

Silicon Carbide Power Schottky Diode

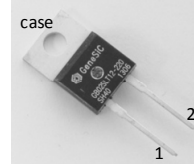
| | | |
|--------------------------------|---|--------|
| V_{RRM} | = | 1200 V |
| $I_F (T_C = 25^\circ\text{C})$ | = | 5 A |
| Q_C | = | 9 nC |

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 | A^2s |
| | | $T_C = 160^\circ\text{C}, t_p = 10\text{ ms}$ | 1.1 | A^2s |
| 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 | μA |
| | | $V_R = 1200\text{ V}, T_j = 175^\circ\text{C}$ | | 10 | 100 | |
| Total capacitive charge | Q_C | $I_F \leq I_{F,MAX}$ $di_F/dt = 200\text{ A}/\mu\text{s}$ $T_j = 175^\circ\text{C}$ | $V_R = 400\text{ V}$ | 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 |
|-----------------|---|-----|----|

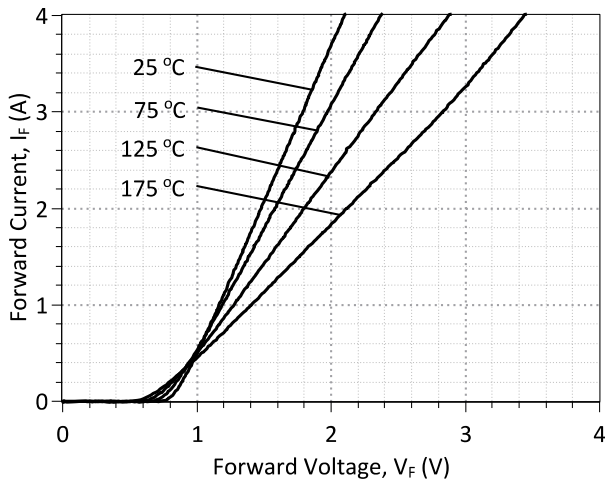


Figure 1: Typical Forward Characteristics

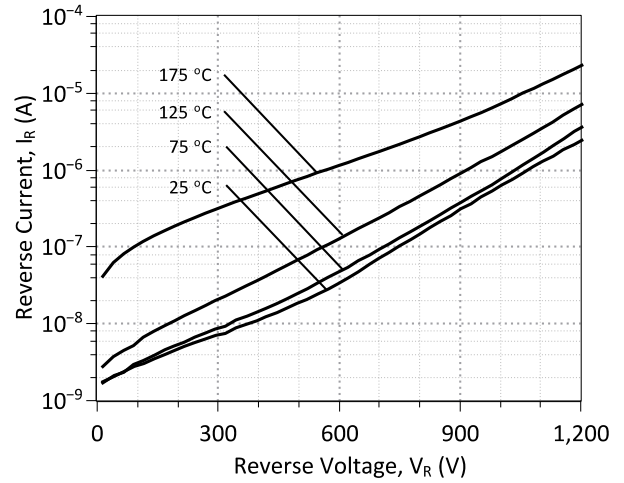


Figure 2: Typical Reverse Characteristics

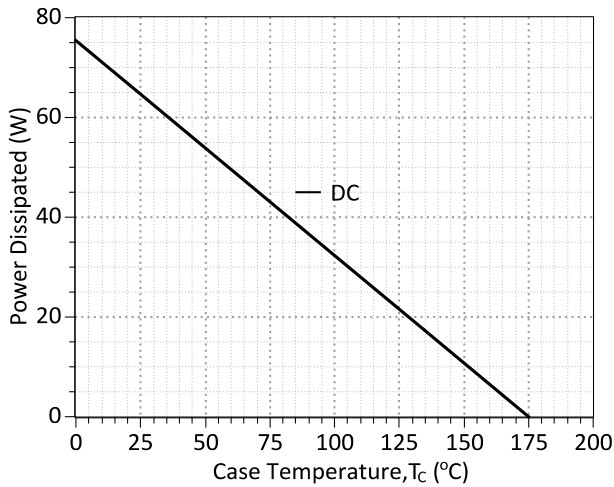
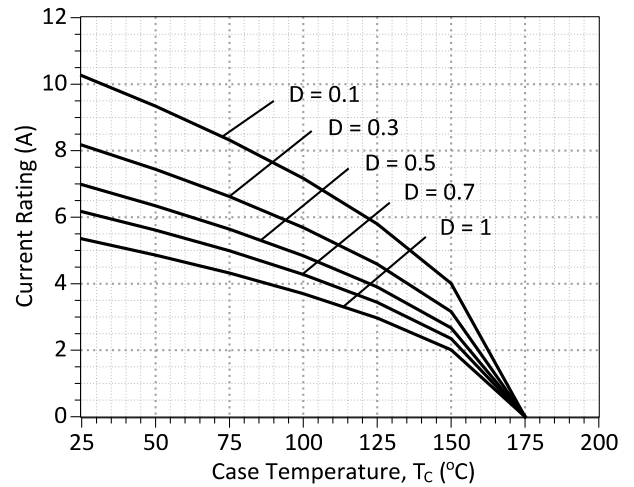


