

SMITHDIAGRAMMET

NanoVNA, smithdiagram og matching

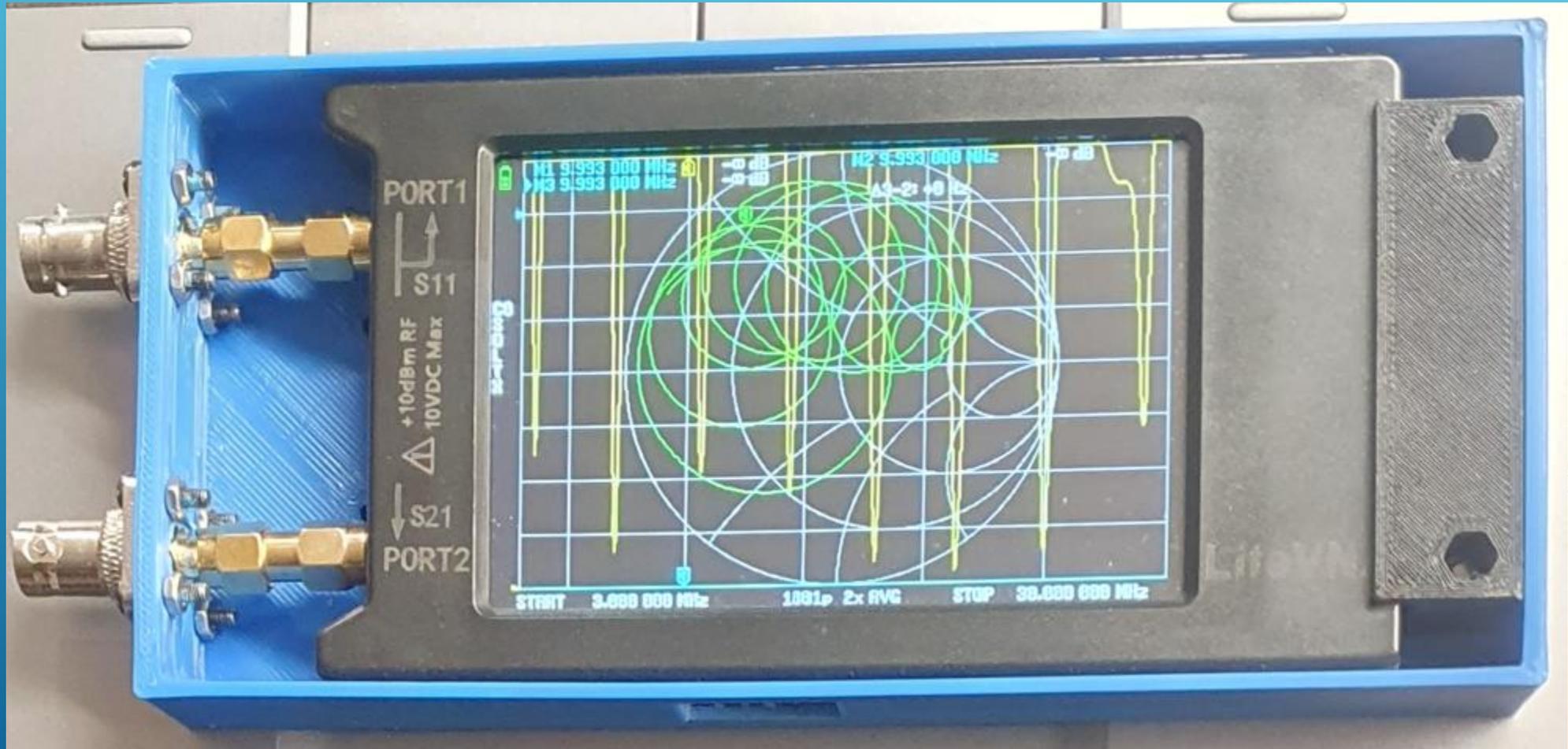


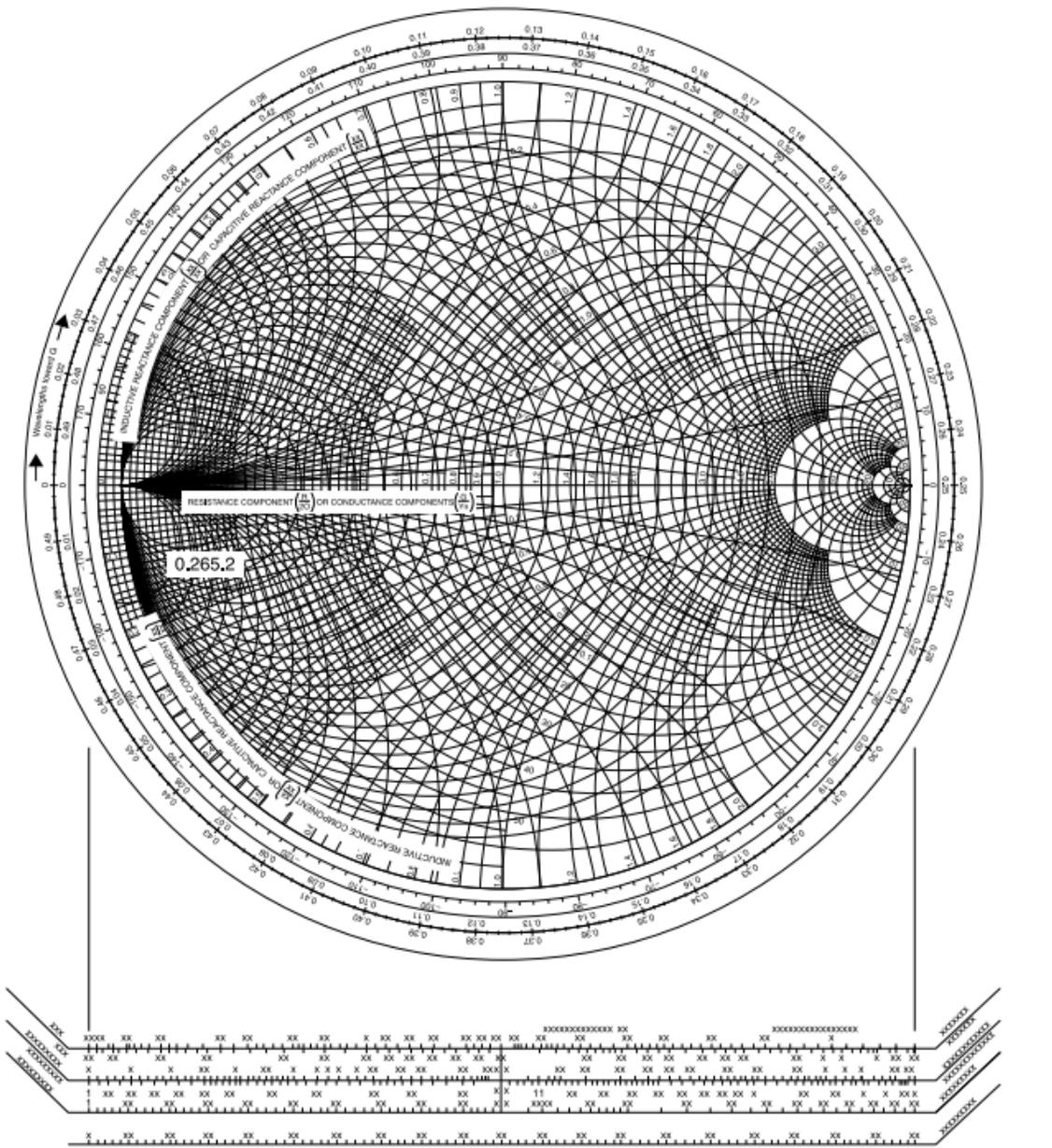
- ▶ Kan utføre det som kalles:
- ▶ Refleksjonsmålinger (s11) og
- ▶ Transmisjonsmålinger (s21)

- ▶ NB! Kalibrering!!! «SOLT(X)»
- ▶ Short – Open – Load (+ eventuelt Transmission (Through - Open))
- ▶ Måler «refleksjons-» og «transmisjons-koeffisienten»
- ▶ Mange måledata beregnes på grunnlag av måleverdiene
- ▶ Lagre måledata som S1P-fil

NANOVNA – LITEVNA64

Eksempel på måledata for en antenne:

