

## Silicon Carbide Power Schottky Diode

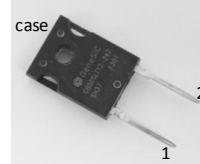
$V_{RRM}$	=	1200 V
$I_F (T_C = 25^\circ\text{C})$	=	100 A
$I_F (T_C \leq 135^\circ\text{C})$	=	50 A
$Q_C$	=	158 nC

### Features

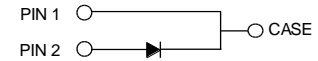
- Industry's leading low leakage currents
- 175 °C maximum operating temperature
- Temperature independent switching behavior
- Superior surge current capability
- Positive temperature coefficient of  $V_F$
- Extremely fast switching speeds
- Superior figure of merit  $Q_C/I_F$

### 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

- 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	$I_F$	$T_C = 25^\circ\text{C}$	100	A
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	$I_{F,max}$	$T_C = 25^\circ\text{C}$ , $t_p = 10\text{ }\mu\text{s}$	1625	A
$I^2t$ value	$\int i^2 dt$	$T_C = 25^\circ\text{C}$ , $t_p = 10\text{ ms}$	450	A <sup>2</sup> s
		$T_C = 135^\circ\text{C}$ , $t_p = 10\text{ ms}$	300	A <sup>2</sup> s
Power dissipation	$P_{tot}$	$T_C = 25^\circ\text{C}$	620	W
Operating and storage temperature	$T_j, T_{stg}$		-55 to 175	°C

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

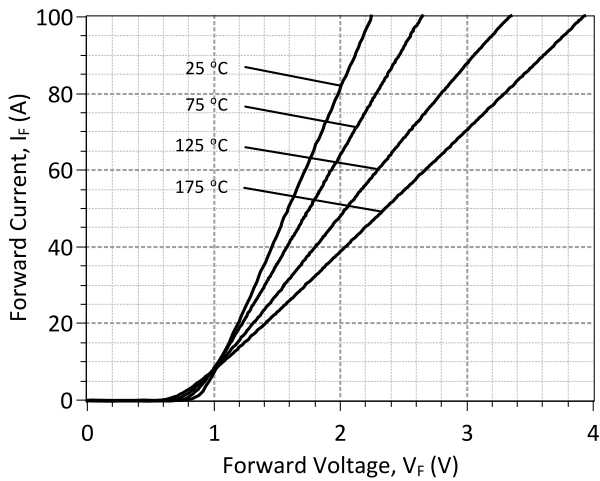
Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Diode forward voltage	$V_F$	$I_F = 50\text{ A}$ , $T_j = 25^\circ\text{C}$		1.5	1.8	V
		$I_F = 50\text{ A}$ , $T_j = 175^\circ\text{C}$		2.4	3.0	
Reverse current	$I_R$	$V_R = 1200\text{ V}$ , $T_j = 25^\circ\text{C}$		25	1000	$\mu\text{A}$
		$V_R = 1200\text{ V}$ , $T_j = 175^\circ\text{C}$		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	$t_s$	$V_R = 1\text{ V}$ , $f = 1\text{ MHz}$ , $T_j = 25^\circ\text{C}$	$V_R = 400\text{ V}$	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

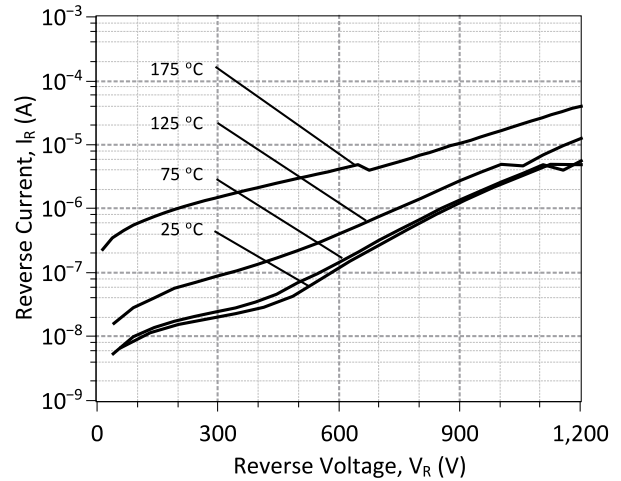
Thermal resistance, junction - case	$R_{thJC}$	0.242	°C/W
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### Mechanical Properties

