

High Temperature Silicon Carbide Power Schottky Diode

V_{RRM}	=	1200 V
$I_F @ 25\text{ }^\circ\text{C}$	=	2.5 A
Q_C	=	6 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 = 0.9 mm x 0.9 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 $T_j = 210\text{ }^\circ\text{C}$, unless otherwise specified

Parameter	Symbol	Conditions	Values		Unit
			min.	typ.	
Repetitive peak reverse voltage	V_{RRM}			1200	V
Continuous forward current	I_F	$T_C = 25\text{ }^\circ\text{C}$, $R_{thJC} = 9.52$		2.5	A
Continuous forward current	I_F	$T_C \leq 190\text{ }^\circ\text{C}$, $R_{thJC} = 9.52$		0.75	A
RMS forward current	$I_{F(RMS)}$	$T_C \leq 190\text{ }^\circ\text{C}$, $R_{thJC} = 9.52$		1.3	A
Surge non-repetitive forward current, Half Sine Wave	$I_{F,SM}$	$T_C = 25\text{ }^\circ\text{C}$, $t_p = 10\text{ ms}$		8	A
Non-repetitive peak forward current	$I_{F,max}$	$T_C = 25\text{ }^\circ\text{C}$, $t_p = 10\text{ }\mu\text{s}$		65	A
I^2t value	$\int i^2 dt$	$T_C = 25\text{ }^\circ\text{C}$, $t_p = 10\text{ ms}$		0.5	A^2S
Power dissipation	P_{tot}	$T_C = 25\text{ }^\circ\text{C}$, $R_{thJC} = 9.52$		26	W
Operating and storage temperature	T_j, T_{sig}			-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	$I_F = 0.75\text{ A}$, $T_j = 25\text{ }^\circ\text{C}$		1.7		V
			$I_F = 0.75\text{ A}$, $T_j = 210\text{ }^\circ\text{C}$		2.8	
Reverse current	I_R	$V_R = 1200\text{ V}$, $T_j = 25\text{ }^\circ\text{C}$		1	10	μA
			$V_R = 1200\text{ V}$, $T_j = 210\text{ }^\circ\text{C}$		10	
Total capacitive charge	Q_C	$I_F \leq I_{F,MAX}$ $di_F/dt = 200\text{ A}/\mu\text{s}$ $T_j = 210\text{ }^\circ\text{C}$	$V_R = 400\text{ V}$	6		nC
			$V_R = 960\text{ V}$	11		
Switching time	t_s	$T_j = 210\text{ }^\circ\text{C}$	$V_R = 400\text{ V}$	< 17		ns
Total capacitance	C	$V_R = 1\text{ V}$, $f = 1\text{ MHz}$, $T_j = 25\text{ }^\circ\text{C}$	$V_R = 400\text{ V}$, $f = 1\text{ MHz}$, $T_j = 25\text{ }^\circ\text{C}$	10		pF
			$V_R = 1000\text{ V}$, $f = 1\text{ MHz}$, $T_j = 25\text{ }^\circ\text{C}$	8		
				66		

Figures:

