High Temperature Silicon Carbide Power Schottky Diode

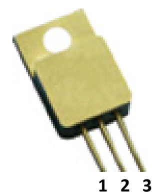
V_{RRM}	=	650 V
V_F	=	1.3 V
I_F	=	10 A
Q_C	=	66 nC

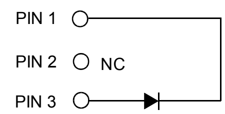
Features

- 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
- 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 °C, unless otherwise specified

Parameter	Symbol	Conditions	Values	Unit
Repetitive peak reverse voltage	V_{RRM}		650	V
Continuous forward current	I_F	$T_C \leq 225$ °C	9.4	A
RMS forward current	$I_{F(RMS)}$	$T_C \leq 225$ °C	16	A
Surge non-repetitive forward current, Half Sine Wave	$I_{F,SM}$	T_C = 25 °C, t_P = 10 ms	140	A
Non-repetitive peak forward current	$I_{F,max}$	T_C = 25 °C, t_P = 10 µs	650	A
I^2t value	$\int i^2\,dt$	T_C = 25 °C, t_P = 10 ms	98	A^2S
Power dissipation	P_{tot}	T_C = 25 °C	208	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 = 10 A, T_j = 25 °C I_F = 10 A, T_j = 210 °C			1.3 1.8		V
Reverse current	I_R	V_R = 650 V, T_j = 25 °C V_R = 650 V, T_j = 250 °C			1 50	5 200	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		66		nC
Switching time	t_s		V_R = 400 V		< 49		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			1107 103 99		pF

