

Bergen, Norway, May 2005

**Simulation of planar components -
parasitics and extraction of models
(package modeling part and
introductory pages of the presentation
of prof. Mrozowski group)**

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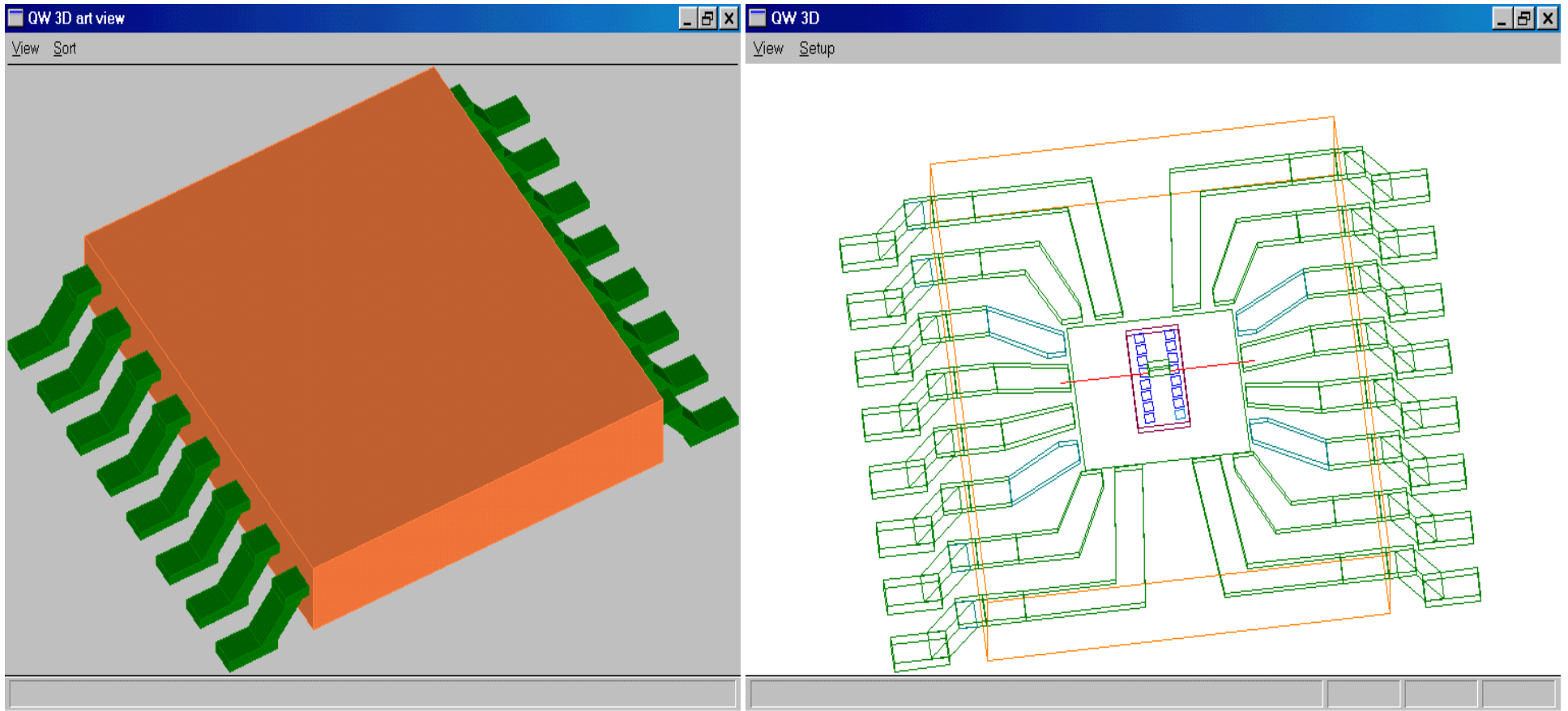
QWED's web page: www.qwed.com.pl

Summary:

- 1. Focus on accuracy: materials, singularities etc.***
- 2. TEM versus quasi-TEM lines, ambiguity of the notions of V, I, Z***
- 3. Losses and skin effect***
- 4. Incorporation of package parameters (after A.Abramowicz and Z.Nosal)***
- 5. Extracion of models (presentation prepared by the group of prof. M.Mrozowski – Technical University of Gdansk)***

