

High Temperature Silicon Carbide Power Schottky Diode

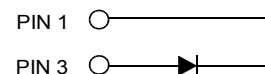
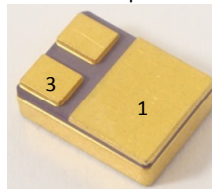
V_{RRM}	=	650 V
V_F	=	1.6 V
I_F	=	1 A
Q_C	=	7 nC

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



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 $T_J = 250\text{ °C}$, unless otherwise specified

Parameter	Symbol	Conditions	Values	Unit
Repetitive peak reverse voltage	V_{RRM}		650	V
Continuous forward current	I_F	$T_C \leq 225\text{ °C}$	1	A
RMS forward current	$I_{F(RMS)}$	$T_C \leq 225\text{ °C}$	2	A
Surge non-repetitive forward current, Half Sine Wave	$I_{F,SM}$	$T_C = 25\text{ °C}$, $t_p = 10\text{ ms}$	10	A
Non-repetitive peak forward current	$I_{F,max}$	$T_C = 25\text{ °C}$, $t_p = 10\text{ }\mu\text{s}$	65	A
I^2t value	$\int i^2 dt$	$T_C = 25\text{ °C}$, $t_p = 10\text{ ms}$	0.5	A ² S
Power dissipation	P_{tot}	$T_C = 25\text{ °C}$	64	W
Operating and storage temperature	T_J, T_{slg}		-55 to 250	°C

Electrical Characteristics at $T_J = 250\text{ °C}$, unless otherwise specified

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Diode forward voltage	V_F	$I_F = 1\text{ A}$, $T_J = 25\text{ °C}$ $I_F = 1\text{ A}$, $T_J = 250\text{ °C}$		1.6 2.6		V
Reverse current	I_R	$V_R = 650\text{ V}$, $T_J = 25\text{ °C}$ $V_R = 650\text{ V}$, $T_J = 250\text{ °C}$		1 5	5 50	μA
Total capacitive charge	Q_C	$I_F \leq I_{F,MAX}$ $dI_F/dt = 200\text{ A}/\mu\text{s}$ $T_J = 210\text{ °C}$		7		nC
Switching time	t_s	$V_R = 400\text{ V}$ $V_R = 400\text{ V}$		< 17		ns
Total capacitance	C	$V_R = 1\text{ V}$, $f = 1\text{ MHz}$, $T_J = 25\text{ °C}$		76		pF
		$V_R = 400\text{ V}$, $f = 1\text{ MHz}$, $T_J = 25\text{ °C}$		12		
		$V_R = 650\text{ V}$, $f = 1\text{ MHz}$, $T_J = 25\text{ °C}$		12		

Thermal Characteristics

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

Mounting torque	M	0.6	Nm
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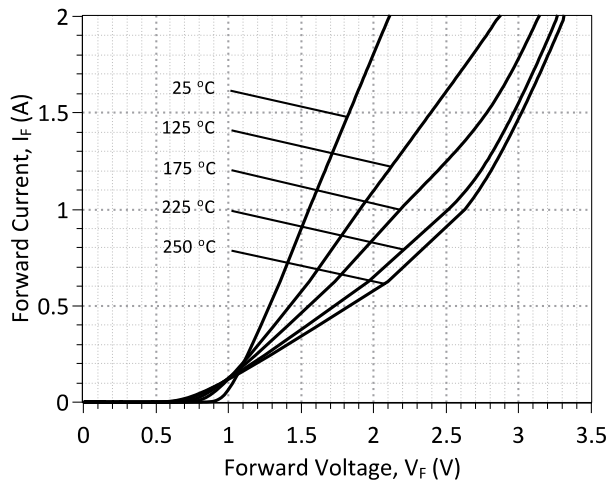


