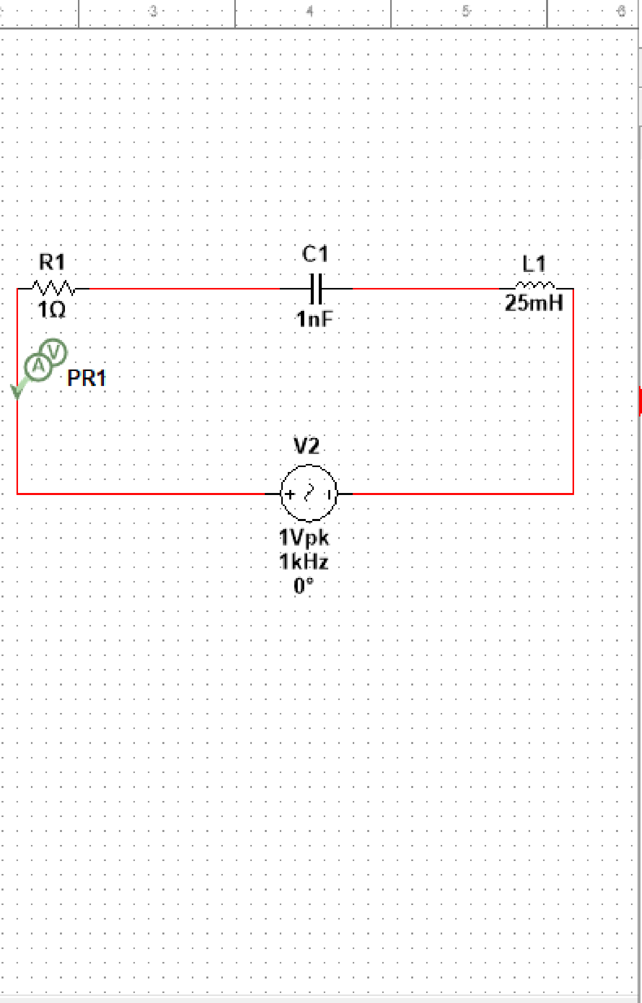
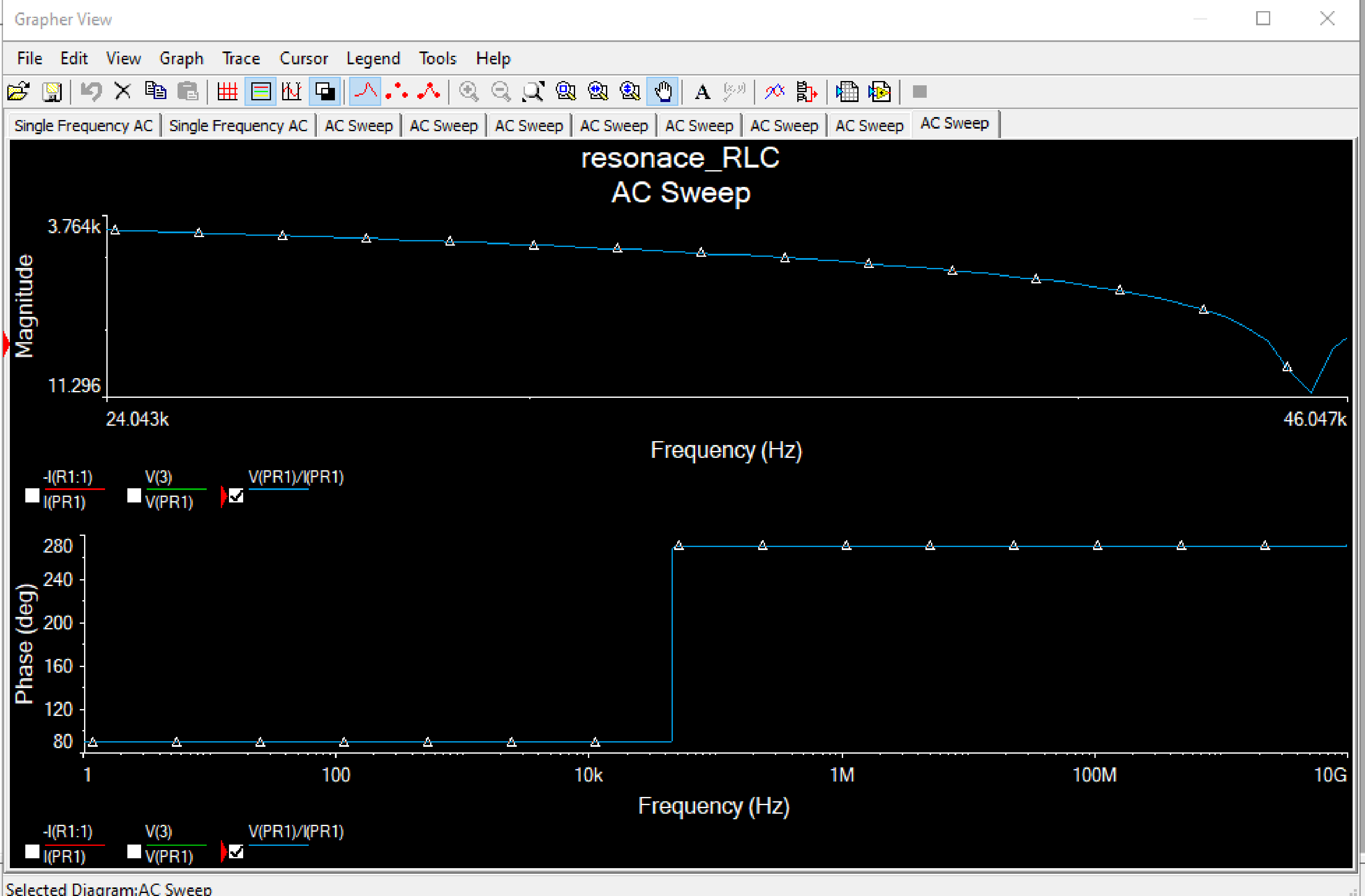
