

## Silicon Carbide Power Schottky Diode Chip

### Features

- 1200 V Schottky rectifier
- 250 °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  $Q_C/I_F$



### Maximum Ratings at $T_j = 250\text{ °C}$ , unless otherwise specified

| Parameter                         | Symbol         | Conditions               | Values     | Unit |
|-----------------------------------|----------------|--------------------------|------------|------|
| Repetitive peak reverse voltage   | $V_{RRM}$      |                          | 1200       | V    |
| Continuous forward current        | $I_F$          | $T_C \leq 235\text{ °C}$ | 1          | A    |
| RMS forward current               | $I_{F(RMS)}$   | $T_C \leq 235\text{ °C}$ | 2          | A    |
| Operating and storage temperature | $T_j, T_{stg}$ |                          | -55 to 250 | °C   |

### Electrical Characteristics at $T_j = 250\text{ °C}$ , unless otherwise specified

| Parameter               | Symbol               | Conditions  | Values                                       |      |      | Unit          |
|-------------------------|----------------------|---|--|------|------|---------------|
|                         |                      |   | min.   | typ. | max. |               |
| Diode forward voltage   | $V_F$                | $I_F = 1\text{ A}, T_j = 25\text{ °C}$  |  | 1.96 |      | V             |
|                         |                      | $I_F = 1\text{ A}, T_j = 210\text{ °C}$   |  | 3.1  |      |               |
| Reverse current         | $I_R$                | $V_R = 1200\text{ V}, T_j = 25\text{ °C}$   |  | 0.1  | 10   | $\mu\text{A}$ |
|                         |                      | $V_R = 1200\text{ V}, T_j = 275\text{ °C}$  |  | 6.6  | 30   |               |
| Total capacitive charge | $Q_C$                | $I_F \leq I_{F,MAX}$<br>$dI_F/dt = 200\text{ A}/\mu\text{s}$<br>$T_j = 210\text{ °C}$ | $V_R = 400\text{ V}$                         | 6    |      | nC            |
|                         | $V_R = 960\text{ V}$ |   | 11   |      |      |               |
| Switching time          | $t_s$                |   | $V_R = 400\text{ V}$<br>$V_R = 960\text{ V}$ | < 17 |      | ns            |
| Total capacitance       | C                    | $V_R = 1\text{ V}, f = 1\text{ MHz}, T_j = 25\text{ °C}$                              |  | 66   |      | pF            |
|                         |                      | $V_R = 400\text{ V}, f = 1\text{ MHz}, T_j = 25\text{ °C}$                            |  | 10   |      |               |
|                         |                      | $V_R = 1000\text{ V}, f = 1\text{ MHz}, T_j = 25\text{ °C}$                           |  | 8    |      |               |

### Thermal Characteristics

|                                     |            |                         |      |      |
|-------------------------------------|------------|-------------------------|------|------|
| Thermal resistance, junction - case | $R_{thJC}$ | Assuming TO-276 package | 3.55 | °C/W |
|-------------------------------------|------------|-------------------------|------|------|

\*For chip size and metallization, please refer to the mechanical datasheet (must have a non-disclosure agreement with GeneSiC Semiconductor).

