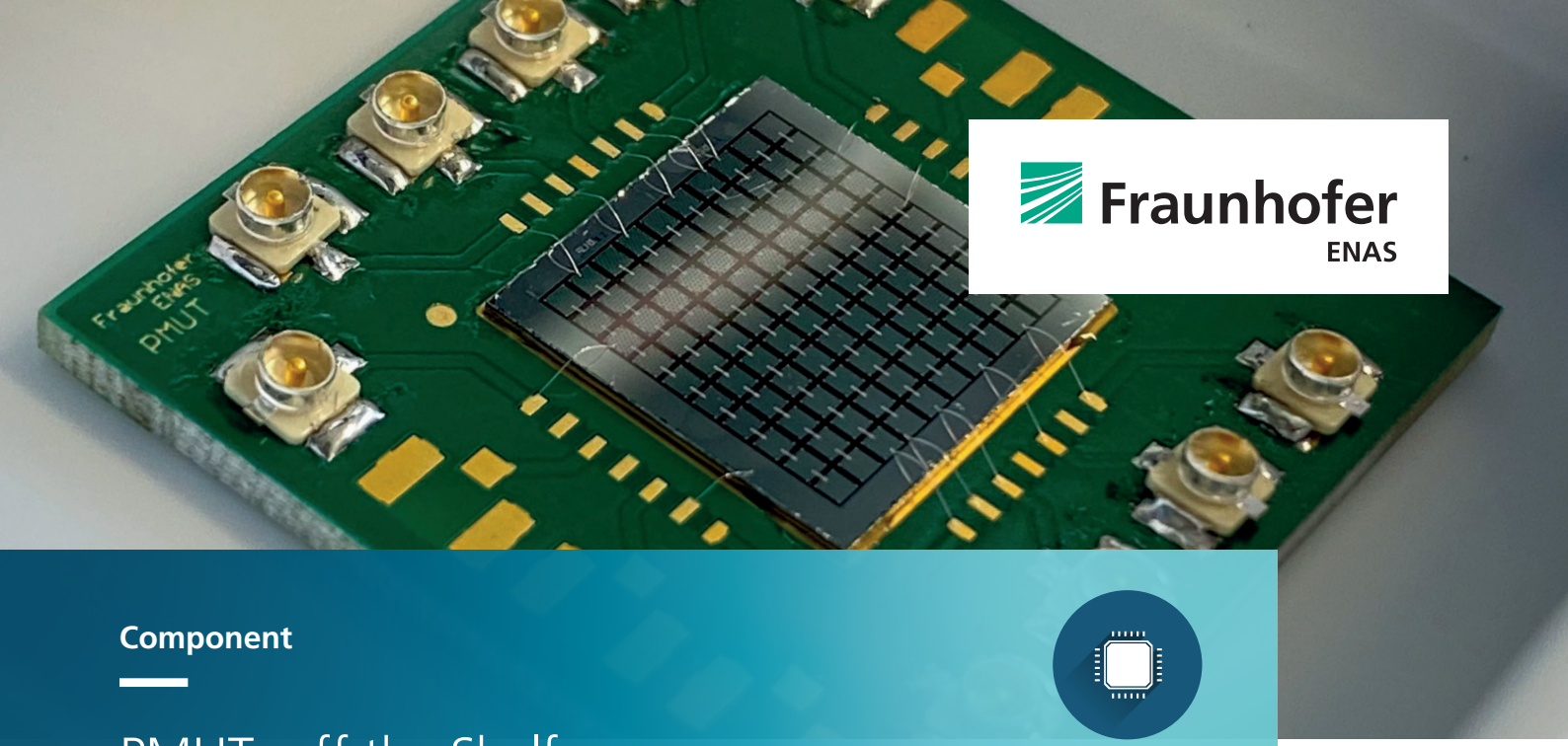


Fraunhofer ENAS

Component

PMUTs off the Shelf – Universal PMUTs for Instant R&D Requests

Fast Facts

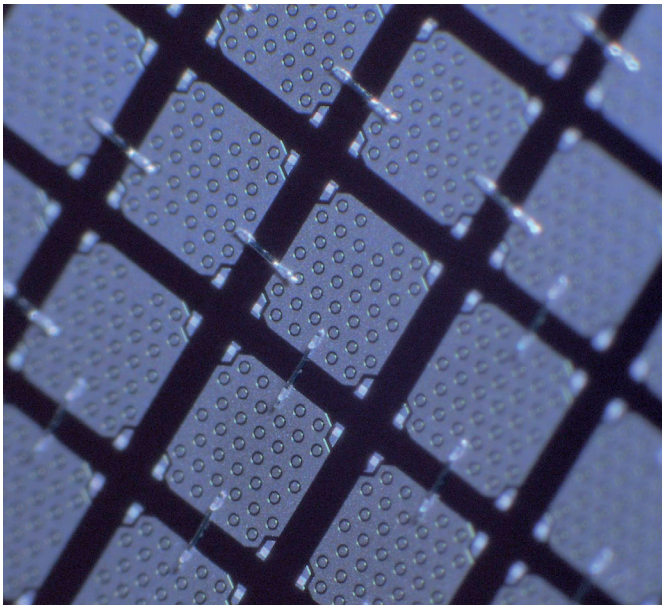
- PMUT chips available as off the shelf components
- Instant supply for R&D tests and services
- Freely selectable chip geometry from 1 mm² to 100 mm²
- Freely selectable number and geometry of acoustic channels
- Standard PMUT frequency bandwidths in stock from 0.2 – 4 MHz (up to 10 MHz)
- Patented universal PMUT technology platform
- Plug'n'play functionality with conventional ultrasonic electronics
- Highly linear performance
- No Curie temperature, no aging of the piezoelectric material, no depolarization

