

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 ($T_C = +90^\circ\text{C}$)	$I_{\text{T(RMS)}}$	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 ($T_C = +80^\circ\text{C}$, $t = 8.3 \text{ ms}$)	$P_{\text{G(AV)}}$	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 $+150$	$^\circ\text{C}$

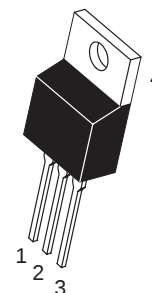
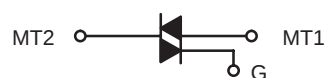
(1) V_{DRM} and V_{RRM} for all types can be applied on a continuous basis. Blocking voltages shall not be tested with a constant current source such that the voltage ratings of the devices are exceeded.



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	$^{\circ}C/W$
Maximum Lead Temperature for Soldering Purposes 1/8" from Case for 10 Seconds	T_L	260	$^{\circ}C$

ELECTRICAL CHARACTERISTICS ($T_C = 25^{\circ}C$ unless otherwise noted; Electricals apply in both directions)

Characteristic	Symbol	Min	Typ	Max	Unit
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OFF CHARACTERISTICS

Peak Blocking Current ($V_D = \text{Rated } V_{DRM}, V_{RRM}; \text{Gate Open}$)	$T_J = 25^{\circ}C$ $T_J = 125^{\circ}C$	$I_{DRM},$ I_{RRM}	— —	— —	10 2.0	μA mA
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ON CHARACTERISTICS

Peak On-State Voltage ⁽¹⁾ ($I_{TM} = \pm 21 \text{ A Peak}$)	V_{TM}	—	1.3	1.6	Volts
Gate Trigger Current (Continuous dc) ($V_D = 12 \text{ Vdc}, R_L = 100 \text{ Ohms}$) MT2(+), G(+) MT2(+), G(–) MT2(–), G(–) MT2(–), G(+) "A" SUFFIX ONLY	I_{GT}	— — — —	— — — —	50 50 50 75	mA
Gate Trigger Voltage (Continuous dc) ($V_D = 12 \text{ Vdc}, R_L = 100 \text{ Ohms}$) 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 ($V_D = 12 \text{ V}, R_L = 100 \text{ Ohms}, T_J = 110^{\circ}C$) MT2(+), G(+); MT2(–), G(–); MT2(+), G(–) MT2(–), G(+) "A" SUFFIX ONLY	V_{GD}	0.2 0.2	— —	— —	Volts
Holding Current ($V_D = 12 \text{ Vdc}, \text{Gate Open}, \text{Initiating Current} = \pm 200 \text{ mA}$)	I_H	—	6.0	40	mA
Turn-On Time ($V_D = \text{Rated } V_{DRM}, I_{TM} = 17 \text{ A}$) ($I_{GT} = 120 \text{ mA}, \text{Rise Time} = 0.1 \mu s, \text{Pulse Width} = 2 \mu s$)	t_{gt}	—	1.5	—	μs

DYNAMIC CHARACTERISTICS

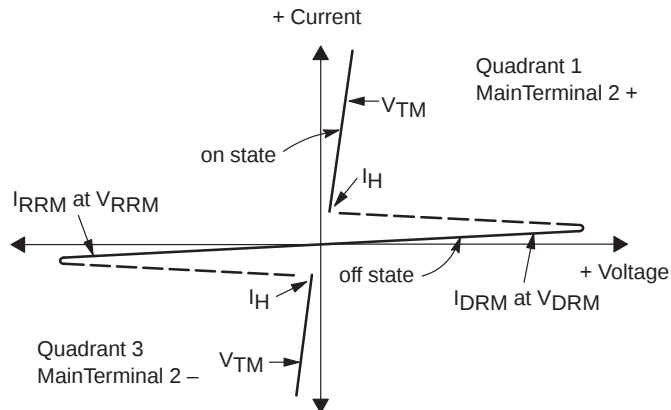
Critical Rate of Rise of Commutation Voltage ($V_D = \text{Rated } V_{DRM}, I_{TM} = 21 \text{ A}, \text{Commutating } di/dt = 7.6 \text{ A/ms},$ Gate Unenergized, $T_C = 80^{\circ}C$)	$dv/dt(c)$	—	5.0	—	$V/\mu s$
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(1) Pulse Test: Pulse Width $\leq 2.0 \text{ ms}$, Duty Cycle $\leq 2\%$.

