RF circuits design

Grzegorz Beziuk

Examples of CAE software

Choose yourself and new technologies

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References

[1] Ansys Incorporation, Ansoft High Frequency Structure Simulator - tutorials, Ansys, (www.ansoft.com)

[2] Kraus G., Ansoft designer SV 2.0 – tutorial fo begginers. Open source document, 2005, (http://www.elektronikschule.de/~krausg/)

[3] Altium limited, Altium designer tutorial – getting started with PCB design, Altium limited, (http://wiki.altium.com/display/ADOH/Getting+Started+with+Altium+Designer)

[4] Altium limited, Denining and running simulation analises, Altium limited, (http://wiki.altium.com/display/ADOH/Getting+Started+with+Altium+Designer)

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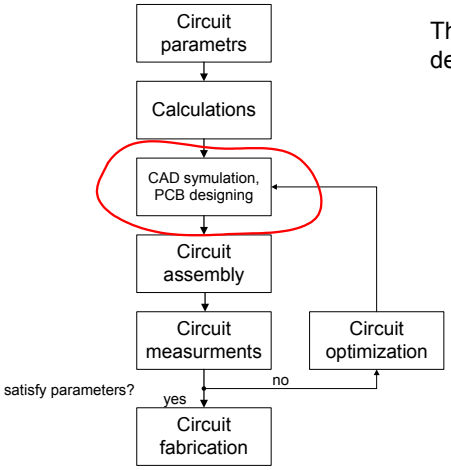
Introduction



The steps of circuit designing process

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Introduction

Circuits symulation software:

Pspice, Orcad, Multisim (free AD), Altium Designer, Tina (free TI), SmartSpice, Hspice, T-Spice, Spectre (RF), Eldo (RF), UltraSim, LT Spice (free LT), NanoSim, Nspice, Hsim, B2Spice, ICAD/4, EDSpice,WINecad, TopSpice, Spice Opus, SiMetrix, Micro-cap

Circuits and EM simulation (RF and microwave): Microwave Office (RF), Ansoft Designer (RF), Sonnet Lite (RF, EMC), Agilent ADS

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PCB designing software:

Altium Designer (Easytrax, Autotrax, Protel), Eagle,Spectra i Allegro (autorouting), CadStar, Orcad, Tina, Circuit Maker, P-Cad, PCB Elegance, EDWin, VisualPC, BPECS32, Expert PCB, CirCAD, Layout, McCAD, EPD (RF, hybrid), gEDA (free – linux), ZenitPCB (free), PCB (free), KiCAD (free)

Some software contains circuit simulation module and PCB designing modulem, for instance Altium Designer.

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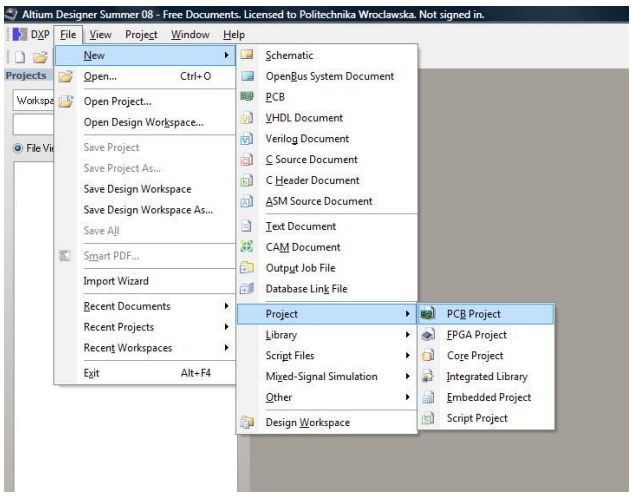
Altium designer – circuits symulation



Create on your PC folder „....”

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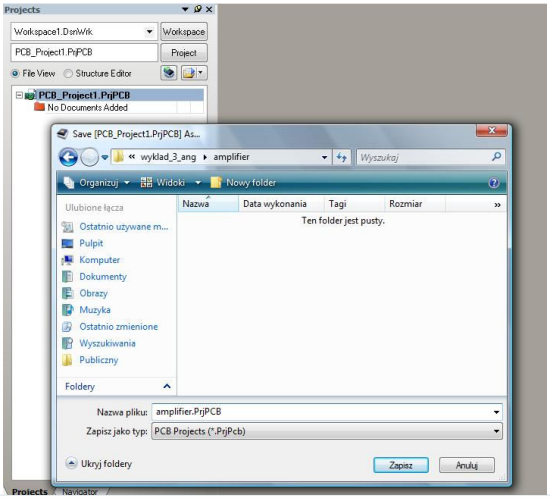

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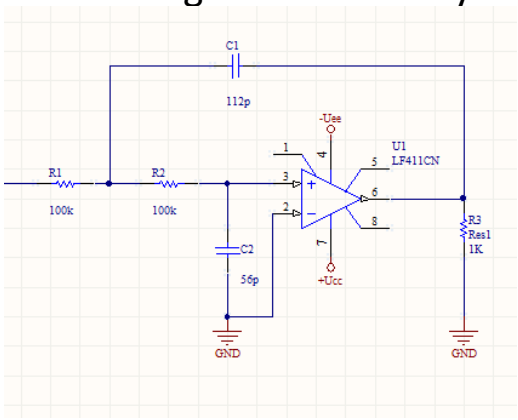

