Description

United Silicon Carbide, Inc. offers the xR series of high performance SiC Schottky diodes. With zero reverse recovery charge and 175°C maximum junction temperature, USCI’s diodes are ideally suited for high frequency and high efficiency power systems with minimum cooling requirements.

Features

- Positive temperature coefficient for safe operation and ease of paralleling
- 175°C maximum operating junction temperature
- Extremely fast switching not dependent on temperature
- Essentially no reverse or forward recovery
- RoHS compliant

Typical Applications

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

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>$V_B$</td>
<td></td>
<td>1200</td>
<td>V</td>
</tr>
<tr>
<td>Repetitive peak reverse voltage, $T_J=25°C$</td>
<td>$V_{RRM}$</td>
<td></td>
<td>1200</td>
<td>V</td>
</tr>
<tr>
<td>Surge peak reverse voltage</td>
<td>$V_{RSM}$</td>
<td></td>
<td>1200</td>
<td>V</td>
</tr>
<tr>
<td>Maximum DC forward current</td>
<td>$I_F$</td>
<td>$T_C = 138°C$</td>
<td>15</td>
<td>A</td>
</tr>
<tr>
<td>Non-repetitive forward surge current sine halfwave</td>
<td>$I_{FSM}$</td>
<td>$T_J=25°C$, $T_p=10ms$</td>
<td>112.5</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$T_J=110°C$, $T_p=10ms$</td>
<td>90</td>
<td></td>
</tr>
<tr>
<td>Repetitive forward surge current sine halfwave, D=0.1</td>
<td>$I_{FRM}$</td>
<td>$T_J=25°C$, $T_p=10ms$</td>
<td>51.2</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$T_J=110°C$, $T_p=10ms$</td>
<td>31.3</td>
<td></td>
</tr>
<tr>
<td>Non-repetitive avalanche energy</td>
<td>$E_{AS}$</td>
<td>$T_J=25°C$, $L=10mH$, $I_{pk}=5A$, $V_{DD}=100V$</td>
<td>132</td>
<td>mJ</td>
</tr>
<tr>
<td>Power dissipation</td>
<td>$P_{tot}$</td>
<td>$T_C = 25°C$</td>
<td>187</td>
<td>W</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$T_C = 138°C$</td>
<td>46</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>$T_{J,STG}$</td>
<td></td>
<td>-55 to 175</td>
<td>°C</td>
</tr>
<tr>
<td>Soldering temperatures, wavesoldering only allowed at leads</td>
<td>$T_{sold}$</td>
<td>1.6mm from case for 10s</td>
<td>260</td>
<td>°C</td>
</tr>
</tbody>
</table>
**Electrical Characteristics**

*TJ = +25°C unless otherwise specified*

<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><em>V</em>&lt;sub&gt;F&lt;/sub&gt;</td>
<td><em>I</em>&lt;sub&gt;F&lt;/sub&gt; = 15A, <em>T</em>&lt;sub&gt;J&lt;/sub&gt; = 25°C</td>
<td>1.5</td>
<td>V</td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>I</em>&lt;sub&gt;F&lt;/sub&gt; = 15A, <em>T</em>&lt;sub&gt;J&lt;/sub&gt; = 175°C</td>
<td>2.5</td>
<td>V</td>
</tr>
<tr>
<td>Reverse current</td>
<td><em>I</em>&lt;sub&gt;R&lt;/sub&gt;</td>
<td><em>V</em>&lt;sub&gt;R&lt;/sub&gt; = 1200V, <em>T</em>&lt;sub&gt;J&lt;/sub&gt; = 25°C</td>
<td>45</td>
<td>µA</td>
</tr>
<tr>
<td></td>
<td></td>
<td><em>V</em>&lt;sub&gt;R&lt;/sub&gt; = 1200V, <em>T</em>&lt;sub&gt;J&lt;/sub&gt; = 175°C</td>
<td>90</td>
<td>µA</td>
</tr>
<tr>
<td>Total capacitive charge</td>
<td><em>Q</em>&lt;sub&gt;C&lt;/sub&gt;</td>
<td><em>V</em>&lt;sub&gt;R&lt;/sub&gt; = 800V</td>
<td>69</td>
<td>nC</td>
</tr>
<tr>
<td>Total capacitance</td>
<td><em>C</em></td>
<td><em>V</em>&lt;sub&gt;R&lt;/sub&gt; = 1V, <em>f</em> = 1MHz</td>
<td>730</td>
<td>pF</td>
</tr>
<tr>
<td>Capacitance stored energy</td>
<td><em>E</em>&lt;sub&gt;C&lt;/sub&gt;</td>
<td><em>V</em>&lt;sub&gt;R&lt;/sub&gt; = 800V</td>
<td>51</td>
<td>µJ</td>
</tr>
</tbody>
</table>

(2) See Figure 8, *Q*<sub>C</sub> is independent on *T*<sub>J</sub>, *di/dt*, and *I*<sub>F</sub> as shown in the application note USCi_AN0011.

**Thermal characteristics**

<table>
<thead>
<tr>
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<th>Value</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermal resistance</td>
<td><em>R</em>&lt;sub&gt;θJC&lt;/sub&gt;</td>
<td></td>
<td>0.6</td>
<td>°C/W</td>
</tr>
</tbody>
</table>

**Typical Performance**

*Figure 1 Typical reverse characteristics*

*Figure 2 Typical forward characteristics*
Figure 3 Power dissipation

Figure 4 Diode forward current

Figure 5 Capacitance vs. reverse voltage

Figure 6 Maximum transient thermal impedance
Figure 7 Typical capacitance stored energy vs. reverse voltage

Figure 8 Typical capacitive charge vs. reverse voltage

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