GeneSiC SEMICONDUCTOR

GB20SLT12-247

Silicon Carbide Power Schottky Diode

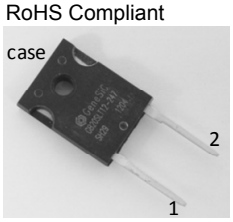
V_{RRM}	=	1200 V
V_F	=	1.6 V
I_F	=	20 A
Q_C	=	112 nC

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 °C, unless otherwise specified

Parameter	Symbol	Conditions	Values	Unit
Repetitive peak reverse voltage	V_{RRM}		1200	V
Continuous forward current	I_F	$T_C \le 145$ °C	20	A
RMS forward current	$I_{F(RMS)}$	$T_C \le 145$ °C	35	A
Surge non-repetitive forward current, Half Sine Wave	$I_{F,SM}$	T_C = 25 °C, t_P = 10 ms T_C = 145 °C, t_P = 10 ms	140 125	A
Non-repetitive peak forward current	$I_{F,max}$	T_C = 25 °C, t_P = 10 µs	650	A
I^2t value	$\int i^2\,dt$	T_C = 25 °C, t_P = 10 ms T_C = 145 °C, t_P = 10 ms	98 78	A^2s
Power dissipation	P_{tot}	T_C = 25 °C	306	W
Operating and storage temperature	T_j , T_{stg}		-55 to 175	°C

Electrical Characteristics at T_j = 175 °C, unless otherwise specified

Parameter	Symbol	Conditions		Values min.	Values typ.	Values max.	Unit
Diode forward voltage	V_F	I_F = 20 A, T_j = 25 °C I_F = 20 A, T_j = 175 °C			1.6 2.6	2.0 3.0	V
Reverse current	I_R	V_R = 1200 V, T_j = 25 °C V_R = 1200 V, T_j = 175 °C			20 40	200 400	µA
Total capacitive charge	Q_C	$I_F \le I_{F,MAX}$ dI_F/dt = 200 A/µs T_j = 175 °C	V_R = 400 V V_R = 960 V		69 112		nC
Switching time	t_s		V_R = 400 V V_R = 960 V		< 49		ns
Total capacitance	C	V_R = 1 V, f = 1 MHz, T_j = 25 °C V_R = 400 V, f = 1 MHz, T_j = 25 °C V_R = 1000 V, f = 1 MHz, T_j = 25 °C			968 76 62		pF

