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°C unless otherwise noted)

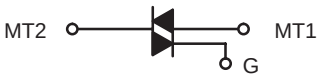
Rating	Symbol	Value	Unit
Peak Repetitive Off–State Voltage(1) (T_J = –40 to +125°C, Sine Wave 50 to 60 Hz, Gate Open) MAC15A6 MAC15–8, MAC15A8 MAC15–10, MAC15A10	V_{DRM}, V_{RRM}	 400 600 800	Volts
Peak Gate Voltage (Pulse Width ≤ 1.0 μsec; T_C = 90°C)	V_{GM}	10	Volts
On–State Current RMS Full Cycle Sine Wave 50 to 60 Hz (T_C = +90°C)	$I_{T(RMS)}$	15	A
Circuit Fusing Consideration (t = 8.3 ms)	I^2t	93	A^2s
Peak Non–repetitive Surge Current (One Full Cycle Sine Wave, 60 Hz, T_C = +80°C) Preceded and followed by rated current	I_{TSM}	150	A
Peak Gate Power (T_C = +80°C, Pulse Width = 1.0 μs)	P_{GM}	20	Watts
Average Gate Power (T_C = +80°C, t = 8.3 ms)	$P_{G(AV)}$	0.5	Watts
Peak Gate Current (Pulse Width ≤ 1.0 μsec; T_C = 90°C)	I_{GM}	2.0	A
Operating Junction Temperature Range	T_J	–40 to +125	°C
Storage Temperature Range	T_{stg}	–40 to +150	°C

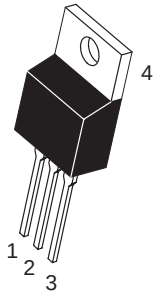
(1) V_{DRM} and V_{RRM} for all types can be applied on a continuous basis. Blocking voltages shall not be tested with a constant current source such that the voltage ratings of the devices are exceeded.

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.

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

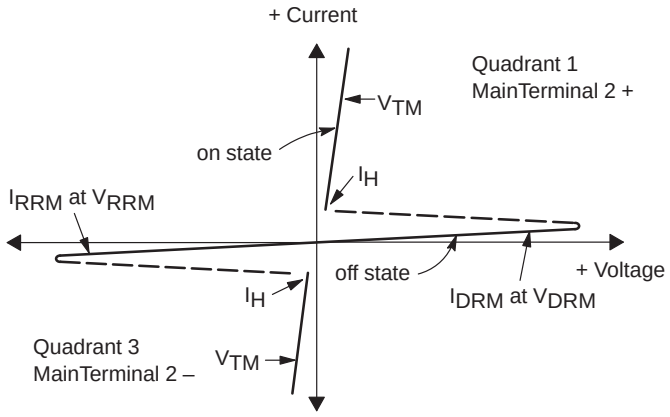
ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted; Electricals apply in both directions)

Characteristic		Symbol	Min	Typ	Max	Unit
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
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

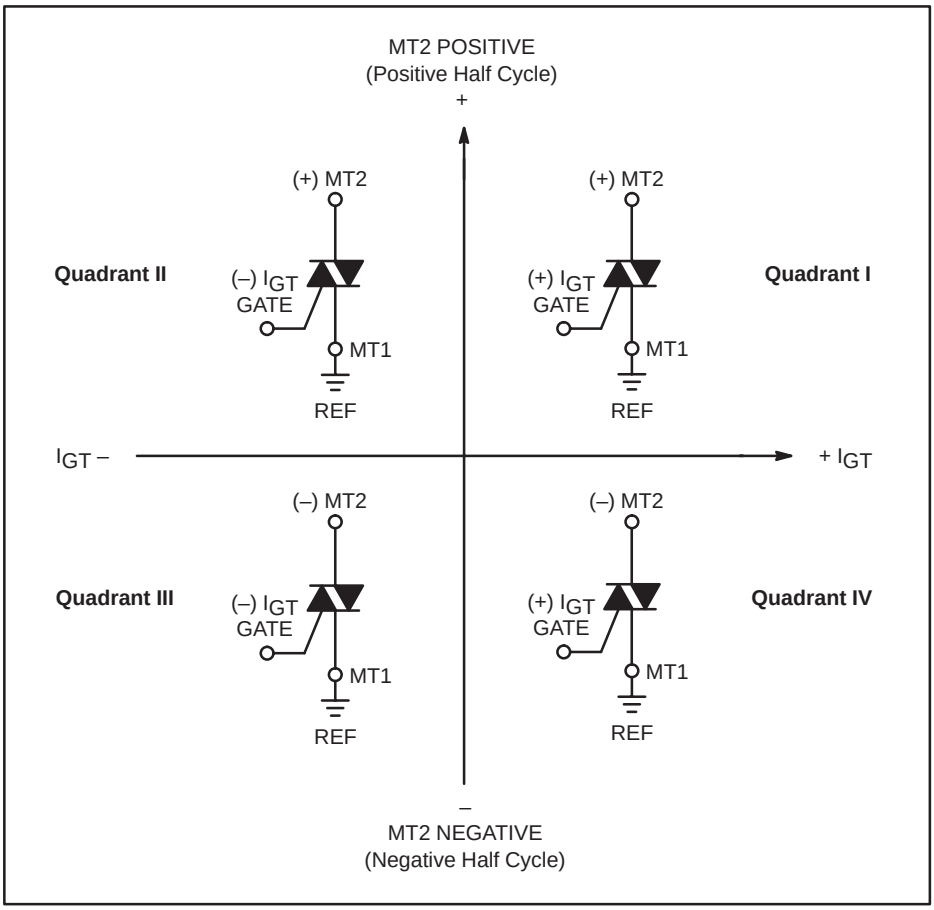
(1) Pulse Test: Pulse Width ≤ 2.0 ms, Duty Cycle ≤ 2%.