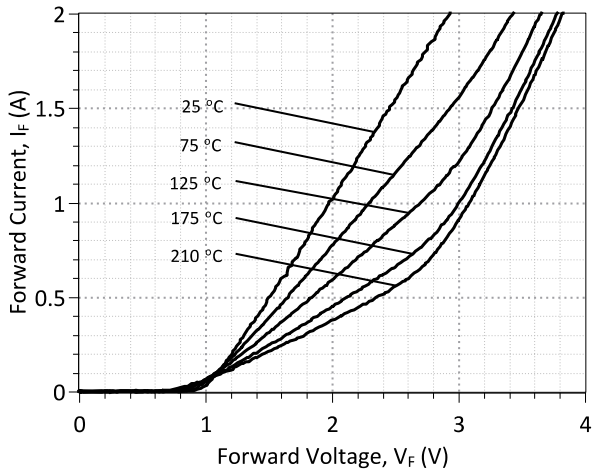


Figure 1: Typical Forward Characteristics

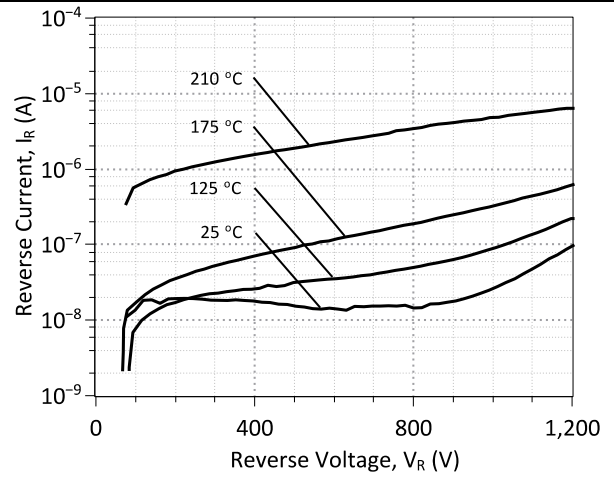


Figure 2: Typical Reverse Characteristics

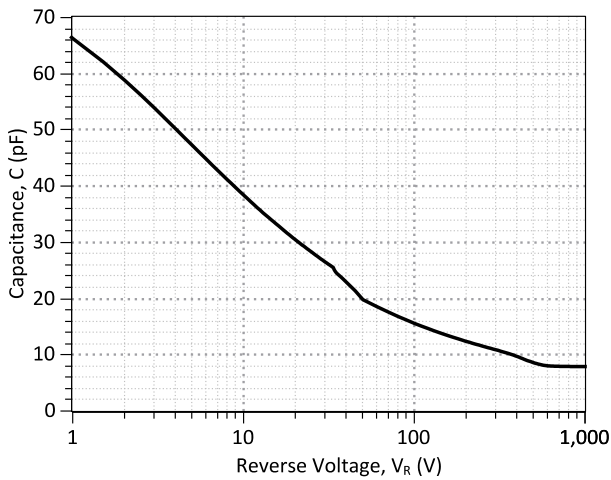


Figure 3: Typical Junction Capacitance vs Reverse Voltage Characteristics

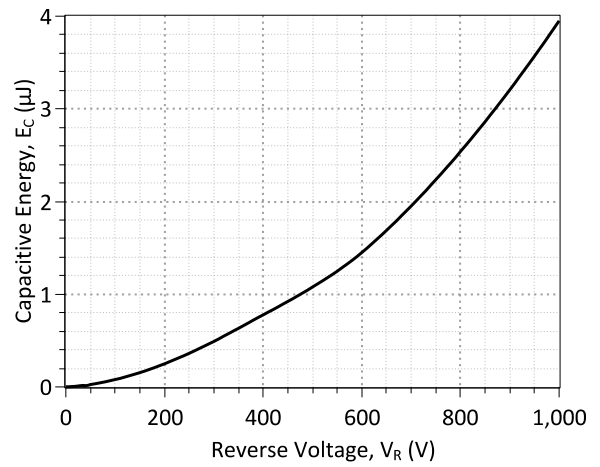
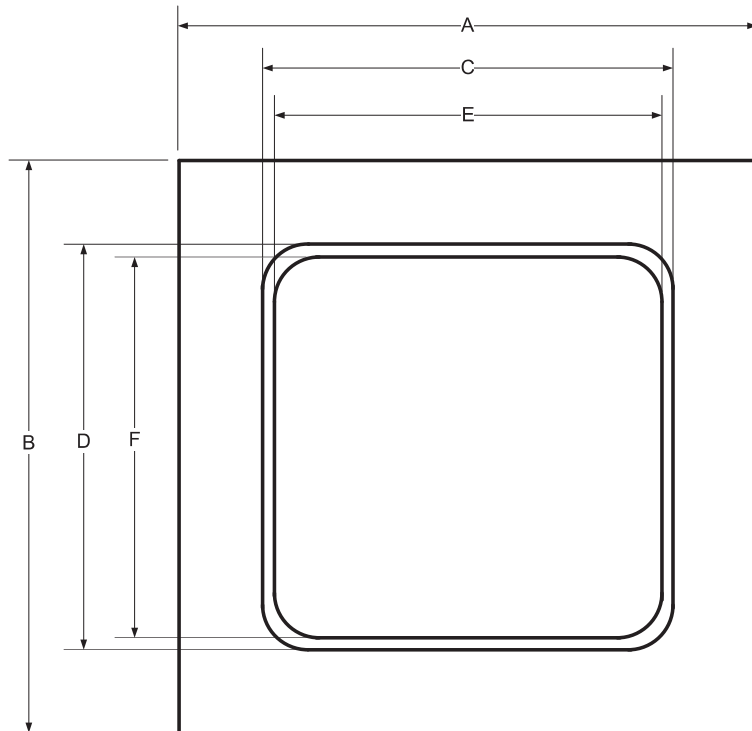


Figure 4: Typical Capacitive Energy vs Reverse Voltage Characteristics

Mechanical Parameters

Die Dimensions	0.9 x 0.9	mm ²
Anode pad size	0.64 x 0.64	
Die Area total / active	0.81/0.36	
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 ≤ 350 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]	0.9
	B [mm]	0.9
METAL	C [mm]	0.64
	D [mm]	0.64
WIRE BONDABLE	E [mm]	0.6
	F [mm]	0.6

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/GB01SHT12-CAL_SPICE.pdf) into LTSPICE (version 4) software for simulation of the GB01SHT12-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 GB01SHT12-CAL SPICE Model
*
.SUBCKT GB01SHT12 ANODE KATHODE
R1 ANODE INT R=((TEMP-24)*0.0099); Temperature Dependant Resistor
D1 INT KATHODE GB01SHT12_25C; Call the 25C Diode Model
D2 ANODE KATHODE GB01SHT12_PIN; Call the PiN Diode Model
.MODEL GB01SHT12_25C D
+ IS      1.88E-18      RS      0.9255
+ N       1            IKF     98.29122743
+ EG     1.2          XTI     3
+ CJO    7.90E-11     VJ     0.367
+ M      1.63         FC      0.5
+ TT     1.00E-10     BV     1200
+ IBV    1.00E-03     VPK    1200
+ IAVE   1           TYPE    SiC_Schottky
+ MFG    GeneSiC_Semiconductor
.MODEL GB01SHT12_PIN D
+ IS      2.76E-16      RS      0.84243
+ N       3.791461     IKF     2.98675
+ EG     3.23         XTI     30
+ FC     0.5         TT     0
+ BV     1200        IBV     1.00E-03
+ VPK    1200        IAVE    1
+ TYPE   SiC_PiN
.ENDS
*
*      End of GB01SHT12-CAL SPICE Model
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