

# GCO2MPS12-252

1200V SiC MPST™ Diode

Silicon Carbide Power  
Schottky Diode

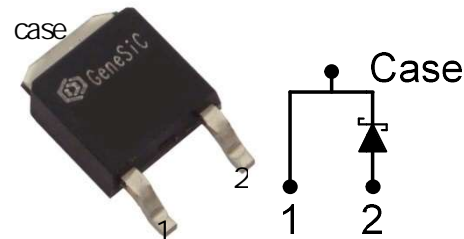


$V_{RRM}$	=	1200 V
$I_F (T_C = 135^\circ\text{C})$	=	5 A
$Q_C$	=	11 nC

## 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-252-2L



## 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	$I_F$	$T_C = 25^\circ\text{C}, D = 1$	11	A
		$T_C = 135^\circ\text{C}, D = 1$	5	
		$T_C = 168^\circ\text{C}, D = 1$	2	
Non-Repetitive Peak Forward Surge Current, Half Sine Wave	$I_{F,SM}$	$T_C = 25^\circ\text{C}, t_p = 10\text{ ms}$	21	A
		$T_C = 150^\circ\text{C}, t_p = 10\text{ ms}$	17	
Repetitive Peak Forward Surge Current, Half Sine Wave	$I_{F,RM}$	$T_C = 25^\circ\text{C}, t_p = 10\text{ ms}$	14	A
		$T_C = 150^\circ\text{C}, t_p = 10\text{ ms}$	8	
Non-Repetitive Peak Forward Surge Current	$I_{F,max}$	$T_C = 25^\circ\text{C}, t_p = 10\text{ }\mu\text{s}$	220	A
$i^2t$ Value	$i^2 dt$	$T_C = 25^\circ\text{C}, t_p = 10\text{ ms}$	1.8	$\text{A}^2\text{s}$
Non-Repetitive Avalanche Energy	$E_{AS}$	$L = 30\text{ mH}, I_{AV} = 2\text{ A}, V_{DD} = 60\text{ V}$	30	mJ
Diode Ruggedness	$dV/dt$	$V_R = 0 \sim 960\text{ V}$	100	$\text{V}/\mu\text{s}$
Power Dissipation	$P_{tot}$	$T_C = 25^\circ\text{C}$	94	W
Operating and Storage Temperature	$T_j, T_{stg}$		-55 to 175	$^\circ\text{C}$

## Electrical Characteristics

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	
Diode Forward Voltage	$V_F$	$I_F = 2\text{ A}, T_j = 25^\circ\text{C}$		1.5	1.8	V
		$I_F = 2\text{ A}, T_j = 175^\circ\text{C}$		2.3	2.7	
Reverse Current	$I_R$	$V_R = 1200\text{ V}, T_j = 25^\circ\text{C}$		0.2	2	$\mu\text{A}$
		$V_R = 1200\text{ V}, T_j = 175^\circ\text{C}$		1	19	
Total Capacitive Charge	$Q_C$	$I_F = I_{F,MAX}$ $di_F/dt = 200\text{ A}/\mu\text{s}$ $T_j = 175^\circ\text{C}$	$V_R = 400\text{ V}$	7		nC
			$V_R = 800\text{ V}$	11		
Switching Time	$t_s$	$V_R = 400\text{ V}$ $V_R = 800\text{ V}$		< 10		ns
Total Capacitance	C	$V_R = 1\text{ V}, f = 1\text{ MHz}, T_j = 25^\circ\text{C}$		118		pF
		$V_R = 800\text{ V}, f = 1\text{ MHz}, T_j = 25^\circ\text{C}$		8		

