

JUAS 2020 – RF tutorial (solutions)

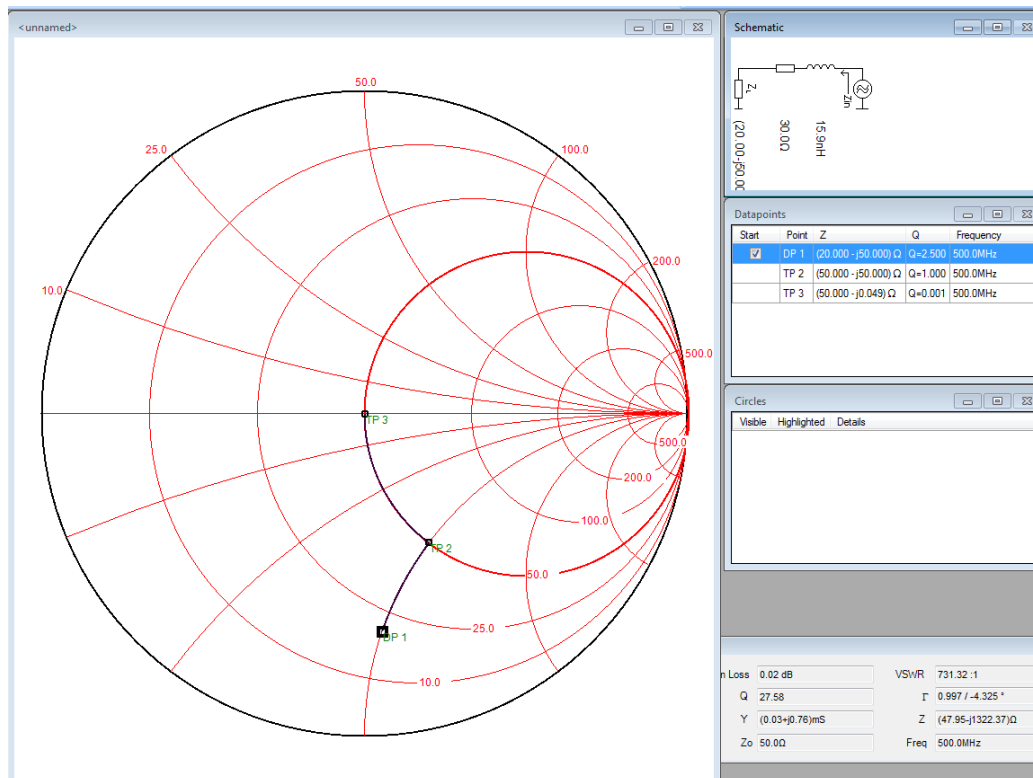
F. Caspers, M. Bozzolan, M. Wendt

Smith chart

1.)

Z_L	C Series	L Series	R Series
$Z = (50 + j25) \Omega$	12.7 pF	-	-
$Z = (50 - j25) \Omega$	-	8 nH	-
$Z = (4 + j21) \Omega$	15.2 pF	-	46.1 Ω
$Z = (20 - j50) \Omega$	-	15.9 nH	30 Ω

Screenshot of the last solution:



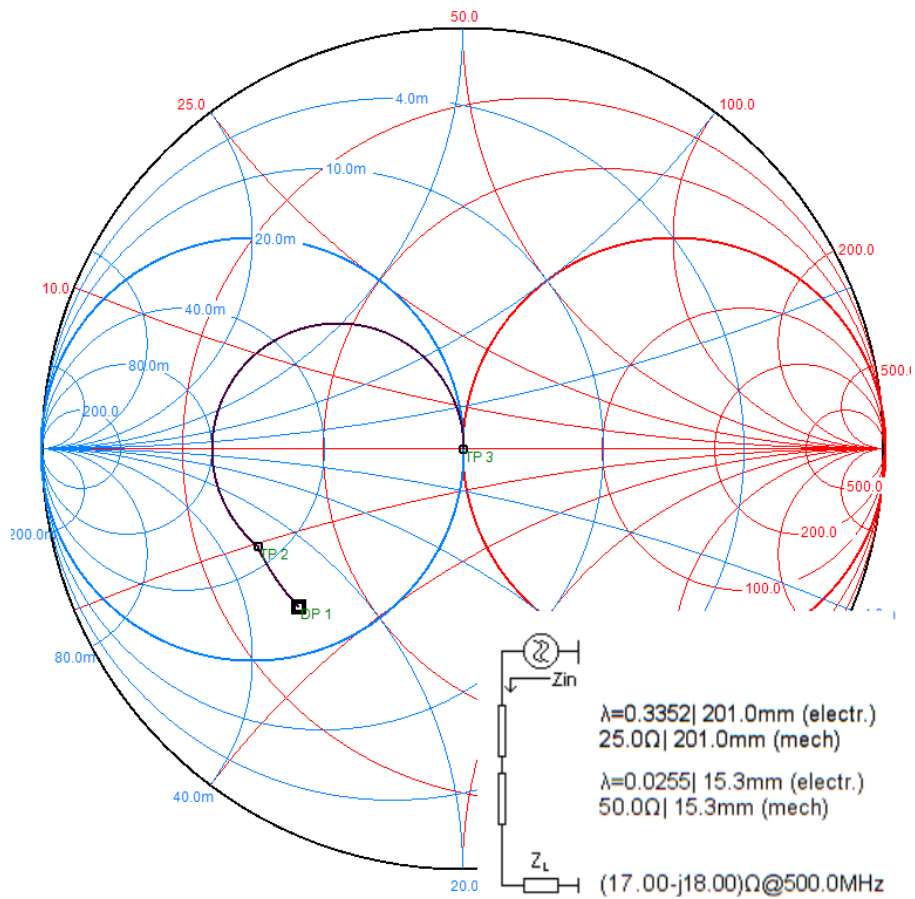
2.)

Z_L	C Shunt	L Shunt	R Shunt
$Z = (50 + j25) \Omega$	2.5 pF	-	257 Ω
$Z = (50 - j25) \Omega$	-	39.8 nH	257 Ω
$Z = (4 + j21) \Omega$	14.6 pF	-	89.8 Ω
$Z = (20 - j50) \Omega$	-	18.5 nH	76 Ω

3.) Multiple solutions are possible. The first element (closest to Z_L) is marked with a *.

Z_L	C Series	L Series	C Shunt	L Shunt
$Z = (32 - j66) \Omega$	-	24.5 nH	-	101.3 nH*
$Z = (13 - j9) \Omega$	24.5 pF*	-	-	9.5 nH
$Z = (37 + j34) \Omega$	26 pF*	-	3.8 pF	-
$Z = (78 + j78) \Omega$	4.4 pF	-	-	108 nH*

4.) Multiple solutions are possible.



5. Smith Chart + RLC circuit

$$C_{\text{shunt}} = 6.4 \text{ pF}$$

$$L_{\text{shunt}} = 15.8 \text{ nH}$$

$$R_{\text{critical}} = 1 \text{ k}\Omega$$