⁾ ($T_J = -40$ to $+110^\circ\text{C}$, sine wave 50 to 60Hz, gate open) MAC997A6, MAC997B6 MAC997A8, MAC997B8	V_{DRM}	400 600	Volts
RMS on-state current (Full cycle sine wave 50 to 60Hz, $T_C = 50^\circ\text{C}$)	$I_{\text{T(RMS)}}$	0.8	Amps
Peak non-repetitive surge current (1 cycle, sine wave, 60 Hz, $T_C = 110^\circ\text{C}$)	I_{TSM}	8.0	Amps
Circuit fusing considerations ($t = 8.3\text{ms}$)	I^2t	0.26	A^2s
Peak gate voltage ($t \leq 2.0\mu\text{s}$, $T_C = 80^\circ\text{C}$)	V_{GM}	5.0	Volts
Peak gate power ($t \leq 2.0\mu\text{s}$, $T_C = 80^\circ\text{C}$)	P_{GM}	5.0	Watts
Average gate power ($t \leq 8.3\text{ms}$, $T_C = 80^\circ\text{C}$)	$P_{\text{G(AV)}}$	0.1	Watts
Peak gate current ($t \leq 2.0\mu\text{s}$, $T_C = 80^\circ\text{C}$)	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} 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.

THERMAL CHARACTERISTICS

Characteristic	Symbol	Maximum	Unit
Thermal resistance, junction to case	$R_{\theta\text{JC}}$	75	$^\circ\text{C/W}$
Thermal resistance, junction to ambient	$R_{\theta\text{JA}}$	200	$^\circ\text{C/W}$

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

Characteristic	Symbol	Min	Typ.	Max	Unit
Peak blocking current ($V_D = \text{Rated } V_{\text{DRM}}, V_{\text{RRM}}, \text{ gate open @ } T_J = 25^\circ\text{C}$) ($V_D = \text{Rated } V_{\text{DRM}}, V_{\text{RRM}}, \text{ gate open @ } T_J = 110^\circ\text{C}$)	$I_{\text{DRM}},$ I_{RRM}	-	-	10 100	μA
Peak on-state voltage ($I_{\text{TM}} = \pm 0.85\text{A}$ peak, pulse width $\leq 2.0\text{ms}$, duty cycle $\leq 2\%$)	V_{TM}	-	-	1.9	Volts
Gate trigger current (continuous dc) ($V_D = 12\text{V}$, $R_L = 100\Omega$) MAC997A6, MAC997A8 MT2(+),G(+) (MT2(+),G(-) MT2(-),G(-) MT2(-),G(+) MAC997B6, MAC997B8 MT2(+),G(+) MT2(+),G(-) MT2(-),G(-) MT2(-),G(+)	I_{GT}	-	-	5.0 5.0 5.0 7.0	mA
Latching current ($V_D = 12\text{V}$, $I_G = 10\text{mA}$) All types MT2(+),G(+) MT2(+),G(-) MT2(-),G(-) MT2(-),G(+)	I_L	-	1.6 10.5 1.5 2.5	15 20 15 15	mA

