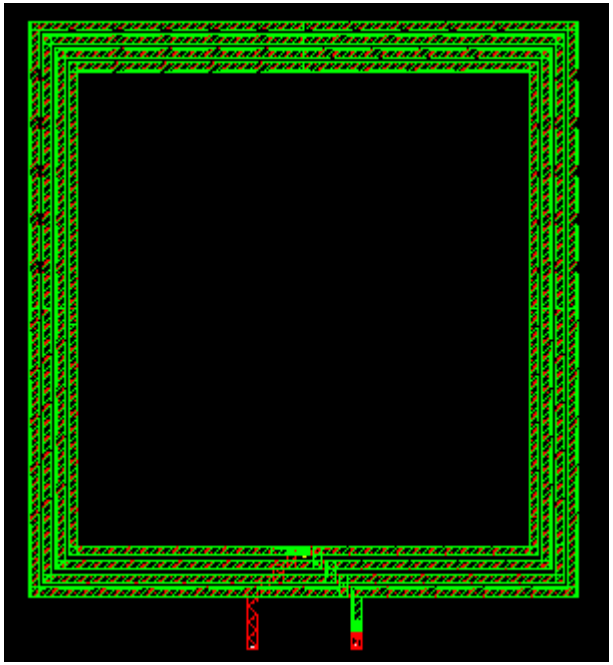
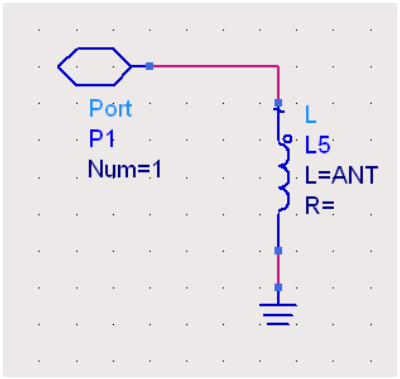
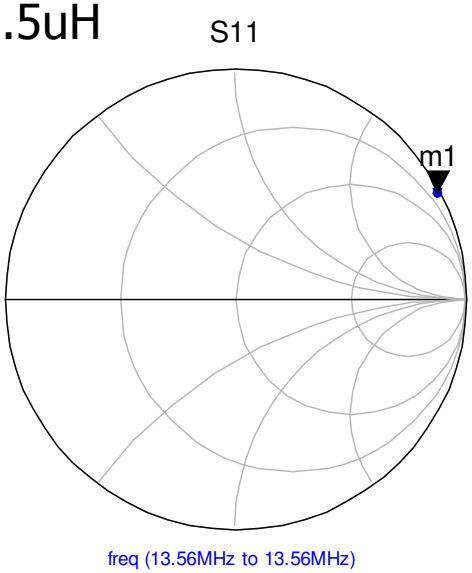
Antenna Inductance Simulation and Measurement

- Use EM Tools to simulate before layout
  - Simulate S11 and we can obtain inductance @ 13.56MHz
  - Recommendatory inductance is around 1uH ~ 2.5uH
- For Example :



