

FFC-100 Frequency Comb

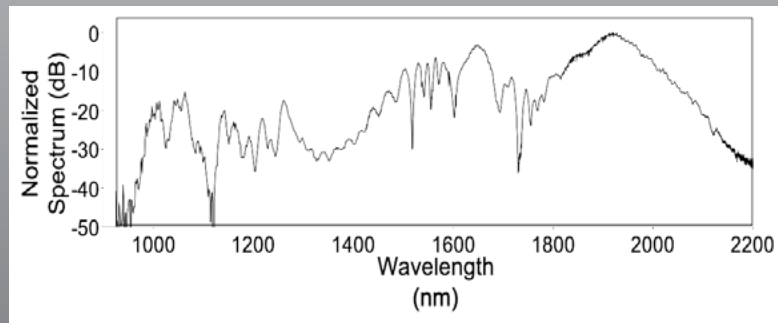
The FFC-100 from Vescent Photonics is a fully stabilized octave-spanning frequency comb with precise control over f_{rep} , f_{opt} , and f_{CEO} . It is built around the Vescent MLL-100 Mode-Locked Laser, a stand-alone erbium-based femtosecond MOPA. A highly non-linear fiber broadens the spectrum and our unique f_{CEO} lock detection reduces the size, weight, and power of the system. The complete FFC-100 frequency comb is designed and built to ensure stable, low-phase noise operation with Allan Deviations supporting the next generation of optical atomic clocks.



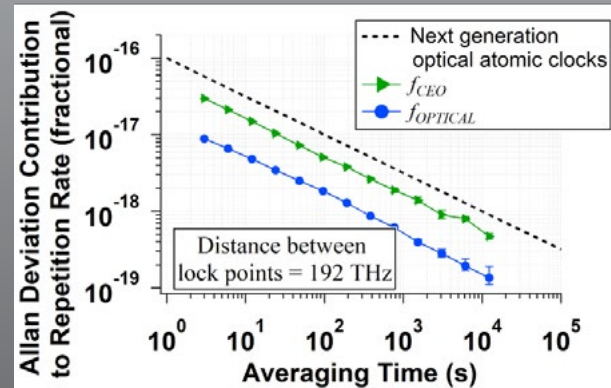
FFC-100 Frequency Comb

The FFC-100 was designed for low SWaP and turn-key, stable operation: A single 2U 19" rack mount chassis contains the oscillator, amplifier, pump lasers, supercontinuum generation module, and f_{CEO} detection and lock as well as the control electronics.

The simple oscillator mode locks at start up every time and the innovative passive SESAM mode-locker is specially designed for a robust, long life. Our unique oscillator design also makes it easy to precisely factory match the repetition rate of two (or more) FFC-100 combs for multi-comb spectroscopy experiments.



Full octave-spanning spectrum of the FFC-100



Rock-solid performance of the FFC-100 offers favorable stability with respect to the next generation of atomic clocks

Features:

- Turn-key operation
- 1560 nm center wavelength
- >30 mW in supercontinuum
- Low phase & amplitude noise
- 2U 19" rack-mounted enclosure
- f_{rep} monitoring, control, and matching
- Input port for f_{opt}
- Repetition rates from 80 to 250 MHz
- Made in America

Applications:

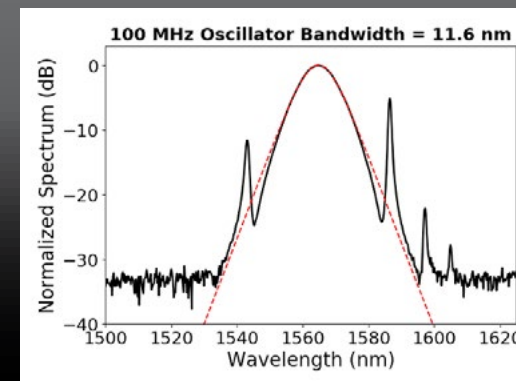
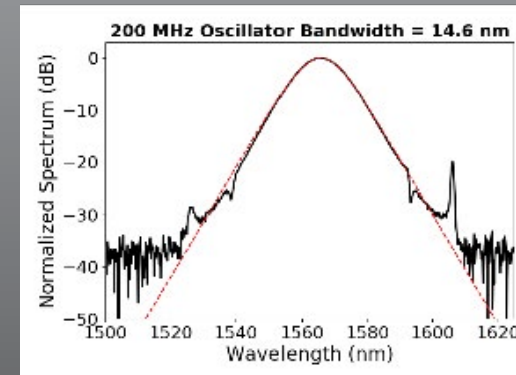
- Time & frequency readout & transfer
- Frequency ruler
- Dual- and multi-comb spectroscopy
- Quantum sensing, computing, & cryptography
- Low-phase noise rf generation



FFC-100 Performance Specifications

Supercontinuum Performance	
Optical Bandwidth	>1,000 nm
Average Power	>30 mW
f_{CEO} Performance	
Signal-to-noise	>35 dB
Linewidth	<200 kHz (typical:125 kHz)
In-Loop Allan Deviation	< $10^{-16}/\sqrt{\tau}$
Oscillator Performance	
Center Wavelength	1560 \pm 10 nm
Oscillator Monitor Output Power	>5 mW
Bandwidth	\geq 10 nm
Nominal Repetition Rate ¹	80, 100, 200, or 250 MHz
Electrical Pump Power Modulation Bandwidth ²	1 MHz
Polarization Extinction Ratio	\geq 20 dB
Optical Outputs	
Supercontinuum, Oscillator, and Amplifier	FC/APC PM1550 fiber (key aligned to slow axis)

