

MAC15 Series

Preferred Device

Triacs

Silicon Bidirectional Thyristors

Designed primarily for full-wave ac control applications, such as solid-state relays, motor controls, heating controls and power supplies; or wherever full-wave silicon gate controlled solid-state devices are needed. Triac type thyristors switch from a blocking to a conducting state for either polarity of applied main terminal voltage with positive or negative gate triggering.

- Blocking Voltage to 800 Volts
- All Diffused and Glass Passivated Junctions for Greater Parameter Uniformity and Stability
- Small, Rugged, Thermowatt Construction for Low Thermal Resistance, High Heat Dissipation and Durability
- Gate Triggering Guaranteed in Three Modes (MAC15 Series) or Four Modes (MAC15A Series)
- Device Marking: Logo, Device Type, e.g., MAC15A6, Date Code

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 60 Hz, Gate Open) MAC15A6 MAC15-8, MAC15A8 MAC15-10, MAC15A10	V_{DRM} , V_{RRM}	400 600 800	Volts
Peak Gate Voltage (Pulse Width $\leq 1.0 \mu\text{sec}$; $T_C = 90^\circ\text{C}$)	V_{GM}	10	Volts
On-State Current RMS Full Cycle Sine Wave 50 to 60 Hz ($T_C = +90^\circ\text{C}$)	$I_T(\text{RMS})$	15	A
Circuit Fusing Consideration ($t = 8.3 \text{ ms}$)	I_{2t}	93	A^2s
Peak Non-repetitive Surge Current (One Full Cycle Sine Wave, 60 Hz, $T_C = +80^\circ\text{C}$) Preceded and followed by rated current	I_{TSM}	150	A
Peak Gate Power ($T_C = +80^\circ\text{C}$, Pulse Width = $1.0 \mu\text{s}$)	P_{GM}	20	Watts
Average Gate Power ($T_C = +80^\circ\text{C}$, $t = 8.3 \text{ ms}$)	$P_{G(AV)}$	0.5	Watts
Peak Gate Current (Pulse Width $\leq 1.0 \mu\text{sec}$; $T_C = 90^\circ\text{C}$)	I_{GM}	2.0	A
Operating Junction Temperature Range	T_J	-40 to +125	$^\circ\text{C}$
Storage Temperature Range	T_{stg}	-40 to +150	$^\circ\text{C}$

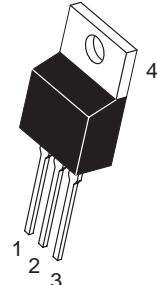
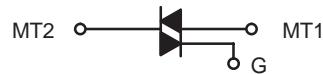
(1) V_{DRM} and V_{RRM} for all types can be applied on a continuous basis. Blocking voltages shall not be tested with a constant current source such that the voltage ratings of the devices are exceeded.



ON Semiconductor

<http://onsemi.com>

TRIACS
15 AMPERES RMS
400 thru 800 VOLTS



TO-220AB
CASE 221A
STYLE 4

PIN ASSIGNMENT	
1	Main Terminal 1
2	Main Terminal 2
3	Gate
4	Main Terminal 2

ORDERING INFORMATION

Device	Package	Shipping
MAC15-8	TO220AB	500/Box
MAC15-10	TO220AB	500/Box
MAC15A6	TO220AB	500/Box
MAC15A8	TO220AB	500/Box
MAC15A10	TO220AB	500/Box

Preferred devices are recommended choices for future use and best overall value.

MAC15 Series

THERMAL CHARACTERISTICS

Characteristic	Symbol	Value	Unit
Thermal Resistance — Junction to Case — Junction to Ambient	$R_{\theta JC}$ $R_{\theta JA}$	2.0 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; Electricals apply in both directions)

Characteristic	Symbol	Min	Typ	Max	Unit
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OFF CHARACTERISTICS

Peak Blocking Current (V _D = Rated V _{DRM} , V _{RRM} ; Gate Open)	T _J = 25°C T _J = 125°C	I _{DRM} , I _{RRM}	— —	— —	10 2.0	μA mA
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ON CHARACTERISTICS