DIGITRON SEMICONDUCTORS

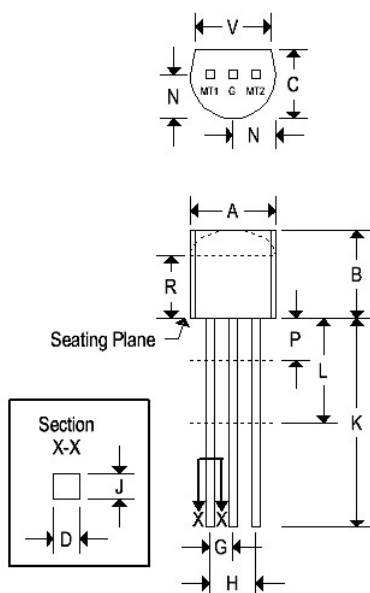
MAC997 SERIES

SILICON BIDIRECTIONAL THYRISTORS

Characteristic	Symbol	Min	Typ.	Max	Unit
Gate trigger voltage (continuous dc) ($V_D = 12V, R_L = 100\Omega$) All types MT2(+),G(+) MT2(+),G(-) MT2(-),G(-) MT2(-),G(+)	V_{GT}	-	0.66	2.0	Volts
Gate non-trigger voltage ($V_D = 12V, R_L = 100\Omega, T_J = 110^\circ C$) All four quadrants	V_{GD}	0.1	-	-	Volts
Holding current ($V_D = 12V$, initiating current = 200mA, gate open)	I_H	-	1.5	10	mA
Turn-on time ($V_D = \text{Rated } V_{DRM}, I_{TM} = 1.0A \text{ pk}, I_G = 25mA$)	t_{gt}	-	2.0	-	μs
Rate of change of commutating current ($V_D = 400V, I_{TM} = 0.84A$, commutating $dv/dt = 1.5V/\mu s$, gate open, $T_J = 110^\circ C$, $f = 250Hz$, with snubber)	$di/dt(c)$	1.6	-	-	A/ms
Critical rate of rise of off-state voltage ($V_D = \text{Rated } V_{DRM}$, exponential waveform, gate open, $T_J = 110^\circ C$)	dv/dt	20	60	-	$V/\mu s$
Repetitive critical rate of rise of on-state current (pulse width = 20 μs , $I_{PKmax} = 15A$, $di_G/dt = 1A/\mu s$, $f = 60Hz$)	di/dt	-	-	10	$A/\mu s$

