



THz Photoconductive Antennas (780 nm)

Photoconductive antennas are widely used to generate and detect both wideband impulse and continuous monochromatic terahertz radiation. Numerous scientific and industrial terahertz imaging and spectroscopy systems used in science and industry are based on these devices.

Antennas PCA-SL-50-50-780 and PCA-D-50-7.2-780 by TYDEX LLC form an ideal pair of antennas, on the basis of which it is possible to build a broadband terahertz spectrometer capable of measuring in the frequency range Δf between 0.1 and 2.2 THz ($\Delta\lambda$ of 3000 to 130 μm).

A typical terahertz time-domain spectrometer configuration is shown in fig. 1. Our antennas are designed to be pumped with femtosecond laser radiation in free space. The laser must comply with the following specifications: wavelength $\lambda_{\text{opt}}=780$ nm, pulse duration $\tau_p=120$ fs, average power per antenna $P_{\text{opt}}=10$ mW.

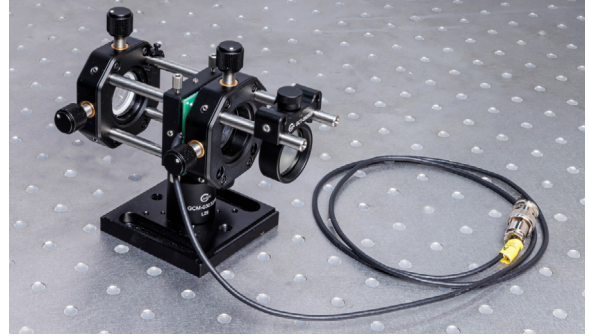
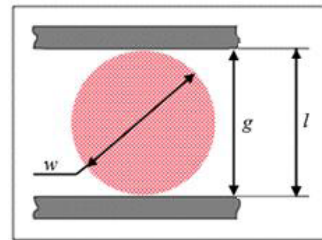
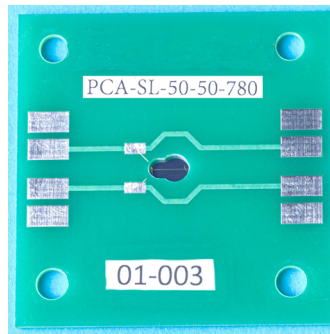


Fig. 3. Photoconductive antenna affixed to an adjustment unit

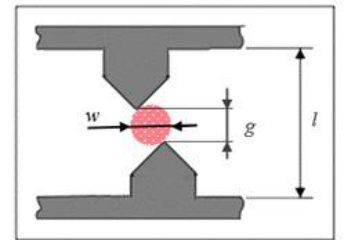
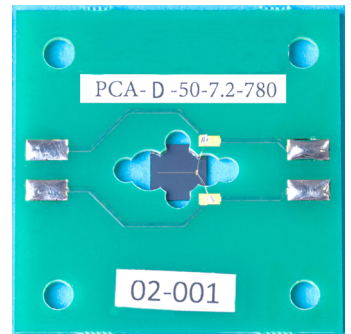
Antenna design

PCA-SL-50-50-780 dipole antenna (generator)



Gap width: $g=50$ μm
Distance between microstrips $l=90$ μm
Focal spot diameter $w \geq 50$ μm

PCA-D-50-7.2-780 dipole antenna (detector)



Gap width: $g=6$ μm
Distance between microstrips $l=90$ μm
Focal spot diameter $w \geq 8$ μm

Key antenna specifications

Chip dimensions	6 x 6 x 0,65 mm
Photoconductive material	LT-GaAs
Dark current at $U_{\text{BIOS}}=30$ V	0.2 mA
Maximum optical power of the pumping laser	30 mW
Dynamic range at 0.5 THz	60 dB
Maximum electric bias of the generator PCA-SL-50-50-780	± 70 V

