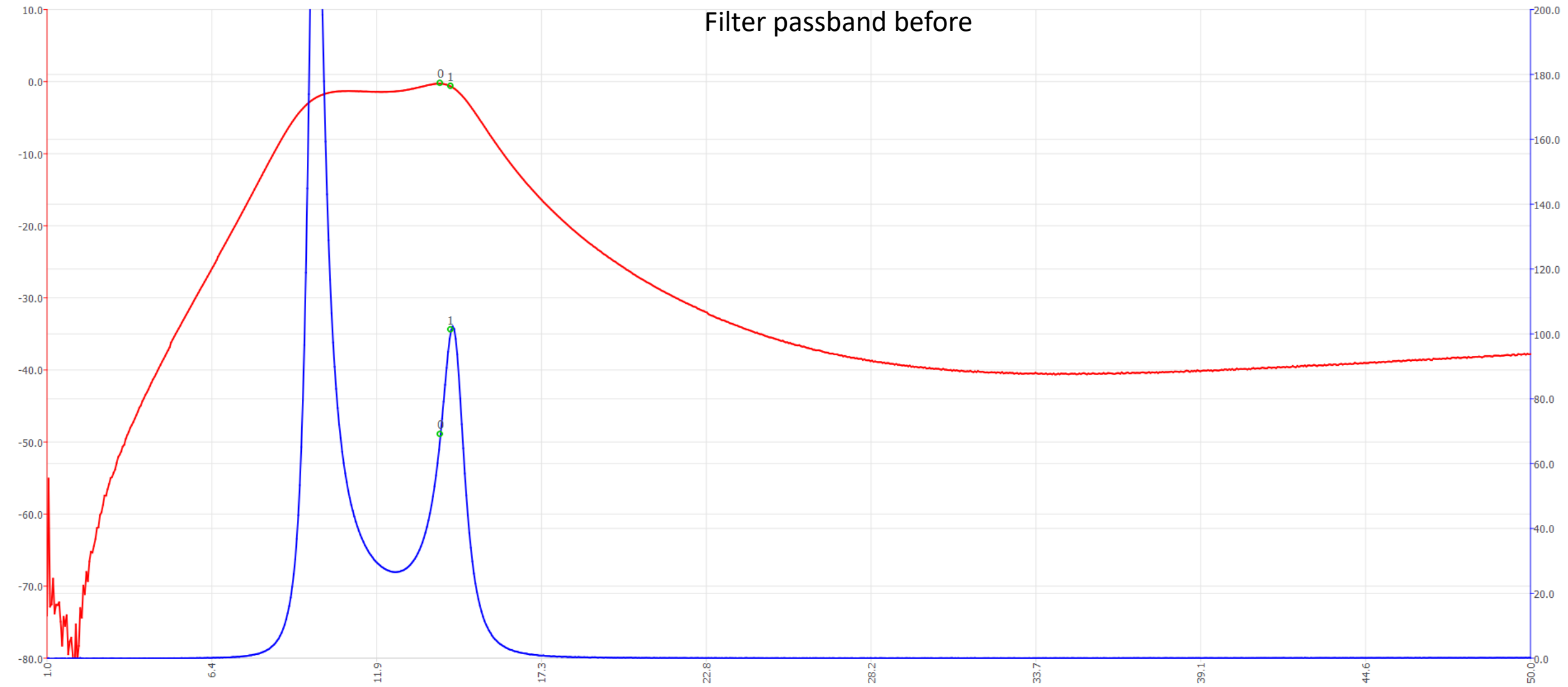


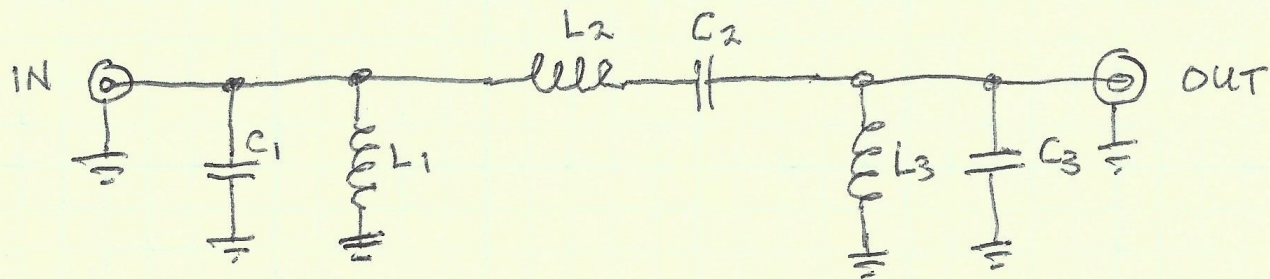
Using a NANO VNA to measure HF filter properties

