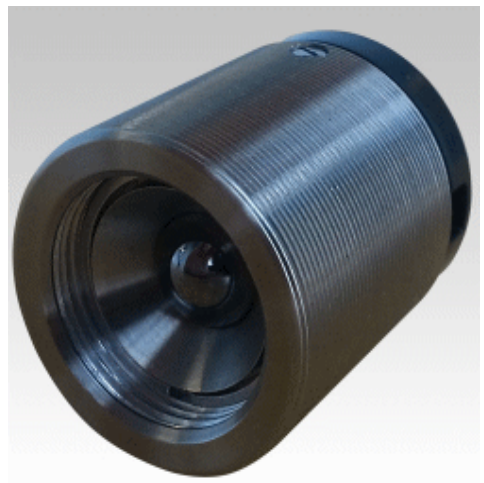
Product Overview

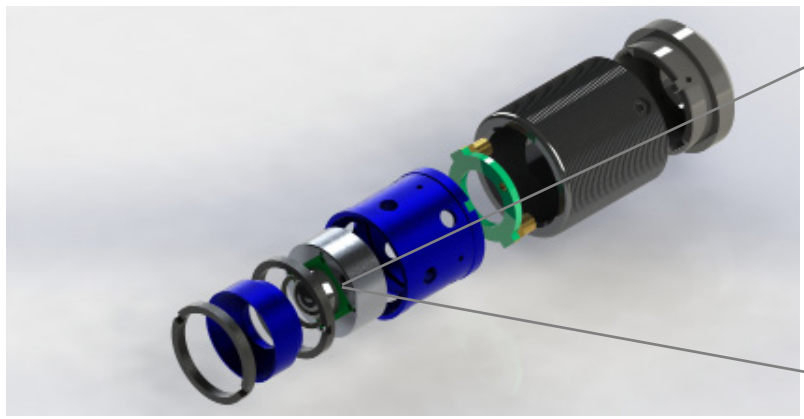
The T-Era-20D40P-800-air terahertz photoconductive antenna (THz-PCA) is used to detect wideband terahertz pulses in THz time-domain systems. The T-Era-20D40P-800-air THz-PCA is made on high resistive ultra-fast epitaxially grown low-temperature GaAs (LT-GaAs) substrates packaged in TeTechS' patent pending terahertz chip enclosure module. The enclosure module houses the THz-PCA chip with a collimating high-resistive silicon lens attach to the back side of the THz-PCA chip. The device is packaged in a modular format so that it is easy to change the THz-PCA chip inside the enclosure at a fraction of cost. The device is shipped with the silicon lens aligned and packaged on the back side of the THz-PCA chip. The silicon lens can be re-aligned after changing the THz-PCA chip using our silicon lens setting fixtures.

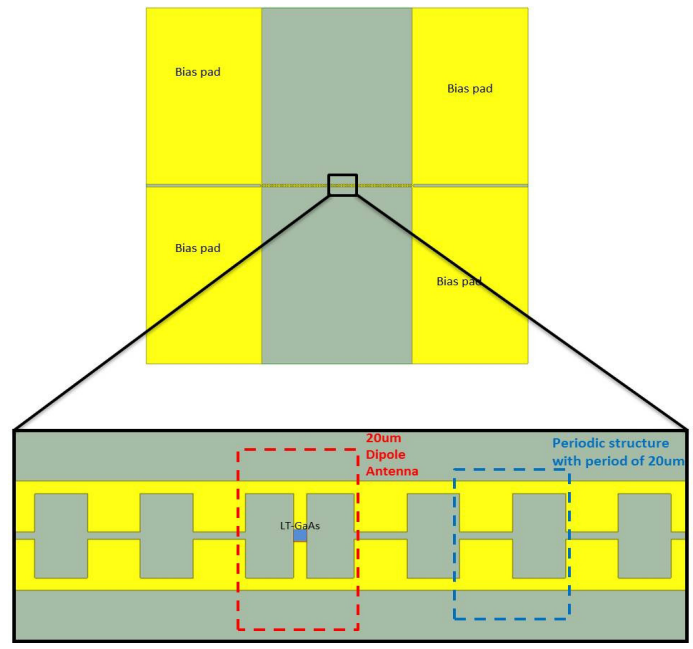
The detected terahertz photocurrent can be measured through a MMCX connector. The standard Ø1" treaded body makes it convenient to attach the module to other standard optical components or mount it on an optical bench. When excited by optical pulses with 15 mW average optical power, the T-Era-20D40P-800-air THz-PCA generates 14 nA peak THz photocurrent with more than 60dB terahertz power spectrum dynamic range.

