TeraFlash pro
Versatile Time-Domain Terahertz Platform


Key Features

· Fiber-coupled InGaAs photoconductive switches

· > 6 THz bandwidth, 95 dB peak dynamic range in < 20 s

· Variable terahertz path length between 15 cm and 110 cm

TeraFlash pro

The TeraFlash pro system combines TOPTICA's established femtosecond laser technology and state-of-the-art InGaAs photoconductive switches into a top-grade terahertz platform. Owing to a highly precise voice-coil delay stage with a timing resolution of 1.3 fs, the TeraFlash pro achieves a bandwidth of 6 THz and a peak dynamic range of 95 dB – within a measurement time with less than half a minute!

The control software can flexibly adjust the scan time and the number of averages. A carefully designed fiber delivery (patent US 9,774,161) guides the laser pulses to the terahertz antennas. Users can thus arrange the antennas in transmission or reflection, according to the requirements of the experiment. They can even vary the terahertz beam length between 15 cm and 110 cm, thanks to a unique time-of-flight compensation stage.
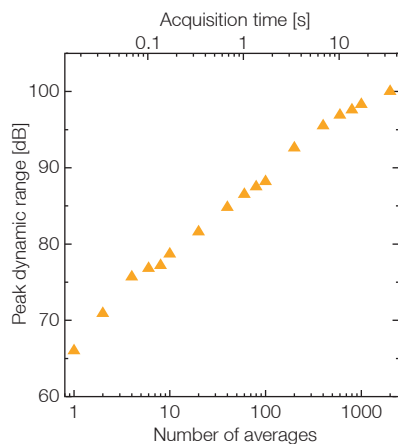
Peak dynamic range versus the number of averaged time traces (lower abscissa) and total acquisition time (upper abscissa).
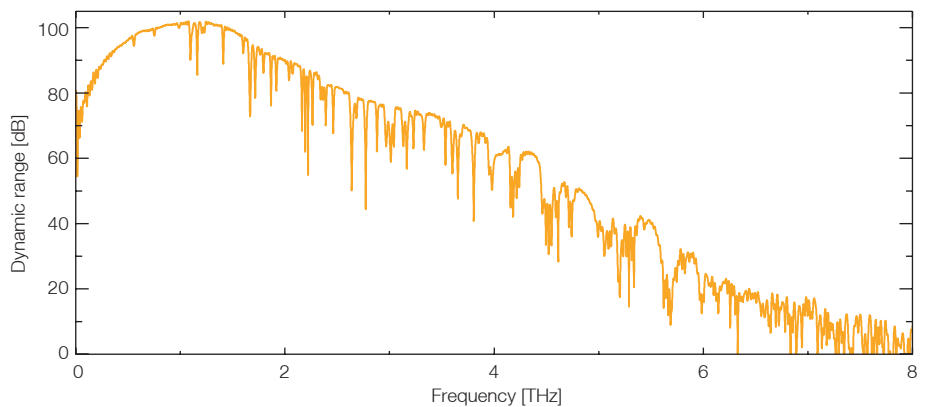

Terahertz spectrum of air with water vapor lines, measured with the TeraFlash pro. Within a measurement time of less than half a minute, the bandwidth reaches 6 THz and the peak dynamic range exceeds 95 dB – an industry record!

Specifications TeraFlash pro	
Components	One femtosecond laser SM/PM fiber delivery 2 mechanical delay stages (stationary / moving) 2 InGaAs photoconductive switches Electronics for data acquisition
Laser wavelength	1560 nm
Laser pulse width	typ. 80 fs
Laser repetition rate	100 MHz
External fiber length	2.5 m
Terahertz emitter	#EK-000978: InGaAs/InP photoconductive switch with 100 µm strip-line antenna, 2.5 m fiber pigtail
Terahertz receiver	#EK-000980: InGaAs/InP photoconductive switch with 25 µm dipole antenna, 10 µm gap, 2.5 m fiber pigtail
Antenna package	Cylindrical, 25 mm, integrated Si lens and SM/PM fiber pigtail
Scan range	5 .. 200 ps
Scan speed	166 traces/s (5 ps) 95 traces/s (20 ps) 60 traces/s (50 ps) 6 traces/s (200 ps) Intermediate settings possible
Spectral range	0.1 – 6 THz, in < 20 s
Average terahertz power	typ. 30 µW
Time-domain dynamic range	typ. 70 dB in < 40 ms 100 dB in < 20 s
Spectral peak dynamic range	typ. 70 dB in < 40 ms 95 dB in < 20 s
Useable terahertz path length	15 – 110 cm, adjustable via software (stationary delay)
Frequency resolution @ max. scan range	< 5 GHz
Computer interface	Ethernet
Computer software	LabView-based GUI, included
Size (H x W x D)	180 x 450 x 560 mm³
System weight	20 kg
Operating voltage	110 / 220 V AC
Accessories	Transmission optomechanics, Reflection head, Imaging extension
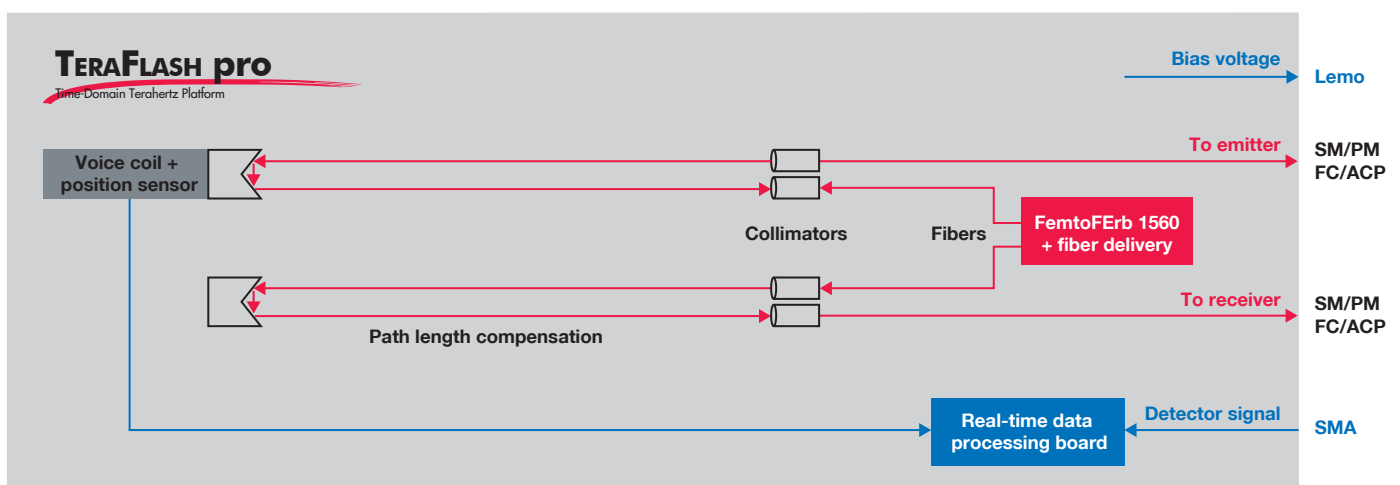
Schematic diagram of the TeraFlash pro. Blue lines depict electric signals, red lines the optical signals.

Further reading:
N. Vieweg et al., *Terahertz-time domain spectrometer with 90 dB peak dynamic range;* J Infrared Milli. Terahz. Waves **35** (2014) 823-832.