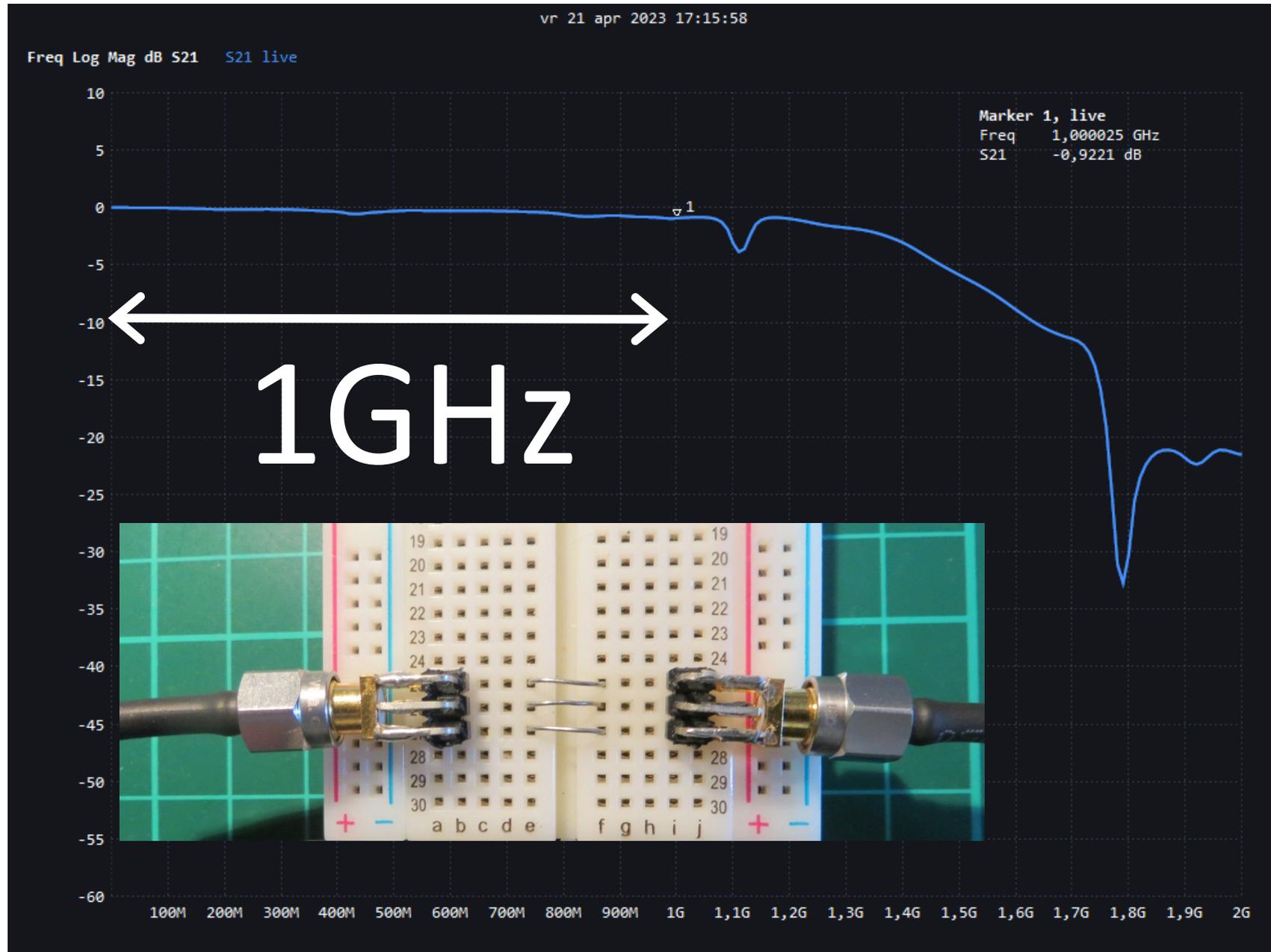
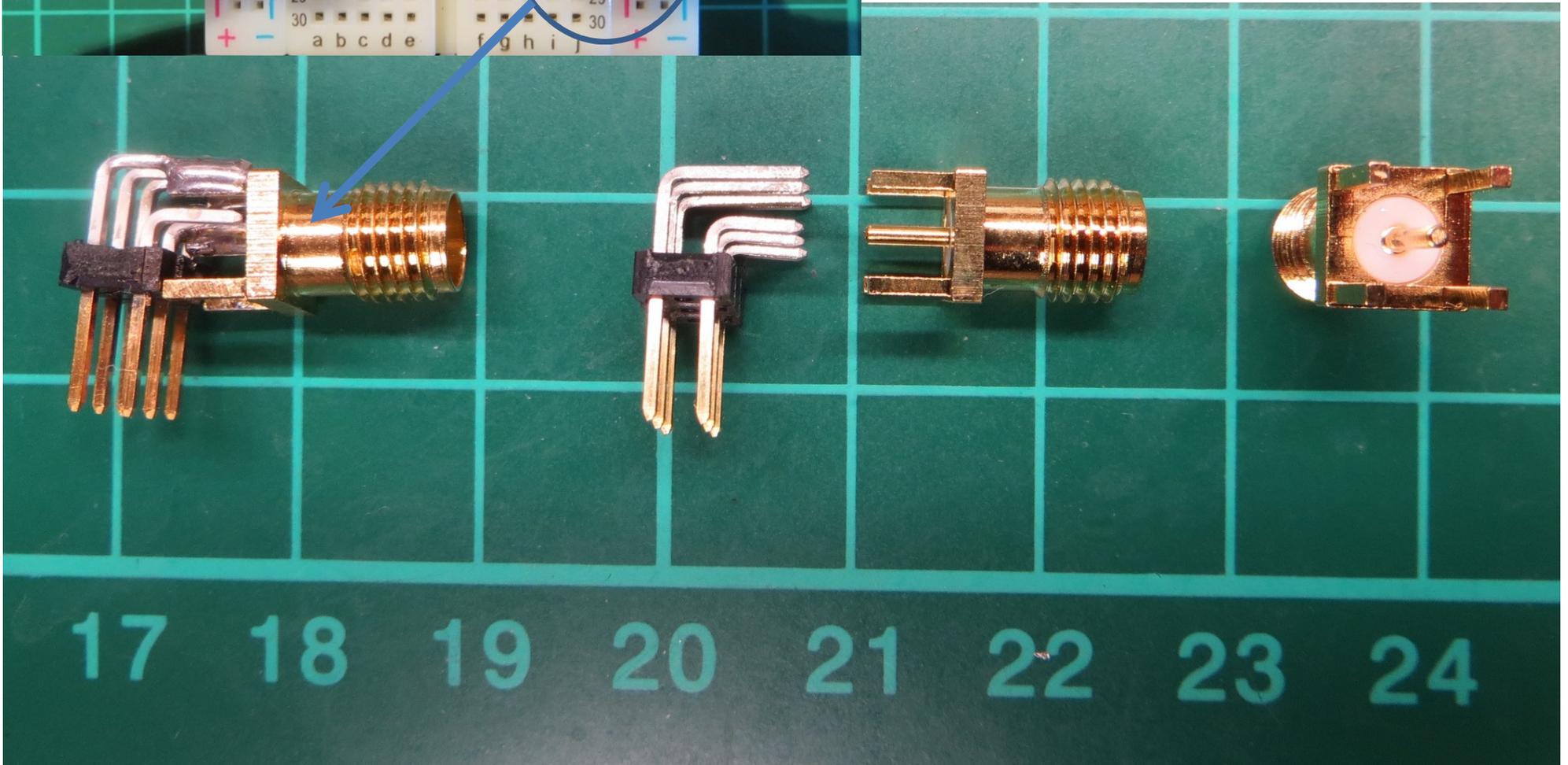
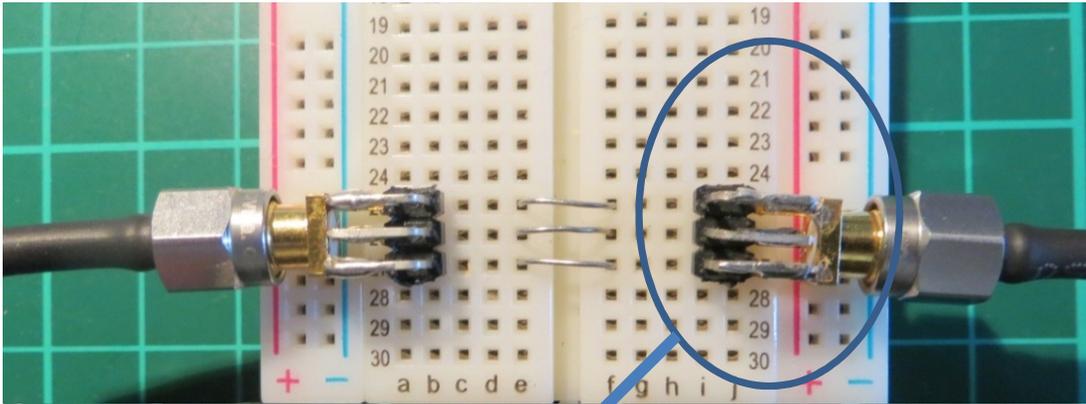


