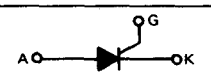
# MCR80 series (SILICON)
# MCR81 series
# MCR82 series




**THYRISTORS**
**PNPN**
**80 AMPERES RMS**
**50 thru 800 VOLTS**

## SILICON CONTROLLED RECTIFIERS

. . . designed for high power industrial and consumer applications in power and speed controls such as welders, furnaces, motors, space heaters and other equipment where control of high current is needed.

- Glass Passivated Junctions with Center Gate Fire for Greater Parameter Uniformity and Stability.
- All Devices are Hermetically Sealed
- Epoxy Encapsulated for Long Voltage Creepage Path
- MCR82 Series Internally Isolated with 5000 Volt Dielectric Strength
- Flexible Leads are Optional – Consult Factory

### MAXIMUM RATINGS

| Rating | | Symbol | Value | Unit |
|---|---|---|---|---|
| Repetitive Peak Reverse Blocking Voltage MCR80- | -0.5 | $V_{RRM}$(1) | 50 | Volts |
| MCR80- | -10 | | 100 | |
| MCR81- | -20 | | 200 | |
| MCR81- | -30 | | 300 | |
| MCR82- | -40 | | 400 | |
| MCR82- | -50 | | 500 | |
| MCR82- | -60 | | 600 | |
| MCR82- | -70 | | 700 | |
| MCR82- | -80 | | 800 | |
| Average On-State Current ($T_C$ = 75°C) | | $I_{T(AV)}$ | 50 | Amp |
| Peak Non-Repetitive Surge Current (One Cycle, 60 Hz) ($T_C$ = 75°C) | | $I_{TSM}$ | 1000 | Amp |
| Circuit Fusing Considerations ($T_J$ = -40 to +125°C) (t = 1.5 to 8.3 ms) | | $I^2t$ | 4150 | $A^2s$ |
| Peak Gate Power | | $P_{GM}$ | 15 | Watts |
| Average Gate Power | | $P_{G(AV)}$ | 3.0 | Watts |
| Peak Forward Gate Current | | $I_{GM}$ | 4.0 | Amp |
| Peak Reverse Gate Voltage | | $V_{GM}$ | 5.0 | Volts |
| Operating Junction Temperature Range | | $T_J$ | -40 to +125 | °C |
| Storage Temperature Range | | $T_{stg}$ | -40 to +150 | °C |
| Stud Torque (3) | | – | 130 | in. lb. |

### THERMAL CHARACTERISTICS

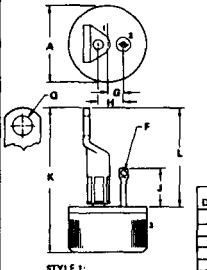
| Characteristic | Symbol | Max | Unit |
|---|---|---|---|
| Thermal Resistance, Junction to Case | $R_{\theta JC}$ | 0.6 | °C/W |

(1) *Ratings apply for zero or negative gate voltage. Devices should not be tested for blocking capability in a manner such that the voltage applied exceeds the rated blocking voltage.*

(2) Devices should not be operated with a positive bias applied to the gate concurrent with a negative potential applied to the anode.

(3) Reliable operation can be impaired if torque rating is exceeded, terminal tubes bent, or seal broken.

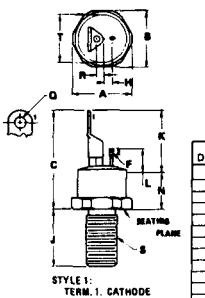
**MCR80 SERIES**




| DIM | MILLIMETERS MIN | MILLIMETERS MAX | INCHES MIN | INCHES MAX |
|---|---|---|---|---|
| A | 19.05 | 19.30 | 0.750 | 0.760 |
| F | 1.27 | 1.65 | 0.050 | 0.065 |
| G | 3.68 | 3.84 | 0.145 | 0.155 |
| H | 5.97 | 6.22 | 0.235 | 0.245 |
| J | 9.27 | 9.53 | 0.365 | 0.375 |
| K | 36.20 | 37.47 | 1.425 | 1.475 |
| L | 25.40 | 26.67 | 1.000 | 1.050 |
| Q | 4.83 | 5.21 | 0.190 | 0.205 |

CASE 287-01

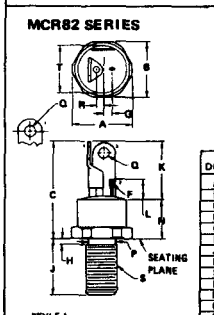
**MCR81 SERIES**




| DIM | MILLIMETERS MIN | MILLIMETERS MAX | INCHES MIN | INCHES MAX |
|---|---|---|---|---|
| A | 29.72 | 30.23 | 1.170 | 1.190 |
| B | 26.42 | 27.05 | 1.040 | 1.065 |
| C | 40.64 | 43.18 | 1.600 | 1.700 |
| F | 1.27 | 1.65 | 0.050 | 0.065 |
| H | 3.68 | 3.84 | 0.145 | 0.155 |
| J | 21.59 | 22.48 | 0.850 | 0.885 |
| K | 22.86 | 27.94 | 0.900 | 1.100 |
| L | 5.08 | 9.53 | 0.200 | 0.375 |
| N | 17.15 | 20.96 | 0.675 | 0.825 |
| Q | 4.83 | 5.21 | 0.190 | 0.205 |
| R | 2.16 | 2.41 | 0.085 | 0.095 |
| S | 1/2 – 20 UNF – 2A | | | |
| T | 25.27 | 25.78 | 0.995 | 1.015 |