Product Specifications

Optical Excitation Wavelength	750 nm-850 nm
Average Optical Power	1 mW-15 mW
Bias Voltage for Optical Alignment	5 V
Dark Resistance	1.7 MΩ
Spectrum Bandwidth	>4 THz
Power Spectrum Dynamic Range	60 dB
Size (O.D.)	1"







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I-V Curves

I. Dark current versus bias voltage

Figure 1 shows the dark current versus applied bias voltage across the T-Era-20D40P-800-air THz-PCA. A dark resistance around 1.7 MΩ is measured.

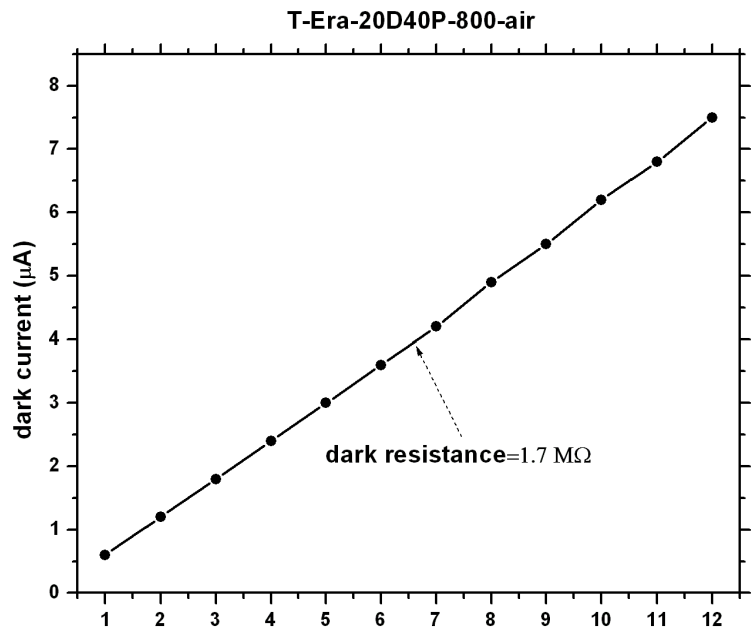

Figure 1. Dark current versus applied bias voltage across the T-Era-20D40P-800-air THz-PCA.

Dark current versus bias voltage measurement settings

THz-PCA Under Test	T-Era-20D40P-800-air
Average Optical Power on THz-PCA	0 mW
Bias Voltage on THz-PCA	1V-12V

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II. Photocurrent versus bias voltage

Figure 2 shows the photocurrent versus bias voltage across the T-Era-20D40P-800-air THz-PCA. The average optical power on the device is fixed at 13 mW. The photocurrent shows a linear increase with bias voltage.

