GD2X10MPS12D
1200V 20A SiC Schottky MPS™ Diode

GeneSiC™
SEMICONDUCTOR

Silicon Carbide Schottky Diode

V_{RRM}	=	1200 V
$I_{F\ (T_C = 159°C)}$ =		20 A *
Q_C	=	64 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

Case(K)

Case

TO-247-3

A   K   A

RoHS

REACH
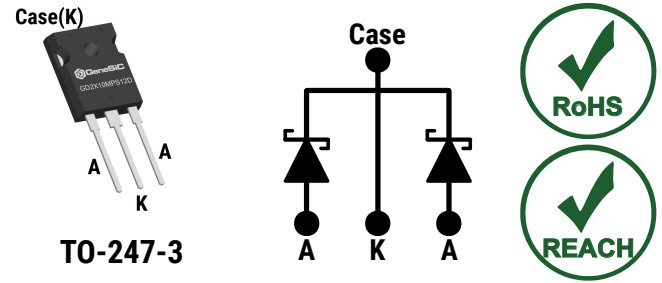
Advantages

- 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

- Power Factor Correction (PFC)
- Solar Inverters
- Battery Chargers
- High Frequency Converters
- Switched Mode Power Supply (SMPS)
- AC/DC Power Supplies
- Anti-Parallel / Free-Wheeling Diode
- LED and HID Lighting

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

Parameter	Symbol	Conditions	Values	Unit	Note
Repetitive Peak Reverse Voltage (Per Leg)	V_{RRM}		1200	V	
Continuous Forward Current (Per Leg / Per Device)	I_F	T_C = 100°C, D = 1	25 / 50	A	Fig. 4
		T_C = 135°C, D = 1	17 / 34		
		T_C = 159°C, D = 1	10 / 20		
Non-Repetitive Peak Forward Surge Current, Half Sine Wave (Per Leg)	$I_{F,SM}$	T_C = 25°C, t_P = 10 ms	100	A	
		T_C = 150°C, t_P = 10 ms	80		
Repetitive Peak Forward Surge Current, Half Sine Wave (Per Leg)	$I_{F,RM}$	T_C = 25°C, t_P = 10 ms	60	A	
		T_C = 150°C, t_P = 10 ms	42		
Non-Repetitive Peak Forward Surge Current (Per Leg)	$I_{F,MAX}$	T_C = 25°C, t_P = 10 µs	500	A	
i²t Value (Per Leg)	$\int i^2 dt$	T_C = 25°C, t_P = 10 ms	50	A²s	
Non-Repetitive Avalanche Energy (Per Leg)	E_{AS}	L = 2.2 mH, I_{AS} = 10 A	109	mJ	
Diode Ruggedness (Per Leg)	dV/dt	V_R = 0 ~ 960 V	200	V/ns	
Power Dissipation (Per Leg / Per Device)	P_{TOT}	T_C = 25°C	175 / 350	W	Fig. 3
Operating and Storage Temperature	T_j , T_{stg}		-55 to 175	°C	

* Per Device

Electrical Characteristics (Per Leg)

Parameter	Symbol	Conditions	Values			Unit	Note
			Min.	Typ.	Max.		
Diode Forward Voltage	V_F	I_F = 10 A, T_j = 25°C		1.5	1.8	V	Fig. 1
		I_F = 10 A, T_j = 175°C		1.9			
Reverse Current	I_R	V_R = 1200 V, T_j = 25°C		1	5	µA	Fig. 2
		V_R = 1200 V, T_j = 175°C		7			
Total Capacitive Charge	Q_C	V_R = 400 V		22		nC	Fig. 7
		V_R = 800 V		32			
Switching Time	t_S	$I_F ≤ I_{F,MAX}$ dI_F/dt = 200 A/µs V_R = 400 V		< 10		ns	
		V_R = 800 V					
Total Capacitance	C	V_R = 1 V, f = 1MHz		367		pF	Fig. 6
		V_R = 800 V, f = 1MHz		21			

