

High Temperature Silicon Carbide Power Schottky Diode

V_{RRM}	=	1200 V
$I_F @ 25^\circ\text{C}$	=	30 A
Q_C	=	58 nC

Features

- 1200 V Schottky rectifier
- 210 °C maximum operating temperature
- Zero reverse recovery charge
- Superior surge current capability
- Positive temperature coefficient of V_F
- Temperature independent switching behavior
- Lowest figure of merit Q_C/I_F
- Available screened to Mil-PRF-19500



Die Size = 2.95 mm x 2.95 mm

Advantages

- High temperature operation
- Improved circuit efficiency (Lower overall cost)
- Low switching losses
- Ease of paralleling devices without thermal runaway
- Smaller heat sink requirements
- Industry's lowest reverse recovery charge
- Industry's lowest device capacitance
- Ideal for output switching of power supplies
- Best in class reverse leakage current at operating temperature

Applications

- Down Hole Oil Drilling
- Geothermal Instrumentation
- Solenoid Actuators
- General Purpose High-Temperature Switching
- Amplifiers
- Solar Inverters
- Switched-Mode Power Supply (SMPS)
- Power Factor Correction (PFC)

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

Parameter	Symbol	Conditions	Values	Unit
Repetitive peak reverse voltage	V_{RRM}		1200	V
Continuous forward current	I_F	$T_C = 25^\circ\text{C}$, $R_{thJC} = 1.08$	30	A
Continuous forward current	I_F	$T_C \leq 190^\circ\text{C}$, $R_{thJC} = 1.08$	9.4	A
RMS forward current	$I_{F(RMS)}$	$T_C \leq 190^\circ\text{C}$, $R_{thJC} = 1.08$	16	A
Surge non-repetitive forward current, Half Sine Wave	$I_{F,SM}$	$T_C = 25^\circ\text{C}$, $t_p = 10\text{ ms}$	65	A
Non-repetitive peak forward current	$I_{F,max}$	$T_C = 25^\circ\text{C}$, $t_p = 10\text{ }\mu\text{s}$	280	A
I^2t value	$\int I^2 dt$	$T_C = 25^\circ\text{C}$, $t_p = 10\text{ ms}$	20	A^2S
Power dissipation	P_{tot}	$T_C = 25^\circ\text{C}$, $R_{thJC} = 1.08$	230	W
Operating and storage temperature	T_J , T_{stg}		-55 to 210	$^\circ\text{C}$

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

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Diode forward voltage	V_F	$I_F = 10\text{ A}$, $T_J = 25^\circ\text{C}$ $I_F = 10\text{ A}$, $T_J = 210^\circ\text{C}$		1.6 2.3		V
Reverse current	I_R	$V_R = 1200\text{ V}$, $T_J = 25^\circ\text{C}$ $V_R = 1200\text{ V}$, $T_J = 210^\circ\text{C}$		1 55	20 300	μA
Total capacitive charge	Q_C	$I_F \leq I_{F,MAX}$ $dI_F/dt = 200\text{ A}/\mu\text{s}$ $T_J = 210^\circ\text{C}$	$V_R = 400\text{ V}$ $V_R = 960\text{ V}$		58 95	nC
Switching time	t_s		$V_R = 400\text{ V}$ $V_R = 960\text{ V}$		< 49	ns
Total capacitance	C	$V_R = 1\text{ V}$, $f = 1\text{ MHz}$, $T_J = 25^\circ\text{C}$			884	pF
		$V_R = 400\text{ V}$, $f = 1\text{ MHz}$, $T_J = 25^\circ\text{C}$			79	
		$V_R = 1000\text{ V}$, $f = 1\text{ MHz}$, $T_J = 25^\circ\text{C}$			63	

Figures:

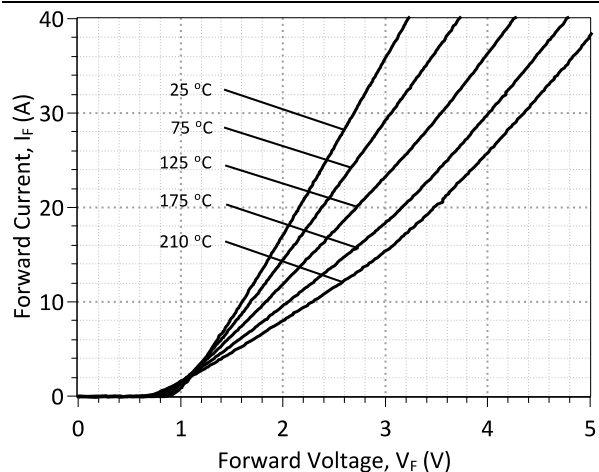


Figure 1: Typical Forward Characteristics

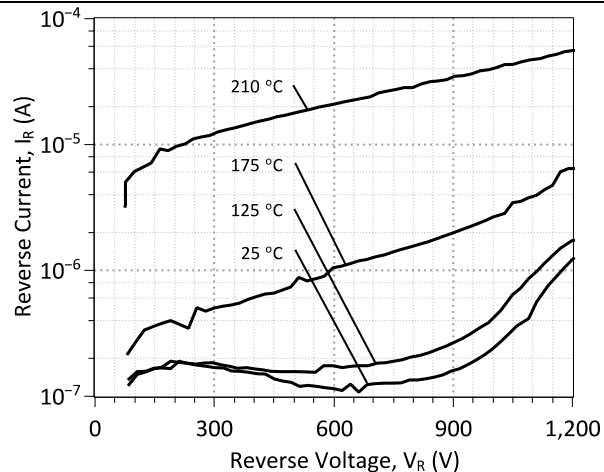


Figure 2: Typical Reverse Characteristics

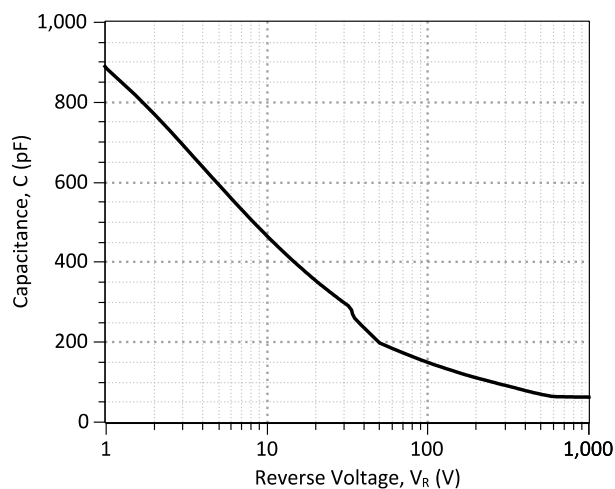


Figure 3: Typical Junction Capacitance vs Reverse Voltage Characteristics

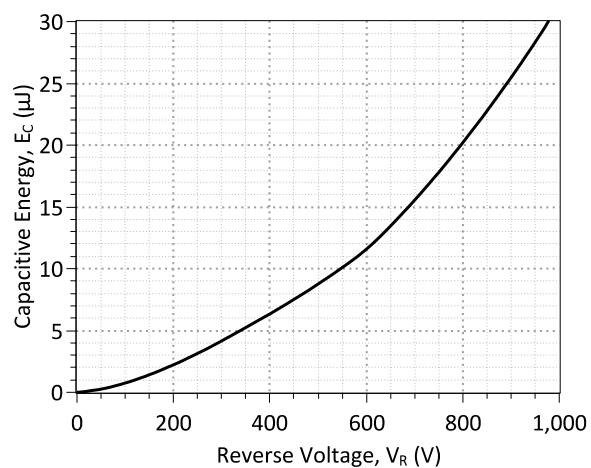
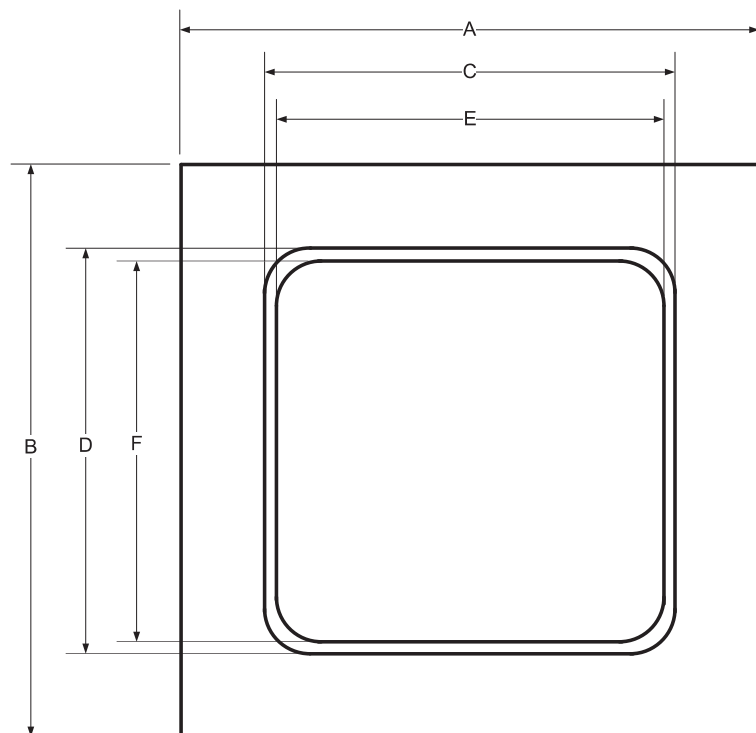


Figure 4: Typical Capacitive Energy vs Reverse Voltage Characteristics

Mechanical Parameters

Die Dimensions	2.95 x 2.95	mm ²
Anode pad size	2.69 x 2.69	
Die Area total / active	8.70/7.02	
Die Thickness	360	µm
Wafer Size	100	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 ≤ 380 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]	2.95
	B [mm]	2.95
METAL	C [mm]	2.69
	D [mm]	2.69
WIRE BONDABLE	E [mm]	2.65
	F [mm]	2.65

Revision History

Date	Revision	Comments	Supersedes
2015/02/09	1	Inserted Mechanical Parameters	
2012/04/03	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/schottky/GB20SHT12-CAL_SPICE.pdf) into LTSPICE (version 4) software for simulation of the GB20SHT12-CAL.

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*      MODEL OF GeneSiC Semiconductor Inc.
*
*      $Revision:   1.0           $
*      $Date:      05-SEP-2013    $
