

GC2X10MPS12-247

1200V 20A SiC Schottky MPS™ Diode



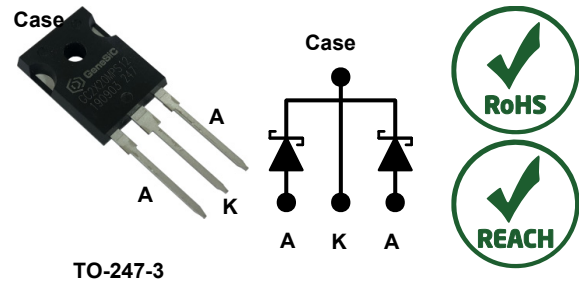
Silicon Carbide Schottky Diode

| | | |
|---|---|---------|
| V_{RRM} | = | 1200 V |
| $I_F (T_C = 100\text{ }^\circ\text{C})$ | = | 56 A * |
| Q_C | = | 54 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 Speed

Package



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

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
- Electric Vehicles (EV) & DC Fast Charging
- Induction Heating & Welding

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

| Parameter | Symbol | Conditions | Values | Unit |
|---|----------------|---|------------|------------------|
| Repetitive Peak Reverse Voltage (Per Leg) | V_{RRM} | | 1200 | V |
| Continuous Forward Current (Per Leg / Per Device) | I_F | $T_C = 25\text{ }^\circ\text{C}, D = 1$ | 41 / 82 | A |
| | | $T_C = 100\text{ }^\circ\text{C}, D = 1$ | 28 / 56 | |
| | | $T_C = 161\text{ }^\circ\text{C}, D = 1$ | 10 / 20 | |
| Non-Repetitive Peak Forward Surge Current, Half Sine Wave (Per Leg) | $I_{F,SM}$ | $T_C = 25\text{ }^\circ\text{C}, t_P = 10\text{ ms}$ | 80 | A |
| | | $T_C = 150\text{ }^\circ\text{C}, t_P = 10\text{ ms}$ | 64 | |
| Repetitive Peak Forward Surge Current, Half Sine Wave (Per Leg) | $I_{F,RM}$ | $T_C = 25\text{ }^\circ\text{C}, t_P = 10\text{ ms}$ | 48 | A |
| | | $T_C = 150\text{ }^\circ\text{C}, t_P = 10\text{ ms}$ | 34 | |
| Non-Repetitive Peak Forward Surge Current (Per Leg) | $I_{F,max}$ | $T_C = 25\text{ }^\circ\text{C}, t_P = 10\text{ }\mu\text{s}$ | 400 | A |
| i^2t Value (Per Leg) | $\int i^2 dt$ | $T_C = 25\text{ }^\circ\text{C}, t_P = 10\text{ ms}$ | 32 | A ² s |
| Non-Repetitive Avalanche Energy (Per Leg) | E_{AS} | $L = 3\text{ mH}, I_{AS} = 10\text{ A}$ | 150 | mJ |
| Diode Ruggedness (Per Leg) | dV/dt | $V_R = 0 \sim 960\text{ V}$ | 200 | V/ns |
| Power Dissipation (Per Leg / Per Device) | P_{tot} | $T_C = 25\text{ }^\circ\text{C}$ | 214 / 428 | W |
| Operating and Storage Temperature | T_j, T_{stg} | | -55 to 175 | °C |

* Per Device

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Electrical Characteristics (Per Leg)

