

## Silicon Carbide Power Schottky Diode

$V_{RRM}$	=	3300 V
$I_F @ 25\text{ }^\circ\text{C}$	=	0.3 A
$Q_C$	=	20 nC

### Features

- 3300 V Schottky rectifier
- 210 °C maximum operating temperature
- Positive temperature coefficient of  $V_F$
- Fast switching speeds
- Superior figure of merit  $Q_C/I_F$



Die Size = 1.39 mm x 1.39 mm

### Advantages

- Improved circuit efficiency (Lower overall cost)
- Significantly reduced switching losses compare to Si PiN diodes
- Ease of paralleling devices without thermal runaway
- Smaller heat sink requirements
- Low reverse recovery current
- Low device capacitance

### Applications

- Down Hole Oil Drilling, Geothermal Instrumentation
- High Voltage Multipliers
- Military Power Supplies

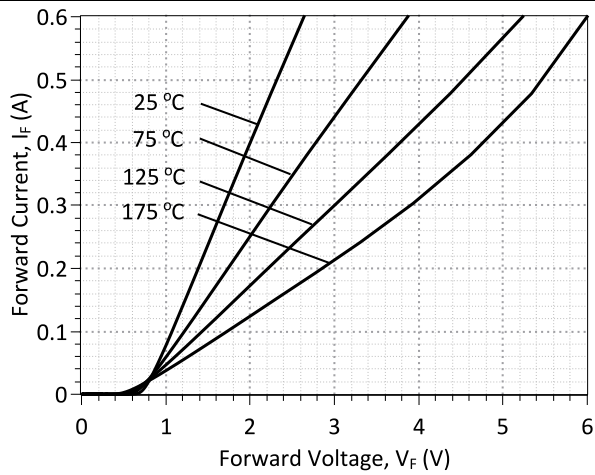
### Maximum Ratings at $T_j = 175\text{ }^\circ\text{C}$ , unless otherwise specified

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Repetitive peak reverse voltage	$V_{RRM}$			3300		V
Continuous forward current	$I_F$	$T_C \leq 125\text{ }^\circ\text{C}$ , $R_{thJC} = 1.69$		0.3		A
RMS forward current	$I_{F(RMS)}$	$T_C \leq 125\text{ }^\circ\text{C}$ , $R_{thJC} = 1.69$		0.35		A
Surge non-repetitive forward current, Half Sine Wave	$I_{F,SM}$	$T_C = 25\text{ }^\circ\text{C}$ , $t_p = 10\text{ ms}$		2		A
		$T_C = 125\text{ }^\circ\text{C}$ , $t_p = 10\text{ ms}$		1		A
Non-repetitive peak forward current	$I_{F,max}$	$T_C = 25\text{ }^\circ\text{C}$ , $t_p = 10\text{ }\mu\text{s}$		10		A
$I^2t$ value	$\int i^2 dt$	$T_C = 25\text{ }^\circ\text{C}$ , $t_p = 10\text{ ms}$		0.1		A <sup>2</sup> S
Power dissipation	$P_{tot}$	$T_C = 25\text{ }^\circ\text{C}$ , $R_{thJC} = 1.69$		89		W
Operating and storage temperature	$T_j, T_{stg}$			-55 to 210		°C

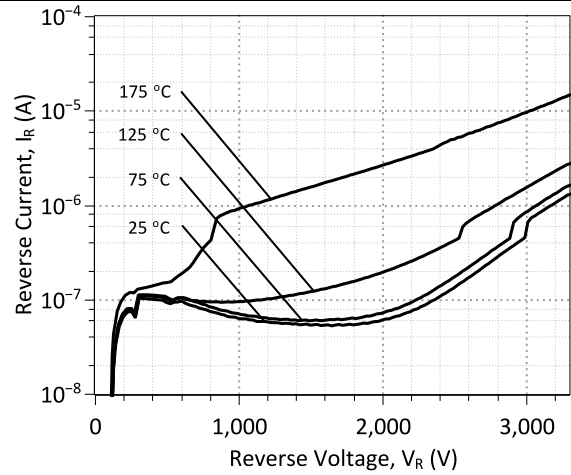
### Electrical Characteristics at $T_j = 175\text{ }^\circ\text{C}$ , unless otherwise specified

