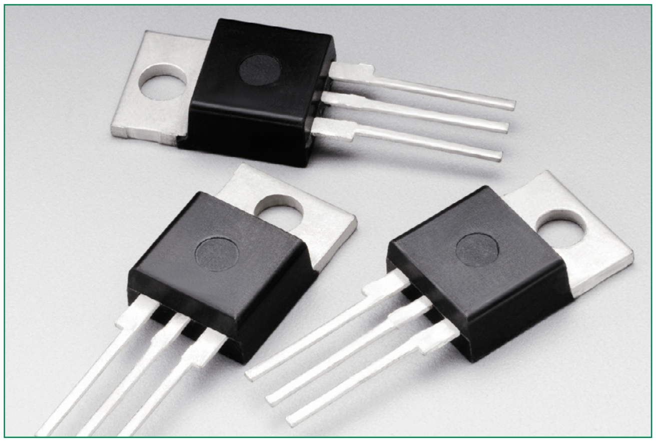
MAC210A8, MAC210A10

Triacs – 400V - 800V



Description

Designed primarily for full-wave AC control applications, such as light dimmers, 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 600 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 Four Modes (Quadrants)
- Pb−Free Packages are Available

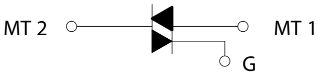
Additional Information

Resources

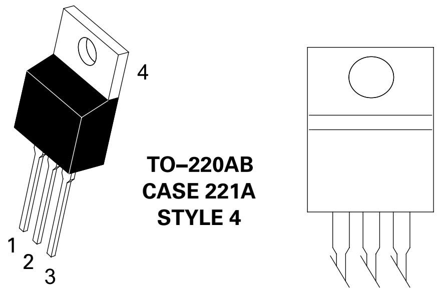
Accessories

Samples

Functional Diagram



Pin Out



Specifications are subject to change without notice.

Revised: GD. 05/21/21

Maximum Ratings (T_J = 25°C unless otherwise noted)

Rating		Symbol	Value	Unit
Peak Repetitive Off−State Voltage (Note 1) (– 40 to 125°C, Sine Wave, 50 to 60 Hz, Gate Open)	MAC210A8 MAC210A10	V_{DRM}, V_{RRM}	600 800	V
On-State RMS Current (Full Cycle Sine Wave, 50 to 60 Hz, T_C = 70°C)		$I_{T\ (RMS)}$	10	A
Peak Non-Repetitive Surge Current (One Full Cycle Sine Wave, 60 Hz, T_c = +25°C) Preceded and followed by rated current		I_{TSM}	100	A
Circuit Fusing Consideration (t = 8.3 ms)		I^2t	40	A^2sec
Peak Gate Power (T_C = +70°C, Pulse Width = 10 μs)		P_{GM}	20	W
Average Gate Power (t = 8.3 ms, T_C = 70°C)		$P_{G\ (AV)}$	0.35	W
Peak Gate Current (T_C = +70°C, Pulse Width = 10 s)		I_{GM}	2.0	A
Operating Junction Temperature Range		T_J	-40 to +125	°C
Storage Temperature Range		T_{stg}	-40 to +150	°C

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

1. 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	°C/W
Maximum Lead Temperature for Soldering Purposes, 1/8” from case for 10 seconds		T_L	260	°C

Electrical Characteristics - OFF (T_J = 25°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)	T_J = 25°C	I_{DRM}, I_{RRM}	-	-	10	μA
	T_J = 125°C		-	-	2.0	mA

Electrical Characteristics - ON (T_J = 25°C unless otherwise noted; Electricals apply in both directions)

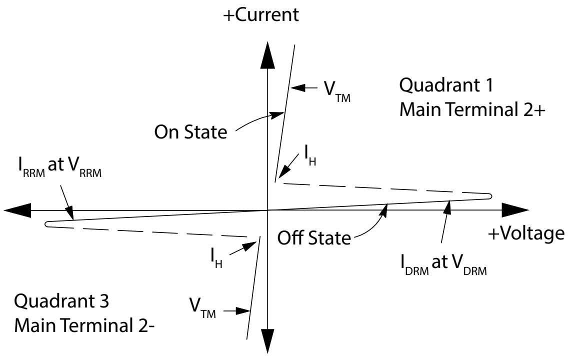
Characteristic		Symbol	Min	Typ	Max	Unit
Peak On−State Voltage (I_{TM} = ±14 A Peak; Pulse Width = 1 to 2 ms, Duty Cycle ≤2%)		V_{TM}	–	1.2	1.65	V
Gate Trigger Current (Continuous dc) (V_D = 12 V_{dc}, R_L = 100 Ohms)	MT2(+), G(+)	I_{GT}	–	12	50	mA
	MT2(+), G(−)		–	12	50	
	MT2(−), G(−)		–	20	50	
	MT2(−), G(+)		–	35	75	
Gate Trigger Voltage (Continuous dc) (V_D = 12 V_{dc}, R_L = 100 Ω)	MT2(+), G(+)	V_{GT}	–	0.9	2.0	V
	MT2(+), G(−)		–	0.9	2.0	
	MT2(−), G(−)		–	1.1	2.0	
	MT2(−), G(+)		–	1.4	2.5	
Holding Current (V_D = 12 V_{dc}, Gate Open, Initiating Current = ±200 mA, TC=+25 °C))		I_H	–	6.0	50	mA
Turn-On Time (Rated V_{DRM}, I_{TM} = 14 A) (I_{GT} = 120 mA, Rise Time = 0.1 s, Pulse Width = 2 s)		t_{gt}	–	1.5	–	μs
Gate Non−Trigger Voltage (Continuous dc) (Main Terminal Voltage = 12 V, RL = 100 , T_J = +125°C)	All Four Quadrants	V_{GD}	0.2	-	-	v