Thermal Characteristics

Thermal resistance, junction - case	R_{thJC}	1.08	°C/W

Mechanical Properties

Mounting torque	M	0.6	Nm

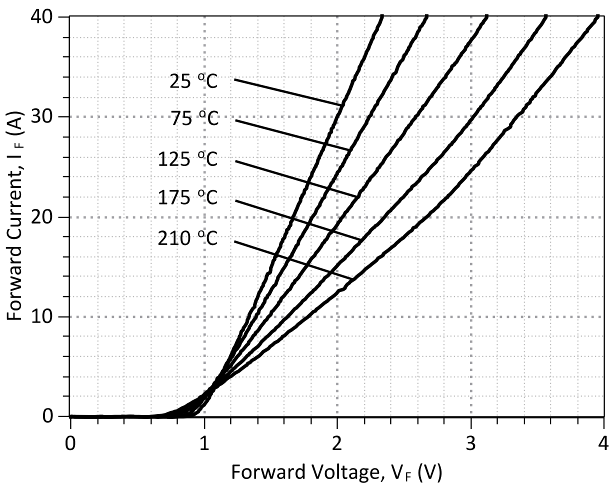


Figure 1: Typical Forward Characteristics

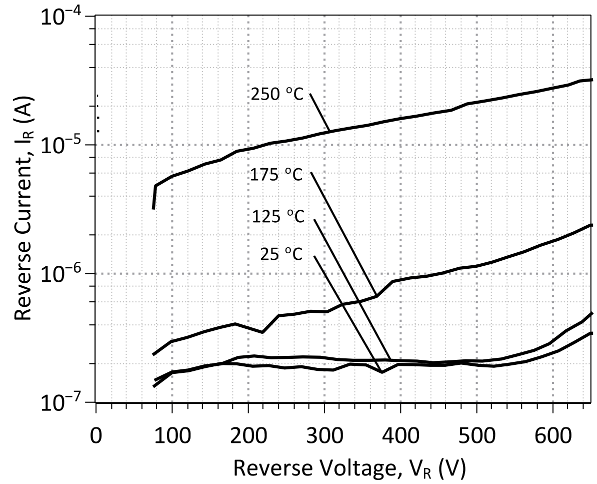


Figure 2: Typical Reverse Characteristics

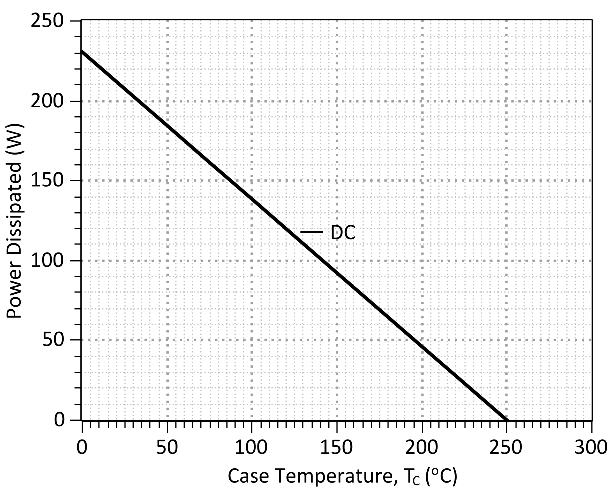


Figure 3: Power Derating Curve

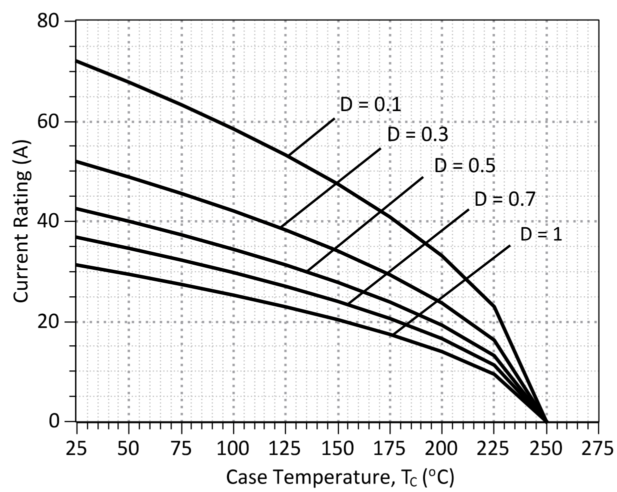


Figure 4: Current Derating Curves (D = t_P/T, t_P= 400 µs)
(Considering worst case Z_{th} conditions)

