DIGITRON™ Semiconductors

High-reliability discrete products
and engineering services since 1977

MAC15 SERIES

SILICON BIDIRECTIONAL THYRISTORS

FEATURES

- Available as "HR" (high reliability) screened per MIL-PRF-19500, JANTX level. Add "HR" suffix to base part number.
- Available as non-RoHS (Sn/Pb plating), standard, and as RoHS by adding "-PBF" suffix.

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Peak repetitive off-state voltage[1] (T_J = -40 to +125°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°C)	$I_{T(RMS)}$	15	Amps
Peak non-repetitive surge current (1 cycle, 60 Hz, T_J = 125°C)	I_{TSM}	150	Amps
Circuit fusing considerations (t = 8.3ms)	I^2t	93	A^2s
Peak gate power (T_C = 80°C, pulse width ≤ 1µs)	P_{GM}	20	Watts
Average gate power (T_C = 80°C, t = 8.3ms)	$P_{G(AV)}$	0.5	Watts
Operating junction temperature range	T_J	-40 to +125	°C
Storage temperature range	T_{stg}	-40 to +150	°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	$R_{\Theta JC}$	2.0	°C/W
Thermal resistance, junction to ambient	$R_{\Theta JA}$	62.5	°C/W
Maximum lead temperature for soldering purposes 1/8" from case for 10 seconds	T_L	260	°C

ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Typ.	Max	Unit
Peak blocking current (V_D = Rated V_{DRM}, gate open @ T_J = 25°C) (V_D = Rated V_{DRM}, gate open @ T_J = 125°C)	I_{DRM}	- -	- -	0.01 2.0	mA
Peak on-state voltage [2] (I_{TM} = ±21A peak	V_{TM}	-	1.2	1.6	Volts
Gate trigger current (continuous dc) (V_D = 12V, R_L = 100Ω) 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 = 12V, gate open, I_T = ±150mA)	I_H	-	20	40	mA
Latch current (V_D = 24V, I_G = 35mA) MT2(+),G(+)	I_L	-	33	50	mA

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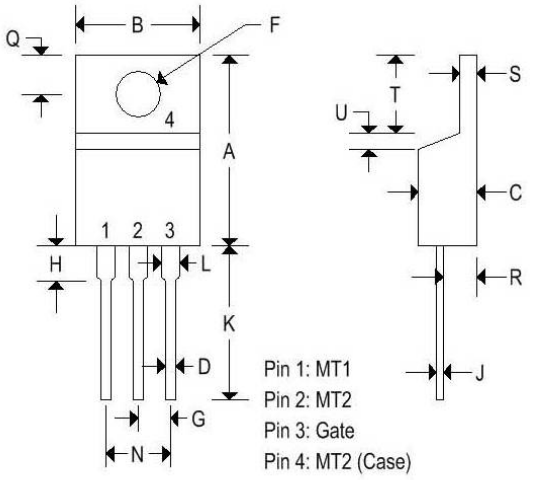
MT2(+),G(-)		-	36	80	
MT2(-),G(-)		-	33	50	
Gate trigger voltage (continuous dc)	V_{GT}				Volts
(V_D = 12V, R_L = 100Ω)					
MT2(+),G(+)		0.5	0.75	1.5	
MT2(+),G(-)		0.5	0.72	1.5	
MT2(-),G(-)		0.5	0.82	1.5	
Rate of change of commutating current [2]	di/dt(c)				A/ms
(V_D = 400V, I_{TM} = 6A, commutating dv/dt = 24V/µs, gate open, T_J = 125°C, f = 250Hz, C_L = 10µF, L_L = 40mH, no snubber)		9.0	-	-	
Critical rate of rise of off-state voltage	dv/dt				V/µs
(V_D = Rated V_{DRM}, exponential waveform, gate open, T_J = 125°C)		250	-	-	

Note 2: Pulse test: Pulse width ≤ 2.0ms, duty cycle ≤ 2%.

MECHANICAL CHARACTERISTICS

Case	TO-220AB
Marking	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

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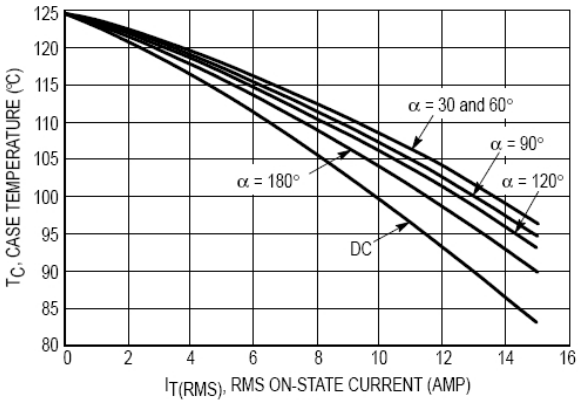

