

## 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	$I_R$	$V_R = 1200\text{ V}$ , $T_j = 25\text{ }^\circ\text{C}$ $V_R = 1200\text{ V}$ , $T_j = 210\text{ }^\circ\text{C}$		1	10	$\mu\text{A}$
				10	100	
Total capacitive charge	$Q_C$	$I_F \leq I_{F,MAX}$ $di_F/dt = 200\text{ A}/\mu\text{s}$ $T_j = 210\text{ }^\circ\text{C}$	$V_R = 400\text{ V}$ $V_R = 960\text{ V}$		6	nC
					11	
Switching time	$t_s$	$T_j = 210\text{ }^\circ\text{C}$	$V_R = 400\text{ V}$ $V_R = 960\text{ V}$		< 17	ns
Total capacitance	C	$V_R = 1\text{ V}$ , $f = 1\text{ MHz}$ , $T_j = 25\text{ }^\circ\text{C}$ $V_R = 400\text{ V}$ , $f = 1\text{ MHz}$ , $T_j = 25\text{ }^\circ\text{C}$ $V_R = 1000\text{ V}$ , $f = 1\text{ MHz}$ , $T_j = 25\text{ }^\circ\text{C}$		66		pF
				10		
				8		

Figures:

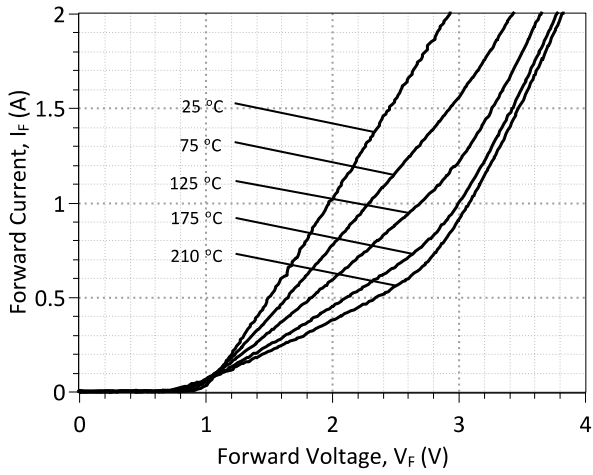


Figure 1: Typical Forward Characteristics

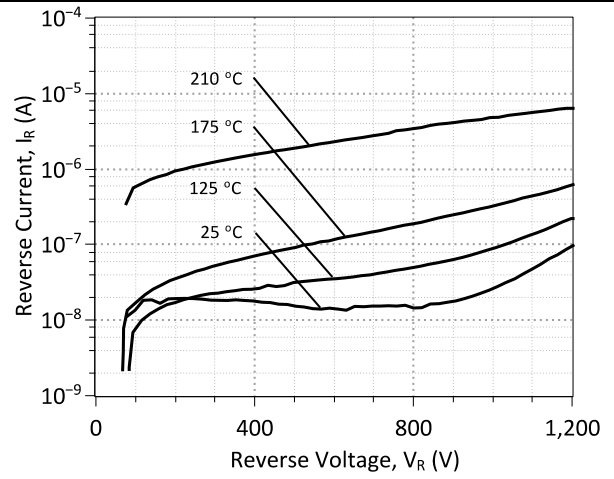


Figure 2: Typical Reverse Characteristics

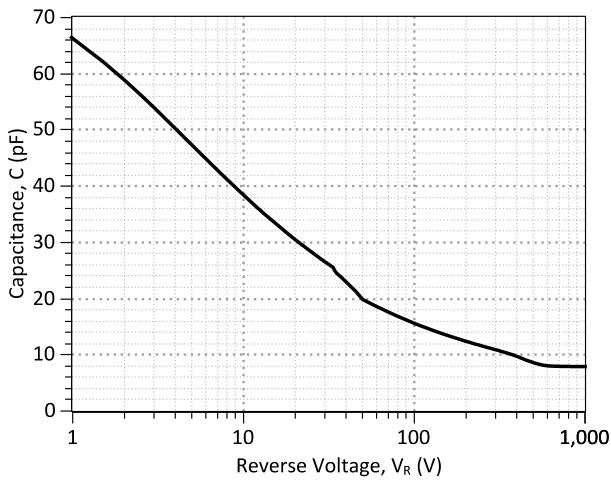


Figure 3: Typical Junction Capacitance vs Reverse Voltage Characteristics

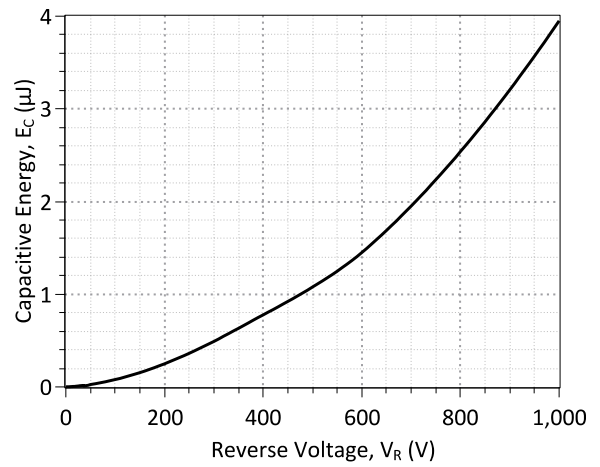
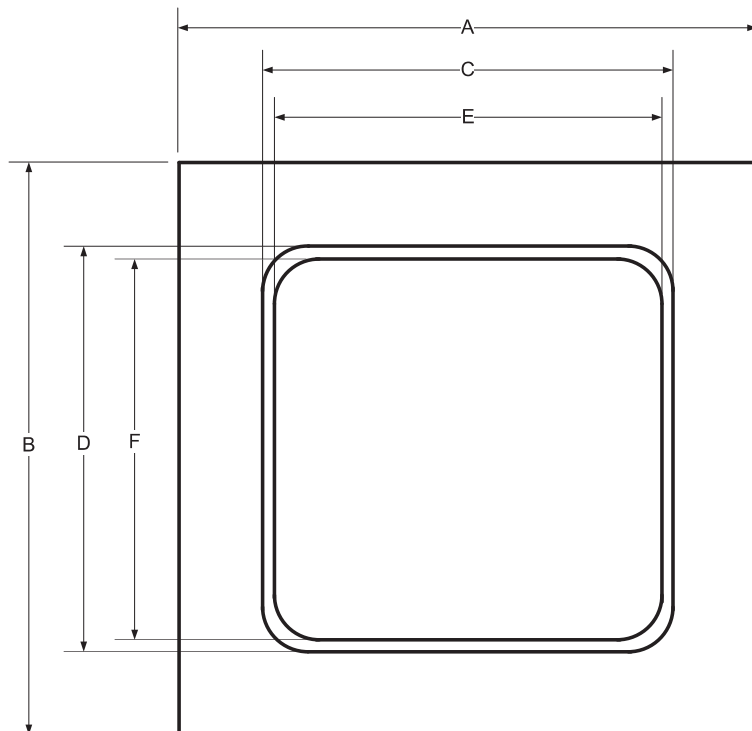


Figure 4: Typical Capacitive Energy vs Reverse Voltage Characteristics

**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, < 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
```