

GC20MPS12-220

1200V 20A SiC Schottky MPS™ Diode



Silicon Carbide Schottky Diode

V_{RRM}	=	1200 V
I_F ($T_C = 135^\circ\text{C}$)	=	27 A
Q_C	=	47 nC

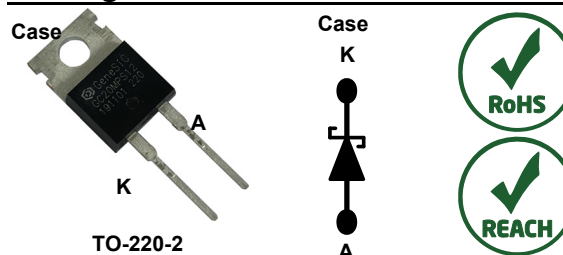
Features

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

Advantages

- Low Standby Power Losses
- Improved Circuit Efficiency (Lower Overall Cost)
- Low Switching Losses
- Ease of Paralleling without Thermal Runaway
- Smaller Heat Sink Requirements
- Low Reverse Recovery Current
- Low Device Capacitance
- Low Reverse Leakage Current

Package



Applications

- Boost Diode in Power Factor Correction (PFC)
- Switched Mode Power Supply (SMPS)
- Uninterruptible Power Supply (UPS)
- Motor Drives
- Freewheeling / Anti-parallel Diode in Inverters
- Solar Inverters & Wind Energy Converters
- Electric Vehicles (EV) & DC Fast Charging
- Induction Heating & Welding

Absolute Maximum Ratings (At $T_C = 25^\circ\text{C}$ Unless Otherwise Stated)

Parameter	Symbol	Conditions	Values	Unit
Repetitive Peak Reverse Voltage	V_{RRM}		1200	V
Continuous Forward Current	I_F	$T_C = 25^\circ\text{C}$, $D = 1$	58	A
		$T_C = 135^\circ\text{C}$, $D = 1$	27	
		$T_C = 150^\circ\text{C}$, $D = 1$	20	
Non-Repetitive Peak Forward Surge Current, Half Sine Wave	$I_{F,SM}$	$T_C = 25^\circ\text{C}$, $t_p = 10\text{ ms}$	160	A
		$T_C = 150^\circ\text{C}$, $t_p = 10\text{ ms}$	128	
Repetitive Peak Forward Surge Current, Half Sine Wave	$I_{F,RM}$	$T_C = 25^\circ\text{C}$, $t_p = 10\text{ ms}$	96	A
		$T_C = 150^\circ\text{C}$, $t_p = 10\text{ ms}$	68	
Non-Repetitive Peak Forward Surge Current	$I_{F,max}$	$T_C = 25^\circ\text{C}$, $t_p = 10\text{ }\mu\text{s}$	800	A
i^2t Value	$\int i^2 dt$	$T_C = 25^\circ\text{C}$, $t_p = 10\text{ ms}$	128	A^2s
Non-Repetitive Avalanche Energy	E_{AS}	$L = 1.3\text{ mH}$, $I_{AS} = 20\text{ A}$	245	mJ
Diode Ruggedness	dV/dt	$V_R = 0 \sim 960\text{ V}$	200	V/ns
Power Dissipation	P_{tot}	$T_C = 25^\circ\text{C}$	242	W
Operating and Storage Temperature	T_j , T_{stg}		-55 to 175	$^\circ\text{C}$

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Electrical Characteristics

Parameter	Symbol	Conditions	Values			Unit
			Min.	Typ.	Max.	
Diode Forward Voltage	V_F	$I_F = 20\text{ A}, T_j = 25\text{ °C}$		1.5	1.8	V
		$I_F = 20\text{ A}, T_j = 175\text{ °C}$		2	2.4	
Reverse Current	I_R	$V_R = 1200\text{ V}, T_j = 25\text{ °C}$		3	15	μA
		$V_R = 1200\text{ V}, T_j = 175\text{ °C}$		30	150	
Total Capacitive Charge	Q_C	$V_R = 400\text{ V}$		34		nC
		$I_F \leq I_{F,MAX}$ $di_F/dt = 200\text{ A}/\mu\text{s}$ $T_j = 175\text{ °C}$ $V_R = 800\text{ V}$		47		
Switching Time	t_s	$V_R = 400\text{ V}$		< 10		ns
		$V_R = 800\text{ V}$				
Total Capacitance	C	$V_R = 1\text{ V}, f = 1\text{ MHz}$		1080		pF
		$V_R = 800\text{ V}, f = 1\text{ MHz}$		70		

