

TeraSense
Terahertz imaging systems

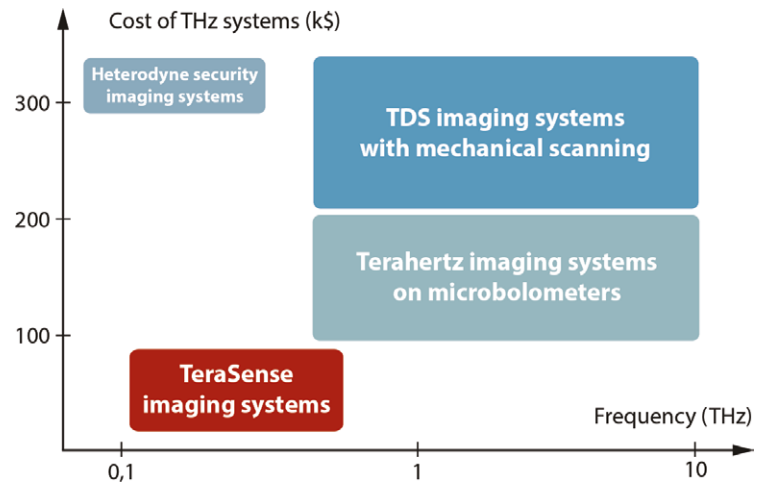


The World's First
**HIGH SPEED TERAHERTZ
IMAGING SYSTEMS**

TeraSense has developed and patented a ground-breaking technology for making new-generation semiconductor detector arrays for terahertz imaging. The novel TeraSense detectors boast excellent sensitivity compared to other available instrumentation operating in frequency range of 0.05 – 0.7 THz. 2D sensor arrays are scalable in the number of pixels to match required shape and dimensions, from a square to a linear matrix, with available pixel sizes of 0.5x0.5, 1.5x1.5 and 3.0x3.0 millimeters. Owing to compatibility of the TeraSense technology with mass-production lines in semiconductor industry, additional advantages of TeraSense detectors are their low cost and ease of large-scale fabrication.

Based on the cutting-edge TeraSense imaging technology, a highly sensitive and exceptionally compact THz camera has been produced. With such a camera there has been achieved a remarkable sub-mm spatial resolution and ultra-fast registration rate of up to 50,000 fps. As this novel technology presently outranks any competition, it has great potential to become an expedient element in a broad scope of hi-tech applications, such as THz non-destructive testing, security screening, medical imaging and terahertz communication, to name a few. What is more, due to their compact size and functional flexibility, TeraSense cameras can be incorporated into more elaborate industrial solutions.

Existing terahertz imaging systems



For the terahertz signal generation purposes TeraSense makes use of proprietary IMPATT and Schottky-diode technologies. Designed to operate in sub-terahertz frequency range of 0.1 – 0.3 THz, these state-of-the-art devices are currently some of the most powerful solid-state THz sources on the market that have capacity to generate a Continuous Wave (CW) signal with output power level of up to 0.5 W. All TeraSense generators feature phenomenally long life-time of fully stable and reliable operation. Moreover, it is their extremely compact size and low cost that put these devices in the vanguard of the competition. All these advantages imply numerous possibilities in terms of both small and large-scale applications as they enable straightforward integration of TeraSense sources as stand-alone units into complex industrial systems.

Terasense products



Terahertz imaging cameras

- Wide spectra range 50 GHz – 0.7 THz
- Noise Equivalent Power 1 nW/√Hz
- High speed image acquisition rate up to 5000 frames per second
- 1.5 mm pixel pitch
- Customized solutions and compact size
- Low cost

Ultrafast line camera for conveyor applications

TeraSense has developed Terahertz camera optimized for high-speed conveyor industrial applications. The camera features 5 kHz (5000 frames per second) speed, custom pixel number and special software to stitch shots.

