MIREGA
COMPACT GAS ANALYZER

Fiber Fabry-Pérot
TEST REPORT

FFP-040

Date:	2026-07-01
Specifications:	FP-1550-30 000-10
Operator:	Yohan
Options:	none
Archive name:	FFP-040

Filter Specifications

The table hereafter summarizes the compliance test results of your FFP-040:

Property	Spec.	Unit
FSR	10.57	THz
Finesse at 1550 nm	41 400	-
Filter bandwidth @1550 nm	255	MHz
Required voltage per FSR	251	Vpp

The following items are compliant by design:

Property	Spec.	Unit
Maximum tuning voltage	+/- 320	V
Maximum optical output power at resonance	2	mW
Single-mode fibers with FC/APC connectors	-	-
First mechanical resonance frequency	50	kHz
Capacitance	< 10	nF

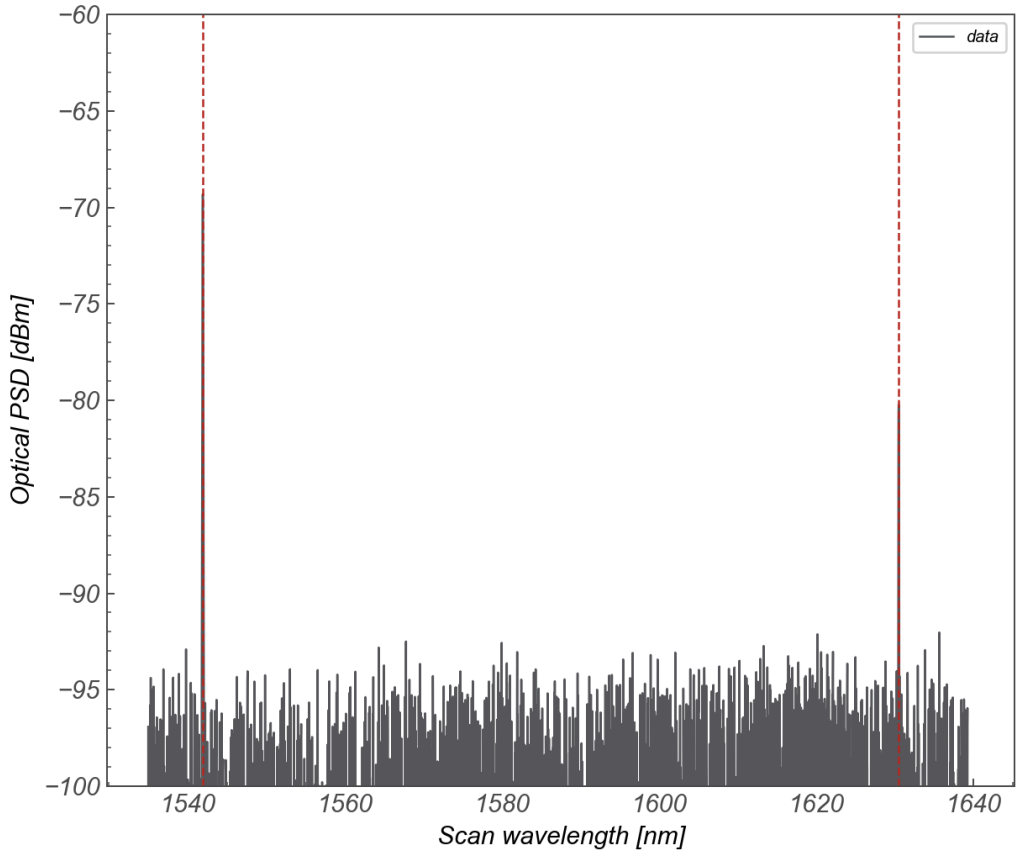
For information, additional tests have been performed on your FFP-040:

Property	Result	Unit
Center wavelength (@0 V and @24 °C)	1550	nm
Insertion loss	3	dB
Minimum extinction ratio for second order mode	meas noise	dB

Free Spectral Range

The full Free Spectral Range (FSR) of the cavity has been measured using a white light source and a spectrum analyzer around 1550 nm to scan a full FSR and detect the resonance peak wavelengths. The optical length of the cavity is then calculated from the full FSR.

