

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

Note 1: V_{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 |
|--|------------------|--------------------------------|------------------------------------|------------------------------|---------------------|
| Peak blocking current (Rated V_{DRM} @ $T_J = 25^\circ\text{C}$) (Rated V_{DRM} @ $T_J = 125^\circ\text{C}$) | I_{DRM} | - - | - - | 10 2 | μA mA |
| Peak on-state voltage (either direction) ($I_{\text{TM}} = 14\text{A}$ peak, pulse width = 1 to 2 ms, duty cycle $\leq 2\%$) | V_{TM} | - | 1.2 | 1.65 | Volts |
| Gate trigger current (continuous dc) (main terminal voltage = 12V, $R_L = 100\Omega$) MT2(+),G(+) MT2(+),G(-) MT2(-),G(-) MT2(-),G(+) "A" suffix only | I_{GT} | - - - - | 12 12 20 35 | 50 50 50 75 | mA |
| Gate trigger voltage (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_{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_{GT} | - - - - 0.2 0.2 | 0.9 0.9 1.1 1.4 - - | 2 2 2 2.5 - - | Volts |

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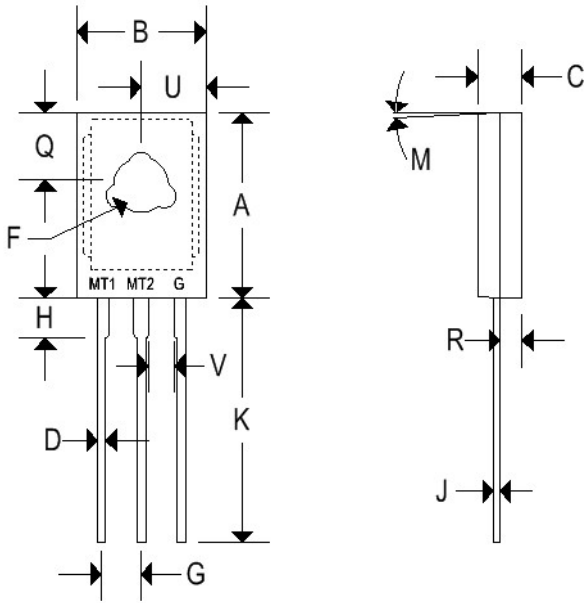
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| Characteristic | Symbol | Min | Typ. | Max | Unit |
|--|------------|-----|------|-----|------------------------|
| Holding current (either direction) (main terminal voltage = 12V, gate open, initiating current = 500mA, $T_C = 25^\circ\text{C}$)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

