

## Silicon Carbide PiN Diode Chip

$V_{RRM}$	=	8000 V
$I_F @ 25\text{ }^\circ\text{C}$	=	2 A

### Features

- 8 kV blocking
- 210 °C operating temperature
- Fast turn off characteristics
- Soft reverse recovery characteristics
- Ultra-Fast high temperature switching



Die Size = 2.4 mm x 2.4 mm

### Advantages

- Reduced stacking
- Reduced system complexity/Increased reliability

### Applications

- Voltage Multiplier
- Ignition/Trigger Circuits
- Oil/Downhole
- Lighting
- Defense

### Maximum Ratings at $T_j = 210\text{ }^\circ\text{C}$ , unless otherwise specified

Parameter	Symbol	Conditions	Values	Unit
Repetitive peak reverse voltage	$V_{RRM}$		8	kV
Continuous forward current	$I_F$		2	A
RMS forward current	$I_{F(RMS)}$		1	A
Operating and storage temperature	$T_j, T_{stg}$		-55 to 210	$^\circ\text{C}$

### Electrical Characteristics at $T_j = 210\text{ }^\circ\text{C}$ , unless otherwise specified

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Diode forward voltage	$V_F$	$I_F = 2\text{ A}, T_j = 25\text{ }^\circ\text{C}$		6.1		V
		$I_F = 2\text{ A}, T_j = 210\text{ }^\circ\text{C}$		4.3		
Reverse current	$I_R$	$V_R = 8\text{ kV}, T_j = 25\text{ }^\circ\text{C}$		4		$\mu\text{A}$
		$V_R = 8\text{ kV}, T_j = 210\text{ }^\circ\text{C}$		4		
Total reverse recovery charge	$Q_{rr}$	$I_F \leq I_{F,MAX}$ $di_F/dt = 70\text{ A}/\mu\text{s}$ $T_j = 210\text{ }^\circ\text{C}$	$V_R = 1000\text{ V}$ $I_F = 1.5\text{ A}$	558		nC
Switching time	$t_s$		$V_R = 1000\text{ V}$ $I_F = 1.5\text{ A}$	< 236		ns
Total capacitance	C	$V_R = 1\text{ V}, f = 1\text{ MHz}, T_j = 25\text{ }^\circ\text{C}$		26		pF
		$V_R = 400\text{ V}, f = 1\text{ MHz}, T_j = 25\text{ }^\circ\text{C}$		5		
		$V_R = 1000\text{ V}, f = 1\text{ MHz}, T_j = 25\text{ }^\circ\text{C}$		4		
Total capacitive charge	$Q_C$	$V_R = 1000\text{ V}, f = 1\text{ MHz}, T_j = 25\text{ }^\circ\text{C}$		5.4		nC

Figures:

