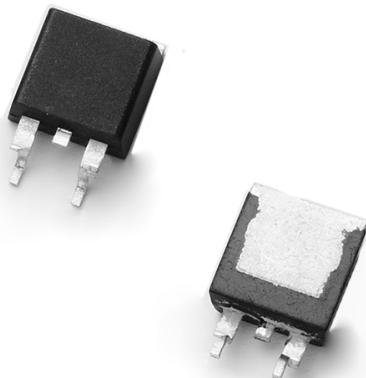


MCR8DSM, MCR8DSN



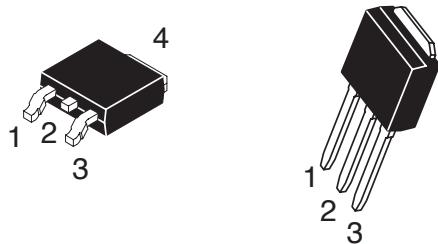
Description

Designed for high volume, low cost, industrial and consumer applications such as motor control; process control; temperature, light and speed control.

Features

- Small Size
- Passivated Die for Reliability and Uniformity
- Low Level Triggering and Holding Characteristics
- Available in Two Package Styles
 - Surface Mount Lead Form – Case 369C
 - Miniature Plastic Package – Straight Leads – Case 369
- Epoxy Meets UL 94 V-0 @ 0.125 in
- ESD Ratings: Human Body Model, 3B > 8000 V
Machine Model, C > 400 V
- Pb-Free Packages are Available

Pin Out



Functional Diagram



Additional Information



Datasheet



Resources



Samples

Maximum Ratings ($T_j = 25^\circ\text{C}$ unless otherwise noted)

| Rating | Symbol | Value | Unit |
|--|---------------------|------------|------------------------|
| Peak Repetitive Off-State Voltage (Note 1) (-40 to 1125°C, Sine Wave, 50 to 60 Hz, Gate Open) | V_{DRM} | 600 | V |
| | V_{RRM} | 800 | |
| On-State RMS Current (All Conduction Angles; $T_c = 90^\circ\text{C}$) | $I_{\text{T(RMS)}}$ | 8.0 | A |
| Average On-State Current (180° Conduction Angles; $T_c = 90^\circ\text{C}$) | $I_{\text{T(AV)}}$ | 5.1 | A |
| Peak Non-Repetitive Surge Current (1/2 Cycle, Sine Wave 60 Hz, $T_j = 110^\circ\text{C}$) | I_{TSM} | 60 | A |
| Circuit Fusing Consideration ($t = 8.3$ ms) | I^2t | 34 | A^2sec |
| Forward Peak Gate Power (Pulse Width ≤ 10 μsec , $T_c = 90^\circ\text{C}$) | P_{GM} | 5.0 | W |
| Forward Average Gate Power ($t = 8.3$ msec, $T_c = 90^\circ\text{C}$) | $P_{\text{GM(AV)}}$ | 0.5 | W |
| Forward Peak Gate Current (Pulse Width ≤ 1.0 μsec , $T_c = 90^\circ\text{C}$) | I_{GM} | 2.0 | A |
| Operating Junction Temperature Range | T_j | -40 to 110 | $^\circ\text{C}$ |
| Storage Temperature Range | T_{stg} | -40 to 150 | $^\circ\text{C}$ |

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

1. V_{DRM} and V_{RRM} for all types can be applied on a continuous basis. Ratings apply for zero or negative gate voltage; however, positive gate voltage shall not be applied concurrent with negative potential on the anode. Blocking voltages shall not be tested with a constant current source such that the voltage ratings of the devices are exceeded.

Thermal Characteristics

| Rating | Symbol | Value | Unit |
|--|------------------|-------|---------------------------|
| Thermal Resistance, Junction-to-Case | R_{8JC} | 2.2 | $^\circ\text{C}/\text{W}$ |
| Thermal Resistance, Junction-to-Ambient | R_{8JA} | 88 | |
| Thermal Resistance, Junction-to-Ambient (Note 2) | R_{8JA} | 80 | |
| Maximum Device Temperature for Soldering Purposes (Note 3) | T_L | 260 | $^\circ\text{C}$ |