Thermal / Mechanical Characteristics

Thermal Resistance, Junction - Case	R_{thJC}		0.62	$^{\circ}\text{C}/\text{W}$
Weight	W_T		2	g
Mounting Torque	T_M	M3 Screw	0.8	Nm

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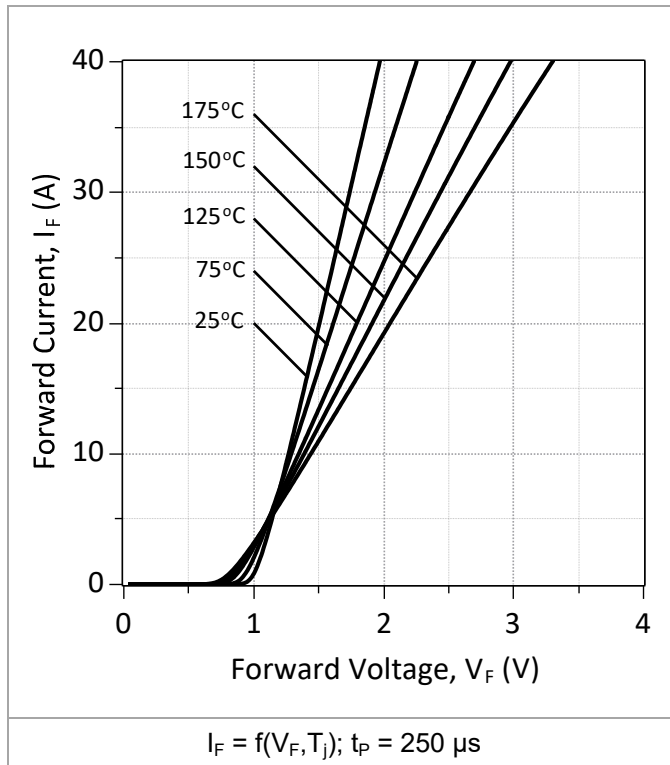