CASE 288-01

**MCR82 SERIES**




| DIM | MILLIMETERS MIN | MILLIMETERS MAX | INCHES MIN | INCHES MAX |
|---|---|---|---|---|
| A | 29.72 | 30.23 | 1.170 | 1.190 |
| B | 26.42 | 27.05 | 1.040 | 1.065 |
| C | 40.64 | 43.18 | 1.600 | 1.700 |
| F | 1.27 | 1.65 | 0.050 | 0.065 |
| G | 3.68 | 3.84 | 0.145 | 0.155 |
| H | 2.29 | 2.79 | 0.090 | 0.110 |
| J | 21.59 | 22.48 | 0.850 | 0.885 |
| K | 22.86 | 27.94 | 0.900 | 1.100 |
| L | 5.08 | 9.53 | 0.200 | 0.375 |
| N | 22.10 | 23.11 | 0.870 | 0.910 |
| P | 11.43 | 11.94 | 0.450 | 0.470 |
| Q | 4.83 | 5.21 | 0.190 | 0.205 |
| R | 2.16 | 2.41 | 0.085 | 0.095 |
| S | 1/2 – 20 UNF – 2A | | | |
| T | 25.27 | 25.78 | 0.995 | 1.015 |

CASE 291-01

**ELECTRICAL CHARACTERISTICS** ($T_C$ = 25°C unless otherwise noted.)

| Characteristic | | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|---|
| Peak Forward Blocking Voltage (1) | -0.5 | $V_{DRM}$ | 50 | | | Volts |
| ($T_J$ = 125°C) MCR80- | -10 | | 100 | – | – | |
| MCR81- | -20 | | 200 | – | – | |
| MCR82- | -30 | | 300 | – | – | |
| | -40 | | 400 | – | – | |
| | -50 | | 500 | – | – | |
| | -60 | | 600 | – | – | |
| | -70 | | 700 | – | – | |
| | -80 | | 800 | – | – | |
| Peak Forward Blocking Current (Rated $V_{DRM}$, with gate open, $T_J$ = 125°C) | | $I_{DRM}$ | – | – | 4.0 | mA |
| Peak Reverse Blocking Current (Rated $V_{RRM}$, with gate open, $T_J$ = 125°C) | | $I_{RRM}$ | – | – | 4.0 | mA |
| Peak On-State Voltage (2) ($I_{TM}$ = 160 A Peak) | | $V_{TM}$ | – | – | 1.55 | Volts |
| Gate Trigger Current, Continuous dc ($V_{AK}$ = 12 V, $R_L$ = 3.0 Ohms) | | $I_{GT}$ | – | – | 70 | mA |
| Gate Trigger Voltage, Continuous dc ($V_{AK}$ = 12 V, $R_L$ = 3.0 Ohms) | | $V_{GT}$ | – | – | 3.0 | Volts |
| Holding Current ($V_{AK}$ = 12 V, Gate Open) | | $I_H$ | – | – | 70 | mA |
| Non-Trigger Gate Voltage (Anode Voltage = Rated $V_{DM}$, $R_L$ = 100 ohms, $T_J$ = 125°C) | | $V_{GD}$ | 0.25 | – | – | Volts |
| Circuit Commutated Turn-Off Time ($I_T$ = 50 A, $I_R$ = 20 A, $T_J$ = 125°C) | | $t_q$ | – | 70 | – | μs |
| Critical Rate of Rise of Off-State Voltage (Rated $V_{DRM}$, Exponential Waveform, $T_J$ = 125°C, Gate Open) | | dv/dt | – | 100 | – | V/μs |

(1) Ratings apply for zero or negative gate voltage. Devices should not be tested with a constant current source for forward or reverse blocking capability such that the voltage applied exceeds the rated blocking voltage.

(2) Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%.

FIGURE 1 – AVERAGE CURRENT DERATING

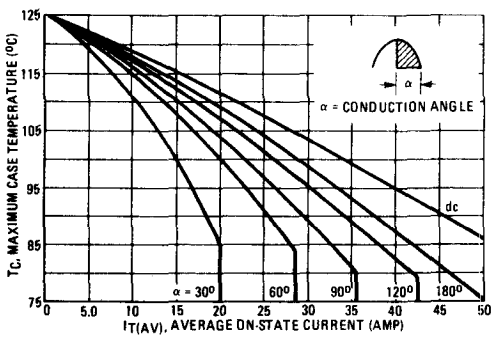



FIGURE 2 – ON-STATE POWER DISSIPATION