Electrical Characteristics - OFF ($T_J = 25^\circ\text{C}$ unless otherwise noted)

| Characteristic | | Symbol | Min | Typ | Max | Unit |
|--|---------------------------|-----------|-----|-----|-----|---------------|
| Peak Repetitive Forward or Reverse Blocking Current (Note 3) ($V_{AK} = \text{Rated } V_{DRM}$ or V_{RRM} , $R_{GK} = 1.0 \text{ k}\Omega$) | $T_J = 25^\circ\text{C}$ | I_{DRM} | - | - | 10 | μA |
| | $T_J = 110^\circ\text{C}$ | I_{RRM} | - | - | 500 | |

Electrical Characteristics - ON ($T_J = 25^\circ\text{C}$ unless otherwise noted; Electricals apply in both directions)

| Characteristic | Symbol | Min | Typ | Max | Unit |
|--|-----------|------|------|-----|---------------|
| Peak Reverse Gate Blocking Voltage ($I_{GR} = 10 \mu\text{A}$) | V_{GRM} | 10 | 12.5 | 18 | V |
| Peak Reverse Gate Blocking Current ($V_{GR} = 10 \text{ V}$) | I_{RGM} | - | - | 1.2 | μA |
| Peak Forward On-State Voltage (Note 4) ($I_{TM} = 16 \text{ A}$) | V_{TM} | - | 1.4 | 1.8 | V |
| Gate Trigger Current (Continuous dc) (Note 5) ($V_{AK} = 12 \text{ Vdc}$, $R_L = 100 \Omega$) | I_{GT} | 5.0 | 12 | 200 | μA |
| ($T_J = 25^\circ\text{C}$) ($T_J = -40^\circ\text{C}$) | | - | - | 300 | |
| Gate Trigger Voltage (Continuous dc) ($V_D = 12 \text{ V}$, $R_L = 100 \Omega$) ($V_D = 12 \text{ V}$, $R_L = 100 \Omega$) (Note 5) | V_{GT} | 0.45 | 0.65 | 1.0 | V |
| ($T_J = 25^\circ\text{C}$) ($T_J = -40^\circ\text{C}$) ($T_J = 125^\circ\text{C}$) | | - | - | 1.5 | |
| 0.2 | | - | - | - | |
| Holding Current ($V_D = 12 \text{ V}$, Initiating Current = 200 mA, $R_{GK} = 1 \text{ k}\Omega$) ($T_J = 25^\circ\text{C}$) ($T_J = -40^\circ\text{C}$) | I_H | 0.5 | 1.0 | 6.0 | mA |
| | | - | - | 10 | |
| Latching Current ($V_D = 12 \text{ V}$, $I_G = 2.0 \text{ mA}$, $R_{GK} = 1 \text{ k}\Omega$) | I_L | 0.5 | 1.0 | 6.0 | mA |
| ($T_J = 25^\circ\text{C}$) ($T_J = -40^\circ\text{C}$) | | - | - | 10 | |
| Total Turn-On Time (Source Voltage = 12 V, $R_s = 6.0 \text{ k}\Omega$, $IT = 16 \text{ A(pk)}$, $R_{GK} = 1.0 \text{ k}\Omega$) ($V_D = \text{Rated } V_{DRM}$, Rise Time = 20 ns, Pulse Width = 10 μs) | tgt | - | 2.0 | 5.0 | μs |

Dynamic Characteristics

| Characteristic | Symbol | Min | Typ | Max | Unit |
|--|---------|-----|-----|-----|------------------------|
| Critical Rate of Rise of Off-State Voltage ($V_D = 0.67 \times \text{Rated } V_{DRM}$, Exponential Waveform, $R_{GK} = 1.0 \text{ k}\Omega$, $T_J = 110^\circ\text{C}$) | dv/dt | 2.0 | 10 | - | $\text{V}/\mu\text{s}$ |

2. Surface mounted on minimum recommended pad size.

3. Ratings apply for negative gate voltage or $R_{GK} = 1.0 \text{ k}\Omega$. Devices shall not have a positive gate voltage concurrently with a negative voltage on the anode. Devices should not be tested with a constant current source for forward and reverse blocking capability such that the voltage applied exceeds the rated blocking voltage.

