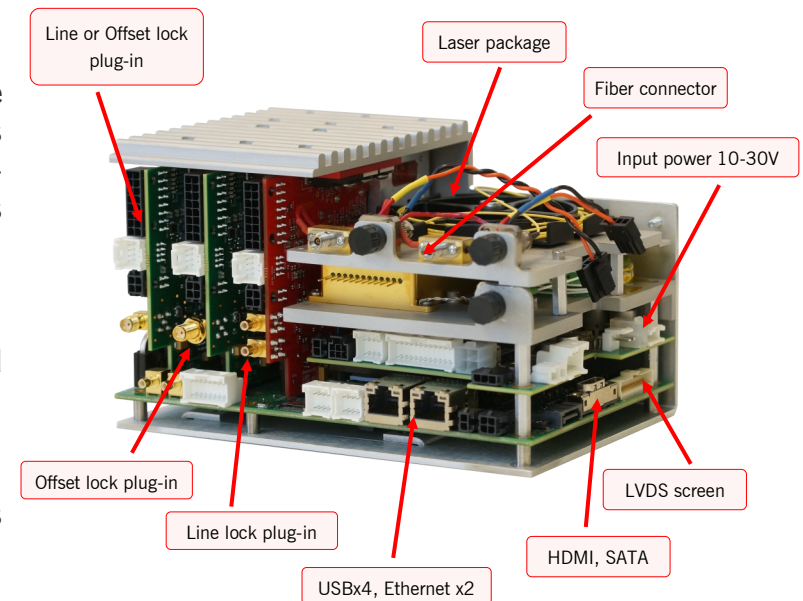


The **Universal platform for quantum applications** enables precise control of multiple lasers used for Position, Navigation and Time measurements or Atomic clocks. It builds Redwave Labs' Universal Platform for Spectroscopic Instrumentation, adding capabilities to lock lasers to atomic or molecular transitions, control precise laser frequencies by **offset locking**. It retains all power, data processing, signal acquisition and control, data storage and external communications features.

- All laser control modules are powered from a single 10-30V power source provided by backplane with integrated charging capabilities.
- Up to **three line lock and offset lock modules** can be combined

Linux based Kontron CPU (COM Express) with additional high end FPGAs and MCUs allows to process all signals in real time.



## Applications

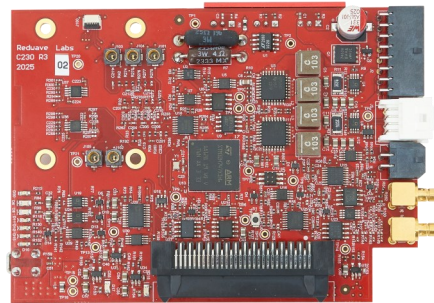
Position, Navigation and Time measurements, Atomic clocks, Laser frequency stabilization, Portable laser instruments

### The full system has the following parts:

1. Com Express Type 10 CPU, with dedicated FPGA with synchronous 2MS/s 16 bit DAC and ADCs, 24 bit ADC with 1 kS/s. Integrated digital PID controller if required
2. Line lock controller including DDS, mixer, FIR and demodulator. Digital PID control for lock. Includes low noise laser and temperature controller
3. Offset lock controller including DDS, mixer, PLL and precise oscillator. Hybrid PID loop. Full digital access to clock and DDS. Includes low noise laser controller and temperature controller. Frequencies up to 10GHz.
4. Full power management with integrated battery charger. 10-30 DC input voltage.
5. Linux OS with full set of libraries and extensive examples.

### Line-lock C230

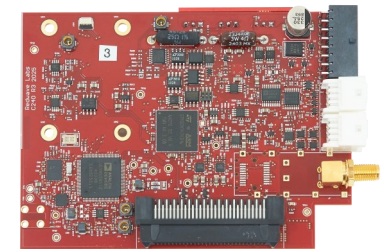
The Line Lock card integrates a laser driver, temperature controller, and a modulation-demodulation scheme to lock the laser current to a hyperfine atomic transition. The C230 operates in conjunction with the Universal Platform, utilizing the Lattice FPGA to manage the mixer and FIR filter. The generated error signal is directly applied to the laser current, ensuring stable laser frequency.



- Low-noise laser driver with output current up to **250 mA**
- Integrated DDS modulation (**10–200 kHz**) with adjustable amplitude for Rb spectroscopic line locking
- **Digital mixer and filter** for precise error signal generation
- Built-in **digital PID controller** for stable locking
- Coarse and **fine current scanning** for optimized laser locking performance
- Temperature stability better than **1 mK RMS**
- Full **SCPI interface** for complete remote control of all parameters

### Offset-lock C240

The Offset Lock card is designed to stabilize the frequency difference between two lasers. It operates by detecting the beat note between the master and slave lasers and comparing it to a reference frequency.



- Low-noise laser driver with output current up to **250mA**
- RF DDS generator from **10MHz to 400MHz** with sub-Hz resolution
- RF input range: **50MHz to 10GHz**, with a built-in frequency divider (**÷1 to ÷64**)
- Integrated **phase-locked loop (PLL)** for offset frequency locking, featuring digital gain control
- **Real-time RF offset tuning** with precise, time-controlled frequency scanning
- Coarse and **fine laser current scanning** for optimized locking performance
- Exceptional temperature stability: **better than 1mK RMS**
- Comprehensive **SCPI interface** for full remote control of all parameters