

## Silicon Carbide Power Schottky Diode Chip

$V_{RRM}$	=	3300 V
$V_F$	=	1.7 V
$I_F$	=	0.3 A
$Q_C$	=	52 nC

### Features

- 3300 V Schottky rectifier
- 175 °C maximum operating temperature
- Electrically isolated base-plate
- Positive temperature coefficient of  $V_F$
- Fast switching speeds
- Superior figure of merit  $Q_C/I_F$



### 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

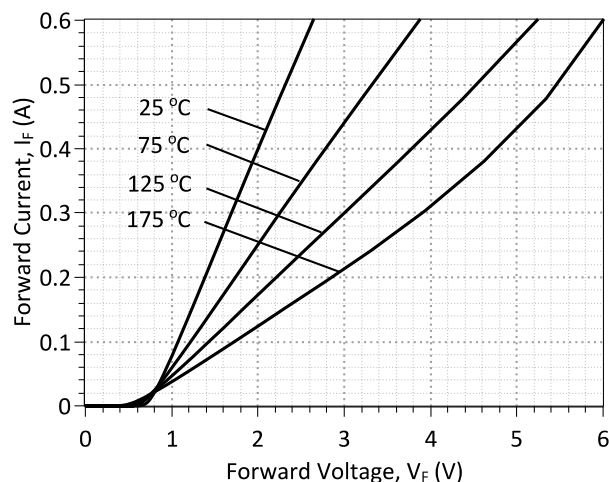
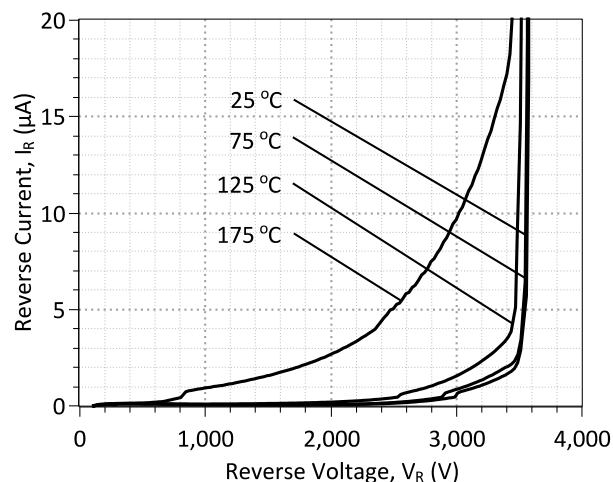
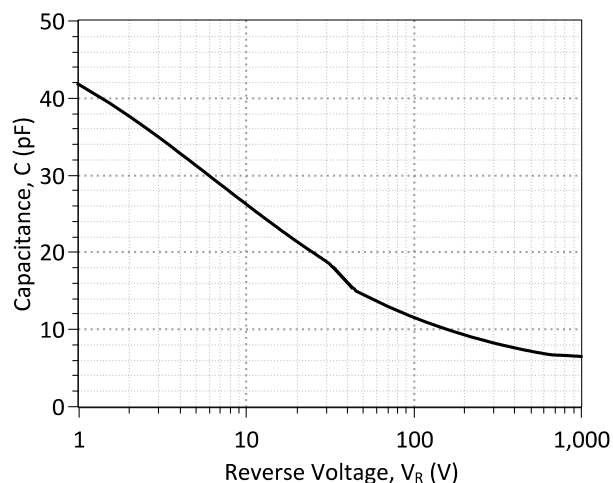
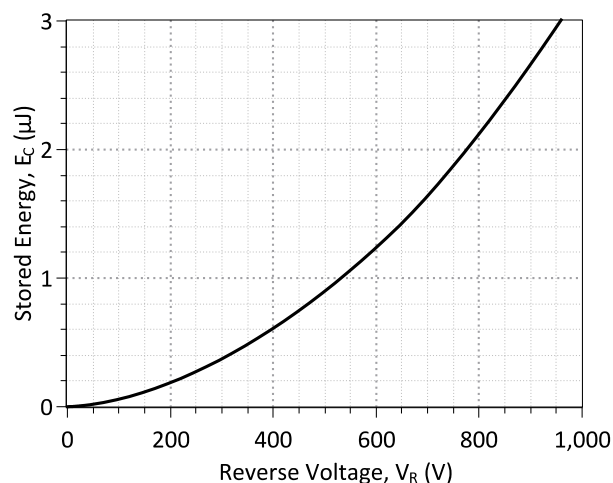
### Maximum Ratings at $T_J = 175\text{ °C}$ , unless otherwise specified

