

Silicon Carbide Power Schottky Diode

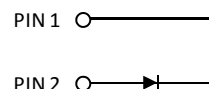
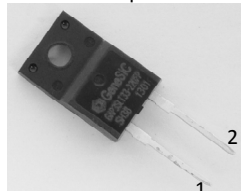
V_{RRM}	=	3300 V
V_F	=	1.7 V
I_F	=	0.3 A
Q_C	=	52 nC

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

Parameter	Symbol	Conditions	Values	Unit
Repetitive peak reverse voltage	V_{RRM}		3300	V
Continuous forward current	I_F	$T_C \leq 125\text{ °C}$	0.3	A
RMS forward current	$I_{F(RMS)}$	$T_C \leq 125\text{ °C}$	0.35	A
Surge non-repetitive forward current, Half Sine Wave	$I_{F,SM}$	$T_C = 25\text{ °C}$, $t_p = 10\text{ ms}$ $T_C = 125\text{ °C}$, $t_p = 10\text{ ms}$	2 1	A
Non-repetitive peak forward current	$I_{F,max}$	$T_C = 25\text{ °C}$, $t_p = 10\text{ }\mu\text{s}$	10	A
I^2t value	$\int i^2 dt$	$T_C = 25\text{ °C}$, $t_p = 10\text{ ms}$	0.1	A ² S
Power dissipation	P_{tot}	$T_C = 25\text{ °C}$	89	W
Operating and storage temperature	T_J , T_{stg}		-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	$I_F = 0.3\text{ A}$, $T_J = 25\text{ °C}$ $I_F = 0.3\text{ A}$, $T_J = 175\text{ °C}$		1.7 4.0	2.2 5.0	V
Reverse current	I_R	$V_R = 3300\text{ V}$, $T_J = 25\text{ °C}$ $V_R = 3300\text{ V}$, $T_J = 175\text{ °C}$		1 10	10 100	μA
Total capacitive charge	Q_C	$I_F \leq I_{F,MAX}$ $dI_F/dt = 35\text{ A}/\mu\text{s}$ $T_J = 175\text{ °C}$		52		nC
Switching time	t_s	$V_R = 1500\text{ V}$ $V_R = 1500\text{ V}$		< 60		ns
Total capacitance	C	$V_R = 1\text{ V}$, $f = 1\text{ MHz}$, $T_J = 25\text{ °C}$ $V_R = 400\text{ V}$, $f = 1\text{ MHz}$, $T_J = 25\text{ °C}$ $V_R = 1000\text{ V}$, $f = 1\text{ MHz}$, $T_J = 25\text{ °C}$		42 8 7		pF

Thermal Characteristics

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

Mounting torque, M3 screw	M	0.6	Nm
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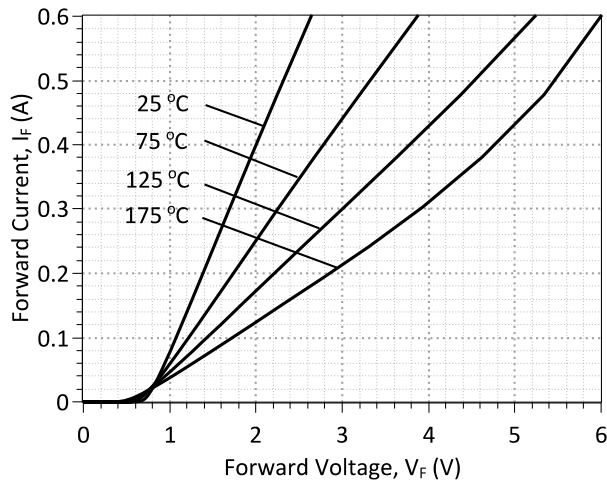


