

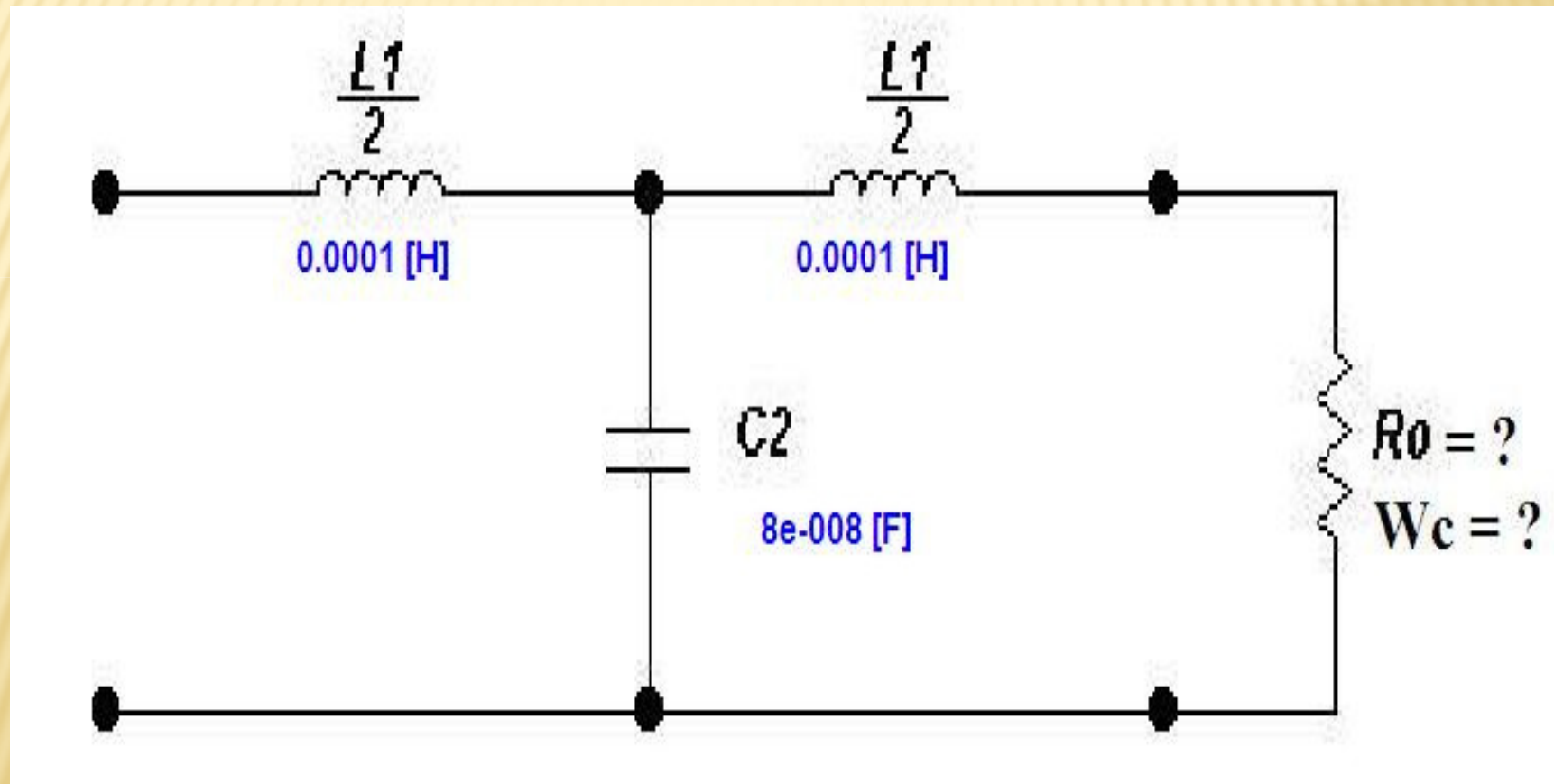
TRABAJO
PRÁCTICO
FILTROS KCTE
2015

TEMA 1: EN EL CIRCUITO DE LA FIGURA DETERMINE:

A) TIPO DE FILTRO

B) IMPEDANCIA CARACTERÍSTICA

C) PULSACIÓN Y FRECUENCIA DE CORTE



TEMA 1: FILTRO PASA-BAJOS Kcte

$$\frac{L_1}{2} = 100[uH] \quad \therefore L_1 = 200[uH]$$

$$C_2 = 80[nF]$$

$$R_o = \sqrt{\frac{L_1}{C_2}} = \sqrt{\frac{200 \times 10^{-6}}{80 \times 10^{-9}}} = 50 [\Omega]$$

$$\omega_c = \frac{2}{\sqrt{L_1 \times C_2}} = \frac{2}{\sqrt{200 \times 10^{-6} \times 80 \times 10^{-9}}} = 500000[rps]$$

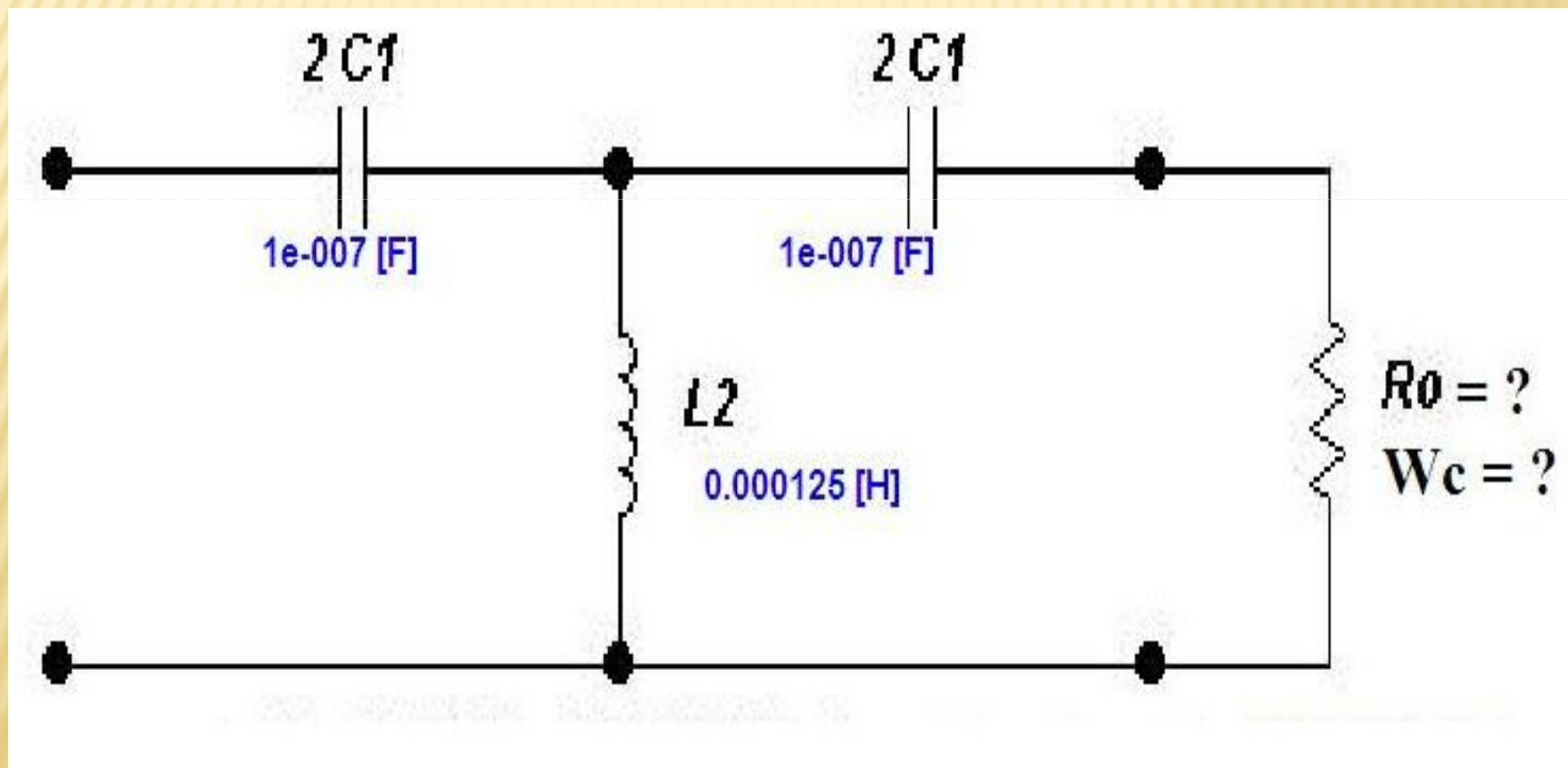
$$f_c = \frac{\omega_c}{2 * \pi} = \frac{500000[rps]}{2 * \pi} = 79577,47[Hz]$$

TEMA 2: EN EL CIRCUITO DE LA FIGURA DETERMINE:

A) TIPO DE FILTRO

B) IMPEDANCIA CARACTERÍSTICA

C) PULSACIÓN Y FRECUENCIA DE CORTE



TEMA 2: FILTRO PASA-ALTOS Kcte

$$2C_1 = 0,1[uF] \quad \therefore C_1 = 50[nF]$$

$$L_2 = 125[uH]$$

$$R_o = \sqrt{\frac{L_2}{C_1}} = \sqrt{\frac{125 \times 10^{-6}}{50 \times 10^{-9}}} = 50 [\Omega]$$

$$\omega_c = \frac{1}{2 \times \sqrt{L_2 \times C_1}} = \frac{1}{2 \times \sqrt{125 \times 10^{-6} \times 50 \times 10^{-9}}} =$$

$$\omega_c = 200000[rps]$$

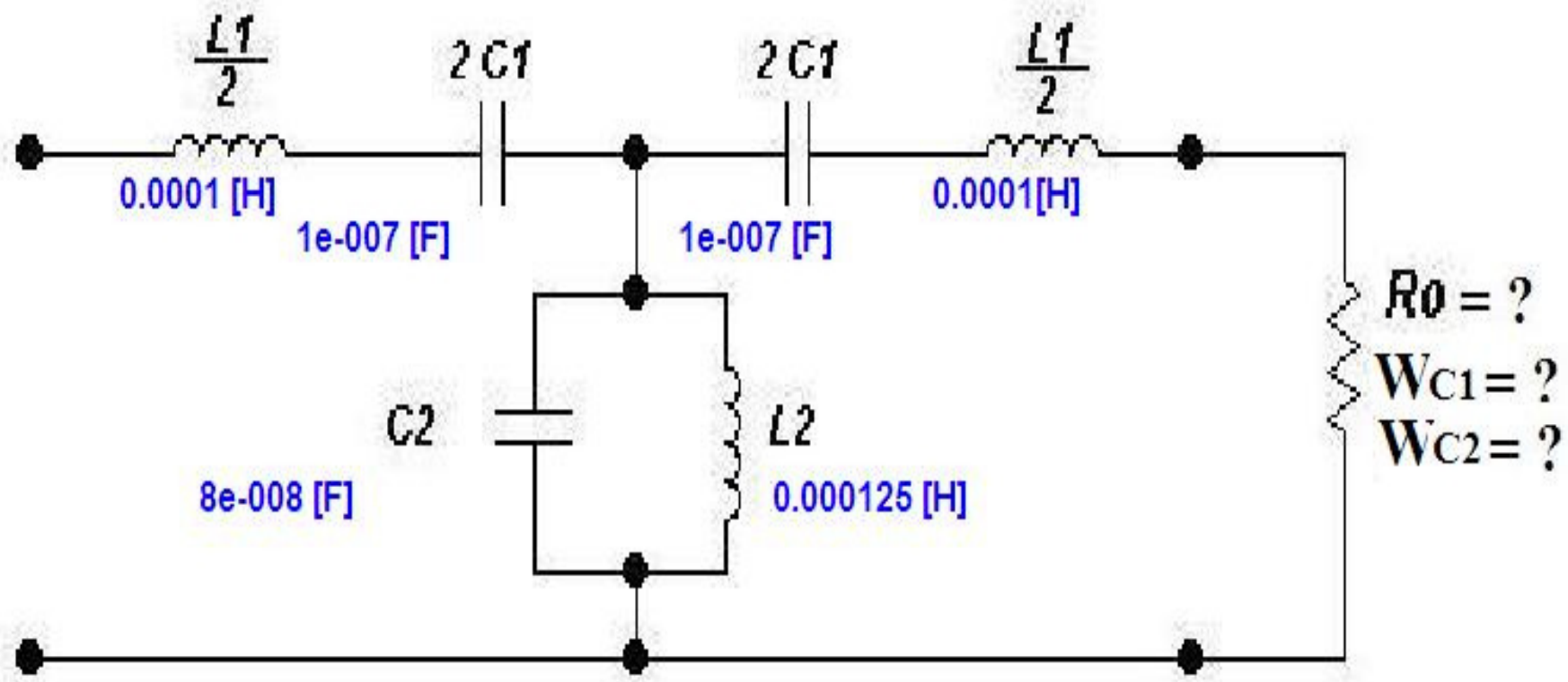
$$f_c = \frac{\omega_c}{2 * \pi} = \frac{200000[rps]}{2 * \pi} = 31830,98[Hz]$$

TEMA 3: EN EL CIRCUITO DE LA FIGURA DETERMINE:

A) TIPO DE FILTRO

B) IMPEDANCIA CARACTERÍSTICA

C) PULSACIONES Y FRECUENCIAS DE CORTE



TEMA 3: FILTRO PASA-BANDA Kcte

$$\frac{L_1}{2} = 100[uH] \quad \therefore L_1 = 200[uH]$$

$$2C_1 = 0,1[uF] \quad \therefore C_1 = 50[nF]$$

$$L_2 = 125[uH] \quad y \quad C_2 = 80[nF]$$

$$R_o = \sqrt{\frac{L_1}{C_2}} = \sqrt{\frac{200 \times 10^{-6}}{80 \times 10^{-9}}} = 50 [\Omega]$$

$$R_o = \sqrt{\frac{L_2}{C_1}} = \sqrt{\frac{125 \times 10^{-6}}{50 \times 10^{-9}}} = 50 [\Omega]$$

$$\omega_o^2 = \frac{1}{L_1 \times C_1} = \frac{1}{\sqrt{200 \times 10^{-6} \times 50 \times 10^{-9}}} = 10^{11} [rps^2]$$

$$\omega_o^2 = \frac{1}{L_2 \times C_2} = \frac{1}{\sqrt{125 \times 10^{-6} \times 80 \times 10^{-9}}} = 10^{11} [rps^2]$$

$$BW = \frac{2}{\sqrt{L_1 \times C_2}} = \frac{2}{\sqrt{200 \times 10^{-6} \times 80 \times 10^{-9}}} = 500000 [rps]$$

$$BW = \frac{2 \times R_o}{L_1} = \frac{2 \times 50}{200 \times 10^{-6}} = 500000 [rps]$$

$$-1 = \frac{1}{BW} \times \left(\omega_{C1} - \frac{\omega_o^2}{\omega_{C1}} \right) \quad y \quad +1 = \frac{1}{BW} \times \left(\omega_{C2} - \frac{\omega_o^2}{\omega_{C2}} \right)$$

$$\Downarrow$$

$$\Downarrow$$

$$\omega_{C1}^2 + \omega_{C1} \times BW - \omega_o^2 = 0 \quad y \quad \omega_{C2}^2 - \omega_{C2} \times BW - \omega_o^2 = 0$$

$$\Downarrow$$

$$\Downarrow$$

$$\omega_{C1} = 153112,887[rps] \quad y \quad \omega_{C2} = 653112,887[rps]$$

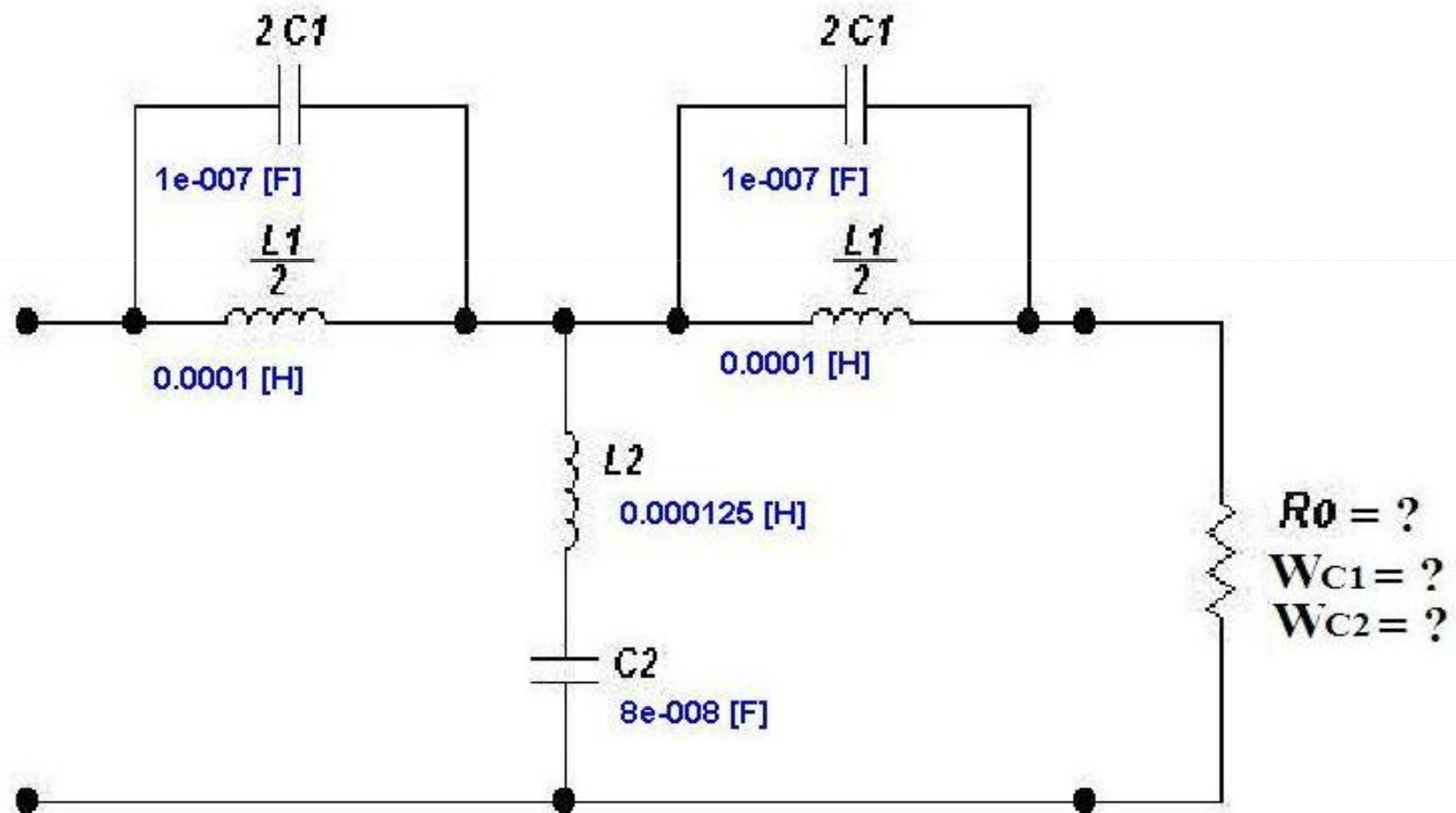
$$f_{C1} = 24368,67[Hz] \quad y \quad f_{C2} = 103946,14[Hz]$$