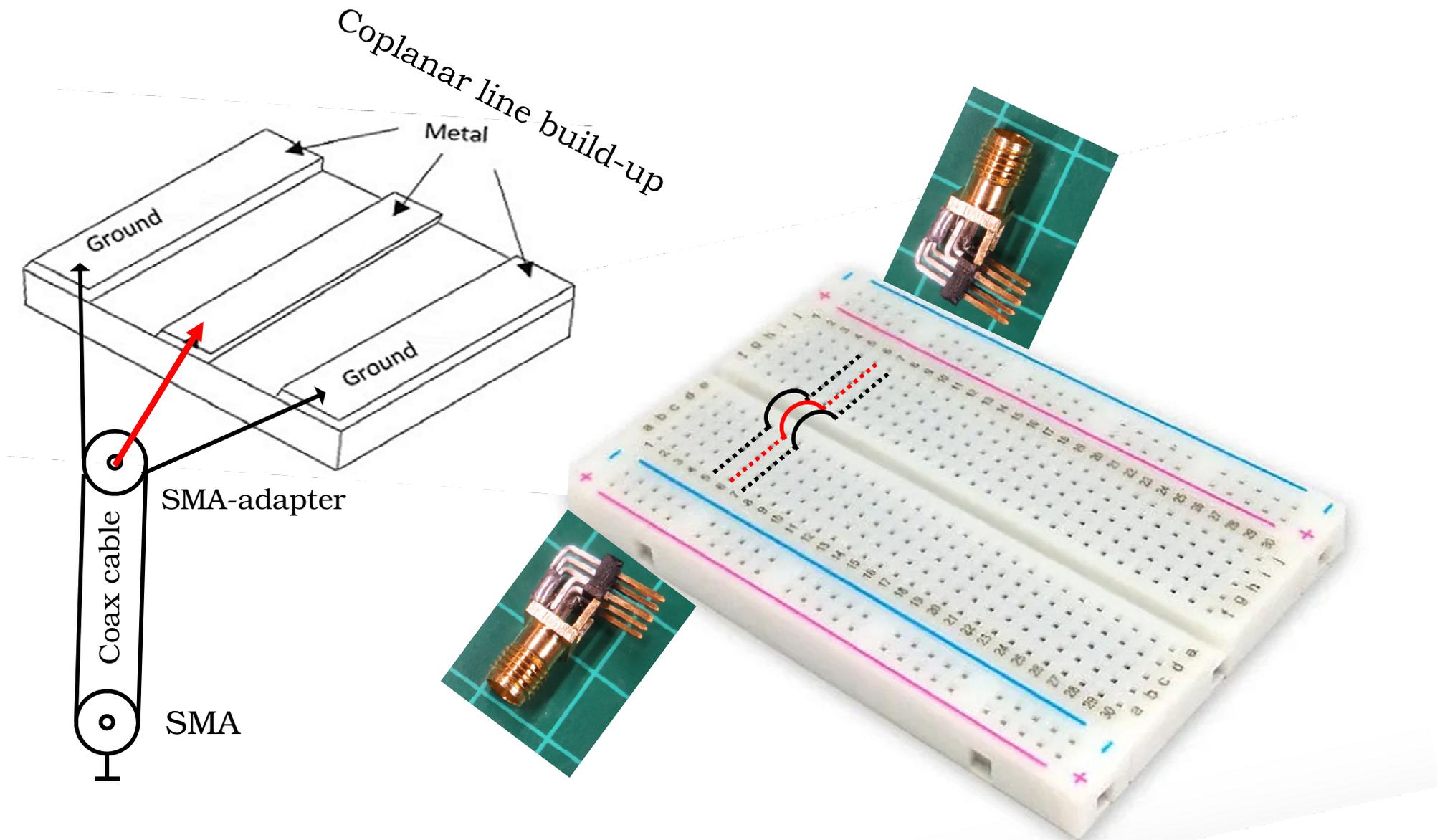
How to send up to 1GHz over a breadboard