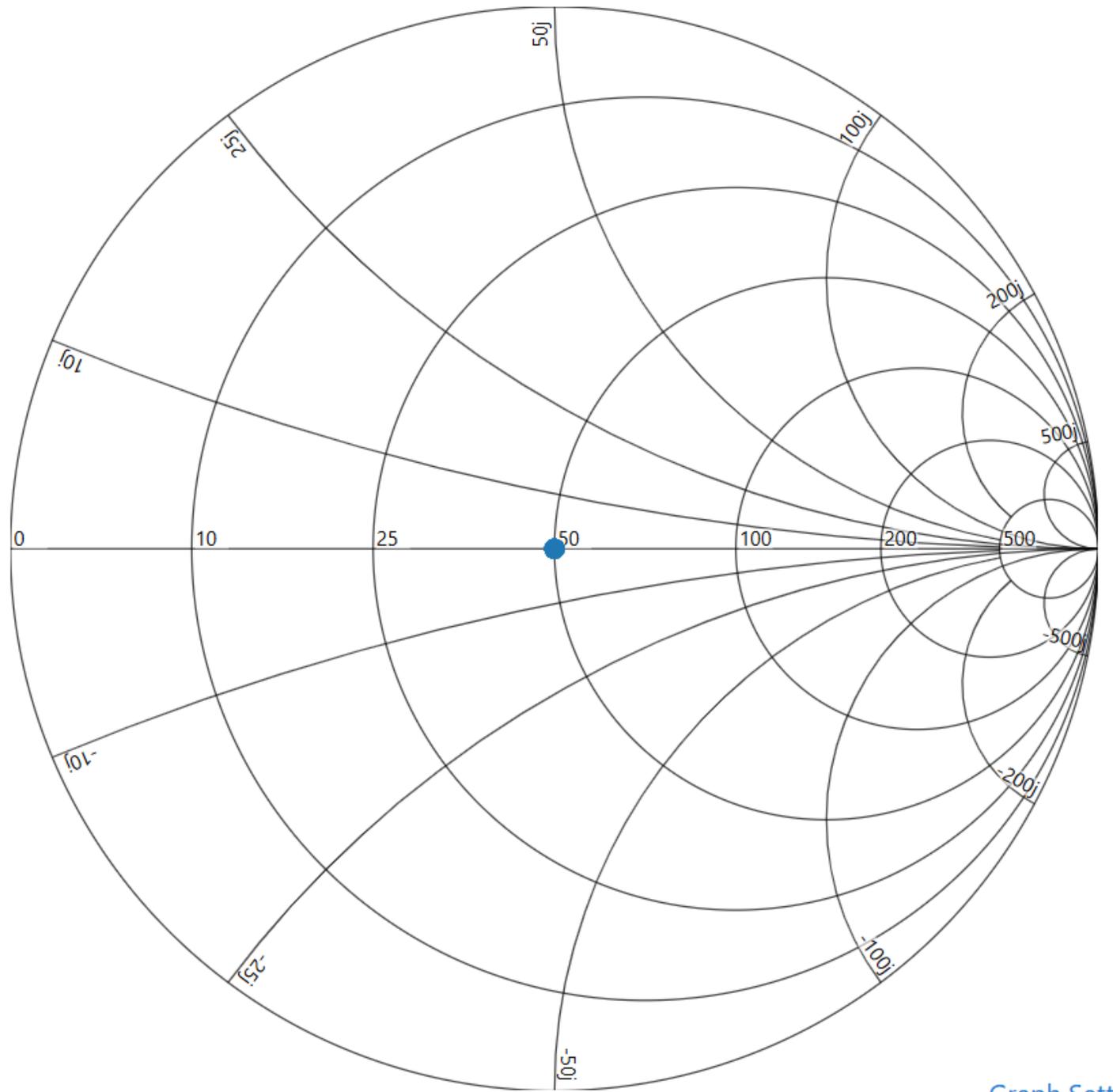




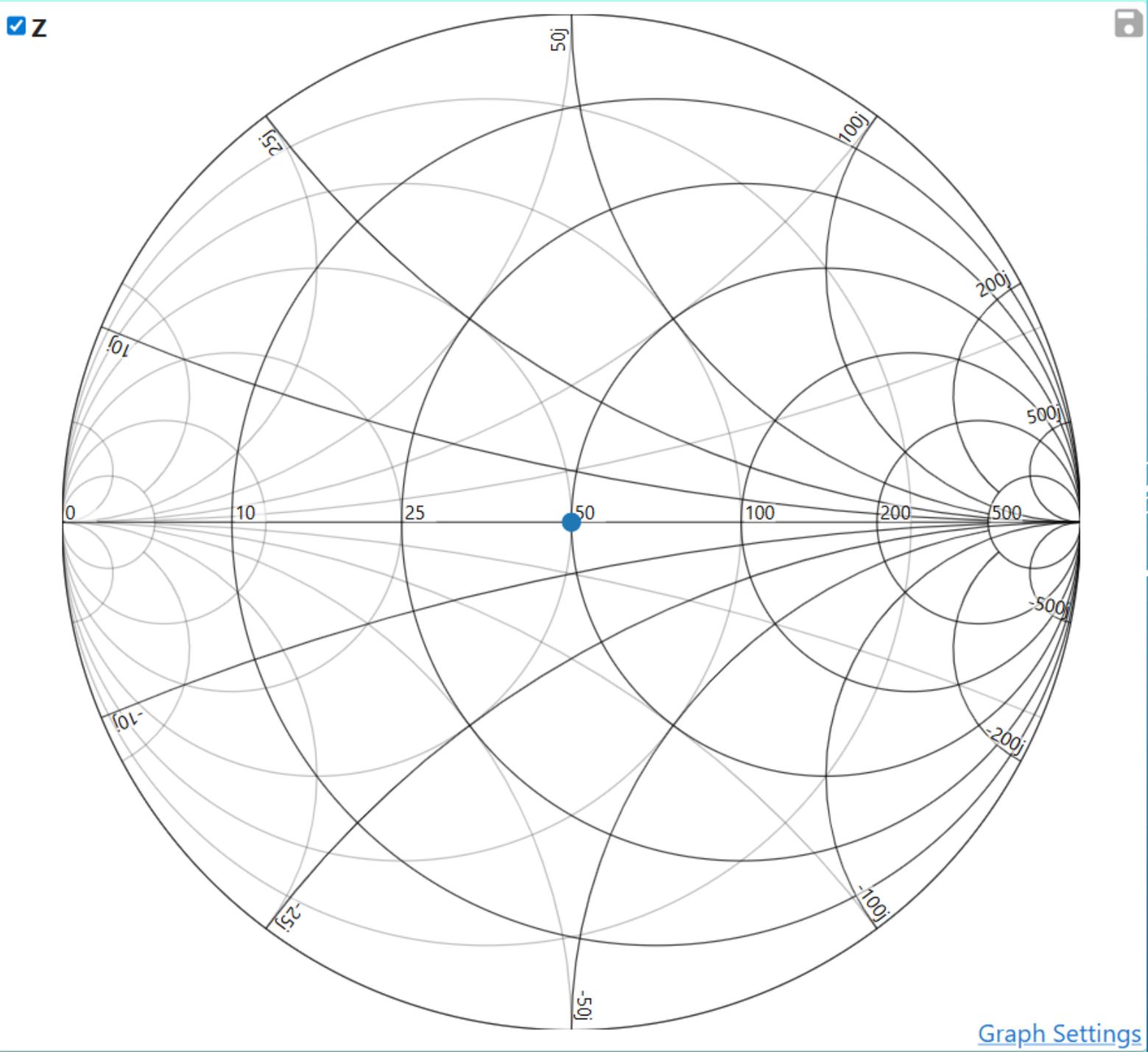
- ▶ Første blikk: kaos av linjer
- ▶ Genial grafisk kalkulator!
- ▶ «oppfunnet» i 1930-årene (Phillip Smith)
- ▶ Plotter inn den komplekse refleksjonskoeffisienten
- ▶ Øvre halvdel: +j (induktiv reaktans)
- ▶ Nedre halvdel: -j (kapasitiv reaktans)
- ▶ Horisontal diagonal: ohmsk motstand
- ▶ Høyre ende: uendelig
- ▶ Venstre ende: kortslutning