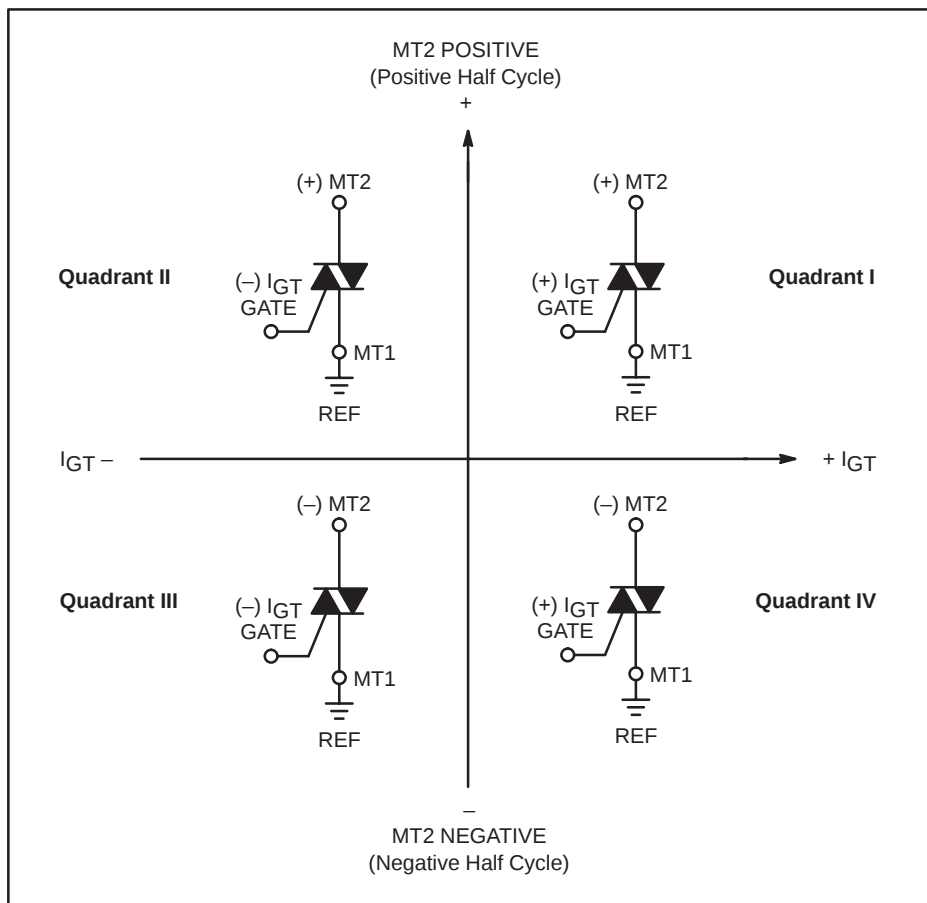
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Voltage Current Characteristic of Triacs (Bidirectional Device)

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.

