



The Prime Grade Portfolio of 100 mm Silicon Carbide Wafers

KEY FEATURES

- Dow Corning's Prime Grade Portfolio optimizes targeted performance and total cost of ownership for next generation power electronic devices.
- The new portfolio offers the power electronic industry's first product grading structure allowing customers to choose low densities of defects – such as MPD, TSD and BPD – to maintain yields, performance and ultimately the development of next generation power electronic devices.
- SiC crystal quality increases with each substrate grade in the portfolio to deliver, at the highest-quality tier, defect densities as low as $MPD \leq 0.1 \text{ cm}^{-2}$, $BPD \leq 300 \text{ cm}^{-2}$ and $TSD \leq 500 \text{ cm}^{-2}$.

TYPICAL APPLICATIONS

- *Dow Corning*[®] Prime Standard Wafers: Schottky and Junction Barrier Schottky diodes
- *Dow Corning*[®] Prime Select Wafers: Pin diodes and switches
- *Dow Corning*[®] Prime Ultra Wafers: High-current and -voltage metal oxide semiconductor field effect transistors (MOSFETs), junction field effect transistors (JFETs), insulated gate bipolar transistors (IGBTs), bipolar junction transistors (BJTs) and pin diodes with large die areas

Three Product Tiers of High Crystal Quality 100 mm Silicon Carbide Wafers

The Prime Grade portfolio from Dow Corning offers three product tiers of 100 mm silicon carbide (SiC) substrates, labeled *Dow Corning*[®] Prime Standard, *Dow Corning*[®] Prime Select and *Dow Corning*[®] Prime Ultra. This groundbreaking SiC substrate grading structure sets a higher standard for specifying tolerances on defects, such as micropipe density (MPD), threading screw dislocations (TSD) and basal plane dislocations (BPD). By offering three product tiers of increasingly tighter tolerances, the Prime Grade portfolio gives power electronic designers greater freedom to optimize the performance and cost of their next generation power electronic devices. All 100 mm wafers in the Prime Grade portfolio offer consistently excellent mechanical characteristics to ensure compatibility with existing and developing device fabrication processes.

Potential Uses

Design and volume manufacture of a range of SiC power electronic devices with more highly targeted performance and cost profiles.

Important Features and Benefits

FEATURES	BENEFITS
<i>Dow Corning</i>[®] Prime Standard Wafers Guaranteed MPD tolerances	Balances performance and cost for electronic components with low to medium current ratings
<i>Dow Corning</i>[®] Prime Select Wafers More stringent tolerances for MPD and BPD	Allows for manufacturing with mid-range current ratings
<i>Dow Corning</i>[®] Prime Ultra Wafers Extremely low MPD, BPD and TSD tolerances; tightened wafer resistivity	Ensures product quality and improves cost efficiency in manufacturing high-current devices

Material Properties

Property	Dow Corning® Prime Standard Wafers	Dow Corning® Prime Select Wafers	Dow Corning® Prime Ultra Wafers
Diameter (mm)	99.7 – 100		
Thickness (µm)	350 ± 20		
Bow (µm)	± 20		
Warp (µm)	≤ 30		
TTV (µm)	≤ 2.5		
SBIR (µm)	≤ 1.5		
Defects (Total Usable Area)	≥ 98%		
Resistivity (ohm-cm)	0.014 – 0.024	0.015 – 0.023	0.016 – 0.022
X-pol Defects	Yes ⁽¹⁾	No	No
Dislocation Distribution (cm ⁻²)			
Total TSD	NR ⁽²⁾	≤ 500	≤ 300
Total BPD	NR ⁽²⁾	≤ 800	≤ 500
Total MPD (cm ⁻²)	≤ 0.5	≤ 0.2	≤ 0.1
Surface and Crystal Imperfections (cm ⁻²)	≤ 1		
Planar Defects II (VI)	0		
Hex Plates	0		
Visual Carbon Inclusion (% area)	≤ 0.05	≤ 0.03	≤ 0.01
Visual Edge Inclusions (% area)	0		
Visible Scratches (mm)	≤ 15		
Edge Chips and Indents	0		
Cracks	0		
Pinholes	0		
Pits	≤ 5	≤ 3	≤ 1

⁽¹⁾"Yes" means feature of area ≤ 400 mm² and length ≤ 50 mm may be present.

⁽²⁾"NR" means data may not be reported.

How Can We Help You Today?

Tell us about your performance, design and manufacturing challenges. Let us put our silicon-based materials expertise, application knowledge and processing experience to work for you.

For more information about our materials and capabilities, visit dowcorning.com.

To discuss how we could work together to meet your specific needs, email electronics@dowcorning.com or go to dowcorning.com/ContactUs for a contact close to your location. Dow Corning has customer service teams, science and technology centers, application support teams, sales offices, and manufacturing sites around the globe.

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