

GD50MPS12-CAL

1200V 50A SiC Schottky MPS™ Diode



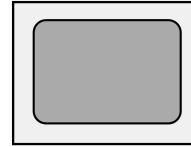
Silicon Carbide Schottky Diode

V_{RRM}	=	1200 V
$I_F(T_C = 144^\circ\text{C})$	=	50 A
Q_C	=	162 nC

Features

- Gen4 Thin Chip Technology for Low V_F
- Superior Figure of Merit $Q_C \cdot V_F$
- Industry-Leading Avalanche (UIL) Robustness
- Enhanced Surge Current Withstand Capability
- Temperature Independent Fast Switching
- Low Thermal Resistance
- Positive Temperature Coefficient of V_F
- High dV/dt Ruggedness

Bare Chip



Advantages

- Improved System Efficiency
- High System Reliability
- Optimal Price Performance
- Reduced Cooling Requirements
- Increased System Power Density
- Zero Reverse Recovery Current
- Easy to Parallel without Thermal Runaway
- Enables Extremely Fast Switching

Applications

- Electric Vehicles and Fast Chargers
- Solar Inverters
- Train Auxiliary Power Supplies
- High frequency Converters
- Motor Drives
- Induction Heating and Welding
- Uninterruptible Power Supplies
- Pulsed Power

Absolute Maximum Ratings (At $T_C = 25^\circ\text{C}$ Unless Otherwise Stated)

Parameter	Symbol	Conditions	Values	Unit	Note
Repetitive Peak Reverse Voltage	V_{RRM}		1200	V	
Continuous Forward Current	I_F	$T_C = 100^\circ\text{C}, D = 1$	86	A	Fig. 4
		$T_C = 135^\circ\text{C}, D = 1$	59		
		$T_C = 144^\circ\text{C}, D = 1$	50		
Non-Repetitive Peak Forward Surge Current, Half Sine Wave	I_{FSM}	$T_C = 25^\circ\text{C}, t_P = 10 \text{ ms}$	300	A	
		$T_C = 150^\circ\text{C}, t_P = 10 \text{ ms}$	50		
Repetitive Peak Forward Surge Current, Half Sine Wave	I_{FRM}	$T_C = 25^\circ\text{C}, t_P = 10 \text{ ms}$	100	A	
		$T_C = 150^\circ\text{C}, t_P = 10 \text{ ms}$	50		
Non-Repetitive Peak Forward Surge Current	I_{FMAX}	$T_C = 25^\circ\text{C}, t_P = 10 \mu\text{s}$	200	A	
i^2t Value	$\int i^2 dt$	$T_C = 25^\circ\text{C}, t_P = 10 \text{ ms}$	450	A^2s	
Non-Repetitive Avalanche Energy	E_{AS}	$L = 0.4 \text{ mH}, I_{AS} = 50 \text{ A}$	452	mJ	
Diode Ruggedness	dV/dt	$V_R = 0 \sim 960 \text{ V}$	200	V/ns	
Power Dissipation	P_{TOT}	$T_C = 25^\circ\text{C}$	463	W	Fig. 3
Operating and Storage Temperature	T_J, T_{stg}		-55 to 175	$^\circ\text{C}$	