Dynamic Characteristics

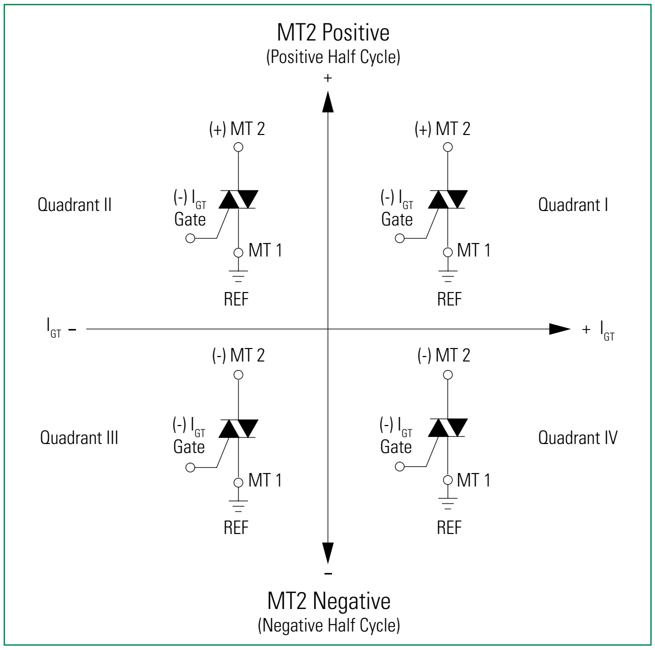
Characteristic	Symbol	Min	Typ	Max	Unit
Critical Rate of Rise of Commutation Voltage (V_D = Rated V_{DRM}, I_{TM} = 14 A, Commutating di/dt = 5.0 A/ms, Gate Unenergized, T_C = 70°C)	di/dt(c)	–	5.0	–	V/µs
Critical Rate of Rise of Off-State Voltage (V_D = Rated V_{DRM}, Exponential Waveform, Gate Open, T_C = +70°C)	dv/dt	–	100	–	V/µs

