GD50MPS12H
1200V 50A SiC Schottky MPS™ Diode

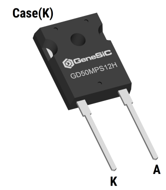
Silicon Carbide Schottky Diode

V_{RRM}	=	1200 V
I_F (T_C = 147°C)	=	50 A
Q_C	=	161 nC

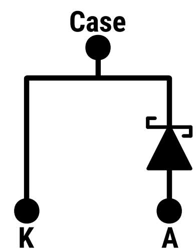
Features

- Gen4 Thin Chip Technology for Low V_F
- Enhanced Surge and Avalanche Robustness
- Superior Figure of Merit Q_C/I_F
- Low Thermal Resistance
- Low Reverse Leakage Current
- Temperature Independent Fast Switching
- Positive Temperature Coefficient of V_F
- High dV/dt Ruggedness

Package



TO-247-2



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°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°C, D = 1 T_C = 135°C, D = 1 T_C = 147°C, D = 1	92 63 50	A	Fig. 4
Non-Repetitive Peak Forward Surge Current, Half Sine Wave	$I_{F,SM}$	T_C = 25°C, t_P = 10 ms T_C = 150°C, t_P = 10 ms	500 400	A	
Repetitive Peak Forward Surge Current, Half Sine Wave	$I_{F,RM}$	T_C = 25°C, t_P = 10 ms T_C = 150°C, t_P = 10 ms	300 210	A	
Non-Repetitive Peak Forward Surge Current	$I_{F,MAX}$	T_C = 25°C, t_P = 10 µs	2500	A	
i^2t Value	$\int i^2 dt$	T_C = 25°C, t_P = 10 ms	1250	A^2s	
Non-Repetitive Avalanche Energy	E_{AS}	L = 0.4 mH, I_{AS} = 50 A	541	mJ	
Diode Ruggedness	dV/dt	V_R = 0 ~ 960 V	200	V/ns	
Power Dissipation	P_{TOT}	T_C = 25°C	519	W	Fig. 3
Operating and Storage Temperature	T_j , T_{stg}		-55 to 175	°C	

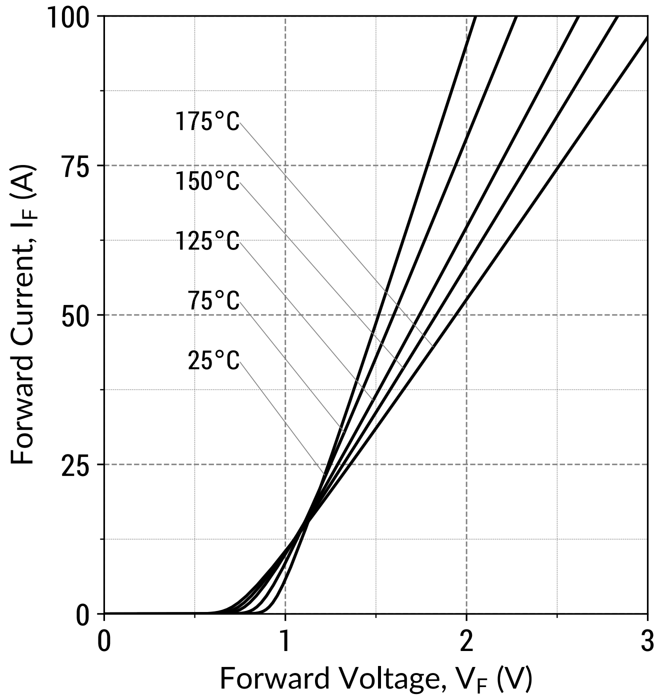
Electrical Characteristics

Parameter	Symbol	Conditions		Values			Unit	Note
				Min.	Typ.	Max.		
Diode Forward Voltage	V_F	I_F = 50 A, T_j = 25°C			1.5	1.8	V	Fig. 1
		I_F = 50 A, T_j = 175°C			1.9			
Reverse Current	I_R	V_R = 1200 V, T_j = 25°C			3	15	μA	Fig. 2
		V_R = 1200 V, T_j = 175°C			33			
Total Capacitive Charge	Q_C	$I_F \leq I_{F,MAX}$ dI_F/dt = 200 A/μs	V_R = 400 V		111		nC	Fig. 7
			V_R = 800 V		161			
Switching Time	t_S		V_R = 400 V V_R = 800 V		< 10		ns	
Total Capacitance	C	V_R = 1 V, f = 1MHz			1835		pF	Fig. 6
		V_R = 800 V, f = 1MHz			107			