| Parameter | Symbol | Conditions | Values | | | Unit |
|-------------------------|--------|---|-----------------------|------|------|---------------|
| | | | Min. | Typ. | Max. | |
| Diode Forward Voltage | V_F | $I_F = 10 \text{ A}, T_j = 25 \text{ }^\circ\text{C}$ | | 1.5 | 1.8 | V |
| | | $I_F = 10 \text{ A}, T_j = 175 \text{ }^\circ\text{C}$ | | 2 | 2.4 | |
| Reverse Current | I_R | $V_R = 1200 \text{ V}, T_j = 25 \text{ }^\circ\text{C}$ | | 1 | 5 | μA |
| | | $V_R = 1200 \text{ V}, T_j = 175 \text{ }^\circ\text{C}$ | | 10 | 50 | |
| Total Capacitive Charge | Q_C | $I_F \leq I_{F,MAX}$ $di_F/dt = 200 \text{ A}/\mu\text{s}$ $T_j = 175 \text{ }^\circ\text{C}$ | $V_R = 400 \text{ V}$ | 19 | | nC |
| | | | $V_R = 800 \text{ V}$ | 27 | | |
| Switching Time | t_s | $V_R = 400 \text{ V}$ $V_R = 800 \text{ V}$ | | < 10 | | ns |
| | | | | | | |
| Total Capacitance | C | $V_R = 1 \text{ V}, f = 1 \text{ MHz}$ | | 616 | | pF |
| | | $V_R = 800 \text{ V}, f = 1 \text{ MHz}$ | | 40 | | |

Thermal / Mechanical Characteristics

| | | | | |
|-------------------------------------|------------|----------|------|---------------------------|
| Thermal Resistance, Junction - Case | R_{thJC} | | 0.70 | $^\circ\text{C}/\text{W}$ |
| Weight | W_T | | 6.1 | g |
| Mounting Torque | T_M | M3 Screw | 1.1 | Nm |

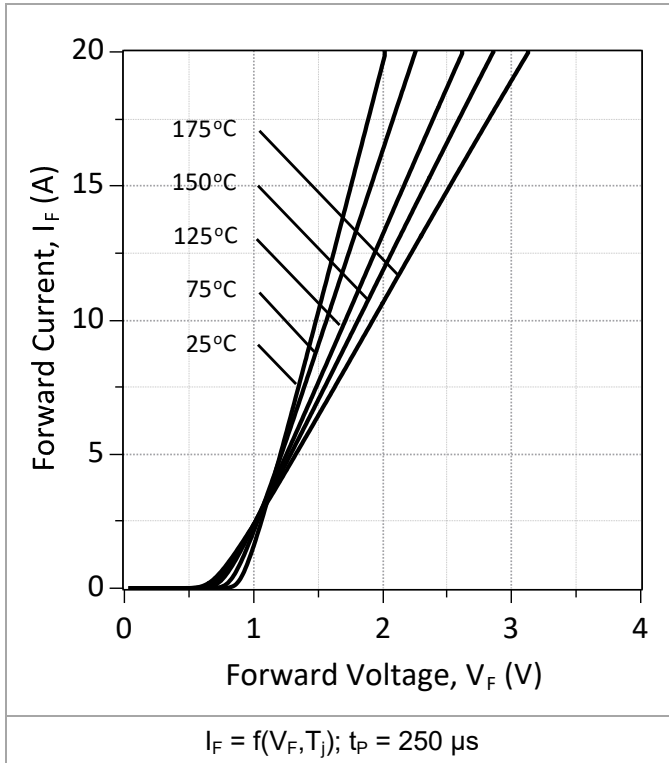


Figure 1: Typical Forward Characteristics (Per Leg)

