Product Overview

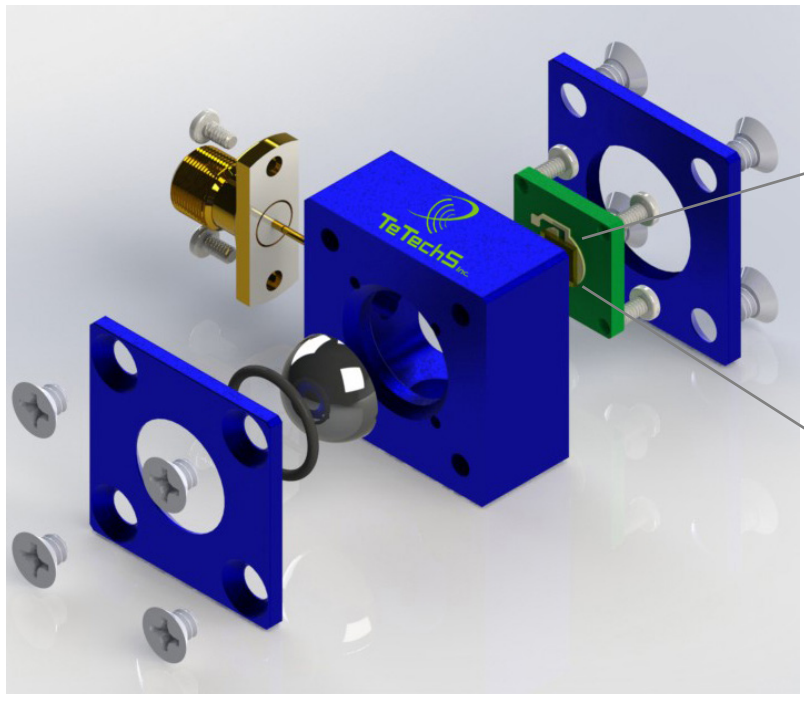
The T-Era-20D-800-air terahertz photoconductive antenna (THz-PCA) is used to generate and detect high power and wideband terahertz pulses in THz time-domain systems. The T-Era-20D-800-air THz-PCA is made on high resistive ultra-fast epitaxially grown low-temperature GaAs (LT-GaAs) substrates and is packaged in TeTechS' patent pending terahertz chip enclosure module. The enclosure module houses the THz-PCA with a collimating high-resistive silicon lens attach to the back side of the THz-PCA chip.

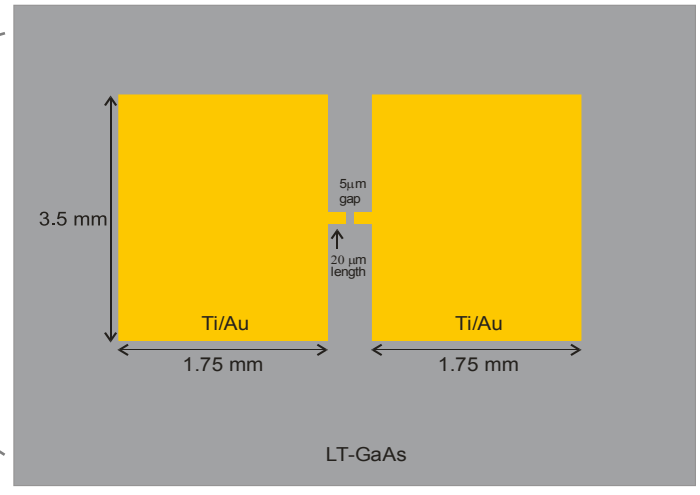
An input bias voltage can be applied to the chip through an isolated SMA connector. A built-in voltage limit circuit prevents overvoltage damage to the chip in the transmitting operation mode. In the receiving operation mode, the detected terahertz photocurrent can be measured through the SMA connector. A standard Ø1/2" treaded hole on the front plate and a tapped hole on the side of the enclosure make it convenient to attach the module to other standard optical components or mount it on an optical bench.

