

Silicon Carbide Power Schottky Diode

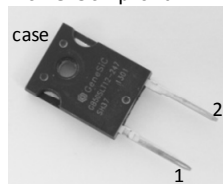
V_{RRM}	=	1200 V
V_F	=	1.6 V
I_F	=	50 A
Q_C	=	247 nC

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

- 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	$T_C \leq 135\text{ °C}$	50	A
RMS forward current	$I_{F(RMS)}$	$T_C \leq 135\text{ °C}$	87	A
Surge non-repetitive forward current, Half Sine Wave	$I_{F,SM}$	$T_C = 25\text{ °C}, t_p = 10\text{ ms}$ $T_C = 135\text{ °C}, t_p = 10\text{ ms}$	350 313	A
Non-repetitive peak forward current	$I_{F,max}$	$T_C = 25\text{ °C}, t_p = 10\text{ }\mu\text{s}$	1625	A
I^2t value	$\int i^2 dt$	$T_C = 25\text{ °C}, t_p = 10\text{ ms}$ $T_C = 135\text{ °C}, t_p = 10\text{ ms}$	450 300	A ² s
Power dissipation	P_{tot}	$T_C = 25\text{ °C}$	620	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	$I_F = 50\text{ A}, T_J = 25\text{ °C}$ $I_F = 50\text{ A}, T_J = 175\text{ °C}$		1.6 2.6	1.8 3.0	V
Reverse current	I_R	$V_R = 1200\text{ V}, T_J = 25\text{ °C}$ $V_R = 1200\text{ V}, T_J = 175\text{ °C}$		200 400	1000 3000	μA
Total capacitive charge	Q_C	$I_F \leq I_{F,MAX}$ $dI_F/dt = 200\text{ A}/\mu\text{s}$ $T_J = 175\text{ °C}$	$V_R = 400\text{ V}$ $V_R = 960\text{ V}$		158 247	nC
Switching time	t_s		$V_R = 400\text{ V}$ $V_R = 960\text{ V}$		50	ns
Total capacitance	C	$V_R = 1\text{ V}, f = 1\text{ MHz}, T_J = 25\text{ °C}$ $V_R = 400\text{ V}, f = 1\text{ MHz}, T_J = 25\text{ °C}$ $V_R = 1000\text{ V}, f = 1\text{ MHz}, T_J = 25\text{ °C}$		2940 203 142		pF

Thermal Characteristics

Thermal resistance, junction - case	R_{thJC}	0.242	°C/W
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Mechanical Properties

Mounting torque	M	0.6	Nm
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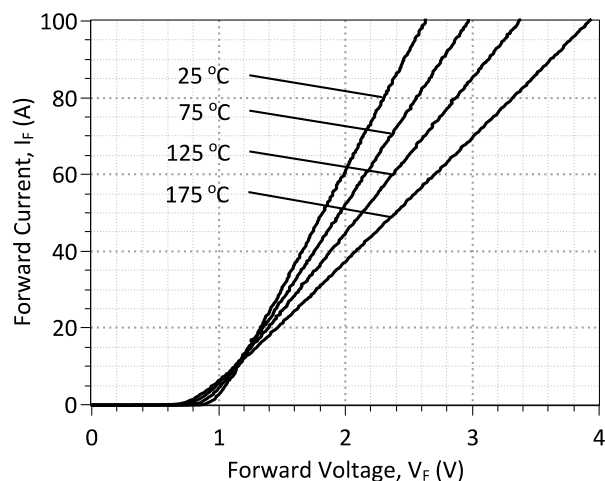


