GB2X50MPS12-227

1200 V SiC MPS™ Diode

Silicon Carbide Power Schottky Diode

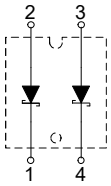
V_{RRM}	=	1200 V
$I_{F\ (Tc\ =\ 132°C)}$	=	100 A*
Q_C	=	554 nC*

Features

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

Package

SOT-227



Advantages

- Low Standby Power Losses
- 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

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

Absolute Maximum Ratings

Parameter	Symbol	Conditions	Values	Unit
Repetitive Peak Reverse Voltage (Per Leg)	V_{RRM}		1200	V
Continuous Forward Current (Per Leg/Per Device)	I_F	T_C = 25 °C, D = 1 T_C = 132 °C, D = 1	102/204 50/100	A
Non-Repetitive Peak Forward Surge Current, Half Sine Wave (Per Leg)	$I_{F,SM}$	T_C = 25 °C, t_P = 10 ms T_C = 150 °C, t_P = 10 ms	320 280	A
Repetitive Peak Forward Surge Current, Half Sine Wave (Per Leg)	$I_{F,RM}$	T_C = 25 °C, t_P = 10 ms T_C = 150 °C, t_P = 10 ms	220 150	A
Non-Repetitive Peak Forward Surge Current (Per Leg)	$I_{F,max}$	T_C = 25 °C, t_P = 10 µs	1400	A
I^2t Value (Per Leg)	$\int i^2\,dt$	T_C = 25 °C, t_P = 10 ms	300	A^2s
Non-Repetitive Avalanche Energy (Per Leg)	E_{AS}	L = 1 mH, I_{AV} = 42 A, V_{DD} = 60 V	450	mJ
Diode Ruggedness (Per Leg)	dV/dt	V_R = 0 ~ 960 V	100	V/µs
Power Dissipation (Per Leg/Per Device)	P_{tot}	T_C = 25 °C	380/760	W
Operating and Storage Temperature	T_j , T_{stg}		-55 to 175	°C

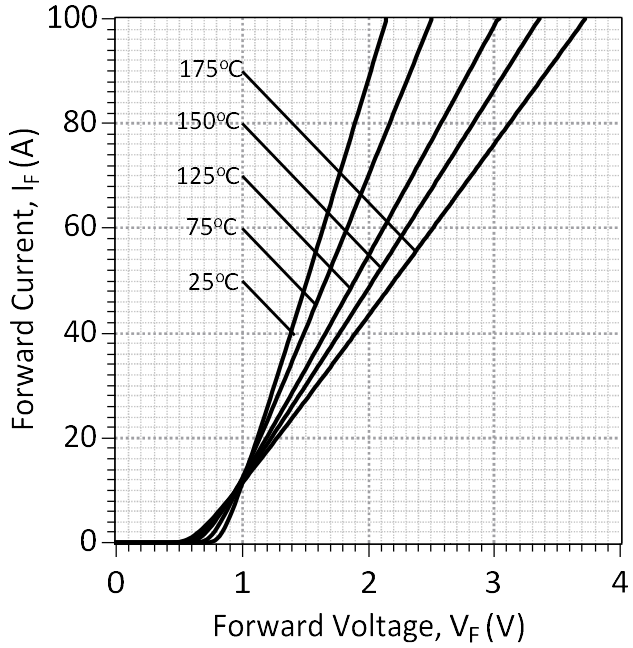
Electrical Characteristics (Per Leg)

Parameter	Symbol	Conditions		Values min.	Values typ.	Values max.	Unit
Diode Forward Voltage	V_F	I_F = 50 A, T_j = 25 °C I_F = 50 A, T_j = 175 °C			1.5 2.3	1.8 2.7	V
Reverse Current	I_R	V_R = 1200 V, T_j = 25 °C V_R = 1200 V, T_j = 175 °C			5 40	70 475	µA
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 V_R = 800 V		186 277		nC
Switching Time	t_s		V_R = 400 V V_R = 800 V		< 10		ns
Total Capacitance	C	V_R = 1 V, f = 1 MHz, T_j = 25 °C V_R = 800 V, f = 1 MHz, T_j = 25 °C			3037 203		pF

