

DIGITRON SEMICONDUCTORS

MAC228(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 ($T_J = 25^\circ\text{C}$ unless otherwise noted)

| Rating | Symbol | Value | Unit |
|---|---------------------|--|----------------------|
| Peak repetitive off-state voltage⁽¹⁾ ($T_J = -40$ to $+110^\circ\text{C}$, $\frac{1}{2}$ sine wave, 50 to 60 Hz, gate open) MAC228-2, MAC228A-2 MAC228-3, MAC228A-3 MAC228-4, MAC228A-4 MAC228-5, MAC228A-5 MAC228-6, MAC228A-6 MAC228-7, MAC228A-7 MAC228-8, MAC228A-8 MAC228-9, MAC228A-9 MAC228-10, MAC228A-10 | V_{DRM} | 50 100 200 300 400 500 600 700 800 | Volts |
| RMS on-state current ($T_C = 80^\circ\text{C}$, full cycle sine wave 50 to 60Hz) | $I_{\text{T(RMS)}}$ | 8 | Amps |
| Peak non-repetitive surge current (1 cycle, 60 Hz, $T_J = 110^\circ\text{C}$) | I_{TSM} | 80 | Amps |
| Circuit fusing considerations ($t = 8.3\text{ms}$) | I^2t | 26 | A^2s |
| Peak gate current ($t \leq 2\mu\text{s}$) | I_{GM} | ± 2.0 | Amps |
| Peak gate voltage ($t \leq 2\mu\text{s}$) | V_{GM} | ± 10 | Volts |
| Peak gate power ($t \leq 2\mu\text{s}$) | P_{GM} | 20 | Watts |
| Average gate power ($T_C = 80^\circ\text{C}$, $t = 8.3\text{ms}$) | $P_{\text{G(AV)}}$ | 0.5 | Watts |
| Operating junction temperature range | T_J | -40 to +110 | $^\circ\text{C}$ |
| Storage temperature range | T_{stg} | -40 to +150 | $^\circ\text{C}$ |
| Mounting torque | | 8.0 | In. lb. |

Note 1: V_{DRM} or V_{RRM} 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 | $^\circ\text{C}/\text{W}$ |
| Thermal resistance, junction to ambient | $R_{\theta\text{JA}}$ | 60 | $^\circ\text{C}/\text{W}$ |

ELECTRICAL CHARACTERISTICS ($T_C = 25^\circ\text{C}$ and either polarity of MT2 to MT1 voltage unless otherwise noted)

| Characteristic | Symbol | Min | Typ. | Max | Unit |
|--|------------------|-----------------|-------------|---------------|---------------------|
| Peak blocking current ($V_D = \text{Rated } V_{\text{DRM}} @ T_J = 25^\circ\text{C}$) ($V_D = \text{Rated } V_{\text{DRM}} @ T_J = 110^\circ\text{C}$) | I_{DRM} | - | - | 10 2 | μA mA |
| Peak on-state voltage ($I_{\text{TM}} = 11\text{A}$ peak, pulse width ≤ 2 ms, duty cycle $\leq 2\%$) | V_{TM} | - | - | 1.8 | Volts |
| Gate trigger current (continuous dc) ($V_D = 12\text{V}$, $R_L = 12\Omega$) (MT2(+),G(+); (MT2(+),G(-); (MT2(-),G(-) (MT2(-),G(+)) "A" suffix only | I_{GT} | - | - | 5.0 10 | mA |
| Gate trigger voltage (continuous dc) ($V_D = 12\text{V}$, $R_L = 100\Omega$) MT2(+),G(+); MT2(+),G(-); MT2(-),G(-) MT2(-),G(+)) "A" suffix only ($V_D = \text{Rated } V_{\text{DRM}}$, $R_L = 10\text{k}\Omega$, $T_C = 110^\circ\text{C}$) MT2(+),G(+); MT2(+),G(-); MT2(-),G(-) MT2(-),G(+)) "A" suffix only | V_{GT} | - 0.2 0.2 | - - - | 2.0 - - | Volts |