Thermal/Package Characteristics

Parameter	Symbol	Conditions	Values			Unit	Note
			Min.	Typ.	Max.		
Thermal Resistance, Junction - Case (Per Leg)	R_{thJC}			0.86		°C/W	Fig. 9
Weight	W_T			6.1		g	
Mounting Torque	T_M	Screws to Heatsink			1.1	Nm	

GeneSiC™
SEMICONDUCTOR

Figure 1: Typical Forward Characteristics (Per Leg)

175°C
150°C
125°C
75°C
25°C

Forward Current, I_F (A)

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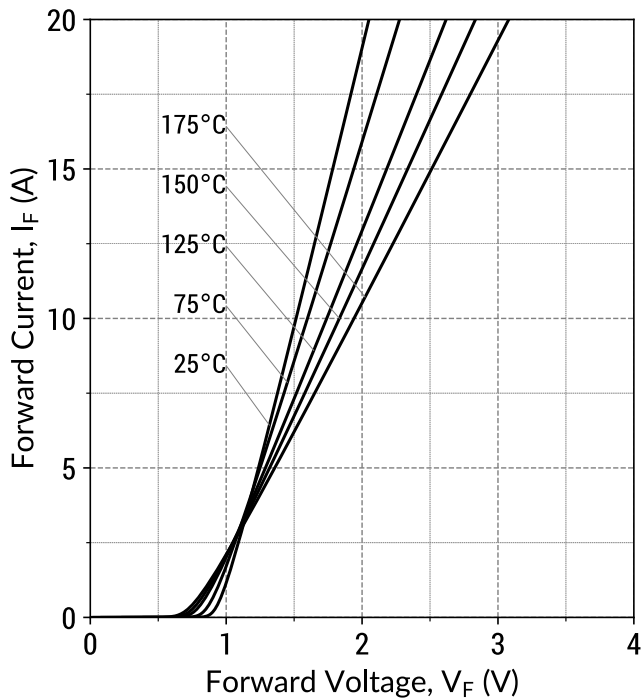
$I_F = f(V_F,T_j)$; $t_P = 250\ \mu s$

Figure 2: Typical Reverse Characteristics (Per Leg)

175°C
150°C
125°C
75°C
25°C

Reverse Current, I_R (A)

Reverse Voltage, V_R (V)
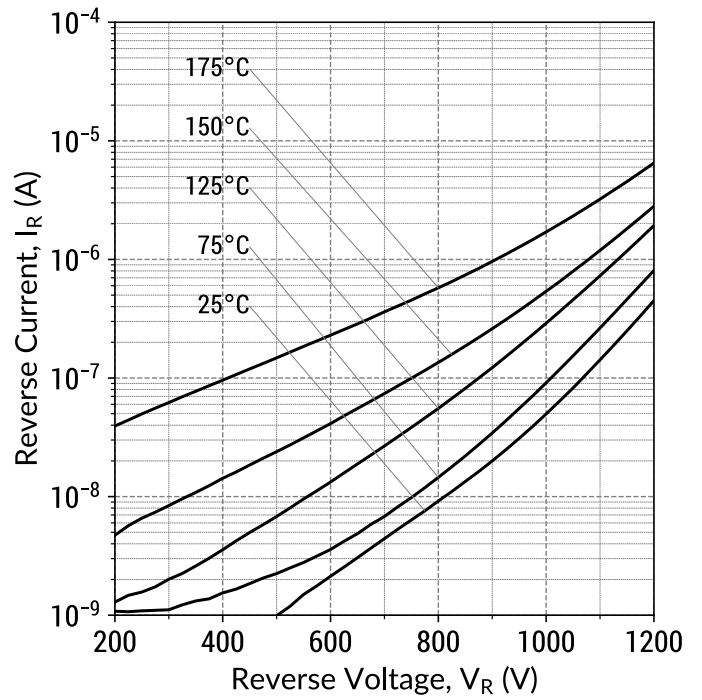
$I_R = f(V_R,T_j)$

