

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 |
|---|------------------------|-------------------|----------------------|
| Peak repetitive forward and reverse off-state voltage ⁽¹⁾ MCR221-5 MCR221-7 MCR221-9 | V_{DRM} V_{RRM} | 300 500 700 | Volts |
| On-state RMS current (180° conduction angles), $T_C = 90^\circ\text{C}$ | $I_{T(RMS)}$ | 16 | Amps |
| Average on-state current | $I_{T(AV)}$ | 10 | Amps |
| Peak non-repetitive surge current (1/2 cycle, sine wave 60Hz, $T_J = 125^\circ\text{C}$) | I_{TSM} | 160 | Amps |
| Circuit fusing ($t = 8.3\text{ms}$, $T_J = -40$ to $+125^\circ\text{C}$) | I^2t | 100 | A^2s |
| Forward peak gate power | P_{GM} | 20 | Watts |
| Forward average gate power | $P_{G(AV)}$ | 0.5 | Watts |
| Forward peak gate current | I_{GM} | 2.0 | Amps |
| Operating junction temperature range | T_J | -40 to 125 | $^\circ\text{C}$ |
| Storage temperature range | T_{stg} | -40 to 150 | $^\circ\text{C}$ |

THERMAL CHARACTERISTICS

| Characteristic | Symbol | Max | Unit |
|--------------------------------------|-----------------|-----|---------------------------|
| Thermal resistance, junction to case | $R_{\theta JC}$ | 1.5 | $^\circ\text{C}/\text{W}$ |

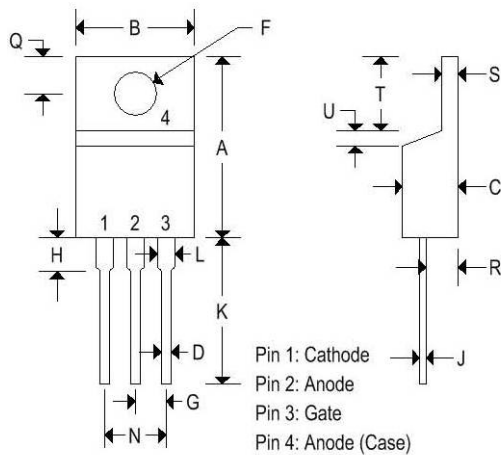
ELECTRICAL CHARACTERISTICS ($T_J = 25^\circ\text{C}$ unless otherwise specified)

| Characteristic | Symbol | Min | Typ | Max | Unit |
|---|--------------------|-----|-----|-----|---------------|
| OFF CHARACTERISTICS | | | | | |
| Peak repetitive forward or reverse blocking current ($V_{AK} = \text{rated } V_{DRM} \text{ or } V_{RRM}$, gate open) | I_{DRM}, I_{RRM} | - | - | 10 | μA |
| | | - | - | 2.0 | mA |
| ON CHARACTERISTICS | | | | | |
| Peak forward on-state voltage ($I_{TM} = 32\text{A}$ peak, pulse width $\leq 1\text{ms}$, duty cycle $\leq 2\%$) | V_{TM} | - | - | 1.7 | Volts |
| Gate trigger current (continuous dc) ($V_D = 12\text{Vdc}$, $R_L = 50\text{ohms}$) | I_{GT} | - | 5.0 | 30 | mA |
| Gate trigger voltage (continuous dc) ($V_D = 12\text{Vdc}$, $R_L = 50\text{ohms}$) | V_{GT} | - | 0.7 | 1.5 | Volts |
| | | - | - | 2.5 | Volts |
| Gate non-trigger voltage ($V_D = \text{Rated } V_{DRM}$, $R_L = 50\text{ohms}$) | V_{GD} | 0.2 | - | - | Volts |