ANT-135601





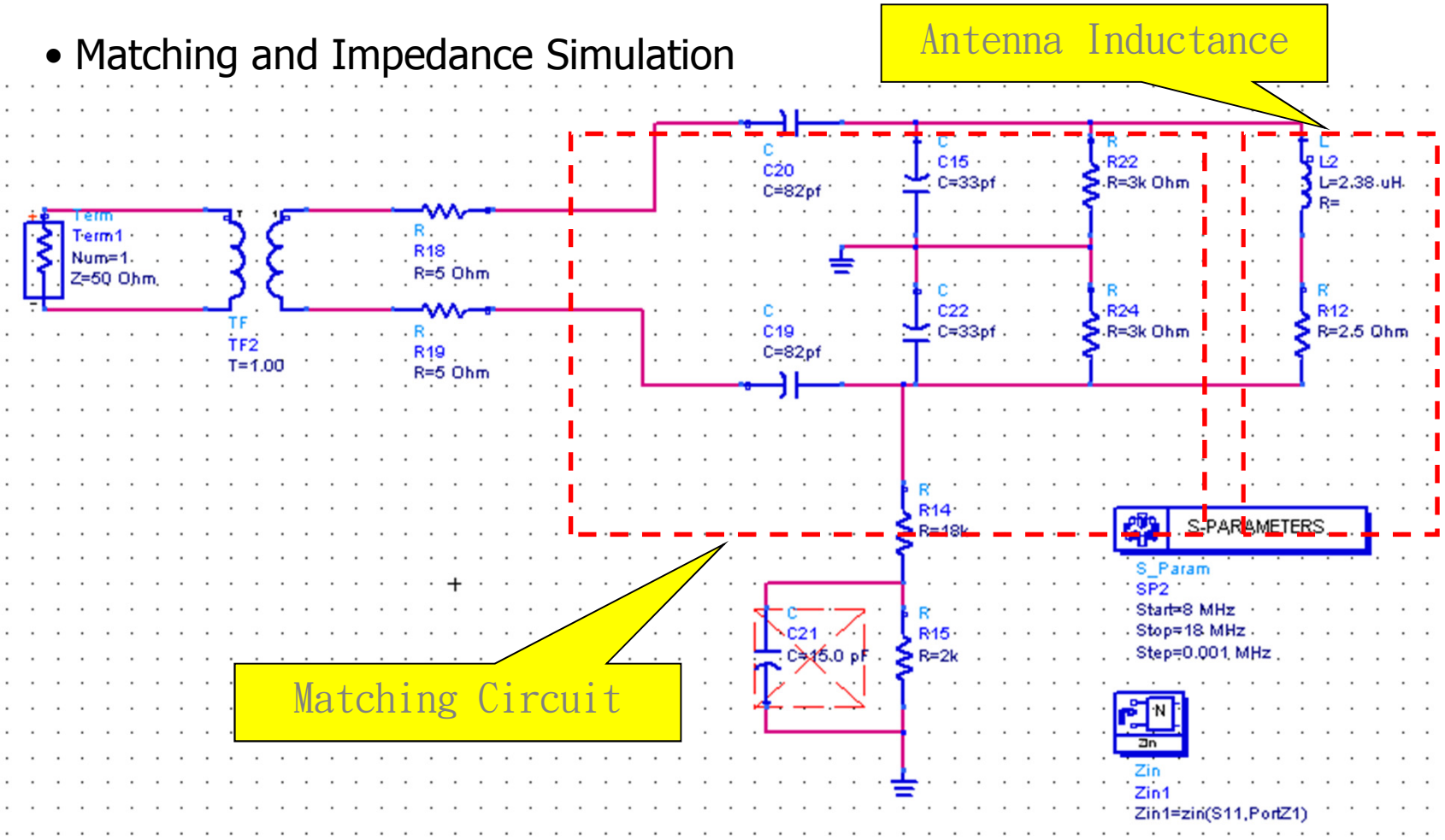
m1
freq=**13.56MHz**
Antares_Demo_Board_S2_ANT_mom..S(1,1)=0.995 / 27.897
impedance = 2.361 + j201.283

