

DIGITRON SEMICONDUCTORS

MAC15 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 $+125^\circ\text{C}$, sine wave, 50 to 60Hz, gate open) MAC15D MAC15M MAC15N	V_{DRM}	400 600 800	Volts
RMS on-state current (60Hz, $T_C = 80^\circ\text{C}$)	$I_{\text{T(RMS)}}$	15	Amps
Peak non-repetitive surge current (1 cycle, 60 Hz, $T_J = 125^\circ\text{C}$)	I_{TSM}	150	Amps
Circuit fusing considerations ($t = 8.3\text{ms}$)	I^2t	93	A^2s
Peak gate power ($T_C = 80^\circ\text{C}$, pulse width $\leq 1\mu\text{s}$)	P_{GM}	20	Watts
Average gate power ($T_C = 80^\circ\text{C}$, $t = 8.3\text{ms}$)	$P_{\text{G(AV)}}$	0.5	Watts
Operating junction temperature range	T_J	-40 to +125	$^\circ\text{C}$
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	$R_{\theta\text{JC}}$	2.0	$^\circ\text{C/W}$
Thermal resistance, junction to ambient	$R_{\theta\text{JA}}$	62.5	$^\circ\text{C/W}$
Maximum lead temperature for soldering purposes 1/8" from case for 10 seconds	T_L	260	$^\circ\text{C}$

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

Characteristic	Symbol	Min	Typ.	Max	Unit
Peak blocking current ($V_D = \text{Rated } V_{\text{DRM}}$, gate open @ $T_J = 25^\circ\text{C}$) ($V_D = \text{Rated } V_{\text{DRM}}$, gate open @ $T_J = 125^\circ\text{C}$)	I_{DRM}	-	-	0.01 2.0	mA
Peak on-state voltage ⁽²⁾ ($I_{\text{TM}} = \pm 21\text{A peak}$)	V_{TM}	-	1.2	1.6	Volts
Gate trigger current (continuous dc) ($V_D = 12\text{V}$, $R_L = 100\Omega$) MT2(+),G(+) MT2(+),G(-) MT2(-),G(-)	I_{GT}	5.0 5.0 5.0	13 16 18	35 35 35	mA
Holding current ($V_D = 12\text{V}$, gate open, $I_T = \pm 150\text{mA}$)	I_{H}	-	20	40	mA
Latch current ($V_D = 24\text{V}$, $I_G = 35\text{mA}$) MT2(+),G(+) MT2(+),G(-) MT2(-),G(-)	I_{L}	- - -	33 36 33	50 80 50	mA