Thermal Characteristics

Thermal resistance, junction - case	R_{thJC}	0.5	°C/W

Mechanical Properties

Mounting torque	M	0.6	Nm

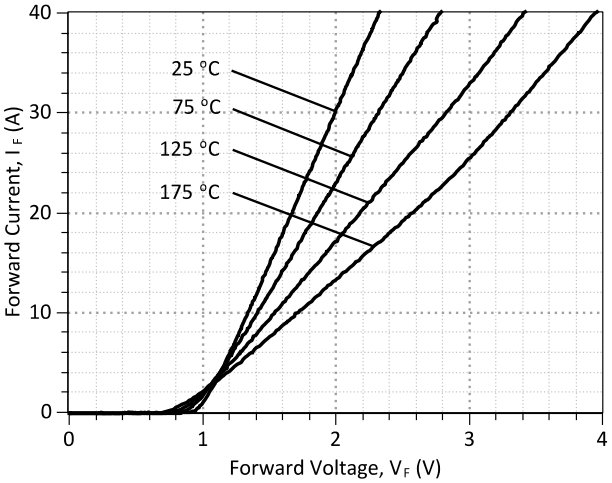


Figure 1: Typical Forward Characteristics

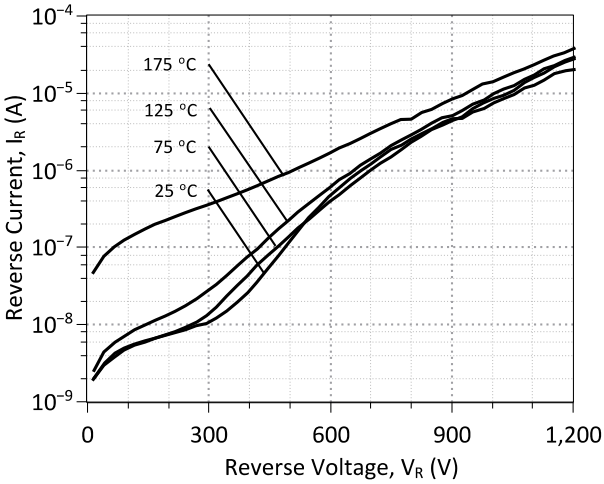


Figure 2: Typical Reverse Characteristics

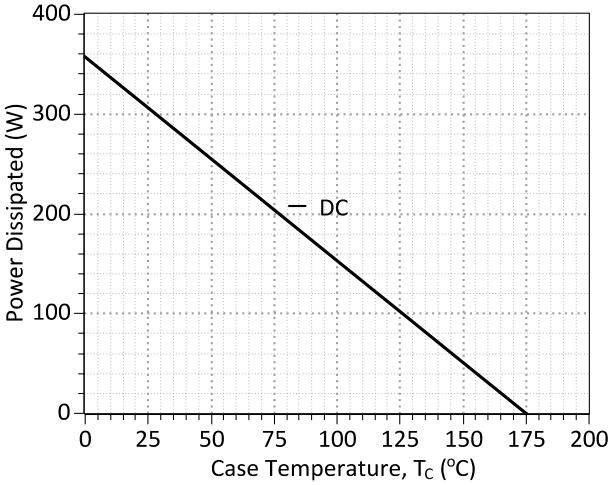


Figure 3: Power Derating Curve

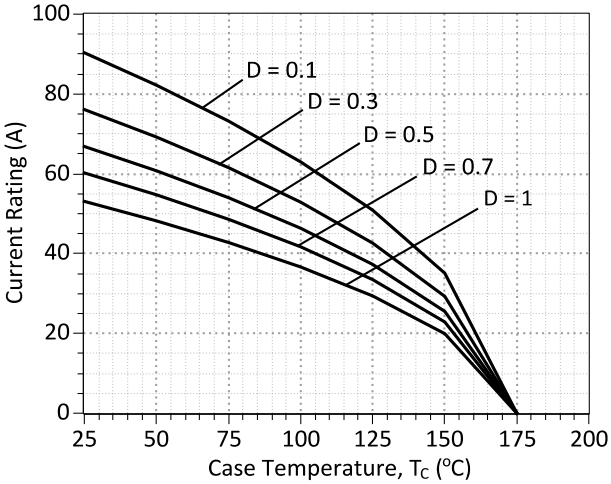


Figure 4: Current Derating Curves (D = t_P/T, t_P= 400 µs) (Considering worst case Z_{th} conditions)