Figure 1: Typical Forward Characteristics

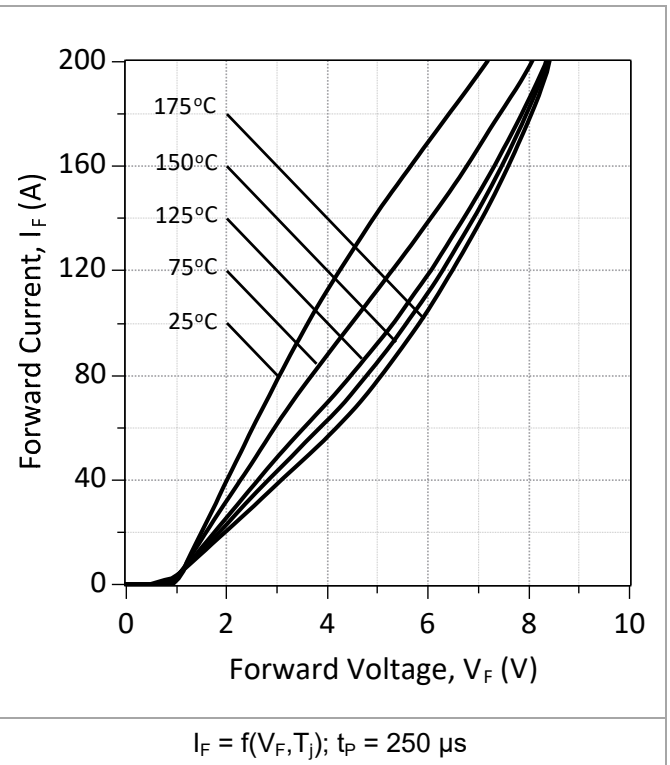


Figure 2: Typical High Current Forward Characteristics

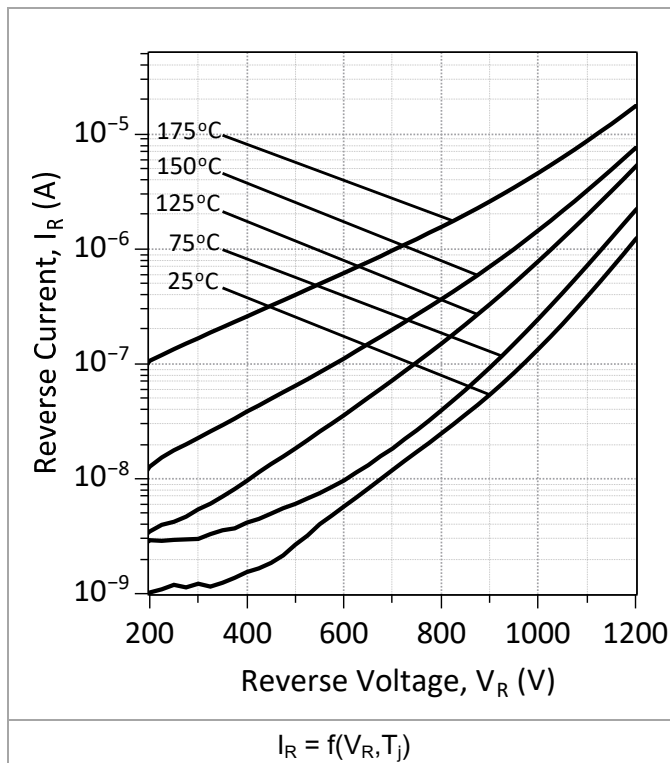


