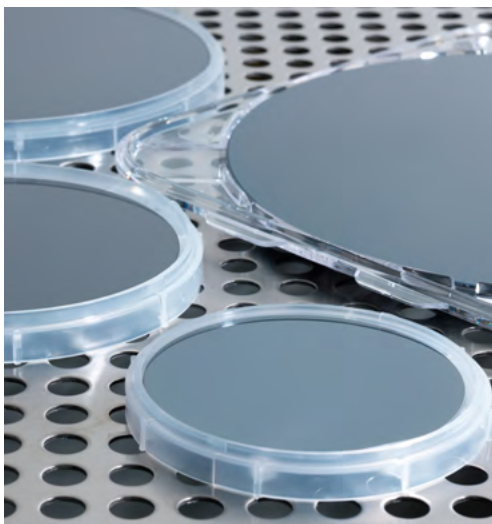




EpiGaN-HV



GaN-on-Si epitaxial wafers for Power switching

The EpiGaN-HV product family is a state-of-the-art (Al,Ga)N/GaN hetero-epitaxial layer structure deposited crack-free on a (111) Si substrate for power switching applications. Soitec offers d-mode HEMT structures with in-situ SiN passivation or GaN caps and e-mode HEMT structures with p-GaN caps.

Custom barrier and cap designs as well as layer structures suitable for 200V and 650V power switching applications are available.

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

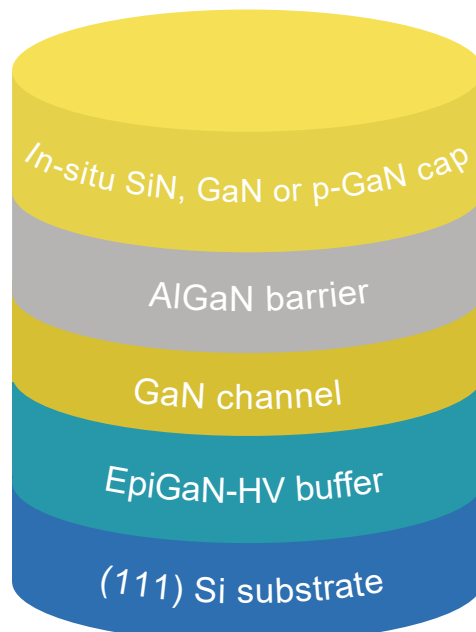
Key features

- 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
- On 200 mm (111) Si
- Bow: < 50 μm
- Excellent uniformity
 - Crystal quality
 - Layer thickness and composition

Typical applications

- Power supplies, USB chargers, wireless power
- EV/HEV, PV

Standard layer structure



Standard layer specifications

Layer name	Description	Thickness target	Comment
Substrate	200 mm Si substrate (111)	725 μ m, 1000 μ m	
HV buffer	Buffer	~2 μ m (200V), ~5 μ m (650V)	
GaN channel	GaN	175nm	Can be customized
Barrier	AlGaN (25% Al)	20nm	Can be customized
Cap layer	d-mode: SiN or GaN e-mode: p-GaN	(2-3)nm up to 100nm p-GaN	Thicknesses can be customized

Characterization specifications

Parameter	Measurement	Units	Target
Barrier thickness	X-Ray	nm	$\pm 10\%$
Barrier composition	Photoluminescence, ellipsometry	%	$\pm 1\%$
Cap thickness	X-Ray	nm	$\pm 10\%$
Wafer bow	Laser profilometer	μ m	± 50 max.
Edge exclusion		mm	5

Electrical specifications (d-mode)

Parameter	Measurement	Units	Target
Electron mobility*	Hall	cm ² /V.s	> 1800 (for 20nm AlGaN, 25%Al)
Sheet charge density*	Hall	/cm ²	> 9e12
Sheet resistivity*	Eddy current	Ohms/sq	< 400 (for 20nm AlGaN, 25%Al)
Vertical breakdown voltage*	for 650V product	V	> 1000
Lateral breakdown voltage* (L _{G-D} >20 μ m)	for 650V product	V	> 1200
Leakage current* (lateral, grounded substrate)	@650V, RT	nA/mm	< 100
Leakage current* (vertical)	@650V, RT	μ A/mm ²	< 1

* Measurements done on a sample basis on calibration wafers