High Power HF Filter Design

With Applications to SO2R

Jeff Crawford 2023

1 Chapter 1

Section 1.6

The large *multi-multi stations* are keenly aware of RF flooding and go to great lengths to mitigate it. One well-known cause of this problem is the standard *wall wart* that powers so many of our electronics. These devices can emanate huge amounts of up-converted noise; some are worse than others. Devices in the home that are powered on all the time are the items to consider first: refrigerator, garage door openers, furnace and controls, intercoms, doorbells, remote control ceiling fans, etc. The reader can see that the list of items can be extensive. Some of the mitigations implemented at the KØZR QTH include:

2 Chapter 2

3 Chapter 3

The bottom half of the '% Trans' column had a number of erroneous entries. The minus signs in the 'Loss, dB' column are also removed since this is implied by the use of the word 'Loss'.

SWR	Γ	% Pwr Refl	RL, dB	% Trans	Loss, dB
1.01	0.005	0.0025	-46.06	100	0
1.10	0.0476	0.227	-26.44	99.77	0.010
1.2	0.0909	0.826	-20.83	99.17	0.036
1.3	0.1304	1.701	-17.69	98.3	0.075
1.4	0.1667	2.778	-15.56	97.22	0.122
1.5	0.2000	4.00	-13.98	96.0	0.177
1.6	0.2308	5.325	-12.74	94.67	0.238
1.7	0.2593	6.722	-11.73	93.28	0.302
1.8	0.2857	8.163	-10.88	91.84	0.37
1.9	0.3103	9.631	-10.16	90.37	0.440
2.0	0.333	11.111	-9.54	88.89	0.512
2.5	0.4286	18.363	-7.36	81.62	0.881
3.0	0.500	25.000	-6.02	75.0	1.249
3.5	0.5556	30.864	-5.11	69.14	1.603

Table 3.6: SWR and Associated Terms

4 Chapter 4

In Region 1 the formula for V_{pk} should specify VAR rather than KVAR.

Region	**Formula**
1	$\mathrm{V}_{pk} = \sqrt{\frac{318\times\mathrm{VAR}}{f\times C}}$
2	VAR = Rated reactive power
3	$I_{\mathrm{rms}} = \sqrt{\frac{\mathrm{VAR}\times f\times C}{159}}$

Table 4.4: Boundary Conditions by Region for Figure 4-15

5 Chapter 5

6 Chapter 6

7 Appendix E

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Figure E.7 stands out prominently compared to the other examples provided. Looking at the associated schematic in Table E.1 (d), a series C configuration, provides insight into the noted behavior. All the examples in Table E.1 were simulated at 1 MHz as noted earlier. If the frequency were increased to 10 MHz, the series C and its J-inverter form are more similar over a wider frequency range. The reason for this is that a series C and a shunt L both present increasingly small and large impedances, respectively, as zero frequency is approached. Inductance is linear with frequency, while the capacitance is inversely proportional with frequency, thus the irregular impedance behavior.

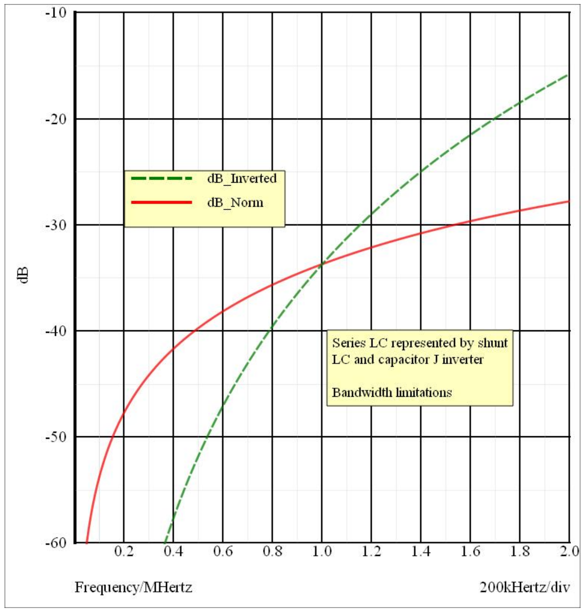

Figure E.8: Series LC Comparison

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There were no errors in the original Figure E.8 except in the descriptive 'bangbox' where 'inductor' was used rather than 'capacitor'. The figure is rescaled as shown here to better illustrate the differences between the two circuits.

Bottom of page 229.
Several of the equation designators were incorrect.

Two derivation methods for the design equations have been presented. The first championed comparing the ABCD cascade of inverter-element-inverter to the standalone element, L or C; see equations (E.6) and (E.7). The second approach capitalized on the impedance transforming properties of the pair of inverters, equation (E.12), and the admittance of a J-inverter of capacitors or inductors, equations (E.16) or (E.17). The same design relationships materialize after some algebra.

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