

# High Temperature Silicon Carbide Power Schottky Diode

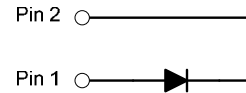
$V_{RRM}$	=	600 V
$I_F$ ( $T_C=25^\circ\text{C}$ )	=	4 A
$Q_C$	=	9 nC

## Features

- 600 V Schottky rectifier
- 210 °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



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 $T_j = 210^\circ\text{C}$ , unless otherwise specified

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Repetitive peak reverse voltage	$V_{RRM}$			600		V
Continuous forward current	$I_F$	$T_C = 25^\circ\text{C}$		4		A
Continuous forward current	$I_F$	$T_C \leq 180^\circ\text{C}$		2		A
RMS forward current	$I_{F(RMS)}$	$T_C \leq 180^\circ\text{C}$		4		A
Surge non-repetitive forward current, Half Sine Wave	$I_{F,SM}$	$T_C = 25^\circ\text{C}, t_p = 10\text{ ms}$		10		A
Non-repetitive peak forward current	$I_{F,max}$	$T_C = 25^\circ\text{C}, t_p = 10\ \mu\text{s}$		65		A
$i^2t$ value	$\int i^2 dt$	$T_C = 25^\circ\text{C}, t_p = 10\text{ ms}$		0.5		A <sup>2</sup> S
Power dissipation	$P_{tot}$	$T_C = 25^\circ\text{C}$		64		W
Operating and storage temperature	$T_j, T_{stg}$			-55 to 210		°C

## Electrical Characteristics at $T_j = 210^\circ\text{C}$ , unless otherwise specified

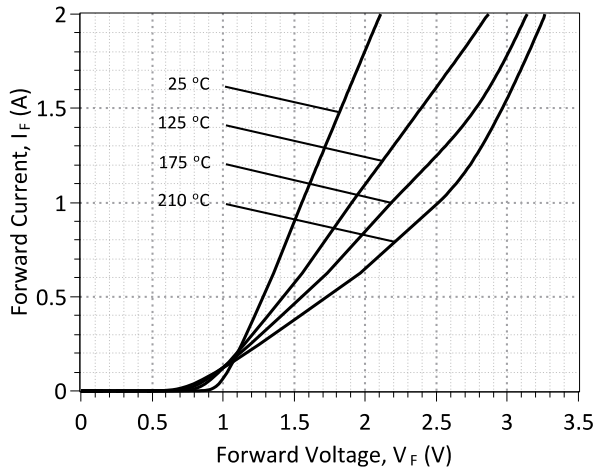
Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Diode forward voltage	$V_F$	$I_F = 1\text{ A}, T_j = 25^\circ\text{C}$		1.6		V
		$I_F = 1\text{ A}, T_j = 210^\circ\text{C}$		2.6		
Reverse current	$I_R$	$V_R = 600\text{ V}, T_j = 25^\circ\text{C}$		1	5	$\mu\text{A}$
		$V_R = 600\text{ V}, T_j = 210^\circ\text{C}$		5	50	
Total capacitive charge	$Q_C$	$I_F \leq I_{F,MAX}$ $di_F/dt = 200\text{ A}/\mu\text{s}$ $T_j = 210^\circ\text{C}$		9		nC
Switching time	$t_s$	$V_R = 600\text{ V}$ $V_R = 600\text{ V}$		< 17		ns
Total capacitance	C	$V_R = 1\text{ V}, f = 1\text{ MHz}, T_j = 25^\circ\text{C}$		76		pF
		$V_R = 600\text{ V}, f = 1\text{ MHz}, T_j = 25^\circ\text{C}$		15		