Ev Paschal, KF7VX

Filter passband before



x	1	14.35 MHz	-0.7 dB	101.2 Ω	<input type="range"/>
+	0	14.00 MHz	-0.3 dB	68.9 Ω	<input type="range"/>



$$C_1 = C_3 = 500 \text{ pF}$$

$$C_2 = 50 \text{ pF}$$

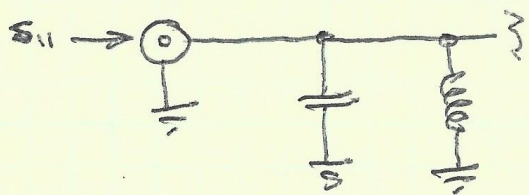
$$L_1 = L_3 = 8 \text{ TURNS ON T-80-6 CORE}$$

$$L_2 = 25 \text{ TURNS ON T-80-6 CORE}$$

ALL L-C PAIRS RESONANT AT 13.56 MHz

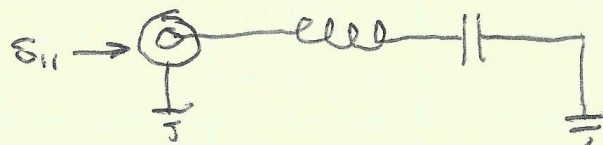
$$f = \frac{1}{2\pi\sqrt{LC}} \rightarrow L = \frac{1}{(2\pi f)^2 C} \quad \text{SO } L_1 = L_3 = 276 \text{ nH}, \quad L_2 = 2.76 \mu\text{H}$$

MEASURING RESONANT FREQUENCIES:



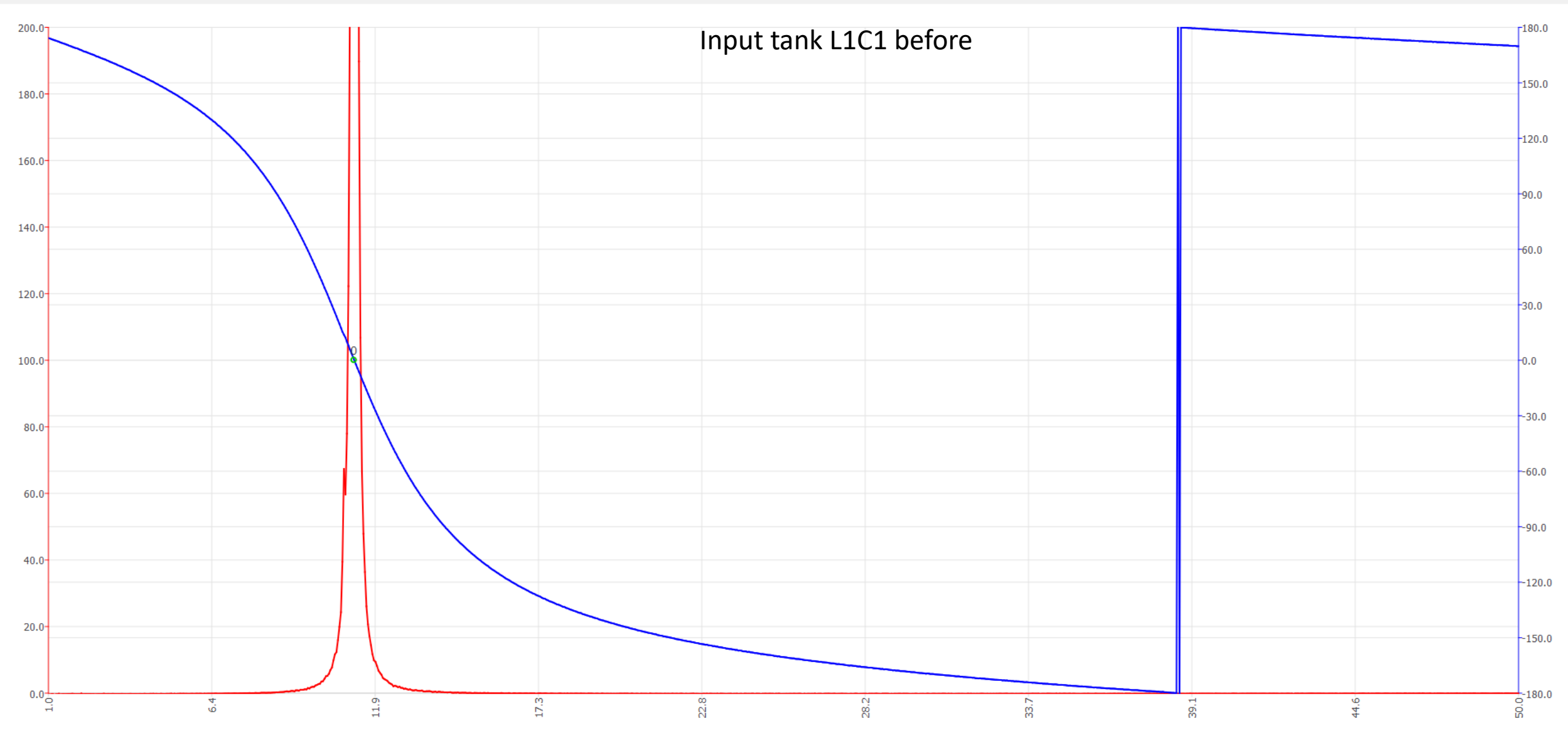
FOR $L_1 C_1, L_3 C_3$

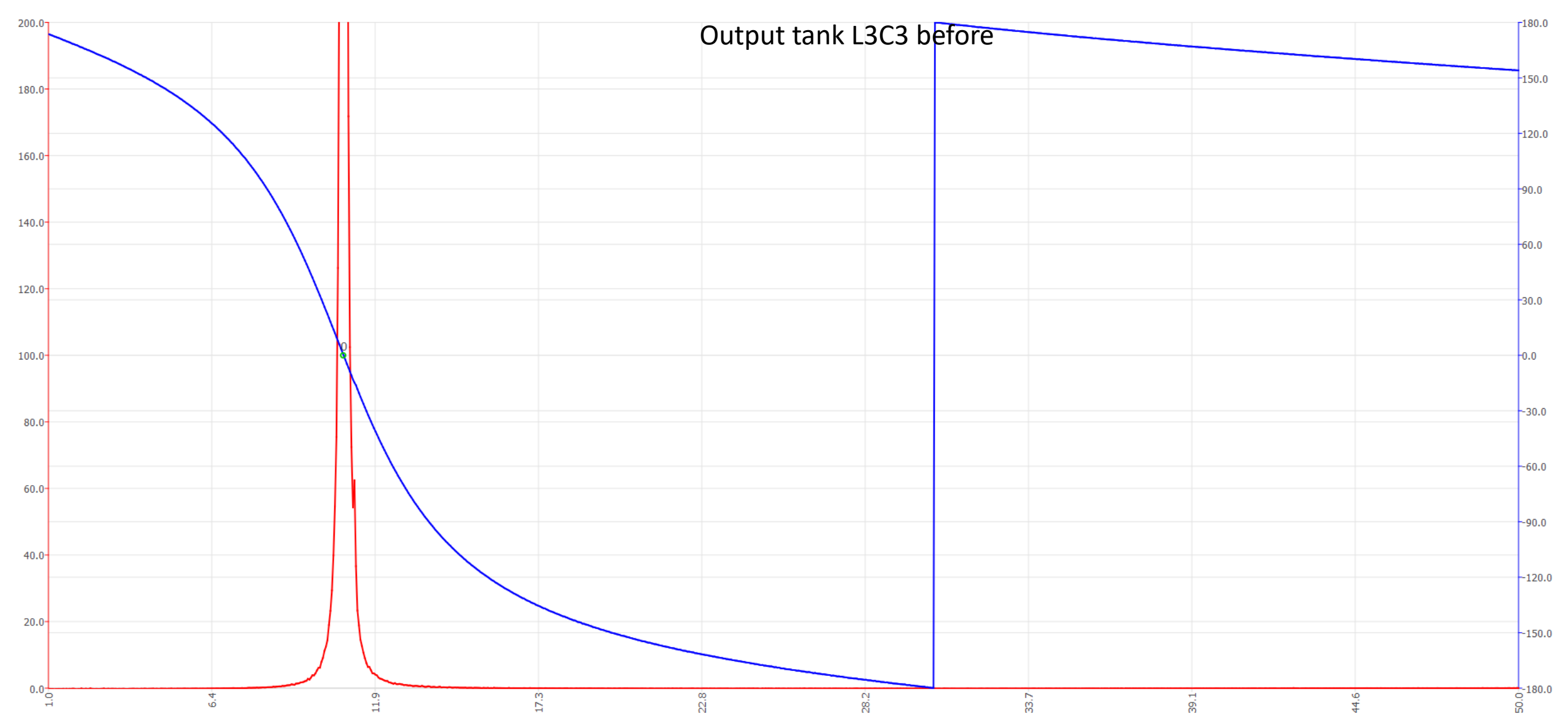
MEASURE $\text{Re}(Z_{11})$, PHASE ANGLE