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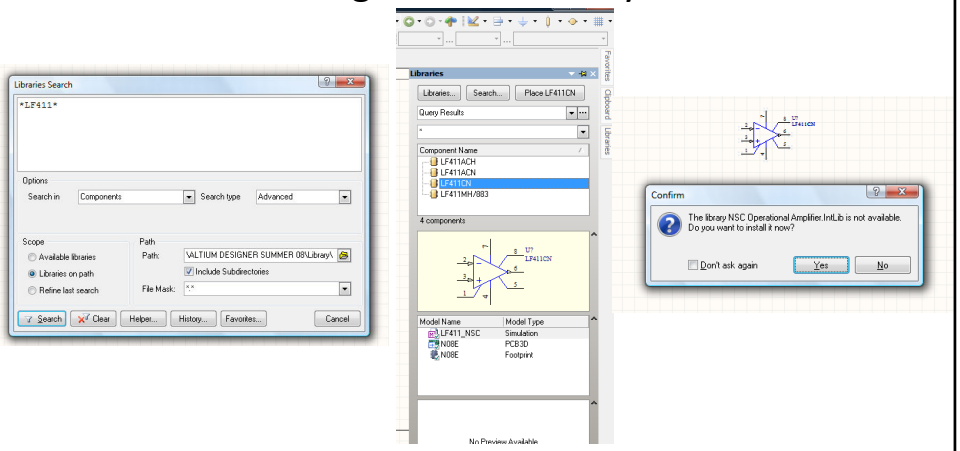

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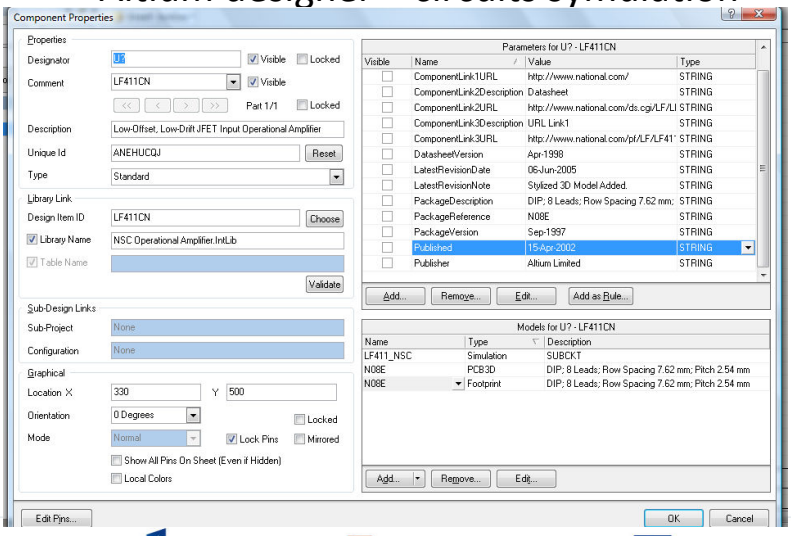

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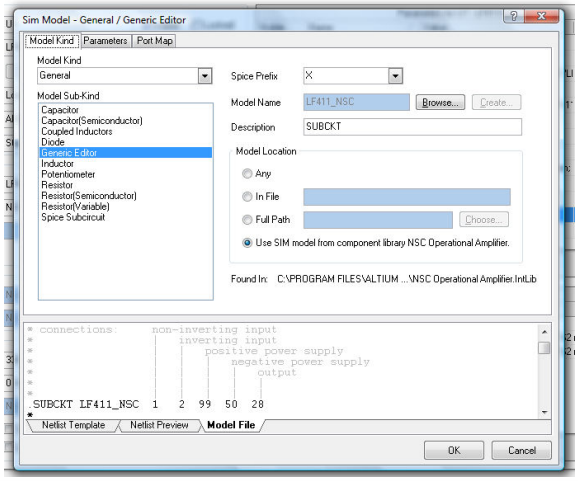

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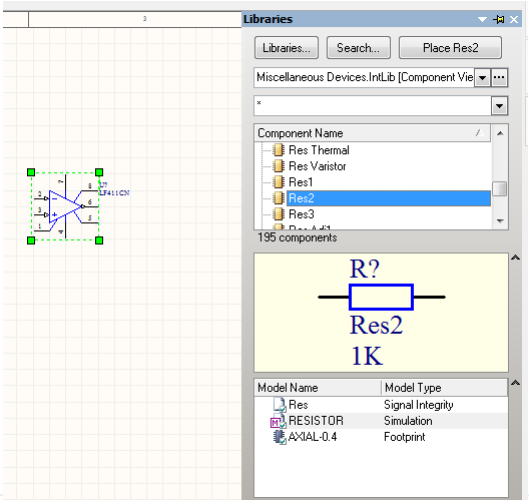

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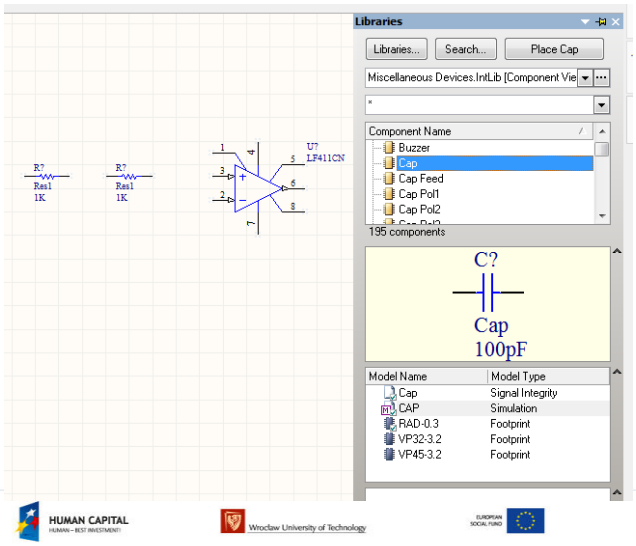

