

## Silicon Carbide Power Schottky Diode

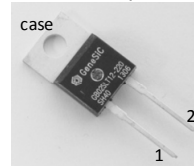
|                                |   |        |
|--------------------------------|---|--------|
| $V_{RRM}$                      | = | 1200 V |
| $I_F (T_C = 25^\circ\text{C})$ | = | 5 A    |
| $Q_C$                          | = | 9 nC   |

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

| Parameter  | Symbol         | Conditions   | Values     | Unit                 |
|--|----------------|--|------------|----------------------|
| Repetitive peak reverse voltage                      | $V_{RRM}$      |  | 1200       | V                    |
| Continuous forward current                           | $I_F$          | $T_C \leq 160^\circ\text{C}$                       | 2          | A                    |
| RMS forward current                                  | $I_{F(RMS)}$   | $T_C \leq 160^\circ\text{C}$                       | 3          | A                    |
| Surge non-repetitive forward current, Half Sine Wave | $I_{F,SM}$     | $T_C = 25^\circ\text{C}$ , $t_p = 10\text{ ms}$    | 18         | A                    |
|  |                | $T_C = 160^\circ\text{C}$ , $t_p = 10\text{ ms}$   | 15         | A                    |
| Non-repetitive peak forward current                  | $I_{F,max}$    | $T_C = 25^\circ\text{C}$ , $t_p = 10\ \mu\text{s}$ | 100        | A                    |
| $i^2t$ value   | $\int i^2 dt$  | $T_C = 25^\circ\text{C}$ , $t_p = 10\text{ ms}$    | 1.6        | $\text{A}^2\text{s}$ |
|  |                | $T_C = 160^\circ\text{C}$ , $t_p = 10\text{ ms}$   | 1.1        | $\text{A}^2\text{s}$ |
| Power dissipation                                    | $P_{tot}$      | $T_C = 25^\circ\text{C}$                           | 65         | W                    |
| Operating and storage temperature                    | $T_j, T_{stg}$ |  | -55 to 175 | $^\circ\text{C}$     |

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

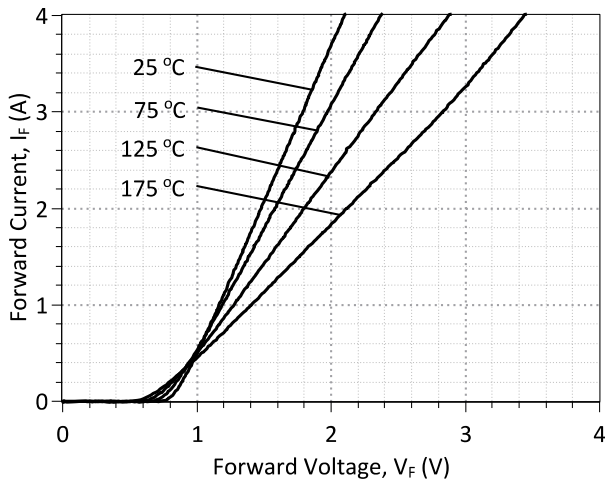
| Parameter               | Symbol               | Conditions  | Values               |      |      | Unit          |
|-------------------------|----------------------|---|----------------------|------|------|---------------|
|                         |                      |   | min.                 | typ. | max. |               |
| Diode forward voltage   | $V_F$                | $I_F = 2\text{ A}$ , $T_j = 25^\circ\text{C}$   |                      | 1.5  | 1.8  | V             |
|                         |                      | $I_F = 2\text{ A}$ , $T_j = 175^\circ\text{C}$  |                      | 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 | $Q_C$                | $I_F \leq I_{F,MAX}$<br>$dI_F/dt = 200\text{ A}/\mu\text{s}$<br>$T_j = 175^\circ\text{C}$ | $V_R = 400\text{ V}$ | 9    |      | nC            |
|                         | $V_R = 960\text{ V}$ |   | 14                   |      |      |               |
| Switching time          | $t_s$                | $V_R = 1\text{ V}$ , $f = 1\text{ MHz}$ , $T_j = 25^\circ\text{C}$                        | $V_R = 400\text{ V}$ | < 17 |      | ns            |
|                         |                      |   | $V_R = 960\text{ V}$ |      |      |               |
| Total capacitance       | C                    | $V_R = 1\text{ V}$ , $f = 1\text{ MHz}$ , $T_j = 25^\circ\text{C}$                        |                      | 131  |      | pF            |
|                         |                      | $V_R = 400\text{ V}$ , $f = 1\text{ MHz}$ , $T_j = 25^\circ\text{C}$                      |                      | 12   |      |               |
|                         |                      | $V_R = 1000\text{ V}$ , $f = 1\text{ MHz}$ , $T_j = 25^\circ\text{C}$                     |                      | 8    |      |               |