Figure 3: Typical Reverse Characteristics

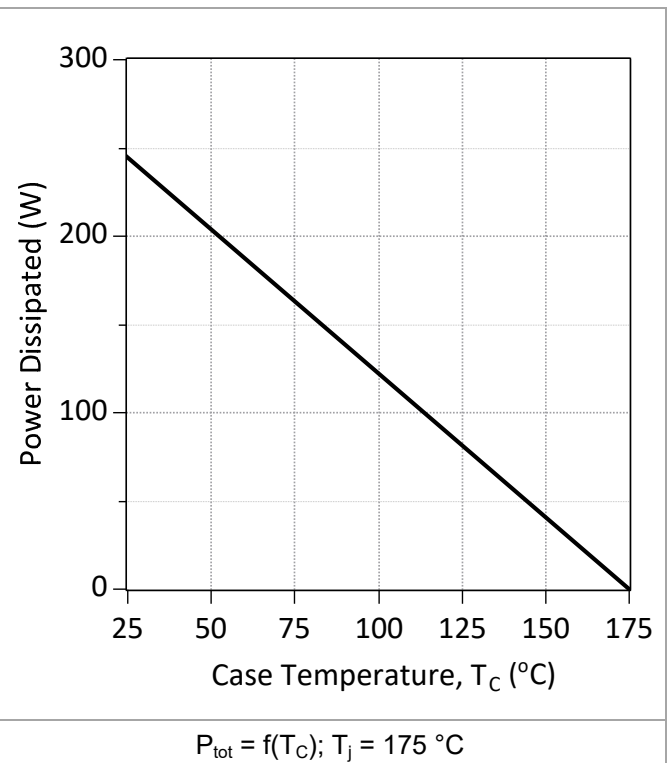


Figure 4: Power Derating Curve

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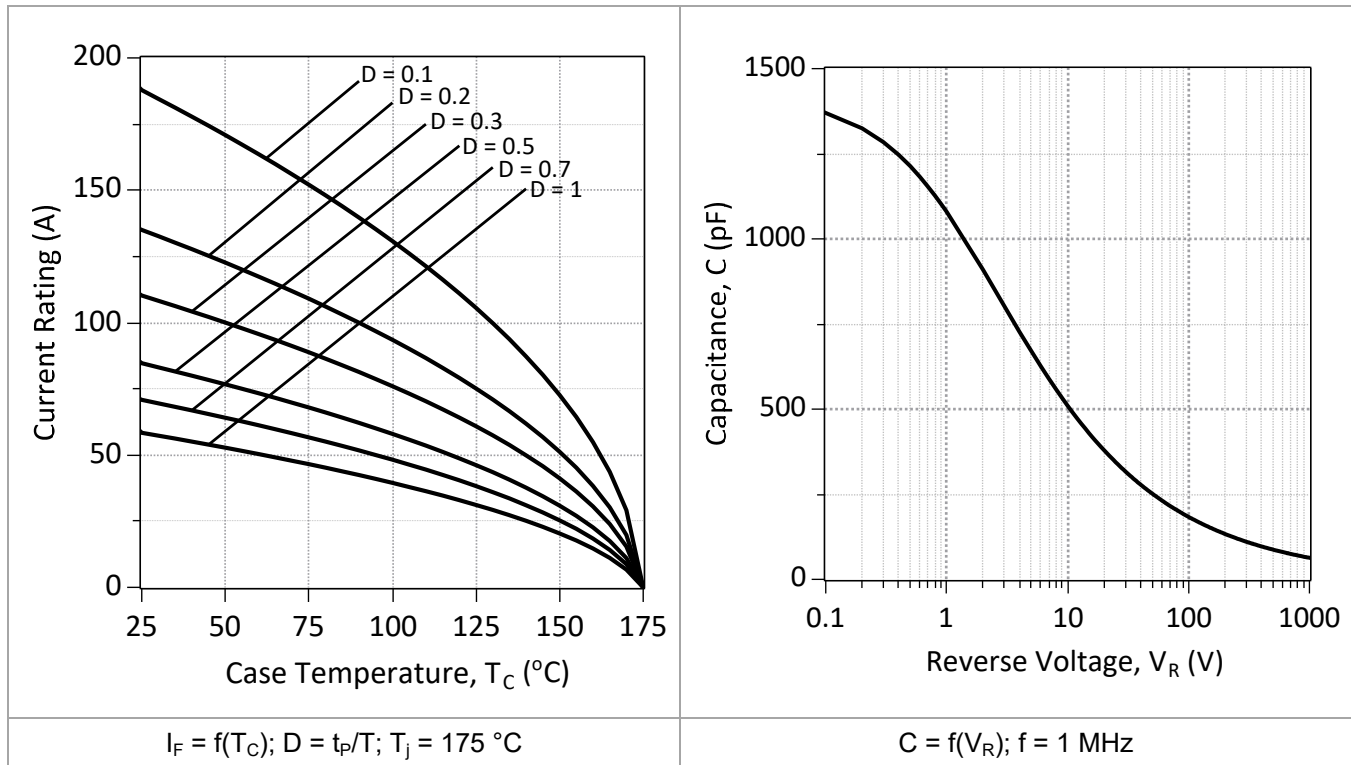


