

Silicon Carbide Power Schottky Diode

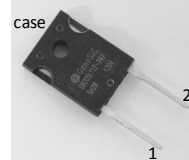
| | | |
|------------------------------------|---|--------|
| V_{RRM} | = | 1200 V |
| $I_F (T_C = 25^\circ\text{C})$ | = | 50 A |
| $I_F (T_C \leq 145^\circ\text{C})$ | = | 20 A |
| Q_C | = | 69 nC |

Features

- Industry's leading low leakage currents
- 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 – 247AC


Advantages

- Low standby power losses
- 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 |
|--|----------------|--|--------|------------|------|----------------------|
| | | | min. | typ. | max. | |
| Repetitive peak reverse voltage | V_{RRM} | | | 1200 | | V |
| Continuous forward current | I_F | $T_C = 25^\circ\text{C}$ | | 50 | | A |
| Continuous forward current | I_F | $T_C \leq 145^\circ\text{C}$ | | 20 | | A |
| RMS forward current | $I_{F(RMS)}$ | $T_C \leq 145^\circ\text{C}$ | | 35 | | A |
| Surge non-repetitive forward current, Half Sine Wave | $I_{F,SM}$ | $T_C = 25^\circ\text{C}$, $t_p = 10\text{ ms}$ | | 140 | | A |
| | | $T_C = 145^\circ\text{C}$, $t_p = 10\text{ ms}$ | | 125 | | A |
| Non-repetitive peak forward current | $I_{F,max}$ | $T_C = 25^\circ\text{C}$, $t_p = 10\text{ }\mu\text{s}$ | | 650 | | A |
| I^2t value | $\int i^2 dt$ | $T_C = 25^\circ\text{C}$, $t_p = 10\text{ ms}$ | | 98 | | A^2s |
| | | $T_C = 145^\circ\text{C}$, $t_p = 10\text{ ms}$ | | 78 | | A^2s |
| Power dissipation | P_{tot} | $T_C = 25^\circ\text{C}$ | | 306 | | 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 | $I_F = 20\text{ A}$, $T_j = 25^\circ\text{C}$ | | 1.6 | 2.0 | V |
| | | $I_F = 20\text{ A}$, $T_j = 175^\circ\text{C}$ | | 2.6 | 3.0 | |
| Reverse current | I_R | $V_R = 1200\text{ V}$, $T_j = 25^\circ\text{C}$ | | 20 | 200 | μA |
| | | $V_R = 1200\text{ V}$, $T_j = 175^\circ\text{C}$ | | 40 | 400 | |
| Total capacitive charge | Q_C | $I_F \leq I_{F,MAX}$ $dI_F/dt = 200\text{ A}/\mu\text{s}$ $T_j = 175^\circ\text{C}$ | $V_R = 400\text{ V}$ | 69 | | nC |
| | $V_R = 960\text{ V}$ | | 112 | | | |
| Switching time | t_s | $V_R = 1\text{ V}$, $f = 1\text{ MHz}$, $T_j = 25^\circ\text{C}$ | $V_R = 400\text{ V}$ | < 49 | | ns |
| | | | $V_R = 960\text{ V}$ | | | |
| Total capacitance | C | $V_R = 1\text{ V}$, $f = 1\text{ MHz}$, $T_j = 25^\circ\text{C}$ | | 968 | | pF |
| | | $V_R = 400\text{ V}$, $f = 1\text{ MHz}$, $T_j = 25^\circ\text{C}$ | | 76 | | |
| | | $V_R = 1000\text{ V}$, $f = 1\text{ MHz}$, $T_j = 25^\circ\text{C}$ | | 62 | | |

Thermal Characteristics

| | | | |
|-------------------------------------|------------|-----|---------------------------|
| Thermal resistance, junction - case | R_{thJC} | 0.5 | $^\circ\text{C}/\text{W}$ |
|-------------------------------------|------------|-----|---------------------------|