### Thermal Characteristics

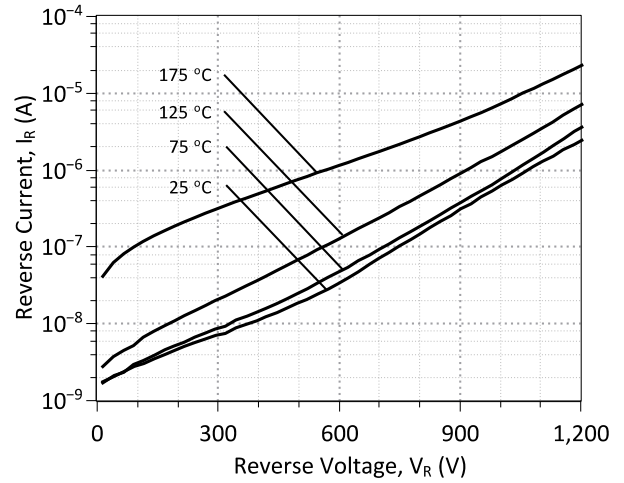
|                                     |            |     |                           |
|-------------------------------------|------------|-----|---------------------------|
| Thermal resistance, junction - case | $R_{thJC}$ | 2.3 | $^\circ\text{C}/\text{W}$ |
|-------------------------------------|------------|-----|---------------------------|

### Mechanical Properties

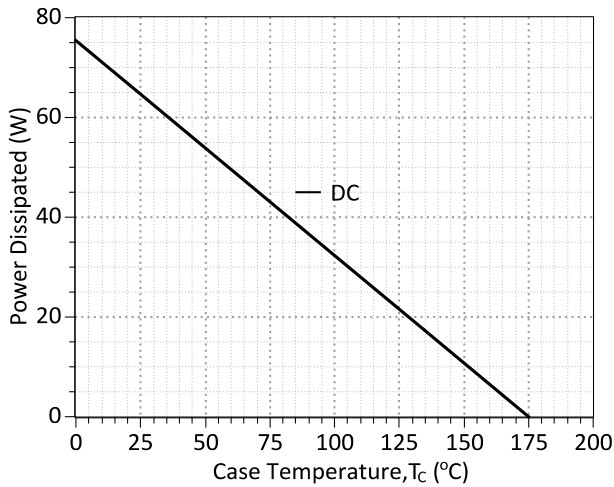
|                 |   |     |    |
|-----------------|---|-----|----|
| Mounting torque | M | 0.6 | Nm |
|-----------------|---|-----|----|



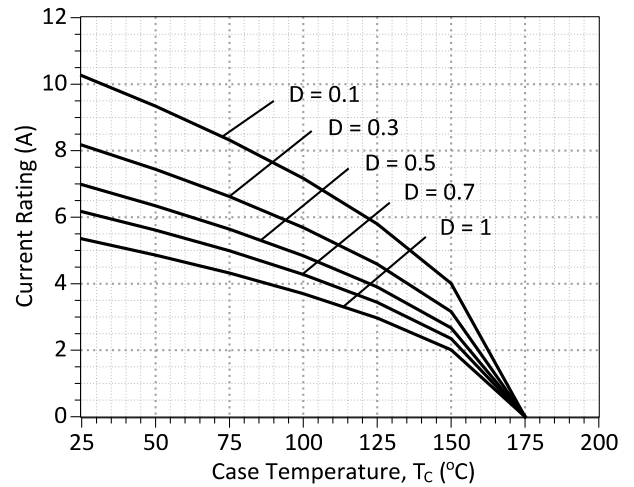
**Figure 1: Typical Forward Characteristics**