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.

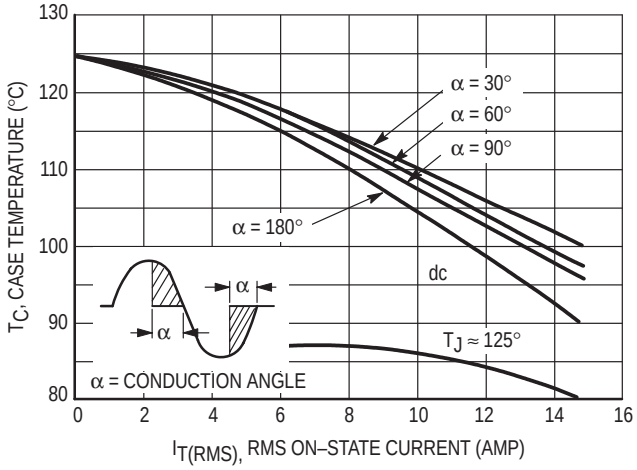


Figure 1. RMS Current Derating

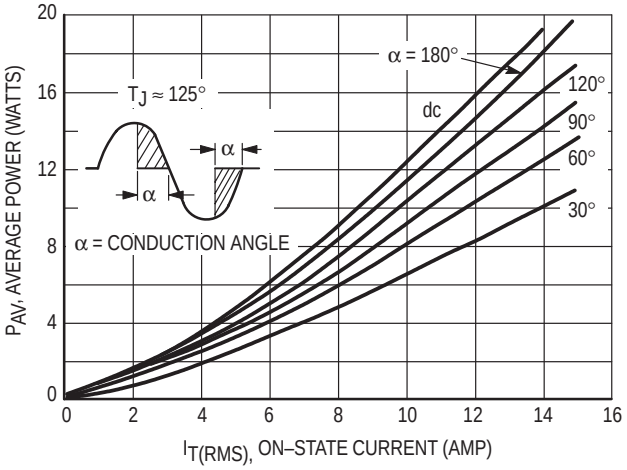


Figure 2. On–State Power Dissipation

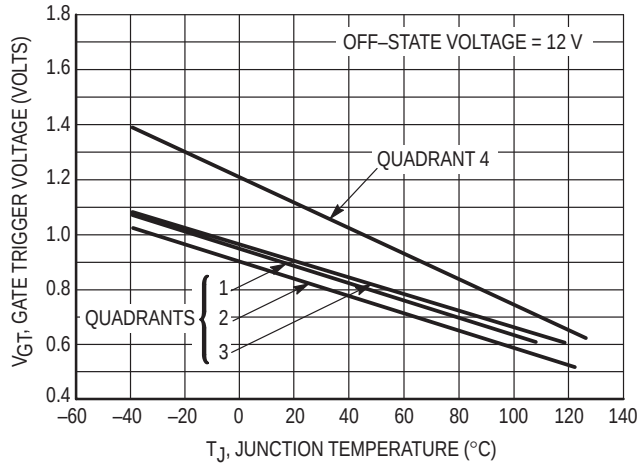


Figure 3. Typical Gate Trigger Voltage

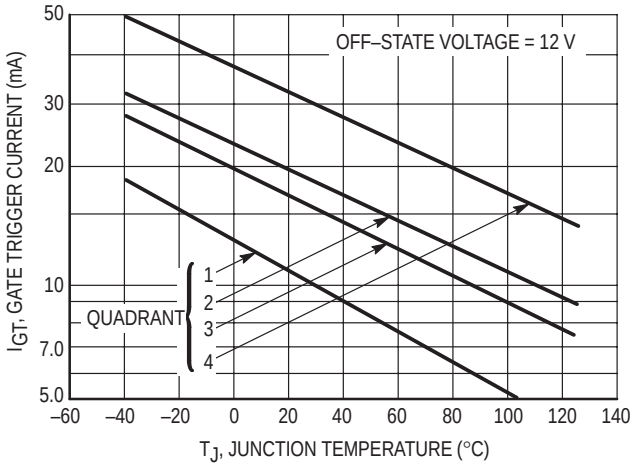


