

## High Temperature Silicon Carbide Power Schottky Diode

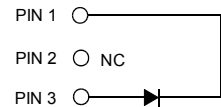
$V_{RRM}$	=	<b>650 V</b>
$I_F (T_C=25^\circ\text{C})$	=	<b>8 A</b>
$Q_C$	=	<b>20 nC</b>

### Features

- 650 V Schottky rectifier
- 250 °C maximum operating temperature
- Electrically isolated base-plate
- Zero reverse recovery charge
- Superior surge current capability
- Positive temperature coefficient of  $V_F$
- Temperature independent switching behavior
- Lowest figure of merit  $Q_C/I_F$
- Available screened to Mil-PRF-19500

### Package

- RoHS Compliant



**TO – 257 (Isolated Base-plate Hermetic Package)**

### Advantages

- High temperature operation
- Improved circuit efficiency (Lower overall cost)
- Low switching losses
- Ease of paralleling devices without thermal runaway
- Smaller heat sink requirements
- Industry's lowest reverse recovery charge
- Industry's lowest device capacitance
- Ideal for output switching of power supplies
- Best in class reverse leakage current at operating temperature

### Applications

- Down Hole Oil Drilling, Geothermal Instrumentation
- High Temperature DC/DC Converters
- High Temperature Motor and Servo Drives
- High Temperature Inverters
- High Temperature Actuator Control
- Military Power Supplies

### Maximum Ratings at $T_j = 250\text{ }^\circ\text{C}$ , unless otherwise specified

Parameter	Symbol	Conditions	Values		Unit
			min.	typ.	
Repetitive peak reverse voltage	$V_{RRM}$			650	V
Continuous forward current	$I_F$	$T_C = 25\text{ }^\circ\text{C}$		8	A
Continuous forward current	$I_F$	$T_C \leq 225\text{ }^\circ\text{C}$		2.5	A
RMS forward current	$I_{F(RMS)}$	$T_C \leq 225\text{ }^\circ\text{C}$		4.3	A
Surge non-repetitive forward current, Half Sine Wave	$I_{F,SM}$	$T_C = 25\text{ }^\circ\text{C}, t_p = 10\text{ ms}$		32	A
Non-repetitive peak forward current	$I_{F,max}$	$T_C = 25\text{ }^\circ\text{C}, t_p = 10\text{ }\mu\text{s}$		120	A
$i^2t$ value	$\int i^2 dt$	$T_C = 25\text{ }^\circ\text{C}, t_p = 10\text{ ms}$		5	A <sup>2</sup> S
Power dissipation	$P_{tot}$	$T_C = 25\text{ }^\circ\text{C}$		66	W
Operating and storage temperature	$T_j, T_{stg}$			-55 to 250	$^\circ\text{C}$

### Electrical Characteristics at $T_j = 250\text{ }^\circ\text{C}$ , unless otherwise specified

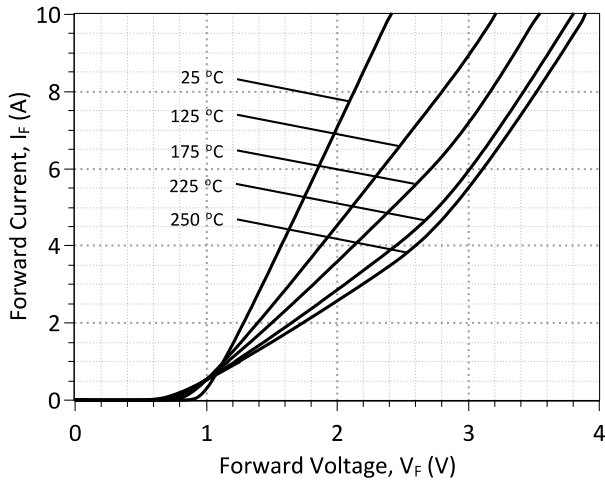
Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Diode forward voltage	$V_F$	$I_F = 2.5\text{ A}, T_j = 25\text{ }^\circ\text{C}$		1.3		V
		$I_F = 2.5\text{ A}, T_j = 250\text{ }^\circ\text{C}$		2.0		
Reverse current	$I_R$	$V_R = 650\text{ V}, T_j = 25\text{ }^\circ\text{C}$		1	5	$\mu\text{A}$
		$V_R = 650\text{ V}, T_j = 250\text{ }^\circ\text{C}$		10	100	
Total capacitive charge	$Q_C$	$I_F \leq I_{F,MAX}$ $di_F/dt = 200\text{ A}/\mu\text{s}$ $T_j = 210\text{ }^\circ\text{C}$	$V_R = 400\text{ V}$	20		nC
Switching time	$t_s$		$V_R = 400\text{ V}$	< 25		ns
Total capacitance	C	$V_R = 1\text{ V}, f = 1\text{ MHz}, T_j = 25\text{ }^\circ\text{C}$		274		pF
		$V_R = 400\text{ V}, f = 1\text{ MHz}, T_j = 25\text{ }^\circ\text{C}$		31		
		$V_R = 650\text{ V}, f = 1\text{ MHz}, T_j = 25\text{ }^\circ\text{C}$		29		