Mechanical Properties

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

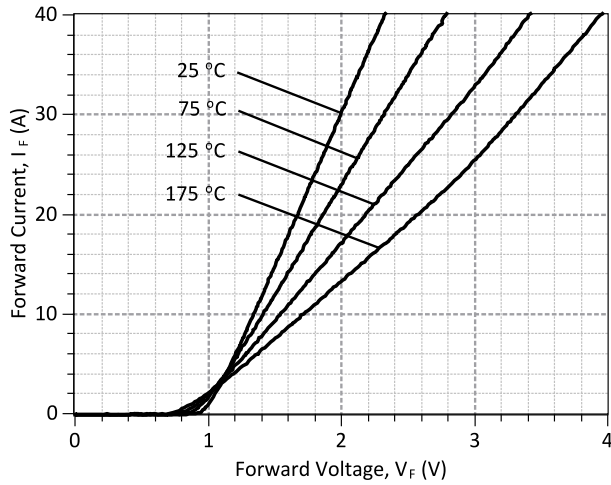


Figure 1: Typical Forward Characteristics

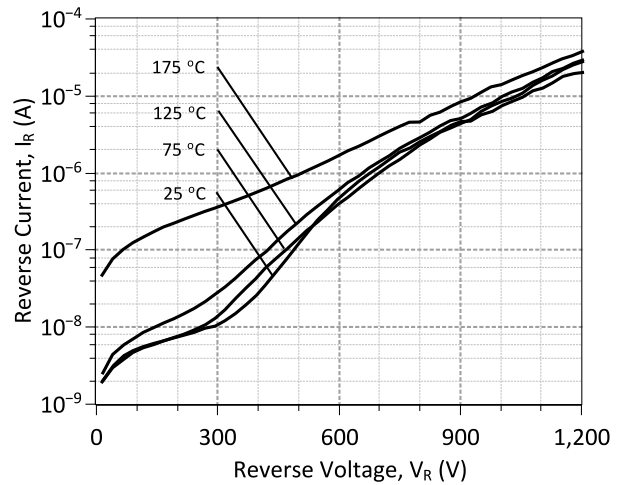


Figure 2: Typical Reverse Characteristics

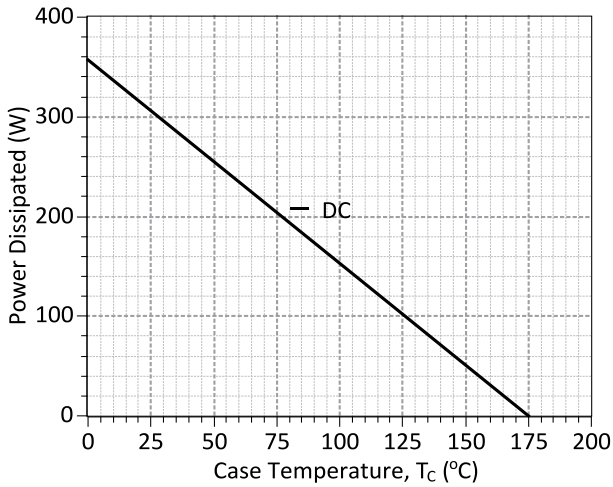
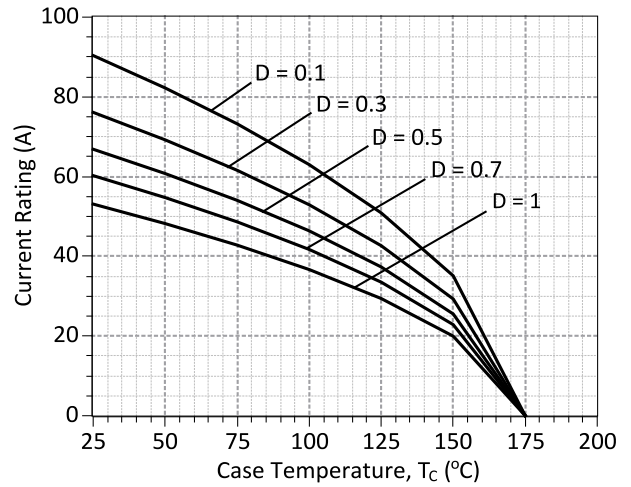