| ON CHARACTERISTICS | | | | | | |
|--|---|----------|--------|----------|----------|------------------|
| Holding current ($V_D = 12\text{Vdc}$) | $T_C = 25^\circ\text{C}$ $T_C = -40^\circ\text{C}$ | I_H | - - | 6 - | 40 60 | mA |
| Turn-on time ($I_{TM} = 16\text{A}$, $I_{GT} = 40\text{mA}$, $V_D = \text{rated } V_{DRM}$) | | t_{gt} | - | 1.0 | - | μs |
| Turn-off time ($I_{TM} = 16\text{A}$, $I_R = 16\text{A}$, $V_D = \text{rated } V_{DRM}$) | $T_C = 25^\circ\text{C}$ $T_J = 125^\circ\text{C}$ | t_q | - - | 15 35 | - - | μs |
| DYNAMIC CHARACTERISTICS | | | | | | |
| Critical rate of rise of off state voltage ($V_D = \text{rated } V_{DRM}$, exponential waveform) | $T_J = 125^\circ\text{C}$ | dv/dt | - | 50 | - | V/ μs |

MECHANICAL CHARACTERISTICS

| | |
|-----------------|-----------------------------|
| 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 |

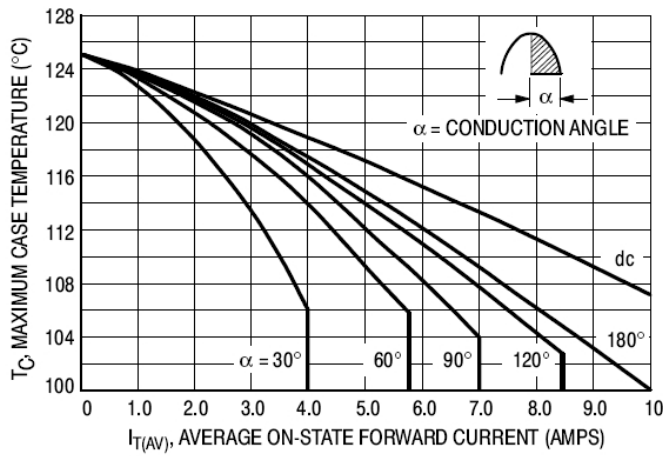
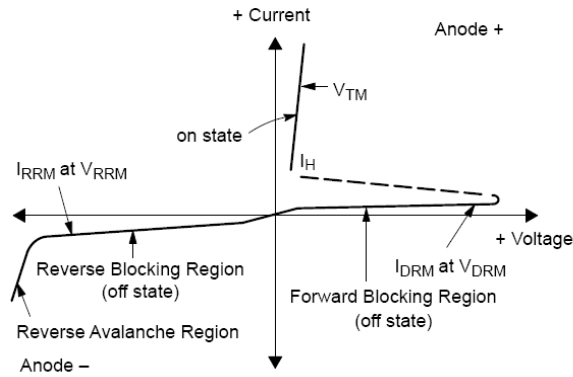