Figure 4. Typical Gate Trigger Current

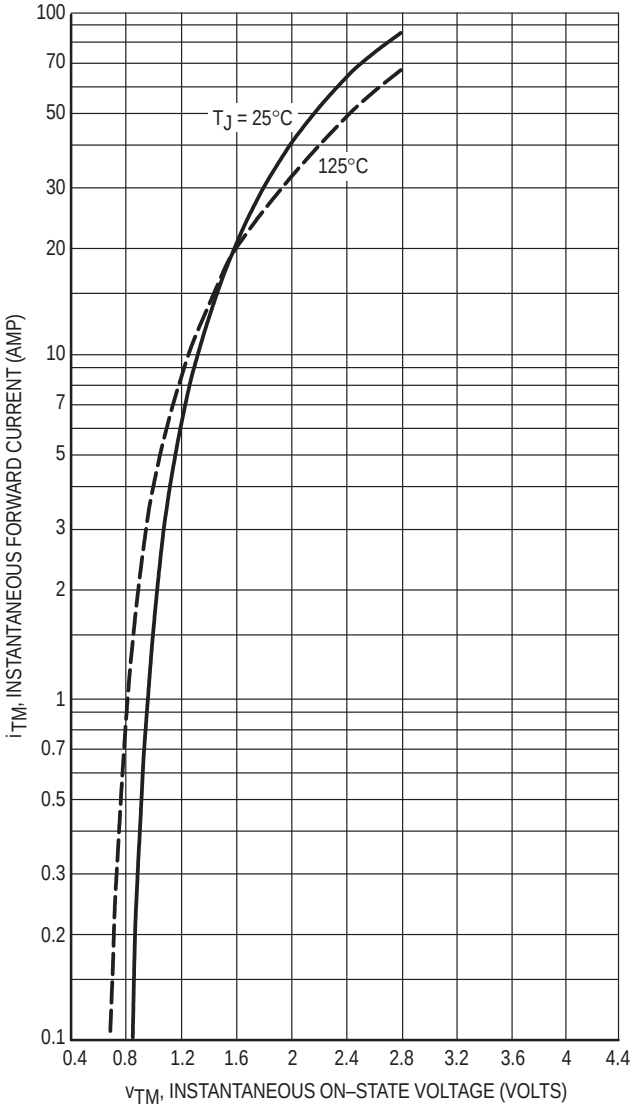


Figure 5. On–State Characteristics

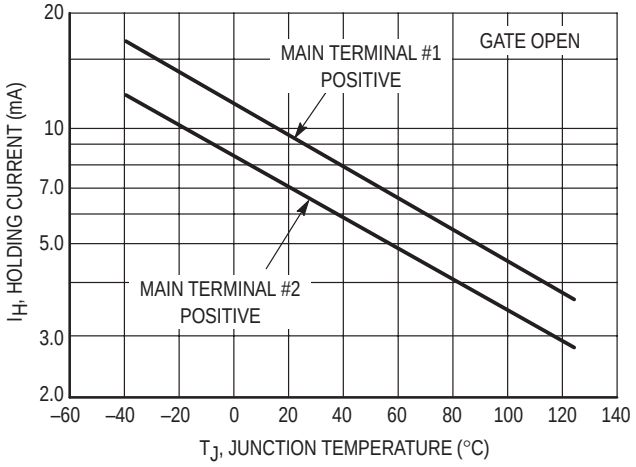


Figure 6. Typical Holding Current

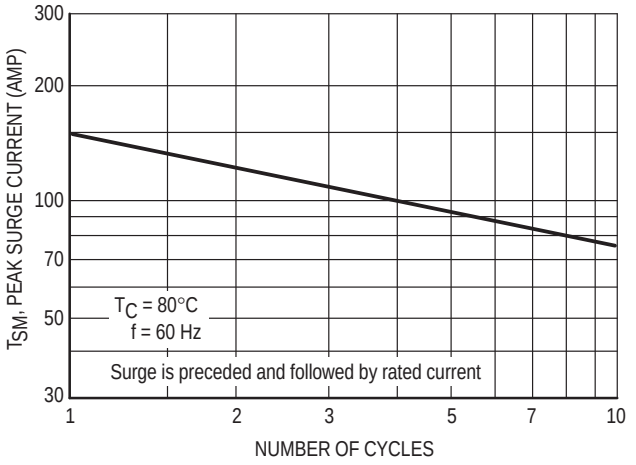


Figure 7. Maximum Non–Repetitive Surge Current

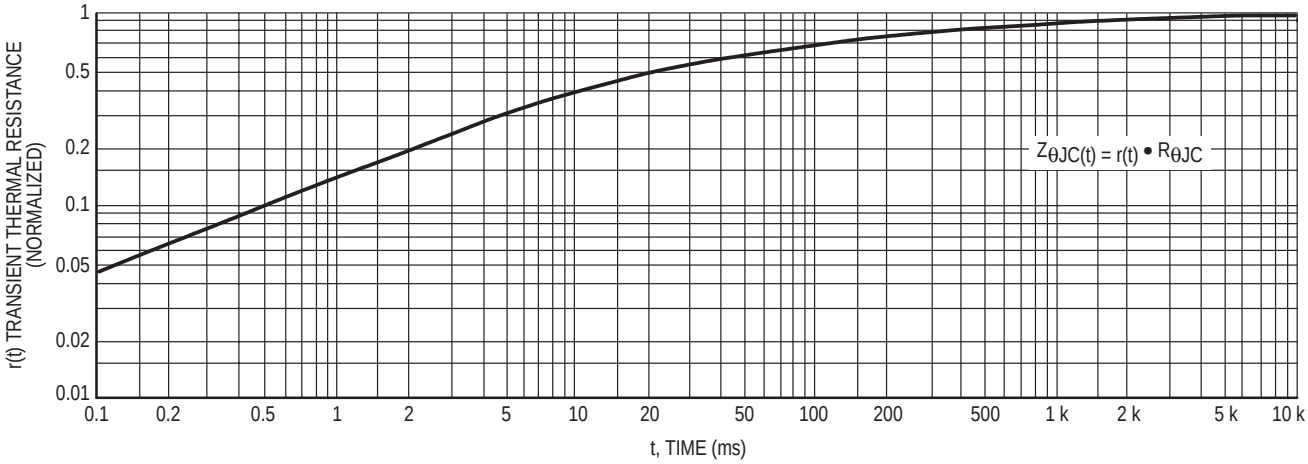