Thermal/Package Characteristics

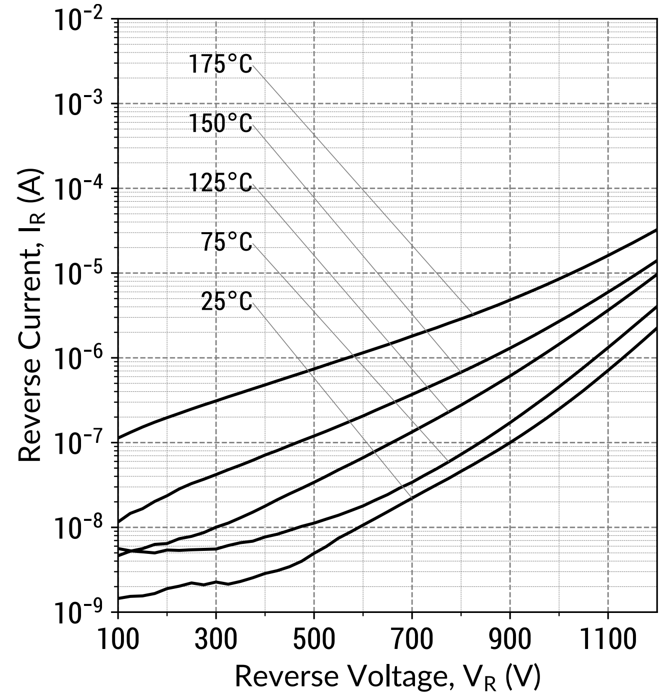
Parameter	Symbol	Conditions	Values			Unit	Note
			Min.	Typ.	Max.		
Thermal Resistance, Junction - Case	R_{thJC}			0.29		°C/W	Fig. 9
Weight	W_T			6.0		g	
Mounting Torque	T_M	Screws to Heatsink			1.1	Nm	

