Crystal Oscillators

Crystal oscillators are oscillators where the primary frequency determining element is a quartz crystal. Because of the inherent characteristics of the quartz crystal the crystal oscillator may be held to extreme accuracy of frequency stability. Temperature compensation may be applied to crystal oscillators to improve thermal stability of the crystal oscillator.

The frequency of a crystal-controlled oscillator is held constant to a high degree of accuracy by the use of a quartz crystal. The frequency depends almost entirely on the dimensions of the crystal (essentially its thickness); other circuit values have comparatively negligible effect. However, the power obtainable is limited by the heat the crystal will stand without fracturing. The amount of heating is dependent upon the r.f. crystal current which, in turn, is a function of the amount of feedback required to provide proper excitation. Crystal heating short of the danger point results in frequency drift to an extent depending upon the way the crystal is cut. Excitation should always be adjusted to the minimum necessary for proper operation.

Oscillator: An oscillator is an RF device that generates an output frequency.

Output: The output of the oscillator is a signal with very specific characteristics. The two most common forms are sinusoidal and square wave

Load: Also called fan-out, load is specified as the number of devices the oscillator can support while still maintaining its signal integrity.

Logic: The type of active device family that the output is designed to interface with.
Logic "1": The "high" level which the output must meet to interface properly with the load.
Logic "0": The "low" level which the output must meet to interface properly with the load.

Rise Time: The time it takes to transition from a logic "0" to a logic "1".
Fall Time: The time it takes to transition from a logic "1" to a logic "0".

Symmetry: Also called duty cycle. The ratio of the amount of time the output signal is logic "1" compared to the time it is logic "0".

Enable / Disable: A feature which allows the output of the oscillator to be shut off.

Three-state: A feature similar to enable / disable, however, when the output is shut off the device behaves like a high impedance.

Voltage Control: A feature where an input voltage is used to adjust the output frequency of the oscillator.

Output Waveform:	CMOS:

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