Figure 3: Power Derating Curves (Per Leg)

Power Dissipated (W)

Case Temperature, T_L (°C)
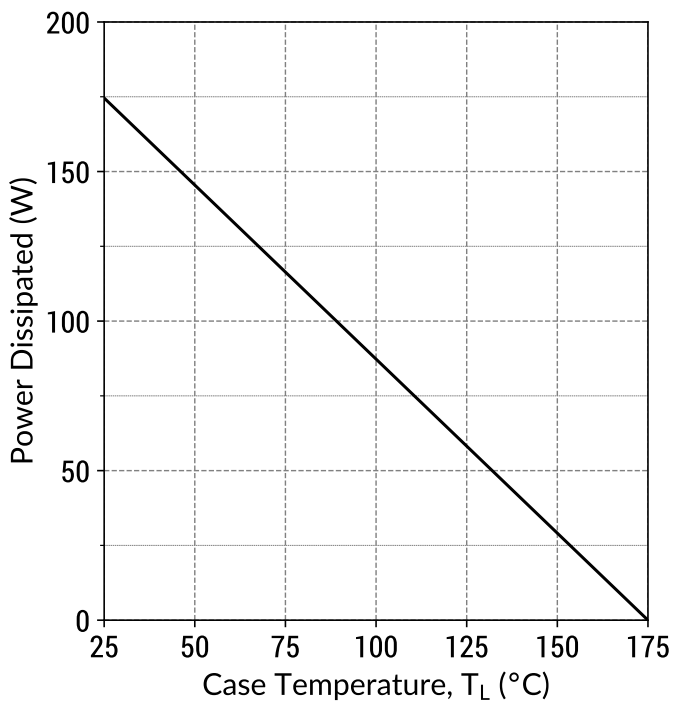
$P_{TOT} = f(T_C)$; $T_j = 175°C$

Figure 4: Current Derating Curves (Typical V_F) (Per Leg)

D = 0.1
D = 0.2
D = 0.3
D = 0.5
D = 0.7
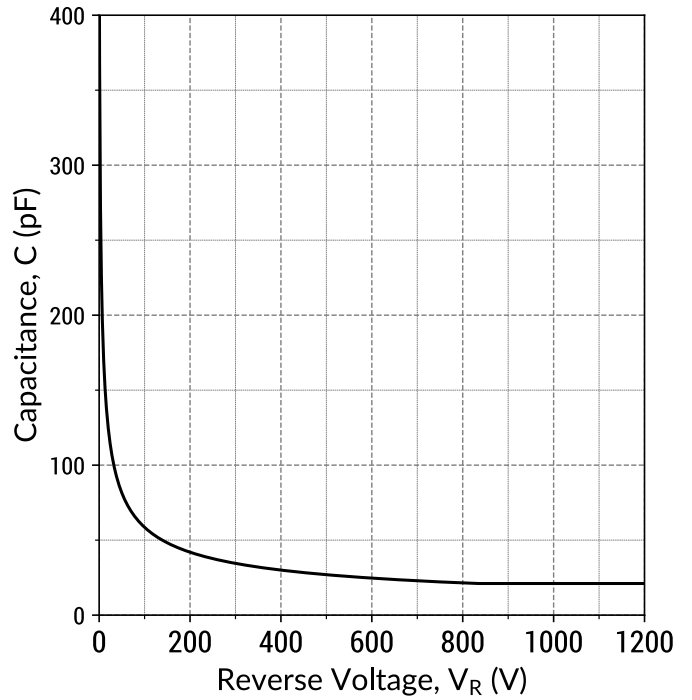D = 1

Current Rating (A)