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Diode forward voltage	$V_F$	$I_F = 0.3\text{ A}$ , $T_j = 25\text{ }^\circ\text{C}$		1.7	2.2	V
		$I_F = 0.3\text{ A}$ , $T_j = 175\text{ }^\circ\text{C}$		4.0	5.0	
Reverse current	$I_R$	$V_R = 3300\text{ V}$ , $T_j = 25\text{ }^\circ\text{C}$		1	10	$\mu\text{A}$
		$V_R = 3300\text{ V}$ , $T_j = 175\text{ }^\circ\text{C}$		10	100	
Total capacitive charge	$Q_C$	$I_F \leq I_{F,MAX}$ $di_F/dt = 35\text{ A}/\mu\text{s}$ $T_j = 175\text{ }^\circ\text{C}$	$V_R = 1500\text{ V}$	20		nC
Switching time	$t_s$		$V_R = 1500\text{ V}$	< 60		ns
Total capacitance	C	$V_R = 1\text{ V}$ , $f = 1\text{ MHz}$ , $T_j = 25\text{ }^\circ\text{C}$		42		pF
		$V_R = 400\text{ V}$ , $f = 1\text{ MHz}$ , $T_j = 25\text{ }^\circ\text{C}$		8		
		$V_R = 1000\text{ V}$ , $f = 1\text{ MHz}$ , $T_j = 25\text{ }^\circ\text{C}$		7		

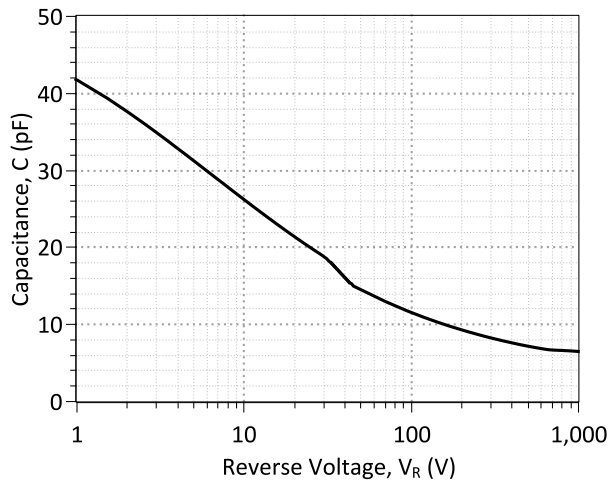
**Figures:**



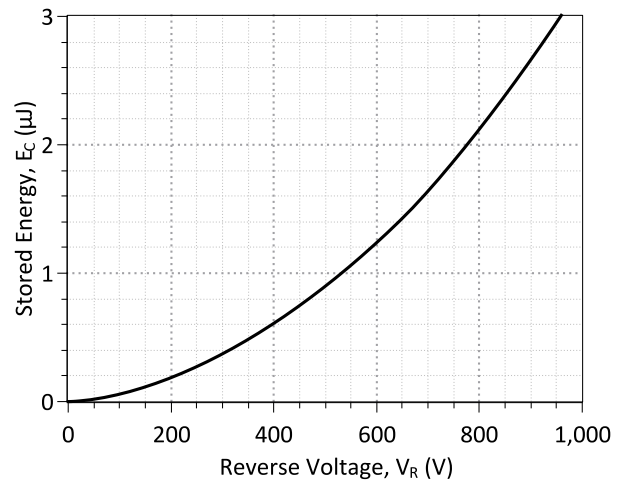
**Figure 1: Typical Forward Characteristics**



