

ABSTRACT OF CRYSTAL OSCILLATORS

Because of excellent stability, the crystal oscillators are widely applied in the fields of communications, measurement, clock, control devices and so on where frequency output with high accuracy is required. With the requirement of frequency stability becoming stricter, it is better to choose purchase of oscillators than the crystal units on many occasions, for frequency output with high stability can be easily acquired with power voltage supplied only to the oscillator. Here we would like to mention that crystal oscillator refers to the combined unit of crystal units and the amplifier with feedback circuit.

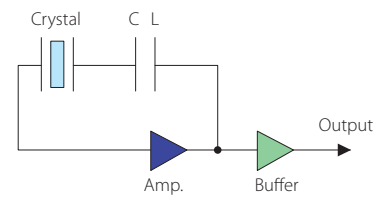
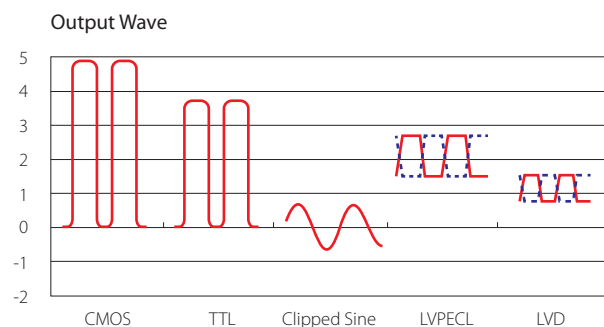


Fig7. OSC current drawing for experimentation

The Main Types of Crystal Oscillator

1. General Crystal Oscillator

Basically this type of oscillator is composed of the crystal unit and feedback amplifier that operates the crystal unit. There are different output waves corresponding to different applications.



2. Voltage-Controlled Crystal Oscillator=VCXO

VCXO is the oscillator with the function of adjustable control of output frequency added to the General Crystal Oscillator by use of external control voltage.

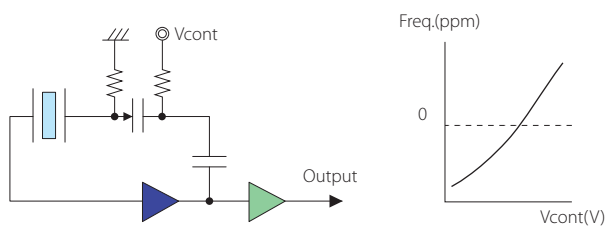


Fig8. VCOX drawing for experimentation

3. Temperature-Compensated Crystal Oscillators, TCXO, VC-TCXO

The biggest factor that affects the frequency stability is the temperature characteristics. With the help of temperature-compensated circuit, this type of oscillator realizes higher stabilization of temperature characteristics than the crystal unit. Because the specified temperature-compensated voltage is applied, TCXO can output much more stable frequency against the ambient temperature. It is mainly applied for the standard oscillator used for frequency synthesizer of mobile communications device. PDC (Personal Digital Cellular), GSM (Global System for Mobile Communication), GPS (Global Positioning System) and so on require frequency with high temperature stability of $\pm 2.5\text{ppm}$ Maximum. Such requirement cannot be satisfied with the AT cut crystal unit only. Moreover, there is subtle difference with different crystal units in temperature characteristics. So, there is need to make compensation with the temperature compensation circuit in order to acquire frequency of high temperature stability.

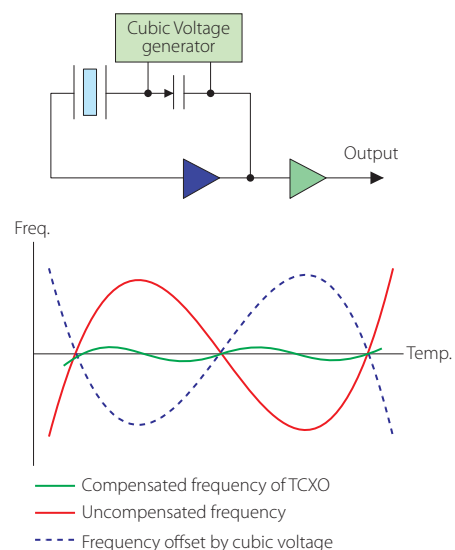


Fig9. TCXO drawing for experimentation