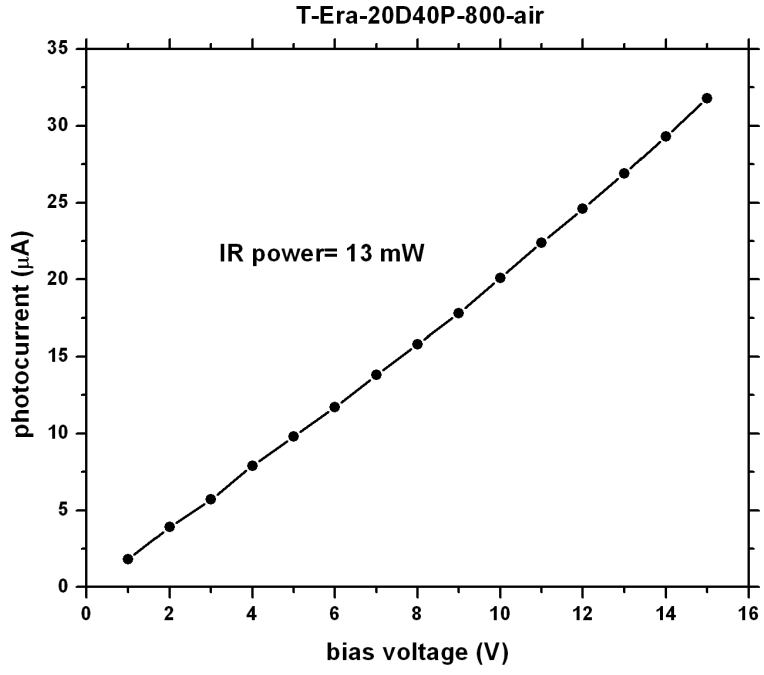

Figure 2. Photocurrent versus applied bias voltage across the T-Era-20D40P-800-air THz-PCA.

Photocurrent versus bias voltage measurement settings

THz-PCA Under Test	T-Era-20D40P-800-air
Optical Excitation Wavelength	800 nm
Optical Pulse Duration	100 fs
Average Optical Power on THz-PCA	13 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-20D40P-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 16 mW.

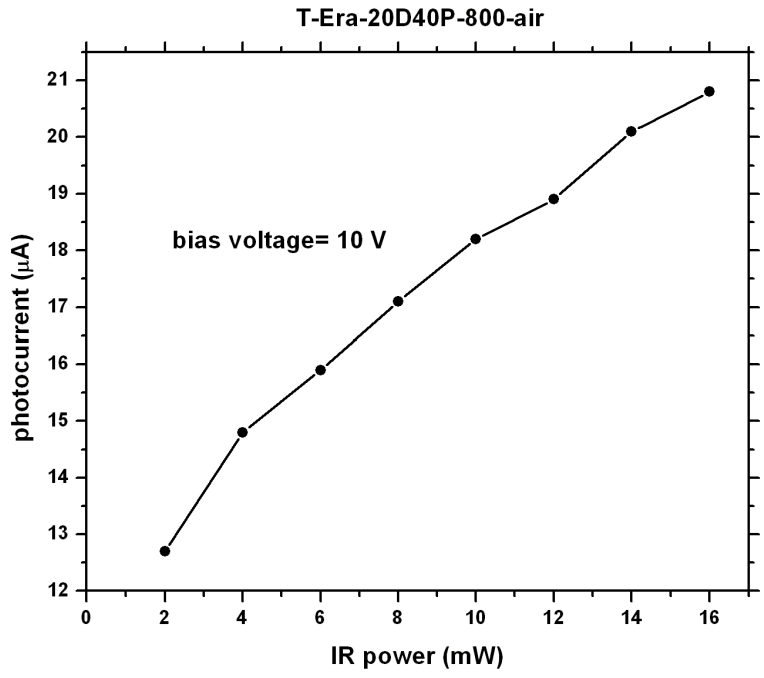

Figure 3. Photocurrent versus average optical power over the T-Era-20D40P-800-air THz-PCA.

Photocurrent versus optical power measurement settings

THz-PCA Under Test	T-Era-20D40P-800-air
Optical Excitation Wavelength	800 nm
Optical Pulse Duration	100 fs
Average Optical Power on THz-PCA	2mW-16mW
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-20D40P-800-air THz-PCA.