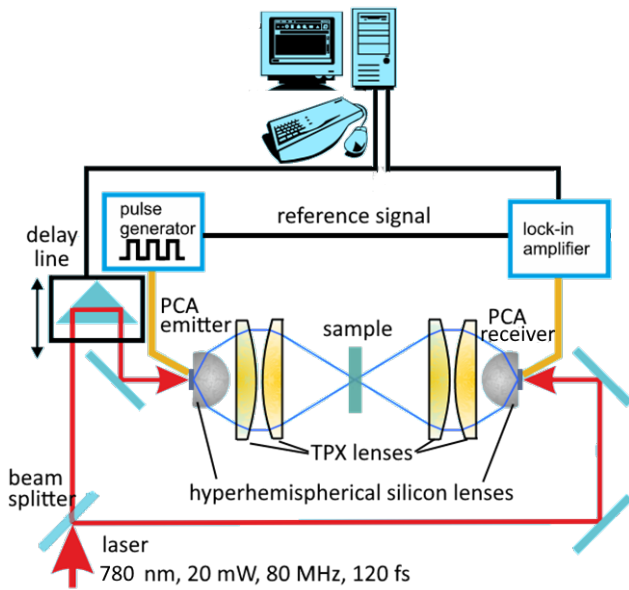


Fig. 1. A diagram of a photoconductive antenna-based terahertz spectrometer

Delivery set

Antennas can be supplied as chips or mounted on a standard PCB (printed circuit board) or on a custom PCB developed by TYDEX according to the customer's specifications. The delivery set includes a silicon hyperhemispherical lens and an adjustment unit for a standard PCB (see fig.3).

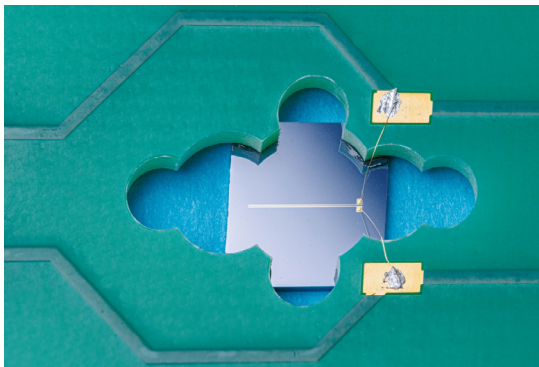


Fig. 2. Photoconductive antenna on a chip



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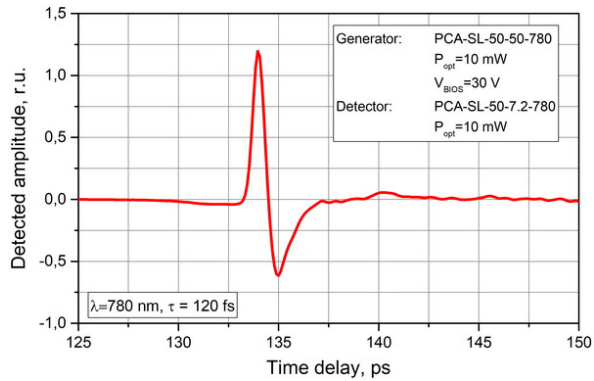


Fig. 5. Time domain terahertz impulse waveform

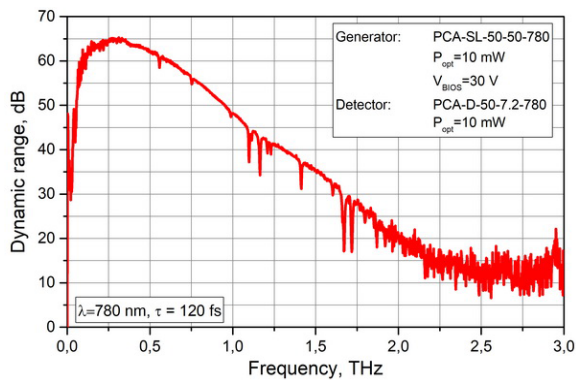


Fig. 6. The frequency dependence of the dynamic range, where the level of 0 dB corresponds to the noise level measured when installing an opaque barrier between the generator and the detector

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