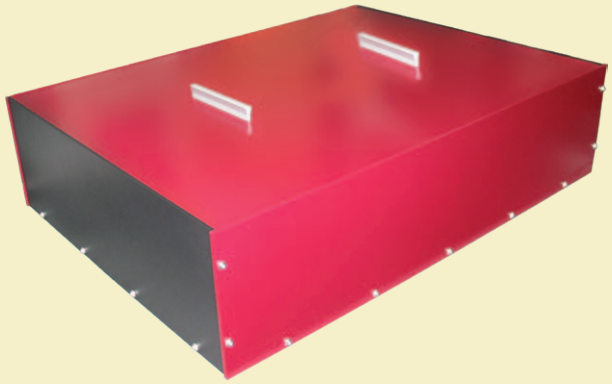
Components

THz Radiation Generator Tera-Ax

- Central frequency 1 THz
- Spectrum width 1.5 THz
- Pulse duration <1 ps
- THz pulse energy up to 1 nJ
- EO-AX THz detector option
- Pumped by commercial Ti:S amplifiers



Product overview

THz non-linear spectroscopy is expected to provide new information about atom, molecular, and solid-state fundamental resonances. Obviously THz non-linear measurements demand high power THz sources. So far only a few studies on THz nonlinear spectroscopy have been done. Most of these studies were performed with THz pulses generated by Free Electron Lasers (FEL). However, extremely high cost of FEL's significantly limits its wide use for the THz non-linear spectroscopy.

We offer a generator of ultra-short THz pulses Tera-Ax providing nJ pulse energy level. The Tera-Ax requires pumping by a femtosecond Ti:S amplifier such as our Regulus or Multus products. Other commercial femtosecond laser amplifiers also can be used for Tera-Ax pumping. Tera-Ax can be used for THz non-linear spectroscopy, large area THz imaging and other THz photonics purposes demanding high-energy ultra-short THz pulses. THz generation in Tera-Ax is based on phase-matched optical rectification in $MgO:LiNbO_3$. The phase-matched condition is reached by tilting of femtosecond laser pulse fronts. Currently optical rectification with tilted femtosecond pulses provides the highest rate of optical-to-THz conversion efficiency.

We also offer the Tera-Ax equipped with the optional EO-AX electro-optic detector providing measurement of electric field temporal profile of THz pulses. Amplitude and phase spectra of THz pulses can be obtained from temporal data by standard Fast Fourier Transform procedure.

Two modifications of the EO-AX utilizing probe beam from amplified femtosecond system and from femtosecond master oscillator are available. The second modification provides about 2 orders of magnitude better signal-to-noise ratio in comparison with the first modification.

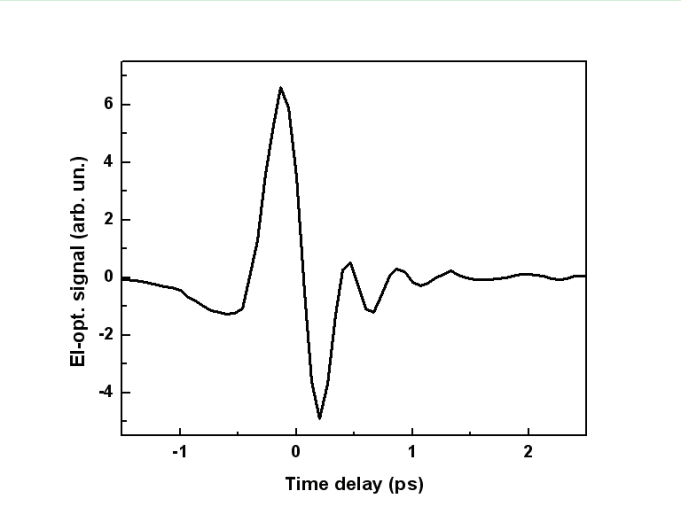
Tera-Ax technical specifications

Output THz radiation	
THz pulse energy	>300 nJ
Pulse duration	0.5-1 ps
Central frequency	1 THz
FWHM spectral intensity bandwidth	1-1.5 THz
Repetition rate	<3 kHz
THz beam divergence	45 mrad in vertical direction 100 mrad in horizontal direction
Dimensions	600 mm x 300 mm x 200 mm
Pump laser radiation requirements	
Laser pulse energy	0.5-2 mJ
Pulse duration	<150 fs
Central wavelength	770-830 nm
EO-AX detector specifications (optional)	
Temporal scan range	180 ps
Spectral resolution	30 GHz