When excited by optical pulses with 15 mW average optical power, a pair of transmitter and receiver T-Era-20D-800-air THz-PCAs generate unprecedented 100 nA peak THz photocurrent on the receiver antenna with more than 75dB terahertz power spectrum dynamic range.

Product Specifications

Optical Excitation Wavelength	750 nm-850 nm
Average Optical Power	1 mW-15 mW
Bias Voltage	1 V-15 V
Dark Resistance	9.1 MΩ
Spectrum Bandwidth	2.5 THz
Power Spectrum Dynamic Range	75 dB
Size (W X L X H)	1" X 1" X 0.4"





Address: 295 Hagey Blvd, 1st Floor, Waterloo, Ontario N2L 6R5, Canada
Toll Free (Canada & USA): +1 855.574.1764
Phone: +1 519.584.0791
Fax: +1 519.513.2421
Email: info@tetechs.com
Web: www.tetechs.com

I-V Curves

I. Dark current versus bias voltage

Figure 1 shows the dark current versus applied bias voltage across the T-Era-20D-800-air THz-PCA. A dark resistance around 9.1 MΩ is measured.

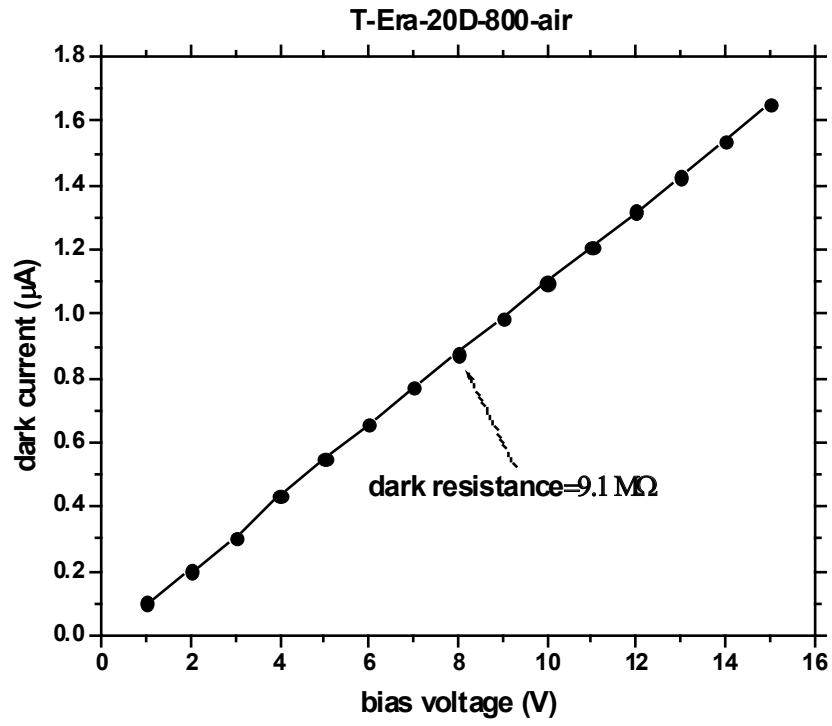


Figure 1. Dark current versus applied bias voltage across the T-Era-20D-800-air THz-PCA.

Dark current versus bias voltage measurement settings

THz-PCA Under Test	T-Era-20D-800-air
Average Optical Power on THz-PCA	0 mW
Bias Voltage on THz-PCA	1V-15V

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II. Photocurrent versus bias voltage

Figure 2 shows the photocurrent versus bias voltage across the T-Era-20D-800-air THz-PCA. The average optical power on the device is fixed at 10 mW. The photocurrent shows an exponential increase with bias voltage.

