GeneSiC SEMICONDUCTOR

GAP3SLT33-220FP

Silicon Carbide Power Schottky Diode

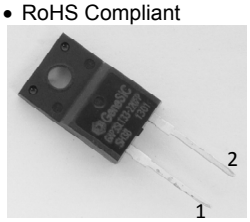
V_{RRM}	=	3300 V
V_F	=	1.7 V
I_F	=	0.3 A
Q_C	=	52 nC

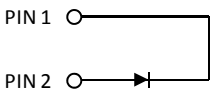
Features

- 3300 V Schottky rectifier
- 175 °C maximum operating temperature
- Electrically isolated base-plate
- Positive temperature coefficient of V_F
- Fast switching speeds
- Superior figure of merit Q_C/I_F

Package

- RoHS Compliant





TO – 220FP (Isolated Base-plate Package)

Advantages

- Improved circuit efficiency (Lower overall cost)
- Significantly reduced switching losses compare to Si PiN diodes
- Ease of paralleling devices without thermal runaway
- Smaller heat sink requirements
- Low reverse recovery current
- Low device capacitance

Applications

- Down Hole Oil Drilling, Geothermal Instrumentation
- High Voltage Multipliers
- Military Power Supplies

Maximum Ratings at T_j = 175 °C, unless otherwise specified

Parameter	Symbol	Conditions	Values	Unit
Repetitive peak reverse voltage	V_{RRM}		3300	V
Continuous forward current	I_F	$T_C \le 125$ °C	0.3	A
RMS forward current	$I_{F(RMS)}$	$T_C \le 125$ °C	0.35	A
Surge non-repetitive forward current, Half Sine Wave	$I_{F,SM}$	T_C = 25 °C, t_P = 10 ms T_C = 125 °C, t_P = 10 ms	tbd tbd	A
Non-repetitive peak forward current	$I_{F,max}$	T_C = 25 °C, t_P = 10 µs	tbd	A
I^2t value	$\int i^2\,dt$	T_C = 25 °C, t_P = 10 ms	tbd	A^2S
Power dissipation	P_{tot}	T_C = 25 °C	89	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 = 0.3 A, T_j = 25 °C I_F = 0.3 A, T_j = 175 °C			1.7 3.9		V
Reverse current	I_R	V_R = 3300 V, T_j = 25 °C V_R = 3300 V, T_j = 175 °C			1.3 14	5 20	µA
Total capacitive charge	Q_C	$I_F \le I_{F,MAX}$ dI_F/dt = 35 A/µs T_j = 175 °C	V_R = 1500 V		52		nC
Switching time	t_s		V_R = 1500 V		< 60		ns
Total capacitance	C	V_R = 1 V, f = 1 MHz, T_j = 25 °C V_R = 400 V, f = 1 MHz, T_j = 25 °C V_R = 1000 V, f = 1 MHz, T_j = 25 °C			42 8 7		pF