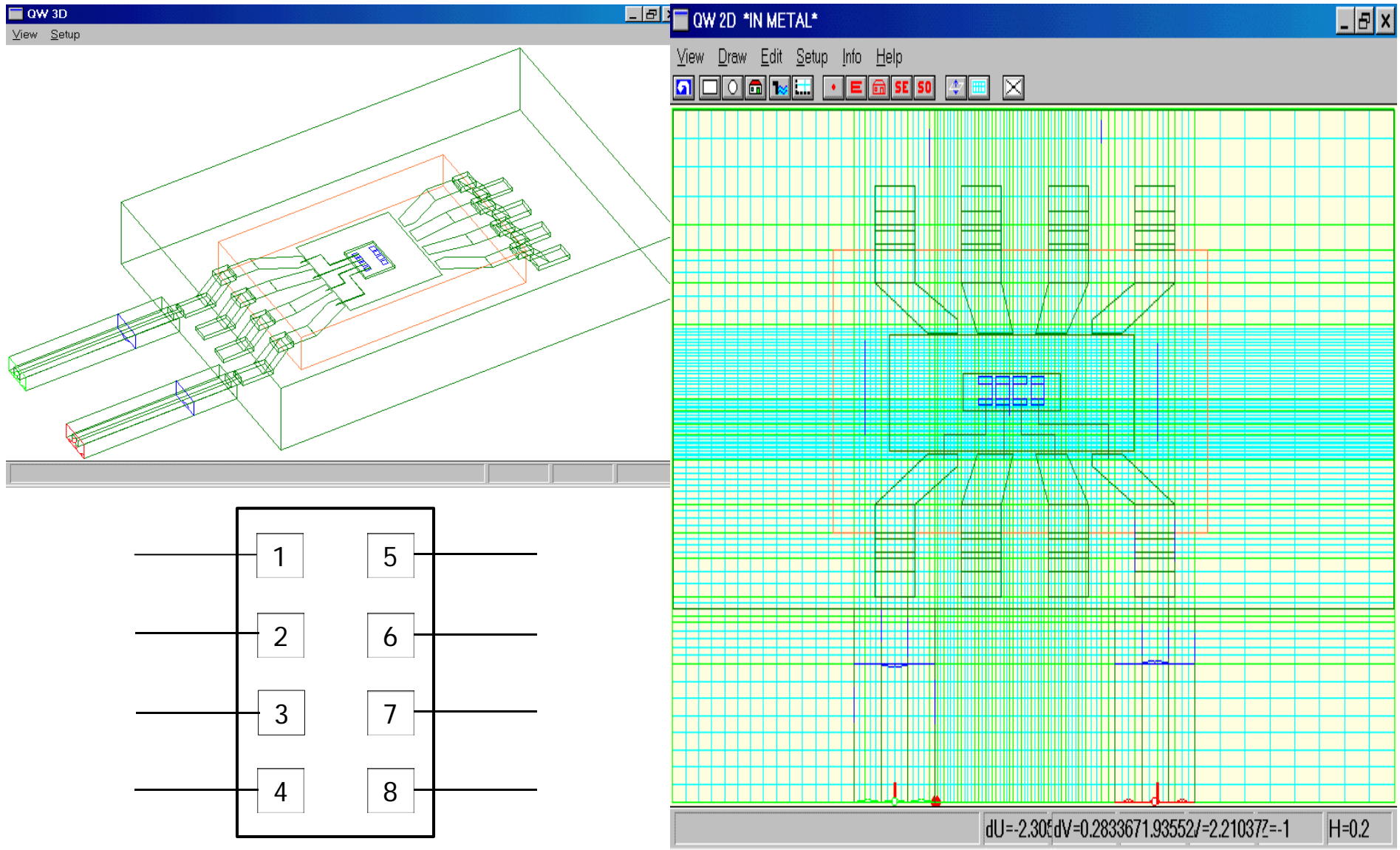
Modeling of IC packages

after A.Abramowicz and Z.Nosal, Inst of Electronic Systems, Warsaw Univ. of Technology contact: aabr@ise.pw.edu.pl, z.nosal@ise.pw.edu.pl,



General and inside view of SSOP16 package

Modeling an IC package SSOP16



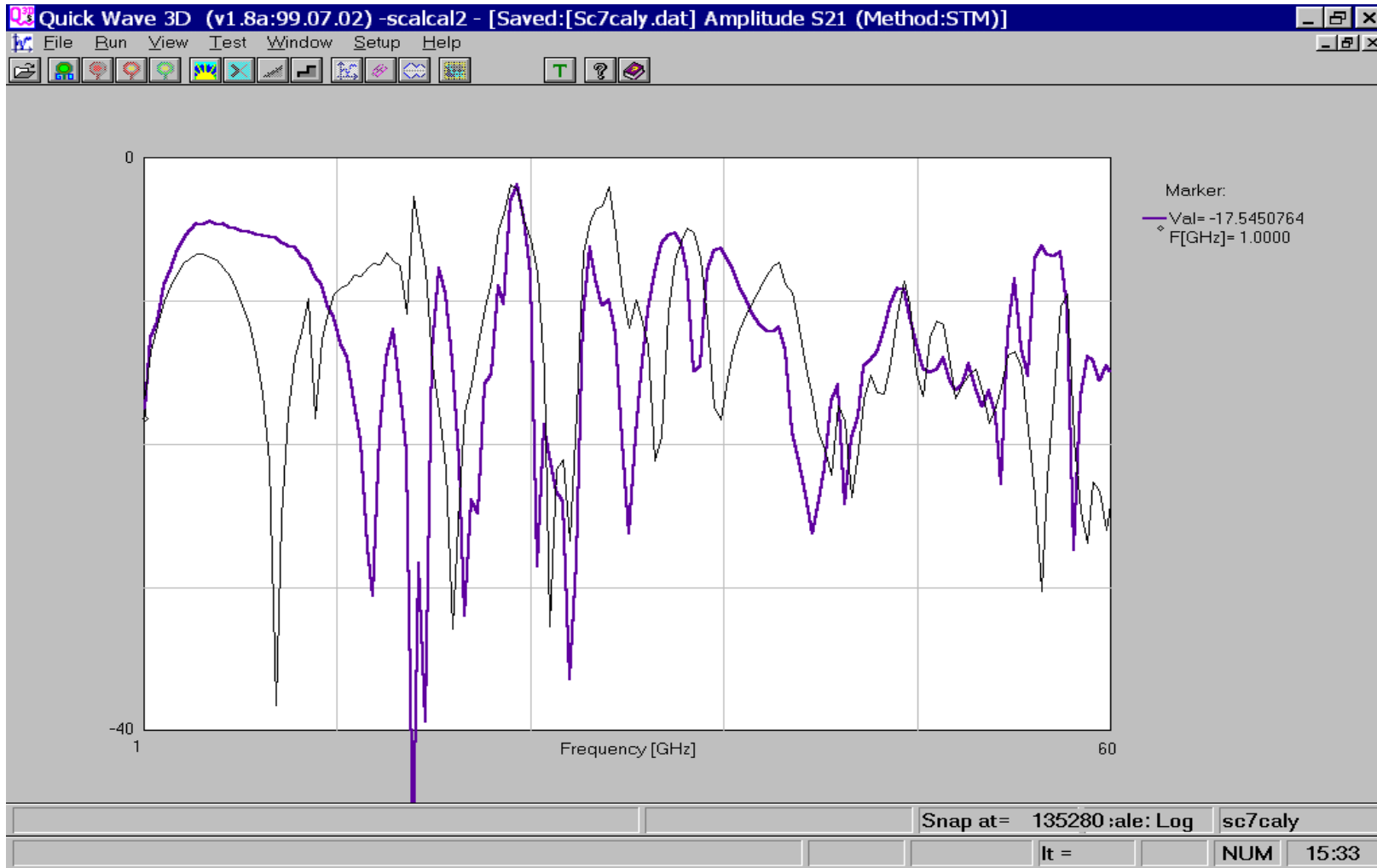
A simplification of SSOP16 package to 8 most relevant contacts and its view in QW-3D simulator

