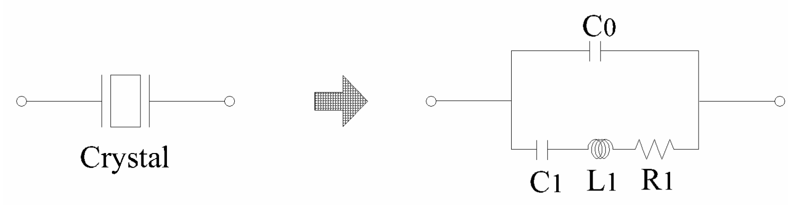
Electrical Characteristics.[Based on IEC 61178-1]



Equivalent constant

C1: Motional Capacitance
L1: Motional Inductance
R1: Motional resistance
Co: shunt Capacitance.

The oscillator designer treats the crystal unit as a circuit component and just deals with the crystal unit's equivalent circuit. Shown above is a simple equivalent circuit of a single-mode quartz resonator. A resonator is a mechanically vibrating system that is linked via the piezoelectric effect, to the electrical world. Below is the explanation of Parameters.

Motional resistance *R1*:
This is a resistance in the series arm of the equivalent circuit when the conductance becomes maximize in an admittance diagram. This is a loss resistance when the crystal unit is vibrating and, the smaller this value, the better the crystal unit.

Motional Inductance *L1:*
If the value is larger, Q becomes higher and the oscillation stability increases.

Motional capacitance *C1*:
The larger this value, the greater frequency variation for a change of load capacitance. Therefore C1 must be kept as small as possible for high stability oscillators. VCXO must have a somewhat larger C1 to allow a large frequency shift. Changing these value to control C1 will cause such problems as Discontinuous Frequency Temperature characteristics. Generally in case of a smaller crystal unit, C1 becomes small and inversely proportional to *L1.*

Shunt capacitance *Co:*
This is the capacitance between electrode films and is determined in accordance with the thickness and the area of electrodes.

Series resonance frequency *fs:*
Frequency calculated from the equivalent constant, L1,C1.

$$fs = \frac{1}{2\pi\sqrt{L1 \bullet C1}}$$

Parallel resonance frequency *fp:*

Frequency calculated from the equivalent constant, $fp = \frac{1}{2\pi\sqrt{L1\frac{Co \times C1}{Co + C1}}}$ L1,C1,Co.

For additional Information, Pleas Contact

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