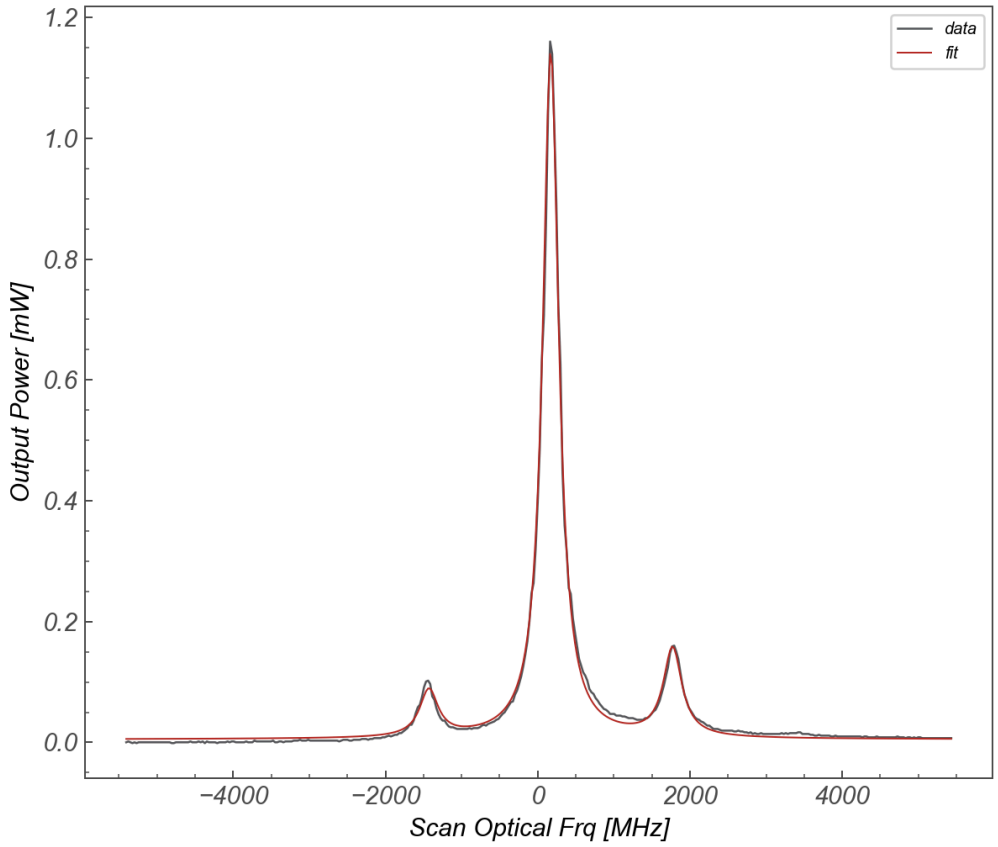
Please note that this measurement is noise-limited by the spectrometer. Position and relative amplitude of the peaks are correct but amplitudes may not be fully accurate.



FSR measurement with spectrometer
FSR = 10.57 THz (84.6 nm @ 1550 nm)

Finesse and bandwidth

Finesse is calculated by first measuring the bandwidth of the filter using a tunable laser with modulation sidebands serving as frequency reference. We then calculate the Finesse as $F = \frac{\text{FSR}}{\text{bandwidth}}$.
Characterization was done using a 1550 nm laser. As the reflectivity of the coating is similar at 1550 nm and 1550 nm, the filter bandwidth is identical.