## Thermal /Mechanical Characteristics

Thermal Resistance, Junction - Case	$R_{\theta JC}$	1.6	$^\circ\text{C}/\text{W}$
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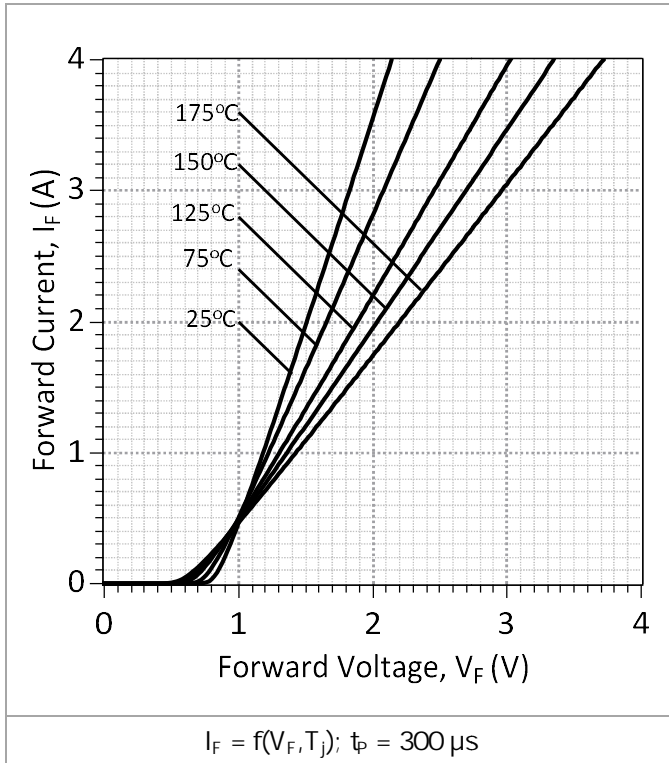