4. Pulse Test; Pulse Width $\leq 2.0 \text{ msec}$, Duty Cycle $\leq 2\%$.

5. RGK current not included in measurements.

Voltage Current Characteristic of SCR

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

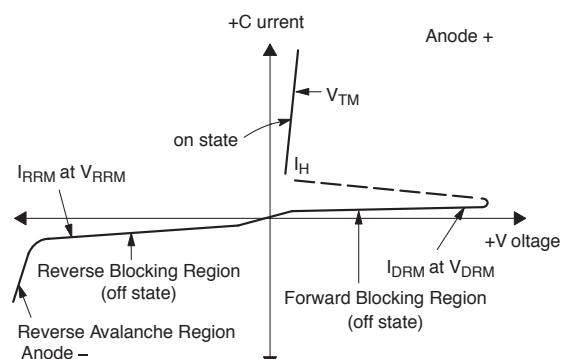


Figure 1. Average Current Derating

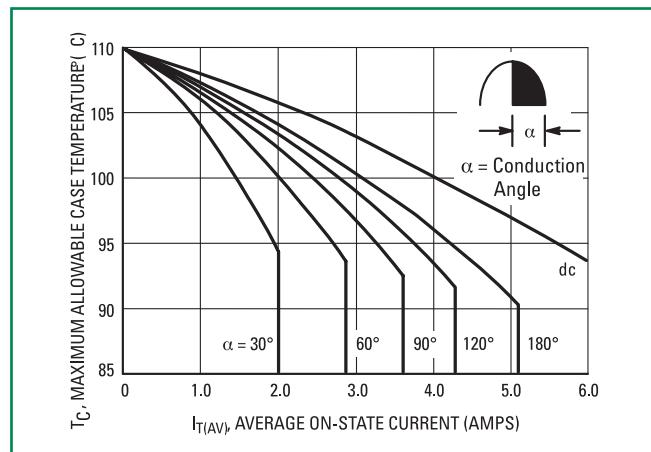


Figure 2. On-State Power Dissipation

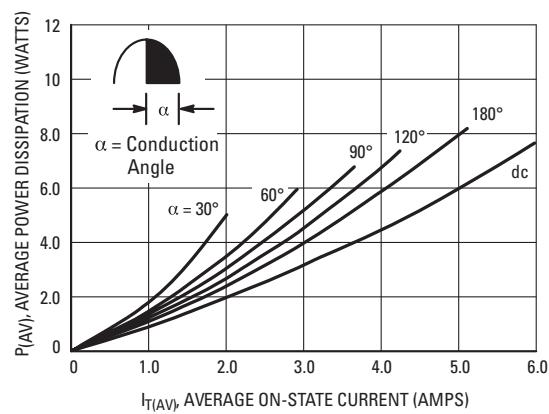


Figure 3. On-State Characteristics

Figure 4. Transient Thermal Response

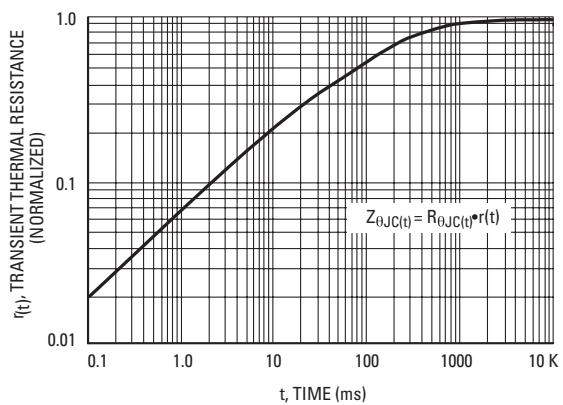


Figure 5. Typical Gate Trigger Current vs Junction Temperature

