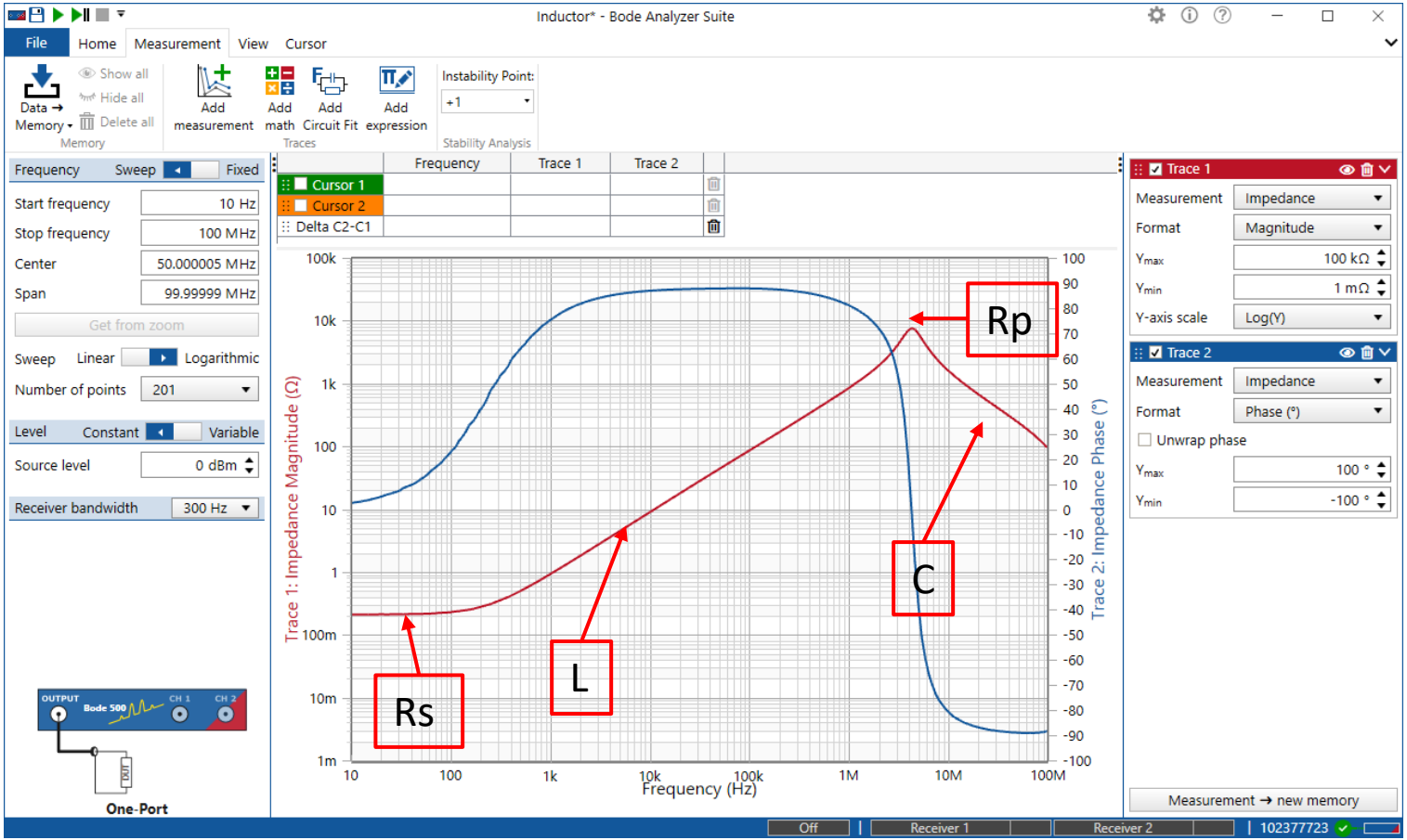
