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Distinguishing between APR and Pullability when specifying a VCXO

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This paper will describe the differences between Absolute Pull Range (APR) and pullability in a VCXO. Oftentimes these two terms are used interchangeably, when in reality they are two separate specifications.

VCXO Pullability, or pull, is the ability to change the output frequency when you change the VCXO control voltage from its center value. Pullability is measured as the frequency difference between the VCXO set at center control voltage and the VCXO set at the extremes of the control voltage. Occasionally people specify pullability from nominal frequency as opposed to from center voltage.

Absolute Pull Range (abbreviated APR), is the worst case pullability. It means that setting the control voltage to the extreme values will allow the VCXO to change the frequency by the APR amount while taking into consideration all instabilities, such as: operating temperature, initial calibration, supply variations, aging, etc.

For VCXO's, APR implies the maximum instability of the reference source (from nominal frequency) that the VCXO will be able to track over all conditions over the life of the device.

Example:
A VCXO specified as having: +/-120ppm Pullability (or pull), +/-15ppm stability over the operating temperature range, +/-5ppm stability versus supply & load variations, +/-10ppm aging for 10 years, and +/-10ppm initial calibration, will have…
+/-80ppm APR guarantee for 10 years over the specified operating temperature range.

APR makes easier for the user to select a VCXO since all instability calculations are included. Let's say a VCXO is needed to build a PLL that needs to track a +/-50ppm reference; all that is needed in this case is a 50ppm APR VCXO.

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