

Silicon Carbide Power Schottky Diode

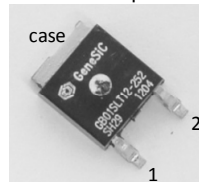
V_{RRM}	=	1200 V
V_F	=	1.6 V
I_F	=	1 A
Q_C	=	13 nC

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

Parameter	Symbol	Conditions	Values	Unit
Repetitive peak reverse voltage	V_{RRM}		1200	V
Continuous forward current	I_F	$T_C \leq 160\text{ °C}$	1	A
RMS forward current	$I_{F(RMS)}$	$T_C \leq 160\text{ °C}$	2	A
Surge non-repetitive forward current, Half Sine Wave	$I_{F,SM}$	$T_C = 25\text{ °C}$, $t_p = 10\text{ ms}$ $T_C = 160\text{ °C}$, $t_p = 10\text{ ms}$	10 8	A
Non-repetitive peak forward current	$I_{F,max}$	$T_C = 25\text{ °C}$, $t_p = 10\text{ }\mu\text{s}$	65	A
I^2t value	$\int i^2 dt$	$T_C = 25\text{ °C}$, $t_p = 10\text{ ms}$ $T_C = 160\text{ °C}$, $t_p = 10\text{ ms}$	0.5 0.3	A ² s
Power dissipation	P_{tot}	$T_C = 25\text{ °C}$	42	W
Operating and storage temperature	T_J , T_{slg}		-55 to 175	°C

Electrical Characteristics at $T_J = 175\text{ °C}$, unless otherwise specified

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Diode forward voltage	V_F	$I_F = 1\text{ A}$, $T_J = 25\text{ °C}$ $I_F = 1\text{ A}$, $T_J = 175\text{ °C}$		1.6 2.4	1.8 3.7	V
Reverse current	I_R	$V_R = 1200\text{ V}$, $T_J = 25\text{ °C}$ $V_R = 1200\text{ V}$, $T_J = 175\text{ °C}$		5 10	10 100	μA
Total capacitive charge	Q_C	$I_F \leq I_{F,MAX}$ $dI_F/dt = 200\text{ A}/\mu\text{s}$ $T_J = 175\text{ °C}$	$V_R = 400\text{ V}$ $V_R = 960\text{ V}$		7 13	nC
Switching time	t_s		$V_R = 400\text{ V}$ $V_R = 960\text{ V}$		< 17	ns
Total capacitance	C	$V_R = 1\text{ V}$, $f = 1\text{ MHz}$, $T_J = 25\text{ °C}$			69	pF
		$V_R = 400\text{ V}$, $f = 1\text{ MHz}$, $T_J = 25\text{ °C}$			10	
		$V_R = 1000\text{ V}$, $f = 1\text{ MHz}$, $T_J = 25\text{ °C}$			8	

Thermal Characteristics

Thermal resistance, junction - case	R_{thJC}	3.6	°C/W
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Mechanical Properties

Mounting torque	M	0.6	Nm
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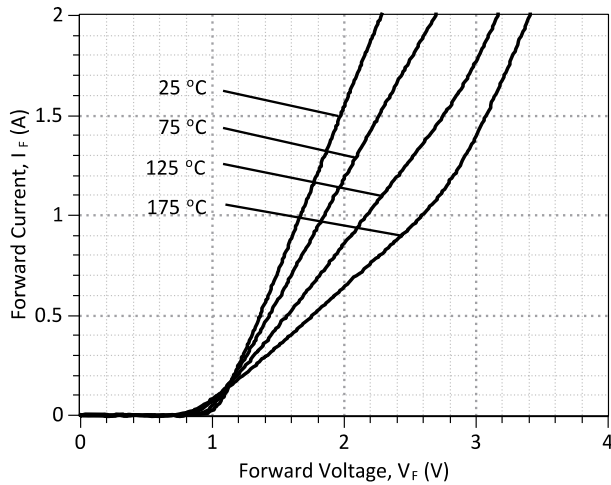