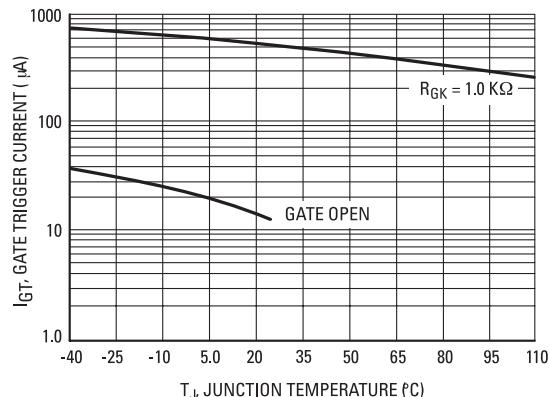


Figure 6. Typical Gate Trigger Voltage vs Junction Temperature

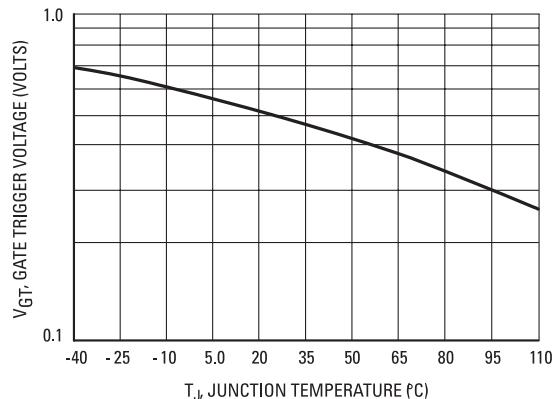


Figure 7. Typical Holding Current vs Junction Temperature

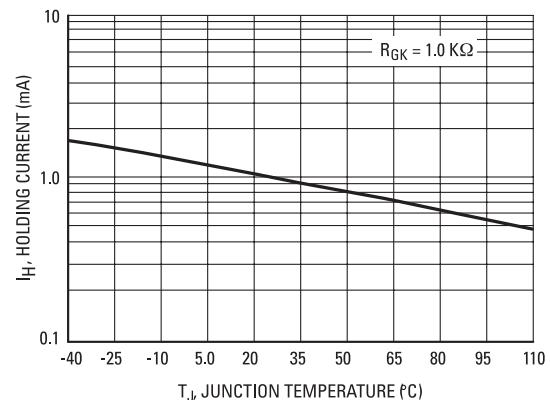


Figure 8. Typical Latching Current vs Junction Temperature

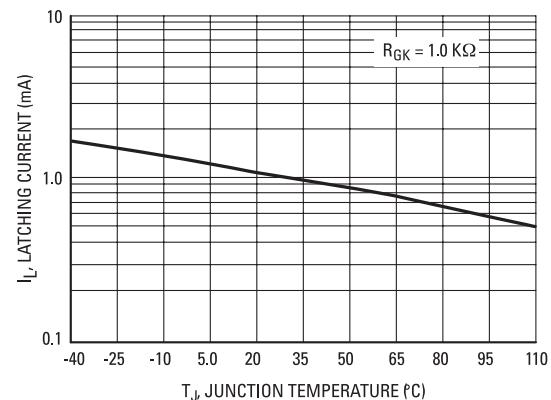


Figure 9. Holding Current versus Gate–Cathode Resistance

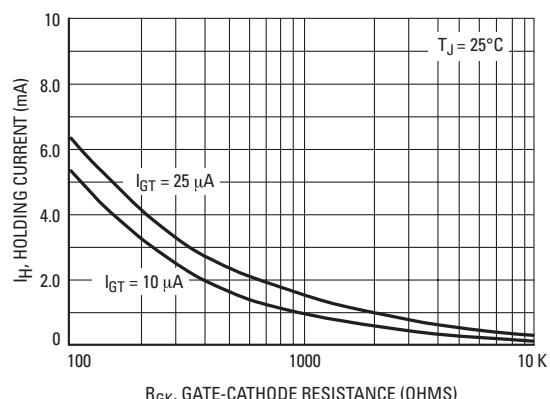


Figure 10. Exponential Static dv/dt vs Gate–Cathode Resistance and Junction Temperature

