GC10MPS12-220

1200 V SiC MPS™ Diode

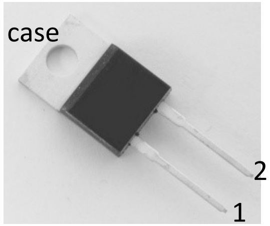
Silicon Carbide Power Schottky Diode

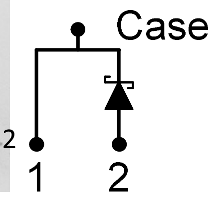
V_{RRM}	=	1200 V
$I_{F\ (Tc\ =\ 135°C)}$	=	23 A
Q_C	=	56 nC

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





TO-220-2L

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

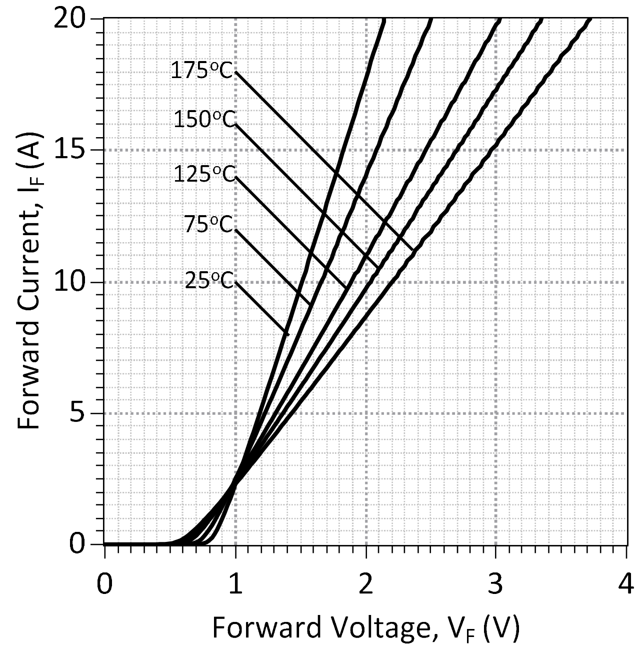
Parameter	Symbol	Conditions	Values	Unit
Repetitive Peak Reverse Voltage	V_{RRM}		1200	V
Continuous Forward Current	I_F	T_C = 25 °C, D = 1 T_C = 135 °C, D = 1 T_C = 166 °C, D = 1	46 23 10	A
Non-Repetitive Peak Forward Surge Current, Half Sine Wave	$I_{F,SM}$	T_C = 25 °C, t_P = 10 ms T_C = 150 °C, t_P = 10 ms	81 65	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	50 35	A
Non-Repetitive Peak Forward Surge Current	$I_{F,max}$	T_C = 25 °C, t_P = 10 µs	860	A
I^2t Value	$\int i^2\, dt$	T_C = 25 °C, t_P = 10 ms	30	A^2s
Non-Repetitive Avalanche Energy	E_{AS}	L = 5 mH, I_{AV} = 10 A, V_{DD} = 60 V	150	mJ
Diode Ruggedness	dV/dt	V_R = 0 ~ 960 V	100	V/µs
Power Dissipation	P_{tot}	T_C = 25 °C	360	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 = 10 A, T_j = 25 °C I_F = 10 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			1 8	14 95	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		37 56		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			616 41		pF

