

## Silicon Carbide Power Schottky Diode

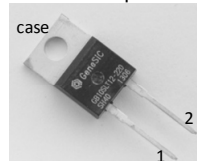
$V_{RRM}$	=	1200 V
$V_F$	=	1.5 V
$I_F$	=	10 A
$Q_C$	=	52 nC

### 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
Repetitive peak reverse voltage	$V_{RRM}$		1200	V
Continuous forward current	$I_F$	$T_C \leq 150\text{ °C}$	10	A
RMS forward current	$I_{F(RMS)}$	$T_C \leq 150\text{ °C}$	17	A
Surge non-repetitive forward current, Half Sine Wave	$I_{F,SM}$	$T_C = 25\text{ °C}$ , $t_p = 10\text{ ms}$	65	A
		$T_C = 150\text{ °C}$ , $t_p = 10\text{ ms}$	55	
Non-repetitive peak forward current	$I_{F,max}$	$T_C = 25\text{ °C}$ , $t_p = 10\text{ }\mu\text{s}$	280	A
$I^2t$ value	$\int i^2 dt$	$T_C = 25\text{ °C}$ , $t_p = 10\text{ ms}$	21	$\text{A}^2\text{s}$
		$T_C = 150\text{ °C}$ , $t_p = 10\text{ ms}$	15	
Power dissipation	$P_{tot}$	$T_C = 25\text{ °C}$	190	W
Operating and storage temperature	$T_J, T_{stg}$		-55 to 175	°C

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

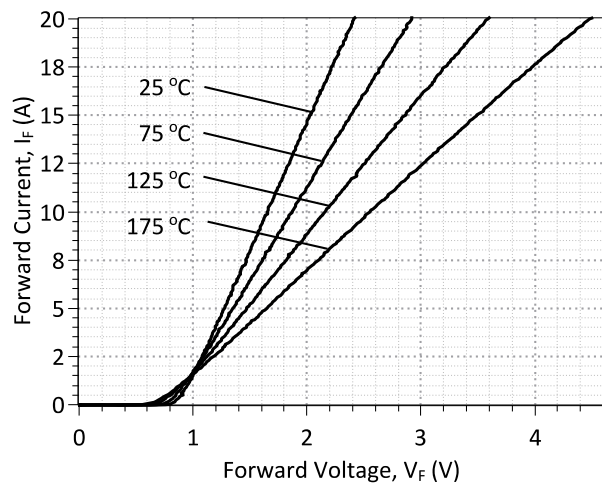
Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Diode forward voltage	$V_F$	$I_F = 10\text{ A}$ , $T_J = 25\text{ °C}$		1.5	1.8	V
		$I_F = 10\text{ A}$ , $T_J = 175\text{ °C}$		2.6	3.0	
Reverse current	$I_R$	$V_R = 1200\text{ V}$ , $T_J = 25\text{ °C}$		5	50	$\mu\text{A}$
		$V_R = 1200\text{ V}$ , $T_J = 175\text{ °C}$		10	100	
Total capacitive charge	$Q_C$	$I_F \leq I_{F,MAX}$ $dI_F/dt = 200\text{ A}/\mu\text{s}$ $T_J = 175\text{ °C}$	$V_R = 400\text{ V}$	31		nC
			$V_R = 960\text{ V}$	52		
Switching time	$t_s$	$V_R = 400\text{ V}$ $V_R = 960\text{ V}$		< 25		ns
Total capacitance	$C$	$V_R = 1\text{ V}$ , $f = 1\text{ MHz}$ , $T_J = 25\text{ °C}$		490		pF
		$V_R = 400\text{ V}$ , $f = 1\text{ MHz}$ , $T_J = 25\text{ °C}$		45		
		$V_R = 1000\text{ V}$ , $f = 1\text{ MHz}$ , $T_J = 25\text{ °C}$		33		