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Transmission between nodes 2 and 6 connected by a metal bar 0.1x0.15 mm in full package model and in simplified (8 pad0 model)

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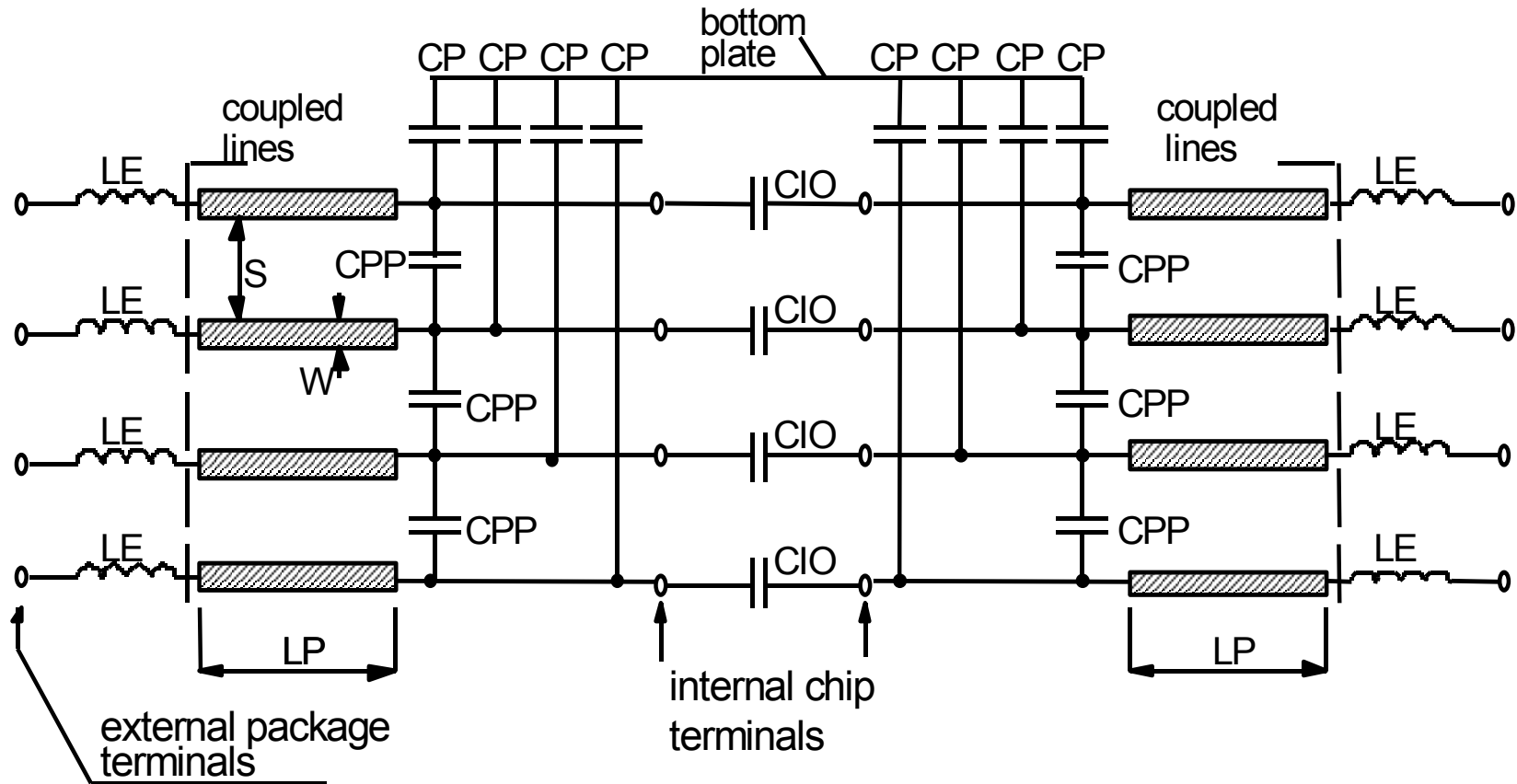
Isolation between node 2 and the last node (magenta) and between node 2 and second to last node

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Isolation between nodes 1 and 4 with non-grounded (floating potential) metal back plane (magenta) and with grounded metal back plane (black).