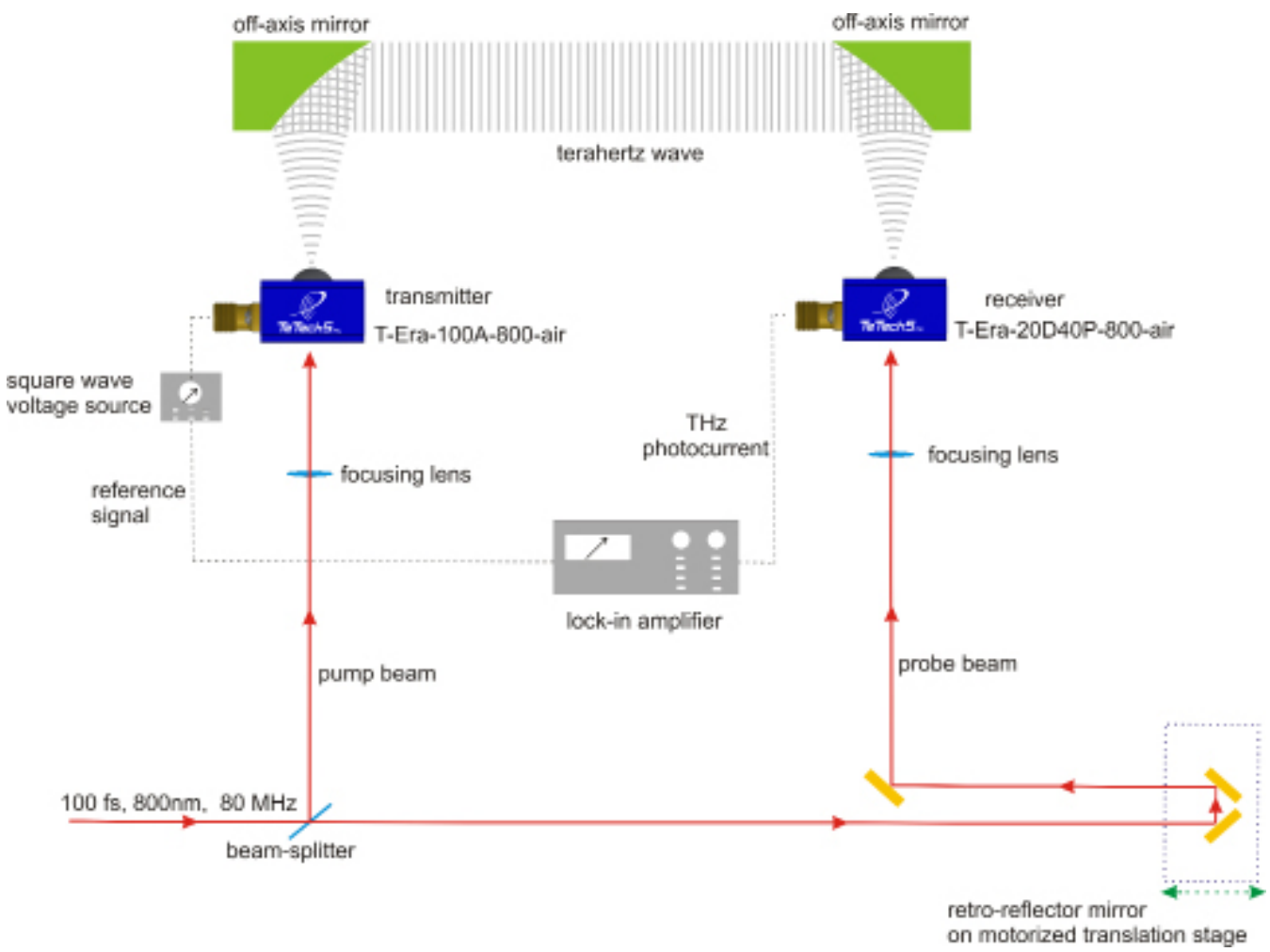

Figure 4. A terahertz response measurement setup for T-Era-20D40P-800-air THz-PCA.

Typical THz Time-Domain Measurement Settings

Transmitter Module	T-Era-100A-800-air
Receiver Module	T-Era-20D40P-800-air
Optical Excitation Wavelength	800 nm
Optical Pulse Duration	100 fs
Average Optical Power on Transmitter	40 mW
Average Optical Power on Receiver	15 mW
Bias Voltage on Transmitter	±10 V

