PULSED TERAHERTZ EMITTER AND RECEIVER MODULES

Fraunhofer HHI

AT A GLANCE

Pulsed photoconductive antennas for 1.5 µm optical wavelength, emitted THz power confirmed by PTB (Physikalisch Technische Bundesanstalt)

Features

- >300 µW THz power
- Photoconductive emitter and receiver
- Mesa-structured InGaAs chips
- Small module footprint
- Plug and play design

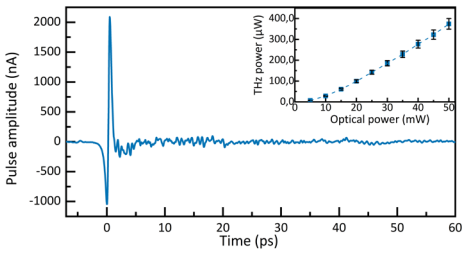
Applications

- High-bandwidth terahertz spectroscopy
- Industrial process control
- Non-contact coating film thickness measurement
- High-speed measurements

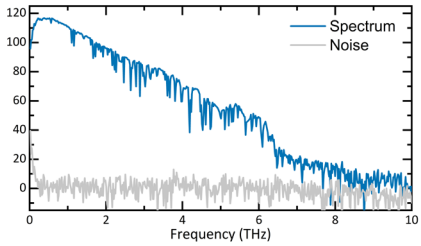
Technical background

In terahertz time-domain spectroscopy (TDS), a device under test (DUT) is probed with a short THz pulse. The frequency dependence of loss and refractive index is extracted from the detected pulse via a Fourier transform. Typical applications for pulsed THz radiation are depth-resolved imaging for e.g. 3D quality inspection and spectroscopic measurements up to 6.5 THz.

HHI's high power THz modules allow for faster measurements and therefore facilitate the transfer of THz technology to industrial applications and environments.



THz pulse trace for 50 mW optical power. The inset shows the emitted THz power vs. optical illumination power.



Frequency spectrum recorded with HHI's pulsed terahertz modules. Operation conditions are given in the specifications.

Specifications

- THz power (typ.): >300 µW
- Spectral range: 0.1 - 6.5 THz
- Dynamic range (peak): >110 dB
- Optical wavelength: 1.5 µm
- Maximum optical power: 50 mW
- Optical pulse duration: 100 fs*
- Emitter bias voltage: 200 V
- Diameter of module: 25 mm

* at emitter position

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A. Dohms et al., "Fiber-Coupled THz TDS System with mW-Level THz Power and up to 137-dB Dynamic Range," in IEEE Transactions on Terahertz Science and Technology, vol. 14, no. 6, pp. 857-864, Nov. 2024, doi: 10.1109/TTHZ.2024.3467173.