

## Silicon Carbide Power Schottky Diode

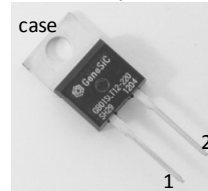
$V_{RRM}$	=	1200 V
$V_F$	=	1.6 V
$I_F$	=	1 A
$Q_C$	=	13 nC

### Features

- 1200 V Schottky rectifier
- 175 °C maximum operating temperature
- Temperature independent switching behavior
- Superior surge current capability
- Positive temperature coefficient of  $V_F$
- Extremely fast switching speeds
- Superior figure of merit  $Q_C/I_F$

### Package

- RoHS Compliant


**TO – 220AC**


### Advantages

- Improved circuit efficiency (Lower overall cost)
- Low switching losses
- Ease of paralleling devices without thermal runaway
- Smaller heat sink requirements
- Low reverse recovery current
- Low device capacitance
- Low reverse leakage current at operating temperature

### Applications

- Power Factor Correction (PFC)
- Switched-Mode Power Supply (SMPS)
- Solar Inverters
- Wind Turbine Inverters
- Motor Drives
- Induction Heating
- Uninterruptible Power Supply (UPS)
- High Voltage Multipliers

### Maximum Ratings at $T_j = 175\text{ °C}$ , unless otherwise specified

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Repetitive peak reverse voltage	$V_{RRM}$			1200		V
Continuous forward current	$I_F$	$T_C \leq 160\text{ °C}$		1		A
RMS forward current	$I_{F(RMS)}$	$T_C \leq 160\text{ °C}$		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
		$T_C = 160\text{ °C}$ , $t_p = 10\text{ ms}$		8		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		$\text{A}^2\text{s}$
		$T_C = 160\text{ °C}$ , $t_p = 10\text{ ms}$		0.3		$\text{A}^2\text{s}$
Power dissipation	$P_{tot}$	$T_C = 25\text{ °C}$		42		W
Operating and storage temperature	$T_j, T_{stg}$			-55 to 175		$^{\circ}\text{C}$

### Electrical Characteristics at $T_j = 175\text{ °C}$ , unless otherwise specified

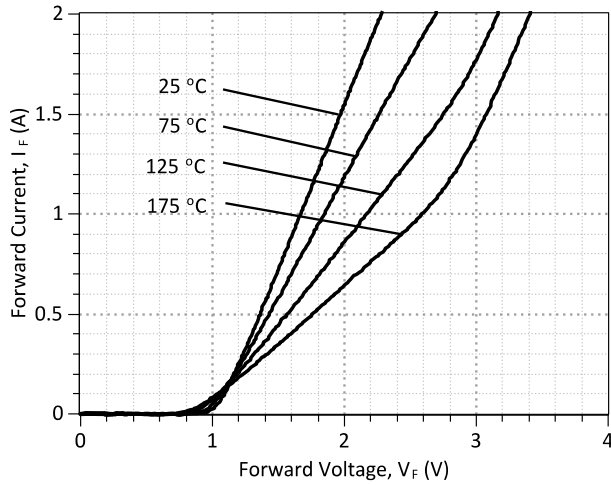
Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Diode forward voltage	$V_F$	$I_F = 1\text{ A}$ , $T_j = 25\text{ °C}$	1.50	1.56	1.75	V
		$I_F = 1\text{ A}$ , $T_j = 175\text{ °C}$	2.29	2.39	3.68	
Reverse current	$I_R$	$V_R = 1200\text{ V}$ , $T_j = 25\text{ °C}$	0.2	0.4	4.5	$\mu\text{A}$
		$V_R = 1200\text{ V}$ , $T_j = 175\text{ °C}$	0.5	1.0	11.3	
Total capacitive charge	$Q_C$	$I_F \leq I_{F,MAX}$ $di_F/dt = 200\text{ A}/\mu\text{s}$ $T_j = 175\text{ °C}$	$V_R = 400\text{ V}$	7		nC
	$V_R = 960\text{ V}$		13			
Switching time	$t_s$	$V_R = 1\text{ V}$ , $f = 1\text{ MHz}$ , $T_j = 25\text{ °C}$	$V_R = 400\text{ V}$	< 17		ns
			$V_R = 960\text{ V}$			
Total capacitance	C	$V_R = 1\text{ V}$ , $f = 1\text{ MHz}$ , $T_j = 25\text{ °C}$		69		pF
		$V_R = 400\text{ V}$ , $f = 1\text{ MHz}$ , $T_j = 25\text{ °C}$		10		
		$V_R = 1000\text{ V}$ , $f = 1\text{ MHz}$ , $T_j = 25\text{ °C}$		8		