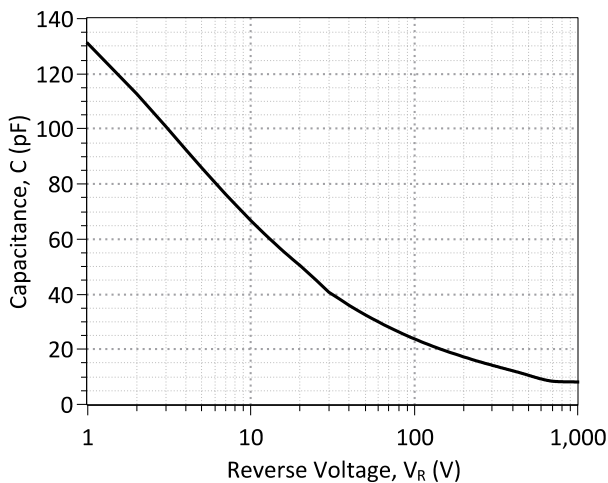
**Figure 2: Typical Reverse Characteristics**



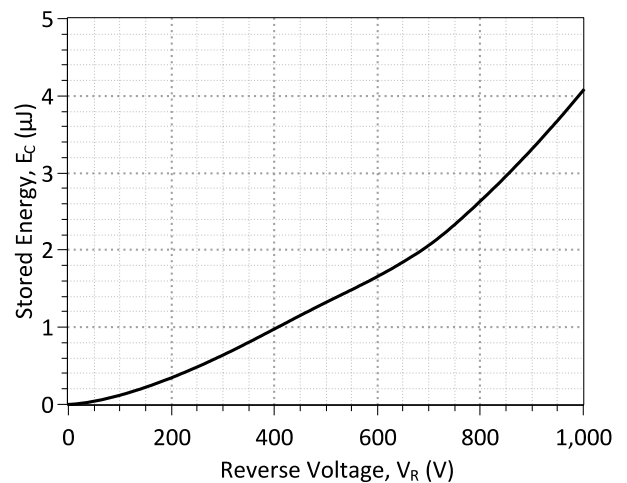
**Figure 3: Power Derating Curve**



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



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



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

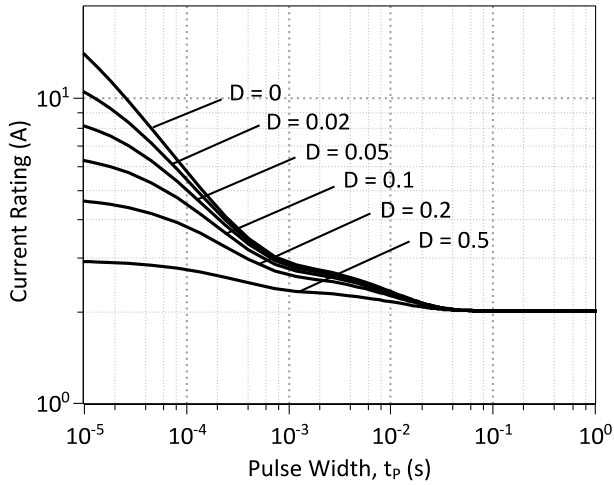


Figure 7: Current vs Pulse Duration Curves at  $T_c = 160\text{ }^\circ\text{C}$

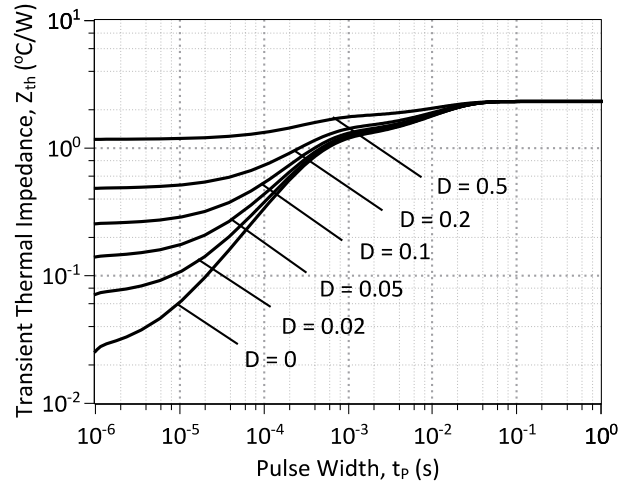
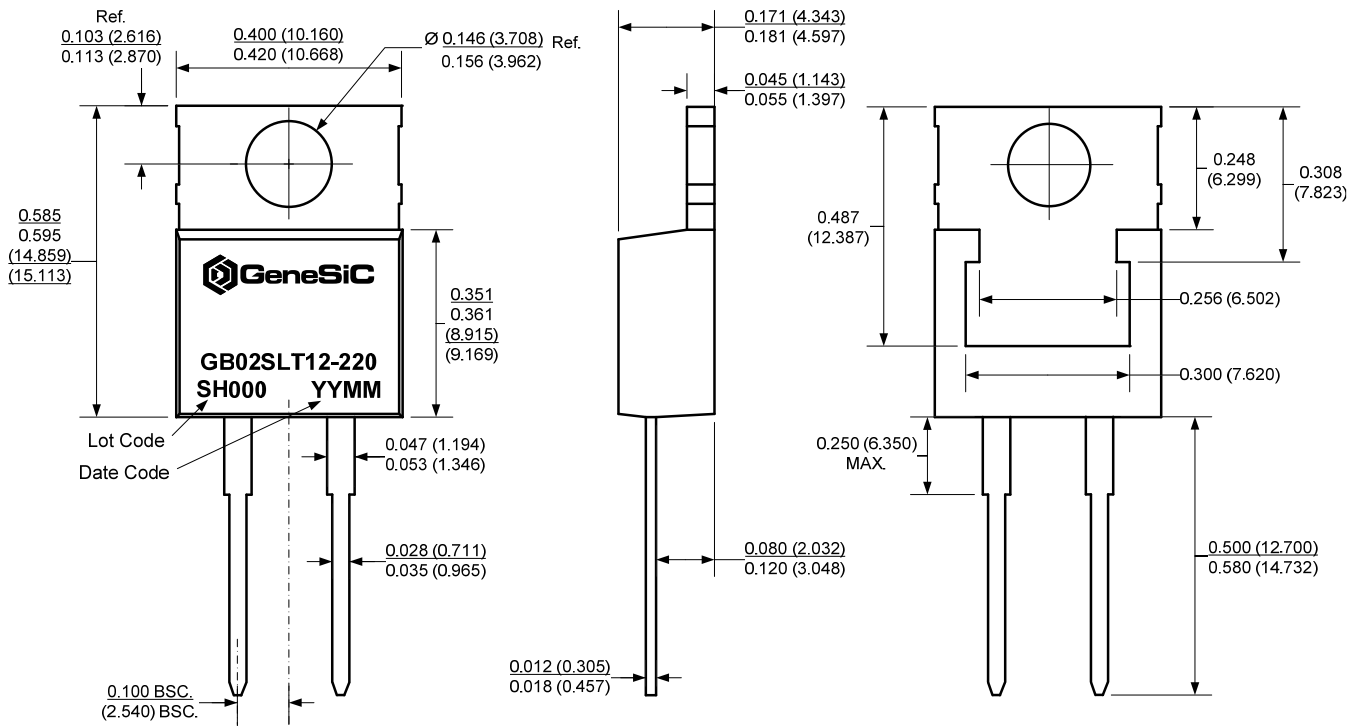


Figure 8: Transient Thermal Impedance

**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

| <b>Revision History</b> |          |                                    |            |
|-------------------------|----------|------------------------------------|------------|
| Date                    | Revision | Comments                           | Supersedes |
| 2014/08/26              | 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          |            |
| 2010/12/13              | 0        | Initial release                    |            |
|                         |          |                                    |            |

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## SPICE Model Parameters

Copy the following code into a SPICE software program for simulation of the GB02SLT12-220 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 GB02SLT12-220 SPICE Model
*
.SUBCKT GB02SLT12 ANODE KATHODE
D1 ANODE KATHODE GB02SLT12
D2 ANODE KATHODE GB02SLT12_PIN
.MODEL GB02SLT12 D
+ IS      2.05E-15      RS      0.282
+ TRS1    0.0054       TRS2    3E-05
+ N       1           IKF      251
+ EG      1.2         XTI      -1.8
+ CJO     1.61E-10    VJ      0.4508
+ M       1.586       FC       0.5
+ TT      1.00E-10    BV       1200
+ IBV     1.00E-03    VPK      1200
+ IAVE    2           TYPE     SiC_Schottky
+ MFG     GeneSiC_Semi
.MODEL GB02SLT12_PIN D
+ IS      1.54E-25     RS      0.39
+ TRS1    -0.003      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 GB02SLT12-220 SPICE Model
```

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