Figure 5: Current Derating Curves

Figure 6: Typical Junction Capacitance vs Reverse Voltage Characteristics

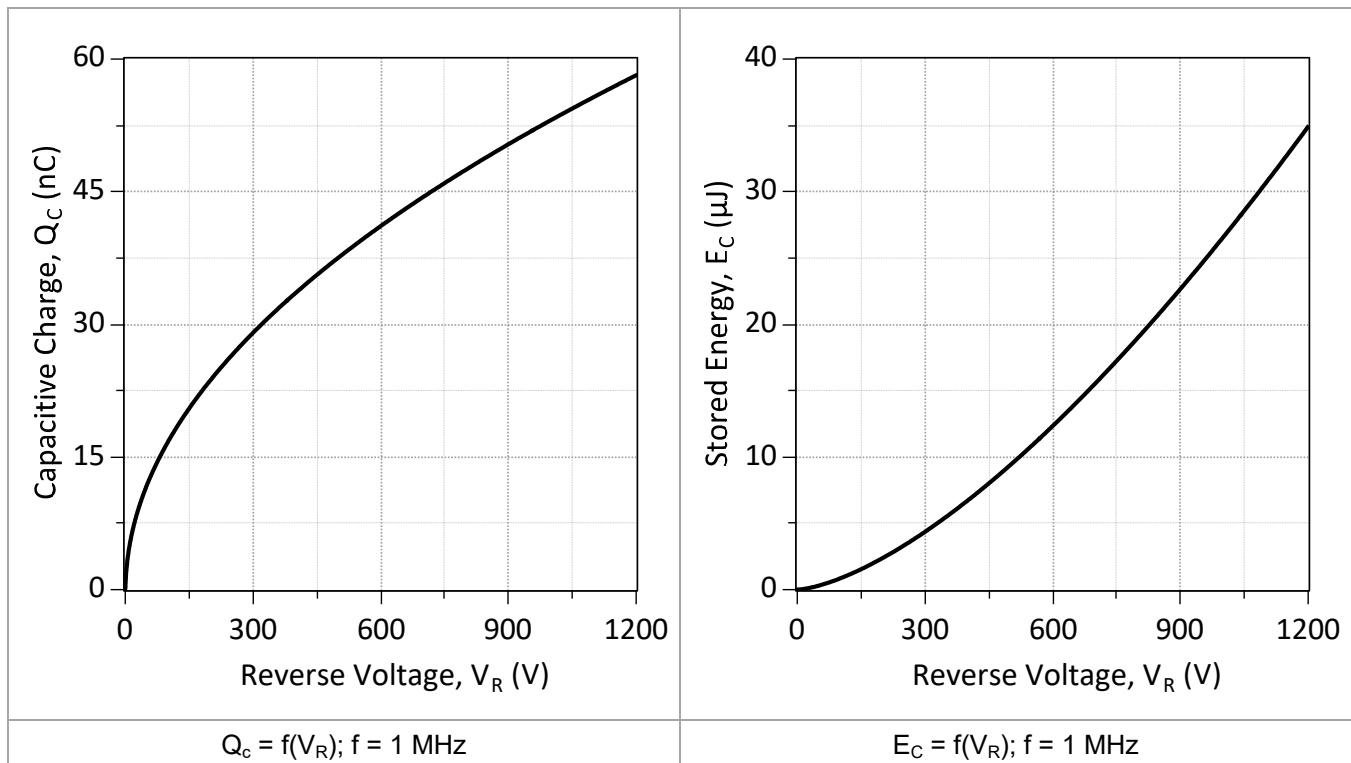


Figure 7: Typical Capacitive Charge vs Reverse Voltage Characteristics

Figure 8: Typical Capacitive Energy vs Reverse Voltage Characteristics

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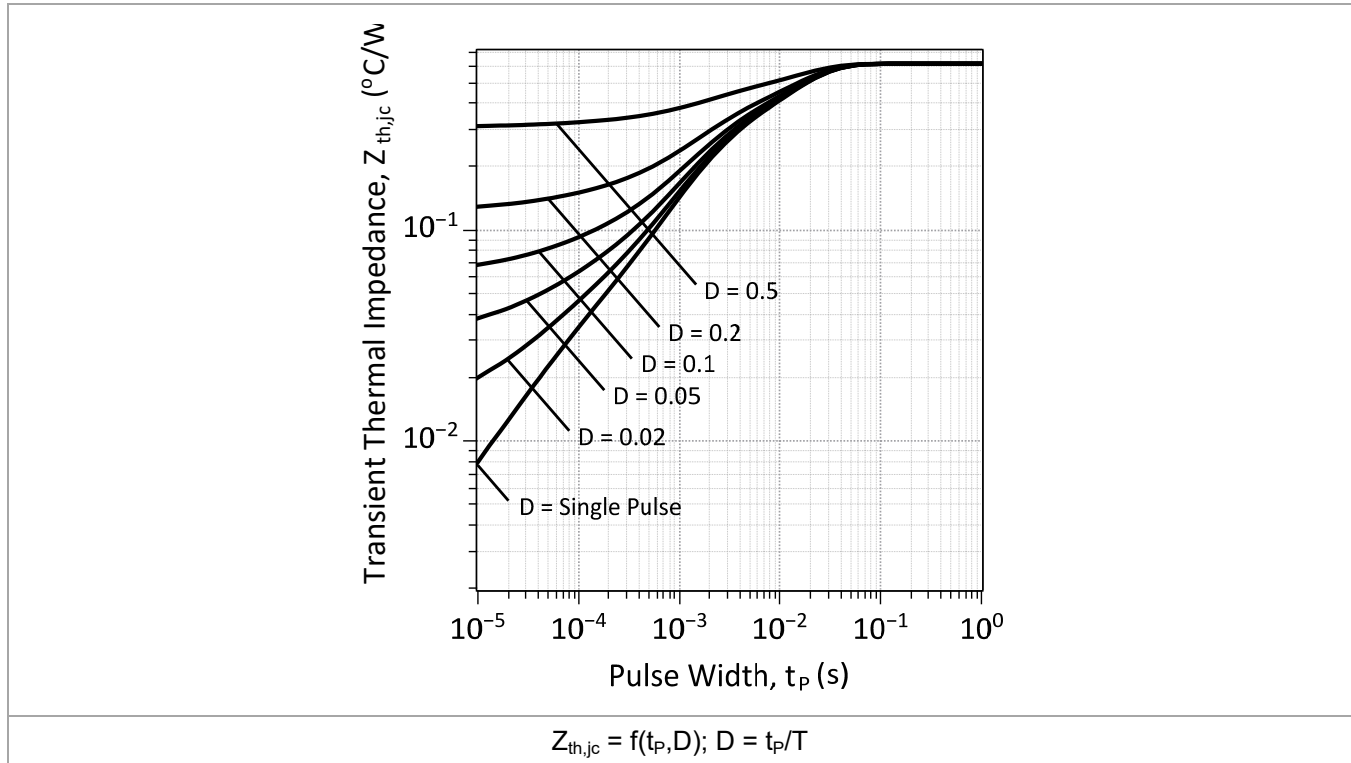


