

## Silicon Carbide Power Schottky Diode Chip

$V_{RRM}$	=	3300 V
$V_F$	=	1.7 V
$I_F$	=	0.3 A
$Q_C$	=	20 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

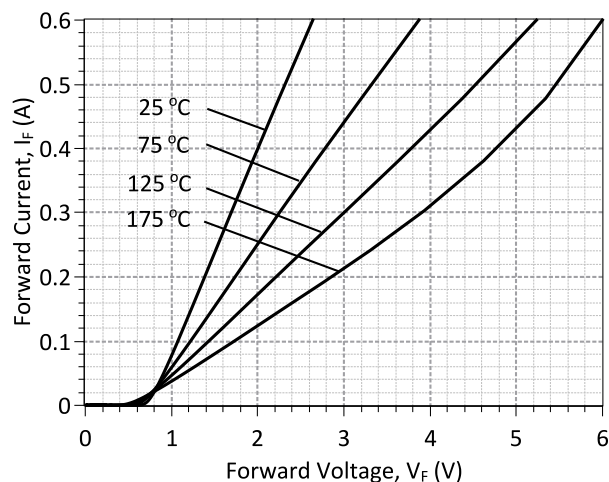
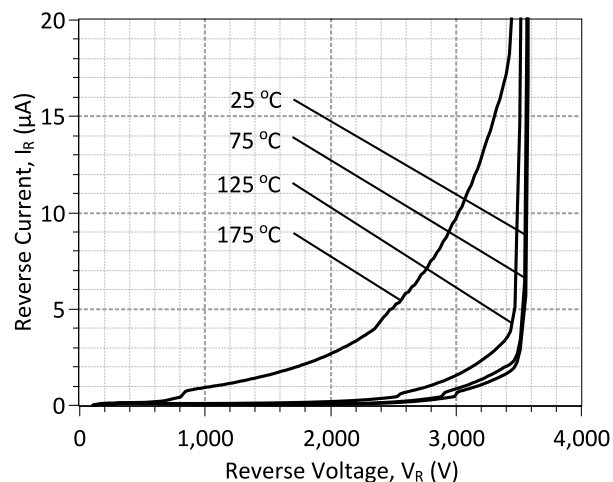
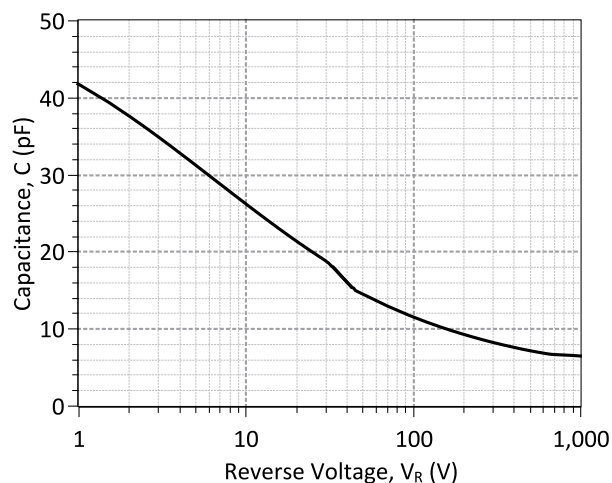
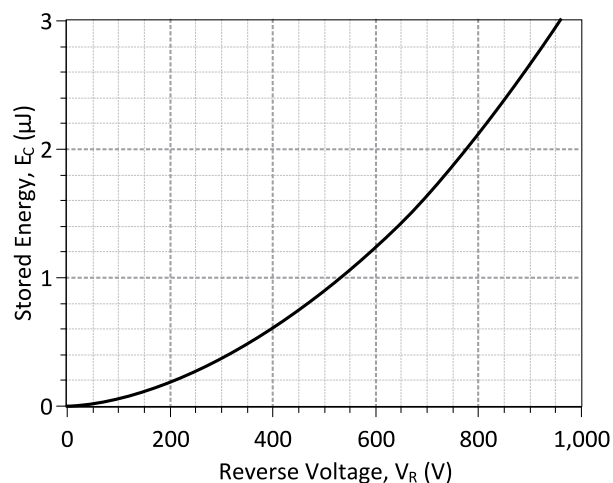
### Maximum Ratings at $T_J = 175\text{ °C}$ , unless otherwise specified

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	$Q_C$	$I_F \leq I_{F,MAX}$ $di_F/dt = 35\text{ A}/\mu\text{s}$ $T_J = 175\text{ °C}$		20		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
2014/12/19	1	Updated Electrical Characteristics	
2013/09/09	0	Initial Release	

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## 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/hit-sic/baredie
*
*      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 GAP3SHT33-CAU SPICE Model
*
.SUBCKT GAP3SHT33 ANODE KATHODE
R1 ANODE INT R=((TEMP-24)*0.0535)
D1 INT KATHODE GAP3SHT33_25C;
D2 ANODE KATHODE GAP3SHT33_PIN;
.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
```