Figure 1: Typical Forward Characteristics

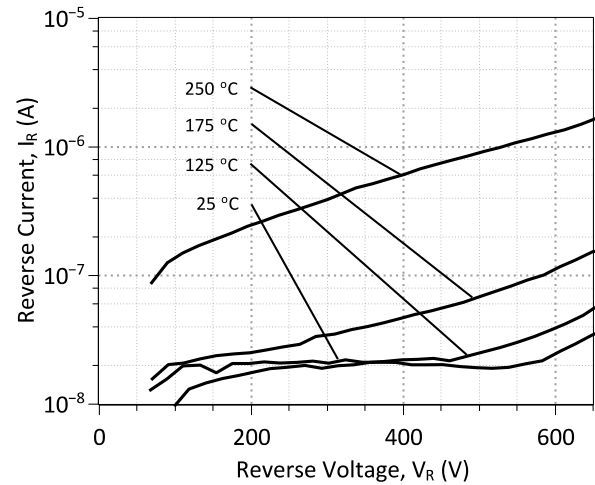


Figure 2: Typical Reverse Characteristics

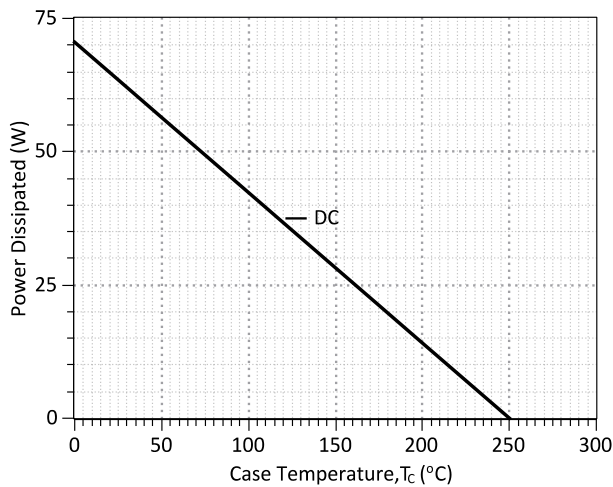
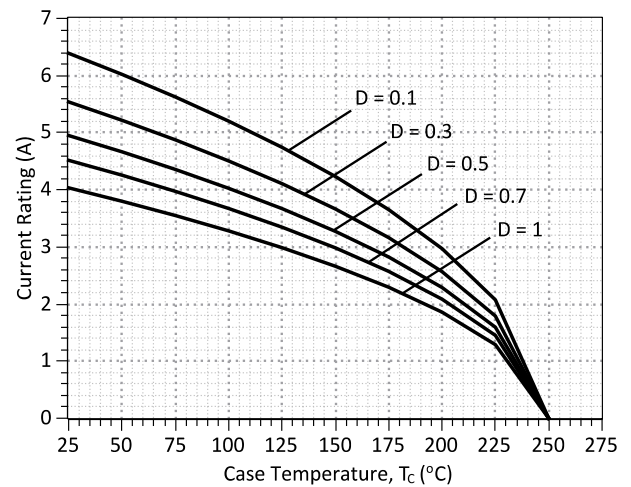