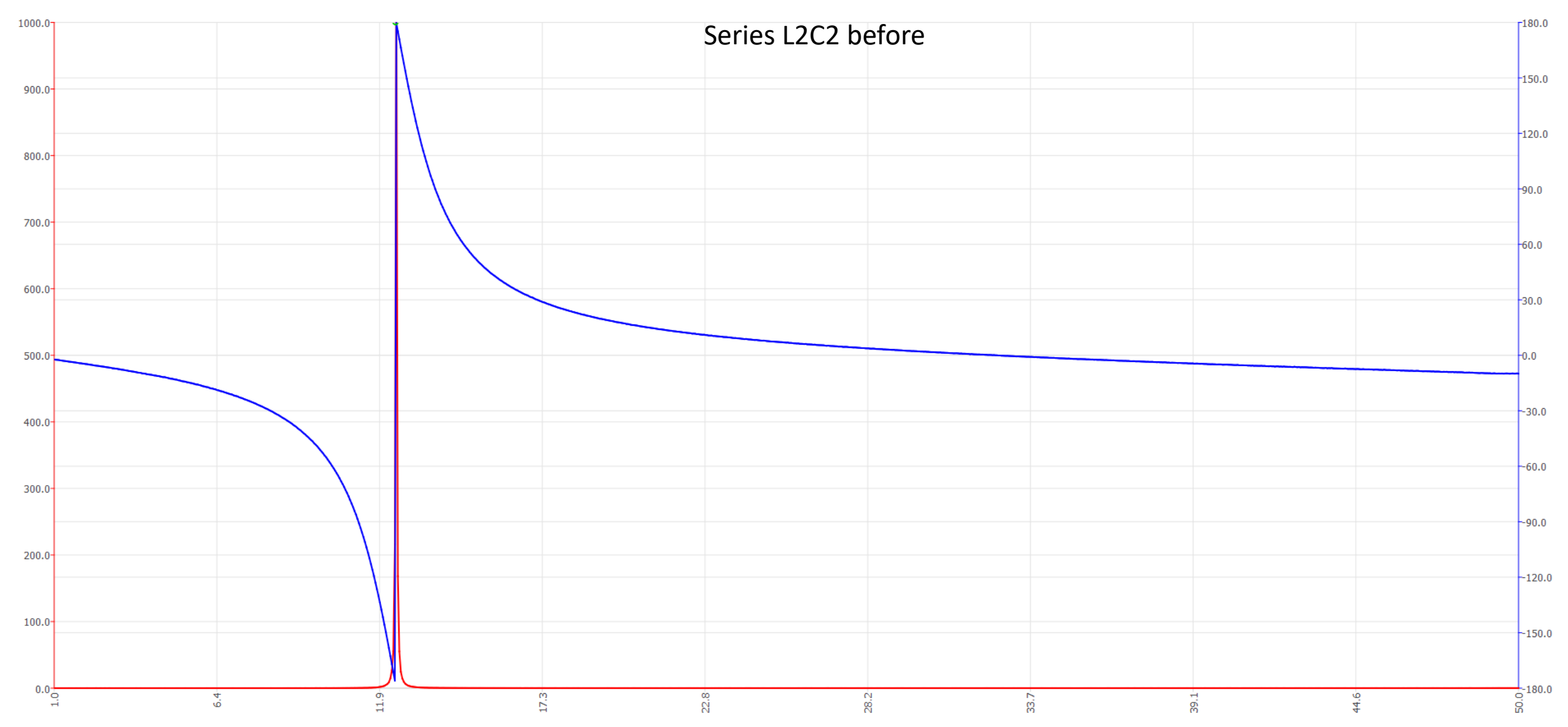


FOR $L_2 C_2$

MEASURE $\text{Re}(Y_{11})$, PHASE ANGLE







MEASURED RESONANT FREQUENCIES

$$L_1 C_1 = 11.20 \text{ MHz} \rightarrow L_1 = 0.404 \mu\text{H}$$

