

# DIGITRON SEMICONDUCTORS

## MAC4120 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

| Rating   | Symbol              | Value                    | Unit             |
|--|---------------------|--------------------------|------------------|
| <b>Peak repetitive off-state voltage</b> <sup>(1)</sup><br>(T <sub>J</sub> = -65 to +100°C, gate open)<br>MAC4120-B<br>MAC4120-D<br>MAC4120-M<br>MAC4120-N | V <sub>DRM</sub>    | 200<br>400<br>600<br>800 | Volts            |
| <b>RMS on-state current</b> (conduction angle = 360°, T <sub>C</sub> = 75°C)   | I <sub>T(RMS)</sub> | 15                       | Amps             |
| <b>Peak non-repetitive surge current</b> (1 cycle, 60 Hz)  | I <sub>TSM</sub>    | 100                      | Amps             |
| <b>Circuit fusing considerations</b> (t = 8.3ms)   | I <sup>2</sup> t    | 40                       | A <sup>2</sup> s |
| <b>Peak gate power</b> (Pulse width = 1μs)   | P <sub>GM</sub>     | 16                       | Watts            |
| <b>Average gate power</b>  | P <sub>G(AV)</sub>  | 0.5                      | Watts            |
| <b>Peak gate trigger current</b> (Pulse width = 1.0μs)   | I <sub>GM</sub>     | 4                        | Amps             |
| <b>Operating junction temperature range</b>  | T <sub>J</sub>      | -65 to +100              | °C               |
| <b>Storage temperature range</b>   | T <sub>stg</sub>    | -65 to +150              | °C               |
| <b>Stud torque</b>   |                     | 30                       | In. lb.          |

Note 1: Ratings apply for open gate conditions. Thyristor devices shall not be tested with a constant current source for blocking capability such that the voltage applied exceeds the rated blocking voltage.

### THERMAL CHARACTERISTICS

| Characteristic                              | Symbol           | Maximum | Unit |
|---|------------------|---------|------|
| <b>Thermal resistance, junction to case</b> | R <sub>θJC</sub> | 1.1     | °C/W |

### ELECTRICAL CHARACTERISTICS (T<sub>C</sub> = 25°C unless otherwise noted)

| Characteristic   | Symbol           | Min           | Typ.        | Max                    | Unit     |
|--|------------------|---------------|-------------|------------------------|----------|
| <b>Peak blocking current</b> (either direction)<br>(V <sub>D</sub> = Rated V <sub>DRM</sub> @ T <sub>C</sub> = 25°C)<br>(V <sub>D</sub> = Rated V <sub>DRM</sub> @ T <sub>C</sub> = 100°C)   | I <sub>DRM</sub> | -             | -           | 10<br>2                | μA<br>mA |
| <b>Peak on-state voltage</b> (either direction)<br>(I <sub>TM</sub> = 21A peak)  | V <sub>TM</sub>  | -             | 1.4         | 1.8                    | Volts    |
| <b>Gate trigger current</b> (continuous dc) <sup>(2)</sup><br>(main terminal voltage = 12V, R <sub>L</sub> = 30Ω)<br>MT2(+),G(+);MT2(-),G(-)<br>MT2(+),G(-);MT2(-),G(+)<br>MT2(+),G(+);MT2(-),G(-), T <sub>C</sub> = -65°C<br>MT2(+),G(-);MT2(-),G(+), T <sub>C</sub> = -65°C                      | I <sub>GT</sub>  | -             | -           | 50<br>80<br>150<br>200 | mA       |
| <b>Gate trigger voltage</b> (continuous dc) All quadrants<br>(main terminal voltage = 12V, R <sub>L</sub> = 30Ω, T <sub>C</sub> = 25°C)<br>(main terminal voltage = 12V, R <sub>L</sub> = 30Ω, T <sub>C</sub> = -65°C)<br>(Rated V <sub>DRM</sub> , R <sub>L</sub> = 125Ω, T <sub>C</sub> = 100°C) | V <sub>GT</sub>  | -<br>-<br>0.2 | -<br>-<br>- | 2.5<br>4.0<br>-        | Volts    |
| <b>Holding current</b> (either direction)<br>(main terminal voltage = 12V, gate open, initiating current = 500mA, T <sub>C</sub> = 25°C)<br>(main terminal voltage = 12V, gate open, initiating current = 500mA, T <sub>C</sub> = -65°C)   | I <sub>H</sub>   | -<br>-        | -<br>-      | 75<br>300              | mA       |
| <b>Gate controlled turn-on time</b><br>(V <sub>D</sub> = Rated V <sub>DRM</sub> , I <sub>TM</sub> = 25A peak, I <sub>GT</sub> = 160mA, rise time = 0.1μs)  | t <sub>gt</sub>  | -             | 1.6         | 2.5                    | μs       |
| <b>Rate of rise of commutation voltage</b><br>(Rated V <sub>DRM</sub> , I <sub>T(RMS)</sub> = 15A, commutating di/dt = 8A/ms, gate unenergized, T <sub>C</sub> = 75°C)   | dv/dt(c)         | 2             | 10          | -                      | V/μs     |