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

MAC210A8, MAC210A10

Triacs – 400V - 800V

Figure 1.
Current Derating

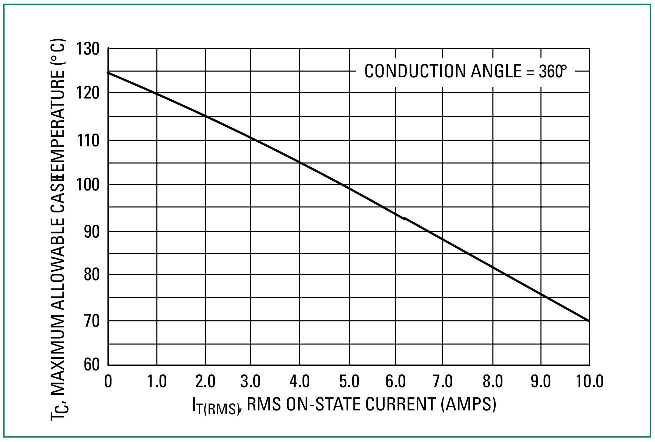


Figure 2.
Power Dissipation

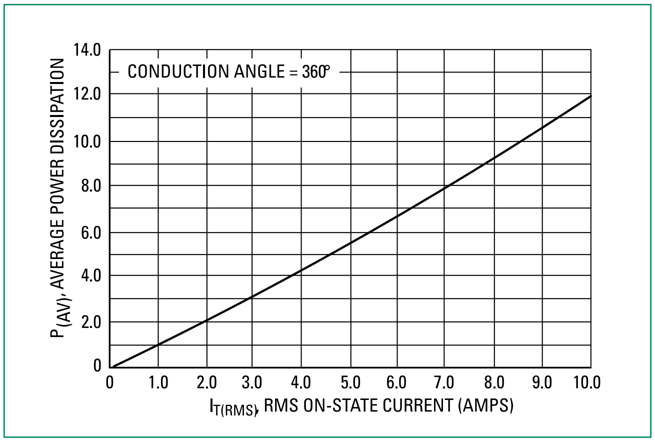


Figure 3.
Maximum On–State Characteristics

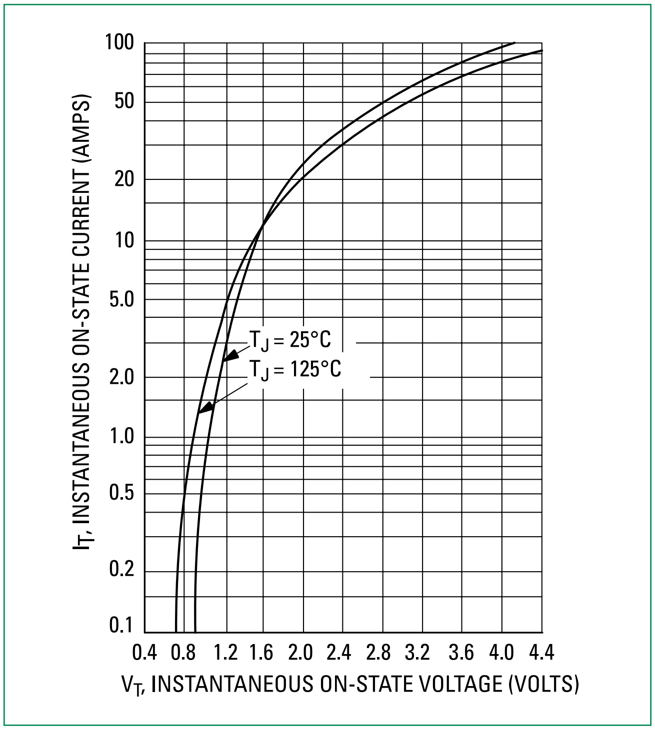


Figure 4.
Maximum Non–Repetitive Surge Current

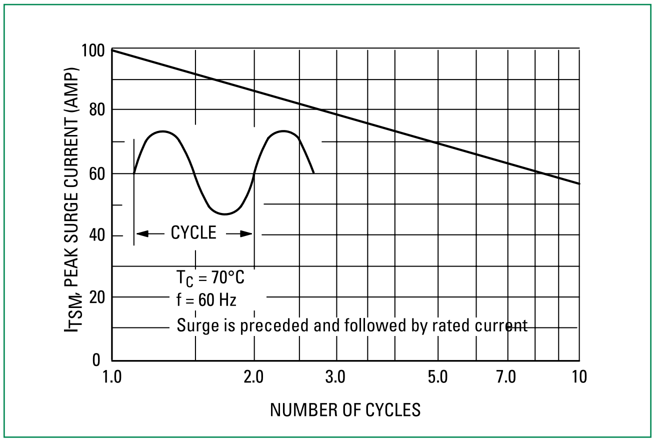
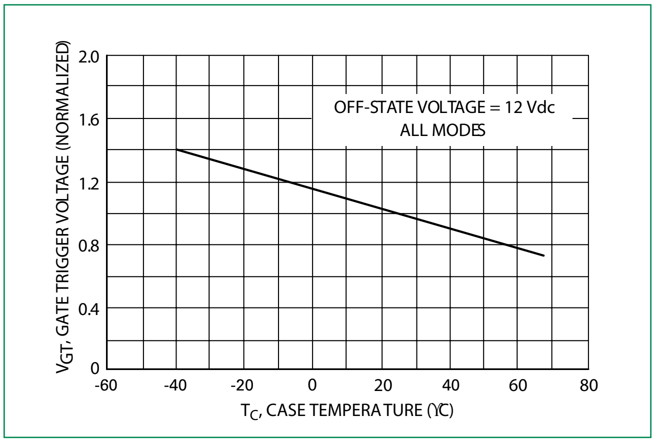


