Description

United Silicon Carbide, Inc. offers the 3rd generation of high performance SiC Merged-PiN-Schottky (MPS) diodes. With zero reverse recovery charge and 175°C maximum junction temperature, these diodes are ideally suited for high frequency and high efficiency power systems with minimum cooling requirements.

Features

- 175°C maximum operating junction temperature
- Easy paralleling
- Extremely fast switching not dependent on temperature
- No reverse or forward recovery
- Enhanced surge current capability, MPS structure
- Excellent thermal performance, Ag sintered
- AEC-Q101 qualified

Maximum Ratings

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Test Conditions</th>
<th>Value</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>DC blocking voltage</td>
<td>$V_R$</td>
<td></td>
<td>650</td>
<td>V</td>
</tr>
<tr>
<td>Repetitive peak reverse voltage, $T_j=25^\circ C$</td>
<td>$V_{RRM}$</td>
<td></td>
<td>650</td>
<td>V</td>
</tr>
<tr>
<td>Surge peak reverse voltage</td>
<td>$V_{RSM}$</td>
<td></td>
<td>650</td>
<td>V</td>
</tr>
<tr>
<td>Maximum DC forward current</td>
<td>$I_T$</td>
<td>$T_J = 152^\circ C$</td>
<td>12</td>
<td>A</td>
</tr>
<tr>
<td>Non-repetitive forward surge current sine halfwave</td>
<td>$I_{FSM}$</td>
<td>$T_J = 25^\circ C$, $t_p = 10\text{ ms}$</td>
<td>90</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$T_J = 110^\circ C$, $t_p = 10\text{ ms}$</td>
<td>72</td>
<td></td>
</tr>
<tr>
<td>Repetitive forward surge current sine halfwave, $D=0.1$</td>
<td>$I_{FRM}$</td>
<td>$T_J = 25^\circ C$, $t_p = 10\text{ ms}$</td>
<td>61.2</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$T_J = 110^\circ C$, $t_p = 10\text{ ms}$</td>
<td>36</td>
<td></td>
</tr>
<tr>
<td>Non-repetitive peak forward current</td>
<td>$I_{F,max}$</td>
<td>$T_J = 25^\circ C$, $t_p = 10\mu s$</td>
<td>620</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$T_J = 110^\circ C$, $t_p = 10\mu s$</td>
<td>558</td>
<td></td>
</tr>
<tr>
<td>Non-repetitive avalanche energy</td>
<td>$E_{AS}$</td>
<td>$T_J = 25^\circ C$, $L = 5\text{ mH}$, $I_{pk}=6.32\text{ A}$, $V_{DD}=100\text{ V}$</td>
<td>100</td>
<td>mJ</td>
</tr>
<tr>
<td>Power dissipation</td>
<td>$P_{Tot}$</td>
<td>$T_J = 25^\circ C$</td>
<td>187.5</td>
<td>W</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$T_J = 152^\circ C$</td>
<td>28.6</td>
<td></td>
</tr>
<tr>
<td>Maximum junction temperature</td>
<td>$T_{J,max}$</td>
<td></td>
<td>175</td>
<td>°C</td>
</tr>
<tr>
<td>Operating and storage temperature</td>
<td>$T_{Jp}$, $T_{STG}$</td>
<td></td>
<td>-55 to 175</td>
<td>°C</td>
</tr>
</tbody>
</table>

Typical Applications

- Power converters
- Industrial motor drives
- Switching-mode power supplies
- Power factor correction modules

Preliminary, November 2017

For more information go to www.unitedsic.com
Electrical Characteristics

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Test Conditions</th>
<th>Value</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forward voltage</td>
<td>$V_F$</td>
<td>$I_F = 12A$, $T_J = 25°C$</td>
<td>1.5</td>
<td>1.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_F = 12A$, $T_J = 150°C$</td>
<td>1.8</td>
<td>2.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_F = 12A$, $T_J = 175°C$</td>
<td>2</td>
<td>2.25</td>
</tr>
<tr>
<td>Reverse current</td>
<td>$I_R$</td>
<td>$V_R = 650V$, $T_J = 25°C$</td>
<td>30</td>
<td>400</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_R = 650V$, $T_J = 175°C$</td>
<td>TBD</td>
<td></td>
</tr>
<tr>
<td>Total capacitive charge</td>
<td>$Q_c$</td>
<td>$V_R = 400V$</td>
<td>25.4</td>
<td></td>
</tr>
<tr>
<td>Total capacitance</td>
<td>$C$</td>
<td>$V_R = 1V$, $f = 1MHz$</td>
<td>358</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_R = 300V$, $f = 1MHz$</td>
<td>42</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_R = 600V$, $f = 1MHz$</td>
<td>36</td>
<td></td>
</tr>
<tr>
<td>Capacitance stored energy</td>
<td>$E_C$</td>
<td>$V_R = 400V$</td>
<td>3.8</td>
<td></td>
</tr>
</tbody>
</table>

(1) $Q_c$ is independent on $T_J$, $dI_f/dt$, and $I_f$ as shown in the application note USCI_AN0011.

Thermal characteristics

<table>
<thead>
<tr>
<th>Parameter</th>
<th>symbol</th>
<th>Test Conditions</th>
<th>Value</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermal resistance, junction - case</td>
<td>$R_{thJC}$</td>
<td></td>
<td>0.8</td>
<td>°C/W</td>
</tr>
</tbody>
</table>

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