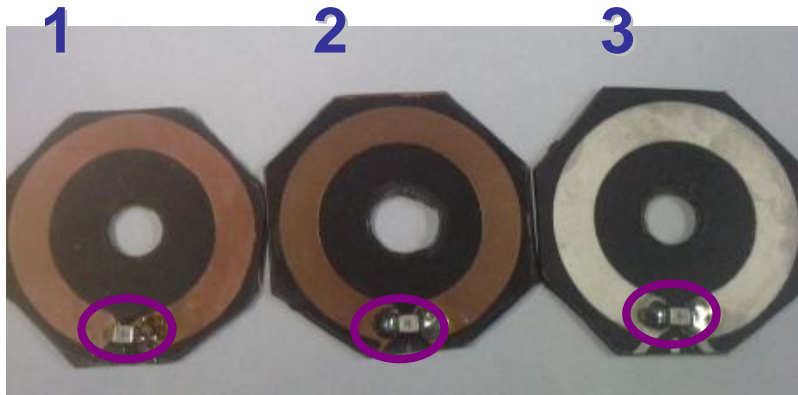


*Q measurement of small
planar loop*

Nico Podevijn

Coil Designs



1) Copper

2) Copper+solderflux

3) tin-plated (1.5 - 2 micron)

- 30 mm average diameter
- 6 (+- 0.2 mm) mm track width
- 2oz (70 micron) copper
- Rogers Duroid RT5880 **Teflon substrate** ($\epsilon_r = 2.2$, loss tangent = 0.001)
- High Q Temex Ceramics **chip capacitors** (68pF)

Measurement setup

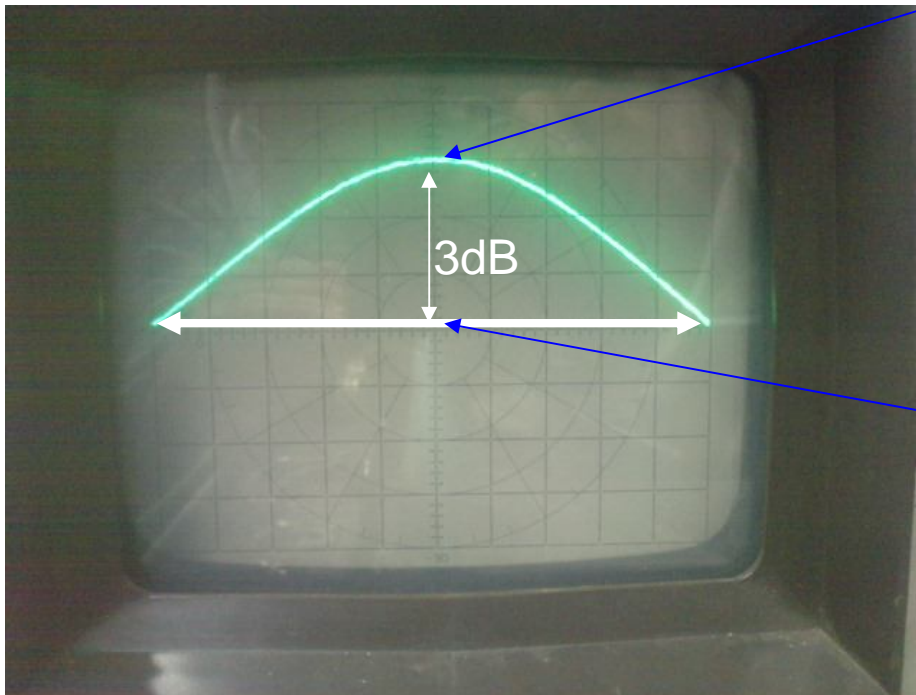


- Reduce environment effect by placing resonator in box surrounded by air
- Split shield coupling loops connected to VNA
- Reduce coupling effects
=> convergence from loaded to unloaded Q
- Repeat measurements for consistency

Measurement

HP 8754A

S21 measurement



Resonance Frequencies

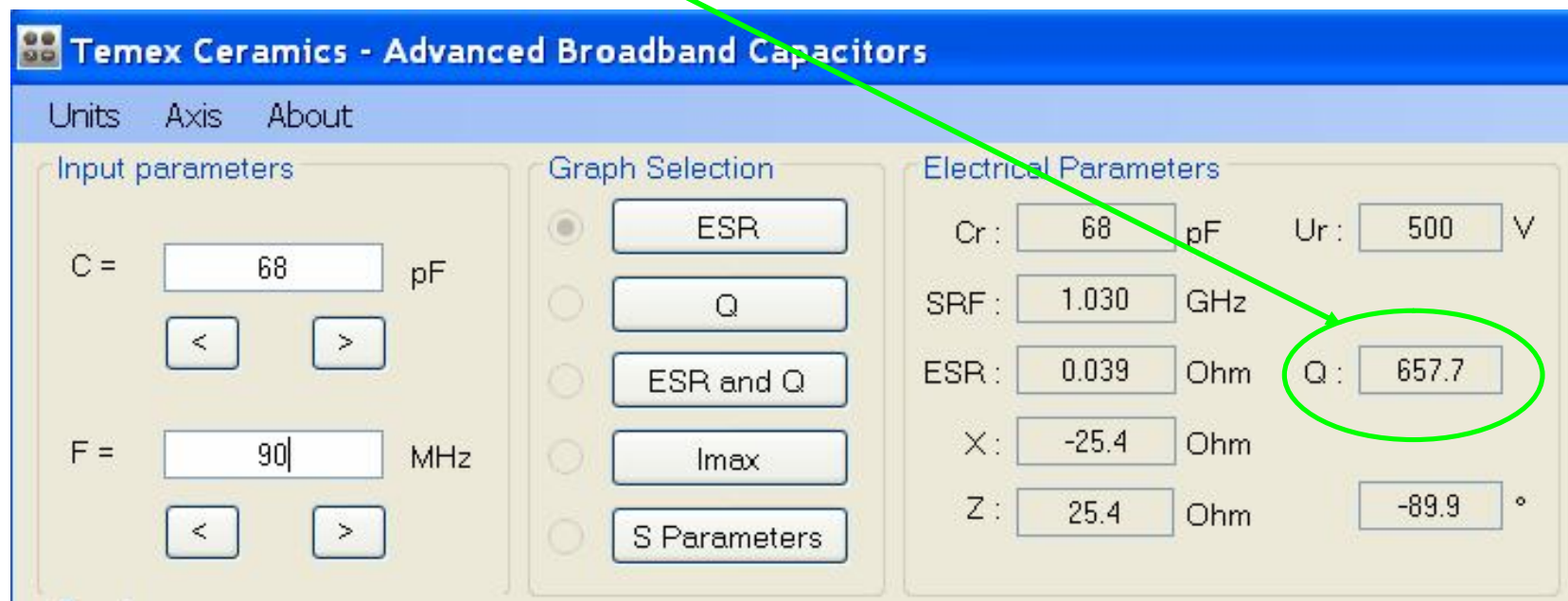
- 1) 89.2 MHz
- 2) 91.9 MHz
- 3) 92.1 MHz

Bandwidth

- 1) 310 kHz (+/- 10kHz)
- 2) 380 kHz (+/- 10kHz)
- 3) 290 kHz (+/- 10kHz)

Q calculation

- Resonator $Q = \text{Resonance freq}/\text{Bandwidth}$
- Capacitor Q from manufacturer software:



- Coil Q from capacitor Q and resonator Q

Results

Q @ 90 MHz:

1) 510

2) 380

3) 620