### Thermal Characteristics

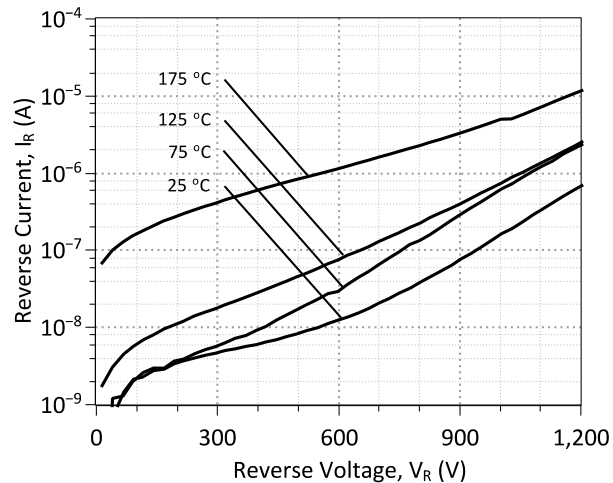
Thermal resistance, junction - case	$R_{thJC}$	0.8	°C/W
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### Mechanical Properties

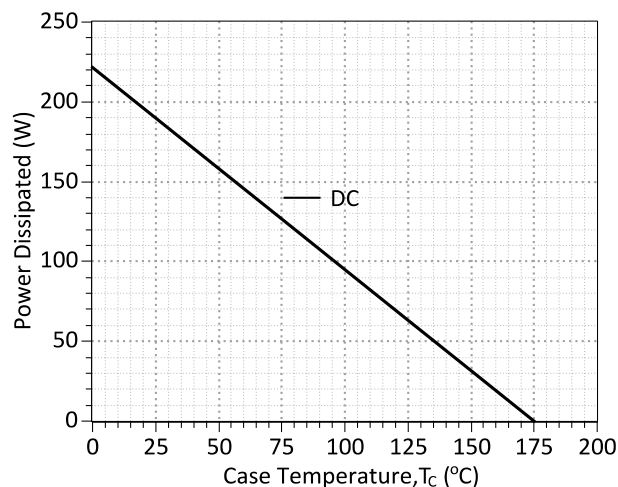
Mounting torque	M	0.6	Nm
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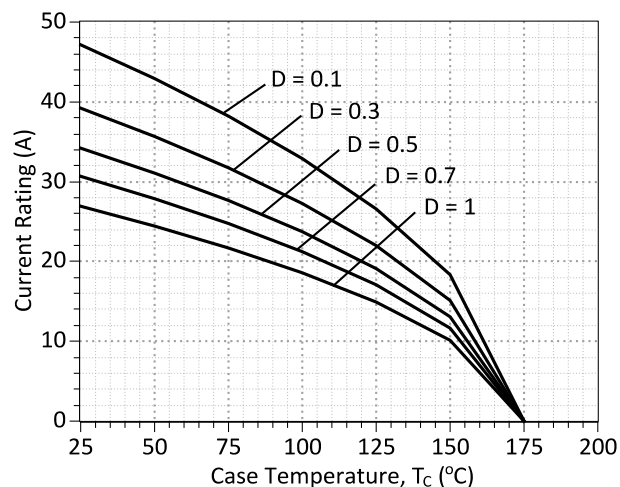
**Figure 1: Typical Forward Characteristics**



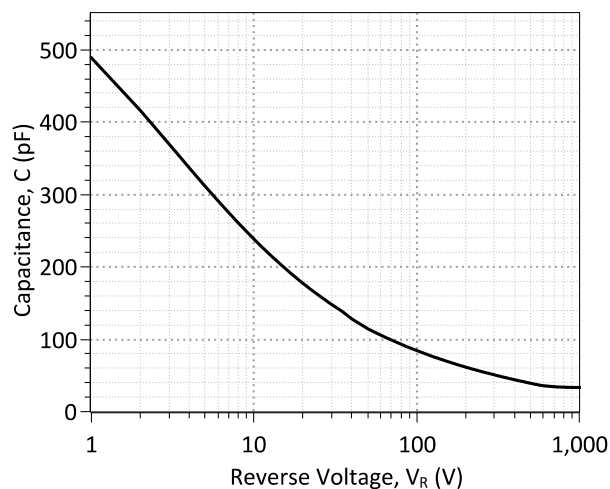
**Figure 2: Typical Reverse Characteristics**