MECHANICAL CHARACTERISTIC

Case	TO-92
Marking	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	-

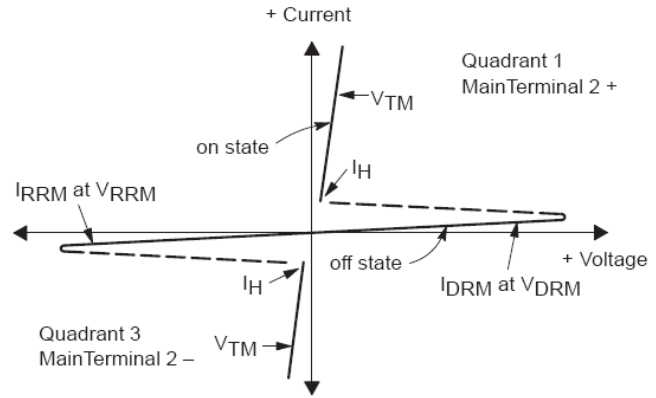
DIGITRON SEMICONDUCTORS

MAC997 SERIES SILICON BIDIRECTIONAL THYRISTORS

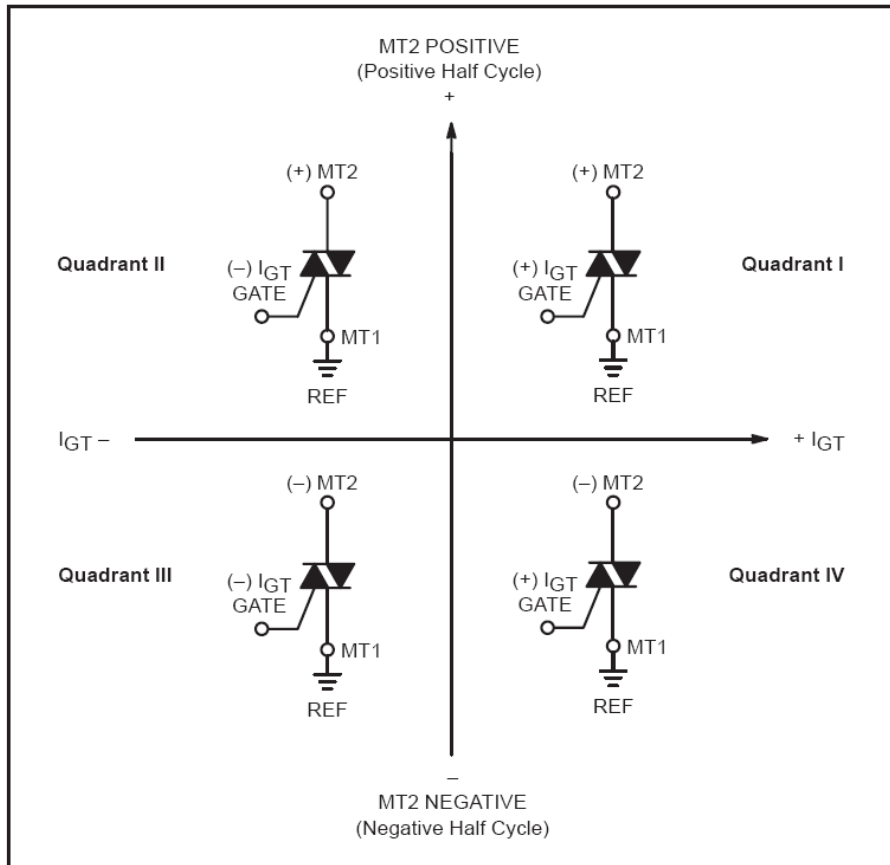
MAC997 Series

**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.

DIGITRON SEMICONDUCTORS

MAC997 SERIES SILICON BIDIRECTIONAL THYRISTORS

MAC997 Series

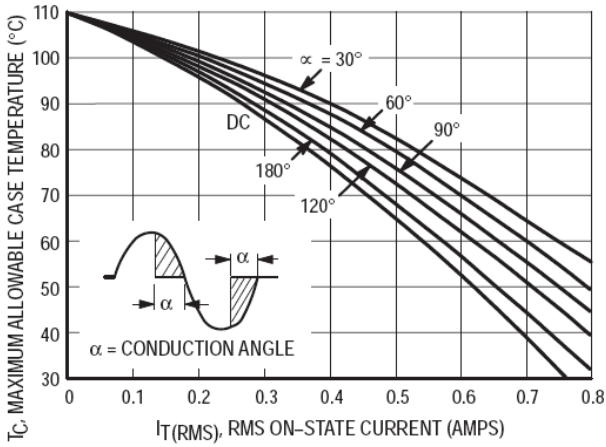


Figure 1. RMS Current Derating

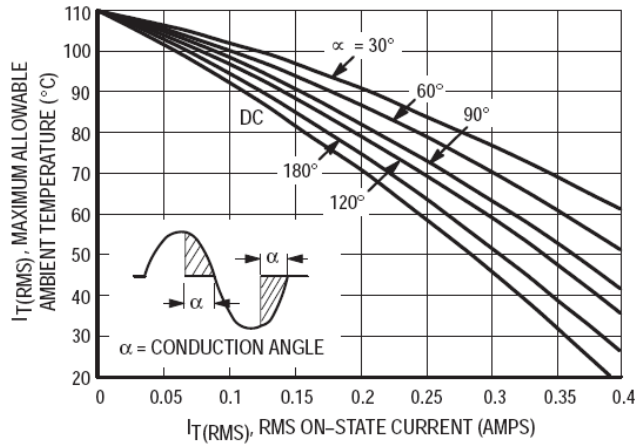


Figure 2. RMS Current Derating