# DIGITRON SEMICONDUCTORS

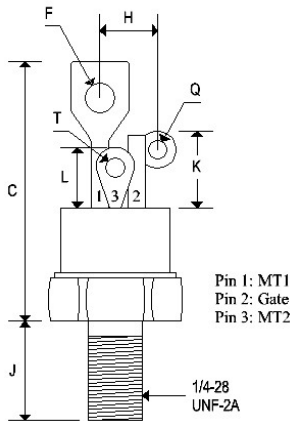
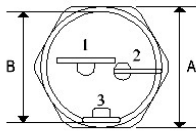
## MAC4120 SERIES

## SILICON BIDIRECTIONAL THYRISTORS

| Characteristic  | Symbol | Min | Typ. | Max | Unit             |
|---|--------|-----|------|-----|------------------|
| <b>Critical rate of rise of off-state voltage</b><br>( $V_D = \text{Rated } V_{DRM}$ , exponential voltage rise, gate open, $T_C = 100^\circ\text{C}$ ) |        |     |      |     |                  |
| MAC4120-B   | dv/dt  | 30  | 150  | -   | V/ $\mu\text{s}$ |
| MAC4120-D   |        | 20  | 100  | -   |                  |
| MAC4120-M   |        | 10  | 75   | -   |                  |
| MAC4120-N   |        | 10  | -    | -   |                  |

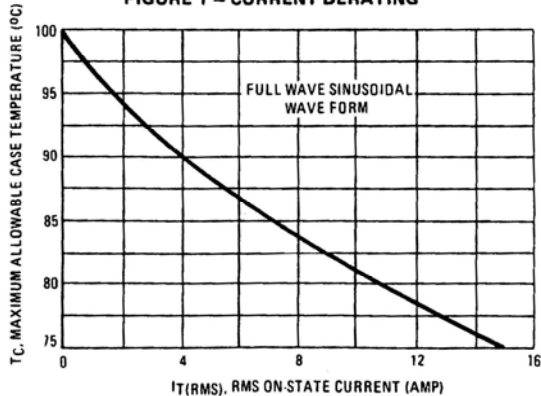
### MECHANICAL CHARACTERISTIC

|                 |                             |
|-----------------|-----------------------------|
| <b>Case</b>     | TO-48 ISO                   |
| <b>Marking</b>  | Body painted, alpha-numeric |
| <b>Polarity</b> | Cathode is stud             |



|   | TO-48 ISO |       |             |        |
|---|-----------|-------|-------------|--------|
|   | Inches    |       | Millimeters |        |
|   | Min       | Max   | Min         | Max    |
| A | 0.551     | 0.559 | 14.000      | 14.200 |
| B | 0.501     | 0.505 | 12.730      | 12.830 |
| C | -         | 1.280 | -           | 32.510 |
| F | -         | 0.160 | -           | 4.060  |
| H | -         | 0.265 | -           | 6.730  |
| J | 0.420     | 0.455 | 10.670      | 11.560 |
| K | 0.300     | 0.350 | 7.620       | 8.890  |
| L | 0.255     | 0.275 | 6.480       | 6.990  |
| Q | 0.055     | 0.085 | 1.400       | 2.160  |
| T | 0.135     | 0.150 | 3.430       | 3.810  |

**FIGURE 1 – CURRENT DERATING**



**FIGURE 2 – POWER DISSIPATION**