SMA to breadboard adapter construction

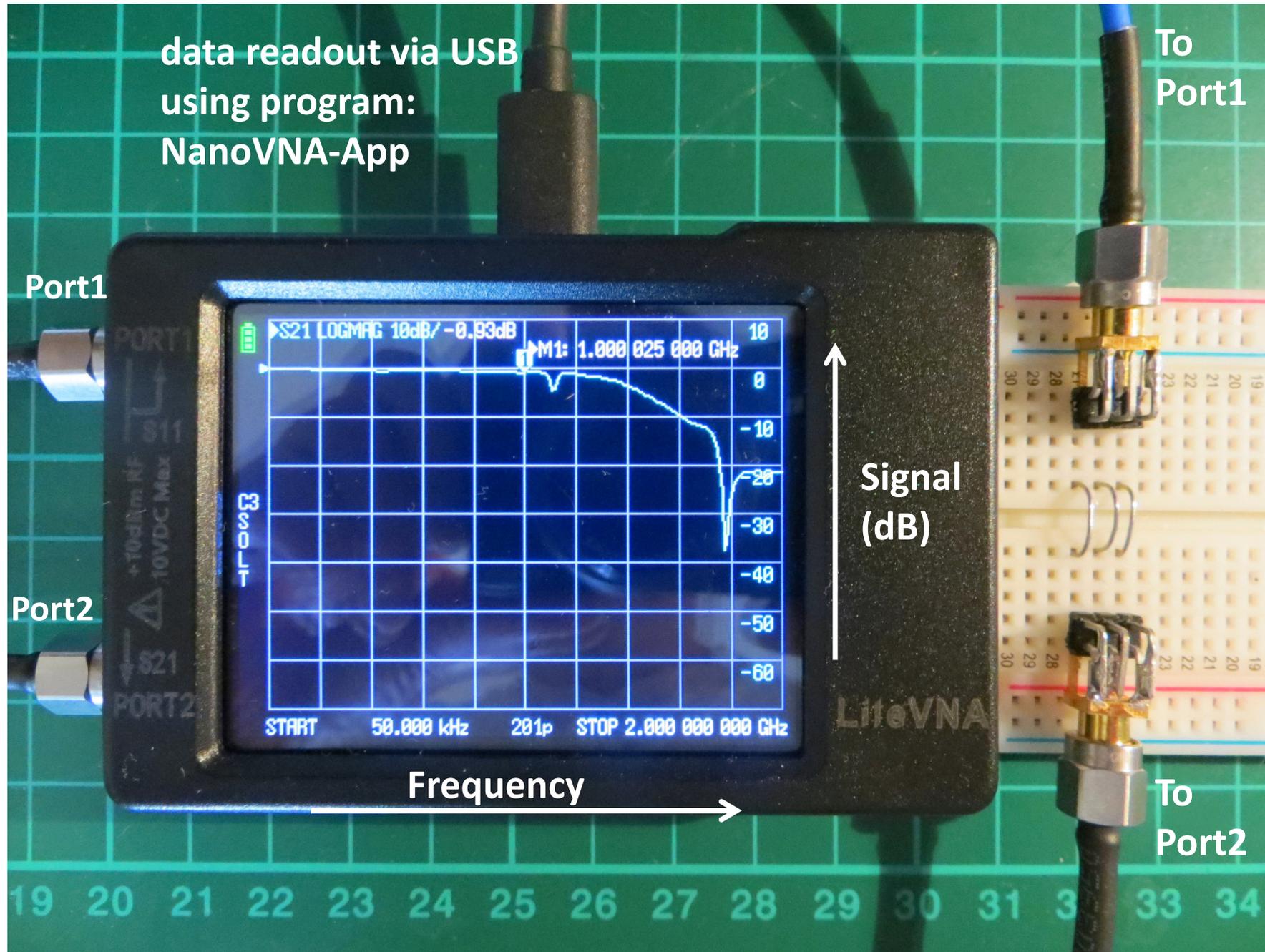


Improvise a “coplanar transmission line” on a breadboard

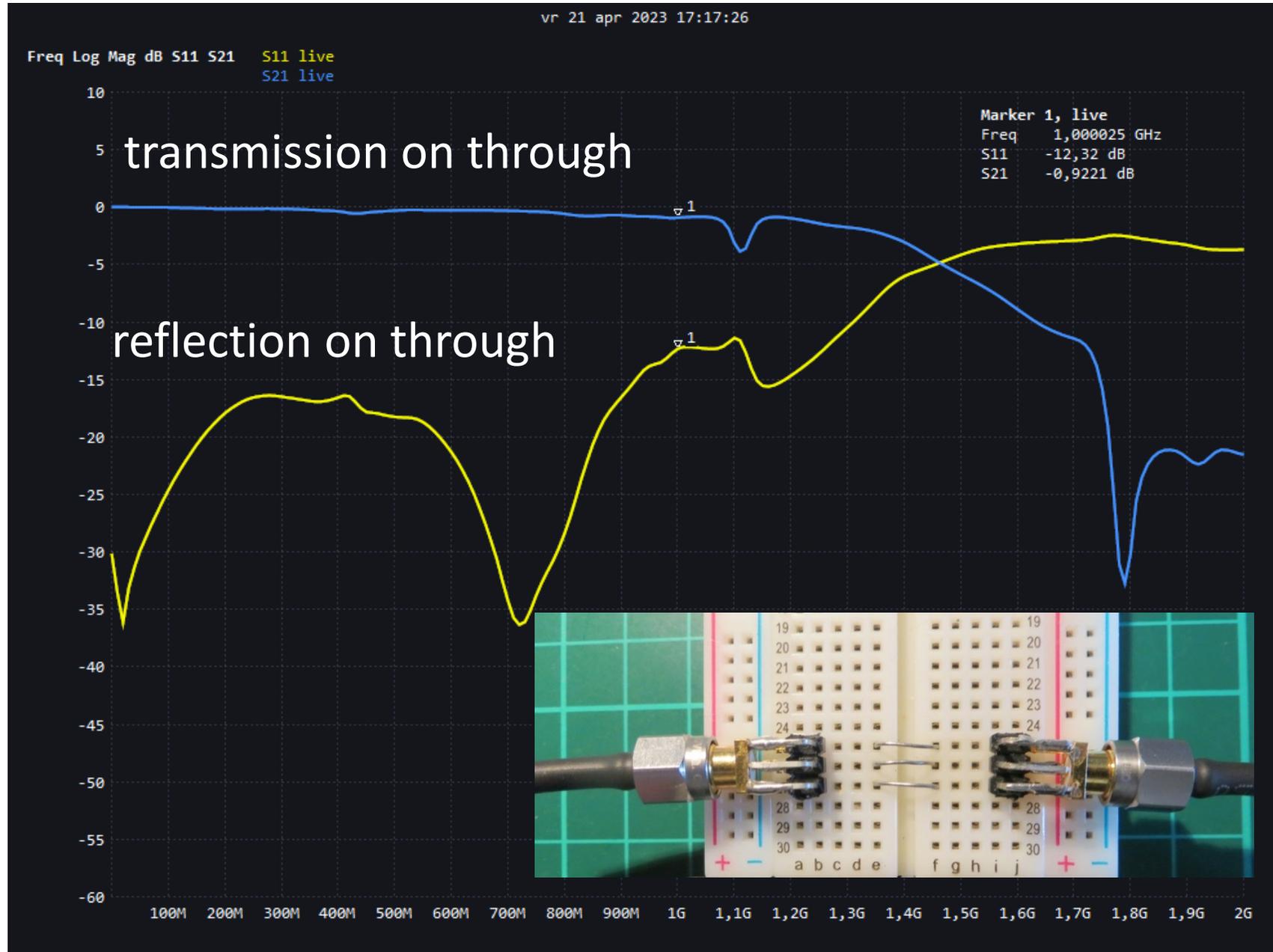


Advantage: a coplanar transmission line does not need a groundplane below the tracks