Figure 1: Typical Forward Characteristics

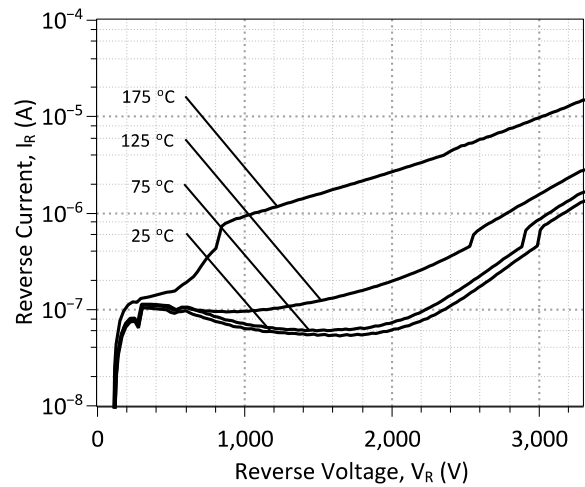


Figure 2: Typical Reverse Characteristics

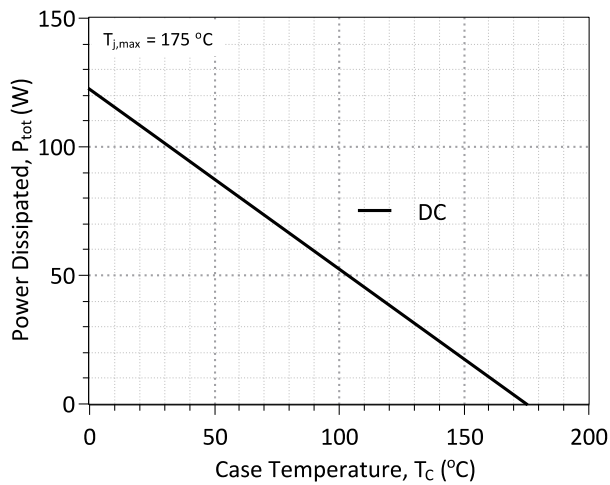
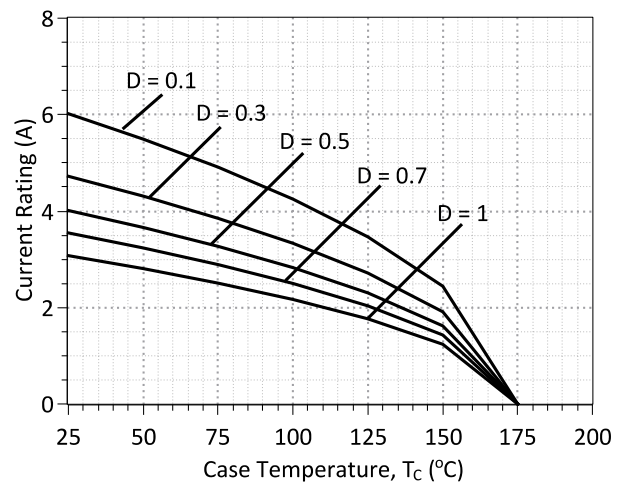