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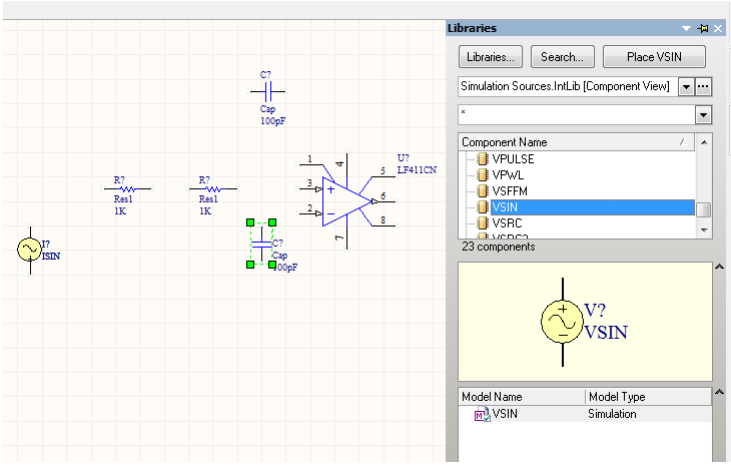

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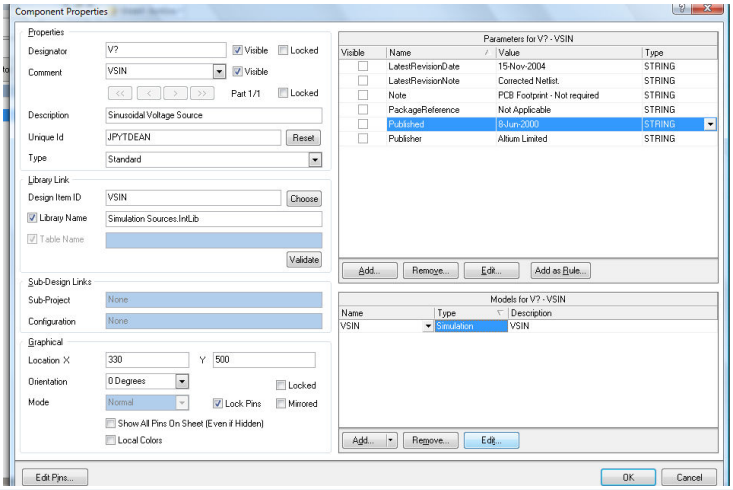

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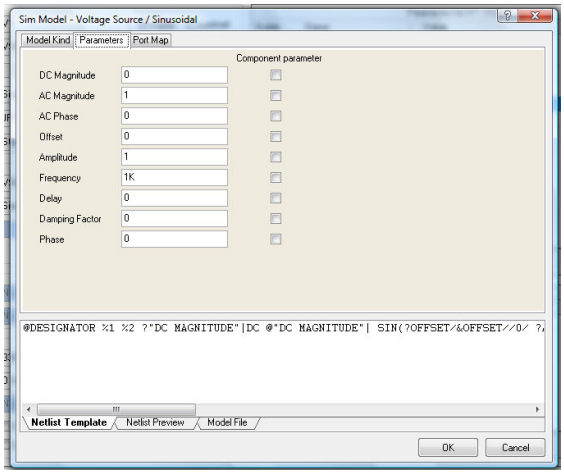

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Altium designer – circuits symulation

- add power sources VSRC, set up volatge values required for +Ucc, -Uee
- add ports (from menu – Vcc power ports) : GND, +Ucc, -Uee
- add load resistance (R3)
- wiring up the circuits
- annotate parts
- compiling the project

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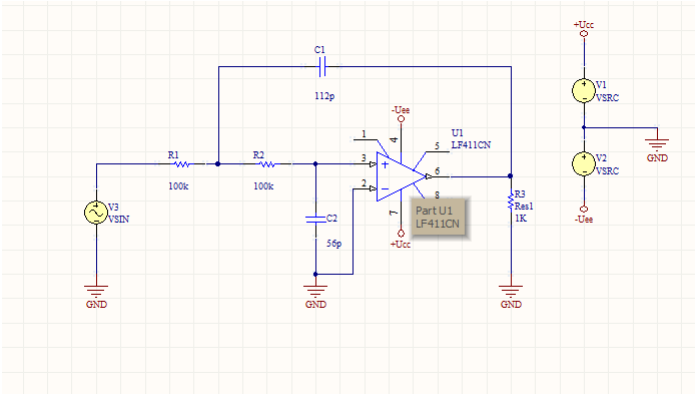

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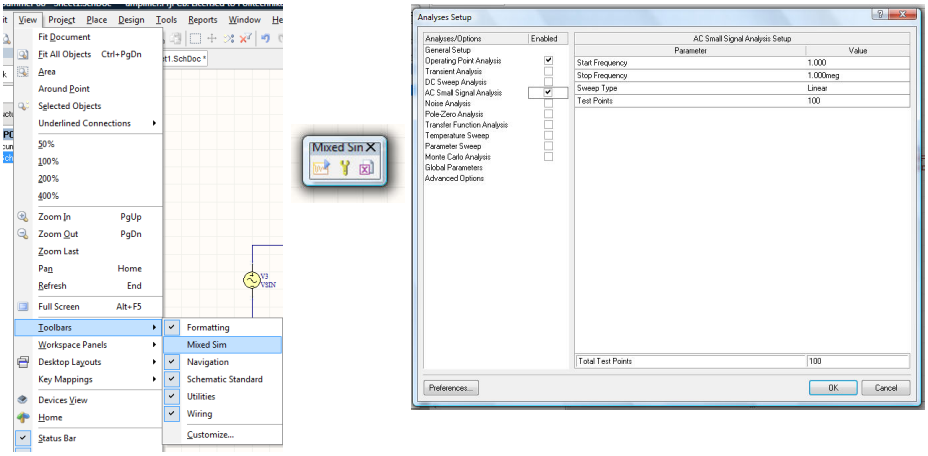

