

Silicon Carbide Power Schottky Diode

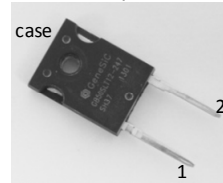
| | | |
|--------------------------------|---|---------------|
| V_{RRM} | = | 1200 V |
| $I_F (T_C = 25^\circ\text{C})$ | = | 100 A |
| Q_C | = | 158 nC |

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 – 247AC

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

- Automotive Traction Inverters
- Power Factor Correction (PFC)
- Switched-Mode Power Supply (SMPS)
- Solar Inverters
- Wind Turbine Inverters
- Motor Drives
- Induction Heating
- Uninterruptible Power Supply (UPS)

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 | $T_C \leq 135^\circ\text{C}$ | 50 | A |
| RMS forward current | $I_{F(RMS)}$ | $T_C \leq 135^\circ\text{C}$ | 87 | A |
| Surge non-repetitive forward current, Half Sine Wave | $I_{F,SM}$ | $T_C = 25^\circ\text{C}, t_p = 10\text{ ms}$ | 350 | A |
| | | $T_C = 135^\circ\text{C}, t_p = 10\text{ ms}$ | 313 | A |
| Non-repetitive peak forward current | $I_{F,max}$ | $T_C = 25^\circ\text{C}, t_p = 10\ \mu\text{s}$ | 1625 | A |
| I^2t value | $\int i^2 dt$ | $T_C = 25^\circ\text{C}, t_p = 10\text{ ms}$ | 450 | A^2s |
| | | $T_C = 135^\circ\text{C}, t_p = 10\text{ ms}$ | 300 | A^2s |
| Power dissipation | P_{tot} | $T_C = 25^\circ\text{C}$ | 620 | 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 | $I_F = 50\text{ A}, T_j = 25^\circ\text{C}$ | | 1.5 | 1.8 | V |
| | | $I_F = 50\text{ A}, T_j = 175^\circ\text{C}$ | | 2.4 | 3.0 | |
| Reverse current | I_R | $V_R = 1200\text{ V}, T_j = 25^\circ\text{C}$ | | 25 | 1000 | μA |
| | | $V_R = 1200\text{ V}, T_j = 175^\circ\text{C}$ | | 100 | 3000 | |
| Total capacitive charge | Q_C | $I_F \leq I_{F,MAX}$ $di_F/dt = 200\text{ A}/\mu\text{s}$ $T_j = 175^\circ\text{C}$ | $V_R = 400\text{ V}$ | 158 | | nC |
| | | | $V_R = 960\text{ V}$ | 247 | | |
| Switching time | t_s | | $V_R = 400\text{ V}$ | 50 | | ns |
| | | | $V_R = 960\text{ V}$ | | | |
| Total capacitance | C | $V_R = 1\text{ V}, f = 1\text{ MHz}, T_j = 25^\circ\text{C}$ | | 2940 | | pF |
| | | $V_R = 400\text{ V}, f = 1\text{ MHz}, T_j = 25^\circ\text{C}$ | | 203 | | |
| | | $V_R = 1000\text{ V}, f = 1\text{ MHz}, T_j = 25^\circ\text{C}$ | | 142 | | |

Thermal Characteristics

| | | | |
|-------------------------------------|------------|-------|---------------------------|
| Thermal resistance, junction - case | R_{thJC} | 0.242 | $^\circ\text{C}/\text{W}$ |
|-------------------------------------|------------|-------|---------------------------|

