

## Silicon Carbide Power Schottky Diode

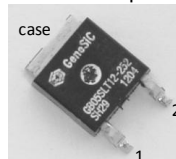
|                                        |   |        |
|----------------------------------------|---|--------|
| $V_{RRM}$                              | = | 1200 V |
| $I_F$ ( $T_C = 25^\circ\text{C}$ )     | = | 12 A   |
| $I_F$ ( $T_C \leq 150^\circ\text{C}$ ) | = | 5 A    |
| $Q_C$                                  | = | 21 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 – 252



### 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

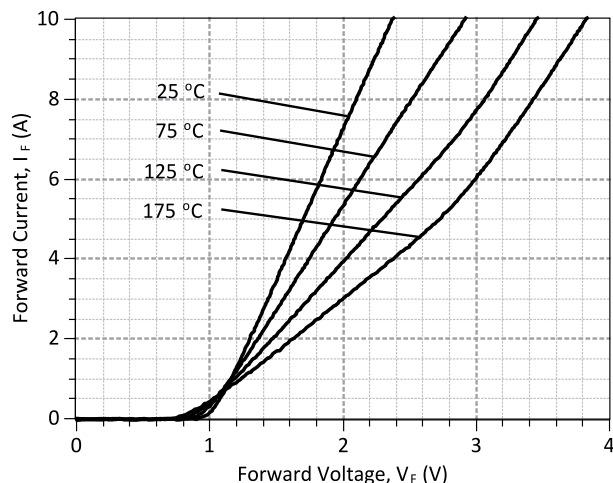
| Parameter                                            | Symbol            | Conditions                                                                            | Values     | Unit                 |
|------------------------------------------------------|-------------------|---------------------------------------------------------------------------------------|------------|----------------------|
| Repetitive peak reverse voltage                      | $V_{RRM}$         |                                                                                       | 1200       | V                    |
| Continuous forward current                           | $I_F$             | $T_C = 25^\circ\text{C}$                                                              | 12         | A                    |
| Continuous forward current                           | $I_F$             | $T_C \leq 150^\circ\text{C}$                                                          | 5          | A                    |
| RMS forward current                                  | $I_{F(RMS)}$      | $T_C \leq 150^\circ\text{C}$                                                          | 8          | A                    |
| Surge non-repetitive forward current, Half Sine Wave | $I_{F,SM}$        | $T_C = 25^\circ\text{C}$ , $t_p = 10$ ms<br>$T_C = 150^\circ\text{C}$ , $t_p = 10$ ms | 32<br>26   | A                    |
| Non-repetitive peak forward current                  | $I_{F,max}$       | $T_C = 25^\circ\text{C}$ , $t_p = 10$ $\mu\text{s}$                                   | 120        | A                    |
| $I^2t$ value                                         | $\int i^2 dt$     | $T_C = 25^\circ\text{C}$ , $t_p = 10$ ms<br>$T_C = 150^\circ\text{C}$ , $t_p = 10$ ms | 5<br>3.4   | $\text{A}^2\text{s}$ |
| 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

