Silicon Carbide Power Schottky Diode

Features
- Industry’s leading low leakage currents
- 175 °C maximum operating temperature
- Temperature independent switching behavior
- Superior surge current capability
- Positive temperature coefficient of \( V_F \)
- Extremely fast switching speeds
- Superior figure of merit \( Q_C/I_F \)

Package
- RoHS Compliant

Advantages
- Low standby power losses
- Improved circuit efficiency (Lower overall cost)
- Low switching losses
- Ease of paralleling devices without thermal runaway
- Smaller heat sink requirements
- Low reverse recovery current
- Low device capacitance
- Low reverse leakage current at operating temperature

Applications
- Power Factor Correction (PFC)
- Switched-Mode Power Supply (SMPS)
- Solar Inverters
- Wind Turbine Inverters
- Motor Drives
- Induction Heating
- Uninterruptible Power Supply (UPS)
- High Voltage Multipliers

Maximum Ratings at \( T_J = 175 \, ^\circ C \), unless otherwise specified

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Conditions</th>
<th>Values</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Repetitive peak reverse voltage</td>
<td>( V_{RRM} )</td>
<td>( T_c = 25 , ^\circ C )</td>
<td>650</td>
<td>V</td>
</tr>
<tr>
<td>Continuous forward current</td>
<td>( I_F )</td>
<td>( T_c = 150 , ^\circ C )</td>
<td>2.5</td>
<td>A</td>
</tr>
<tr>
<td>Continuous forward current</td>
<td>( I_F )</td>
<td>( T_c = 25 , ^\circ C )</td>
<td>1</td>
<td>A</td>
</tr>
<tr>
<td>RMS forward current</td>
<td>( I_{F,RMS} )</td>
<td>( T_c = 150 , ^\circ C )</td>
<td>2</td>
<td>A</td>
</tr>
<tr>
<td>Surge non-repetitive forward current, Half Sine Wave</td>
<td>( I_{F,SM} )</td>
<td>( T_c = 25 , ^\circ C ), ( t_r = 10 , ms )</td>
<td>10</td>
<td>A</td>
</tr>
<tr>
<td>Non-repetitive peak forward current</td>
<td>( I_{F,MAX} )</td>
<td>( T_c = 25 , ^\circ C ), ( t_r = 10 , \mu s )</td>
<td>65</td>
<td>A</td>
</tr>
<tr>
<td>( I^2t ) value</td>
<td>( J^2 dt )</td>
<td>( T_c = 25 , ^\circ C ), ( t_r = 10 , ms )</td>
<td>0.5</td>
<td>A*S</td>
</tr>
<tr>
<td>Power dissipation</td>
<td>( P_{tot} )</td>
<td>( T_c = 25 , ^\circ C )</td>
<td>64</td>
<td>W</td>
</tr>
<tr>
<td>Operating and storage temperature</td>
<td>( T_J ), ( T_{stg} )</td>
<td></td>
<td>-55 to 175</td>
<td>( ^\circ C )</td>
</tr>
</tbody>
</table>

Electrical Characteristics at \( T_J = 175 \, ^\circ C \), unless otherwise specified

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Conditions</th>
<th>Values</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diode forward voltage</td>
<td>( V_F )</td>
<td>( I_F = 1 , A ), ( T_J = 25 , ^\circ C )</td>
<td>1.5</td>
<td>V</td>
</tr>
<tr>
<td>Reverse current</td>
<td>( I_R )</td>
<td>( V_R = 650 , V ), ( T_J = 25 , ^\circ C )</td>
<td>2.3</td>
<td>mA</td>
</tr>
<tr>
<td></td>
<td></td>
<td>( V_R = 650 , V ), ( T_J = 175 , ^\circ C )</td>
<td>10</td>
<td>mA</td>
</tr>
<tr>
<td>Total capacitive charge</td>
<td>( Q_C )</td>
<td>( I_F \leq I_{F,MAX} ) ( \frac{dV}{dt} = 200 , A/\mu s )</td>
<td>( V_R = 400 , V )</td>
<td>nC</td>
</tr>
<tr>
<td>Switching time</td>
<td>( t_s )</td>
<td>( T_J = 175 , ^\circ C )</td>
<td>( V_R = 400 , V )</td>
<td>ns</td>
</tr>
<tr>
<td>Total capacitance</td>
<td>( C )</td>
<td>( V_R = 1 , V, f = 1 , MHz ), ( T_J = 25 , ^\circ C )</td>
<td>76</td>
<td>pF</td>
</tr>
</tbody>
</table>

Thermal Characteristics
- Thermal resistance, junction - case | \( R_{thJC} \) | 3.55 | ^\circ C/W |
Figure 1: Typical Forward Characteristics