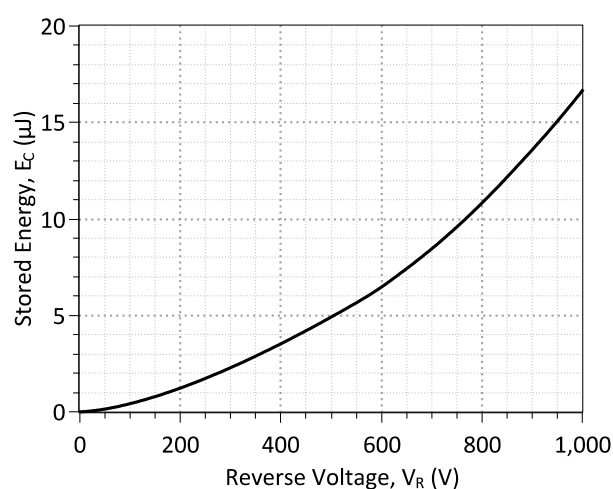
**Figure 3: Power Derating Curve**



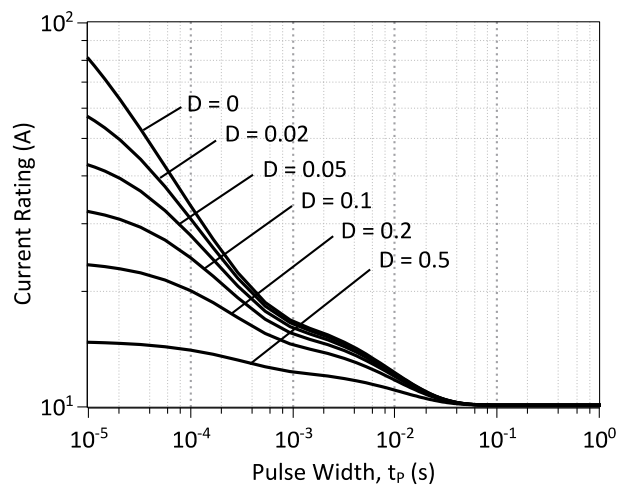
**Figure 4: Current Derating Curves ( $D = t_p/T$ ,  $t_p = 400 \mu s$ )  
(Considering worst case  $Z_{th}$  conditions)**



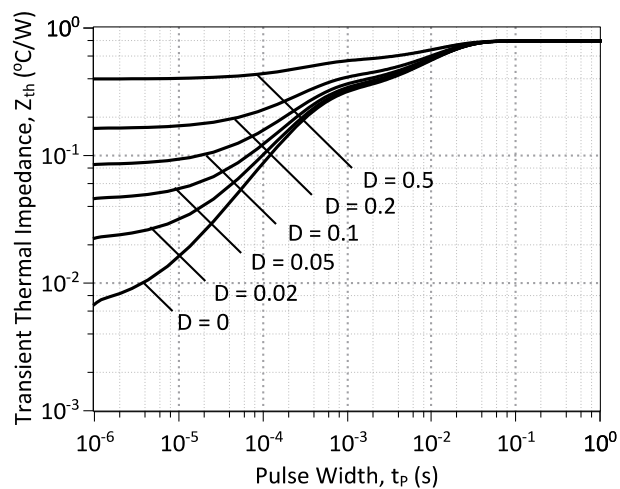
**Figure 5: Typical Junction Capacitance vs Reverse Voltage Characteristics**



**Figure 6: Typical Switching Energy vs Reverse Voltage Characteristics**



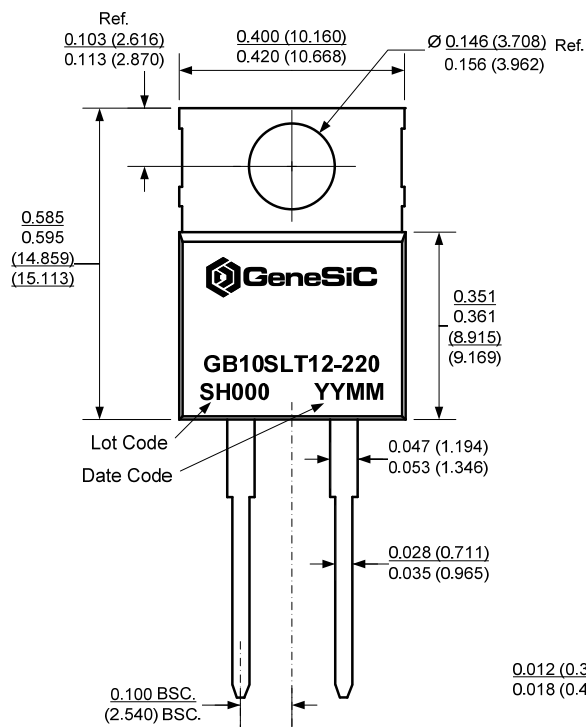
**Figure 7: Current vs Pulse Duration Curves at  $T_c = 150\text{ }^{\circ}\text{C}$**