Thermal / Mechanical Characteristics

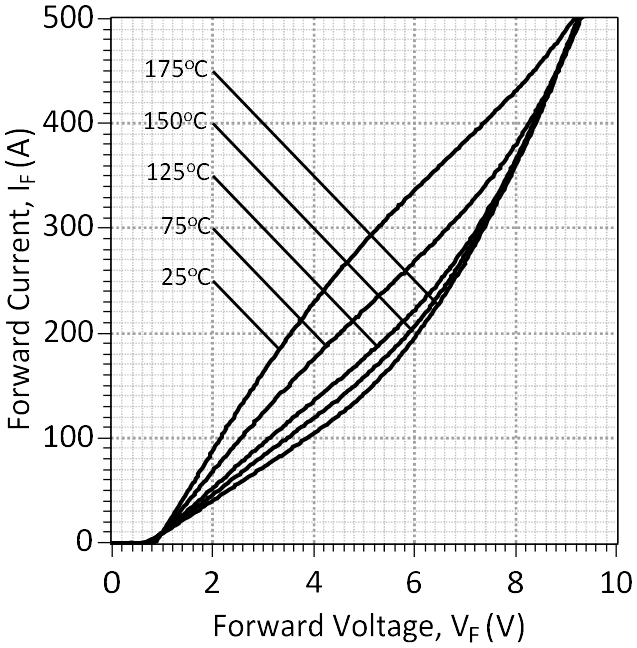
Thermal Resistance, Junction – Case (Per Leg)	R_{thJC}	0.39	°C/W

* Per Device, ** Per Leg



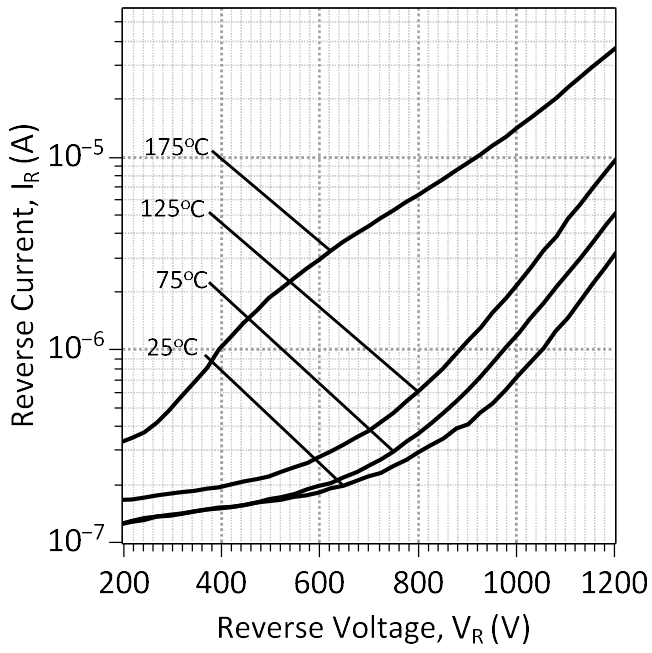
$I_F = f(V_F, T_j)$; t_P = 300 µs

Figure 1: Typical Forward Characteristics (Per Leg)



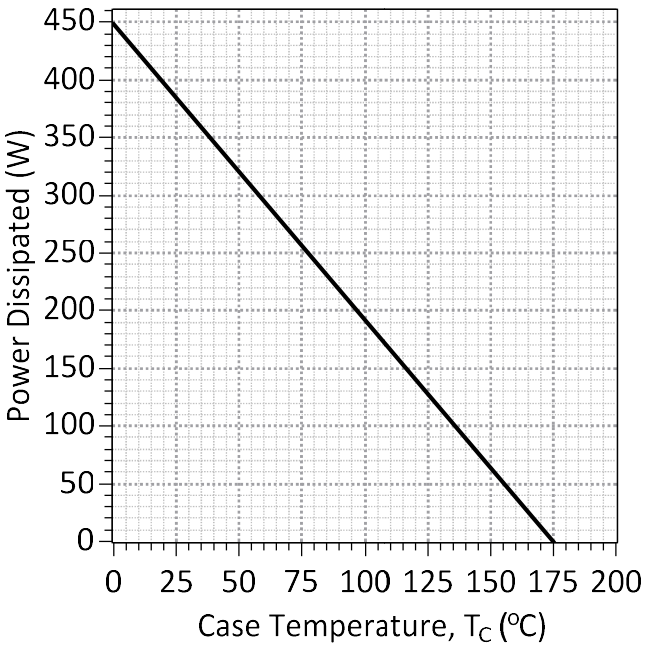
$I_F = f(V_F, T_j)$; t_P = 300 µs

Figure 2: Typical High Current Forward Characteristics (Per Leg)