Figure 1. RMS Current Derating

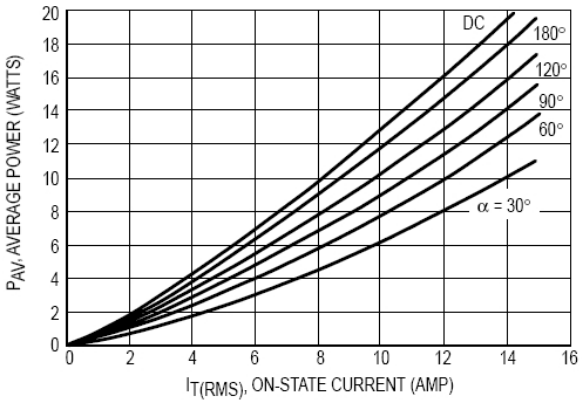

Figure 2. On-State Power Dissipation

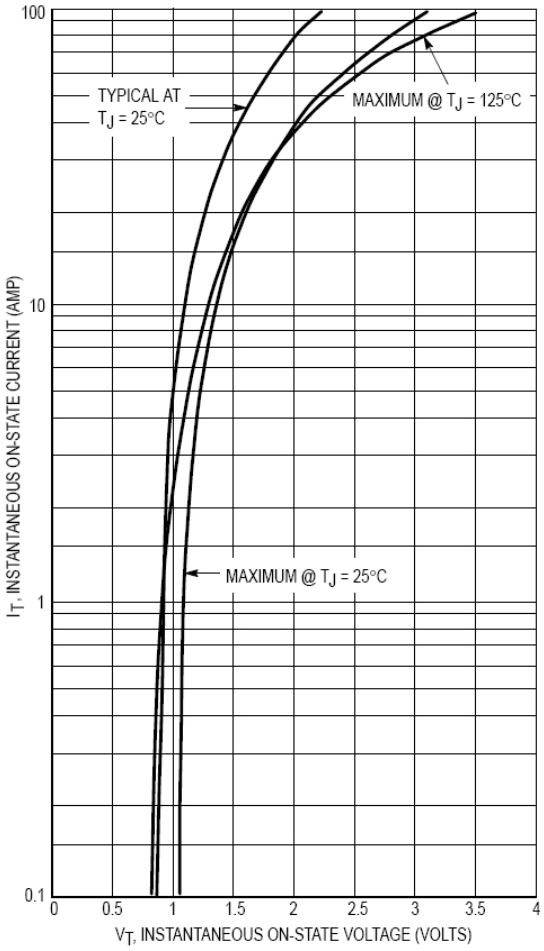

Figure 3. On-State Characteristics

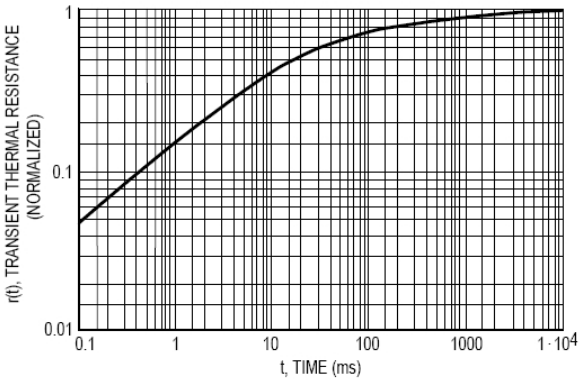

Figure 4. Thermal Response

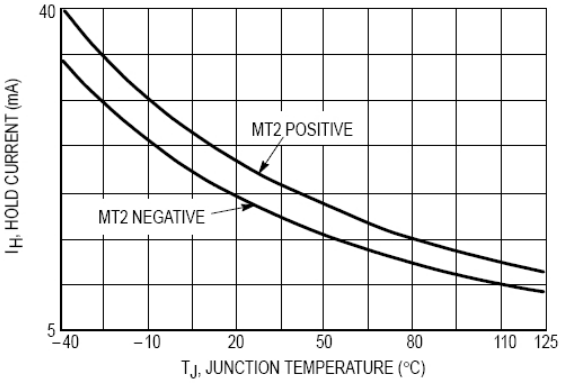

Figure 5. Hold Current Variation

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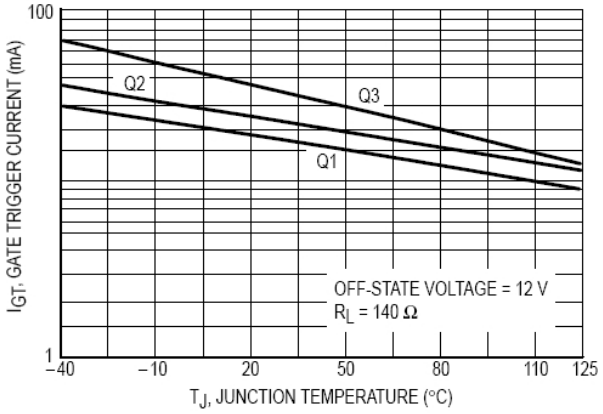


