

# MSC2X31/30SDA170J 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. MSC2X31/30SDA170J are dual 1700 V, 30 A SiC SBD devices in a SOT-227 package.

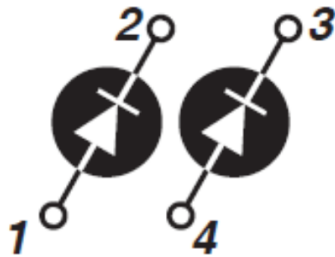
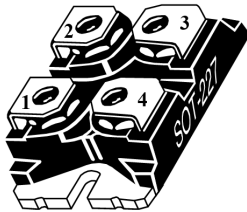


Figure 1 • Parallel MSC2X31SDA170J

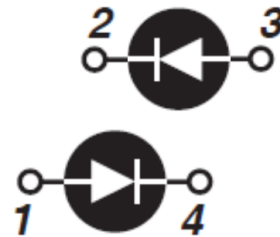


Figure 2 • Anti-parallel MSC2X30SDA170J

## Features

The following are key features of the MSC2X31SDA170J and MSC2X30SDA170J 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 MSC2X31SDA170J and MSC2X30SDA170J devices:

- Outstanding performance at high-frequency operation
- Direct mounting to heatsink (isolated package)
- Low junction-to-case thermal resistance
- RoHS compliant

## Applications

The MSC2X31SDA170J and MSC2X30SDA170J 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 of the MSC2X31SDA170J and MSC2X30SDA170J devices.

### Absolute Maximum Ratings

The following table shows the absolute maximum ratings per diode of the MSC2X31SDA170J and MSC2X30SDA170J devices.  $T_C = 25\text{ }^{\circ}\text{C}$  unless otherwise specified.

**Table 1 • Absolute Maximum Ratings**

| Symbol | Parameter                                                         | Ratings | Unit |
|--------|-------------------------------------------------------------------|---------|------|
| $V_R$  | Maximum DC reverse voltage                                        | 1700    | V    |
| $I_F$  | Maximum DC forward current<br>$T_C = 100\text{ }^{\circ}\text{C}$ | 30      | A    |

The following table shows the thermal and mechanical characteristics of the MSC2X31SDA170J and MSC2X30SDA170J devices.

**Table 2 • Thermal and Mechanical Characteristics**

| Symbol          | Characteristics                                                                               | Min  | Typ  | Max  | Unit                        |
|-----------------|-----------------------------------------------------------------------------------------------|------|------|------|-----------------------------|
| $R_{\theta JC}$ | Junction-to-case thermal resistance                                                           |      | 0.45 | 0.65 | $^{\circ}\text{C}/\text{W}$ |
| $V_{ISOLATION}$ | RMS voltage<br>(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

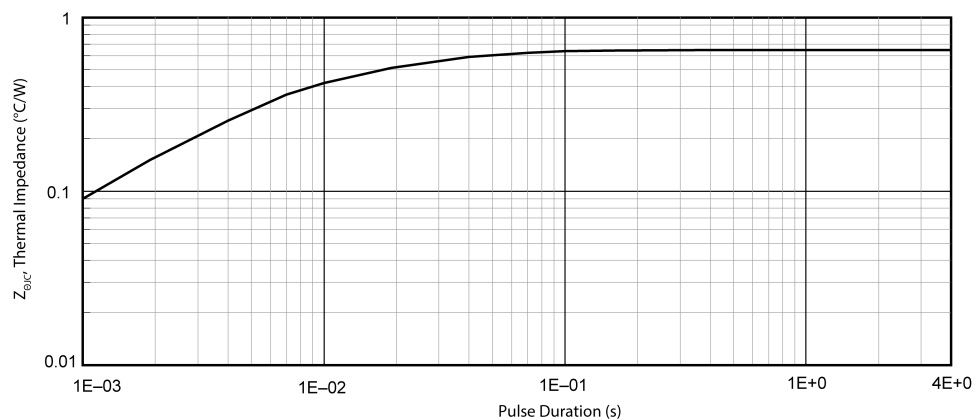
The following table shows the static characteristics per diode of the MSC2X31SDA170J and MSC2X30SDA170J devices.  $T_J = 25\text{ }^{\circ}\text{C}$  unless otherwise specified.