TEMA 4: EN EL CIRCUITO DE LA FIGURA DETERMINE:

A) TIPO DE FILTRO

B) IMPEDANCIA CARACTERÍSTICA

C) PULSACIONES Y FRECUENCIAS DE CORTE



TEMA 4: FILTRO ELIMINA-BANDA Kcte

$$\frac{L_1}{2} = 100[uH] \quad \therefore L_1 = 200[uH]$$

$$2C_1 = 0,1[uF] \quad \therefore C_1 = 50[nF]$$

$$L_2 = 125[uH] \quad y \quad C_2 = 80[nF]$$

$$R_o = \sqrt{\frac{L_1}{C_2}} = \sqrt{\frac{200 \times 10^{-6}}{80 \times 10^{-9}}} = 50 [\Omega]$$

$$R_o = \sqrt{\frac{L_2}{C_1}} = \sqrt{\frac{125 \times 10^{-6}}{50 \times 10^{-9}}} = 50 [\Omega]$$

$$\omega_o^2 = \frac{1}{L_1 \times C_1} = \frac{1}{\sqrt{200 \times 10^{-6} \times 50 \times 10^{-9}}} = 10^{11} [rps^2]$$

$$\omega_o^2 = \frac{1}{L_2 \times C_2} = \frac{1}{\sqrt{125 \times 10^{-6} \times 80 \times 10^{-9}}} = 10^{11} [rps^2]$$

$$BW = \frac{1}{2 \times \sqrt{L_2 \times C_1}} = \frac{1}{2 \times \sqrt{125 \times 10^{-6} \times 50 \times 10^{-9}}} = 200000 [rps]$$

$$BW = \frac{1}{2 \times R_o \times C_1} = \frac{1}{2 \times 50 \times 500 \times 10^{-9}} = 200000 [rps]$$

$$+1 = BW \times \left(\frac{1}{\omega_{C1} - \frac{\omega_o^2}{\omega_{C1}}} \right) \quad y \quad -1 = BW \times \left(\frac{1}{\omega_{C2} - \frac{\omega_o^2}{\omega_{C2}}} \right)$$

$$\Downarrow$$

$$\Downarrow$$

$$\omega_{C1}^2 + \omega_{C1} \times BW - \omega_o^2 = 0 \quad y \quad \omega_{C2}^2 - \omega_{C2} \times BW - \omega_o^2 = 0$$

$$\Downarrow$$

$$\Downarrow$$

$$\omega_{C1} = 231662,479[rps] \quad y \quad \omega_{C2} = 431662,479[rps]$$

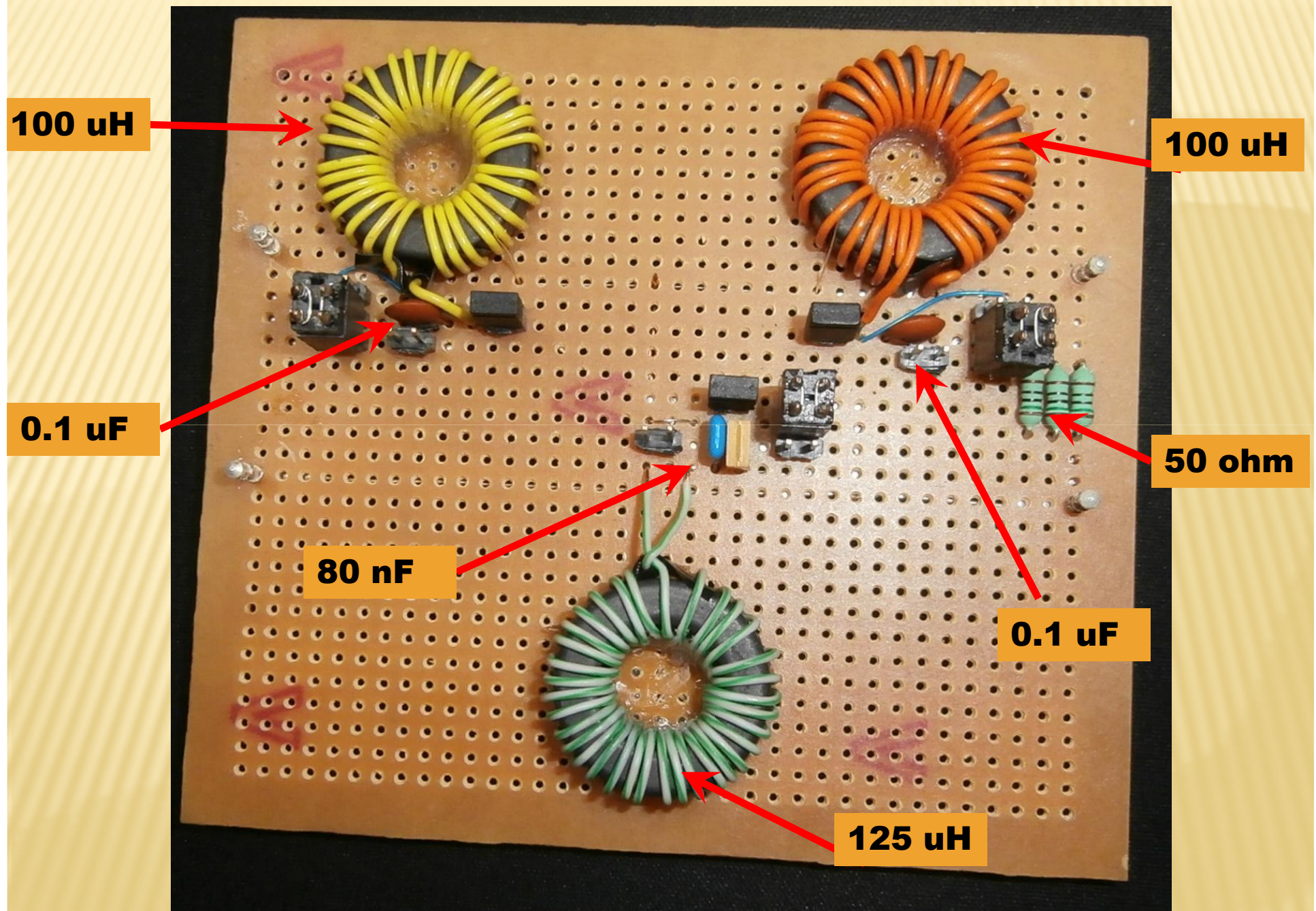
$$f_{C1} = 36870,228[Hz] \quad y \quad f_{C2} = 68701,217[Hz]$$