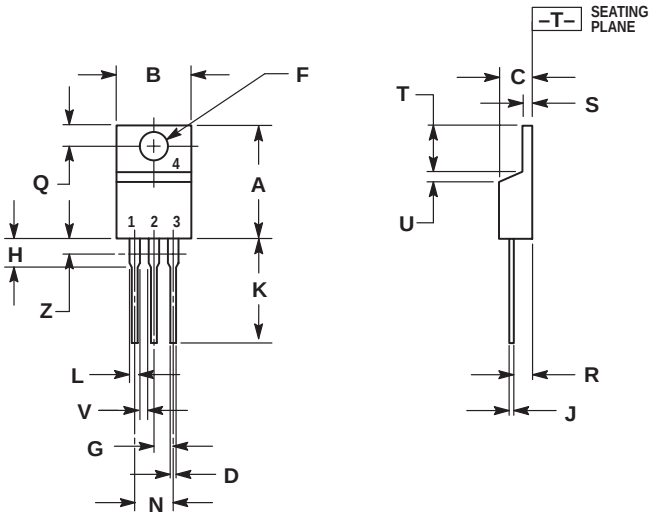


Figure 8. Thermal Response

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.

	INCHES		MILLIMETERS	
DIM	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
2. MAIN TERMINAL 2
3. GATE
4. MAIN TERMINAL 2

Notes

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