Figure 1: Typical Forward Characteristics

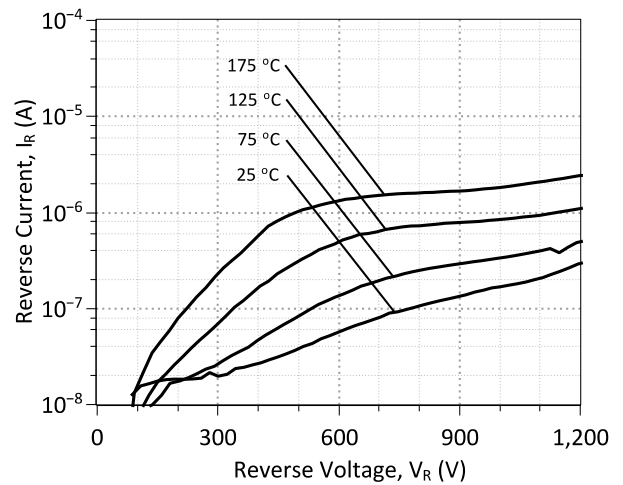


Figure 2: Typical Reverse Characteristics

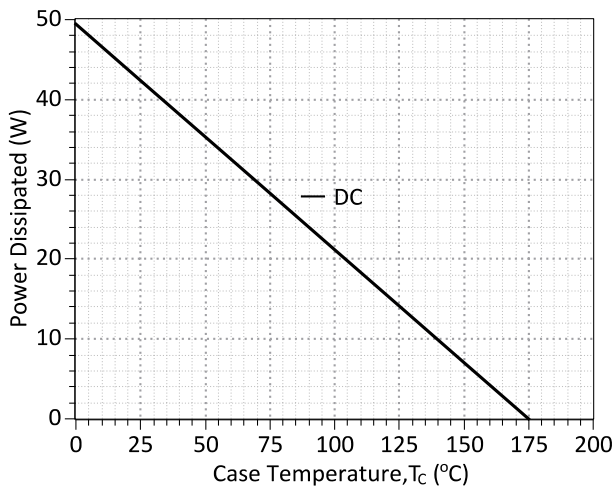
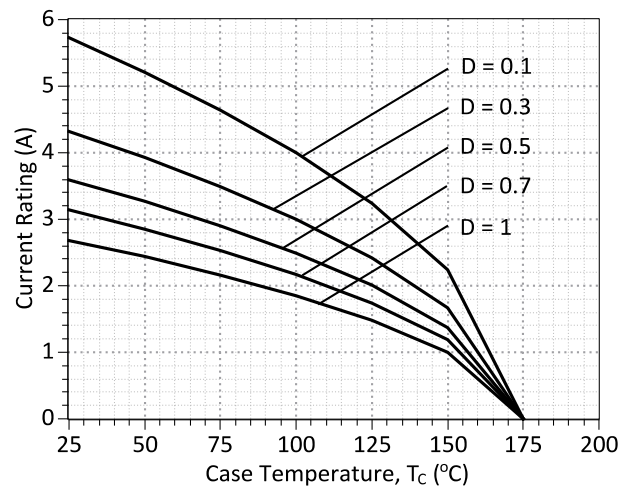


