



Frequency Modulation

Application note: FM input

The PPCL700 and PPCL550 Pure Photonics tunable laser (and some custom partnumbers) can be optionally configured with a frequency modulation input. This input can be used to finetune the frequency at a high update rate to lock the laser to a resonance.

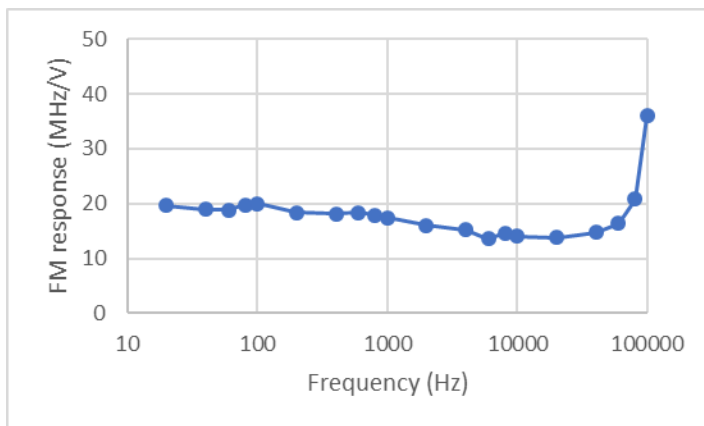
This application note describes the frequency modulation feature.

1. Configuration

The FM input is an analog input into the PZT driver circuit. On PPCL700 it is pin 20 of the 20 pin connector. On the PPCL550 it is the first or second (if amplitude modulation input is included, it is first) SMA connector from the edge.

The FM input is a high resistance input (20 kOhm) without noticeable current draw. The useful input range is 0-6V. The driver circuit applies up to 28V onto the PZT through an Op Amps. When the input voltage goes below 0V or exceeds 6V, the signal is clipped.

A typical frequency modulation response is shown in the below graph. This may vary from device to device, but not by too much. The modulation frequency is not restricted beyond 100kHz, however the resonance of the PZT (at 150kHz) may get stronger. Going beyond that will have a very low transfer constant.



Dithermode

In dithermode the laser itself applies a 24V pk-pk signal at 200Hz onto the PZT. This signal is used to determine the alignment of the laser cavity with the filters. In the dithermode the laser needs this signal to align and if this signal is not strong enough, the unit starts to adjust the phase section to find the signal (resulting in frequency drift and loss of lock). In dithermode, the PZT signal is driven by an internal voltage source and it is stronger than the external modulation voltage.

When applying a modulation signal that is moderately strong and/or close to 200Hz, the laser will lose lock.

Whisper mode

In whisper mode, the laser has disabled the dither and the laser is not dependent on the locking signal. As such, the user can apply any signal on the FM input without impacting the locking behavior of the laser. The internally generated voltage is now disabled (floating) and the external voltage fully controls the PZT voltage.

Simplified circuit

In dithermode the internal dither is on and competes with the FM input. Applying a voltage on the FM input in dithermode will reduce the dither on the PZT. One can measure the voltage on the PZT pin and monitor the dither signal.

In whispermode the internal dither input is floating, so the 10k resistor is eliminated from the circuit. The FM input goes through a voltage divider and the OpAmp amplifies the signal 9x. An output voltage below 0V or above 28V is clipped due to the OpAmp supplies.