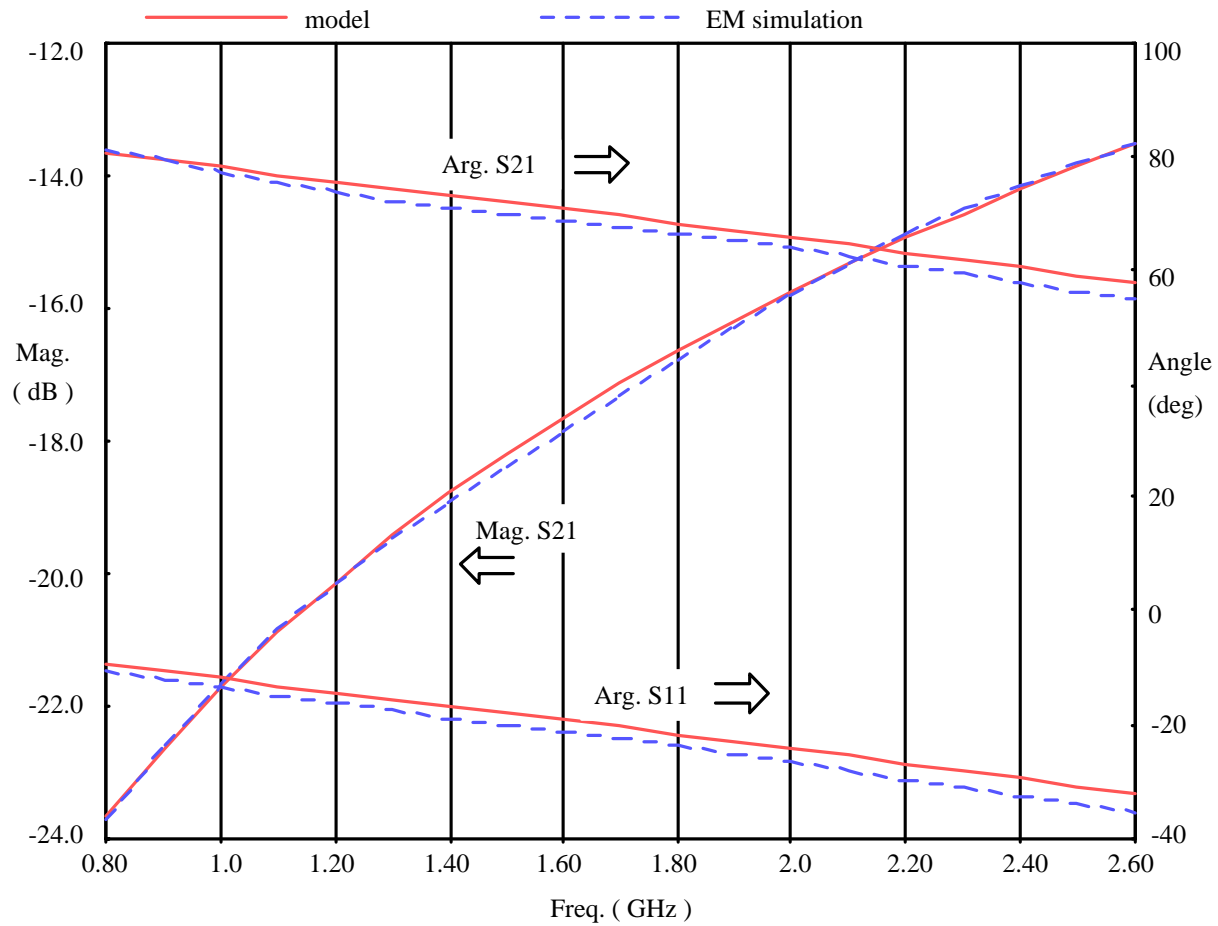
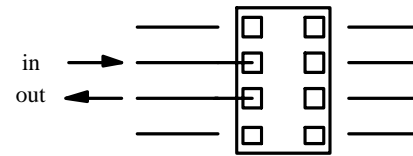
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Lumped equivalent circuit of the package proposed by Z.Nosal