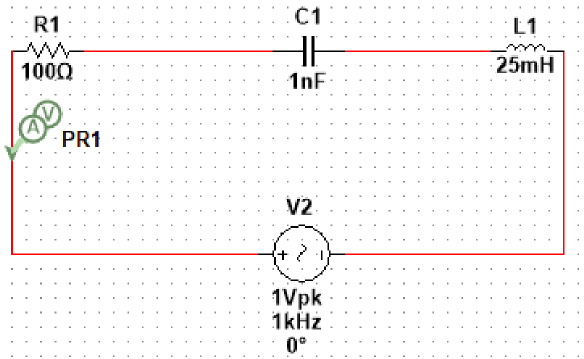
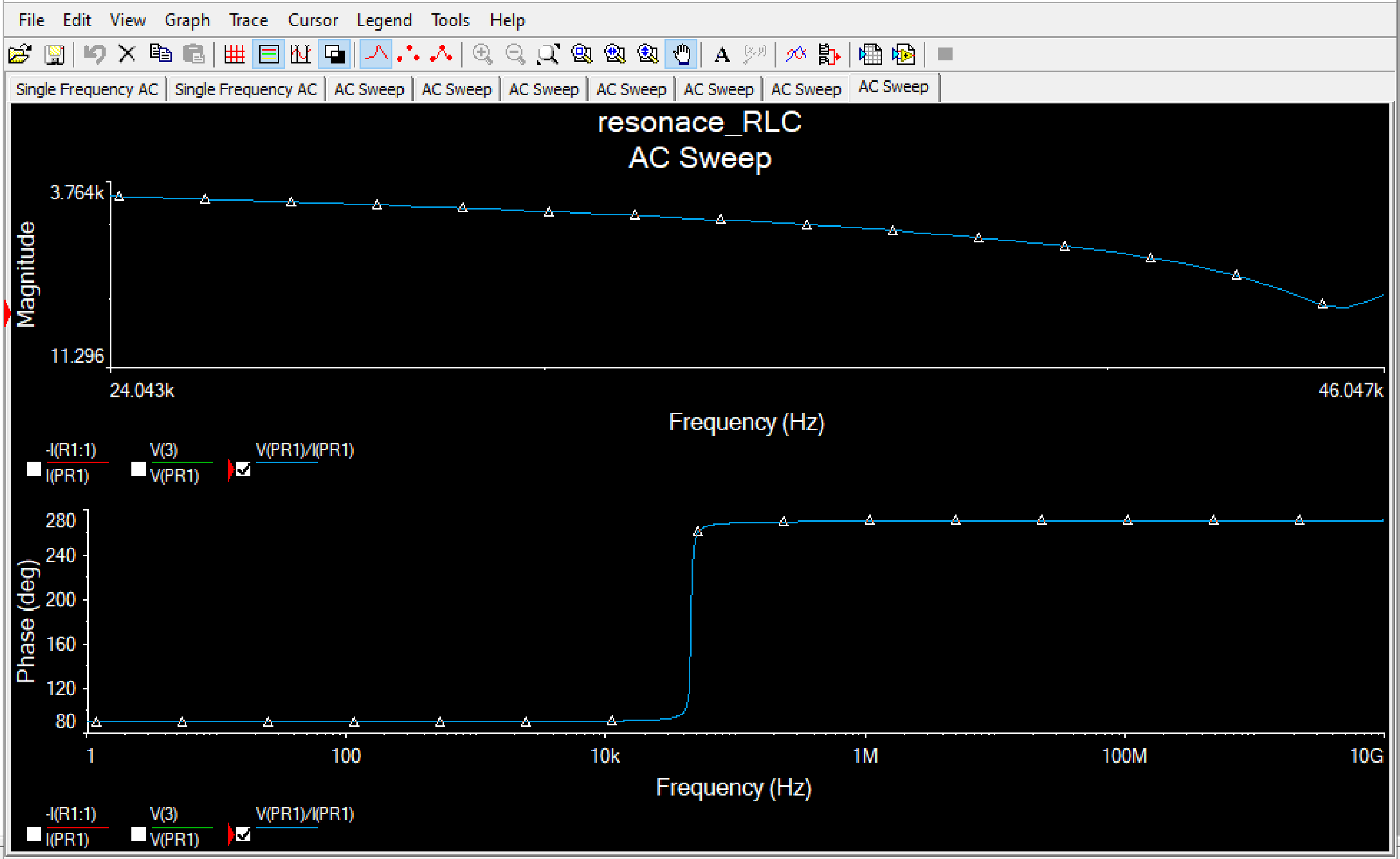