Peak On-State Voltage ⁽¹⁾ (I _{TM} = ±21 A Peak)	V _{TM}	—	1.3	1.6	Volts
Gate Trigger Current (Continuous dc) (V _D = 12 Vdc, R _L = 100 Ohms) MT2(+), G(+) MT2(+), G(−) MT2(−), G(−) MT2(−), G(+) "A" SUFFIX ONLY	I _{GT}	— — — —	— — — —	50 50 50 75	mA
Gate Trigger Voltage (Continuous dc) (V _D = 12 Vdc, R _L = 100 Ohms) MT2(+), G(+) MT2(+), G(−) MT2(−), G(−) MT2(−), G(+) "A" SUFFIX ONLY	V _{GT}	— — — —	0.9 0.9 1.1 1.4	2 2 2 2.5	Volts
Gate Non-Trigger Voltage (V _D = 12 V, R _L = 100 Ohms, T _J = 110°C) MT2(+), G(+); MT2(−), G(−); MT2(+), G(−) MT2(−), G(+) "A" SUFFIX ONLY	V _{GD}	0.2 0.2	— —	— —	Volts
Holding Current (V _D = 12 Vdc, Gate Open, Initiating Current = ±200 mA)	I _H	—	6.0	40	mA
Turn-On Time (V _D = Rated V _{DRM} , I _{TM} = 17 A) (I _{GT} = 120 mA, Rise Time = 0.1 μs, Pulse Width = 2 μs)	t _{gt}	—	1.5	—	μs

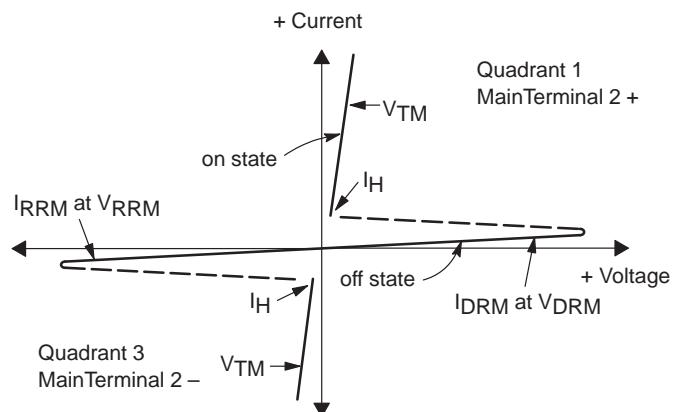
DYNAMIC CHARACTERISTICS

Critical Rate of Rise of Commutation Voltage (V _D = Rated V _{DRM} , I _{TM} = 21 A, Commutating di/dt = 7.6 A/ms, Gate Unenergized, T _C = 80°C)	dv/dt(c)	—	5.0	—	V/μs
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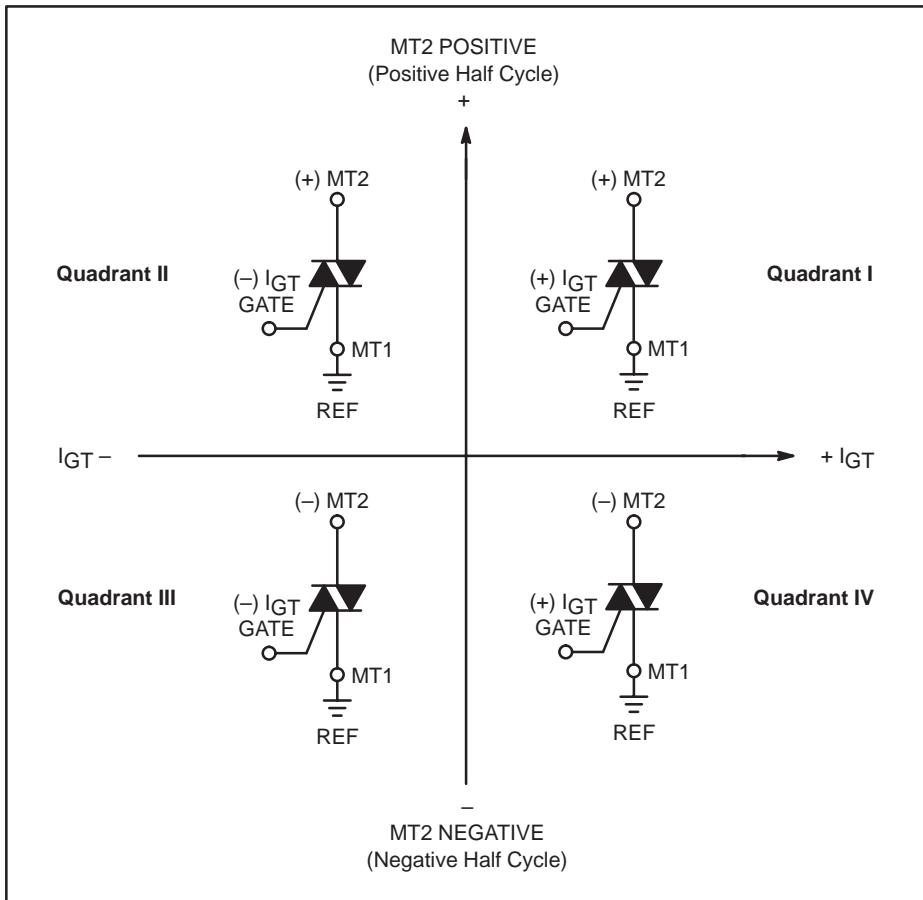
(1) Pulse Test: Pulse Width ≤ 2.0 ms, Duty Cycle ≤ 2%.