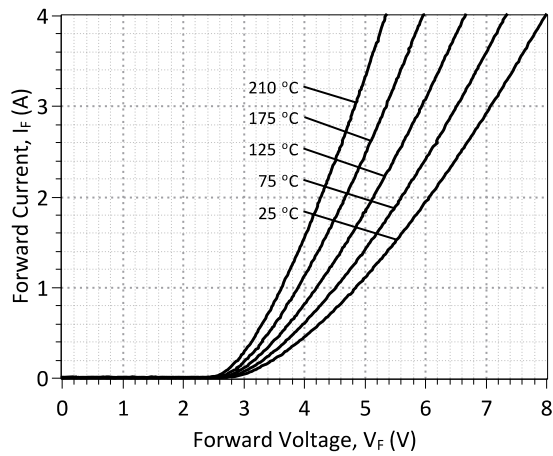


Figure 1: Typical Forward Characteristics

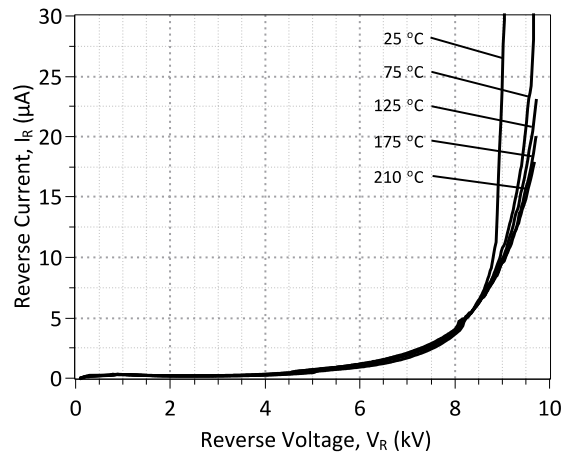


Figure 2: Typical Reverse Characteristics at 25 °C

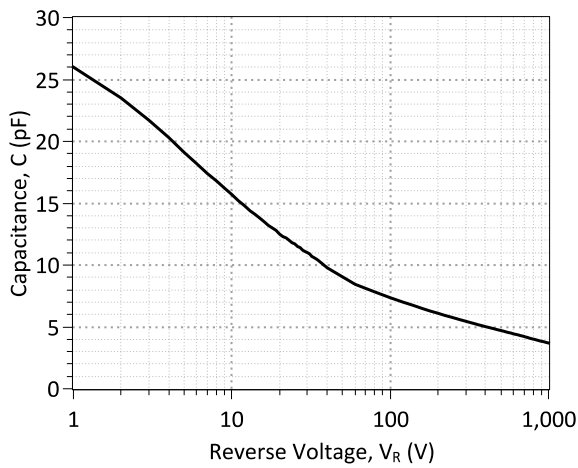


Figure 3: Typical Junction Capacitance vs Reverse Voltage Characteristics

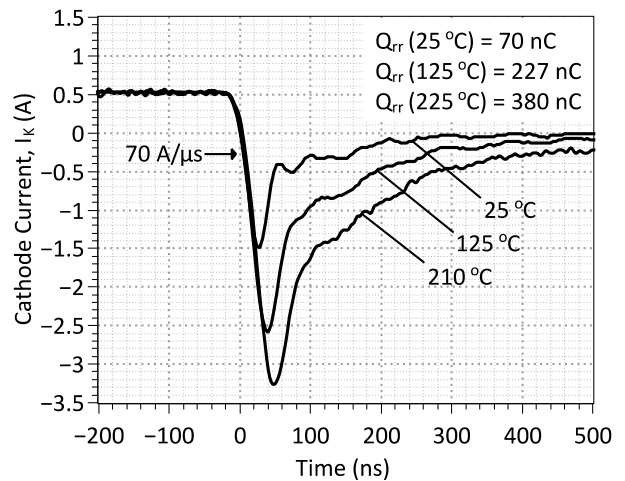


Figure 4: Typical Turn Off Characteristics at  $I_k = 0.5 \text{ A}$  and  $V_R = 1000 \text{ V}$

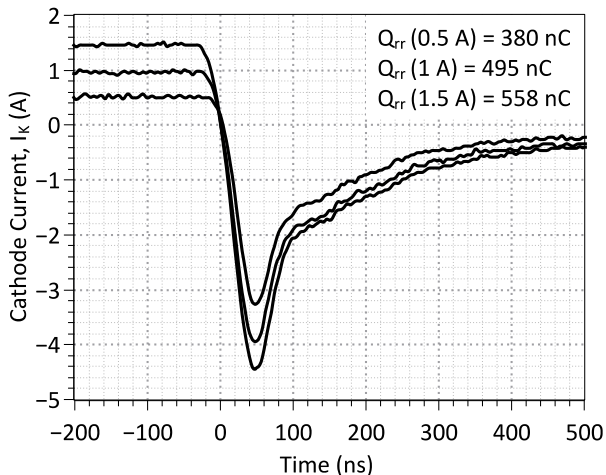


Figure 5: Typical Turn Off Characteristics at  $T_j = 210 \text{ °C}$  and  $V_R = 1000 \text{ V}$

