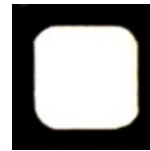


## High Temperature Silicon Carbide Power Schottky Diode

|                                  |   |        |
|----------------------------------|---|--------|
| $V_{RRM}$                        | = | 1200 V |
| $I_F @ 25\text{ }^\circ\text{C}$ | = | 2.5 A  |
| $Q_C$                            | = | 6 nC   |

### Features

- 1200 V Schottky rectifier
- 210°C maximum operating temperature
- Zero reverse recovery charge
- Superior surge current capability
- Positive temperature coefficient of  $V_F$
- Temperature independent switching behavior
- Lowest figure of merit  $Q_C/I_F$
- Available screened to Mil-PRF-19500



Die Size = 0.9 mm x 0.9 mm

### Advantages

- High temperature operation
- Improved circuit efficiency (Lower overall cost)
- Low switching losses
- Ease of paralleling devices without thermal runaway
- Smaller heat sink requirements
- Industry's lowest reverse recovery charge
- Industry's lowest device capacitance
- Ideal for output switching of power supplies
- Best in class reverse leakage current at operating temperature

### Applications

- Down Hole Oil Drilling
- Geothermal Instrumentation
- Solenoid Actuators
- General Purpose High-Temperature Switching
- Amplifiers
- Solar Inverters
- Switched-Mode Power Supply (SMPS)
- Power Factor Correction (PFC)

### Maximum Ratings at $T_j = 210\text{ }^\circ\text{C}$ , unless otherwise specified

| Parameter  | Symbol         | Conditions   | Values |            | Unit                 |
|--|----------------|--|--------|------------|----------------------|
|  |                |  | min.   | typ.       |                      |
| Repetitive peak reverse voltage                      | $V_{RRM}$      |  |        | 1200       | V                    |
| Continuous forward current                           | $I_F$          | $T_C = 25\text{ }^\circ\text{C}$ , $R_{thJC} = 9.52$             |        | 2.5        | A                    |
| Continuous forward current                           | $I_F$          | $T_C \leq 190\text{ }^\circ\text{C}$ , $R_{thJC} = 9.52$         |        | 0.75       | A                    |
| RMS forward current                                  | $I_{F(RMS)}$   | $T_C \leq 190\text{ }^\circ\text{C}$ , $R_{thJC} = 9.52$         |        | 1.3        | A                    |
| Surge non-repetitive forward current, Half Sine Wave | $I_{F,SM}$     | $T_C = 25\text{ }^\circ\text{C}$ , $t_p = 10\text{ ms}$          |        | 8          | A                    |
| Non-repetitive peak forward current                  | $I_{F,max}$    | $T_C = 25\text{ }^\circ\text{C}$ , $t_p = 10\text{ }\mu\text{s}$ |        | 65         | A                    |
| $I^2t$ value   | $\int i^2 dt$  | $T_C = 25\text{ }^\circ\text{C}$ , $t_p = 10\text{ ms}$          |        | 0.5        | $\text{A}^2\text{S}$ |
| Power dissipation                                    | $P_{tot}$      | $T_C = 25\text{ }^\circ\text{C}$ , $R_{thJC} = 9.52$             |        | 26         | W                    |
| Operating and storage temperature                    | $T_j, T_{stg}$ |  |        | -55 to 210 | $^\circ\text{C}$     |

### Electrical Characteristics at $T_j = 210\text{ }^\circ\text{C}$ , unless otherwise specified

| Parameter               | Symbol | Conditions  | Values               |      |      | Unit          |
|-------------------------|--------|---|----------------------|------|------|---------------|
|                         |        |   | min.                 | typ. | max. |               |
| Diode forward voltage   | $V_F$  | $I_F = 0.75\text{ A}$ , $T_j = 25\text{ }^\circ\text{C}$  |                      | 1.7  |      | V             |
|                         |        |   |                      | 2.8  |      |               |
| Reverse current         | $I_R$  | $V_R = 1200\text{ V}$ , $T_j = 25\text{ }^\circ\text{C}$<br>$V_R = 1200\text{ V}$ , $T_j = 210\text{ }^\circ\text{C}$ |                      | 1    | 10   | $\mu\text{A}$ |
|                         |        |   |                      | 10   | 100  |               |
| Total capacitive charge | $Q_C$  | $I_F \leq I_{F,MAX}$<br>$di_F/dt = 200\text{ A}/\mu\text{s}$<br>$T_j = 210\text{ }^\circ\text{C}$                     | $V_R = 400\text{ V}$ | 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      | $V_R = 1\text{ V}$ , $f = 1\text{ MHz}$ , $T_j = 25\text{ }^\circ\text{C}$  |                      | 66   |      | pF            |
|                         |        | $V_R = 400\text{ V}$ , $f = 1\text{ MHz}$ , $T_j = 25\text{ }^\circ\text{C}$  |                      | 10   |      |               |
|                         |        | $V_R = 1000\text{ V}$ , $f = 1\text{ MHz}$ , $T_j = 25\text{ }^\circ\text{C}$   |                      | 8    |      |               |

