Data sheet Tera-SED 10 -- Serial #11-2F

The active area of the Tera-SED 10 is 10 mm × 10 mm. The dark current-voltage characteristic was determined using rectangular-shaped voltage pulses with a repetition rate of 10 kHz and a duty cycle of 10 %. See Fig. 1.

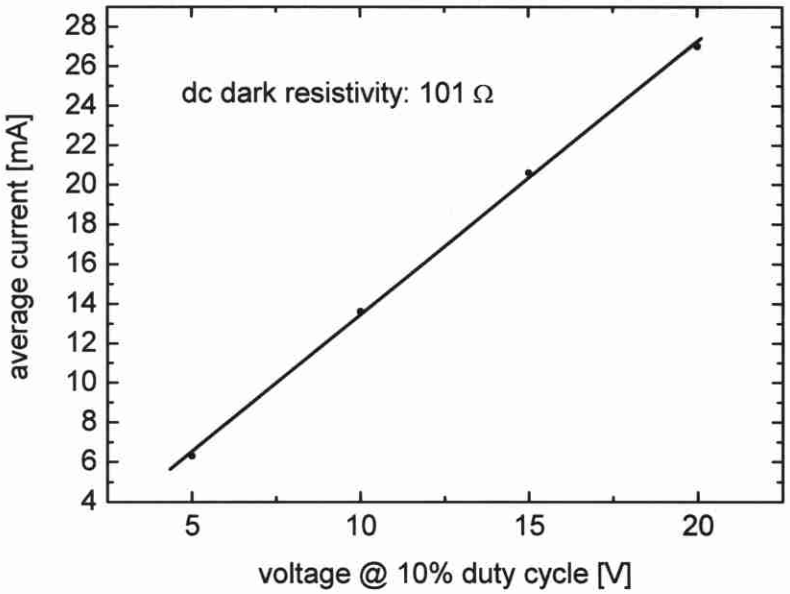

Fig. 1: Dark current-voltage characteristic of the Tera-SED 10, Serial #11-2F

It is recommended to (re-)determine the impedance or the dark current-voltage characteristic of your individual device(s) before illuminating the device(s) with laser radiation. To this end, use the procedure described in the Operating manual, Section 4.2 "Test procedure for current-voltage characteristic".

It is also strongly recommended to use this electrical setup when operating the Tera-SED with pulsed laser illumination.

Absolute maximum ratings not to be exceeded at any time:

Bias Voltage	Type	Max. duty cycle	Max. laser power @ 300 µm FWHM
10 V	DC	N/A	200 mW
+/-10V	pulsed	50 %	200 mW
15 V	pulsed	50 %	600 mW
25 V	pulsed	10 %	600 mW

The product of bias voltage *V_b*, duty cycle *t_c* and *average* current *I_av* shall not exceed 0.75 W at any time:

$$V\_b\ (V) * t\_c * I\_av\ (A) \leq 0.75\ W$$

with *t_c* := duration of single pulse / period of voltage pulse train.

The following conditions have been tested as safe modes of operation for this device using a Ti:Sapphire oscillator (repetition rate 78 MHz). It is strongly reccomended to operate the device under similar conditions:

- 10 V DC bias voltage, average laser power 200 mW, laser spot size 300 µm.
- +/-10 V rectangular-shaped voltage, average laser power 200 mW, laser spot size 300 µm. This will increase the measured signal and signal/noise ratio by a factor of 2. Of course the THz field amplitude will not increase.
- 15 V rectangular-shaped voltage pulses, 50 % duty cycle, repetition rate 10 kHz, average laser power 600 mW, laser spot size 300 µm.
- 25 V rectangular voltage pulses, 10 % duty cycle, rep. rate 10 kHz, average laser power 600 mW, laser spot size 300 µm.

The same voltages can be safely applied when the spot-size is reduced to 80 µm AND if the average laser power is kept below 150 mW.

The voltages and duty cycles noted here are valid for voltage pulse repetition rates in the range from 10 kHz – 100 MHz. For lower repetition rates, either the voltage OR the duty cycle has to be reduced, since the device will be heated during the pulses of longer duration.