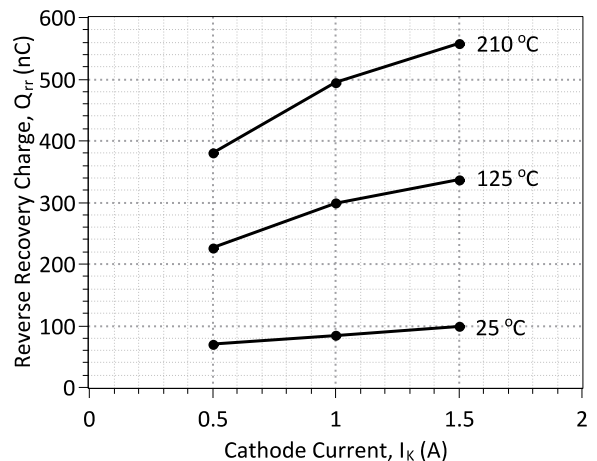


Figure 6: Reverse Recovery Charge vs Cathode Current

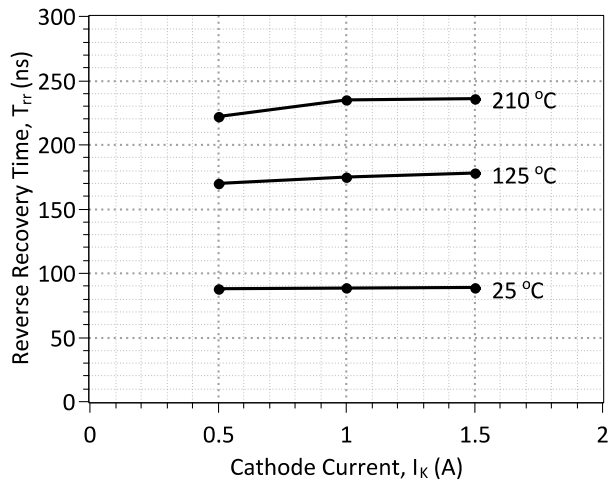
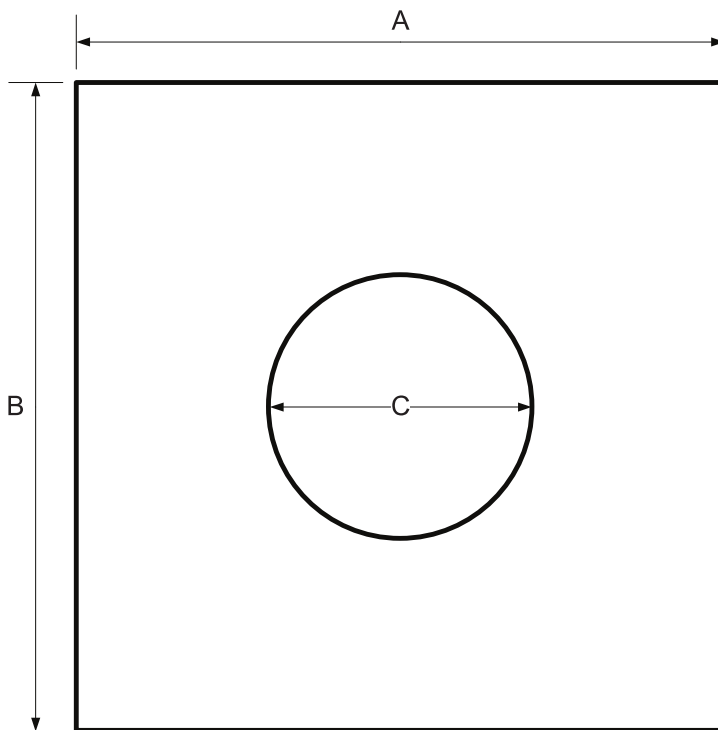


Figure 7: Reverse Recovery Time vs Cathode Current

**Mechanical Parameters**

Die Dimensions	2.4 x 2.4	mm <sup>2</sup>
Anode pad size	Φ 0.98	mm
Area total / active	5.76/0.75	mm <sup>2</sup>
Die Thickness	450	μm
Wafer Size	76.2	mm
Flat Position	0	deg
Die Frontside Passivation	Polyimide	
Anode Pad Metallization	4000 nm Al	
Backside Cathode Metallization	400 nm Ni + 200 nm Au	
Die Attach	Electrically conductive glue or solder	
Wire Bond	Al ≤ 130 μm	
Reject ink dot size	Φ ≥ 0.3 mm	
Recommended storage environment	Store in original container, in dry nitrogen, < 6 months at an ambient temperature of 23 °C	

**Chip Dimensions:**



DIE	A [mm]	2.4
	B [mm]	2.4
METAL	C [mm]	0.98

**Revision History**

Date	Revision	Comments	Supersedes
2015/04/30	2	Updated Electrical Characteristics	
2015/02/25	1	Inserted Mechanical Parameters	
2013/02/18	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/hit\\_sic/baredie/pin/GA01PNS80-CAL\\_SPICE.pdf](http://www.genesicsemi.com/images/hit_sic/baredie/pin/GA01PNS80-CAL_SPICE.pdf)) into LTSPICE (version 4) software for simulation of the GA01PNS80-CAL device.

```
*      MODEL OF GeneSiC Semiconductor Inc.
*
*      $Revision:   1.1           $
*      $Date:      30-APR-2015   $
*
*      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 GA01PNS80-CAL SPICE Model
*
. MODEL GA01PNS80 D
+ IS      9.2491e-015
+ RS      1.02512
+ N       3.3373
+ IKF     0.00011784
+ EG      3.23
+ XTI     25
+ TRS1    -0.0024
+ CJO     2.7E-11
+ VJ      2.304
+ M       0.376
+ FC      0.5
+ BV      8000
+ IBV     1.00E-03
+ VPK     8000
+ IAVE    1
+ TYPE    SiC_PiN
+ MFG     GeneSiC_Semi
*
*      End of GA01PNS80-CAL SPICE Model
```