Note 1: Assumes Thermal Resistance, Junction - Case (R_{thJC}) of 0.32°C/W

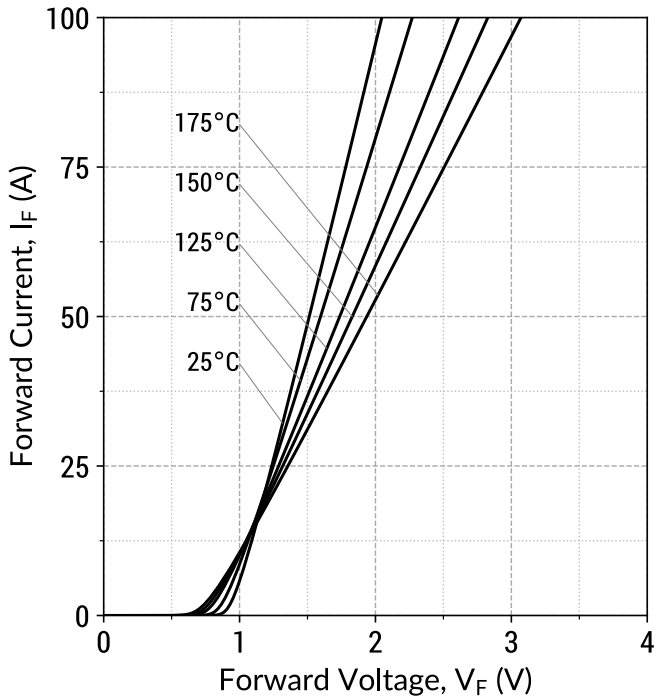
Electrical Characteristics

Parameter	Symbol	Conditions	Values			Unit	Note
			Min.	Typ.	Max.		
Diode Forward Voltage	V_F	$I_F = 50\text{ A}, T_j = 25^\circ\text{C}$		1.5	1.8	V	Fig. 1
		$I_F = 50\text{ A}, T_j = 175^\circ\text{C}$		1.9			
Reverse Current	I_R	$V_R = 1200\text{ V}, T_j = 25^\circ\text{C}$		3	30	μA	Fig. 2
		$V_R = 1200\text{ V}, T_j = 175^\circ\text{C}$		33			
Total Capacitive Charge	Q_C	$I_F \leq I_{F,MAX}$ $di_F/dt = 200\text{ A}/\mu\text{s}$	$V_R = 400\text{ V}$		111	nC	Fig. 7
			$V_R = 800\text{ V}$		162		
Switching Time	t_s		$V_R = 400\text{ V}$ $V_R = 800\text{ V}$	< 10		ns	
Total Capacitance	C	$V_R = 1\text{ V}, f = 1\text{ MHz}$		1842		pF	Fig. 6
		$V_R = 800\text{ V}, f = 1\text{ MHz}$		108			

Mechanical Parameters

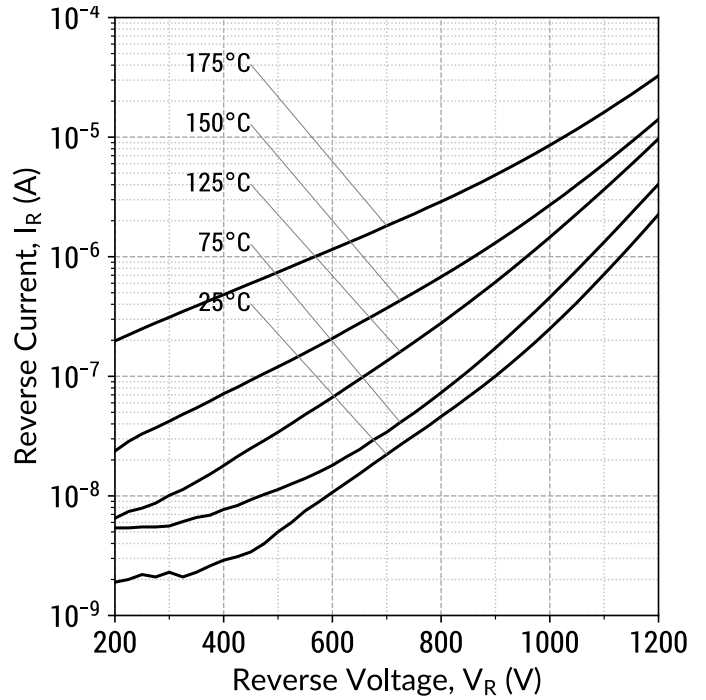
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Figure 1: Typical Forward Characteristics