Breadboard RF line measurements setup, using LiteVNA



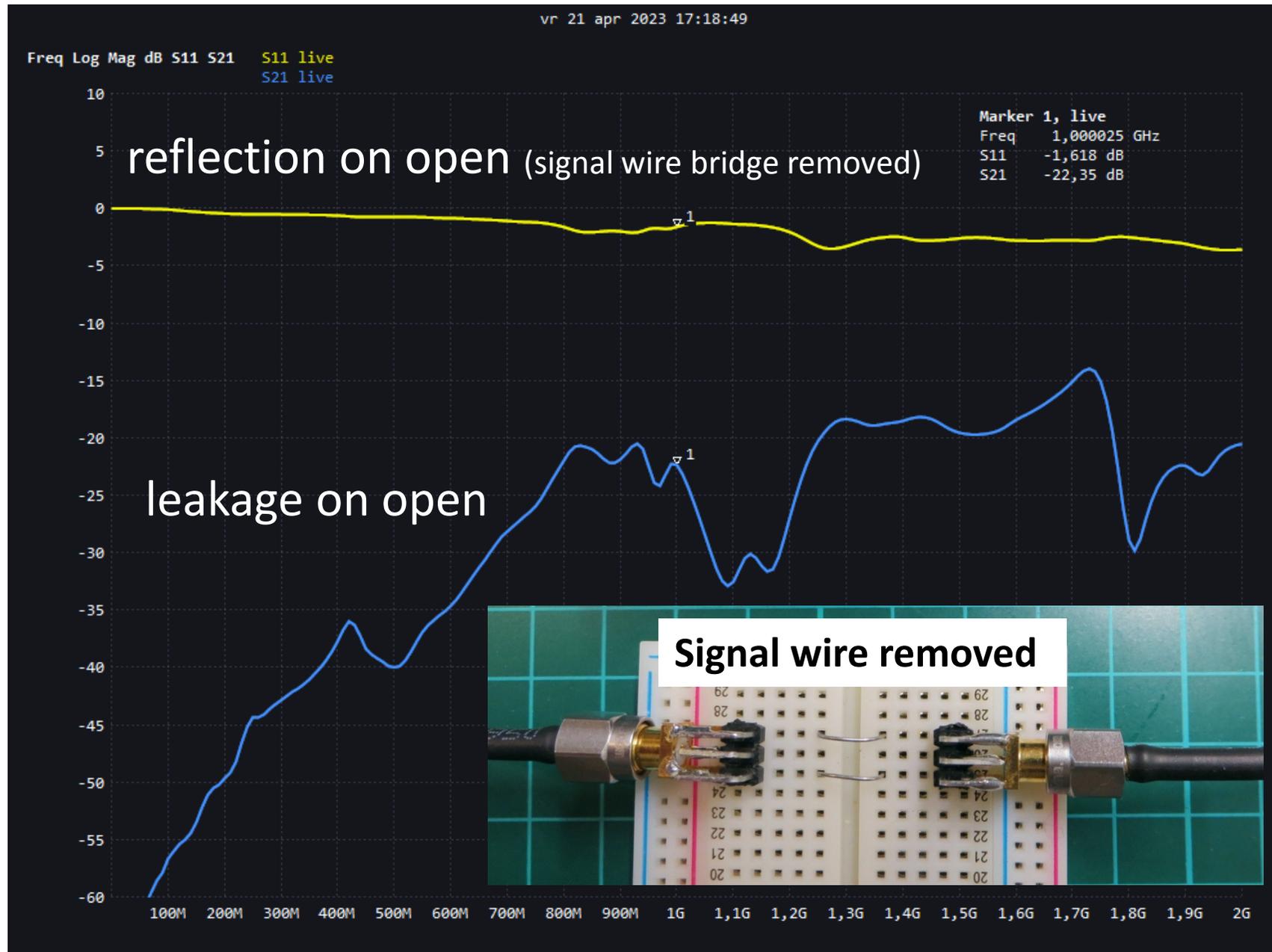
Breadboard RF line transmission measurement



For an ideal line: transmission= 0dB, reflection= -infinite dB

For an acceptable line: transmission> -1dB, reflection <-10dB

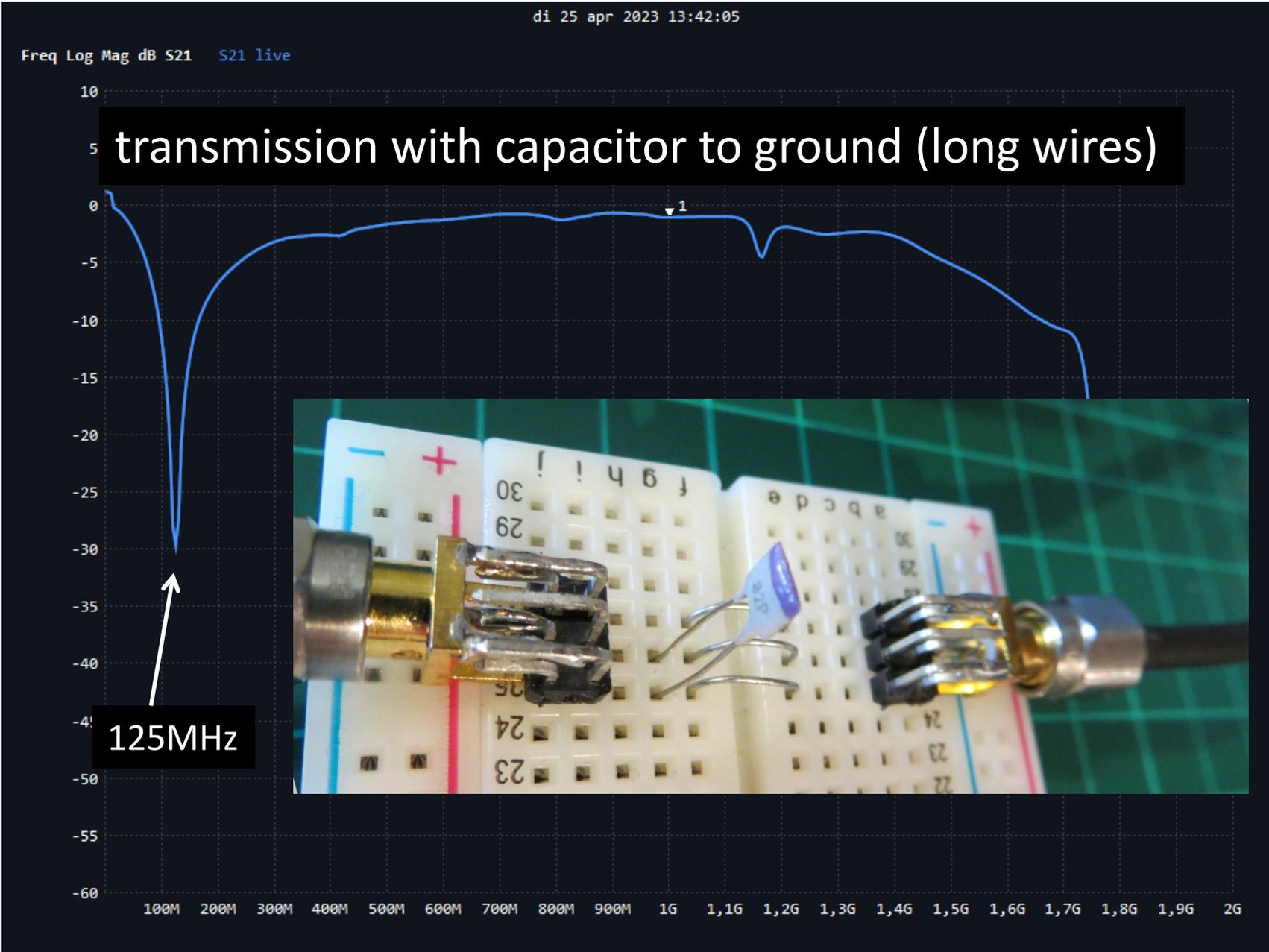
Breadboard RF line interrupted, leakage measurement



