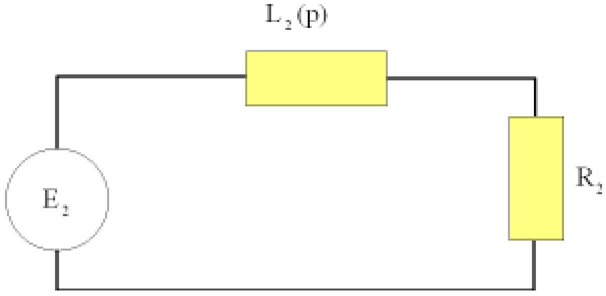
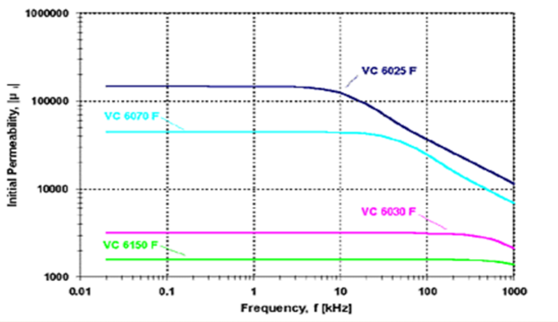
First order low pass filter





$$L_2(p) = \frac{N_2^2.S}{l}.\mu_r.\frac{1}{1+p\tau_c} = \frac{L_2}{1+p\tau_c}$$

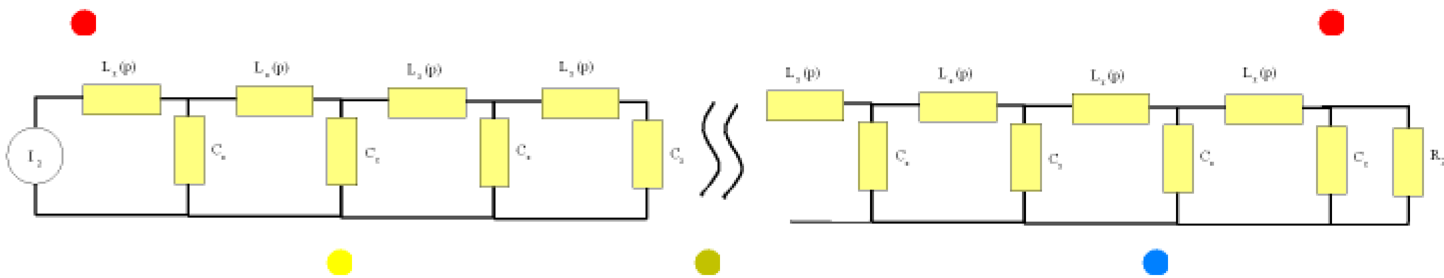
$$\vartheta = \frac{\frac{L_2}{R_2}}{\frac{L_2}{R_2}+\tau_c} \qquad \widetilde{\tau_2} = \frac{L_2}{R_2}+\tau_c$$

$$I_2(p) = -\frac{N_1}{N_2}.\frac{\vartheta.\widetilde{\tau_2}.p}{1+p.\widetilde{\tau_2}}.I_1(p)$$

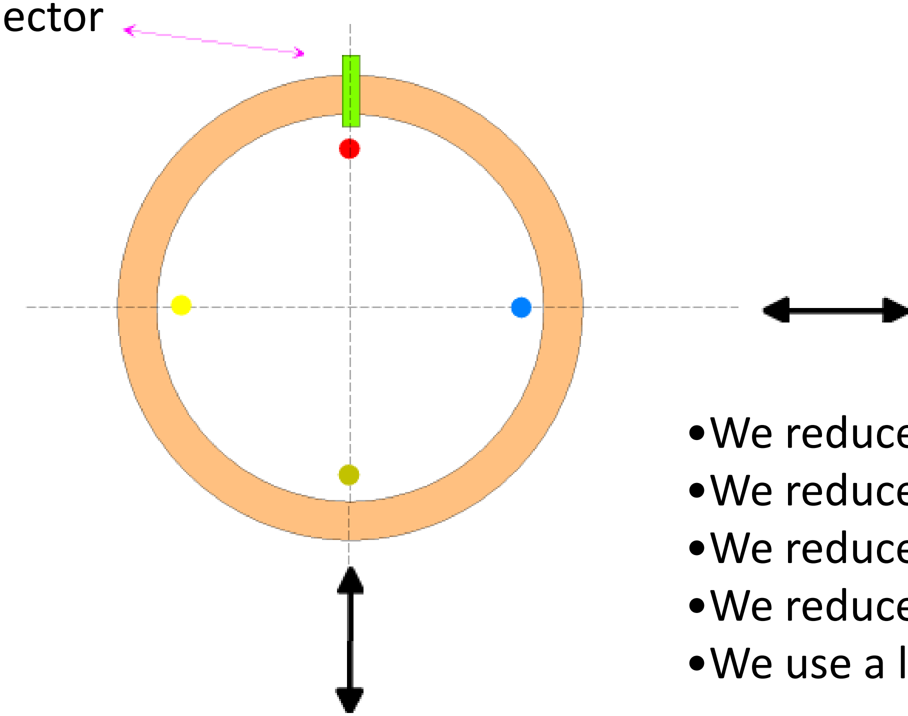
Transmission line

$$I_2(p) \cong -\frac{N_1}{N_2}.I_1(p).\vartheta.\widetilde{\tau_2}.p.e^{-\widetilde{\tau_2}.p} = \widetilde{I_1}(p)e^{-\widetilde{\tau_2}.p}$$