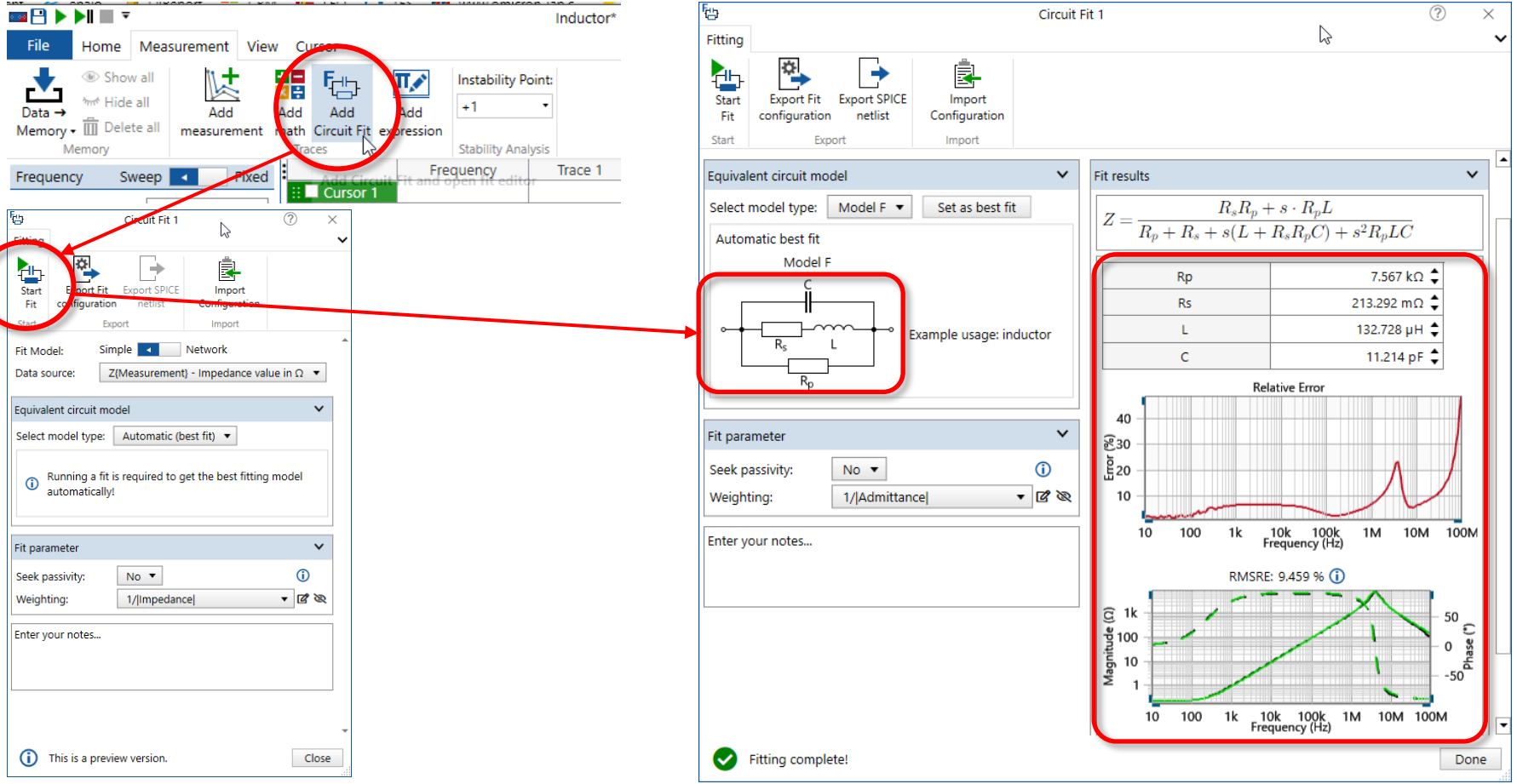
Curve Fitting & Model Fitting

