

### FEATURES

- Available as "HR" (high reliability) screened per MIL-PRF-19500, JANTX level. Add "HR" suffix to base part number.
- Available as non-RoHS (Sn/Pb plating), standard, and as RoHS by adding "-PBF" suffix.

### MAXIMUM RATINGS

| Rating   | Symbol              | Value       | Unit             |
|--|---------------------|-------------|------------------|
| <b>Peak repetitive off-state voltage<sup>(1)</sup></b><br>(T <sub>J</sub> = -40 to +125°C, sine wave, 50 to 60Hz, gate open) |                     |             |                  |
| MCR12LD  | V <sub>DRM</sub>    | 400         | V                |
| MCR12LM  | V <sub>RRM</sub>    | 600         |                  |
| MCR12LN  |                     | 800         |                  |
| <b>On-state RMS current</b> (180° conduction angles, T <sub>C</sub> = 80°C)  | I <sub>T(RMS)</sub> | 12          | A                |
| <b>Peak non-repetitive surge current</b><br>(half-cycle, sine wave, 60Hz, T <sub>J</sub> = 125°C)                            | I <sub>TSM</sub>    | 100         | A                |
| <b>Circuit fusing consideration</b> (t = 8.3ms)  | I <sup>2</sup> t    | 41          | A <sup>2</sup> s |
| <b>Forward peak gate power</b> (pulse width ≤ 1.0μs, T <sub>C</sub> = 80°C)  | P <sub>GM</sub>     | 5.0         | W                |
| <b>Forward average gate power</b> (t = 8.3ms, T <sub>C</sub> = 80°C)   | P <sub>G(AV)</sub>  | 0.5         | W                |
| <b>Forward peak gate current</b> (pulse width ≤ 1.0μs, T <sub>C</sub> = 80°C)  | I <sub>GM</sub>     | 2.0         | A                |
| <b>Operating temperature range</b>   | T <sub>J</sub>      | -40 to +125 | °C               |
| <b>Storage temperature range</b>   | T <sub>stg</sub>    | -40 to +150 | °C               |
|  |                     |             |                  |
| Rating   | Symbol              | Value       | Unit             |
| <b>Peak repetitive off-state voltage<sup>(1)</sup></b><br>(T <sub>J</sub> = -40 to +125°C, sine wave, 50 to 60Hz, gate open) |                     |             |                  |
| MCR12LD  | V <sub>DRM</sub>    | 400         | V                |
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| <b>On-state RMS current</b> (180° conduction angles, T <sub>C</sub> = 80°C)  | I <sub>T(RMS)</sub> | 12          | A                |
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| <b>Circuit fusing consideration</b> (t = 8.3ms)  | I <sup>2</sup> t    | 41          | A <sup>2</sup> s |
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| <b>Forward peak gate current</b> (pulse width ≤ 1.0μs, T <sub>C</sub> = 80°C)  | I <sub>GM</sub>     | 2.0         | A                |
| <b>Operating temperature range</b>   | T <sub>J</sub>      | -40 to +125 | °C               |
| <b>Storage temperature range</b>   | T <sub>stg</sub>    | -40 to +150 | °C               |

### THERMAL CHARACTERISTICS

| Characteristic  | Symbol           | Maximum | Unit |
|---|------------------|---------|------|
| Thermal resistance, junction to case                                      | R <sub>θJC</sub> | 2.2     | °C/W |
| Thermal resistance, junction to ambient                                   | R <sub>θJA</sub> | 62.5    | °C/W |
| Maximum lead temperature for soldering purposes<br>1/8" from case for 10s | T <sub>L</sub>   | 260     | °C   |

