Silicon Carbide Power Schottky Diode

V_{RRM}	=	650 V
I_F @ 25 °C	=	100 A
Q_C	=	158 nC

Features

- 650 V Schottky rectifier
- 175 °C maximum operating temperature
- Temperature independent switching behavior
- Superior surge current capability
- Positive temperature coefficient of V_F
- Extremely fast switching speeds
- Superior figure of merit Q_C/I_F
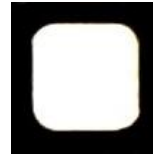
Die Size = 4.5 mm x 4.5 mm

Advantages

- Improved circuit efficiency (Lower overall cost)
- Low switching losses
- Ease of paralleling devices without thermal runaway
- Smaller heat sink requirements
- Low reverse recovery current
- Low device capacitance
- Low reverse leakage current at operating temperature

Applications

- Automotive Traction Inverters
- Power Factor Correction (PFC)
- Switched-Mode Power Supply (SMPS)
- Solar Inverters
- Wind Turbine Inverters
- Motor Drives
- Induction Heating
- Uninterruptible Power Supply (UPS)

Maximum Ratings at T_j = 175 °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} = 0.24	100	A
Continuous forward current	I_F	T_C ≤ 135 °C, R_{thJC} = 0.24	50	A
RMS forward current	$I_{F(RMS)}$	T_C ≤ 135 °C, R_{thJC} = 0.24	87	A
Surge non-repetitive forward current, Half Sine Wave	$I_{F,SM}$	T_C = 25 °C, t_P = 10 ms	350	A
		T_C = 135 °C, t_P = 10 ms	313	
Non-repetitive peak forward current	$I_{F,max}$	T_C = 25 °C, t_P = 10 μs	1625	A
I^2t value	$\int i^2\, dt$	T_C = 25 °C, t_P = 10 ms	450	A^2s
		T_C = 135 °C, t_P = 10 ms	300	
Power dissipation	P_{tot}	T_C = 25 °C, R_{thJC} = 0.24	620	W
Operating and storage temperature	T_j , T_{stg}		-55 to 175	°C

Electrical Characteristics at T_j = 175 °C, unless otherwise specified

| Parameter	Symbol	Conditions		Values min.	Values typ.	Values max.	Unit
Diode forward voltage	V_F	I_F = 50 A, T_j = 25 °C			1.5	1.8	V
		I_F = 50 A, T_j = 175 °C			2.4	3.0	
Reverse current	I_R	V_R = 650 V, T_j = 25 °C			1	100	μA
		V_R = 650 V, T_j = 175 °C			10	500	
Total capacitive charge	Q_C	I_F ≤ $I_{F,MAX}$ dI_F/dt = 200 A/μs T_j = 175 °C	V_R = 400 V		158		nC
Switching time	t_s		V_R = 400 V		50		ns
Total capacitance	C	V_R = 1 V, f = 1 MHz, T_j = 25 °C			2940		pF
		V_R = 400 V, f = 1 MHz, T_j = 25 °C			203		
		V_R = 650 V, f = 1 MHz, T_j = 25 °C			155		

Figures:
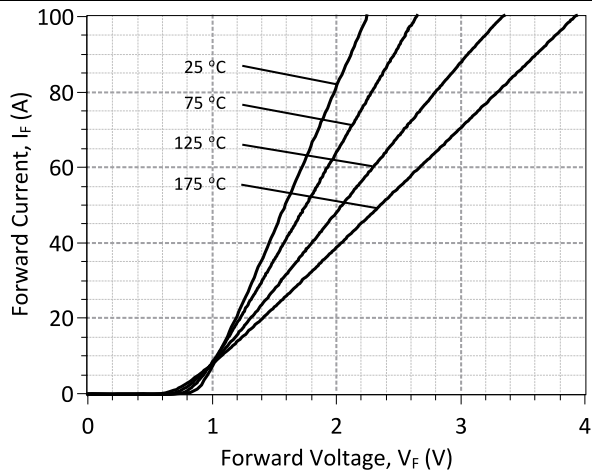
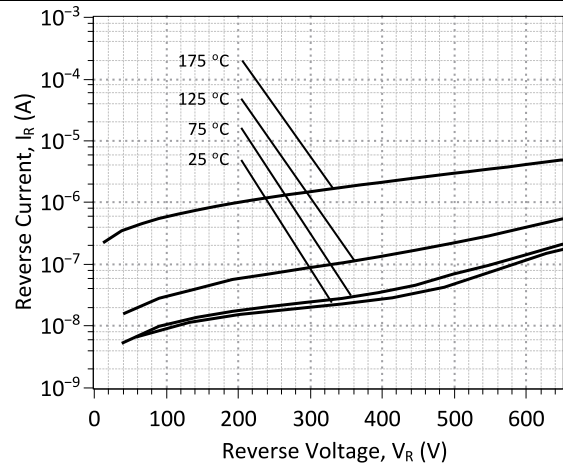Figure 1: Typical Forward Characteristics
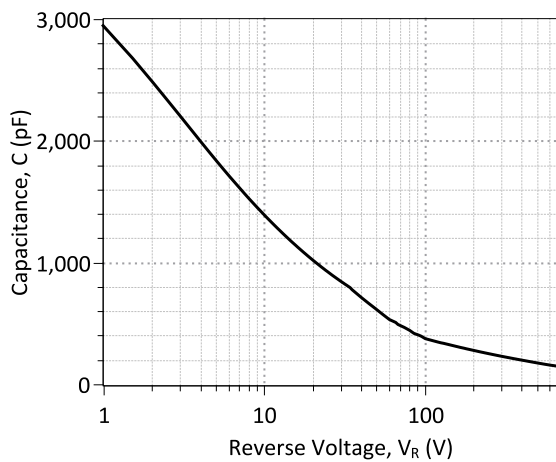