Figure 3: Power Derating Curve



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

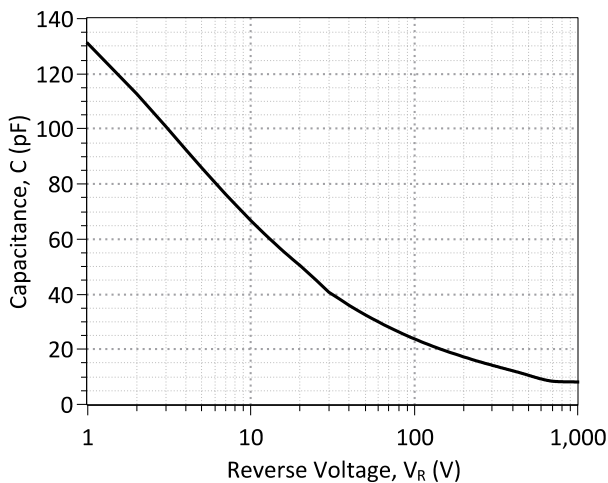


Figure 5: Typical Junction Capacitance vs Reverse Voltage Characteristics

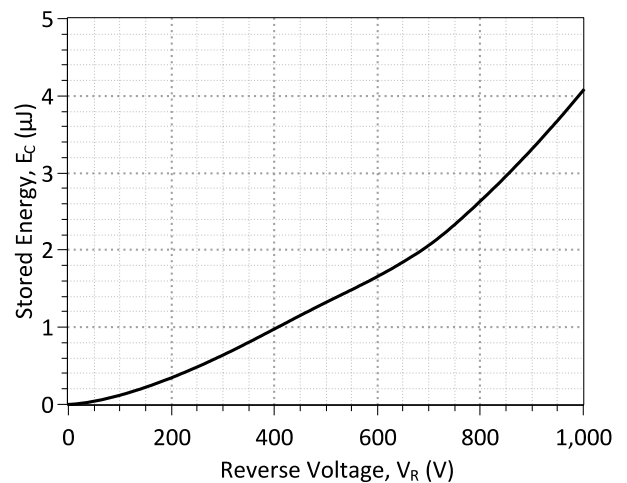


Figure 6: Typical Switching Energy vs Reverse Voltage Characteristics

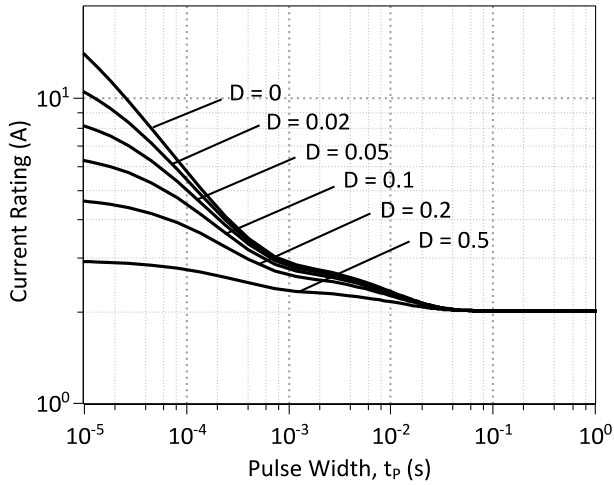


