

How to use a Third Overtone Crystal with a 80C51 Family Microcontroller

Description

For cost reason using an overtone crystal is 5 to 6 times cheaper than a fundamental one. Using this type of crystal is slightly different comparing to a fundamental one. The frequency of an overtone crystal is adjusted on the fundamental one and this one must be trapped by a LC pass-band filter. The typical schematic is shown below.

CP1 and CP2 are the parasitic capacitors due to the packaging and the PCB lay-out. L1 and C1 is the

pass-band filter used to trap the fundamental frequency. C2 is a small capacitor to increase a little bit the open-loop gain given by:

$$A \times B = A \times \frac{CP2 + C2}{CP1}$$

where A is the gain at the operating frequency and B is the gain of the feed-back. The frequency of the filter is given below:

$$f_T = \frac{F_Q}{3} = \frac{36.864}{3} = 12.288 \text{ MHz}$$

$$L_1 = \frac{1}{(2 \times \pi \times f_T)^2 \times C3}$$

Where C3 = 33 pF

$$L_1 = \frac{1}{(2 \times \pi \times 12.288 \times 10^6)^2 \times (39 \times 10^{-12})} = 4.3 \mu H$$

The standard one is 4.7μH and not critical because the bandwidth is large enough. C2 is chosen to be equal to

10pf (a larger value break-down the amplifier and the open loop gain).

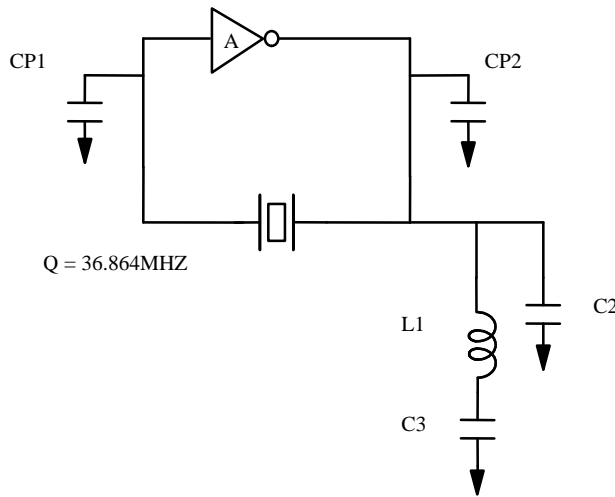


Figure 1. Typical application with a third overtone crystal