

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	$I_{F,SM}$	$T_C = 25\text{ °C}$, $t_p = 10\text{ ms}$	tbd	A
		$T_C = 125\text{ °C}$, $t_p = 10\text{ ms}$	tbd	
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 ² 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	μA
		$V_R = 3300\text{ V}$, $T_j = 175\text{ °C}$		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).

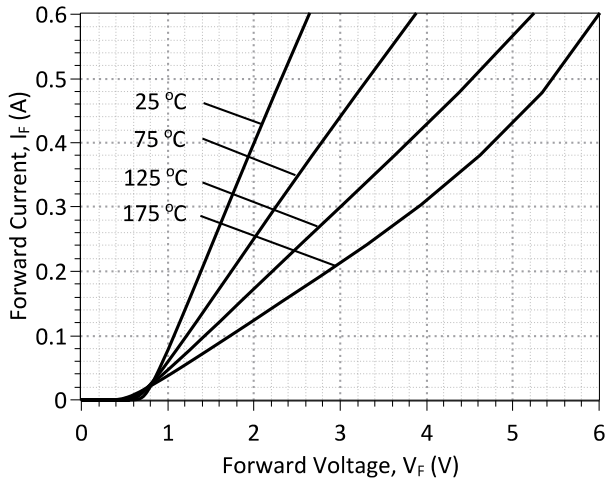


Figure 1: Typical Forward Characteristics

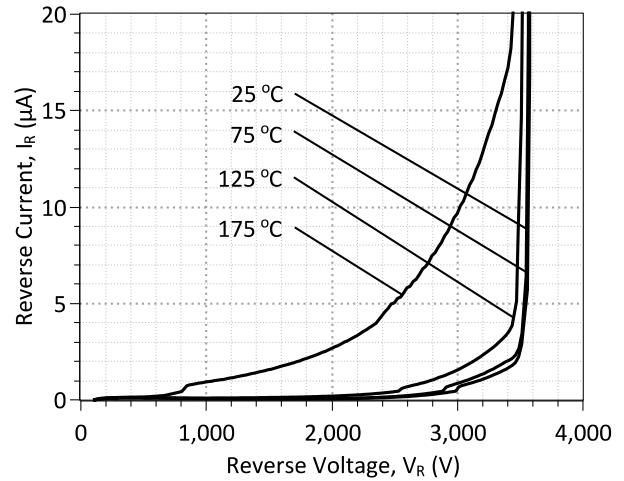


Figure 2: Typical Reverse Characteristics

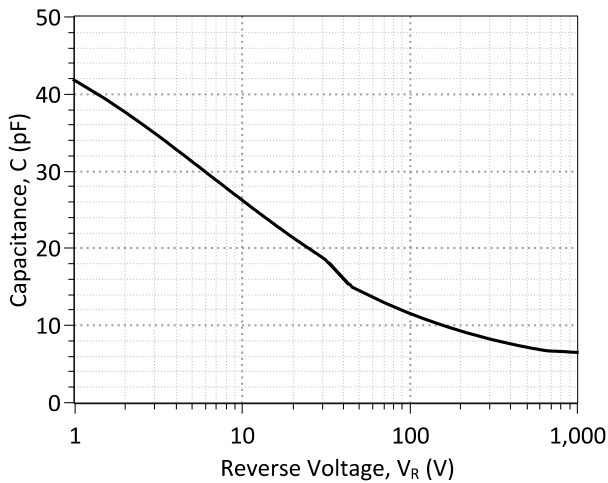


Figure 3: Typical Junction Capacitance vs Reverse Voltage Characteristics

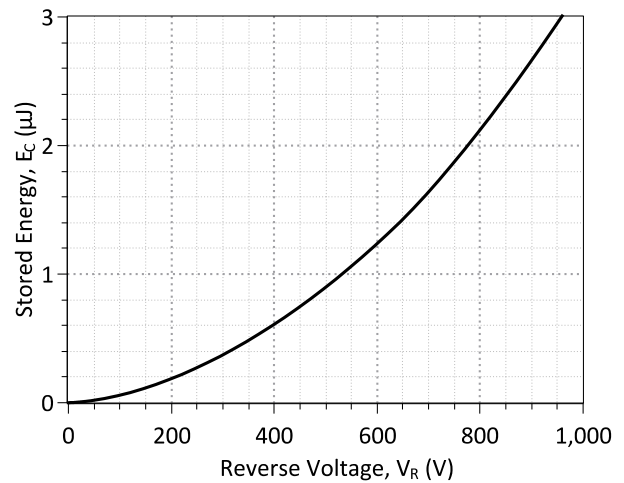


Figure 4: Typical Switching Energy vs Reverse Voltage Characteristics

Revision History

Date	Revision	Comments	Supersedes
2013/09/09	0	Initial Release	

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SPICE Model Parameters

Copy the following code into a SPICE software program for simulation of the GAP3SHT33-CAL 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-CAL 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-CAL SPICE Model
```