Figure 9: Transient Thermal Impedance

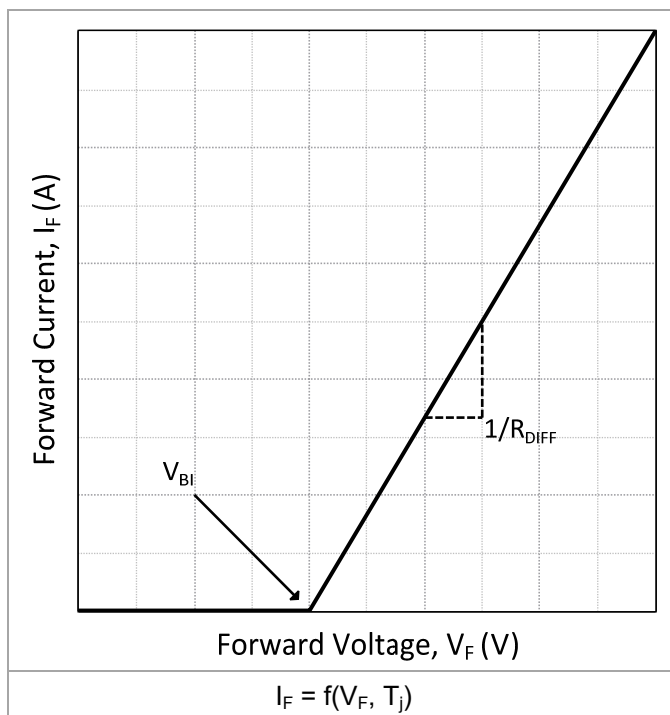


Figure 10: Forward Curve Model

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

Built-In Voltage (V_{BI}):

$$V_{BI}(T_j) = m \cdot T_j + n \text{ (V)},$$

$$m = -1.48e-03, n = 1.08$$

Differential Resistance (R_{DIFF}):