INSTRUMENTO EMPLEADO PARA MEDICIÓN

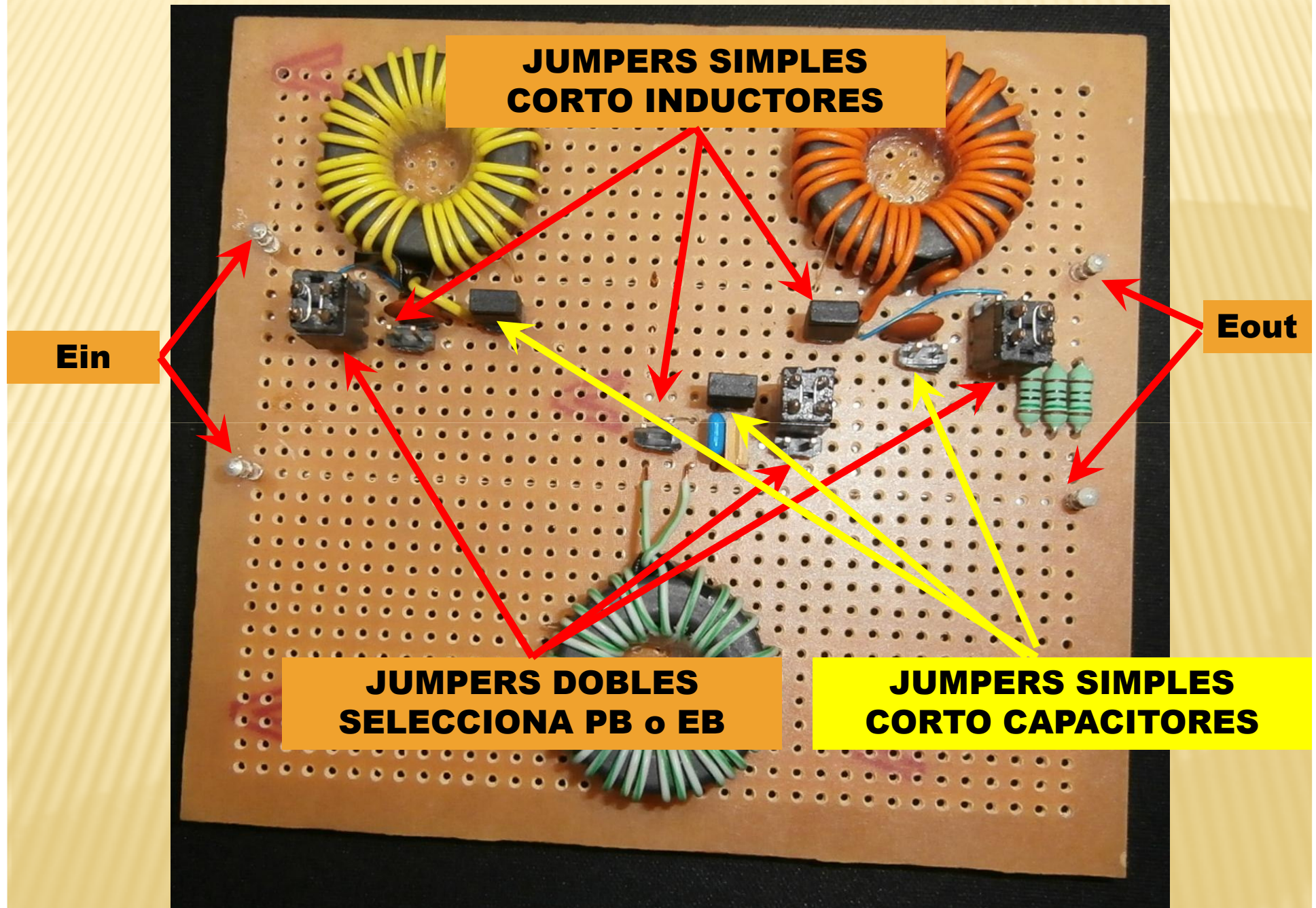


**OSCILOSCOPIO CON CONEXIÓN USB DE DOS
CANALES Y GENERADOR DE SEÑALES**

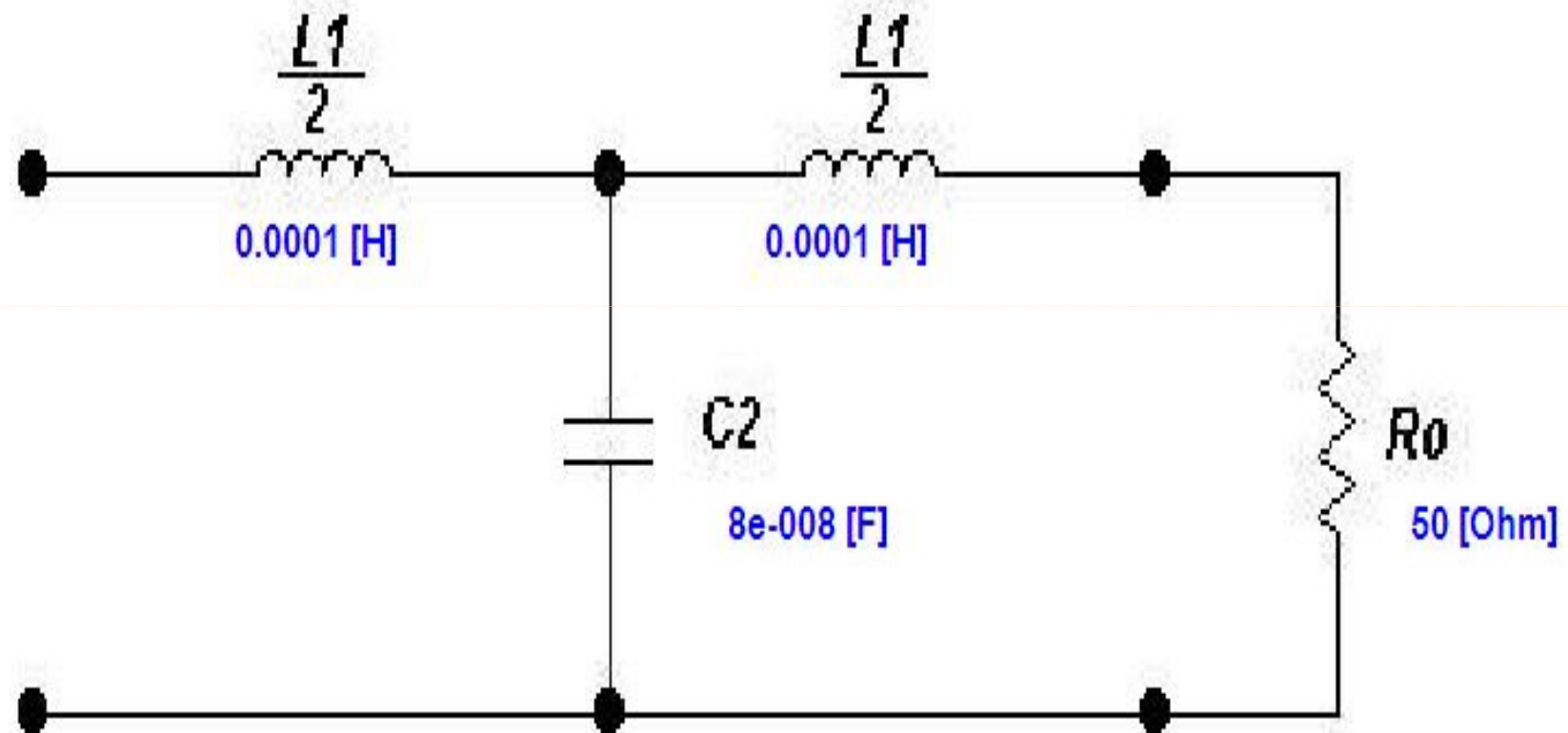
CIRCUITO EMPLEADO PARA MEDICIÓN



CIRCUITO EMPLEADO PARA MEDICIÓN

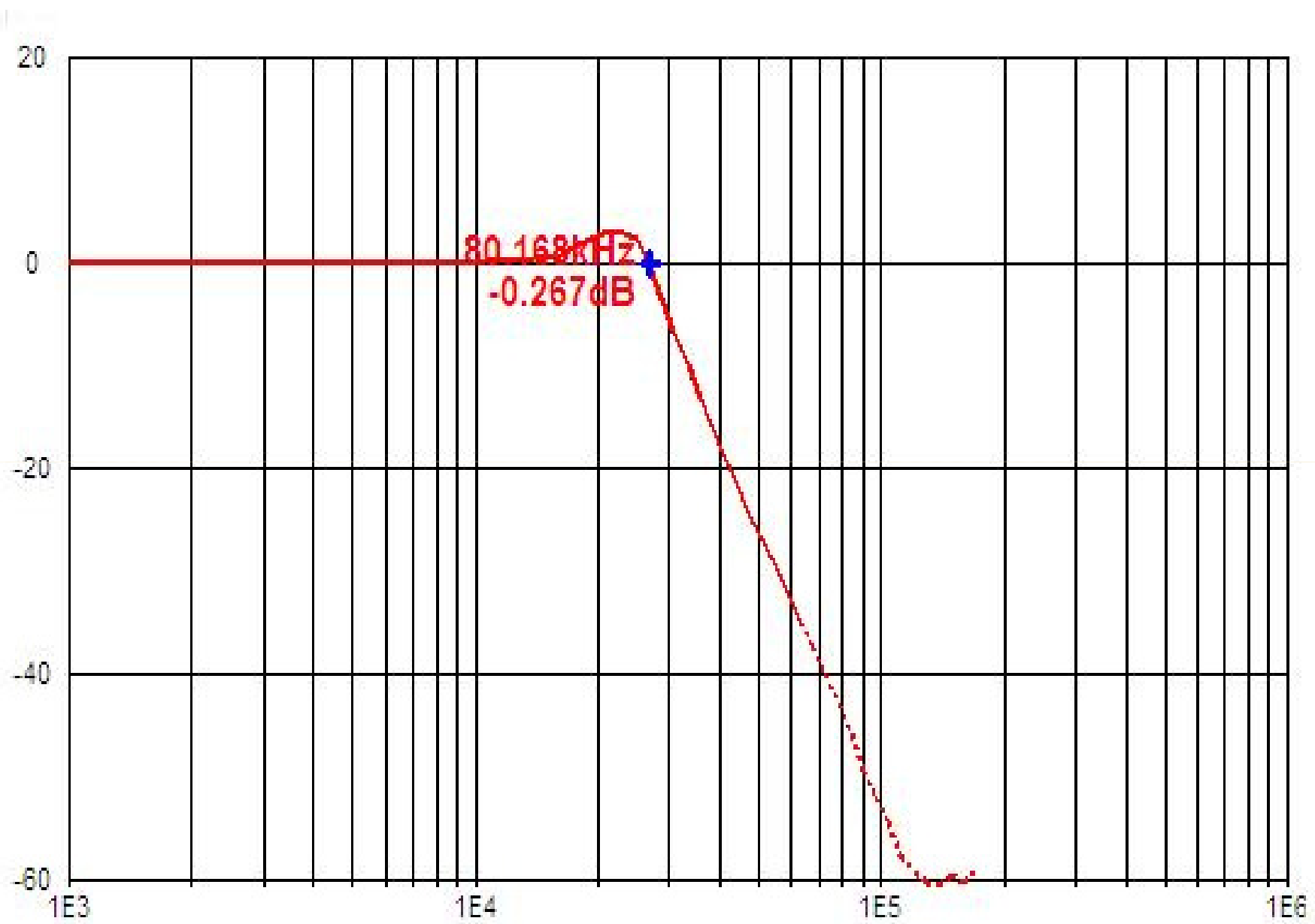