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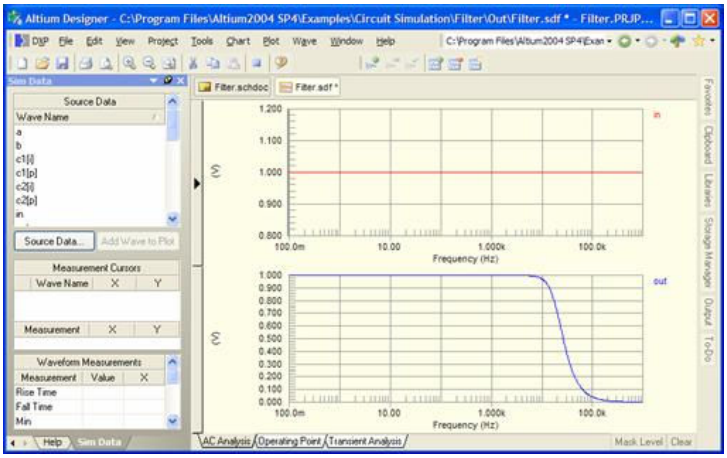

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Altium designer – PCB designing

- add to existing project PCB
- save PCB as „.....”
- replace in the circuit all sources by appropriate ports,
- once again annotate schematic (function – update changings list)
- check whether all parts have defined footprints
- then use finction – „Design/Update PCB document ***.PcbDoc”
- define outline of Pcb (by means of Keep out layer) and set origin

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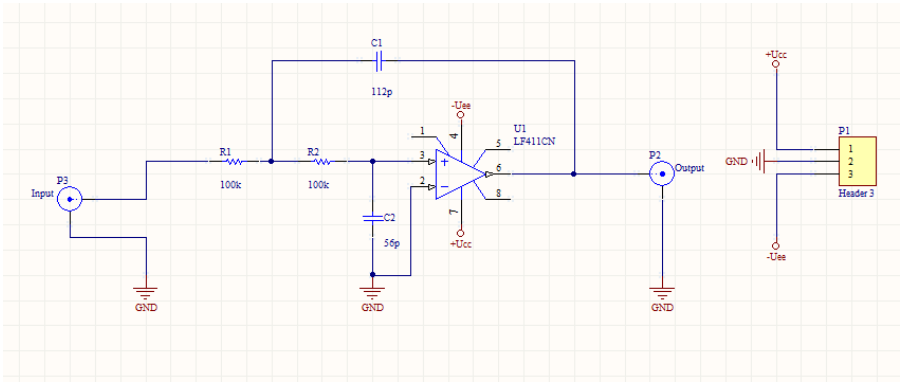

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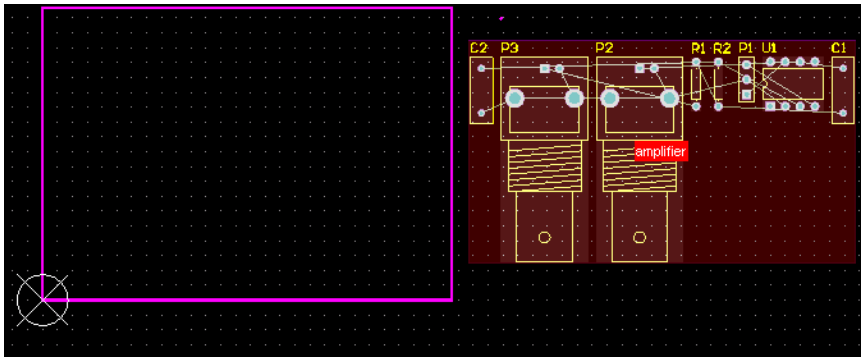

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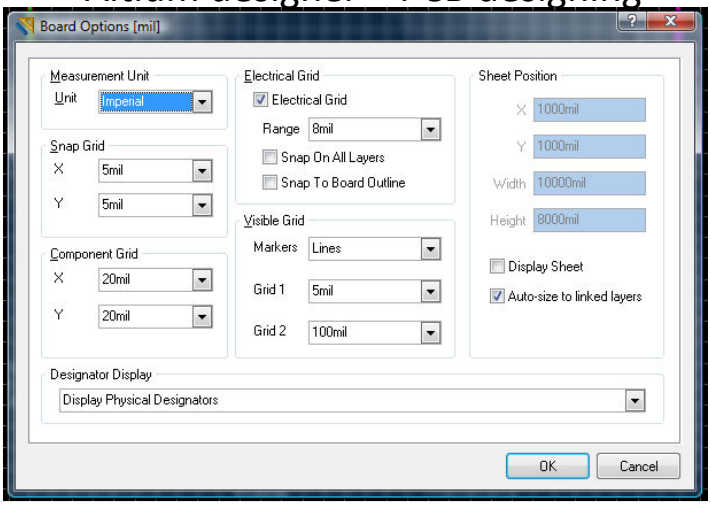

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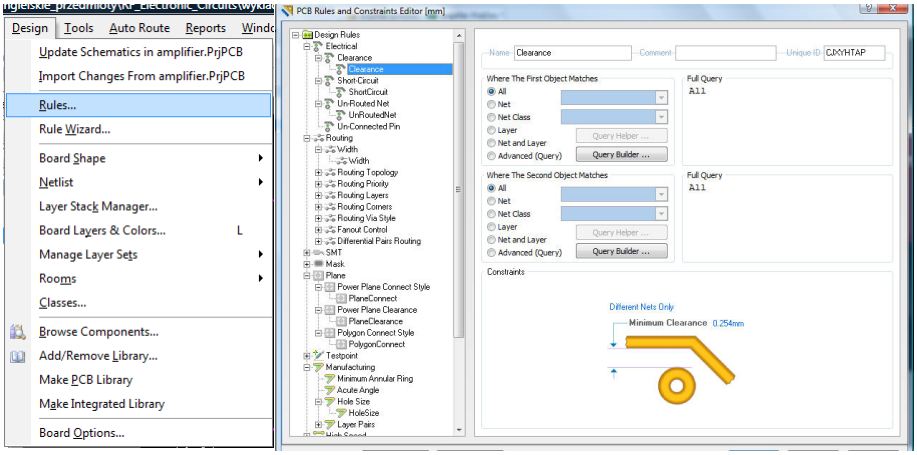