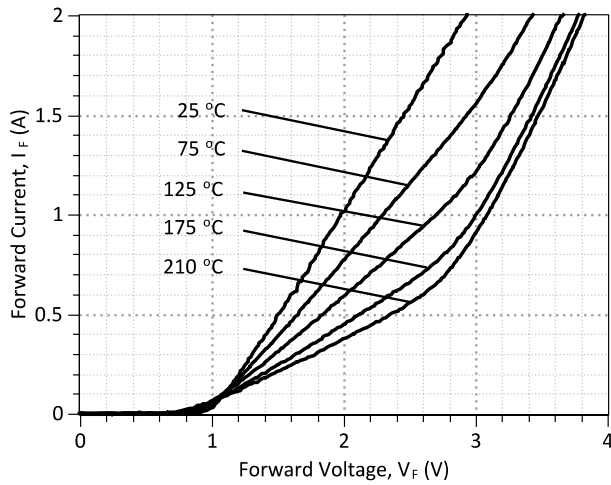


Figure 1: Typical Forward Characteristics

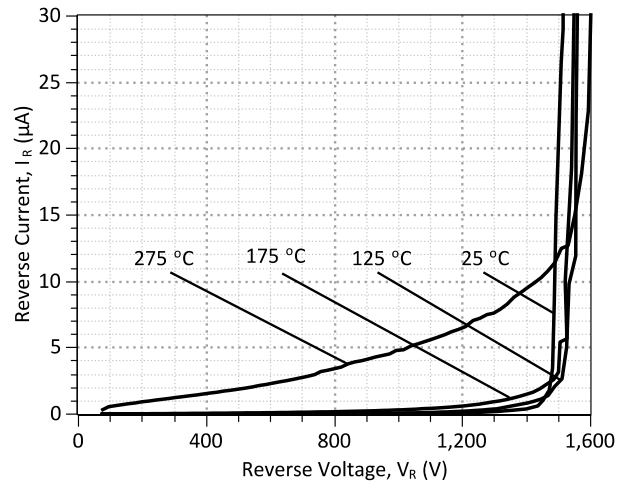


Figure 2: Typical Reverse Characteristics

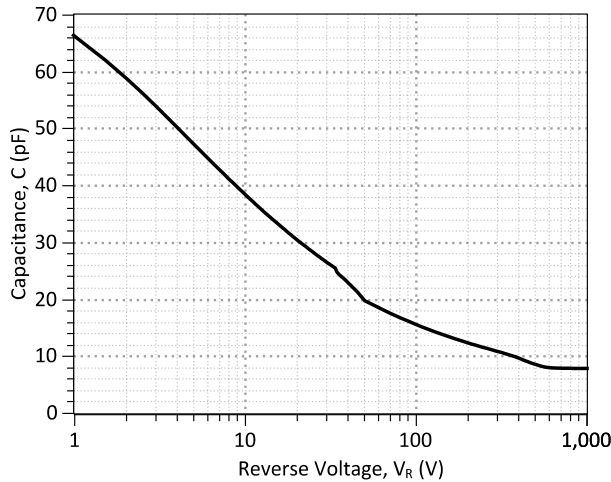


Figure 3: Typical Junction Capacitance vs Reverse Voltage Characteristics

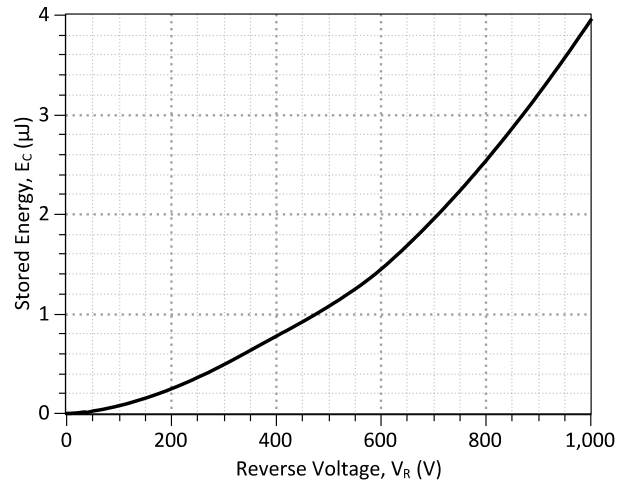


Figure 4: Typical Switching Energy vs Reverse Voltage Characteristics

| Revision History |          |                 |            |
|------------------|----------|-----------------|------------|
| Date             | Revision | Comments        | Supersedes |
| 2012/04/03       | 0        | Initial release |            |

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## SPICE Model Parameters

Copy the following code into a SPICE software program for simulation of the GB01SHT12-CAU device.

```
*      MODEL OF GeneSiC Semiconductor Inc.
*
*      $Revision:   1.0           $
*      $Date:      05-SEP-2013   $
*
*      GeneSiC Semiconductor Inc.
*      43670 Trade Center Place Ste. 155
*      Dulles, VA 20166
*      http://www.genesicsemi.com/index.php/sic-products/schottky
*
*      COPYRIGHT (C) 2013 GeneSiC Semiconductor Inc.
*      ALL RIGHTS RESERVED
*
*      These models are provided "AS IS, WHERE IS, AND WITH NO WARRANTY
*      OF ANY KIND EITHER EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED
*      TO ANY IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A
*      PARTICULAR PURPOSE."
*      Models accurate up to 2 times rated drain current.
*
*      Start of GB01SHT12-CAU SPICE Model
*
.SUBCKT GB01SHT12 ANODE KATHODE
R1 ANODE INT R=((TEMP-24)*0.0099); Temperature Dependant Resistor
D1 INT KATHODE GB01SHT12_25C; Call the 25C Diode Model
D2 ANODE KATHODE GB01SHT12_PIN; Call the PiN Diode Model
.MODEL GB01SHT12_25C D
+ IS      1.88E-18      RS      0.9255
+ N       1            IKF     98.29122743
+ EG      1.2          XTI     3
+ CJO     7.90E-11     VJ      0.367
+ M       1.63         FC      0.5
+ TT      1.00E-10     BV      1500
+ IBV     1.00E-03     VPK     1200
+ IAVE    1            TYPE    SiC_Schottky
+ MFG     GeneSiC_Semiconductor
.MODEL GB01SHT12_PIN D
+ IS      2.76E-16      RS      0.84243
+ N       3.791461     IKF     2.98675
+ EG      3.23         XTI     30
+ FC      0.5         TT      0
+ BV      1500        IBV     1.00E-03
+ VPK     1200        IAVE    1
+ TYPE    SiC_PiN
.ENDS
*
*      End of GB01SHT12-CAU SPICE Model
```