DIGITRON SEMICONDUCTORS

MAC15 SERIES

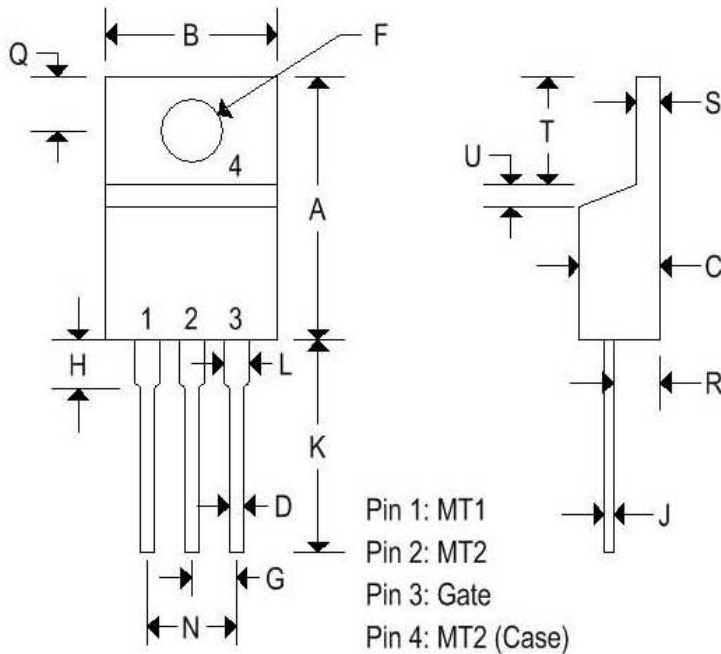
SILICON BIDIRECTIONAL THYRISTORS

Characteristic	Symbol	Min	Typ.	Max	Unit
Gate trigger voltage (continuous dc) ($V_D = 12V$, $R_L = 100\Omega$) MT2(+),G(+) MT2(+),G(-) MT2(-),G(-)	V_{GT}	0.5 0.5 0.5	0.75 0.72 0.82	1.5 1.5 1.5	Volts
Rate of change of commutating current ⁽²⁾ ($V_D = 400V$, $I_{TM} = 6A$, commutating $dv/dt = 24V/\mu s$, gate open, $T_J = 125^\circ C$, $f = 250Hz$, $C_L = 10\mu F$, $L_L = 40mH$, no snubber)	$di/dt(c)$	9.0	-	-	A/ms
Critical rate of rise of off-state voltage ($V_D = \text{Rated } V_{DRM}$, exponential waveform, gate open, $T_J = 125^\circ C$)	dv/dt	250	-	-	V/ μs

Note 2: Pulse test: Pulse width $\leq 2.0ms$, duty cycle $\leq 2\%$.

MECHANICAL CHARACTERISTIC

Case	TO-220AB
Marking	Body painted, 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