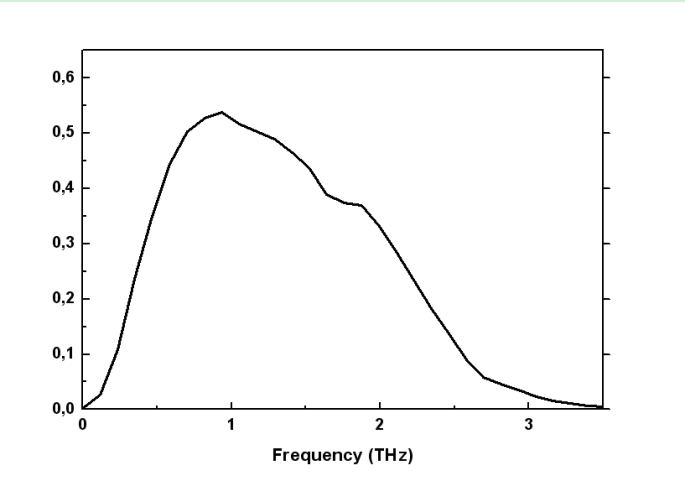
Avesta Ltd., Laboratory Building, P. N. Lebedev Physical Institute,
Troitsk, 142190, Moscow, Russia

Tel: +7 495 967-94-73; +7 495 851-00-78
Fax: +7 495 646-04-95

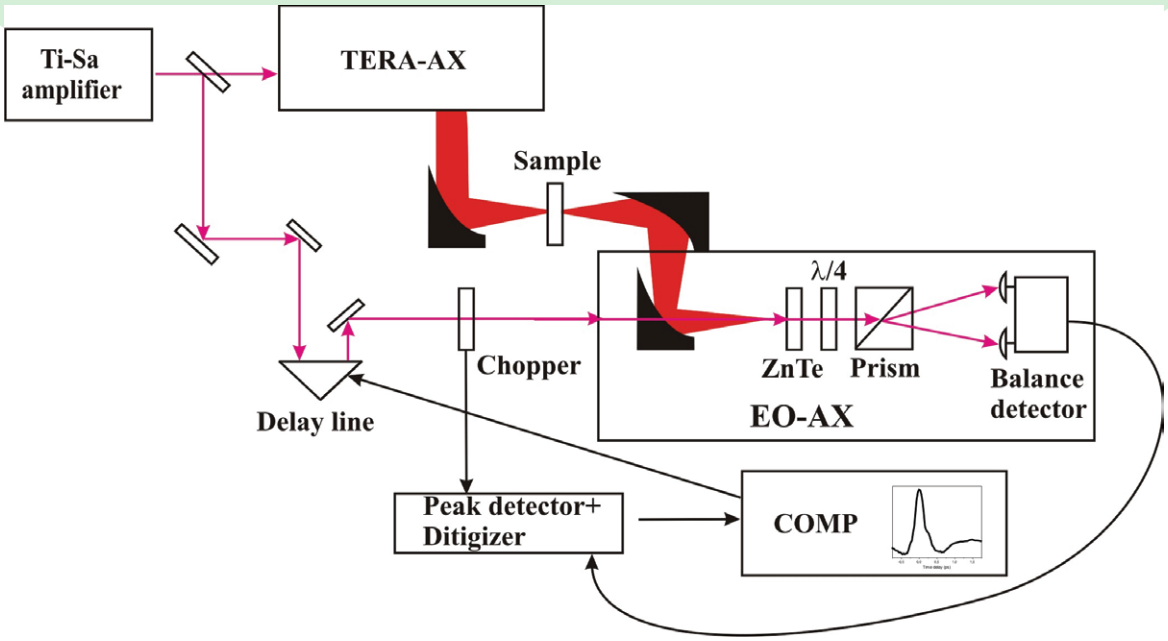
e-mail: fs@avesta.ru
www.avesta.ru



Time-domain signal



FFT amplitude spectrum



Layout of the Tera-Ax generator and optional EO-Ax detector

The complete system contains:

- The Tera-Ax - optomechanical box - THz emitter based on optical rectification in MgO:LiNbO3 crystal with output parabolic mirror
- EO-AX THz detector (optional) based on electrooptical sampling in ZnTe crystal. It includes:
  1) 3 parabolic mirrors for focusing the THz beam in the sample
  2) Highly sensitive balanced detector and digitizer
  3) Optical chopper
  4) Delay line
  5) Software

The full system is supplied on main breadboard (800x600 mm) with a cover box that can be purged with nitrogen if necessary.
We also offer our Ti:S ultrafast amplifiers as a pump source. If you already have a Ti:S amplifier please let us know its specification.

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Tel: +7 495 967-94-73; +7 495 851-00-78
Fax: +7 495 646-04-95

e-mail: fs@avesta.ru
www.avesta.ru