Figure 1: Typical Forward Characteristics



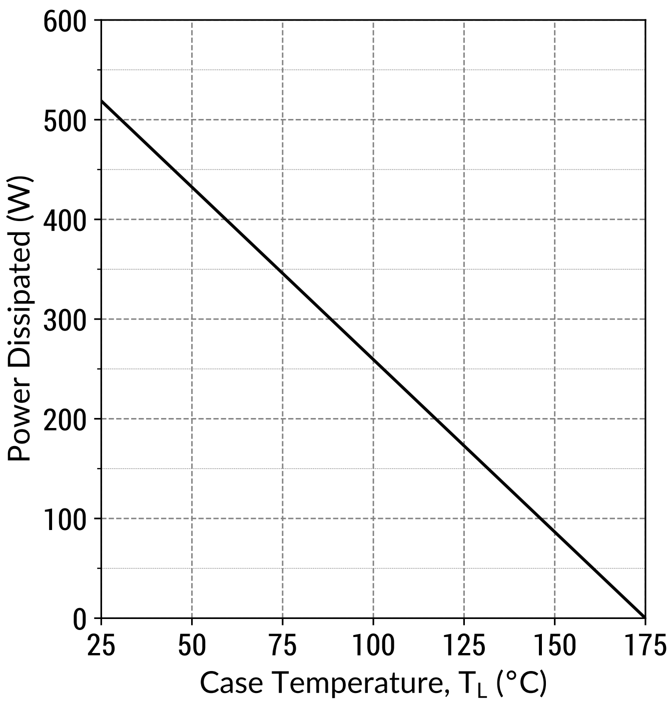
$I_F = f(V_F, T_j)$; $t_P = 250\ \mu s$

Figure 2: Typical Reverse Characteristics



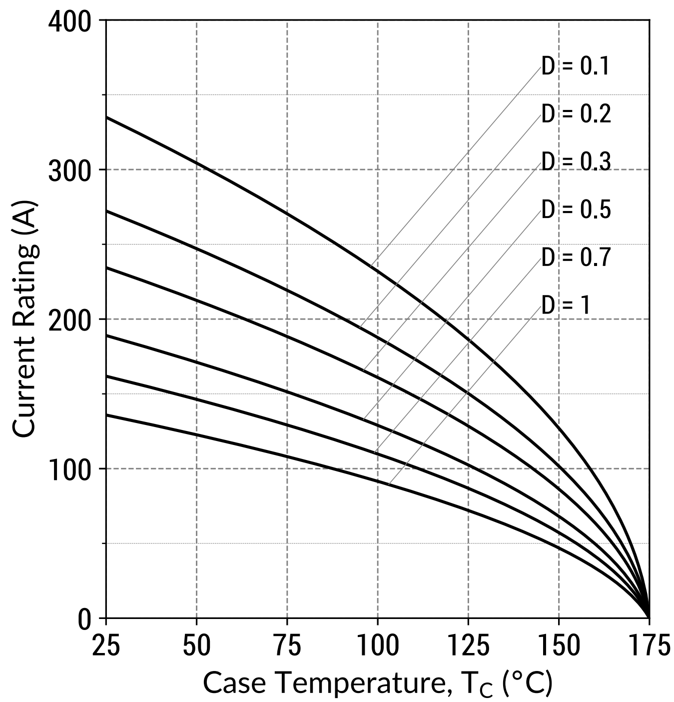
$I_R = f(V_R, T_j)$

Figure 3: Power Derating Curves



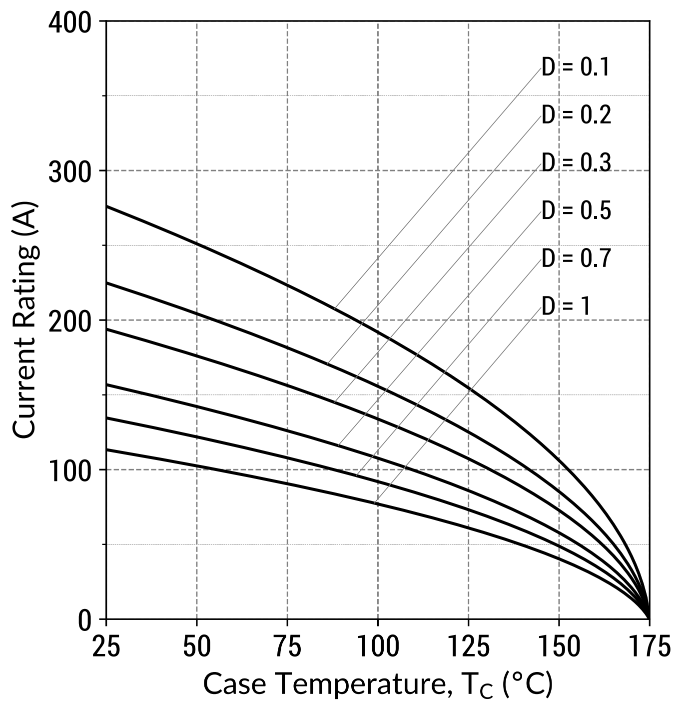
$P_{TOT} = f(T_C)$; $T_j = 175°C$

Figure 4: Current Derating Curves (Typical V_F)



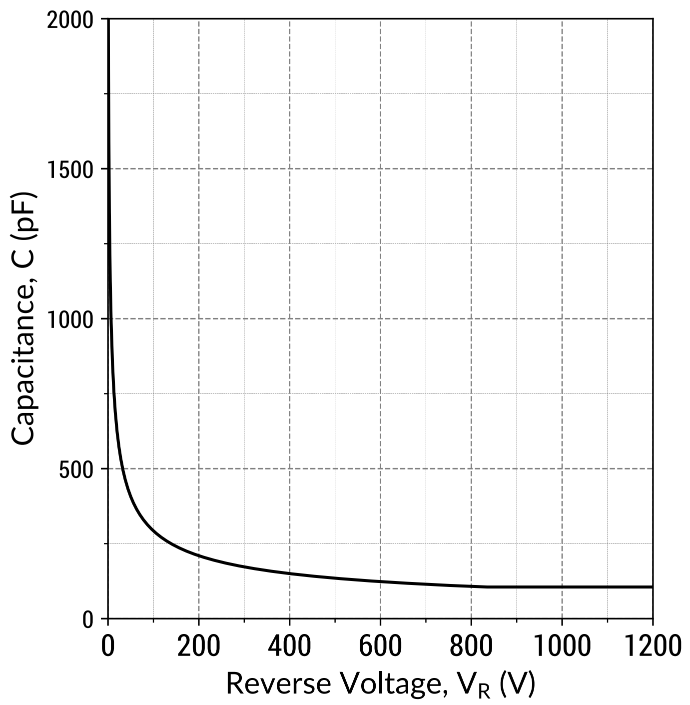
$I_F = f(T_C)$; $D = t_P/T$; $T_j \leq 175°C$; $f_{SW} > 10kHz$