$$L_2 C_2 = 12.45 \text{ MHz} \rightarrow L_2 = 3.27 \mu\text{H}$$

$$L_3 C_3 = 10.85 \text{ MHz} \rightarrow L_3 = 0.430 \mu\text{H}$$

CHANGE INDUCTOR L_1 8T TO 7T

L_2 25T TO 23T

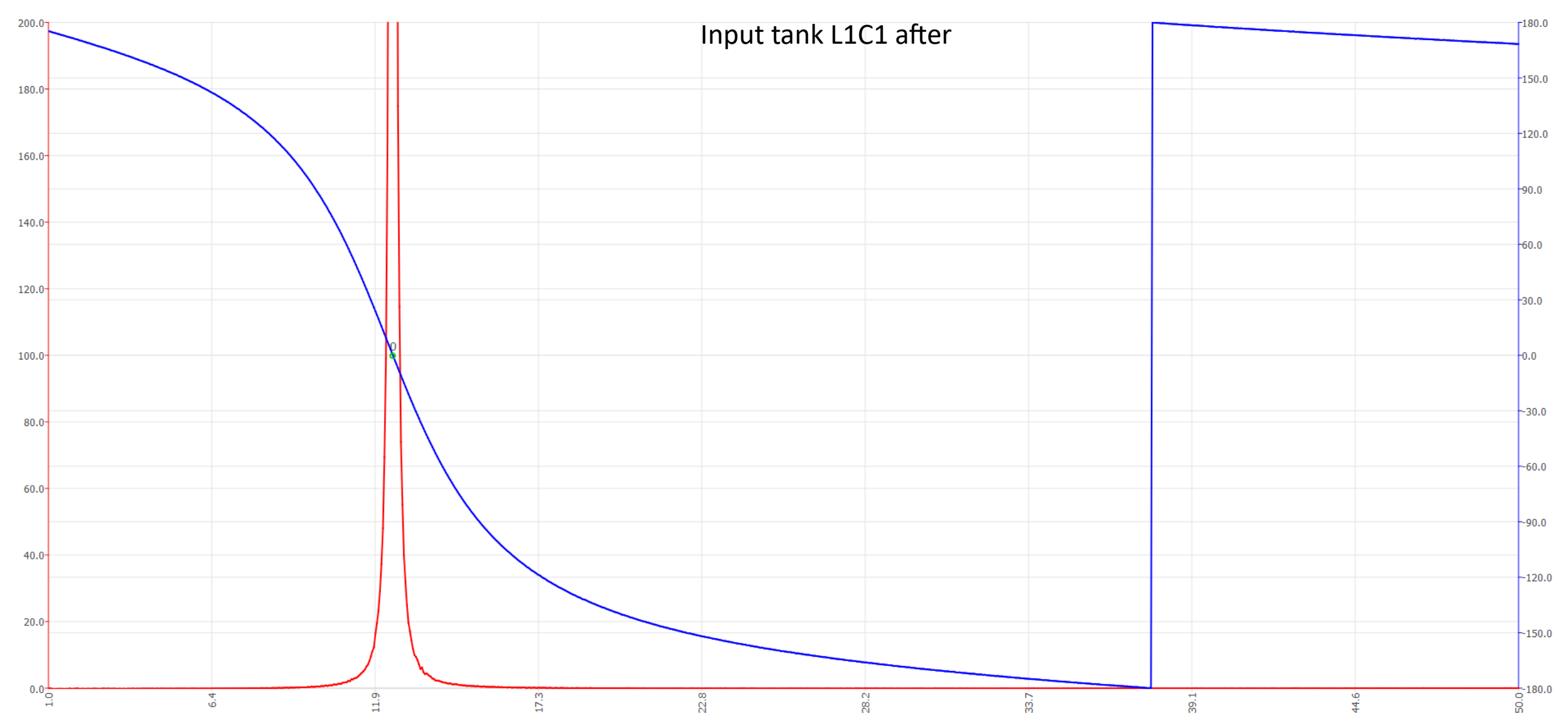
L_3 8T TO 6T

