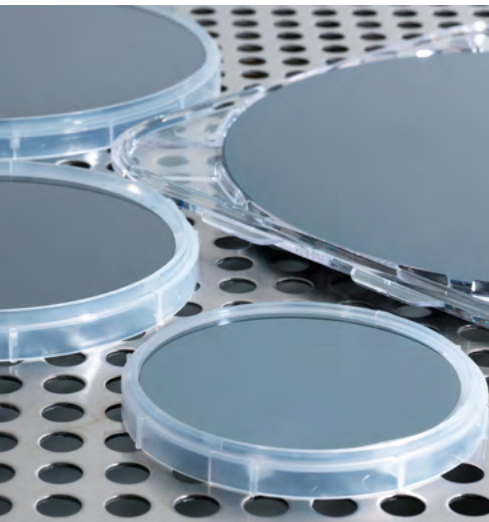




# HV650V

## GaN Epiwafers for Power Switching



### 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
- Breakdown Voltage: > 1000 V
- Leakage Current:
  - < 100 nA/mm@650V
- On 150mm and 200mm (111) Si
- Bow: < 50  $\mu$ m
- Excellent uniformity
  - Crystal quality
  - Layer thickness and composition

### Typical Applications

- 600V HEMTs - High Electron Mobility Transistors
- GaN Diodes

### 650V GaN-on-Si Epitaxial Wafers

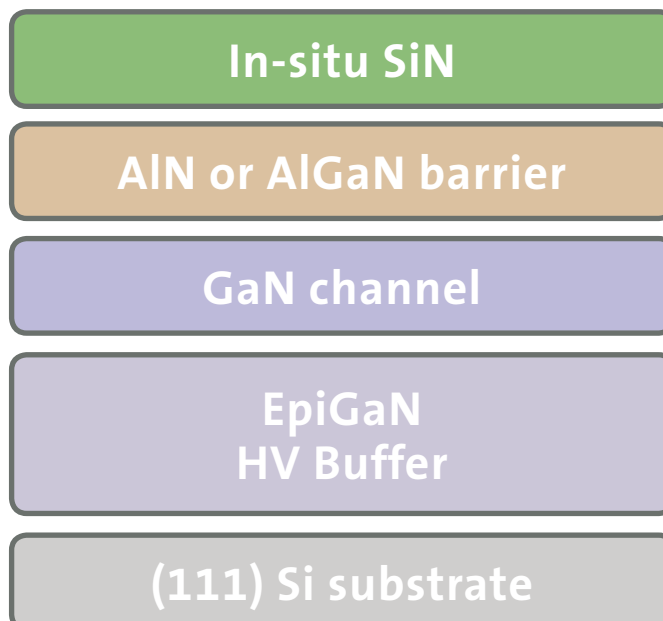
The HV650V product family is a state-of-the-art (Al,Ga)N/GaN hetero-epitaxial layer structure deposited crack-free on a (111) Si-wafer for high voltage power switching applications. EpiGaN offers two standard HEMT structures with in-situ SiN passivation: one with a unique binary AlN barrier and the other having an AlGa<sub>N</sub> 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 AlGa<sub>N</sub> 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





# HV650V

## Standard Layer Specifications

Layer Name	Description	Thickness Target	Comment
Substrate	150mm Si substrate (111), $\pm 0.5^\circ$ 200mm Si substrate (111), $\pm 0.5^\circ$	1000 $\mu$ m 1150 $\mu$ m	other substrate diameters available upon request
HV Buffer	Buffer	5.5 $\mu$ m	
GaN Channel	GaN	175nm	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) 10 $\pm$ 1 (for AlN)
Wafer Bow	Laser profilometer	$\mu$ m	$\pm$ 50 max.
Edge Exclusion		mm	5
Vertical Breakdown Voltage*		V	> 1000
Lateral Breakdown Voltage* ( $L_{G-D} > 20 \mu$ m)		V	> 1200
Leakage Current* (lateral, grounded substrate)	@650V, RT	nA/mm	< 100
Leakage Current* (vertical)	@650V, RT	$\mu$ A/mm <sup>2</sup>	< 1

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

## Electrical Specifications

Parameter	Measurement	Units	Target
Electron Mobility*	Hall	cm <sup>2</sup> /V.s	> 1800 (for AlGaN, 25% Al) > 1000 (for AlN)
Sheet Charge Density*	Hall	/cm <sup>2</sup>	> 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