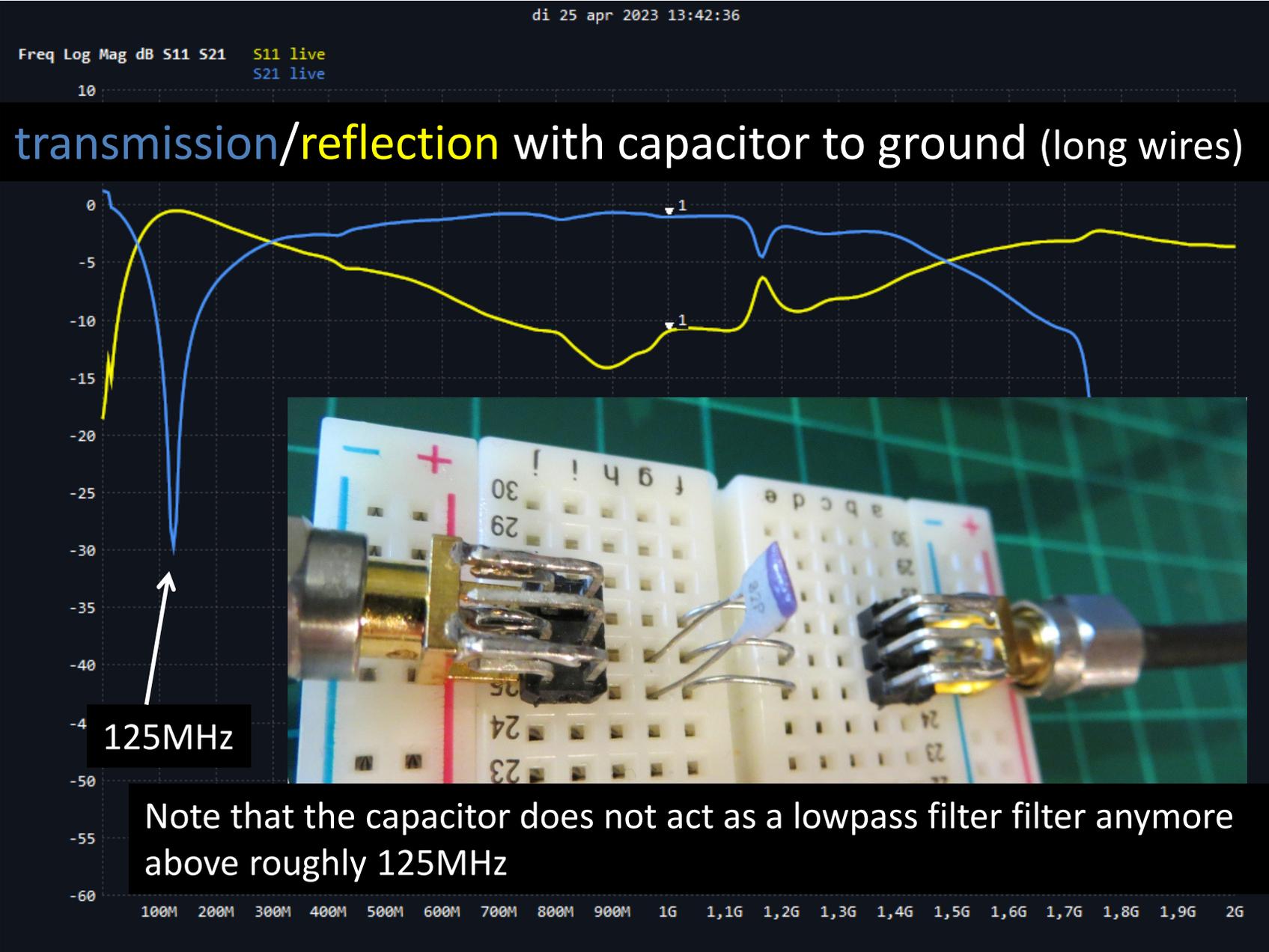
For an ideal interrupted line: transmission = -infinite dB, reflection = 0 dB

For an acceptable interrupted line: transmission < -20 dB, reflection > -2 dB

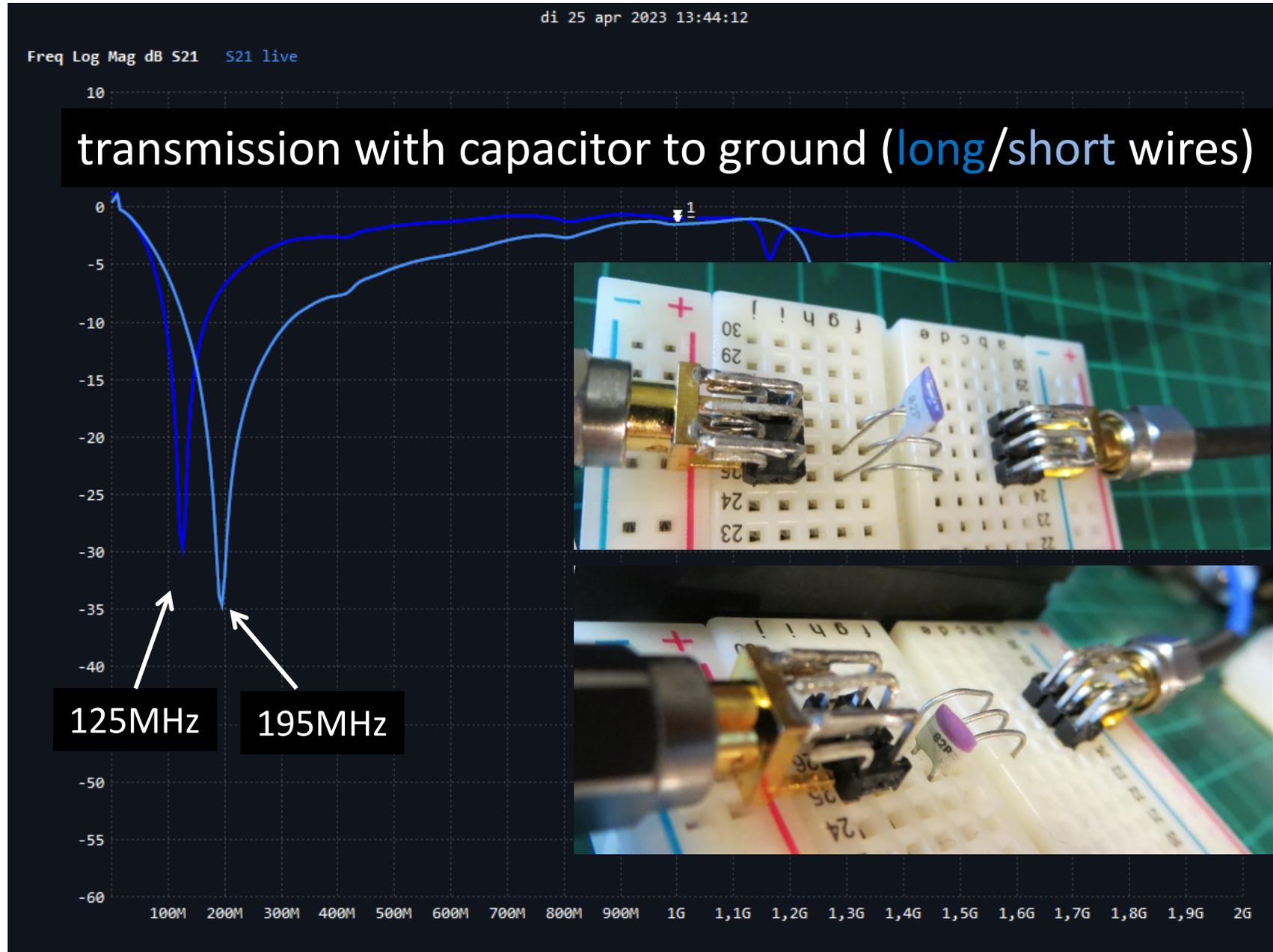
Application: see selfresonance of filtercapacitor (82pF) to gnd



