GeneSiC SEMICONDUCTOR

# GB01SLT12-220

## Silicon Carbide Power Schottky Diode

| | | |
|---|---|---|
| $V_{RRM}$ | = | 1200 V |
| $I_{F\ (Tc\ =\ 25°C)}$ | = | 2.5 A |
| $Q_C$ | = | 7 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 – 220AC


### 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 | $I_F$ | $T_C \le 160$ °C | 1 | A |
| RMS forward current | $I_{F(RMS)}$ | $T_C \le 160$ °C | 2 | A |
| Surge non-repetitive forward current, Half Sine Wave | $I_{F,SM}$ | $T_C$ = 25 °C, $t_P$ = 10 ms<br>$T_C$ = 160 °C, $t_P$ = 10 ms | 10<br>8 | A |
| Non-repetitive peak forward current | $I_{F,max}$ | $T_C$ = 25 °C, $t_P$ = 10 µs | 65 | A |
| $I^2t$ value | $\int i^2\,dt$ | $T_C$ = 25 °C, $t_P$ = 10 ms<br>$T_C$ = 160 °C, $t_P$ = 10 ms | 0.5<br>0.3 | $A^2s$ |
| Power dissipation | $P_{tot}$ | $T_C$ = 25 °C | 42 | 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 | $V_F$ | $I_F$ = 1 A, $T_j$ = 25 °C<br>$I_F$ = 1 A, $T_j$ = 175 °C | | | 1.6<br>2.4 | 1.8<br>3.7 | V |
| Reverse current | $I_R$ | $V_R$ = 1200 V, $T_j$ = 25 °C<br>$V_R$ = 1200 V, $T_j$ = 175 °C | | | 1<br>10 | 10<br>100 | µA |
| Total capacitive charge | $Q_C$ | $I_F \le I_{F,MAX}$<br>$dI_F/dt$ = 200 A/µs<br>$T_j$ = 175 °C | $V_R$ = 400 V<br>$V_R$ = 960 V | | 7<br>13 | | nC |
| Switching time | $t_s$ | | $V_R$ = 400 V<br>$V_R$ = 960 V | | < 17 | | ns |
| Total capacitance | C | $V_R$ = 1 V, f = 1 MHz, $T_j$ = 25 °C<br>$V_R$ = 400 V, f = 1 MHz, $T_j$ = 25 °C<br>$V_R$ = 1000 V, f = 1 MHz, $T_j$ = 25 °C | | | 69<br>10<br>8 | | pF |

### Thermal Characteristics

| | | | |
|---|---|---|---|
| Thermal resistance, junction - case | $R_{thJC}$ | 3.6 | °C/W |