Simulation: 2.36+j201 ~= 1R+2.36uH

Measurement: 2.5R+2.38uH

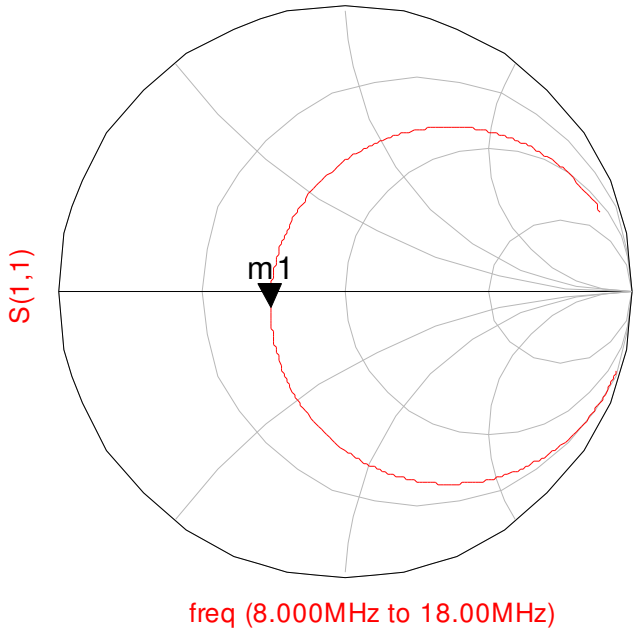
Add Matching Circuit and Simulation

- Matching and Impedance Simulation

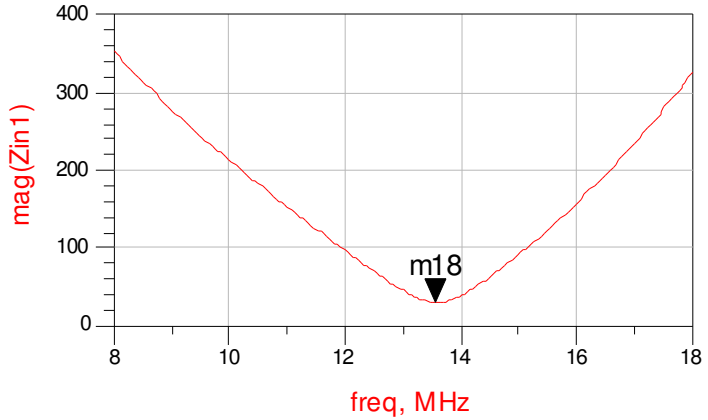


Add Matching Circuit and Simulation

- Matching and Impedance Simulation
  - Recommendatory Zin is around 20 ~ 40 Ohm
  - Too small Zin will cause RR10 output current more than limitation



m1
freq=13.57MHz
S(1,1)=0.265 / -168.180
impedance = 29.257 - j3.416



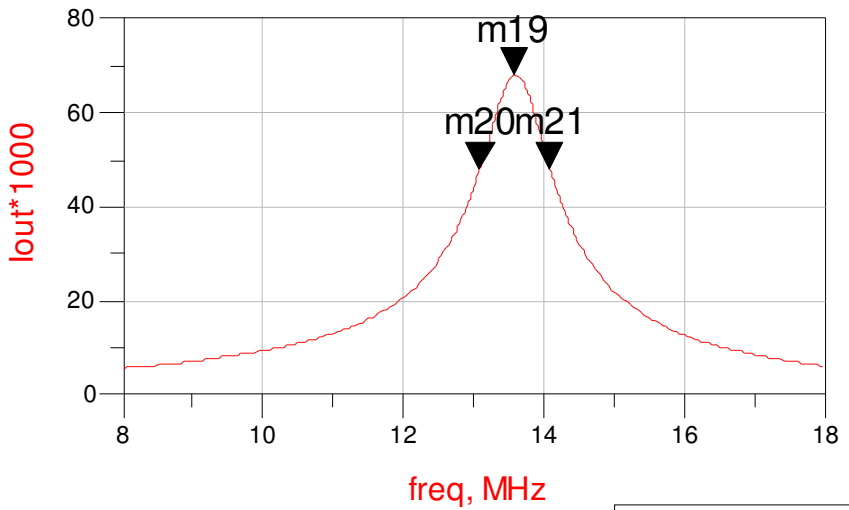
m18
freq=13.56MHz
mag(Zin1)=29.479

Add Matching Circuit and Simulation

- Estimated Iout and BW

Eqn Iout=2/(mag(Zin1))