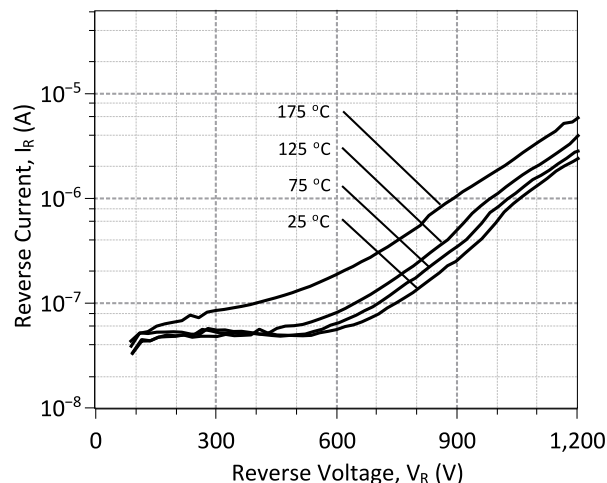
| Parameter               | Symbol | Conditions                                                                            | Values        |            |            | Unit          |
|-------------------------|--------|---------------------------------------------------------------------------------------|---------------|------------|------------|---------------|
|                         |        |                                                                                       | min.          | typ.       | max.       |               |
| Diode forward voltage   | $V_F$  | $I_F = 5$ A, $T_J = 25^\circ\text{C}$<br>$I_F = 5$ A, $T_J = 175^\circ\text{C}$       |               | 1.6<br>2.6 | 1.9<br>3.0 | V             |
| Reverse current         | $I_R$  | $V_R = 1200$ V, $T_J = 25^\circ\text{C}$<br>$V_R = 1200$ V, $T_J = 175^\circ\text{C}$ |               | 5<br>10    | 50<br>100  | $\mu\text{A}$ |
| Total capacitive charge | $Q_C$  | $I_F \leq I_{F,MAX}$<br>$dI_F/dt = 200$ A/ $\mu\text{s}$<br>$T_J = 175^\circ\text{C}$ | $V_R = 400$ V |            | 21         | nC            |
|                         |        |                                                                                       | $V_R = 960$ V |            | 35         |               |
| Switching time          | $t_s$  | $V_R = 400$ V<br>$V_R = 960$ V                                                        |               |            | < 25       | ns            |
|                         |        |                                                                                       |               |            |            |               |
| Total capacitance       | C      | $V_R = 1$ V, $f = 1$ MHz, $T_J = 25^\circ\text{C}$                                    |               |            | 260        | pF            |
|                         |        | $V_R = 400$ V, $f = 1$ MHz, $T_J = 25^\circ\text{C}$                                  |               |            | 25         |               |
|                         |        | $V_R = 1000$ V, $f = 1$ MHz, $T_J = 25^\circ\text{C}$                                 |               |            | 20         |               |

### Thermal Characteristics

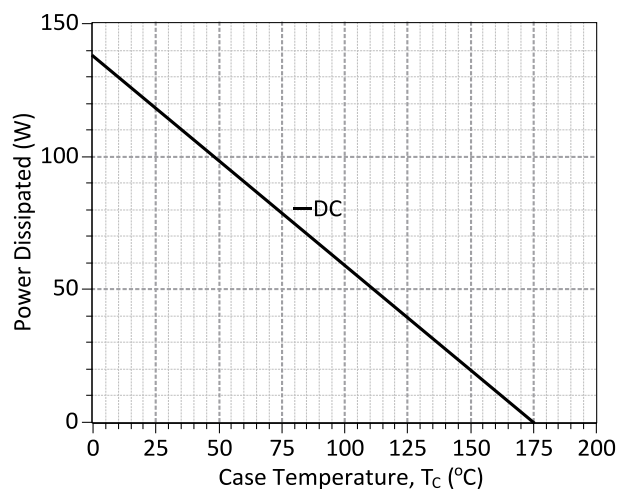
|                                     |            |     |                    |
|-------------------------------------|------------|-----|--------------------|
| Thermal resistance, junction - case | $R_{thJC}$ | 1.4 | $^\circ\text{C/W}$ |
|-------------------------------------|------------|-----|--------------------|



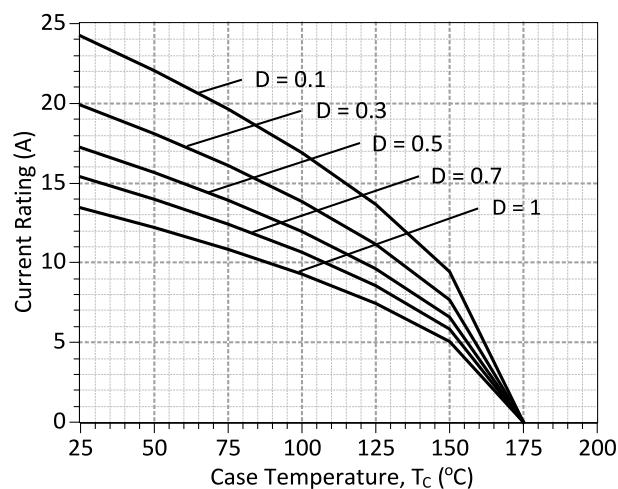
**Figure 1: Typical Forward Characteristics**