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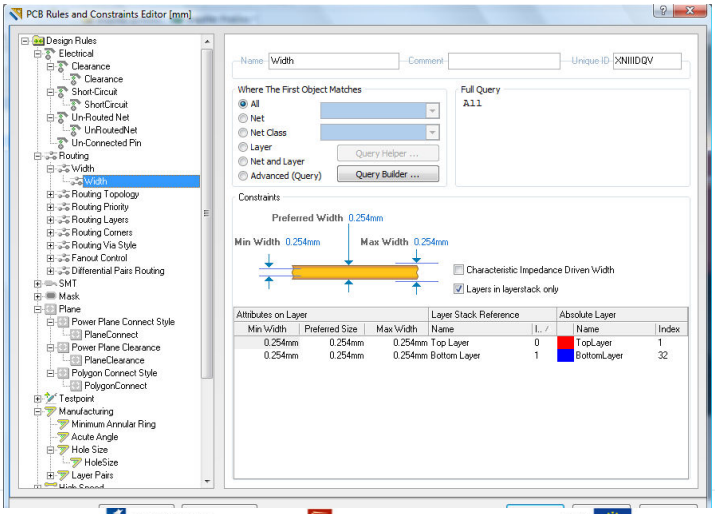

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Altium designer – PCB designing

- set up all rules
- place all components
- define new size of Pcb outline
- define Pcb clamping points
- connect components (one layer board – bottom/top layer, two layers board top and bottom layer)

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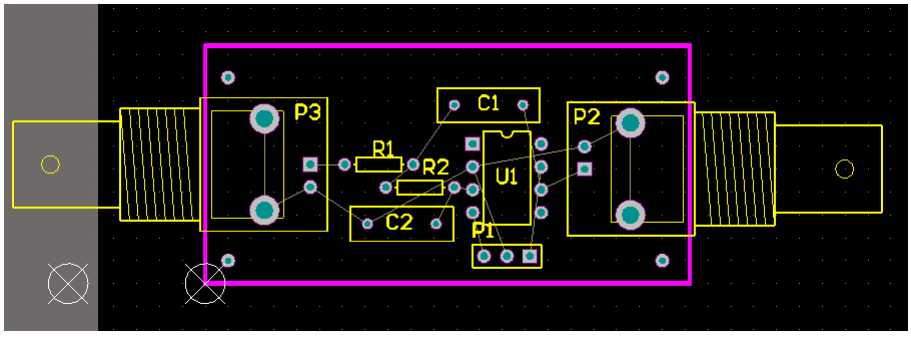

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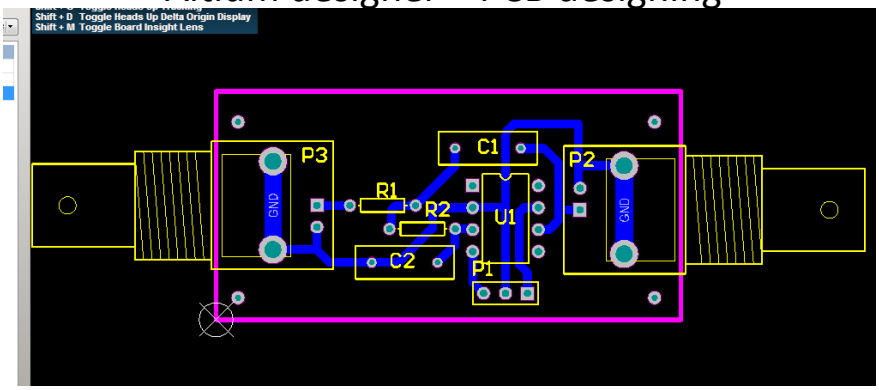

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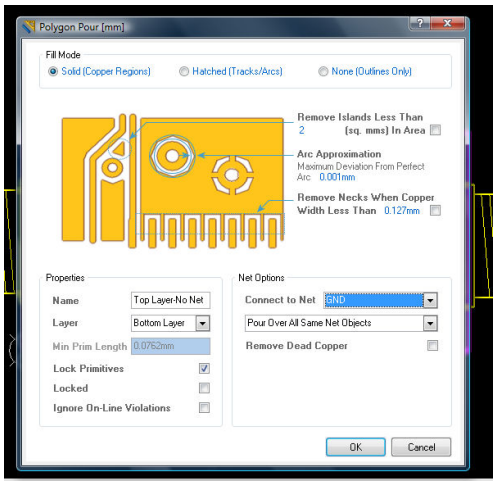

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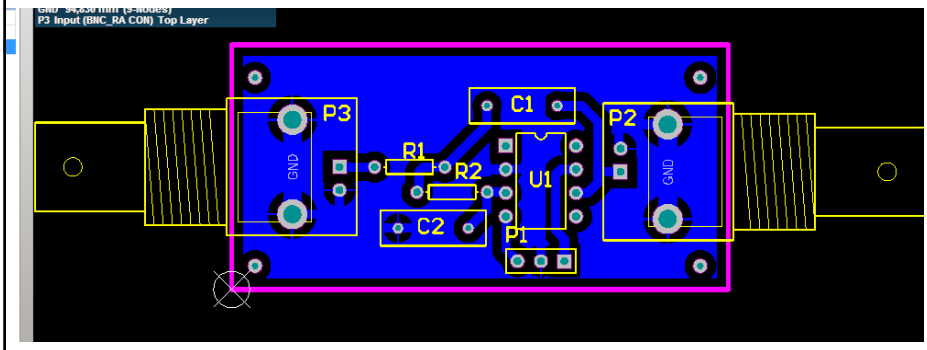