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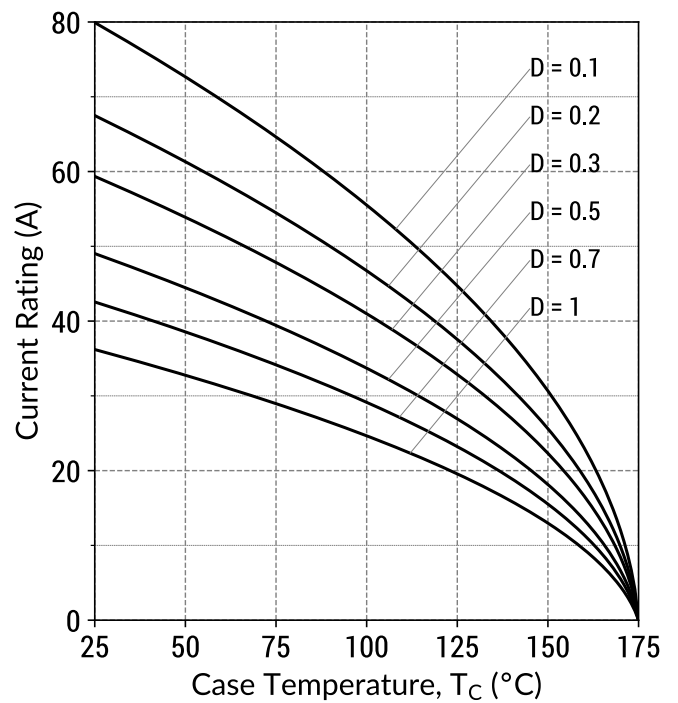
$I_F = f(T_C)$; $D = t_P/T$; $T_j \leq 175°C$; $f_{SW} > 10kHz$

Figure 5: Current Derating Curves (Maximum V_F) (Per Leg)
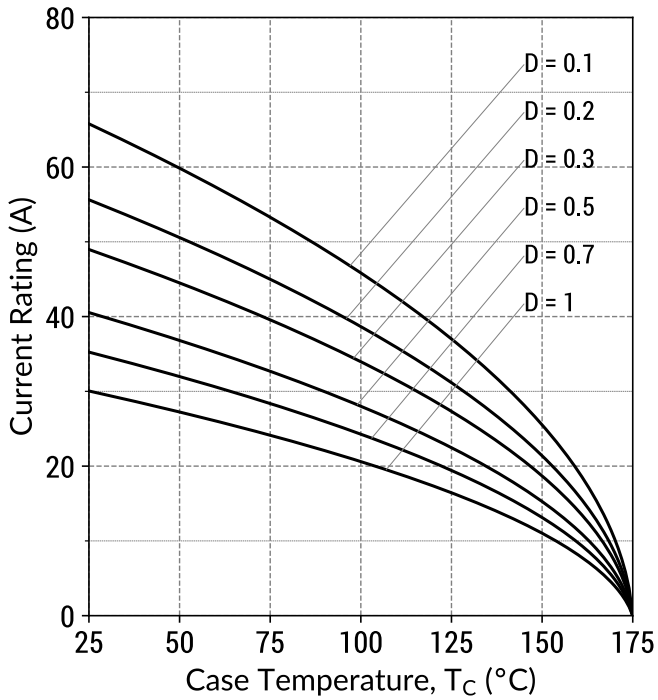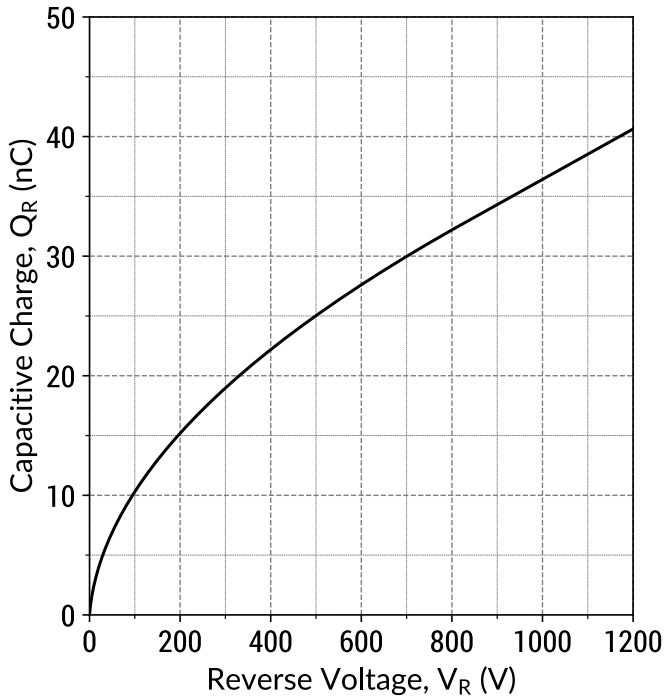

