High Temperature Silicon Carbide Power Schottky Diode

V_{RRM}	=	650 V
$I_{F\ (Tc=25°C)}$	=	4 A
Q_C	=	7 nC

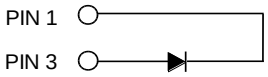
Features

- 650 V Schottky rectifier
- 250 °C maximum operating temperature
- 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





SMD0.5 / TO – 276 (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	4	A
Continuous forward current	I_F	T_C ≤ 225 °C	1	A
RMS forward current	$I_{F(RMS)}$	T_C ≤ 225 °C	2	A
Surge non-repetitive forward current, Half Sine Wave	$I_{F,SM}$	T_C = 25 °C, t_P = 10 ms	10	A
Non-repetitive peak forward current	$I_{F,max}$	T_C = 25 °C, t_P = 10 µs	65	A
I^2t value	$\int i^2\,dt$	T_C = 25 °C, t_P = 10 ms	0.5	A^2S
Power dissipation	P_{tot}	T_C = 25 °C	64	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 min.	Values typ.	Values max.	Unit
Diode forward voltage	V_F	I_F = 1 A, T_j = 25 °C			1.6		V
		I_F = 1 A, T_j = 250 °C			2.6		
Reverse current	I_R	V_R = 650 V, T_j = 25 °C			1	5	µA
		V_R = 650 V, T_j = 250 °C			5	50	
Total capacitive charge	Q_C	$I_F \le I_{F,MAX}$ dI_F/dt = 200 A/µs T_j = 210 °C	V_R = 400 V		7		nC
Switching time	t_s		V_R = 400 V		< 17		ns
Total capacitance	C	V_R = 1 V, f = 1 MHz, T_j = 25 °C			76		pF
		V_R = 400 V, f = 1 MHz, T_j = 25 °C			12		
		V_R = 650 V, f = 1 MHz, T_j = 25 °C			12		

