

## High Temperature Silicon Carbide Power Schottky Diode

$V_{RRM}$	=	650 V
$I_F @ 25\text{ }^\circ\text{C}$	=	8 A
$Q_C$	=	20 nC

### Features

- 650 V Schottky rectifier
- 250 °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 = 1.6 mm x 1.6 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)

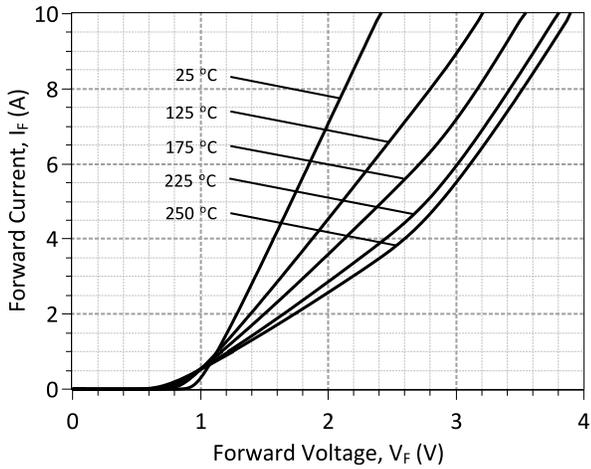
### Maximum Ratings at $T_j = 250\text{ }^\circ\text{C}$ , unless otherwise specified

Parameter	Symbol	Conditions	Values	Unit
Repetitive peak reverse voltage	$V_{RRM}$		650	V
Continuous forward current	$I_F$	$T_C = 25\text{ }^\circ\text{C}$ , $R_{thJC} = 3.4$	8	A
Continuous forward current	$I_F$	$T_C \leq 225\text{ }^\circ\text{C}$ , $R_{thJC} = 3.4$	2.5	A
RMS forward current	$I_{F(RMS)}$	$T_C \leq 225\text{ }^\circ\text{C}$ , $R_{thJC} = 3.4$	4.3	A
Surge non-repetitive forward current, Half Sine Wave	$I_{F,SM}$	$T_C = 25\text{ }^\circ\text{C}$ , $t_p = 10\text{ ms}$	32	A
Non-repetitive peak forward current	$I_{F,max}$	$T_C = 25\text{ }^\circ\text{C}$ , $t_p = 10\text{ }\mu\text{s}$	120	A
$I^2t$ value	$\int i^2 dt$	$T_C = 25\text{ }^\circ\text{C}$ , $t_p = 10\text{ ms}$	5	A <sup>2</sup> S
Power dissipation	$P_{tot}$	$T_C = 25\text{ }^\circ\text{C}$ , $R_{thJC} = 3.4$	66	W
Operating and storage temperature	$T_j, T_{sig}$		-55 to 250	$^\circ\text{C}$

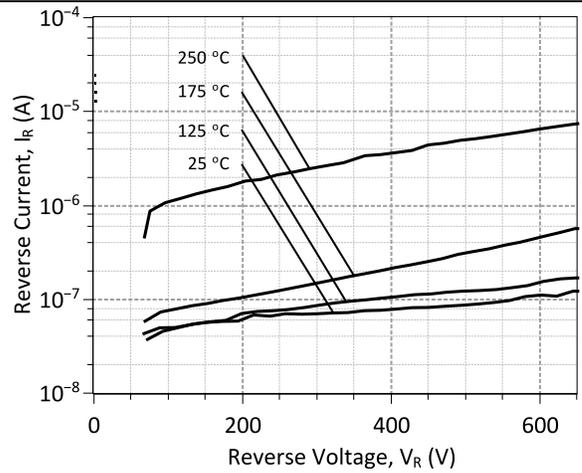
### Electrical Characteristics at $T_j = 250\text{ }^\circ\text{C}$ , unless otherwise specified

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Diode forward voltage	$V_F$	$I_F = 2.5\text{ A}$ , $T_j = 25\text{ }^\circ\text{C}$		1.3		V
		$I_F = 2.5\text{ A}$ , $T_j = 250\text{ }^\circ\text{C}$		2.0		
Reverse current	$I_R$	$V_R = 650\text{ V}$ , $T_j = 25\text{ }^\circ\text{C}$		1	5	$\mu\text{A}$
		$V_R = 650\text{ V}$ , $T_j = 250\text{ }^\circ\text{C}$		10	100	
Total capacitive charge	$Q_C$	$I_F \leq I_{F,MAX}$ $dI_F/dt = 200\text{ A}/\mu\text{s}$ $T_j = 210\text{ }^\circ\text{C}$		20		nC
Switching time	$t_s$	$V_R = 400\text{ V}$		< 25		ns
		$V_R = 400\text{ V}$		< 25		
Total capacitance	C	$V_R = 1\text{ V}$ , $f = 1\text{ MHz}$ , $T_j = 25\text{ }^\circ\text{C}$		274		pF
		$V_R = 400\text{ V}$ , $f = 1\text{ MHz}$ , $T_j = 25\text{ }^\circ\text{C}$		31		
		$V_R = 650\text{ V}$ , $f = 1\text{ MHz}$ , $T_j = 25\text{ }^\circ\text{C}$		29		

