

## Silicon Carbide Power Schottky Diode

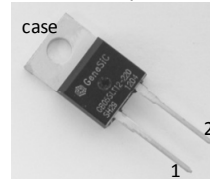
$V_{RRM}$	=	<b>1200 V</b>
$I_F (T_C = 25^\circ\text{C})$	=	<b>12 A</b>
$Q_C$	=	<b>21 nC</b>

### 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 $T_j = 175^\circ\text{C}$ , unless otherwise specified

Parameter	Symbol	Conditions	Values	Unit
Repetitive peak reverse voltage	$V_{RRM}$		1200	V
Continuous forward current	$I_F$	$T_C \leq 155^\circ\text{C}$	5	A
RMS forward current	$I_{F(RMS)}$	$T_C \leq 155^\circ\text{C}$	8	A
Surge non-repetitive forward current, Half Sine Wave	$I_{F,SM}$	$T_C = 25^\circ\text{C}, t_p = 10\text{ ms}$	32	A
		$T_C = 155^\circ\text{C}, t_p = 10\text{ ms}$	26	
Non-repetitive peak forward current	$I_{F,max}$	$T_C = 25^\circ\text{C}, t_p = 10\ \mu\text{s}$	120	A
$I^2t$ value	$\int i^2 dt$	$T_C = 25^\circ\text{C}, t_p = 10\text{ ms}$	5	A <sup>2</sup> s
		$T_C = 155^\circ\text{C}, t_p = 10\text{ ms}$	3.4	
Power dissipation	$P_{tot}$	$T_C = 25^\circ\text{C}$	117	W
Operating and storage temperature	$T_j, T_{stg}$		-55 to 175	°C

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

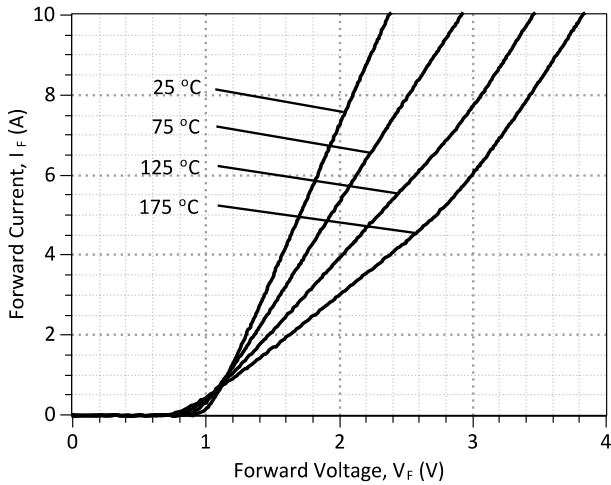
Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Diode forward voltage	$V_F$	$I_F = 5\text{ A}, T_j = 25^\circ\text{C}$		1.6	1.9	V
		$I_F = 5\text{ A}, T_j = 175^\circ\text{C}$		2.6	3.0	
Reverse current	$I_R$	$V_R = 1200\text{ V}, T_j = 25^\circ\text{C}$		5	50	$\mu\text{A}$
		$V_R = 1200\text{ V}, T_j = 175^\circ\text{C}$		10	100	
Total capacitive charge	$Q_C$	$I_F \leq I_{F,MAX}$ $dI_F/dt = 200\text{ A}/\mu\text{s}$ $T_j = 175^\circ\text{C}$	$V_R = 400\text{ V}$	21		nC
			$V_R = 960\text{ V}$	35		
Switching time	$t_s$	$V_R = 400\text{ V}$ $V_R = 960\text{ V}$		< 25		ns
Total capacitance	C	$V_R = 1\text{ V}, f = 1\text{ MHz}, T_j = 25^\circ\text{C}$		260		pF
		$V_R = 400\text{ V}, f = 1\text{ MHz}, T_j = 25^\circ\text{C}$		25		
		$V_R = 1000\text{ V}, f = 1\text{ MHz}, T_j = 25^\circ\text{C}$		20		

