Understanding pull mode of FPGA inputs

From 3-3 of MachXO2 datasheet:

\[ V = IR \]

\[ \frac{3.3V}{30\mu A} = 100 \Omega \]

\[ \frac{3.3V}{300\mu A} = 10 \Omega \]

Pull down resistance varies from 10\(\Omega \) to 100\(\Omega \).

Connecting Analog Controller to FPGA (Wrong!)

The FPGA will break if input voltages go higher than 3.7 volts.

\[ V_{IH} = 2 \text{ Volts,} \]
\[ V_{IL} = 0.8 \text{ Volts.} \]

Vin is 2.8 Volts if \( R_{PD} \) is 10K.

Vin is 5.1 Volts if \( R_{PD} \) is 110K.

Analog Controller: Compandor acts as a switch.
Connecting Analog Controller to FPGA (correct)

\[ V_{in} = \frac{32k}{64k} (5.6\text{ V}) = 2.8 \text{ Volts} \]

Connecting Measuring Prior Circuit

\[ V_{in} = \frac{31k}{63k} (5.6) = 2.75 \text{ Volts} \]

Measuring the circuit only decreases the measured voltage by 2%.

Most of the resistors are \(+/- 5\%\) accurate.
Changing Analog Board to 3.3 Volt Operation

- T12 powers the potentiometers and comparators.
- Comparators can use any voltage from 3-16V.

Analog Board

FPGA Board