MSCDC50H1701AG
Datasheet
SiC Diode Full Bridge Power Module
December 2019
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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 shows the product overview of the MSCDC50H1701AG device.

All multiple inputs and outputs must be shorted together 1/2 ; 7/8 ; 9/10 ; 12/13
All ratings at Tj = 25°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 MSCDC50H1701AG device:

- Silicon Carbide (SiC) Schottky diode
  - Zero reverse recovery
  - Zero forward recovery
  - Temperature independent switching behavior
  - Positive temperature coefficient on VF
- High blocking voltage
• Very low stray inductance
• Aluminum nitrate (AlN) substrate for improved thermal performance

2.2 Benefits

The following are benefits of the MSCDC50H1701AG device:
• Outstanding performance at high frequency operation
• Solderable terminals for easy PCB mounting
• Direct mounting to heatsink (isolated package)
• Low profile
• RoHS compliant

2.3 Applications

The MSCDC50H1701AG device is designed for the following applications:
• Uninterruptible power supplies
• Induction heating
• Welding equipment
• High-speed rectifiers
3 Electrical Specifications

This section shows the electrical specifications of the MSCDC50H1701AG device.

3.1 Absolute Maximum Ratings

The following table shows the absolute maximum ratings per SiC diode of the MSCDC50H1701AG device.

Table 1 • Absolute Maximum Ratings

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Parameter</th>
<th>Unit</th>
<th>Max Ratings</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>$V_{RRM}$</td>
<td>Repetitive peak reverse voltage</td>
<td>V</td>
<td>1700 V</td>
<td></td>
</tr>
<tr>
<td>$I_F$</td>
<td>DC forward current</td>
<td>A</td>
<td>$T_c = 125 ^\circ C$</td>
<td>50 A</td>
</tr>
</tbody>
</table>

Table 2 • Thermal and Package Characteristics

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Characteristics</th>
<th>Unit</th>
<th>Min</th>
<th>Max</th>
<th>Description</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>V</td>
<td>4000 V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$T_J$</td>
<td>Operating junction temperature range</td>
<td>°C</td>
<td>$-40$</td>
<td>$175$</td>
<td></td>
</tr>
<tr>
<td>$T_{JGP}$</td>
<td>Recommended junction temperature under switching conditions</td>
<td>°C</td>
<td>$-40$</td>
<td>$T_{Jmax}-25$</td>
<td></td>
</tr>
<tr>
<td>$T_{STG}$</td>
<td>Storage temperature range</td>
<td>°C</td>
<td>$-40$</td>
<td>$125$</td>
<td></td>
</tr>
<tr>
<td>$T_C$</td>
<td>Operating case temperature</td>
<td>°C</td>
<td>$-40$</td>
<td>$125$</td>
<td></td>
</tr>
<tr>
<td>Torque</td>
<td>Mounting torque</td>
<td>N.m</td>
<td>2</td>
<td>3</td>
<td>Information on M4</td>
</tr>
<tr>
<td>Wt</td>
<td>Package weight</td>
<td>g</td>
<td>80 g</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3.2 Electrical Performance

The following table shows the electrical characteristics per SiC diode of the MSCDC50H1701AG.

Table 3 • Electrical Characteristics

<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>$V_F$</td>
<td>Diode forward voltage</td>
<td>$I_F = 50 \text{ A}$</td>
<td>$T_j = 25 ^\circ C$</td>
<td>1.5</td>
<td>1.8</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$T_j = 175 ^\circ C$</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$I_{RM}$</td>
<td>Reverse leakage current</td>
<td>$V_R = 1700 \text{ V}$</td>
<td>$T_j = 25 ^\circ C$</td>
<td>50</td>
<td>200</td>
<td>μA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$T_j = 175 ^\circ C$</td>
<td>250</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$Q_C$</td>
<td>Total capacitive charge</td>
<td>$V_R = 900 \text{ V}$</td>
<td></td>
<td></td>
<td>410</td>
<td>nC</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>C</td>
<td>Total capacitance</td>
<td>f = 1 MHz, V_R = 600 V</td>
<td>300</td>
<td></td>
<td></td>
<td>pF</td>
</tr>
<tr>
<td></td>
<td></td>
<td>f = 1 MHz, V_R = 900 V</td>
<td>250</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>0.32</td>
<td>°C/W</td>
</tr>
</tbody>
</table>
3.3 Typical Performance Curves

This following section shows the typical performance curves of the MSCDC50H1701AG device.

**Figure 1 • Maximum Transient Thermal Impedance**

![Maximum Transient Thermal Impedance graph]

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

![Forward Current vs. Forward Voltage graph]

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

![Capacitance vs. Reverse Voltage graph]
4 Package Specification

This section shows the package specification of the MSCDC50H1701AG device.

4.1 Package Outline Drawing

The following image illustrates the package outline of the MSCDC50H1701AG device. The dimensions are in millimeters.

Figure 4 • Package Outline Drawing
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