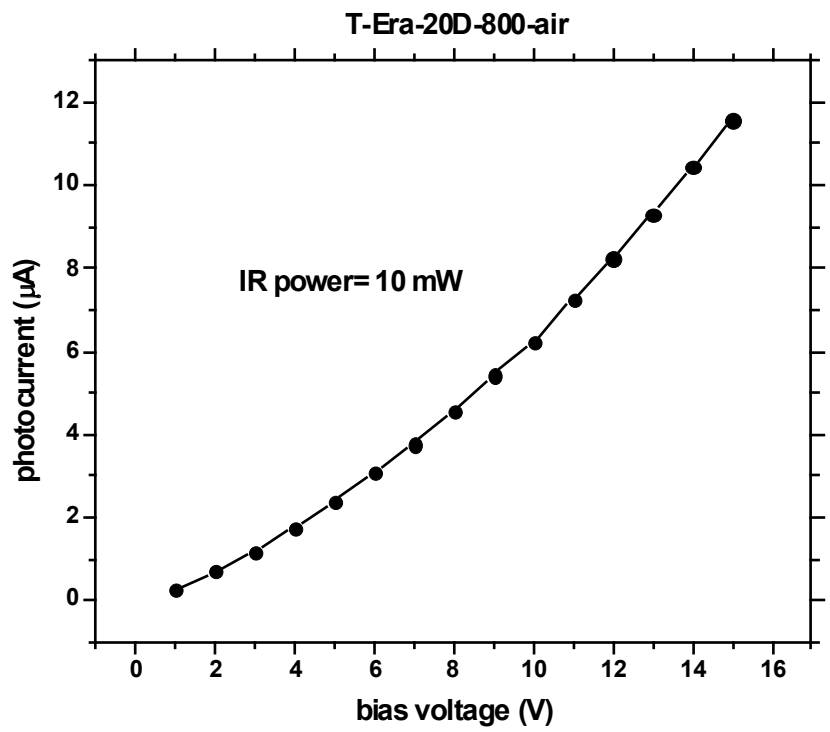

Figure 2. Photocurrent versus applied bias voltage across the T-Era-20D-800-air THz-PCA.

Photocurrent versus bias voltage measurement settings

THz-PCA Under Test	T-Era-20D-800-air
Optical Excitation Wavelength	800 nm
Optical Pulse Duration	100 fs
Average Optical Power on THz-PCA	10 mW
Bias Voltage on THz-PCA	1V-15V

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III. Photocurrent versus optical power

Figure 3 shows the photocurrent versus average optical power on the T-Era-20D-800-air THz-PCA. The bias voltage across the device is fixed at 10 V. The photocurrent starts to saturate for average optical power beyond 15 mW.

