Clean Measurement

The PPCL300 and PPCL550 Pure Photonics tunable laser (and some custom partnumbers) can be optionally configured with a Clean Measurement input. This input is an analog input directly connected to the 12-bit ADC on the micro-processor. The way the micro-processor responds to the input is determined by the firmware and can be customized. Currently there are two implementations:

- Analog FTF, where the input signal is used to offset the laser from the center frequency. The magnitude of the offset range can be set up to +- 30 GHz or smaller ranges (to optimize the resolution).
- Clean Scan detection (with Clean Scan firmware, requires additional calibration) where a signal is collected along with a clean scan.

This application note describes the clean measurement feature.

1. Configuration

The CM input is an analog input into the gain current driver circuit. On PPCL300 it is pin 18 (pin 19 for CM2) of the 20 pin connector. On the PPCL550 it is the SMA connector furthest away from the corner (e.g. either 1, 2 or 3 dependent on what other features are available).

The CM input is a high resistance input (50kOhm) without noticeable current draw. The useful input range is 0-8V. Operating outside this range with clip the internal OpAmp and will rail the internal equivalent voltage at 0 or 8V.

The ADC has a 12-bit resolution, so the voltage resolution is 2mV. The typically update rate is 100Hz, but firmware implementations may utilize interrupts to get a higher speed.

Operating mode

The CM feature can operate in dither/telecom mode or whisper mode. The firmware implementation determines what happens to the input.

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2. Applications

Analog FTF

This feature is available on most firmwares 8.0.9.6

The analog FTF feature maps the input to the CM1 port to the FTF register (0x62). This means that e.g. 6V with a 5,000MHz response would be equivalent to writing +2,500MHz to register 0x62.

The user sets the maximum range of the FTF response (MAX) and 0V is mapped to -MAX, 4V to 0 and 8V to +MAX. The offset value is probed every 10ms.

The analog FTF is controlled through register 0xF0. Writing 0 to register 0xF0 (the default at startup) disables the analog FTF. Other values will enable the analog FTF with the MAX set to that value.

The Basic GUI has the Fine Tune Frequency setting in the STEP 2 window. By entering the MAX value in the FTF field and checking the analog FTF box, the analog FTF is enabled.

Within the basic GUI, the analog FTF operation can be monitored by looking at the sled temperature (laser temperature). With increasing voltage, the laser temperature should decrease and with decreasing voltage it should increase. The response is 0.2C per GHz.

It is recommended to only activate the analog FTF once the laser has been enabled.

Clean Scan with monitoring

This feature requires firmware 8.2.8

The standard sequence for Clean Scan is given in the implementation guide for Clean Scan. This feature allows for monitoring of the clean measurement inputs during the scan and saving it to memory. This e.g. may be useful for integrating the system response fully aligned with the internal offset readings.

To activate this feature, write the measurement interval to register 0xF4 (e.g. 10ms is 1). Writing 0 to this register will disable the feature. Note that this register needs to be set before the module is put into whispermode.

To read the collected date use register 0xF5. In the datafield to the module use byte 1 (bit 15-8) for the sweep ID (the Clean Scan consist of several sweeps) and the 2nd byte (bit 7-0) for the datapoint ID. The response is a 16 bit integer, with the first bit the offset at time of measurement in units of 0.1GHz (so this is truncated and needs to be interpreted) and the last 12 bits the measured data.