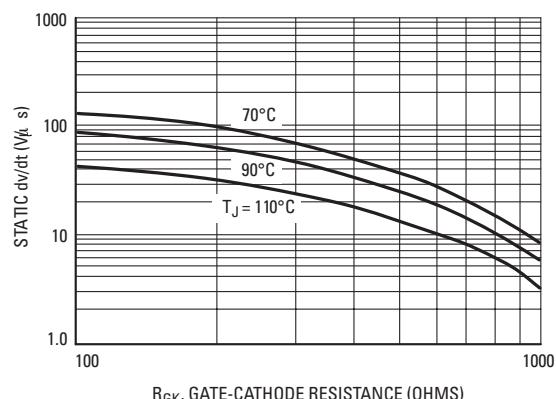


Figure 11. Exponential Static dv/dt vs Gate–Cathode Resistance and Peak Voltage

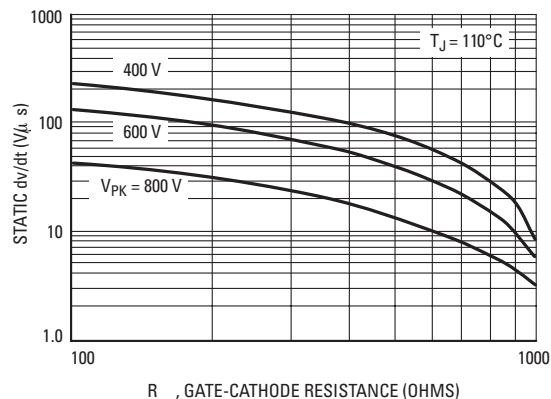
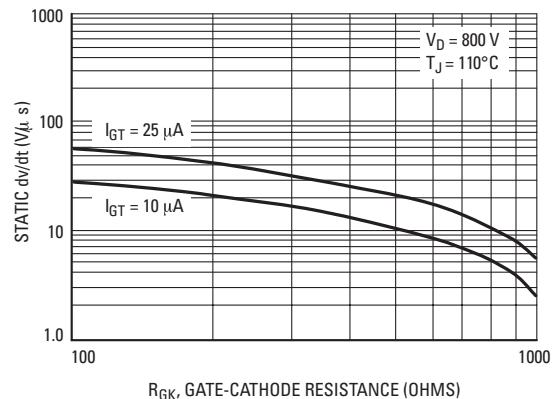


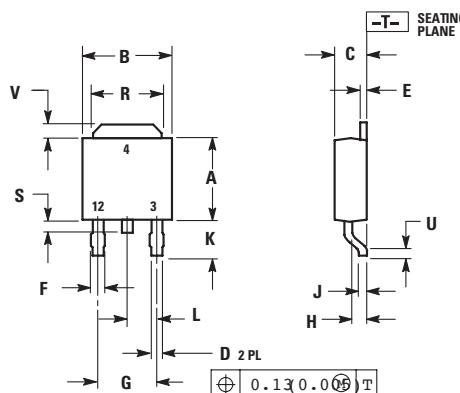
Figure 12. Exponential Static dv/dt vs Gate–Cathode Resistance and Gate Trigger Current Sensitivity



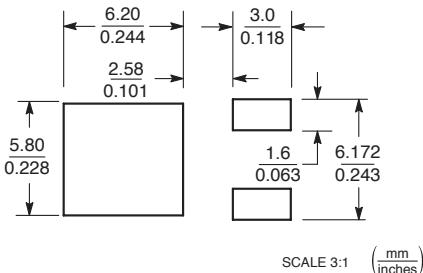
Thyristors

Surface Mount – 600V - 800V > MCR8DSM, MCR8DSN

Dimensions



Soldering Footprint



Part Marking System



Y= Year
 WW= Work Week
 CR8DSx= Device Code
 x= M or N
 G= Pb-Free Package

| Dim | Inches | | Millimeters | |
|-----|-----------|-------|-------------|------|
| | Min | Max | Min | Max |
| A | 0.235 | 0.245 | 5.97 | 6.22 |
| B | 0.250 | 0.265 | 6.35 | 6.73 |
| C | 0.086 | 0.094 | 2.19 | 2.38 |
| D | 0.027 | 0.035 | 0.69 | 0.88 |
| E | 0.018 | 0.023 | 0.46 | 0.58 |
| F | 0.037 | 0.045 | 0.94 | 1.14 |
| G | 0.180 BSC | | 4.58 BSC | |
| H | 0.034 | 0.040 | 0.87 | 1.01 |
| J | 0.018 | 0.023 | 0.46 | 0.58 |
| K | 0.102 | 0.114 | 2.60 | 2.89 |
| L | 0.090 BSC | | 2.29 BSC | |
| R | 0.180 | 0.215 | 4.57 | 5.45 |
| S | 0.025 | 0.040 | 0.63 | 1.01 |
| U | 0.020 | --- | 0.51 | --- |
| V | 0.035 | 0.050 | 0.89 | 1.27 |
| Z | 0.155 | --- | 3.93 | --- |

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.

Pin Assignment

| | |
|---|---------|
| 1 | Cathode |
| 2 | Anode |
| 3 | Gate |
| 4 | Anode |

Ordering Information

| Device | Package | Shipping |
|------------|----------------|------------------|
| MCR8DSMT4 | DPAK | 2500/Tape & Reel |
| MCR8DSMT4G | DPAK (Pb-Free) | |
| MCR8DSNT4 | DPAK | |
| MCR8DSNT4G | DPAK (Pb-Free) | |

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