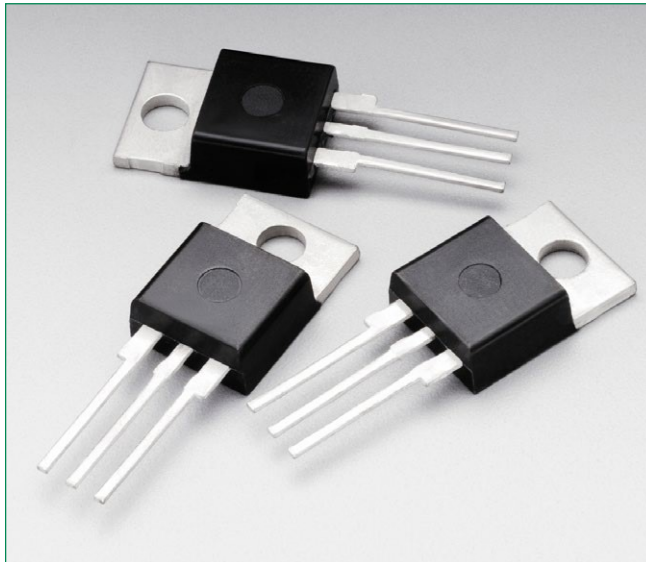




MAC15 Series



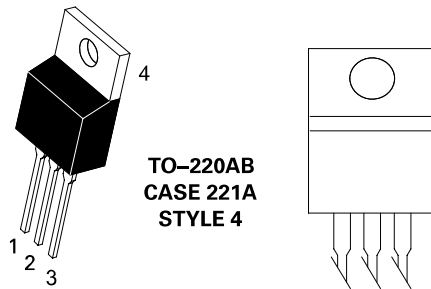
Description

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.

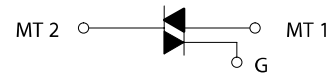
Features

- Blocking Voltage to 800 V
- 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)
- These Devices are Pb-Free and are RoHS Compliant

Pin Out



Functional Diagram



Additional Information



Datasheet



Resources



Samples

Maximum Ratings ($T_J = 25^\circ\text{C}$ unless otherwise noted)

Rating	Symbol	Value	Unit
Peak Repetitive Off-State Voltage (Note 1) (Gate Open, Sine Wave 50 to 60 Hz, $T_J = 25^\circ$ to 100°C)	MAC15A6G MAC15-8G, MAC15A8G MAC15-10G, MAC15A10G V_{DRM} V_{RRM}	400 600 800	V
On-State RMS Current (Full Cycle Sine Wave, 50 to 60 Hz, $T_C = 90^\circ\text{C}$)	$I_{T(RMS)}$	15	A
Peak Non-Repetitive Surge Current (One Full Cycle Sine Wave, 60 Hz, $T_J = 125^\circ\text{C}$) Preceded and Followed by Rated Current	I_{TSM}	150	A
Peak Gate Voltage (Pulse Width ::: 1.0 μsec ; $T_C = 90^\circ\text{C}$)	V_{GM}	10	V
Circuit Fusing Consideration ($t = 8.3$ ms)	I^2t	93	A ² sec
Peak Gate Power ($T_C = +80^\circ\text{C}$, Pulse Width = 1.0 μs)	P_{GM}	20	W
Peak Gate Current (Pulse Width ::: 1.0 μsec ; $T_C = 90^\circ\text{C}$)	I_{GM}	2.0	A
Average Gate Power ($t = 8.3$ ms, $T_C = 80^\circ\text{C}$)	$P_{G(AV)}$	0.5	W
Operating Junction Temperature Range	T_J	-40 to +125	$^\circ\text{C}$
Storage Temperature Range	T_{stg}	-40 to +150	$^\circ\text{C}$

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

- V_{DRM} and V_{RRM} for all types can be applied on a continuous basis. Ratings apply for zero or negative gate voltage; however, positive gate voltage shall not be applied concurrent with negative potential on the anode. Blocking voltages shall not be tested with a constant current source such that the voltage ratings of the devices are exceeded.

