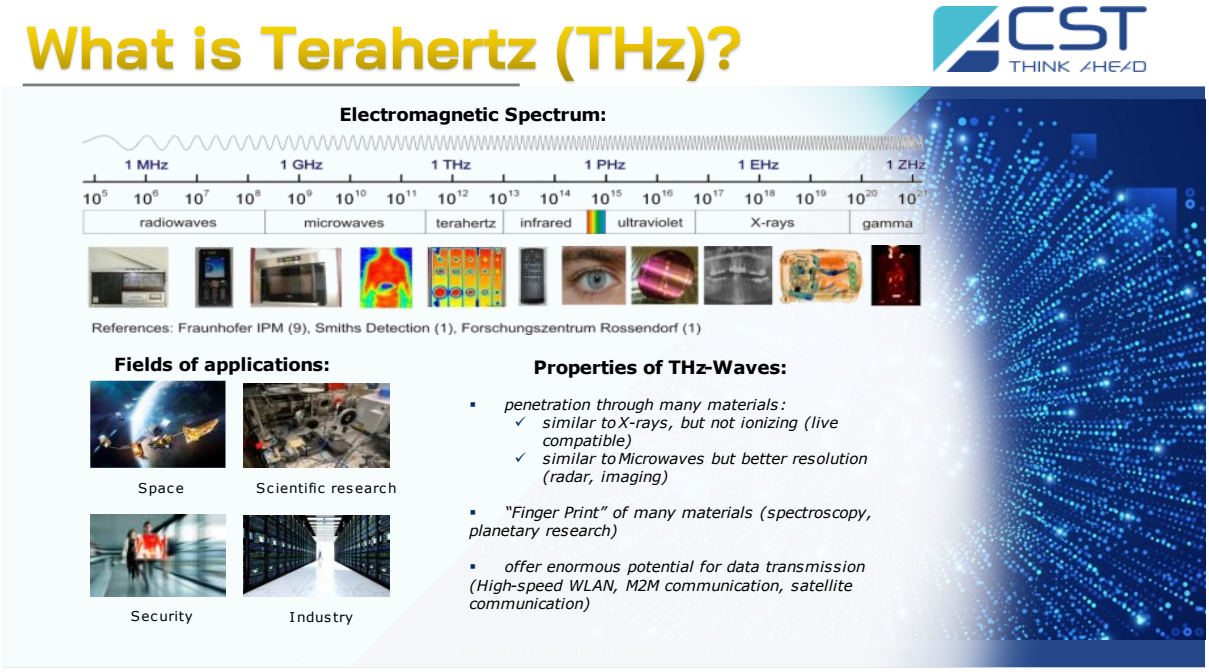
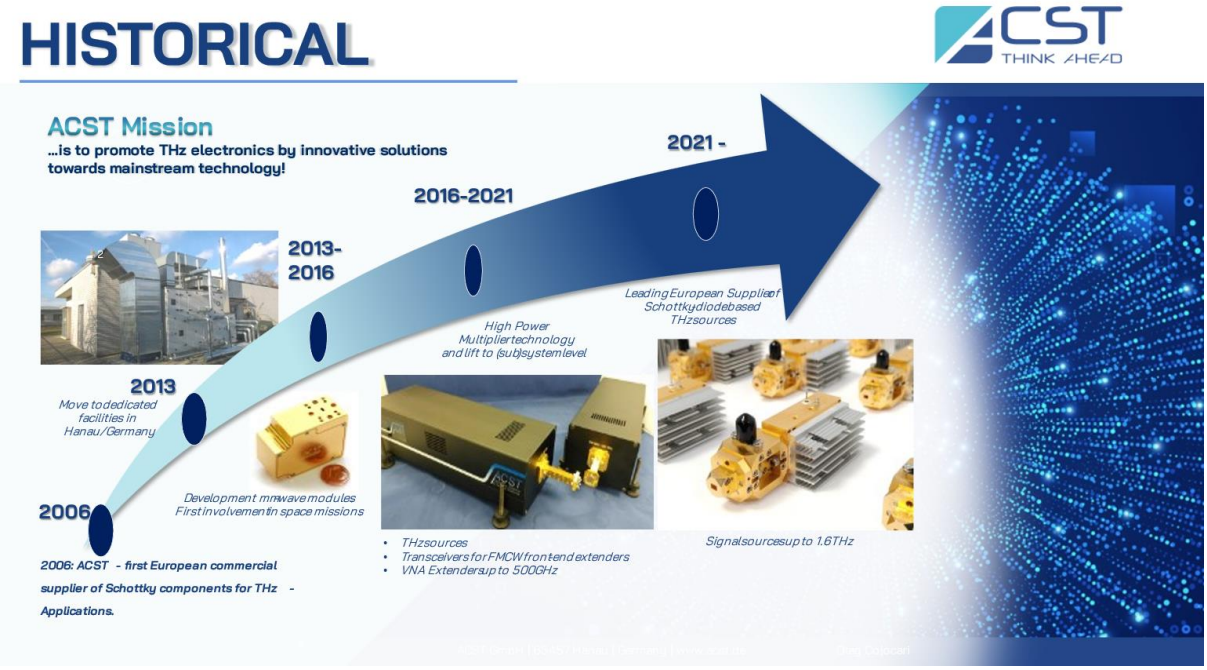
Founded in 2006 ACST GmbH became the first European supplier of Schottky diodes for mm-waves and Terahertz (THz) Applications. The following figure gives an introduction to definition and application of THz technology.