Figure 3: Power Derating Curve



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

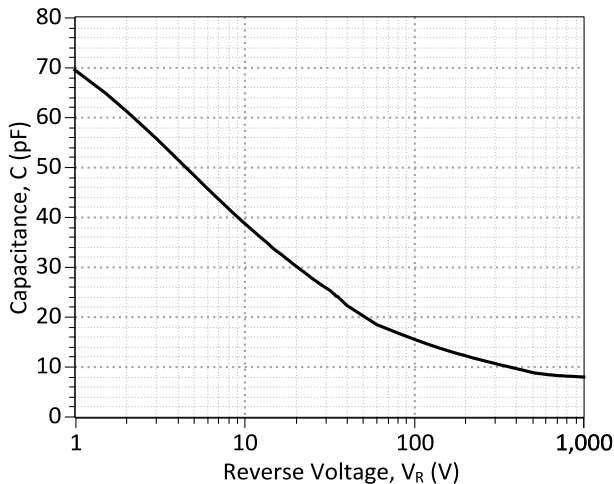


Figure 5: Typical Junction Capacitance vs Reverse Voltage Characteristics

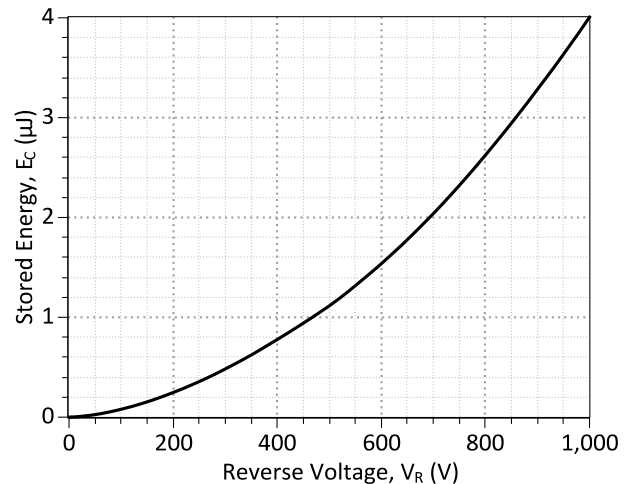
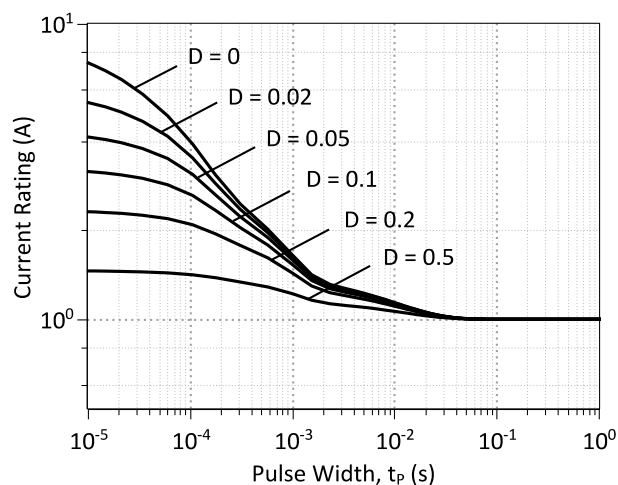
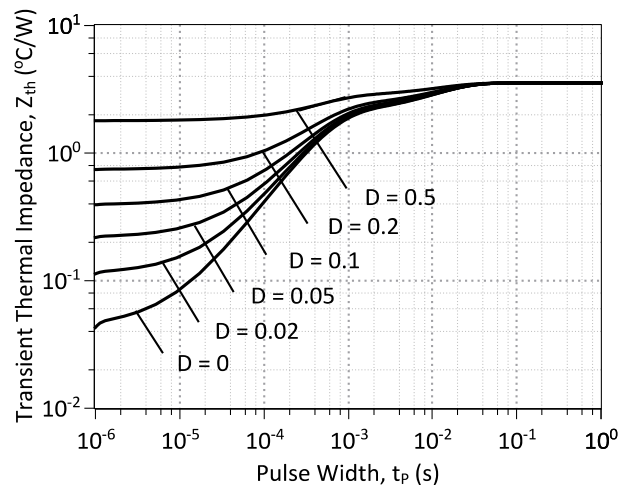