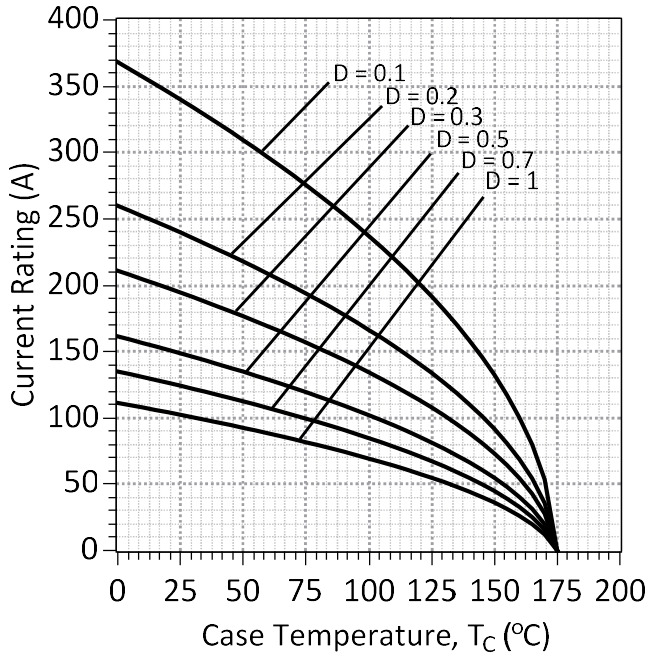
$I_R = f(V_R, T_j)$

Figure 3: Typical Reverse Characteristics (Per Leg)



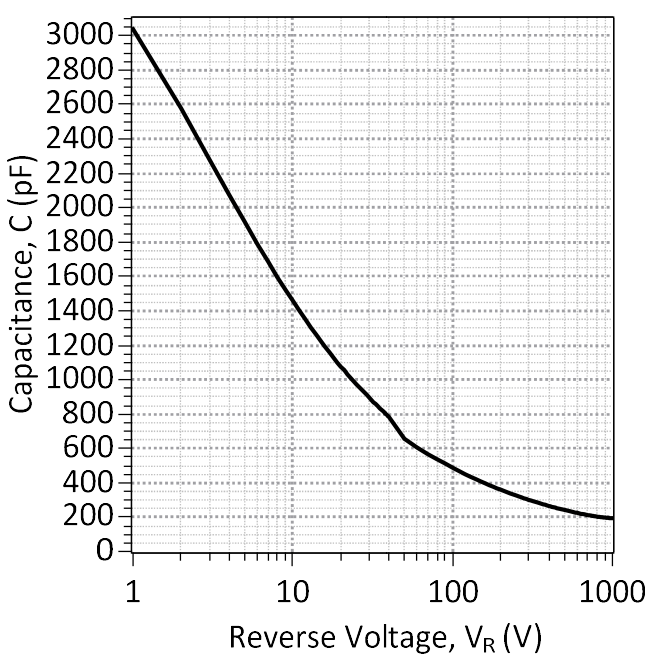
$P_{tot} = f(T_j)$

Figure 4: Power Derating Curve (Per Leg)



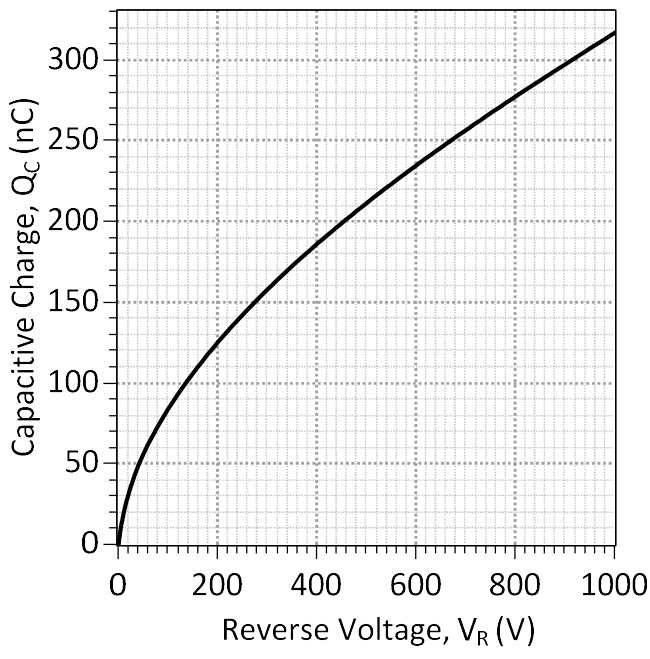
$I_F = f(T_C)$; D = t_P/T, t_P= 10 µs

Figure 5: Current Derating Curves (Per Leg)