### Thermal Characteristics

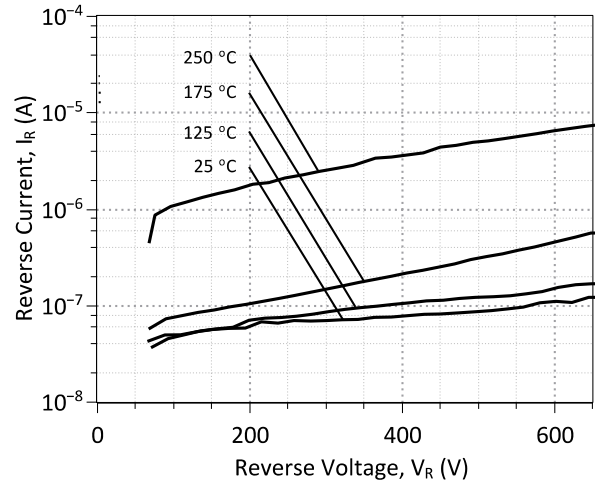
Thermal resistance, junction - case	$R_{thJC}$	3.4	$^\circ\text{C}/\text{W}$
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### Mechanical Properties

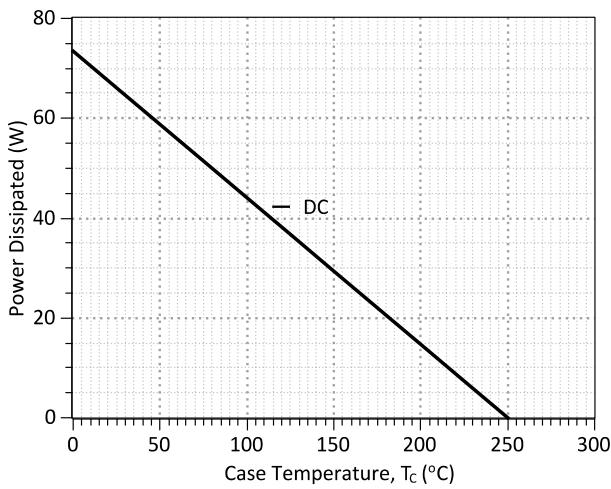
Mounting torque	M	0.6	Nm
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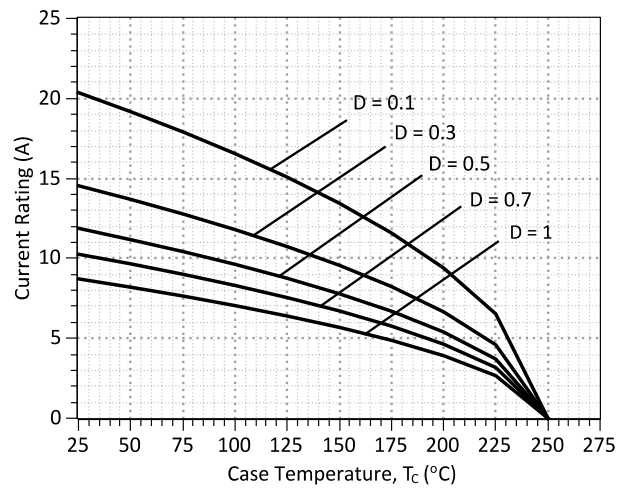
**Figure 1: Typical Forward Characteristics**



