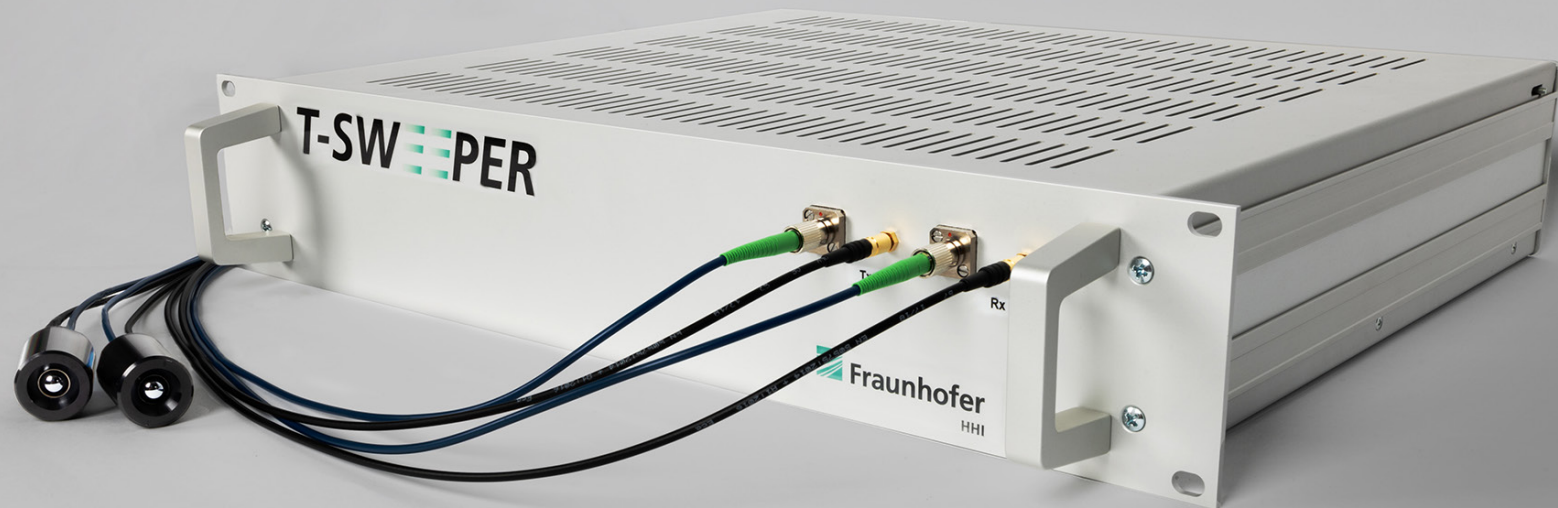


# T-SWEEPER: REAL-TIME FREQUENCY-DOMAIN TERAHERTZ SYSTEM



## AT A GLANCE

Fiber-coupled terahertz frequency-domain spectrometer operating at 1.5  $\mu\text{m}$  optical wavelength



### Features

- Turnkey operation
- Fully fiber-coupled
- No moving parts
- Realtime data acquisition

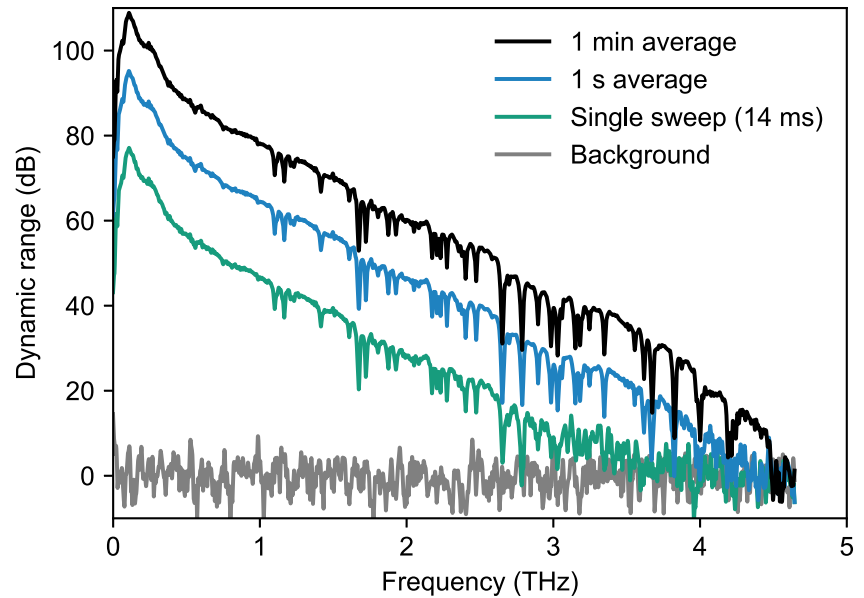
### Applications

- High-resolution terahertz spectroscopy
- Industrial process control
- Non-contact thickness measurement

### Technical background

Robust and agile terahertz (THz) systems are the prerequisite for transferring THz technologies from research facilities to industrial environments. The T-Sweeper realtime continuous wave THz system is based on mature telecom components, operating at an optical wavelength of 1.5  $\mu\text{m}$ . Utilizing HHI's fiber-coupled continuous wave THz emitter and detector modules, the T-Sweeper provides an unique combination of flexibility, high performance and high speed. This enables the adaptation of the T-Sweeper to your specific application.

*Kutz et al., "A Terahertz-Fast-Sweep Optoelectronic Frequency-Domain Spectrometer: Calibration, Performance Tests and Comparison with TDS and FDS", Appl. Sci. 12(16), 8257 (2022).*



Spectral dynamic range of the T-Sweeper realtime cw terahertz system. The dynamic range is shown for different averaging times.

### Specifications

- Power at 1 THz: >1  $\mu$ W
- Frequency resolution: 1 GHz
- Peak dynamic range:  
>70 dB single sweep (14 ms)  
>100 dB 1 min average
- Size: 19", 2U (11 x 48 x 36 cm<sup>3</sup>)
- Weight: 5 kg

### 1.3 THz mode

- Sweep range: 1.3 THz
- Acquisition time:  
5 ms per spectrum
- Effective bandwidth:  
1.3 THz in single shot

### Broadband mode

- Sweep range: >4 THz
- Acquisition time:  
14 ms per spectrum
- Effective bandwidth:  
3 THz for single shot  
>4 THz for 1000 averages

L. Liebermeister et al. "Optoelectronic frequency-modulated continuous-wave terahertz spectroscopy with 4 THz bandwidth", *Nature Communications* 12, 1071 (2021).

J. Kutz, J. "A Terahertz Fast-Sweep Optoelectronic Frequency-Domain Spectrometer: Calibration, Performance Tests, and Comparison with TDS and FDS". *Applied Sciences* 12 (2022).

S. Mohammadzadeh, et al. "Extreme Ultra-Wideband Optoelectronic Frequency-Modulated Continuous-Wave Terahertz Radar", *Laser & Photonics Reviews* 17 (2023).



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