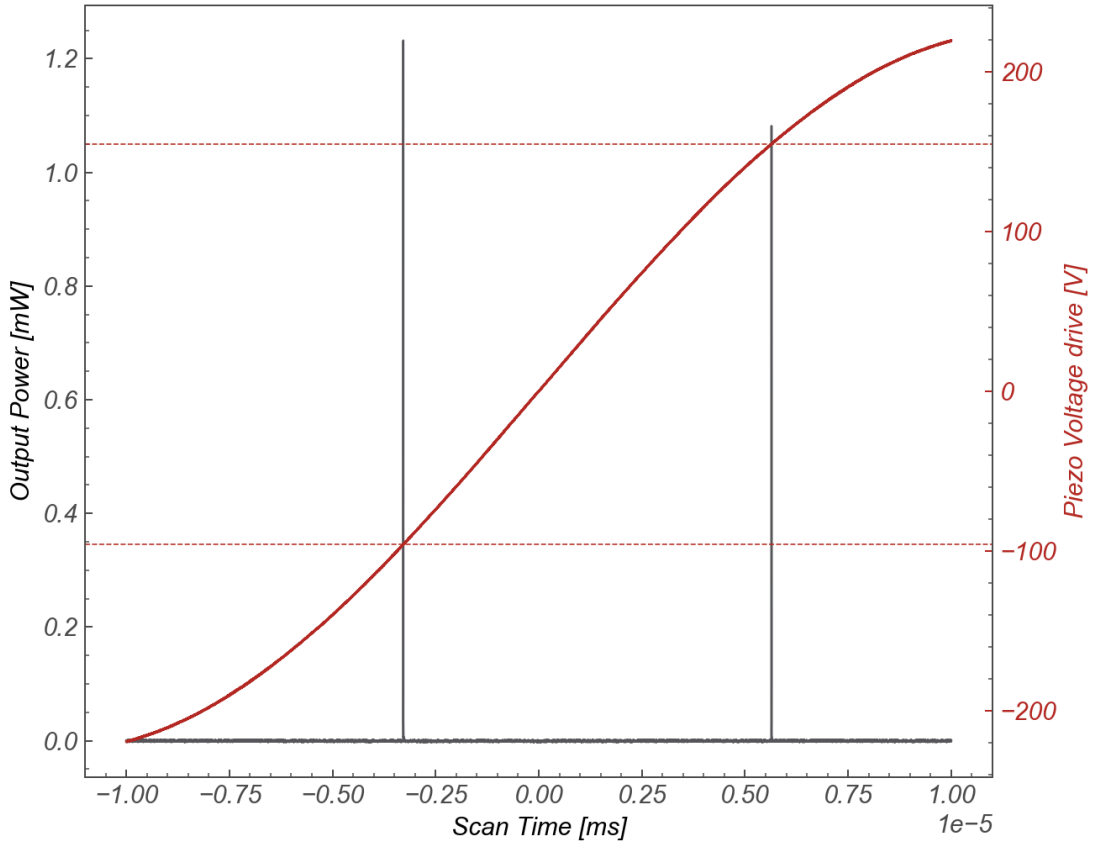


Resonance peak @1550 nm with 254.94 MHz sidebands

Bandwidth: 255 MHz
Finesse: $\boldsymbol{F = \frac{10.57\ \text{THz}}{255\ \text{MHz}} = 41400}$

Tuning voltage per FSR

An entire Free Spectral Range is scanned to measure the required voltage necessary to scan this complete FSR.



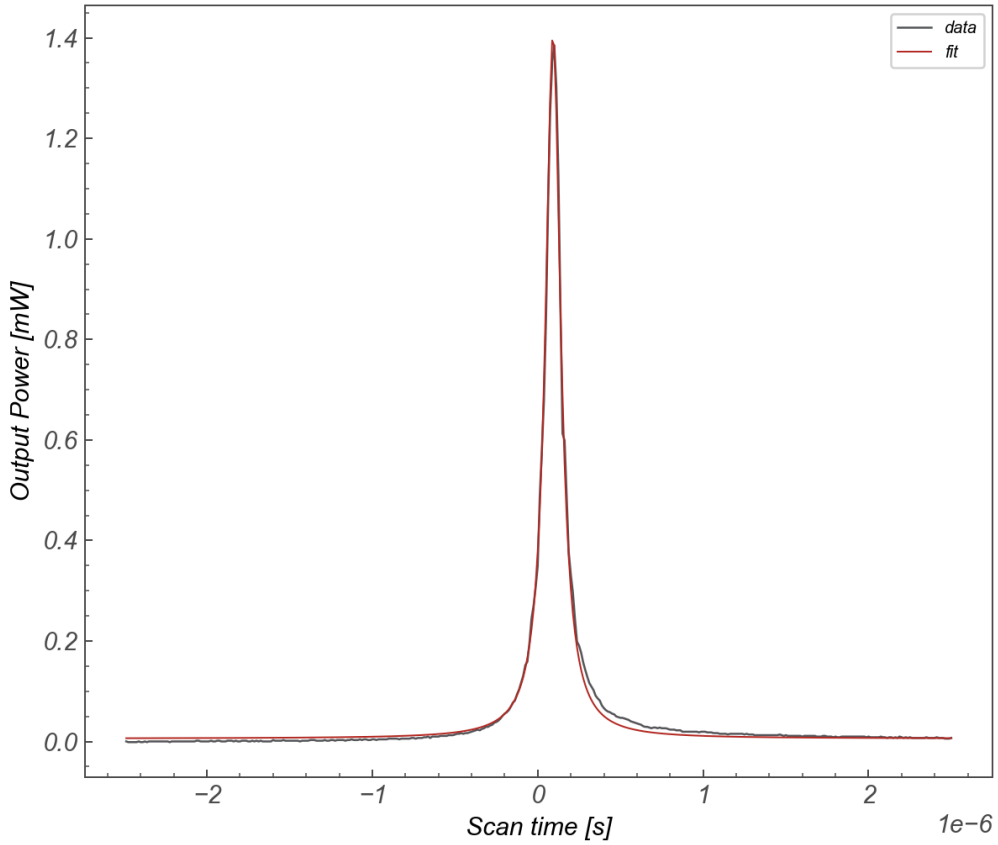
Full FSR characterization scanning the piezoelectric actuator