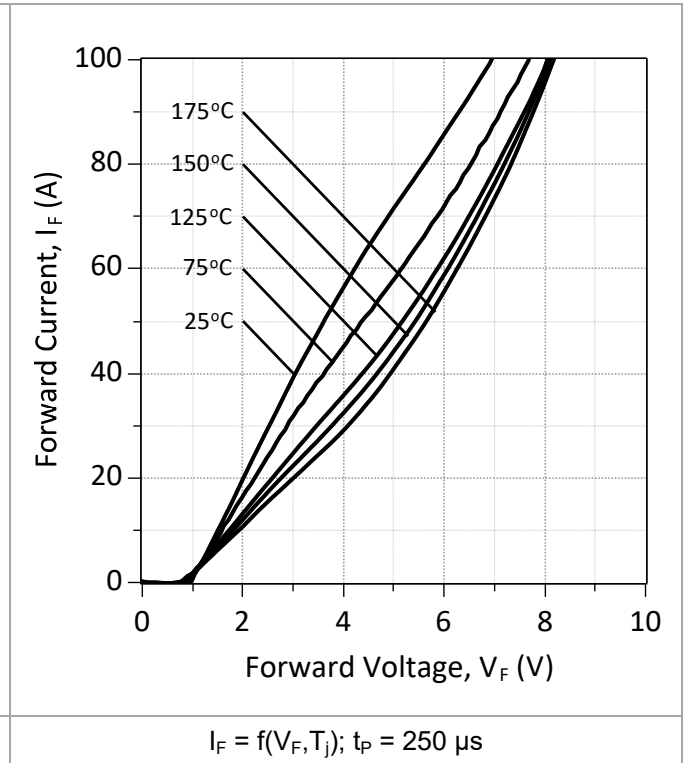


Figure 2: Typical High Current Forward Characteristics (Per Leg)

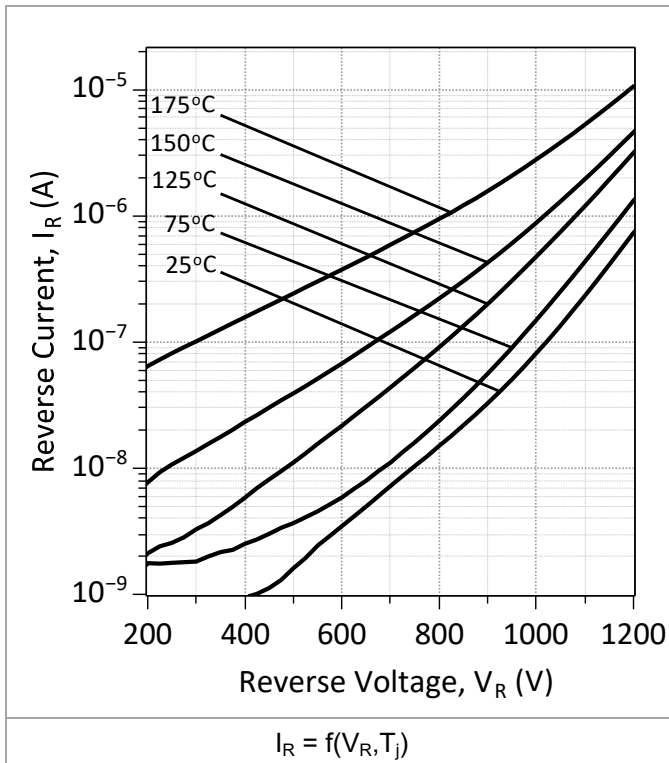


Figure 3: Typical Reverse Characteristics (Per Leg)

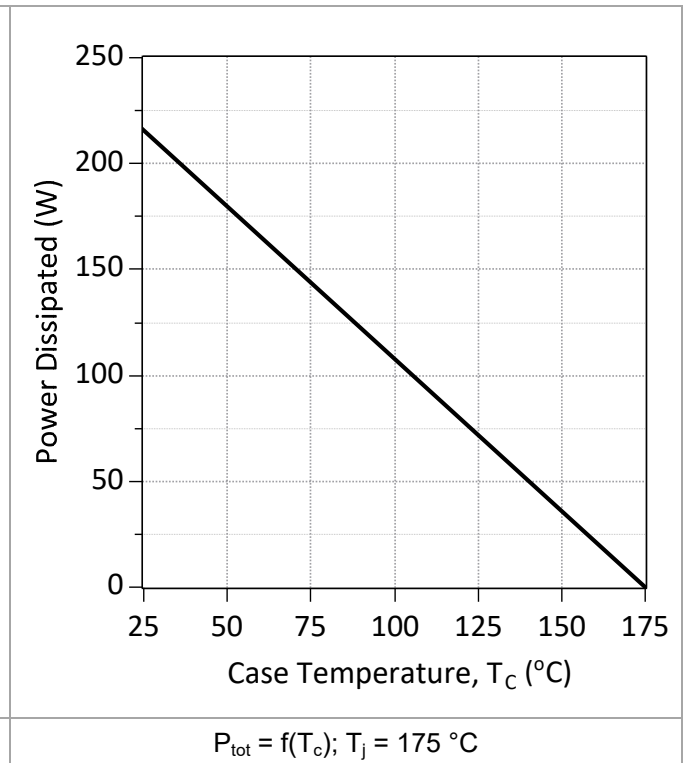


Figure 4: Power Derating Curve (Per Leg)

