

# DIGITRON SEMICONDUCTORS

## MAC210(A) SERIES

## SILICON BIDIRECTIONAL THYRISTORS

Available Non-RoHS (standard) or RoHS compliant (add PBF suffix).

Available as "HR" (high reliability) screened per MIL-PRF-19500, JANTX level. Add "HR" suffix to base part number.

### MAXIMUM RATINGS $T_C = 25^\circ\text{C}$ unless otherwise noted

Rating	Symbol	Value	Unit
<b>Peak repetitive off-state voltage</b> <sup>(1)</sup> ( $T_J = -40$ to $+125^\circ\text{C}$ , 1/2 sine wave, 50 to 60Hz, gate open) MAC210-4, MAC210A-4 MAC210-5, MAC210A-5 MAC210-6, MAC210A-6 MAC210-7, MAC210A-7 MAC210-8, MAC210A-8 MAC210-9, MAC210A-9 MAC210-10, MAC210A-10	$V_{\text{DRM}}$	200 300 400 500 600 700 800	Volts
<b>RMS on-state current</b> (full sine wave, 50 to 60Hz, $T_C = 70^\circ\text{C}$ )	$I_{\text{T(RMS)}}$	10	Amps
<b>Peak non-repetitive surge current</b> (1 cycle, 60 Hz, $T_C = 70^\circ\text{C}$ , preceded and followed by rated current)	$I_{\text{TSM}}$	100	Amps
<b>Circuit fusing considerations</b> ( $t = 8.3\text{ms}$ )	$I^2t$	40	$\text{A}^2\text{s}$
<b>Peak gate power</b> ( $T_C = 70^\circ\text{C}$ , pulse width = $10\mu\text{s}$ )	$P_{\text{GM}}$	20	Watts
<b>Average gate power</b> ( $T_C = 70^\circ\text{C}$ , $t = 8.3\text{ms}$ )	$P_{\text{G(AV)}}$	0.35	Watts
<b>Peak gate current</b> ( $T_C = 70^\circ\text{C}$ , pulse width = $10\mu\text{s}$ )	$I_{\text{GM}}$	2.0	Amps
<b>Operating junction and storage temperature range</b>	$T_J, T_{\text{stg}}$	-40 to +125	$^\circ\text{C}$

Note 1:  $V_{\text{DRM}}$  for all types can be applied on a continuous basis. Blocking voltage shall not be tested with a constant current source such that the voltage ratings of the devices are exceeded.

### THERMAL CHARACTERISTICS

Characteristic	Symbol	Maximum	Unit
Thermal resistance, junction to case	$R_{\theta\text{JC}}$	2.2	$^\circ\text{C}/\text{W}$

### ELECTRICAL CHARACTERISTICS ( $T_C = 25^\circ\text{C}$ unless otherwise noted)

Characteristic	Symbol	Min	Typ.	Max	Unit
<b>Peak blocking current</b> (Rated $V_{\text{DRM}}$ @ $T_J = 25^\circ\text{C}$ ) (Rated $V_{\text{DRM}}$ @ $T_J = 125^\circ\text{C}$ )	$I_{\text{DRM}}$	- -	- -	10 2	$\mu\text{A}$ mA
<b>Peak on-state voltage</b> (either direction) ( $I_{\text{TM}} = 14\text{A}$ peak, pulse width = 1 to 2 ms, duty cycle $\leq 2\%$ )	$V_{\text{TM}}$	-	1.2	1.65	Volts
<b>Gate trigger current</b> (continuous dc) (main terminal voltage = 12V, $R_L = 100\Omega$ ) MT2(+),G(+) MT2(+),G(-) MT2(-),G(-) MT2(-),G(+) "A" suffix only	$I_{\text{GT}}$	- - - -	12 12 20 35	50 50 50 75	mA
<b>Gate trigger voltage</b> (continuous dc) (main terminal voltage = 12V, $R_L = 100\Omega$ ) MT2(+),G(+) MT2(+),G(-) MT2(-),G(-) MT2(-),G(+) "A" suffix only (main terminal voltage = Rated $V_{\text{DRM}}$ , $R_L = 10\text{k}\Omega$ , $T_J = 125^\circ\text{C}$ ) MT2(+), G(+); MT2(-), G(-); MT2(+), G(-) MT2(-), G(+) "A" suffix only	$V_{\text{GT}}$	- - - - 0.2 0.2	0.9 0.9 1.1 1.4 - -	2 2 2 2.5 - -	Volts

