IC-Emit
Comparing Simulated/Measured IC Emission Spectrum

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System Dependability and Compatibility Group
Z'EMC attitude

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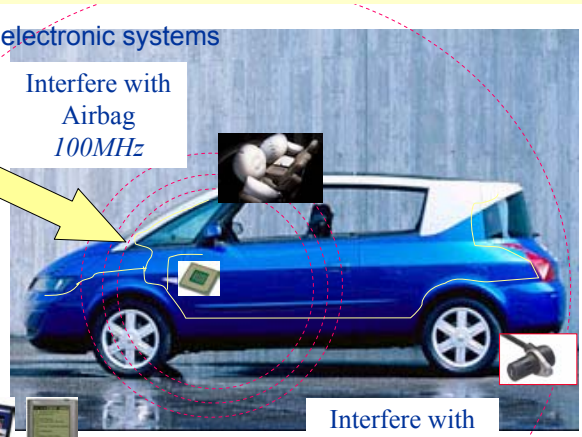
1. Context

More Complex Embedded electronic systems

32b Micro-controler units

Interfere with Airbag *100MHz*

Interfere with Mobile *0.9,1.8,1.9GHz*

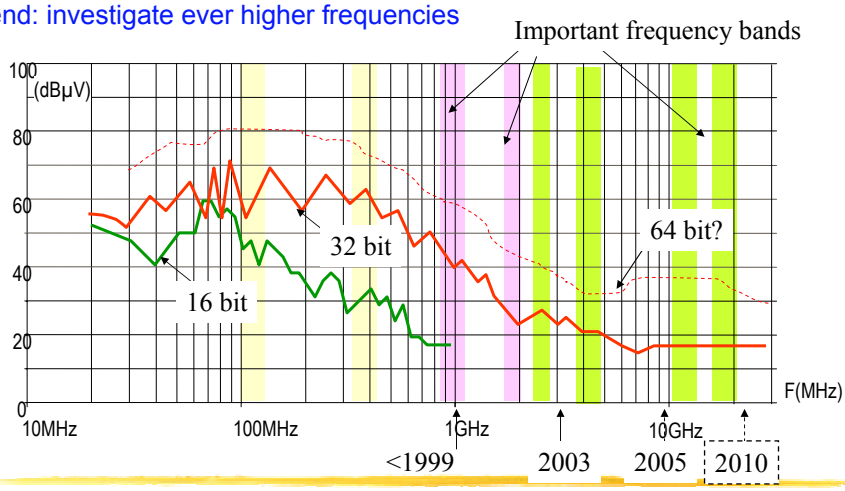


Interfere with Computer *2.5Ghz*

Interfere with ABS *100MHz*

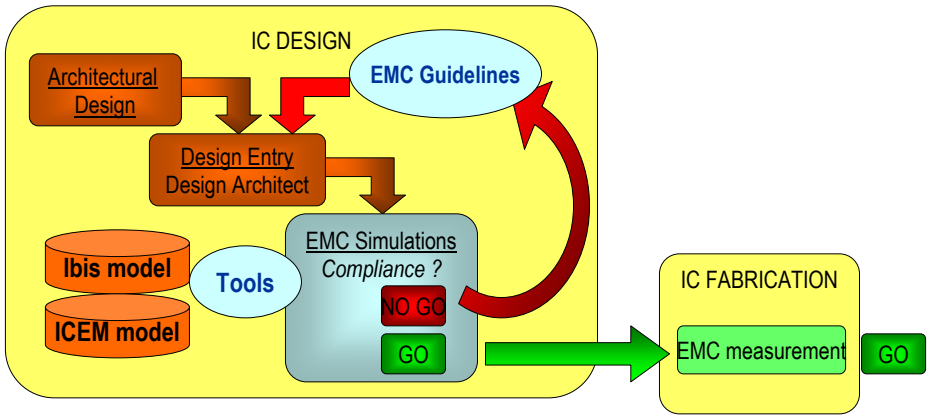
1. Context

Trend: investigate ever higher frequencies



1. Context

Help to simulate IC Electromagnetic Emission before fabrication

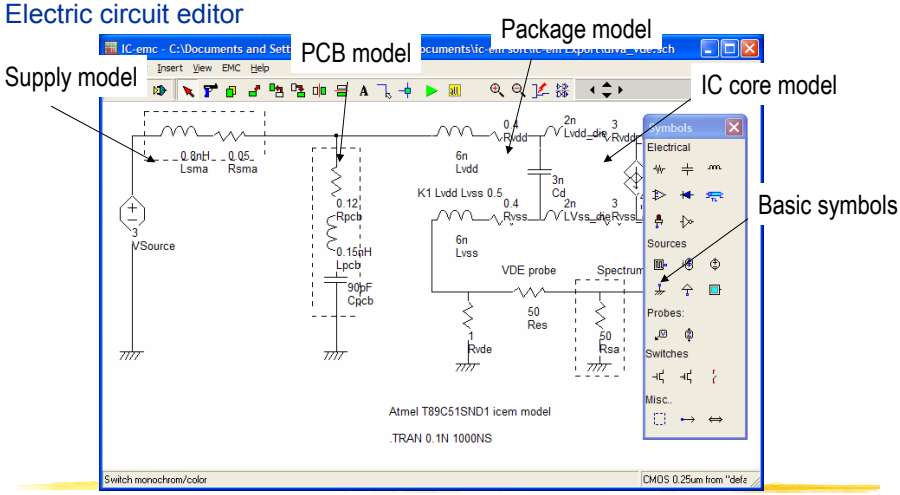


2. What is IC-Emit

- An electric circuit editor
- An IBIS to circuit translator
- An analog simulator
- A dB vs. frequency post processor
- A library of EMC/IC elements
- A data base of measured emission
- A simple tool to compared measured/Simulated emission
- A convenient way to investigate *what if* impact on emission