Figure 3: Power Derating Curve



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

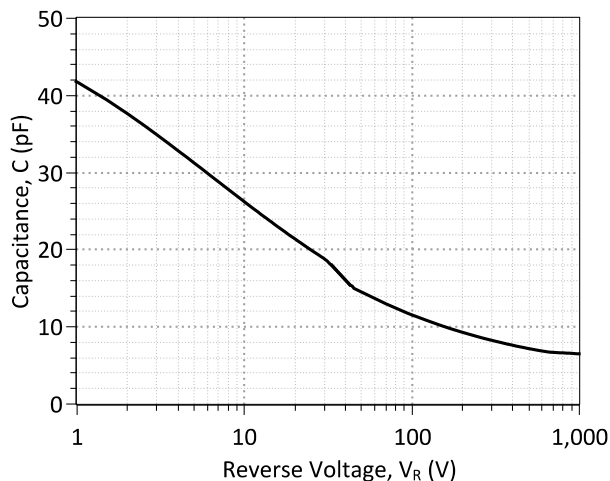


Figure 5: Typical Junction Capacitance vs Reverse Voltage Characteristics

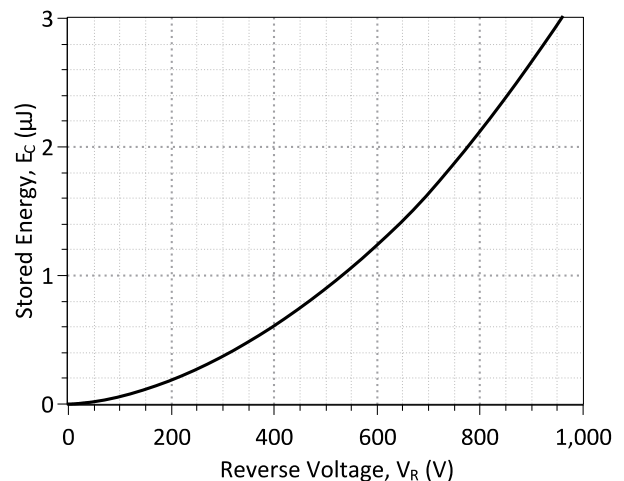
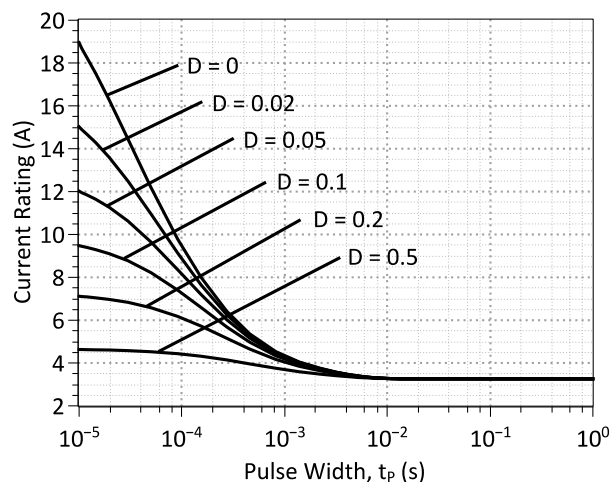
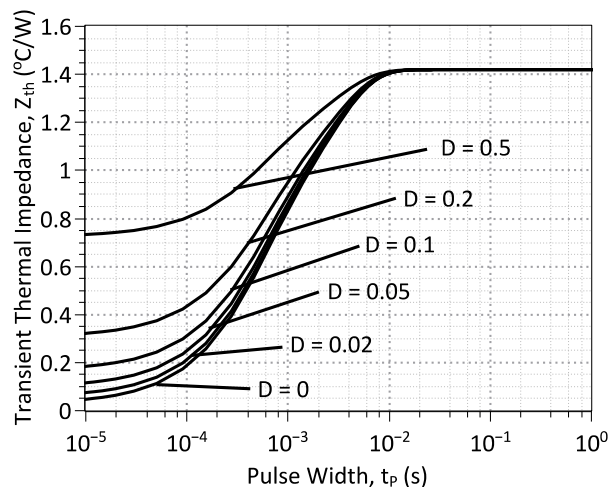
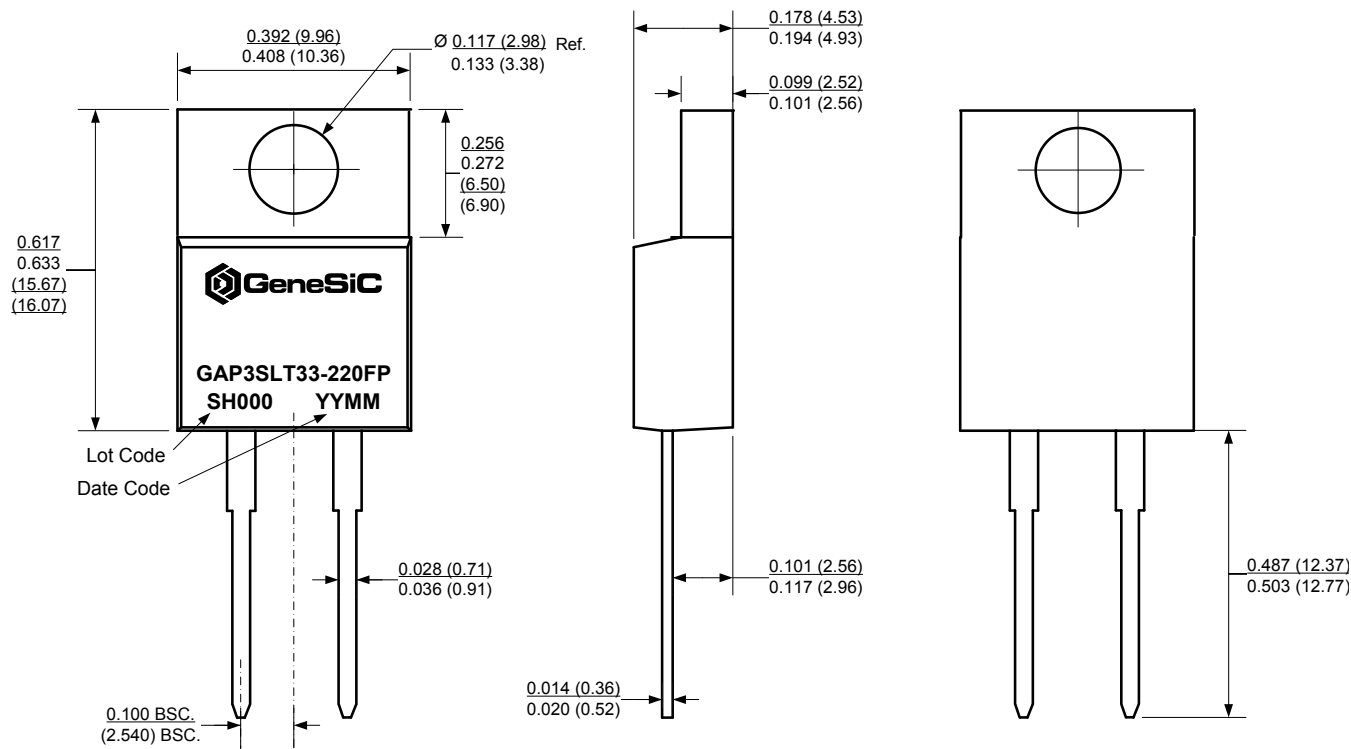


Figure 6: Typical Switching Energy vs Reverse Voltage Characteristics


Figure 7: Current vs Pulse Duration Curves at $T_c = 150\text{ }^{\circ}\text{C}$

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
2013/11/12	2	Updated Electrical Characteristics	
2013/03/22	1	Added Thermal Characteristics	
2013/01/23	0	Initial Release	

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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       3300
+ 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      3300
+ IBV     1.00E-03     VPK      3300
+ IAVE    3.00E-01     TYPE     SiC_PiN
.ENDS
* End of GAP3SLT33-220FP SPICE Model
```