GC50MPS12-247

1200V 50A SiC Schottky MPS™ Diode

GeneSiC SEMICONDUCTOR

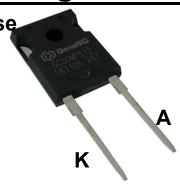
Silicon Carbide Schottky Diode

V_{RRM}	=	1200 V
$I_{F\ (Tc\ =\ 135°C)}$	=	70 A
Q_C	=	110 nC

Features

- High Avalanche (UIS) Capability
- Enhanced Surge Current Capability
- Superior Figure of Merit Q_C/I_F
- Low Thermal Resistance
- 175 °C Maximum Operating Temperature
- Temperature Independent Switching Behavior
- Positive Temperature Coefficient of V_F
- Extremely Fast Switching Speeds

Package



TO-247-2

RoHS

REACH

Advantages

- Low Standby Power Losses
- Improved Circuit Efficiency (Lower Overall Cost)
- Low Switching Losses
- Ease of Paralleling without Thermal Runaway
- Smaller Heat Sink Requirements
- Low Reverse Recovery Current
- Low Device Capacitance
- Low Reverse Leakage Current

Applications

- Boost Diode in Power Factor Correction (PFC)
- Switched Mode Power Supply (SMPS)
- Uninterruptible Power Supply (UPS)
- Motor Drives
- Freewheeling / Anti-parallel Diode in Inverters
- Solar Inverters & Wind Energy Converters
- Electric Vehicles (EV) & DC Fast Charging
- Induction Heating & Welding

Absolute Maximum Ratings (At T_C = 25 °C Unless Otherwise Stated)

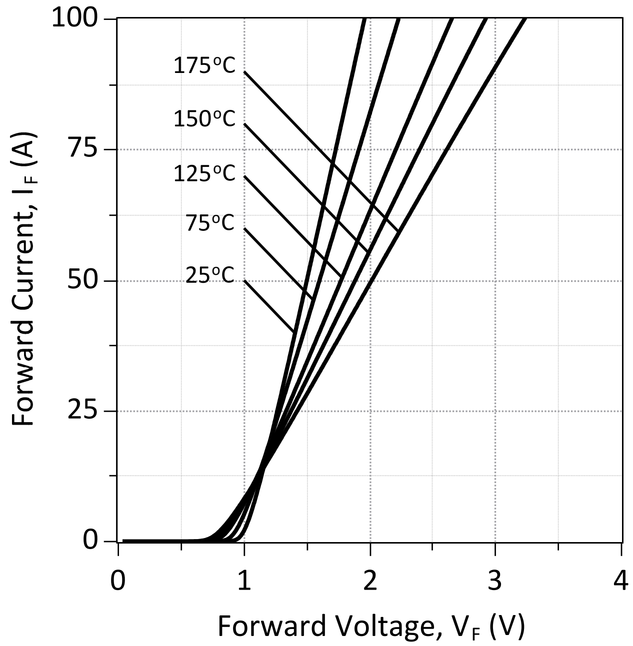
Parameter	Symbol	Conditions	Values	Unit
Repetitive Peak Reverse Voltage	V_{RRM}		1200	V
Continuous Forward Current	I_F	T_C = 25 °C, D = 1	150	A
		T_C = 135 °C, D = 1	70	
		T_C = 152 °C, D = 1	50	
Non-Repetitive Peak Forward Surge Current, Half Sine Wave	$I_{F,SM}$	T_C = 25 °C, t_P = 10 ms	400	A
		T_C = 150 °C, t_P = 10 ms	320	
Repetitive Peak Forward Surge Current, Half Sine Wave	$I_{F,RM}$	T_C = 25 °C, t_P = 10 ms	240	A
		T_C = 150 °C, t_P = 10 ms	168	
Non-Repetitive Peak Forward Surge Current	$I_{F,max}$	T_C = 25 °C, t_P = 10 µs	2000	A
i^2t Value	$\int i^2\,dt$	T_C = 25 °C, t_P = 10 ms	800	A^2s
Non-Repetitive Avalanche Energy	E_{AS}	L = 0.5 mH, I_{AS} = 50 A	600	mJ
Diode Ruggedness	dV/dt	V_R = 0 ~ 960 V	200	V/ns
Power Dissipation	P_{tot}	T_C = 25 °C	625	W
Operating and Storage Temperature	T_j , T_{stg}		-55 to 175	°C

