# Silicon Carbide PiN Diode Chip

| | | |
|---|---|---|
| $V_{RRM}$ | = | 15000 V |
| $I_F$ @ 25 °C | = | 1 A |

## Features

- 15 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

- Highest voltage rectifier commercially available
- Reduced stacking
- Reduced system complexity/Increased reliability

## Applications

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

### Maximum Ratings at $T_j$ = 210 °C, unless otherwise specified

| Parameter | Symbol | Conditions | Values | Unit |
|---|---|---|---|---|
| Repetitive peak reverse voltage | $V_{RRM}$ | | 15 | kV |
| Continuous forward current | $I_F$ | | 1 | A |
| RMS forward current | $I_{F(RMS)}$ | | 0.5 | A |
| Operating and storage temperature | $T_j$ , $T_{stg}$ | | -55 to 210 | °C |

### Electrical Characteristics at $T_j$ = 210 °C, unless otherwise specified

| Parameter | Symbol | Conditions | Values | | | Unit |
|---|---|---|---|---|---|---|
| | | | min. | typ. | max. | |
| Diode forward voltage | $V_F$ | $I_F$ = 1 A, $T_j$ = 25 °C<br>$I_F$ = 1 A, $T_j$ = 210 °C | | 6.4<br>4.3 | | V |
| Reverse current | $I_R$ | $V_R$ = 15 kV, $T_j$ = 25 °C<br>$V_R$ = 15 kV, $T_j$ = 210 °C | | 1 | 20<br>100 | µA |
| Total reverse recovery charge | $Q_{rr}$ | $I_F \le I_{F,MAX}$, $dI_F/dt$ = 70 A/µs, $T_j$ = 210 °C; $V_R$ = 1000 V, $I_F$ = 1.5 A | | 558 | | nC |
| Switching time | $t_s$ | $I_F \le I_{F,MAX}$, $dI_F/dt$ = 70 A/µs, $T_j$ = 210 °C; $V_R$ = 1000 V, $I_F$ = 1.5 A | | < 236 | | 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 | | 22<br>4<br>3 | | pF |
| Total capacitive charge | $Q_C$ | $V_R$ = 1000 V, f = 1 MHz, $T_j$ = 25 °C | | 4.5 | | nC |