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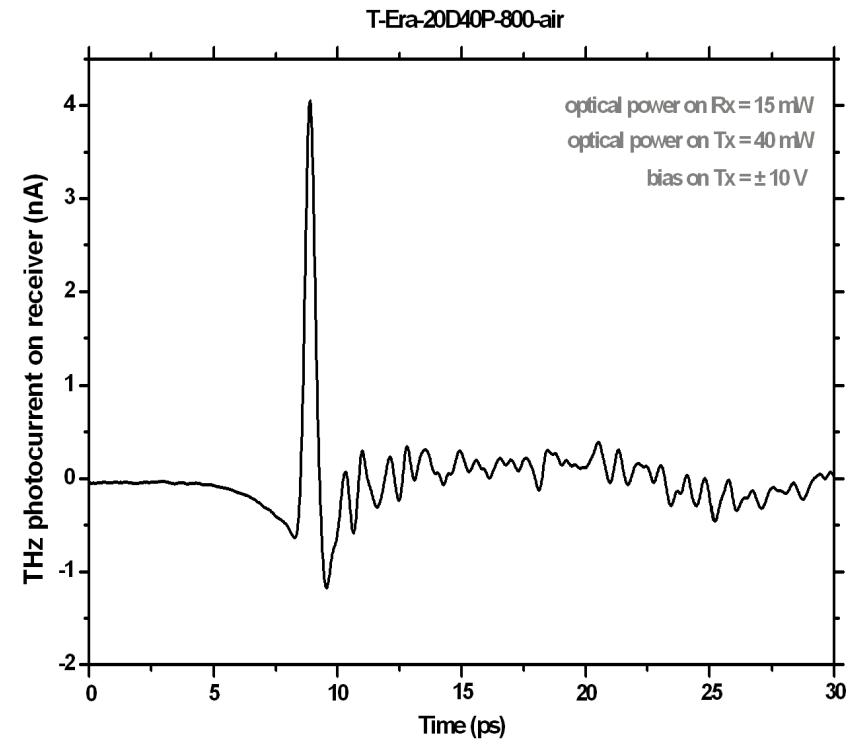
V. Terahertz Response

Figure 5 shows a typical THz pulse and its corresponding normalized power spectrum generated by a T-Era-100A-800-air transmitter module and detected by a T-Era-20D40P-800-air receiver module in a terahertz time-domain system.



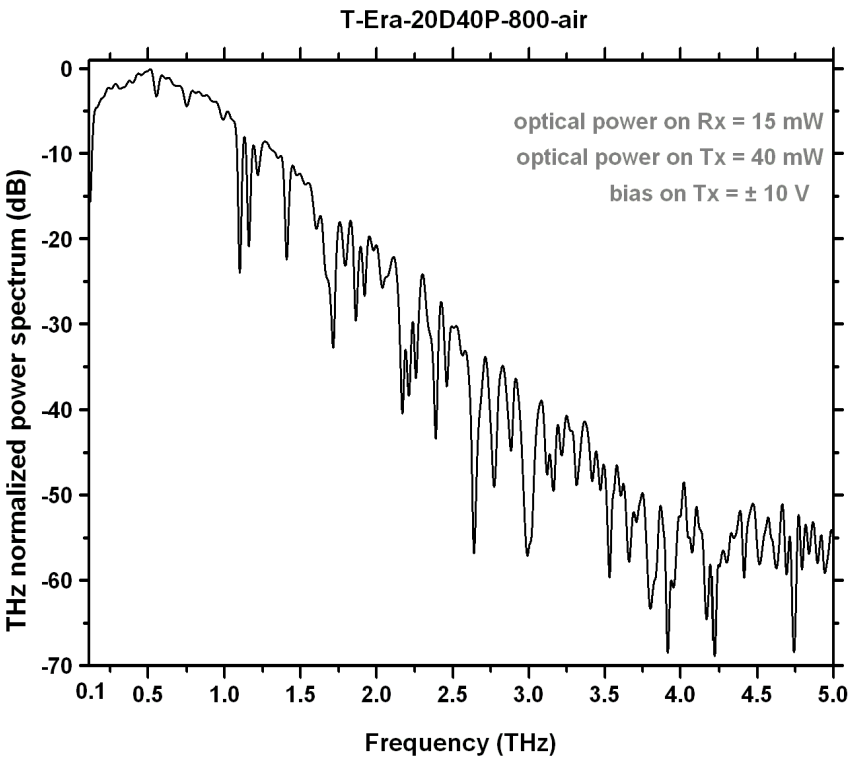


Figure 5. Typical THz pulse and its corresponding normalized power spectrum generated by a T-Era-100A-800-air transmitter module and detected by a T-Era-20D40P-800-air receiver module.