Figure 2: Typical Reverse Characteristics

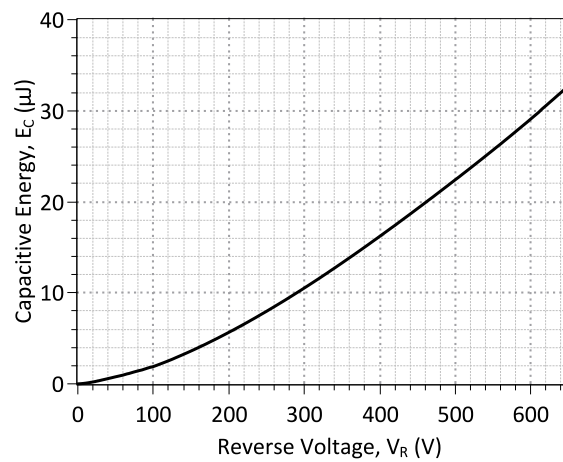Figure 3: Typical Junction Capacitance vs Reverse Voltage Characteristics

Figure 4: Typical Capacitive Energy vs Reverse Voltage Characteristics

Mechanical Parameters

Die Dimensions	4.5 x 4.5	mm^2
Anode Pad Size	4.24 x 4.24	
Die Area total / active	20.25/17.64	
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:
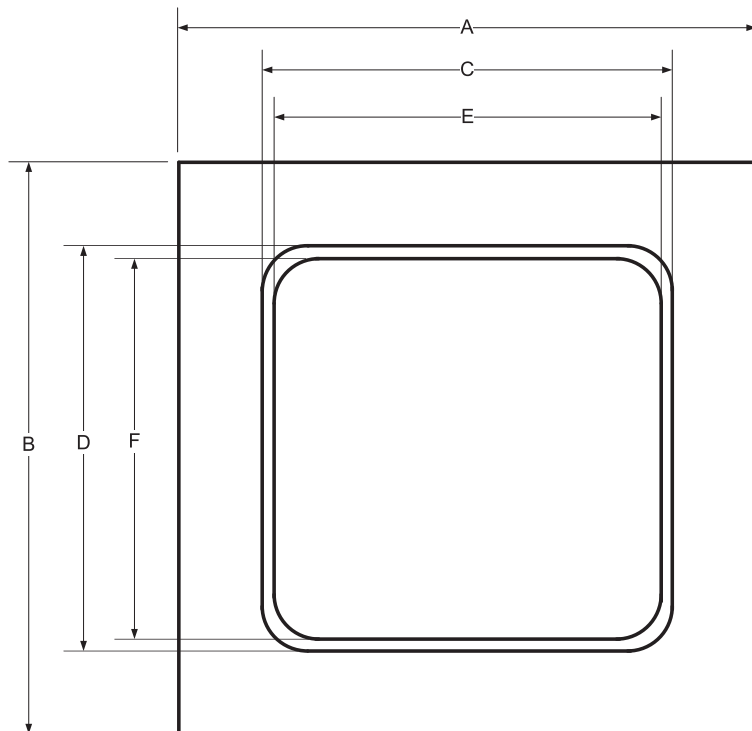
DIE	A [mm]	4.5
	B [mm]	4.5
METAL	C [mm]	4.24
	D [mm]	4.24
WIRE BONDABLE	E [mm]	4.2
	F [mm]	4.2

Revision History

Date	Revision	Comments	Supersedes
2015/02/12	3	Inserted Mechanical Parameters	
2014/09/12	2	Updated Electrical Characteristics	
2013/11/12	1	Updated Electrical Characteristics	
2013/09/18	0	Initial Release	

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/GB50SLT06-CAL_SPICE.pdf) into LTSPICE (version 4) software for simulation of the GA50SLT06-CAL.

```
*     MODEL OF GeneSiC Semiconductor Inc.
*
*     $Revision:   1.0            $
*     $Date:   20-SEP-2013        $
*
*     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 GB50SLT06-CAL SPICE Model
*
.SUBCKT GB50SLT06 ANODE KATHODE
D1 ANODE KATHODE GB50SLT06_SCHOTTKY
D2 ANODE KATHODE GB50SLT06_SURGE
.MODEL GB50SLT06_SCHOTTKY D
+ IS       1.99E-16       RS        0.015652965
+ N        1              IKF       1000
+ EG       1.2            XTI       3
+ TRS1     0.0042         TRS2      1.3E-05
+ CJO      3.86E-09       VJ        1.362328465
+ M        0.48198551     FC        0.5
+ TT       1.00E-10       BV        650
+ IBV      1.00E-03       VPK       650
+ IAVE     50             TYPE      SiC_Schottky
+ MFG      GeneSiC_Semi
.MODEL GB50SLT06_SURGE D
+ IS       1.54E-19       RS        0.1
+ TRS1     -0.004         N         3.941
+ EG       3.23           IKF       19
+ XTI      0              FC        0.5
+ TT       0              BV        650
+ IBV      1.00E-03       VPK       650
+ IAVE     50             TYPE      SiC_PiN
.ENDS
*
* End of GB50SLT06-CAL SPICE Model
```