

Silicon Carbide Power Schottky Diode

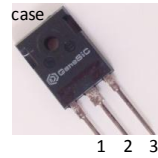
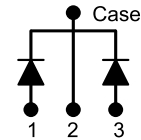
V_{RRM}	=	1200 V
$I_F (T_C = 25^\circ\text{C})$	=	50 A **
$I_F (T_C \leq 150^\circ\text{C})$	=	20 A **
Q_C	=	31 nC *

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 – 247


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

- 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 $T_j = 175^\circ\text{C}$, unless otherwise specified

Parameter	Symbol	Conditions	Values	Unit
Repetitive peak reverse voltage	V_{RRM}		1200	V
Continuous forward current (Per Leg/Device)	I_F	$T_C = 25^\circ\text{C}$	25/50	A
Continuous forward current (Per Leg/Device)	I_F	$T_C \leq 150^\circ\text{C}$	10/20	A
RMS forward current (Per Leg/Device)	$I_{F(RMS)}$	$T_C \leq 150^\circ\text{C}$	17/34	A
Surge non-repetitive forward current, Half Sine Wave	$I_{F,SM}$	$T_C = 25^\circ\text{C}, t_p = 10\text{ ms}$	65	A
		$T_C = 150^\circ\text{C}, t_p = 10\text{ ms}$	55	
Non-repetitive peak forward current	$I_{F,max}$	$T_C = 25^\circ\text{C}, t_p = 10\text{ }\mu\text{s}$	280	A
I^2t value	$\int j^2 dt$	$T_C = 25^\circ\text{C}, t_p = 10\text{ ms}$	21	A^2s
		$T_C = 150^\circ\text{C}, t_p = 10\text{ ms}$	15	
Power dissipation (Per Leg/Device)	P_{tot}	$T_C = 25^\circ\text{C}$	190/380	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 (Per Leg)

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Diode forward voltage	V_F	$I_F = 10\text{ A}, T_j = 25^\circ\text{C}$	1.5	1.8	V	
		$I_F = 10\text{ A}, T_j = 175^\circ\text{C}$	2.6	3.0		
Reverse current	I_R	$V_R = 1200\text{ V}, T_j = 25^\circ\text{C}$	5	50	μA	
		$V_R = 1200\text{ V}, T_j = 175^\circ\text{C}$	10	100		
Total capacitive charge	Q_C	$I_F \leq I_{F,MAX}$ $di_F/dt = 200\text{ A}/\mu\text{s}$ $T_j = 175^\circ\text{C}$	$V_R = 400\text{ V}$	31	nC	
	$V_R = 960\text{ V}$		52			
Switching time	t_s		$V_R = 400\text{ V}$	< 25	ns	
Total capacitance	C	$V_R = 1\text{ V}, f = 1\text{ MHz}, T_j = 25^\circ\text{C}$		490	pF	
		$V_R = 400\text{ V}, f = 1\text{ MHz}, T_j = 25^\circ\text{C}$		45		
		$V_R = 1000\text{ V}, f = 1\text{ MHz}, T_j = 25^\circ\text{C}$		33		

Thermal Characteristics

Thermal resistance, junction - case	R_{thJC}	0.8 *	$^\circ\text{C}/\text{W}$
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Mechanical Properties

Mounting torque	M	0.6	Nm
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* Per Leg, ** Per Device

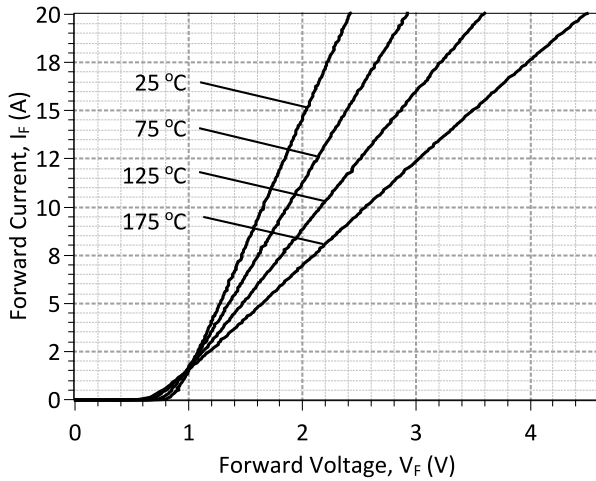


Figure 1: Typical Forward Characteristics (Per Leg)