m19
freq=13.57MHz
Iout*1000=67.886



m20
freq=13.08MHz
Iout*1000=48.041

m21
freq=14.08MHz
Iout*1000=48.015

Eqn I3dB=67.886/1.4142

Eqn BW=14.08-13.08

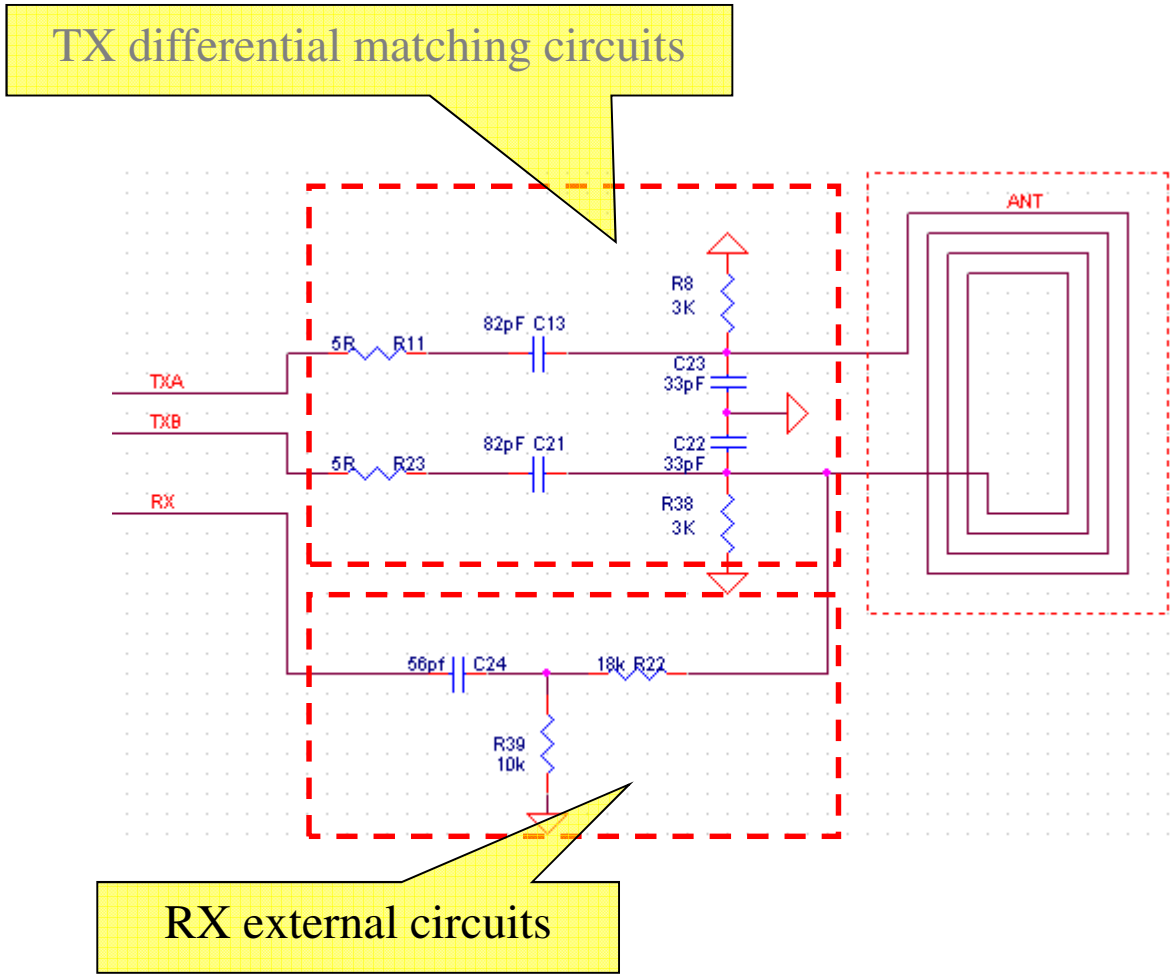
Eqn QL=13.56/BW

I3dB	BW	QL
48.003	1.000	13.560

Iout(p-p)= 68 mA; BW = 1 MHz ; Q=13.5