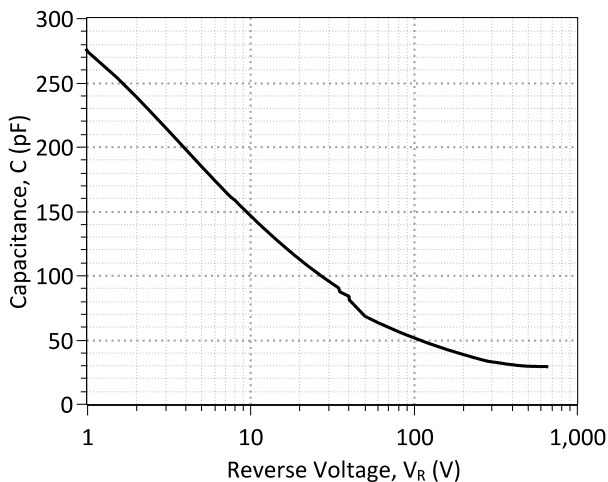
**Figure 2: Typical Reverse Characteristics**



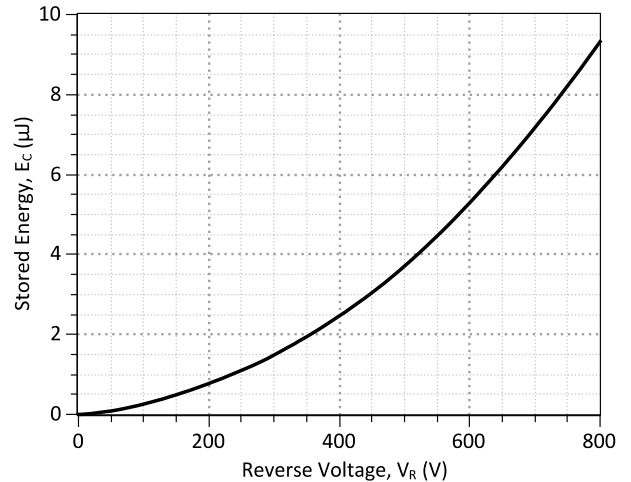
**Figure 3: Power Derating Curve**



**Figure 4: Current Derating Curves (D =  $t_p/T$ ,  $t_p = 400 \mu s$ )  
(Considering worst case  $Z_{th}$  conditions)**