Figure 5.
Typical Gate Trigger Voltage



MAC210A8, MAC210A10

Triacs – 400V - 800V

Figure 6.
Typical Gate Trigger Current

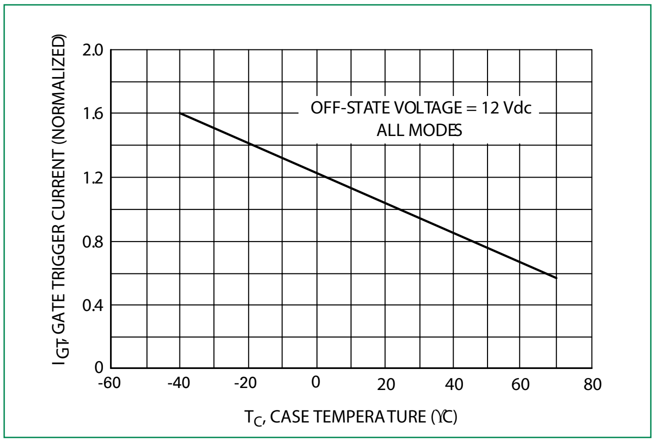


Figure 7.
Typical Holding Current

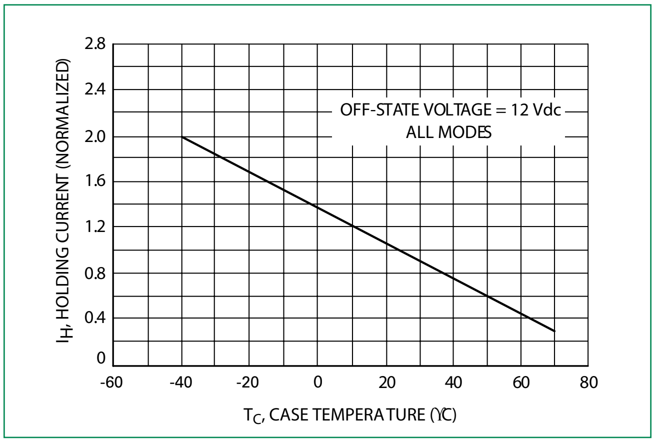
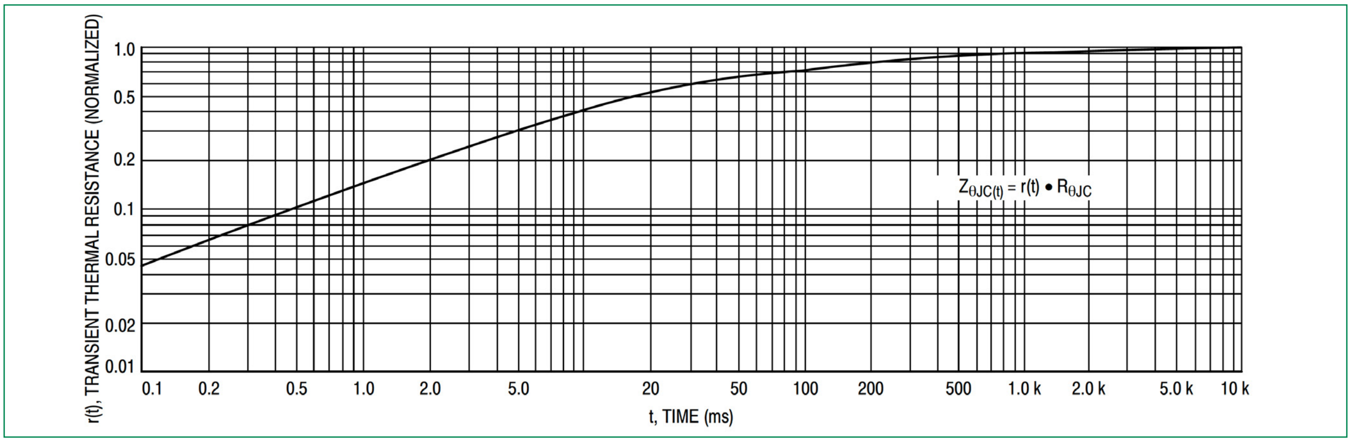
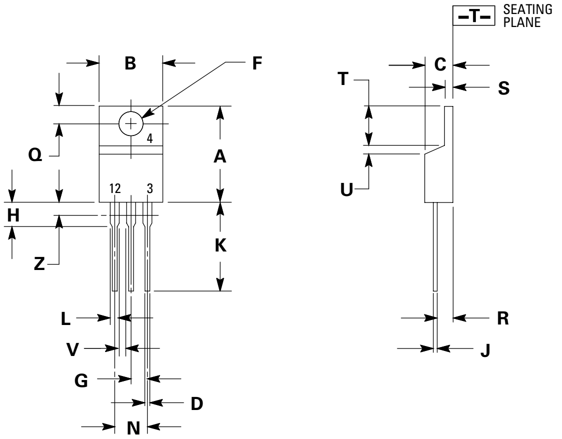


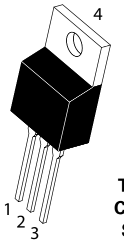
Figure 8.
Thermal Response



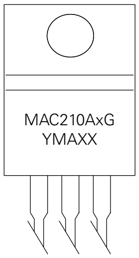
Dimensions



Part Marking System



TO–220AB
CASE 221A
STYLE 12



x =8 or 10
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	Main Terminal 2

Ordering Information

Device	Package	Shipping
MAC210A8	TO-220AB	1000 Units/ Box
MAC210A8G	TO-220AB (Pb-Free)	
MAC210A10	TO-220AB	
MAC210A10G	TO-220AB (Pb-Free)	