### Thermal Characteristics

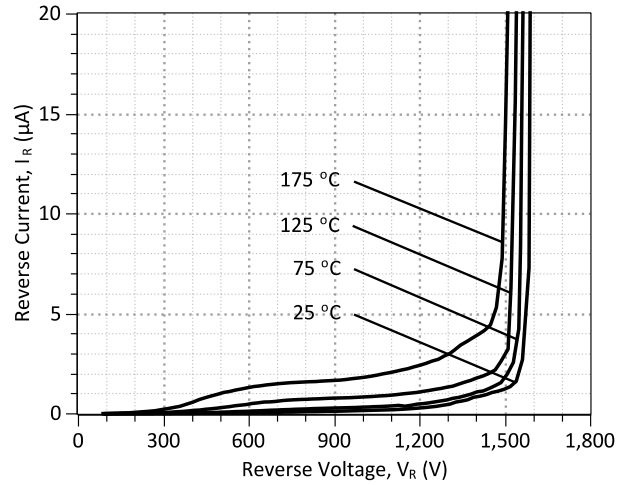
Thermal resistance, junction - case	$R_{thJC}$	3.6	$^{\circ}\text{C}/\text{W}$
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### Mechanical Properties

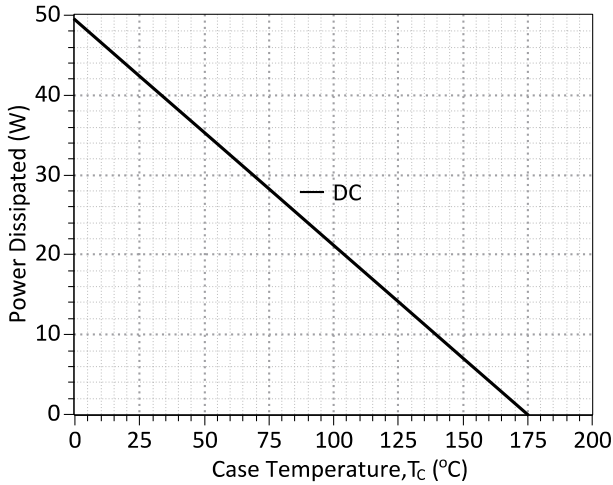
Mounting torque	M	0.6	Nm
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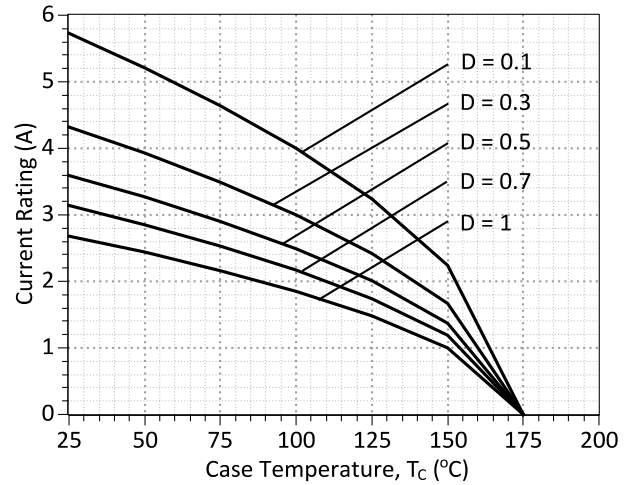
**Figure 1: Typical Forward Characteristics**



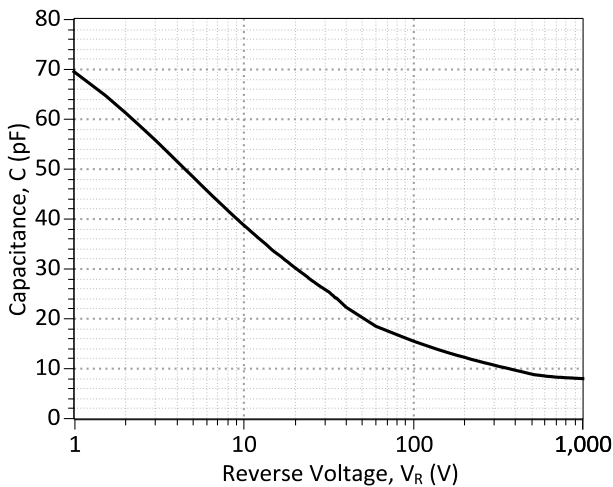
**Figure 2: Typical Reverse Characteristics**



