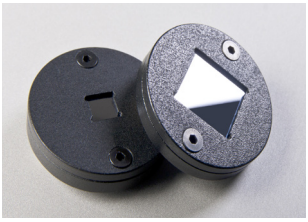
Tera-SED

Large area THz emitter

Laser Quantum
A Novanta Company



- Large-area terahertz emitter
- Low external bias voltages
- No external cooling required
- Superior interdigitated design

Overview

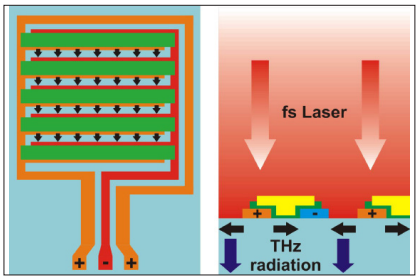
Efficient sources of Terahertz (THz) radiation are of great importance for a large variety of scientific and technological applications. Important key factors are a large bandwidth and a high THz electric field amplitude. This usually implies a large emitter area and in conventional concepts requires high bias voltages (several hundreds of volts) in order to achieve the necessary bias field strengths, typically in the kV/cm range. The key advantage of the Tera-SED is the unique combination of large active area and low bias voltage requirement.

Technical information

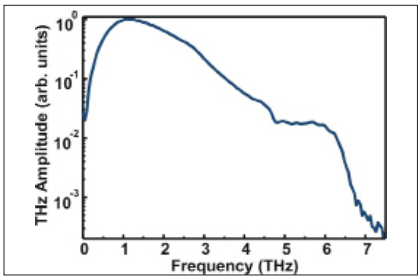
The **Tera-SED** is a planar large-area GaAs-based photoconductive emitter for impulsive generation of broadband THz radiation with a superior design. It features a novel interdigitated electrode MSM structure which allows for a large active area with kV/cm-bias fields between individual electrodes. Only low external bias voltages are required, eliminating the need for a pulsed, high-voltage supply. Its flexible scalable device technology makes **Tera-SED** an efficient and versatile THz emitter.

Tera-SED requires no external cooling. It comes attached to a metal holder fitting into 1-inch optics mounts. Ease of use and hassle-free alignment are key assets.

Tera-SED is available in two different versions: 10x10 mm^2 usable area intended for use with amplified fs-laser systems (pulse energy up to 300 µJ, saturating from ~10 µJ) and 3x3 mm^2 usable area best suited for use with fs-laser oscillators.



Tera-SED functional principle: with applied bias voltage the electric field direction is reversed between successive electrode fingers. An optically opaque metal layer is applied between every other finger pair such that optical excitation is only possible in areas exhibiting the same electric field direction. THz radiation emitted from the device thus interferes constructively in the far-field.



Tera-SED3 emission spectrum at 10 V DC bias and 0.7 nj pulse energy, acquired with Laser Quantum GmbH (formerly Gigaoptics) ' High-Speed ASOPS technique.

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Key device characteristics

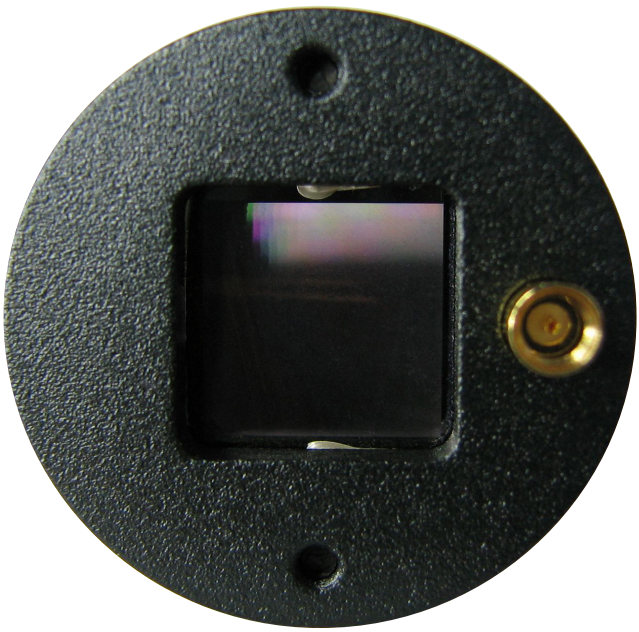
	Tera-SED3	Tera-SED10
Size	3x3 mm²	10x10 mm²
Peak emission frequency	1.0-1.5 THz	
Spectral width (@-10 dB)	~2.5 THz	
Pulse energy	7.5 nJ	10 µJ
Max.opt. excitation intensity	8 W/mm²	
Max.opt. excitation power	650 mW	
Optical excitation wavelength	700-850 nm	
Pulsed THz field amplitude:	< 5kV/cm	
Low bias voltage (DC or switchable)[1]	1-30 V	
Bias modulation frequency	DC to 100 kHz	
Duty cycle[2]	5% to 100% (cw)	

[1] max. bias voltage depends on active area and type of usage.
[2] max. duty cycle depends on active area and type of usage.

Electrical performance parameters*

	Vbias	duty cycle	THz field amplitude
Tera-SED3	up to 10 V	CW	100 V/cm (@10 V)
7.5 nJ pulse energy	10 V-20 V	50%	200 V/cm (@ 20 V)
Spotsize	300 µm max. 30 V	10%	300 V/cm
Tera-SED10	up to 5 V	CW	1000 V/cm (@5V)
10 µJ pulse energy	5 V-20 V	50%	2000 V/cm (@20 V)
Spotsize 2 to 6 mm	max. 25 V	5%	5000 V/cm

* Typical values only. Actual field strengths may vary depending on specific experimental conditions.



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