The Transformer considered as a transmission line



Connector

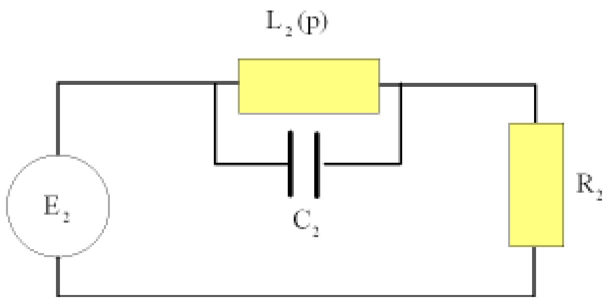


The intensity depend on the position

- We reduce the diameter of the core
- We reduce the transversal section
- We reduce the number of turns
- We reduce the relative permeability
- We use a low pas filter

The intensity don't depend of the position

Influence of parasitic capacitor



$$L_2(p) = \frac{N_2^2.S}{l}.\mu.\frac{1}{1+p\tau_c} = \frac{L_2}{1+p\tau_c}$$

$$\vartheta = \frac{\frac{L_2}{R_2}}{\frac{L_2}{R_2}+\tau_c}$$

$$I_2(p) = -\frac{N_1}{N_2}.\vartheta.\tilde{\tau_2}.p.\frac{1+p.\tilde{\tau_2}+\ p^2.\vartheta.\tilde{\tau_2}.C_2.R_2}{1+p.\tilde{\tau_2}.(1+\vartheta)+p^2.\vartheta.\tilde{\tau_2}.C_2.R_2]}.I_1(p)$$

$$f_1 = \frac{1+\sqrt{1-\frac{4.\vartheta.C_2.R_2}{\tilde{\tau_2}}}}{\vartheta.C_2.R_2.\pi} \qquad f_2 = \frac{1-\sqrt{1-\frac{4.\vartheta.C_2.R_2}{\tilde{\tau_2}}}}{\vartheta.C_2.R_2.\pi}$$

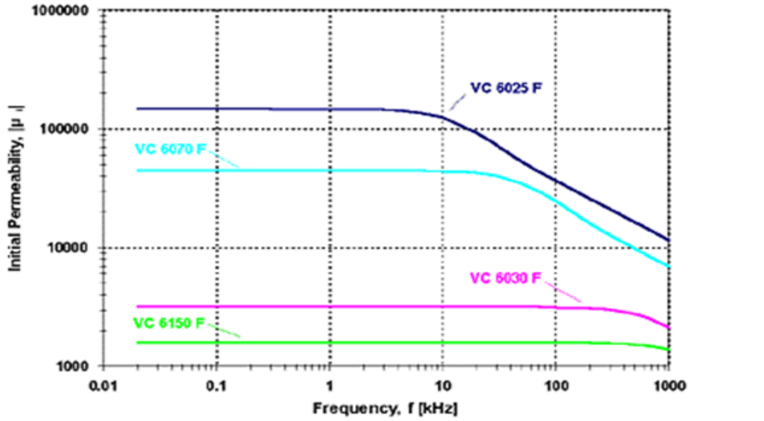
$$I_2(p) = -\frac{N_1}{N_2}.\vartheta.\tilde{\tau_2}.p.\frac{1+p.\beta.\tilde{\tau_2}}{1+p.\sigma.\tilde{\tau_2}.(1+\vartheta)}I_1(p) = \widetilde{I_1(p)}.e^{-p.\tilde{\tau_2}.\sigma.(1+\vartheta)}$$

Calculus and measure

$$\widetilde{\tau_2} = \frac{L_2}{R_2} + \tau_c = 67.18\ \mu S \quad \vartheta = \frac{51.26}{51.26 + 15.92} \cong \ 0.763$$