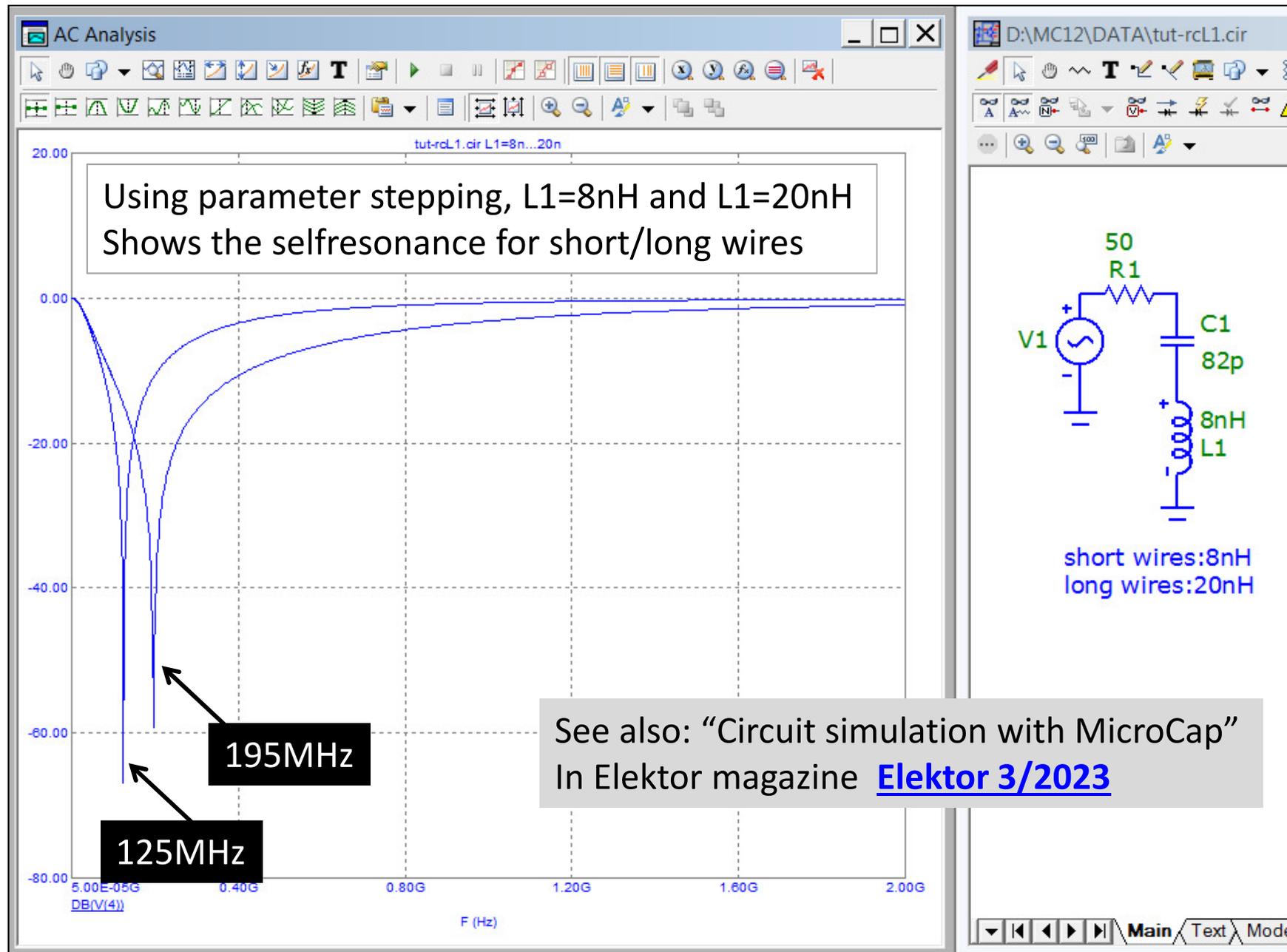
Application: see selfresonance of filtercapacitor (82pF) to gnd