## Thermal Characteristics

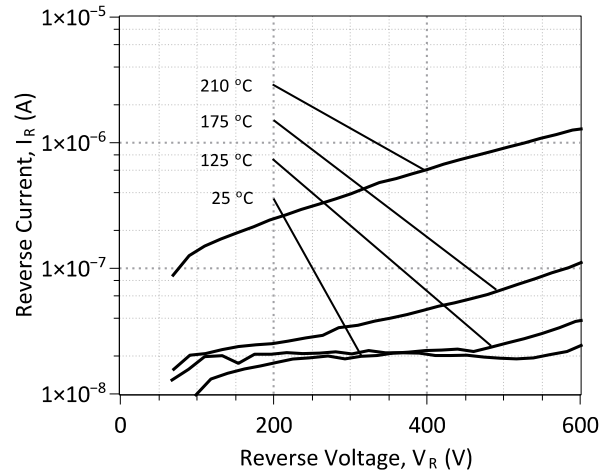
Thermal resistance, junction - case	$R_{thJC}$	5.55	°C/W
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## Mechanical Properties

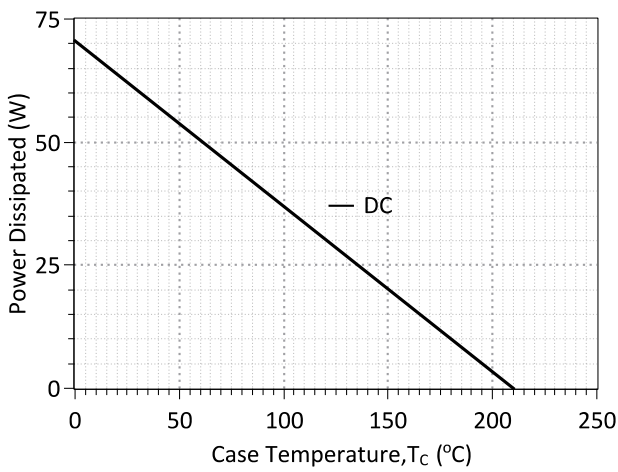
Mounting torque	M	0.6	Nm
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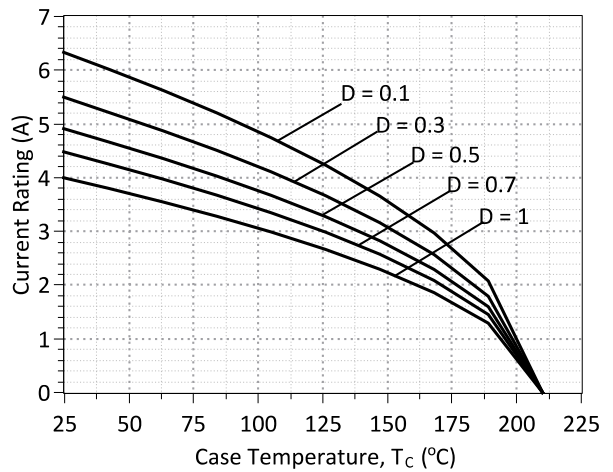
**Figure 1: Typical Forward Characteristics**



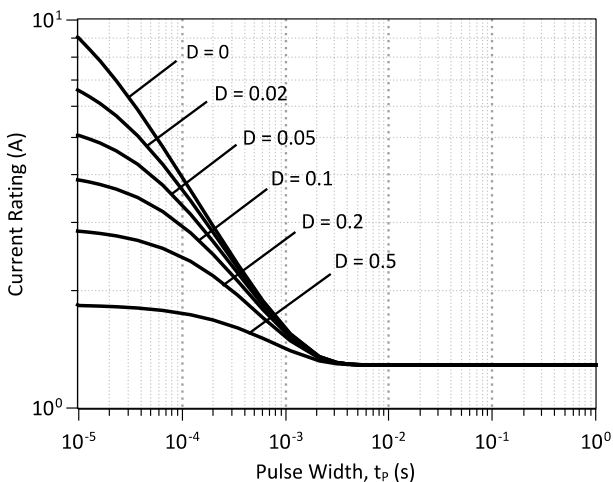
**Figure 2: Typical Reverse Characteristics**