Figure 1. Average Current Derating

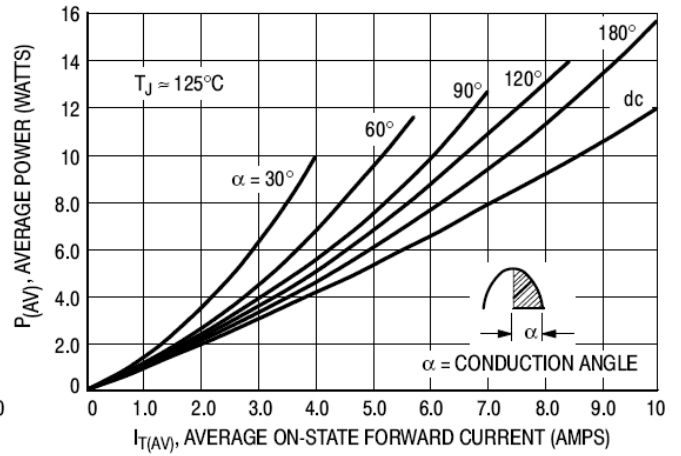


Figure 2. Maximum On-State Power Dissipation

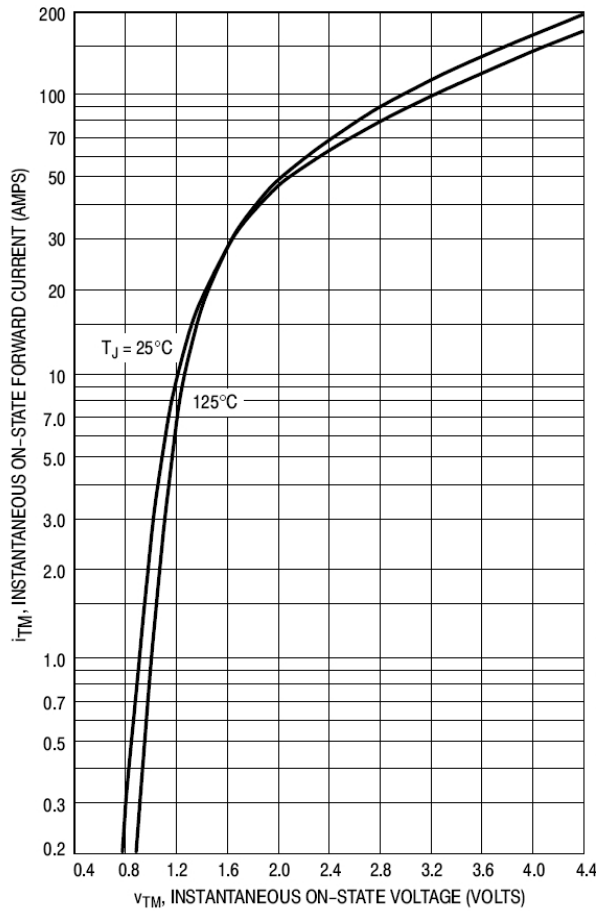


Figure 3. On-State Characteristics

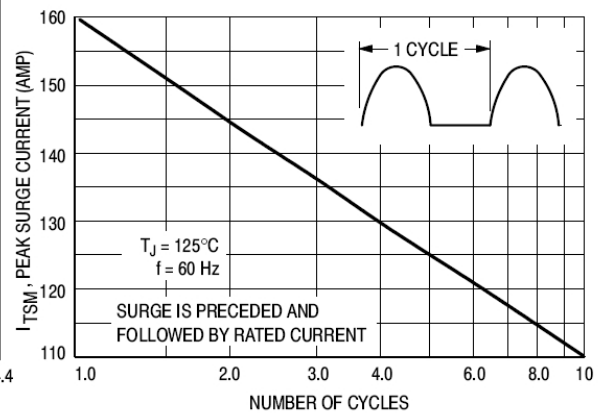


Figure 4. Maximum Non-Repetitive Surge Current

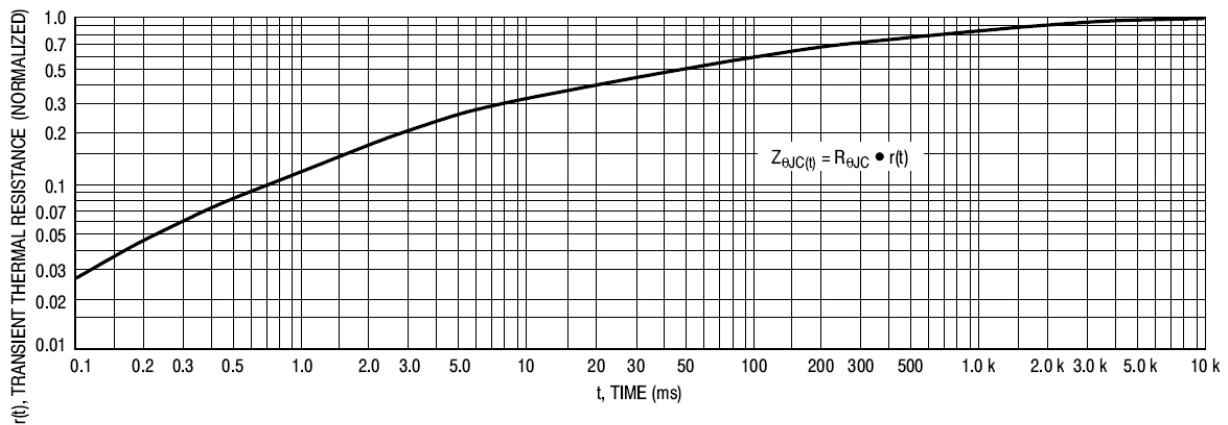


Figure 5. Thermal Response



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MCR221-5, MCR221-7, MCR221-9

