High Temperature Silicon Carbide Power Schottky Diode

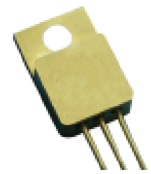
V_{RRM}	=	650 V
$I_{F\ (Tc=25°C)}$	=	8 A
Q_C	=	20 nC

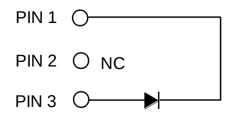
Features

- 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
- Solenoid Actuators
- General Purpose High-Temperature Switching
- Amplifiers
- Solar Inverters
- Switched-Mode Power Supply (SMPS)
- Power Factor Correction (PFC)

Maximum Ratings at T_j = 250 °C, unless otherwise specified

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

Electrical Characteristics at T_j = 250 °C, unless otherwise specified

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

Thermal Characteristics

Thermal resistance, junction - case	R_{thJC}	3.4	°C/W

Mechanical Properties

Mounting torque	M	0.6	Nm

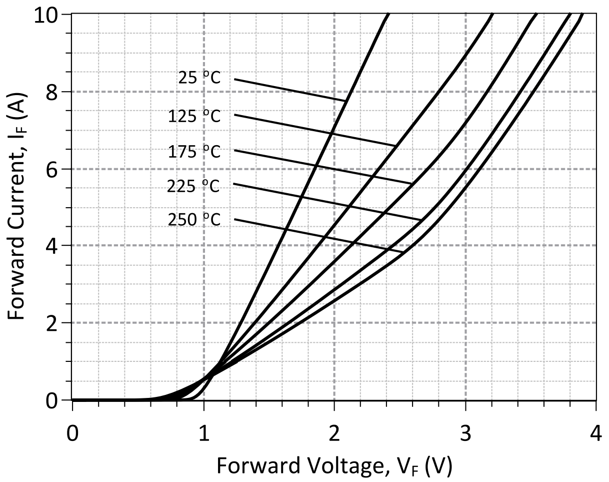


Figure 1: Typical Forward Characteristics

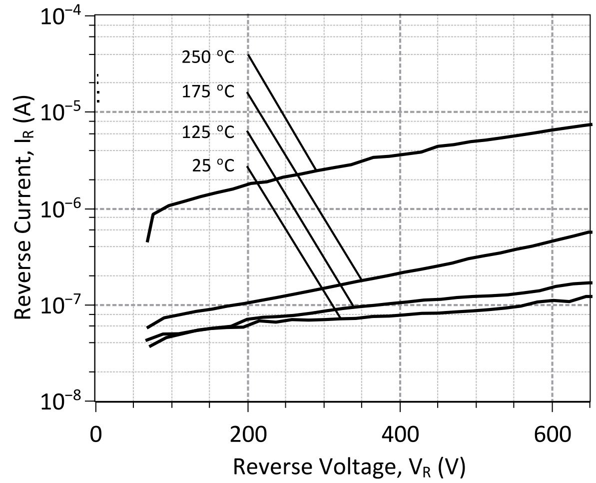


Figure 2: Typical Reverse Characteristics

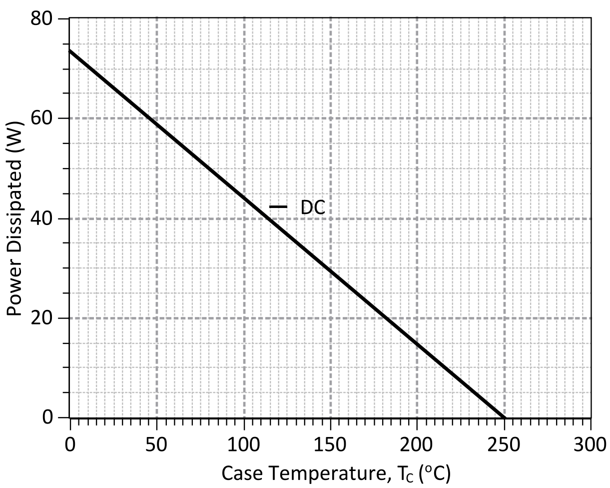


Figure 3: Power Derating Curve

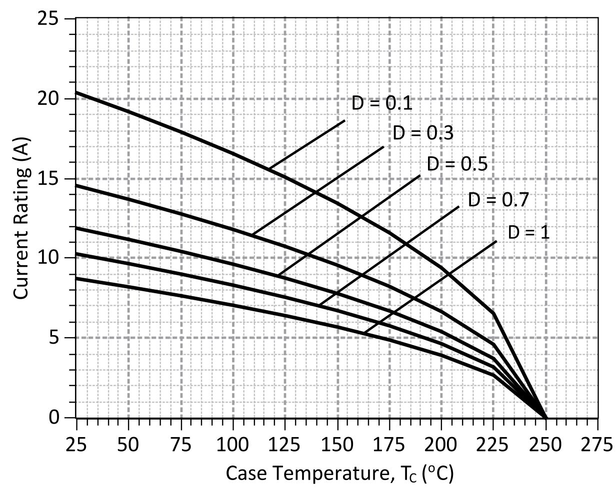


Figure 4: Current Derating Curves (D = t_P/T, t_P= 400 µs) (Considering worst case Z_{th} conditions)