Figure 1: Typical Forward Characteristics

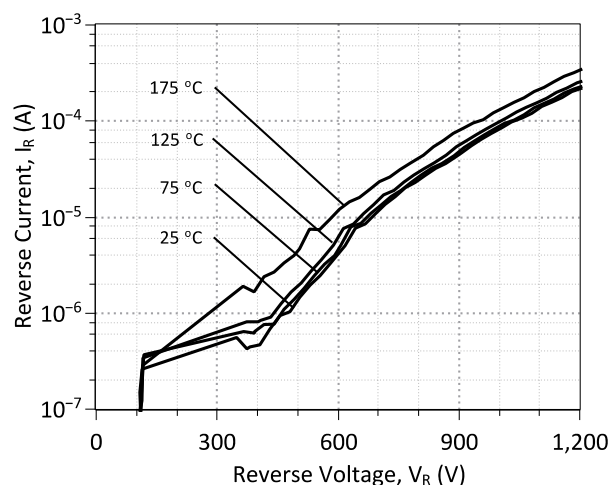


Figure 2: Typical Reverse Characteristics

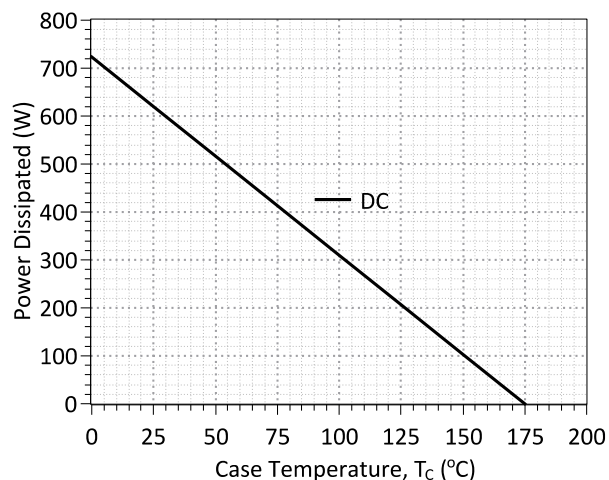
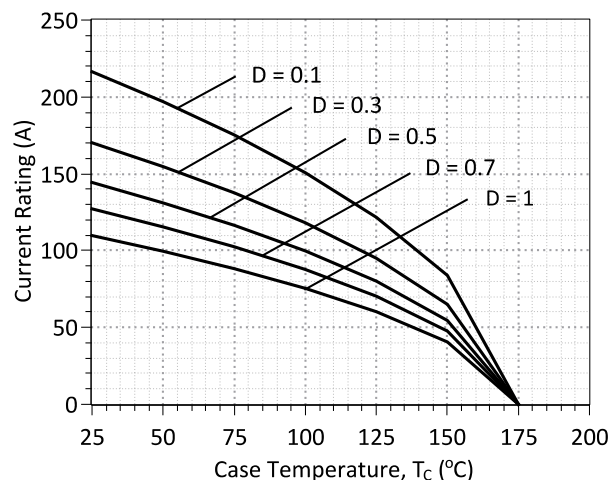


Figure 3: Power Derating Curve



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

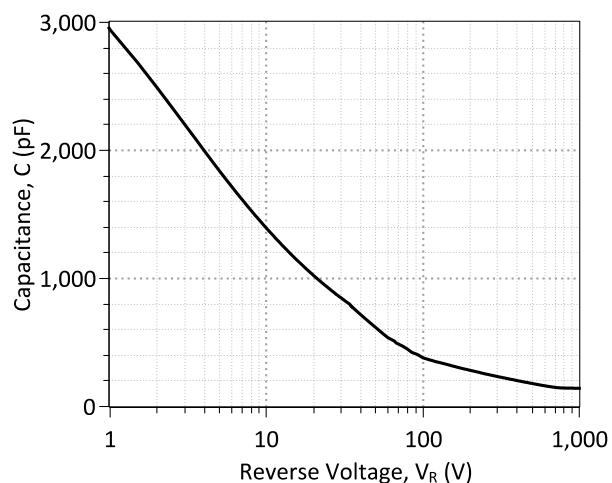


Figure 5: Typical Junction Capacitance vs Reverse Voltage Characteristics

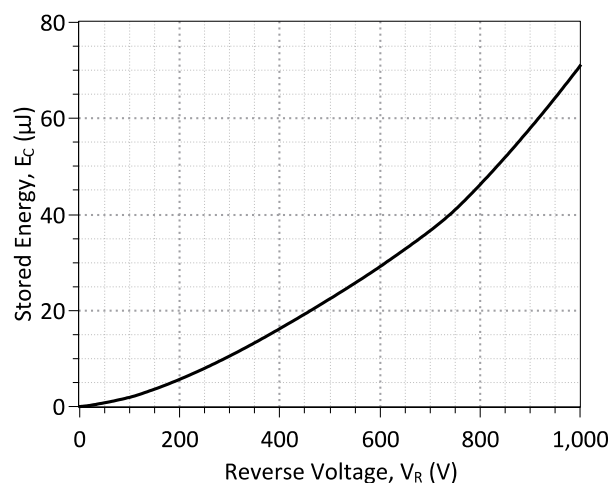


Figure 6: Typical Switching Energy vs Reverse Voltage Characteristics

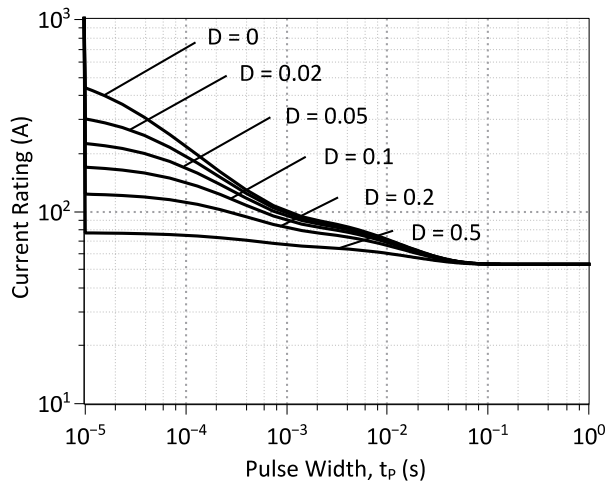


Figure 7: Current vs Pulse Duration Curves at $T_c = 135\text{ }^{\circ}\text{C}$