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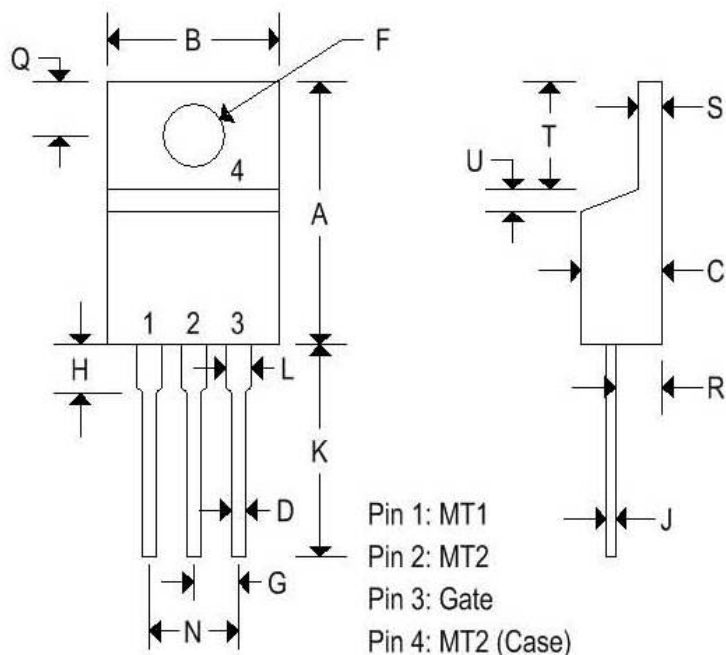
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| Characteristic | Symbol | Min | Typ. | Max | Unit |
|--|------------|-----|------|-----|------------|
| Holding current ($V_D = 12V$, gate open, $I_{TM} = 200mA$) | I_H | - | - | 15 | mA |
| Gate controlled turn on time ($V_D = \text{Rated } V_{DRM}$, $I_{TM} = 16A$ peak, $I_G = 30mA$) | t_{gt} | - | 1.5 | - | μs |
| Critical rate of rise of off-state voltage ($V_D = \text{Rated } V_{DRM}$, exponential waveform, $T_C = 110^\circ C$) | dv/dt | - | 25 | - | V/ μs |
| Critical rate of rise of commutation voltage ($V_D = \text{Rated } V_{DRM}$, $I_{TM} = 11.3A$, commutating $di/dt = 4.1A/ms$, gate unenergized, $T_C = 80^\circ C$) | $dv/dt(c)$ | - | 5 | - | V/ μs |

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 – RMS CURRENT DERATING

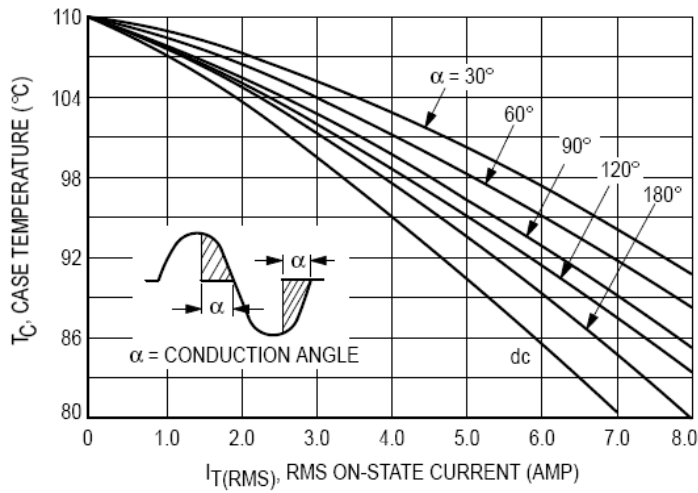


FIGURE 2 – ON-STATE POWER DISSIPATION