R1
1Ω
C1
1nF
L1
25mH
PR1
V2
1Vpk
1kHz
0°


Grapher View
File Edit View Graph Trace Cursor Legend Tools Help
Single Frequency AC
Single Frequency AC
AC Sweep
resonace_RLC
AC Sweep
3.764k
11.296
Magnitude
24.043k
46.047k
Frequency (Hz)
-I(R1:1)
I(PR1)
V(3)
V(PR1)
V(PR1)/I(PR1)
280
240
200
160
120
80
Phase (deg)
1
100
10k
1M
100M
10G
Frequency (Hz)
-I(R1:1)
I(PR1)
V(3)
V(PR1)
V(PR1)/I(PR1)
Selected Diagram:AC Sweep


R1
100Ω
C1
1nF
L1
25mH
PR1
V2
1Vpk
1kHz
0°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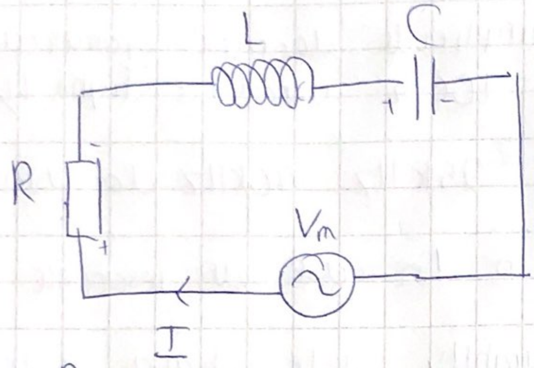
I(PR1)
V(3)
V(PR1)
V(PR1)/I(PR1)

RLC - Resonance

1/



Since ~~Us in~~ Resonance frequency f_R appears when the inductive reactance (Z_L) of inductor equal to capacitive reactance (Z_C) of capacitor. Thus we have

$$Z_L = Z_C \Leftrightarrow 2\pi f_R L = \frac{1}{2\pi f_R C}$$

$$\Leftrightarrow 4\pi^2 f_R^2 = \frac{1}{LC}$$

$$\Leftrightarrow f_R^2 = \frac{1}{4\pi^2 LC} \Leftrightarrow \boxed{f_R = \frac{1}{2\pi\sqrt{LC}}}$$

2/ Since f_R above equation does not depend on R, in both (a) & (b)

we have $f_R = \frac{1}{2\pi\sqrt{LC}} = \frac{1}{2\pi\sqrt{(25\cdot 10^{-3})(1\cdot 10^{-9})}} \approx 31831$ Hz

≈ 32 kHz

3/ (a) the two Plots represent the amplitude & phase angle of the total impedance Z. Since Z is complex number, it can be presented in polar form, which consisting amplitude & phase angle in frequency domain

(b) In case of 1Ω the amplitude decrease dramatically at near 40KHZ while 100Ω it reduce slightly. Both are considered in 25KHz - 40KHz domain

(c) In ~~frequ~~ phase angle in 1Ω case at resonance frequency, it increase straightly while change in 100Ω is slightly a bit