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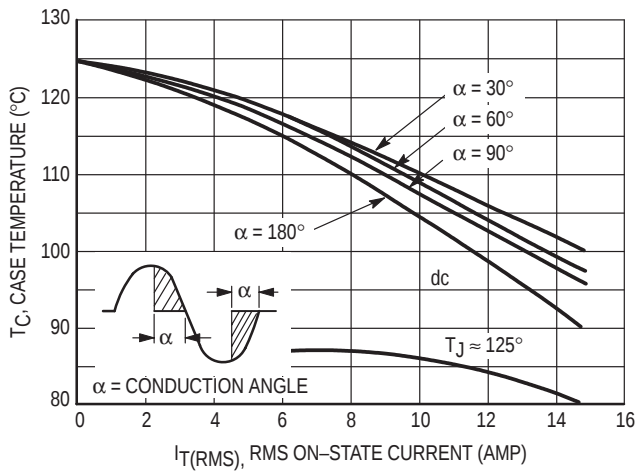


Figure 1. RMS Current Derating

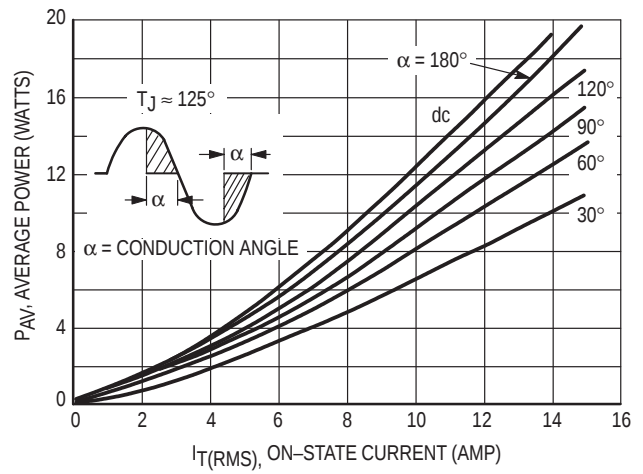


Figure 2. On-State Power Dissipation

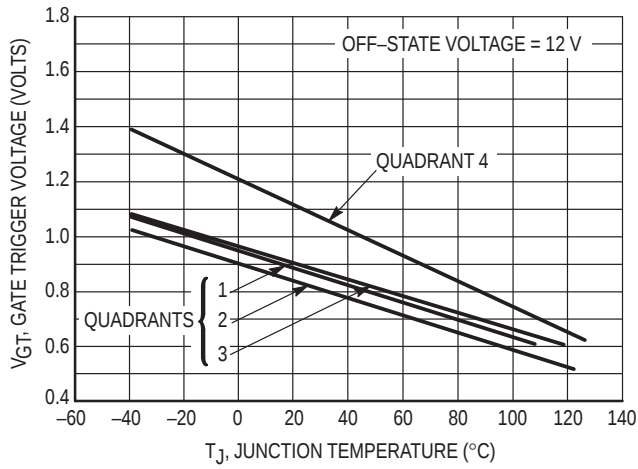