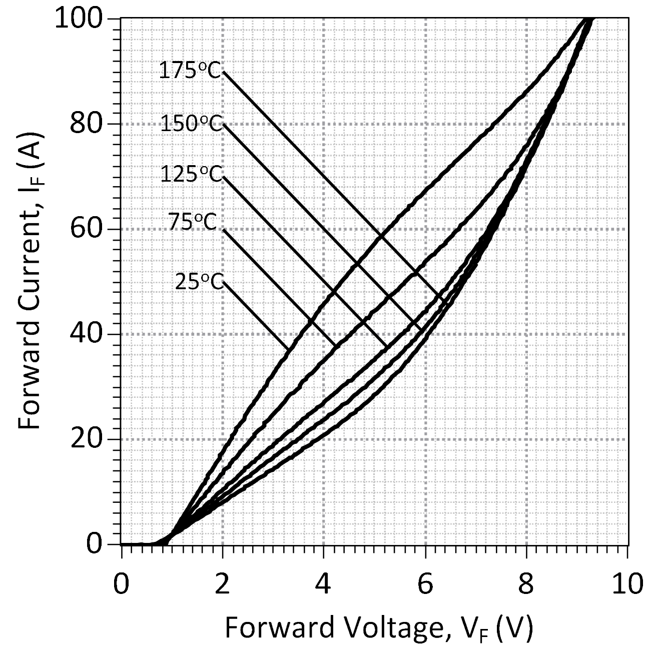
Thermal / Mechanical Characteristics

Thermal Resistance, Junction - Case	R_{thJC}		0.42	°C/W



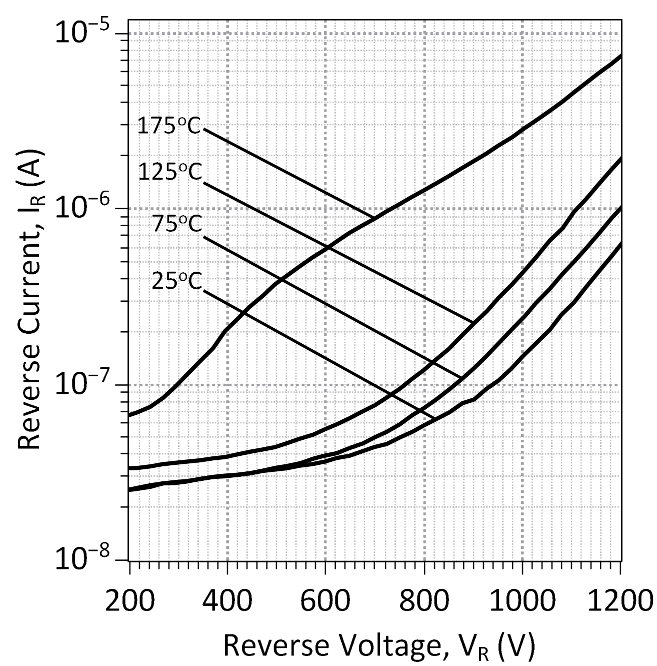
$I_F = f(V_F, T_j)$; t_P = 300 µs

Figure 1: Typical Forward Characteristics



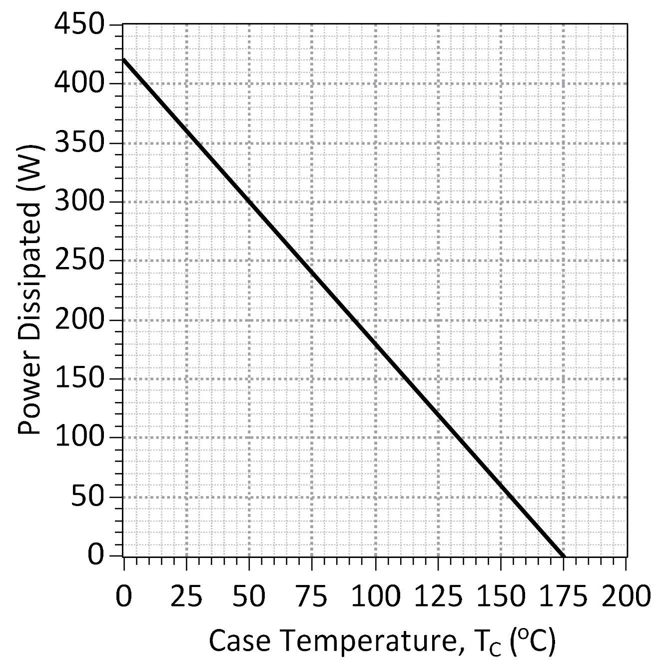
$I_F = f(V_F, T_j)$; t_P = 300 µs

Figure 2: Typical High Current Forward Characteristics



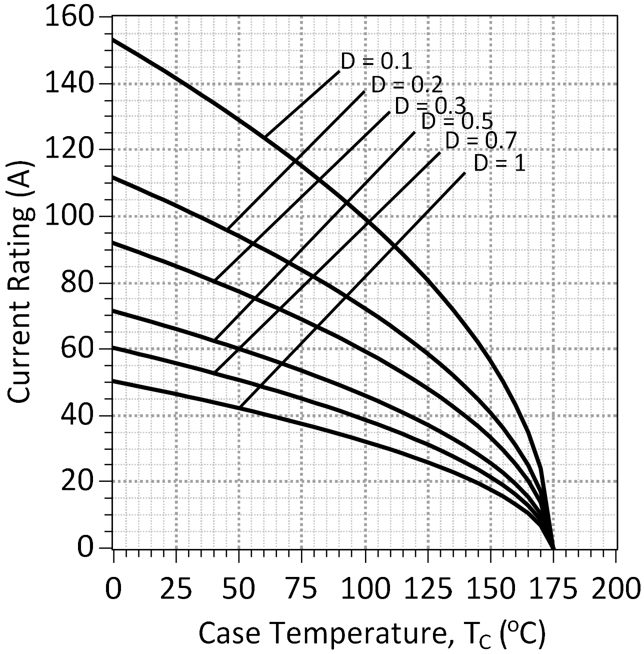