Required voltage span: 251 Vpp

Due to the non-linearity and specific behavior of the piezoelectric actuators, higher voltage might be necessary depending on the sweep frequency and voltage offset. Please contact us for further information.
Please note that the difference in peak heights is due to the sample rate of the oscilloscope and not related to any actual power fluctuation.

Additional tests: Insertion loss

Insertion loss is measured by comparing the peak transmission and the reflected signal as reference for the optical power.



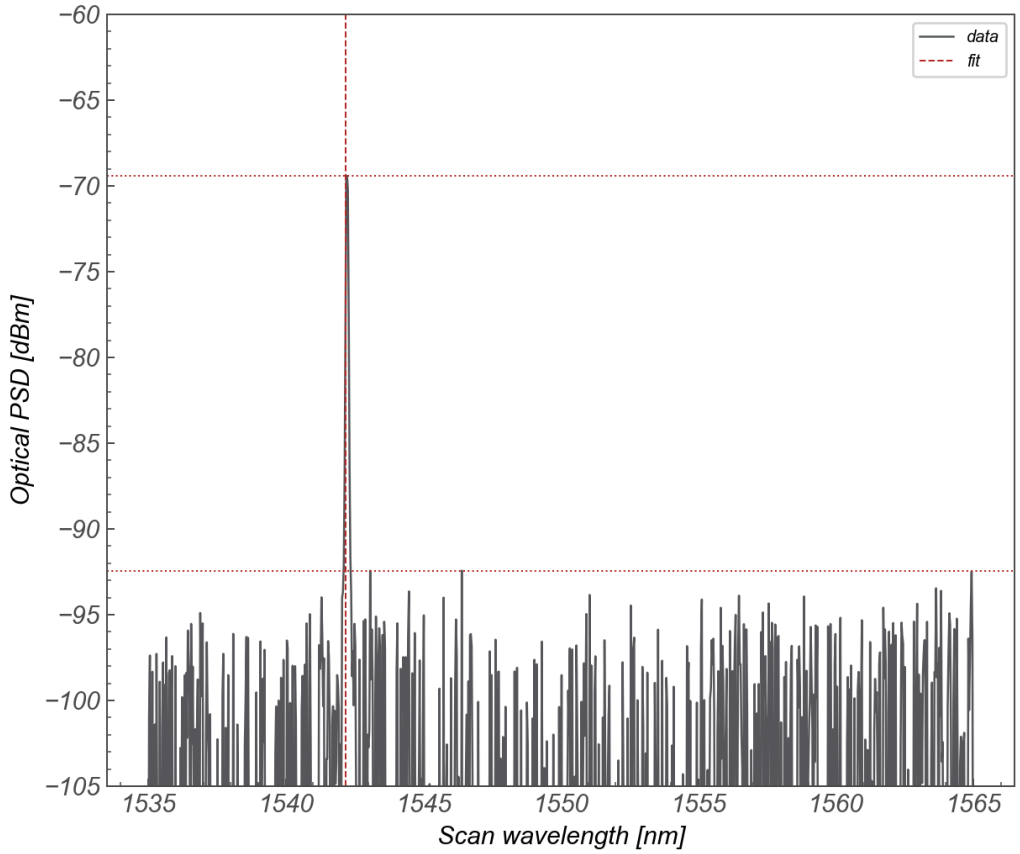
Transmission signal of the filter swept around 1550 nm

Transmission ratio: $\frac{1.4\ \mathrm{mW}}{2.77\ \mathrm{mW}} = 50.5\%$
Insertion loss: 3 dB

Additional tests: Secondary mode

As with any optical cavity, secondary modes can appear due to slight fluctuations in the assembly. While we try to minimize those to a absolute minimum, we cannot always fully suppress every mode. The main resonance peak is known as the TEM_{00} mode and has the largest amplitude (several orders of magnitude above any secondary mode).

Our method of detection could not reveal these secondary modes in the transmission of the cavity, and we assume it to be lower than the noise of our spectrum-analysis.



Transmission of the cavity around the main resonance peak

Minimum extinction ratio below noise measurement (−21 dB)