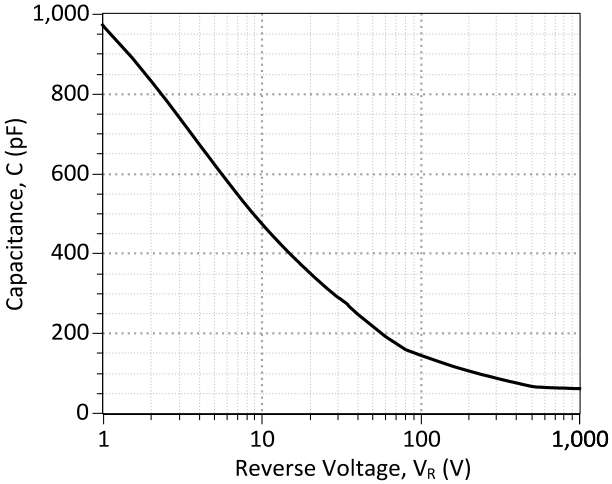


Figure 5: Typical Junction Capacitance vs Reverse Voltage Characteristics

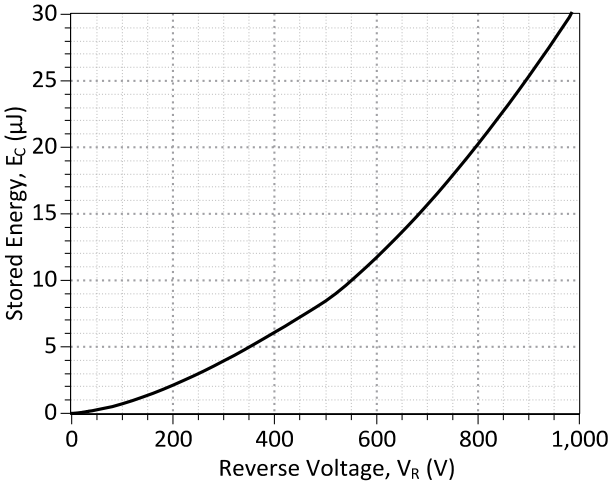


Figure 6: Typical Switching Energy vs Reverse Voltage Characteristics

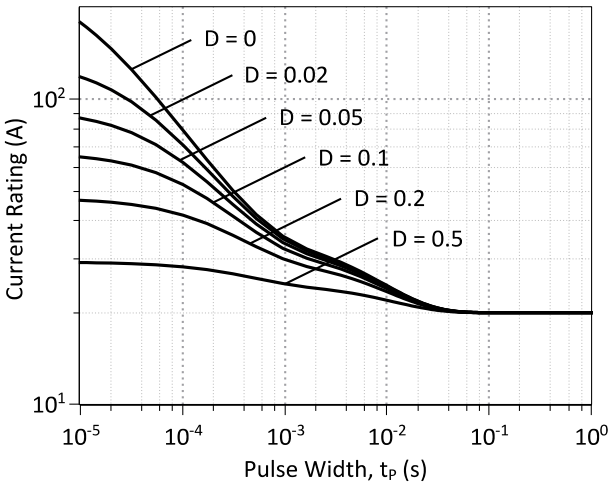


Figure 7: Current vs Pulse Duration Curves at T_C = 145 °C

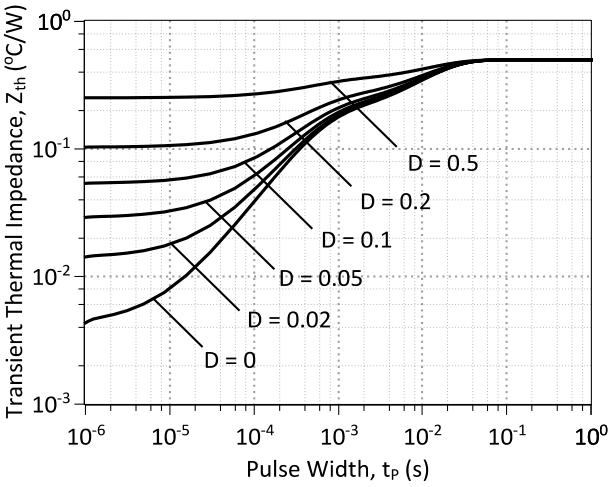
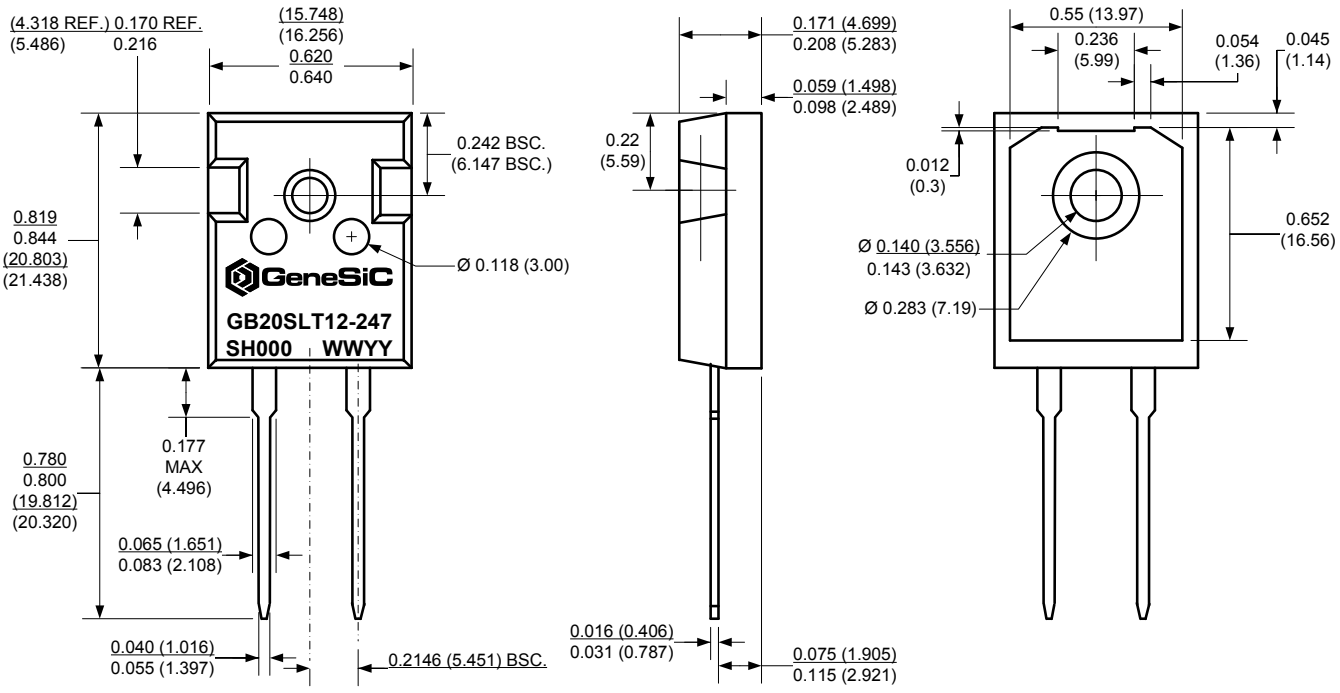


Figure 8: Transient Thermal Impedance

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	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

SPICE Model Parameters

Copy the following code into a SPICE software program for simulation of the GB20SLT12-247 device.

```
*     MODEL OF GeneSiC Semiconductor Inc.
*
*     $Revision:   1.0           $
*     $Date:   04-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 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
```