

# MEMS-based varactor for adaptive sensor solutions

Fig. 1: 3D image of a manufactured varactor using a laser scanner microscope

## Cognitive Systems in Industrial Evolution

Industrial evolution is being driven by cognitive systems that combine artificial intelligence with advanced sensors. The growing demand for miniaturized and high-performance components in communication and consumer electronics highlights the limitations of traditional varactors in terms of size, adaptability, and cost. These constraints hinder the development of innovative applications requiring flexible frequency tuning.

## Our solution: MEMS-based varactors

MEMS varactors offer a revolutionary solution to these challenges, enabling significant miniaturization and improved performance through precise impedance and frequency control. These modules allow to enhance existing systems'

efficiency and unlock new applications via filtering, inline calibration and measurement range extension, driving the next generation of communication devices and advancing the electronics industry.

## Benefits

- Miniaturization: more compact designs in electronic devices
- Enhanced performance: continuous an in-situ tuning of impedance and frequency over wide dynamic range
- Cost-effectiveness: Full CMOS compatibility
- Innovation Enablement: enabling next-generation devices

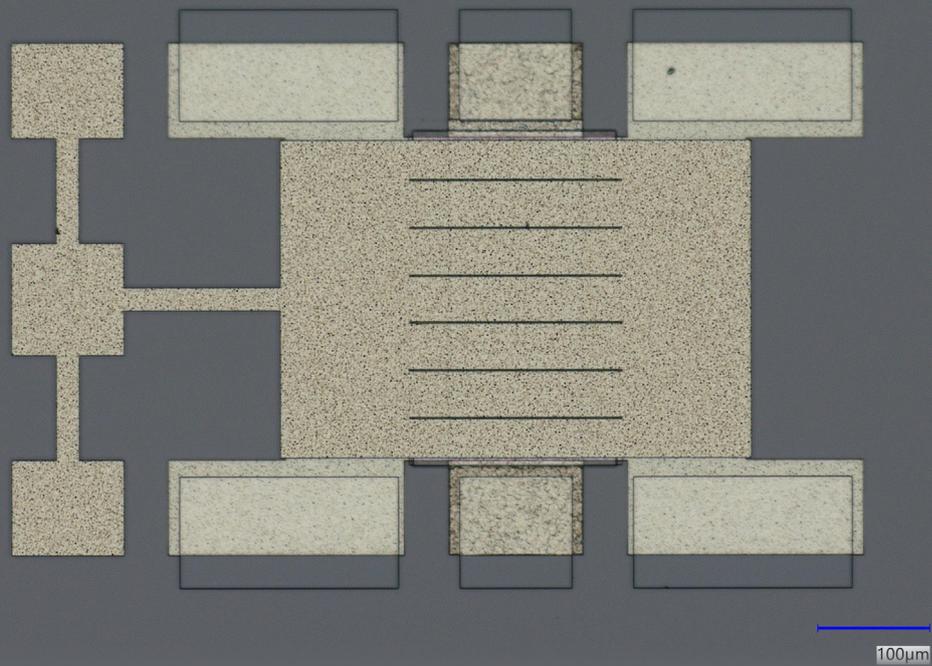
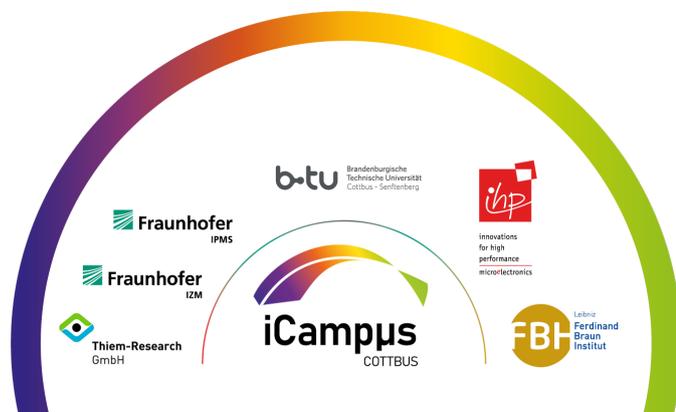


Fig. 2: Optical image of a varactor test structure

## Application fields

- **Measurement and sensor technology**
  - Inline calibration
  - Adjustment of measurement ranges
  - Resolution adjustment
- **Communication technology**
  - 5G and 6G adjustable filter
  - Antenna impedance adjustment
- **Industry and automation**
  - Inline calibration
  - Drift correction
  - Monitoring systems

Parameter	Min.	Max.
Signal frequencies /GHz	0	10
Capacitance tuning ratio	5	15
Capacitance variation rates /MHz	0	1
Footprint /mm <sup>2</sup>	0.7x0.7	3x3
Quality factor	80	100
Driving voltage /V	5	50
Signal line resistivity /µΩcm	2.7	2.7
Absolute capacitance /pF	0.2	10



Join us in the application of tunable MEMS varactors!  
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## Contact

Dr. Michael Stolz  
 Acoustic Sensors and Systems  
 +49 355 69 – 2483  
[michael.stolz@ipms.fraunhofer.de](mailto:michael.stolz@ipms.fraunhofer.de)

Fraunhofer Institutes for Photonic  
 Microsystems IPMS  
 Branch »Integrated Silicon  
 Systems ISS«  
 Konrad-Zuse-Straße 1  
 03046 Cottbus, Germany  
[www.ipms.fraunhofer.de/en](http://www.ipms.fraunhofer.de/en)

