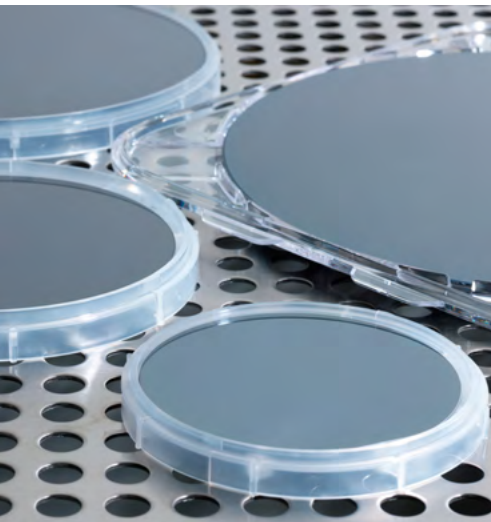




HVRF

GaN Epiwafers for RF Power



Key Features

- In-situ SiN passivation
 - Superior dynamic behavior
 - Excellent material stability
 - State-of-the-art device reliability
 - High wafer-to-wafer uniformity
 - Compatible with Si wafer fabrication lines
- AlGaN based heterostructures
- Buffer resistivity: $> 5 \times 10^{11}$ Ohms/sq
- On 150, 200mm (111) Si or 100mm SI SiC
- Bow: $< 50 \mu\text{m}$
- Excellent uniformity
 - Crystal quality
 - Layer thickness and composition

Typical Applications

- RF HEMTs - High Electron Mobility Transistors for mmW applications

RF Power GaN Epitaxial Wafers

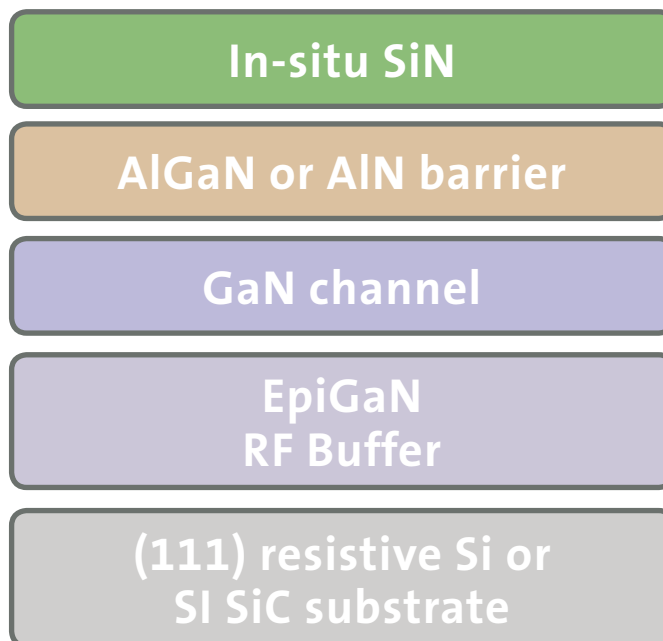
The HVRF product family is a state-of-the-art (Al,Ga)N/GaN hetero-epitaxial layer structure deposited crack-free on a (111) high resistance Si or semi-insulating SiC wafer for RF power applications. EpiGaN offers two standard HEMT structures with in-situ SiN passivation: one with a unique binary AlN barrier and the other having an AlGaN barrier with 25% Al content. Custom barrier and cap layer designs are available upon request.

The epitaxial layer consists of an active heterostructure based on an AlGaN or AlN barrier layer and a GaN channel, providing high electron mobility and low sheet resistivity.

The proprietary high-voltage buffer design offers low leakage currents, high breakdown voltage, low dispersion and a consistently low wafer bow.

EpiGaN's unique capability includes an in-situ SiN passivation, enabling an unparalleled dynamic transistor behavior, enhanced material stability and device reliability.

Standard Layer Structure



Standard Layer Specifications

Layer Name	Description	Typical Thickness	Comment
Substrate	150mm Si substrate (111), $\pm 0.5^\circ$ 200mm Si substrate (111), $\pm 0.5^\circ$ 100mm SiC substrate	675 μ m 725 μ m 500 μ m	High resistivity substrate High resistivity substrate Semi-insulating Other substrate diameters available on request
RF Buffer	Buffer	(1.5-2) μ m	
GaN Channel	GaN	175nm	Thickness can be customized
Barrier	AlGaN (25% Al) or AlN	20nm or (4-6)nm	Thickness and composition can be customized
Cap layer	SiN	50nm (AlGaN barrier) or 10nm (AlN barrier)	GaN cap available upon request for AlGaN barrier

Characterization Specifications

Parameter	Measurement	Units	Target
AlGaN thickness AlN thickness	X-Ray	nm	20 \pm 2 (4-6) \pm 1
AlGaN Composition*	Photoluminescence	%	25 \pm 1
SiN Cap Thickness	X-Ray	nm	50 \pm 5 (for AlGaN) or 10 \pm 1 (for AlN)
Wafer Bow	Laser profilometer	μ m	\pm 50 max.

AlGaN barrier thickness and composition and cap thickness can be customized upon request

Electrical Specifications

Parameter	Measurement	Units	Target
Electron Mobility*	Hall	cm ² /V.s	> 1800 (for AlGaN, 25% Al) > 1000 (for AlN)
Sheet Charge Density*	Hall	/cm ²	> 9e12 (for AlGaN, 25% Al) > (1.5-2)e13 (for AlN)
Sheet Resistivity*	Eddy current	Ohms/sq	< 400 (for AlGaN, 25% Al) < 350 (for AlN)
Buffer resistivity*	Buffer Isolation Structure	Ohms/sq @ 1MV/cm	> 5e11

* Measurements done on a sample basis on calibration wafers