DIGITRON SEMICONDUCTORS

MAC15 SERIES SILICON BIDIRECTIONAL THYRISTORS

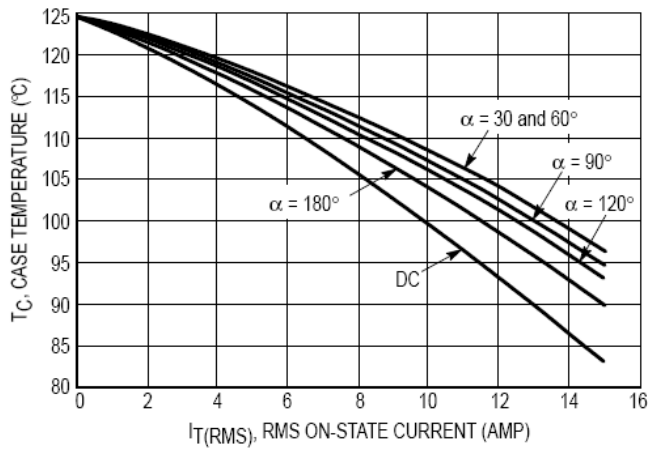


Figure 1. RMS Current Derating

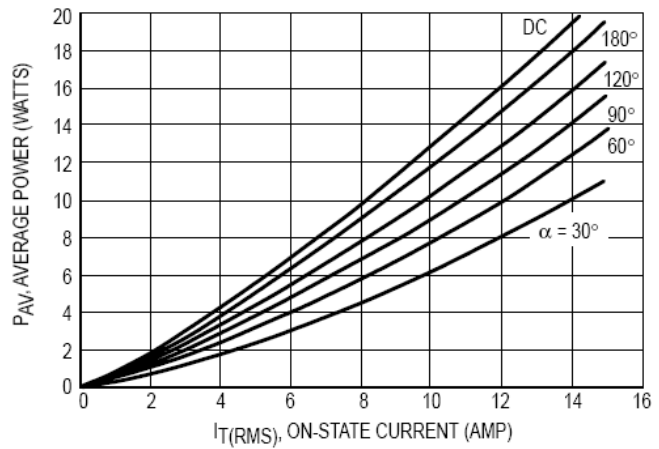


Figure 2. On-State Power Dissipation

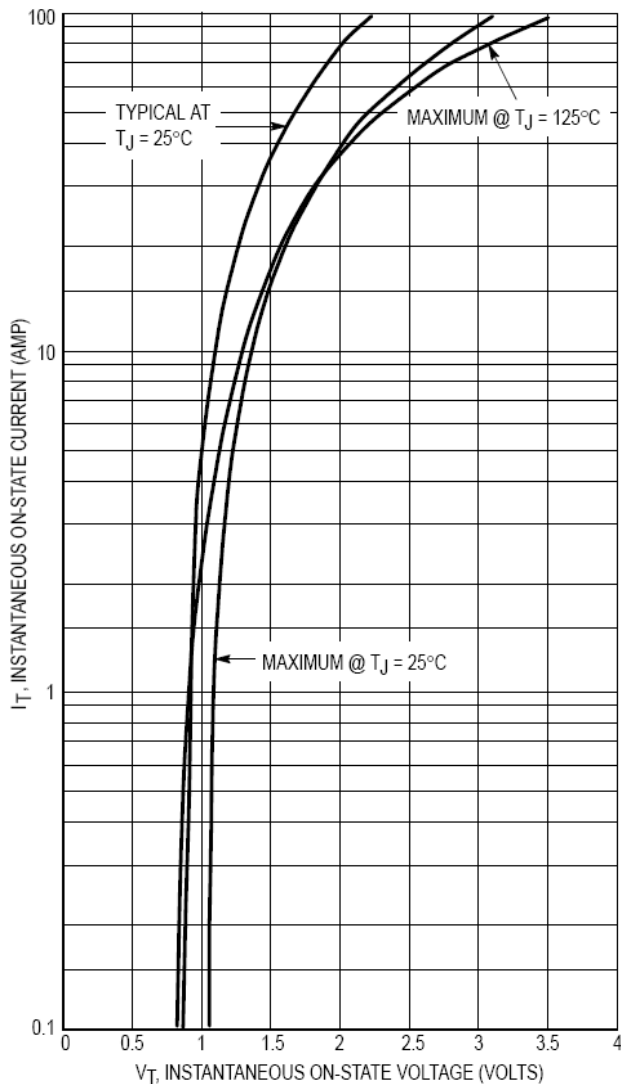


Figure 3. On-State Characteristics

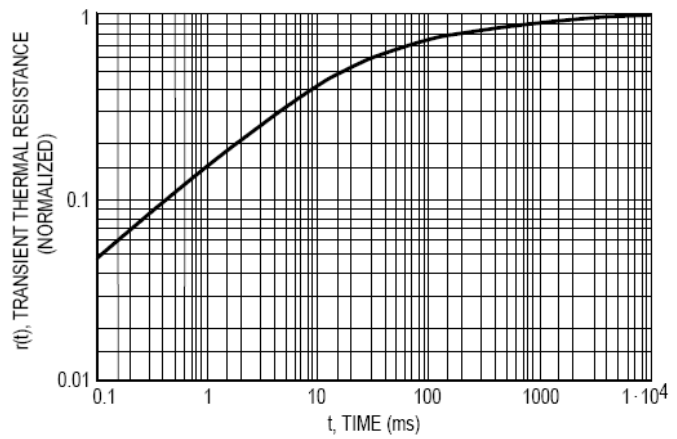


Figure 4. Thermal Response

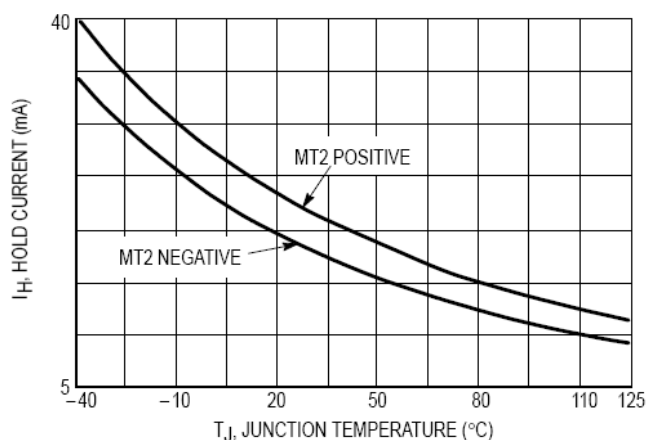


Figure 5. Hold Current Variation

DIGITRON SEMICONDUCTORS

MAC15 SERIES

SILICON BIDIRECTIONAL THYRISTORS

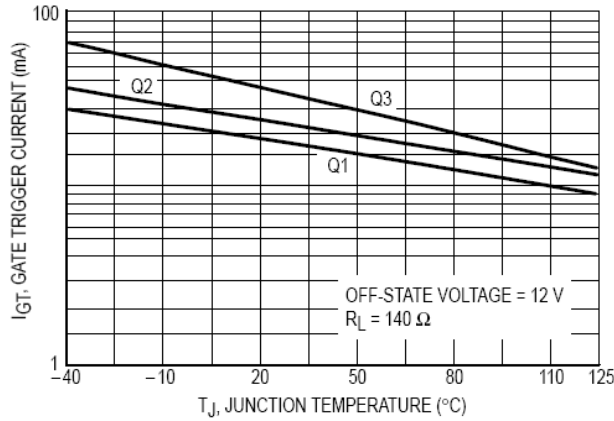