For Bode Analyzer Suite

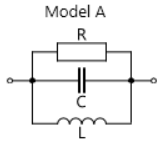
Curve Fitting of an Inductor



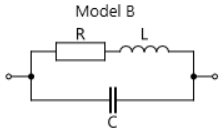
Circuit Fitting Feature of BAS 3.50



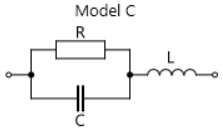
Available Models



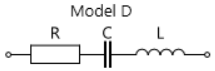
Parallel Resonator



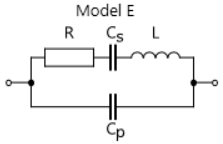
Parallel Resonator
(series L damping)



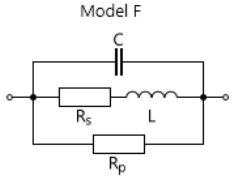
Parallel Resonator
(parallel C damping)



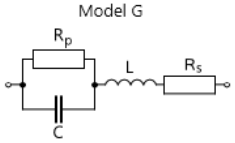
Series Resonator



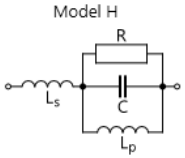
Quartz Crystal



Inductor

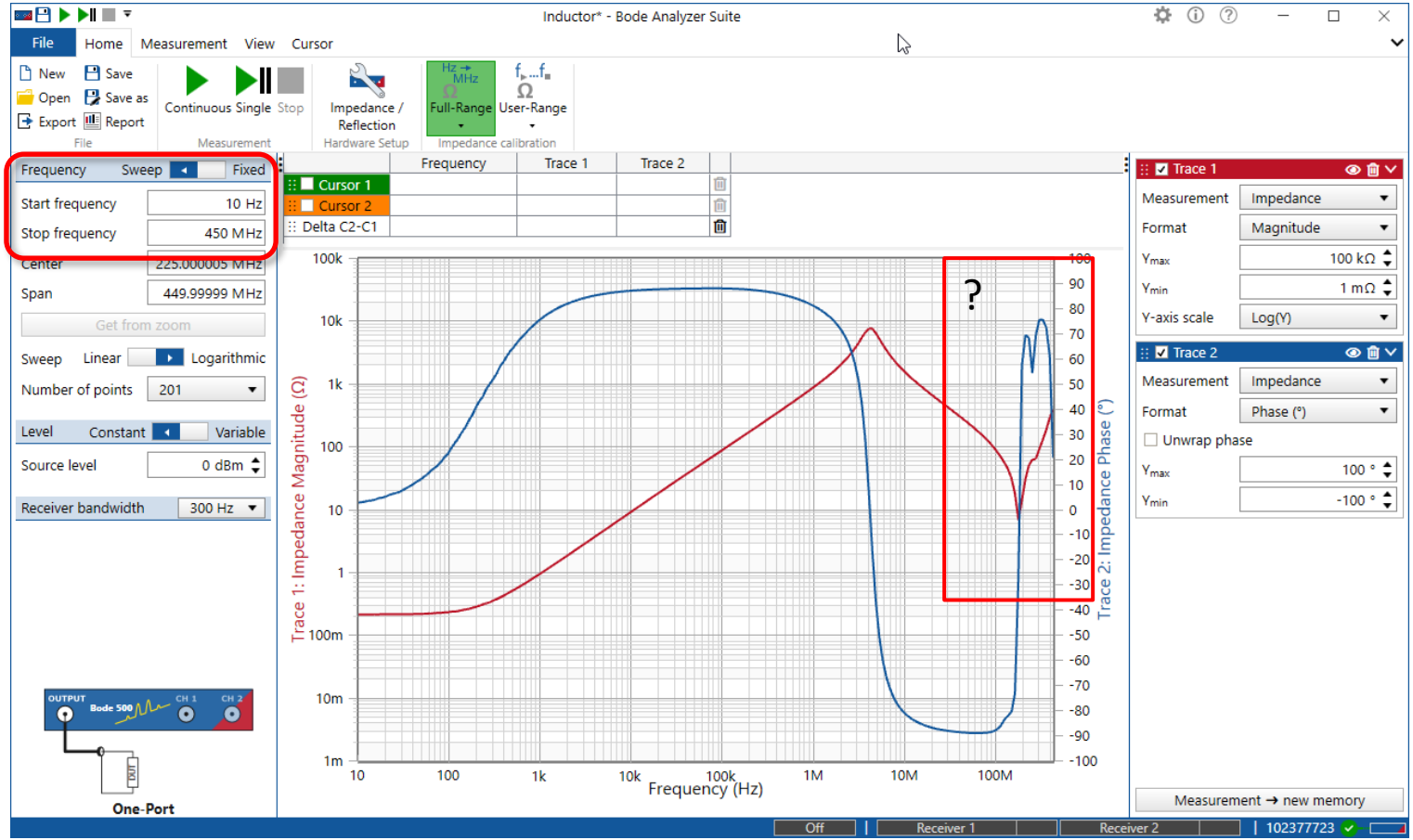


Capacitor

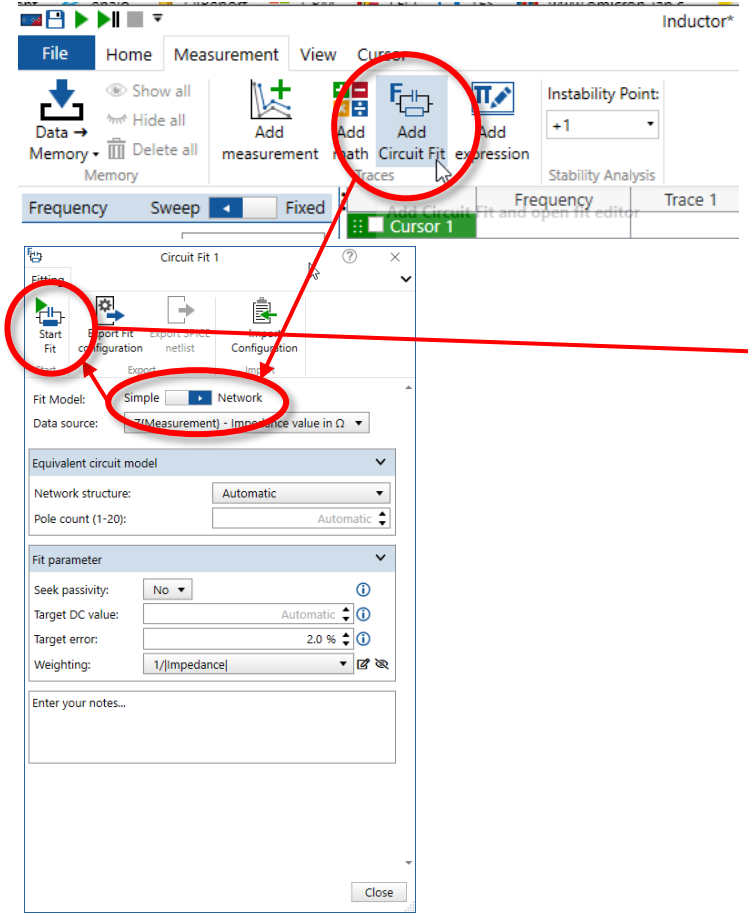


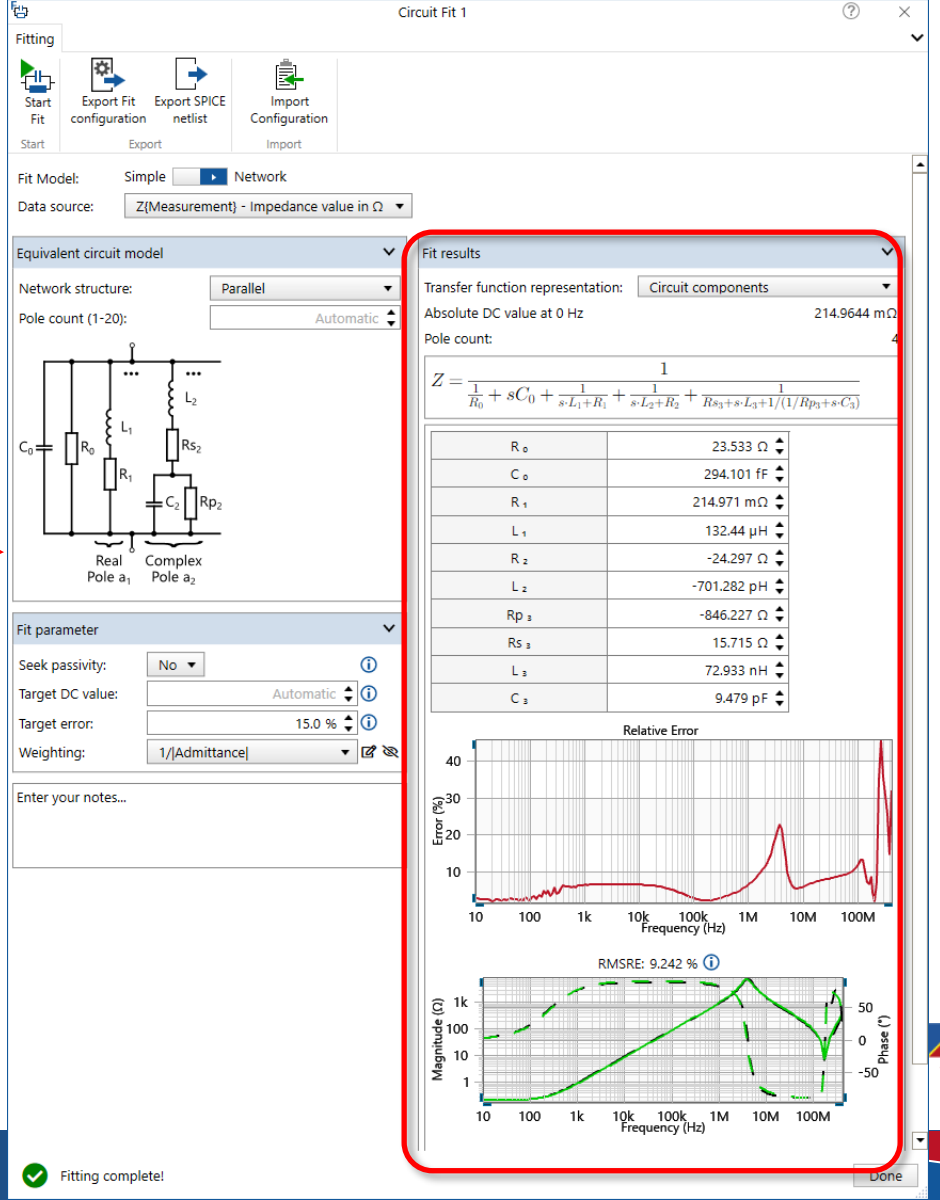
Strange circuit with
3 storage elements

But What Now?