Figure 2: Typical Reverse Characteristics

Figure 3: Power Derating Curve

Figure 4: Current Derating Curves ($D = t_p/T$, $t_p = 400 \mu s$) (Considering worst case $Z_{th}$ conditions)

Figure 5: Typical Junction Capacitance vs Reverse Voltage Characteristics

Figure 6: Typical Capacitive Energy vs Reverse Voltage Characteristics
Figure 7: Current vs Pulse Duration Curves at T_C = 160 °C

Figure 8: Transient Thermal Impedance

Package Dimensions:

SMB / DO - 214AA

<table>
<thead>
<tr>
<th>Abbreviated Part Name</th>
<th>Lot Code</th>
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<tr>
<td>Cathode Band</td>
<td>ZV165 3GNAZ</td>
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<table>
<thead>
<tr>
<th>Dimensions</th>
<th>Inches</th>
<th>Millimeters</th>
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<tbody>
<tr>
<td>A</td>
<td>0.077-0.086</td>
<td>1.950-2.200</td>
</tr>
<tr>
<td>B</td>
<td>0.160-0.180</td>
<td>4.060-4.570</td>
</tr>
<tr>
<td>C</td>
<td>0.130-0.155</td>
<td>3.300-3.940</td>
</tr>
<tr>
<td>D</td>
<td>0.084-0.096</td>
<td>2.130-2.440</td>
</tr>
<tr>
<td>E</td>
<td>0.030-0.060</td>
<td>0.760-1.520</td>
</tr>
<tr>
<td>F</td>
<td>-0.008-</td>
<td>-0.203</td>
</tr>
<tr>
<td>G</td>
<td>0.205-0.220</td>
<td>5.210-5.590</td>
</tr>
<tr>
<td>H</td>
<td>0.006-0.012</td>
<td>0.152-0.305</td>
</tr>
<tr>
<td>I</td>
<td>0.089-</td>
<td>2.260-</td>
</tr>
<tr>
<td>J</td>
<td>0.085-</td>
<td>2.160-</td>
</tr>
<tr>
<td>K</td>
<td>-0.107-</td>
<td>2.740-</td>
</tr>
<tr>
<td>L</td>
<td>0.085-</td>
<td>2.160-</td>
</tr>
</tbody>
</table>

NOTE
1. CONTROLLED DIMENSION IS INCH. DIMENSION IN BRACKET IS MILLIMETER.
2. DIMENSIONS DO NOT INCLUDE END FLASH, MOLD FLASH, MATERIAL PROTRUSIONS
Revision History

<table>
<thead>
<tr>
<th>Date</th>
<th>Revision</th>
<th>Comments</th>
<th>Supersedes</th>
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<tr>
<td>2014/08/26</td>
<td>1</td>
<td>Updated Electrical Characteristics</td>
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<td>2013/09/09</td>
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<td>Initial release</td>
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Published by
GeneSiC Semiconductor, Inc.
43670 Trade Center Place Suite 155
Dulles, VA 20166

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SPICE Model Parameters

This is a secure document. Please copy this code from the SPICE model PDF file on our website (http://www.genesicsemi.com/images/products_sic/rectifiers/GB01SLT06-214_SPICE.pdf) into LTSPICE (version 4) software for simulation of the GB01SLT06-214.

*MODEL OF GeneSiC Semiconductor Inc.

* $Revision:   1.0    $
* $Date:   09-SEP-2013   $

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* Dulles, VA 20166
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* Models accurate up to 2 times rated drain current.
*
* Start of GB01SLT06-214 SPICE Model
*
.SUBCKT GB01SLT06 ANODE KATHODE
D1 ANODE KATHODE GB01SLT06_25C; Call the Schottky Diode Model
D2 ANODE KATHODE GB01SLT06_PIN; Call the PiN Diode Model

.MODEL GB01SLT06_25C D
+ IS 3.57E-18 RS 0.49751
+ TRS1 0.0057 TRS2 2.40E-05
+ N 1 IKF 322
+ EG 1.2 XTI 3
+ CJO 9.12E-11 VJ 0.371817384
+ M 1.527759838 FC 0.5
+ TT 1.00E-10 BV 650
+ IBV 1.00E-03 VPK 650
+ IAVE 1 TYPE SiC_Schottky
+ MFG GeneSiC_Semiconductor

.MODEL GB01SLT06_PIN D
+ IS 5.73E-11 RS 0.72994
+ N 5 IKF 800
+ EG 3.23 XTI -14
+ FC 0.5 TT 0
+ BV 650 IBV 1.00E-03
+ VPK 650 IAVE 1
+ TYPE SiC_PiN

.ENDS
*
* End of GB01SLT06-214 SPICE Model