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.

MAC15 Series

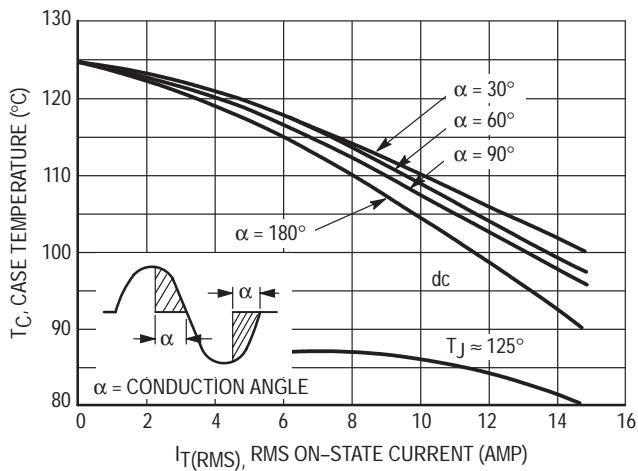


Figure 1. RMS Current Derating

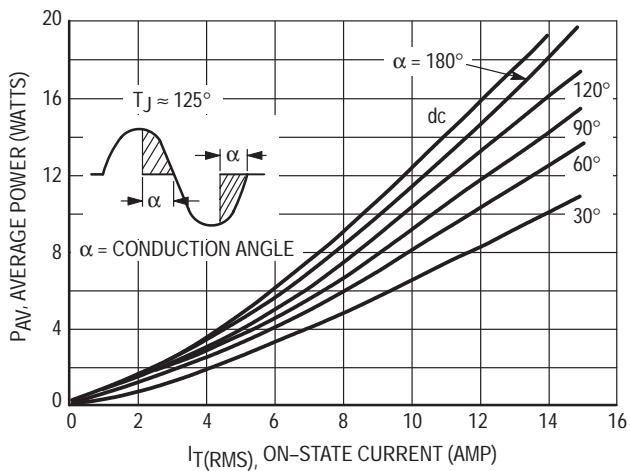


Figure 2. On-State Power Dissipation

