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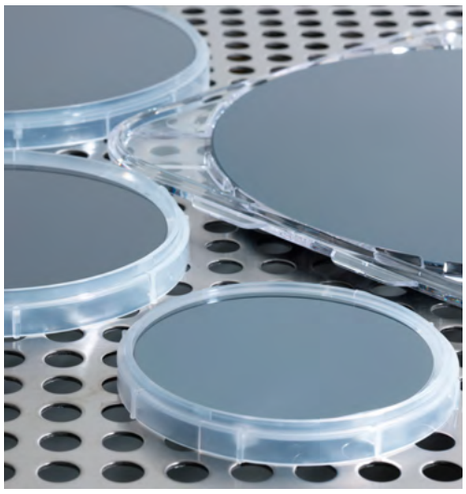
EpiGaN-RF



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 AlGaN 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 unparalled dynamic transistor behaviour, enhanced material stability and device reliability.

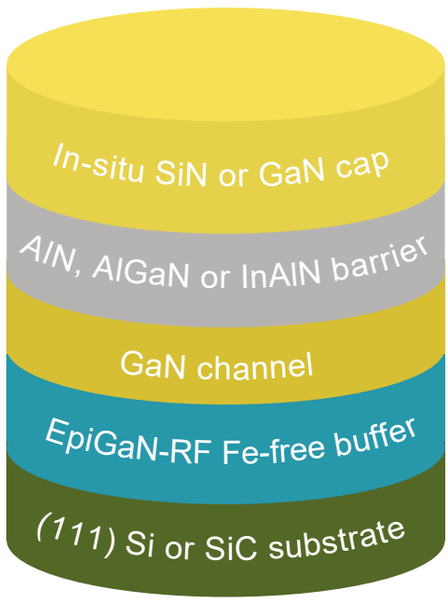
Key features

- 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 µm
- 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



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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	AlGaN (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	(2-3)nm	

Characterization specifications

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

Electrical specifications

Parameter	Measurement	Units	Target
Electron mobility*	Hall	$cm^2/V.s$	> 1800 (for AlGaN, 25% Al) > 1000 (for AlN) >1500 (for InAlN,17% In)
Sheet charge density*	Hall	$/cm^2$	> 9e12 (for AlGaN, 25% Al) > 1.5e13 (for AlN) >1.5e13 (for InAlN,17% In)
Sheet resistivity*	Eddy current	Ohms/sq	< 400 (for AlGaN, 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