

Real-Time Terahertz Spectrometer

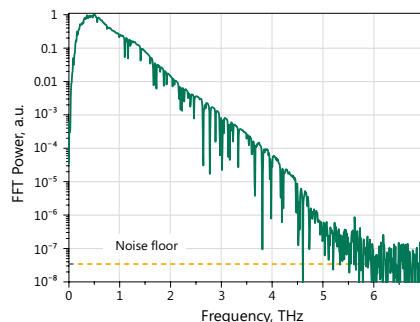
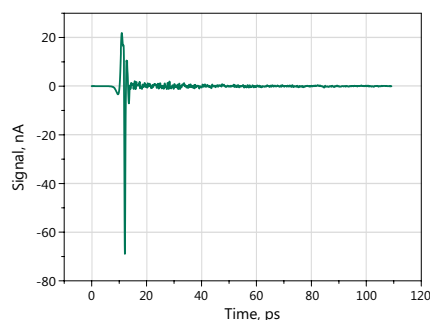


Real-time Terahertz Spectrometer offered by Ekspla is a powerful tool for investigative applications of pulsed terahertz waves. With simple and robust design, it is easy-to-use and adaptable to individual requirements.

The unique design of microstrip photoconductive antenna fabricated on low-temperature grown GaAs substrate ensures broadband spectral coverage and high dynamic range. The system is designed with two delay lines: fast and slow. Fast scan line allows real time data acquisition with 10 spectra/s speed and 110 ps time window. Average of collected spectra can increase dynamic range to 70 dB at pulse maximum and extend spectral range up to 4.5 THz. Additional slow delay line allows

combination of multiple time windows; thus spectrometer obtains excellent spectral resolution < 2.5 GHz. The fast scan line is designed without bearings and uses a magnetically coupled drive which makes it extremely reliable and significantly extends the lifetime.

T-SPEC spectrometer has hermetic housing with mounted gas inlets. It can be used as purging box, when experiment requires special environmental conditions, like nitrogen or dried air. The spacious sample area allows easy integration of additional equipment, like cryostat or heater. On a special demand we can provide the integration of such equipment, ensuring good fit, spectrometer box sealing, vibration isolation and operation automation.



Typical performance of T-SPEC series Real-time THz Spectrometer (measured in ambient atmosphere)

T-SPEC series

FEATURES

- ▶ Wide spectral range up to 4.5 THz
- ▶ High dynamic range > 70 dB @ 0.4 THz
- ▶ Real-time data acquisition up to 10 spectra/s
- ▶ Excellent spectral resolution better than 2.5 GHz
- ▶ "No bearing" design of fast delay line – virtually unlimited lifetime
- ▶ Transmission and reflection modes
- ▶ High spatial resolution THz imaging
- ▶ Complete PC control
- ▶ User-friendly software

APPLICATIONS

- ▶ Chemical material characterization
- ▶ Carrier lifetime and mobility in semiconductors
- ▶ Dielectric properties and complex refractive index
- ▶ Metamaterials investigation
- ▶ Medical and biological nondestructive research
- ▶ Thickness measurements

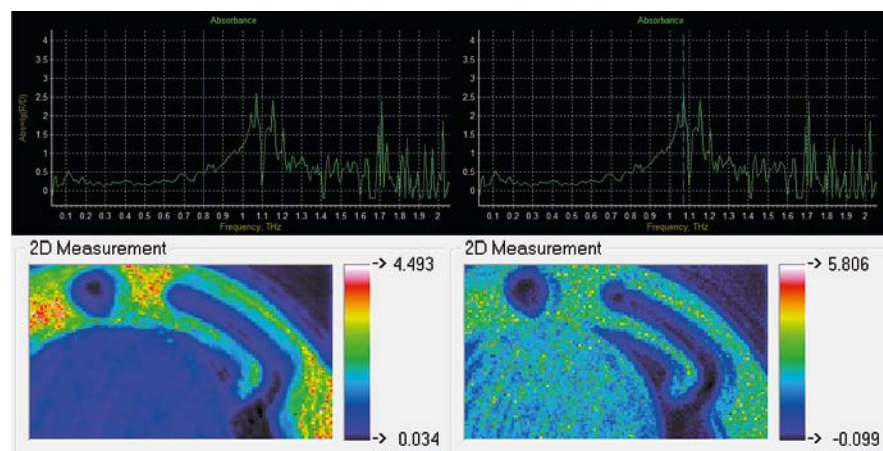
Spectrometer is equipped with two standard spectroscopy modules for transmission and reflection configurations. Each module contains motorized sample manipulator. This allows measurements of multiple samples one by one, without physical access to the spectrometer. Reflection module has convenient vertical architecture, where THz beams reaches the sample from bottom and reflects backwards. The measured samples can be replaced quickly just by laying them down on the sample holder. No adjustment is needed either when changing samples or when changing modules.

Our T-SPEC series spectrometer is the perfect choice for broadband THz imaging. It allows scan of up to 25×25 mm sample with spatial resolution of approx. 1 mm. Measurements contain information about the target, revealing both structural and spectroscopic information.

THz image of tablet containing L-Tartaric acid and metallic part taken in transmission geometry. Tablet is almost transparent at 0.8 THz frequency and become visible close to absorption peak at 1.1 THz frequency

SPECIFICATIONS

Model	T-SPEC
GENERAL SPECIFICATIONS	
Spectral range	>4.5 THz
Dynamic range	>70 dB @ 0.4 THz
Acquisition rate	10 scans/s
Spectral resolution:	
fast scan	<10 GHz
combined mode (fast + slow)	<2.5 GHz
Scan range:	
fast scan	110 ps
combined mode (fast + slow)	440 ps
Beam diameter on the sample	~ 2 mm @ 1 THz
Configurations	Transmission / normal reflection
Computer interface	USB
Dimensions	560 × 520 × 202 mm
PUMP LASER REQUIREMENTS	
Pump laser	External or integrated
Laser output type	Free space
Wavelength	760–840 nm or 1020–1100 nm
Pulse duration	<120 fs
Output power	>60 mW
Pulse repetition rate	20–100 MHz



T-SPEC spectroscopy modules: reflection geometry (left) and transmission geometry (right)