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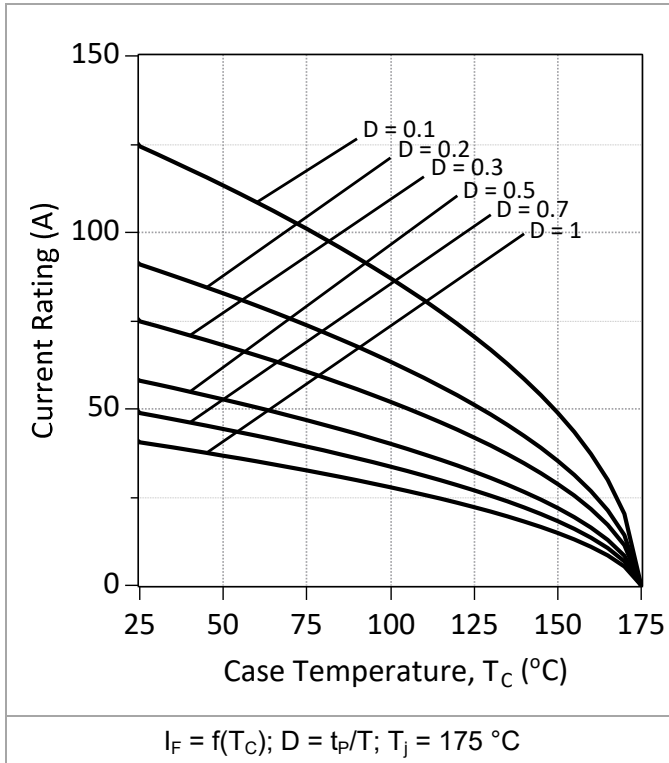


Figure 5: Current Derating Curves (Per Leg)

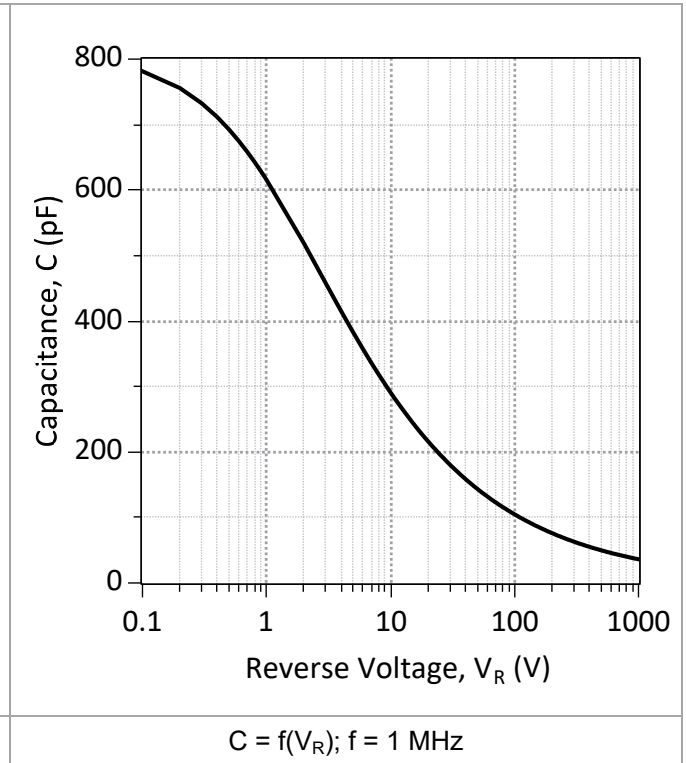


Figure 6: Typical Junction Capacitance vs. Reverse Voltage Characteristics (Per Leg)

