

MSC2X51/50SDA070J Dual Silicon Carbide Schottky Barrier Diodes

Product Overview

The Silicon Carbide (SiC) power Schottky barrier diode (SBD) product line from Microsemi increases the performance over silicon diode solutions while lowering the total cost of ownership for high-voltage applications. MSC2X51/50SDA070J are dual 700 V, 50 A SiC SBD devices in a SOT-227 package.

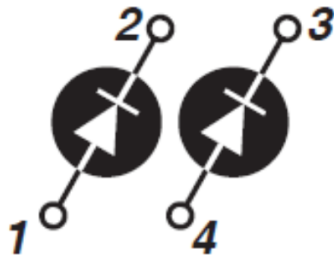
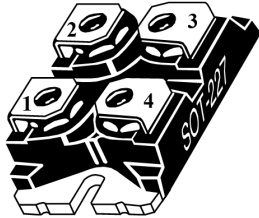


Figure 1 • Parallel MSC2X51SDA070J

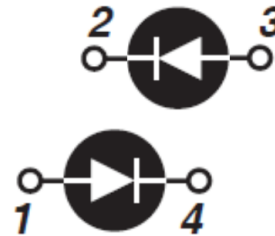


Figure 2 • Anti-parallel MSC2X50SDA070J

Features

The following are key features of the MSC2X51SDA070J and MSC2X50SDA070J devices:

- No reverse recovery
- Low forward voltage
- Low leakage current
- Avalanche-energy rated
- RoHS compliant
- Isolated voltage to 2500 V

Benefits

The following are benefits of the MSC2X51SDA070J and MSC2X50SDA070J devices:

- High switching frequency
- Low switching losses
- Low noise (EMI) switching
- Higher reliability systems
- Increased system power density
- Direct mounting to the heat sink (isolated package)

Applications

The MSC2X51SDA070J and MSC2X50SDA070J devices are designed for the following applications:

- Power factor correction (PFC)
- Anti-parallel diode
 - Switch-mode power supply
 - Inverters/converters
 - Motor controllers
- Freewheeling diode
 - Switch-mode power supply
 - Inverters/converters
- Snubber/clamp diode

Device Specifications

This section shows the specifications for the MSC2X51SDA070J and MSC2X50SDA070J devices.

Absolute Maximum Ratings

The following table shows the absolute maximum ratings per diode for the MSC2X51SDA070J and MSC2X50SDA070J devices. $T_C = 25\text{ }^\circ\text{C}$, unless otherwise specified.

Table 1 • Absolute Maximum Ratings

| Symbol | Parameter | Maximum Ratings | Unit |
|--------|----------------------------|--|------|
| V_R | Maximum DC reverse voltage | 700 | V |
| I_F | Maximum DC forward current | $T_C = 80\text{ }^\circ\text{C}$ 50 | A |

The following table shows the thermal and mechanical characteristics of the MSC2X51SDA070J and MSC2X50SDA070J devices.

Table 2 • Thermal and Mechanical Characteristics

| Symbol | Characteristics | Min | Typ | Max | Unit |
|-----------------|---|------|------|------|---------------------------|
| $R_{\theta JC}$ | Junction-to-case thermal resistance | | 0.65 | 0.85 | $^\circ\text{C}/\text{W}$ |
| $V_{ISOLATION}$ | RMS voltage (50 Hz–60 Hz sinusoidal waveform from terminals to mounting base for 1 minute) | 2500 | | | V |
| T_J, T_{STG} | Operating junction and storage temperature range | –55 | | 175 | $^\circ\text{C}$ |
| Wt | Package weight | | 1.03 | | oz |
| | | | 29.2 | | g |
| | Mounting torque, M4 screw | | 10 | | lbf-in |
| | | | 1.1 | | N.m |

Electrical Performance

The following table shows the static characteristics per diode of the MSC2X51SDA070J and MSC2X50SDA070J devices.

Table 3 • Static Characteristics Per Diode

| Symbol | Characteristics | Test Conditions | | Min | Typ | Max | Unit |
|----------|-------------------------|--|------------------------------------|-----|-----|-----|---------------|
| V_F | Diode forward voltage | $I_F = 50 \text{ A}$ | $T_J = 25 \text{ }^\circ\text{C}$ | | 1.5 | 1.8 | V |
| | | | $T_J = 175 \text{ }^\circ\text{C}$ | | 1.9 | | |
| I_{RM} | Reverse leakage current | $V_R = 700 \text{ V}$ | $T_J = 25 \text{ }^\circ\text{C}$ | | 15 | 200 | μA |
| | | | $T_J = 175 \text{ }^\circ\text{C}$ | | 250 | | |
| Q_C | Total capacitive charge | $V_R = 400 \text{ V}$ | | | 133 | | nC |
| C_J | Junction capacitance | $f = 1 \text{ MHz}, V_R = 200 \text{ V}$ | | | 248 | | pF |
| | | $f = 1 \text{ MHz}, V_R = 400 \text{ V}$ | | | 216 | | |

Typical Performance Curves

This section shows the typical performance curves for the MSC2X51SDA070J and MSC2X50SDA070J devices.