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Broad bandwidth seed pulses are generated by the MLL-100 Mode-Locked Laser at repetition rates from 80 to 250 MHz



FFC-100 Performance Specifications (con't)

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Repetition Rate Control	
Computer Control ³	1-5 ppm
PZT Modulation Control Input Range ^{3,4}	0.3 - 1.0 ppm
PZT Control Transfer Function ³	15 - 50 ppb/V
PZT Control Bandwidth ⁵	>100 kHz
Temperature Control Range ⁶	300 ppm
Temperature Control Transfer Function	10 ppm/°C
Temperature Set Point Resolution	<0.1 mK
Repetition Rate Stability ⁷	<1 ppm/°C
Monitor Outputs	
f_{rep}	
RF Bandwidth	500 MHz
RF Power	>-10 dBm
f_{opt}	
RF Bandwidth	>50 MHz
RF Power	>-40 dBm
f_{CEO}	
RF Bandwidth	>50 MHz
RF Power	>-40 dBm
Optical Output	Oscillator and/or amplifier power
Physical Properties	
Power Input	100 - 240 VAC; 50 - 60 Hz
Power Consumption	<40 W
Dimensions ⁸	19" rack mountable: 19" x 10" x 2U

All specifications subject to change without notice.

¹Can be factory tuned to within 5 kHz

²Loop bandwidth limited by Er:fiber to ~30 kHz

³Depends on nominal repetition rate

⁴0-100 V input

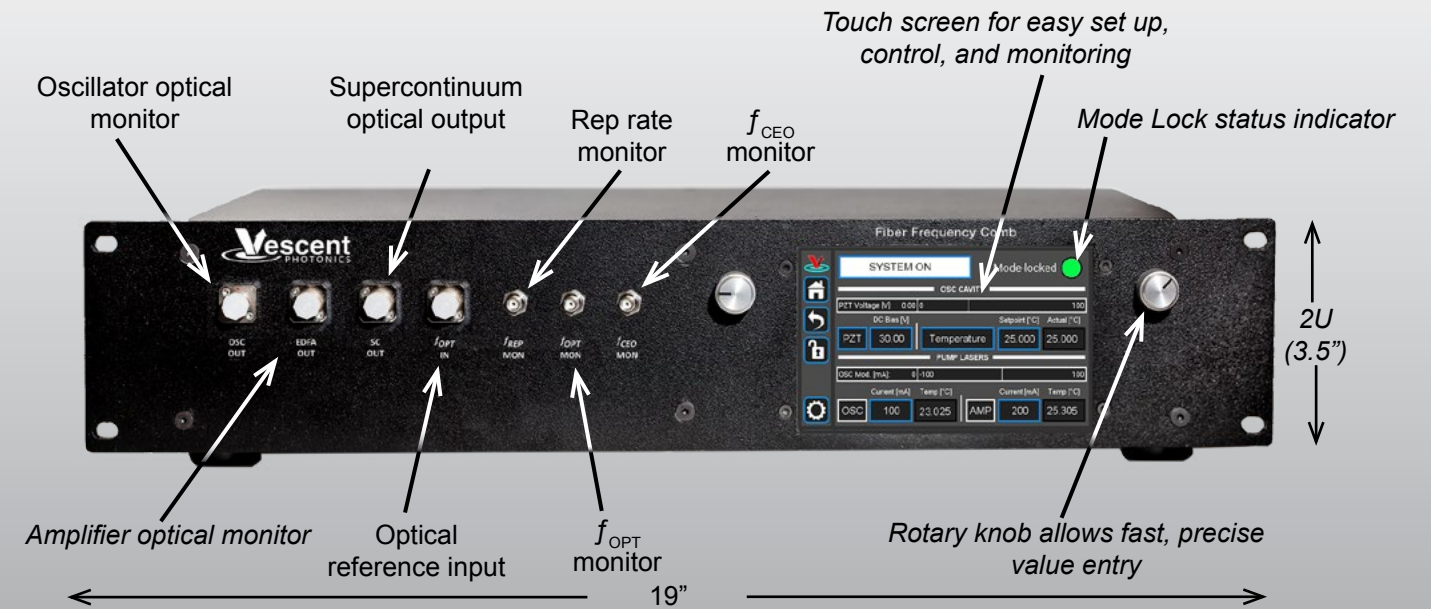
⁵Small signal (± 10 V range centered at nominal set point)

⁶Assuming 40°C range

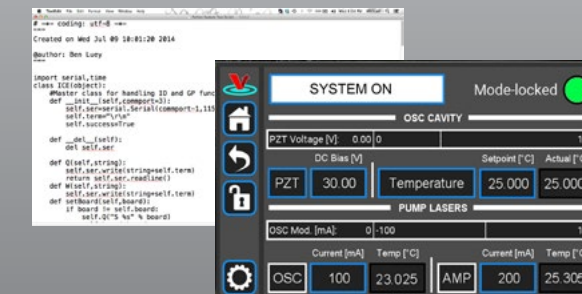
⁷With respect to room temperature

⁸Includes all electro-optical components & electronic drivers

Meet the FFC-100



FFC-100 compact Frequency Comb



Control the FFC-100 via a touch screen or a serial command API



Made in America!



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