With the setup described in the manual, the THz waveform and corresponding frequency spectrum (displayed in Fig. 2 and Fig. 3, respectively) were obtained from a Tera-SED10. The test conditions were:

- Optical excitation: central wavelength 800 nm, repetition rate 78 MHz, average power 600 mW, spot-size 300 µm (FWHM)
- Electrical bias: bias voltage 25V (corresponding bias field strength: 50 kV/cm), rectangular-shaped pulses, 10 % duty cycle, 10 kHz.
- Detection system: ZnTe, 110-oriented, thickness 25 µm.

Note that the THz waveform also depends strongly on the whole setup including the parabolic mirrors, the electro-optic detection crystal, etc. !

IMPORTANT NOTICE

THE TERA-SED THZ SOURCE IS NOT CAPABLE OF EMITTING ELECTROMAGNETIC RADIATION AS A STAND-ALONE DEVICE AND, THEREFORE, REGARDED AS PASSIVE OPTICAL COMPONENT. HENCE, THE DEVICE IS NEITHER SUBJECT TO FDA RULES AND REGULATIONS NOR SUBJECT TO EUROPEAN (CE) CERTIFICATION STANDARDS.

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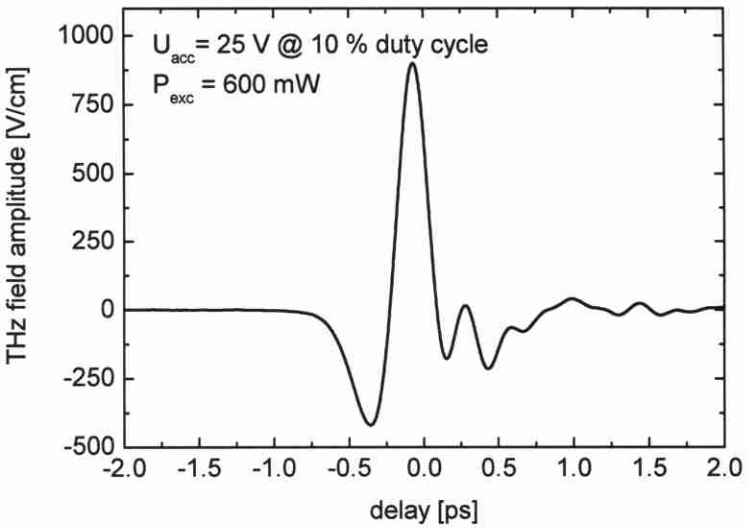

Fig. 2: Typical THz waveform for a Tera-SED 10

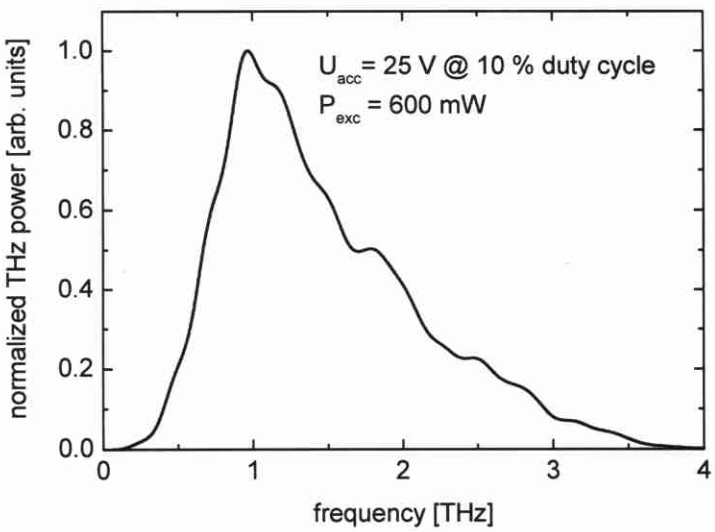

Fig. 3: Typical THz spectrum for a Tera-SED 10

Tested

23.06.11, *Date, signature*

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