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
- 100% UIS tested
- 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>$T_C = 25°C$</td>
<td>650</td>
<td>V</td>
</tr>
<tr>
<td>Repetitive peak reverse voltage, $T_J=25°C$</td>
<td>$V_{RSM}$</td>
<td></td>
<td>650</td>
<td>V</td>
</tr>
<tr>
<td>Surge peak reverse voltage</td>
<td>$V_{FSM}$</td>
<td></td>
<td>650</td>
<td>V</td>
</tr>
<tr>
<td>Maximum DC forward current</td>
<td>$I_F$</td>
<td>$T_J = 152°C$</td>
<td>16</td>
<td>A</td>
</tr>
<tr>
<td>Non-repetitive forward surge current sine halfwave</td>
<td>$I_{FSM}$</td>
<td>$T_C = 25°C, t_p = 10ms$</td>
<td>100</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$T_C = 110°C, t_p = 10ms$</td>
<td>90</td>
<td>A</td>
</tr>
<tr>
<td>Repetitive forward surge current sine halfwave, D=0.1</td>
<td>$I_{FRM}$</td>
<td>$T_C = 25°C, t_p = 10ms$</td>
<td>65.9</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$T_C = 110°C, t_p = 10ms$</td>
<td>40.7</td>
<td>A</td>
</tr>
<tr>
<td>Non-repetitive peak forward current</td>
<td>$I_{F,\text{max}}$</td>
<td>$T_C = 25°C, t_p = 10\mu s$</td>
<td>550</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$T_C = 110°C, t_p = 10\mu s$</td>
<td>550</td>
<td>A</td>
</tr>
<tr>
<td>$i^2t$ value</td>
<td>$\int i^2dt$</td>
<td>$T_C = 25°C, t_p = 10ms$</td>
<td>50</td>
<td>A$^2$s</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$T_C = 110°C, t_p = 10ms$</td>
<td>40</td>
<td>A$^2$s</td>
</tr>
<tr>
<td>Power dissipation</td>
<td>$P_{\text{tot}}$</td>
<td>$T_C = 25°C$</td>
<td>230.8</td>
<td>W</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$T_C = 152°C$</td>
<td>35.4</td>
<td>W</td>
</tr>
<tr>
<td>Maximum junction temperature</td>
<td>$T_{J,\text{max}}$</td>
<td>$T_C = 25°C$</td>
<td>175</td>
<td>°C</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$T_C = 152°C$</td>
<td>175</td>
<td>°C</td>
</tr>
<tr>
<td>Operating and storage temperature</td>
<td>$T_{J,STG}$</td>
<td>$-55 to 175°C$</td>
<td>260</td>
<td>°C</td>
</tr>
<tr>
<td>Soldering temperatures, wavesoldering only allowed at leads</td>
<td>$T_{solder}$</td>
<td>1.6mm from case for 10s</td>
<td>1.6mm from case for 10s</td>
<td>°C</td>
</tr>
</tbody>
</table>
Electrical Characteristics

$T_J = +25^\circ C$ 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>$V_F$</td>
<td>$I_F=16A, T_J=25^\circ C$</td>
<td>-</td>
<td>1.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_F=16A, T_J=150^\circ C$</td>
<td>-</td>
<td>1.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_F=16A, T_J=175^\circ C$</td>
<td>-</td>
<td>2.1</td>
</tr>
<tr>
<td>Reverse current</td>
<td>$I_R$</td>
<td>$V_R=650V, T_J=25^\circ C$</td>
<td>-</td>
<td>16.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_R=650V, T_J=175^\circ C$</td>
<td>-</td>
<td>100</td>
</tr>
<tr>
<td>Total capacitive charge</td>
<td>$Q_C$</td>
<td>$V_R=400V$</td>
<td>38</td>
<td></td>
</tr>
<tr>
<td>Total capacitance</td>
<td>$C$</td>
<td>$V_R=1V, f=1MHz$</td>
<td>500</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_R=300V, f=1MHz$</td>
<td>62</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_R=600V, f=1MHz$</td>
<td>56</td>
<td></td>
</tr>
<tr>
<td>Capacitance stored energy</td>
<td>$E_C$</td>
<td>$V_R=400V$</td>
<td>5.6</td>
<td></td>
</tr>
</tbody>
</table>

$1)$ $Q_C$ is independent on $T_J$, $di/dt$, 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>$R_{JIC}$</td>
<td></td>
<td>0.5</td>
<td>0.65</td>
</tr>
</tbody>
</table>

Typical Performance

Figure 1 Typical forward characteristics

Figure 2 Typical forward characteristics in surge current
Figure 3 Typical reverse characteristics

Figure 4 Power dissipation

Figure 5 Diode forward current

Figure 6 Maximum transient thermal impedance
Figure 7 Capacitance vs. reverse voltage at 1MHz

Figure 8 Typical capacitive charge vs. reverse voltage

Figure 9 Typical capacitance stored energy vs. reverse voltage
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