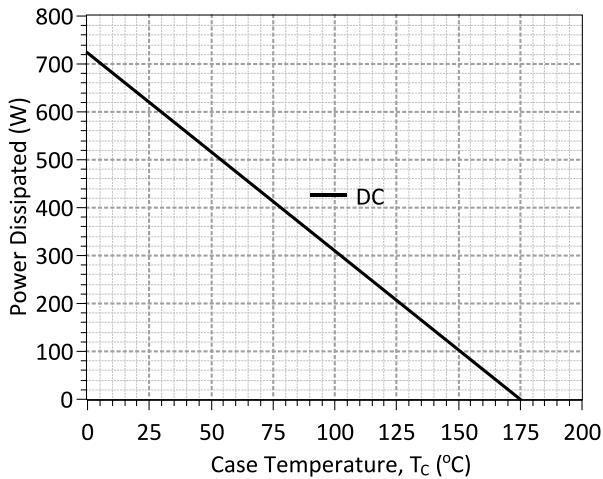
Mounting torque	M	0.6	Nm
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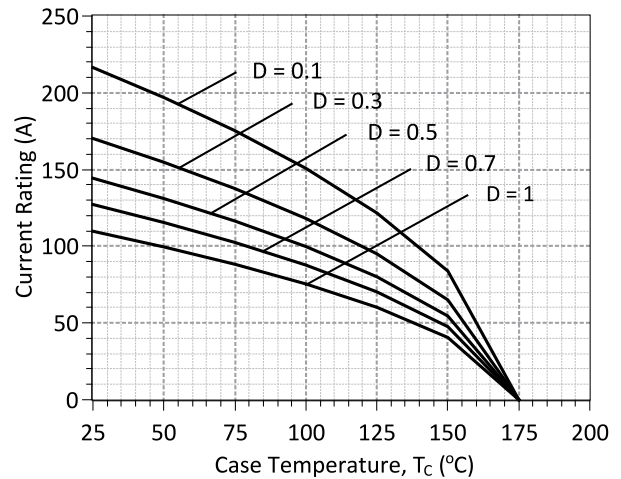
**Figure 1: Typical Forward Characteristics**



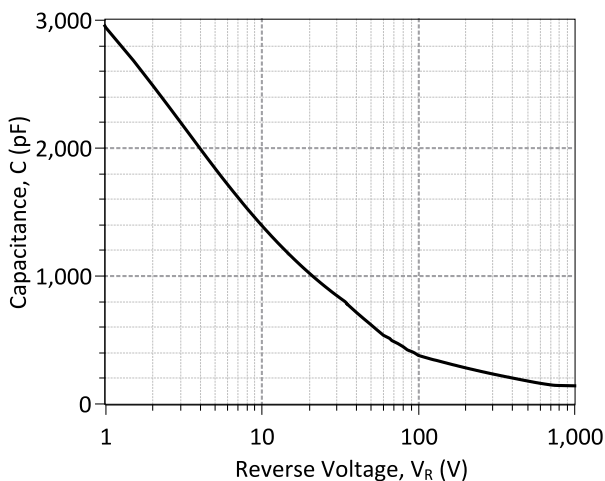
**Figure 2: Typical Reverse Characteristics**