TEMA 1: FILTRO PASA-BAJOS DE KCTE

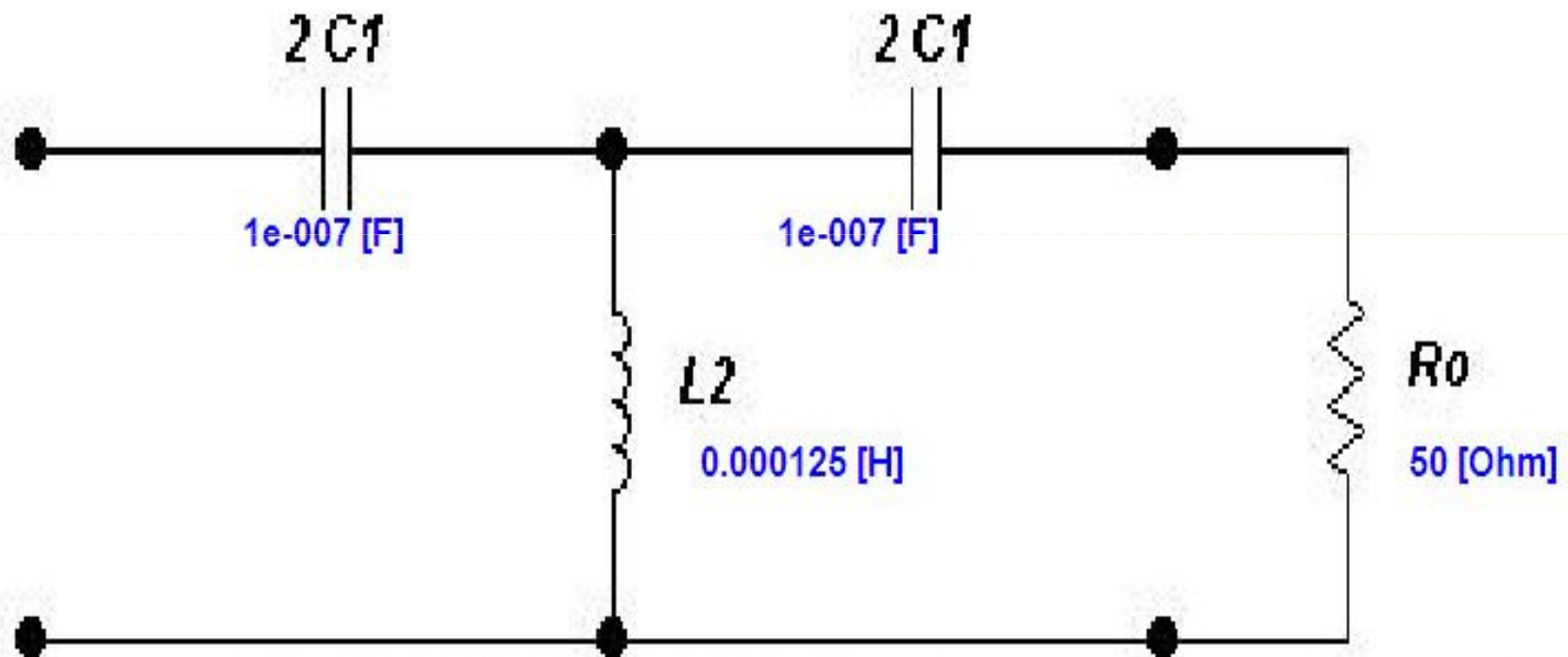


FILTRO PASA BAJOS KCTE

Frec. de corte $f_c = 79577.4715$ [Hz]



TEMA 2: FILTRO PASA-ALTOS DE KCTE



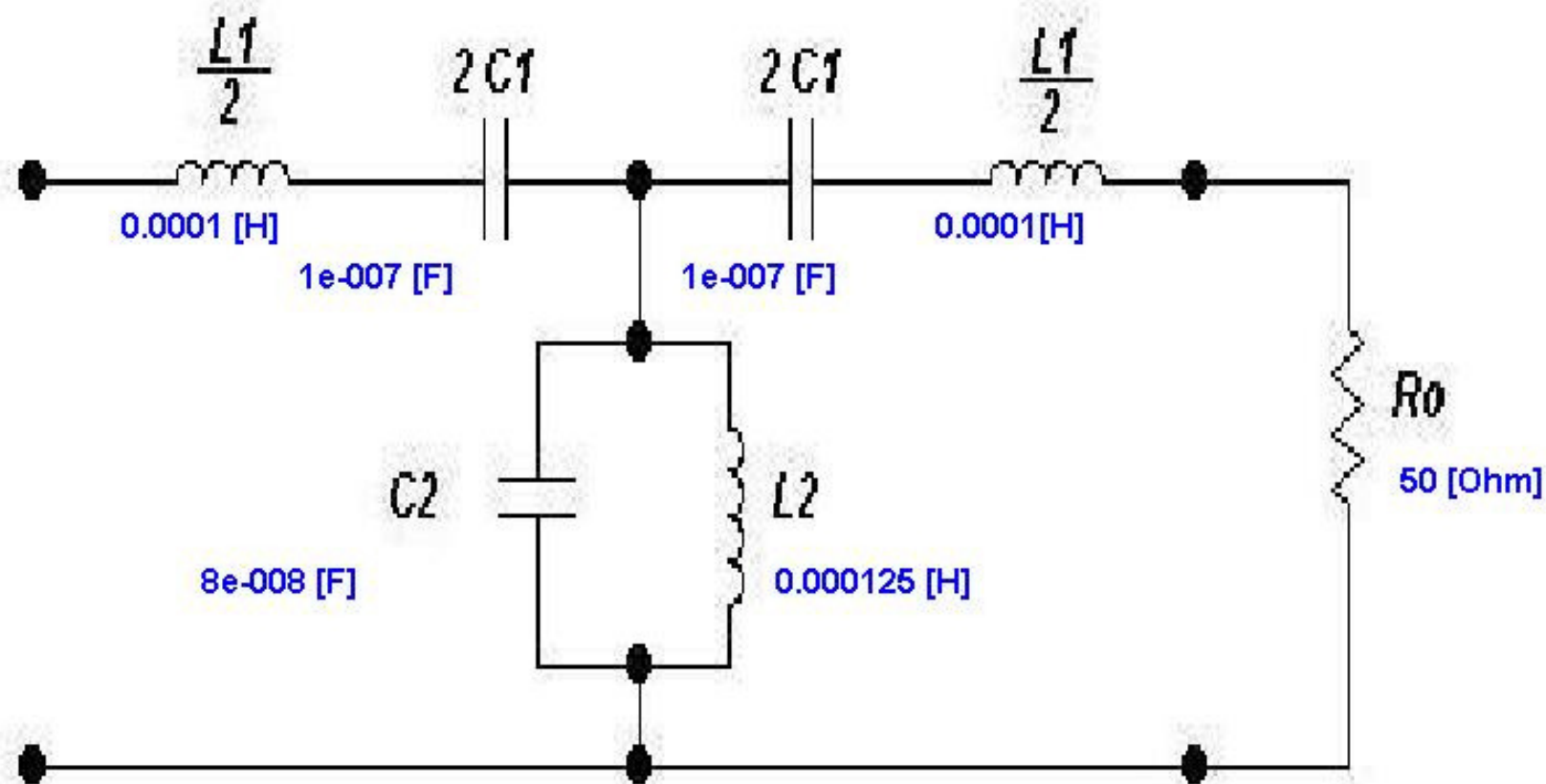
FILTRO PASA ALTOS KCTE

Frec. de corte $f_c = 31830.9886$ [Hz]

