HEXATECH

PRODUCT DATASHEET

ALUMINUM NITRIDE SUBSTRATE
AlN-10 • C - PLANE

Next generation devices demand advances in semiconductor materials.

UV-C LEDs and laser diodes, as well as high performance power and RF devices are all made using AlGaN epitaxial layers, often with Al concentrations above 60%. The key to manufacturing these high performance devices is the ability to produce high quality AlN substrates on which these epitaxial layers are laid down.

By building devices directly on HexaTech's native AlN substrates, device layer defects can be reduced 10,000 to 1,000,000 times when compared to the next best technologies. Utilizing HexaTech's high quality substrates translates to devices with optimum performance, reliability and production yields.

Standard Specifications for 50.8 mm (2") Diameter Substrates
Part Number: AlN-10-50-G1

Characteristic	Specification
Diameter	50.8 mm ± 0.5 mm
Thickness	400.0 µm ± 50.0 µm
Face Orientation	{0001} ± 0.5°
Surface Finish	Al face: CMP N face: Polished
High resolution XRD Rocking Curve, (0002) Reflection	< 50 arcsec FWHM
Usable Area	> 95%
Edge Exclusion	2.0 mm
Primary Flat Orientation	{10-10} ± 5.0°
Primary Flat Length	16.0 mm ± 2.0 mm
Secondary Flat Orientation	90° CW from Primary Flat, as viewed from Al face
Secondary Flat Length	8.0 ± 2.0 mm
Laser Marking	N face, parallel to Primary Flat
Packaging	Single wafer cups

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P 919 481 4412 | www.hexatechinc.com | sales@hexatechinc.com

Standard Specifications for 76.2 mm (3") Diameter Substrates
Part Number: AIN-10-75-G1

Characteristic	Specification
Diameter	76.2 mm ± 0.50 mm
Thickness	400.0 µm ± 50.0 µm
Face Orientation	{0001} ± 0.5°
Surface Finish	Al face: CMP N face: Polished
High resolution XRD Rocking Curve, (0002) Reflection	< 50 arcsec FWHM
Usable Area	> 95%
Edge Exclusion	3.0 mm
Primary Flat Orientation	{10-10} ± 5.0°
Primary Flat Length	22.22 mm ± 3.17 mm
Secondary Flat Orientation	90° CW from Primary Flat, as viewed from Al face
Secondary Flat Length	11.18 ± 1.52 mm
Laser Marking	N face, parallel to Primary Flat
Packaging	Single wafer cups

Standard Specifications for 2" and 3" Products

Characteristic	Specification
Shape	Bow: ≤ 30 µm Warp: ≤ 30 µm TTV: ≤ 30 µm
Surface Roughness	Ra ≤ 0.5 nm
Cracks	None, by naked eye, high intensity light
Surface Contamination	None, by naked eye, diffuse light
Scratches	Al face: ≤ 3, total cumulative length < one half substrate diameter
Edge Chips	≤ 2, maximum of 1.0 mm length and width

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Standard Specifications for 100.0 mm Diameter Substrates
Part Number: AIN-10-100-G1

Characteristic	Specification
Diameter	100.0 mm ± 0.50 mm
Thickness	400.0 µm ± 50.0 µm
Face Orientation	{0001} ± 0.5°
Surface Finish	Al face: CMP N face: Polished
High resolution XRD Rocking Curve, (0002) Reflection	< 50 arcsec FWHM
Usable Area	> 95%
Edge Exclusion	3.0 mm
Primary Flat Orientation	{10-10} ± 5.0°
Primary Flat Length	32.5 mm ± 2.0 mm
Secondary Flat Orientation	90° CW from Primary Flat, as viewed from Al face
Secondary Flat Length	18.0 ± 2.0 mm
Laser Marking	N face, parallel to Primary Flat
Packaging	Single wafer cups

Standard Specifications for 100.0 mm Products

Characteristic	Specification
Shape	Bow: ≤ 45 µm Warp: ≤ 45 µm TTV: ≤ 30 µm
Surface Roughness	Ra ≤ 0.5 nm
Cracks	None, by naked eye, high intensity light
Surface Contamination	None, by naked eye, diffuse light
Scratches	Al face: ≤ 3, total cumulative length < one half substrate diameter
Edge Chips	≤ 2, maximum of 1.0 mm length and width