Thermal Characteristics

Thermal resistance, junction - case	R_{thJC}	3.55	°C/W

Mechanical Properties

Mounting torque	M	0.6	Nm

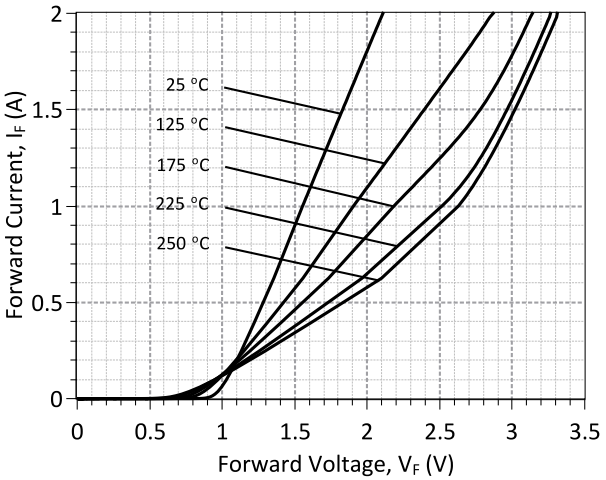


Figure 1: Typical Forward Characteristics

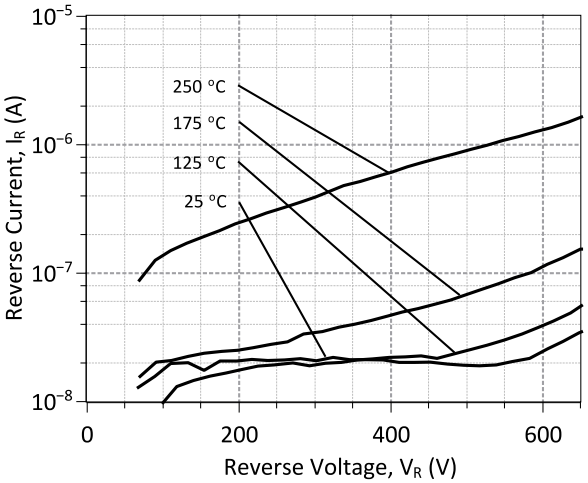


Figure 2: Typical Reverse Characteristics

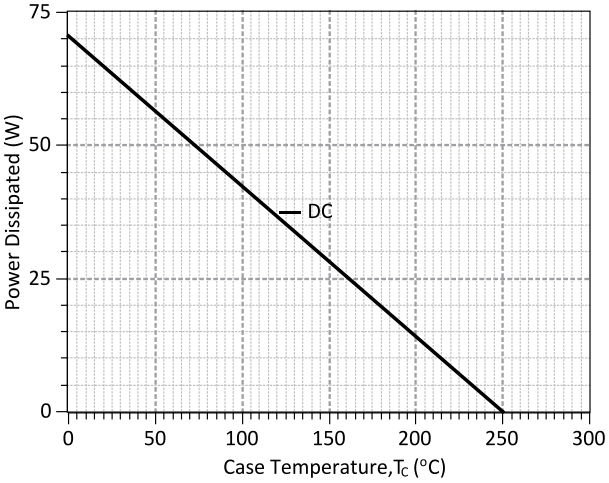


Figure 3: Power Derating Curve

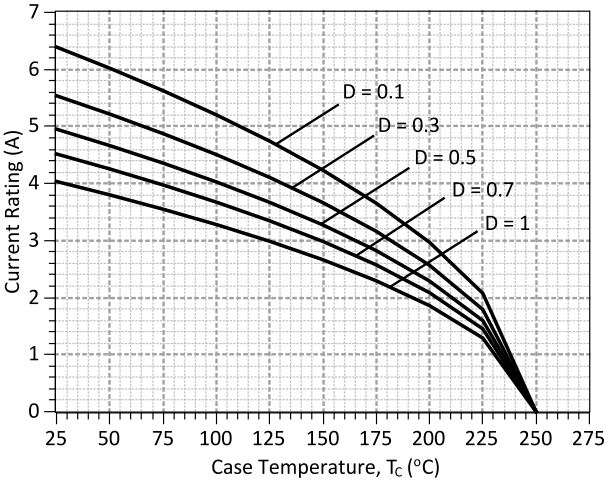


Figure 4: Current Derating Curves (D = t_P/T, t_P= 400 µs) (Considering worst case Z_{th} conditions)

