Definition of VCXO

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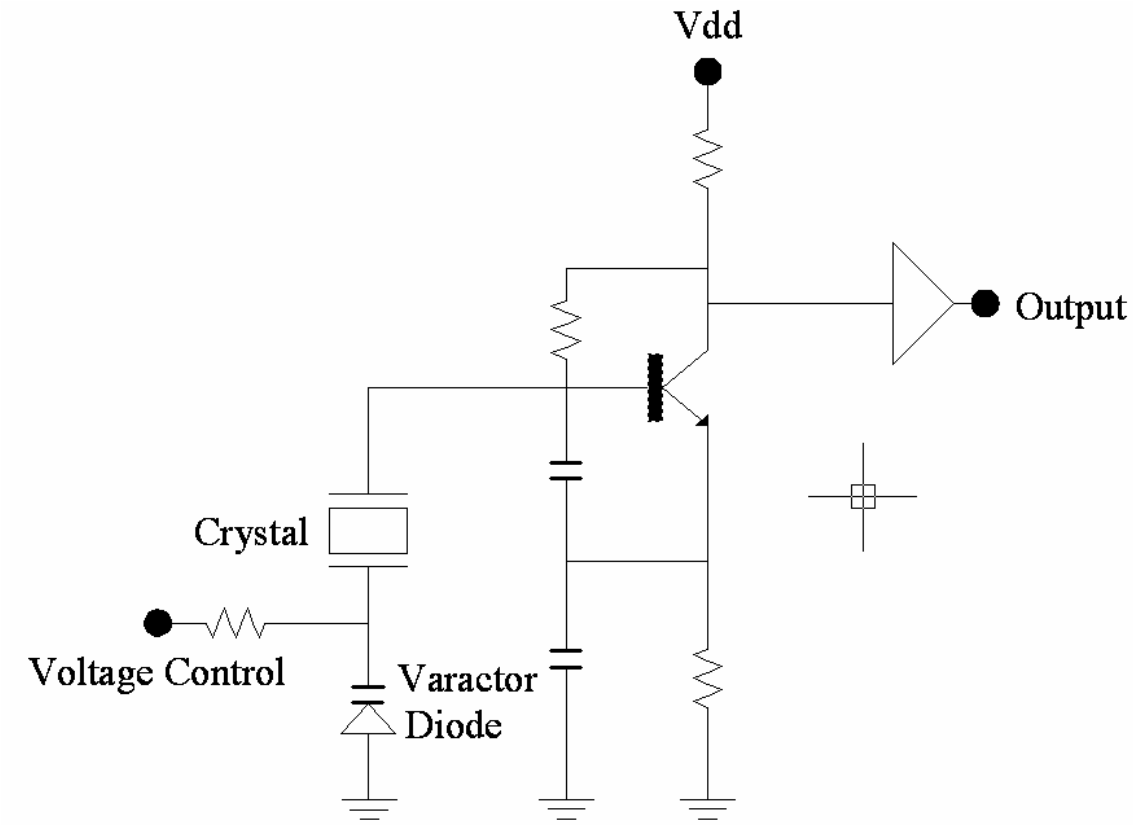
A VCXO is a voltage controlled crystal oscillator. A VCXO has voltage-variable attached in series with the crystal. By varying the control voltage, the capacitance of the varactor changes accordingly. Thus the frequency changed.