Figure 6. Gate Trigger Current Variation

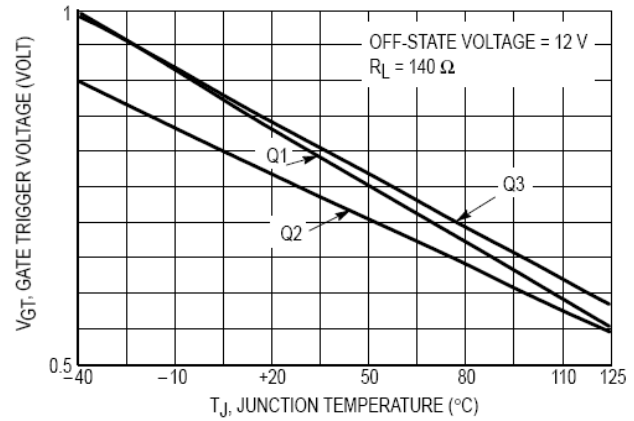


Figure 7. Gate Trigger Voltage Variation

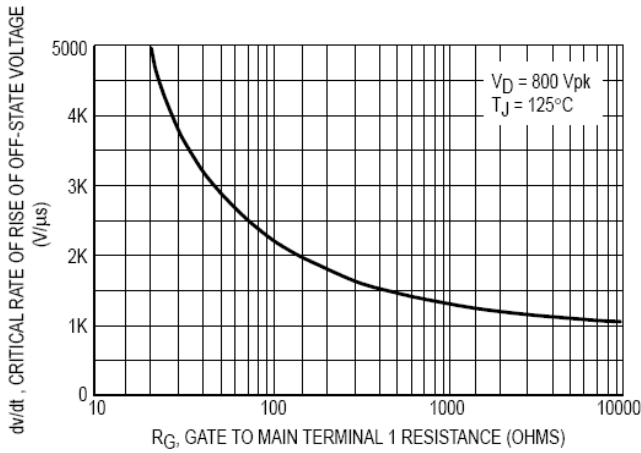


Figure 8. Critical Rate of Rise of Off-State Voltage (Exponential)

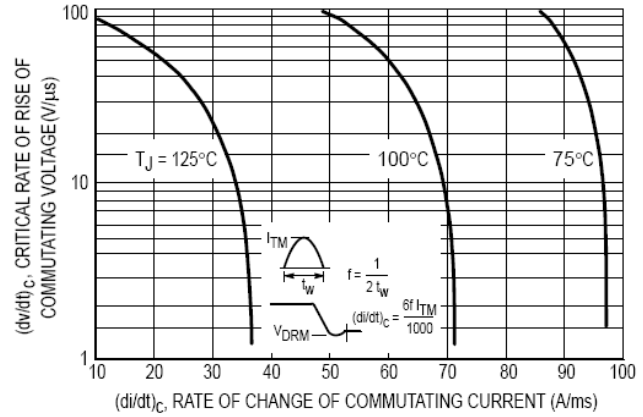
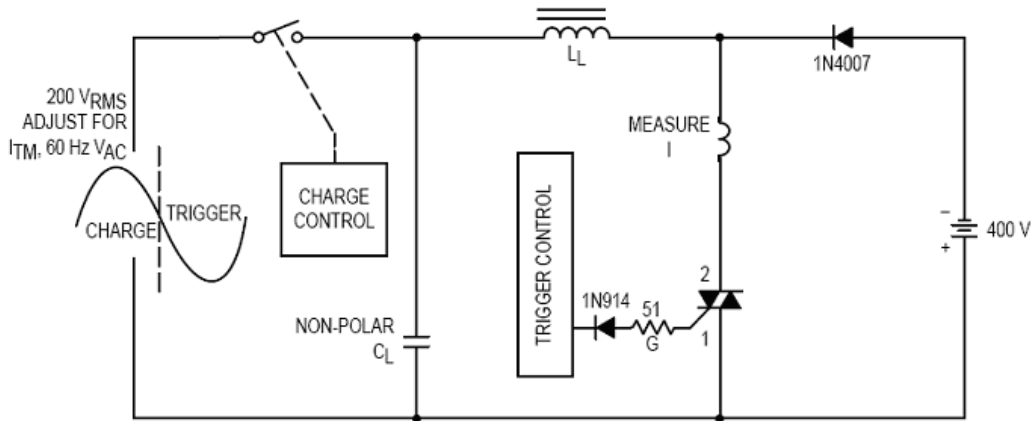


Figure 9. Critical Rate of Rise of Commutating Voltage



Note: Component values are for verification of rated $(dv/dt)_c$.

Figure 10. Simplified Test Circuit to Measure the Critical Rate of Rise of Commutating Voltage