Figure 1: Typical Forward Characteristics

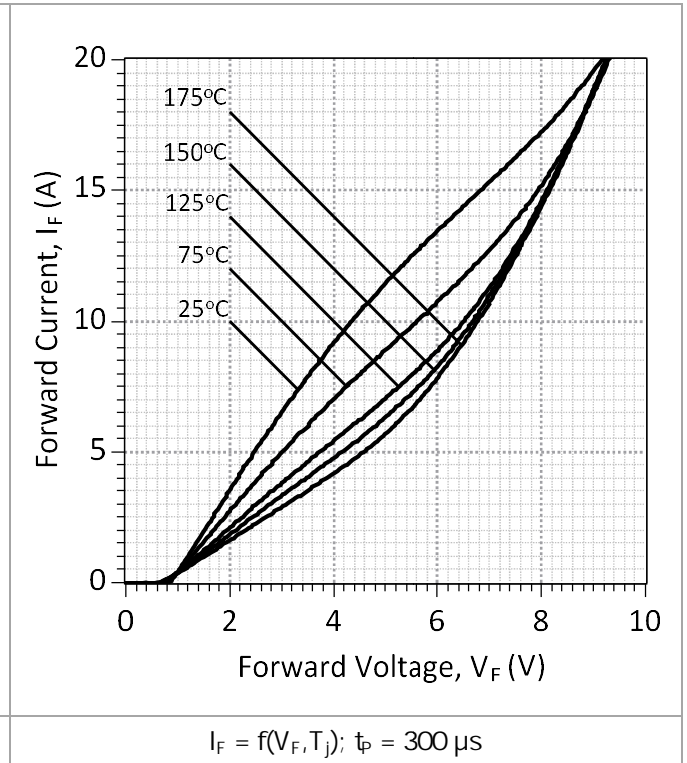


Figure 2: Typical High Current Forward Characteristics

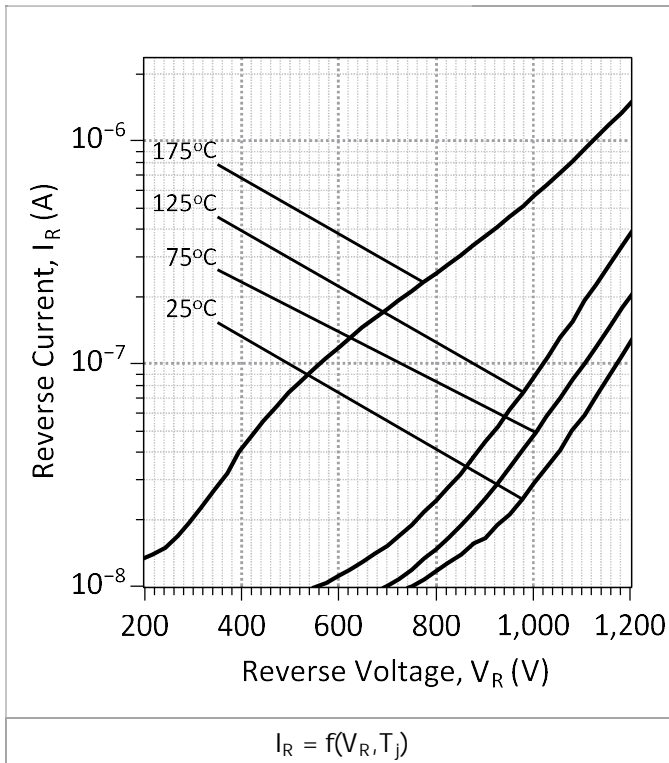


Figure 3: Typical Reverse Characteristics

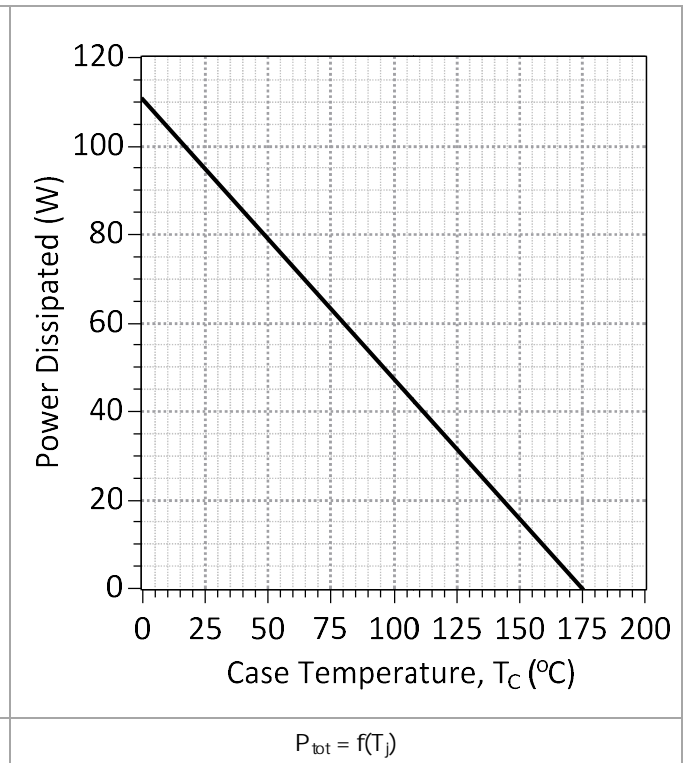