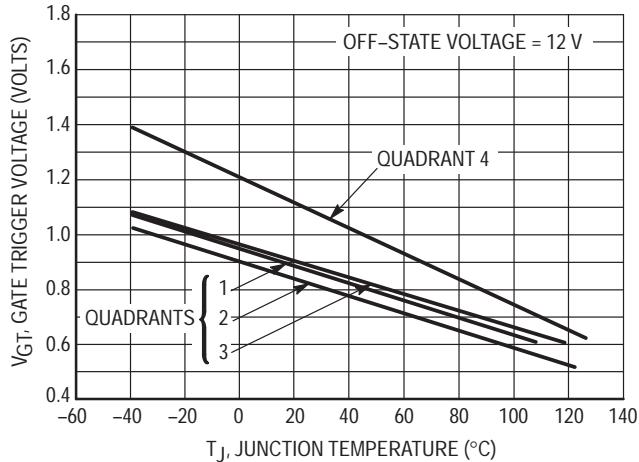


Figure 3. Typical Gate Trigger Voltage

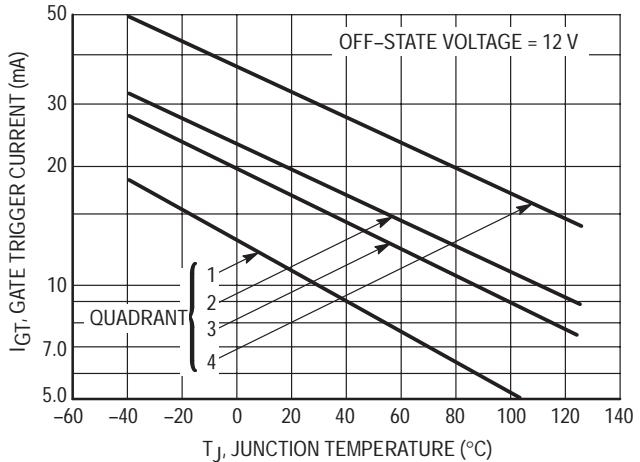


Figure 4. Typical Gate Trigger Current

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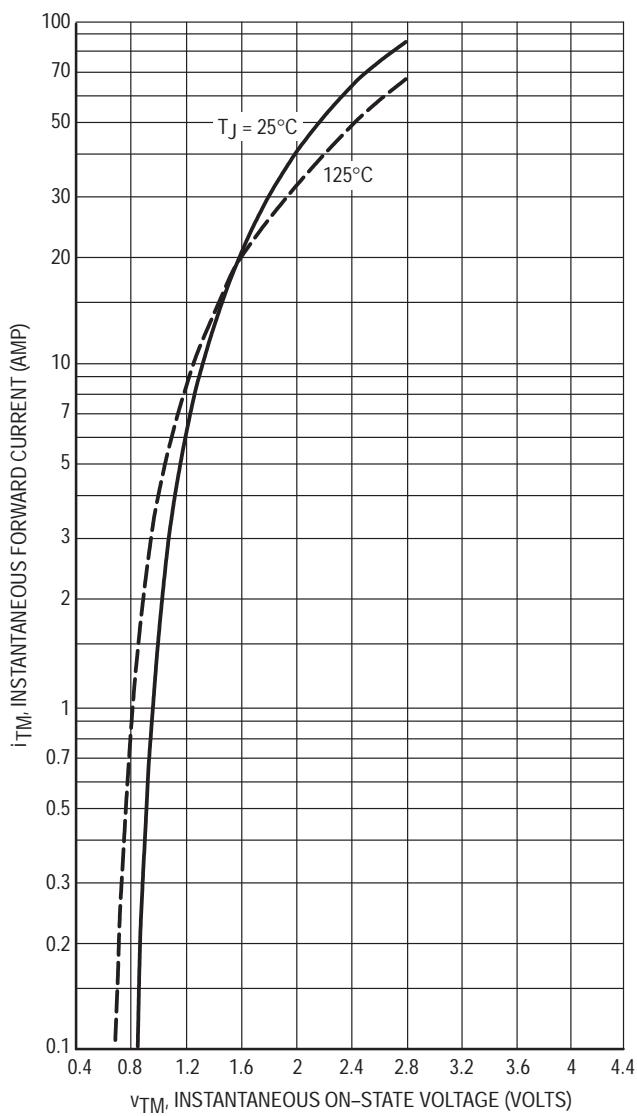