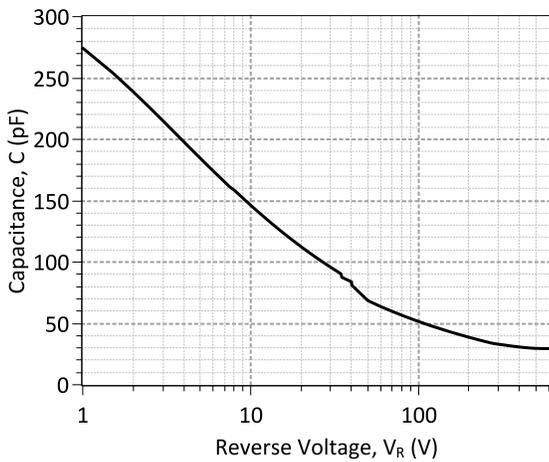
**Figures:**



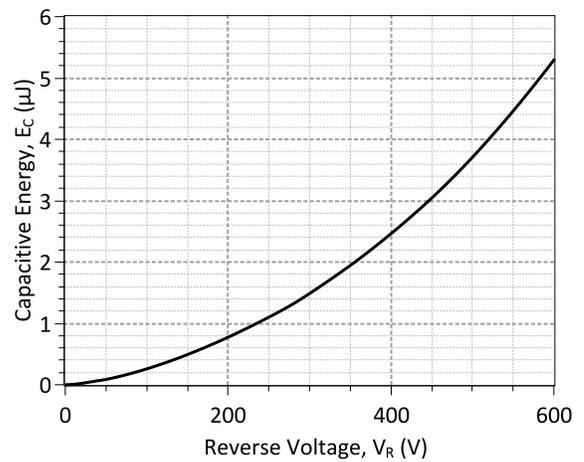
**Figure 1: Typical Forward Characteristics**



**Figure 2: Typical Reverse Characteristics**



**Figure 3: Typical Junction Capacitance vs Reverse Voltage Characteristics**

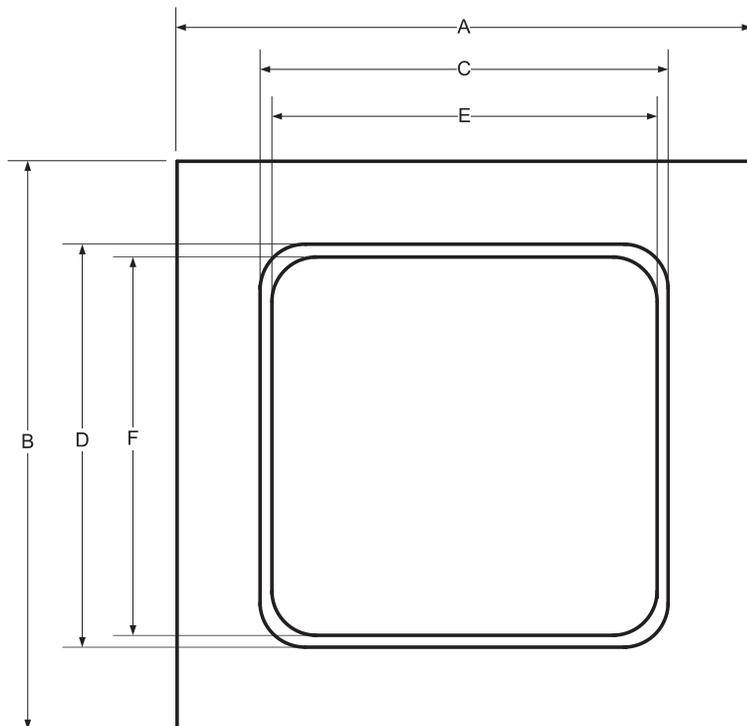


**Figure 4: Typical Capacitive Energy vs Reverse Voltage Characteristics**

**Mechanical Parameters**

Die Dimensions	1.6 x 1.6	mm <sup>2</sup>
Anode pad size	1.34 x 1.34	
Die Area total / active	2.56/1.69	
Die Thickness	360	μm
Wafer Size	100	mm
Flat Position	0	deg
Die Frontside Passivation	Polyimide	
Anode Pad Metallization	400 nm Ni + 200 nm Au	
Backside Cathode Metallization	400 nm Ni + 200 nm Au	
Die Attach	Electrically conductive glue or solder	
Wire Bond	Au ≤ 76 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]	1.6
	B [mm]	1.6
<b>METAL</b>	C [mm]	1.34
	D [mm]	1.34
<b>WIRE BONDABLE</b>	E [mm]	1.3
	F [mm]	1.3

**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/GB05SHT06-CAU\\_SPICE.pdf](http://www.genesicsemi.com/images/hit_sic/baredie/schottky/GB05SHT06-CAU_SPICE.pdf)) into LTSPICE (version 4) software for simulation of the GB05SHT06-CAU.

```
*      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 GB05SHT06-CAU SPICE Model
*
.SUBCKT GB05SHT06 ANODE KATHODE
D1 ANODE KATHODE GB05SHT06_25C; Call the Schottky Diode Model
D2 ANODE KATHODE GB05SHT06_PIN; Call the PiN Diode Model
.MODEL GB05SHT06_25C D
+ IS      1.99E-17      RS      0.12463
+ N       1            IKF     569.082
+ EG      1.2          XTI     3
+ TRS1    0.0035       TRS2    3.87E-05
+ CJO     3.38E-10     VJ      0.41772
+ M       1.5479       FC      0.5
+ TT      1.00E-10     BV      650
+ IBV     1.00E-03     VPK     650
+ IAVE    5            TYPE    SiC_Schottky
+ MFG     GeneSiC_Semiconductor
.MODEL GB05SHT06_PIN D
+ IS      1.33E-10     RS      0.31147
+ N       5            IKF     0
+ EG      3.23         XTI     -10
+ FC      0.5          TT      0
+ BV      650          IBV     1.00E-03
+ VPK     650          IAVE    5
+ TYPE    SiC_PiN
.ENDS
*
*      End of GB05SHT06-CAU SPICE Model
```

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