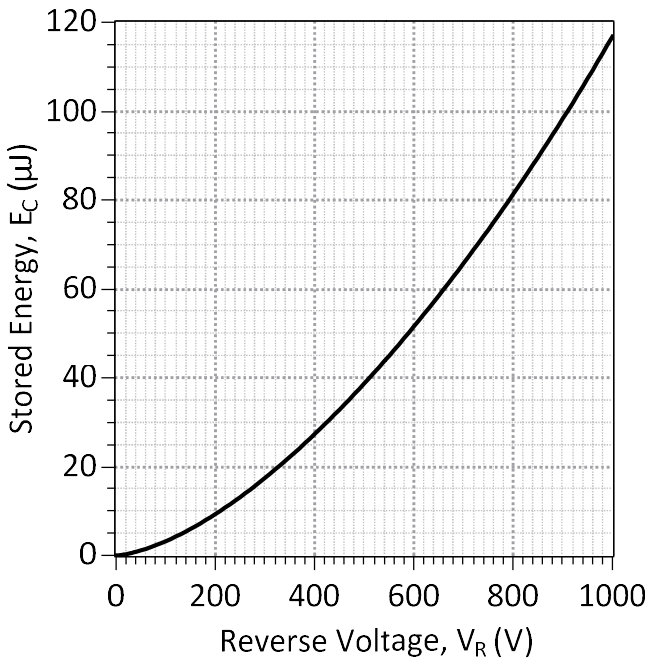
C = f(V_R); T_j = 25 °C; f = 1MHz

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



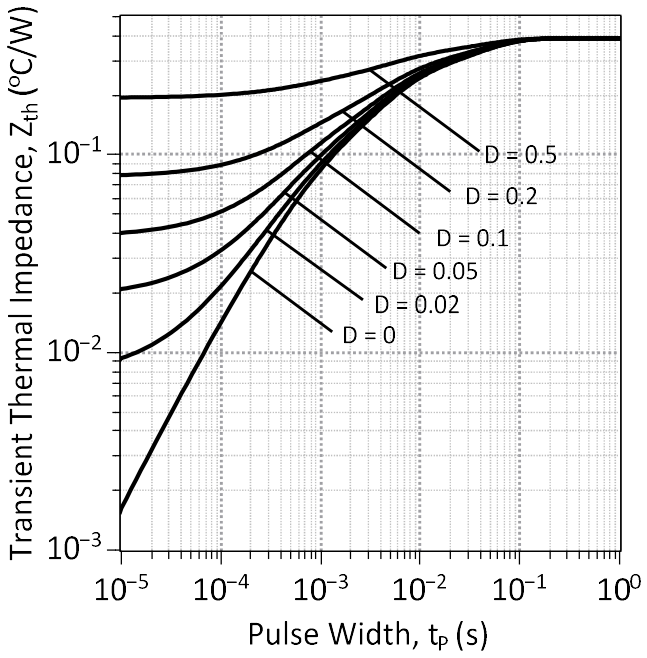
Q_c = f(V_R); T_j = 25 °C; f = 1MHz

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



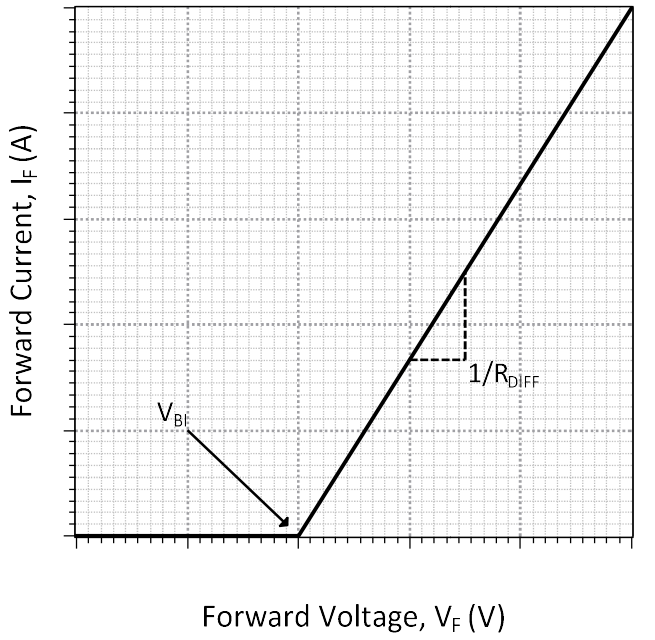
E_C = f(V_R); T_j = 25 °C; f = 1MHz

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



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

Figure 9: Transient Thermal Impedance (Per Leg)



$I_F = f(V_F, T_j)$

Figure 10: Forward Curve Model (Per Leg)