### Mechanical Properties

| | | | |
|---|---|---|---|
| Mounting torque | M | 0.6 | Nm |

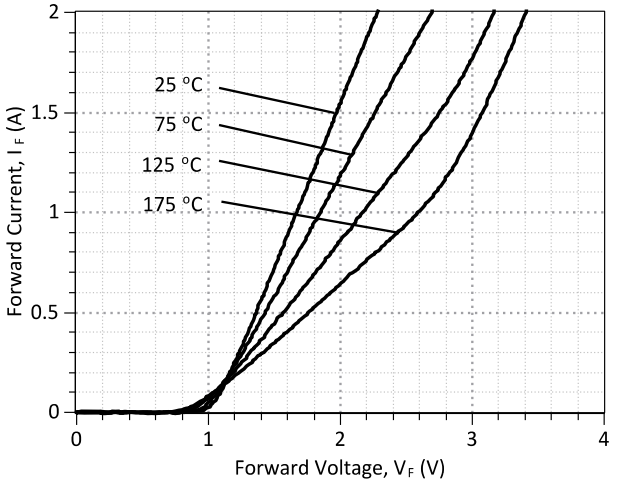



**Figure 1: Typical Forward Characteristics**

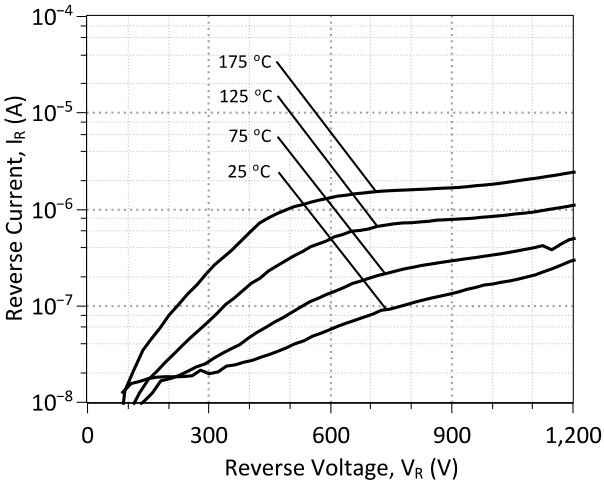



**Figure 2: Typical Reverse Characteristics**

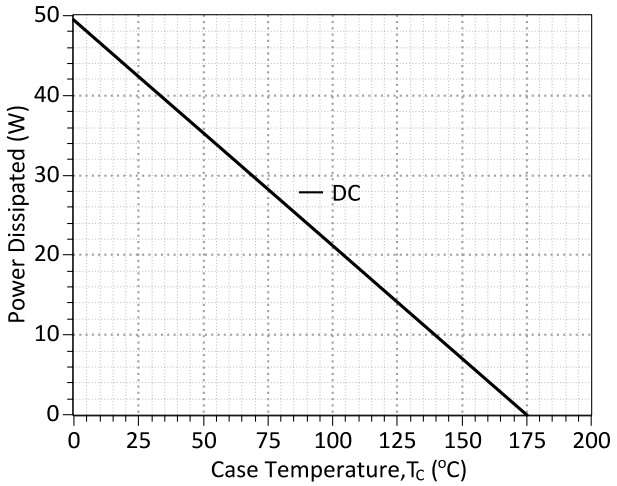



**Figure 3: Power Derating Curve**

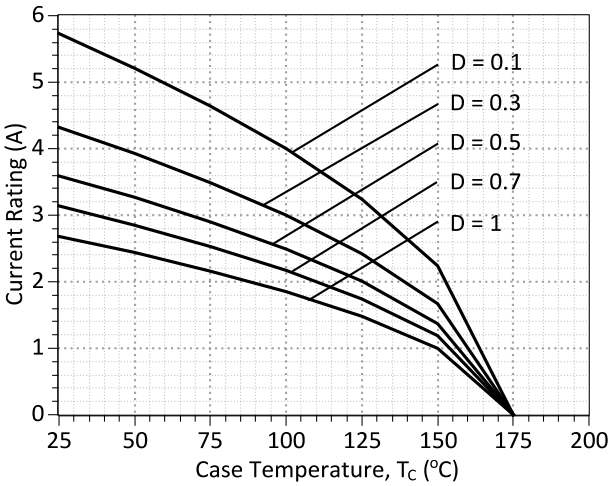



**Figure 4: Current Derating Curves (D = $t_P$/T, $t_P$= 400 µs) (Considering worst case $Z_{th}$ conditions )**

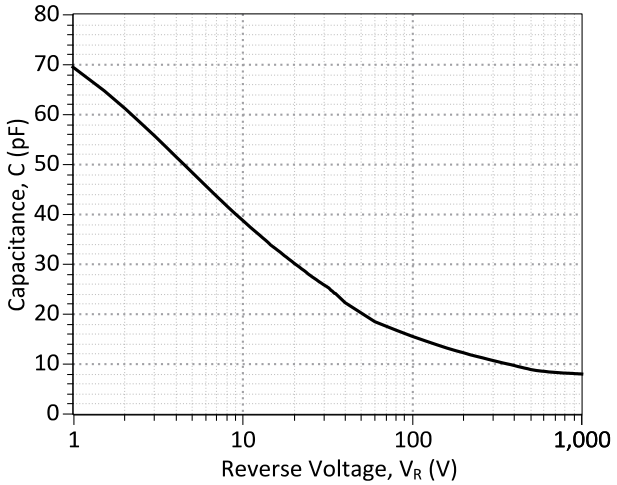



**Figure 5: Typical Junction Capacitance vs Reverse Voltage Characteristics**

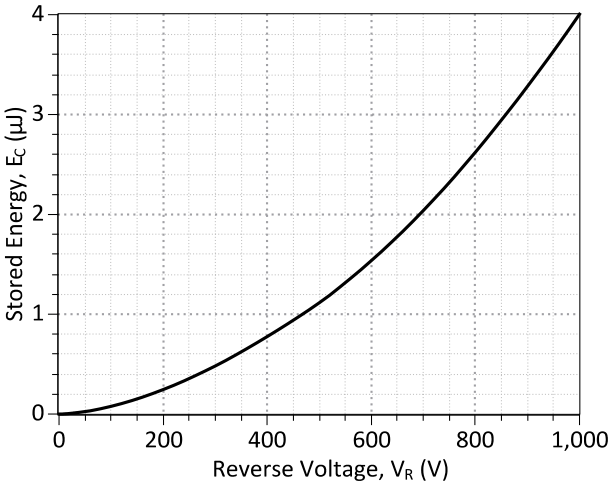



**Figure 6: Typical Switching Energy vs Reverse Voltage Characteristics**

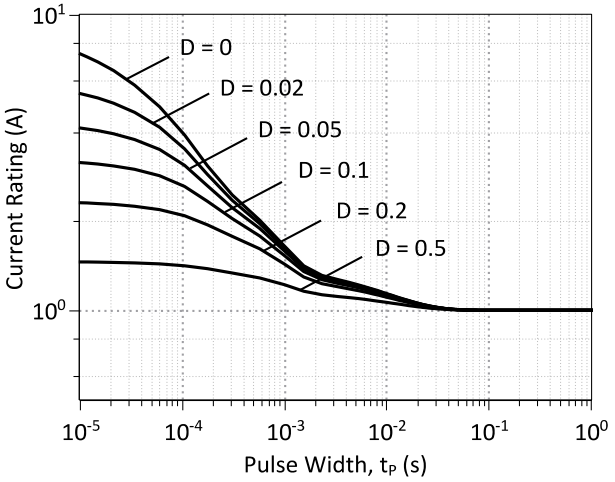