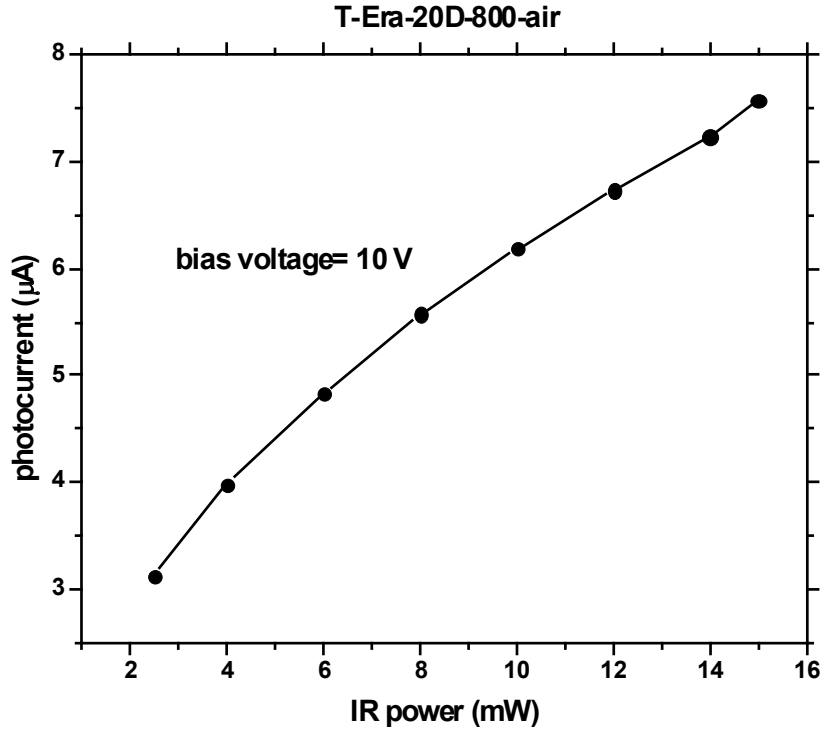

Figure 3. Photocurrent versus average optical power over the T-Era-20D-800-air THz-PCA.

Photocurrent versus optical power measurement settings

THz-PCA Under Test	T-Era-20D-800-air
Optical Excitation Wavelength	800 nm
Optical Pulse Duration	100 fs
Average Optical Power on THz-PCA	2.5mW-15mW
Bias Voltage on THz-PCA	10 V

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IV. Terahertz Measurement Setup

Figure 4 shows a terahertz response measurement setup for T-Era-20D-800-air THz-PCA.

