

Silicon Carbide Power Schottky Diode

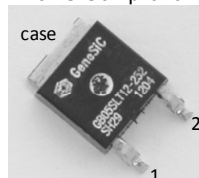
V_{RRM}	=	1200 V
I_F ($T_C = 25^\circ\text{C}$)	=	12 A
Q_C	=	21 nC

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 – 252



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

Parameter	Symbol	Conditions	Values	Unit
Repetitive peak reverse voltage	V_{RRM}		1200	V
Continuous forward current	I_F	$T_C \leq 155^\circ\text{C}$	5	A
RMS forward current	$I_{F(RMS)}$	$T_C \leq 155^\circ\text{C}$	8	A
Surge non-repetitive forward current, Half Sine Wave	$I_{F,SM}$	$T_C = 25^\circ\text{C}$, $t_P = 10\text{ ms}$	32	A
		$T_C = 155^\circ\text{C}$, $t_P = 10\text{ ms}$	26	
Non-repetitive peak forward current	$I_{F,max}$	$T_C = 25^\circ\text{C}$, $t_P = 10\text{ }\mu\text{s}$	120	A
I^2t value	$\int i^2 dt$	$T_C = 25^\circ\text{C}$, $t_P = 10\text{ ms}$	5	A^2s
		$T_C = 155^\circ\text{C}$, $t_P = 10\text{ ms}$	3.4	
Power dissipation	P_{tot}	$T_C = 25^\circ\text{C}$	117	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	$I_F = 5\text{ A}$, $T_J = 25^\circ\text{C}$		1.6	1.9	V
		$I_F = 5\text{ A}$, $T_J = 175^\circ\text{C}$		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	$I_F \leq I_{F,MAX}$ $dI_F/dt = 200\text{ A}/\mu\text{s}$ $T_J = 175^\circ\text{C}$	$V_R = 400\text{ V}$	21		nC
			$V_R = 960\text{ V}$	35		
Switching time	t_s		$V_R = 400\text{ V}$ $V_R = 960\text{ V}$	< 25		ns
Total capacitance	C	$V_R = 1\text{ V}$, $f = 1\text{ MHz}$, $T_J = 25^\circ\text{C}$		260		pF
		$V_R = 400\text{ V}$, $f = 1\text{ MHz}$, $T_J = 25^\circ\text{C}$		25		
		$V_R = 1000\text{ V}$, $f = 1\text{ MHz}$, $T_J = 25^\circ\text{C}$		20		

Thermal Characteristics

Thermal resistance, junction - case	R_{thJC}	1.4	$^\circ\text{C}/\text{W}$
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Mechanical Properties

Mounting torque	M	0.6	Nm
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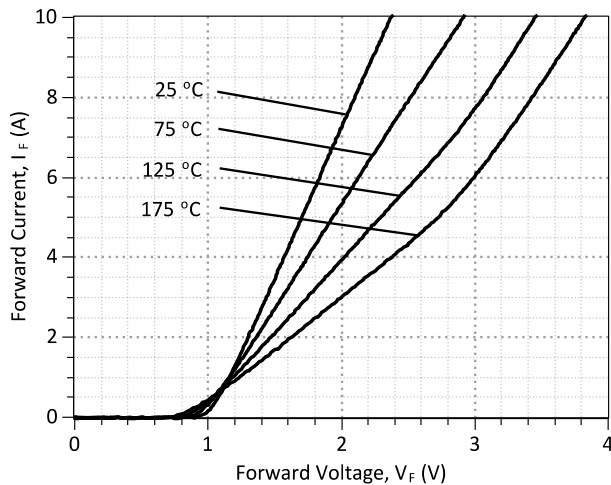