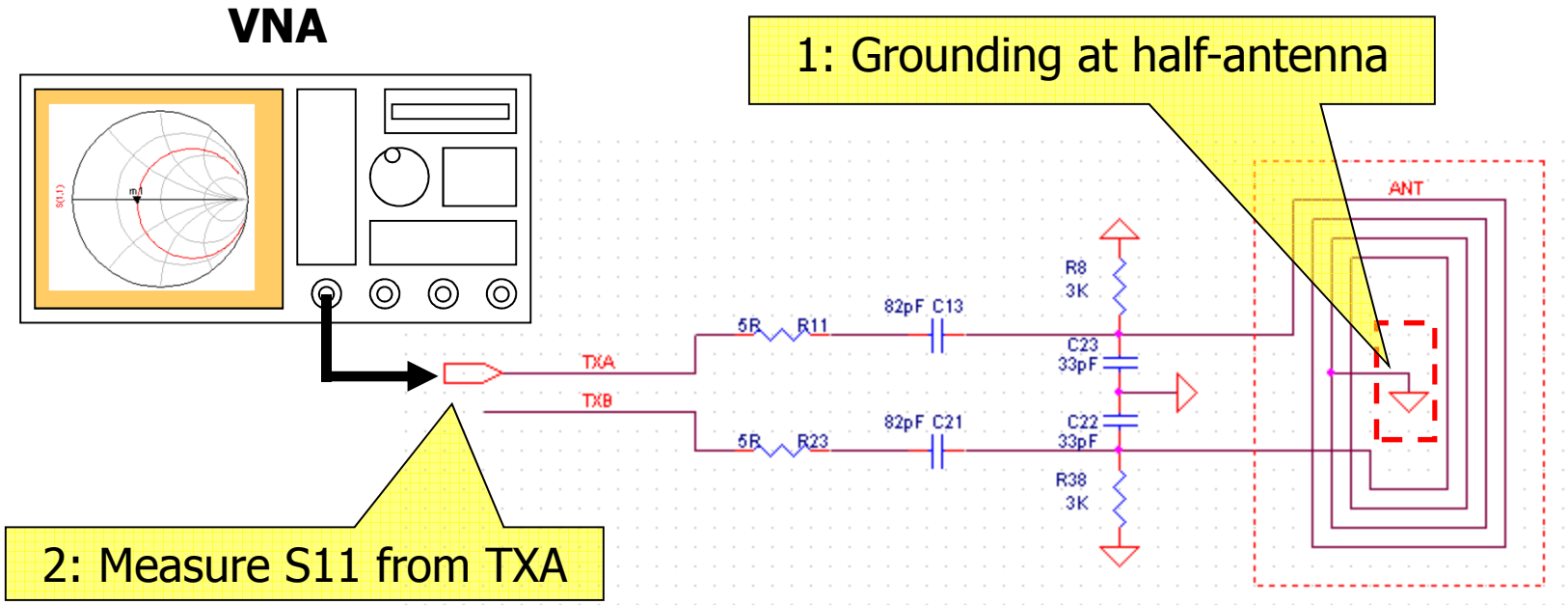
Measure your Matching

- HF TX and RX related circuit



Measure your Matching

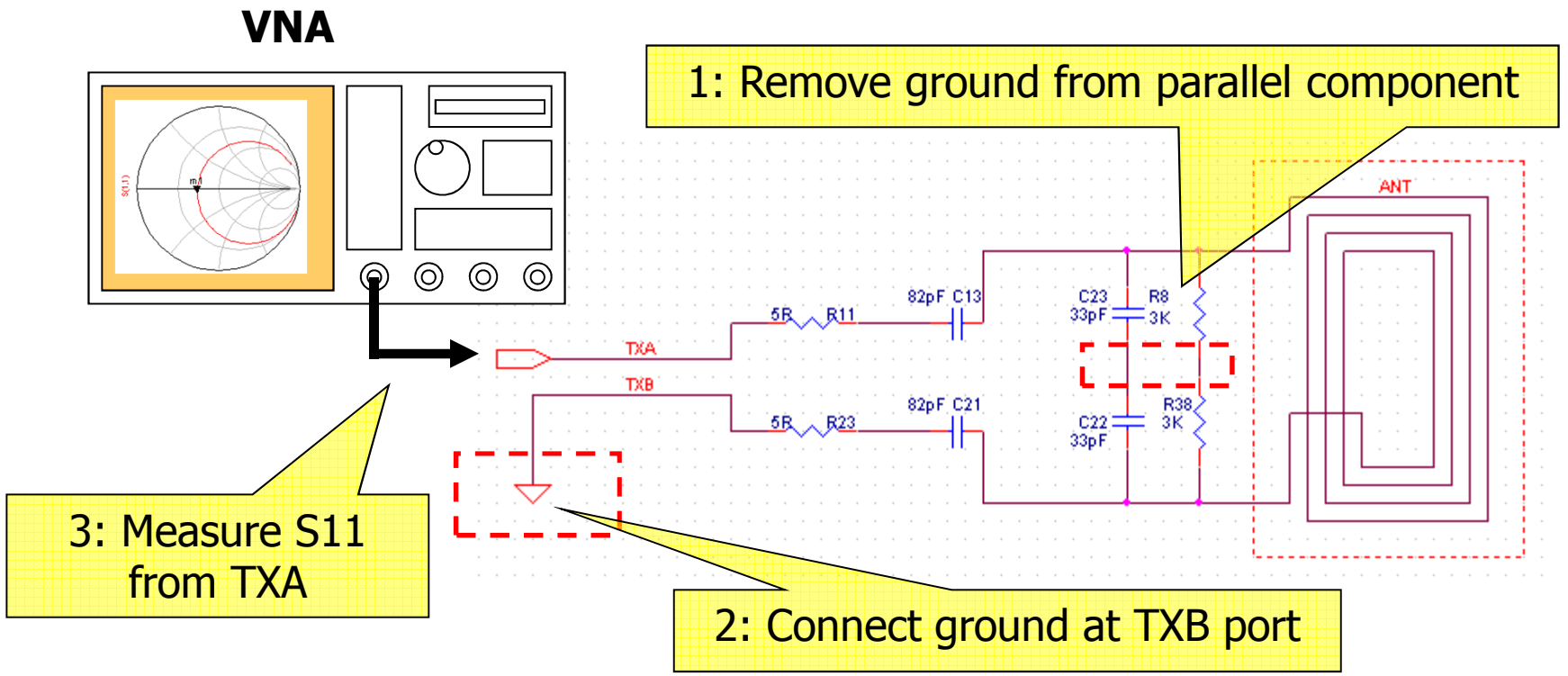
- Method 1 to measure matching



- If you matching to 30Ohm, you can measure around 15 Ohm in the condition

