GeneSiC
S E M I C O N D U C T O R

GB02SHT01-46

## High Temperature Silicon Carbide Power Schottky Diode

V_{RRM}	=	100 V
$I_{F (Tc=25°C)}$	=	4 A
Q_C	=	9 nC

Features

- 100 V Schottky rectifier
- 225 °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

PIN 1

PIN 3
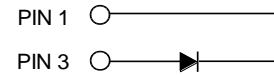
TO – 46

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 = 225 °C, unless otherwise specified

Parameter	Symbol	Conditions	Values	Unit
Repetitive peak reverse voltage	V_{RRM}		100	V
Continuous forward current	I_F	T_C = 25 °C	4	A
Continuous forward current	I_F	$T_C \leq$ 225 °C	2	A
RMS forward current	$I_{F(RMS)}$	$T_C \leq$ 225 °C	4	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 225	°C

Electrical Characteristics at T_j = 225 °C, unless otherwise specified

Parameter	Symbol	Conditions		Values			Unit
				min.	typ.	max.	
Diode forward voltage	V_F	I_F = 1 A, T_j = 25 °C			1.6		V
		I_F = 1 A, T_j = 225 °C			2.6		
Reverse current	I_R	V_R = 100 V, T_j = 25 °C			1	5	µA
		V_R = 100 V, T_j = 225 °C			5	50	
Total capacitive charge	Q_C	$I_F \leq I_{F,MAX}$ dl$_F$/dt = 200 A/µs T_j = 210 °C	V_R = 100 V		9		nC
Switching time	t_s		V_R = 100 V		< 17		ns
Total capacitance	C	V_R = 1 V, f = 1 MHz, T_j = 25 °C			76		pF
		V_R = 100 V, f = 1 MHz, T_j = 25 °C			20		

Thermal Characteristics

Parameter	Symbol			Unit
Thermal resistance, junction - case	R_{thJC}		5.55	°C/W

Mechanical Properties

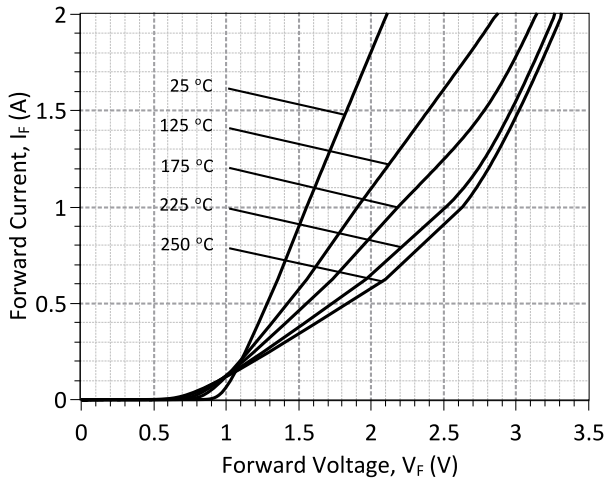| Parameter	Symbol			Unit
Mounting torque	M		0.6	Nm

Figure 1: Typical Forward Characteristics
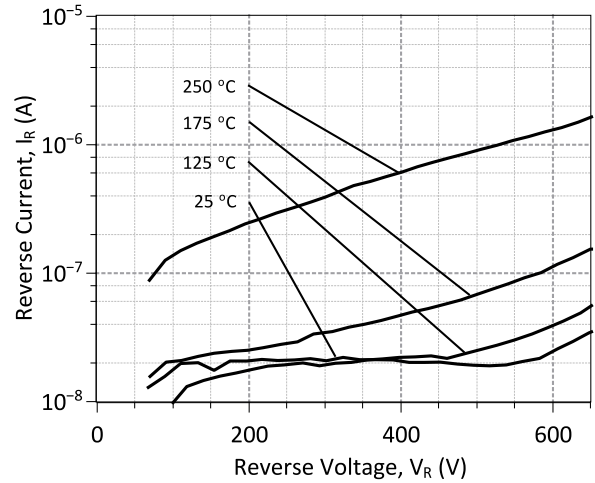

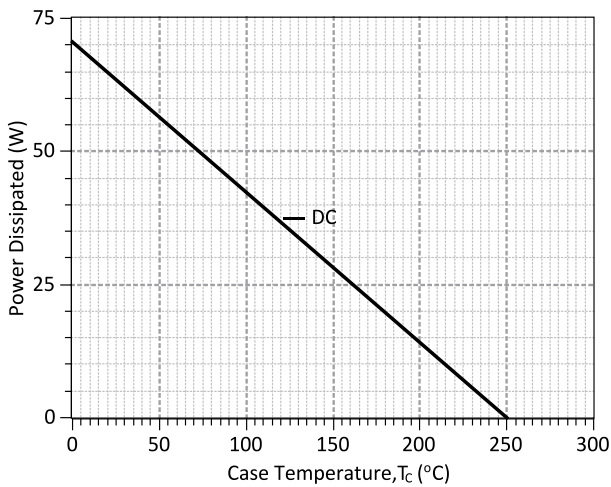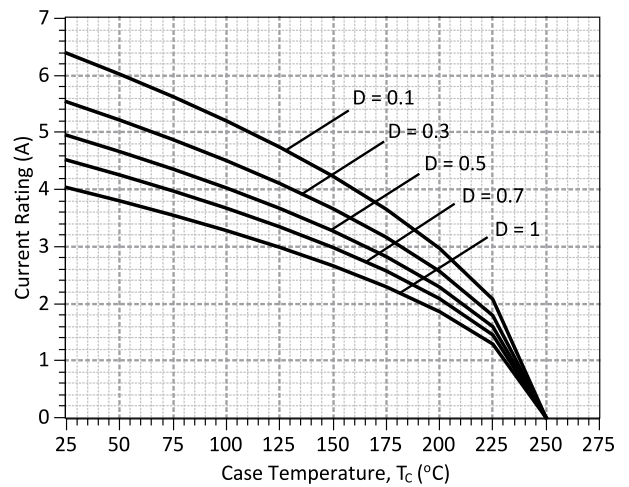**Figure 2: Typical Reverse Characteristics**