Application: see selfresonance of capacitor to gnd versus wire length

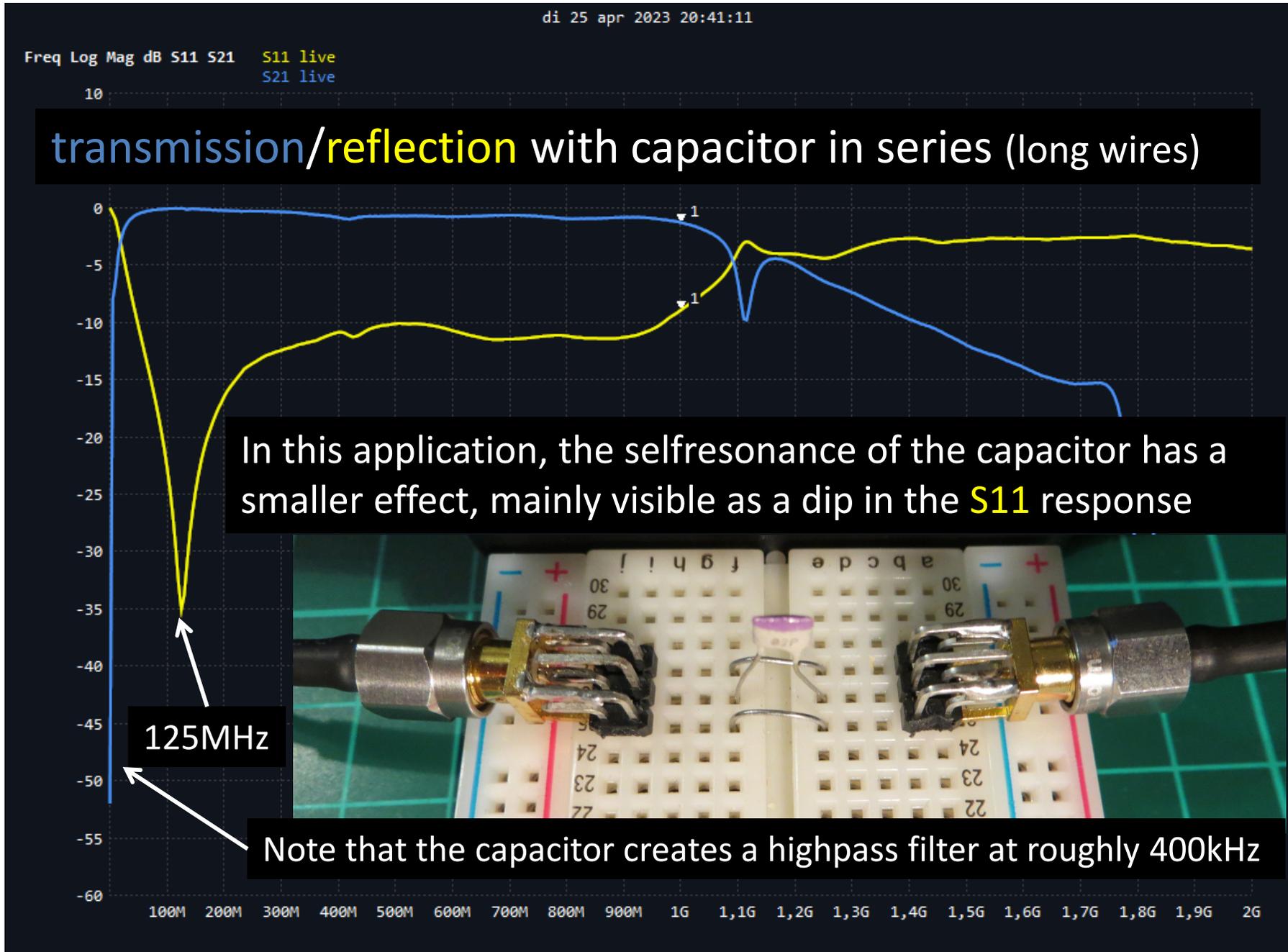


Simulation (MicroCap) of selfresonance filter capacitor to gnd

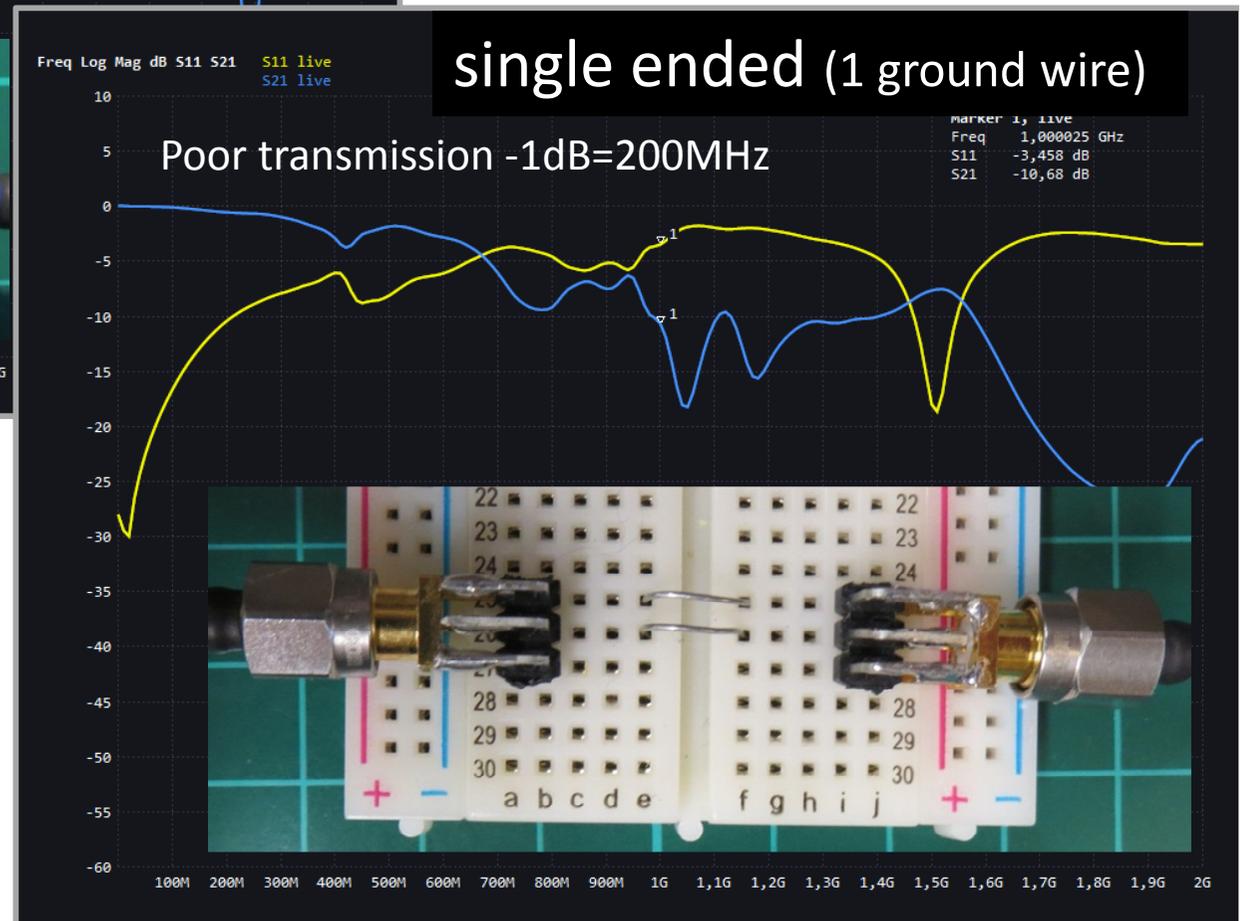
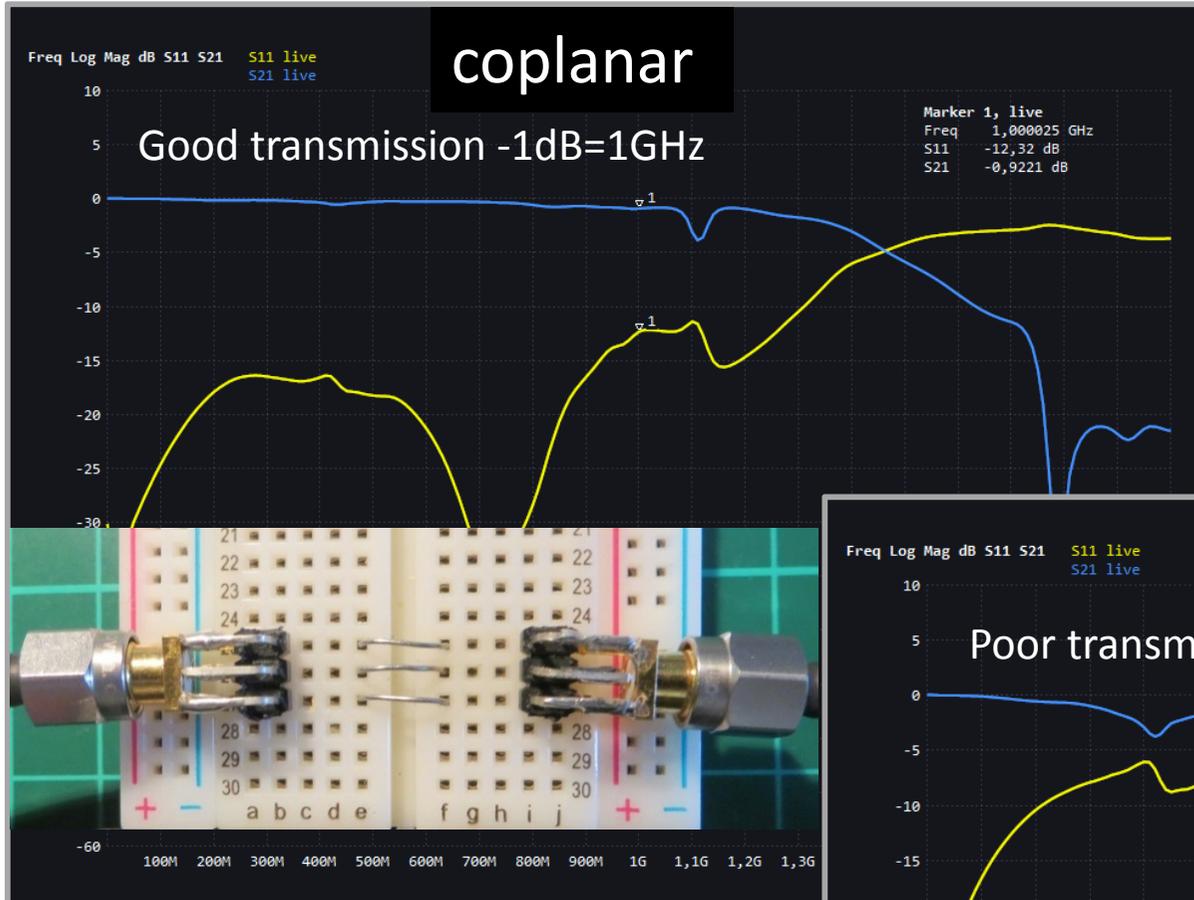


