IC-Emit
Comparing Simulated/Measured IC
Emission Spectrum

Etienne SICARD, Amaury SOUBEYRAN
etienne.sicard@insa-tlse.fr
amaury.soubeyran@eads.net
http://www.ic-emc.org

Table of contents

- Context
- What is IC-Emit
- Description
- Added value
- Conclusion
1. Context

More Complex Embedded electronic systems

- 32b Micro-controller units
- Interfere with Mobile 0.9, 1.8, 1.9GHz
- Interfere with Computer 2.5GHz
- Interfere with Airbag 100MHz
- Interfere with ABS 100MHz

Trend: investigate ever higher frequencies

Important frequency bands

- 16 bit
- 32 bit
- 64 bit?

February 04  E. Sicard DATE Ibis Summit, DIVA project  3/15
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

Supply model

PCB model

Package model

IC core model

Basic symbols

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

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

February 04  E. SicardDATE Ibis Summit, DIVA project 13/15
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