TEMA 2: FILTRO PASA-ALTOS DE KCTE



TEMA 3: FILTRO PASA-BANDA DE KCTE

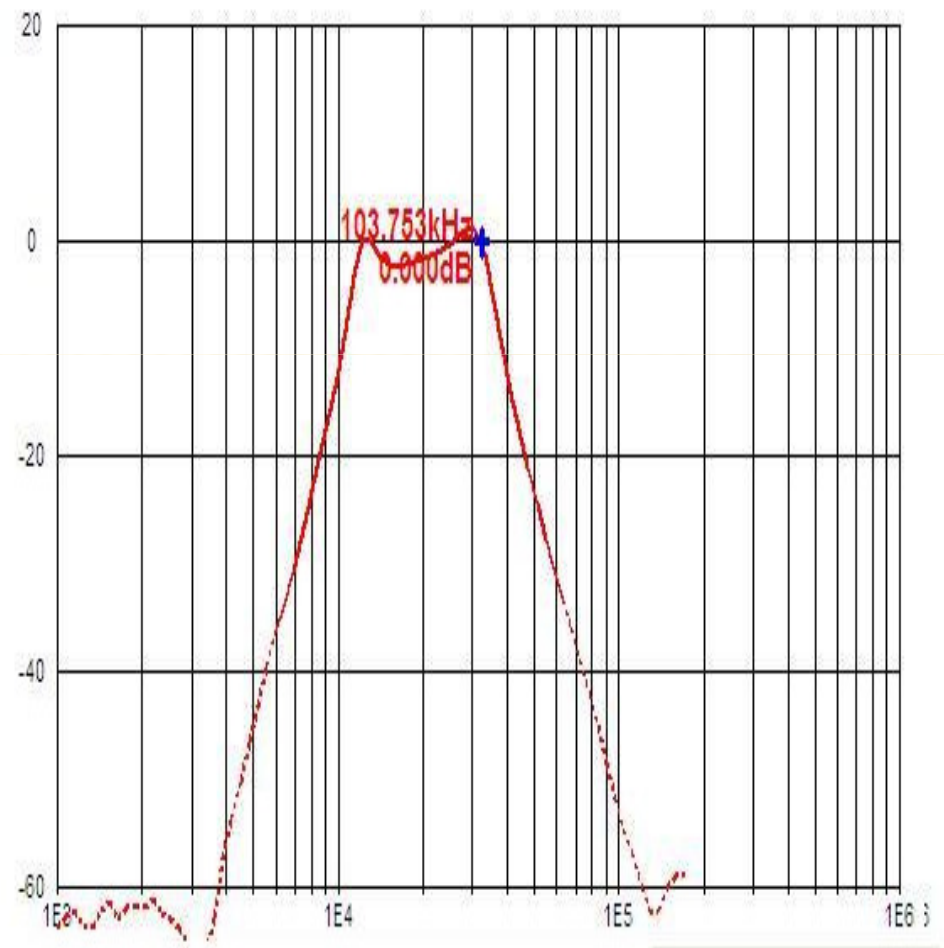
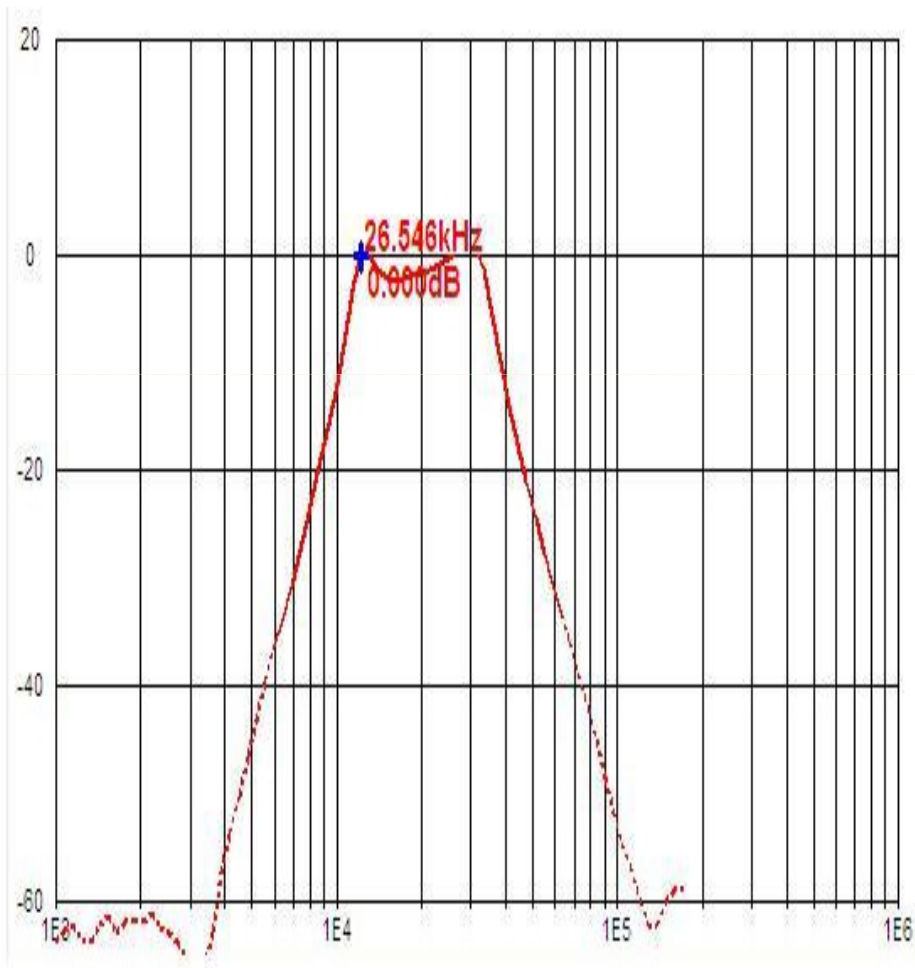


FILTRO PASA BANDA KCTE

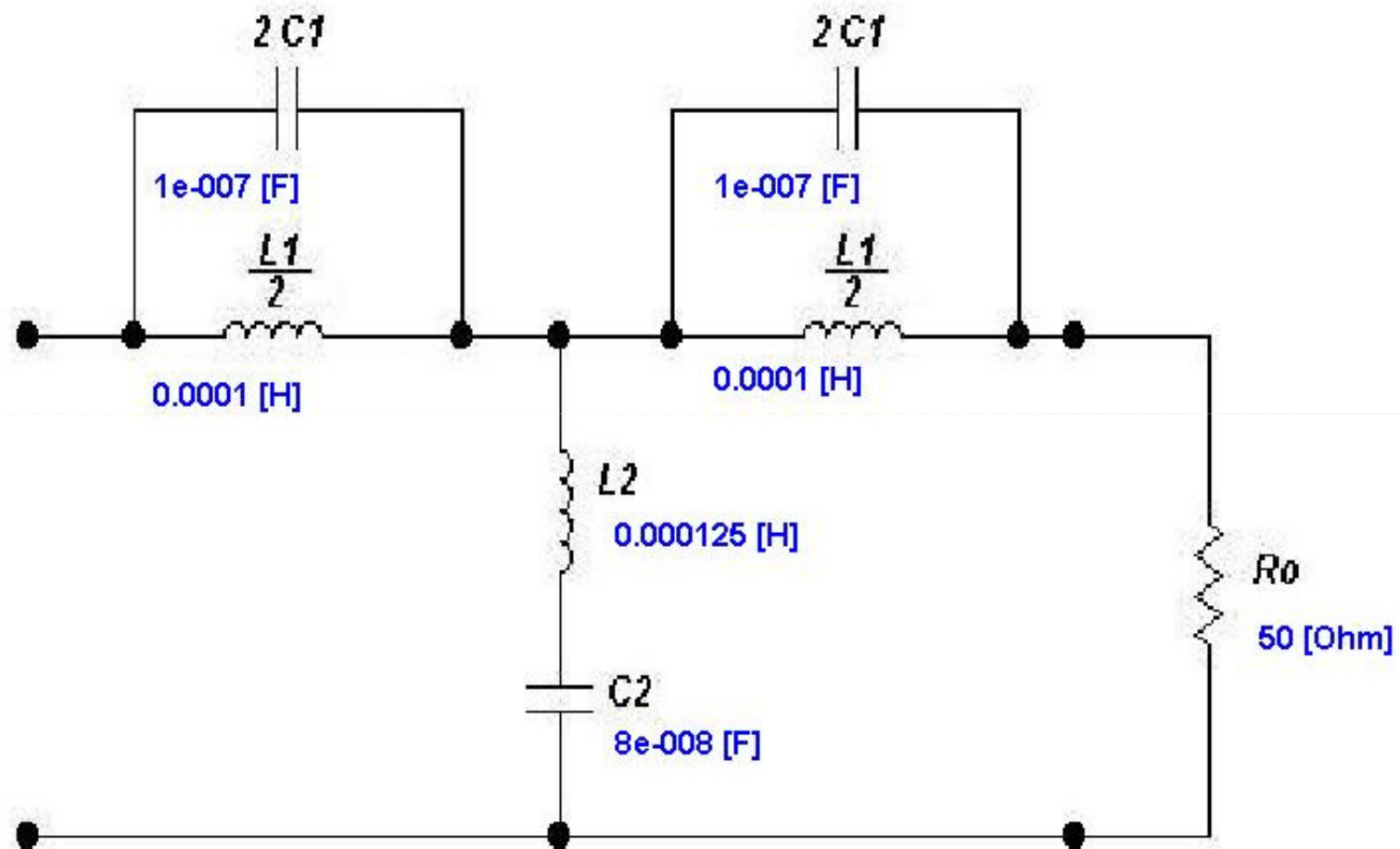
Frec. de corte inferior $fc1 = 24368.7 \text{ [Hz]}$

