High Temperature Silicon Carbide Power Schottky Diode

V_{RRM}	=	650 V
I_F @ 25 °C	=	30 A
Q_C	=	66 nC

Features

- 650 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 °C, unless otherwise specified

Parameter	Symbol	Conditions	Values	Unit
Repetitive peak reverse voltage	V_{RRM}		650	V
Continuous forward current	I_F	T_C = 25 °C, R_{thJC} = 1.08	30	A
Continuous forward current	I_F	T_C ≤ 190 °C, R_{thJC} = 1.08	9.4	A
RMS forward current	$I_{F(RMS)}$	T_C ≤ 190 °C, R_{thJC} = 1.08	16	A
Surge non-repetitive forward current, Half Sine Wave	$I_{F,SM}$	T_C = 25 °C, t_P = 10 ms	140	A
Non-repetitive peak forward current	$I_{F,max}$	T_C = 25 °C, t_P = 10 µs	650	A
I^2t value	$\int i^2\,dt$	T_C = 25 °C, t_P = 10 ms	98	A^2S
Power dissipation	P_{tot}	T_C = 25 °C, R_{thJC} = 1.08	208	W
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 min.	Values typ.	Values max.	Unit
Diode forward voltage	V_F	I_F = 10 A, T_j = 25 °C I_F = 10 A, T_j = 210 °C			1.3 1.8		V
Reverse current	I_R	V_R = 650 V, T_j = 25 °C V_R = 650 V, T_j = 210 °C			1 50	5 200	µA
Total capacitive charge	Q_C	$I_F \le I_{F,MAX}$ dI_F/dt = 200 A/µs T_j = 210 °C	V_R = 400 V		66		nC
Switching time	t_s		V_R = 400 V		< 49		ns
Total capacitance	C	V_R = 1 V, f = 1 MHz, T_j = 25 °C V_R = 400 V, f = 1 MHz, T_j = 25 °C V_R = 650 V, f = 1 MHz, T_j = 25 °C			1107 103 99		pF

Figures:

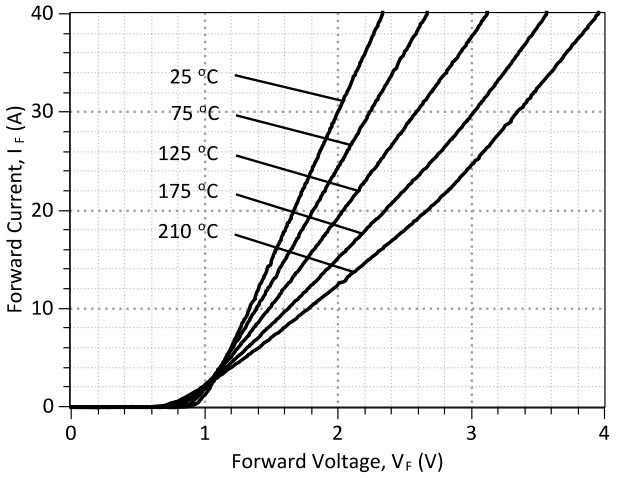


Figure 1: Typical Forward Characteristics

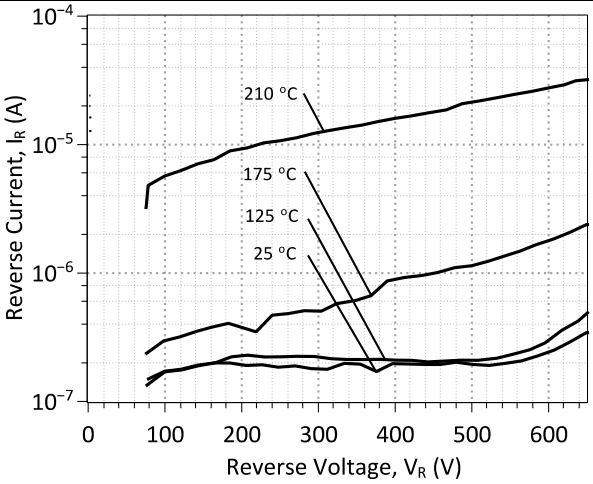


Figure 2: Typical Reverse Characteristics

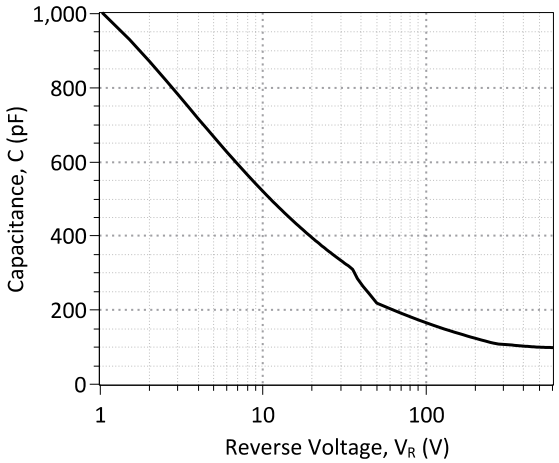


Figure 3: Typical Junction Capacitance vs Reverse Voltage Characteristics

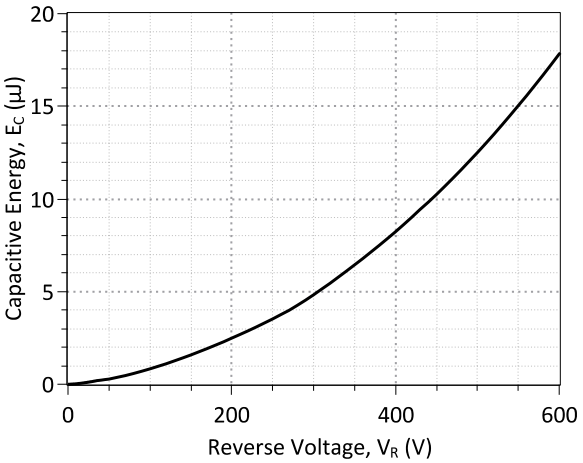
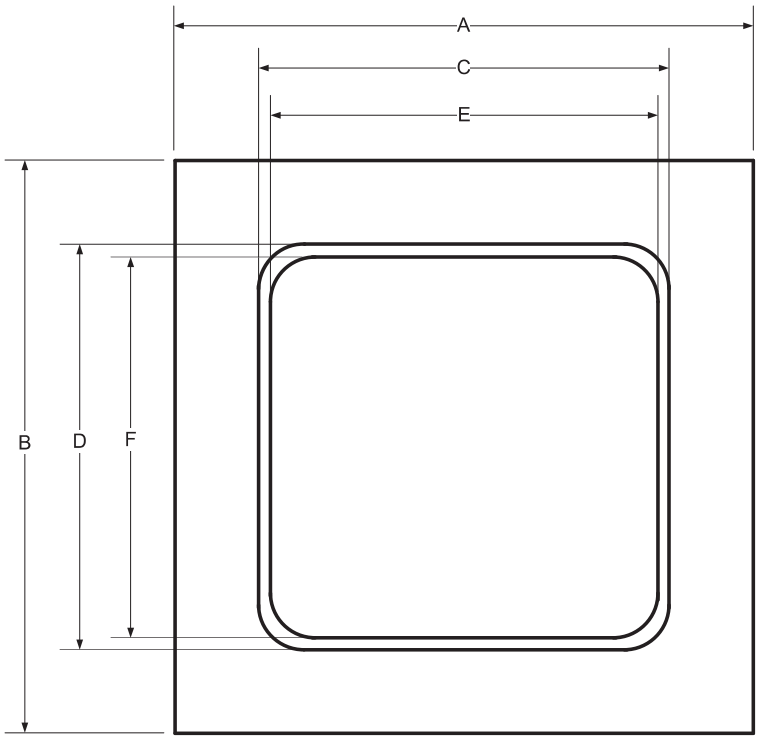


Figure 4: Typical Capacitive Energy vs Reverse Voltage Characteristics

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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Dulles, VA 20166

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/GB20SHT06-CAL_SPICE.pdf) into LTSPICE (version 4) software for simulation of the GB20SHT06-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
*
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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 GB20SHT06-CAL SPICE Model
*
.SUBCKT GB20SHT06 ANODE KATHODE
D1 ANODE KATHODE GB20SHT06_25C; Call the Schottky Diode Model
D2 ANODE KATHODE GB20SHT06_PIN; Call the PiN Diode Model
.MODEL GB20SHT06_25C D
+ IS       8.46E-17        RS         0.0319
+ N        1               IKF        1000
+ EG       1.2             XTI        3
+ TRS1     0.0038          TRS2       3.00E-05
+ CJO      1.26E-09        VJ         0.438
+ M        1.5278          FC         0.5
+ TT       1.00E-10        BV         650
+ IBV      1.00E-03        VPK        650
+ IAVE     20              TYPE       SiC_Schottky
+ MFG      GeneSiC_Semiconductor
.MODEL GB20SHT06_PIN D
+ IS       2.77E-10        RS         0.086693
+ N        3.3505          IKF        3.67E-06
+ EG       3.23            XTI        -10
+ FC       0.5             TT         0
+ BV       650             IBV        1.00E-03
+ VPK      650             IAVE       20
+ TYPE     SiC_PiN
.ENDS
*
* End of GB20SHT06-CAL SPICE Model
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