### Thermal Characteristics

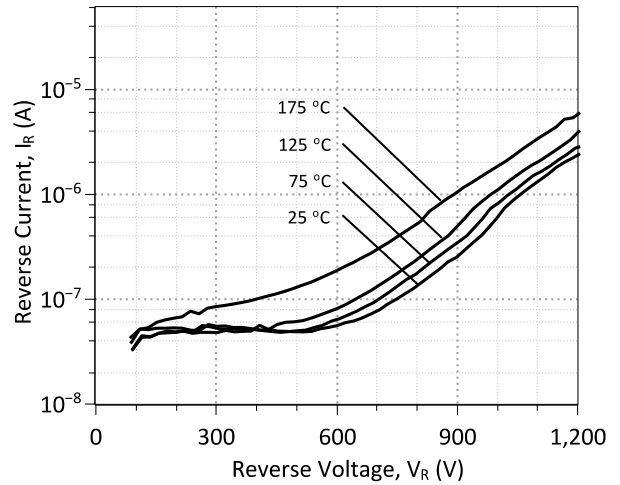
Thermal resistance, junction - case	$R_{thJC}$	1.4	°C/W
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### Mechanical Properties

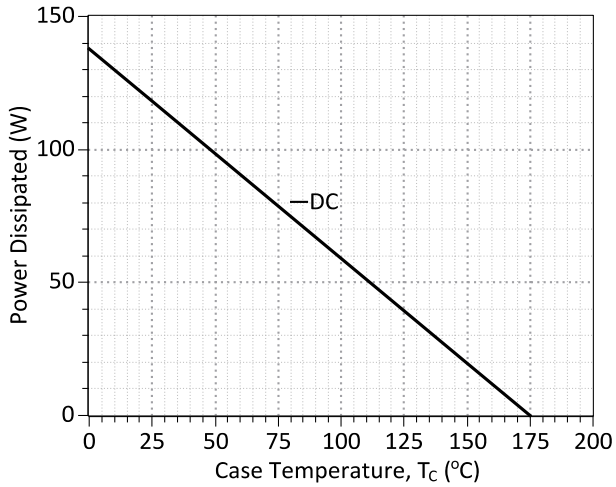
Mounting torque	M	0.6	Nm
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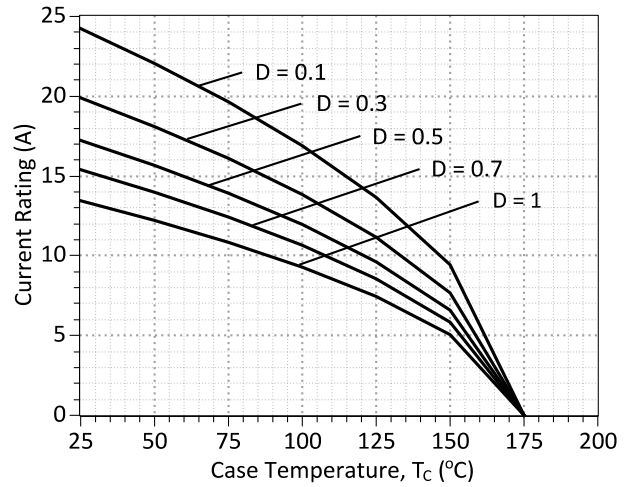
**Figure 1: Typical Forward Characteristics**



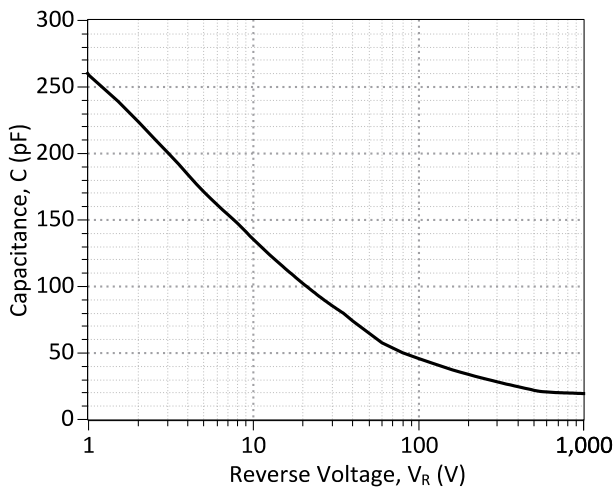
**Figure 2: Typical Reverse Characteristics**