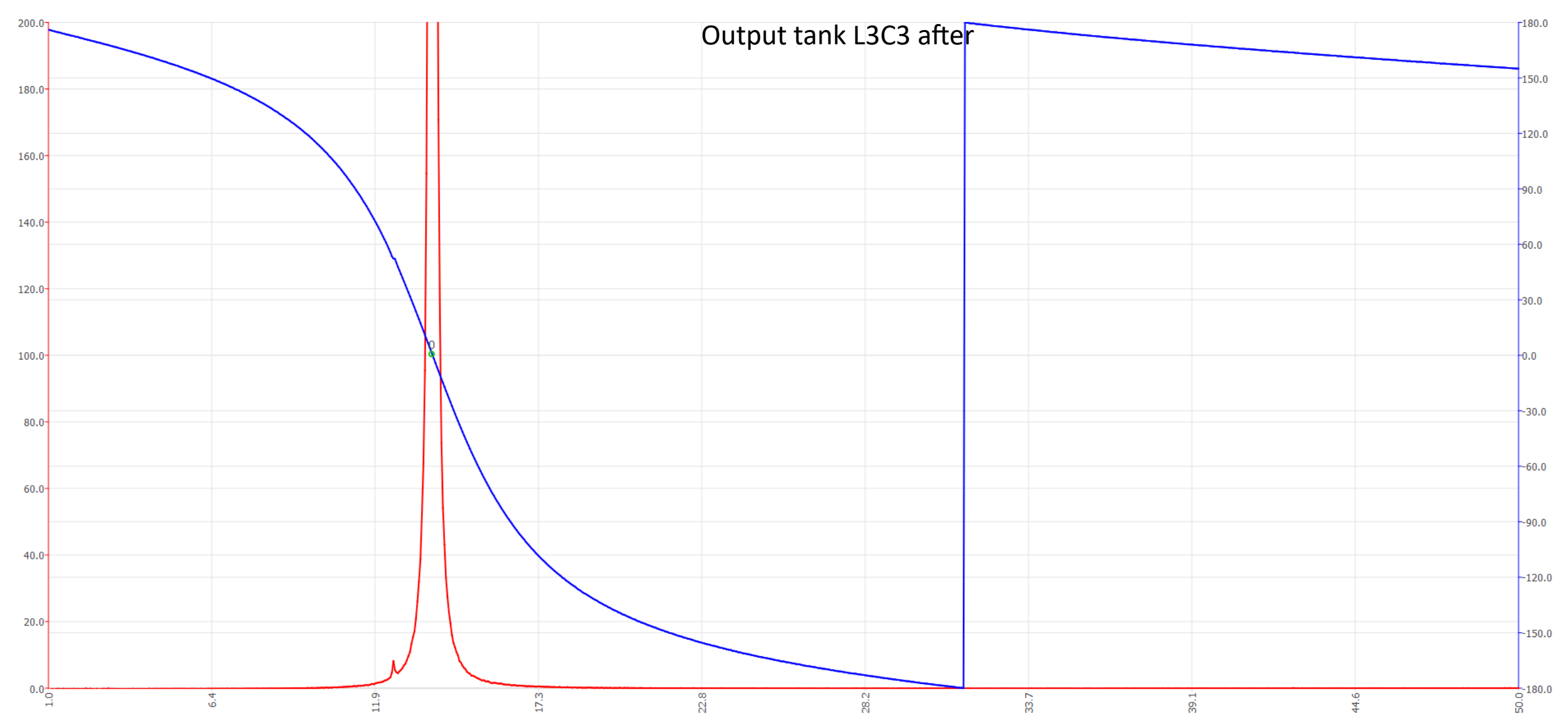
INDUCTANCE CALCULATION $L = N^2 A_L$

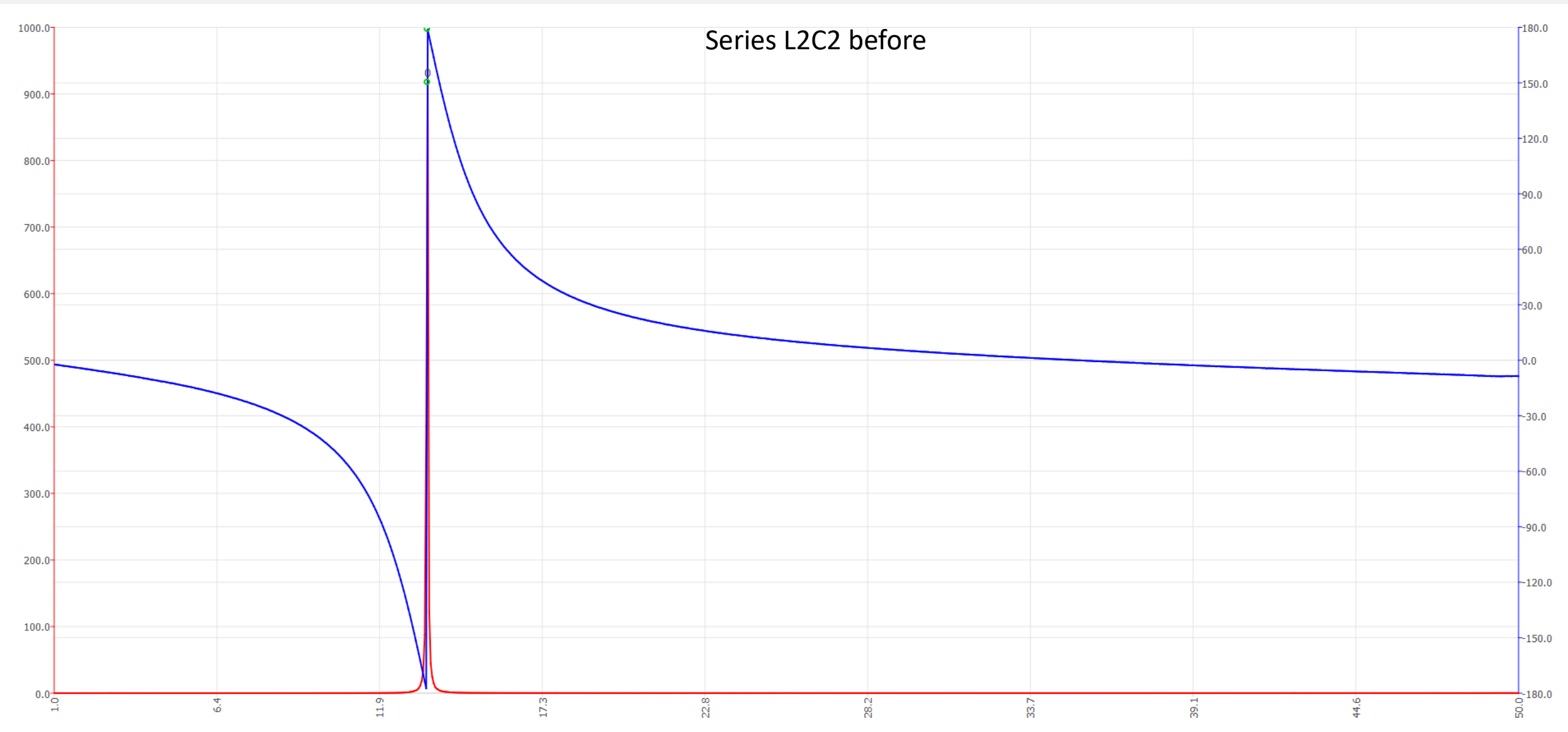
$$L_1 \text{ 8T, } 0.404 \mu\text{H} \rightarrow A_L = 6.31 \times 10^{-9} \text{ H/T}^2$$

