



INFICON EDC Inc. *Quality Quartz Crystals and Oscillators*

## **CRYSTAL EQUATIONS -**

$$\text{Total Circuit Capacitance} = C_t = C_0 + C_1$$

$$\text{Series Resonant Frequency} = F_s = \frac{1}{2\pi \times \sqrt{C_1 \times L_1}}$$

$$\text{Anti Resonant Frequency} = F_a = \frac{1}{2\pi \times L_1 \times \sqrt{\frac{C_0 \times C_1}{C_0 + C_1}}}$$

$$\text{Load Resonant Frequency} = F_l = \frac{1}{2\pi \times L_1 \times \sqrt{\frac{C_t \times C_1}{C_t + C_1}}}$$

$$\text{Motional Capacitance} = C_1 = \frac{2 \times C_t \times \Delta F}{F_s}$$

$$\text{Motional Inductance} = L_1 = \frac{1}{4\pi^2 \times F_s^2 \times C_1}$$

$$\text{Change in Frequency} = \frac{\Delta F}{F} = \frac{F_s \times C_1}{2 \times C_t}$$

$$\text{Series Resonant Resistance} = R_1 = \frac{2\pi \times F_s \times L_1}{Q}$$

$$\text{Load Resonant Resistance} = R_l = R_1 \times \left(1 + \frac{C_0}{C_1}\right)^2$$

$$\text{Quality Factor} = Q = \frac{2\pi \times F_s \times L_1}{R_1}$$

$$\text{Trim Sensitivity} = TS = \frac{C_1 \times 1,000,000}{2 \times C_t^2}$$

$$\text{Load Capacitance} = C_l = \frac{C_1 \times C_2}{C_1 + C_2} + C_{stray}$$

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