Figure 3: Power Derating Curve



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

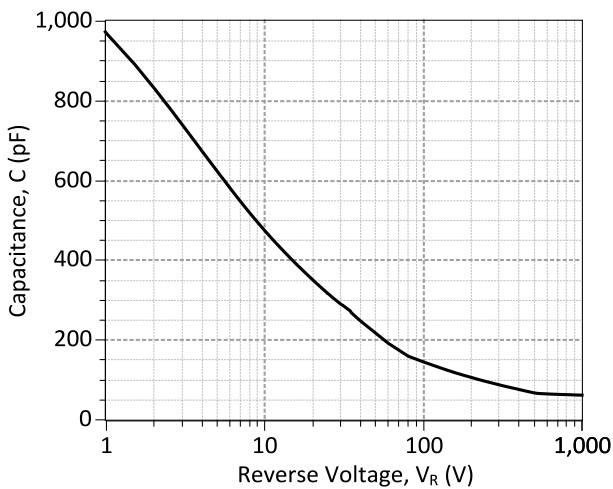


Figure 5: Typical Junction Capacitance vs Reverse Voltage Characteristics

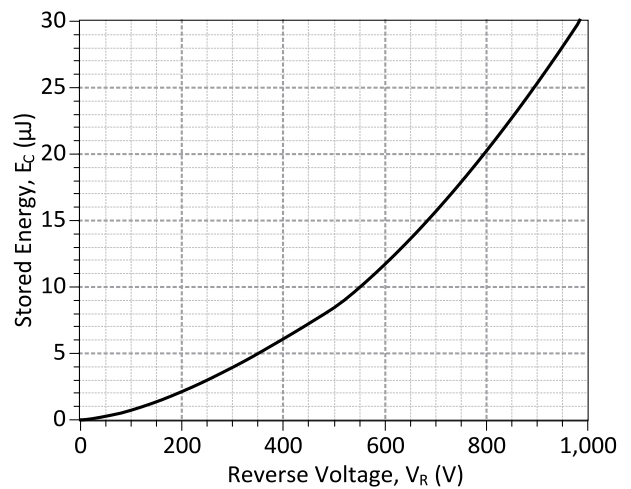


Figure 6: Typical Capacitive Energy vs Reverse Voltage Characteristics

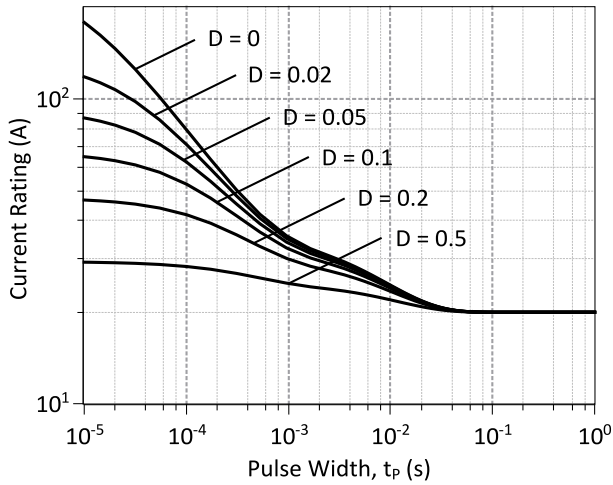


Figure 7: Current vs Pulse Duration Curves at $T_c = 145\text{ }^\circ\text{C}$

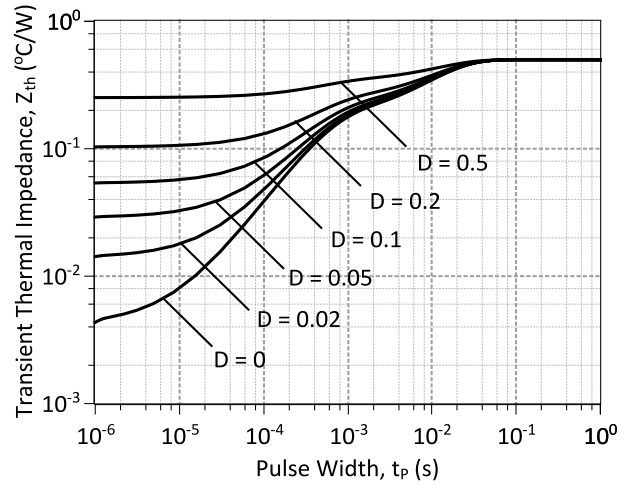
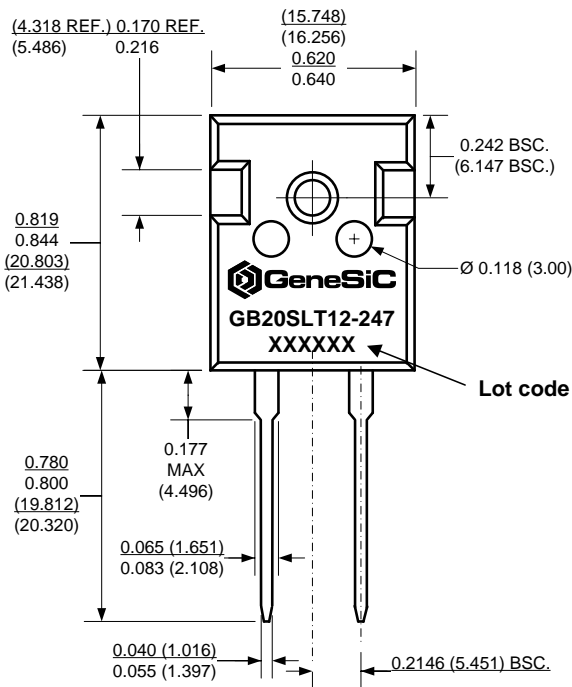


