

Silicon Carbide Power Schottky Diode

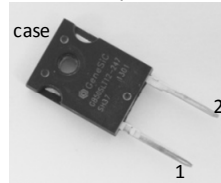
V_{RRM}	=	1200 V
$I_F (T_C = 25^\circ\text{C})$	=	100 A
Q_C	=	158 nC

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	$I_{F,SM}$	$T_C = 25^\circ\text{C}, t_p = 10\text{ ms}$ $T_C = 135^\circ\text{C}, t_p = 10\text{ ms}$	350 313	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	
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	$^\circ\text{C}/\text{W}$
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Mechanical Properties

Mounting torque	M	0.6	Nm
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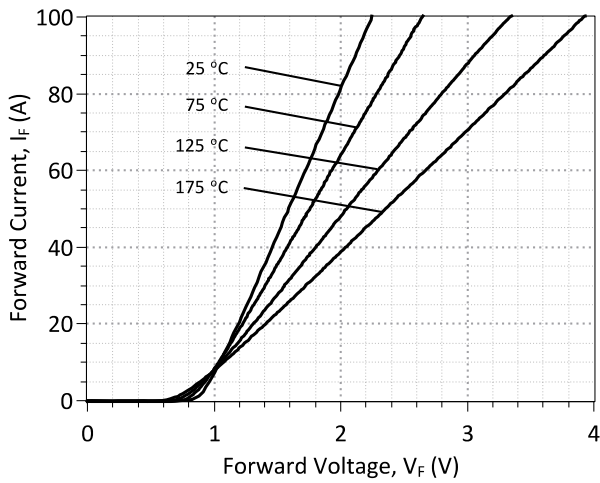


Figure 1: Typical Forward Characteristics

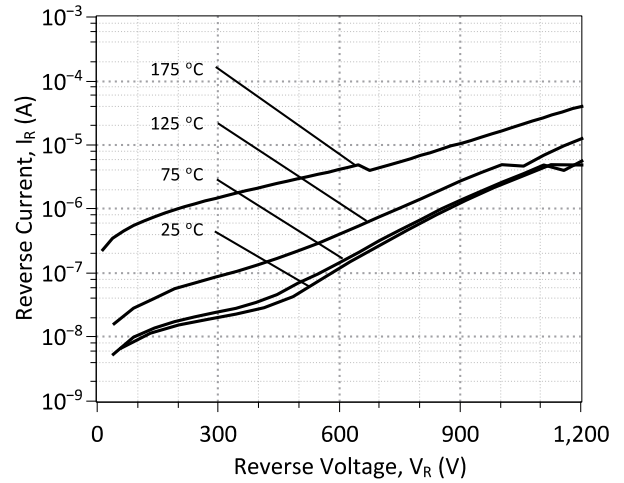


Figure 2: Typical Reverse Characteristics

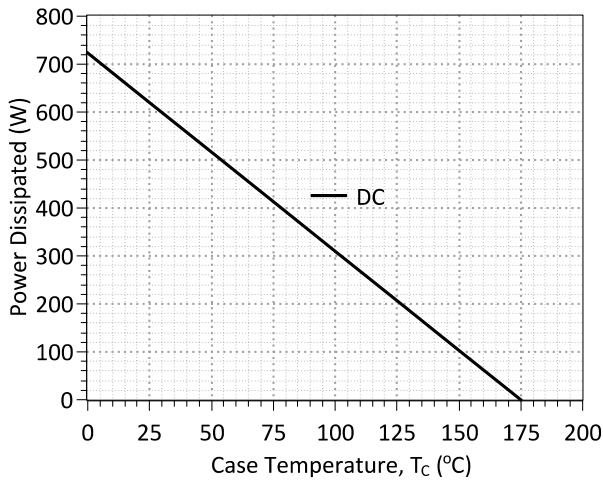
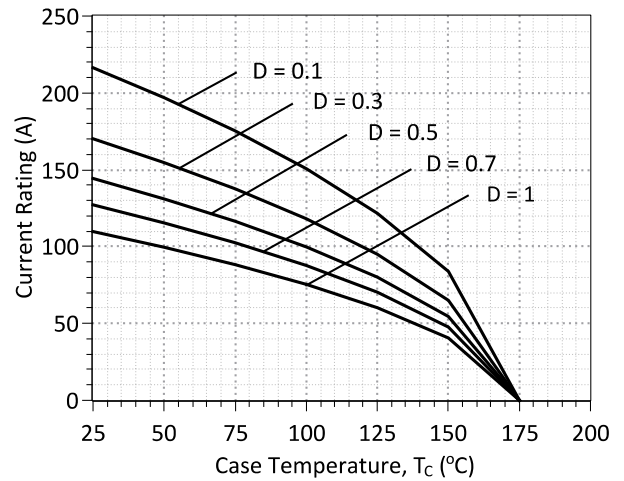