Electrical Characteristics

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	2.4	
Reverse Current	I_R	V_R = 1200 V, T_j = 25 °C			5	25	μA
		V_R = 1200 V, T_j = 175 °C			50	250	
Total Capacitive Charge	Q_C	$I_F \le I_{F,MAX}$ dI$_F$/dt = 200 A/μs T_j = 175 °C	V_R = 400 V		78		nC
			V_R = 800 V		110		
Switching Time	t_s		V_R = 400 V		< 10		ns
			V_R = 800 V				
Total Capacitance	C	V_R = 1 V, f = 1 MHz			226		pF
		V_R = 800 V, f = 1 MHz			163		

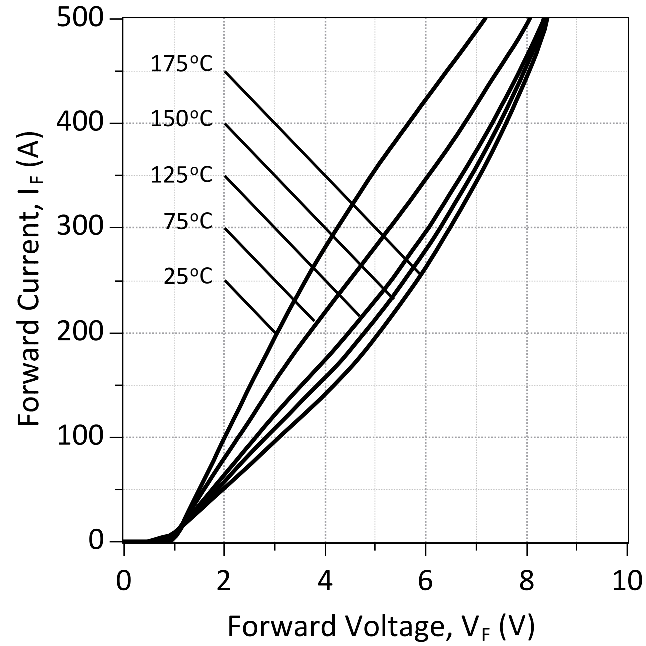
Thermal / Mechanical Characteristics

Thermal Resistance, Junction - Case	R_{thJC}			0.24		°C/W
Weight	W_T			6		g
Mounting Torque	T_M	M3 Screw			1.1	Nm