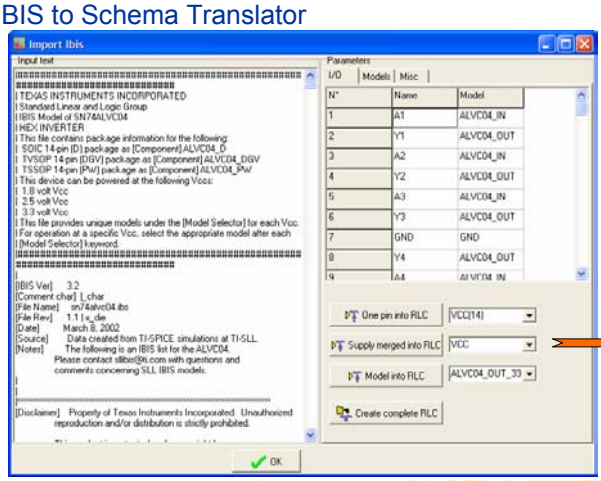
3. Description

Electric circuit editor

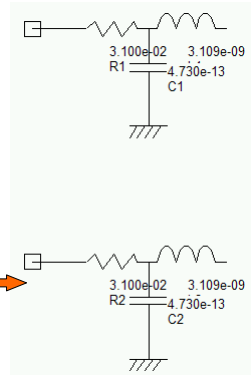


3. Description

IBIS to Schema Translator



Equivalent R,L,C of supply networks

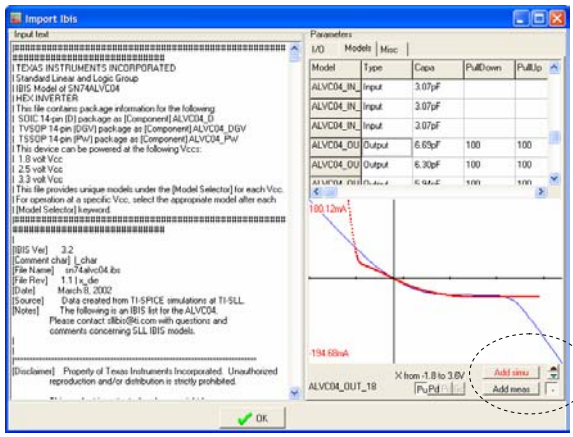


*R/n, L/n, C*n*

3. Description

IBIS to Schema Translator

Simple comparison between simulated, measured and IBIS data



3. Description

Analog simulator: PC Spice freeware from www.winspice.com

Simple, free PC tool

Support from Mike Smith

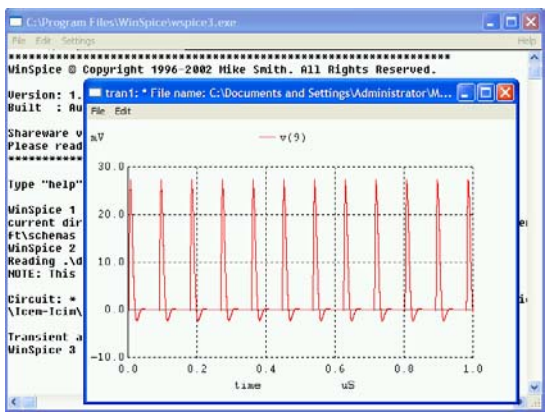
Simple clear manual

Script-based

Access to models

Simple TRAN, AC, DC analysis

… Poor FFT



3. Description

dB vs frequency post processing

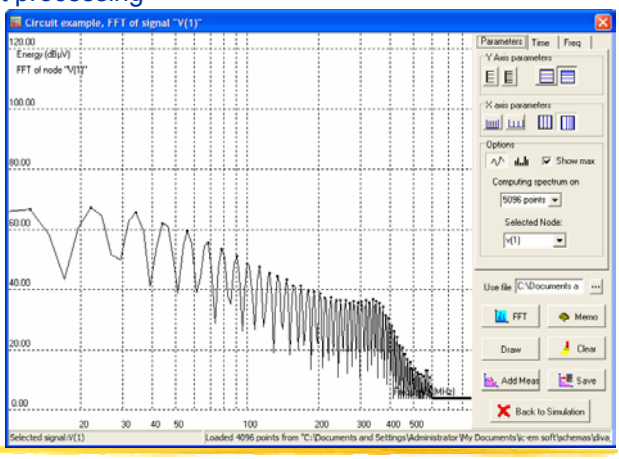
Log/Log, 10MHz-10GHz

Based on WinSpice text output

Access to FFT parameters, scale, lin

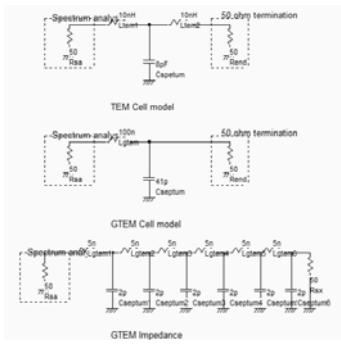
Can add measurements

Can save in simple format



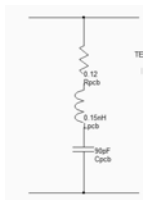
4. Added value