Figure 1: Typical Forward Characteristics

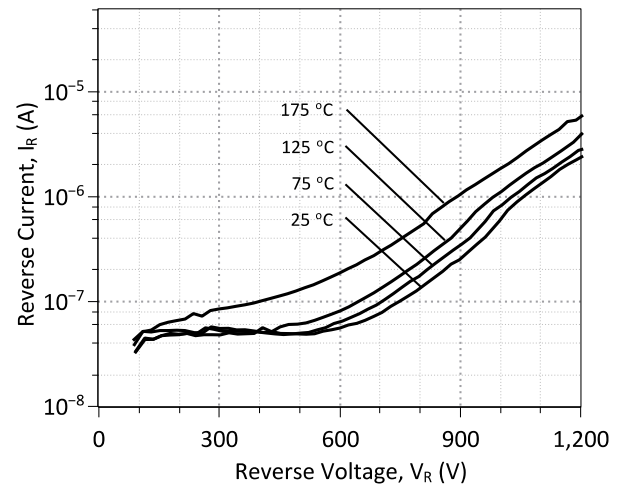


Figure 2: Typical Reverse Characteristics

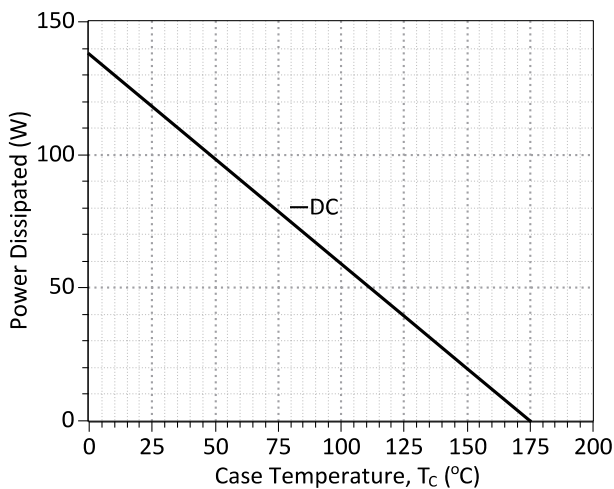
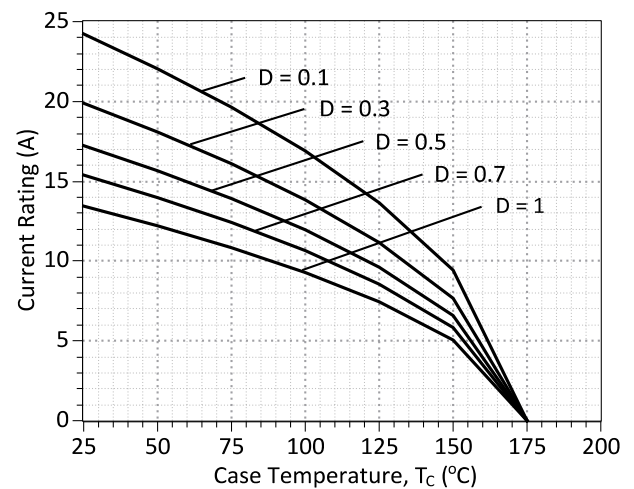


