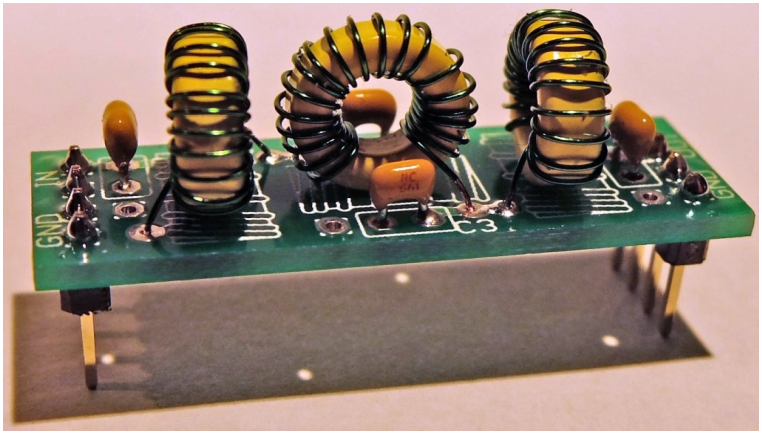
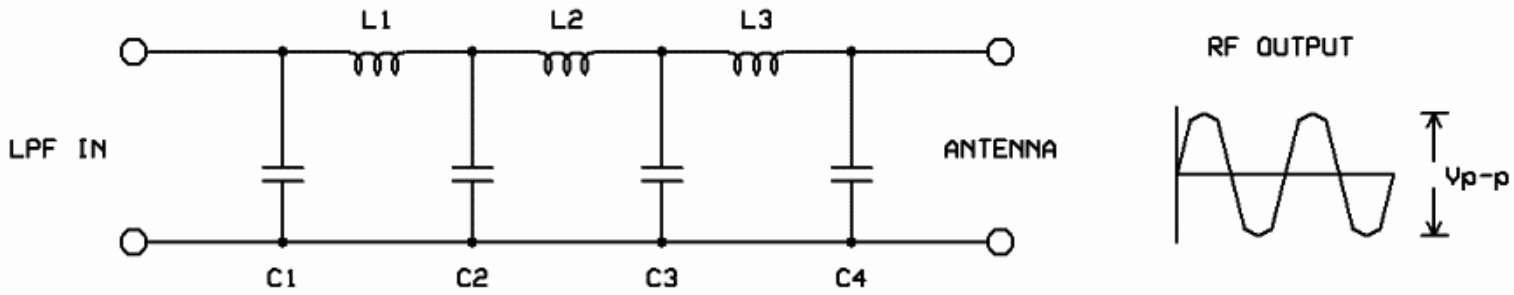
Low Pass Filter Kit



1. Introduction

A low pass filter (LPF) is required following the power amplifier of a transmitter to attenuate unwanted emissions on harmonic frequencies. This 7-element Low Pass Filter kit is based on the G-QRP technical notes, a design by Ed Wetherhold W3NQN.

2. Design



The design uses four capacitors and three inductors wound on micrometals toroids and has 50-ohm input and output impedance. The small PCB has a 4-pin plug at its input and output. It is designed to fit onto the “Ultimate2” multi-mode QRSS/WSPR transmitter kit, but may of course be used as a LPF for other QRP transmitter designs.

Note that the kit is supplied with high-quality low-loss RF ceramic capacitors of the C0G type (NP0, meaning near-zero temperature drift).

3. Parts List

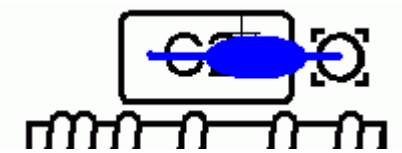
Please refer to the parts list below, for your band. Capacitor values are in picofarads (pf) and the inductors L1-3 specify the number of turns to wind on the toroid.

Band	C1	C2	C3	C4	L1	L2	L3	Toroid
160m	820	2200	2200	820	30	34	30	T50-2 (red)
80m	470	1200	1200	470	25	27	25	T37-2 (red)
60m	680	1200	1200	680	23	24	23	T37-2 (red)
40m	270	680	680	270	21	24	21	T37-6 (yellow)
30m	270	560	560	270	19	20	19	T37-6 (yellow)
20m	180	390	390	180	16	17	16	T37-6 (yellow)
17m	100	270	270	100	13	15	13	T37-6 (yellow)
15m	82	220	220	82	12	14	12	T37-6 (yellow)
12m	100	220	220	100	12	13	12	T37-6 (yellow)
10m	56	150	150	56	10	11	10	T37-6 (yellow)

Most of the supplied capacitors are a yellow colour having 2.5mm spaced wires, and are supplied on paper tape. Since the writing on the capacitor is difficult to read without a loupe or magnifying glass, I have written the value on one of the capacitor pairs, for easy identification.