▶ <https://onlinesmithchart.com/>

Z

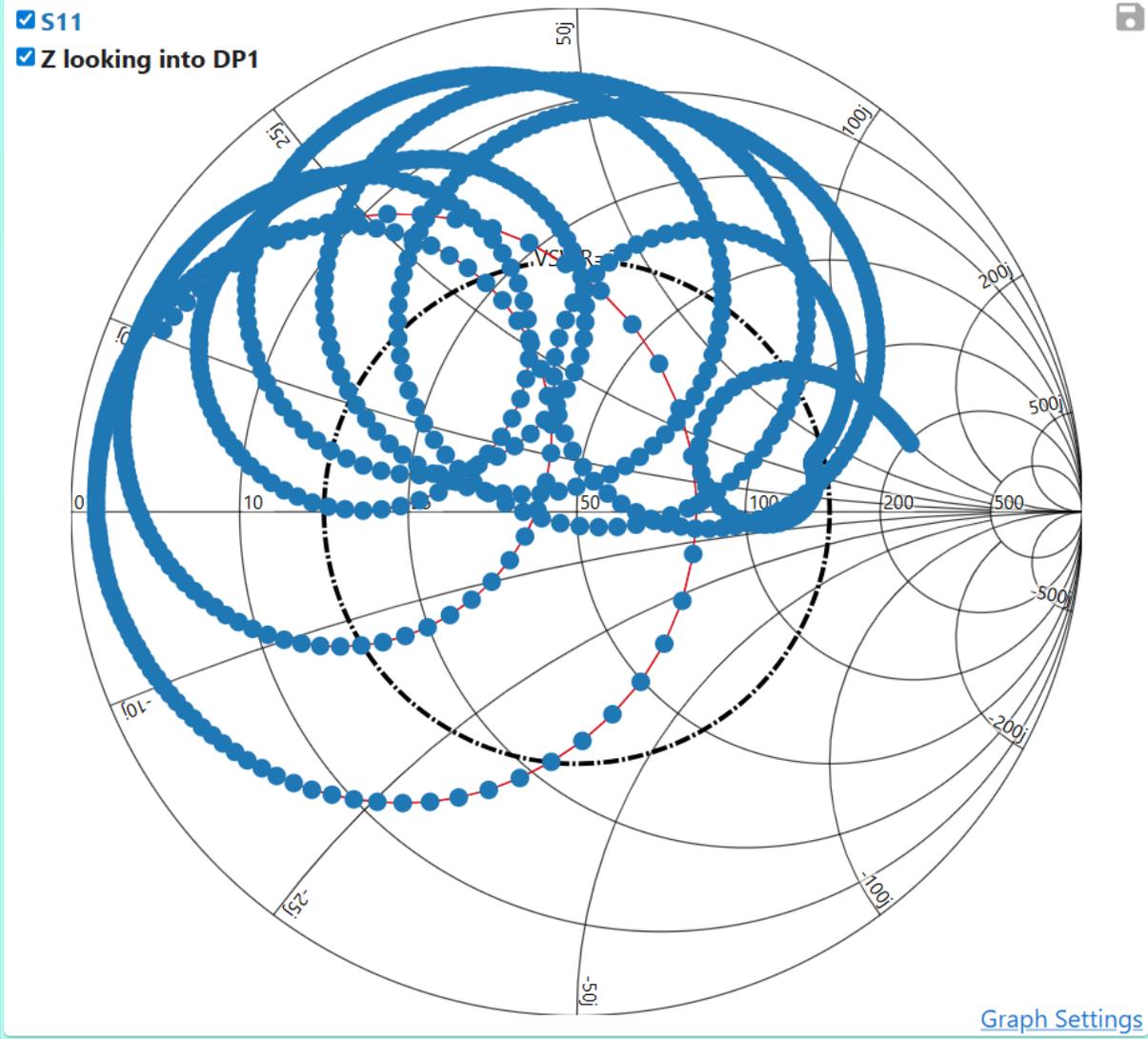


- ▶ Med impedans- og admittans-sirkler



- ▶ Eksempel på en S1P-fil (Touchstone)

```
!File created by NanoVNA
# Hz S RI R 50
3000000 -0.818051008 0.360309856
3027000 -0.796773184 0.387697504
3054000 -0.771288128 0.415286208
3081000 -0.743660992 0.441816160
3108000 -0.711809536 0.468655424
3135000 -0.675768000 0.493383424
3162000 -0.637481216 0.517214464
3189000 -0.593020288 0.538655232
3216000 -0.546674560 0.558156608
3243000 -0.493141280 0.573836096
3270000 -0.436671584 0.585480064
```



► Plukke ut data:

!File created by NanoVNA

# Hz	S	RI	R 50
3000000	-0.818051008	0.360309856	
3027000	-0.796773184	0.387697504	
3054000	-0.771288128	0.415286208	
3081000	-0.743660992	0.441816160	
3108000	-0.711809536	0.468655424	
3135000	-0.675768000	0.493383424	
3162000	-0.637481216	0.517214464	
3189000	-0.593020288	0.538655232	
3216000	-0.546674560	0.558156608	
3243000	-0.493141280	0.573836096	
3270000	-0.436671584	0.585480064	
3297000	-0.374367136	0.591304256	
3324000	-0.308354048	0.589648576	
3351000	-0.239572416	0.581300672	
3378000	-0.166816224	0.562840320	
3405000	-0.094273816	0.533905504	
3432000	-0.022220338	0.492117312	
3459000	0.047054872	0.438744192	