Figure 3: Power Derating Curve



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

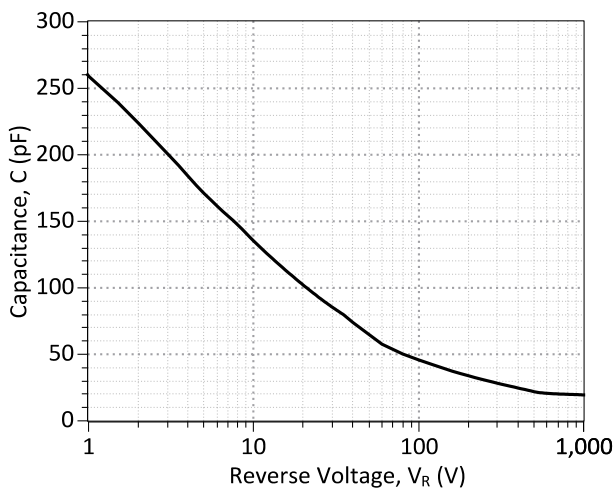


Figure 5: Typical Junction Capacitance vs Reverse Voltage Characteristics

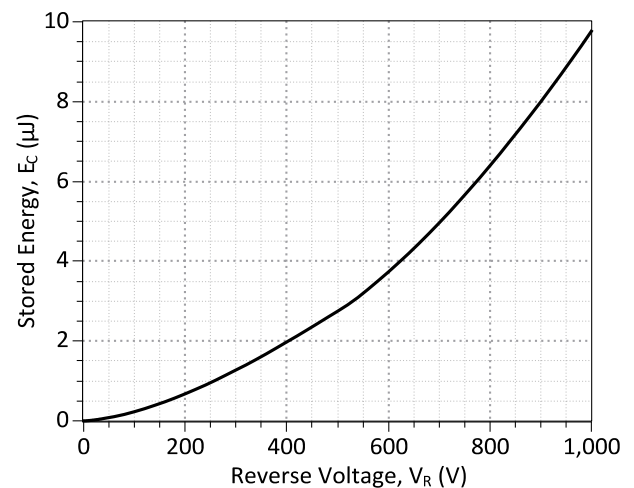


Figure 6: Typical Switching Energy vs Reverse Voltage Characteristics

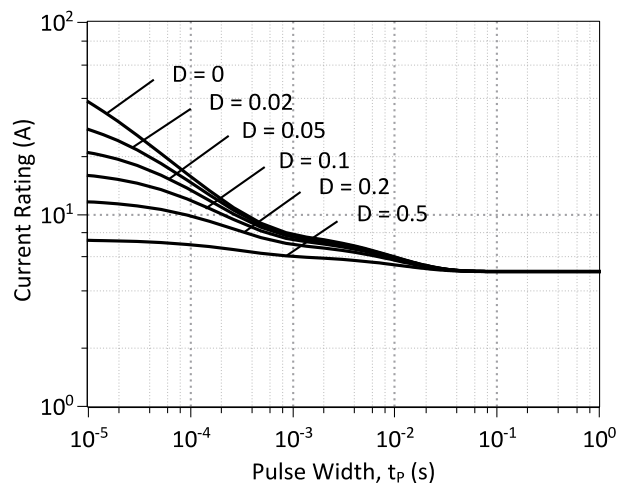


Figure 7: Current vs Pulse Duration Curves at $T_c = 155\text{ }^{\circ}\text{C}$