Measure your Matching

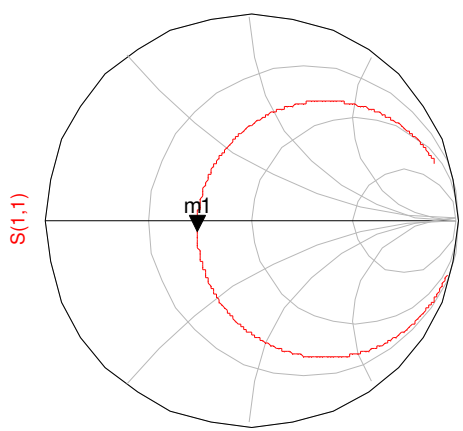
- Method 2 to measure matching

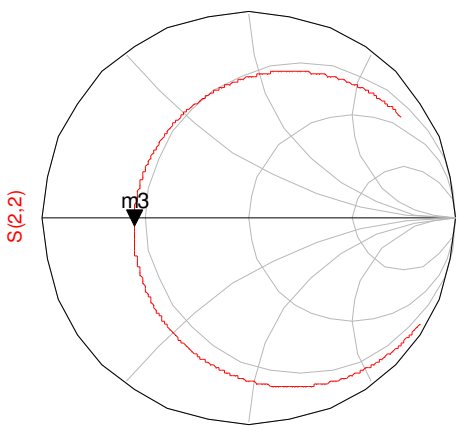


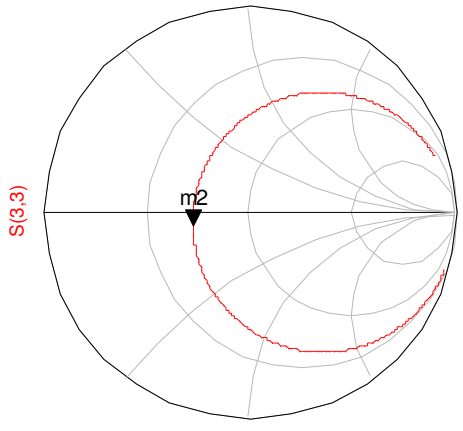
- If your matching is 30Ohm, you can measure around 30 Ohm in the condition