Figure 3: Power Derating Curve

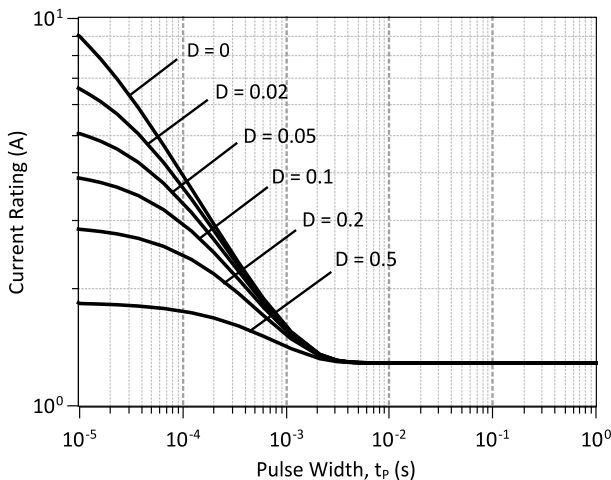**Figure 4: Current Derating Curves (D = t_P/T, t_P= 400 µs) (Considering worst case Z_{th} conditions)**

Figure 5: Current vs Pulse Duration Curves at T_C = 225 °C
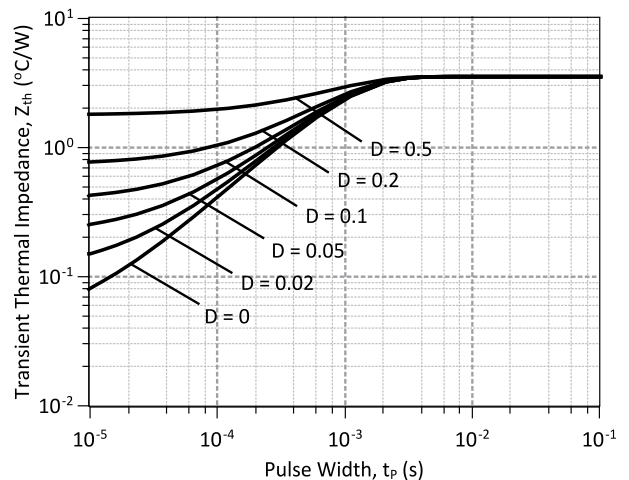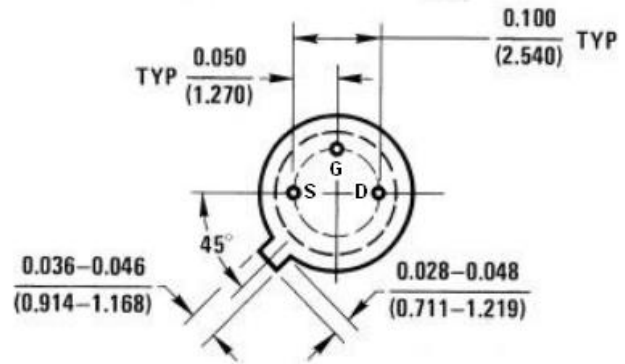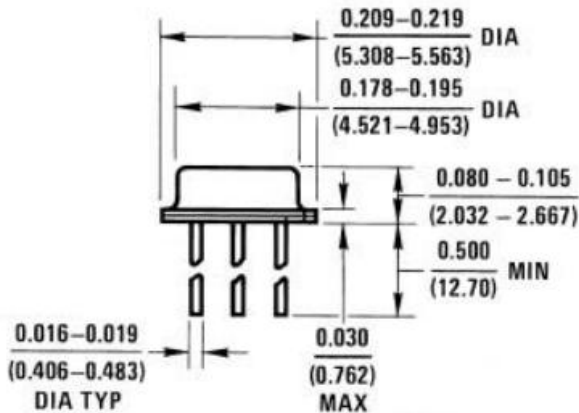

Figure 6: Transient Thermal Impedance

Package Dimensions:

TO-46   **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
2014/08/29	0	Initial release	

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 GB02SHT01-46.

```
*      MODEL OF GeneSiC Semiconductor Inc.
*
*      $Revision:   1.0            $
*      $Date:   29-AUG-2014        $
*
*      GeneSiC Semiconductor Inc.
*      43670 Trade Center Place Ste. 155
*      Dulles, VA 20166
*
*      COPYRIGHT (C) 2014 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 GB02SHT01-46 SPICE Model
*
.SUBCKT GB02SHT01ANODE KATHODE
D1 ANODE KATHODE GB02SHT01_25C; Call the Schottky Diode Model
D2 ANODE KATHODE GB02SHT01_PIN; Call the PiN Diode Model
.MODEL GB02SHT01_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        100
+ IBV     1.00E-03        VPK       100
+ IAVE    2               TYPE      SiC_Schottky
+ MFG     GeneSiC_Semiconductor
.MODEL GB02SHT01_PIN D
+ IS      5.73E-11        RS        0.72994
+ N       5               IKF       800
+ EG      3.23            XTI       -14
+ FC      0.5             TT        0
+ BV      100             IBV       1.00E-03
+ VPK     100             IAVE      2
+ TYPE    SiC_PiN
.ENDS
*
* End of GB02SHT01 SPICE Model
```