Parameter	Symbol	Conditions	Values	Unit
Repetitive peak reverse voltage	$V_{RRM}$		3300	V
Continuous forward current	$I_F$	$T_C \leq 125\text{ °C}$	0.3	A
RMS forward current	$I_{F(RMS)}$	$T_C \leq 125\text{ °C}$	0.35	A
Surge non-repetitive forward current, Half Sine Wave	$I_{F,SM}$	$T_C = 25\text{ °C}$ , $t_p = 10\text{ ms}$ $T_C = 125\text{ °C}$ , $t_p = 10\text{ ms}$	tbd tbd	A
Non-repetitive peak forward current	$I_{F,max}$	$T_C = 25\text{ °C}$ , $t_p = 10\text{ }\mu\text{s}$	tbd	A
$I^2t$ value	$\int i^2 dt$	$T_C = 25\text{ °C}$ , $t_p = 10\text{ ms}$	tbd	A <sup>2</sup> S
Power dissipation	$P_{tot}$	$T_C = 25\text{ °C}$	25	W
Operating and storage temperature	$T_J, T_{stg}$		-55 to 175	°C

### Electrical Characteristics at $T_J = 175\text{ °C}$ , unless otherwise specified

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Diode forward voltage	$V_F$	$I_F = 0.3\text{ A}$ , $T_J = 25\text{ °C}$		1.7		V
		$I_F = 0.3\text{ A}$ , $T_J = 175\text{ °C}$		3.9		
Reverse current	$I_R$	$V_R = 3300\text{ V}$ , $T_J = 25\text{ °C}$		1.3	5	$\mu\text{A}$
		$V_R = 3300\text{ V}$ , $T_J = 175\text{ °C}$		14	20	
Total capacitive charge	$Q_C$	$I_F \leq I_{F,MAX}$ $di_F/dt = 35\text{ A}/\mu\text{s}$ $T_J = 175\text{ °C}$		52		nC
Switching time	$t_s$	$V_R = 1500\text{ V}$ $V_R = 1500\text{ V}$		< 60		ns
Total capacitance	C	$V_R = 1\text{ V}$ , $f = 1\text{ MHz}$ , $T_J = 25\text{ °C}$		42		pF
		$V_R = 400\text{ V}$ , $f = 1\text{ MHz}$ , $T_J = 25\text{ °C}$		8		
		$V_R = 1000\text{ V}$ , $f = 1\text{ MHz}$ , $T_J = 25\text{ °C}$		7		

\*For chip size and metallization, please refer to the mechanical datasheet (must have a non-disclosure agreement with GeneSiC Semiconductor).


**Figure 1: Typical Forward Characteristics**

**Figure 2: Typical Reverse Characteristics**

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

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

#### Revision History

Date	Revision	Comments	Supersedes
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

Copy the following code into a SPICE software program for simulation of the GAP3SHT33-CAU device.

```
*      MODEL OF GeneSiC Semiconductor Inc.
*
*      $Revision:   1.0           $
*      $Date:      09-SEP-2013   $
*
*      GeneSiC Semiconductor Inc.
*      43670 Trade Center Place Ste. 155
*      Dulles, VA 20166
*      http://www.genesicsemi.com/index.php/sic-products/schottky
*
*      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      3700
+ 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      3700
+ IBV     1.00E-03      VPK      3300
+ IAVE    3.00E-01      TYPE     SiC_PiN
.ENDS
*      End of GAP3SHT33-CAU SPICE Model
```