$I_F = f(T_C); D = t_P/T; T_j ≤ 175°C; f_{SW} > 10kHz$

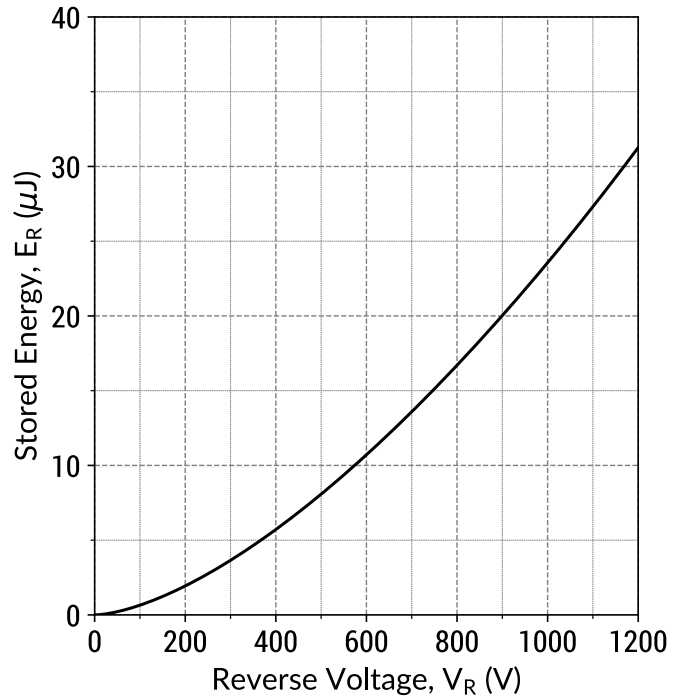## Figure 6: Typical Junction Capacitance vs Reverse Voltage Characteristics (Per Leg)

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

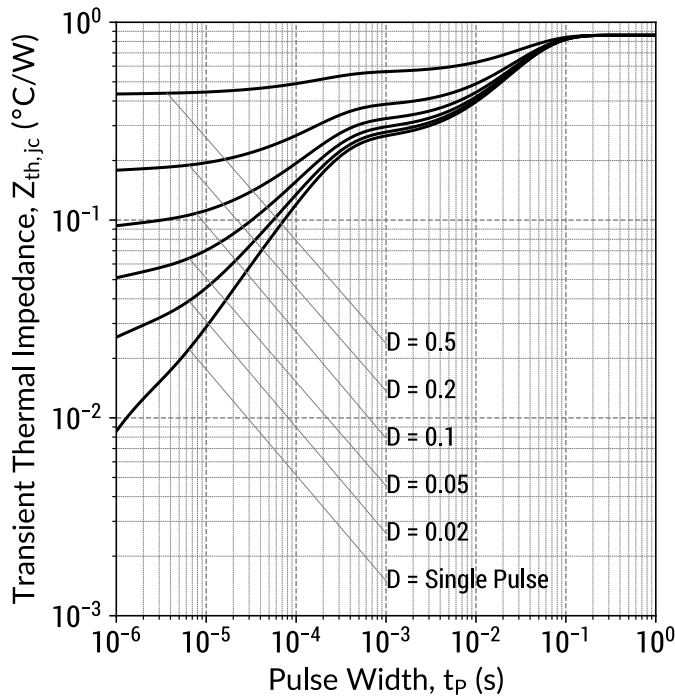## Figure 7: Typical Capacitive Charge vs Reverse Voltage Characteristics (Per Leg)