$$L_2 \text{ 25T, } 3.27 \mu\text{H} \rightarrow A_L = 5.23 \times 10^{-9} \text{ H/T}^2$$

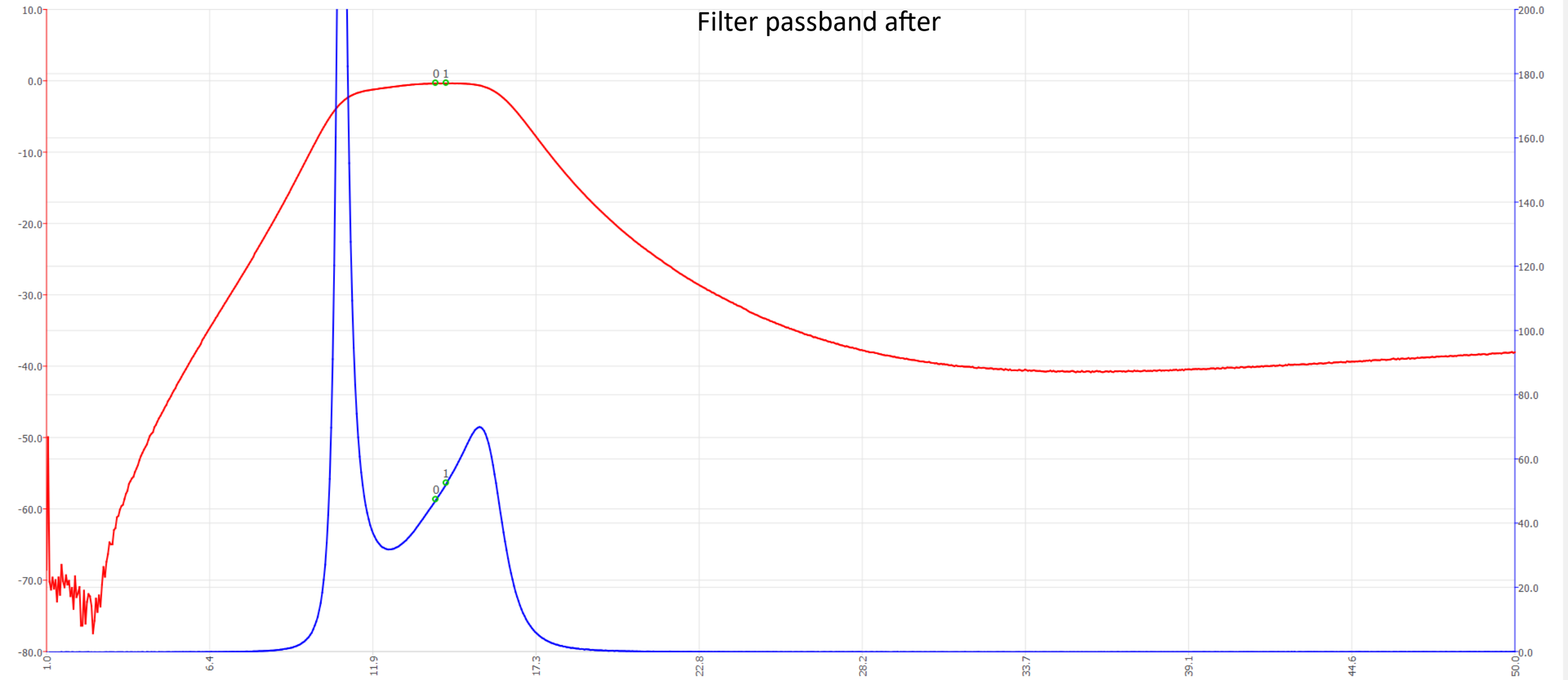
$$L_3 \text{ 8T, } 0.430 \mu\text{H} \rightarrow A_L = 6.72 \times 10^{-9} \text{ H/T}^2$$