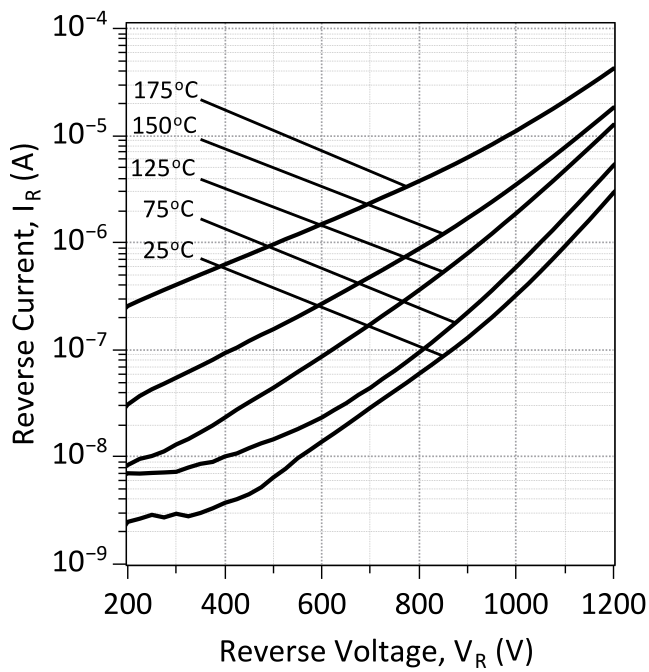
$I_F = f(V_F, T_j)$; t_P = 250 µs

Figure 1: Typical Forward Characteristics



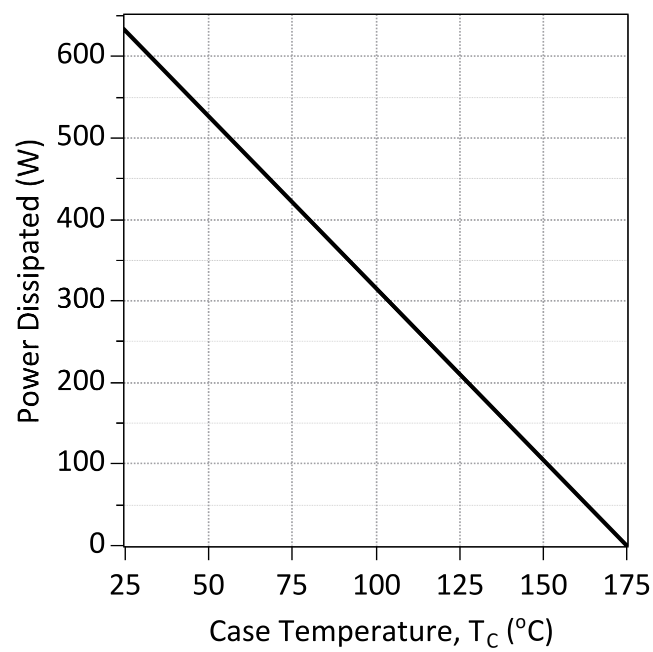
$I_F = f(V_F, T_j)$; t_P = 250 µs

Figure 2: Typical High Current Forward Characteristics



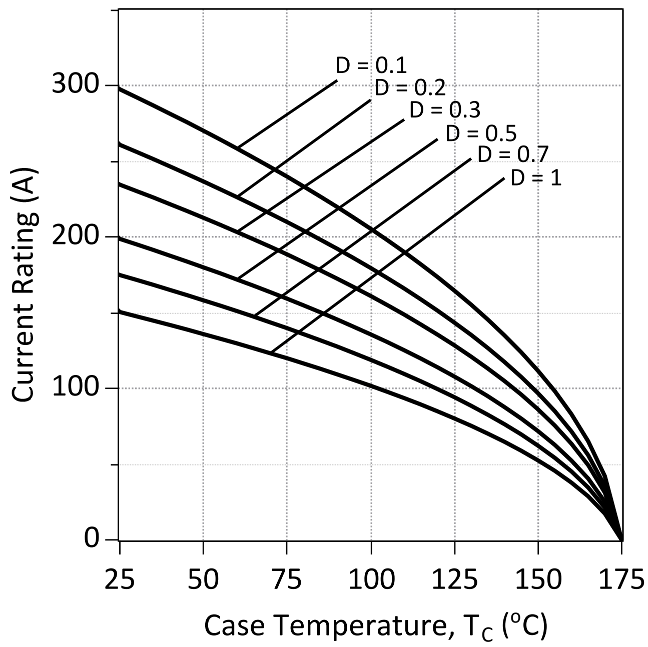
$I_R = f(V_R, T_j)$

Figure 3: Typical Reverse Characteristics



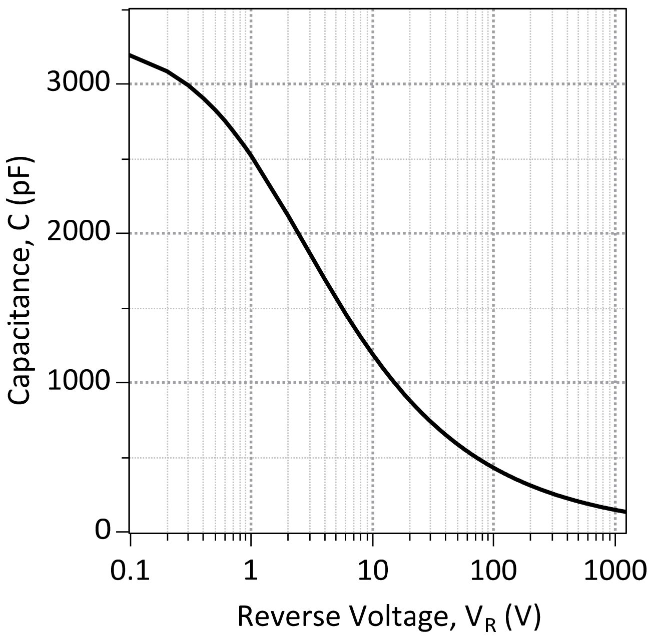
$P_{tot} = f(T_C)$; T_j = 175 °C

Figure 4: Power Derating Curve



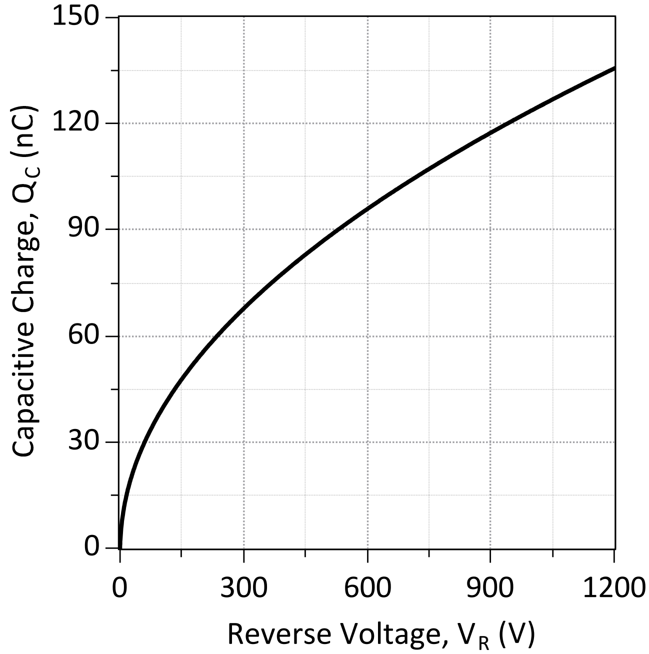
$I_F = f(T_C)$; $D = t_P/T$; $T_j = 175$ °C