**Figure 7: Current vs Pulse Duration Curves at $T_C$ = 160 °C**

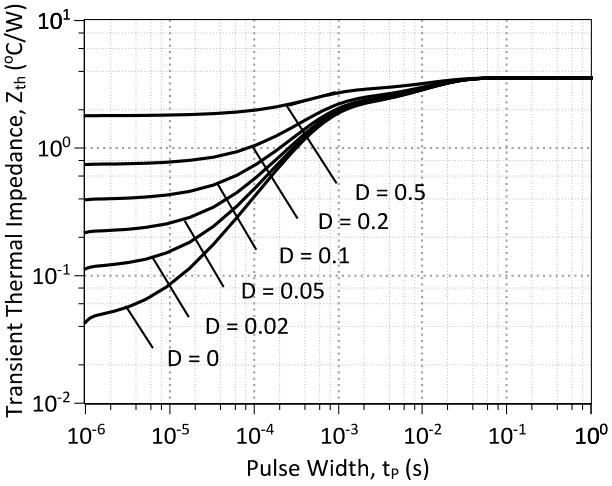
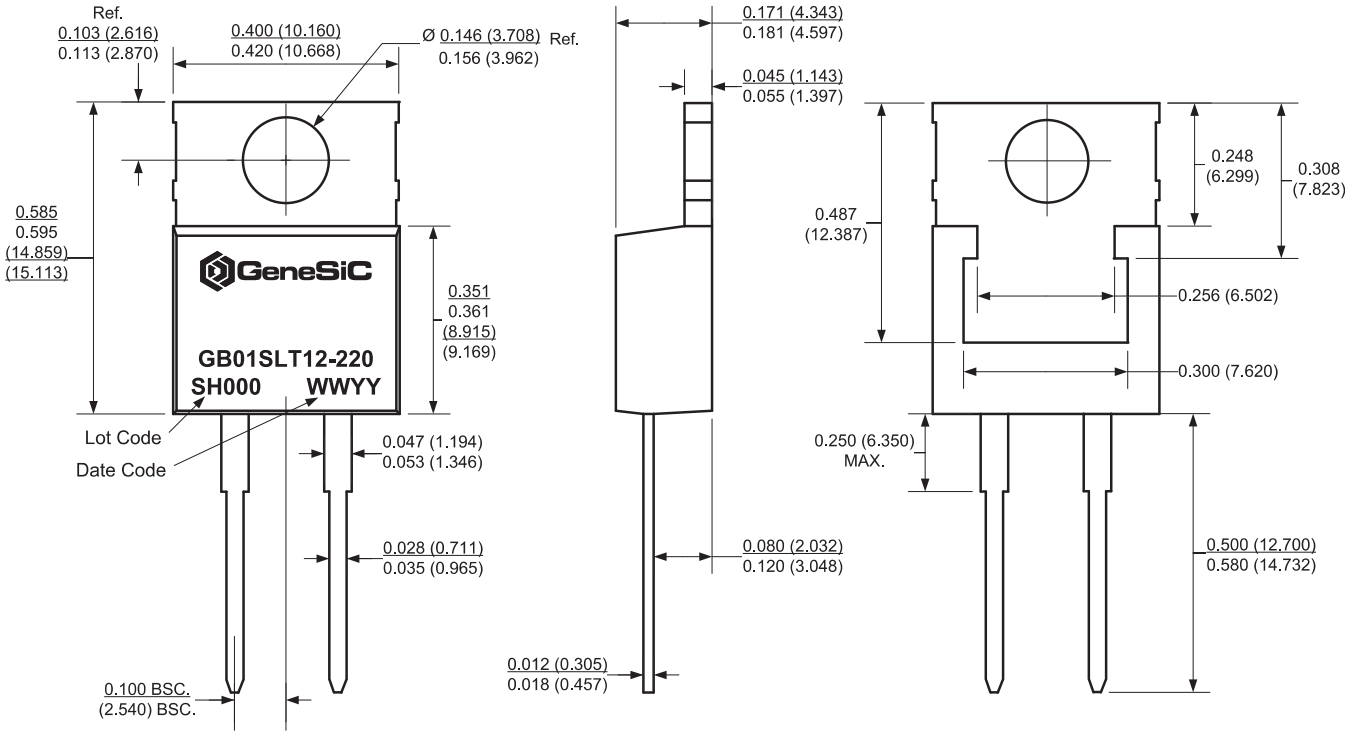



**Figure 8: Transient Thermal Impedance**

## Package Dimensions:

**TO-220AC** **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 |
| 2014/08/26 | 3 | Updated Electrical Characteristics | |
| 2013/02/05 | 2 | Second generation update | |
| 2012/05/22 | 1 | Second generation release | |
| 2010/12/13 | 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 GB01SLT12-220 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 GB01SLT12-220 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 GB01SLT12-220 SPICE Model
```

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GB01SLT12-220