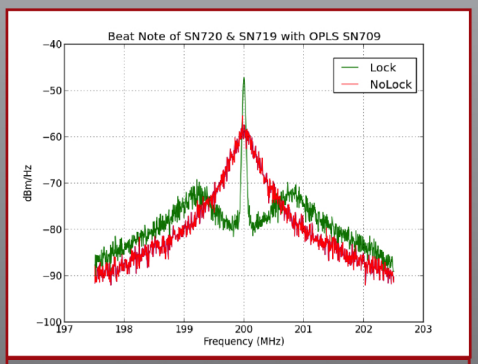
D2-135 Offset Phase Lock Servo

The D2-135 Offset Phase Lock Servo is designed to precisely control and quickly adjust the frequency detuning between two lasers. Broad, rapid detuning of the slave laser is possible via a phase/ frequency detector and an adjustable-parameter PID loop filter.

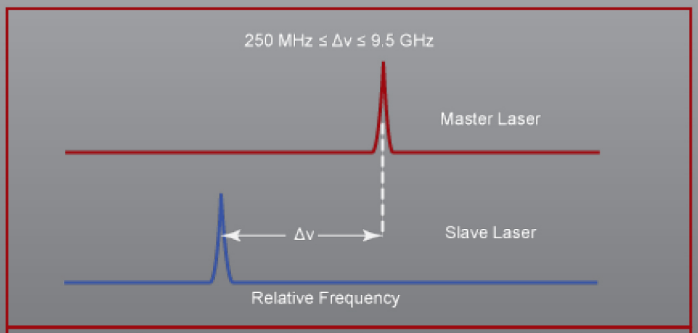
D2-135 Offset Phase Lock Servo

The D2-135 works together with the D2-150 Heterodyne Module and the D2-160 Beat Note Detector. The D2-150 overlaps the master and slave lasers and launches the optical beat note into a multimode fiber where it is delivered to the D2-160, converted to an electrical beat note and supplied to the D2-135.

The D2-135 OPLS provides a true phase lock with the conveniently large capture range of a frequency lock. Offset locking lasers is a favorable alternative to two (or more) absolute frequency locks, both for the microsecond tuning capabilities and the coherence between master and slave.



Phase-locked beat note (green) between two DBR lasers



User control of slave-laser offset

Features:

- Offsets from 250 MHz to >9.5 GHz
- Arbitrary precision of offset via external reference
- True phase coherence between master and slave
- Feed forward input for microsecond frequency jumps
- User-adjustable servo loop parameters
- Computer control of offset
- Internal ramp generator

Applications:

- Cold-atom physics
- Frequency combs
- Atomic clocks
- Inertial navigation
- Gravity measurements
- Quantum computing & cryptography
- Electromagnetically induced transparency
- Cavity transfer of frequency standards

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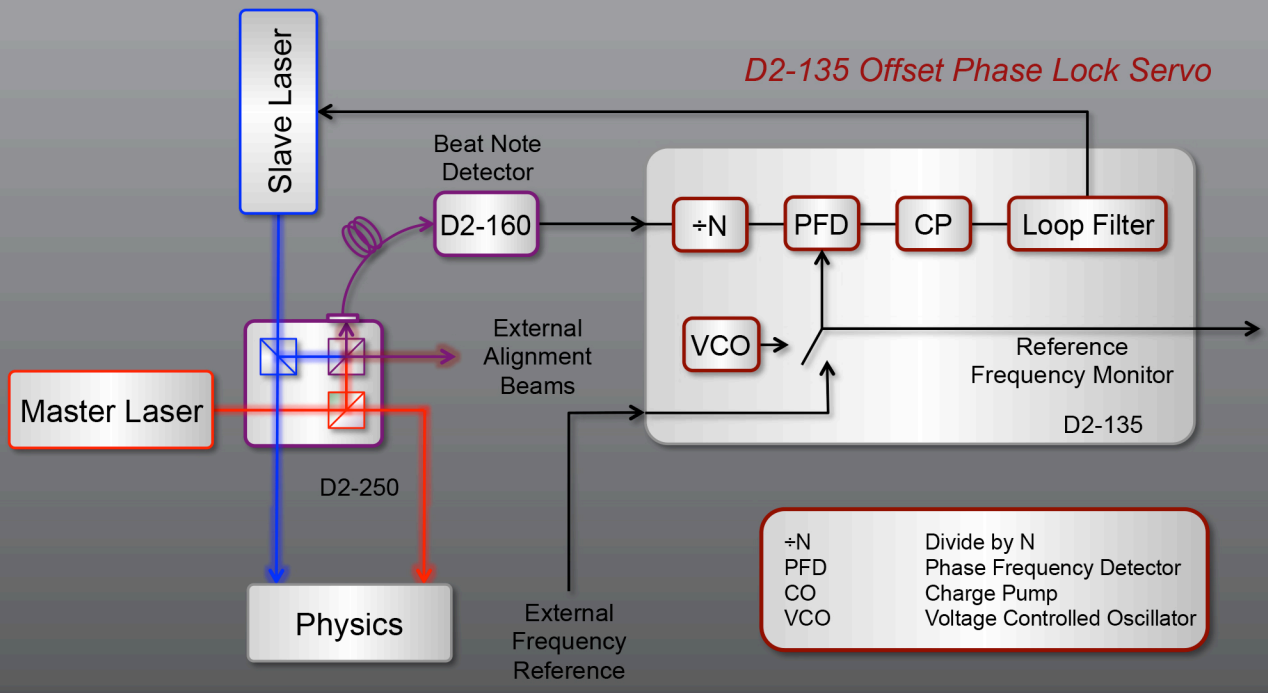
D2-135 OPLS

Parameter	Specification
Offset Frequency Range	250 MHz to >9.5 GHz
Wavelength Switching Time[1]	<50 µs (≤5 GHz jumps) <100 µs (≤9.5 GHz jumps)
Servo Loop Bandwidth[2]	10 MHz
User-adjustable Gain	0 to -76 dB
Reference Signal Source	Internal VCO or external input
VCO drift	500 ppm/°C
External Reference Input Range[3]	30 - 250 MHz
Electrical Beat Note Input	SMA
Beat Note Input Range	-10 to +10 dBm
Dimensions	8.9×3.8×7.3″ (22.6×9.7×18.5 cm)
Power Input[4]	+5, ±15 VDC

Notes:
All specifications subject to change without notice.
[1]With feed forward
[2]Frequency at which servo oscillates when locked to itself
[3]Covers complete lock range
[4]Available from D2-005 linear power supply

A typical configuration for the D2-135 Offset Phase Lock Servo is shown below. Master and slave lasers create an optical beat note in the D2-150 Heterodyne Module which launches it into a fiber. The beat note is converted to an electrical signal by the D2-160 fast photodetector which passes it to the D2-135. A divided down beat note (÷N) is mixed with a reference generated either by the on-board Voltage Controlled Oscillator (VCO) or by an external reference. The error signal is processed by the loop filter and is used to drive the slave laser into a true phase lock to the master.



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