Figures:

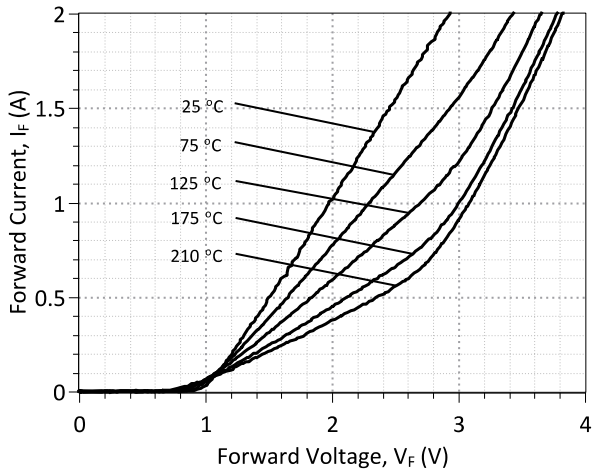


Figure 1: Typical Forward Characteristics

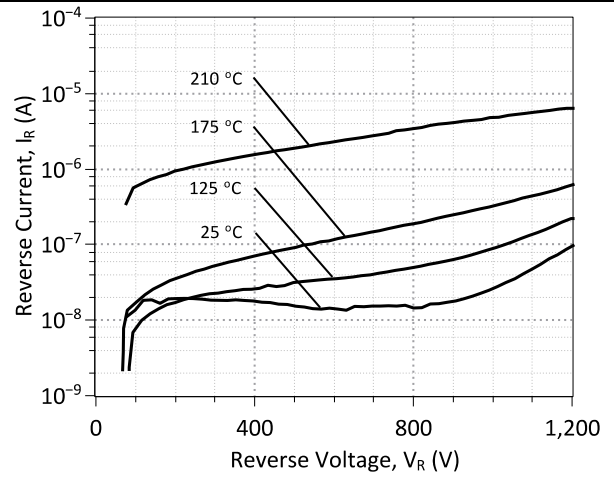


Figure 2: Typical Reverse Characteristics

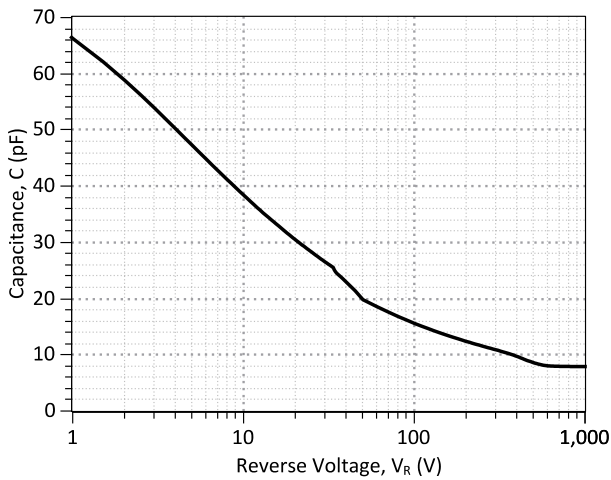


Figure 3: Typical Junction Capacitance vs Reverse Voltage Characteristics

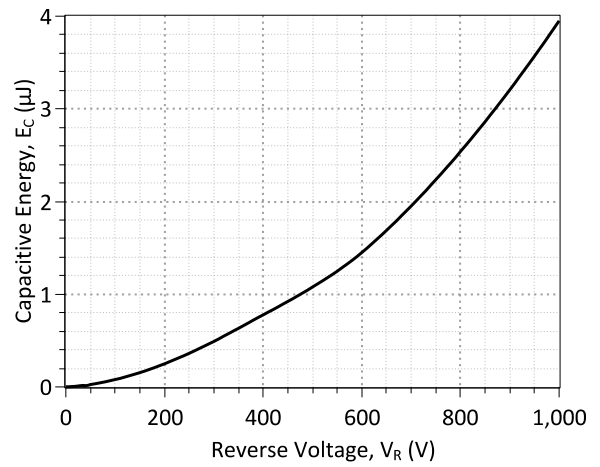
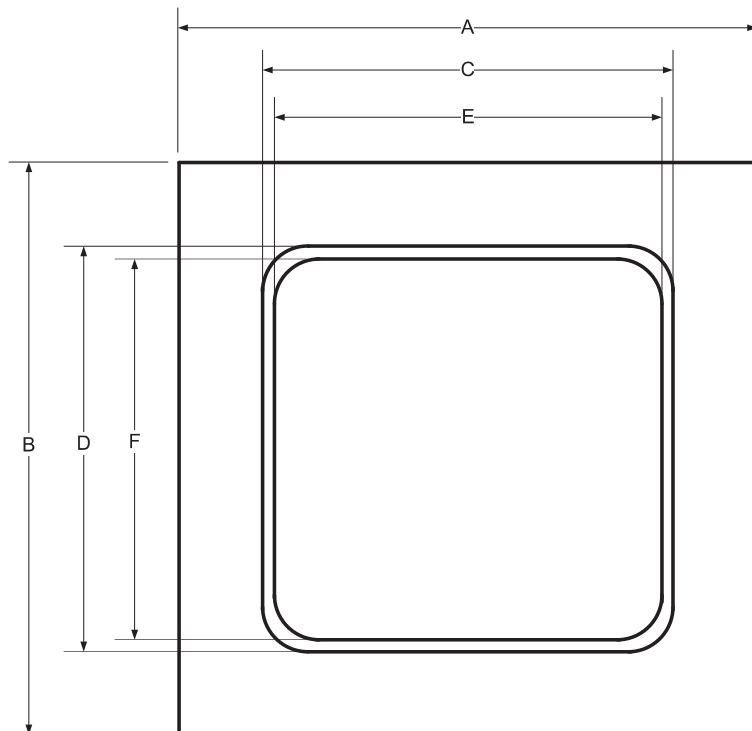


Figure 4: Typical Capacitive Energy vs Reverse Voltage Characteristics

**Mechanical Parameters**

|                                 |  |                 |
|---------------------------------|--|-----------------|
| Die Dimensions                  | 0.9 x 0.9  | mm <sup>2</sup> |
| Anode pad size                  | 0.64 x 0.64  |                 |
| Die Area total / active         | 0.81/0.36  |                 |
| Die Thickness                   | 360  | µm              |
| Wafer Size                      | 100  | mm              |
| Flat Position                   | 0  | deg             |
| Die Frontside Passivation       | Polyimide  |                 |
| Anode Pad Metallization         | 4000 nm Al   |                 |
| Backside Cathode Metallization  | 400 nm Ni + 200 nm Au  |                 |
| Die Attach                      | Electrically conductive glue or solder   |                 |
| Wire Bond                       | Al ≤ 350 µm  |                 |
| Reject ink dot size             | Φ ≥ 0.3 mm   |                 |
| Recommended storage environment | Store in original container, in dry nitrogen,<br>< 6 months at an ambient temperature of 23 °C |                 |

**Chip Dimensions:**



|                      |        |      |