**ELECTRICAL CHARACTERISTICS** ( $T_J = 25^\circ\text{C}$  unless otherwise specified)

| Characteristic   | Symbol                 | Min    | Typ    | Max         | Unit                   |
|--|------------------------|--------|--------|-------------|------------------------|
| <b>OFF CHARACTERISTICS</b>   |                        |        |        |             |                        |
| <b>Peak forward or reverse blocking current</b><br>( $V_D = \text{Rated } V_{DRM} \text{ or } V_{RRM}, \text{ gate open}$ )<br>$T_J = 25^\circ\text{C}$<br>$T_J = 125^\circ\text{C}$ | $I_{DRM}$<br>$I_{RRM}$ | -<br>- | -<br>- | 0.01<br>2.0 | mA                     |
| <b>ON CHARACTERISTICS</b>  |                        |        |        |             |                        |
| <b>Peak on-state voltage*</b><br>( $I_{TM} = 24\text{A}$ )   | $V_{TM}$               | -      | -      | 2.2         | V                      |
| <b>Gate trigger current</b> (continuous dc)<br>( $V_D = 12\text{V}, R_L = 100\Omega$ )   | $I_{GT}$               | 2.0    | 4.0    | 8.0         | mA                     |
| <b>Holding current</b><br>( $V_D = 12\text{V}, \text{ gate open, initiating current} = 200\text{mA}$ )   | $I_H$                  | 4.0    | 10     | 20          | mA                     |
| <b>Latch current</b><br>( $V_D = 12\text{V}, I_g = 20\text{mA}$ )  | $I_L$                  | 6.0    | 12     | 30          | mA                     |
| <b>Gate trigger voltage</b> (continuous dc)<br>( $V_D = 12\text{V}, R_L = 100\Omega$ )   | $V_{GT}$               | 0.5    | 0.65   | 0.8         | V                      |
| <b>DYNAMIC CHARACTERISTICS</b>   |                        |        |        |             |                        |
| <b>Critical rate of rise of off-state voltage</b><br>( $V_D = \text{rated } V_{DRM}, \text{ exponential waveform, gate open, } T_J = 125^\circ\text{C}$ )                            | $dv/dt$                | 100    | 250    | -           | $\text{V}/\mu\text{s}$ |
| <b>Critical rate of rise of on-state current</b><br>( $I_{PK} = 50\text{A}, P_w = 40\mu\text{sec}, di_g/dt = 1\text{A}/\mu\text{s}, I_{gt} = 50\text{mA}$ )                          | $di/dt$                | -      | -      | 50          | $\text{A}/\mu\text{s}$ |

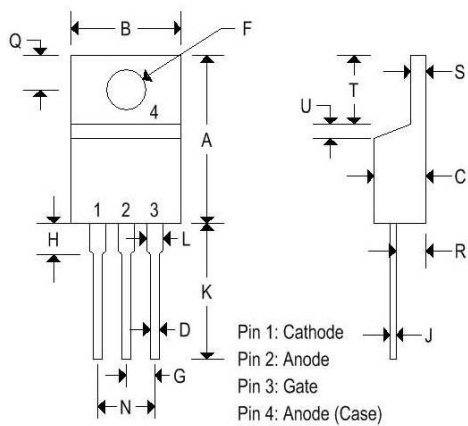
\* Pulse width  $\leq 1.0\text{ms}$ , duty cycle  $\leq 2\%$ .

# MCR12LD, MCR12LM, MCR12LN

## SILICON CONTROLLED RECTIFIERS

### MECHANICAL CHARACTERISTICS

|                 |                             |
|-----------------|-----------------------------|
| <b>Case:</b>    | TO-220AB                    |
| <b>Marking:</b> | Body painted, alpha-numeric |
| <b>Pin out:</b> | 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  |

### Voltage Current Characteristic of SCR

| Symbol    | Parameter                                 |
|-----------|---|
| $V_{DRM}$ | Peak Repetitive Off State Forward Voltage |
| $I_{DRM}$ | Peak Forward Blocking Current             |
| $V_{RRM}$ | Peak Repetitive Off State Reverse Voltage |
| $I_{RRM}$ | Peak Reverse Blocking Current             |
| $V_{TM}$  | Peak On State Voltage                     |
| $I_H$     | Holding Current                           |

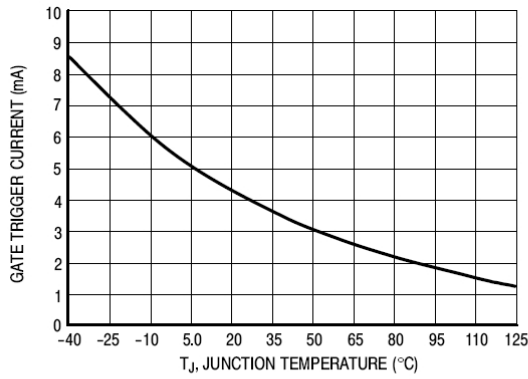
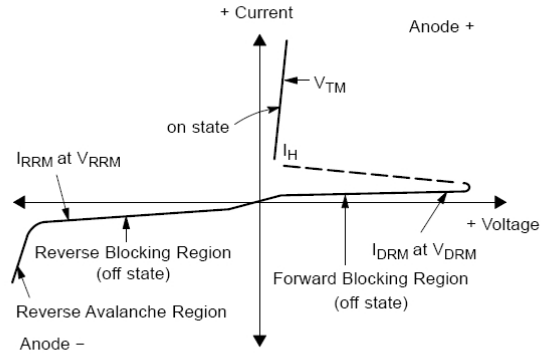