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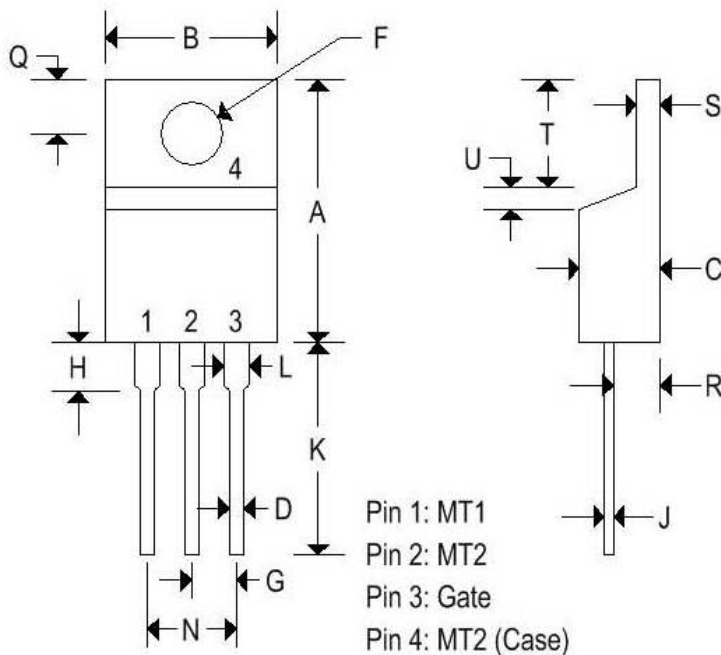
## MAC210(A) SERIES

## SILICON BIDIRECTIONAL THYRISTORS

Characteristic	Symbol	Min	Typ.	Max	Unit
<b>Holding current</b> (either direction) (main terminal voltage= 12V, gate open, initiating current = 500mA, $T_C = 25^\circ\text{C}$ )	$I_H$	-	6	50	mA
<b>Turn on time</b> (Rated $V_{DRM}$ , $I_{TM} = 14\text{A}$ , $I_{GT} = 120\text{mA}$ , rise time = $0.1\mu\text{s}$ , pulse width = $2\mu\text{s}$ )	$t_{gt}$	-	1.5	-	$\mu\text{s}$
<b>Critical rate of rise of commutation voltage</b> ( $V_D = \text{Rated } V_{DRM}$ , $I_{TM} = 14\text{A}$ , commutating $di/dt = 5.0\text{A/ms}$ , gate unenergized, $T_C = 70^\circ\text{C}$ )	$dv/dt(c)$	-	5	-	$\text{V}/\mu\text{s}$
<b>Critical rate of rise of off-state voltage</b> ( $V_D = \text{Rated } V_{DRM}$ , exponential voltage rise, gate open, $T_C = 70^\circ\text{C}$ )	$dv/dt$	-	100	-	$\text{V}/\mu\text{s}$