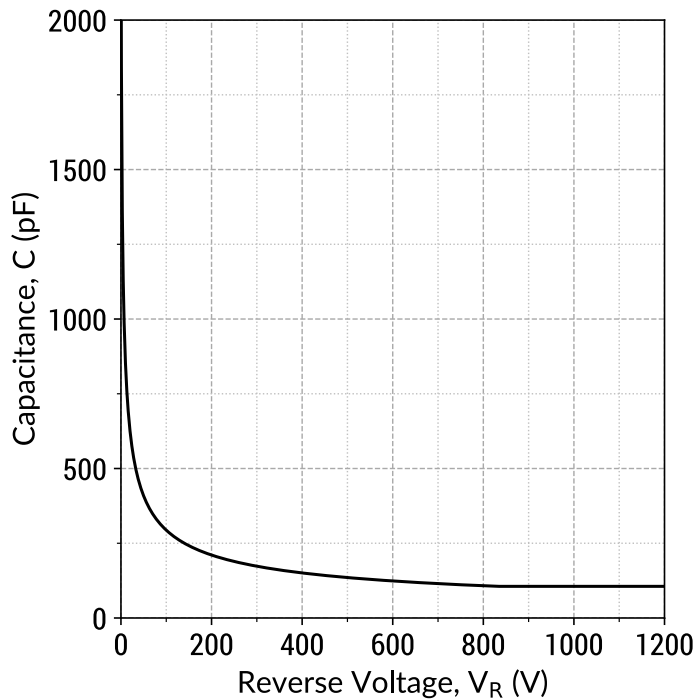
$$I_F = f(V_F, T_j); t_p = 250 \mu s$$

Figure 2: Typical Reverse Characteristics



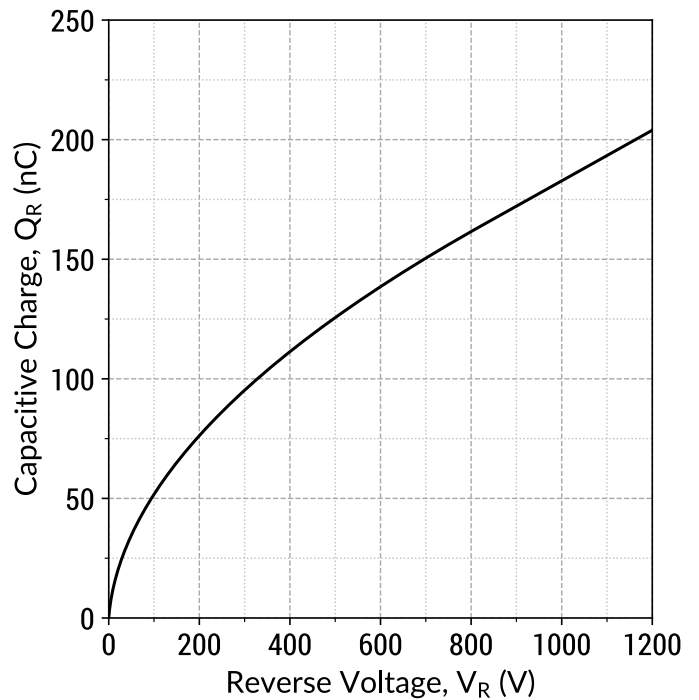
$$I_R = f(V_R, T_j)$$

Figure 3: Typical Junction Capacitance vs Reverse Voltage Characteristics



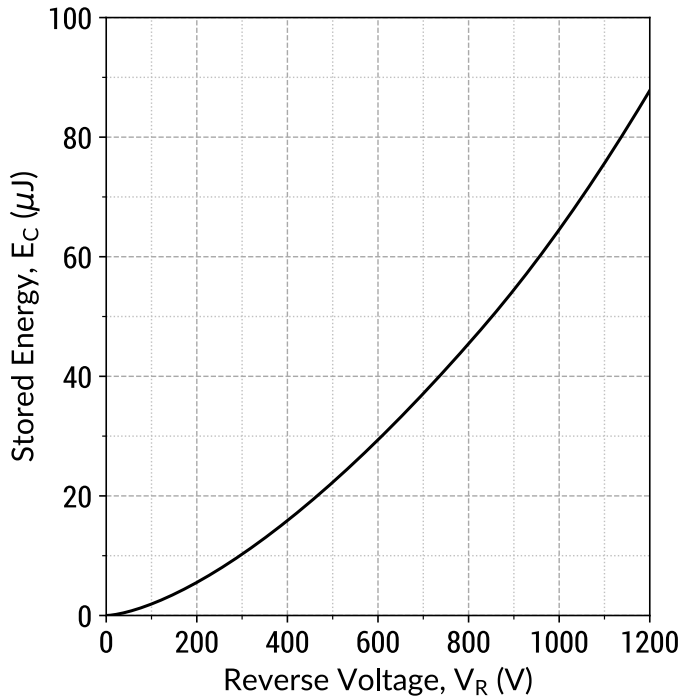
$$C = f(V_R); f = 1 \text{ MHz}$$

Figure 4: Typical Capacitive Charge vs Reverse Voltage Characteristics



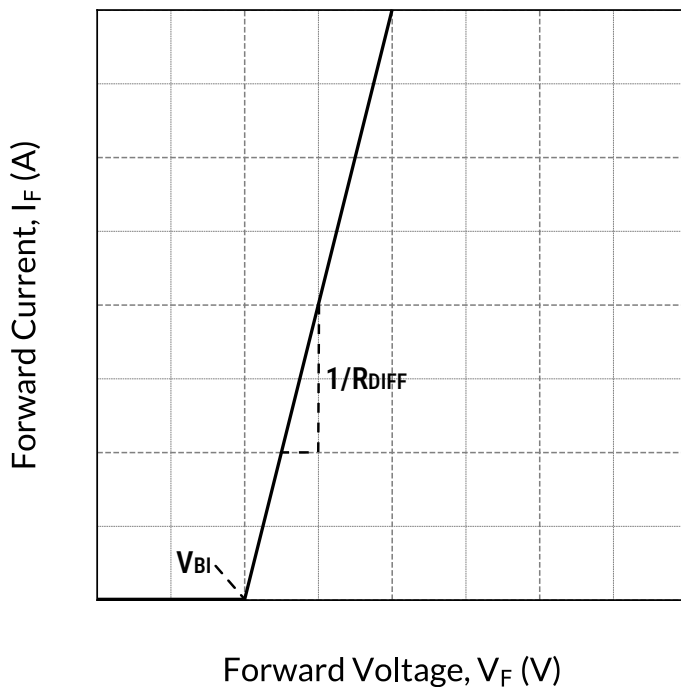
$$Q_C = f(V_R); f = 1 \text{ MHz}$$

Figure 5: Typical Capacitive Energy vs Reverse Voltage Characteristics



$E_c = f(V_R); f = 1\text{MHz}$

Figure 6: Forward Curve Model



$I_F = f(V_F, T_j)$

Forward Curve Model Equation:

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

Built-In Voltage (V_{BI}):

$V_{BI}(T_j) = m \times T_j + n$ (V)

$m = -0.00119$ (V/°C)

$n = 1.01$ (V)

Differential Resistance (R_{DIFF}):

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

$a = 2.37e-07$ ($\Omega/^\circ\text{C}^2$)

$b = 3.29e-05$ ($\Omega/^\circ\text{C}$)

$c = 0.00976$ (Ω)

Forward Power Loss Equation:

$P_{LOSS} = V_{BI}(T_j) \times I_{AVG} + R_{DIFF}(T_j) \times I_{RMS}^2$

Chip Dimensions

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NOTE

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

Compliance

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.

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Related Links

- SPICE Models: https://www.genesicsemi.com/sic-schottky-mps/GD50MPS12-CAL/GD50MPS12-CAL_SPICE.zip
- PLECS Models: https://www.genesicsemi.com/sic-schottky-mps/GD50MPS12-CAL/GD50MPS12-CAL_PLECS.zip
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- Compliance: <https://www.genesicsemi.com/compliance>
- Quality Manual: <https://www.genesicsemi.com/quality>

Revision History

- Rev 21/Jun: Updated with most recent test data
- Supersedes: Rev 20/Jul



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