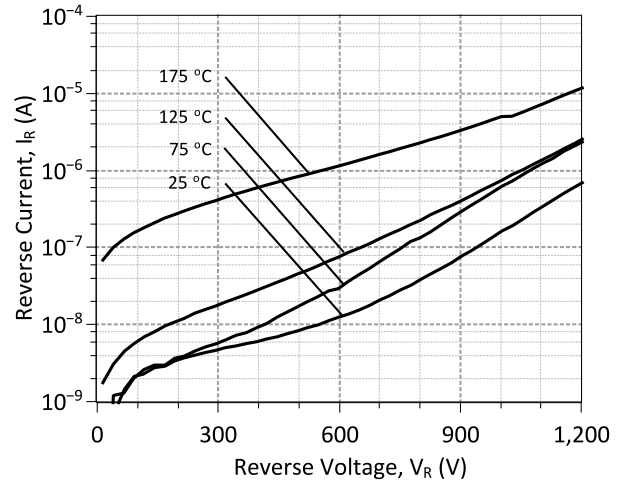


Figure 2: Typical Reverse Characteristics (Per Leg)

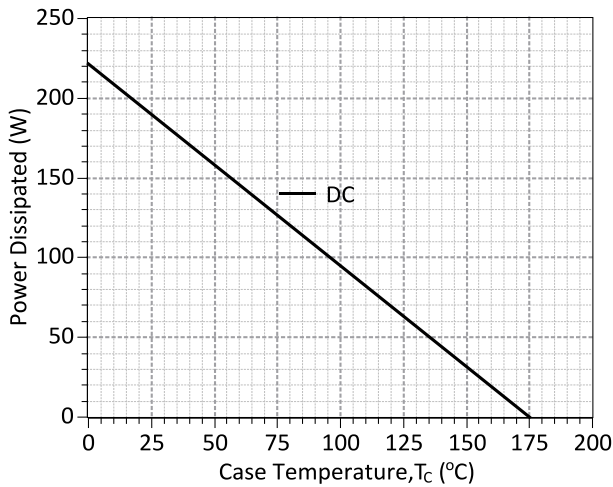


Figure 3: Power Derating Curve (Per Leg)

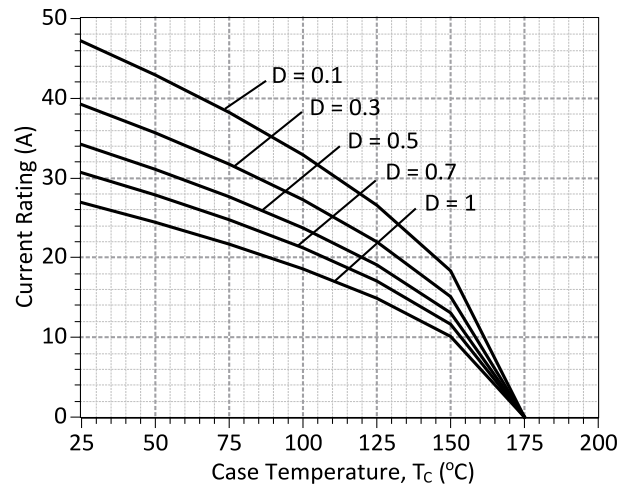


Figure 4: Current Derating Curves (D = t_p/T , $t_p = 400 \mu s$) (Considering worst case Z_{th} conditions) (Per Leg)

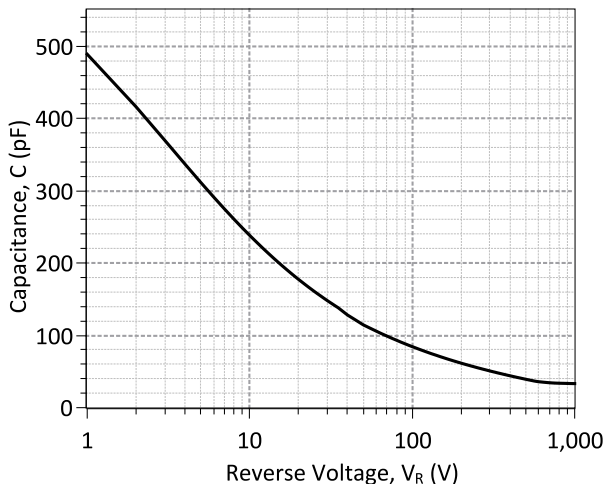


Figure 5: Typical Junction Capacitance vs Reverse Voltage Characteristics (Per Leg)