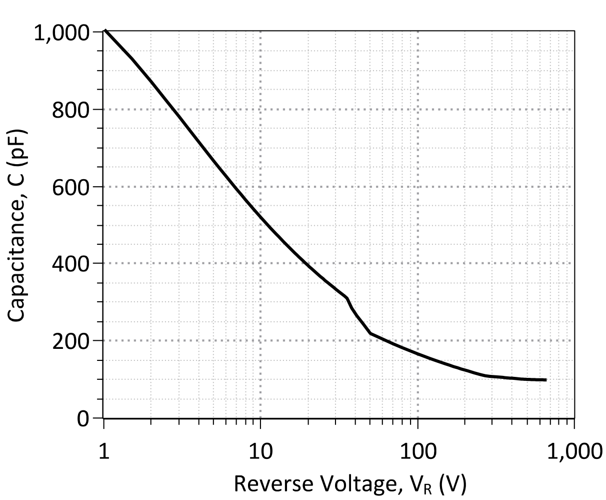


Figure 5: Typical Junction Capacitance vs Reverse Voltage Characteristics

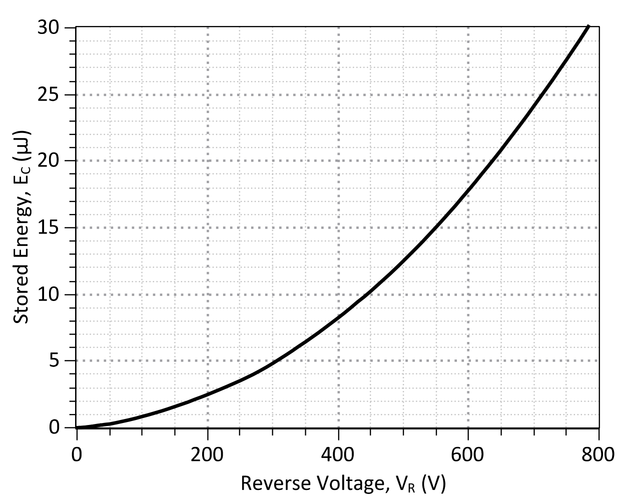


Figure 6: Typical Switching Energy vs Reverse Voltage Characteristics

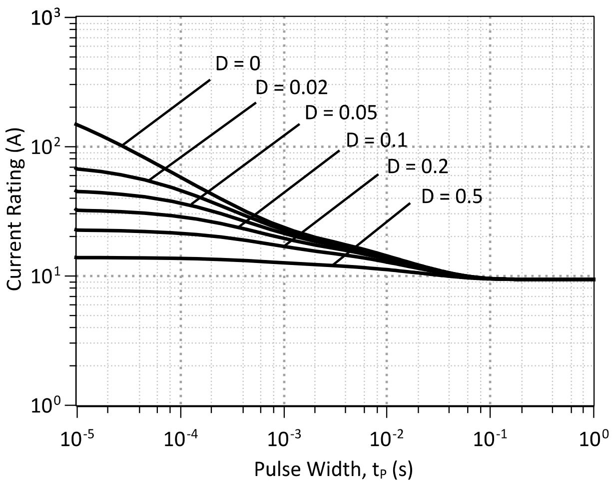


Figure 7: Current vs Pulse Duration Curves at T_C = 225 °C

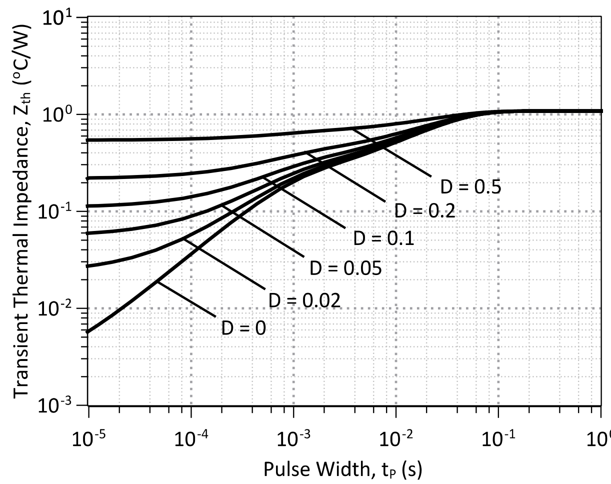
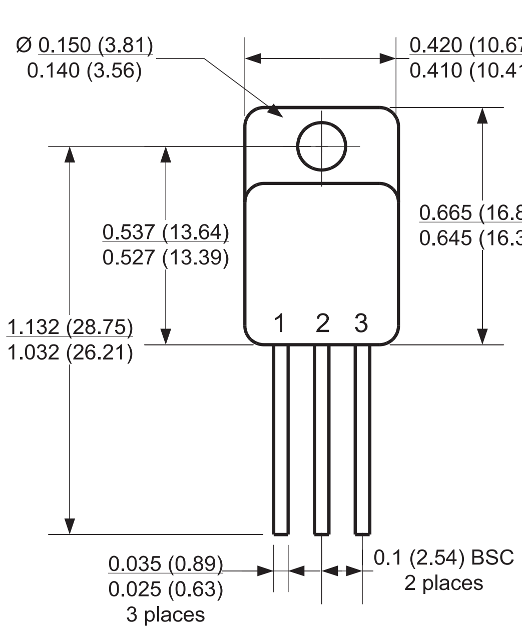


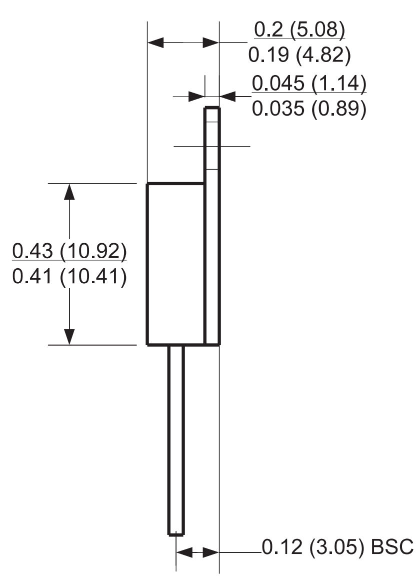
Figure 8: Transient Thermal Impedance

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
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 1N8034-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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*     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 1N8034-GA SPICE Model
*
.SUBCKT 1N8034 ANODE KATHODE
D1 ANODE KATHODE 1N8034_25C; Call the Schottky Diode Model
D2 ANODE KATHODE 1N8034_PIN; Call the PiN Diode Model
.MODEL 1N8034_25C D
+ IS       8.46E-17         RS         0.0319
+ N        1                IKF        1000
+ EG       1.2              XTI        3
+ TRS1     0.0038           TRS2       3.00E-05
+ CJO      1.26E-09         VJ         0.438
+ M        1.5278           FC         0.5
+ TT       1.00E-10         BV         650
+ IBV      1.00E-03         VPK        650
+ IAVE     20               TYPE       SiC_Schottky
+ MFG      GeneSiC_Semiconductor
.MODEL 1N8034_PIN D
+ IS       2.77E-10         RS         0.086693
+ N        3.3505           IKF        3.67E-06
+ EG       3.23             XTI        -10
+ FC       0.5              TT         0
+ BV       650              IBV        1.00E-03
+ VPK      650              IAVE       20
+ TYPE     SiC_PiN
.ENDS
*
* End of 1N8034-GA SPICE Model
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