Figure 4: Power Derating Curve

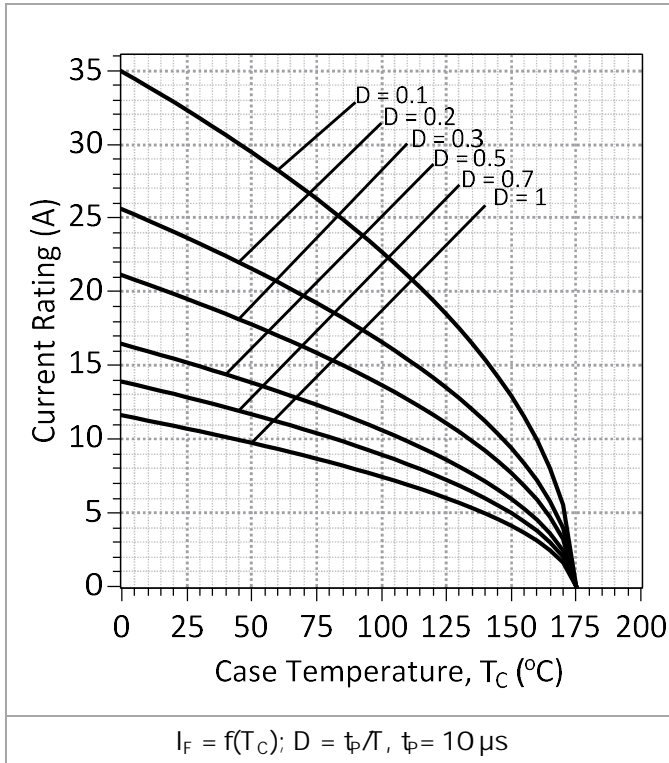


Figure 5: Current Derating Curves

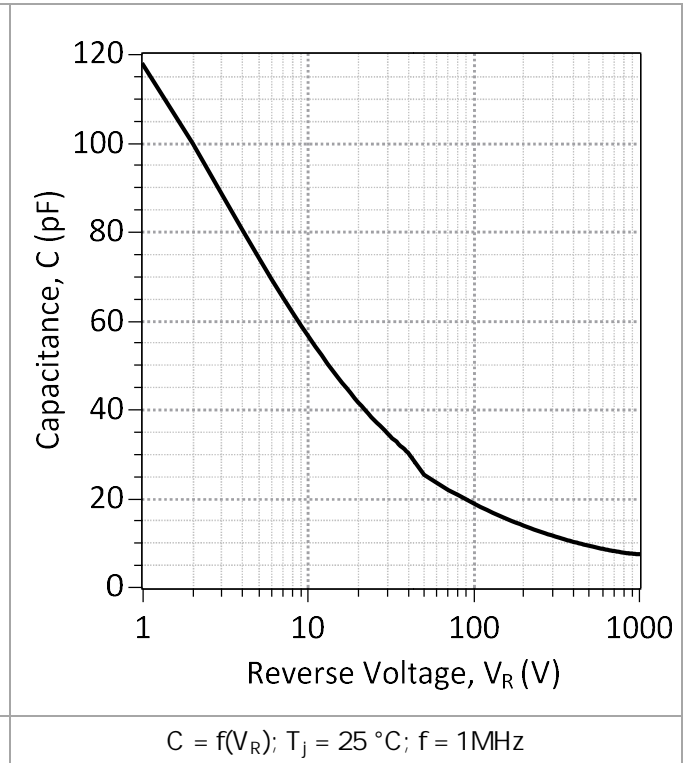


Figure 6: Typical Junction Capacitance vs Reverse Voltage Characteristics

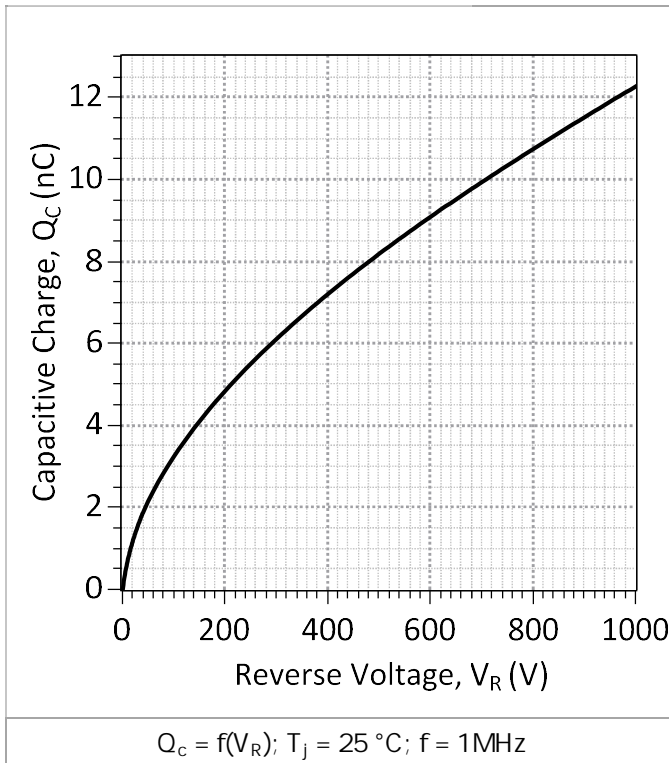