$I_R = f(V_R, T_j)$

Figure 3: Typical Reverse Characteristics



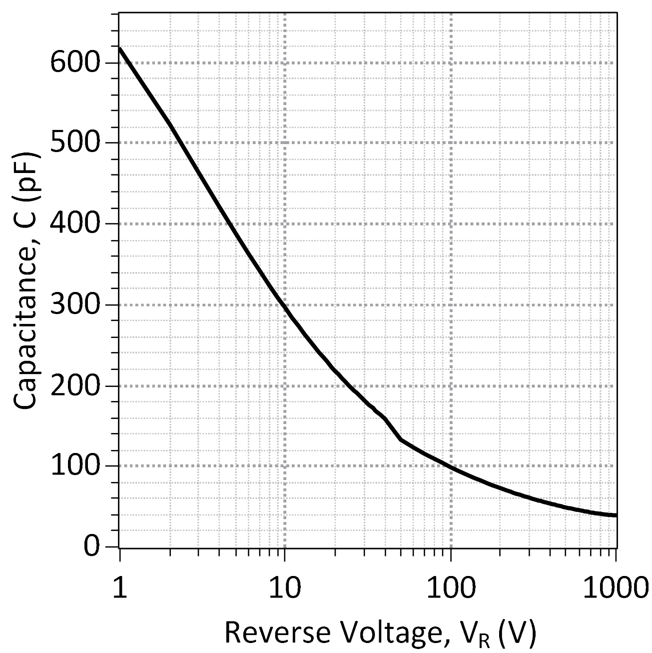
$P_{tot} = f(T_j)$

Figure 4: Power Derating Curve



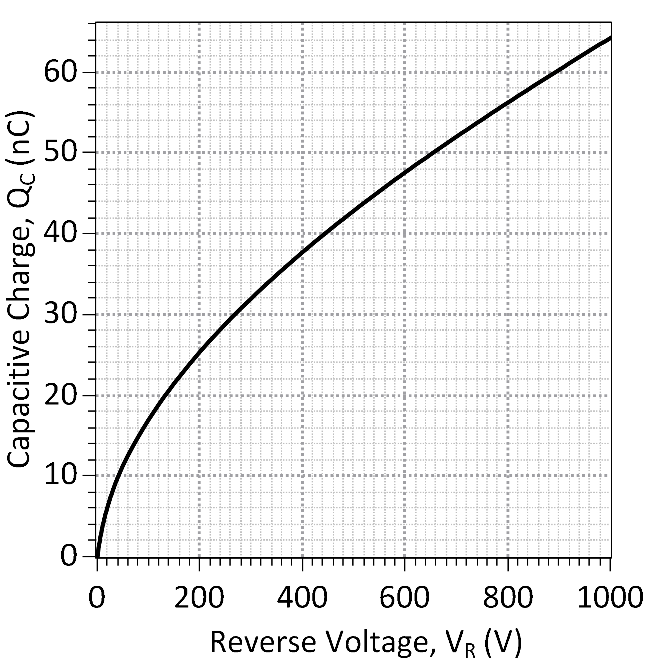
$I_F = f(T_C)$; $D = t_P/T$, t_P= 10 µs

Figure 5: Current Derating Curves



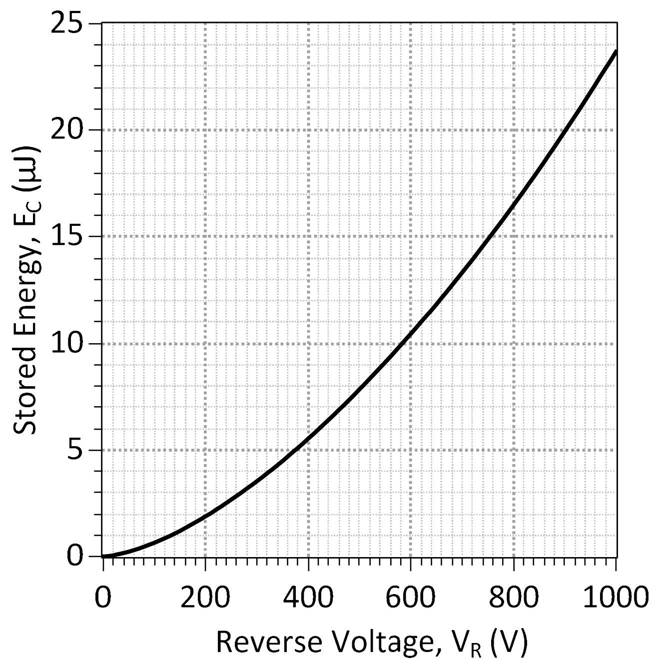
$C = f(V_R)$; T_j = 25 °C; f = 1MHz