Figure 3: Power Derating Curve



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

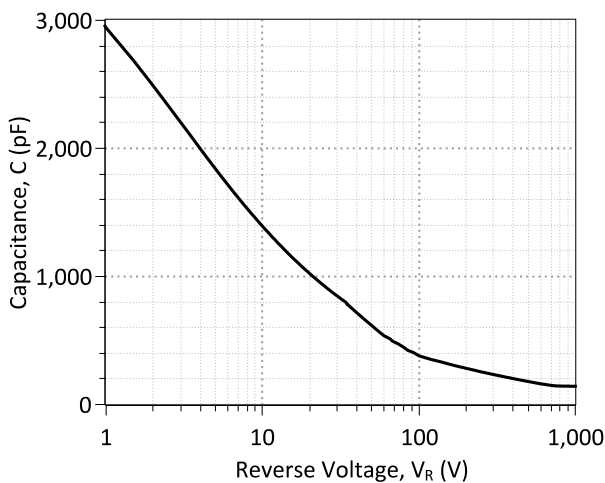


Figure 5: Typical Junction Capacitance vs Reverse Voltage Characteristics

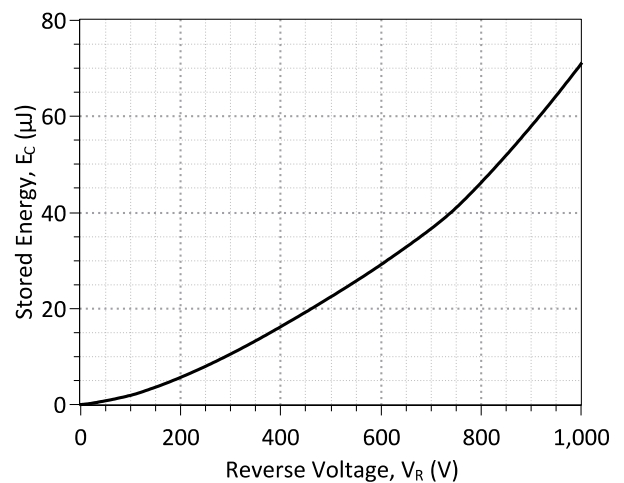


Figure 6: Typical Switching Energy vs Reverse Voltage Characteristics

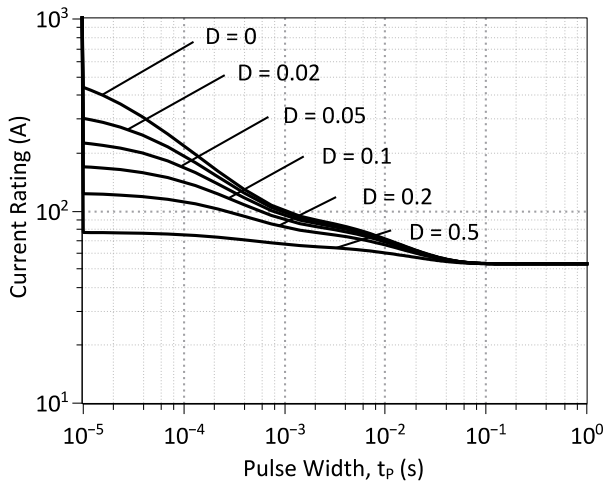


Figure 7: Current vs Pulse Duration Curves at $T_c = 135\text{ }^\circ\text{C}$