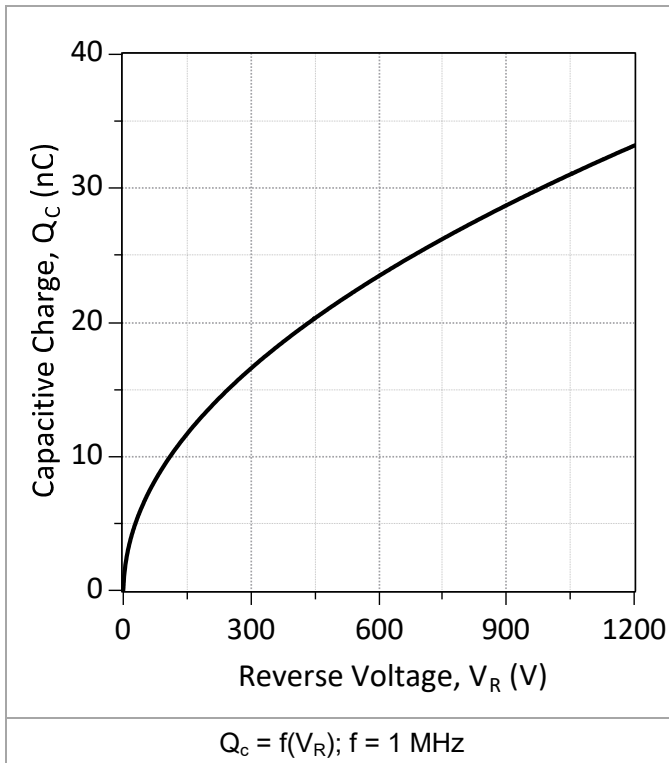


Figure 7: Typical Capacitive Charge vs. Reverse Voltage Characteristics (Per Leg)

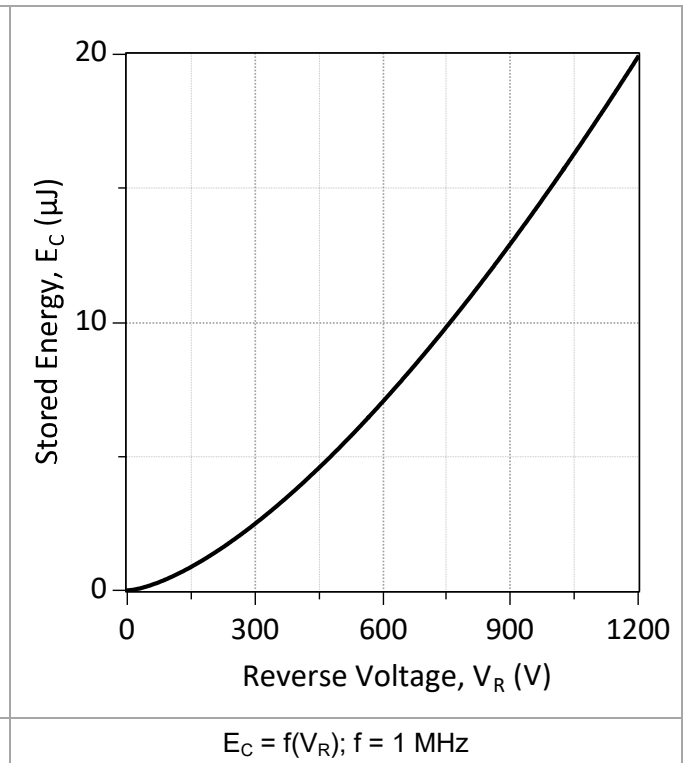


Figure 8: Typical Capacitive Energy vs. Reverse Voltage Characteristics (Per Leg)