Mechanical Properties

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

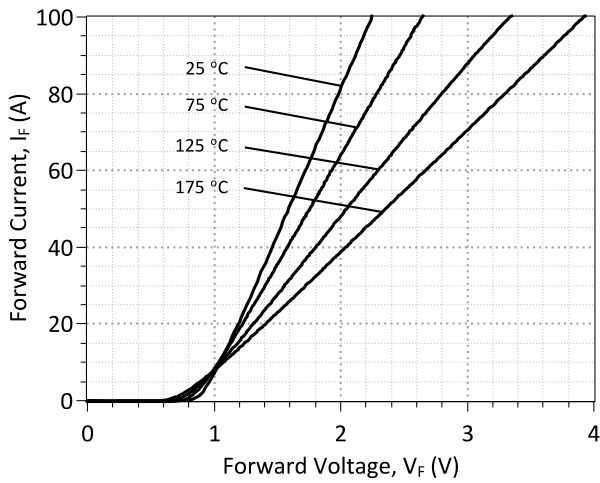


Figure 1: Typical Forward Characteristics

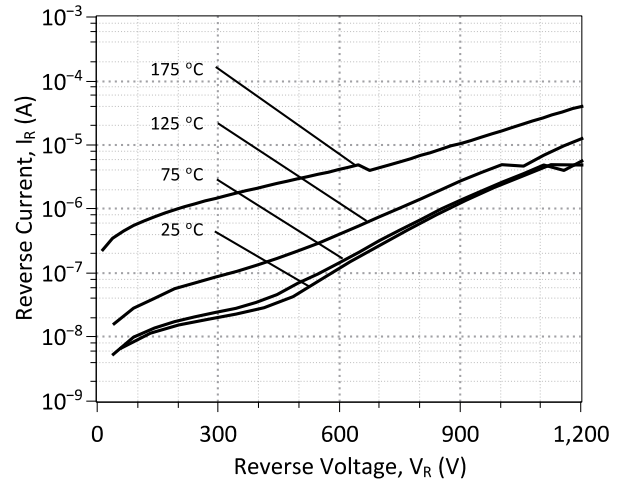


Figure 2: Typical Reverse Characteristics

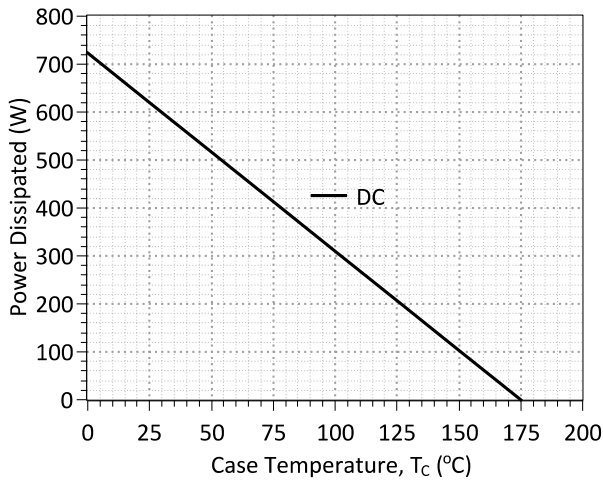
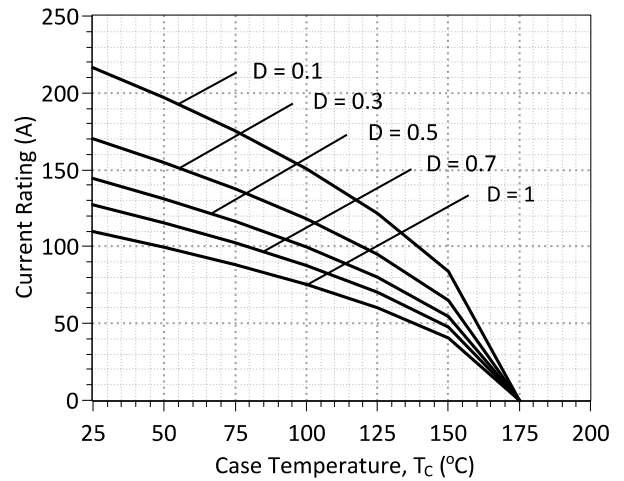