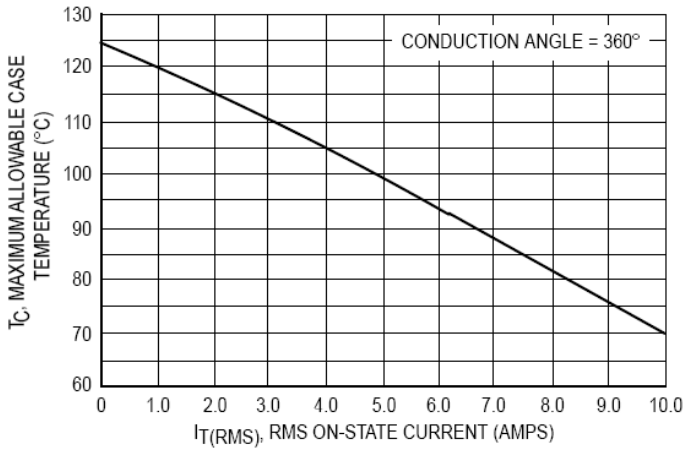


FIGURE 2 — POWER DISSIPATION

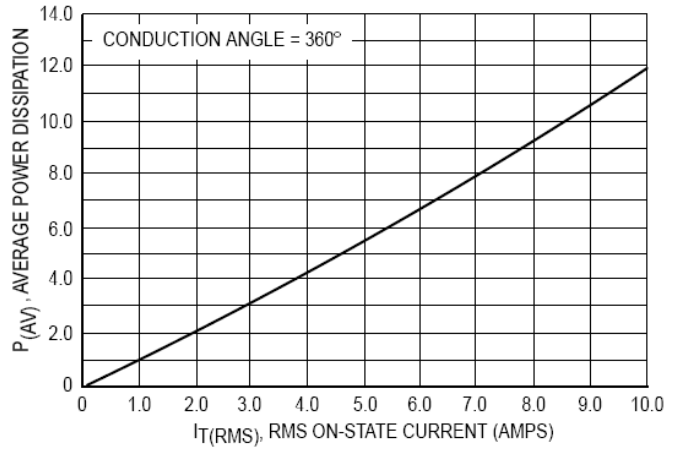


FIGURE 3 — MAXIMUM ON-STATE CHARACTERISTICS

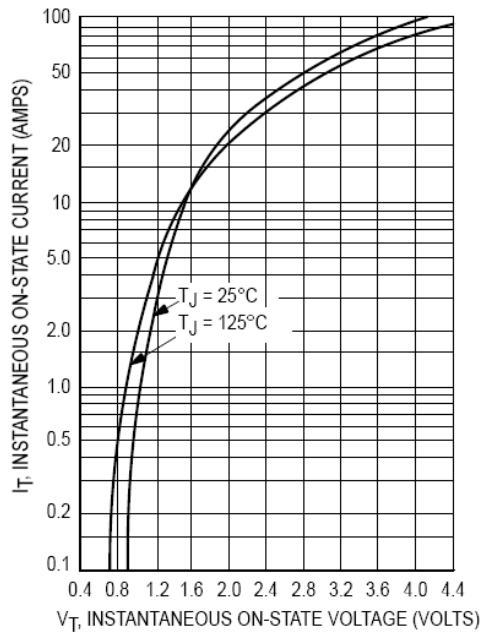


FIGURE 4 — MAXIMUM NON-REPETITIVE SURGE CURRENT

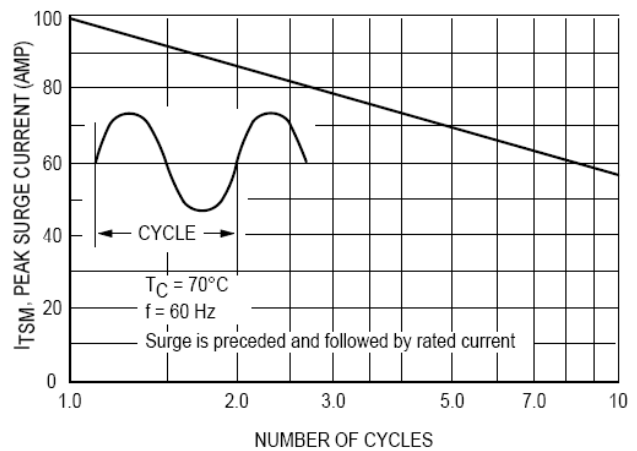
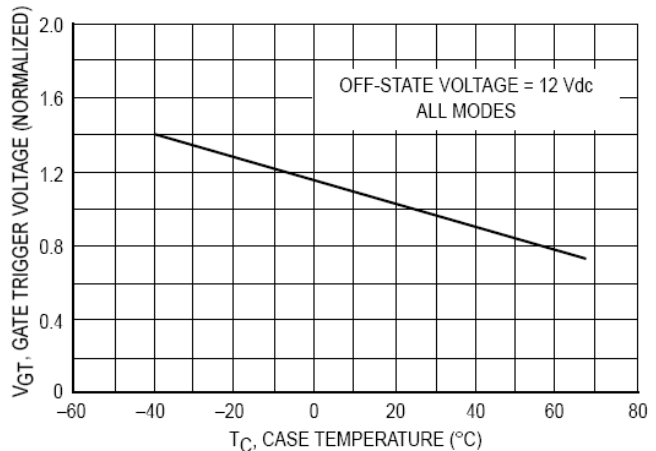


FIGURE 5 — TYPICAL GATE TRIGGER VOLTAGE



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FIGURE 6 — TYPICAL GATE TRIGGER CURRENT

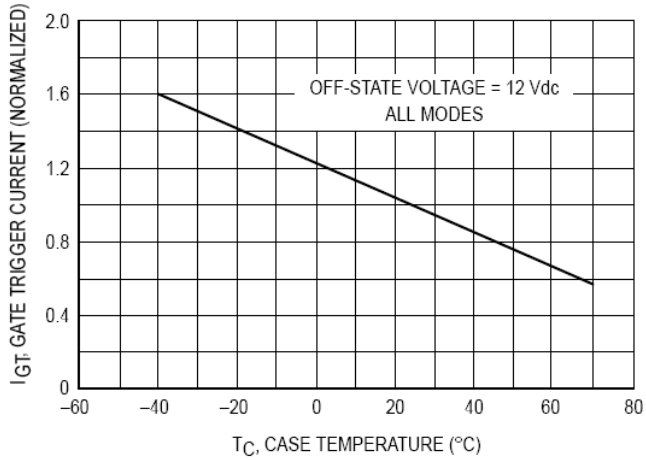


FIGURE 7 — TYPICAL HOLDING CURRENT

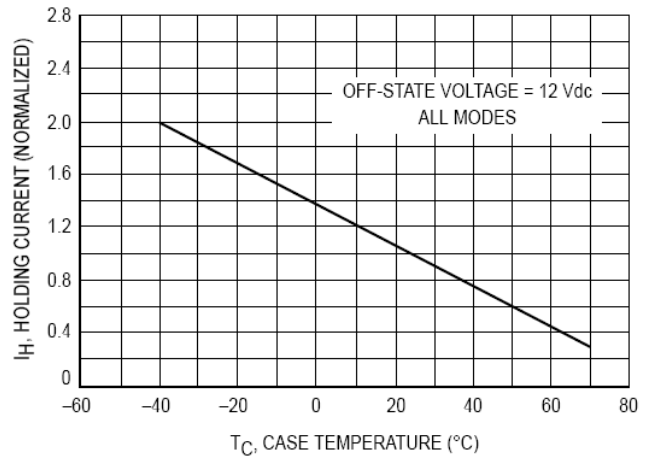


FIGURE 8 — THERMAL RESPONSE