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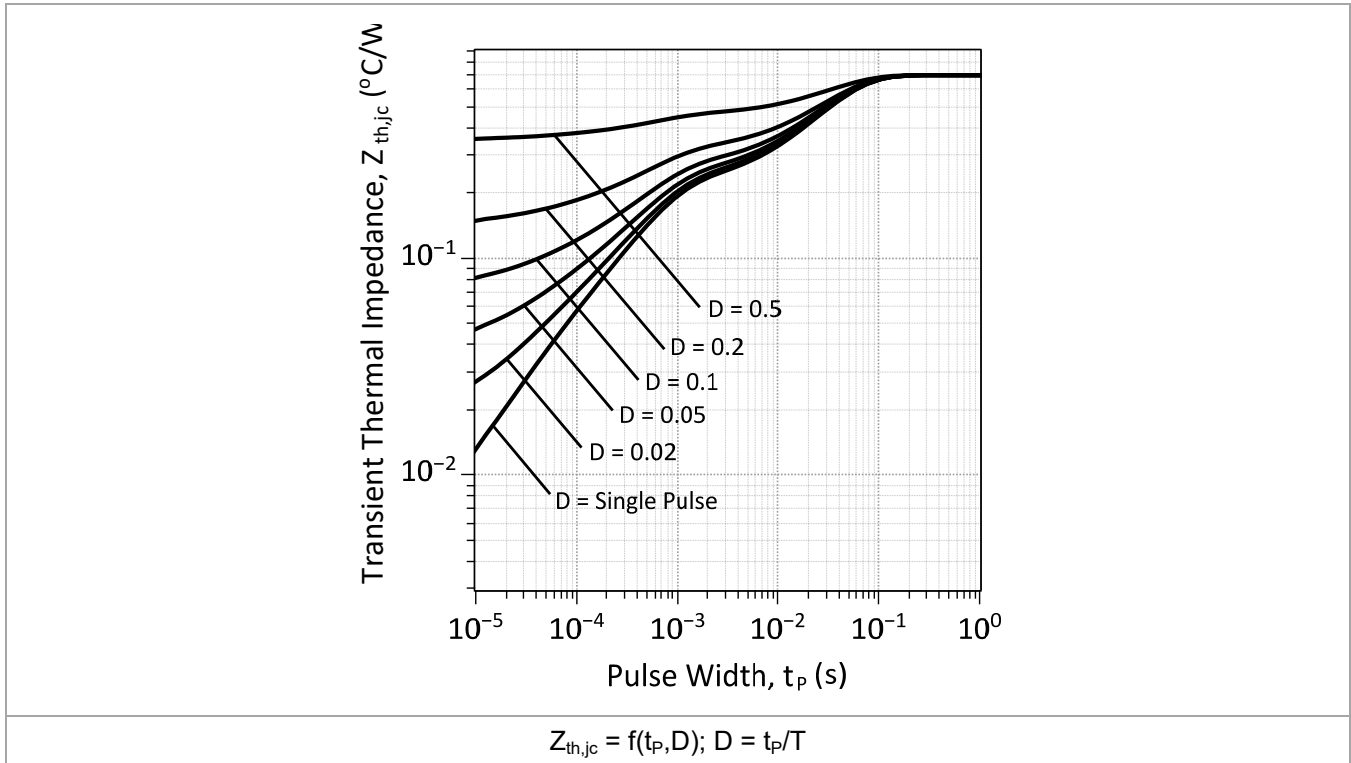


Figure 9: Transient Thermal Impedance (Per Leg)

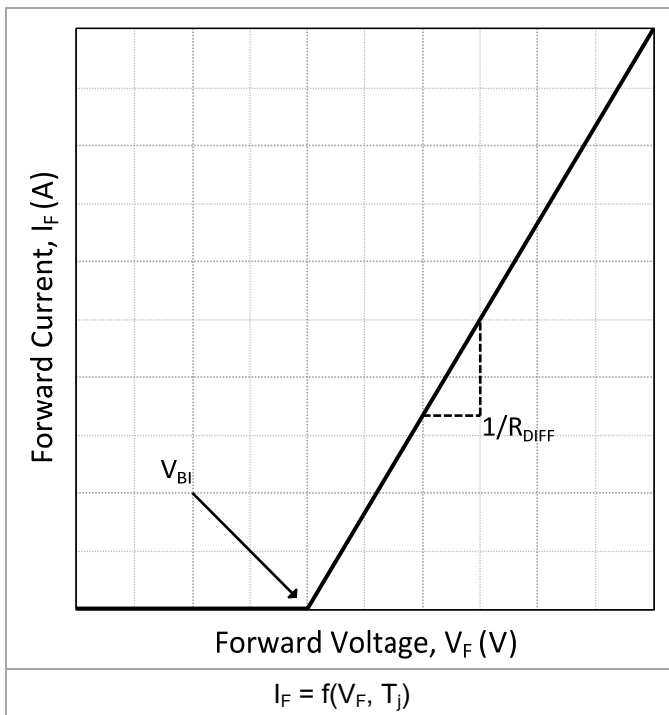


Figure 10: Forward Curve Model (Per Leg)