Figure 5: Current Derating Curves (Maximum V_F)



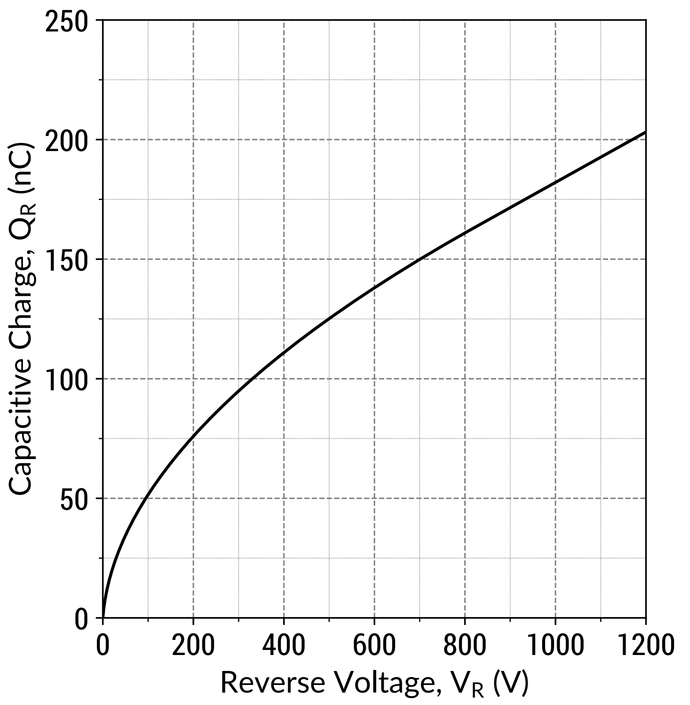
$I_F = f(T_C)$; $D = t_P/T$; $T_j \leq 175°C$; $f_{SW} > 10kHz$

