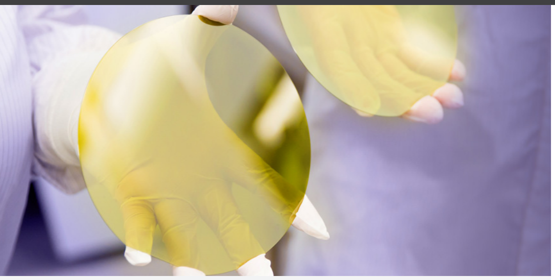
Compound Semiconductor Solutions
SK siltron css

150 mm Silicon Carbide Epitaxial Wafers
High-quality epitaxy for leading-edge power electronics



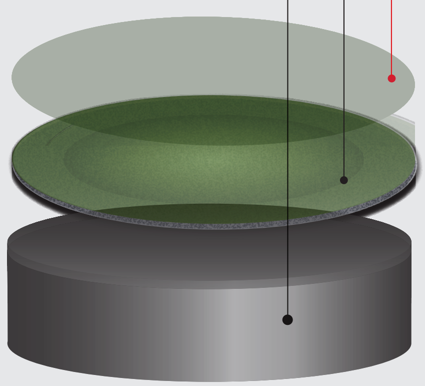
Key features

- 150 mm wafers
- High-quality epitaxy
- State-of-the-art thickness and doping uniformity
- Low defect density
- Leading-edge wafer flatness
- Customizable product tolerances to meet specific customer needs

Your source for SiC wafers

SK Siltron CSS offers leading-edge SiC material solutions across the value chain for power electronics manufacturing processes, including:

- **150 mm SiC epitaxial wafers**
- 150 mm and 200 mm SiC wafers
- 150 mm SiC ingots



SK Siltron CSS offers leading-edge 150 mm SiC homoepitaxial wafers ready to meet the performance and quality needs of device manufacturers. SK Siltron CSS SiC epitaxial wafers feature state-of-the-art thickness and doping uniformity to enable customers to produce best-in-class SiC devices.

Product overview

SK Siltron CSS continues to develop and improve our SiC epitaxial wafers, consisting of our 4H single-crystal, 4° off-axis, n-type 150 mm substrates and a SiC epitaxial layer for the production of high-performance power devices. The epitaxial growth process imparts a high-quality, low-defect, single-crystal layer with the same orientation as the substrate. The process begins with the growth of a "buffer" layer, which terminates substrate defects and prevents them from propagating further into the epitaxial layer. Following growth of the buffer layer, the epitaxial growth process transitions to growth of the "drift" layer. The doping concentration, thickness and defectivity of the drift layer are critical to the performance of the SiC devices fabricated atop this epitaxial layer. The characteristics of this drift layer are tailored by SK Siltron CSS to meet customers' specific requirements.

Precise control of thickness, doping (carrier concentration) and defect density is required by device manufacturers to enable the manufacturing of high-yielding power devices. Features of the SK Siltron CSS epitaxial growth process include:

- Excellent thickness control – 25 pt FTIR measurement on each wafer
  - Maximum deviation from thickness target for all points
  - Thickness uniformity from all points measured
- Excellent doping control – 9 pt CV measurement on each wafer
  - Maximum deviation from doping target for all points measured
  - Doping uniformity from all points measured
- Excellent shape and flatness control – whole wafer interferometer shape inspection
  - SBIR/SFQR reported for 10 mm x 10 mm sites
- Excellent defect control – laser light scattering, defect inspection on each wafer
  - Defect detection recipes correlated to device yield

Potential uses

SK Siltron CSS epitaxial wafers enable the design and volume manufacturing of a broad range of SiC power electronics devices with aggressive performance and cost profiles. Due to the inherent material properties of SiC, devices are well-suited for current and future power electronics applications. SK Siltron CSS SiC epitaxial wafers are used in the production of a wide range of SiC power devices, including MOSFETs, JBS and MPS diodes, and JFETS. SiC, therefore, is a key enabling technology for next-generation electric vehicles, renewable energy conversion and distribution, and a myriad of other products.