Figure 3. Typical Gate Trigger Voltage

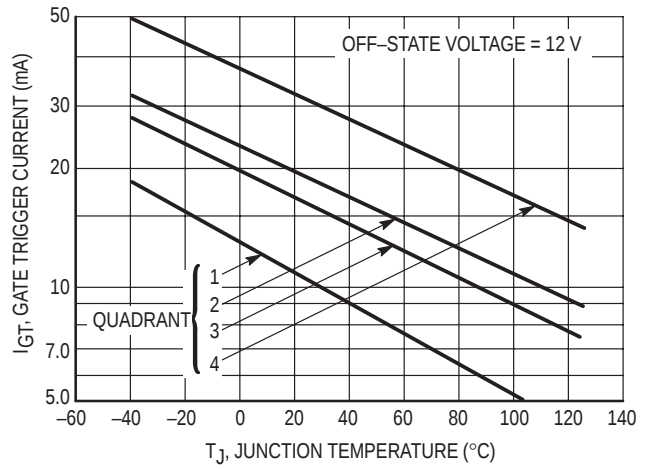


Figure 4. Typical Gate Trigger Current

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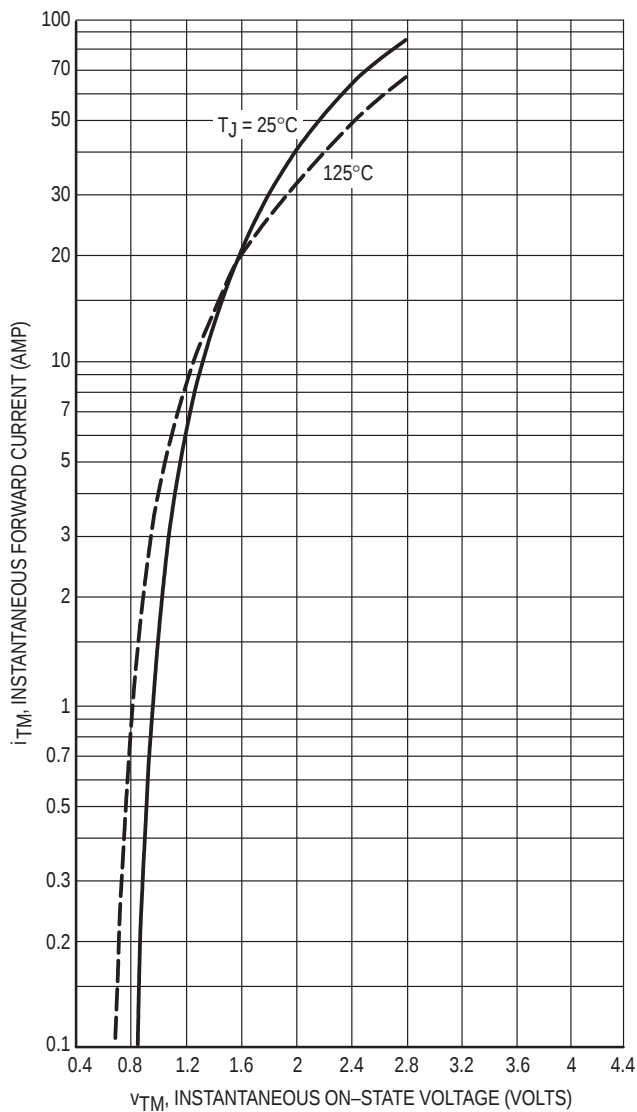