**Figure 5: Typical Junction Capacitance vs Reverse Voltage Characteristics**



**Figure 6: Typical Switching Energy vs Reverse Voltage Characteristics**

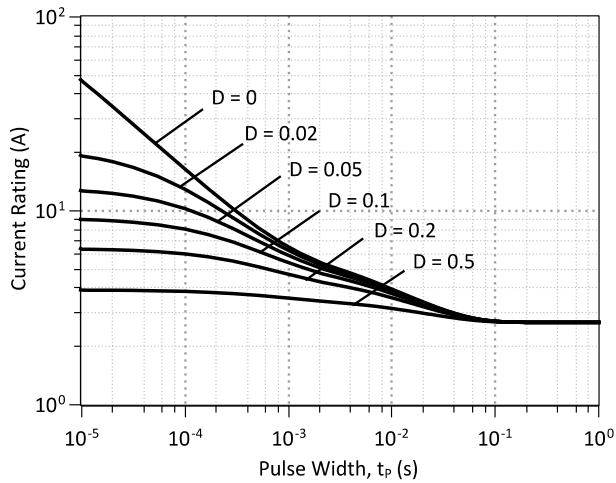


Figure 7: Current vs Pulse Duration Curves at  $T_c = 225\text{ }^\circ\text{C}$

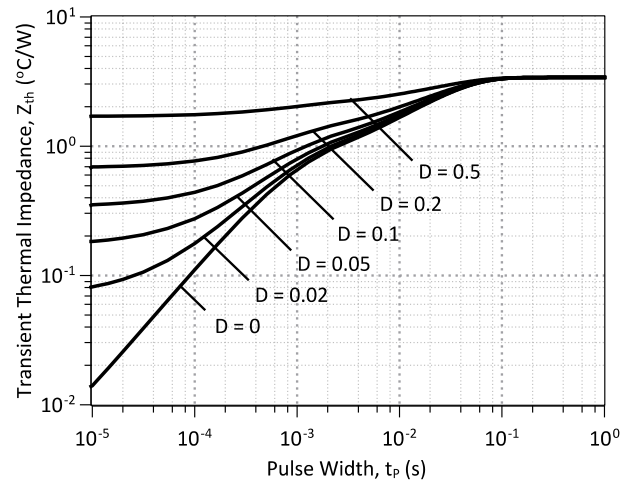
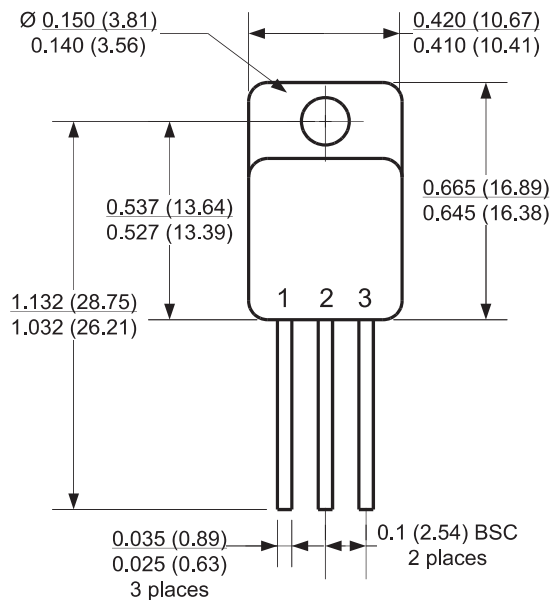


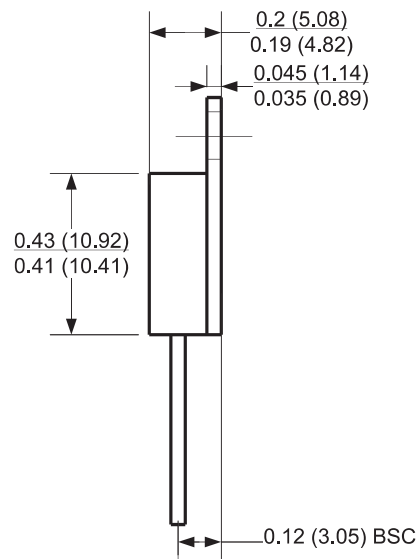
Figure 8: Transient Thermal Impedance

**Package Dimensions:**

**TO-257**



**PACKAGE OUTLINE**



**NOTE**

1. CONTROLLED DIMENSION IS INCH. DIMENSION IN BRACKET IS MILLIMETER.
2. DIMENSIONS DO NOT INCLUDE END FLASH, MOLD FLASH, MATERIAL PROTRUSIONS

**Revision History**

Date	Revision	Comments	Supersedes
2014/08/26	1	Updated Electrical Characteristics	
2012/04/24	0	Initial release	

Published by

GeneSiC Semiconductor, Inc.  
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## SPICE Model Parameters

Copy the following code into a SPICE software program for simulation of the 1N8032-GA device.

```
*      MODEL OF GeneSiC Semiconductor Inc.
*
*      $Revision:   1.0           $
*      $Date:      05-SEP-2013   $
*
*      GeneSiC Semiconductor Inc.
*      43670 Trade Center Place Ste. 155
*      Dulles, VA 20166
*      http://www.genesicsemi.com/index.php/hit-sic/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 1N8032-GA SPICE Model
*
.SUBCKT 1N8032 ANODE KATHODE
D1 ANODE KATHODE 1N8032_25C; Call the Schottky Diode Model
D2 ANODE KATHODE 1N8032_PIN; Call the PiN Diode Model
.MODEL 1N8032_25C D
+ IS      1.99E-17      RS      0.12463
+ N       1            IKF     569.082
+ EG      1.2          XTI     3
+ TRS1    0.0035       TRS2    3.87E-05
+ CJO     3.38E-10     VJ      0.41772
+ M       1.5479       FC      0.5
+ TT      1.00E-10     BV      650
+ IBV     1.00E-03     VPK     650
+ IAVE    5            TYPE    SiC_Schottky
+ MFG     GeneSiC_Semiconductor
.MODEL 1N8032_PIN D
+ IS      1.33E-10     RS      0.31147
+ N       5            IKF     0
+ EG      3.23         XTI     -10
+ FC      0.5          TT      0
+ BV      650          IBV     1.00E-03
+ VPK     650          IAVE    5
+ TYPE    SiC_PiN
.ENDS
*
*      End of 1N8032-GA SPICE Model
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