Frec. de corte superior $fc2 = 103946.1464 \text{ [Hz]}$

TEMA 3: FILTRO PASA-BANDA DE KCTE



TEMA 4: FILTRO ELIMINA-BANDA DE KCTE

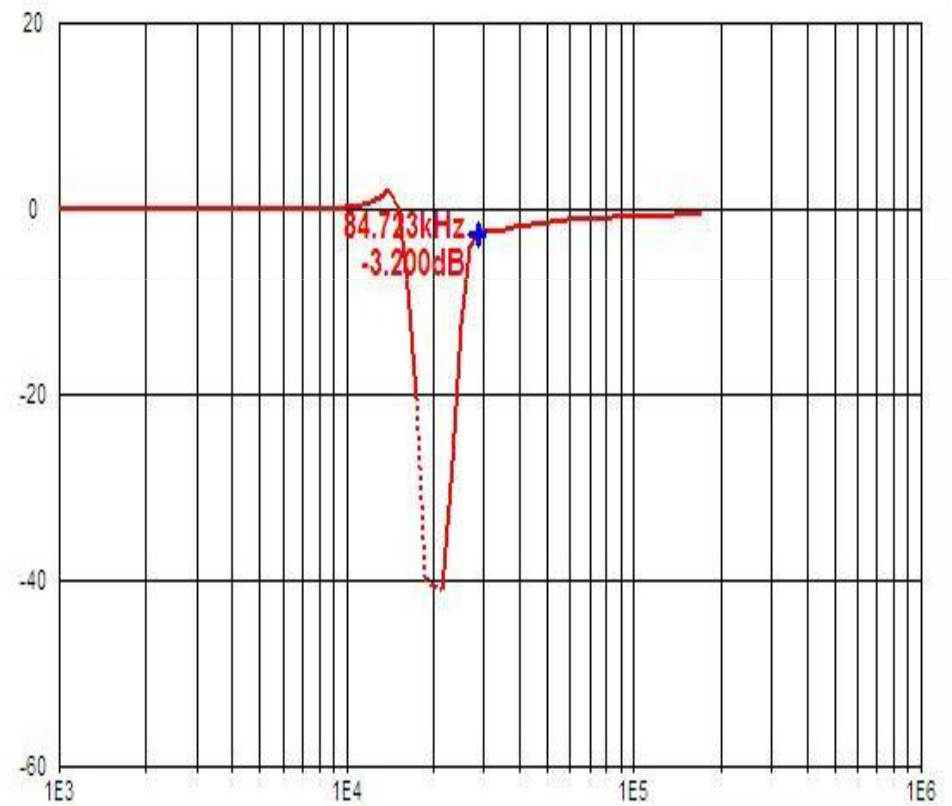
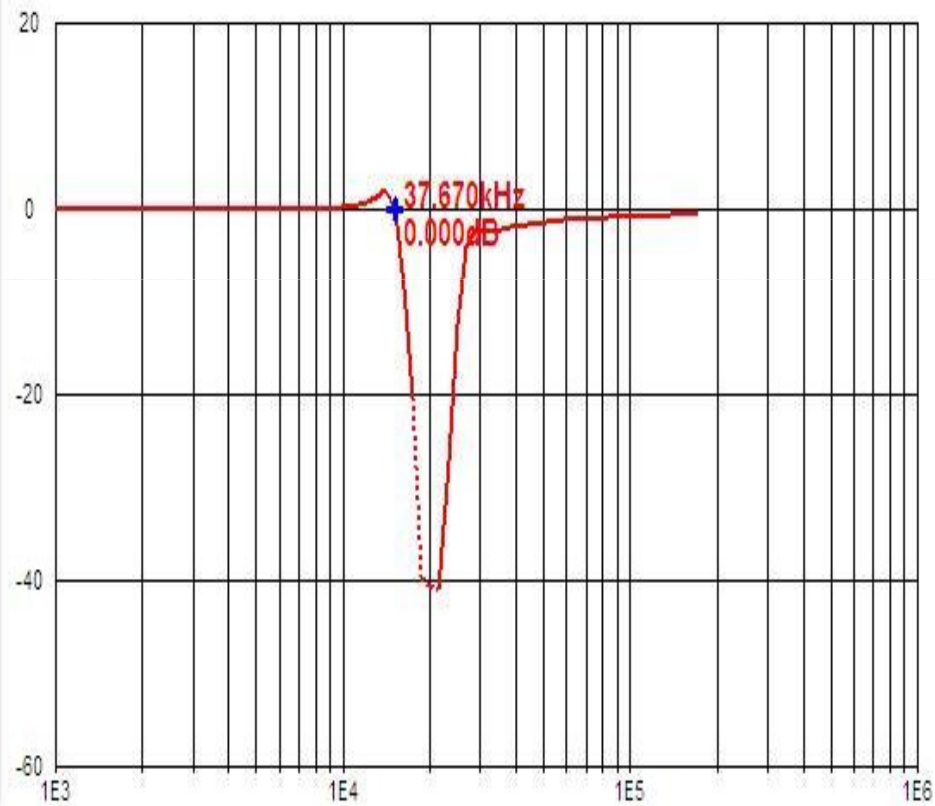


FILTRO ELIMINA BANDA KCTE

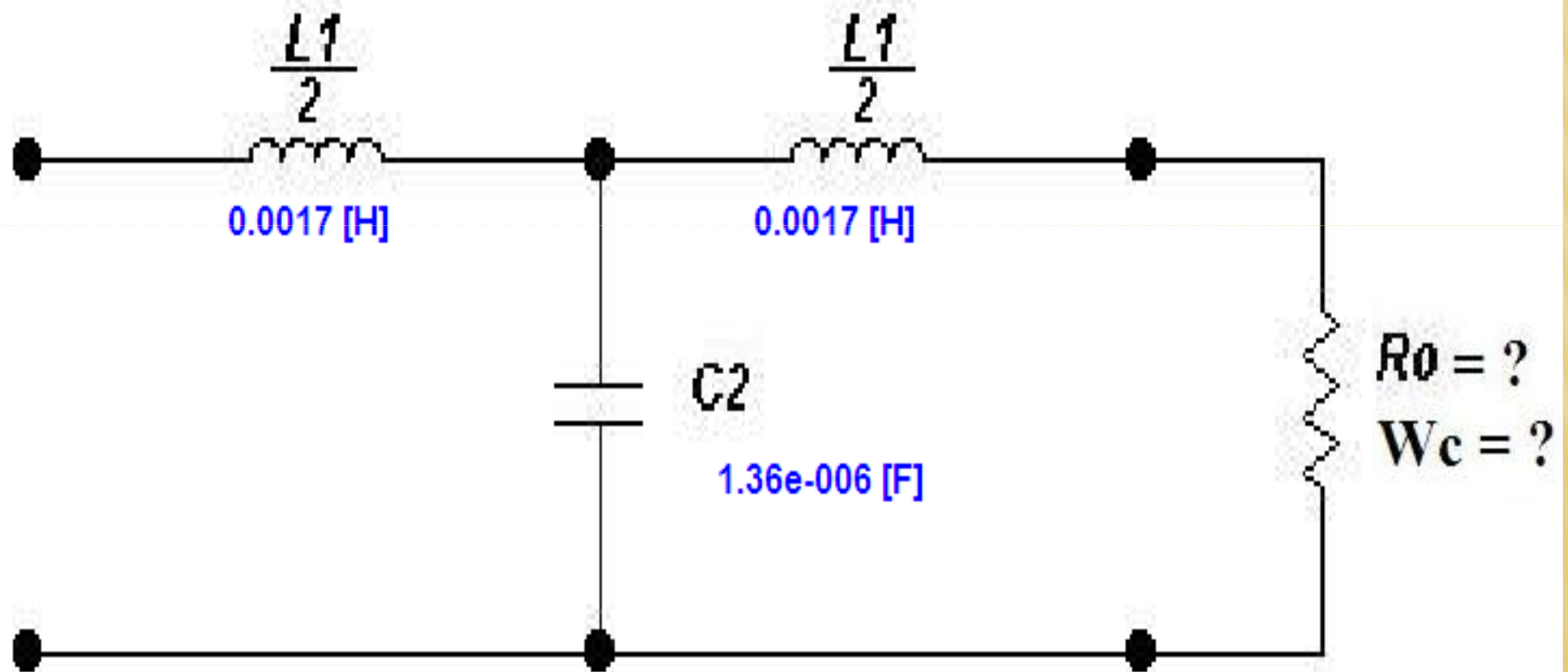
Frec. de corte inferior $fc1 = 36870.232$ [Hz]