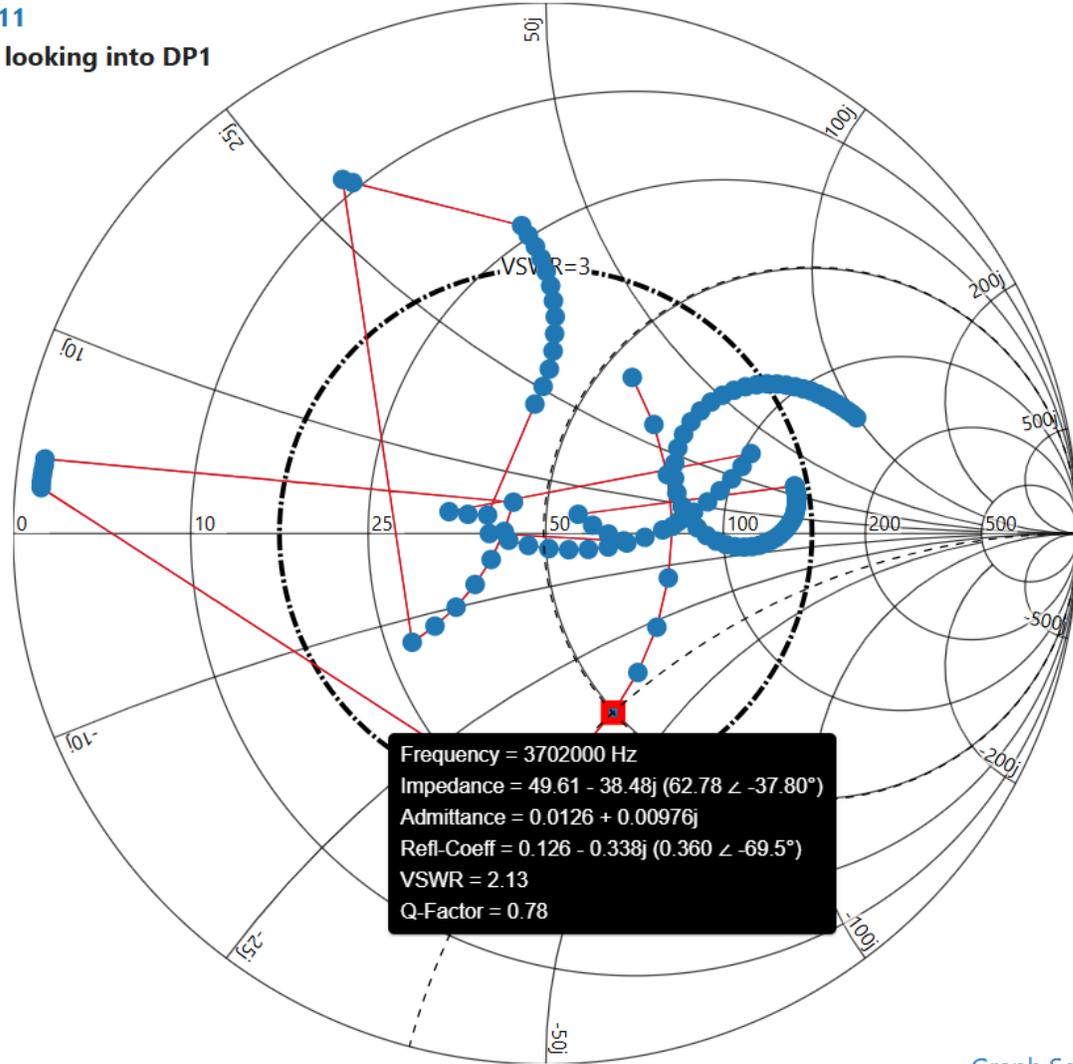
!File created by NanoVNA

# Hz	S	RI	R 50
3513000	0.162432544	0.294233632	
3540000	0.202936688	0.205660672	
3567000	0.228213840	0.1111166432	
3594000	0.237970736	0.013646368	
3621000	0.230279504	-0.083644496	
3648000	0.208585920	-0.176690800	
3675000	0.172890032	-0.261738448	
3702000	0.126448032	-0.337516832	
3729000	0.070592120	-0.401872416	
3756000	0.011156389	-0.454895872	
