

## 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:

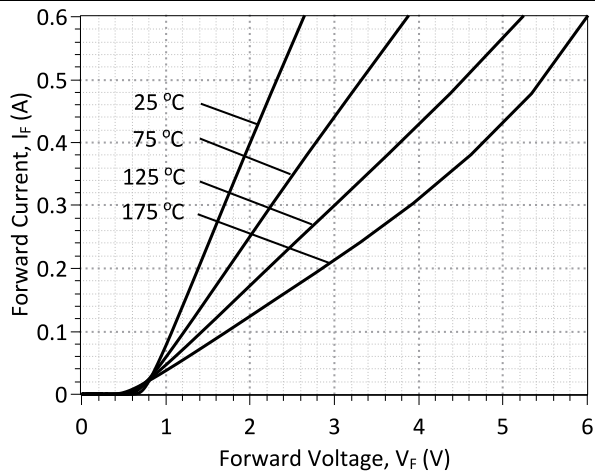


Figure 1: Typical Forward Characteristics

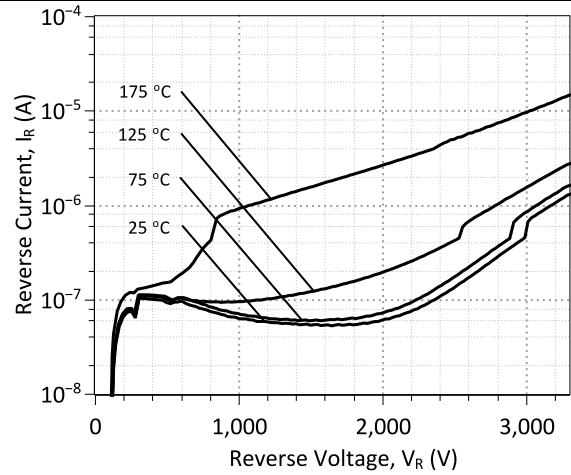


Figure 2: Typical Reverse Characteristics

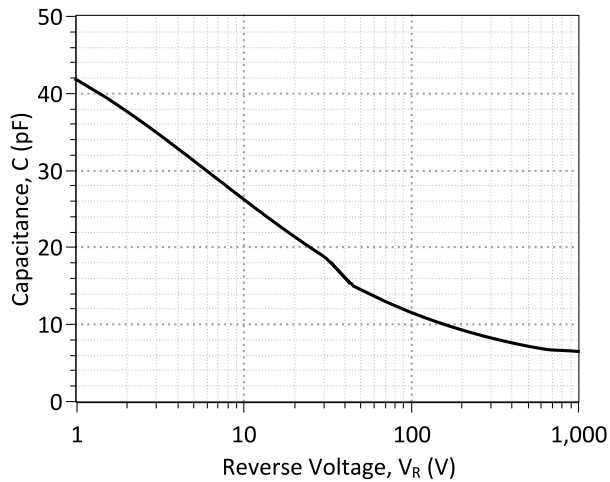


Figure 3: Typical Junction Capacitance vs Reverse Voltage Characteristics

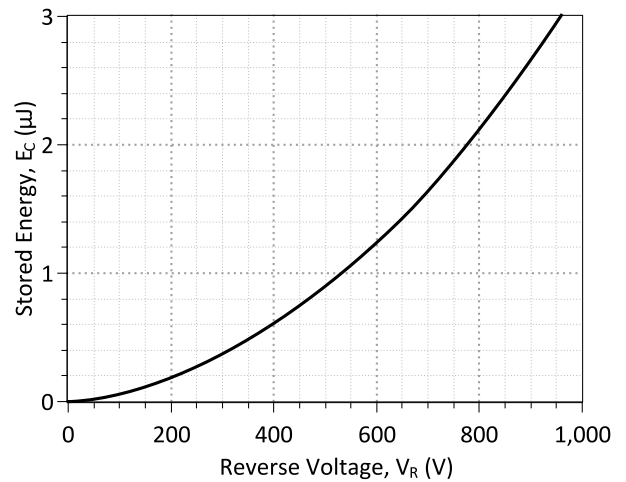
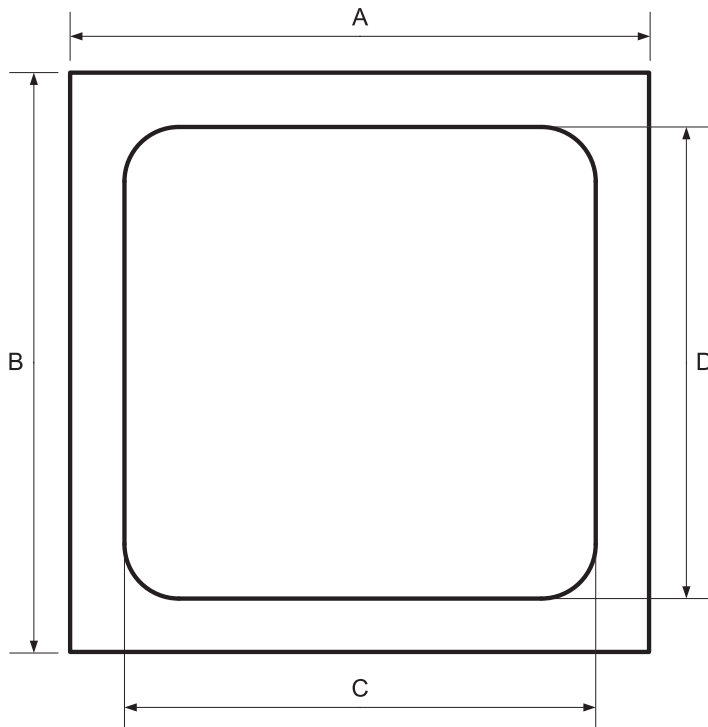


Figure 4: Typical Capacitive Energy vs Reverse Voltage Characteristics

**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	

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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/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
```