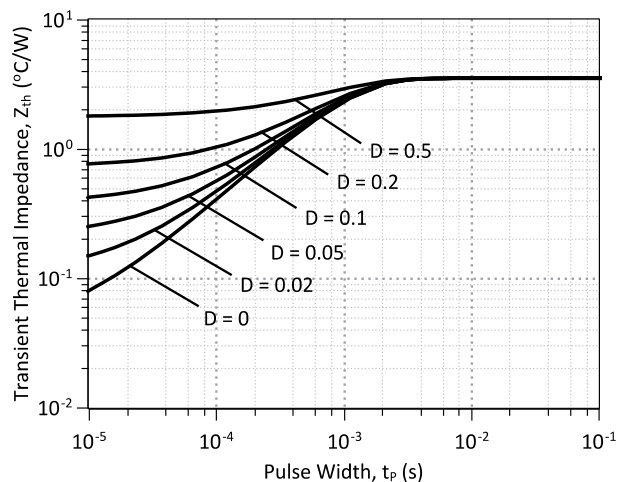
**Figure 3: Power Derating Curve**



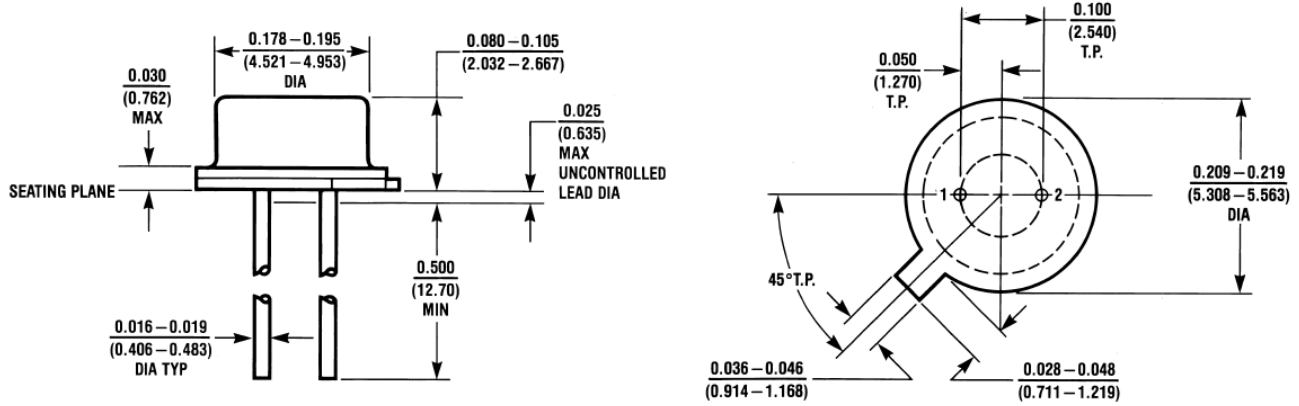
**Figure 4: Current Derating Curves ( $D = t_p/T$ ,  $t_p = 400 \mu s$ )  
(Considering worst case  $Z_{th}$  conditions)**



**Figure 5: Current vs Pulse Duration Curves at  $T_C = 190 \text{ }^\circ\text{C}$**



**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	

Published by

GeneSiC Semiconductor, Inc.  
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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 GB02SHT06-46.

```
*      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.
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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 GB02SHT06-46 SPICE Model
*
.SUBCKT GB02SHT06ANODE KATHODE
D1 ANODE KATHODE GB02SHT06_25C; Call the Schottky Diode Model
D2 ANODE KATHODE GB02SHT06_PIN; Call the PiN Diode Model
.MODEL GB02SHT06_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      600
+ IBV     1.00E-03     VPK     600
+ IAVE    2            TYPE    SiC_Schottky
+ MFG     GeneSiC_Semiconductor
.MODEL GB02SHT06_PIN D
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+ N       5            IKF     800
+ EG      3.23         XTI     -14
+ FC      0.5          TT      0
+ BV      600          IBV     1.00E-03
+ VPK     600          IAVE    2
+ TYPE    SiC_PiN
.ENDS
*
*      End of GB02SHT06 SPICE Model
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