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

Built-In Voltage (V_{Bi}):

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

$$m = -1.42e-03, n = 0.98$$

Differential Resistance (R_{DIFF}):

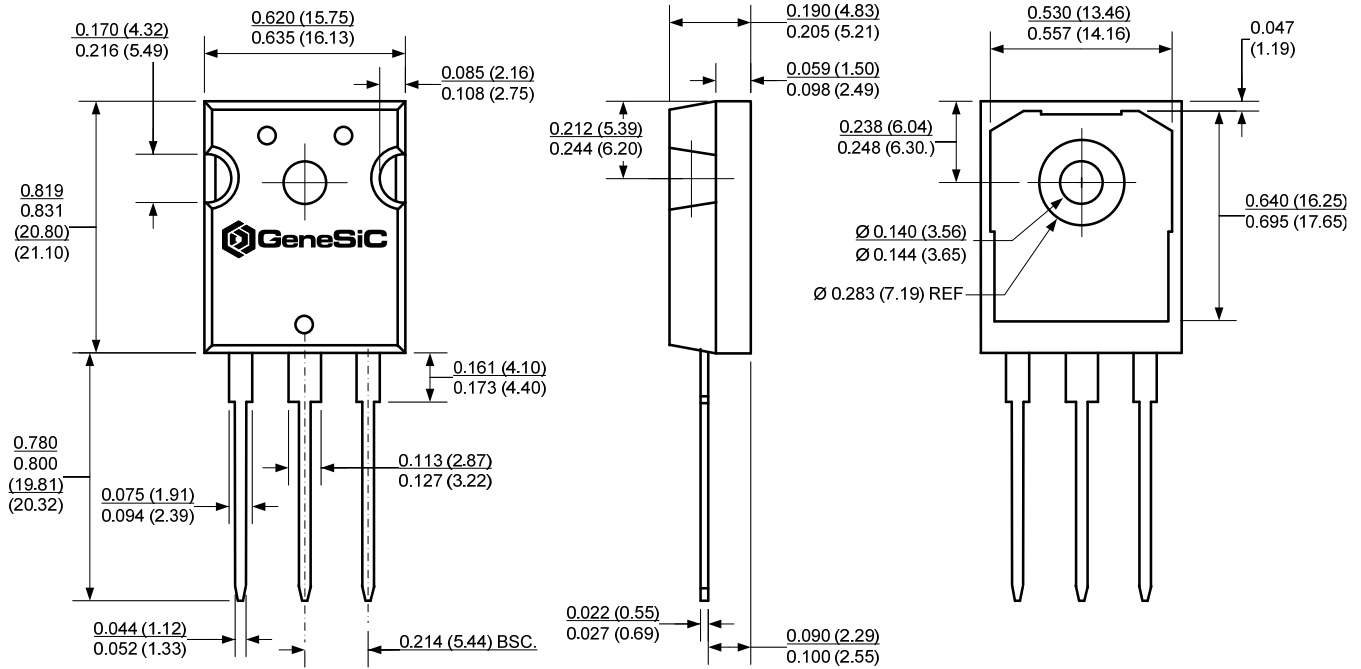
$$R_{DIFF}(T_j) = a \cdot T_j^2 + b \cdot T_j + c \text{ (}\Omega\text{);}$$

$$a = 1.33e-06, b = 1.44e-05, c = 0.047$$

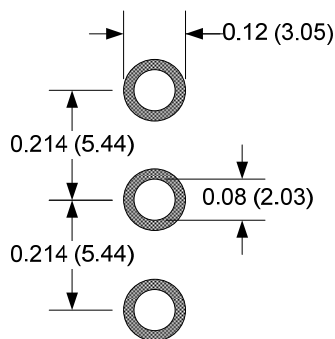
Package Dimensions

TO-247-3

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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- SPICE Models: <https://www.genesicsemi.com/schottky-mps>
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