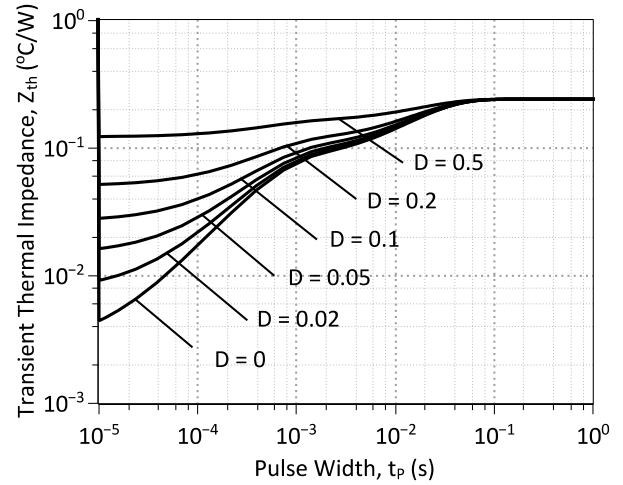
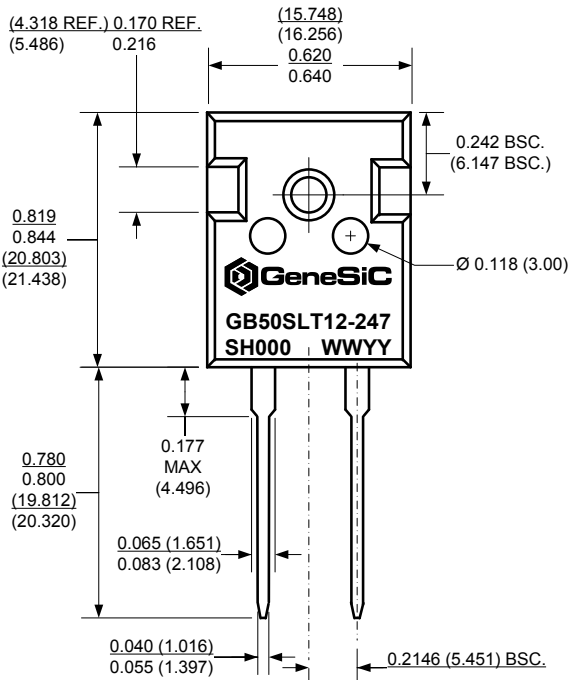


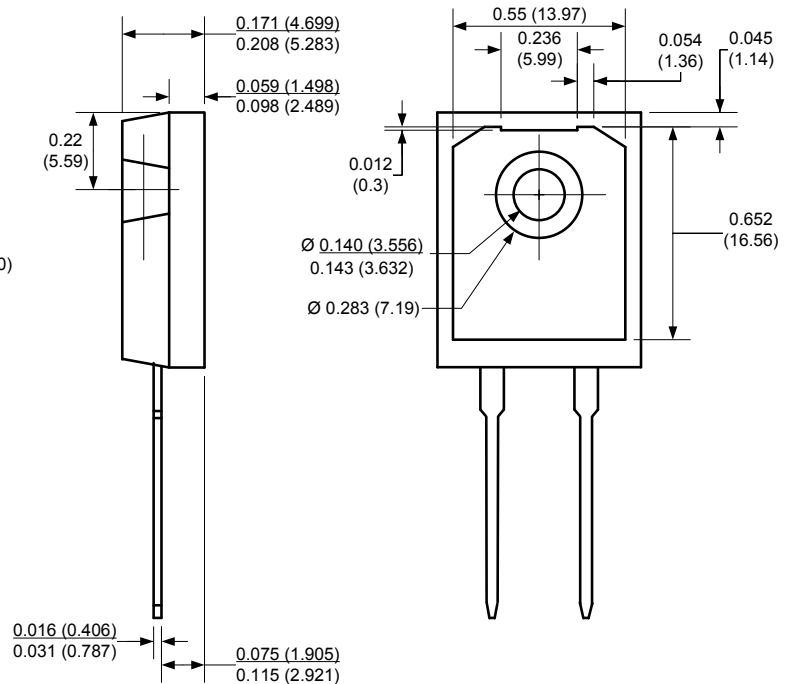
Figure 8: Transient Thermal Impedance

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
2013/11/12	2	Updated Electrical Characteristics	
2013/02/07	1	Updated Electrical Characteristics	
2012/12/17	0	Initial release	

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SPICE Model Parameters

Copy the following code into a SPICE software program for simulation of the GB50SLT12-247 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 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
```