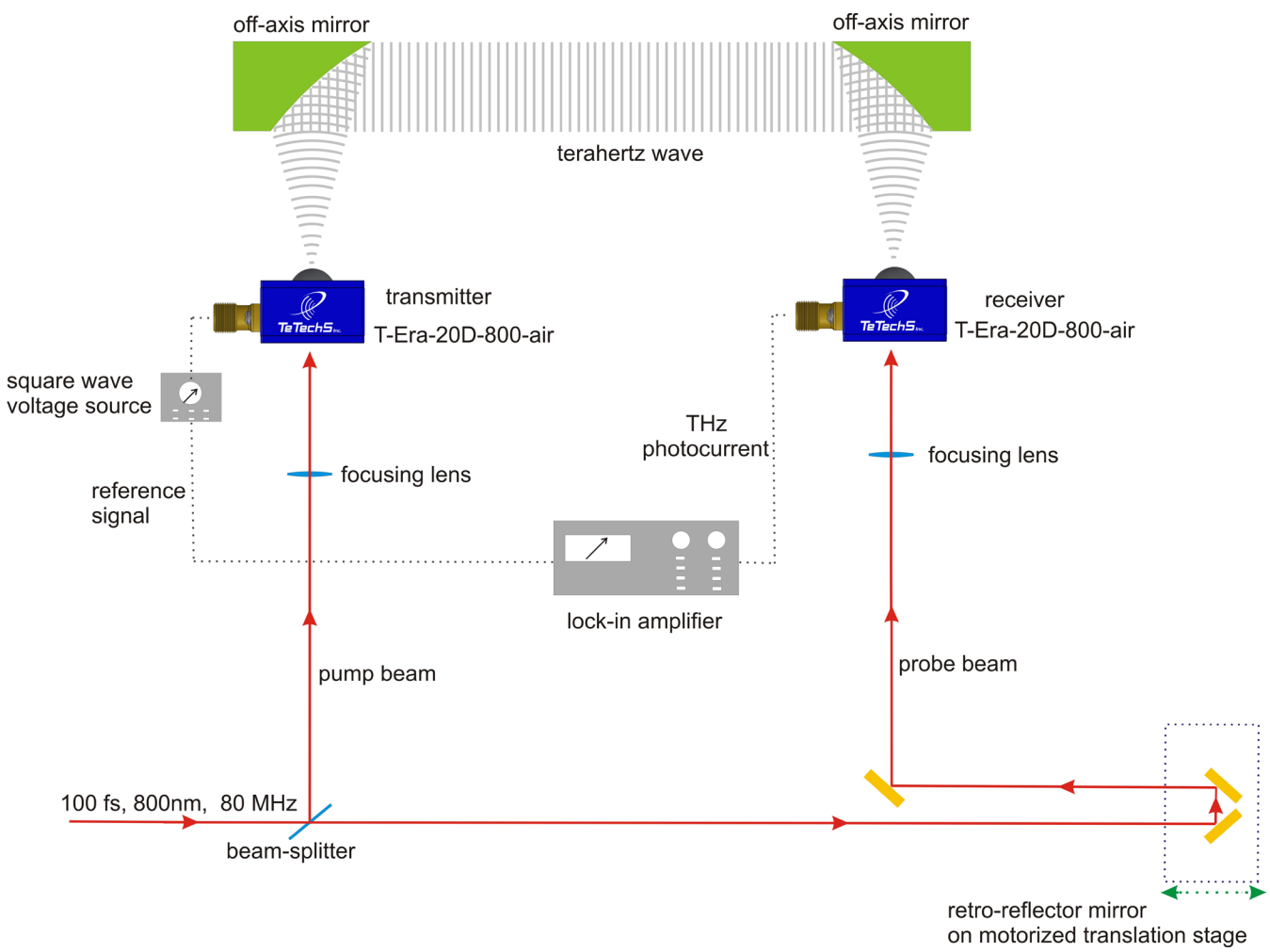

Figure 4. A terahertz response measurement setup for T-Era-20D-800-air THz-PCA.

Typical THz Time-Domain Measurement Settings

Transmitter Module	T-Era-20D-800-air
Receiver Module	T-Era-20D-800-air
Optical Excitation Wavelength	800 nm
Optical Pulse Duration	100 fs
Average Optical Power on Transmitter	10 mW
Average Optical Power on Receiver	10 mW
Bias Voltage on Transmitter	10 V

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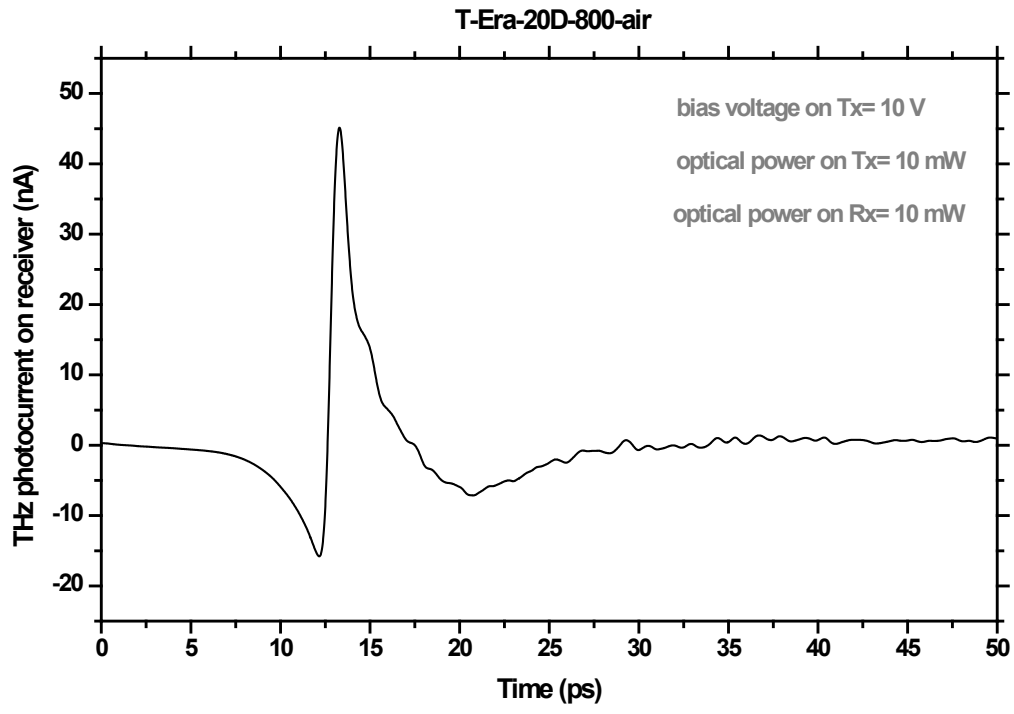
V. Terahertz Response

Figure 5 shows a typical THz pulse and its corresponding power spectrum generated and detected by a pair of T-Era-20D-800-air THz-PCAs in a terahertz time-domain system.