Thermal Characteristics

Rating	Symbol	Value	Unit
Thermal Resistance, Junction-to-Case (AC) Junction-to-Ambient	$R_{\theta JC}$ $R_{\theta JA}$	2.0 62.5	$^\circ\text{C}/\text{W}$
Maximum Lead Temperature for Soldering Purposes, 1/8" from case for 10 seconds	T_L	260	$^\circ\text{C}$

Electrical Characteristics - OFF ($T_J = 25^\circ\text{C}$ unless otherwise noted ; Electricals apply in both directions)

Characteristic	Symbol	Min	Typ	Max	Unit
Peak Repetitive Blocking Current ($V_D = V_{DRM} = V_{RRM}$, Gate Open)	I_{DRM} I_{RRM}	-	-	1.0	mA
		-	-	2.0	

Electrical Characteristics - ON ($T_J = 25^\circ\text{C}$ unless otherwise noted; Electricals apply in both directions)

Characteristic	Symbol	Min	Typ	Max	Unit
Peak On-State Voltage (Note 2) ($I_{TM} = \pm 21$ A Peak)	V_{TM}	-	1.3	1.6	V
Gate Trigger Current (Continuous dc) ($V_D = 12$ V, $R_L = 100$ Ω)	I_{GT}	MT2(+), G(+)	-	50	mA
		MT2(+), G(-)	-	50	
		MT2(-), G(-)	-	50	
		MT2(-), G(+)	-	75	
Gate Trigger Voltage (Continuous dc) ($V_D = 12$ V, $R_L = 100$ Ω)	V_{GT}	MT2(+), G(+)	0.5	0.62	V
		MT2(+), G(-)	0.5	0.57	
		MT2(-), G(-)	0.5	0.65	
		MT2(-), G(+)	0.5	0.74	
Gate Non-Trigger Voltage ($T_J = 125^\circ\text{C}$) ($V_D = 12$ V, $R_L = 100$ Ω)	V_{GD}	MT2(+), G(+)	0.2	-	V
		MT2(+), G(-)	0.2	-	
		MT2(-), G(-)	0.2	-	
		MT2(-), G(+)	0.2	-	
Holding Current ($V_D = 12$ V _{ac} , Gate Open, Initiating Current = ± 200 mA)	I_H	-	6.0	40	mA

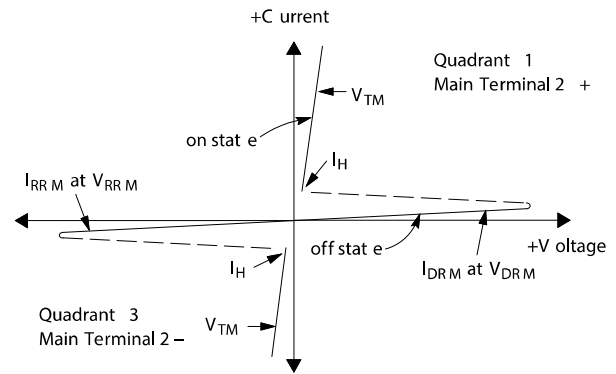
- Indicates Pulse Test: Pulse Width ≤ 2.0 ms, Duty Cycle $\leq 2\%$.

Dynamic Characteristics

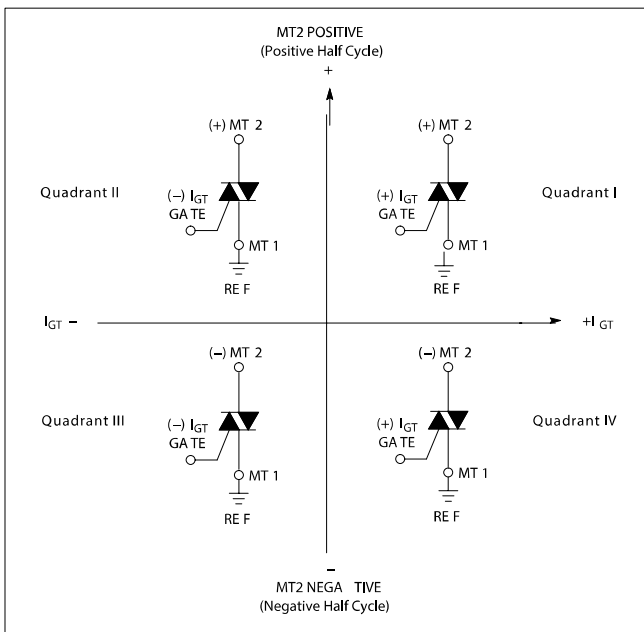
Characteristic	Symbol	Min	Typ	Max	Unit
Critical Rate of Rise of Commutation Voltage ($V_D = \text{Rated } V_{DRM}, I_{TM} = 21 \text{ A}$, Commutating $di/dt = 7.6 \text{ A/ms}$, Gate Unenergized, $TC = 80^\circ\text{C}$)	dV/dt	–	5.0	–	$V/\mu\text{s}$

