

GaN epitaxial wafers for RF Power

The EpiGaN-RF product family consists of state-of-the-art (In,Al)N/GaN or (Al,Ga)N/GaN hetero epitaxial layer structures deposited crack-free on a (111) high-resistance Si or semi-insulating SiC substrate for RF applications. Soitec offers standard HEMT structures with AlN, InAlN or AlGaIn barriers which can be combined with in-situ SiN passivation or GaN caps. Custom barrier and cap layer designs are available on request.

The proprietary high-voltage buffer design offers high breakdown voltage, low trapping effects and RF losses and a consistently low wafer bow.

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

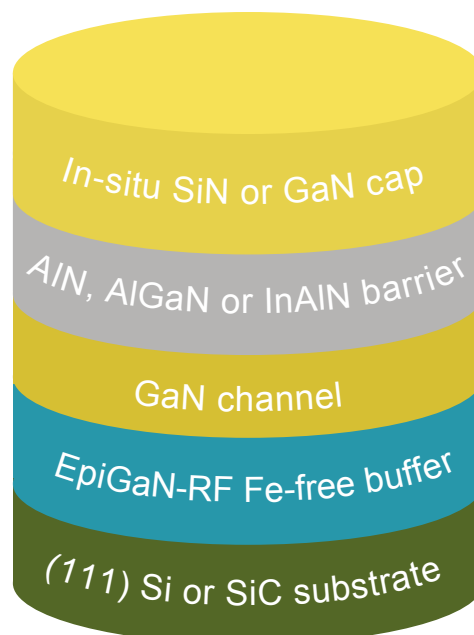
Key features

- 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
- Lowest RF losses on Si substrates
- Buffer resistivity: $> 5e11$ Ohms/sq
- On 150, 200-mm (111) Si or 100, 150-mm SI SiC
- Bow: < 50 μ m
- Excellent uniformity
 - Crystal quality
 - Layer thickness and composition

Typical applications

- RF discretes and MMICs for wireless infrastructure (4G LTE, 5G (sub-6GHz, mmW), SatCom)

Standard layer structure



Standard layer specifications

Layer name	Description	Typical thickness	Comment
Substrate	150-mm Si substrate (111) 200-mm Si substrate (111) 100, 150-mm SiC substrate	675µm 725µm 500µm	High resistivity substrate High resistivity substrate Semi-insulating
RF buffer	(Al,Ga)N	(1-2)µm	Fe-free
GaN channel	GaN	150nm	Thickness can be customized
Barrier	AlGaIn (25% Al) or AlN or InAlN (17% In)	20nm or (4-6)nm or 10nm	Thickness and composition can be customized
Cap layer	SiN or GaN	(2-20)nm or (2-3)nm	Thickness can be customized

Characterization specifications

Parameter	Measurement	Units	Target
Barrier thickness	X-Ray	nm	± 10%
Barrier composition	Photoluminescence, ellipsometry	%	± 1%
SiN cap thickness	X-Ray	nm	± 10%
Wafer bow	Laser profilometer	µm	± 50 max.

Electrical specifications

Parameter	Measurement	Units	Target
Electron mobility*	Hall	cm ² /V.s	> 1800 (for AlGaIn, 25% Al) > 1000 (for AlN) >1500 (for InAlN,17% In)
Sheet charge density*	Hall	/cm ²	> 9e12 (for AlGaIn, 25% Al) > 1.5e13 (for AlN) >1.5e13 (for InAlN,17% In)
Sheet resistivity*	Eddy current	Ohms/sq	< 400 (for AlGaIn, 25% Al) < 350 (for AlN) <250 (for InAlN,17% In)
Buffer breakdown	Buffer isolation structure	V	>200 @ 1µA/mm

* Measurements done on a sample basis on calibration wafers