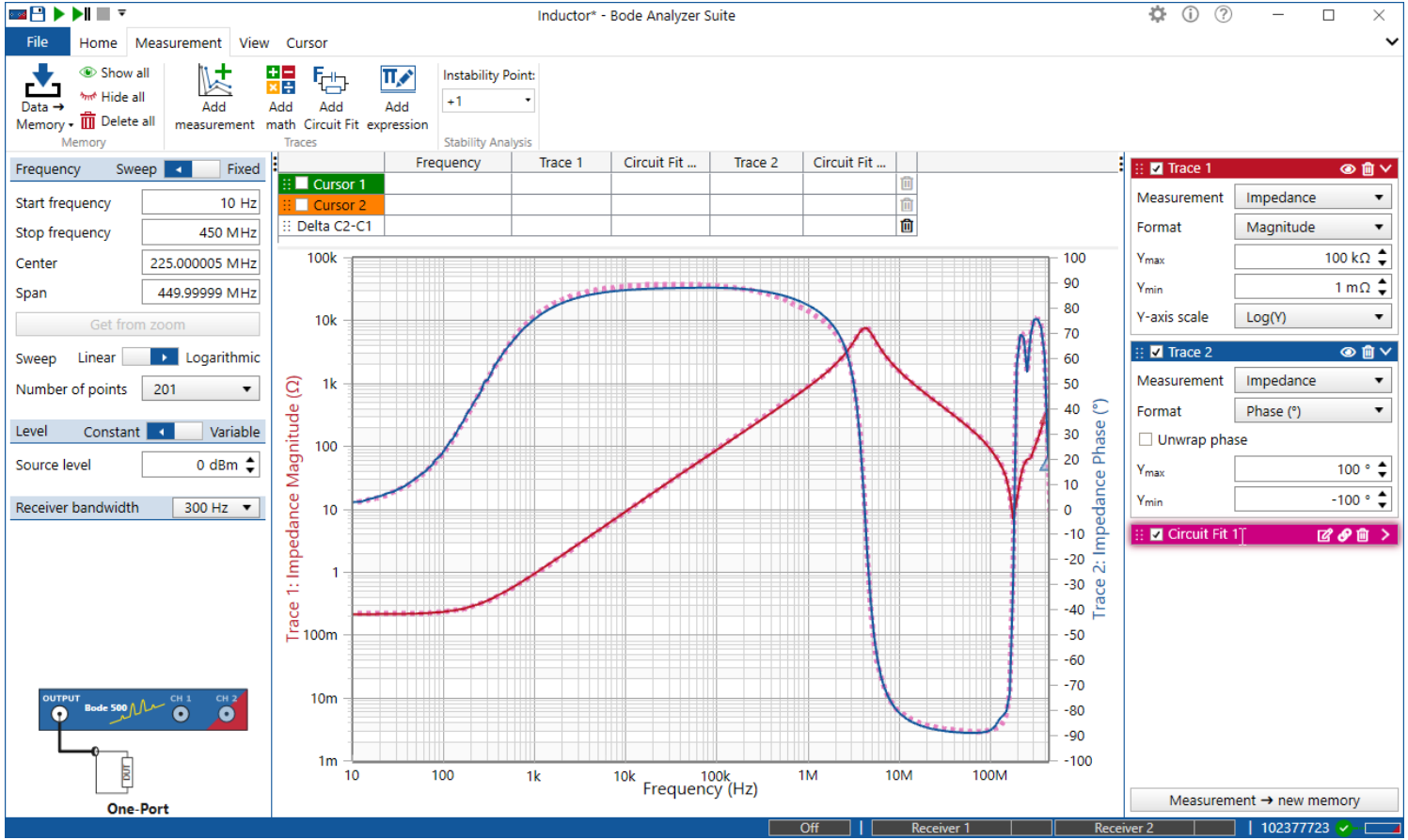

Inductor* - Bode Analyzer Suite
File
Home
Measurement
View
Cursor
New
Save
Open
Save as
Export
Report
Continuous
Single
Stop
Impedance / Reflection
Full-Range
User-Range
Frequency
Sweep
Fixed
Start frequency
10 Hz
Stop frequency
450 MHz
Center
225.000005 MHz
Span
449.99999 MHz
Get from zoom
Sweep
Linear
Logarithmic
Number of points
201
Level
Constant
Variable
Source level
0 dBm
Receiver bandwidth
300 Hz
Cursor 1
Cursor 2
Delta C2-C1
Trace 1
Trace 2
?
Trace 1: Impedance Magnitude (Ω)
Trace 2: Impedance Phase (°)
Frequency (Hz)
Trace 1
Measurement
Impedance
Format
Magnitude
Ymax
100 kΩ
Ymin
1 mΩ
Y-axis scale
Log(Y)
Trace 2
Measurement
Impedance
Format
Phase (°)
Unwrap phase
Ymax
100 °
Ymin
-100 °
Measurement → new memory
OUTPUT
Bode 500
CH 1
CH 2
One-Port
Off
Receiver 1
Receiver 2
102377723

Network Fitting





5% Target Error → 8 poles



Possibilities

- Transfer function export (copy → paste)
  - Partial fractions
  - Polynomial
  - Factorized (Pole-Zero)
  - Circuit Components

$$Z = \frac{1}{D + sE + \frac{c_1}{s-a_1} + \frac{c_2}{s-a_2} + \frac{c_3}{s-a_3} + \frac{\overline{c_3}}{s-\overline{a_3}}}$$