Figure 7: Typical Capacitive Charge vs. Reverse Voltage Characteristics

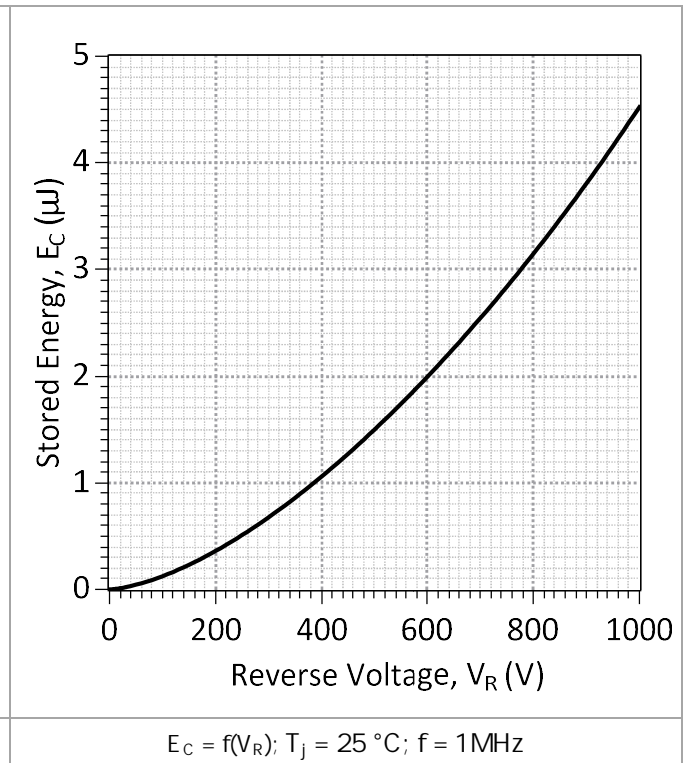


Figure 8: Typical Capacitive Energy vs. Reverse Voltage Characteristics

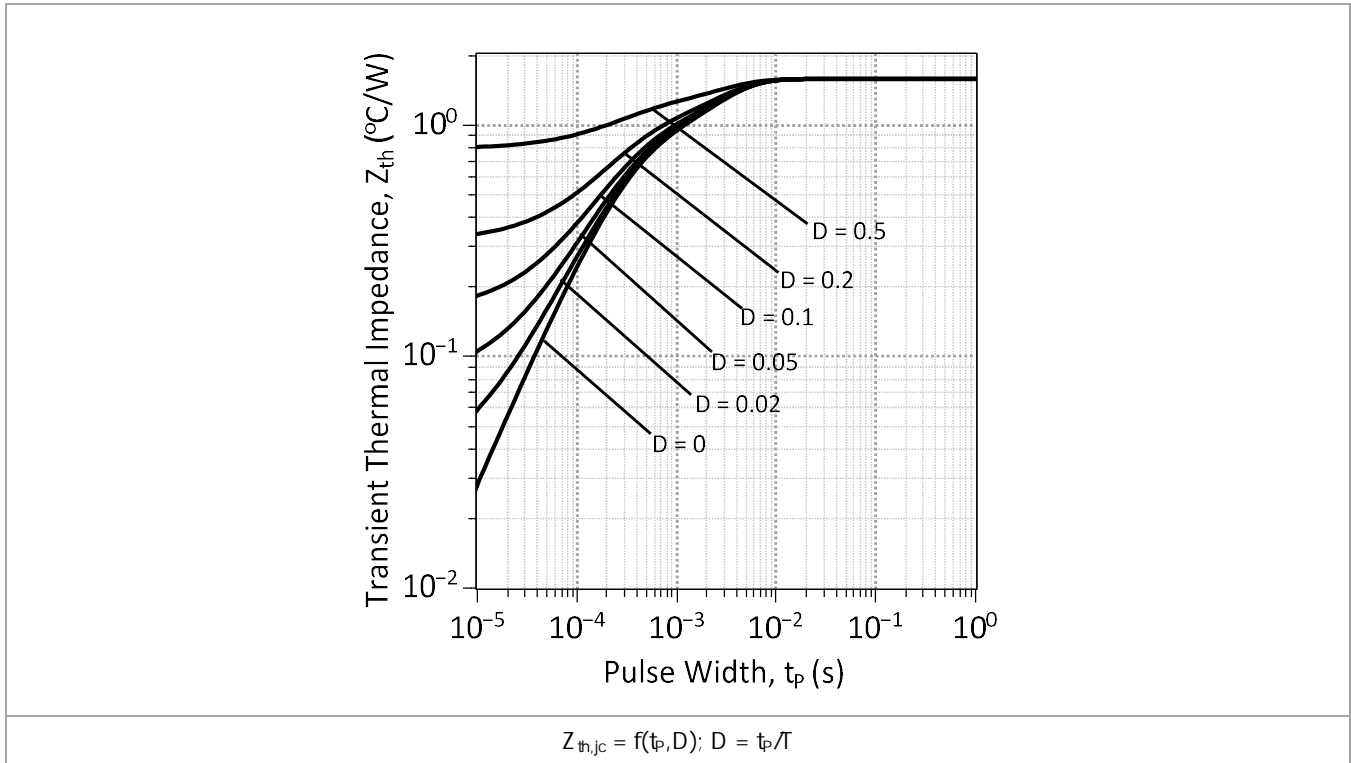


Figure 9: Transient Thermal Impedance