Figure 5. On-State Characteristics

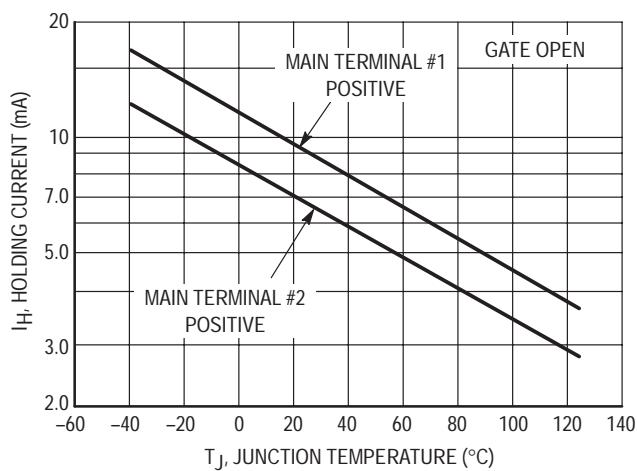


Figure 6. Typical Holding Current

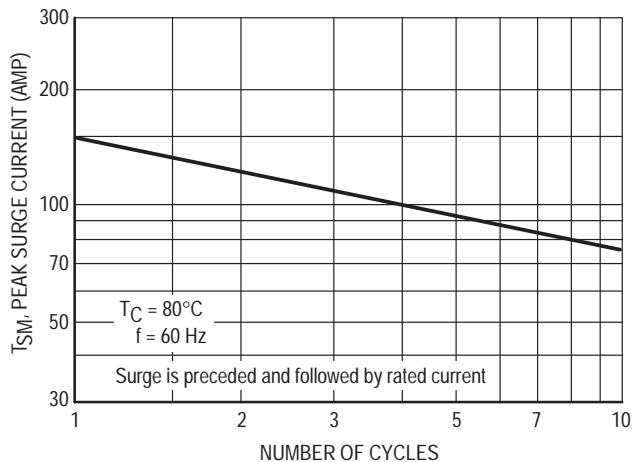


Figure 7. Maximum Non-Repetitive Surge Current

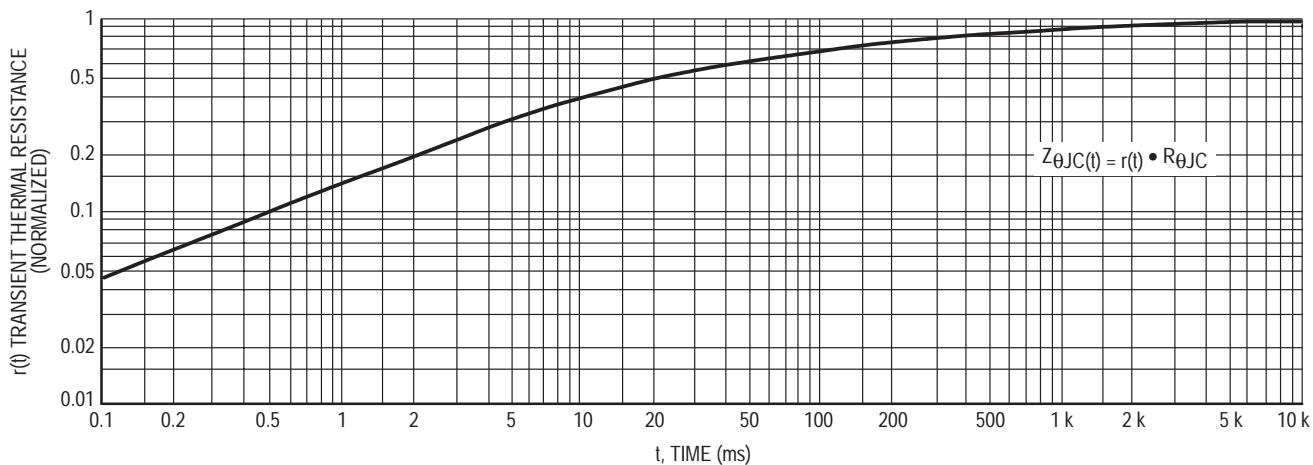
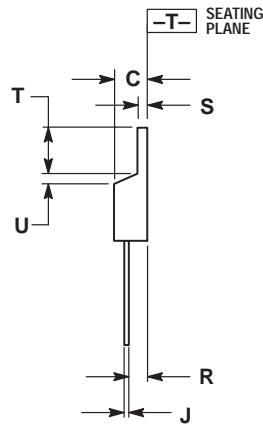
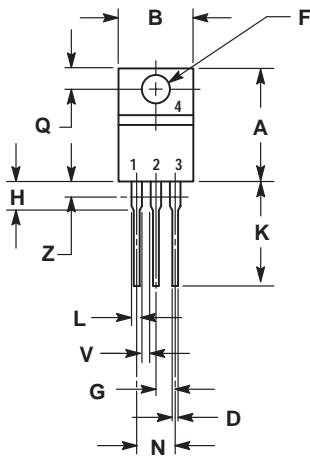


Figure 8. Thermal Response

MAC15 Series

PACKAGE DIMENSIONS

TO-220AB CASE 221A-07 ISSUE Z



NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION Z DEFINES A ZONE WHERE ALL BODY AND LEAD IRREGULARITIES ARE ALLOWED.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.570	0.620	14.48	15.75
B	0.380	0.405	9.66	10.28
C	0.160	0.190	4.07	4.82
D	0.025	0.035	0.64	0.88
F	0.142	0.147	3.61	3.73
G	0.095	0.105	2.42	2.66
H	0.110	0.155	2.80	3.93
J	0.014	0.022	0.36	0.55
K	0.500	0.562	12.70	14.27
L	0.045	0.060	1.15	1.52
N	0.190	0.210	4.83	5.33
Q	0.100	0.120	2.54	3.04
R	0.080	0.110	2.04	2.79
S	0.045	0.055	1.15	1.39
T	0.235	0.255	5.97	6.47
U	0.000	0.050	0.00	1.27
V	0.045	---	1.15	---
Z	---	0.080	---	2.04

STYLE 4:

1. MAIN TERMINAL 1
2. MAIN TERMINAL 2
3. GATE
4. MAIN TERMINAL 2

Notes

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