Being a spin-off company of the Technische Universität Darmstadt (TUD), ACST succeeded over twenty years of technology standards, R&D activity, and accumulated experience at TUD in the field of THz technology. Over the past decade ACST has undertaken over twenty R&D projects supported by ESA, EC (FP7 & H2020), the German Government (BMBF, BMWI), and industrial partners. Relying on accumulated experience and know-how, ACST extended their products over wide range of applications, targeting at ultimate performance at mm/submm-waves and THz frequencies.

Nowadays ACST is the leading European supplier of high-power frequency multipliers and THz sources. With over 20 years of experience in terahertz solutions ACST a strong partner in the field of Radioastronomy, communications, and scientific instrumentation, but also for industrial applications like MM/SubMM-Wave imaging for security and non-destructive quality control. ACST products provide the state-of-the-art performance and comply to the demand of high technology standards for applications in areas of scientific research, laboratory instrumentation, industry, security, and space.

The following picture illustrates historical highlights of ACST GmbH.

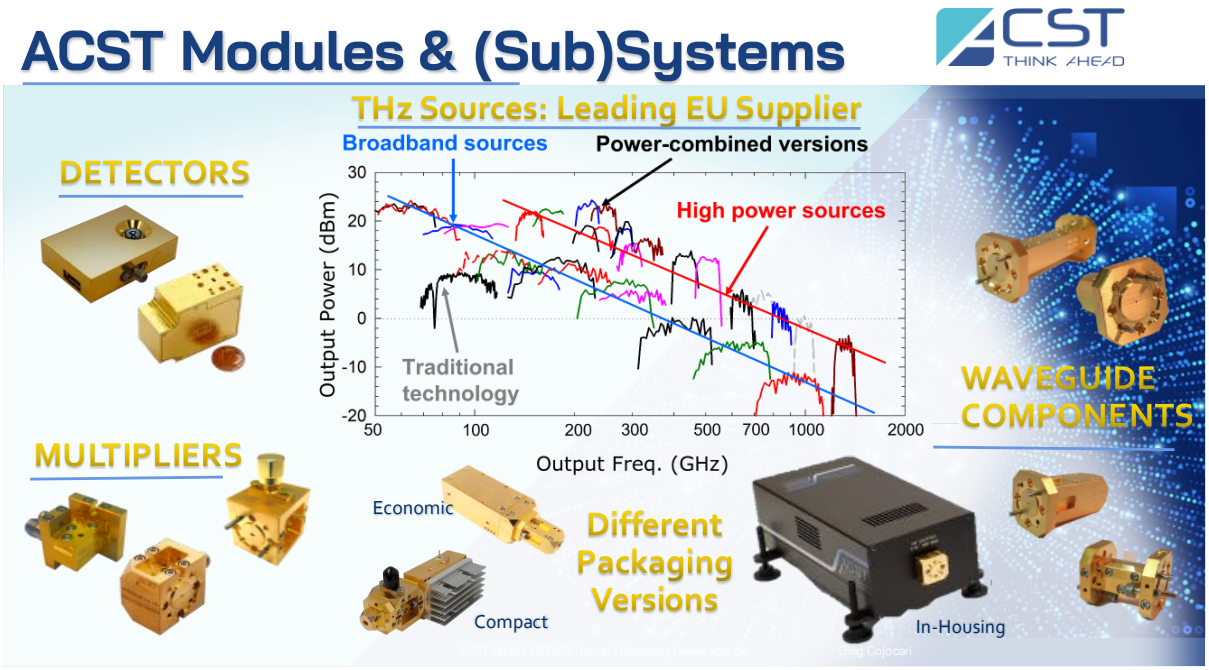


Easy Engineering: What are the main areas of activity of the company?

- Research and Development of Schottky-diode based Technology for mm-waves and Terahertz applications
- Development of commercial market for THz-technology
- Fabrication and commercialization of mm/sub-mm wave components and (sub)systems
- Reliability qualification tests for commercial and space qualification

Easy Engineering: What's the news about new products/services?

Recently the range of available high-power THz sources at ACST has been extended up to 1500GHz. These sources provide a frequency bandwidth of >15%, which significantly exceeds worldwide analogues for similar technology. Achievable power levels with ACST technology are in the range of 200mW@ 250GHz, 40mW@500GHz, 8mW@750GHz, and 1mW@1300GHz. These are state-of-the-art values worldwide.



Another recent breakthrough development at ACST is Low-barrier receiver technology. This technology allows for building THz receivers up to 1THz and above. The main advantage of such receivers is their low power consumption requirements, which is about 10 times lower in comparison to analogues receivers by traditional technology. This aspect place ACST THz receivers into the range of “first-choice” for space applications but also for many applications in commercial market.

Easy Engineering: What are the ranges of products/services?