Figure 3: Power Derating Curve



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

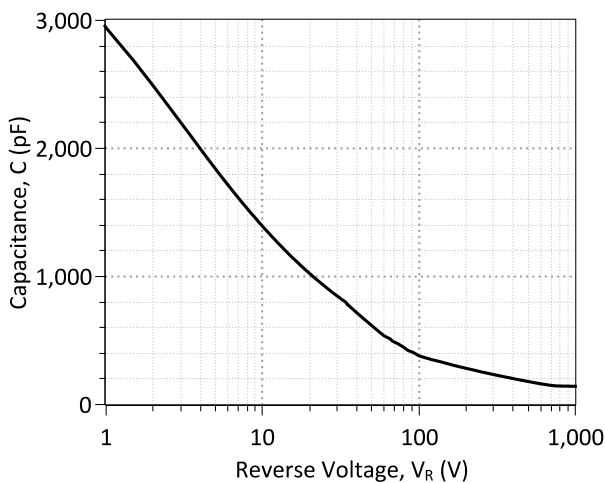


Figure 5: Typical Junction Capacitance vs Reverse Voltage Characteristics

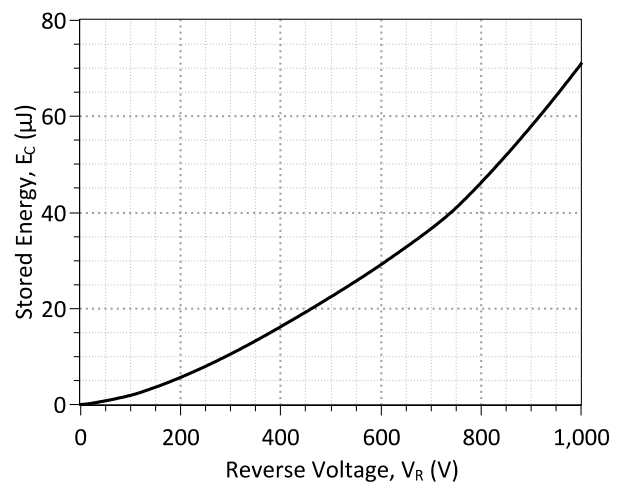


Figure 6: Typical Switching Energy vs Reverse Voltage Characteristics

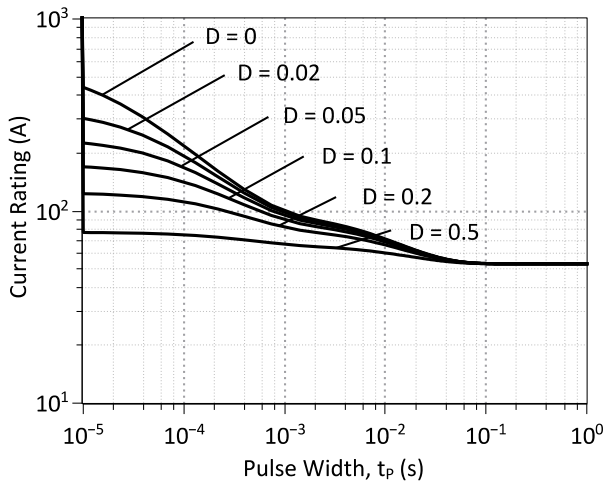


Figure 7: Current vs Pulse Duration Curves at $T_c = 135\text{ }^\circ\text{C}$

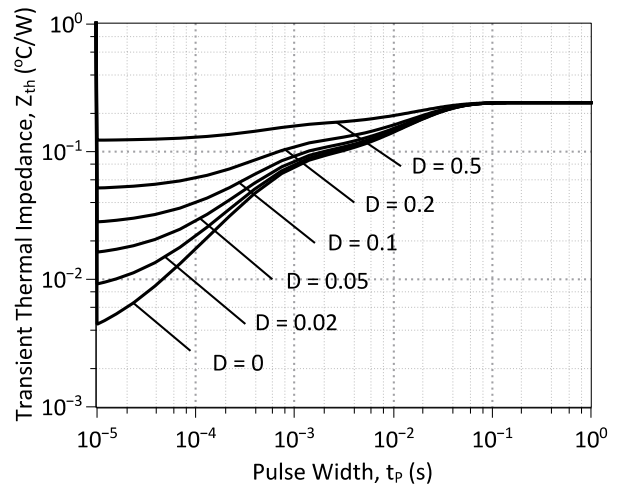
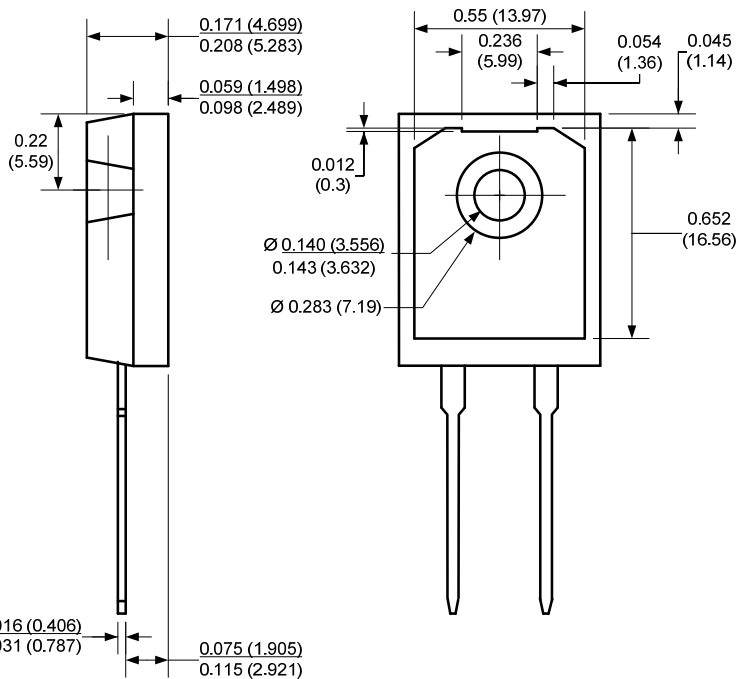
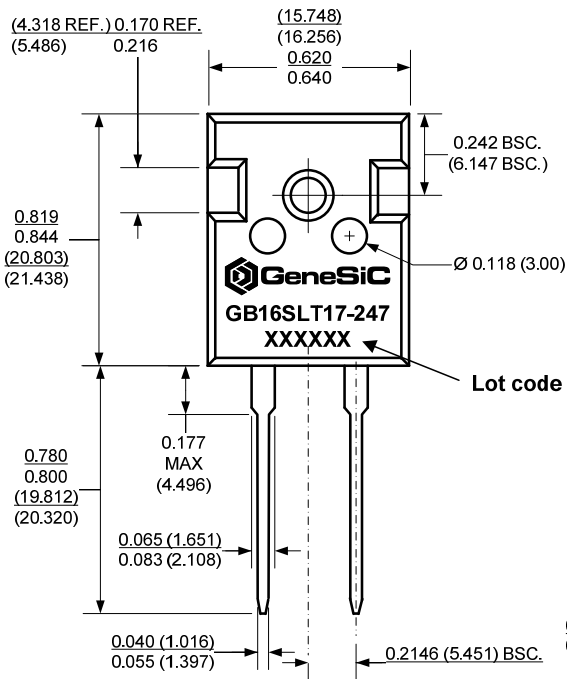


Figure 8: Transient Thermal Impedance

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 |
|------------|----------|------------------------------------|------------|
| 2014/12/17 | 3 | Updated Electrical Characteristics | |
| 2014/08/26 | 2 | Updated Electrical Characteristics | |
| 2013/02/07 | 1 | Updated Electrical Characteristics | |
| 2012/12/17 | 0 | Initial release | |
| | | | |

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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/GB50SLT12-247_SPICE.pdf) into LTSPICE (version 4) software for simulation of the GA50JT17-247.

```
*      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/commercial-sic/sic-schottky-rectifiers/
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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 GB50SLT12-247 SPICE Model
*
.SUBCKT GB50SLT12 ANODE KATHODE
D1 ANODE KATHODE GB50SLT12_SCHOTTKY
D2 ANODE KATHODE GB50SLT12_SURGE
.MODEL GB50SLT12_SCHOTTKY D
+ IS      1.99E-16      RS      0.015652965
+ N       1            IKF     1000
+ EG      1.2          XTI     3
+ TRS1    0.0042       TRS2    1.3E-05
+ CJO     3.86E-09     VJ      1.362328465
+ M       0.48198551   FC      0.5
+ TT      1.00E-10     BV      1200
+ IBV     1.00E-03     VPK     1200
+ IAVE    50           TYPE    SiC_Schottky
+ MFG     GeneSiC_Semi
.MODEL GB50SLT12_SURGE D
+ IS      1.54E-19     RS      0.1
+ 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    50           TYPE    SiC_PiN
.ENDS
*
*      End of GB50SLT12-247 SPICE Model
```