Figure 6: Typical Junction Capacitance vs Reverse Voltage Characteristics



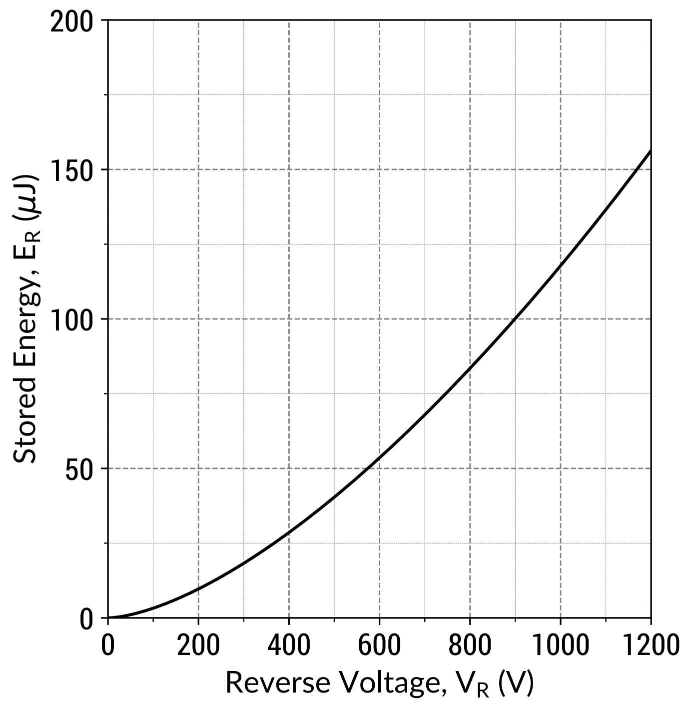
$C = f(V_R)$; f = 1MHz

Figure 7: Typical Capacitive Charge vs Reverse Voltage Characteristics



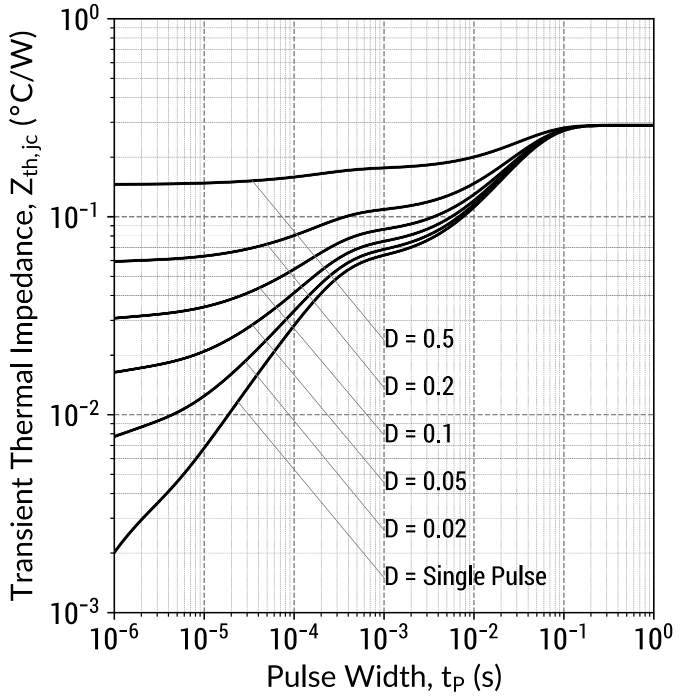
$Q_C = f(V_R)$; f = 1MHz

Figure 8: Typical Capacitive Energy vs Reverse Voltage Characteristics



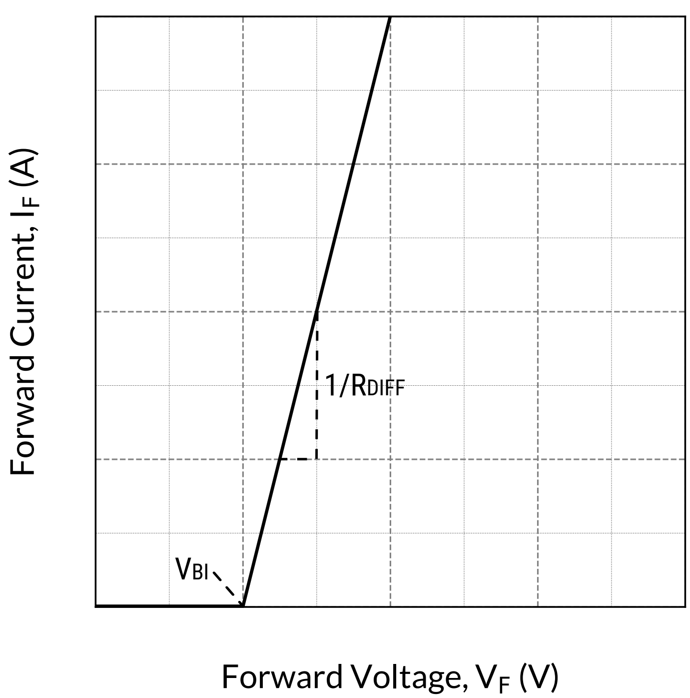
$E_C = f(V_R)$; f = 1MHz

Figure 9: Transient Thermal Impedance



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

Figure 10: 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 = 2.38e-07 (Ω/°C²)

b = 3.3e-05 (Ω/°C)