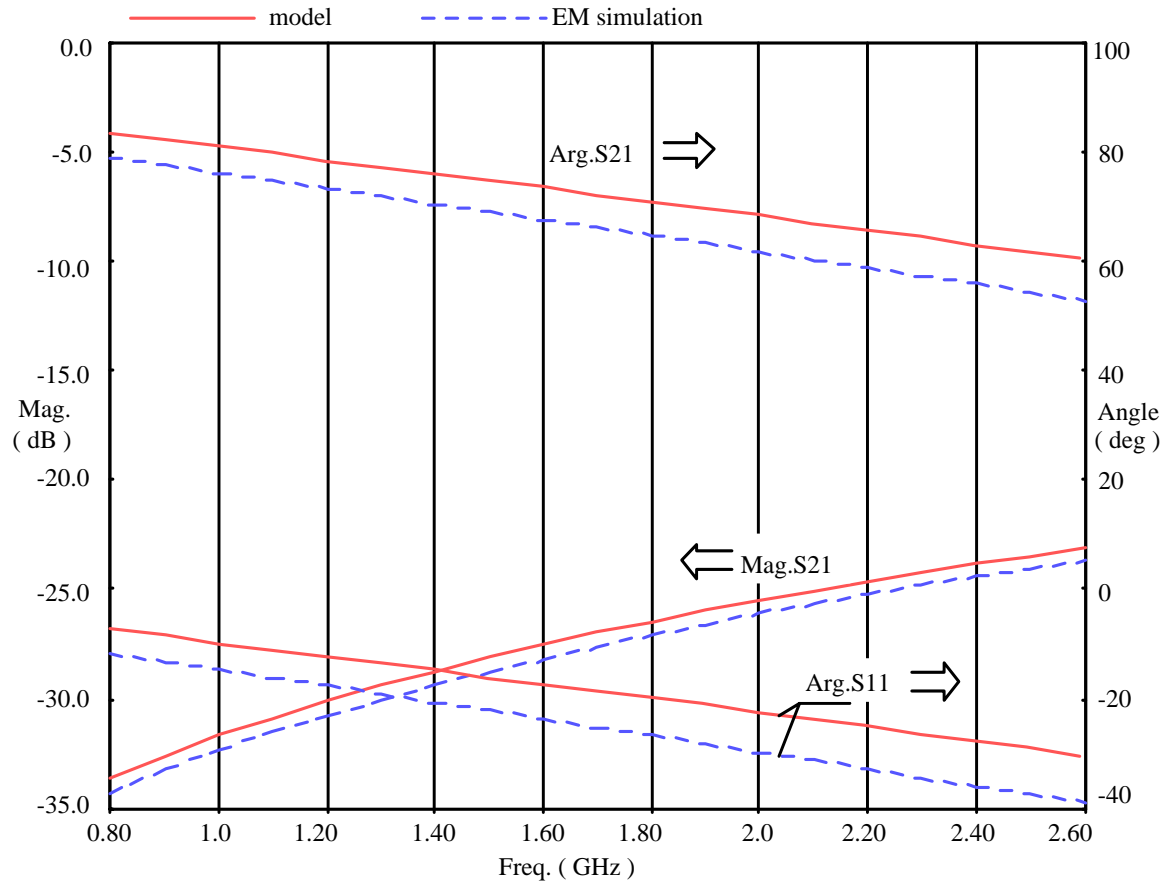
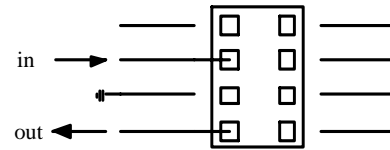
Electromagnetic simulation results in particular configurations of connections will be compared with circuit simulation results with particular values of lumped elements for the best fitting.

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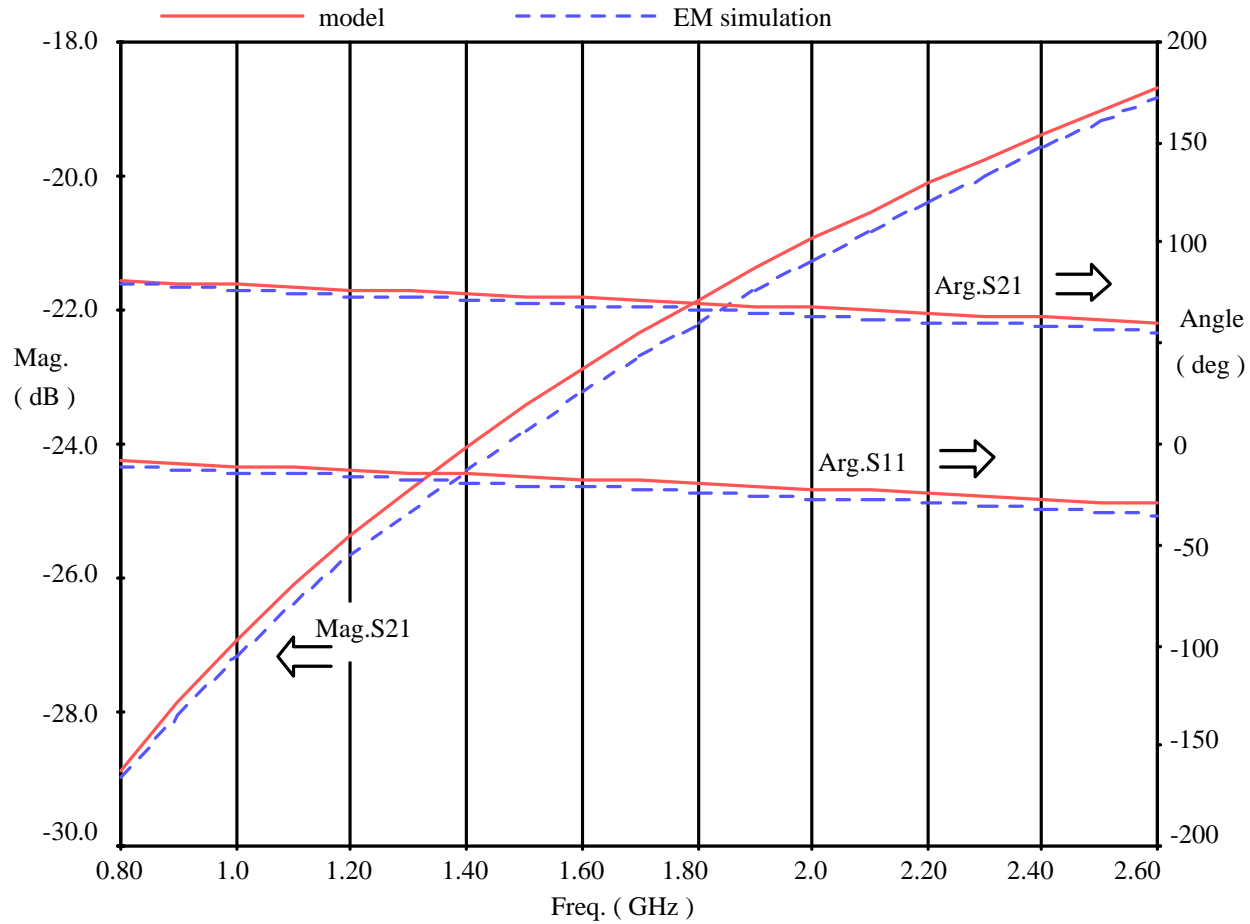
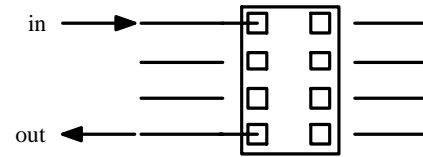
Fitting configuration no.1