**Table 3 • Static Characteristics Per Diode**

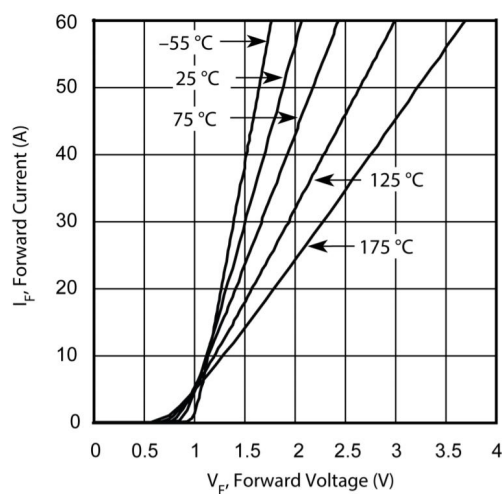
| Symbol   | Characteristics         | Test Conditions                        |                                     | Min | Typ | Max | Unit          |
|----------|-------------------------|----------------------------------------|-------------------------------------|-----|-----|-----|---------------|
| $V_F$    | Diode forward voltage   | $I_F = 30\text{ A}$                    | $T_J = 25\text{ }^{\circ}\text{C}$  |     | 1.5 | 1.8 | V             |
|          |                         |                                        | $T_J = 175\text{ }^{\circ}\text{C}$ |     | 2.3 |     |               |
| $I_{RM}$ | Reverse leakage current | $V_R = 1700\text{ V}$                  | $T_J = 25\text{ }^{\circ}\text{C}$  |     | 4   | 200 | $\mu\text{A}$ |
|          |                         |                                        | $T_J = 175\text{ }^{\circ}\text{C}$ |     | 125 |     |               |
| $Q_C$    | Total capacitive charge | $V_R = 900\text{ V}$                   |                                     |     | 230 |     | nC            |
| $C_J$    | Junction capacitance    | $V_R = 600\text{ V}, f = 1\text{ MHz}$ |                                     |     | 167 |     | pF            |
|          |                         | $V_R = 900\text{ V}, f = 1\text{ MHz}$ |                                     |     | 138 |     |               |

## Typical Performance Curves

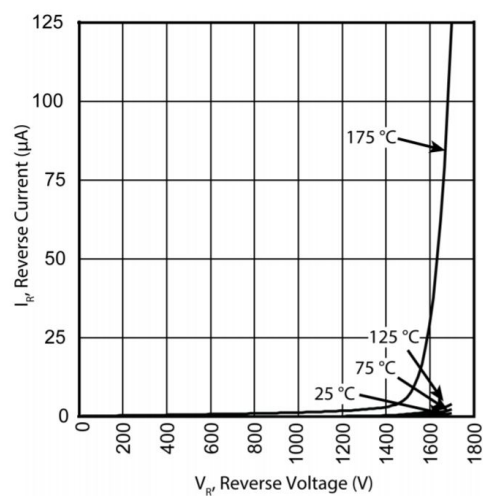
This section shows the typical performance curves per diode of the MSC2X31SDA170J and MSC2X30SDA170J devices.



**Figure 3 • Maximum Transient Thermal Impedance**



**Figure 4 • Forward Current vs. Forward Voltage**



**Figure 5 • Reverse Current vs. Reverse Voltage**

## Package Specification

This section shows the package specification of the MSC2X31SDA170J and MSC2X30SDA170J devices.

### Package Outline Drawing

The following figure illustrates the SOT-227 package outline of the MSC2X31SDA170J and MSC2X30SDA170J devices. The dimensions in the figure below are in millimeters and (inches).

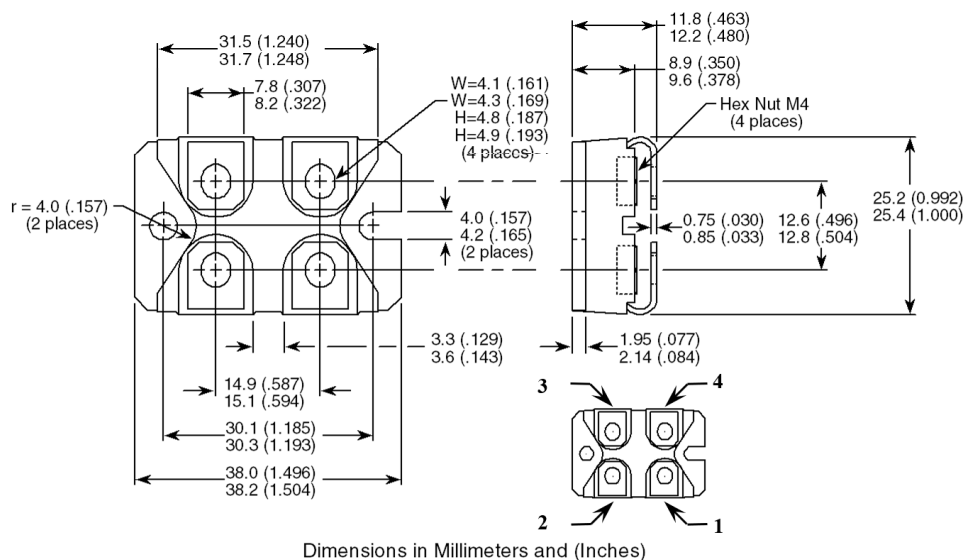


Figure 6 • Package Outline Drawing

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