

## Terahertz Parametric Oscillator (TPO)



### Product Description

The TPO systems are based on difference frequency generation in quasi-phase matched GaAs crystals placed inside an optical parametric oscillator (OPO) pumped by an ultrafast fiber laser. It generates 6-10 ps THz pulses at repetition rate of 80 MHz, delivering up to 1mW average power and 1.5 W of peak power. Central frequencies of 0.85 or 1.5 THz and a spectral width of 100 GHz fits perfectly into the atmospheric transmission windows, making these sources ideal for THz imaging applications. Very high peak powers make the TPO suitable for imaging systems employing non-linear effects, while sufficient average power makes it suitable for thermal detector array imaging as well.

### Product Image:



### Specifications:

MODEL	CENTRAL FREQUENCY	SPECTRAL WIDTH	DURATION	AVERAGE POWER	PEAK POWER
TPO-850	0.85 THz	< 200 GHz	$8 \pm 2$ ps	100 $\mu$ W	150 mW
TPO-1500	1.5 THz	< 200 GHz	$8 \pm 2$ ps	100 $\mu$ W	150 mW
TPO-1500 HP	1.5 THz	< 200 GHz	$8 \pm 2$ ps	1 mW	1.5 W

**Notes:** Polarization: Linear, Vertical

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### Operating Principle:

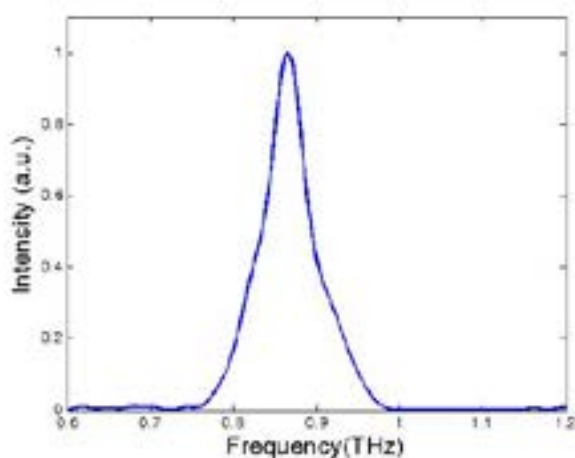
A mode locked fiber laser pumps the OPO with a 7 W average power in 8 picosecond pulses at 1064 nm. These are parametrically down converted to 2.1 micron signal and idler pulses separated by 0.85 THz or 1.55 THz. Difference frequency generation between signal and idler pulses in a quasiphase matched gallium arsenide placed inside the OPO cavity produces stable output at the difference frequency.

The THz waves are extracted from the OPO cavity via a right angle parabolic mirror with a passage for the mid IR so that the THz waves are collimated and reflected out of the cavity. A filter that transmits THz and blocks shorter wavelengths is used as a window for the THz waves while filtering out any low power IR that may have inadvertently been scattered inside the OPO to provide a pure 0.85 or 1.55 THz output. Additional outputs at 1 and 2  $\mu\text{m}$  are available on request.

### Applications:

- THz Imaging
- THz Spectroscopy
- Pump-Probe Experiments
- Non-linear Optics

*Typical Spectrum for TPO-850*



*Typical Spectrum for TPO-1500*