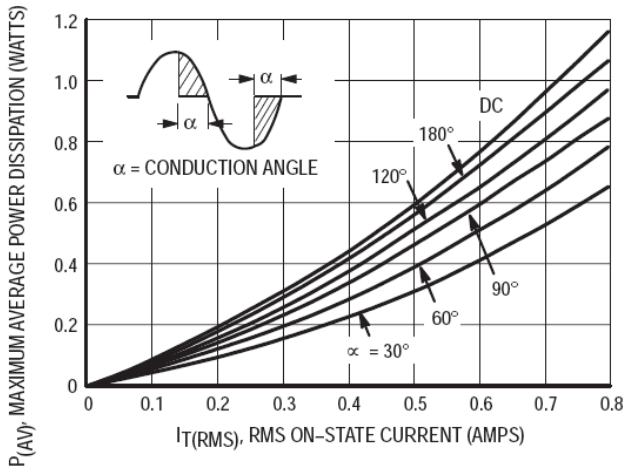


Figure 3. Power Dissipation

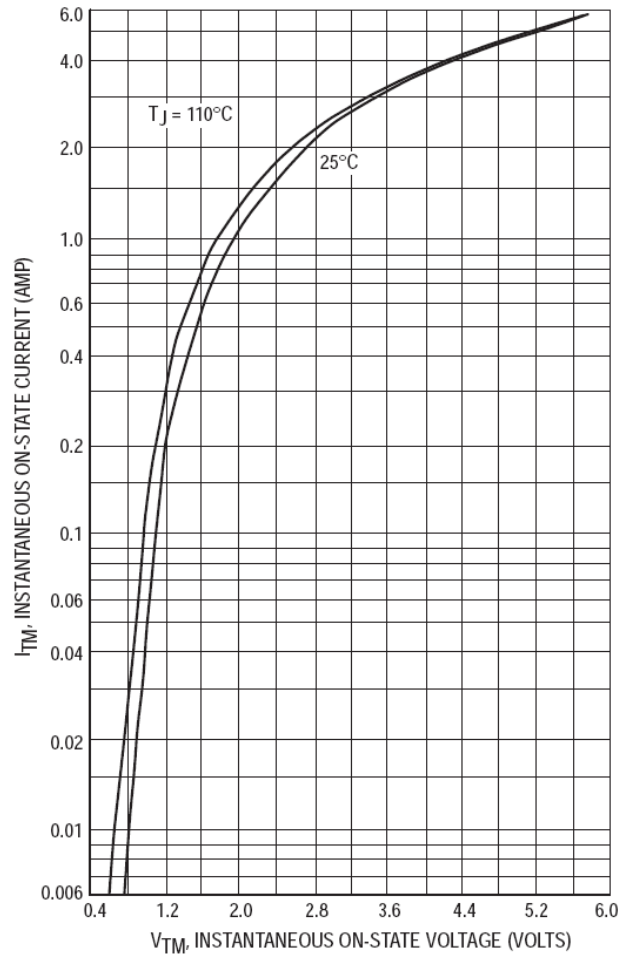


Figure 4. On-State Characteristics

DIGITRON SEMICONDUCTORS

MAC997 SERIES SILICON BIDIRECTIONAL THYRISTORS

MAC997 Series

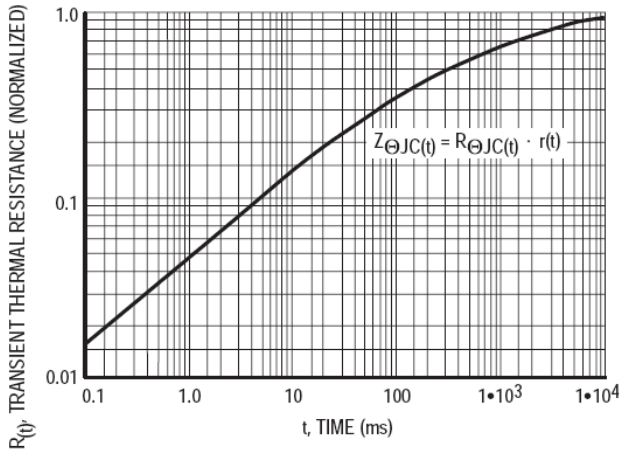


Figure 5. Transient Thermal Response

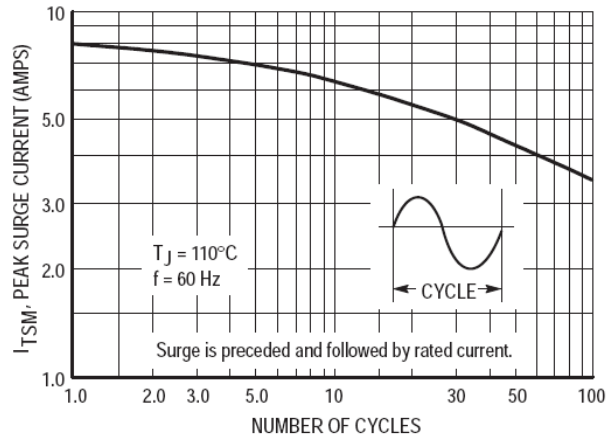


Figure 6. Maximum Allowable Surge Current

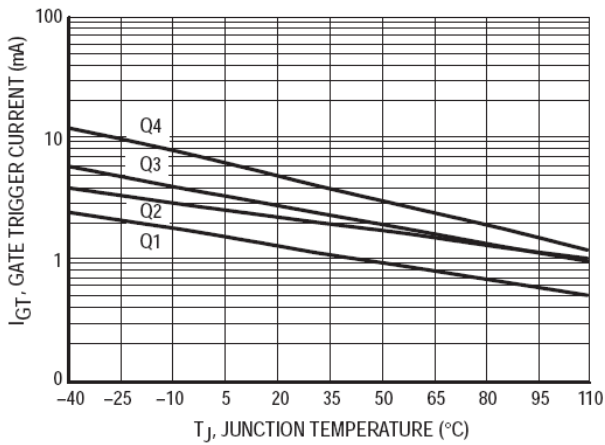


Figure 7. Typical Gate Trigger Current versus Junction Temperature

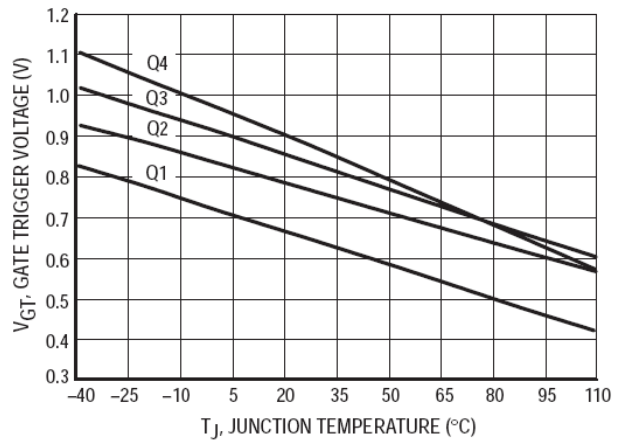


Figure 8. Typical Gate Trigger Voltage versus Junction Temperature