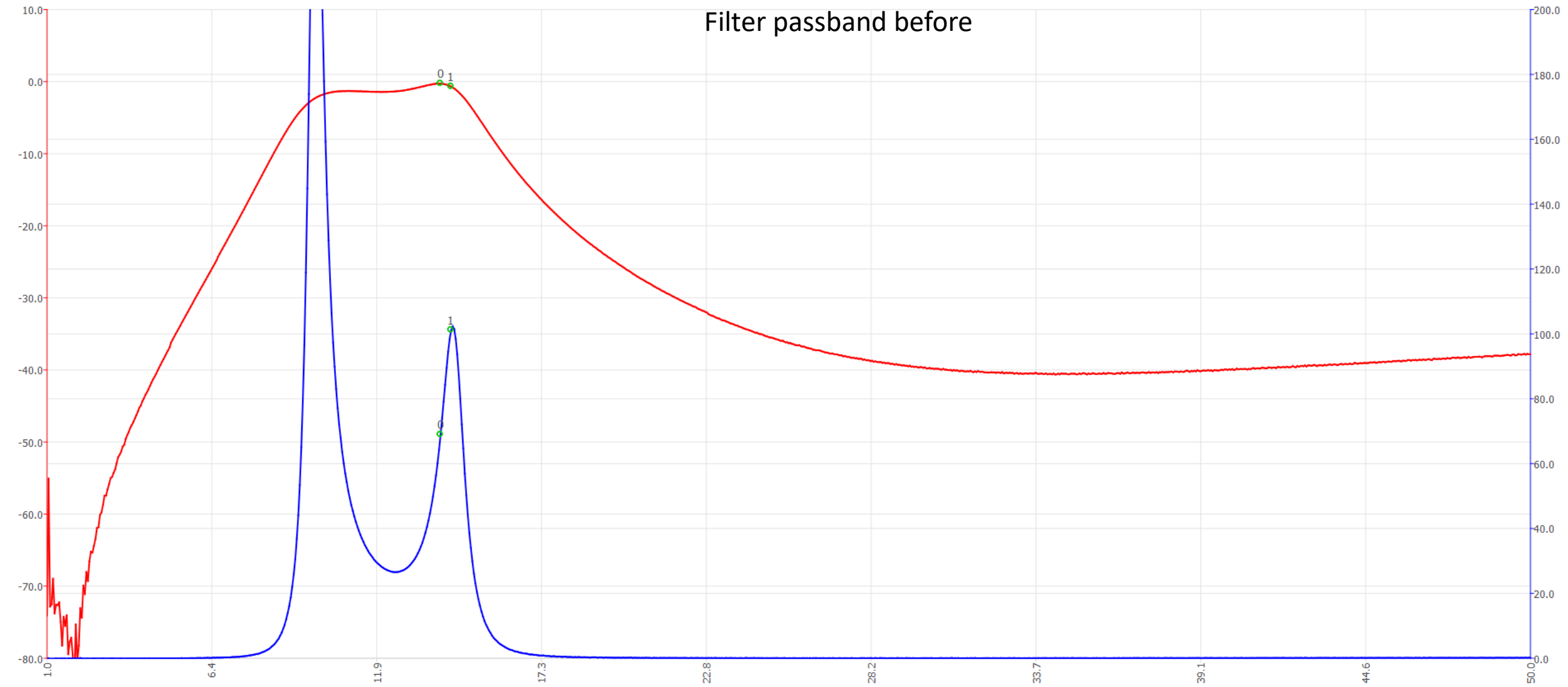


Filter passband after



x	1	14.35 MHz	-0.4 dB	52.4 Ω	<input type="text"/>
+	0	14.00 MHz	-0.4 dB	47.2 Ω	<input type="text"/>

Filter passband before



X	1	14.35 MHz	-0.7 dB	101.2 Ω	<input type="range"/>
+	0	14.00 MHz	-0.3 dB	68.9 Ω	<input type="range"/>