3783000	-0.050362328	-0.496358624	
5268000	-0.947304000	0.086418064	
5295000	-0.947163328	0.097408664	
5322000	-0.945539968	0.108619080	
5349000	-0.943969792	0.118621904	
5376000	-0.941609216	0.129290448	
5403000	-0.940219072	0.140487696	
7023000	-0.060572824	0.059056940	

Open src Simplify Exit

S11

Z looking into DP1

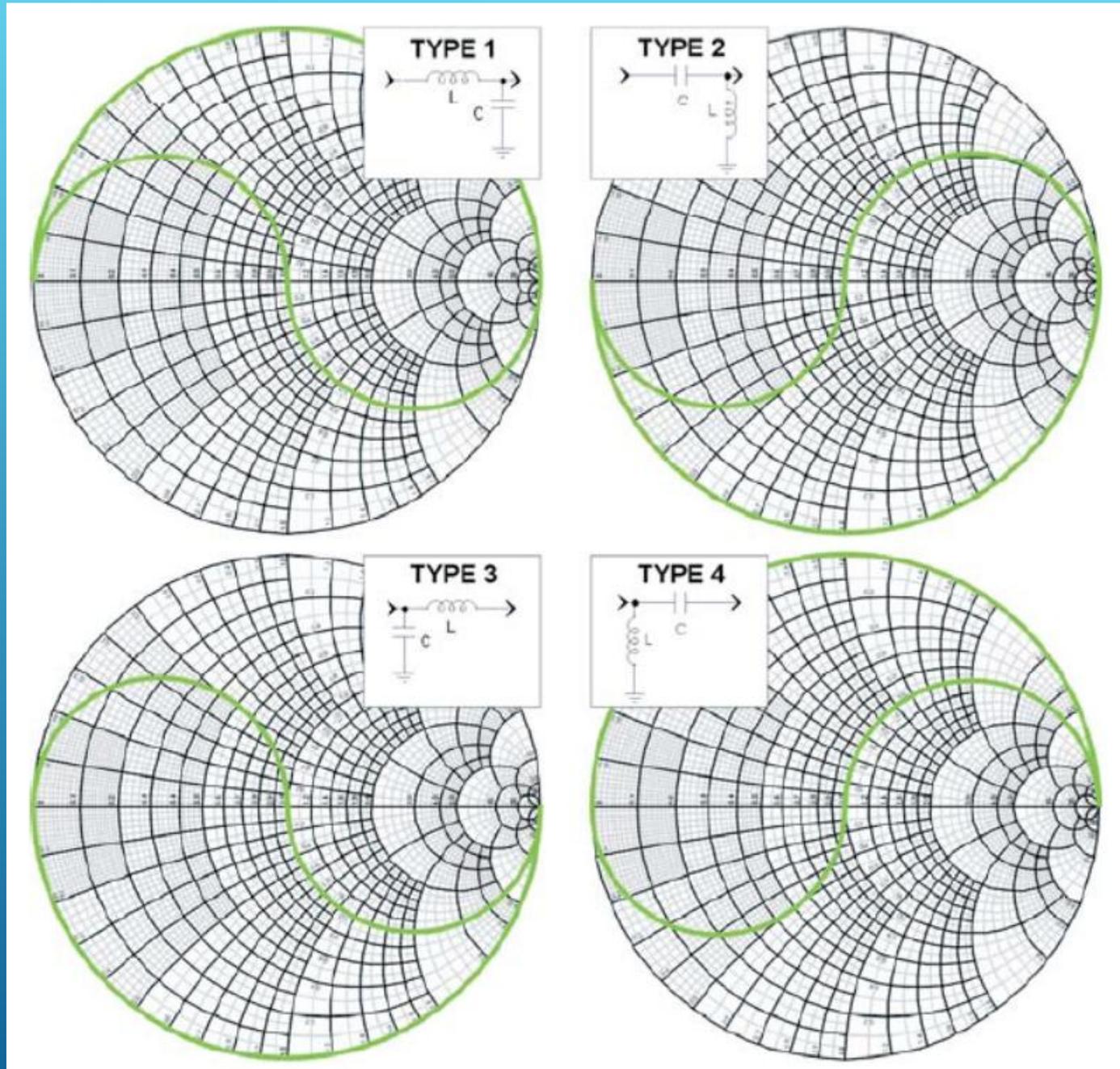
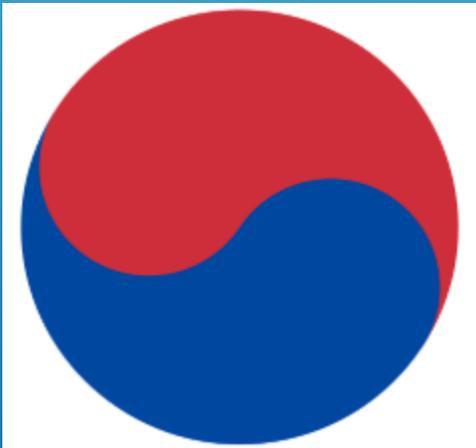