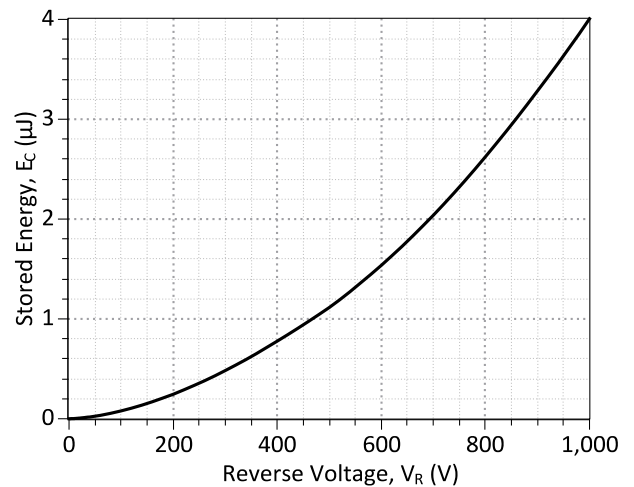
**Figure 3: Power Derating Curve**



**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**

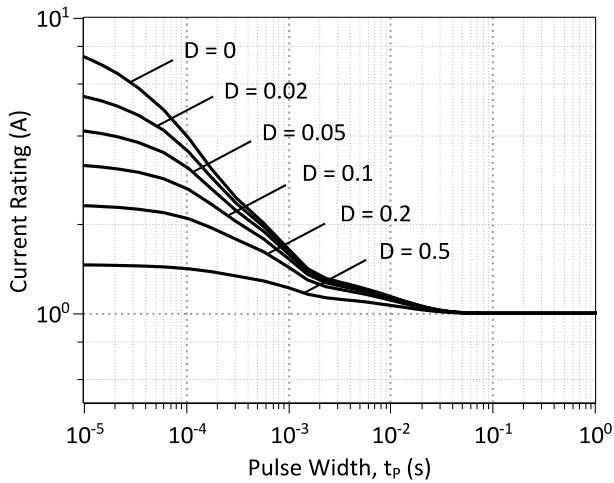


Figure 7: Current vs Pulse Duration Curves at  $T_c = 160\text{ }^\circ\text{C}$

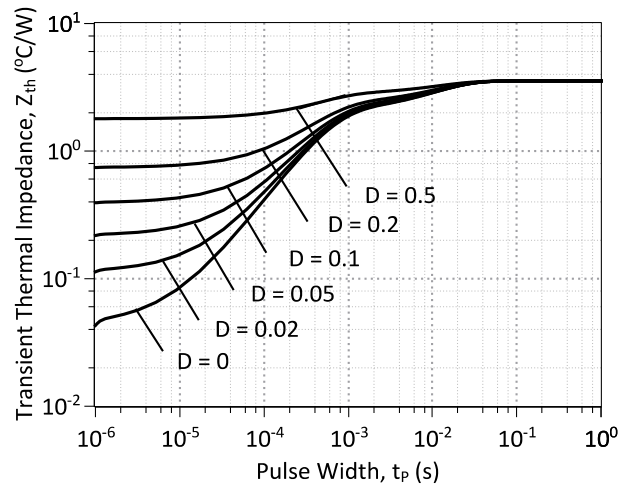
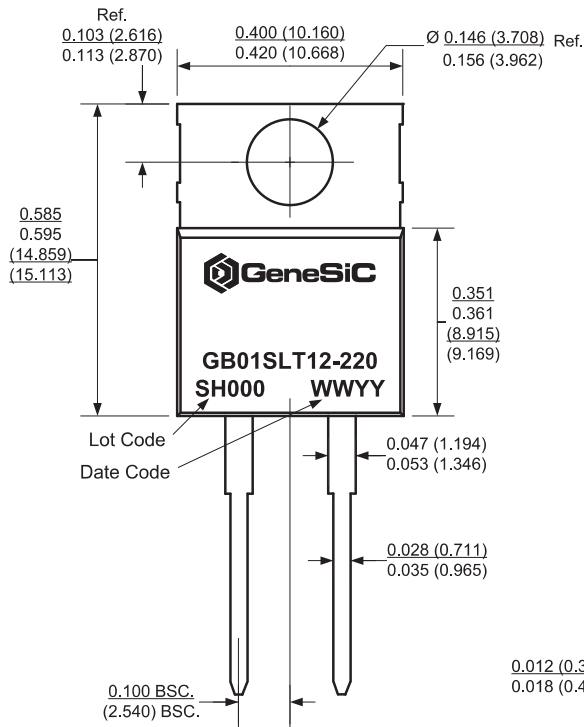