## Figures:

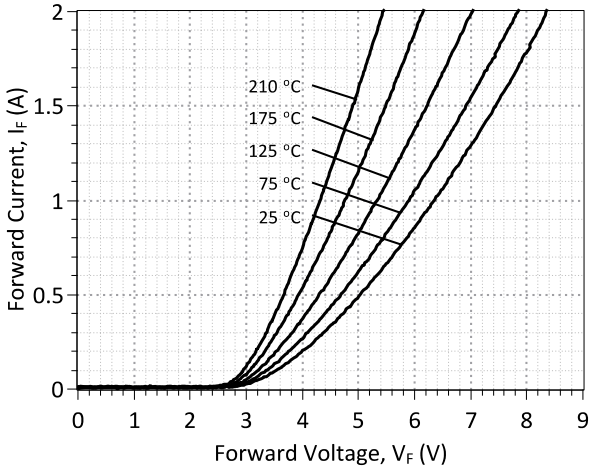



**Figure 1: Typical Forward Characteristics**

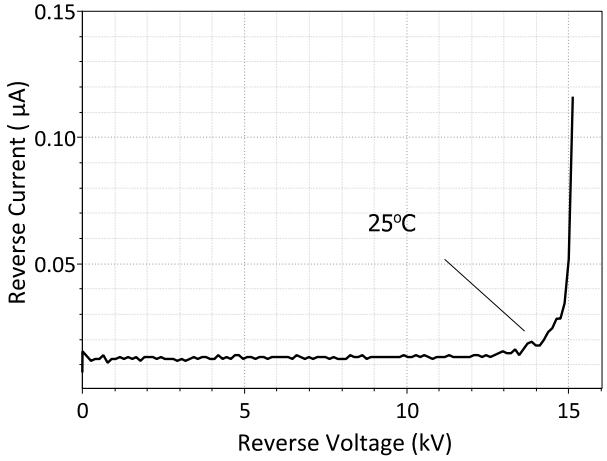



**Figure 2: Typical Reverse Characteristics**

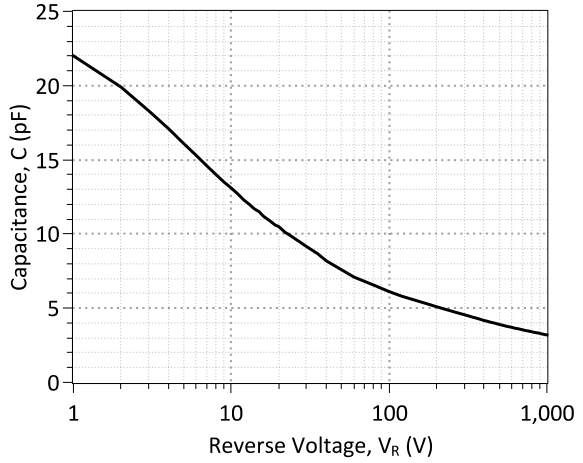



**Figure 3: Typical Junction Capacitance vs Reverse Voltage Characteristics**

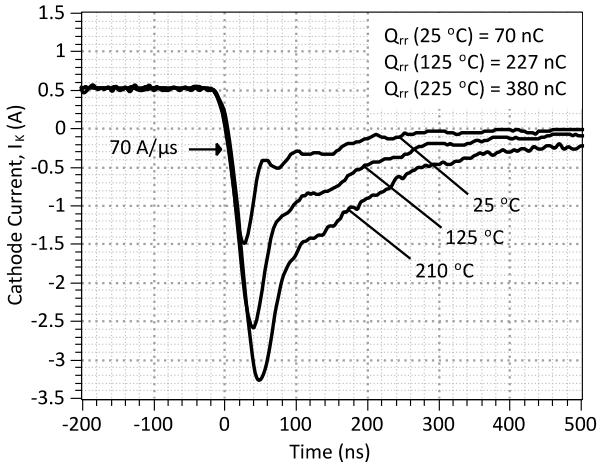



**Figure 4: Typical Turn Off Characteristics at $I_k$ = 0.5 A and $V_R$ = 1000 V**

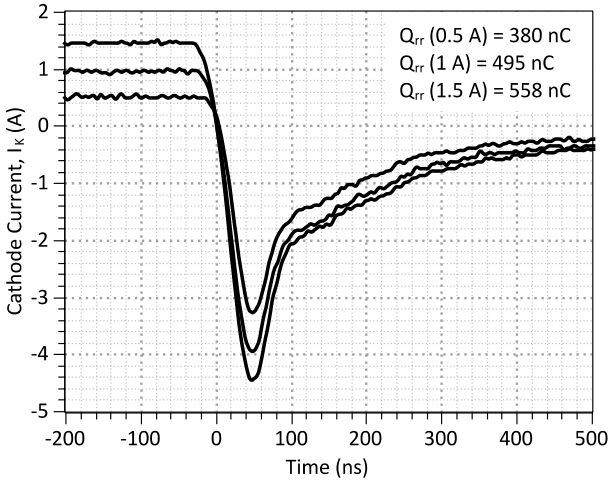



**Figure 5: Typical Turn Off Characteristics at $T_j$ = 210 °C and $V_R$ = 1000 V**

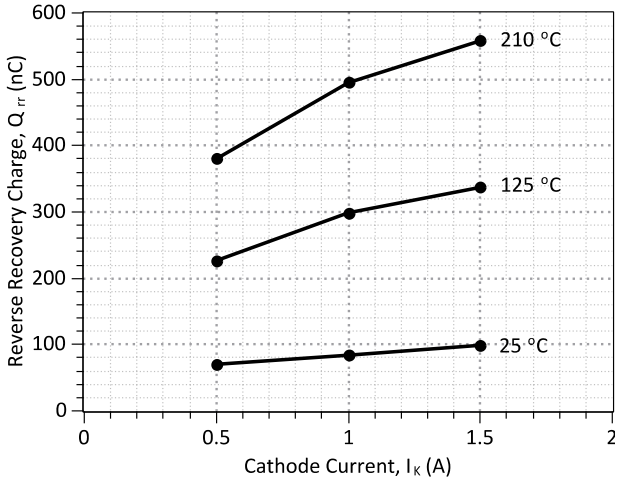



**Figure 6: Reverse Recovery Charge vs Cathode Current**

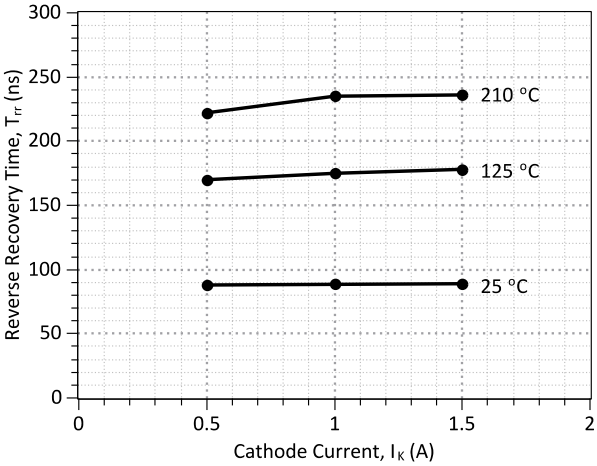
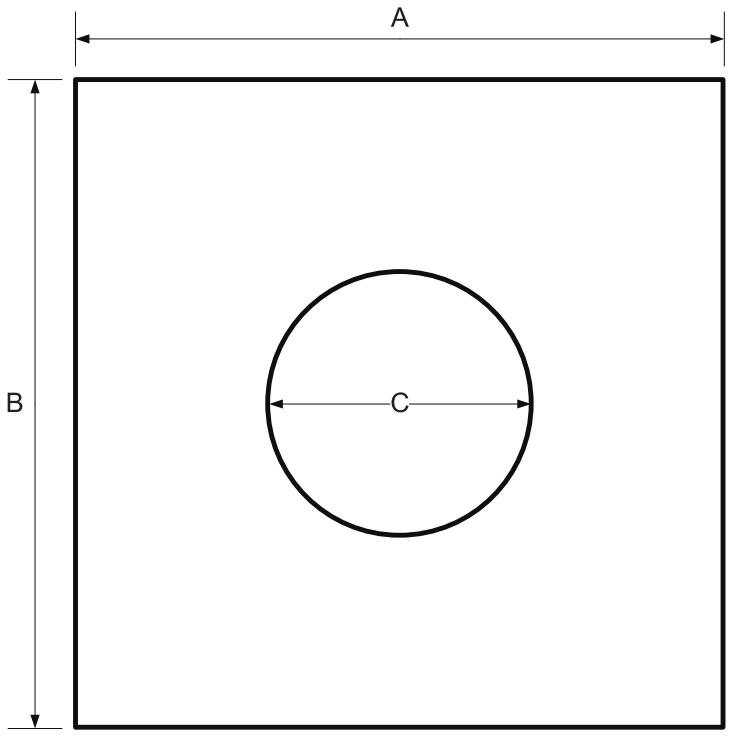



**Figure 7: Reverse Recovery Time vs Cathode Current**

## Mechanical Parameters

| | | |
|---|---|---|
| Die Dimensions | 2.4 x 2.4 | $mm^2$ |
| Anode pad size | Φ 0.98 | mm |
| Area total / active | 5.76/0.75 | $mm^2$ |
| Die Thickness | 450 | µm |
| Wafer Size | 100 | mm |
| Flat Position | 0 | deg |
| Die Frontside Passivation | Polyimide | |
| Anode Pad Metallization | 400 nm Ni + 200 nm Au | |
| Backside Cathode Metallization | 400 nm Ni + 200 nm Au | |
| Die Attach | Electrically conductive glue or solder | |
| Wire Bond | Au ≤ 26 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 | |
| 2014/08/26 | 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/GA01PNS150-CAU_SPICE.pdf) into LTSPICE (version 4) software for simulation of the GA01PNS150-CAU 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) 2014 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 GA01PNS150-CAU SPICE Model
*
 .MODEL GA01PNS150 D
+ IS       9.71E-12
+ RS       2.24770
+ N        5.7869
+ IKF      0.039646
+ EG       3.23
+ XTI      58
+ TRS1     -0.0034
+ CJO      2.28E-11
+ VJ       2.304
+ M        0.376
+ FC       0.5
+ BV       16000
+ IBV      1.00E-03
+ VPK      15000
+ IAVE     1
+ TYPE     SiC_PiN
+ MFG      GeneSiC_Semi
*
* End of GA01PNS150-CAU SPICE Model
```