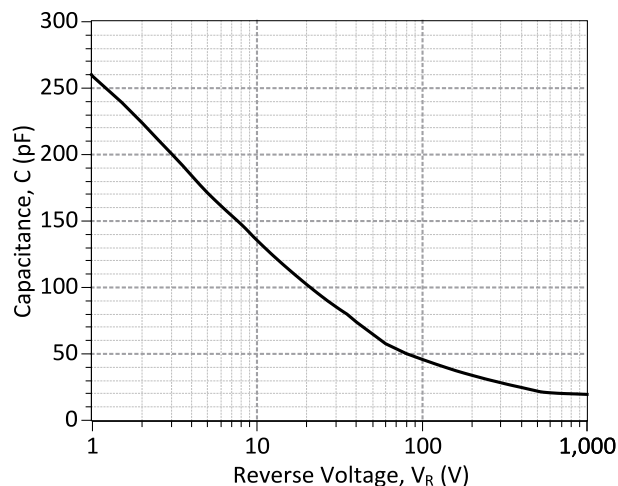
**Figure 2: Typical Reverse Characteristics**



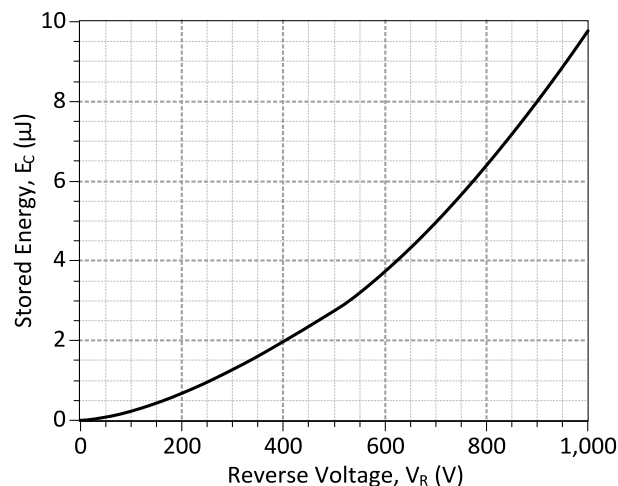
**Figure 3: Power Derating Curve**



**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 Capacitive Energy vs Reverse Voltage Characteristics**

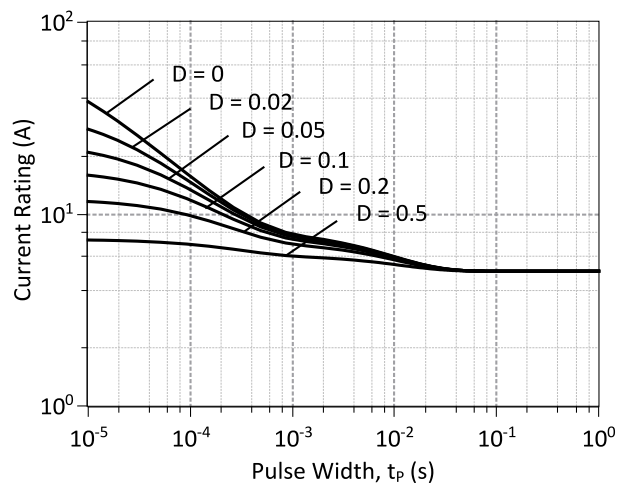


Figure 7: Current vs Pulse Duration Curves at  $T_c = 155\text{ }^{\circ}\text{C}$