Thermal Characteristics

Thermal resistance, junction – Cu lead frame	R_{thJC}	1.69	°C/W

Mechanical Properties

Mounting torque, M3 screw	M	0.6	Nm

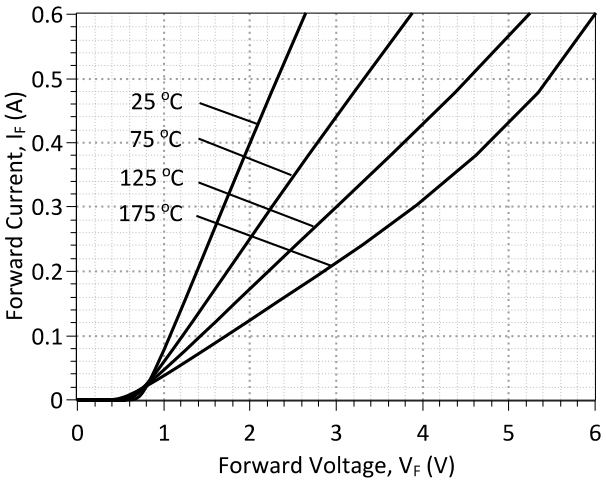


Figure 1: Typical Forward Characteristics

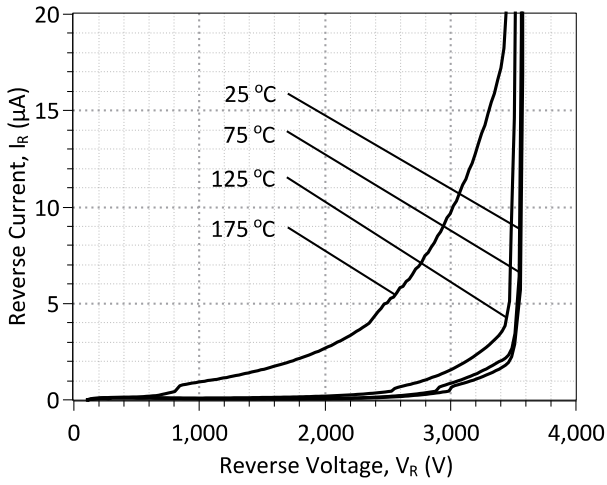


Figure 2: Typical Reverse Characteristics

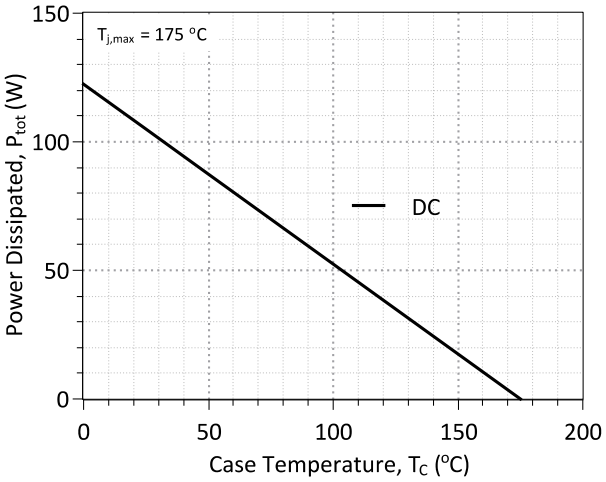


Figure 3: Power Derating Curve

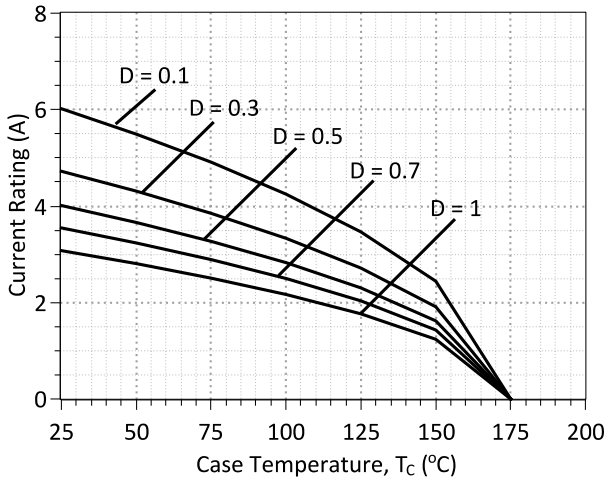


Figure 4: Current Derating Curves (D = t_p/T, t_p = 400 µs) (Considering worst case Zth conditions)