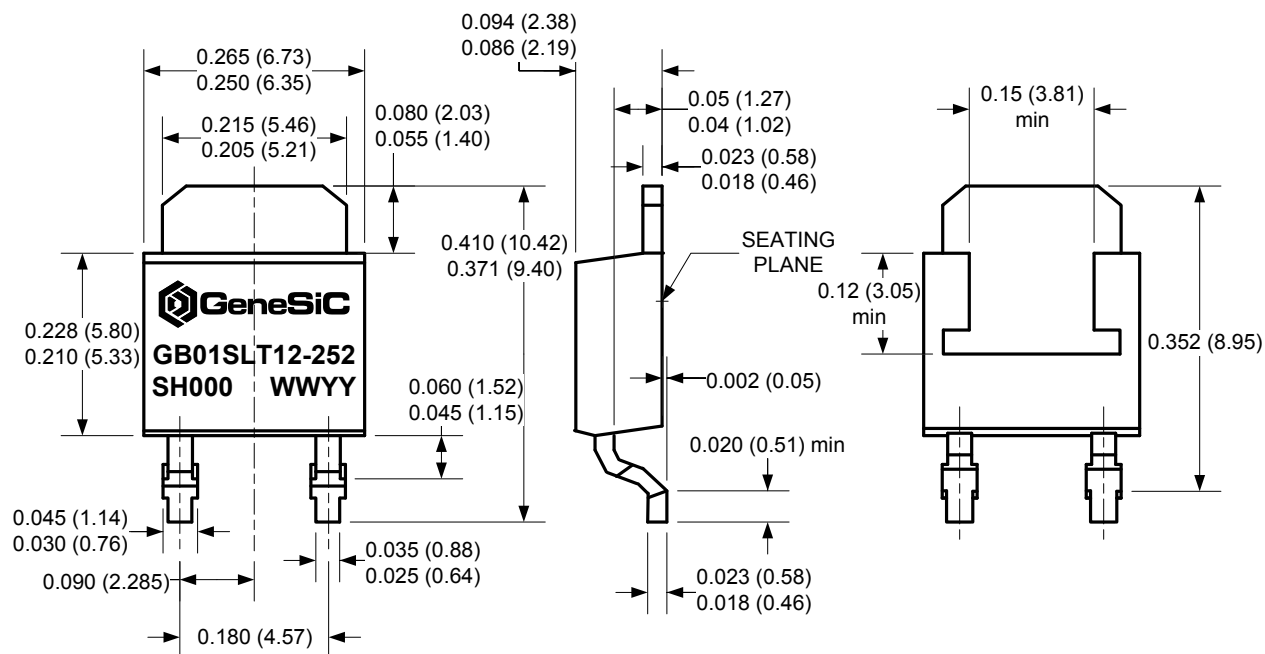
Figure 6: Typical Switching Energy vs Reverse Voltage Characteristics


Figure 7: Current vs Pulse Duration Curves at $T_c = 160\text{ }^{\circ}\text{C}$

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 $<D> 0.004$ INCH MAXIMUM

Revision History			
Date	Revision	Comments	Supersedes
2013/11/12	3	Updated Electrical Characteristics	
2013/02/05	2	Second generation update	
2012/05/22	1	Second generation release	
2010/12/13	0	Initial release	

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SPICE Model Parameters

Copy the following code into a SPICE software program for simulation of the GB01SLT12-252 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 GB01SLT12-252 SPICE Model
*
.SUBCKT GB01SLT12 ANODE KATHODE
R1 ANODE INT R=((TEMP-24)*0.0069); Temperature Dependant Resistor
D1 INT KATHODE GB01SLT12_25C; Call the 25C Diode Model
D2 ANODE KATHODE GB01SLT12_PIN; Call the PiN Diode Model
.MODEL GB01SLT12_25C D
+ IS      7.27E-19      RS      0.592251
+ N        1           IKF      407.773
+ EG       1.2          XTI      3
+ CJO      7.90E-11     VJ       0.367
+ M         1.63         FC       0.5
+ TT       1.00E-10     BV       1200
+ IBV      1.00E-03     VPK      1200
+ IAVE      1           TYPE     SiC_Schottky
+ MFG      GeneSiC_Semiconductor
.MODEL GB01SLT12_PIN D
+ IS      1.08E-17      RS      1.8
+ N        2.2313       IKF      999
+ EG       3.23          XTI     -65
+ FC       0.5           TT       0
+ BV       1200          IBV      1.00E-03
+ VPK      1200          IAVE     1
+ TYPE     SiC_PiN
.ENDS
*
*      End of GB01SLT12-252 SPICE Model
```