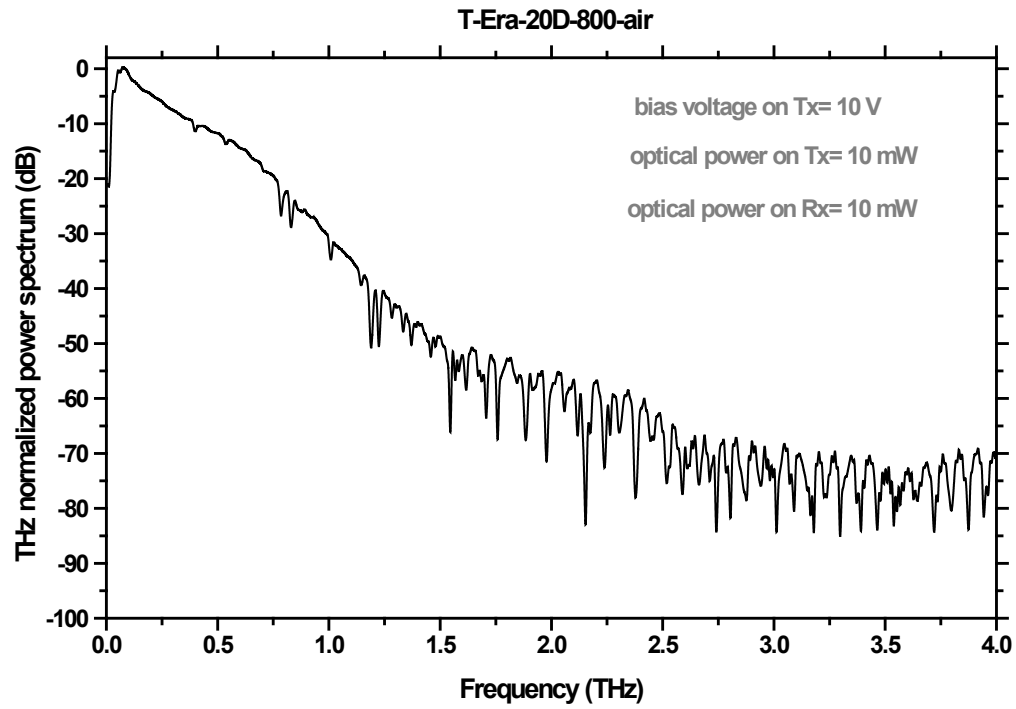


Figure 5. Typical THz pulse and its corresponding power spectrum generated by a T-Era-20D-800-air transmitter module and detected by a T-Era-20D-800-air receiver module

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VI. Terahertz peak photocurrent versus optical power and bias voltage

Figure 6 shows the terahertz peak photocurrent versus average optical power on the T-Era-20D-800-air THz-PCA transmitter and receiver. The bias voltage on the transmitter device is fixed at 10 V.