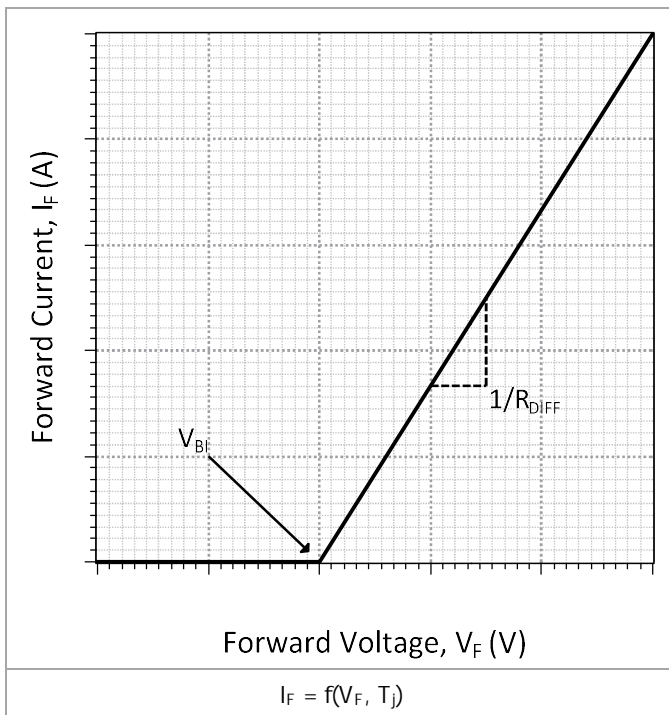


Figure 10: Forward Curve Model

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

Built-In Voltage ( $V_{BI}$ ):

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

$$m = -1.30e-03, b = 0.906$$

Differential Resistance ( $R_{DIFF}$ ):