ACST product range extends on three different levels of THz technology:

- Semiconductor components
- Functional modules
- (Sub)Systems.

These are illustrated in the following picture:

Availability of expertise at all these three levels represents an unique feature in THz commercial world and offers unbeatable advantages for development of customized solutions on THz market. The ACST product range may be roughly classified as in following:

- Semiconductor components based on Schottky-diodes for mm-waves and THz applications.
- Functional modules for mm-waves and THz applications like are frequency multipliers, mixers, and envelope detectors.
- (Sub)Systems for mm-waves and THz applications, like are Signal sources, Receivers, Radiometers, frequency extenders for microwave instruments as Vector Network analyzers, Spectrum analyzers, Radar systems.
- Customized developments.

Easy Engineering: What is the state of the market where you are currently active?

Due to particular properties of Terahertz (THz) waves to contain spectroscopic information on various materials and processes, THz technology is intensively used in Radioastronomy and traditionally supported by space agencies like are ESA, NASA JAXA, and others worldwide. In the last decade THz technology has considerably advanced and several Earth Observation space missions are currently either ongoing or in preparation stage. These Space Missions mainly target at clime research, which is one of most acute topics nowadays.

As an example please look at
https://www.esa.int/Applications/Observing_the_Earth/Meteorological_missions/Arctic_Weather_Satellite/Arctic_Weather_Satellite_tested_for_life_in_orbit
ACST is one of key suppliers for such space missions.

First (the oldest) terrestrial commercial market for THz technology is scientific instrumentation for research and development laboratories at universities and companies.

Considerable advancements of THz technology within last years in respect to availability of high-quality THz products and price reduction, actively contribute to emerging of new industrial applications like are Security and non-destructive quality control. Such applications are expected to explode THz market within near-middle future.

Easy Engineering: What estimations do you have for the beginning of 2024?

ACST involvement in several large projects on international space-business market are expected in 2024-2025.
Also, on-going development activities at ACST are assumed to be commercialized within nearest years and considerably contribute to move THz technology from niche applications into main-stream technology in Europe and the rest of the world.