[Graph Settings](#)

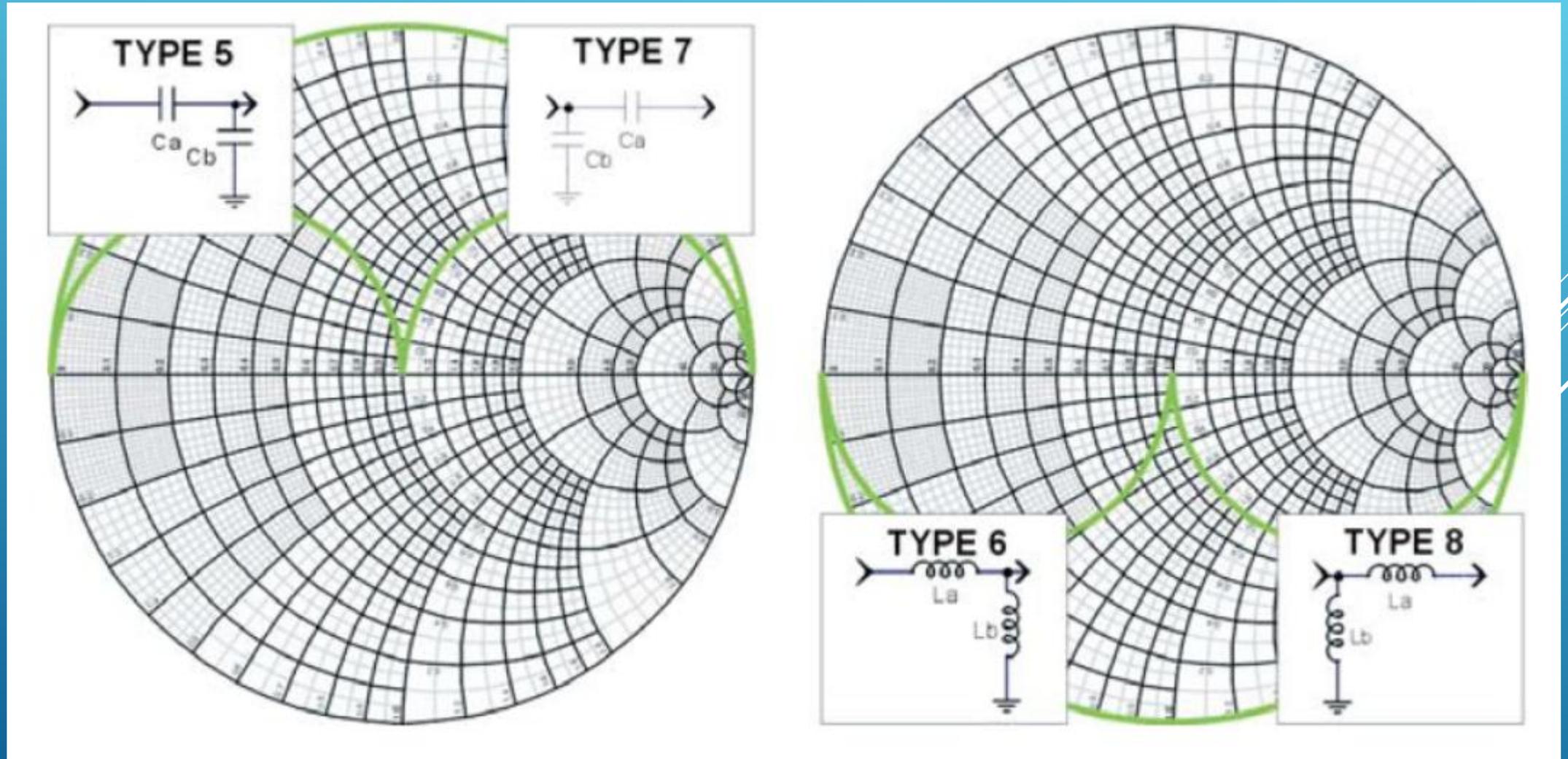
- ▶ «Yin-Yang»
- ▶ Match følgende: 3,702MHz: $Z = 49.61 - j38.48$ VSWR=2.13
- ▶ Bruk av Pasan – to alternativer for perfekt match
- ▶ Kalibreringsplan og måleledning