Figure 1. Typical Gate Trigger Current versus Junction Temperature

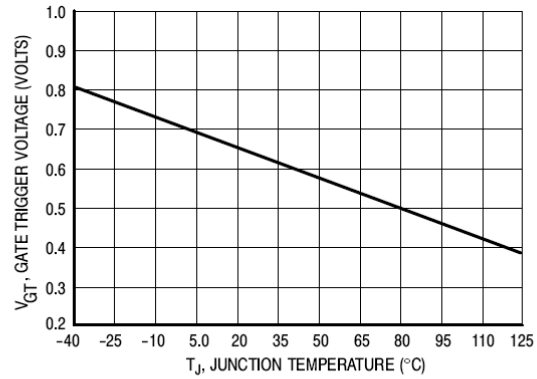


Figure 2. Typical Gate Trigger Voltage versus Junction Temperature

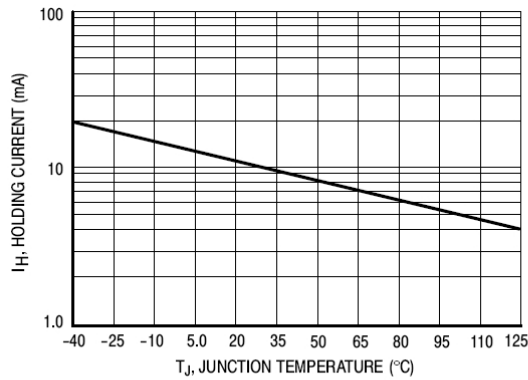


Figure 3. Typical Holding Current versus Junction Temperature

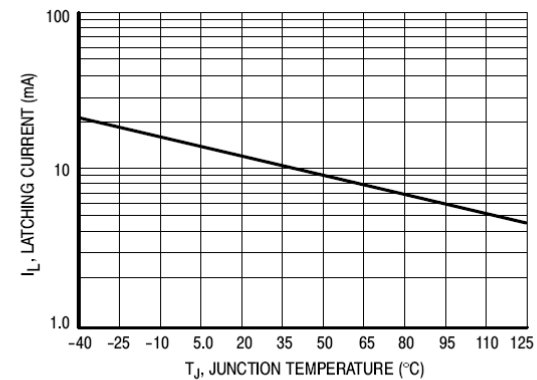


Figure 4. Typical Latching Current versus Junction Temperature

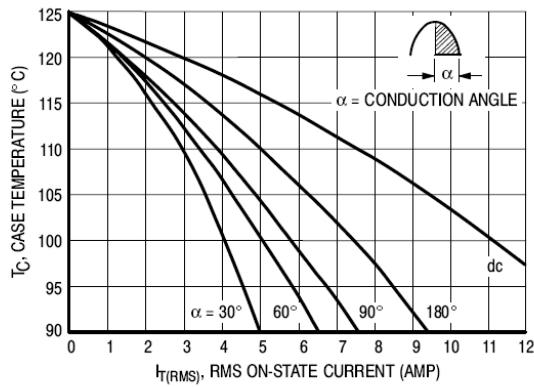


Figure 5. Typical RMS Current Derating

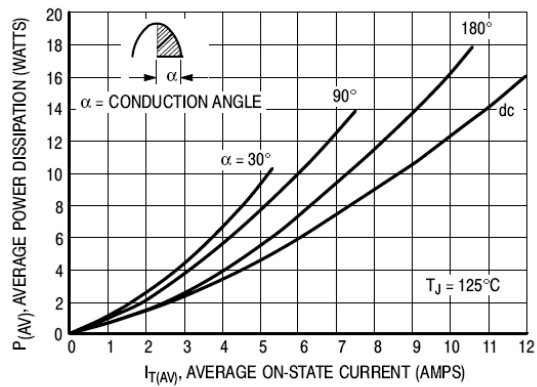


Figure 6. On-State Power Dissipation

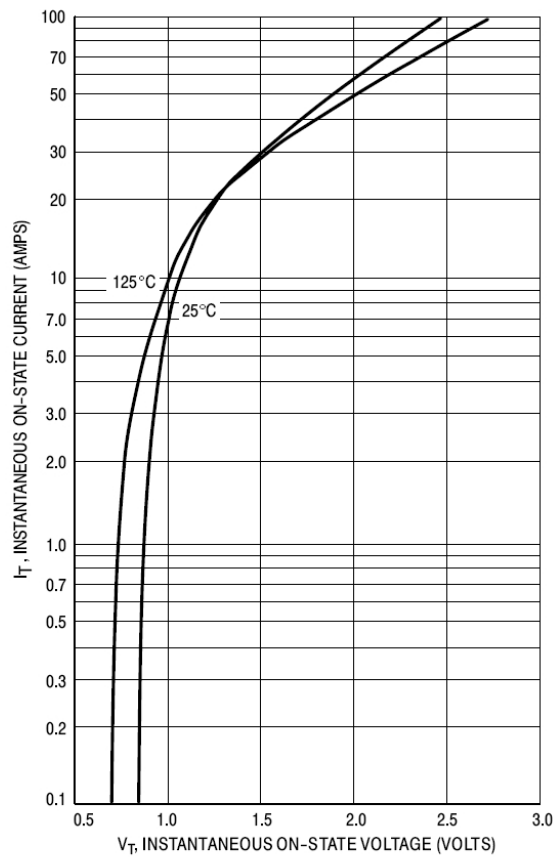


Figure 7. Typical On-State Characteristics