Figure 3: Power Derating Curve



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

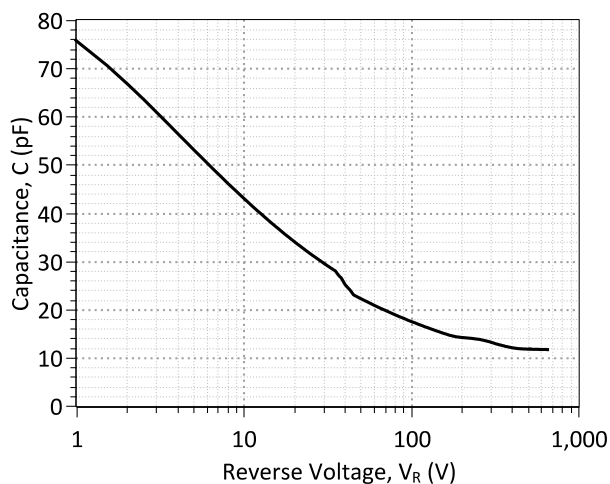


Figure 5: Typical Junction Capacitance vs Reverse Voltage Characteristics

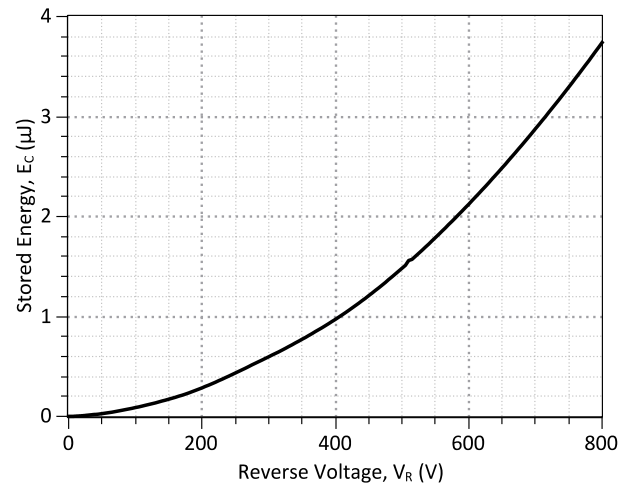


Figure 6: Typical Switching Energy vs Reverse Voltage Characteristics

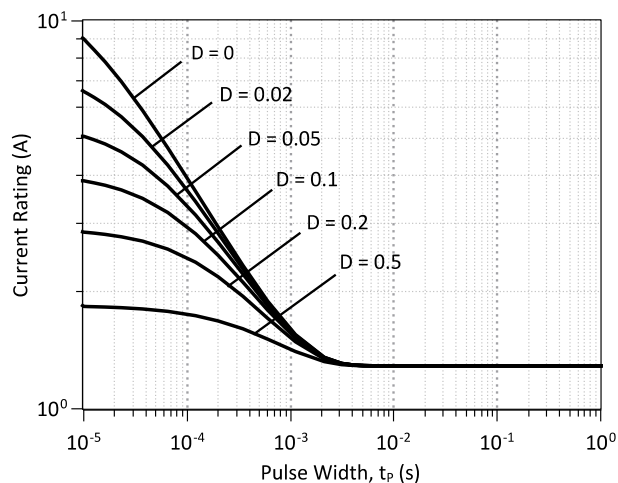


Figure 7: Current vs Pulse Duration Curves at $T_c = 225\text{ }^{\circ}\text{C}$

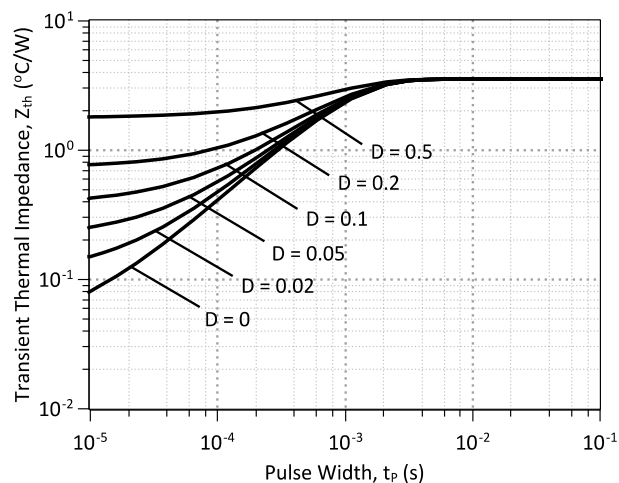
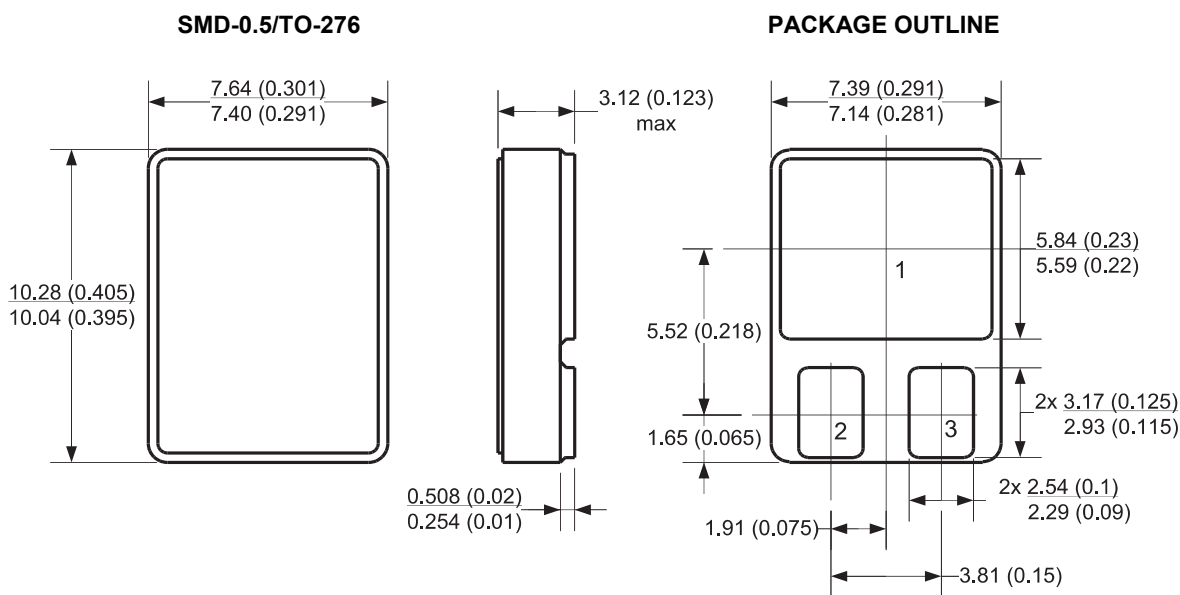


Figure 8: Transient Thermal Impedance

Package Dimensions:



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
2013/11/13	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 1N8031-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 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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