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

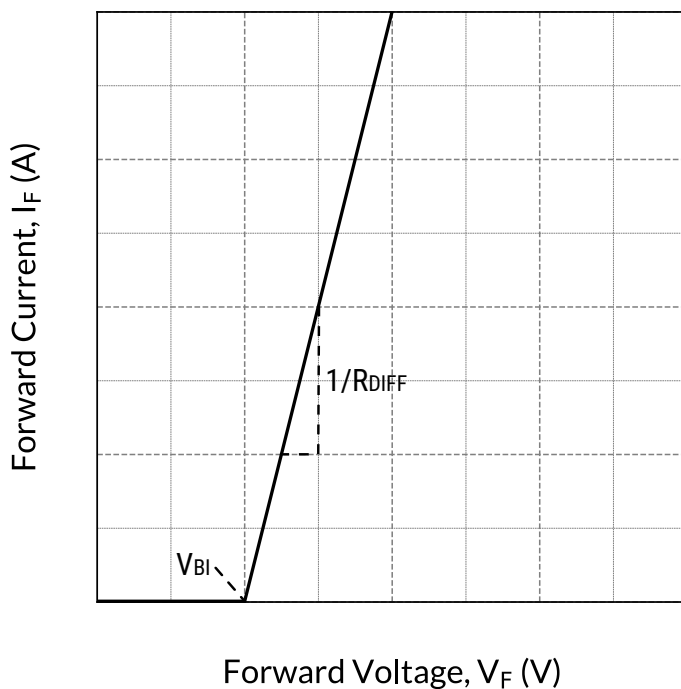## Figure 8: Typical Capacitive Energy vs Reverse Voltage Characteristics (Per Leg)

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

GeneSiC™
SEMICONDUCTOR

Figure 9: Transient Thermal Impedance (Per Leg)

D = 0.5
D = 0.2
D = 0.1
D = 0.05
D = 0.02
D = Single Pulse

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

Figure 10: Forward Curve Model (Per Leg)