Figure 6: Typical Junction Capacitance vs Reverse Voltage Characteristics



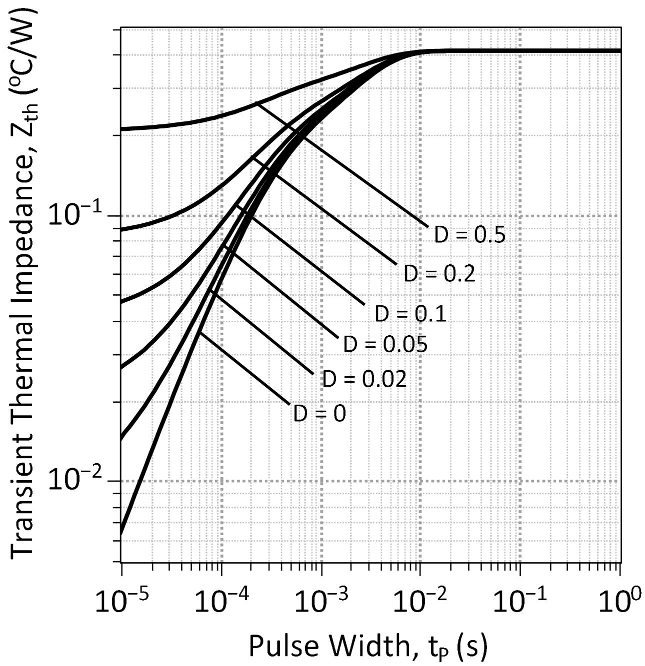
$Q_c = f(V_R)$; T_j = 25 °C; f = 1MHz

Figure 7: Typical Capacitive Charge vs. Reverse Voltage Characteristics



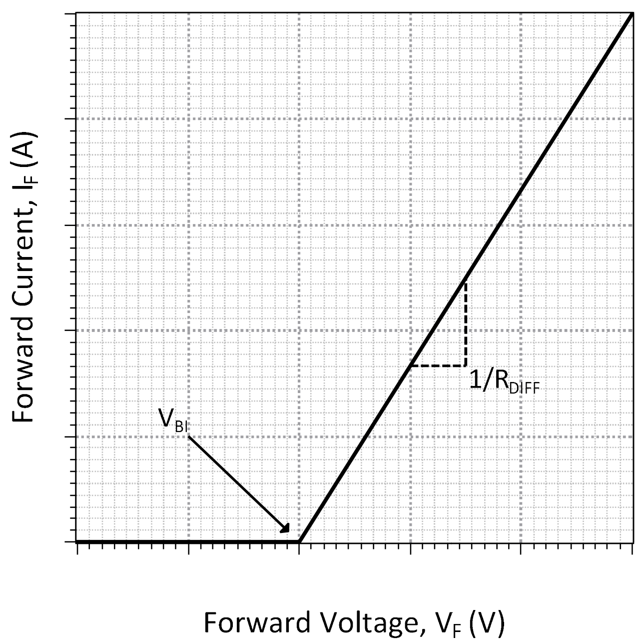
$E_C = f(V_R)$; T_j = 25 °C; f = 1MHz

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

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

Built-In Voltage (V_{BI}):