*
*      GeneSiC Semiconductor Inc.
*      43670 Trade Center Place Ste. 155
*      Dulles, VA 20166
*
*      COPYRIGHT (C) 2013 GeneSiC Semiconductor Inc.
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*      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 GB20SHT12-CAL SPICE Model
*
.SUBCKT GB20SHT12 ANODE KATHODE
D1 ANODE KATHODE GB20SHT12_25C; Call the Schottky Diode Model
D2 ANODE KATHODE GB20SHT12_PIN; Call the PiN Diode Model
. MODEL GB20SHT12_25C D
+ IS      1.74E-13      RS      0.05105
+ TRS1    0.005         TRS2    1.68E-5
+ N       1.2637323     IKF      1.884319
+ EG      1.2           XTI      3
+ CJO     1.15E-09      VJ       0.44
+ M       1.5           FC       0.5
+ TT      1.00E-10      BV       1200
+ IBV     1.00E-03      VPK      1200
+ IAVE    20           TYPE     SiC_Schottky
+ MFG     GeneSiC_Semiconductor
. MODEL GB20SHT12_PIN D
+ IS      5.15E-15      RS      0.2
+ N       3.1605        IKF      0.00055844
+ EG      3.23          XTI      3
+ FC      0.5           TT       0
+ BV      1200          IBV      1.00E-03
+ VPK     1200          IAVE     20
+ TYPE    SiC_PiN
.ENDS
*
*      End of GB20SHT12-CAL SPICE Model
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