



THZ IMAGING

ARRAY DETECTORS IN THE THZ WAVEBAND BASED ON ANTENNA-COUPLED MICROBOLOMETERS (320 X 240 PIXELS)

+ WHAT IS CEA-LETI'S THZ DEVICE?

Building on its thermal infrared bolometric technology, CEA-Leti developed smart detectors that enable THz real-time imaging in the most effective way, similar to visible-light digital cameras. CEA-Leti's THz imaging technology is unique. It relies on a patented bolometer architecture in which optical collection is provided by crossed bow-tie antennas combined with a quarter-wavelength dielectric cavity.

THz waves collected by these antennas are then converted into heat and detected by a thermo-resistive layer derived from CEA-Leti and ULIS's mature bolometer technology.

+ APPLICATIONS

THz radiation can translate into various commercial applications:

- Non-destructive testing for various industrial fields: food/agriculture, pharmaceutical products, semiconductors, automotive, etc.
- Defense and security: people screening, luggage control, etc.
- Remote spectral analysis in waste sorting or cultural-heritage diagnosis
- Biology and medicine—dermatology, biochips, etc.

+ KEY ADVANTAGES

- Room temperature operation, compactness and video output
- Full compatibility with silicon technology manufacturing process
- Low-cost and high production yield
- Broadband spectral absorption
- Millimetric or submillimetric resolution
- May be customized with innovative pixel and array architecture: frequency range, polarization, etc.

KEY FIGURES

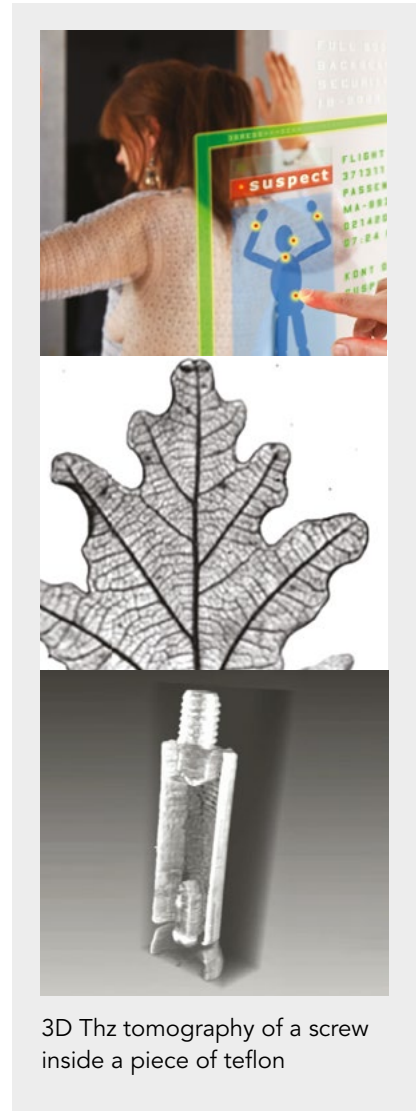
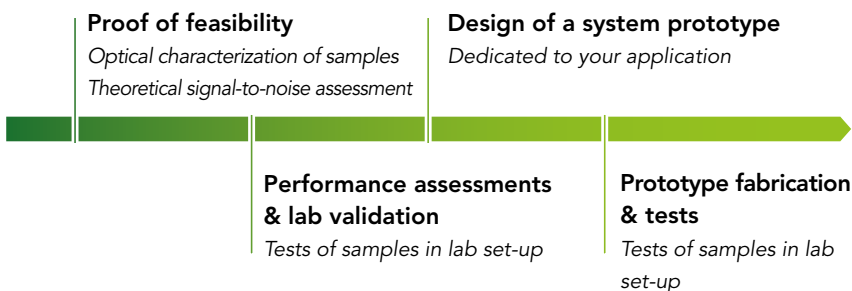
- Large format: 320 x 240 pixels
- Pixel pitch: 50 μm
- Spectral range: 0.3 THz-4THz (optimized for 1-3 THz)
- NEP @2.5 THz: 30 pW
- Frame rate: 25 Hz

+ THZ RADIATION

Terahertz (THz) band loosely denotes the spectral region 0.3-10 THz (1 mm - 30 μm). Electromagnetic waves in this band uniquely combine very interesting properties:

- **Sees through matter:** Penetration through non-polar materials such as fabric, ceramic, plastic, leather and cardboard
- **Monitors water content:** High sensitivity to polar molecules
- **Identifies materials like chemicals, explosives, etc.**
Specific spectral signatures of many gases, liquids and solids
- **Safer than X-ray:** Low-energy, non-ionizing radiation

+ HOW DO WE WORK TOGETHER?



3D Thz tomography of a screw inside a piece of teflon

INTERESTED IN THIS TECHNOLOGY?

Contact:
Nicolas Lio Soon Shun
nicolas.liosoonshun@cea.fr
 +33 679 295 297

Leti, technology research institute

Commissariat à l'énergie atomique et aux énergies alternatives
 Minatec Campus | 17 avenue des Martyrs | 38054 Grenoble Cedex 9 | France

www.leti-cea.com