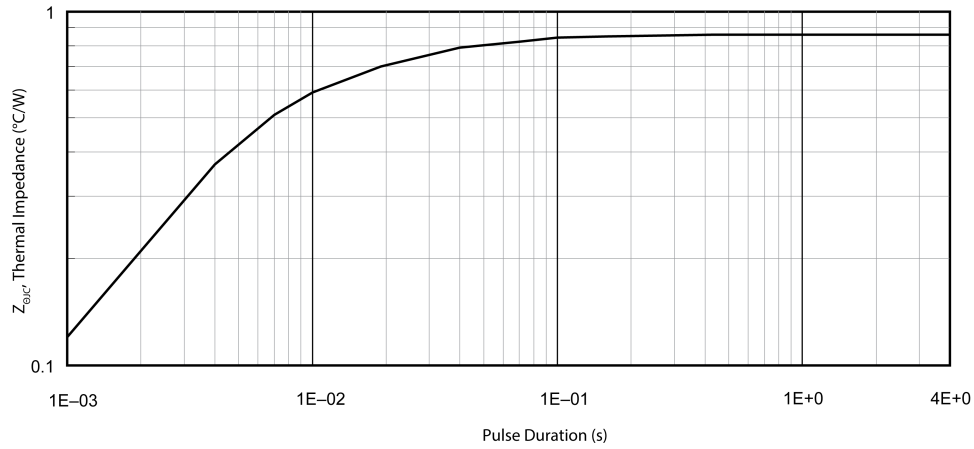


Figure 3 • Maximum Transient Thermal Impedance

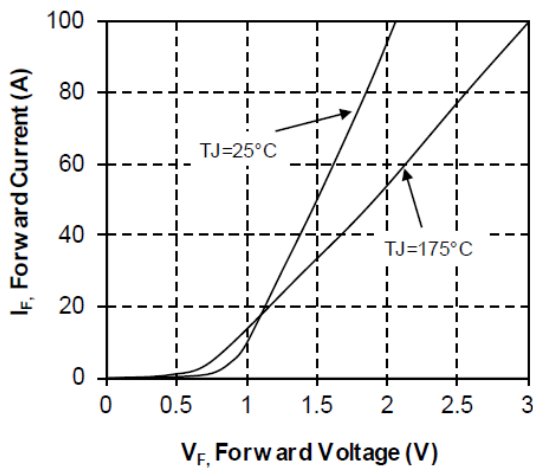


Figure 4 • Forward Current vs. Forward Voltage

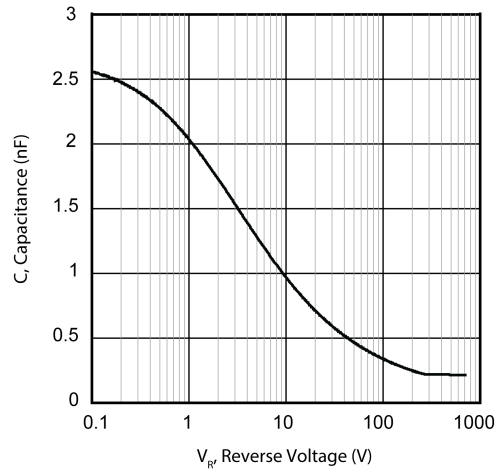


Figure 5 • Capacitance vs. Reverse Voltage

Package Specification

This section shows the package specification of the MSC2X51SDA070J and MSC2X50SDA070J devices.

Package Outline Drawing

The following figure illustrates the SOT-227 package outline of the MSC2X51SDA070J and MSC2X50SDA070J devices. The dimensions in the figure below are in millimeters and (inches).

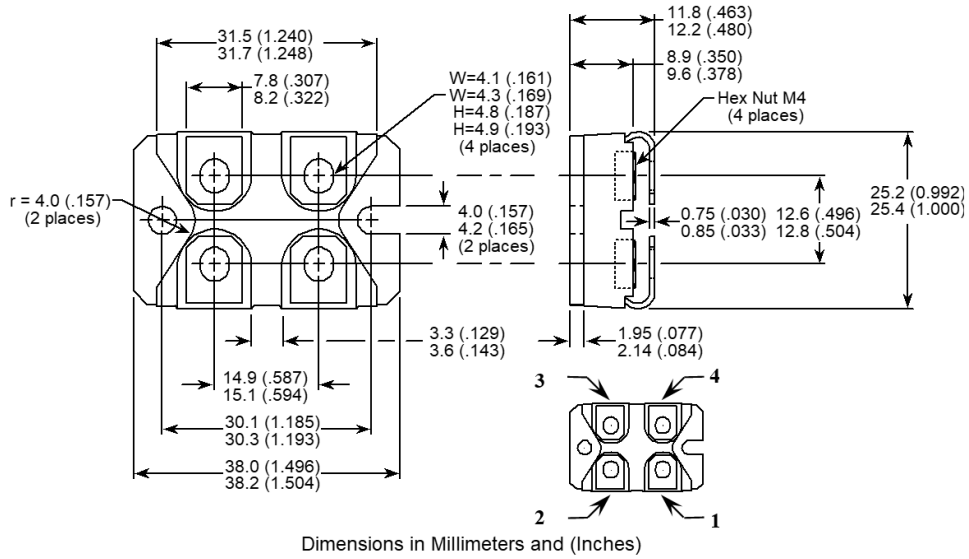


Figure 6 • Package Outline Drawing

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053-4105 | May 2020 | Released