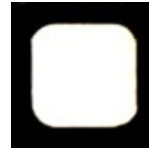


# High Temperature Silicon Carbide Power Schottky Diode

$V_{RRM}$	=	650 V
$I_F @ 25\text{ }^\circ\text{C}$	=	2.5 A
$Q_C$	=	7 nC

## Features

- 650 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)

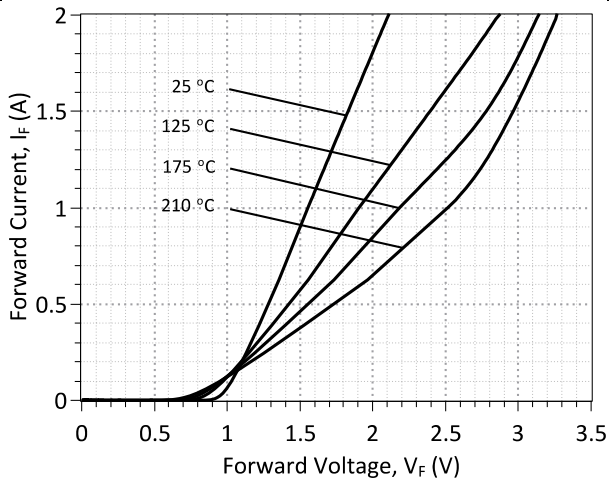
## Maximum Ratings at $T_j = 210\text{ }^\circ\text{C}$ , unless otherwise specified

Parameter	Symbol	Conditions	Values		Unit
			min.	typ.	
Repetitive peak reverse voltage	$V_{RRM}$			650	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	$I_{F,SM}$	$T_C = 25\text{ }^\circ\text{C}$ , $t_p = 10\text{ ms}$		10	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	$\int j^2 dt$	$T_C = 25\text{ }^\circ\text{C}$ , $t_p = 10\text{ ms}$		0.5	A <sup>2</sup> S
Power dissipation	$P_{tot}$	$T_C = 25\text{ }^\circ\text{C}$ , $R_{thJC} = 9.52$		24	W
Operating and storage temperature	$T_j, T_{stg}$			-55 to 210	°C

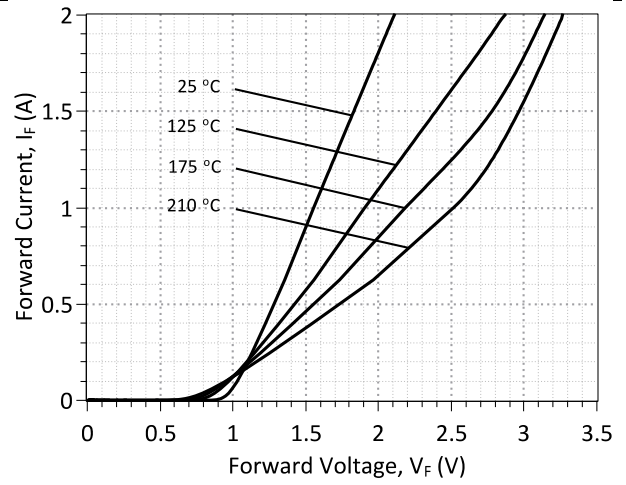
## Electrical Characteristics at $T_j = 210\text{ }^\circ\text{C}$ , unless otherwise specified

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Diode forward voltage	$V_F$	$I_F = 0.75\text{ A}$ , $T_j = 25\text{ }^\circ\text{C}$		1.4		V
		$I_F = 0.75\text{ A}$ , $T_j = 210\text{ }^\circ\text{C}$		2.3		
Reverse current	$I_R$	$V_R = 650\text{ V}$ , $T_j = 25\text{ }^\circ\text{C}$		1	5	$\mu\text{A}$
		$V_R = 650\text{ V}$ , $T_j = 210\text{ }^\circ\text{C}$		5	50	
Total capacitive charge	$Q_C$	$I_F \leq I_{F,MAX}$ $dI_F/dt = 200\text{ A}/\mu\text{s}$ $T_j = 210\text{ }^\circ\text{C}$		7		nC
Switching time	$t_s$	$V_R = 400\text{ V}$		< 17		ns
		$V_R = 400\text{ V}$		< 17		
Total capacitance	C	$V_R = 1\text{ V}$ , $f = 1\text{ MHz}$ , $T_j = 25\text{ }^\circ\text{C}$		76		pF
		$V_R = 400\text{ V}$ , $f = 1\text{ MHz}$ , $T_j = 25\text{ }^\circ\text{C}$		12		
		$V_R = 650\text{ V}$ , $f = 1\text{ MHz}$ , $T_j = 25\text{ }^\circ\text{C}$		12		