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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-20D40P-800-air THz-PCA receiver. The bias voltage on the transmitter T-Era-100A-800-air is fixed at ±10 V.

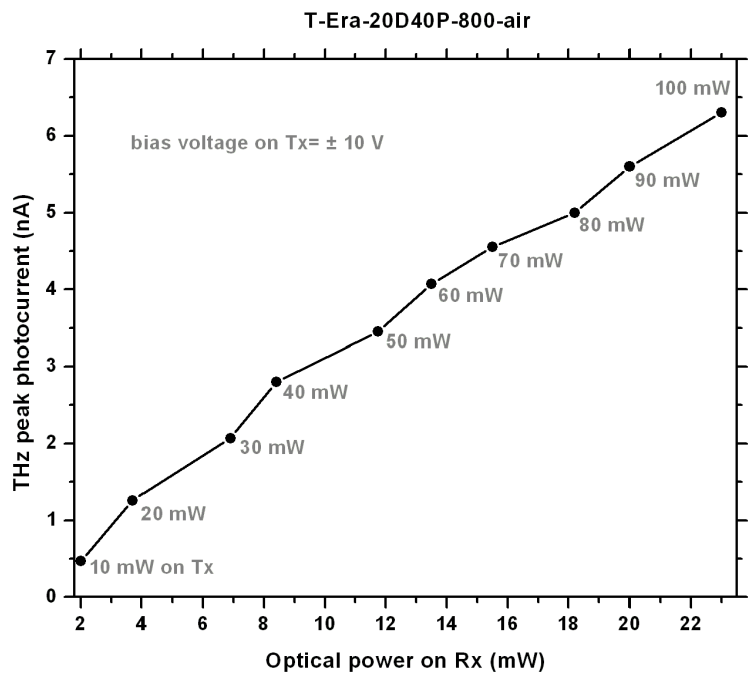

Figure 6. Terahertz peak photocurrent versus average optical power over the T-Era-20D40P-800-air THz-PCA. The average optical power on the transmitter module for each measurement point is shown on the graph.

Figure 7 shows the terahertz peak photocurrent versus bias voltage on the T-Era-20D40P-800-air THz-PCA transmitter. The average optical power on the transmitter is 40 mW and on the receiver devices is 15 mW.

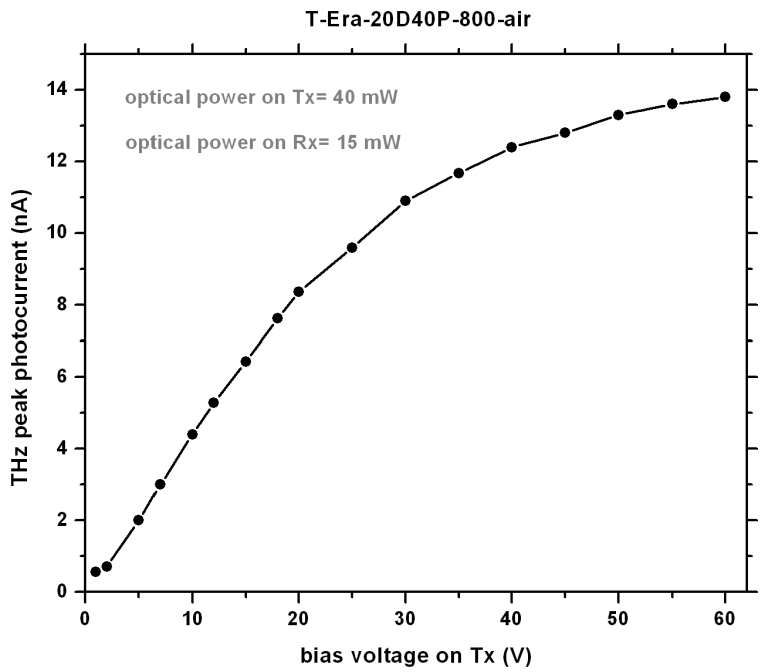

Figure 7. Terahertz peak photocurrent on T-Era-20D40P-800-air receiver versus bias voltage over the transmitter T-Era-100A-800-air.

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