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1  Revision History

The revision history describes the changes that were implemented in the document. The changes are listed by revision, starting with the most current publication.

1.1  Revision 1.0

Revision 1.0 was published in December 2019. It is the first publication of this document.
2 Product Overview

This section provides the product overview for the MSCDC450A170AG device.

All ratings at $T_j = 25 \, ^\circ\text{C}$, unless otherwise specified.

**Caution:** These devices are sensitive to electrostatic discharge. Proper handling procedures should be followed.

### 2.1 Features

The following are key features of the MSCDC450A170AG device:

- Silicon Carbide (SiC) Schottky diode
  - Zero reverse recovery
  - Zero forward recovery
  - Temperature independent switching behavior
  - Positive temperature coefficient on VF

- Low stray inductance
- M5 power connectors
- High level of integration
• Aluminum nitride (AlN) substrate for improved thermal performance

2.2 Benefits
The following are benefits of the MSCDC450A170AG device:
• Outstanding performance at high frequency operation
• Low noise switching
• Direct mounting to heatsink (isolated package)
• Low junction-to-case thermal resistance
• RoHS compliant

2.3 Applications
The MSCDC450A170AG device is designed for the following applications:
• Uninterruptible power supply (UPS)
• Induction heating
• Welding equipment
• High-speed rectifiers
3 Electrical Specifications

This section provides the electrical specifications for the MSCDC450A170AG device.

3.1 Absolute Maximum Ratings

The following table shows the absolute maximum ratings per diode for the MSCDC450A170AG device.

**Table 1 • Absolute Maximum Ratings**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Max Ratings</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>V_{RRM}</td>
<td>Repetitive peak reverse voltage</td>
<td>1700</td>
<td>V</td>
</tr>
<tr>
<td>I_F</td>
<td>DC forward current</td>
<td>T_c = 125 °C</td>
<td>A</td>
</tr>
</tbody>
</table>

The following table shows the Thermal and Package Characteristics of the MSCDC450A170AG device.

**Table 2 • Thermal and Package Characteristics**

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Characteristic</th>
<th>Min</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>V_{ISOL}</td>
<td>RMS isolation voltage, any terminal to case t = 1 minute, 50 Hz/60 Hz</td>
<td>4000</td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>T_j</td>
<td>Operating junction temperature range</td>
<td>−40</td>
<td>175</td>
<td>°C</td>
</tr>
<tr>
<td>T_{JDP}</td>
<td>Recommended junction temperature under switching conditions</td>
<td>−40</td>
<td>T_{Jmax} = 25</td>
<td></td>
</tr>
<tr>
<td>T_{STG}</td>
<td>Storage temperature range</td>
<td>−40</td>
<td>125</td>
<td></td>
</tr>
<tr>
<td>T_C</td>
<td>Operating case temperature</td>
<td>−40</td>
<td>125</td>
<td></td>
</tr>
<tr>
<td>Torque</td>
<td>Mounting torque</td>
<td>M6</td>
<td>3</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>To heatsink</td>
<td>M5</td>
<td>2</td>
<td>3.5</td>
</tr>
<tr>
<td>Wt</td>
<td>Package weight</td>
<td></td>
<td>300</td>
<td>g</td>
</tr>
</tbody>
</table>
### Electrical Specifications

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Characteristic</th>
<th>Test Conditions</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Qc</td>
<td>Total capacitive charge</td>
<td>$V_R = 900 \text{ V}$</td>
<td>3.69</td>
<td></td>
<td></td>
<td>µC</td>
</tr>
<tr>
<td>C</td>
<td>Total capacitance</td>
<td>$f = 1 \text{ MHz, } V_R = 600 \text{ V}$</td>
<td>2.7</td>
<td></td>
<td></td>
<td>nF</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$f = 1 \text{ MHz, } V_R = 900 \text{ V}$</td>
<td>2.25</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R_{thJC}</td>
<td>Junction-to-case thermal resistance</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>°C/W</td>
</tr>
</tbody>
</table>
3.3 Typical Performance Curves

This section shows the typical performance curves for the MSCDC450A170AG device.

**Figure 1 • Maximum Transient Thermal Impedance**

![Maximum Transient Thermal Impedance](image1)

<table>
<thead>
<tr>
<th>Ri (°C/W)</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>taul (s)</td>
<td>0.004</td>
<td>0.002</td>
<td>0.009</td>
<td>0.033</td>
<td>0.026</td>
<td>0.010</td>
<td>0.060</td>
</tr>
</tbody>
</table>

**Figure 2 • Forward Current vs. Forward Voltage**

![Forward Current vs. Forward Voltage](image2)

**Figure 3 • Capacitance vs. Reverse Voltage**

![Capacitance vs. Reverse Voltage](image3)
4 Package Specifications

This section shows the package specifications for the MSCDC450A170AG device.

4.1 Package Outline Drawing

The following image illustrates the package outline of MSCDC450A170AG device. The dimensions in the following figure are in millimeters.

Figure 4 • Package Outline Drawing
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