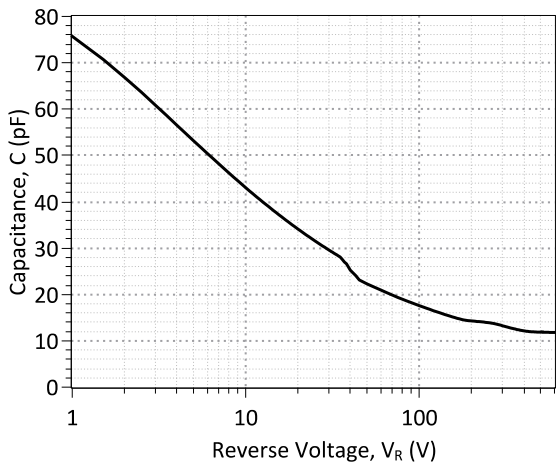
**Figures:**



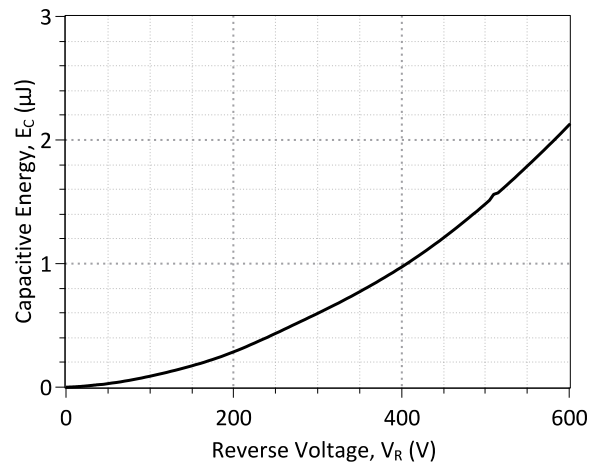
**Figure 1: Typical Forward Characteristics**



**Figure 2: Typical Reverse Characteristics**



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

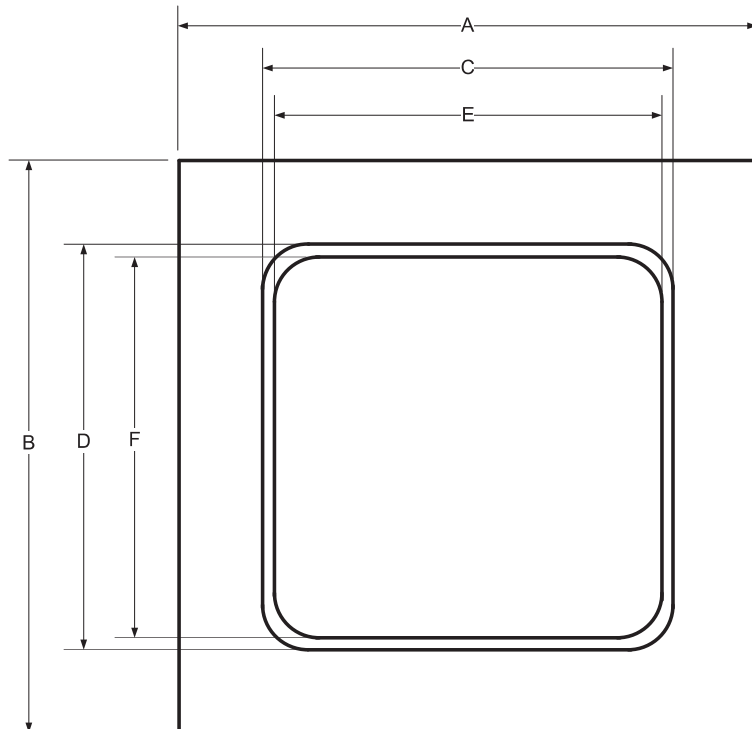


**Figure 4: Typical Capacitive Energy vs Reverse Voltage Characteristics**

**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	

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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/GB01SHT06-CAL\\_SPICE.pdf](http://www.genesicsemi.com/images/hit_sic/baredie/schottky/GB01SHT06-CAL_SPICE.pdf)) into LTSPICE (version 4) software for simulation of the GB01SHT06-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 GB01SHT06-CAL SPICE Model
*
.SUBCKT GB01SHT06 ANODE KATHODE
D1 ANODE KATHODE GB01SHT06_25C; Call the Schottky Diode Model
D2 ANODE KATHODE GB01SHT06_PIN; Call the PiN Diode Model
.MODEL GB01SHT06_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 GB01SHT06_PIN D
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+ 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 GB01SHT06-CAL SPICE Model
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