### MECHANICAL CHARACTERISTIC

Case	TO-220AB
Marking	Body painted, alpha-numeric
Pin out	See below

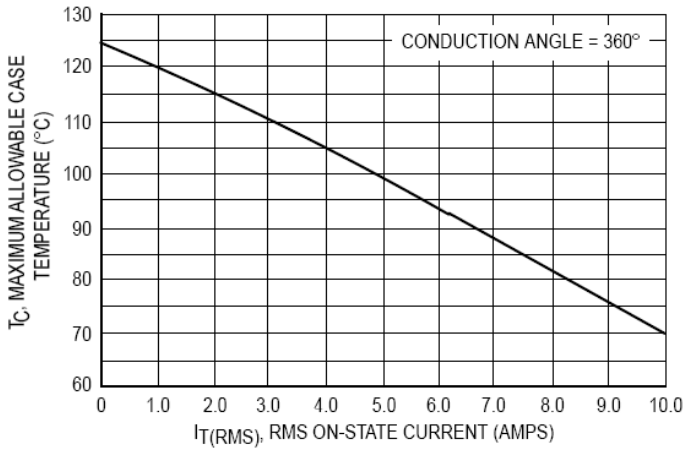


	TO-220AB			
	Inches		Millimeters	
	Min	Max	Min	Max
A	0.575	0.620	14.600	15.750
B	0.380	0.405	9.650	10.290
C	0.160	0.190	4.060	4.820
D	0.025	0.035	0.640	0.890
F	0.142	0.147	3.610	3.730
G	0.095	0.105	2.410	2.670
H	0.110	0.155	2.790	3.930
J	0.014	0.022	0.360	0.560
K	0.500	0.562	12.700	14.270
L	0.045	0.055	1.140	1.390
N	0.190	0.210	4.830	5.330
Q	0.100	0.120	2.540	3.040
R	0.080	0.110	2.040	2.790
S	0.045	0.055	1.140	1.390
T	0.235	0.255	5.970	6.480
U	-	0.050	-	1.270
V	0.045	-	1.140	-
Z	-	0.080	-	2.030

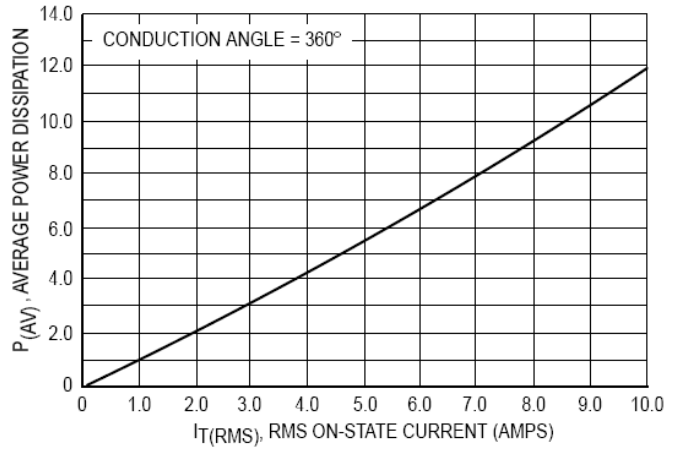
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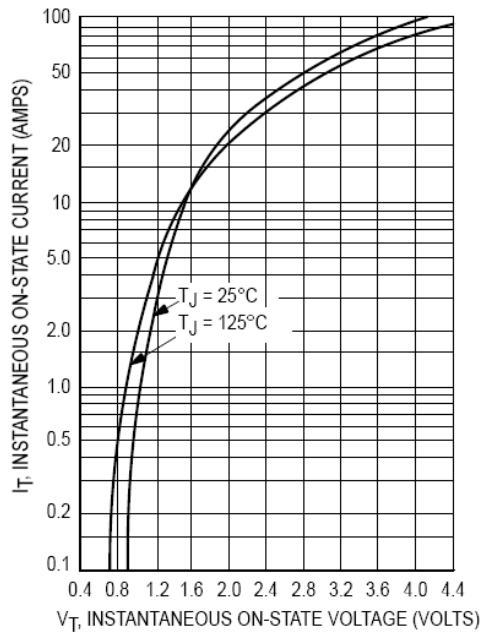
**FIGURE 1 — CURRENT DERATING**