$$Z = \frac{a_0 + a_1 s + a_2 s^2 + a_3 s^3 + a_4 s^4}{b_0 + b_1 s + b_2 s^2 + b_3 s^3 + b_4 s^4 + b_5 s^5}$$

$$Z = \frac{1}{k} \cdot \frac{(s-a_1)(s-a_2)(s-a_3)(s-\overline{a_3})}{(s-z_1)(s-\overline{z_1})(s-z_2)(s-\overline{z_2})(s-z_3)(s-\overline{z_3})}$$

$$Z = \frac{1}{\frac{1}{R_0} + sC_0 + \frac{1}{s \cdot L_1 + R_1} + \frac{1}{s \cdot L_2 + R_2} + \frac{1}{Rs_3 + s \cdot L_3 + 1/(1/Rp_3 + s \cdot C_3)}}$$

- Spice netlist export for simulator import
- Search for Passivity
- Target DC value can be configured
- Weighting can be manually changed

Inductor_Circuit Fit 1_2023-11-07T20_09_44.cir | variant_map.xml

```
1   .SUBCKT Circuit_Fit_1 _IN _OUT
2   C0 _IN _OUT 9.4855315481236574E-002
3   R0 _IN _OUT 1.6251389781385120E-010
4   L1 _IN N1 -4.8906660210553214E-021
5   R1 N1 _OUT -1.6944446029849314E-010
6   L2 _IN N2 7.4388629568445440E-016
7   R2 N2 _OUT 1.2074390408402216E-012
8   L3 _IN N3 4.1014555954137731E-019
9   Rs3 N3 N4 9.1710192112811248E-011
10  C3 N4 _OUT 1.6823475547857594E+000
11  Rp3 N4 _OUT -4.4760810482417102E-009
12  .ENDS Circuit_Fit_1
13  .END
```