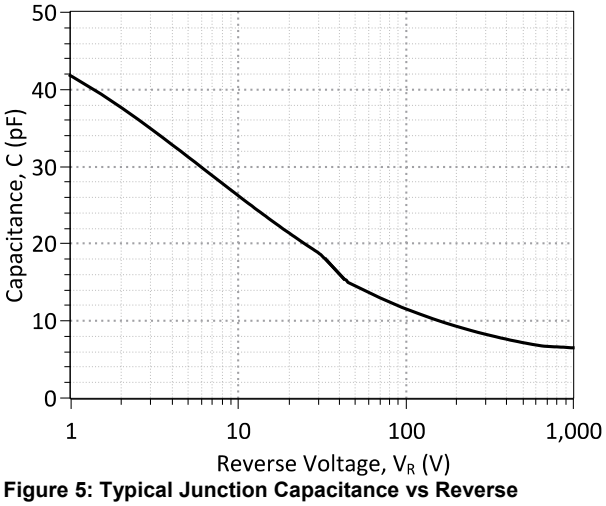


Figure 5: Typical Junction Capacitance vs Reverse Voltage Characteristics

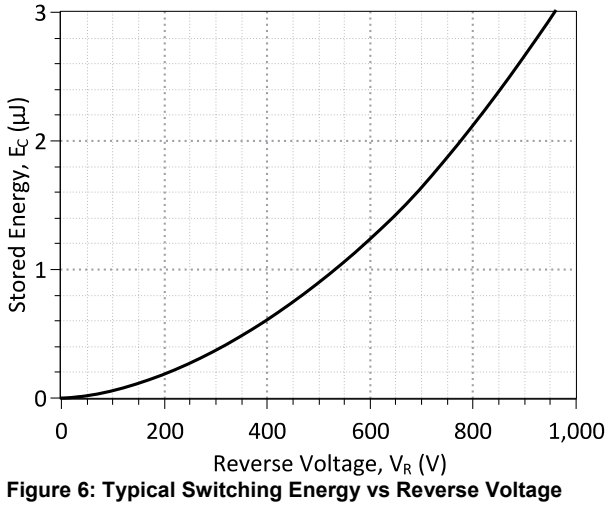


Figure 6: Typical Switching Energy vs Reverse Voltage Characteristics

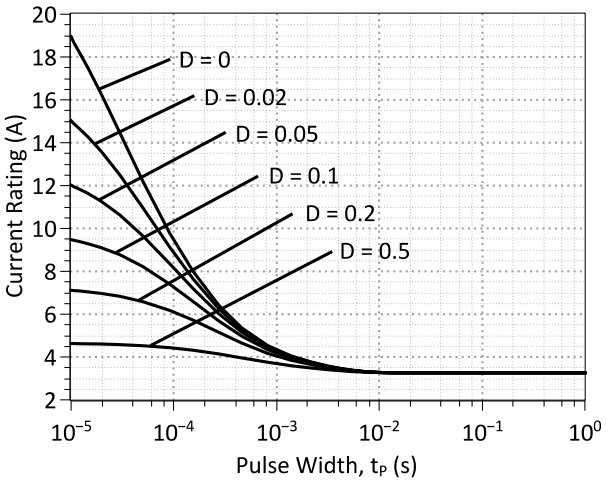


Figure 7: Current vs Pulse Duration Curves at T_C = 150 °C

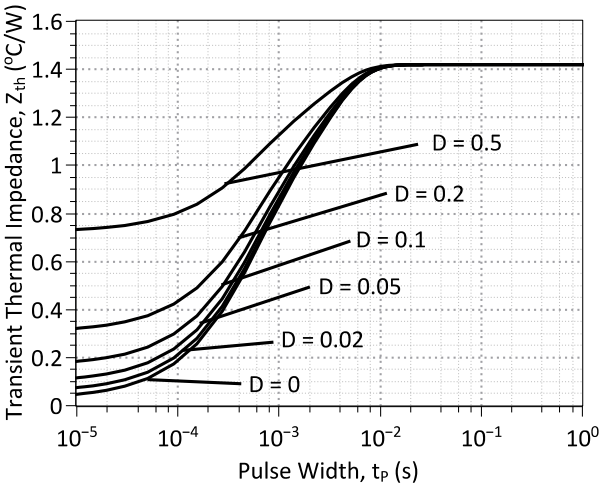
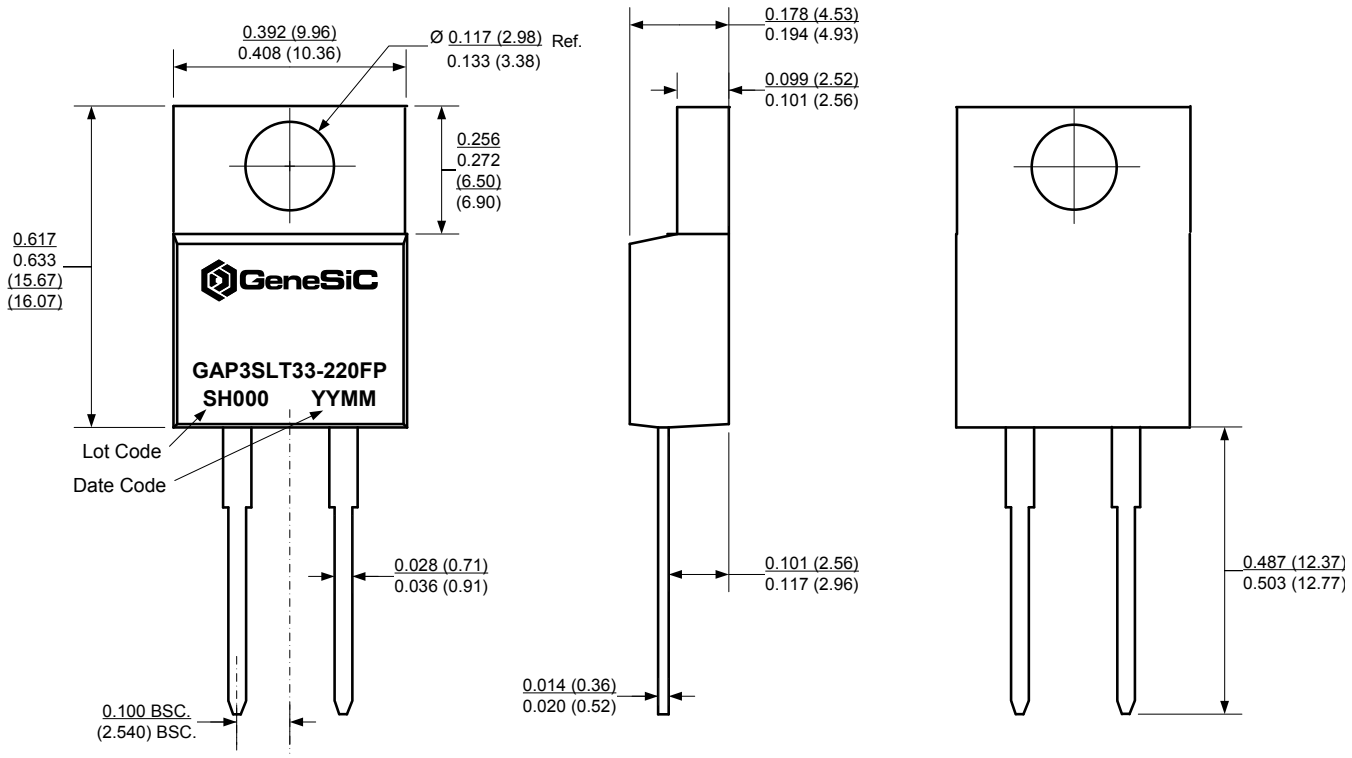


Figure 8: Transient Thermal Impedance

Package Dimensions:

TO-220FP **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
2013/03/22	1	Added Thermal Characteristics	
2013/01/23	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 GAP3SLT33-220FP 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 GAP3SLT33-220FP SPICE Model
*
.SUBCKT GAP3SLT33 ANODE KATHODE
R1 ANODE INT R=((TEMP-24)*0.0535); Temperature Dependant Resistor
D1 INT KATHODE GAP3SLT33_25C; Call the 25C Diode Model
D2 ANODE KATHODE GAP3SLT33_PIN; Call the PiN Diode Model
.MODEL GAP3SLT33_25C D
+ IS       1.39E-14        RS         2.88
+ N        1.0120127       IKF        36.05007504
+ EG       1.2             XTI        -3
+ CJO      6.01E-11        VJ         0.924257443
+ M        0.3084545       FC         0.5
+ TT       1.00E-10        BV         3700
+ IBV      1.00E-03        VPK        3300
+ IAVE     3.00E-01        TYPE       SiC_Schottky
+ MFG      GeneSiC_Semiconductor
.MODEL GAP3SLT33_PIN D
+ IS       178.99E-18      RS         15
+ N        5               EG         3.23
+ XTI      50              FC         0.5
+ TT       0               BV         3700
+ IBV      1.00E-03        VPK        3300
+ IAVE     3.00E-01        TYPE       SiC_PiN
.ENDS
* End of GAP3SLT33-220FP SPICE Model
```