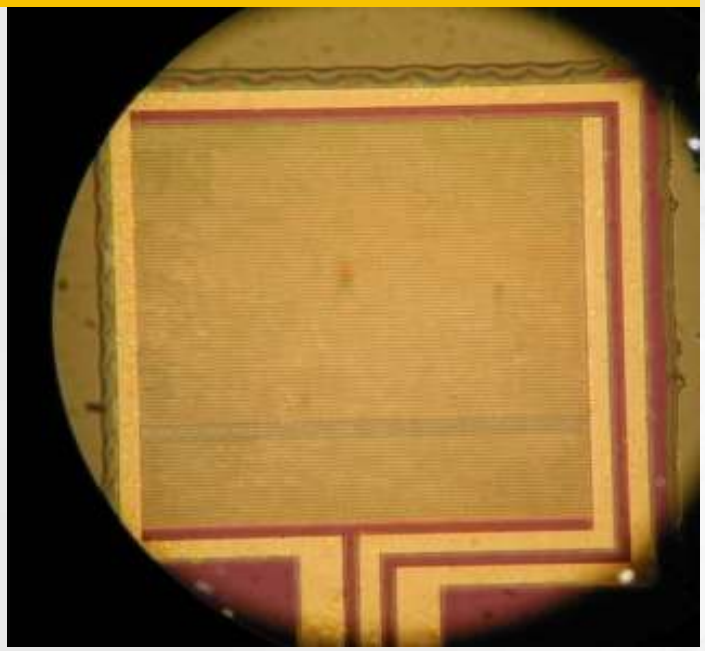
GIGAOPTICS
femtosecond technologies

TERA-SED

large-area Terahertz emitter

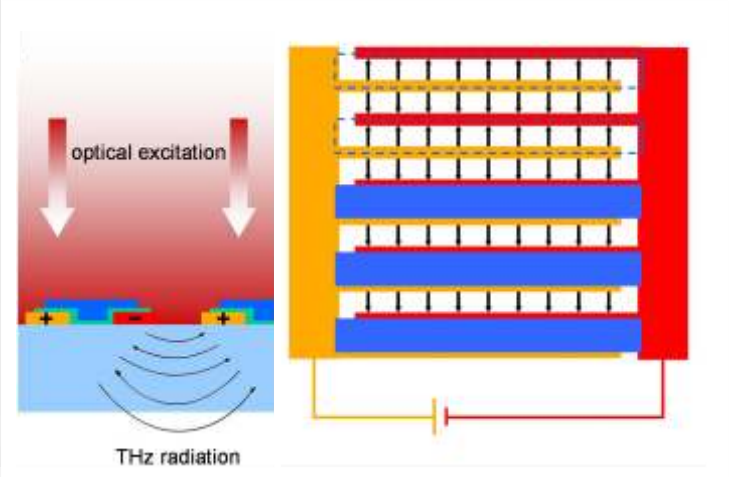


Efficient sources of Terahertz (THz) radiation are of great importance for a large variety of scientific and technological applications. The driving force behind the development of femtosecond-laser-based THz emitters are applications which call for a large bandwidth and/or a high THz electric field amplitude. This usually implies a large emitter area and, therefore, high bias voltages in order to achieve the necessary bias field strengths, typically in the kV/cm range.

description

Tera-SED is a planar large-area GaAs-based photoconductive Terahertz (THz) emitter for impulsive generation of broadband THz radiation. It features a novel interdigitated electrode MSM structure which allows for a large active area with kV/cm-bias fields between individual electrodes. Still only low *external* bias voltages are required, eliminating the need for a pulsed, high-voltage supply. Its flexibly 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 functional principle: with applied bias voltage the electric field direction is reversed between successive electrode fingers. An optically opaque metal layer (blue) 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.

key device characteristics

- pulsed THz field amplitude: up to kilovolts/cm
- low bias voltage (DC or switchable)[§]: 1- 30 V typ.
- bias modulation frequency: DC to 100 kHz
- duty cycle[+]: 5% to 100% (cw)
- superior interdigitated design
- device area: 3 x 3 mm^2
  10 x 10 mm^2

[§] max. bias voltage depends on active area and type of usage, see page 2.
[+] max. duty cycle depends on active area and type of usage. For typical parameters see page 2.

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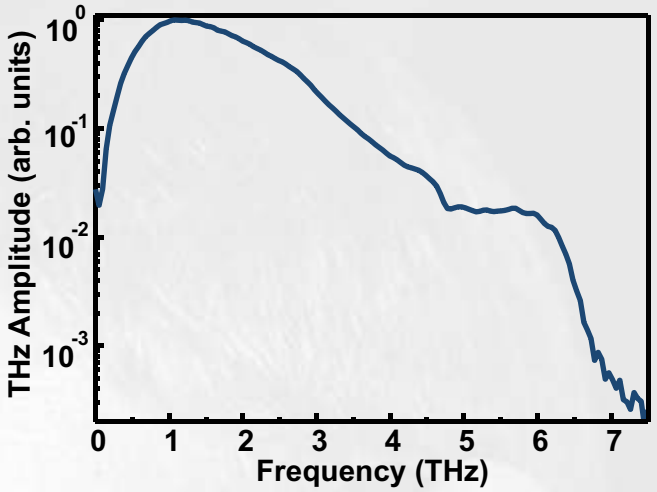
Tera-SED is available in two different versions: 10x10mm^2 usable area (as shown above) and 3x3mm^2 usable area. The device is permanently mounted into a circular metal holder fitting into standard 1-inch optics mounts (not included).



Tera-SED3 emission spectrum at 10V DC bias and 0.7nJ pulse energy, acquired with Gigaoptics' *High-Speed ASOPS* technique. See **www.gigaoptics.com** for more detailed information.

specifications / performance parameters

peak emission frequency	1.0-1.5 THz
spectral width (@ -10dB)	~2.5 THz
max. opt. excitation power	8 W/mm^2
optical excitation wavelength	700 - 860nm
dimension (including metal holder)	1 inch (O. D.)

Tera-SED is available in two different versions: 10x10mm^2 usable area intended for use with amplified fs-laser systems (pulse energy up to 1mJ) and 3x3mm^2 usable area best suited for use with fs-laser oscillators.

Electrical performance parameters[§]:

	V_{bias}	duty cycle	THz field amplitude
Tera-SED 3	up to 10V	cw	100V/cm (@ 10V)
7.5nJ pulse energy, spotsize 300μm	10V - 20V	50 %	200V/cm (@ 20V)
	max. 30 V	10 %	300V/cm
Tera-SED 10	up to 5V	cw	1000V/cm (@ 5V)
10μJ pulse energy, spotsize 2-6 mm	5V - 20V	50 %	2000V/cm (@ 20V)
	max. 25V	5 %	5000V/cm

[§] typical values only. Actual field strengths may vary depending on specific experimental conditions.

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