Figure 5. On-State Characteristics

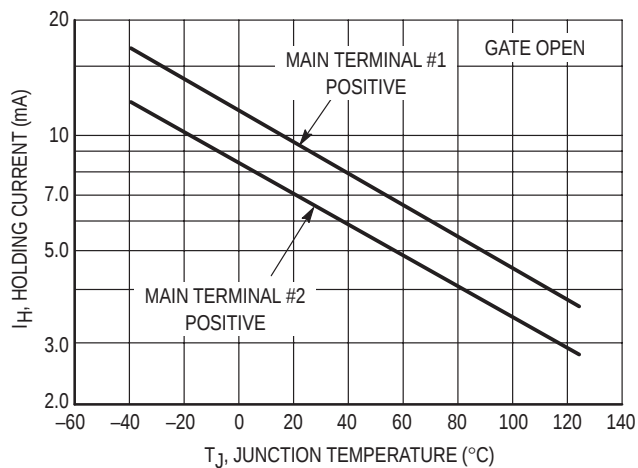


Figure 6. Typical Holding Current

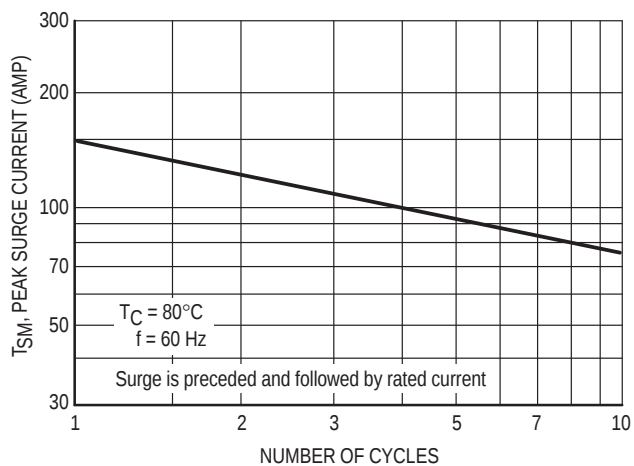


Figure 7. Maximum Non-Repetitive Surge Current

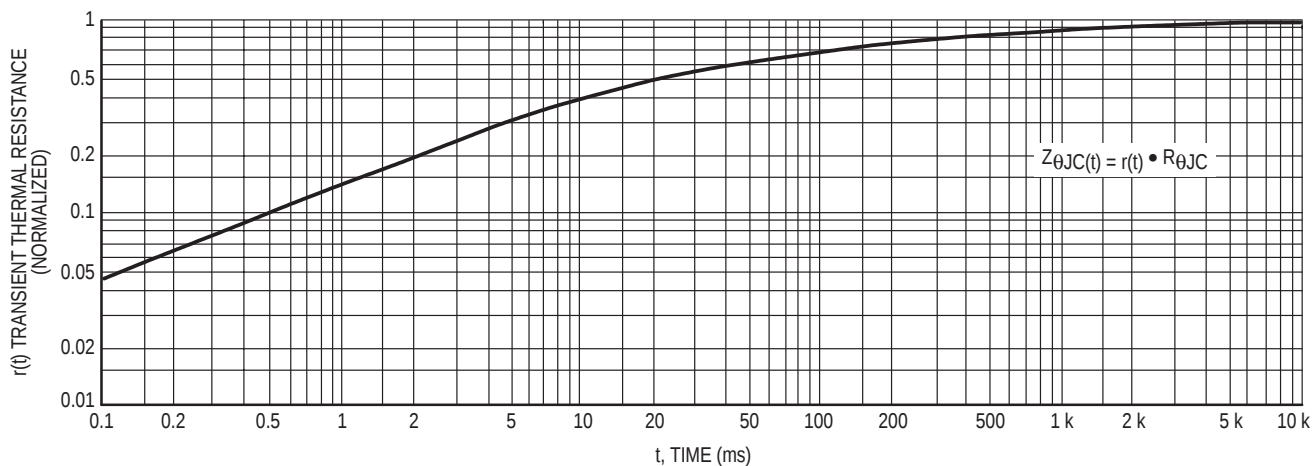
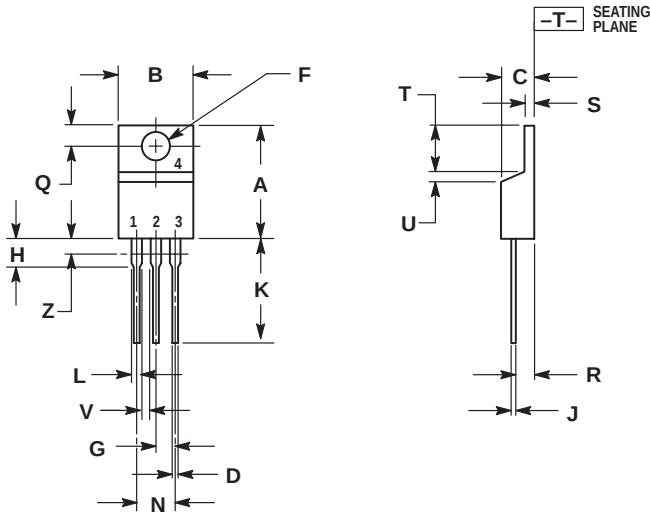


Figure 8. Thermal Response

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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:

- PIN 1. MAIN TERMINAL 1
- MAIN TERMINAL 2
- GATE
- MAIN TERMINAL 2

Notes

MAC15 Series

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