

## Electro-Optic Laser Frequency Comb

**Summary:** Electro-optic laser frequency combs (EO Combs) from Octave Photonics provide a reliable method for generating femtosecond frequency combs at repetition rates between 5 and 30 GHz. Octave Photonics specializes in building EO combs with ultra-low phase noise, octave-spanning bandwidth, and femtosecond pulse durations. Applications include spectrograph calibration and dual-comb spectroscopy.



19-inch-rack-mount Base EO comb.

Specification	Base EO Comb	Broadened EO comb
<b>Repetition rate</b>	5 to 30 GHz	5 to 30 GHz
<b>Repetition rate tuning range</b>	1+ GHz	5 MHz (typical)
<b>Center wavelength*</b>	1550 nm	1550 nm
<b>Output power</b>	Up to 5 Watts	Up to 5 Watts
<b>Pulse duration</b>	0.8 to 1.5 ps	As short as 20 fs
<b>Dimensions**</b>	0.65 x 0.4 x 0.16 m (3U rack-mount)	Base EO comb plus 0.5 x 0.5 x 0.2 m table-top unit

\*Contact Octave Photonics for additional custom wavelength options.

\*\*Dimensions depend on configuration and do not include power supplies.



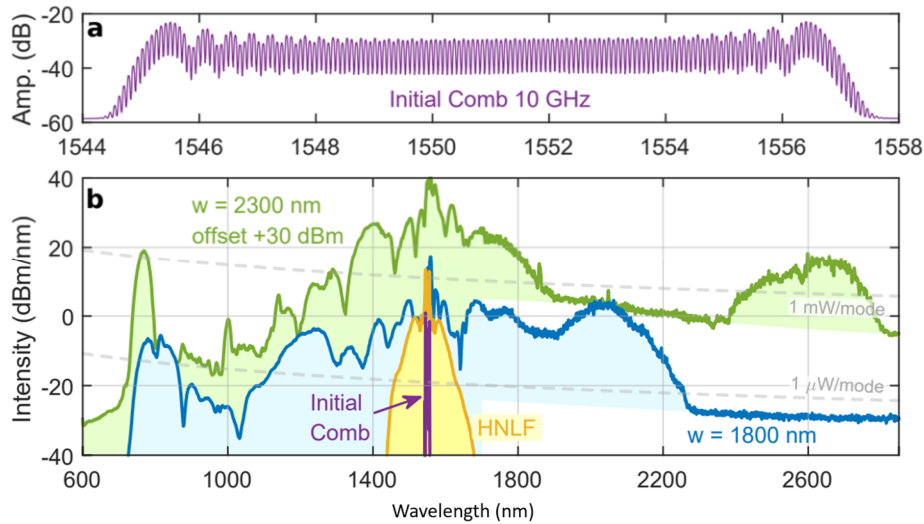
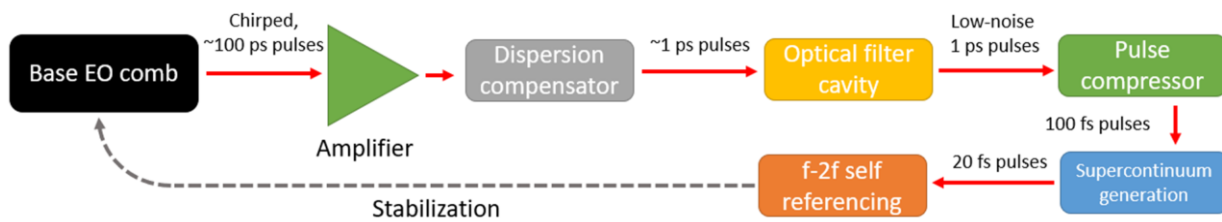


Figure 1. (Top) The spectrum of the base EO comb, with 10 GHz comb teeth visible. (Right) The green and blue lines show the EO comb spectrum after broadening in nanophotonic waveguides.

**Customization:** The EO combs from Octave Photonics are highly customizable, depending on the desired output. In full form, the base EO comb is combined with an amplifier and dispersion compensator to provide 1 ps pulses with up to several watts of average power. The pulses pass through an optical filter cavity to produce a low-noise pulse train. These pulses then enter the pulse compressor, where their duration is reduced to 100 fs. Finally, supercontinuum generation in a nanophotonic waveguide produces an octave spanning spectrum, which is used for f-2f self-referencing and stabilization of the carrier-envelope-offset frequency of the EO Comb. Octave Photonics can also assist with the integration of EO combs with applications.



## References

For more information about ultrashort pulses from ultrastable electro-optic combs, see:  
 Carlson et al., "Ultrafast electro-optic light with subcycle control," *Science* **361**, 1358 (2018).  
[doi.org/10.1126/science.aat6451](https://doi.org/10.1126/science.aat6451) [arxiv.org/abs/1711.08429](https://arxiv.org/abs/1711.08429)

To learn more about how EO combs can be used for exoplanet detection, see:  
 Metcalf et al., "Stellar spectroscopy in the near-infrared with a laser frequency comb," *Optica* **6**, 233-239 (2019).  
[doi.org/10.1364/OPTICA.6.000233](https://doi.org/10.1364/OPTICA.6.000233) [arxiv.org/abs/1902.00500](https://arxiv.org/abs/1902.00500)