General Description

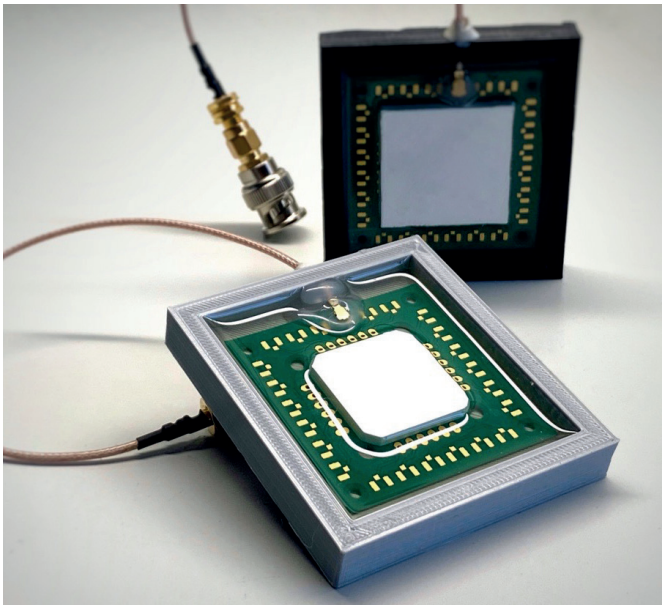
The patented technology platform for piezoelectric micromechanical ultrasonic transducers (PMUTs) enables the short-term or immediate availability of customized microchips without the setup costs of a wafer run, even in small quantities. This makes micromechanical ultrasound attractive for research and development in new applications, especially for SMEs. The electrical properties of the ultrasonic transducers are similar to those of conventional ultrasonic heads, which means that the transducer and established ultrasonic electronics are generally plug'n'play solutions. The PMUTs are available on the wafer level and can be diced to the required chip size (1 mm pitch) on request. The chip consists of unit cells of acoustic transducers, which are electrically contacted as required. This arrangement according to the desired shape of the acoustic channel can also be made in a grid pattern, thus enabling multi-array arrangements. The transducers have a bandwidth of around 100 percent in liquid form and the center frequency is determined by the geometry of the movable silicon membranes. The technology platform enables standardized transducer elements in a total bandwidth of 0.2 MHz to 4 MHz, and up to 10 MHz on request.

More Features

- Standard PMUT center frequencies (in air) 0.7 kHz, 1.5 MHz, 3.5 MHz, (9 MHz)
- Standard PMUT bandwidth frequencies (in liquid) 0.2 – 0.8 kHz, 0.5 – 1.5 MHz, 1 – 4 MHz, (3 – 10 MHz)
- Chip size selectable from 1 x 1 mm² to 10 x 10 mm² with a grid size of 1 mm in each direction
- Acoustic channel number and size selectable from approx. 1 x 1 mm² to 10 x 10 mm² with a grid size of 1 mm in each direction
- High actuator energy in transmit mode
- Low actuation voltages (< 10 V)
- High voltage possible (> 100 V)
- High sensitivity in receive mode
- No bias voltage needed



PMUT array with individualized acoustic channels.



Plug´n´play PMUT evaluation system.

Suggested Applications

- PMUTs for industry 4.0
- PMUTs for autonomous systems
- PMUTs for medical ultrasound
- PMUTs for medical photo acoustic imaging
- PMUTs for consumer electronics
- PMUTs for automotive
- Design and technology customizable for specific applications
- Technology transfer service for MEMS foundries available

Sample Request

Order samples and test the PMUT technology. Standardized samples with 1 to 10 acoustic channels and a sensor size of 1 mm² – 100 mm² are available for proof of concept. The center frequency depends on the transducer type and is typically 0.5 MHz, 1 MHz or 2 MHz. The bandwidth is approx. 100 percent. More options for the chip size, acoustic channel number and geometry as well as frequency ranges are available on request. The PMUTs can be covered with an acoustic matching layer and are waterproof. The system can be connected via SMA/BNC adapter to various electronics and is generally compatible with conventional ultrasonic electronics. The samples are typically in stock or available on short notice.

In cooperation with

ZfM Zentrum für Mikro- und Nanotechnologien

TECHNISCHE UNIVERSITÄT CHEMNITZ

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