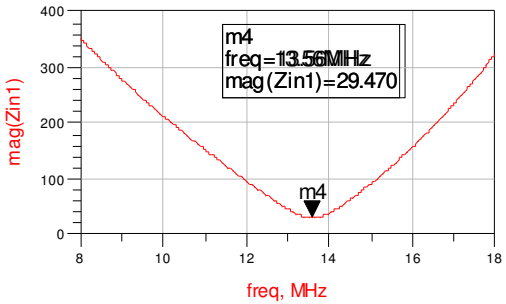
Measure your Matching

- Different measure result of each method

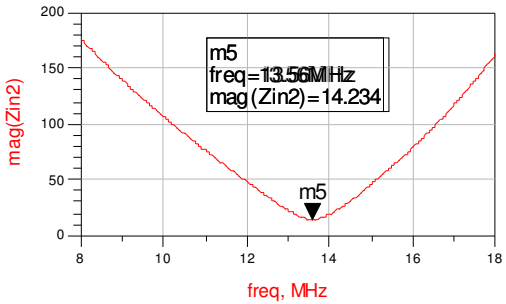




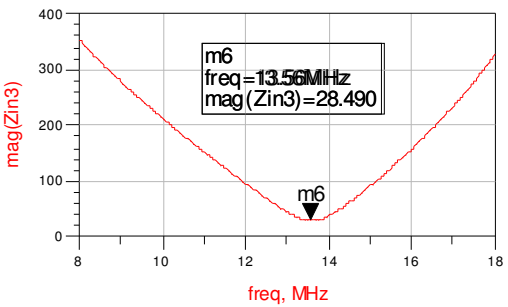




Simulation result



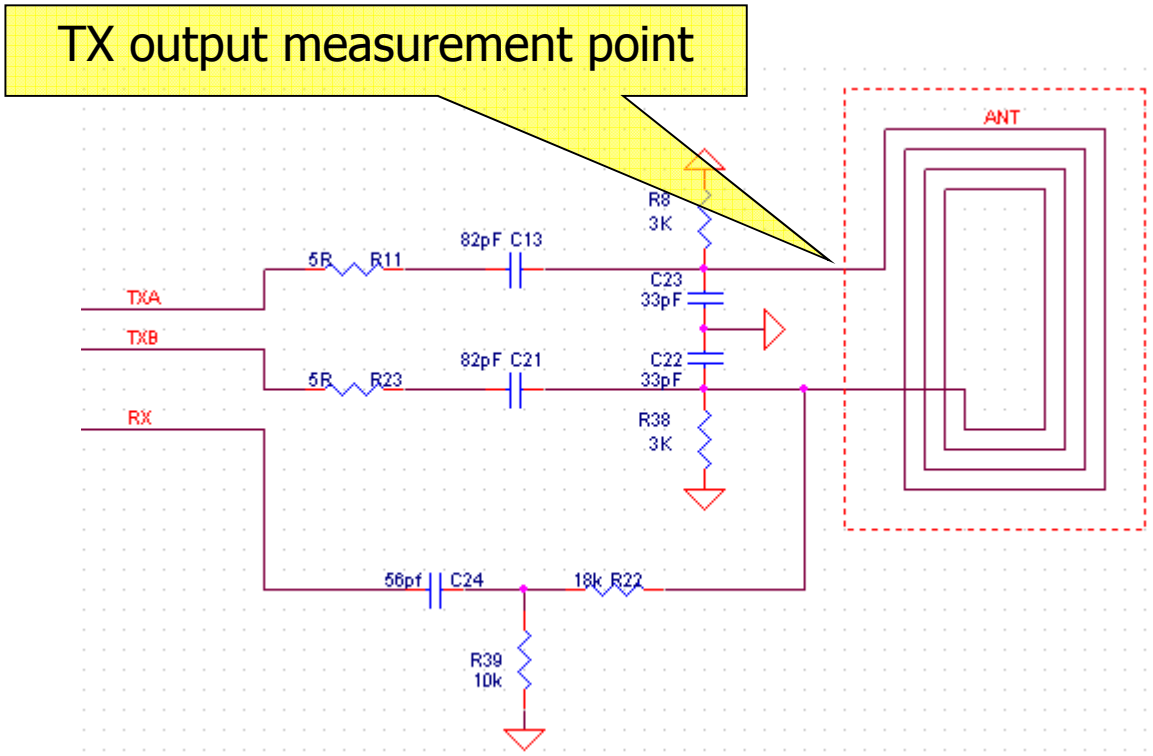
Method 1 impedance



Method 2 impedance

Measure Antenna Coil Voltage

- Recommendatory antenna output voltage is around 10 ~ 20 Vpp at antenna coil to ground.
- You can modify matching circuit Zin to obtain wanted output voltage.



Fine Tune Rx Input Voltage

- Recommendatory RX input voltage is around 0.8 ~ 1.5 Vpp at RX measurement point.
- You can fine tune R39 to obtain suitable voltage.