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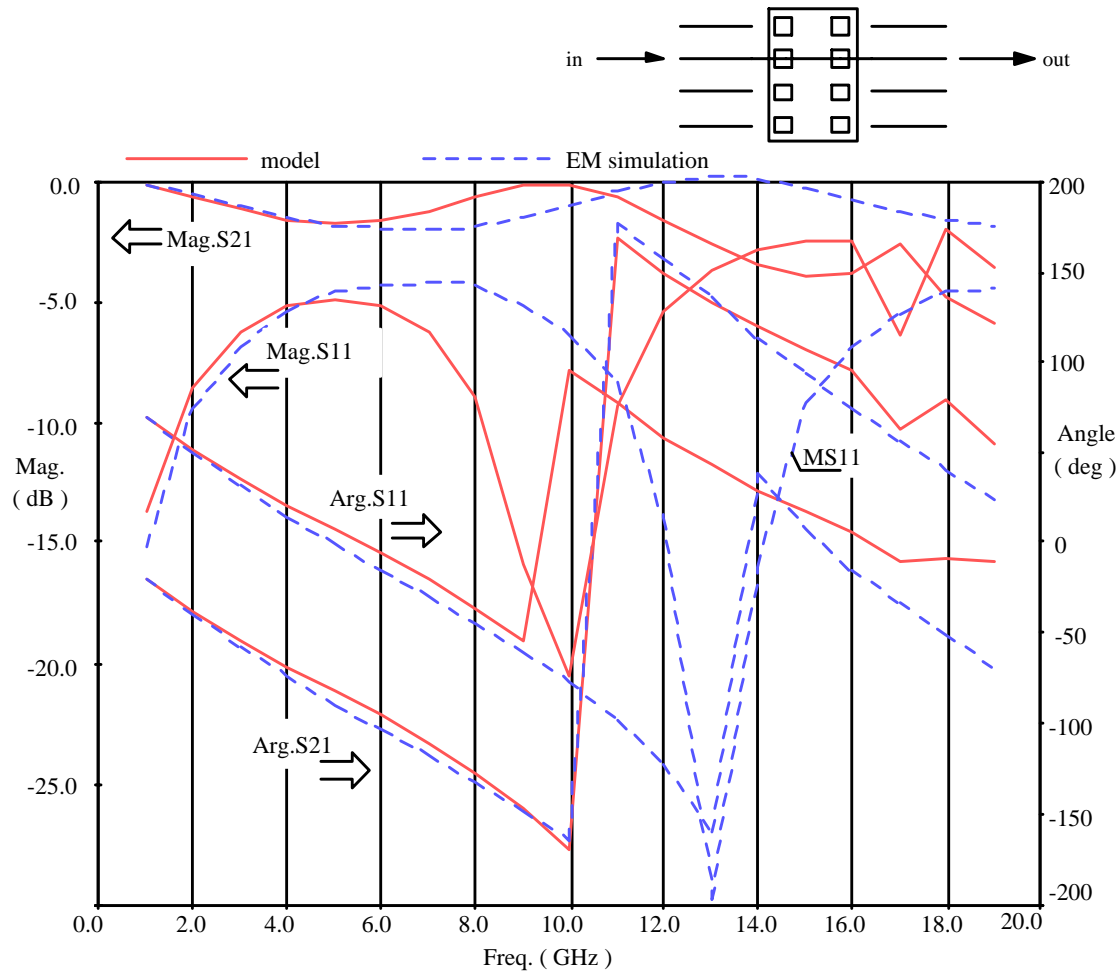
Fitting configuration no.2