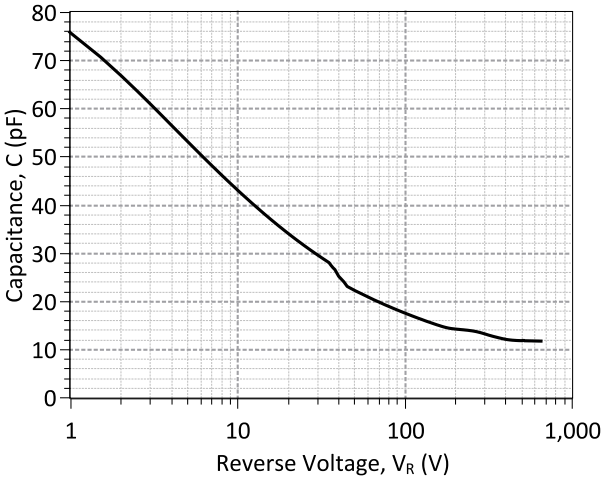


Figure 5: Typical Junction Capacitance vs Reverse Voltage Characteristics

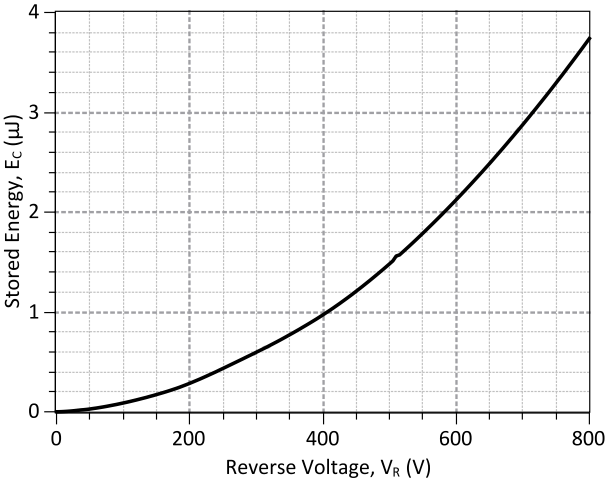


Figure 6: Typical Switching Energy vs Reverse Voltage Characteristics

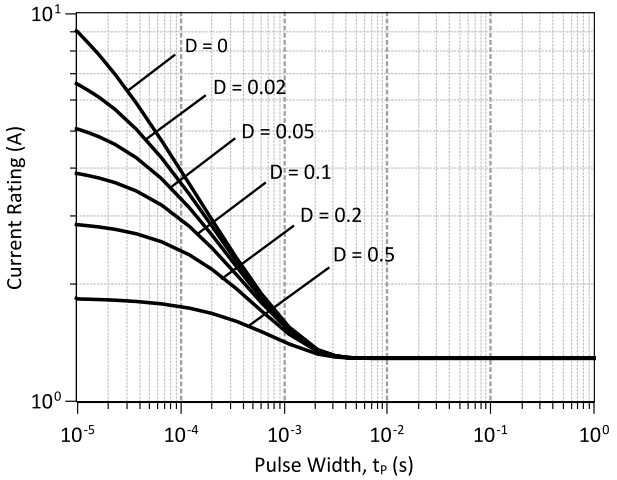


Figure 7: Current vs Pulse Duration Curves at T_C = 225 °C

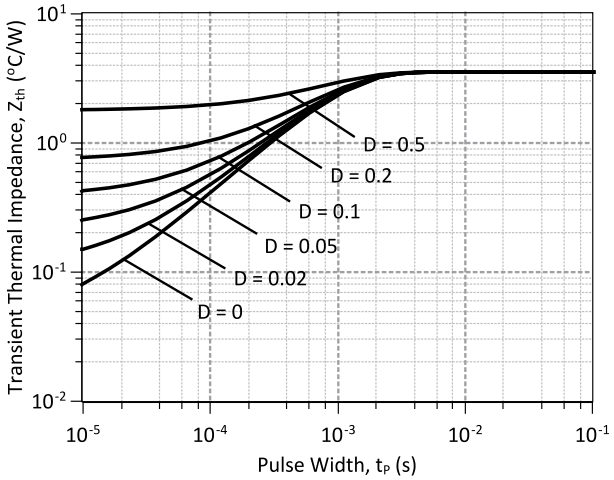
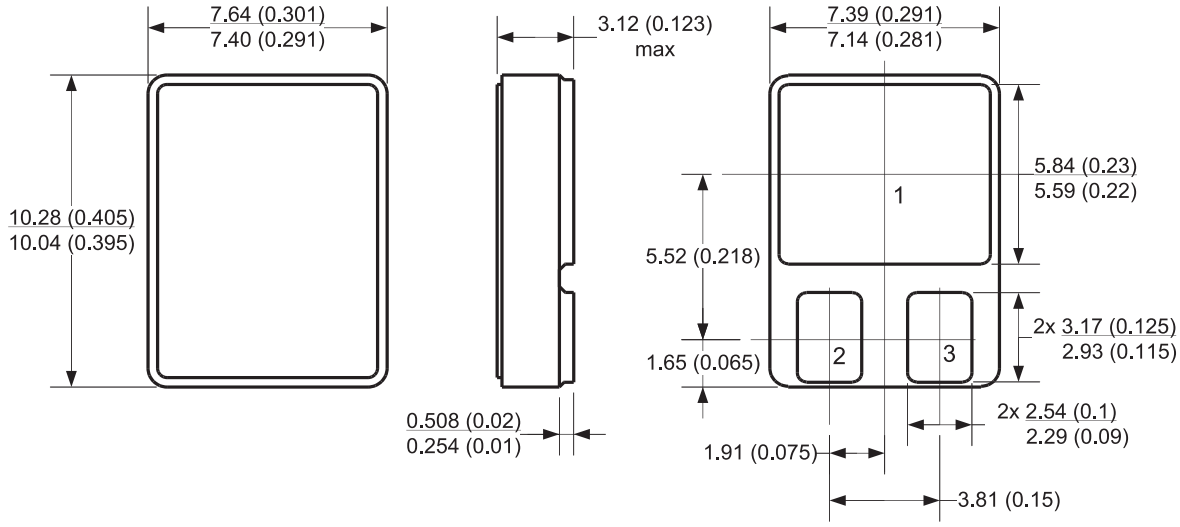


Figure 8: Transient Thermal Impedance

Package Dimensions:

SMD-0.5/TO-276 **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

This is a secure document. Copy this code from the SPICE model PDF file on our website into a SPICE software program for simulation of the 1N8031-GA.

```
*     MODEL OF GeneSiC Semiconductor Inc.
*
*     $Revision:   1.0           $
*     $Date:   05-SEP-2013       $
*
*     GeneSiC Semiconductor Inc.
*     43670 Trade Center Place Ste. 155
*     Dulles, VA 20166
*
*     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 1N8031-GA SPICE Model
*
.SUBCKT 1N8031 ANODE KATHODE
D1 ANODE KATHODE 1N8031_25C; Call the Schottky Diode Model
D2 ANODE KATHODE 1N8031_PIN; Call the PiN Diode Model
.MODEL 1N8031_25C D
+ IS       3.57E-18        RS         0.49751
+ TRS1     0.0057          TRS2       2.40E-05
+ N        1               IKF        322
+ EG       1.2             XTI        3
+ CJO      9.12E-11        VJ         0.371817384
+ M        1.527759838     FC         0.5
+ TT       1.00E-10        BV         650
+ IBV      1.00E-03        VPK        650
+ IAVE     1               TYPE       SiC_Schottky
+ MFG      GeneSiC_Semiconductor
.MODEL 1N8031_PIN D
+ IS       5.73E-11        RS         0.72994
+ N        5               IKF        800
+ EG       3.23            XTI        -14
+ FC       0.5             TT         0
+ BV       650             IBV        1.00E-03
+ VPK      650             IAVE       1
+ TYPE     SiC_PiN
.ENDS
*
* End of 1N8031-GA SPICE Model
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