|----------------------|--------|------|
| <b>DIE</b>           | A [mm] | 0.9  |
|                      | B [mm] | 0.9  |
| <b>METAL</b>         | C [mm] | 0.64 |
|                      | D [mm] | 0.64 |
| <b>WIRE BONDABLE</b> | E [mm] | 0.6  |
|                      | F [mm] | 0.6  |

**Revision History**

| Date       | Revision | Comments                       | Supersedes |
|------------|----------|--------------------------------|------------|
| 2015/02/09 | 1        | Inserted Mechanical Parameters |            |
| 2012/04/03 | 0        | Initial release                |            |

## Published by

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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/hit\\_sic/baredie/schottky/GB01SHT12-CAL\\_SPICE.pdf](http://www.genesicsemi.com/images/hit_sic/baredie/schottky/GB01SHT12-CAL_SPICE.pdf)) into LTSPICE (version 4) software for simulation of the GB01SHT12-CAL.

```
*      MODEL OF GeneSiC Semiconductor Inc.
*
*      $Revision:   1.0           $
*      $Date:      05-SEP-2013   $
*
*      GeneSiC Semiconductor Inc.
*      43670 Trade Center Place Ste. 155
*      Dulles, VA 20166
*
*      COPYRIGHT (C) 2013 GeneSiC Semiconductor Inc.
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*
*      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-CAL 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      1200
+ 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      1200         IBV     1.00E-03
+ VPK     1200         IAVE    1
+ TYPE    SiC_PiN
.ENDS
*
*      End of GB01SHT12-CAL SPICE Model
```