Why SK Siltron CSS?

SK Siltron CSS is a pure-play manufacturer of both SiC substrates and epitaxial wafers with a long track record of proven customer service and innovation. With the backing of SK Siltron, CSS also possesses a wealth of expertise developed in the volume manufacturing of leading-edge Si wafers that is being leveraged to continue driving improvement of CSS's SiC wafers and to aggressively expand capacity to meet your needs.

Material properties

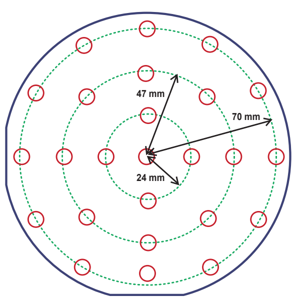
Please refer to product data sheet for complete property summary. These values are not intended for use in preparing specifications. Please contact your local sales office or SK Siltron CSS technical support for definition of product specifications.

Product metric (epitaxy 2 to 20 µm)	Result
Epitaxy doping concentration, cm^{-3}	
Standard epi	4e+15 < Nd < 1e+17
Special request	9e+14 < Nd < 2e+19
Total of all epilayers target thickness max deviation	≤ 10%
Total of all epilayer thickness uniformity (sigma/mean)	≤ 5%
Epilayer net target doping max deviation	≤ 15%
Epilayer net doping uniformity (sigma/mean)	≤ 10%
AFM surface roughness – RMS(1), nm	≤ 1
Bow, µm	± 30
Warp, µm	≤ 50
TTV, µm	≤ 10
SBIR(2), µm	≤ 2

(1) Not 100% inspected. AFM on a 10 µm x 10 µm scan.
(2) $SBIR_{max}$ (10 mm x 10 mm).

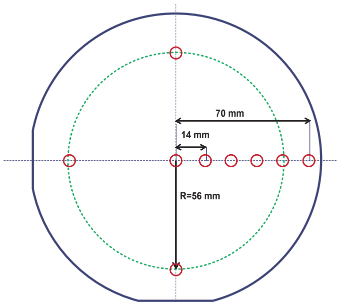
Note (n-type, Si-face).
- Edge exclusion: thickness, doping and LLS is 5 mm EE.
- Nominal buffer layer: 1 µm @ 1e+18/cm^3.
- Thickness (measured by FTIR, 25 pts): 2 to 20 µm.
- Carrier concentration (measured by Hg-CV, 9 pts): 4e+15 to 1e+17/cm^3.
- Max deviation is for all measurement points; percentage reported is calculated from [(Target – Actual)/Target].

Thickness (25 point) measurement pattern



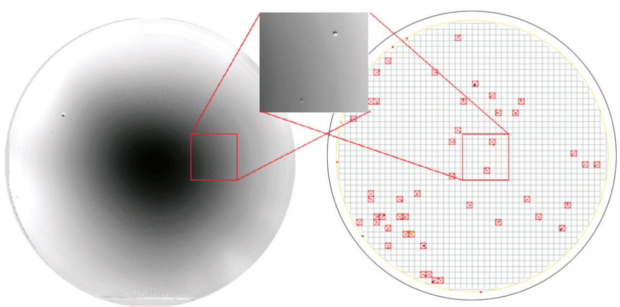
Dimensions not to scale

CV-02 (9 point) measurement pattern



Dimensions not to scale

Laser light scattering surface scan (LLS)



LLS defect map
Predicted device yield = 97%
(Device size: 2 mm x 2 mm)

How can we help you today?

Tell us about your performance, design and manufacturing challenges. Let us put our materials expertise, application knowledge and processing experience to work for you. For more information about our materials and capabilities, visit **www.sksiltron.com/en/wafer/waferC.do**.

To discuss how we could work together to meet your specific needs, contact us at **sales@sksiltron.com**.

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