On 17m, the C1 and C4 capacitors should be 110pF according to the G-QRP web page, however I could not source a 110pF capacitor, so 100pF is used and should be a reasonable substitute.

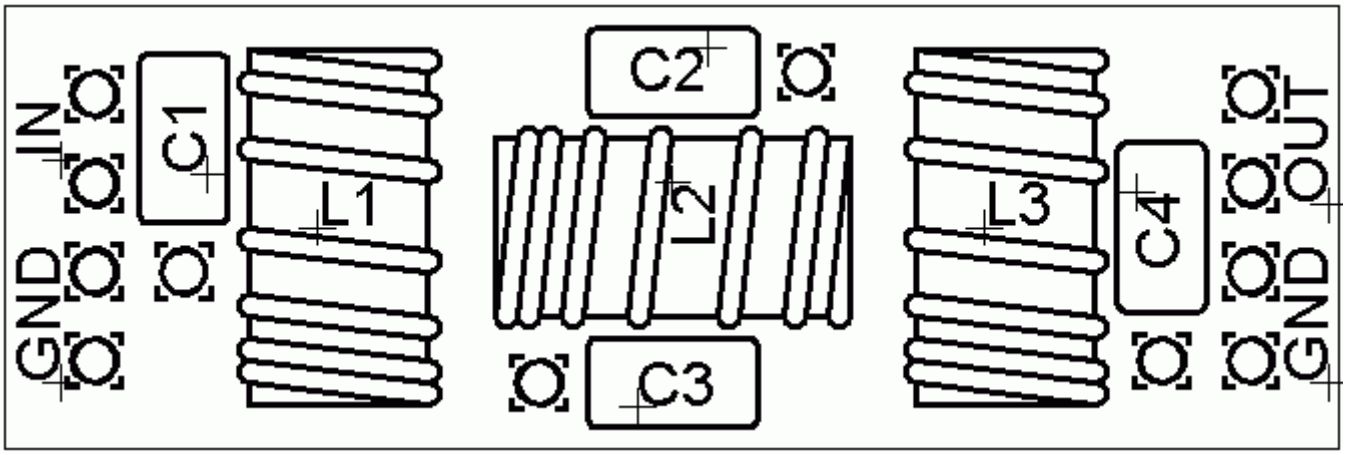
In the case of the 80m kit, the 1200pF capacitor is the blue-coloured capacitor not supplied on paper tape.



In the case of the 160m kit, both capacitor values are the blue-coloured type. The 820pF capacitor is the one with 2.5mm wire-spacing, and the 2200pF capacitor has 5mm wire-spacing. Since the 2200pF capacitor has 5mm (0.2-inch) wire-spacing, you can mount it as shown in the picture to the right here, using the spare hole next to the rectangular capacitor legend on the PCB (shown here for C2). This hole is connected to the right-hand usual capacitor hole and is provided precisely for this situation i.e. when you have a 5mm-spaced capacitor.

4. Construction

Parts placement is defined by the printed legend on the PCB. Please refer to the parts placement diagram below.



The PCB is quite small and the parts are close together. You are recommended to use a low wattage iron with a fine tip, and fine solder e.g. 1mm diameter or less. Take care not to overheat the PCB and risk damaging it. A well-lit area and magnifying glass can assist. Be careful not to bridge solder across closely-packed connections. I recommend checking with a DVM to make sure no solder bridges have been inadvertently created. Take care to ensure correct alignment of the 4-pin plugs.

Winding the toroids is quite straightforward, and the supplied wire should be enough for all three toroids, just divide it into three pieces. Remember that each time the wire goes through the centre of the toroid counts as one turn. Labelling the toroids aids identification later! Trim the ends of the wire, scrape the enamel off and tin them with solder. As an alternative to scraping the enamel off, the wire ends may be held in a hot blob of solder on the iron tip for a few seconds, and the enamel will bubble away. Check continuity on the board with a DVM.

5. Resources

Please see the kit page http://www.hanssummers.com/lpfkit for any information on latest updates and issues.

The G-QRP club LPF design: http://www.gqrp.com/technical2.htm

Please join the Yahoo group http://groups.yahoo.com/group/qrplabs/ to for new kit announcements and to discuss any problems with the kit, enhancements you've made, or just to tell everyone how much fun you're having.