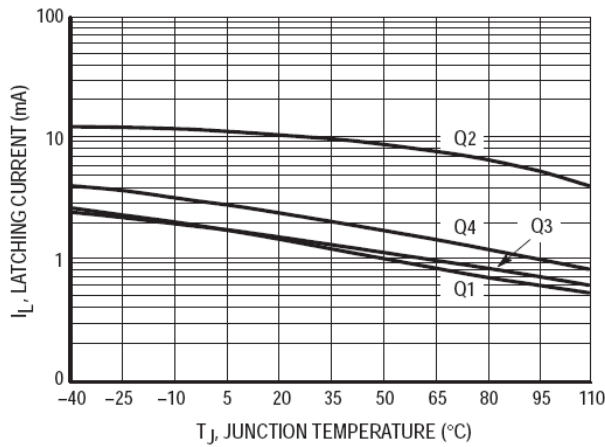


Figure 9. Typical Latching Current versus Junction Temperature

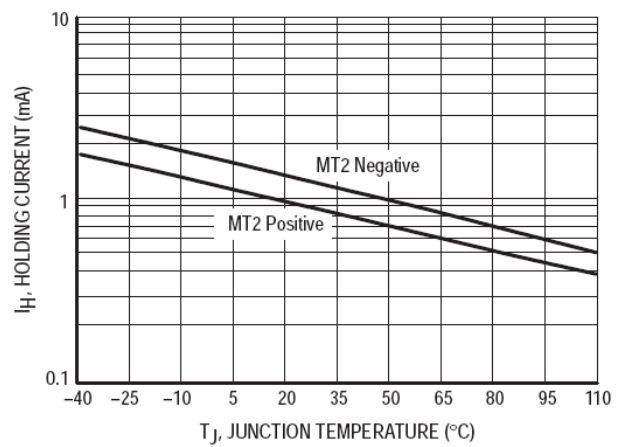


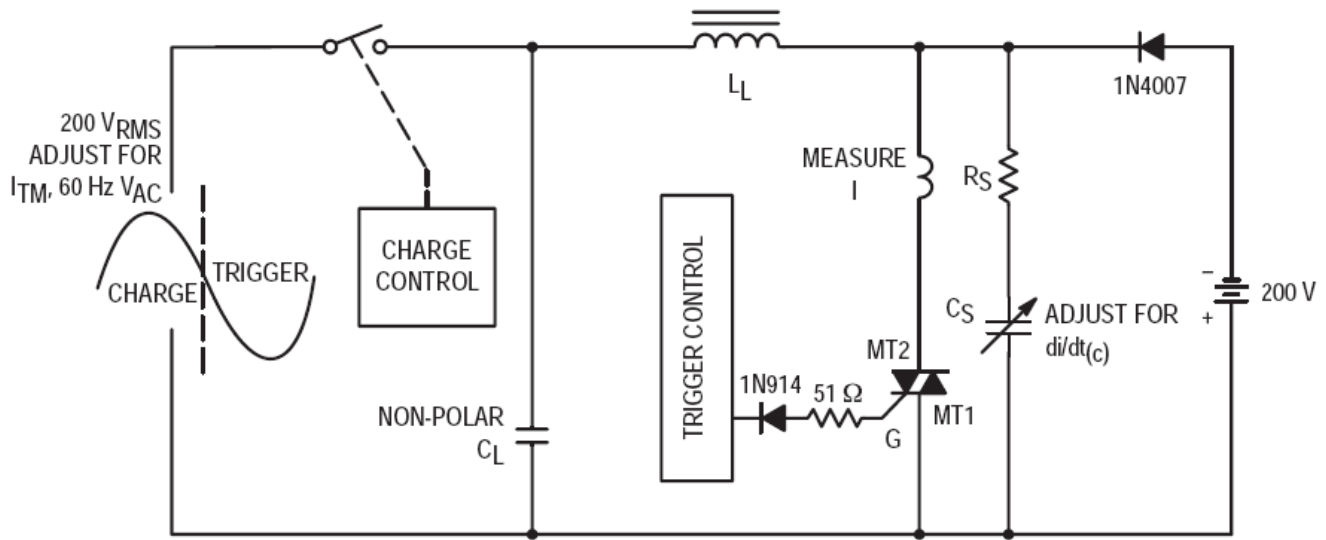
Figure 10. Typical Holding Current versus Junction Temperature

DIGITRON SEMICONDUCTORS

MAC997 SERIES

SILICON BIDIRECTIONAL THYRISTORS

MAC997 Series



Note: Component values are for verification of rated $(di/dt)_c$. See AN1048 for additional information.

Figure 11. Simplified Test Circuit to Measure the Critical Rate of Rise of Commutating Current $(di/dt)_c$