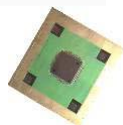
A library of EMC/IC elements



Tem model

GTem model





PCB board

4. Added value

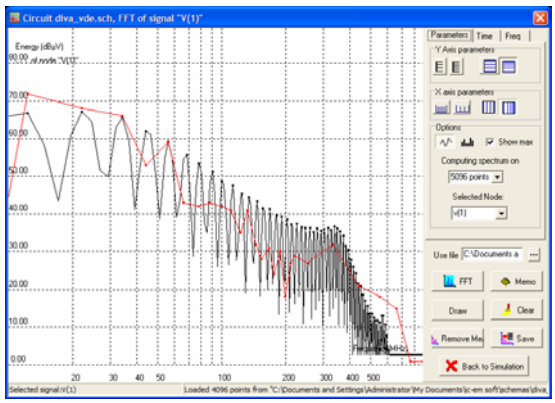
A data base of measured emission spectrum

16 bit micro-controllers

32 bit micro-controller

0.18µm CMOS Test-chip

Full SPICE model given for immediate comparison with measurements



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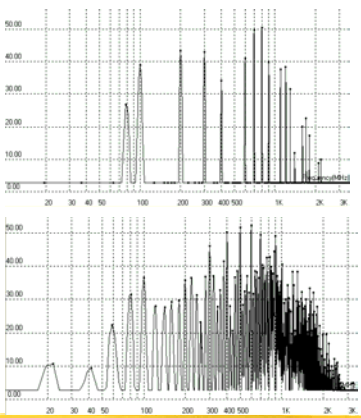
4. Added value

A convenient way to investigate *what if* impact on emission

16 bit micro-controller, core only

16 bit micro-controller, core and active I/O



Conclusion

- An environment for simple emission simulation has been developed
- The schematic editor interfaces with WinSpice
- A post processor has been setup for easy comparison between measured and simulated spectrum
- A library of models and measurements is available
- The package is online at www.ic-emc.org
- Demos at DATE'04, EmcCompo 04, IEEE EMC 2004 St Clara