Note: The wire inductance can be estimated by using 1 nH/mm as a rule of thumb

Application: selfresonance of capacitor (82pF) in series connection



For the Pro's: The advantage of coplanar wiring versus single ended



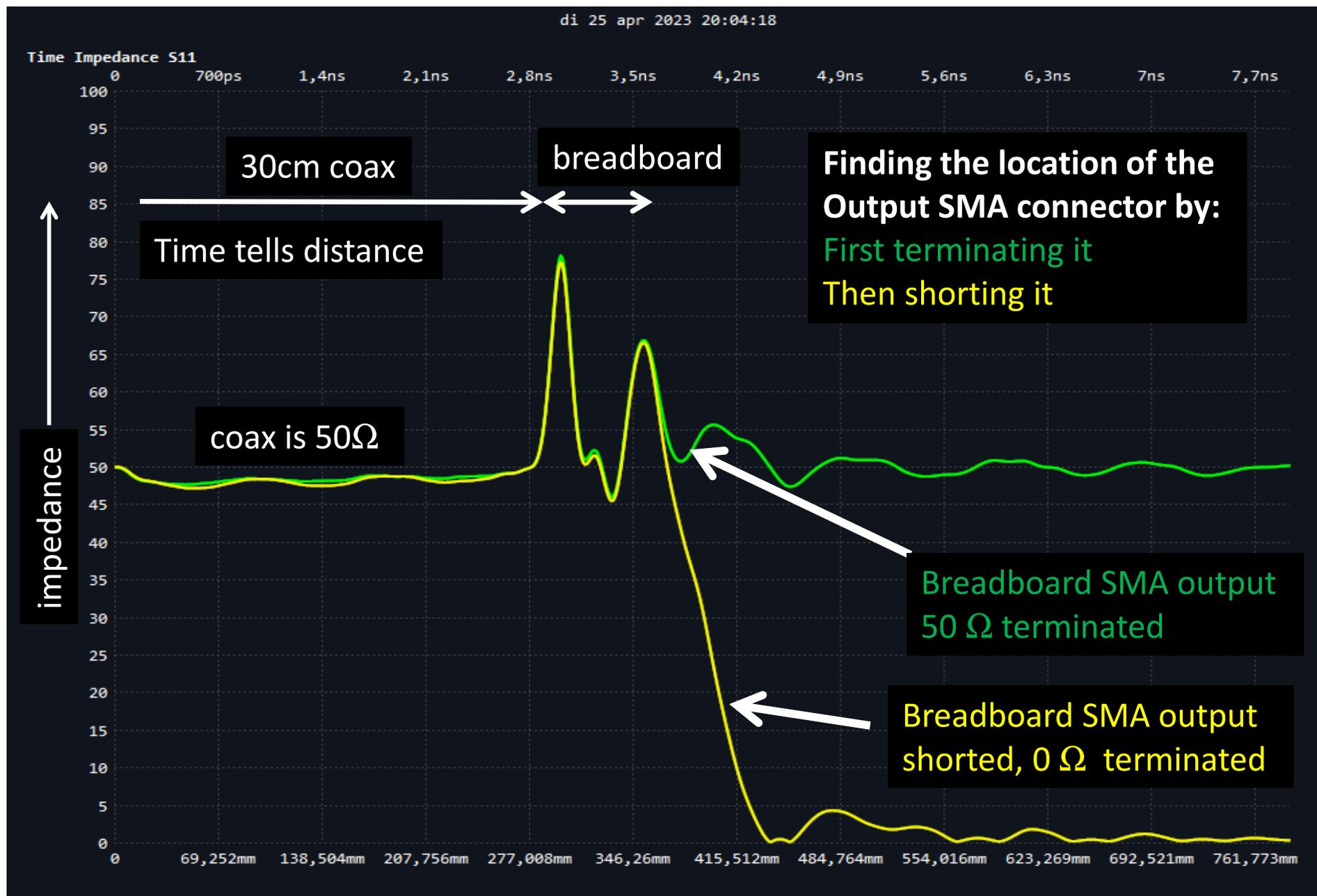
For the Pro's: impedance mismatch showing at frequencies >1GHz

Example of using 6.3GHz Time Domain Reflectometry (TDR) function of LiteVNA



For the Pro's: impedance mismatch showing at frequencies >1GHz

Using 6.3GHz Time Domain Reflectometry (TDR) function of LiteVNA



For the Pro's:

One could argue that the bridged distance is relative short compared to the wavelength of 1GHz to have the proposed structure effectively operating as a transmission line.

It is however longer than 0.1 wavelength (the usual rule of thumb limit) and approaching the quarter wavelength where large resonances could occur on a mismatch.

The 3-wire coplanar structure also confines the signal and cannot be replaced by simply 2 wires of the same length as is shown in the measurements.

For these reasons I tend to refer to this structure as a (quite short) transmission line.