$1/R_{DIFF}$

V_{BI}

$I_F = f(V_F, T_j)$

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 = 1.19e-06 (Ω/°C^2)
b = 0.000165 (Ω/°C)
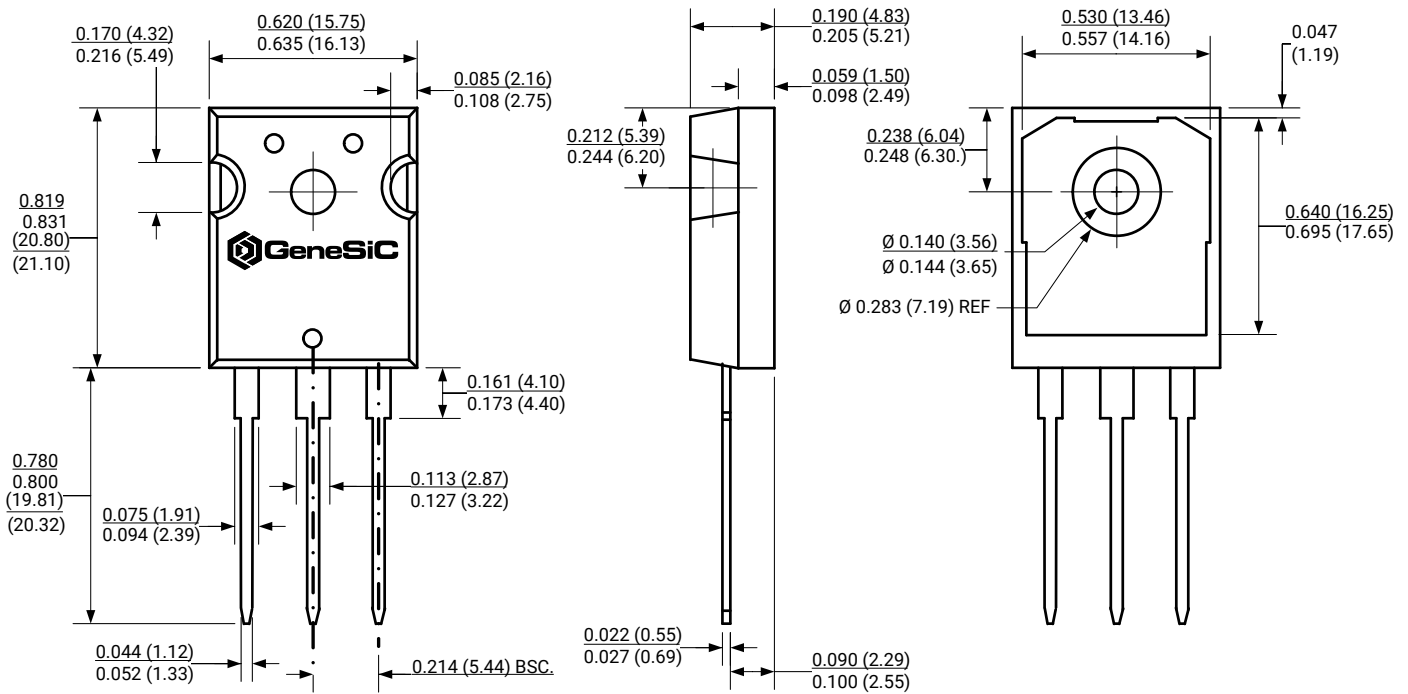c = 0.049 (Ω)

Forward Power Loss Equation:

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

GeneSiC
SEMICONDUCTOR

Package Dimensions

TO-247-3 Package Outline

Recommended Solder Pad Layout

Package View

Case (K)

A   A
K
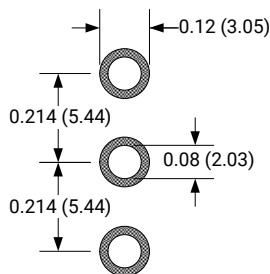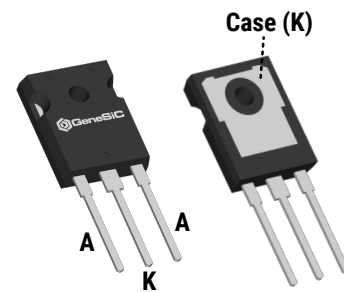
NOTE

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.

Disclaimer

GeneSiC Semiconductor, Inc. reserves right to make changes to the product specifications and data in this document without notice. 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.

Unless otherwise expressly indicated, GeneSiC products are not designed, tested or authorized for use in life-saving, medical, aircraft navigation, communication, air traffic control and weapons systems, nor in applications where their failure may result in death, personal injury and/or property damage.

Related Links

- SPICE Models: https://www.genesicsemi.com/sic-schottky-mps/GD2X10MPS12D/GD2X10MPS12D_SPICE.zip
- PLECS Models: https://www.genesicsemi.com/sic-schottky-mps/GD2X10MPS12D/GD2X10MPS12D_PLECS.zip
- CAD Models: https://www.genesicsemi.com/sic-schottky-mps/GD2X10MPS12D/GD2X10MPS12D_3D.zip
- 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/

Jul. 20 Rev 1
Copyright© 2020 GeneSiC Semiconductor Inc.
All Rights Reserved.

Published by GeneSiC Semiconductor, Inc.
43670 Trade Center Place Suite 155, Dulles, VA 20166; USA
Page 7 of 7