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

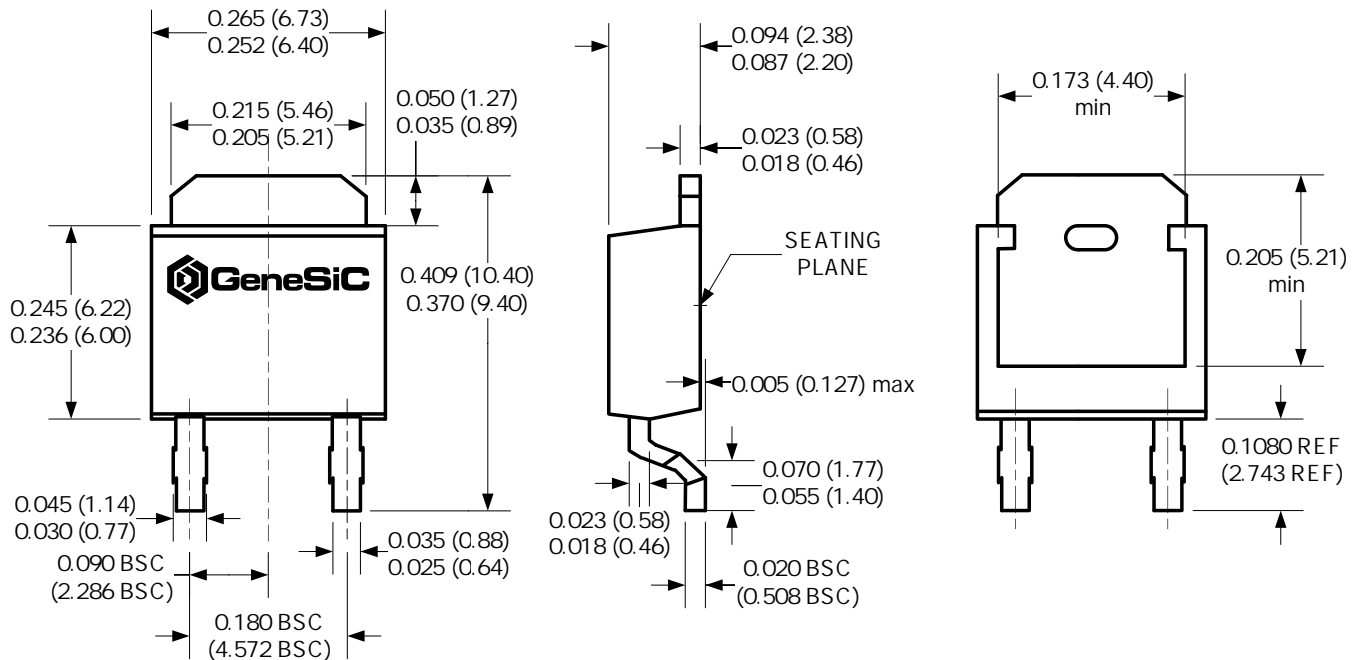
$$a = 5.98e-05, b = 8.58e-03, c = 1.96$$

GCO2MPS12-252  
 1200V SiC MPST™ Diode  
 Package Dimensions:

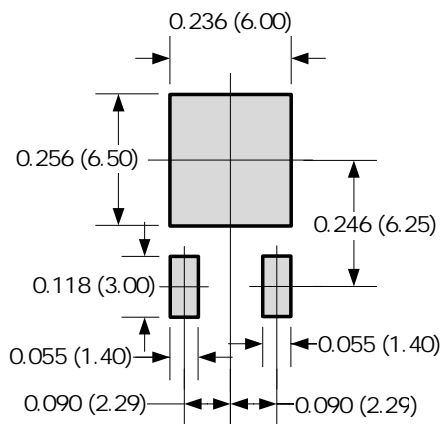


TO-252-2L

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

# GCO2MPS12-252

## 1200 V SiC MPS™ Diode



### 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/>

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/GCO2MPS12-252\\_SPICE.pdf](http://www.genesicsemi.com/sic_rectifiers_diodes/merged_pin_schottky/GCO2MPS12-252_SPICE.pdf)) into LTSPICE (version 4) software for simulation of the GCO2MPS12-252.

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*      GeneSi C Semi conductor Si C MPS™ Rectifier
*      Revision: 1.1
*      Date: February-2018
*****
**      TO-252-2 package
*****
.SUBCKT GCO2MPS12 AK Case
L_anode    A      AD      6n
D1         AD     Case    GCO2MPS12
L_cathode  K      Case    6n
.ENDS
*****
.SUBCKT GCO2MPS12 ANODE KATHODE
D1 ANODE KATHODE GCO2MPS12_SCHOTTKY
.MODEL GCO2MPS12_SCHOTTKY D
+ IS      2.05E-15      RS      0.3105
+ N       1             IKF     500
+ EG      1.2           XTI     2
+ TRS1    0.005434      TRS2    2.717E-05
+ CJO     1.65E-10      VJ      0.879
+ M       0.438         FC      0.5
+ TT      1.00E-10      BV      1600
+ IBV     0.2E-06       VPK     1200
+ IAVE    2             TYPE    SiC_MPS™
+ MFG     GeneSiC_Semi
.ENDS
* End of GCO2MPS12-252 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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