MATCHING

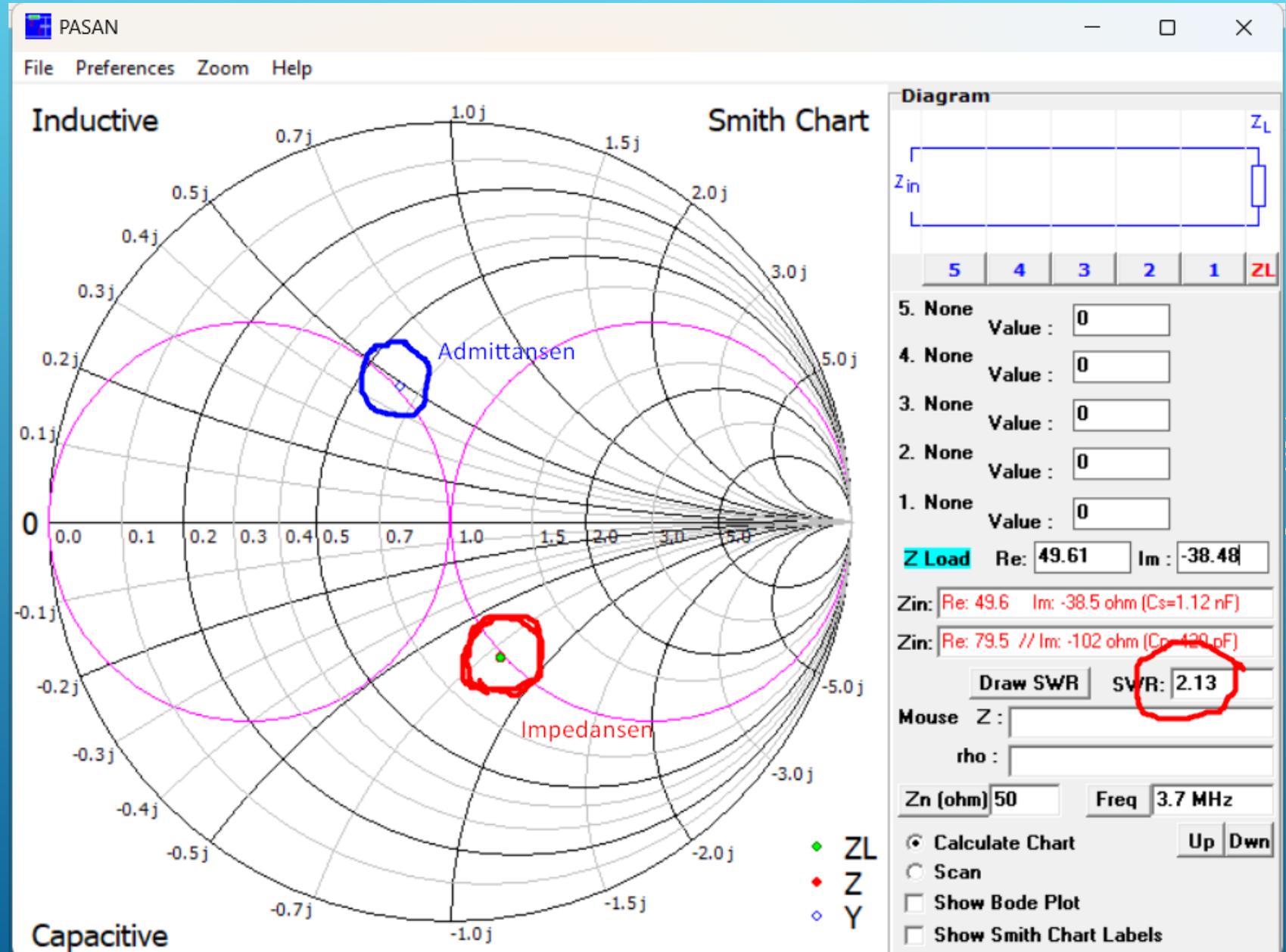
► Yin-Yang



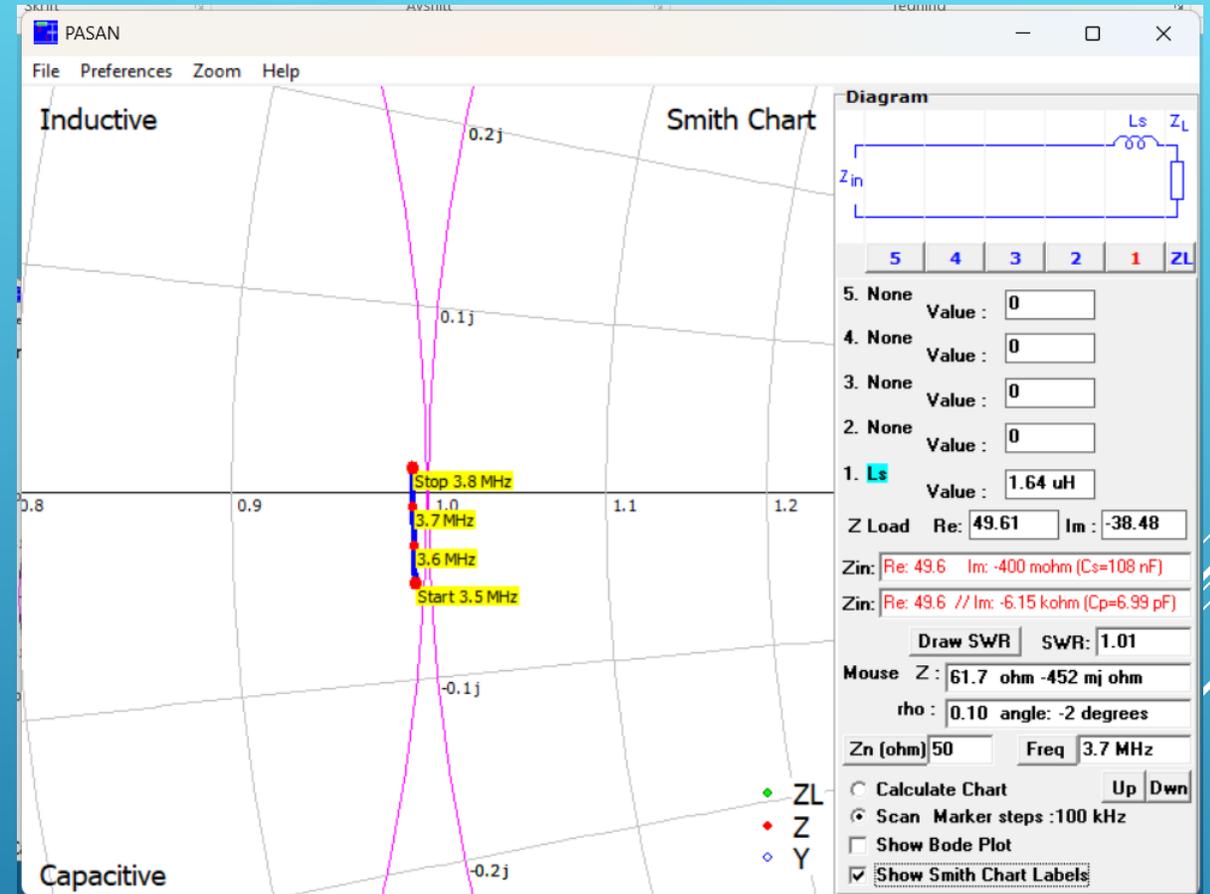
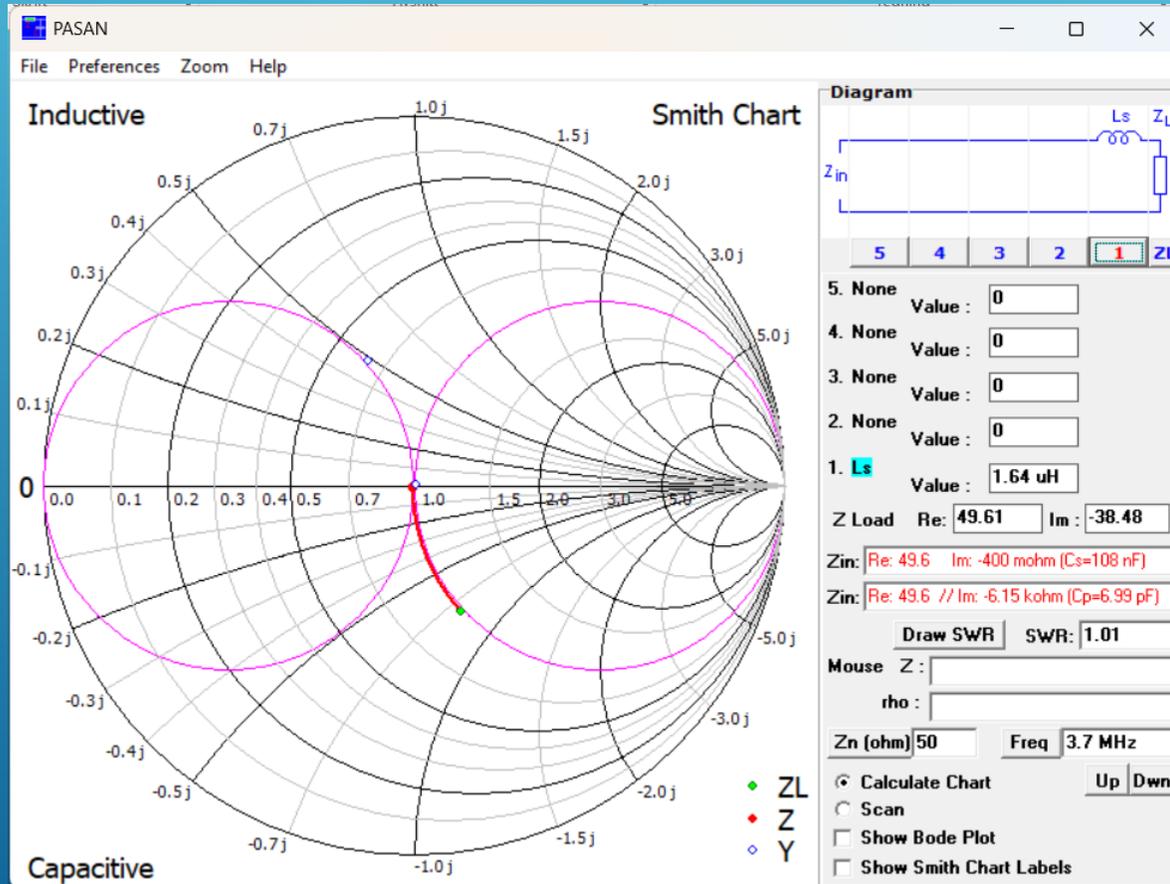
► To ekstra!



- ▶ Impedansen lagt inn i Pasan



► Litt «dum» impedans å matche



- ▶ Vise bruk av Pasan.... så langt tiden tillater eller dere vil.....
- ▶ Kilder:

<https://onlinesmithchart.com/>

http://science4all.nl/?Electronics__Pasan

https://www.highfrequencyelectronics.com/Mar06/HFE0306_Rhea.pdf

<https://picture.iczhiku.com/resource/eetop/wHKGwURIfpruSNcm.pdf>

<https://kj.skontorp.net/>

