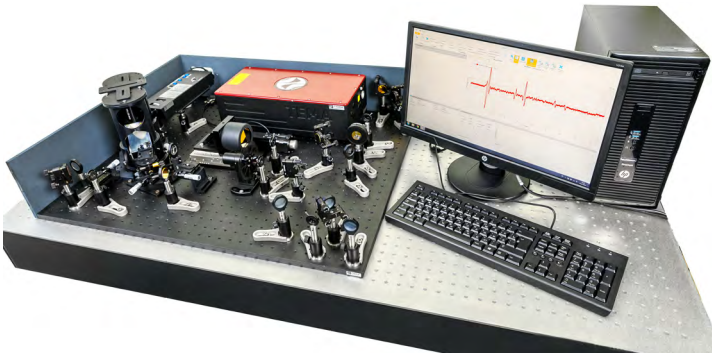
Pulsed Terahertz Spectrometer PTS-1



Tydex Pulsed Terahertz Spectrometer (PTS-1) is an integrated solution for broadband THz time-domain spectroscopy. It is ideal for scientific research applications due to its radiation propagating through free space and flexible optical scheme.

Similar to other broadband THz time-domain spectroscopy systems, the pumping source for THz radiation generator is a femtosecond laser (1048 nm wavelength, ~100 fs pulse duration, 60 MHz pulse repetition rate). PTS-1 utilizes optical rectification of femtosecond pulses to generate THz radiation. The femtosecond laser radiation is transmitted to THz radiation generator which is a crystal of magnesium-oxide-doped lithium niobate (MgO:$LiNbO_3$) plate with a HRFZ Si prism. The generated pulses propagate through free space and are detected by electro-optical means with an Electro-Optical Detector (EOD) manufactured by Tydex.

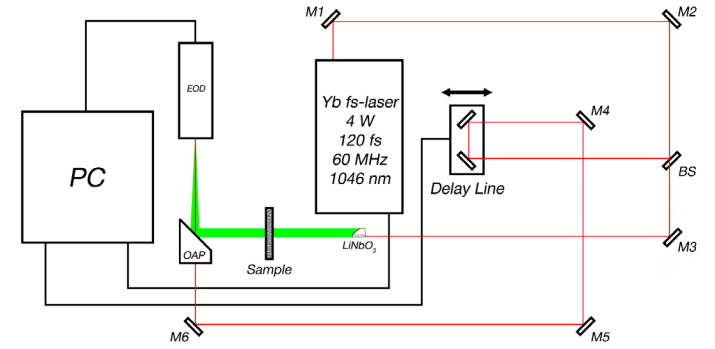


Fig. 1. Principal diagram of PTS-1.

THz radiation generation and detection is effected as follows: laser radiation is delivered by a system of mirrors to the beamsplitter, where it is divided into a pumping beam and a signal beam.

The pumping beam is focused into the generating structure. THz radiation output from the generating structure is directed to the cell containing the sample under study. After passing through the cell, the THz radiation is focused into electro-optical crystal of EOD.

The signal beam passes through an optical delay line, then is focused into the same EOD crystal by the system of mirrors. The EOD signal (the TDS systems directly measure the electric field of THz pulse) is received by the software that also controls the delay line. The software includes a mathematical apparatus that transforms the EOD signal into a frequency spectrum.

Key features of the PTS-1:

- High output power – no less than 200 μW;
- Flexible system;
- Feature-rich software.

Applications of the PTS-1:

- Determining material properties in THz range (transmission, reflection, absorption, refractive index, complex permittivity);
- Monitoring superfast processes in semiconductors;
- Superfast switching of semiconductor devices;
- Determining the free carrier concentration in doped or optically excited semiconductors.

PTS-1 package includes:

- Solid-state femtosecond laser;
- Electro-Optical Detector of pulsed THz radiation;
- All optomechanical components, both for optical and THz path;
- Delay line;
- Electronic control units for the optical delay line, optomechanical modulator and laser;
- PC with pre-installed TydexLN software.

Software functions:

- Delay line control;
- Receiving data from EOD;
- Data processing;
- Data export and import.

Operating modes of the PTS-1:

- Transmission, AOI = 0°;
- Reflection, AOI = 0°;
- Reflection, AOI = 45° (optional);
- Parallel beam measurements (optional).

Key specifications:

Spectral range	0.1-2.5 THz
Dynamic range	≥ 60 dB
Average output power (THz radiation)	≥ 200 μW
Delay time	330 ps
Spectral resolution	5 GHz

Source:

Type of THz radiation source	MgO:$LiNbO_3$
Center pumping wavelength	1048 nm
Pumping laser pulse duration	120 fs

Detector:

Detector type	Near IR EOD
EO crystal	ZnTe

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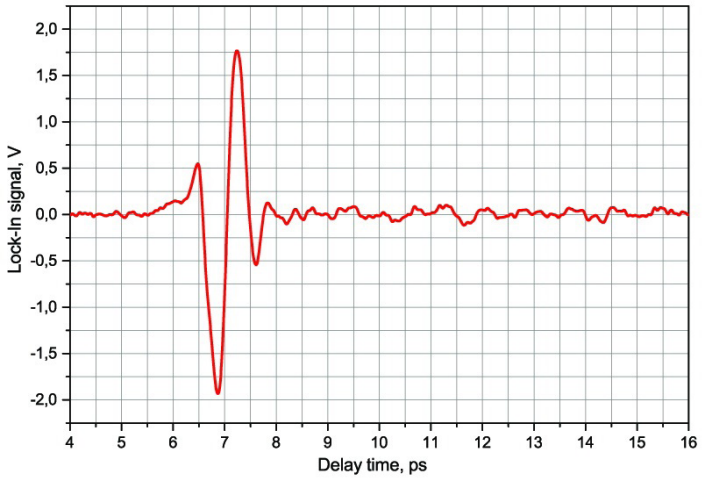

Fig. 2. The waveform of the pulse.

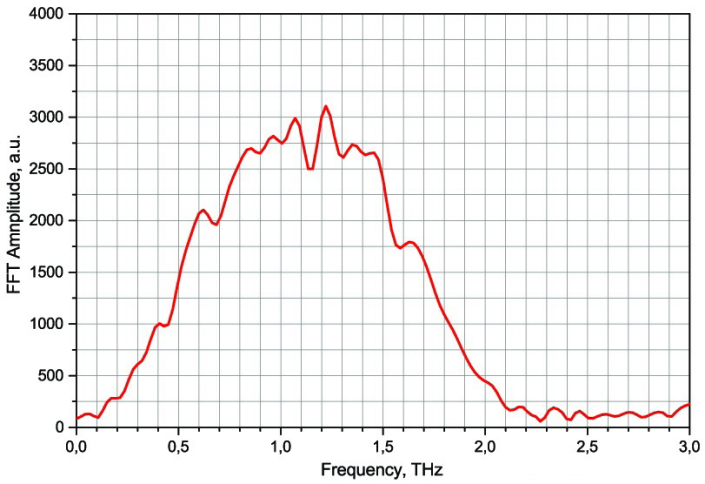

Fig. 3. Frequency spectrum.

For price quotation and delivery please fill in the request form on our website.

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