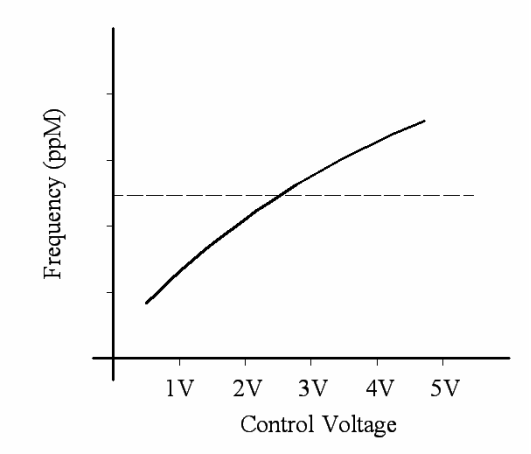


Typical VCXO

2. Peculiar to VCXO

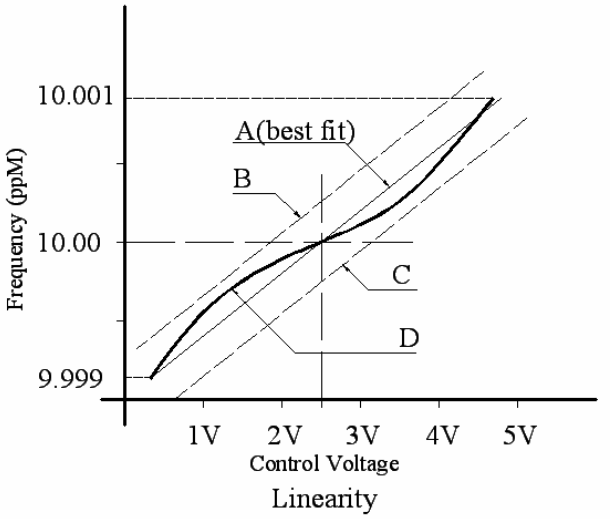
Control Voltage: This is the varying voltage which is applied to the VCXO input terminal causing a change in frequency. It is sometimes referred to as Modulation Voltage, especially if the input is an AC signal.

Deviation: This is the amount of frequency change which results from changes in control voltage. For example. A 5volt control voltage might result in a deviation of 100ppM, or a 0 to +5V control voltage might result in total deviation of 150ppM



Transfer function: (Slope Polarity) Direction of change in frequency vs. change in control voltage. The transfer is said to be positive if the frequency rises when increasing control voltage, as in the figure. The transfer function is negative if the frequency drops when increasing voltage control.

Linearity: The generally accepted definition of linearity is that specified in MIL-0-55310. It is the ratio between frequency error and total deviation, expressed in percent, where frequency error is the maximum frequency excursion from the best straight line drawn through a plot of output frequency vs. control voltage. If the specification for an oscillator requires a linearity of +/- 5% and the actual deviation is 2Khz total as shown in below figure, the curve of output frequency vs. control voltage input could vary +/- 100Hz(2Khz +/- 5%) from the best straight line "A". these limits are shown by lines "B" and "C". "D" represents the typical Curve of a VCXO exhibiting linearity within +/-5%.



Good VCXO design dictates that the voltage to frequency curve be smooth and monotonic.

Modulation rate: This is the rate at which the control voltage can change resulting in a corresponding frequency change. It is measured by applying a sinewave signal with a peak value equal to the specified control voltage, demodulating the VCXO's output signal, and comparing the output level of the demodulated signal at different modulation rates. The modulation rate is defined as the maximum modulation frequency which produces a demodulated signal within 3 dB of that which is present with a 100 Hz modulating signal. The modulation rate of VCXO is restricted by the physical characteristics of the crystal. While the VCXO modulation input network can be broadened to produce a 3 dB response above 100Khz, the demodulated signal may exhibit amplitude variations of 5 ~ 15dB at modulation frequencies greater than 20 Khz due to the crystal.

Stability: a quartz crystal is a high Q device which is the crystal oscillator's stability determining element. It inherently resists being "pulled" from its designed frequency. In order to produce a VCXO with significant deviation, the oscillator circuit must be "de-Q'd." this results in degrading the inherent stability of the crystal in terms of its frequency vs temperature characteristic, its aging characteristic, and its short term stability characteristic. Therefore, it is in the user's best interest not to specify a wider deviation than that absolutely required.

Input Impedance: A measure of isolation between the input port of the VCXO network and the voltage control source. Typical input impedance is > 50 Kohms@10Khz.

For additional Information, Pleas Contact

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