

[The Coil that Exceeds Q Value 2000](#)

About 8 years ago, I saw an article in a Forums said one can made a coil to achieve Q value 1800. At that time I start to dream of doing a Q 2000 coil.

Last year, A Chinese radio amateur Mr. Han Hong did a lot of experiments, he uses Litz wire and many R40C1 ferrite toroids to made the coils, the best one reached Q value 1994 (see hhy99's article in Chinese Forums [http://www.crystalradio.cn/forum.php?mo ... orid=68736](http://www.crystalradio.cn/forum.php?mo...orid=68736))

About the R40C1 ferrite toroids, please read the information here: [viewtopic.php?f=2&t=5586&hilit=R40C1](http://www.crystalradio.cn/forum.php?f=2&t=5586&hilit=R40C1)



(Mr. Han's DIY digital Q meter is made with a Q meter circuit board kit that design by Mr. Xu Jianwei (xjw01). Compare to a HP-4342A Q meter, the measurement results are very close. This is another masterpiece of Mr. Han.)

I am very interested in Mr. Han's experiment. He was very enthusiastic to make a complete set of polytetrafluoroethylene experimental parts and mail to me. These parts are including PTFE long screws, gasket for ferrite toroids and coil tubes.



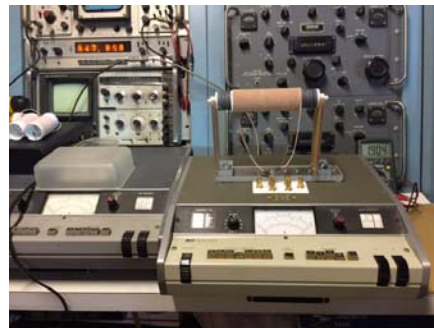
The coil tube's shape is not ideal, looks not a good circle. I have a box of 1 mm thickness of the PTFE sheet. So I went to hardware store to find a suitable metal pipe (1-1 / 2 " diameter, 6" length) and some adjustable fastening rings. I furl around the PTFE sheet on metal pipe, use adjustable fastening rings to tighten up and set 100 degrees Celsius bake for 10 minutes in the oven.



After cooling down, wrap the Scotch tape on the tube, a nice PTFE tube is ready for make the coil.



I use 26 pcs of 37 X 23 X 7 mm R40C1 ferrite toroids to form a 7-1/2" ferrite rod. Between each ferrite toroid there is a 0.3 mm PTFE gasket (without these gasket, inductance of the coil will increase but the Q value decreases a lot (about 300Q), the Q value also will change when relax or tighten the nut at both ends.)



According to Mr. Han's experience, the highest unloaded Q value is a coil that used two 660 / 0.04mm Litz wire in parallel, the Q value reached 1994.

I test a variety of coils. The best one also is two 660 / #46 Litz wire in parallel. One wire is single nylon insulated (pink color), other wire is double layers nylon insulated (brown color). The reason to use a double layers nylon insulated is hoping to slightly increases the distance between conductors and reduce the distributed capacitance. The coil is 46 turns (two wire in parallel). Its diameter is 1.7", length 6.0", inductance 95uH.

Before I measure the Q value, the coil and ferrite toroid / ferrite rod were exposure to strong sunlight for several hours, warm up the HP-4342A Q meter for few hours, short my long wire antenna to ground, adjust the position of Q meter away from metal objects, the coil is adjust the position to see best Q, at least 6" above Q meter, and all test frequency must be few KHz off the AM radio broadcasting frequency.

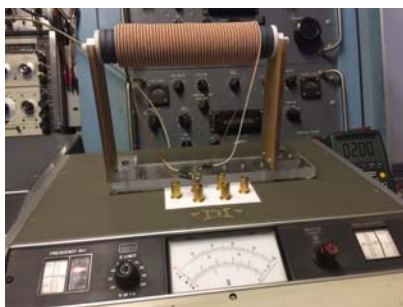
771KHz – 1925mV (=2022Q), 470
 795KHz – 1929mV (=2026Q), 422
 845KHz – 1925mV (=2022Q), 370
 895KHz – 1909mV (=2005Q), 326
 995KHz – 1869mV (=1963Q), 259
 1095KHz - 1807mV (=1898Q), 208
 1195KHz - 1747mV (=1835Q), 170
 1295KHz - 1684mV (=1769Q), 140
 1395KHz - 1609mV (=1690Q), 119
 1495KHz - 1551mV (=1629Q), 99
 1595KHz - 1487mV (=1562Q), 84
 1695KHz - 1423mV (=1495Q), 71

My HP-4342A Q meter is not calibrated. The digital voltmeter shows 952mV when the analog meter indicates 1000Q, I don't know which readings is accurate. If I assume the analog meter is right, then the digital voltmeter shows 1904mV, Q value of the test coil should be reach 2000Q.

The above 46 turns coil, its lowest resonance frequency is 771KHz (when Q meter set on 470pf). The test result on digital voltmeter are:

(note: The right column is the "C" reading on L/C window of the HP Q meter)

771KHz – 1925mV (=2022Q), 470
 795KHz – 1929mV (=2026Q), 422
 845KHz – 1925mV (=2022Q), 370
 895KHz – 1909mV (=2005Q), 326
 995KHz – 1869mV (=1963Q), 259
 1095KHz - 1807mV (=1898Q), 208
 1195KHz - 1747mV (=1835Q), 170
 1295KHz - 1684mV (=1769Q), 140
 1395KHz - 1609mV (=1690Q), 119
 1495KHz - 1551mV (=1629Q), 99
 1595KHz - 1487mV (=1562Q), 84
 1695KHz - 1423mV (=1495Q). 71



I had three times test on 795KHz and got 2.00V reading (=2101Q). Even 2000mV equal to 2000Q, can I say this coil is reach my 2000Q dream?



We all know the Q measurement is very unstable, every time the test results are different. Whether my test really reach 2000Q, after all, the Q value of this coil has reached a new level.

I have been test some other type of coils, will continue to report their result...