Crystal Glossary

**Aging**: A change in the frequency and/or the resistance of a quartz crystal unit with the passage of time. Aging does not include effect of changing environments.

**Blank**: A quartz resonator plate. Also known as wafer, plate or resonator.

**C0**: The abbreviation for Shunt Capacitance.

**C1**: The abbreviation for Motional Capacitance. Motional capacitance is also abbreviated as Cm.

**C.I.**: The abbreviation for Crystal Impedance sometimes used in place of the word resistance.

**Crystal**: A generic term for “piezoelectric quartz crystal”.

**Deviation**: The amount by which a frequency differs from the nominal or a specified frequency.

**Drive Level**: The amount of power dissipated by the oscillating crystal unit. Usually expressed in terms of microwatt (uW).

**ESR**: The abbreviation for “Equivalent Series Resistance.” As a crystal unit has a resistive element, this term is required in order to define and quantify that characteristic.

**Fundamental**: The lowest frequency at which a resonator plate will oscillate. The physical dimensions of the plate determine this frequency.

**Load Capacitance**: The value of capacitance used in conjunction with the crystal unit. Load capacitance is a parameter specified by the customer, typically expressed in pF.

**Operating Temperature Range**: Temperature range over which the crystal’s characteristics are guaranteed.

**Overtone**: An odd numbered multiple of the fundamental frequency.

**PPM**: The abbreviation for Parts Per Million, a method of calculation used to specify the permissible frequency deviation of a crystal or oscillator. May also be seen as ppm.

**Pullability**: The change in frequency of a crystal unit, either from the natural resonant frequency (Fr) to a load resonant frequency (FL), or from one load resonant frequency to another. The frequency can be pulled in a parallel resonant circuit by changing the value of load capacitance. A decrease in load capacitance causes an increase in frequency, and an increase in load capacitance causes a decrease in frequency.

**Shunt Capacitance**: A parameter associated with a quartz crystal unit, used to identify the capacitance resulting from the presence of the electrodes plus stray capacitance associated with the holder.
**Stability:** The allowable deviation, in parts per million (ppm), over a specified temperature range. Deviation is referenced to the measured frequency at +25°C.

**STD Calibration Tolerance:** The allowable deviation from nominal, in parts per million (ppm), at a specific temperature, usually +25°C.

**Tape and Reel:** Refers to the packaging method used to accommodate automated pick & place equipment.

**Trim Sensitivity:** The derivative of the load frequency with respect to load capacitance.

\[ TS = 500,000 \times \frac{C_1}{(C_0 + CL)^2} \]

Where \( C_1 \)= motional capacitance, \( C_0 \)= shunt capacitance, \( CL \)= load capacitance