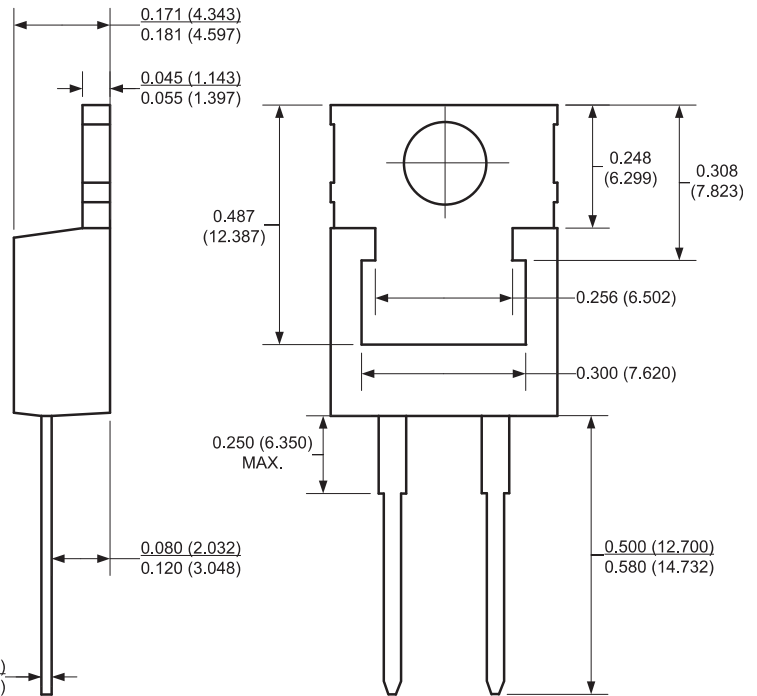
Figure 8: Transient Thermal Impedance

**Package Dimensions:**

**TO-220AC**



**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
2013/02/05	2	Second generation update	
2012/05/22	1	Second generation release	
2010/12/13	0	Initial release	

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## SPICE Model Parameters

Copy the following code into a SPICE software program for simulation of the GB01SLT12-220 device.

```
*      MODEL OF GeneSiC Semiconductor Inc.
*
*      $Revision:   1.0           $
*      $Date:      04-SEP-2013   $
*
*      GeneSiC Semiconductor Inc.
*      43670 Trade Center Place Ste. 155
*      Dulles, VA 20166
*      http://www.genesicsemi.com/index.php/sic-products/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 GB01SLT12-220 SPICE Model
*
.SUBCKT GB01SLT12 ANODE KATHODE
R1 ANODE INT R=((TEMP-24)*0.0069); Temperature Dependant Resistor
D1 INT KATHODE GB01SLT12_25C; Call the 25C Diode Model
D2 ANODE KATHODE GB01SLT12_PIN; Call the PiN Diode Model
.MODEL GB01SLT12_25C D
+ IS      7.27E-19      RS      0.592251
+ N       1            IKF     407.773
+ EG      1.2          XTI     3
+ CJO     7.90E-11     VJ      0.367
+ M       1.63         FC      0.5
+ TT      1.00E-10     BV      1500
+ IBV     1.00E-03     VPK     1200
+ IAVE    1            TYPE    SiC_Schottky
+ MFG     GeneSiC_Semiconductor
.MODEL GB01SLT12_PIN D
+ IS      1.08E-17     RS      1.8
+ N       2.2313      IKF     999
+ EG      3.23        XTI     -65
+ FC      0.5         TT      0
+ BV      1500        IBV     1.00E-03
+ VPK     1200        IAVE    1
+ TYPE    SiC_PiN
.ENDS
*
*      End of GB01SLT12-220 SPICE Model
```