Figure 5: Current Derating Curves



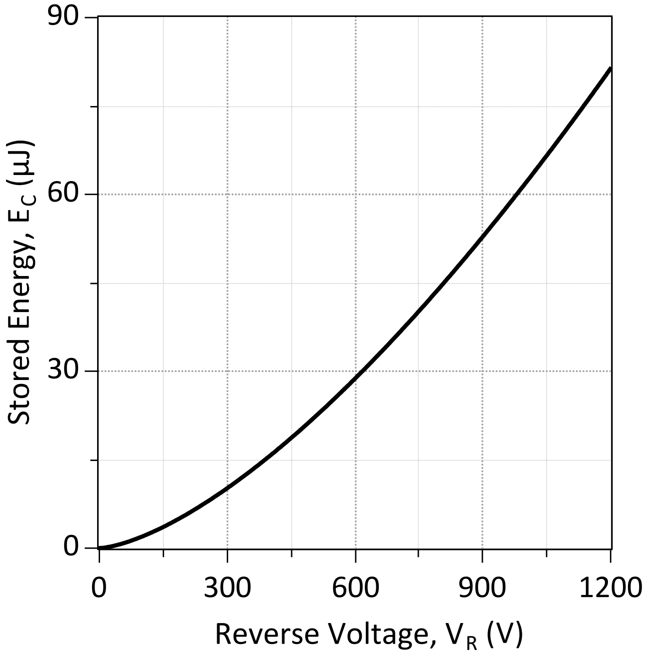
$C = f(V_R)$; f = 1 MHz

Figure 6: Typical Junction Capacitance vs Reverse Voltage Characteristics



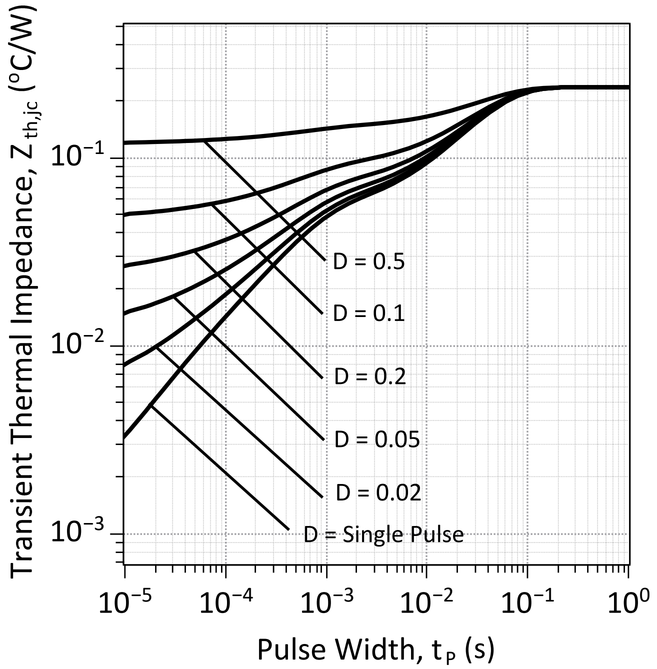
$Q_c = f(V_R)$; f = 1 MHz

Figure 7: Typical Capacitive Charge vs Reverse Voltage Characteristics



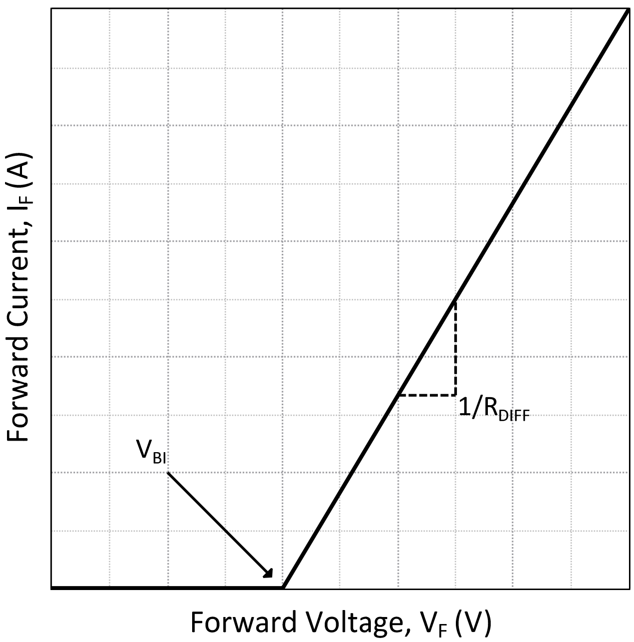
$E_C = f(V_R)$; f = 1 MHz