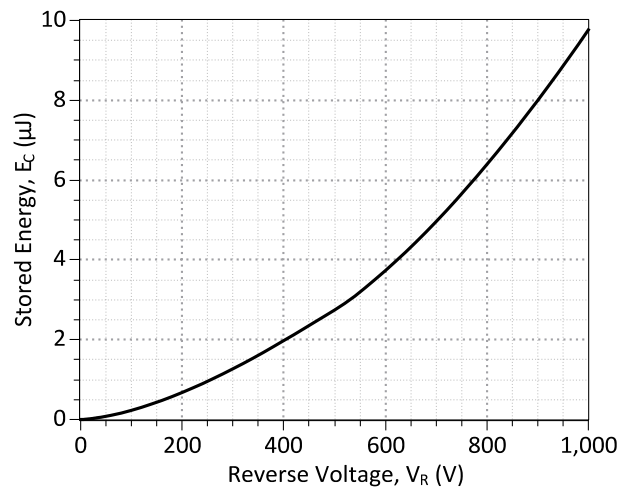
**Figure 3: Power Derating Curve**



**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**

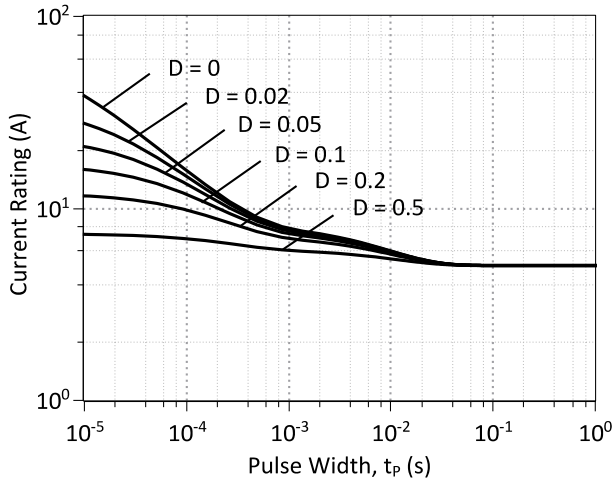


Figure 7: Current vs Pulse Duration Curves at  $T_c = 155\text{ }^\circ\text{C}$

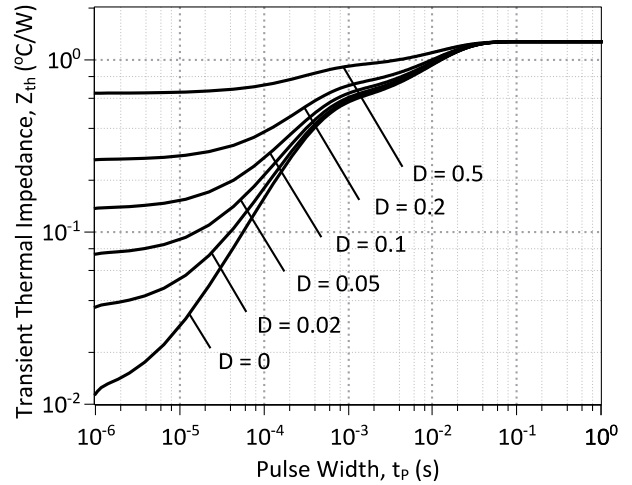
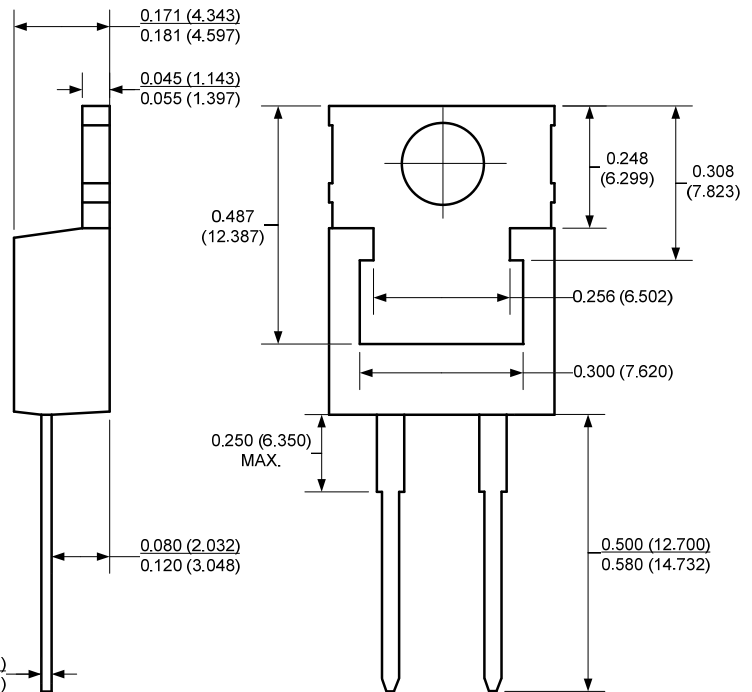
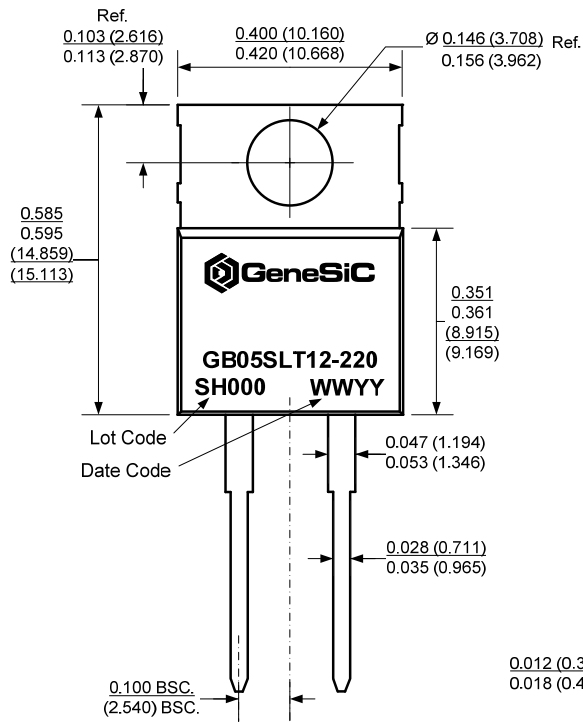


Figure 8: Transient Thermal Impedance

**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
2014/08/26	3	Updated Electrical Characteristics	
2013/02/05	2	Second generation update	
2012/05/22	1	Second generation release	
2010/12/14	0	Initial release	

Published by

GeneSiC Semiconductor, Inc.  
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Dulles, VA 20166

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## SPICE Model Parameters

Copy the following code into a SPICE software program for simulation of the GB05SLT12-220 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 GB05SLT12-220 SPICE Model
*
.SUBCKT GB05SLT12 ANODE KATHODE
R1 ANODE INT R=((TEMP-24)*0.0015); Temperature Dependant Resistor
D1 INT KATHODE GB05SLT12_25C; Call the 25C Diode Model
D2 ANODE KATHODE GB05SLT12_PIN; Call the PiN Diode Model
.MODEL GB05SLT12_25C D
+ IS      5.83E-18      RS      0.1276
+ N       1            IKF     602
+ EG      1.2          XTI     3
+ CJO     3.00E-10     VJ     0.419
+ M       1.6          FC      0.5
+ TT      1.00E-10     BV      1200
+ IBV     1.00E-03     VPK     1200
+ IAVE    5            TYPE    SiC_Schottky
+ MFG     GeneSiC_Semiconductor
.MODEL GB05SLT12_PIN D
+ IS      3.50 E-12     RS      0.3648
+ N       4.409        IKF     73
+ EG      3.23         XTI     -6
+ FC      0.5          TT      0
+ BV      1200         IBV     1.00E-03
+ VPK     1200         IAVE    1
+ TYPE    SiC_PiN
.ENDS
*
*      End of GB05SLT12-220 SPICE Model
```

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