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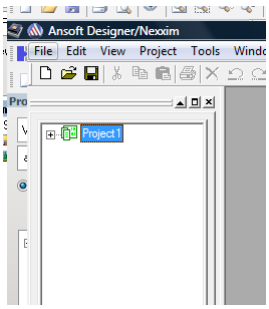
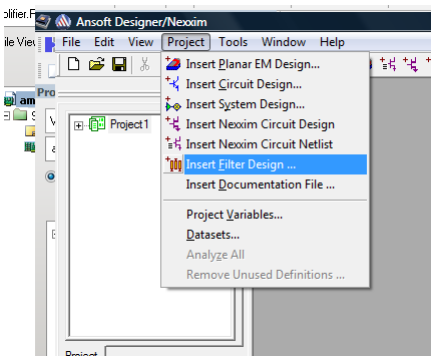
Ansoft Designer – filter project





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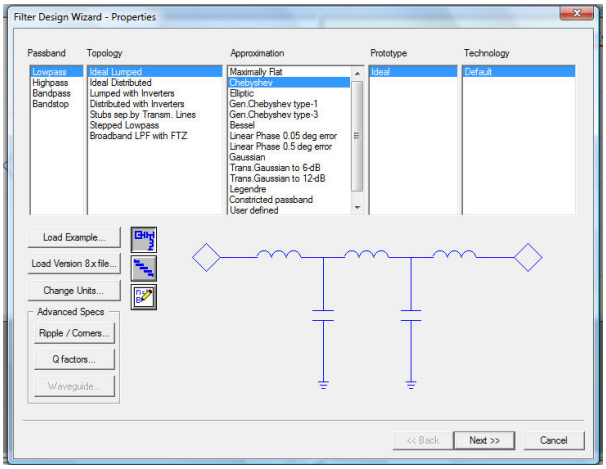

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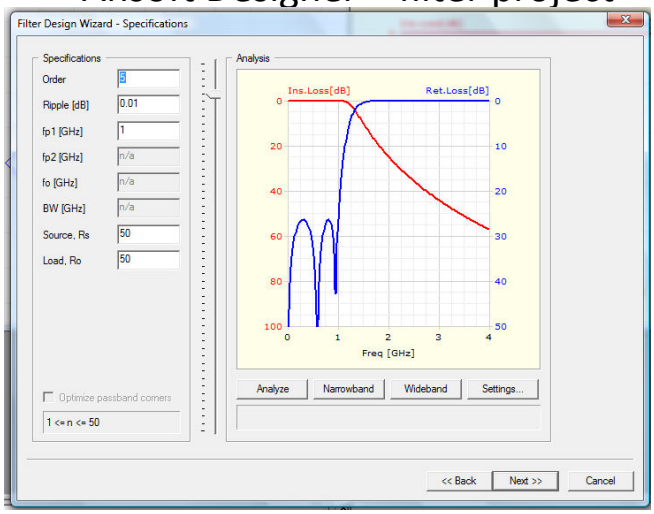

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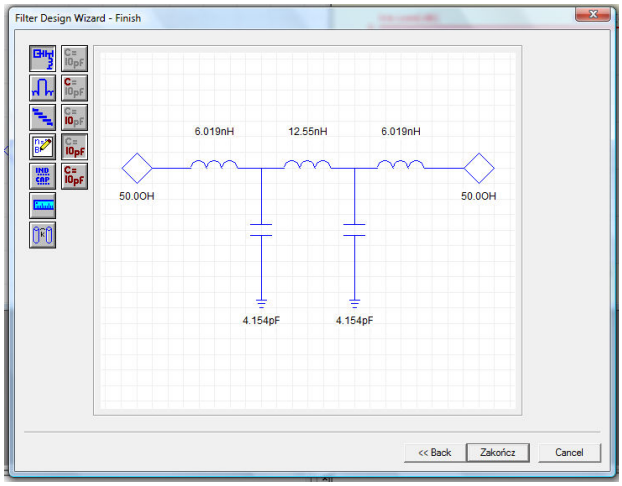

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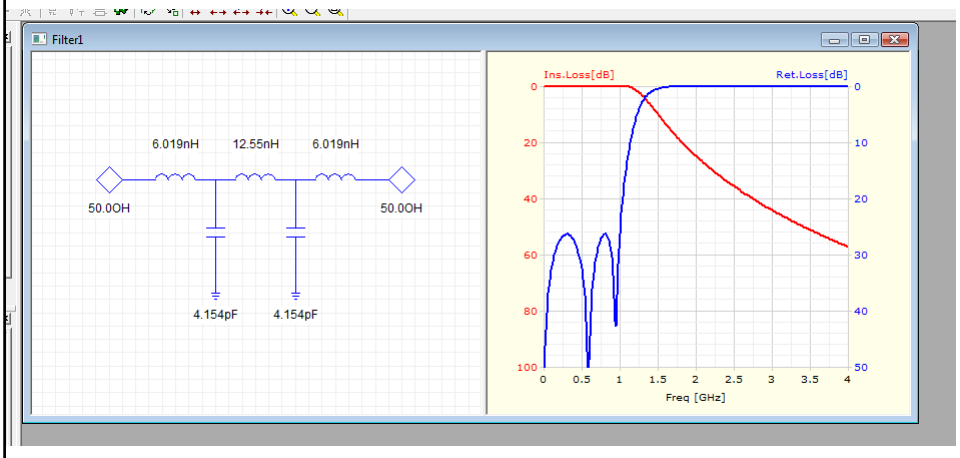