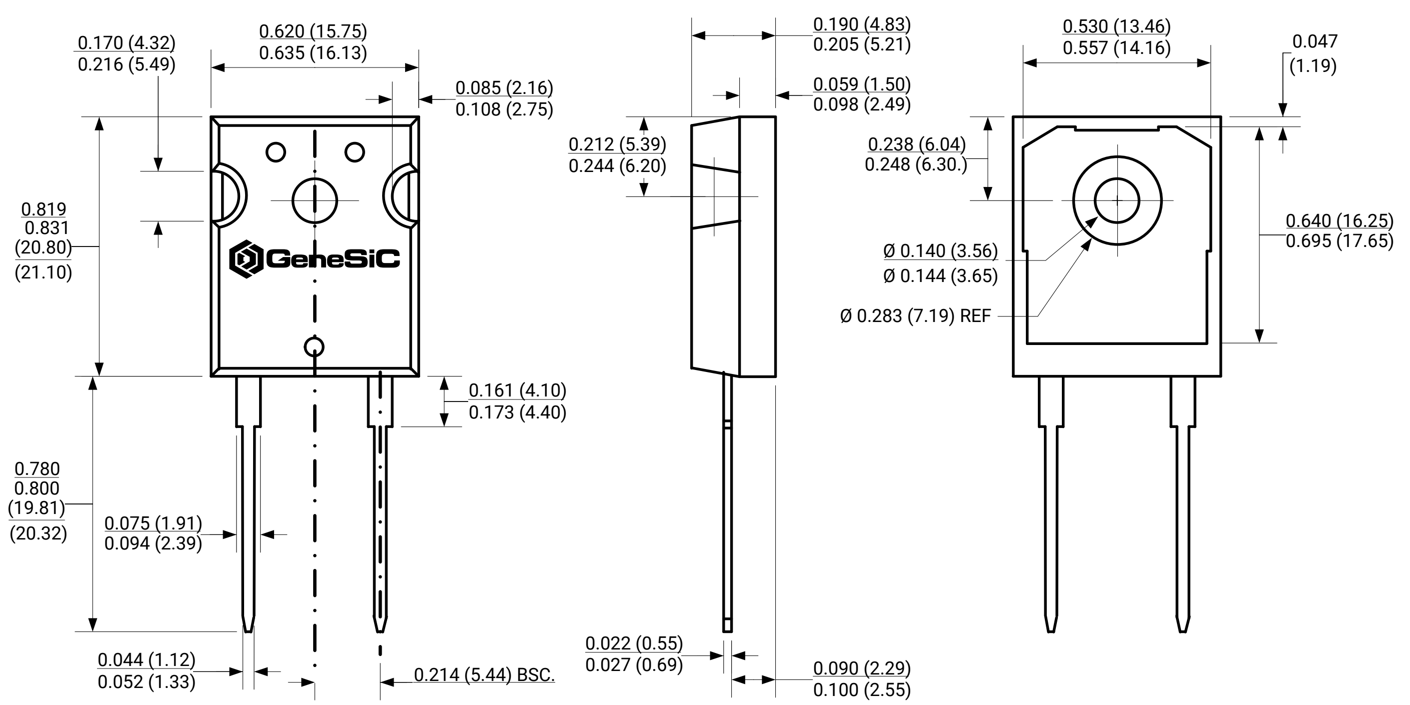
c = 0.00979 (Ω)

Forward Power Loss Equation:

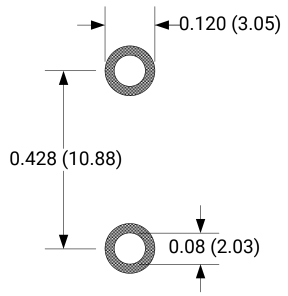
$P_{LOSS} = V_{BI}(T_j) \times I_{AVG} + R_{DIFF}(T_j) \times I_{RMS}^2$

Package Dimensions

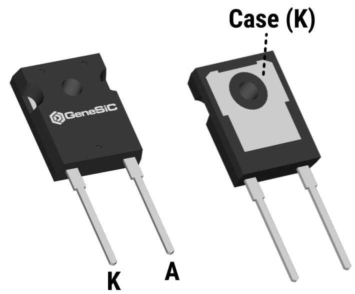
TO-247-2 Package Outline



Recommended Solder Pad Layout



Package View



NOTE

1. CONTROLLED DIMENSION IS INCH. DIMENSION IN BRACKET 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/GD50MPS12H/GD50MPS12H_SPICE.zip
- PLECS Models: https://www.genesicsemi.com/sic-schottky-mps/GD50MPS12H/GD50MPS12H_PLECS.zip
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- Evaluation Boards: https://www.genesicsemi.com/technical-support
- Reliability: https://www.genesicsemi.com/reliability
- Compliance: https://www.genesicsemi.com/compliance
- Quality Manual: https://www.genesicsemi.com/quality

Revision History

Date	Revision	Comments	Supersedes
Jul. 27, 2020	Rev 1	Initial Release	

www.genesicsemi.com/sic-schottky-mps/

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