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

m = -1.32e-03, b = 0.915

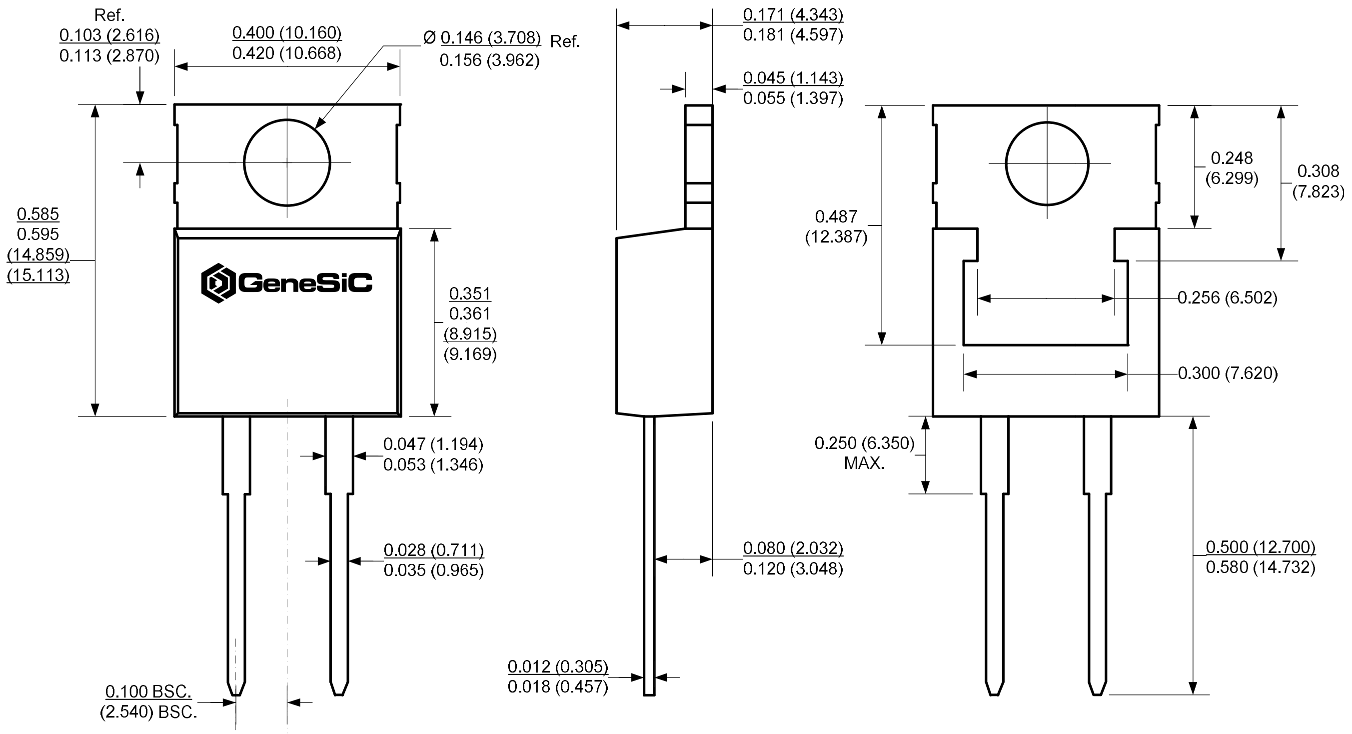
Differential Resistance (R_{DIFF}):

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

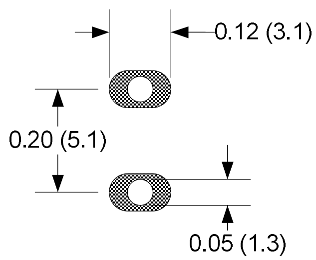
a = 7.30e-05, b = 8.99e-03, c = 2.26

Package Dimensions:

TO-220-2L **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 (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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Related Links

- Soldering Document: http://www.genesicsemi.com/quality/quality-manual/
- Tin-whisker Report: http://www.genesicsemi.com/quality/compliance/
- Reliability Report: http://www.genesicsemi.com/quality/reliability/

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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/GC10MPS12-220_SPICE.pdf) into LTSPICE (version 4) software for simulation of the GC10MPS12-220.

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*     GeneSiC Semiconductor SiC MPS™ Rectifier
*     Revision: 1.1
*     Date: February-2018
**************************************************************************
**          TO-220-2 package
**************************************************************************
.SUBCKT GC10MPS12 A K Case
L_anode     A       AD       6.5n
D1          AD      Case     GC10MPS12
L_cathode   K       Case     6.5n
.ends
**************************************************************************
.SUBCKT GC10MPS12 ANODE KATHODE
D1 ANODE KATHODE GC10MPS12_SCHOTTKY
.MODEL GC10MPS12_SCHOTTKY D
+ IS        8.721E-15        RS          0.062
+ N         1                IKF         500
+ EG        1.2              XTI         2
+ TRS1      0.005434         TRS2        2.717E-05
+ CJO       8.59E-10         VJ          0.879
+ M         0.438            FC          0.5
+ TT        1.00E-10         BV          1600
+ IBV       1E-06            VPK         1200
+ IAVE      10               TYPE        SiC_MPS™
+ MFG       GeneSiC_Semi
.ENDS
* End of GC10MPS12-220 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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