

What is CL value of crystal? What is its influence on?

All quartz crystal resonators have a series resonant frequency (f_s , frequency of lowest impedance). At this frequency, the crystal appears resistive in the circuit. Crystals can be "pulled" from this series frequency by adding reactance (capacitance) in series with the crystal. When operated in combination with an external load capacitance (CL) the crystal oscillates in a frequency range slightly above its series resonant frequency. This is the parallel (load resonant) frequency.

When ordering a parallel crystal, always specify the nominal parallel resonant frequency and the amount of load capacitance in picoFarads (pF). For example, a standard value of CL (such as 15pF) can be ordered; the capacitor values are then calculated to match the crystal CL.

The load frequency is dependent on the CL value, and its formula is showed below.

$$FL = FS \cdot \left(\frac{C_1}{2(C_0 + C_L)} + 1 \right)$$

If the output crystal frequency is higher than targeted frequency, you should increase the external capacitance, CL (or the values of Cd & Cg), to lower the frequency to your targeted frequency. Another method is that adopt a crystal with lower capacitance if the frequency is higher than the center frequency.