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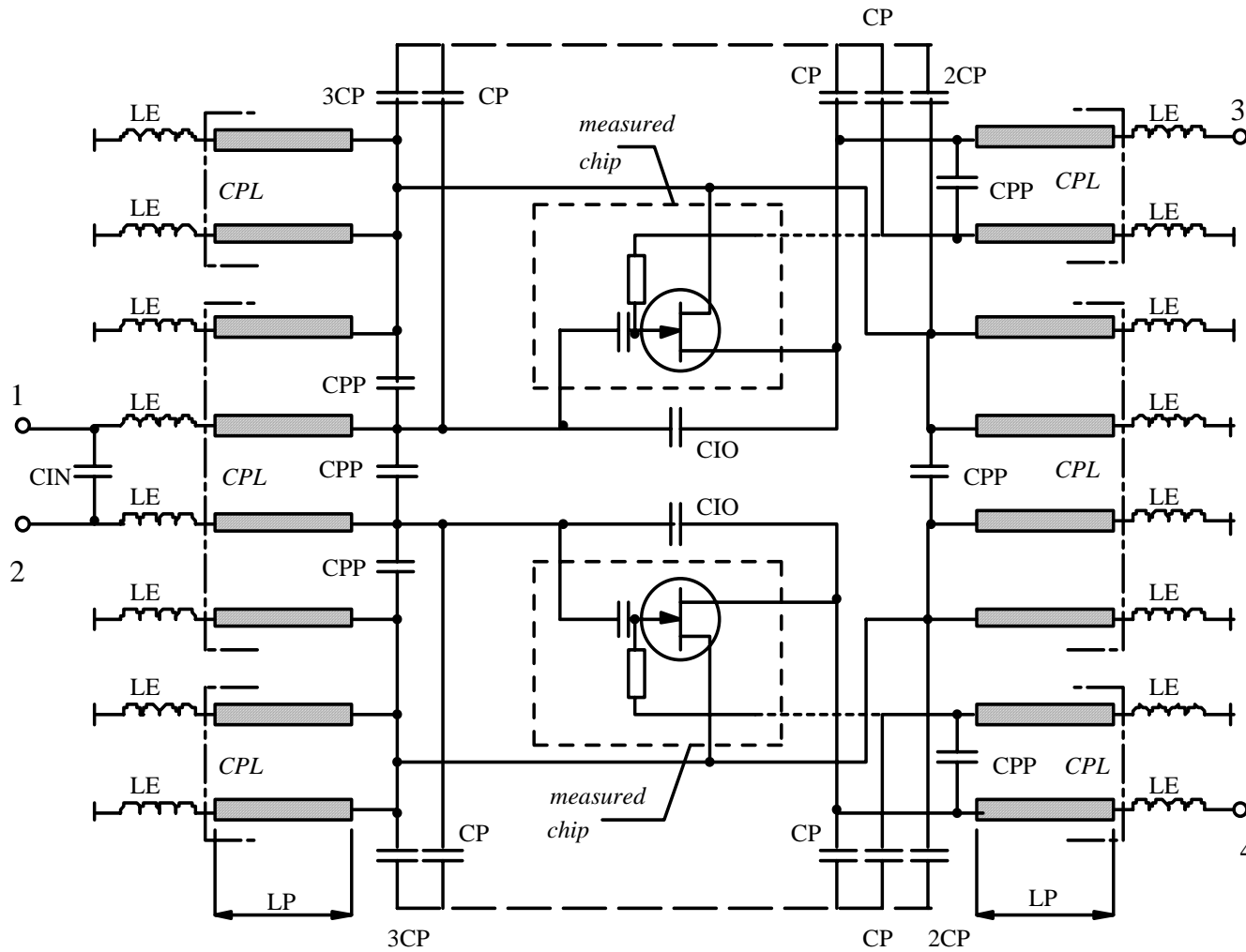
Fitting configuration no.3

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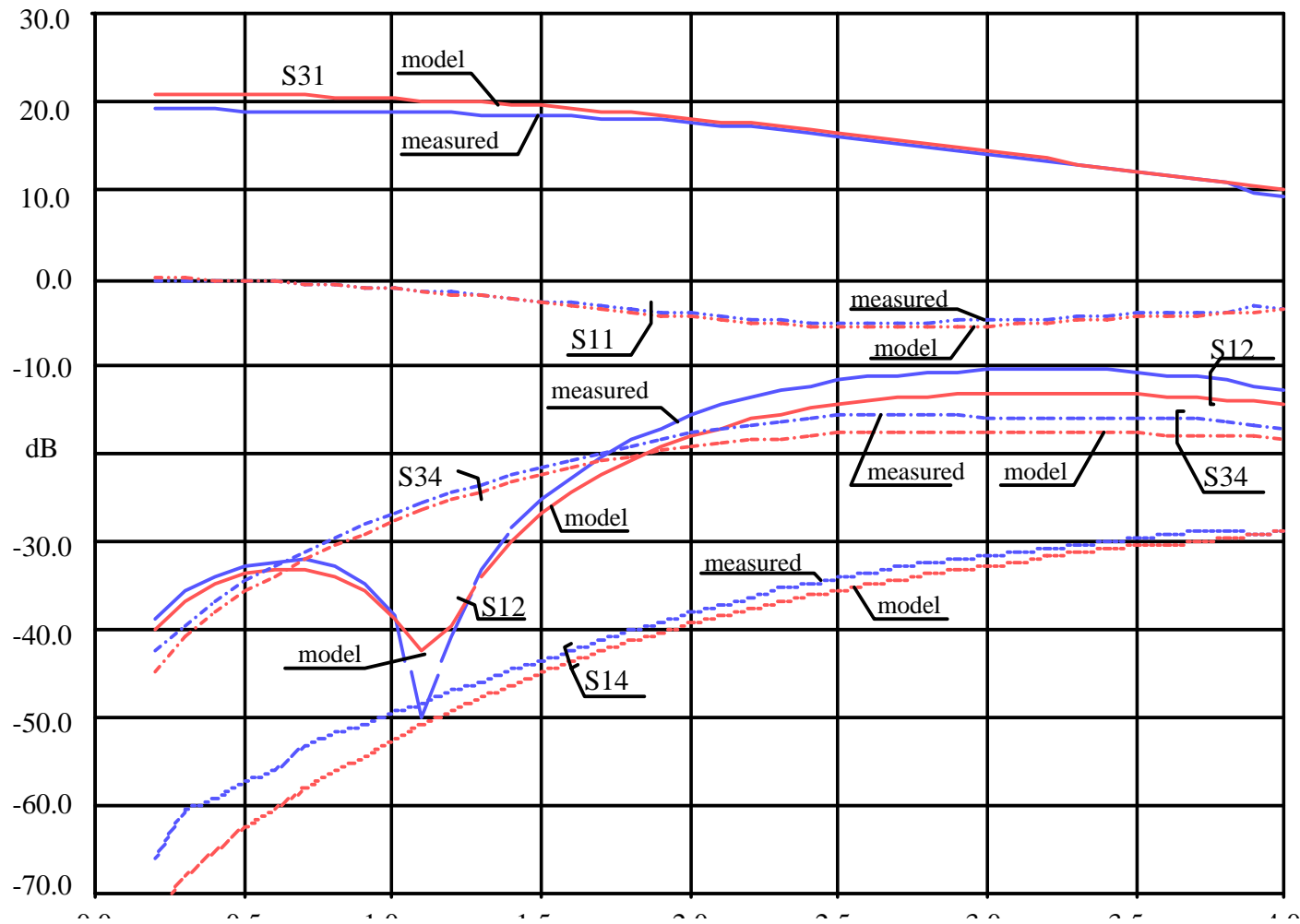
Fitting configuration no.4