Number of pixels (scalable): 256 x 1
 Min detectable power/pixel:

- 100 nW (at 5000 fps)
- 45 nW (at 1000 fps)
- 14 nW (at 100 fps)



Sub-terahertz sources



IMPATT diodes (IMPact ionization Avalanche Transit-Time)

Frequencies	100 GHz	140 GHz	200 GHz	300 GHz
Output power	80/180/400 mW	30/90/180 mW	50 mW	10/>20/40 mW

- High power output
- Protective isolator for enhanced stability
- TTL modulation option with 1µs rise/fall time
- High gain horn antenna or WR- type flange

Terahertz security body scanner

Working distance:	3 - 6 m
Imaging area (at 3 m):	70 x 70 cm (at 3 m) 120 x 120 cm (at 6 m)
Resolution:	3 cm (at 3 m) 6 cm (at 6 m)
Operating frequency:	100 GHz
THz sensor array:	3 x 3 mm, 32 x 32 px
Number of sources:	6
Frame rate:	Live Stream



Ultrafast terahertz detectors

	Ultrafast	Fast
Response time	150 ps	1 µs
Spectral range	50 GHz - 0.7 THz	50 GHz - 0.7 THz
Impedance	50 Ω	10 k Ω
Responsivity	0.5 V/W	10 V/W
Noise equivalent power	2 nW/√Hz	1 nW/√Hz
No power supply	✓	✓

Optics for terahertz

TeraSense offers custom manufacturing of quasi-optical components for THz range: PTFE and TPX lenses, windows, prisms, attenuators, polarizers, beam splitters. Terahertz lenses are done with diameters 1 - 30 cm and focal lengths 50 - 300 mm.



TeraSense Imaging Cameras and IMPATT diodes have EC Certificate of Compliance (EC Certificate of Conformity) and are 100% environmentally friendly products that can be safely used with no detriment to human health/safety.

Featured clients

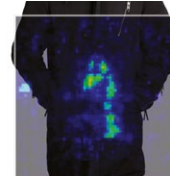
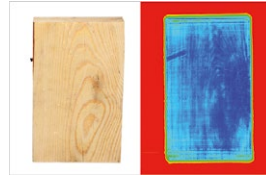


Applications



Terahertz quality control

Non-destructive analysis (NDT) of the internal structure of objects (quality control of products). THz cameras enable to visualize the contents of sealed packages or food products under various enclosures.



Terahertz wireless communication

Building high-frequency wireless telecommunication systems of new generation (up to 100 Gbit/sec). This application holds high promise for high-speed information transmission between electronic devices; building wireless local area networks (WLAN) and wireless personal area networks (WPAN) of new generation, as well as creating entirely secured dedicated channels of wireless communication.



Terahertz imaging security

Security systems for various applications: people screening, luggage scanning, as well as scanning postal parcels and envelopes in terms of prohibited items inside. Here the emphasis is primarily made on one feature that unlike X-ray, THz radiation is not detrimental to human body. THz scanners allow remote detection of metallic, plastic, ceramic and other object concealed under clothes — at a distance of a few meters.



Terahertz imaging in medicine

THz tomography in medicine allows to conduct analysis of the upper layers of a human body — skin, vessels, joints and muscles. There are known successful applications of THz tomography for detecting skin and breast cancers at early stages. Capability of visualizing current conditions of wounds under gypsum/bandage layers also represents high interest.



Terahertz science

Scientific applications of THz radiation include spectroscopy of long-wavelength lattice vibrations of crystals, bending vibrations of molecules. Frequencies of soft modes in ferroelectric materials and frequencies matching the energy of apertures in superconductors are also 'residing' within THz range. Terahertz frequency range is convenient for creation and study of meta-materials and plasmonic effects.

About TeraSense



Since 2008

bringing innovations in THz imaging



Over 500 happy clients

in science and industry



50+ distributors

around the world



2 headquarters and
40 people team

with half holding Ph.D. degree



Products used at
5 continents in over
50 countries of the world



100+ publications
and **5 patents**