Figure 7: Current vs Pulse Duration Curves at $T_c = 160\text{ }^\circ\text{C}$

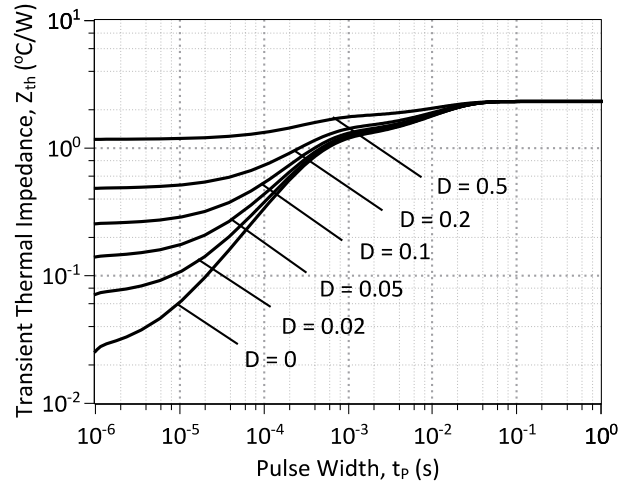
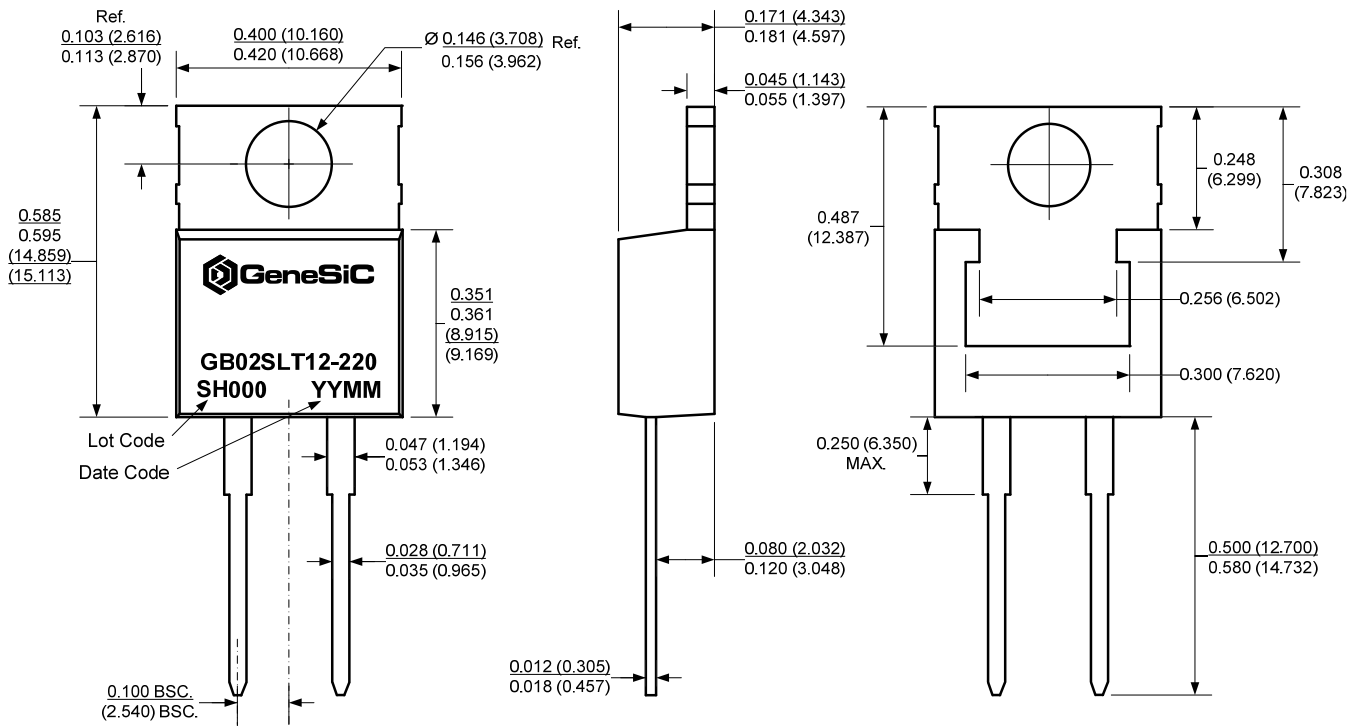


Figure 8: Transient Thermal Impedance

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

| Revision History | | | |
|-------------------------|----------|------------------------------------|------------|
| 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
```