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

Built-In Voltage (V_{BI}):

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

m = -1.29e-03, b = 0.913

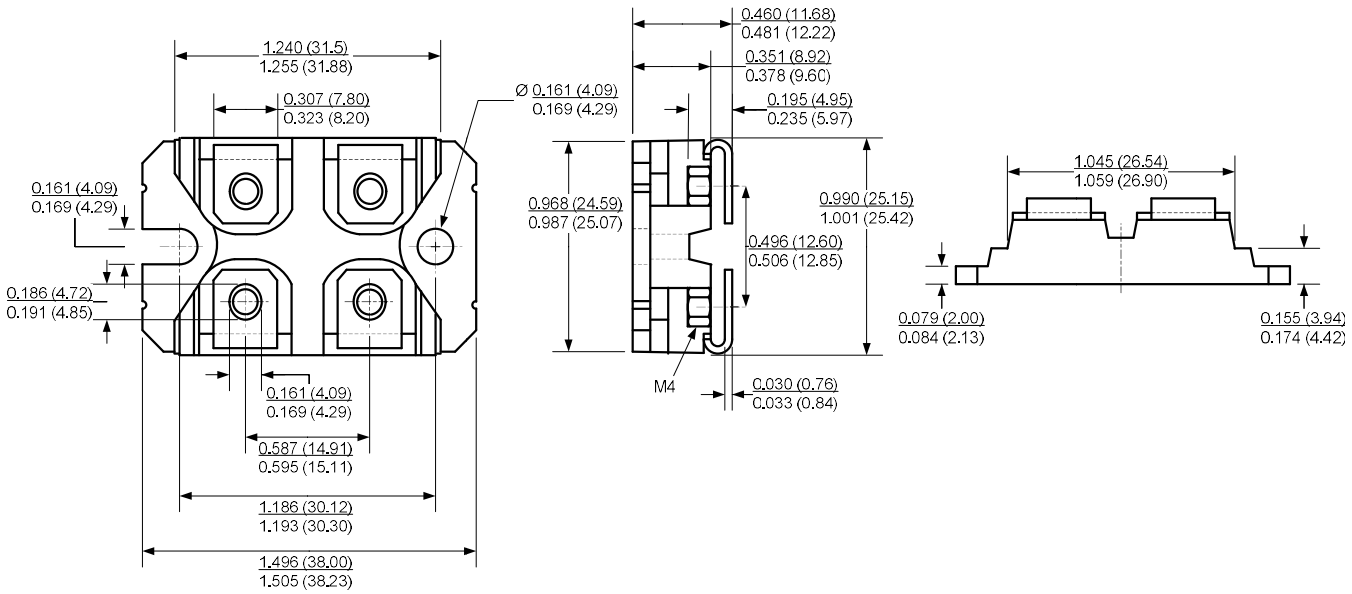
Differential Resistance (R_{DIFF}):

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

a = 6.10e-05, b = 9.01e-03, c = 2.01

Package Dimensions:

SOT-227 **PACKAGE OUTLINE**



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 (RoHS2), as implemented January 2, 2013. 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.

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- Soldering Document: http://www.genesicsemi.com/quality/quality-manual/
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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/sic_rectifiers_diodes/merged_pin_schottky/GB2X50MPS12-227_SPICE.pdf) into LTSPICE (version 4) software for simulation of the GB2X50MPS12-227. All the simulations are per leg.

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*     GeneSiC Semiconductor SiC MPS™ Rectifier
*     Revision: 1.1
*     Date: February-2018
*********************************************************************
**          SOT-227 package
*********************************************************************
.SUBCKT GB2X50MPS12 A K Case
L_anode     A       AD      10n
D1          AD      Case    GC50MPS12
L_cathode   K       Case    10n
.ends
*********************************************************************
.SUBCKT GB2X50MPS12 ANODE KATHODE
D1 ANODE KATHODE GC50MPS12_SCHOTTKY
.MODEL GC50MPS12_SCHOTTKY D
+ IS        4.27E-14          RS          0.0124
+ N         1                 IKF         500
+ EG        1.2               XTI         2
+ TRS1      0.005434          TRS2        2.717E-05
+ CJO       4.24E-10          VJ          0.879
+ M         0.438             FC          0.5
+ TT        1.00E-10          BV          1600
+ IBV       5E-06             VPK         1200
+ IAVE      50                TYPE        SiC_MPS™
+ MFG       GeneSiC_Semi
.ENDS
* End of GB2X50MPS12-227 SPICE Model
*********************************************************************
* This model is 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."
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