Voltage Current Characteristic of SCR

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

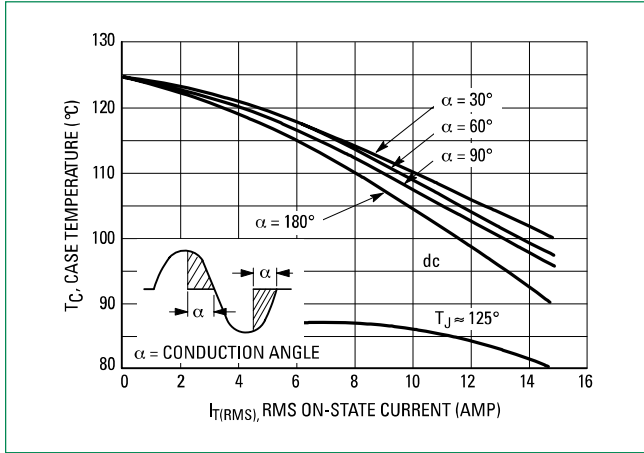


Figure 2. On-State Power Dissipation

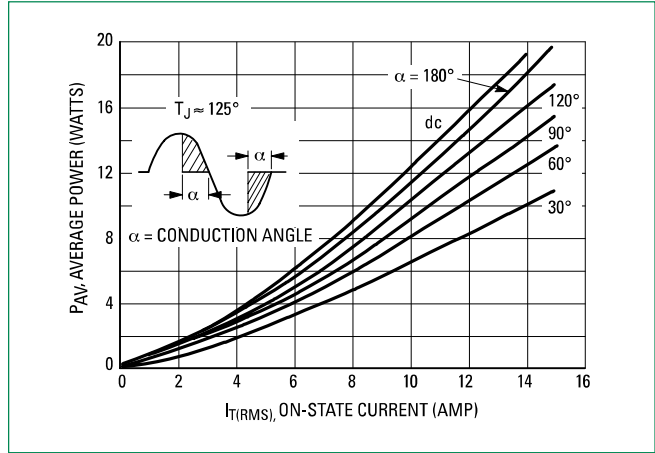


Figure 3. Typical Gate Trigger Voltage

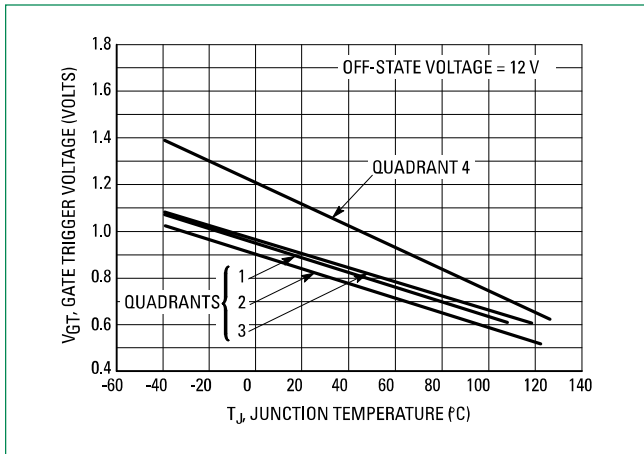


Figure 4. Typical Gate Trigger Current

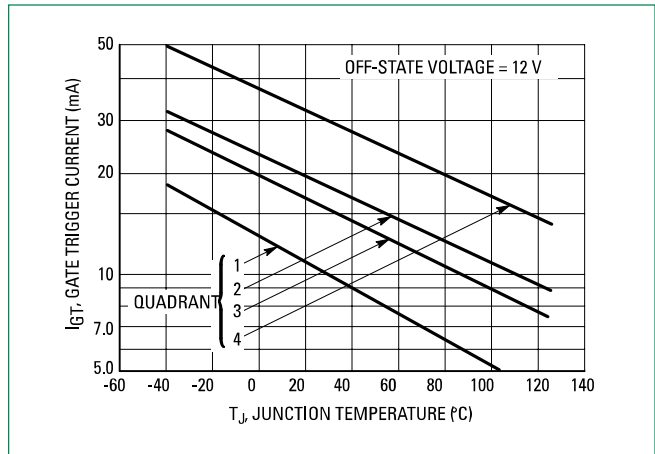


Figure 5. On-State Characteristics

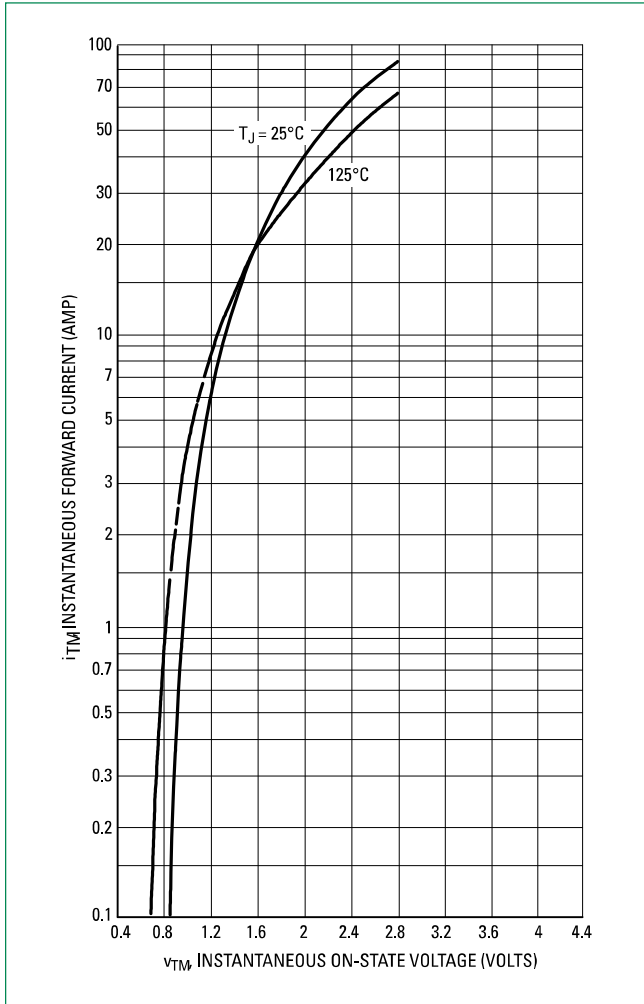


Figure 6. Typical Holding Current

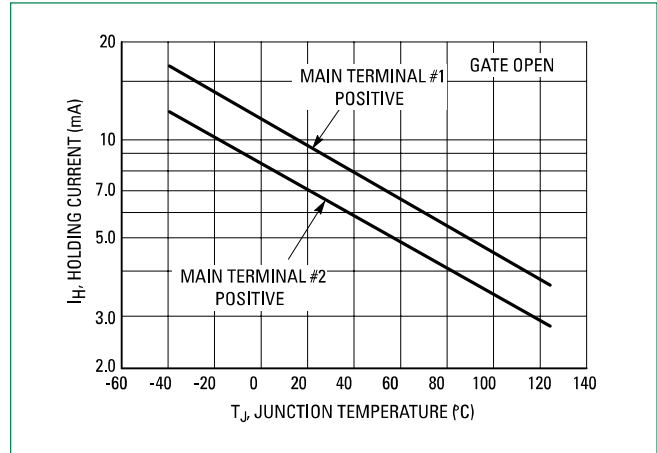


Figure 7. Maximum Non-Repetitive Surge Current