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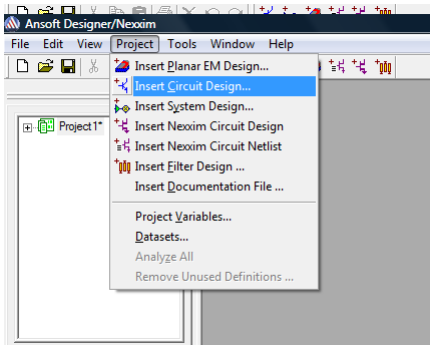
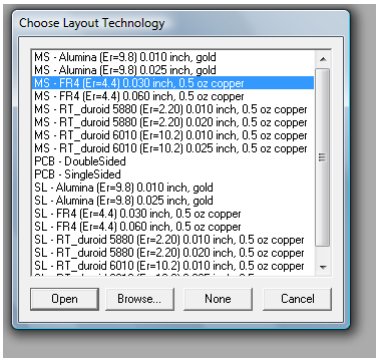
Ansoft Designer – Impedance Matching using a 1 / 4 –Microstrip-Line (on a FR4-Board)





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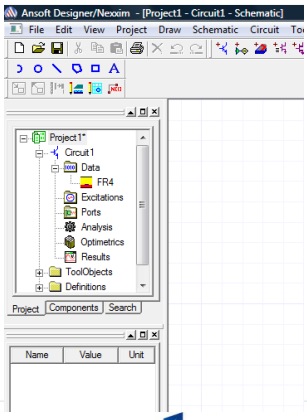

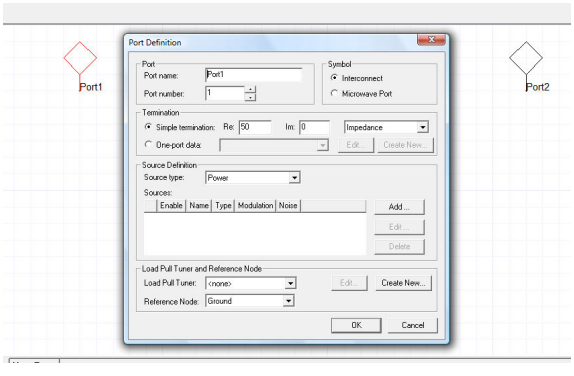

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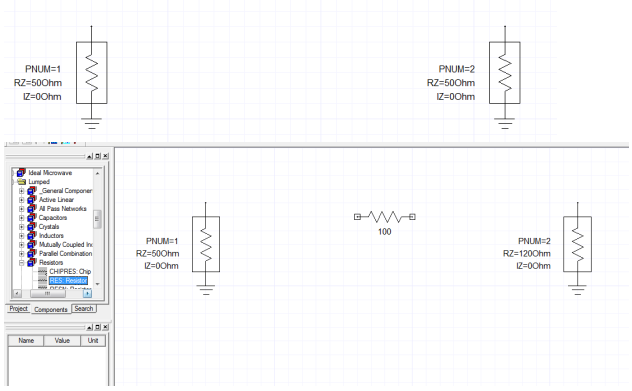

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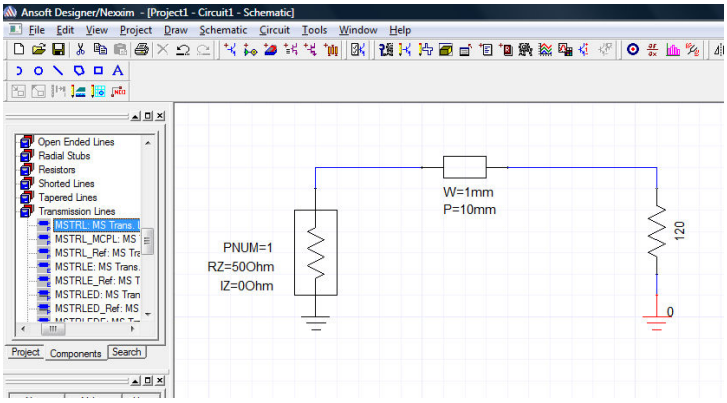

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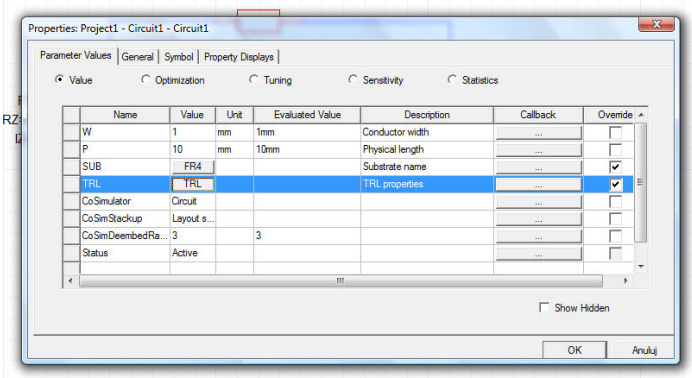