Figure 8: Typical Capacitive Energy vs Reverse Voltage Characteristics



$Z_{th,jc} = f(t_P, D)$; $D = t_P/T$

Figure 9: Transient Thermal Impedance



$I_F = f(V_F, T_j)$

Figure 10: Forward Curve Model

$I_F = (V_F - V_{BI})/R_{DIFF}$ (A)

Built-In Voltage (V_{BI}):

$V_{BI}(T_j) = m*T_j + n$ (V),

m = -1.47e-03, n = 1.08

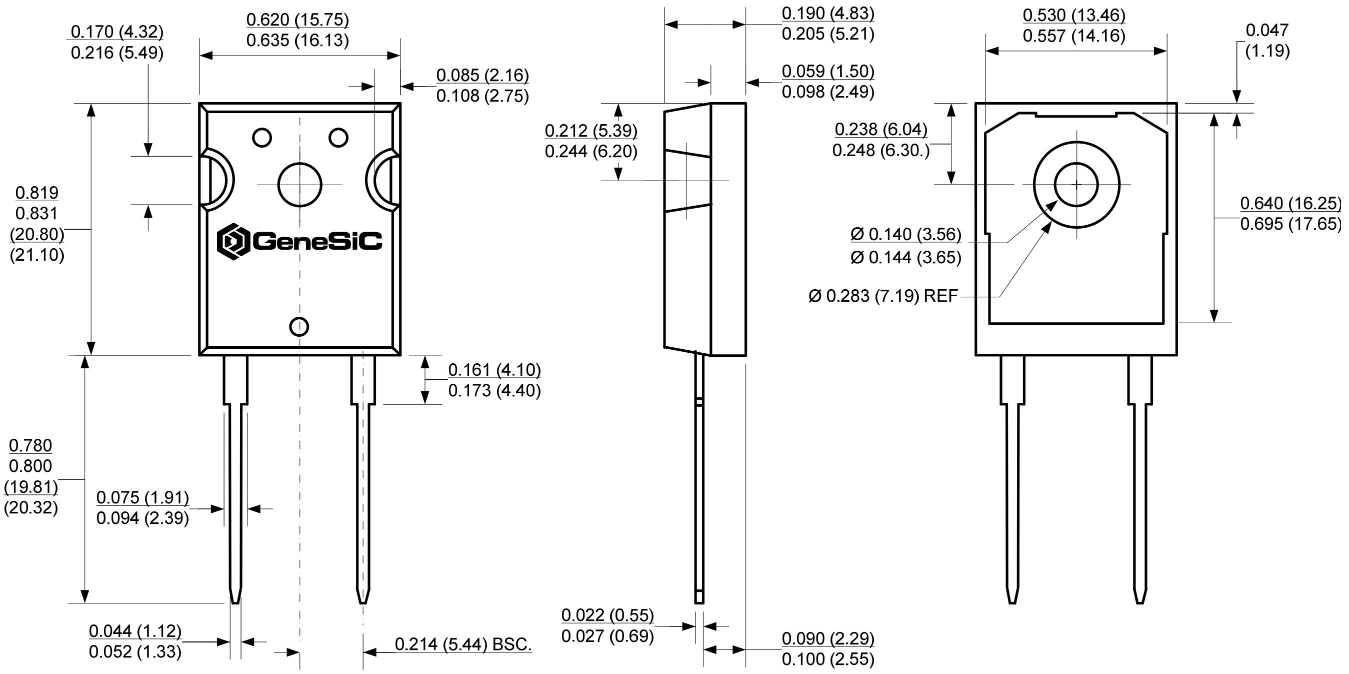
Differential Resistance (R_{DIFF}):