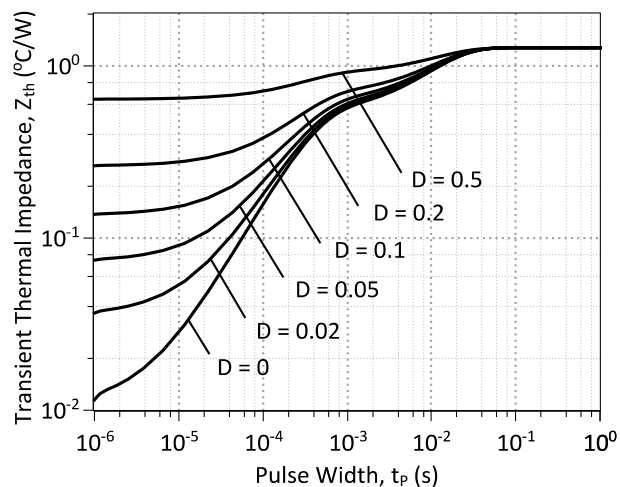
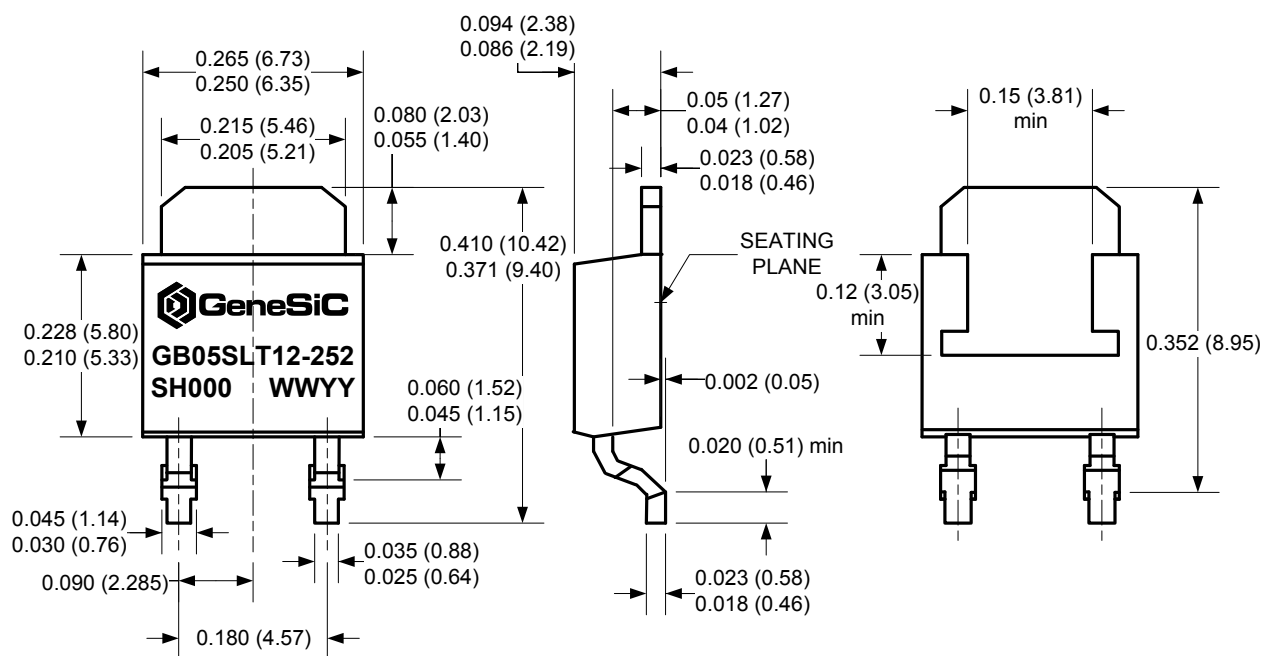


Figure 8: Transient Thermal Impedance

Package Dimensions:

TO-252

PACKAGE OUTLINE



NOTE

1. CONTROLLED DIMENSION IS INCH. DIMENSION IN BRACKET IS MILLIMETER.
2. DIMENSIONS DO NOT INCLUDE END FLASH, MOLD FLASH, MATERIAL PROTRUSIONS
3. CONTROLLED LEAD COPLANARITY $\langle D \rangle 0.004$ INCH MAXIMUM

Revision History			
Date	Revision	Comments	Supersedes
2014/08/26	3	Updated Electrical Characteristics	
2013/02/05	2	Second generation update	
2012/05/22	1	Second generation release	
2010/12/14	0	Initial release	

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SPICE Model Parameters

Copy the following code into a SPICE software program for simulation of the GB05SLT12-252 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 GB05SLT12-252 SPICE Model
*
.SUBCKT GB05SLT12 ANODE KATHODE
R1 ANODE INT R=((TEMP-24)*0.0015); Temperature Dependant Resistor
D1 INT KATHODE GB05SLT12_25C; Call the 25C Diode Model
D2 ANODE KATHODE GB05SLT12_PIN; Call the PiN Diode Model
.MODEL GB05SLT12_25C D
+ IS      5.83E-18      RS      0.1276
+ N        1           IKF      602
+ EG       1.2          XTI      3
+ CJO      3.00E-10     VJ       0.419
+ M         1.6         FC       0.5
+ TT       1.00E-10     BV       1200
+ IBV      1.00E-03     VPK      1200
+ IAVE      5           TYPE     SiC_Schottky
+ MFG      GeneSiC_Semiconductor
.MODEL GB05SLT12_PIN D
+ IS      3.50 E-12     RS      0.3648
+ N        4.409       IKF      73
+ EG       3.23        XTI      -6
+ FC       0.5         TT       0
+ BV       1200        IBV      1.00E-03
+ VPK      1200        IAVE     1
+ TYPE     SiC_PiN
.ENDS
*
*  End of GB05SLT12-252 SPICE Model
```