## Comparison of SiC vs Si Technologies

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<th>Silicon vs Silicon Carbide</th>
<th>Performance of SiC Power Device</th>
<th>Impact on AC-DC/DC-AC Circuits</th>
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<td>Lower On-State Voltage Drop (2X-3X)</td>
<td>Higher Efficiency</td>
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<td>Smaller Epitaxial Field (10X – 20X)</td>
<td>Faster Switching Speeds (100-1000X)</td>
<td>Size Reduction</td>
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| Higher Thermal Conductivity 
(3.3-4.5W/cmK vs 1.5W/cmK)                | Higher Chip Temperatures 
(250-300°C vs 125°C)                                                  | Higher Continuous Current and Pulsed Power     |
| Higher Melting Point (2X)                 | Higher Operating Temperature (3X)                                    | Smaller, Simpler Heat Sink                     |
| Larger Bandgap (3X) 
Smaller n$_j$ (10$^{16}$X)            | Higher Intrinsic Adiabatic Pulsed Current Level (3X-10X)             | Higher Current Capability                      |
Schottky Rectifiers

- **GB01SLT06-214** 650V 1A SMB (DO-214) Production
- **GB01SLT12-220** 1200V 1A TO-220 Production
- **GB01SLT12-252** 1200V 1A TO-252 Production
- **GB01SLT12-214** 1200V 1A SMB(DO-214) Production
- **GB02SLT12-214** 1200V 2A SMB(DO-214) Production
- **GB02SLT12-220** 1200V 2A TO-220 Production
- **GB02SLT12-252** 1200V 2A TO-252 Production
- **GB05SLT12-220** 1200V 5A TO-220 Production
- **GB05SLT12-252** 1200V 5A TO-252 Production
- **GB10SLT12-220** 1200V 10A TO-220 Production
- **GB10SLT12-252** 1200V 10A TO-252 Production
- **GB20SLT12-247** 1200V 20A TO-247 Production
- **GB50SLT12-247** 1200V 50A TO-247 Production
- **GAP3SLT33-220FP** 3300V 0.3A TO-220FP Production
- **GAP3SLT33-214** 3300V 0.3A SMB(DO-214) Production
* Forward Characteristics

- GeneSiC Diodes are designed to operate at **High** temperatures (≈ 225 °C) and exhibit **Low** On State Voltages, thereby resulting in **Low** Conduction Losses

- Implementation of Optimized Device Design and Robust Processing Techniques allow GeneSiC Diodes to deliver **Superior Surge Current Capability** with **Temperature Independent** Barrier Heights and Ideality Factors

* GB07SHT12-247
**Features/Benefits**
- Operating temperatures up to 225 °C
- Industry’s lowest device Zero Bias Capacitance and Reverse Recovery Charge
- Easy paralleling due to Positive Temperature Coefficient of $V_f$
- Temperature Independent Extremely Fast Switching Transients
- Improved Circuit Efficiencies
- Best in class Reverse Leakage Current at operating temperatures

**Applications**
- Power Factor Correction
- Switch Mode Power Supply\(^{(a)}\)
- Inverter, Motor Drives\(^{(b)}\)
- Induction Heating
- Uninterruptable Power Supply
- Down Hole Oil Drilling, Geothermal Instrumentation
- Aerospace and Defense

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\(^{(a)}\) \(^{(b)}\)
* Blocking Characteristics

- GeneSiC 1200 V Diodes are designed to deliver **Best-in-Class Blocking Performance** with leakage current densities less than 1 mA/cm² even at 225 °C operating temperatures.
- GeneSiC diodes display **smallest increase** in the leakage current as the temperature is increased from 25 °C to 225 °C.
- The Blocking Performance is solely limited by Avalanche Breakdown.

* 1200 V / 10 A SiC Schottky rectifiers
* Turn-Off Characteristics

- GeneSiC Diodes offer **Lowest Reverse Recovery Charge**, $Q_c$, and **Lowest Figure of Merit**, $Q_c/I_F$, for any current rating
- Moreover, $Q_c$ is independent of applied $di/dt$, $I_F$ and Temperature
- Lower ‘$Q_c$’ values will drastically reduce the switching losses in the inverter and converter applications

* 1200 V / 10 A SiC Schottky rectifiers

![Graph showing reverse recovery characteristics]

- $di/dt = 140 \text{ A/μs}$
- $T_J = 150^\circ\text{C}$

Contd...