SILICON CONTROLLED RECTIFIERS

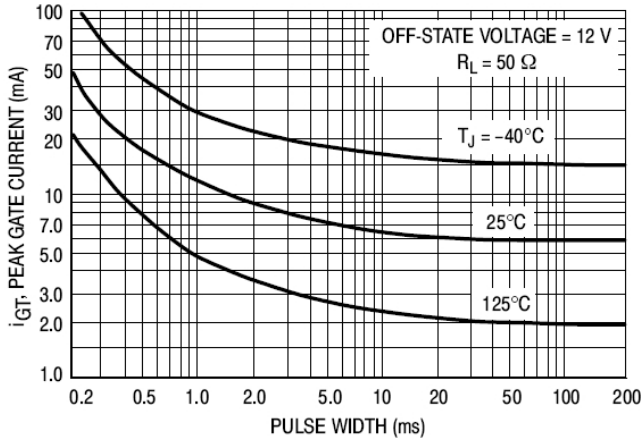


Figure 6. Typical Gate Trigger Current versus Pulse Width

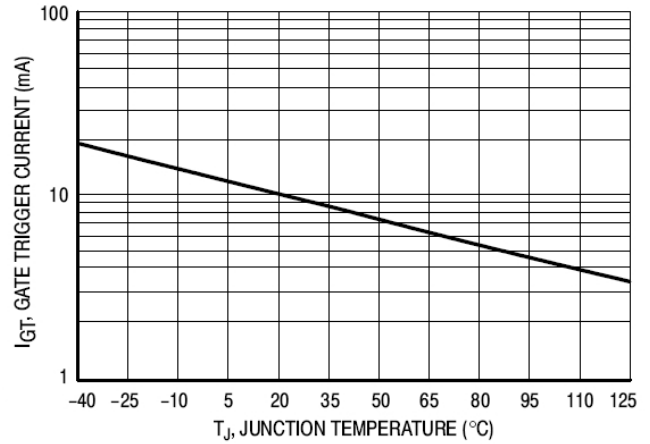


Figure 7. Typical Gate Trigger Current versus Junction Temperature

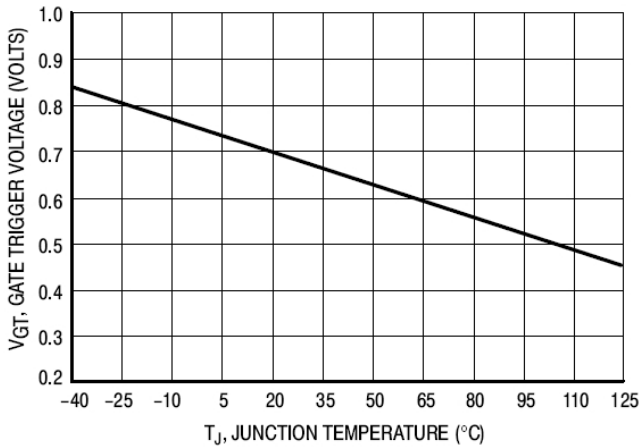


Figure 8. Typical Gate Trigger Voltage versus Junction Temperature

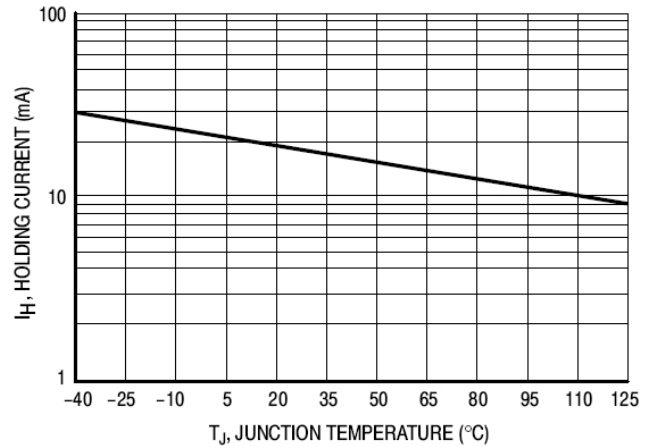


Figure 9. Typical Holding Current versus Junction Temperature