

# D2-135 Offset Phase Lock Servo

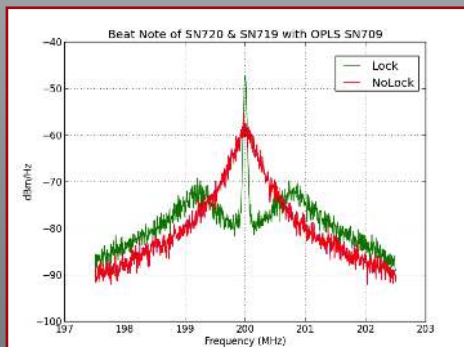
The D2-135 Offset Phase Lock Servo is designed to precisely control and quickly adjust the frequency detuning between two lasers. Broad, rapid detuning of the slave laser is possible via a phase/frequency detector and an adjustable-parameter PID loop filter.



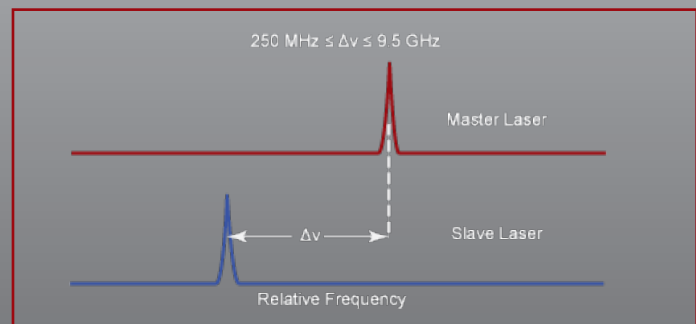
*D2-135 Offset Phase Lock Servo*

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

# D2-135 OPLS

Parameter	Specification
Offset Frequency Range	250 MHz to >9.5 GHz
Wavelength Switching Time <sup>1</sup>	<50 $\mu$ s ( $\leq$ 5 GHz jumps) <100 $\mu$ s ( $\leq$ 9.5 GHz jumps)
Servo Loop Bandwidth <sup>2</sup>	10 MHz
User-adjustable Gain	0 to -76 dB
Reference Signal Source	Internal VCO or external input
VCO drift	500 ppm/ $^{\circ}$ C
External Reference Input Range <sup>3</sup>	30 - 250 MHz
Electrical Beat Note Input	SMA
Beat Note Input Range	-10 to +10 dBm
Dimensions	8.9 $\times$ 3.8 $\times$ 7.3" (22.6 $\times$ 9.7 $\times$ 18.5 cm)
Power Input <sup>4</sup>	+5, $\pm$ 15 VDC

**Notes:**

All specifications subject to change without notice.

<sup>1</sup>With feed forward

<sup>2</sup>Frequency at which servo oscillates when locked to itself

<sup>3</sup>Covers complete lock range

<sup>4</sup>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 ( $\div$ 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.