Frec. de corte superior $fc2 = 68701.2206$ [Hz]

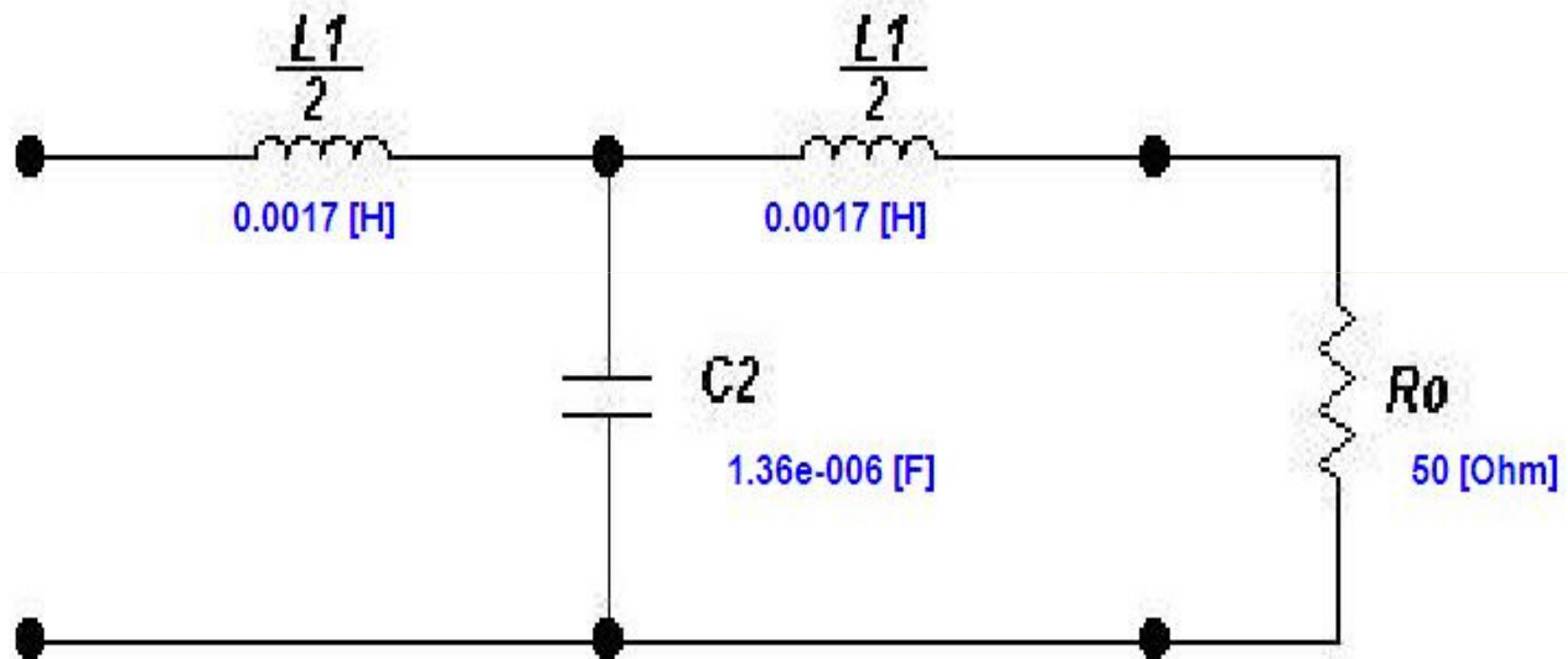
TEMA 4: FILTRO ELIMINA-BANDA DE KCTE



TEMA 5: FILTRO PASA_BAJOS DE KCTE



TEMA 5: FILTRO PASA_BAJOS DE KCTE



FILTRO PASA BAJOS KCTE

Frec. de corte $f_c = 4681.0277$ [Hz]

Network Analyser

Start Frequency

End Frequency

Frequency Step

☒ Logarithmic ☐ Linear

Max Waveform Amplitude

0 10 20 30 40 50 60 70 80 90 100

START STOP

Current Frequency:

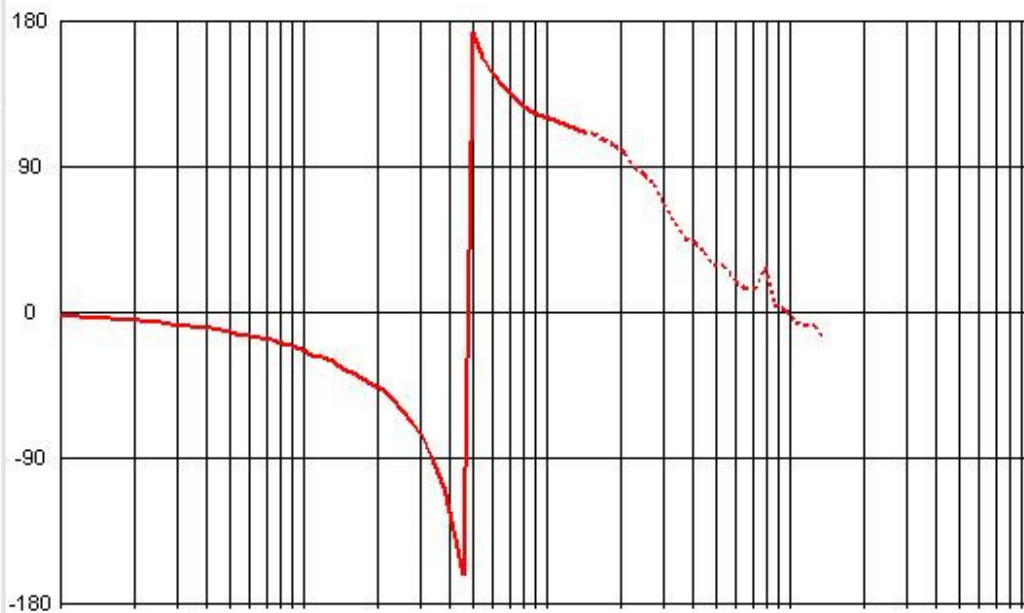
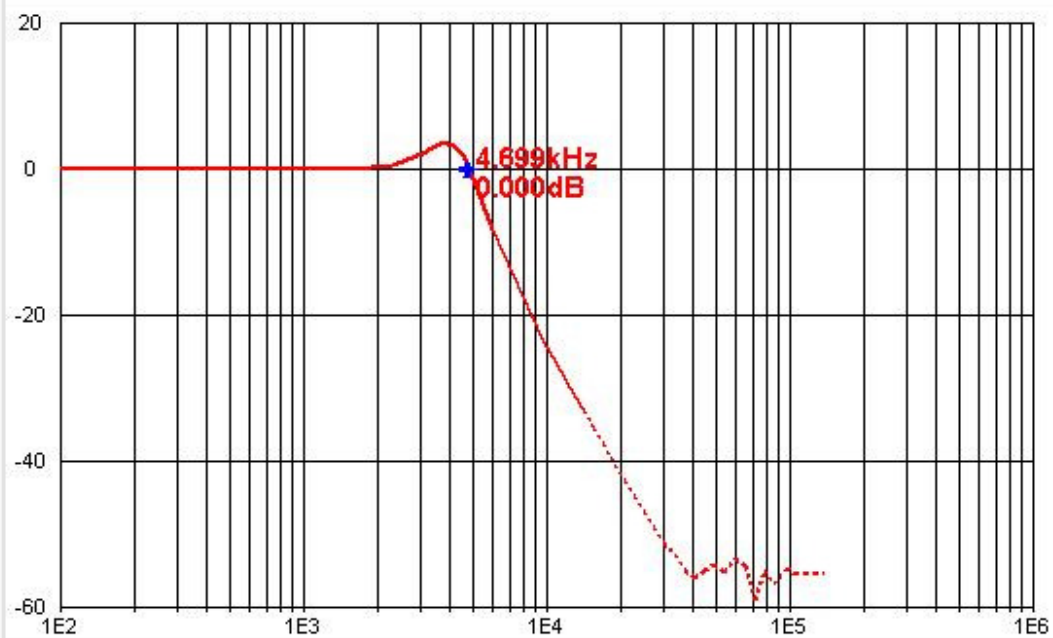
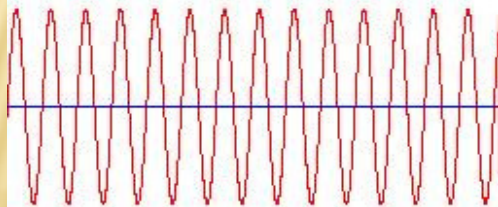
Channel A Preamp:

Channel B Preamp:

Waveform Amplitude (%):

Analyzer Status:

Oscilloscope Display



**FIN DE LA
PRESENTACIÓN**

GRACIAS !