Figure 6. Gate Trigger Current Variation

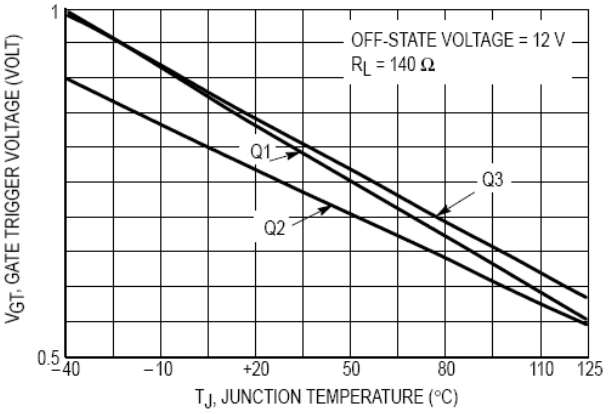


Figure 7. Gate Trigger Voltage Variation

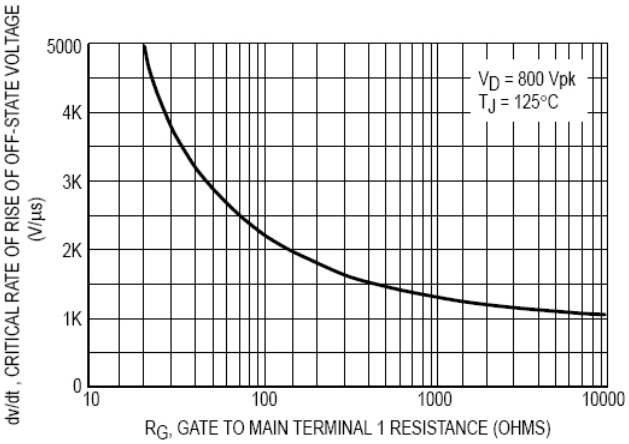


Figure 8. Critical Rate of Rise of Off-State Voltage (Exponential)

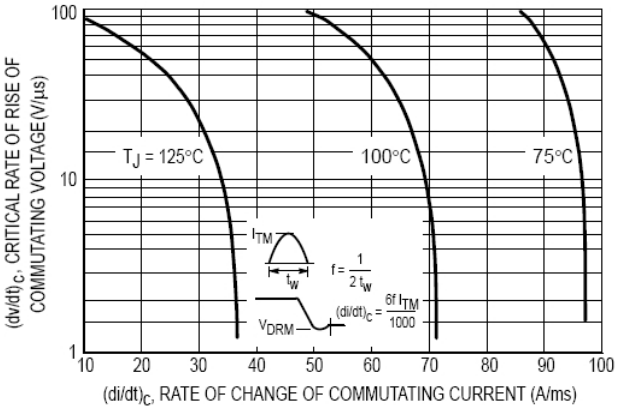
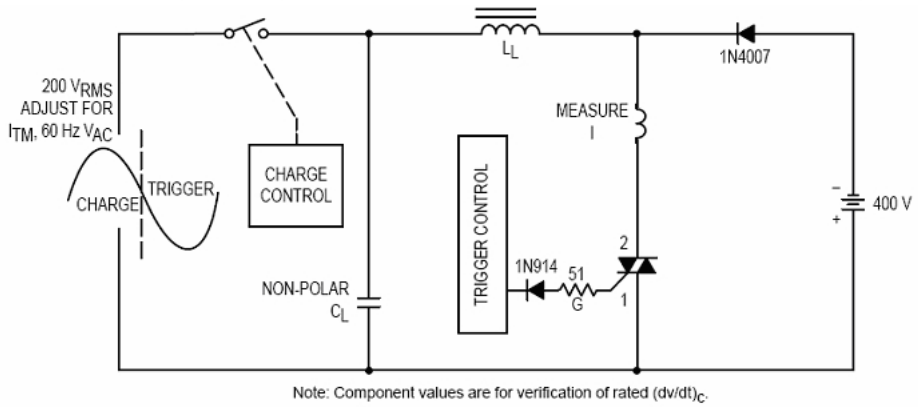


Figure 9. Critical Rate of Rise of Commutating Voltage



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