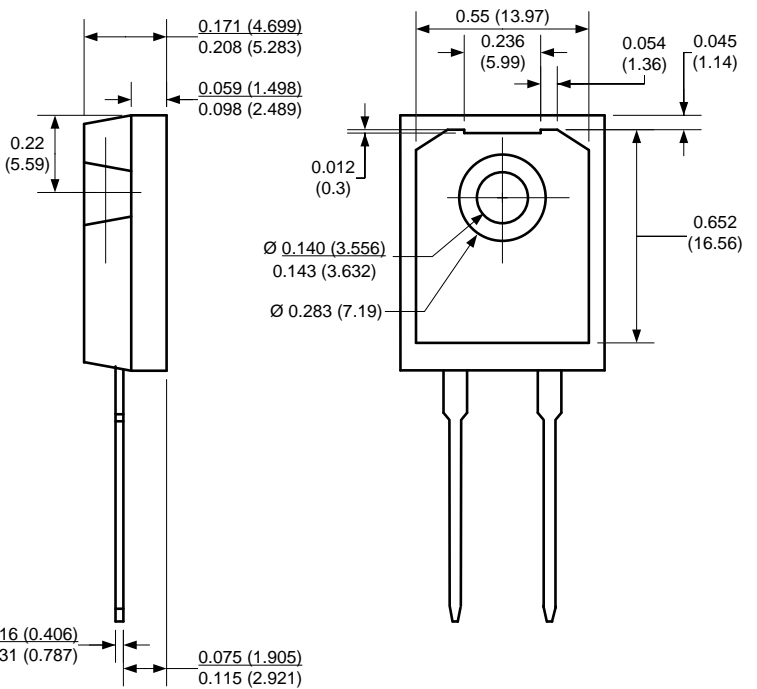
Figure 8: Transient Thermal Impedance

Package Dimensions:

TO-247AC



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 | |
| 2013/02/28 | 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

This is a secure document. Please copy this code from the SPICE model PDF file on our website (http://www.genesicsemi.com/images/products_sic/rectifiers/GB20SLT12-247_SPICE.pdf) into LTSPICE (version 4) software for simulation of the GB20SLT12-247.

```
*      MODEL OF GeneSiC Semiconductor Inc.
*
*      $Revision:   1.0           $
*      $Date:      04-SEP-2013   $
*
*      GeneSiC Semiconductor Inc.
*      43670 Trade Center Place Ste. 155
*      Dulles, VA 20166
*
*      COPYRIGHT (C) 2013 GeneSiC Semiconductor Inc.
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*
* 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 GB20SLT12-247 SPICE Model
*
.SUBCKT GB20SLT12 ANODE KATHODE
R1 ANODE INT R=((TEMP-24)*0.00035); Temperature Dependant Resistor
D1 INT KATHODE GB20SLT12_25C; Call the 25C Diode Model
D2 ANODE KATHODE GB20SLT12_PIN; Call the PiN Diode Model
.MODEL GB20SLT12_25C D
+ IS      5.48E-17      RS      0.03214547
+ N       1            IKF     1000
+ EG      1.2          XTI     3
+ CJO     1.15E-09     VJ      0.44
+ M       1.5          FC      0.5
+ TT      1.00E-10     BV      1200
+ IBV     1.00E-03     VPK     1200
+ IAVE    20          TYPE     SiC_Schottky
+ MFG     GeneSiC_Semiconductor
.MODEL GB20SLT12_PIN D
+ IS      1.54E-13     RS      0.23
+ N       3.941        IKF     19
+ EG      3.23         XTI     0
+ FC      0.5          TT      0
+ BV      1200         IBV     1.00E-03
+ VPK     1200         IAVE    1
+ TYPE    SiC_PiN
.ENDS
*
* End of GB20SLT12-247 SPICE Model
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