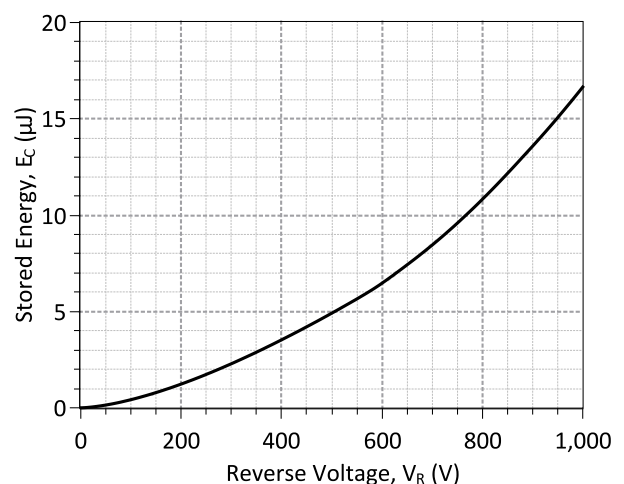


Figure 6: Typical Capacitive Energy vs Reverse Voltage Characteristics (Per Leg)

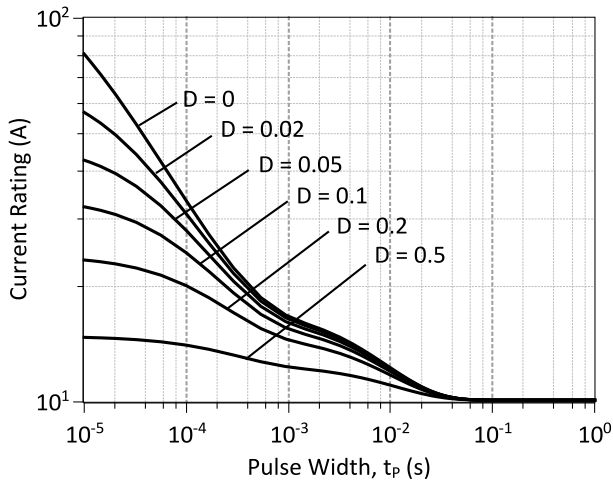


Figure 7: Current vs Pulse Duration Curves at $T_c = 150\text{ }^\circ\text{C}$ (Per Leg)