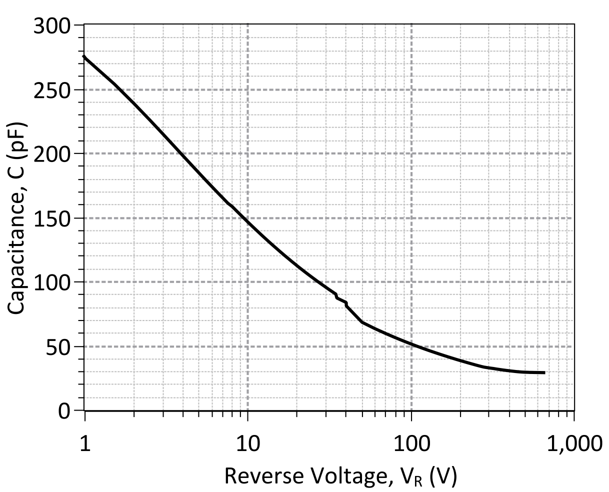


Figure 5: Typical Junction Capacitance vs Reverse Voltage Characteristics

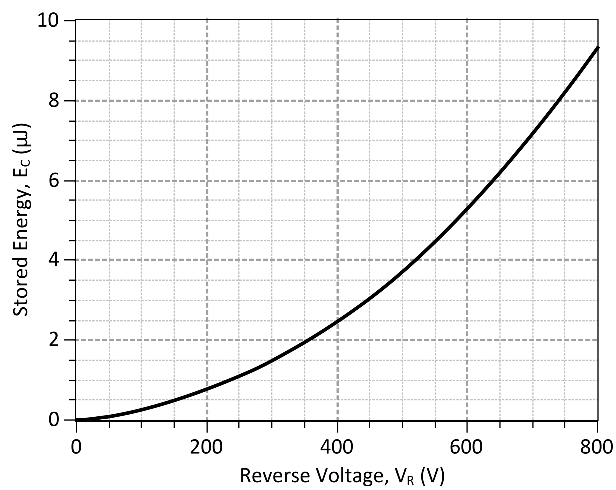


Figure 6: Typical Switching Energy vs Reverse Voltage Characteristics

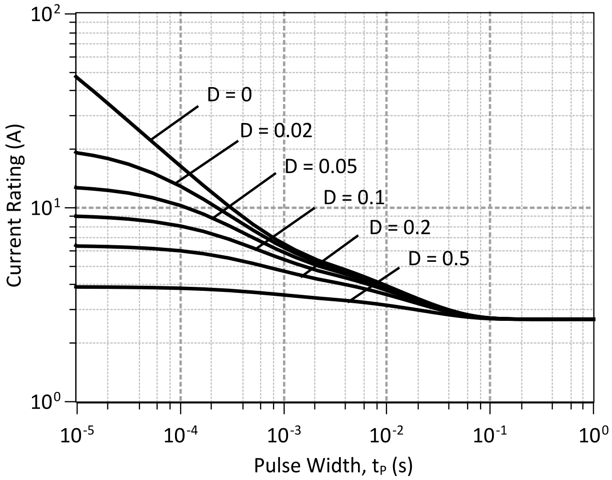


Figure 7: Current vs Pulse Duration Curves at T_C = 225 °C

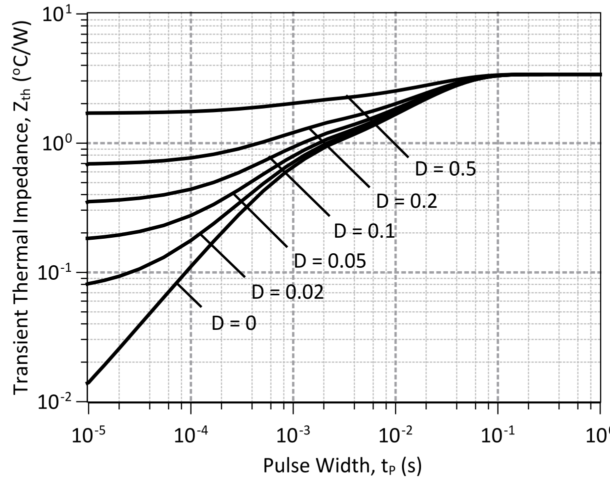
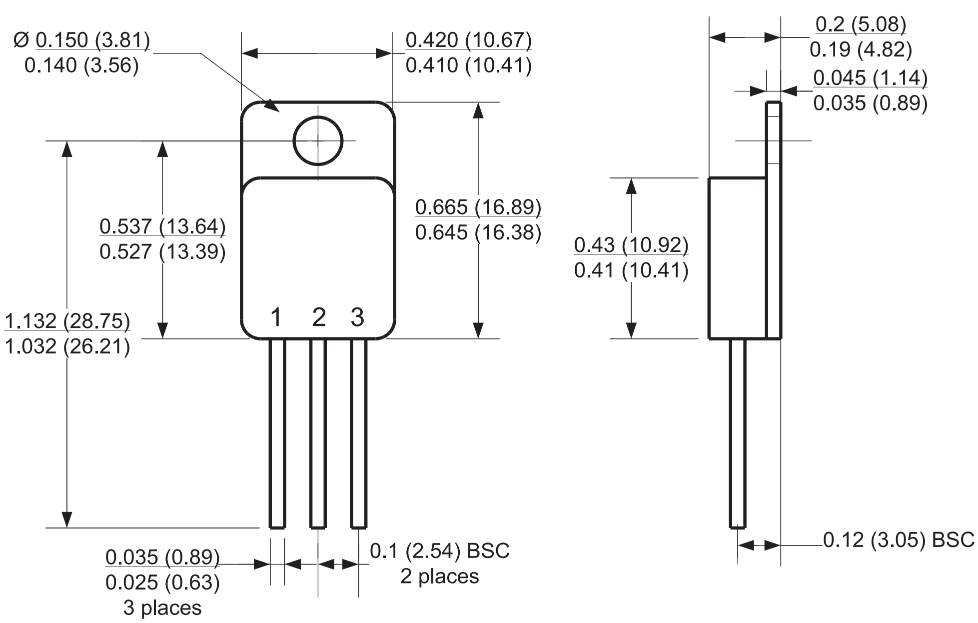


Figure 8: Transient Thermal Impedance

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	

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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
*
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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 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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