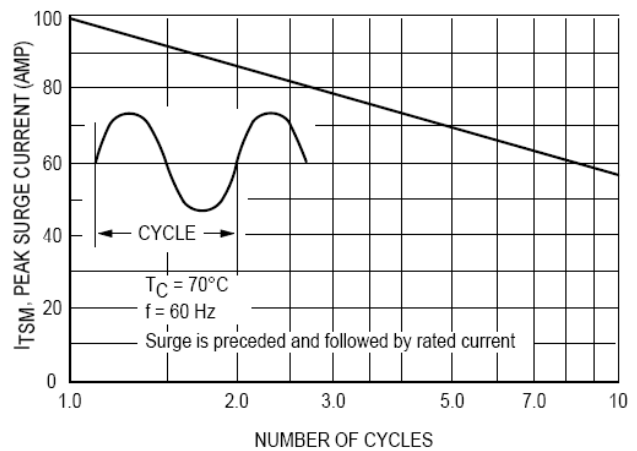
**FIGURE 2 — POWER DISSIPATION**



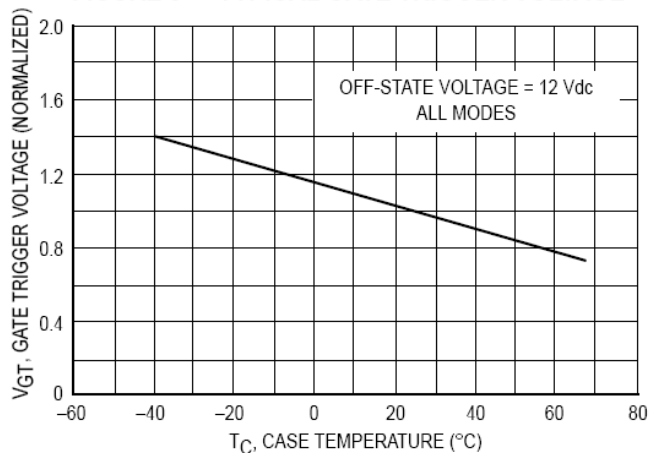
**FIGURE 3 — MAXIMUM ON-STATE CHARACTERISTICS**



**FIGURE 4 — MAXIMUM NON-REPETITIVE SURGE CURRENT**



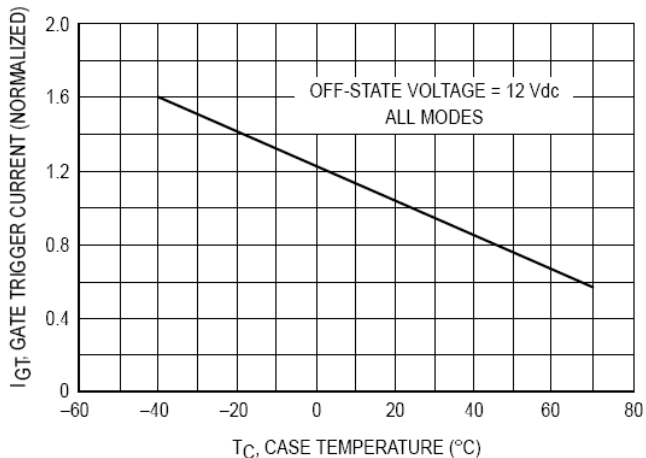
**FIGURE 5 — TYPICAL GATE TRIGGER VOLTAGE**



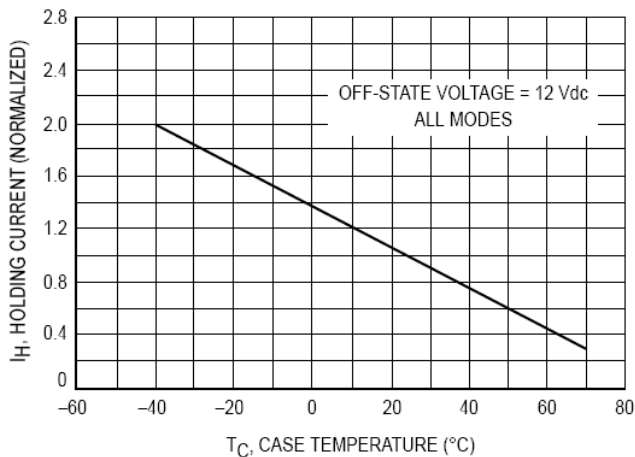
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**FIGURE 6 — TYPICAL GATE TRIGGER CURRENT**



**FIGURE 7 — TYPICAL HOLDING CURRENT**



**FIGURE 8 — THERMAL RESPONSE**