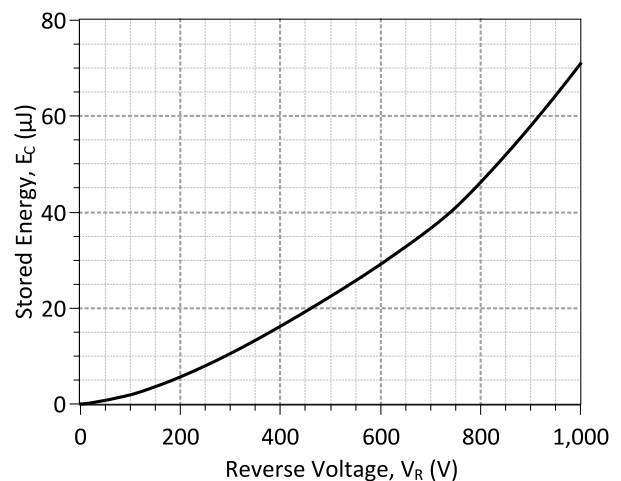
**Figure 3: Power Derating Curve**



**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 Capacitive Energy vs Reverse Voltage Characteristics**

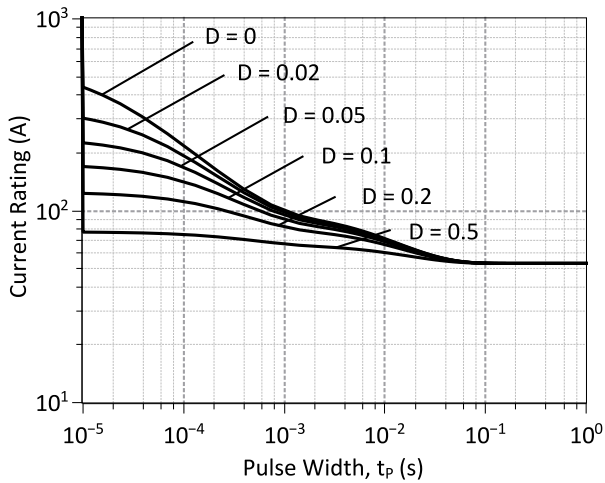


Figure 7: Current vs Pulse Duration Curves at  $T_c = 135\text{ }^\circ\text{C}$

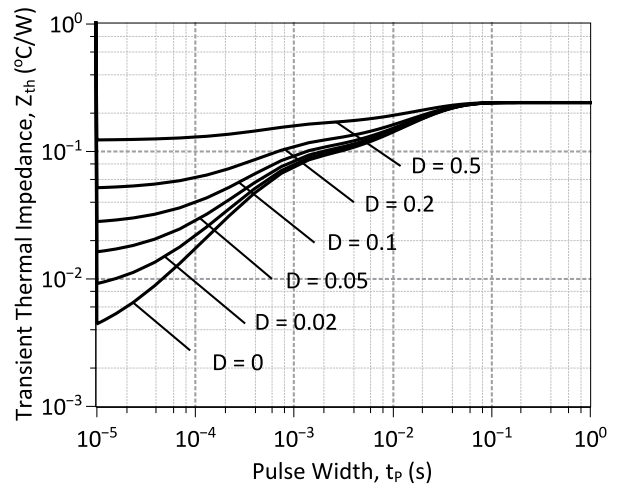
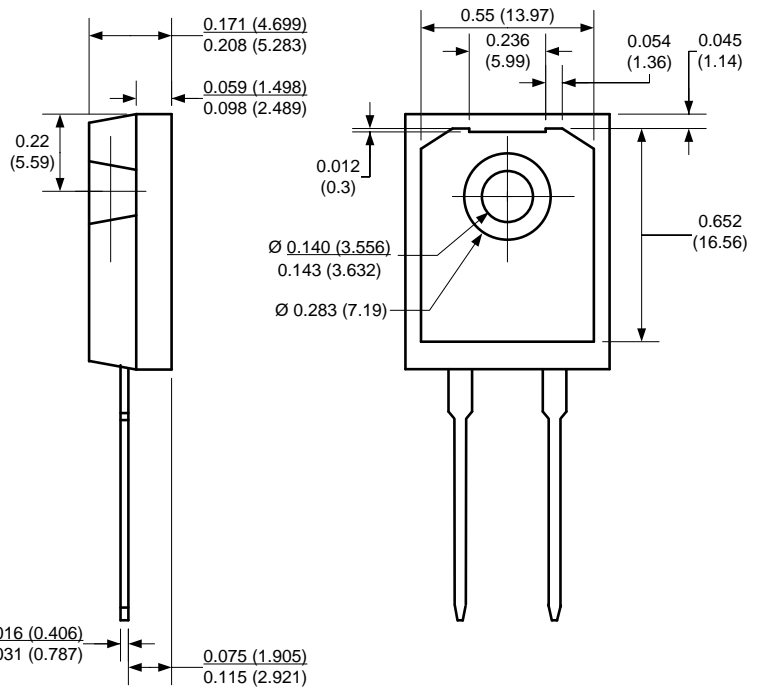
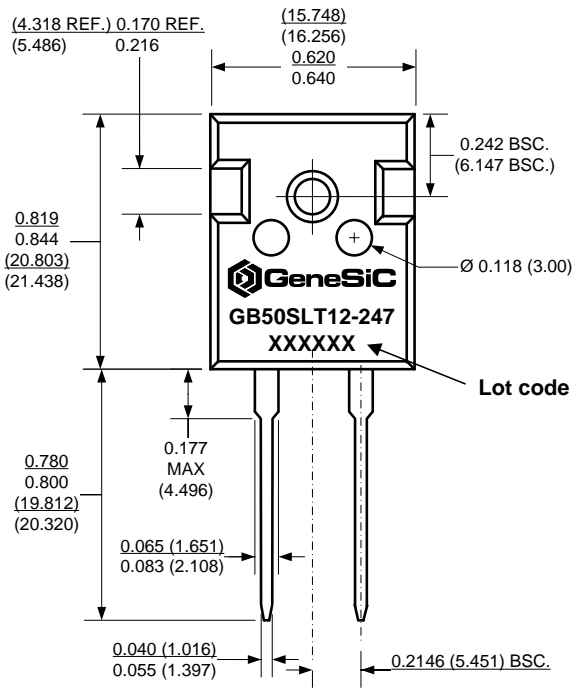


Figure 8: Transient Thermal Impedance

**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](http://www.genesicsemi.com/images/products_sic/rectifiers/GB50SLT12-247_SPICE.pdf)) into LTSPICE (version 4) software for simulation of the GA50SLT12-247.

```
*      MODEL OF GeneSiC Semiconductor Inc.
*
*      $Revision: 1.0          $
*      $Date: 20-SEP-2013    $
*
*      GeneSiC Semiconductor Inc.
*      43670 Trade Center Place Ste. 155
*      Dulles, VA 20166
*
*      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
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