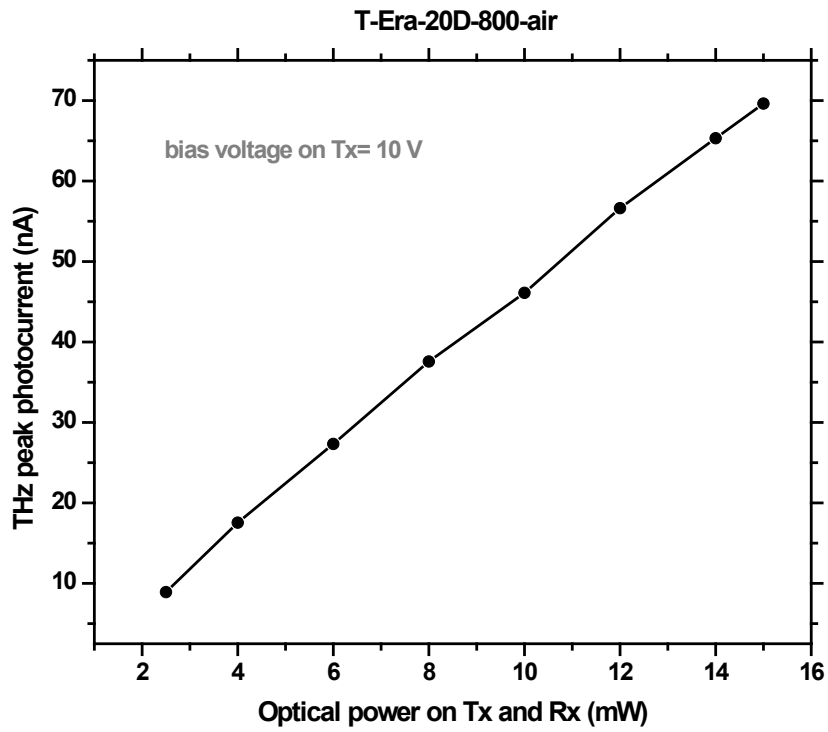

Figure 6. Terahertz peak photocurrent versus average optical power over the T-Era-20D-800-air THz-PCA.

Figure 7 shows the terahertz peak photocurrent versus bias voltage on the T-Era-20D-800-air THz-PCA transmitter. The average optical power on the transmitter and receiver devices is fixed at 10 mW.

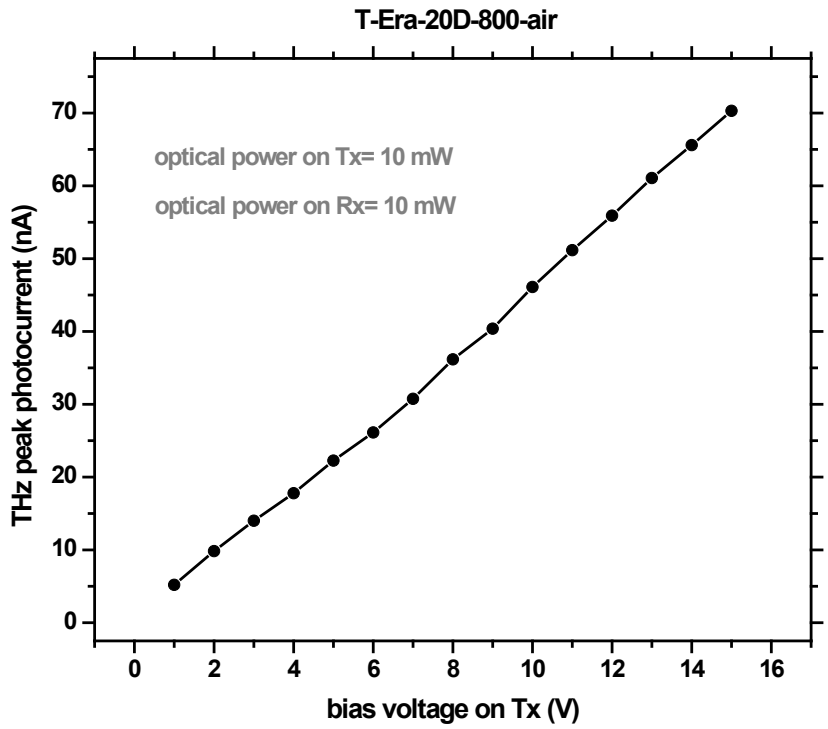

Figure 7. Terahertz peak photocurrent versus bias voltage over the T-Era-20D-800-air THz-PCA.

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