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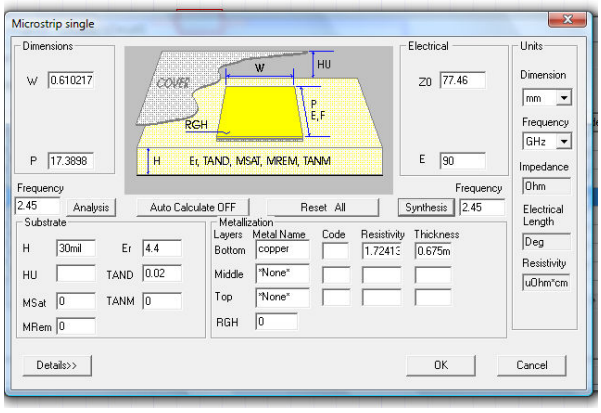

$$Z_0 = \sqrt{50 \cdot 120} = 77.46\Omega$$

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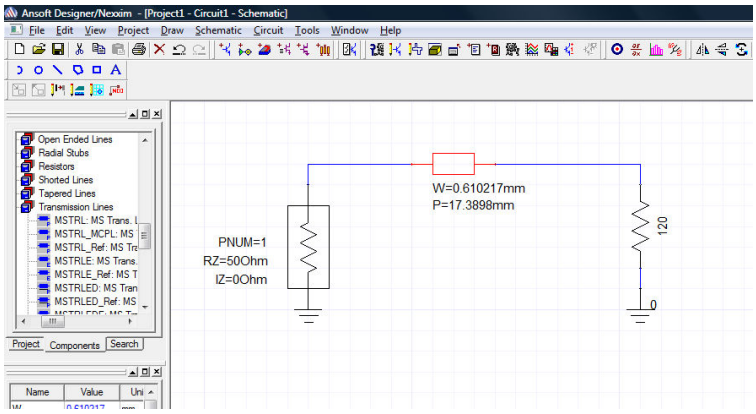

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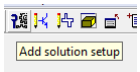

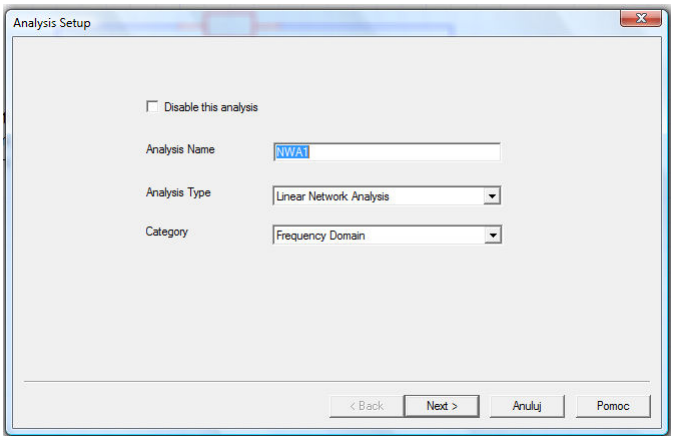

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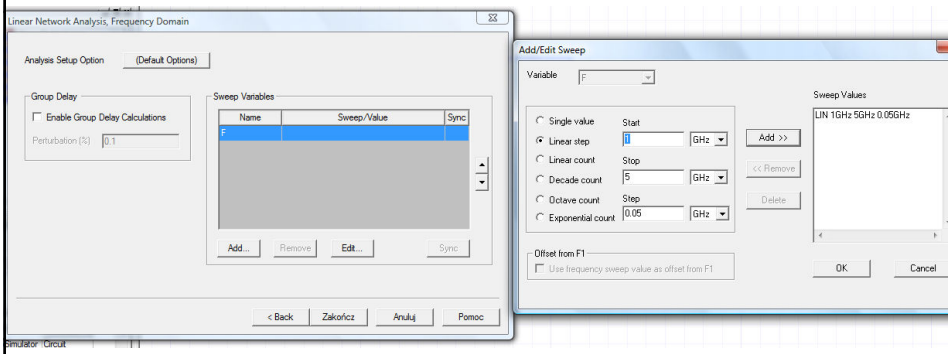

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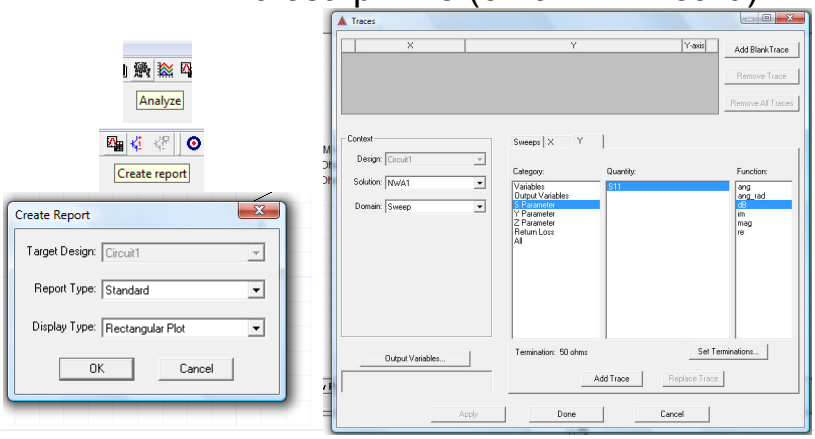
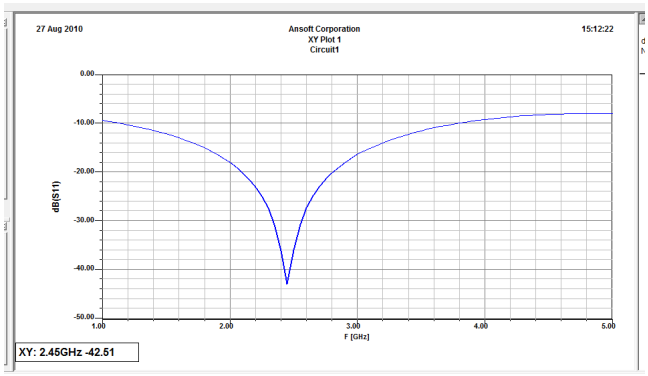


Ansoft Designer – Impedance Matching using a 1 / 4 –Microstrip-Line (on a FR4-Board)



Wrocław University of Technology
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