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

$$a = 7.45e-07, b = 8.84e-05, c = 0.0192$$

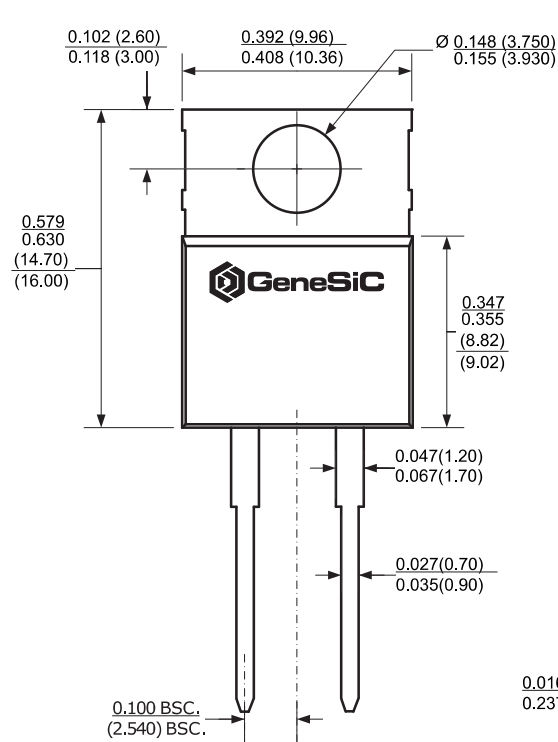
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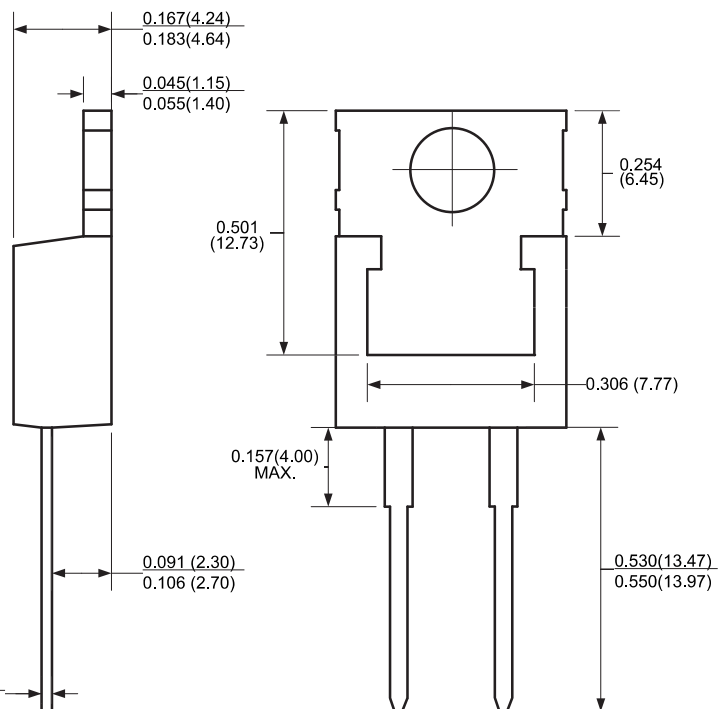


Package Dimensions

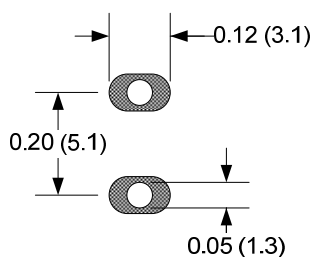
TO-220-2



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

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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.

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Related Links

- SPICE Models: <https://www.genesicsemi.com/schottky-mps>
- Evaluation Boards: <https://www.genesicsemi.com/technical-support>
- Quality Manual: <https://www.genesicsemi.com/technical-support/quality-manual>
- Compliance: <https://www.genesicsemi.com/technical-support/compliance>
- Reliability Report: <https://www.genesicsemi.com/technical-support/reliability>

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На всех этапах разработки и производства наши партнеры могут получить квалифицированную поддержку опытных инженеров.

Система менеджмента качества компании отвечает требованиям в соответствии с ГОСТ Р ИСО 9001, ГОСТ РВ 0015-002 и ЭС РД 009

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