Modeling an IC package SSOP16



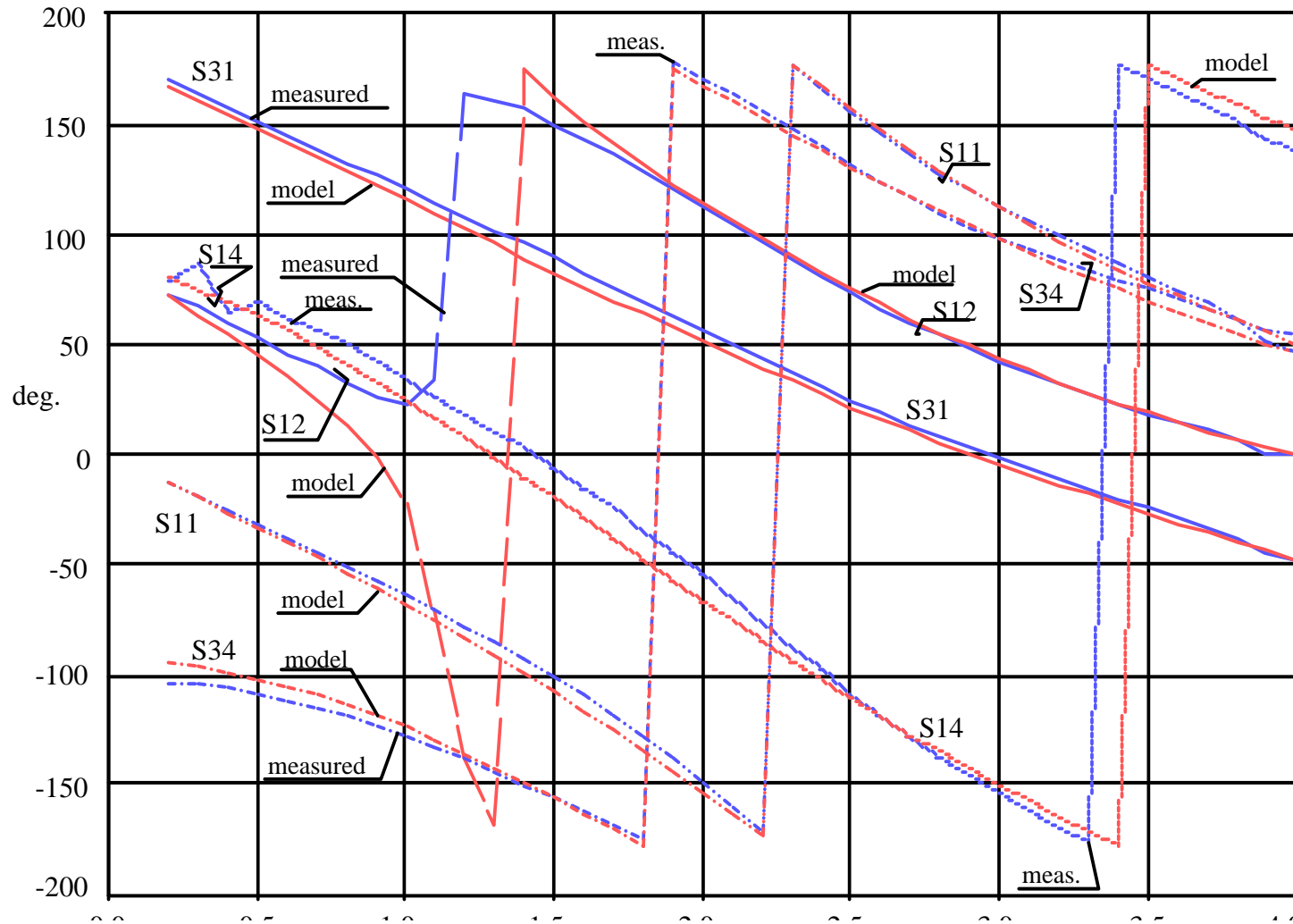
IC in the package

Modeling an IC package SSOP16



Comparison of modeling versus measurements of the packaged IC $|S_{mn}|$

Modeling an IC package SSOP16



Comparison of modeling versus measurements of the packaged IC ($\text{Arg}(S_{mn})$)

Research summary

WiComm Center of Excellence

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WiComm

- Applied computational electromagnetics group
- Prof. Michał Mrozowski - head
 - dr K. Nyka, dr P.Kozakowski
 - 5-7 PhD students
- Center of Excellence status since 2004
- e-mail: *m.mrozowski@wicomm.org*

Center of Excellence

- Research program
 - Methods of computational electromagnetics aimed at custom microwave/RF CAD tools
 - Analysis, design and prototyping of microwave/RF circuits, antenna and subsystems
 - Electromagnetic Compatibility and signal integrity
 - Propagation of the radio waves in buildings and urban environment
- home page: *www.wicomm.org*

Research areas

- Surrogate models of complex microwave devices
- SPICE Equivalent circuits
- Nested macromodels
- Filters
 - Electrical prototype synthesis
 - Rapid dimension synthesis
 - Fast numerical tuning and optimization