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.

**Description**

**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>$V_B$</td>
<td></td>
<td>650</td>
<td>V</td>
</tr>
<tr>
<td>Repetitive peak reverse voltage, $T_J=25°C$</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>$I_F$</td>
<td>$T_C = 153°C$</td>
<td>6</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>45</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$T_C = 110°C$, $t_p = 10ms$</td>
<td>39</td>
<td></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>29.5</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$T_C = 110°C$, $t_p = 10ms$</td>
<td>17.9</td>
<td></td>
</tr>
<tr>
<td>Non-repetitive peak forward current</td>
<td>$I_{F, max}$</td>
<td>$T_C = 25°C$, $t_p = 10μs$</td>
<td>320</td>
<td>A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$T_C = 110°C$, $t_p = 10μs$</td>
<td>320</td>
<td></td>
</tr>
<tr>
<td>$i^2t$ value</td>
<td>$\int i^2dt$</td>
<td>$T_C = 25°C$, $t_p = 10ms$</td>
<td>10.1</td>
<td>A^2s</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$T_C = 110°C$, $t_p = 10ms$</td>
<td>7.6</td>
<td></td>
</tr>
<tr>
<td>Power dissipation</td>
<td>$P_{Tot}$</td>
<td>$T_C = 25°C$</td>
<td>93.4</td>
<td>W</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$T_C = 153°C$</td>
<td>13.4</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>$T_J, T_{STG}$</td>
<td></td>
<td>-55 to 175</td>
<td>°C</td>
</tr>
<tr>
<td>Soldering temperatures, wavesoldering only allowed at leads</td>
<td>$T_{solder}$</td>
<td>1.6mm from case for 10s</td>
<td>260</td>
<td>°C</td>
</tr>
</tbody>
</table>

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

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For more information go to www.unitedsic.com
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>$I_F=6A, T_J=25^\circ C$</td>
<td>-</td>
<td>1.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$I_F=6A, T_J=150^\circ C$</td>
<td>-</td>
<td>1.8</td>
</tr>
<tr>
<td>Reverse current</td>
<td>$I_R$</td>
<td>$V_R=650V, T_J=25^\circ C$</td>
<td>-</td>
<td>0.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_R=650V, T_J=175^\circ C$</td>
<td>-</td>
<td>6</td>
</tr>
<tr>
<td>Total capacitive charge</td>
<td>$Q_C$</td>
<td>$V_R=400V$</td>
<td>14.5</td>
<td>nC</td>
</tr>
<tr>
<td>Total capacitance</td>
<td>$C$</td>
<td>$V_R=1V, f=1MHz$</td>
<td>196</td>
<td>pF</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_R=300V, f=1MHz$</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>$V_R=600V, f=1MHz$</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>Capacitance stored energy</td>
<td>$E_C$</td>
<td>$V_R=400V$</td>
<td>2.2</td>
<td>$\mu J$</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>1.2</td>
<td>1.6</td>
</tr>
</tbody>
</table>

Typical Performance

![Figure 1 Typical forward characteristics](image1)

![Figure 2 Typical forward characteristics in surge current](image2)

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For more information go to www.unitedsic.com
Figure 3 Typical reverse characteristics

Figure 4 Power dissipation

Figure 5 Diode forward current

Figure 6 Maximum transient thermal impedance

For more information go to www.unitedsic.com
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

$Q_C = \int_{V_R}^{V} C(V) dV$
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We are here for you. Addresses and Contacts.

Sales Germany & Austria

Geometrical sensors
Other products
Kurt Stritzelberger
Phone  +49 89 374 288 87 22
kurt.stritzelberger@pewatron.com

Pressure sensors
Other products
Gerhard Vetter
Phone  +49 89 374 288 87 26
gerhard.vetter@pewatron.com

Gas sensors and modules
Peter Felder
Phone  +41 44 877 35 05
peter.felder@pewatron.com

Sales Switzerland & Liechtenstein

Postcode 3000 – 9999
Basil Frei
Phone  +41 44 877 35 18
basil.frei@pewatron.com

Postcode 1000 – 2999
Christian Mohrenstecher
Phone  +41 76 444 57 93
christian.mohrenstecher@pewatron.com

Sales International Key Accounts

Peter Felder
Phone  +41 44 877 35 05
peter.felder@pewatron.com

Sales Other Countries / Product Management

Pressure Sensors
Load Cells
Philipp Kistler
Phone  +41 44 877 35 03
philipp.kistler@pewatron.com

Gas sensors
Gas sensor modules
Dr. Thomas Clausen
Phone  +41 44 877 35 13
thomas.clausen@pewatron.com

Flow / Level / Medical products
Dr. Adriano Pittarelli
Phone  +49 89 374 288 87 67
adriano.pittarelli@pewatron.com

Power supplies
Sebastiano Leggio
Phone  +41 44 877 35 06
sebastiano.leggio@pewatron.com

Linear position sensors
Angle sensors
Eric Letsch
Phone  +41 44 877 35 14
eric.letsch@pewatron.com

Drive technology
CH Postcode 5000 – 9999 / DE
Roman Homa
Phone  +41 76 444 00 86
roman.homa@pewatron.com

Accelerometers
Sensor elements
Christoph Kleye
Phone  +49 89 374 288 87 61
christoph.kleye@pewatron.com

Current sensors / Power solutions &
Turkey
Osman Coban
Phone  +49 89 374 288 87 65
osman.coban@pewatron.com

Drive technology
CH Postcode 1000 – 4999 / AT / IT / FR
Christian Mohrenstecher
Phone  +41 76 444 57 93
christian.mohrenstecher@pewatron.com

Harald Thomas
Phone  +49 89 374 288 87 23
harald.thomas@pewatron.com

We are here for you. Addresses and Contacts.