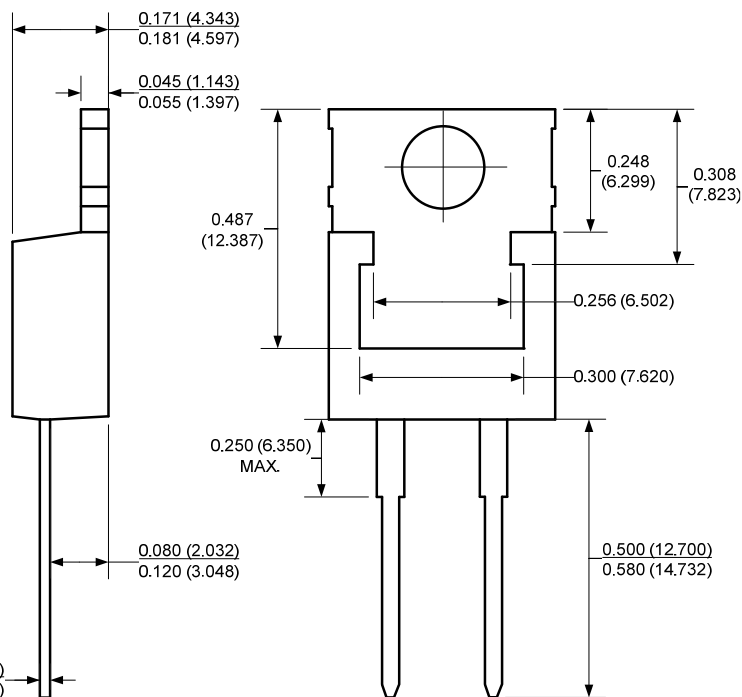
**Figure 8: Transient Thermal Impedance**

**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
2013/11/12	4	Updated Electrical Characteristics	
2013/06/12	3	Updated Electrical Characteristics	
2012/12/18	2	Second generation update	
2012/05/22	1	Second generation release	
2010/12/14	0	Initial release	

Published by  
GeneSiC Semiconductor, Inc.  
43670 Trade Center Place Suite 155  
Dulles, VA 20166

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## SPICE Model Parameters

Copy the following code into a SPICE software program for simulation of the GB10SLT12-220 device.

```
*      MODEL OF GeneSiC Semiconductor Inc.
*
*      $Revision:   1.0           $
*      $Date:      20-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 GB10SLT12-220 SPICE Model
*
.SUBCKT GB10SLT12 ANODE KATHODE
D1 ANODE KATHODE GB10SLT12_SCHOTTKY
D2 ANODE KATHODE GB10SLT12_PIN
.MODEL GB10SLT12_SCHOTTKY D
+ IS      4.55E-15      RS      0.0736
+ N        1           IKF     1000
+ EG       1.2         XTI     -2
+ TRS1     0.0054347826 TRS2   2.71739E-05
+ CJO      6.40E-10    VJ      0.469
+ M        1.508       FC      0.5
+ TT       1.00E-10    BV      1200
+ IBV      1.00E-03    VPK     1200
+ IAVE     10          TYPE    SiC_Schottky
+ MFG      GeneSiC_Semi
.MODEL GB10SLT12_PIN D
+ IS      1.54E-22      RS      0.19
+ TRS1    -0.004        N       3.941
+ EG       3.23         IKF     19
+ XTI      0           FC      0.5
+ TT       0           BV      1200
+ IBV      1.00E-03    VPK     1200
+ IAVE     10          TYPE    SiC_Pin
.ENDS
*
*  End of GB10SLT12-220 SPICE Model
```