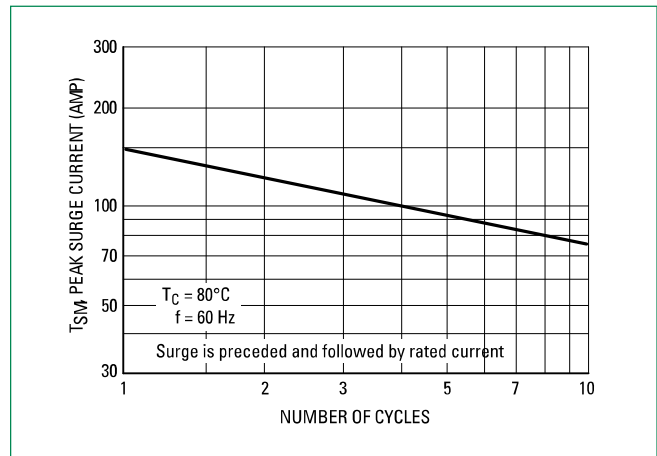
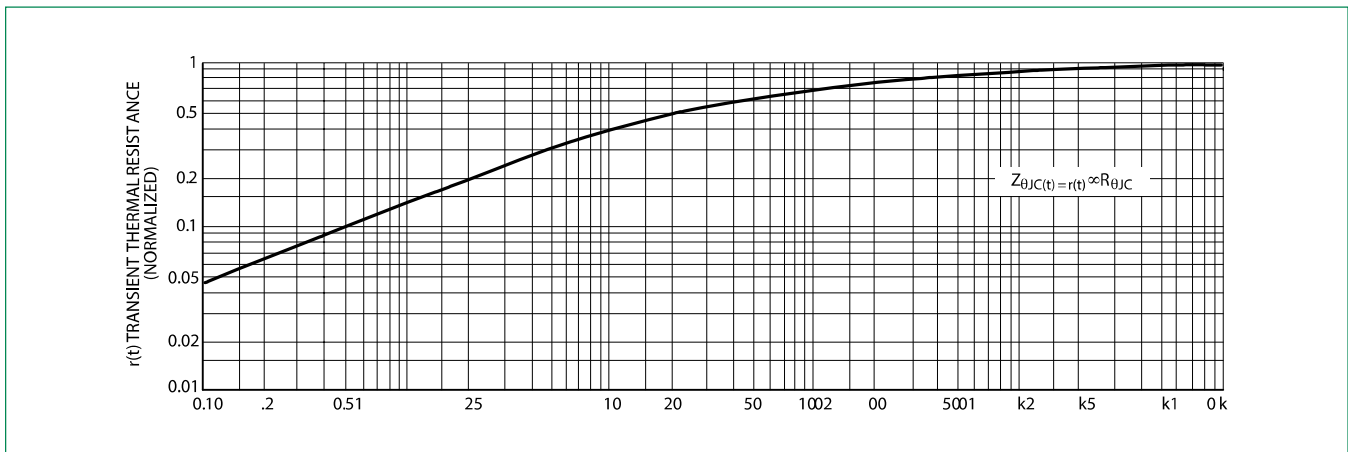
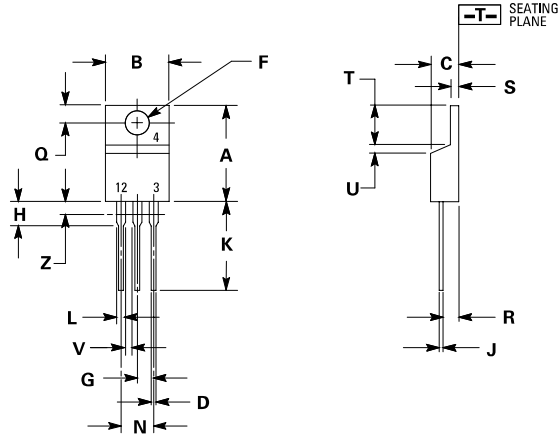


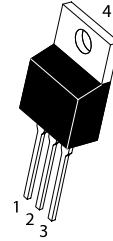
Figure 8. Thermal Response



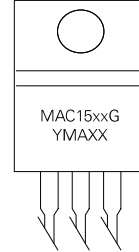
Dimensions



Part Marking System



**TO-220AB
CASE 221A
STYLE 12**



xx =See Table on Page 2
Y =Year
M =Month
A =Assembly Site
XX =Lot Serial Code
G =Pb-Free Package

Dim	Inches		Millimeters	
	Min	Max	Min	Max
A	0.590	0.620	14.99	15.75
B	0.380	0.420	9.65	10.67
C	0.178	0.188	4.52	4.78
D	0.025	0.035	0.64	0.89
F	0.142	0.147	3.61	3.73
G	0.095	0.105	2.41	2.67
H	0.110	0.130	2.79	3.30
J	0.018	0.024	0.46	0.61
K	0.540	0.575	13.72	14.61
L	0.060	0.075	1.52	1.91
N	0.195	0.205	4.95	5.21
Q	0.105	0.115	2.67	2.92
R	0.085	0.095	2.16	2.41
S	0.045	0.060	1.14	1.52
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

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.

Pin Assignment	
1	Main Terminal 1
2	Main Terminal 2
3	Gate
4	No Connection

Ordering Information

Device	Device Marking	Package	Shipping
MAC15-8G	MAC15-8	TO-220AB (Pb-Free)	500 Units/Box
MAC15-10G	MAC1510		
MAC15A6G	MAC15A6		
MAC15A8G	MAC15A8		
MAC15A10G	MAC15A10		

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