

Erbium Fiber Frequency Comb

The AOSense erbium fiber frequency comb is a compact, low-noise, polarization-maintaining (PM) device.

AOSense has also developed several all-fiber extensions to visible wavelengths corresponding to atomic transitions. This functionality is integrated into the standard optical package and does not require external modules. Current versions include:

- Wavelength extensions to 657 nm, 689 nm, 698 nm, 780 nm, and 1064 nm. Contact us for additional information.
- Visible wavelength heterodyne module is included in the optical package. The user supplies a fiber-coupled CW wavelength, and a fiber-coupled optical beat note is output from the package.
- Typical beat note SNRs between the supplied reference and a single comb tooth are 40- 55 dB (300 kHz RBW).



Features

- Turnkey mode-locking with an all-PM fiber architecture centered around 1550 nm. No user optimization is necessary
- 160 MHz repetition rate with an ability of repetition rate matching for dual comb applications.
- Low-noise oscillator exhibiting a free-running CEO linewidth of <200 kHz.
- Temperature insensitive f-2f interferometer that delivers CEO beat notes of SNR > 45dB (RBW = 300 kHz).
- Dual fast/slow cavity length actuators with bandwidth > 300 kHz.
- Integrated optical heterodyne module: the user supplies a fiber-coupled optical reference frequency on a specified ITU grid location, and the fiber-coupled optical beat note is output
- Robust design and packaging able to maintain lock during >10g shock and >10 K temperature excursions (specific results dependent upon servo electronics).
- Demonstrated Allan deviation <math> < 5 \times 10^{-18}</math> at 1 s and $\sim 10^{-20}</math> after $10^5</math> s as well as phase-slip free operation for more than 30 days]$$

Frequency Standard

Erbium Fiber Frequency Comb



Specifications

AOSense erbium fiber frequency comb parameters

| | |
|--|-----------------------------|
| Optical package dimensions | 8" x 6.75" x 1.25" |
| Center wavelength | 1550 nm |
| Repetition rate (matching available) | 160 MHz |
| Free-running CEO linewidth | < 200 kHz |
| CEO beat note | SNR > 45 dB (RBW = 300 kHz) |
| Repetition rate tuning with slow length actuator | ~1 kHz |
| Fast cavity-length actuator bandwidth | ~300 kHz |
| Comb output power | ~20 mW |

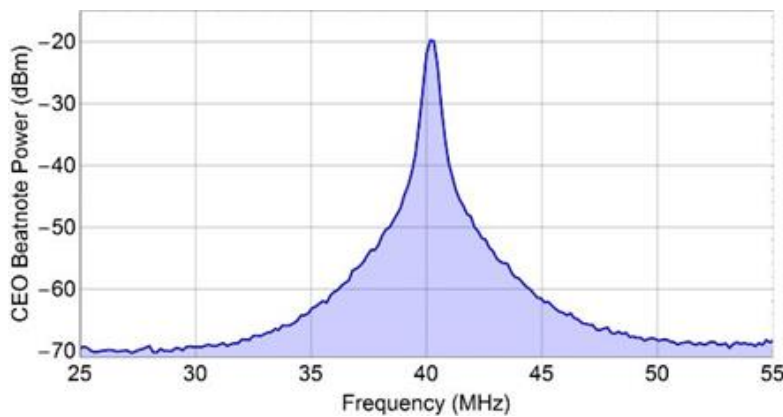


Figure 1: Typical CEO beat note in 300 kHz RBW.

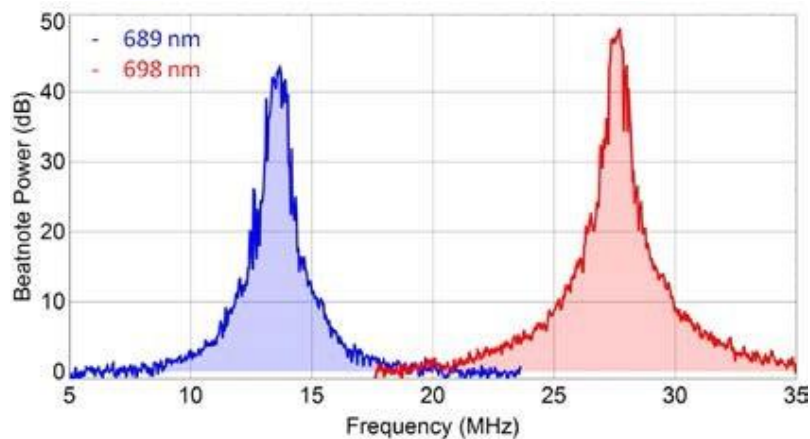


Figure 2: Free-running 689 nm (blue) and 698 nm (red) optical beat notes (300 kHz RBW) simultaneously measured with a dual visible wavelength comb.

For more information, contact us at sales@aosense.com