$R_{DIFF}(T_j) = a*T_j^2 + b*T_j + c$ (Ω);

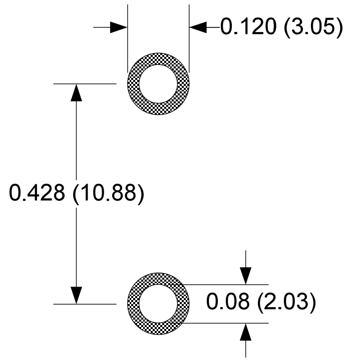
a = 2.87e-07, b = 3.40e-05, c = 0.0076

Package Dimensions

TO-247-2 **Package Outline**



Recommended Solder Pad Layout



NOTE
1. CONTROLLED DIMENSION IS INCH. DIMENSION IN BRACKET IS MILLIMETER.
2. DIMENSIONS DO NOT INCLUDE END FLASH, MOLD FLASH, MATERIAL PROTRUSIONS

RoHS Compliance

The levels of RoHS restricted materials in this product are below the maximum concentration values (also referred to as the threshold limits) permitted for such substances, or are used in an exempted application, in accordance with EU Directive 2011/65/EC (RoHS 2), as adopted by EU member states on January 2, 2013 and amended on March 31, 2015 by EU Directive 2015/863. RoHS Declarations for this product can be obtained from your GeneSiC representative.

REACh Compliance

REACh substances of high concern (SVHCs) information is available for this product. Since the European Chemical Agency (ECHA) has published notice of their intent to frequently revise the SVHC listing for the foreseeable future, please contact a GeneSiC representative to insure you get the most up-to-date REACh SVHC Declaration. REACh banned substance information (REACh Article 67) is also available upon request.

This product has not been designed or tested for use in, and is not intended for use in, applications implanted into the human body nor in applications in which failure of the product could lead to death, personal injury or property damage, including but not limited to equipment used in the operation of nuclear facilities, life-support machines, cardiac defibrillators or similar emergency medical equipment, aircraft navigation or communication or control systems, or air traffic control systems.

GeneSiC disclaims all and any warranty and liability arising out of use or application of any product. No license, express or implied to any intellectual property rights is granted by this document.

Related Links

- SPICE Models: https://www.genesicsemi.com/schottky-mps
- Evaluation Boards: https://www.genesicsemi.com/technical-support
- Quality Manual: https://www.genesicsemi.com/technical-support/quality-manual
- Compliance: https://www.genesicsemi.com/technical-support/compliance
- Reliability Report: https://www.genesicsemi.com/technical-support/reliability

www.genesicsemi.com/schottky-mps

Published by
GeneSiC Semiconductor, Inc.
43670 Trade Center Place Suite 155
Dulles, VA 20166