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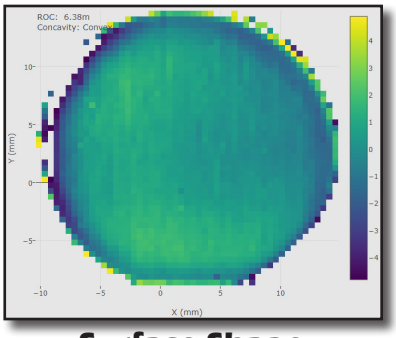
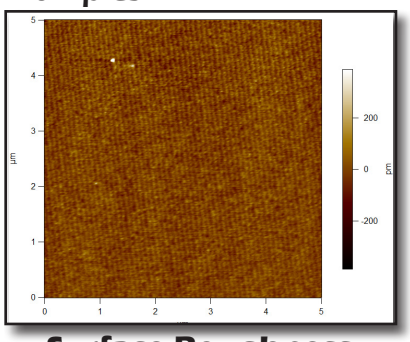
Aluminum Nitride C-Plane Substrate

Selected Characterization Examples



Surface Shape

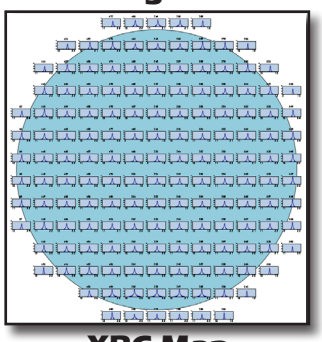
Polished c-plane substrate with full wafer variation of ± 4 microns.



Surface Roughness

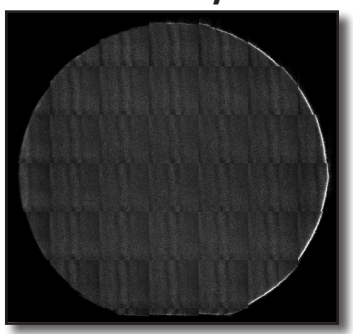
AFM image (5 x 5 µm²) of a CMP polished c-plane substrate with RMS surface roughness of ~0.1 nm.

High Resolution X-Ray (Philips X'Pert Pro MRD)



XRC Map

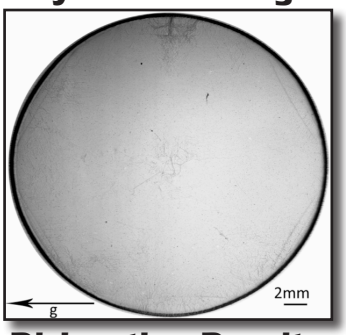
Full-wafer XRC map at 2 mm step size with FWHM of (00.2) and (10.2) reflections at 11" and 12", respectively.



XRT Reflection Composite

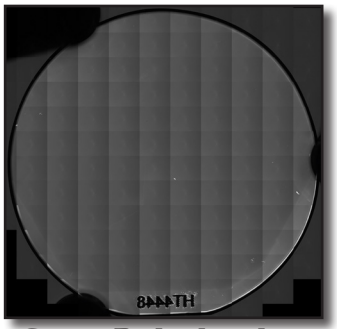
Composite of X-ray topograph images showing no extended structural defects.

White Beam X-Ray Topography (National Synchrotron Light Source)



Dislocation Density

Transmission X-ray topograph of c-plane substrate exhibiting low dislocation density (< 10^3/cm²).



Cross Polarization

Crossed polarizer image of c-plane substrate exhibiting uniform extinction.

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ABOUT HEXATECH

HexaTech Inc. has developed a proprietary crystal growth process that yields single crystalline aluminum nitride (AlN) boules ideally suited for the fabrication of high-quality AlN substrates. High-performance, high Al concentration AlGaN semiconductor devices currently face a crucial challenge in terms of achievable device quality. Fabricating these devices on lattice-matched, highly thermally conducting, single crystalline AlN wafers enables sophisticated, next-generation AlGaN-based devices with vastly superior performance and device lifetimes.

For more company or product information, please visit us at www.hexatechinc.com or contact sales@hexatechinc.com.

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