**Figure 2: Typical Reverse Characteristics**



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

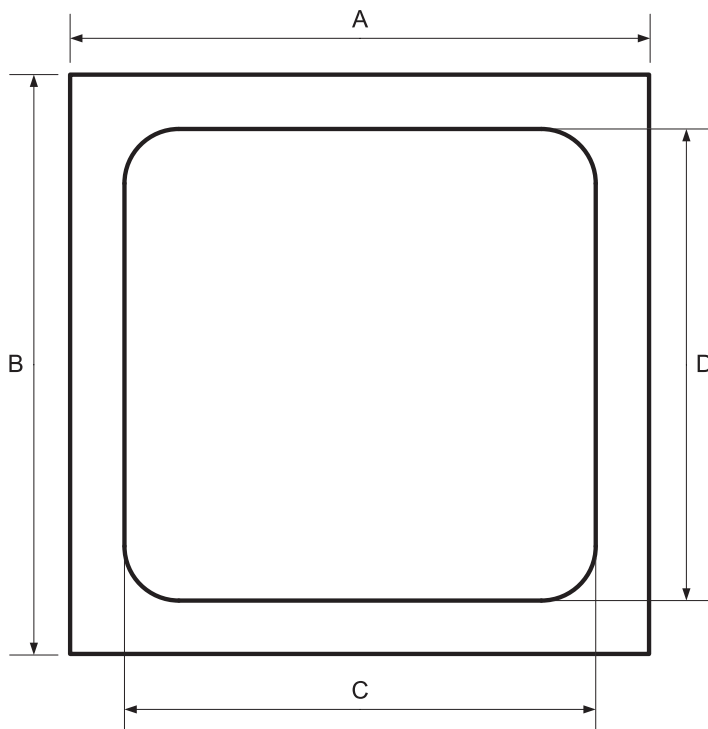


**Figure 4: Typical Capacitive Energy vs Reverse Voltage Characteristics**

**Mechanical Parameters**

Die Dimensions	1.39 x 1.39	mm <sup>2</sup>
Anode pad size	0.75 x 0.75	
Die Area total / active	1.93/0.56	
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 ≤ 1 mil	
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]	1.39
	B [mm]	1.39
<b>METAL</b>	C [mm]	0.75
	D [mm]	0.75

**Revision History**

Date	Revision	Comments	Supersedes
2015/0212	2	Inserted Mechanical Parameters	
2014/12/19	1	Updated Electrical Characteristics	
2013/09/09	0	Initial Release	

Published by  
GeneSiC Semiconductor, Inc.  
43670 Trade Center Place Suite 155  
Dulles, VA 20166

GeneSiC Semiconductor, Inc. reserves right to make changes to the product specifications and data in this document without notice.

GeneSiC disclaims all and any warranty and liability arising out of use or application of any product. No license, express or implied to any intellectual property rights is granted by this document.

Unless otherwise expressly indicated, GeneSiC products are not designed, tested or authorized for use in life-saving, medical, aircraft navigation, communication, air traffic control and weapons systems, nor in applications where their failure may result in death, personal injury and/or property damage.

## 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/GAP3SHT33-CAU\\_SPICE.pdf](http://www.genesicsemi.com/images/hit_sic/baredie/schottky/GAP3SHT33-CAU_SPICE.pdf)) into LTSPICE (version 4) software for simulation of the GAP3SHT33-CAU.

```
*      MODEL OF GeneSiC Semiconductor Inc.
*
*      $Revision:   1.0           $
*      $Date:      04-SEP-2013   $
*
*      GeneSiC Semiconductor Inc.
*      43670 Trade Center Place Ste. 155
*      Dulles, VA 20166
*
*      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 GAP3SHT33-CAU SPICE Model
*
.SUBCKT GAP3SHT33 ANODE KATHODE
R1 ANODE INT R=((TEMP-24)*0.0535); Temperature Dependant Resistor
D1 INT KATHODE GAP3SHT33_25C; Call the 25C Diode Model
D2 ANODE KATHODE GAP3SHT33_PIN; Call the PiN Diode Model
.MODEL GAP3SHT33_25C D
+ IS      1.39E-14      RS      2.88
+ N       1.0120127    IKF     36.05007504
+ EG      1.2          XTI     -3
+ CJO     6.01E-11     VJ     0.924257443
+ M       0.3084545    FC     0.5
+ TT      1.00E-10     BV     3300
+ IBV     1.00E-03     VPK    3300
+ IAVE    3.00E-01     TYPE   SiC_Schottky
+ MFG     GeneSiC_Semiconductor
.MODEL GAP3SHT33_PIN D
+ IS      178.99E-18   RS      15
+ N       5           EG     3.23
+ XTI     50          FC     0.5
+ TT      0           BV     3300
+ IBV     1.00E-03     VPK    3300
+ IAVE    3.00E-01     TYPE   SiC_PiN
.ENDS
* End of GAP3SHT33-CAU SPICE Model
```