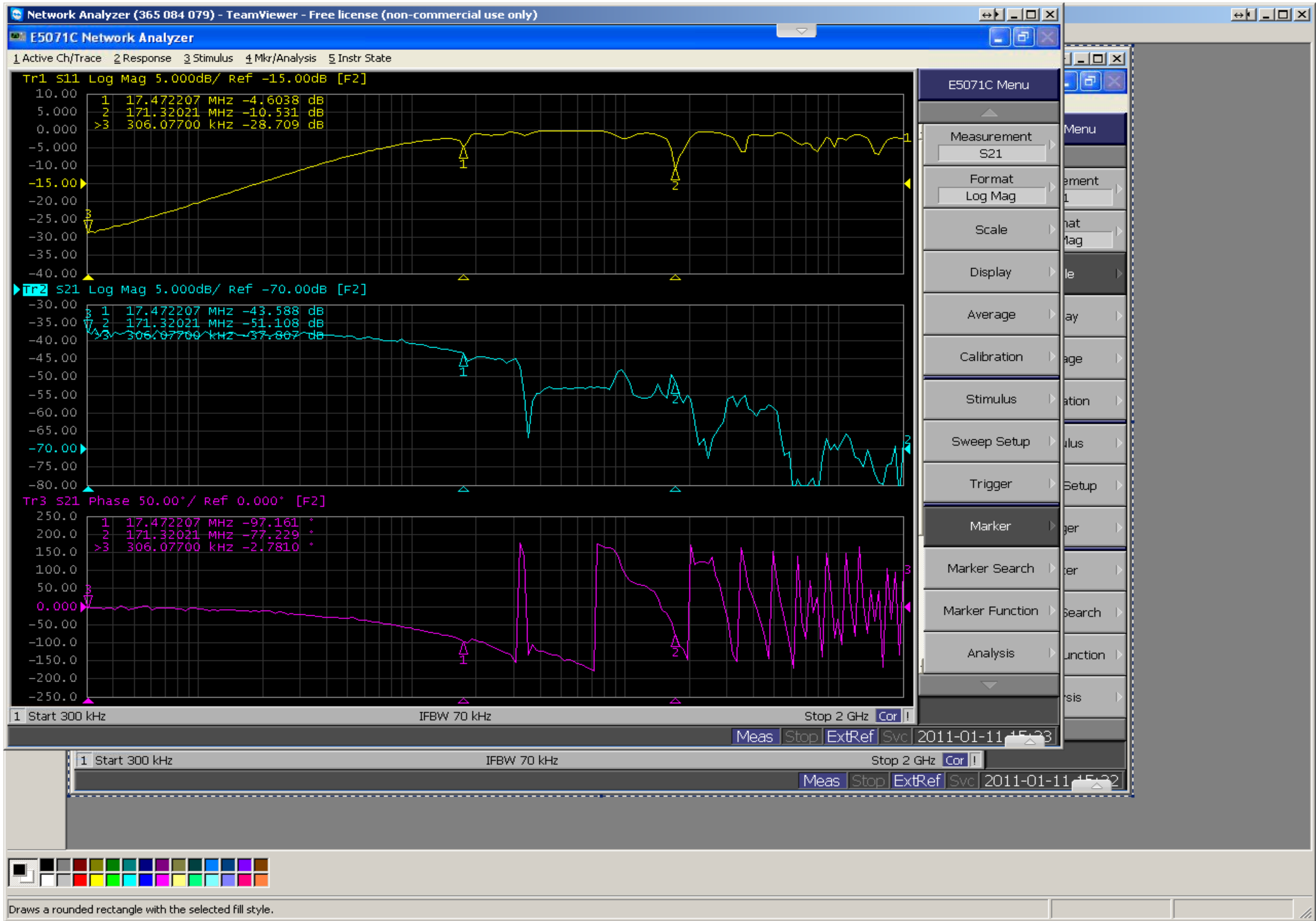
$$\tau_c = \frac{1}{2.\pi.f_c} = 15.92\ \mu S \qquad L_2 \cong 2.56\ mH$$

$$Estimated\ value\ is:\ C_2 \cong \ 20\ pF \qquad R_2 \ = 50\ Ohms$$



$$f_1 = \frac{1 + \sqrt{1 - \frac{4.\vartheta.C_2.R_2}{\widetilde{\tau_2}}}}{\vartheta.C_2.R_2.\pi} \qquad f_2 = \frac{1 - \sqrt{1 - \frac{4.\vartheta.C_2.R_2}{\widetilde{\tau_2}}}}{\vartheta.C_2.R_2.\pi}$$

$$\frac{1}{\vartheta.C_2.R_2.\pi} \cong \frac{10^{12}}{2397} Hz \cong 417\ MHz$$


Network Analyzer (365 084 079) - TeamViewer - Free license (non-commercial use only)
E5071C Network Analyzer
1 Active Ch/Trace 2 Response 3 Stimulus 4 Mkr/Analysis 5 Instr State
Tr1 S11 Log Mag 5.000dB/ Ref -15.00dB [F2]
1 17.472207 MHz -4.6038 dB
2 171.32021 MHz -10.531 dB
>3 306.07700 kHz -28.709 dB
Tr2 S21 Log Mag 5.000dB/ Ref -70.00dB [F2]
1 17.472207 MHz -43.588 dB
2 171.32021 MHz -51.108 dB
>3 306.07700 kHz -37.807 dB
Tr3 S21 Phase 50.00°/ Ref 0.000° [F2]
1 17.472207 MHz -97.161 °
2 171.32021 MHz -77.229 °
>3 306.07700 kHz -2.7810 °
1 Start 300 kHz
IFBW 70 kHz
Stop 2 GHz
Cor
Meas
Stop
ExtRef
Svc
E5071C Menu
Measurement
S21
Format
Log Mag
Scale
Display
Average
Calibration
Stimulus
Sweep Setup
Trigger
Marker
Marker Search
Marker Function
Analysis
Draws a rounded rectangle with the selected fill style.