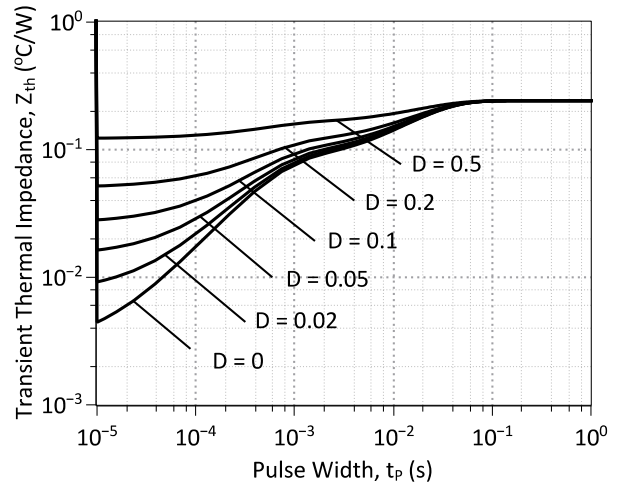
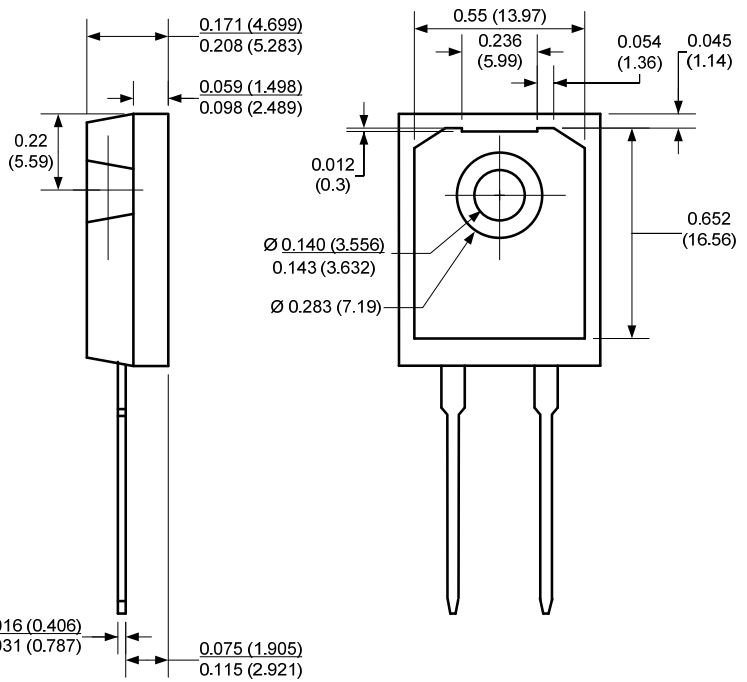
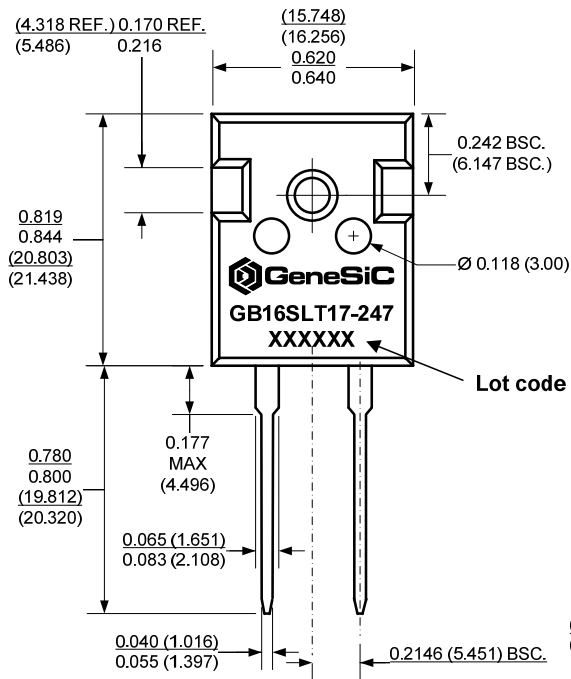


Figure 8: Transient Thermal Impedance

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
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.

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*      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
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