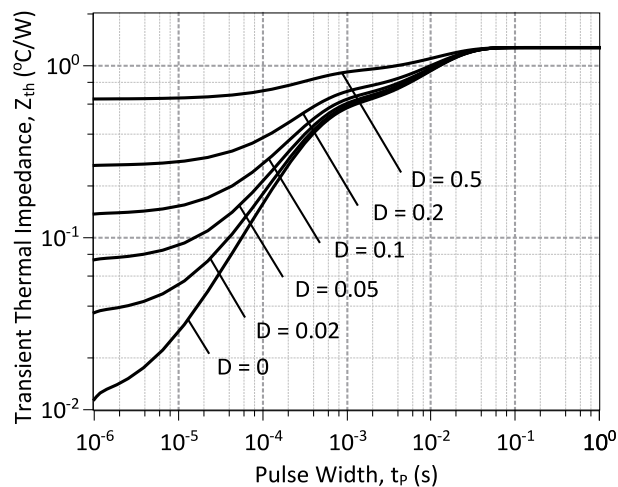
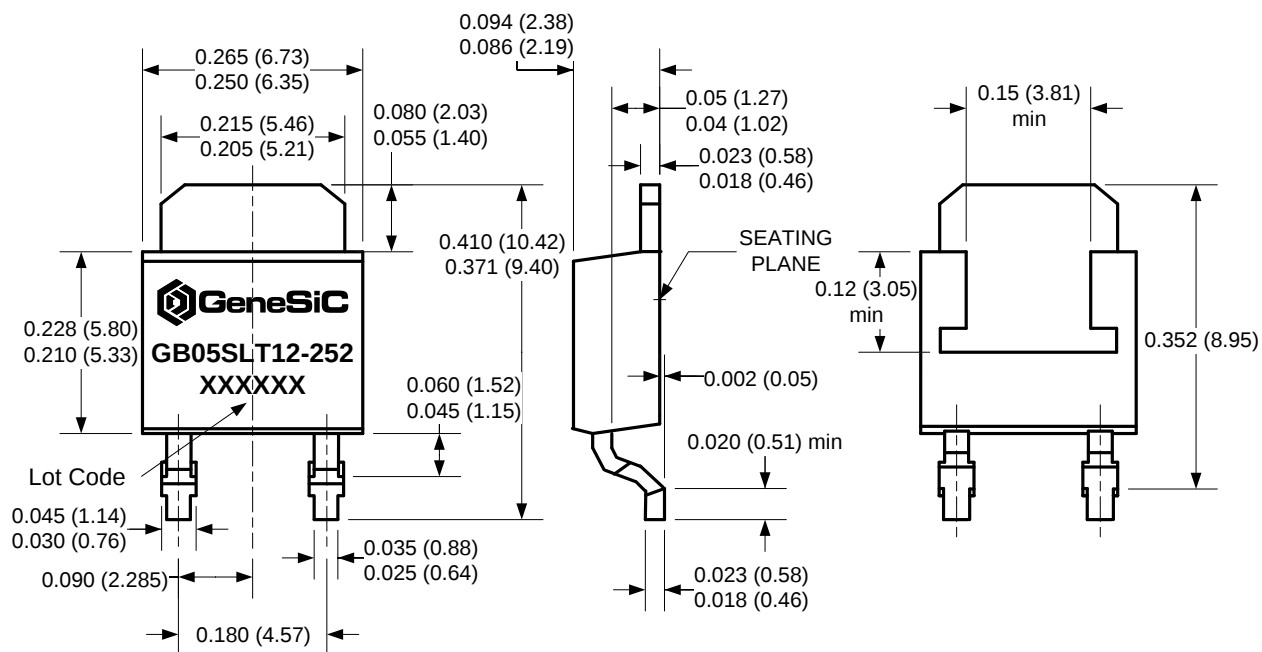


Figure 8: Transient Thermal Impedance

## 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 <D> 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

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/GB05SLT12-252\\_SPICE.pdf](http://www.genesicsemi.com/images/products_sic/rectifiers/GB05SLT12-252_SPICE.pdf)) into LTSPICE (version 4) software for simulation of the GB05SLT12-252.

```
*      MODEL OF GeneSiC Semiconductor Inc.
*
*      $Revision:   1.0           $
*      $Date:      04-SEP-2013    $
*
*      GeneSiC Semiconductor Inc.
*      43670 Trade Center Place Ste. 155
*      Dulles, VA 20166
*
*      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
```

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