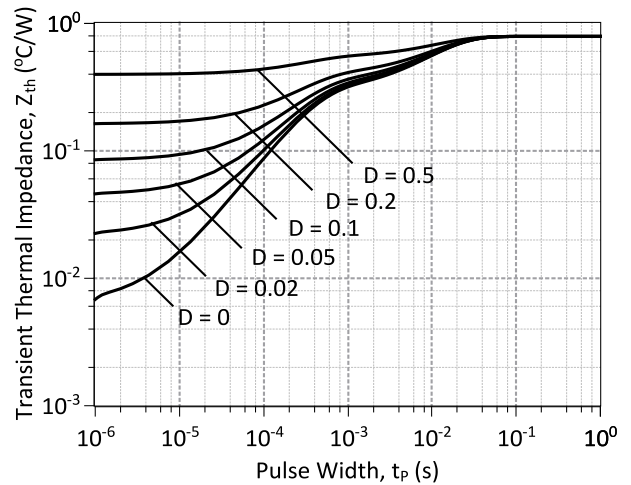
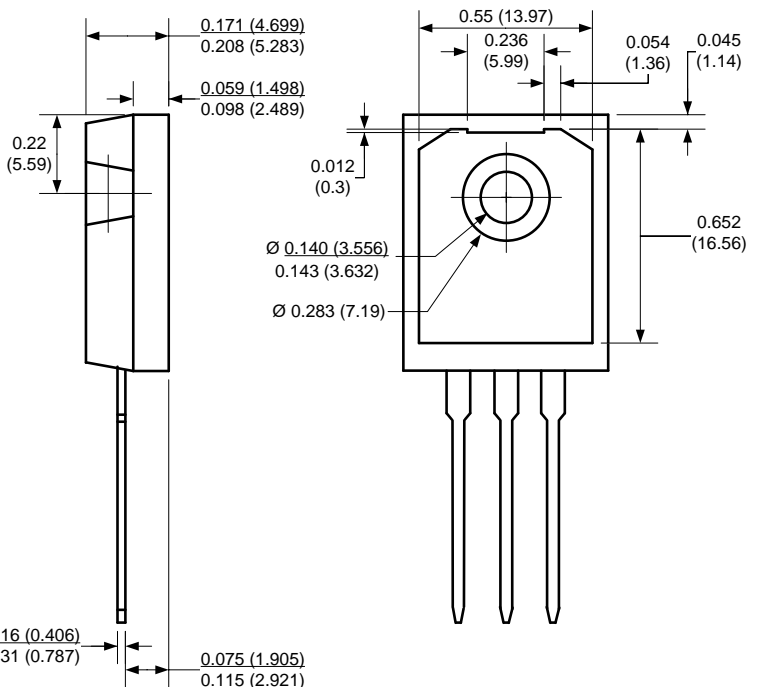
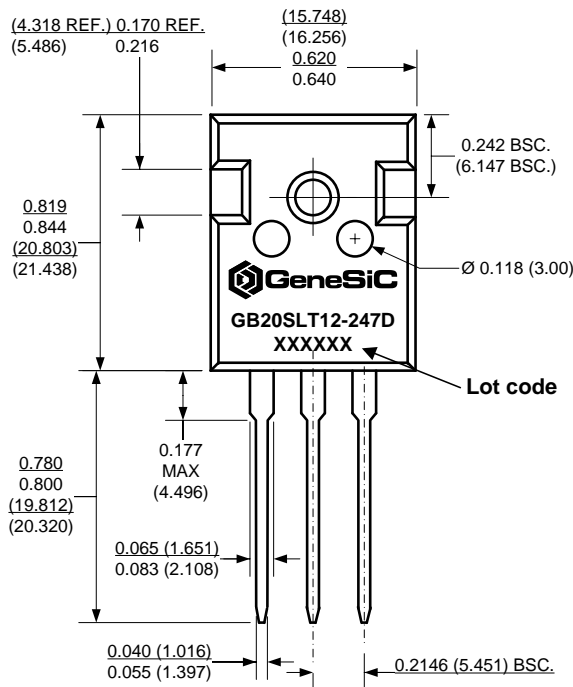


Figure 8: Transient Thermal Impedance (Per Leg)

Package Dimensions:

TO-247

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
2015/09/16	0	Initial release	

Published by

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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/GB20SLT12-247D_SPICE.pdf) into LTSPICE (version 4) software for simulation of the GB20SLT12-247D. All the simulations are per Leg.

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*      MODEL OF GeneSiC Semiconductor Inc.
*
*      $Revision:   1.0           $
*      $Date:      16-SEP-2015   $
*
*      GeneSiC Semiconductor Inc.
*      43670 Trade Center Place Ste. 155
*      Dulles, VA 20166
*
*      COPYRIGHT (C) 2015 GeneSiC Semiconductor Inc.
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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 GB20SLT12-247D SPICE Model
*
.SUBCKT GB20SLT12D ANODE KATHODE
D1 ANODE KATHODE GB20SLT12D_SCHOTTKY
D2 ANODE KATHODE GB20SLT12D_PIN
.MODEL GB20SLT12D_SCHOTTKY D
+ IS      4.55E-15      RS      0.0736
+ N       1            IKF     1000
+ EG     1.2          XTI     -2
+ TRS1   0.0054347826 TRS2   2.71739E-05
+ CJO    6.40E-10     VJ      0.469
+ M      1.508        FC      0.5
+ TT     1.00E-10     BV      1200
+ IBV    1.00E-03     VPK     1200
+ IAVE   10          TYPE    SiC_Schottky
+ MFG    GeneSiC_Semi
.MODEL GB20SLT12D_PIN D
+ IS      1.54E-22      RS      0.19
+ 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   10          TYPE    SiC_PiN
.ENDS
*
*      End of GB20SLT12-247D SPICE Model
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