The role of IBIS in near-field Emission Prediction of ICs

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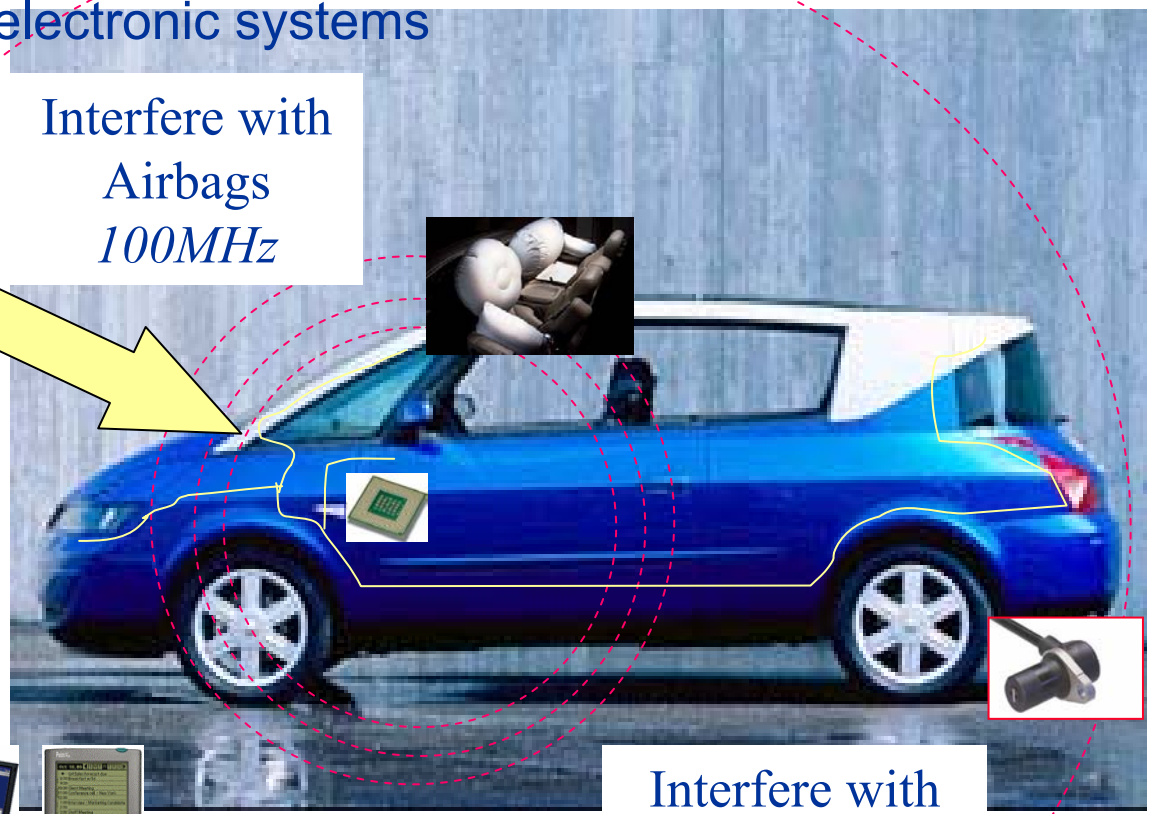
1. Context

More Complex Embedded electronic systems

32b Micro-controler units

Interfere with Airbags *100MHz*

Interfere with Mobile *0.9,1.8,1.9GHz*



Interfere with Computer *2.45Ghz*

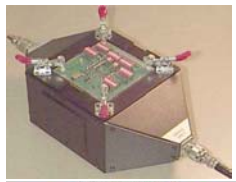
Interfere with ABS *100MHz*

1. Context

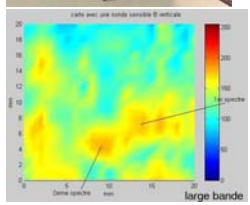
Existing methods and tools for IC emission

Measurement methods

Radiated DC-1GHz



IEC 61967-2



IEC 61967-3

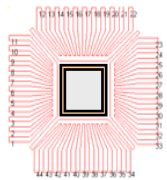
Conducted DC-1GHz

IEC 61967-4

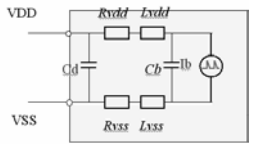
Above 1GHz

Under standardization

Standard Models



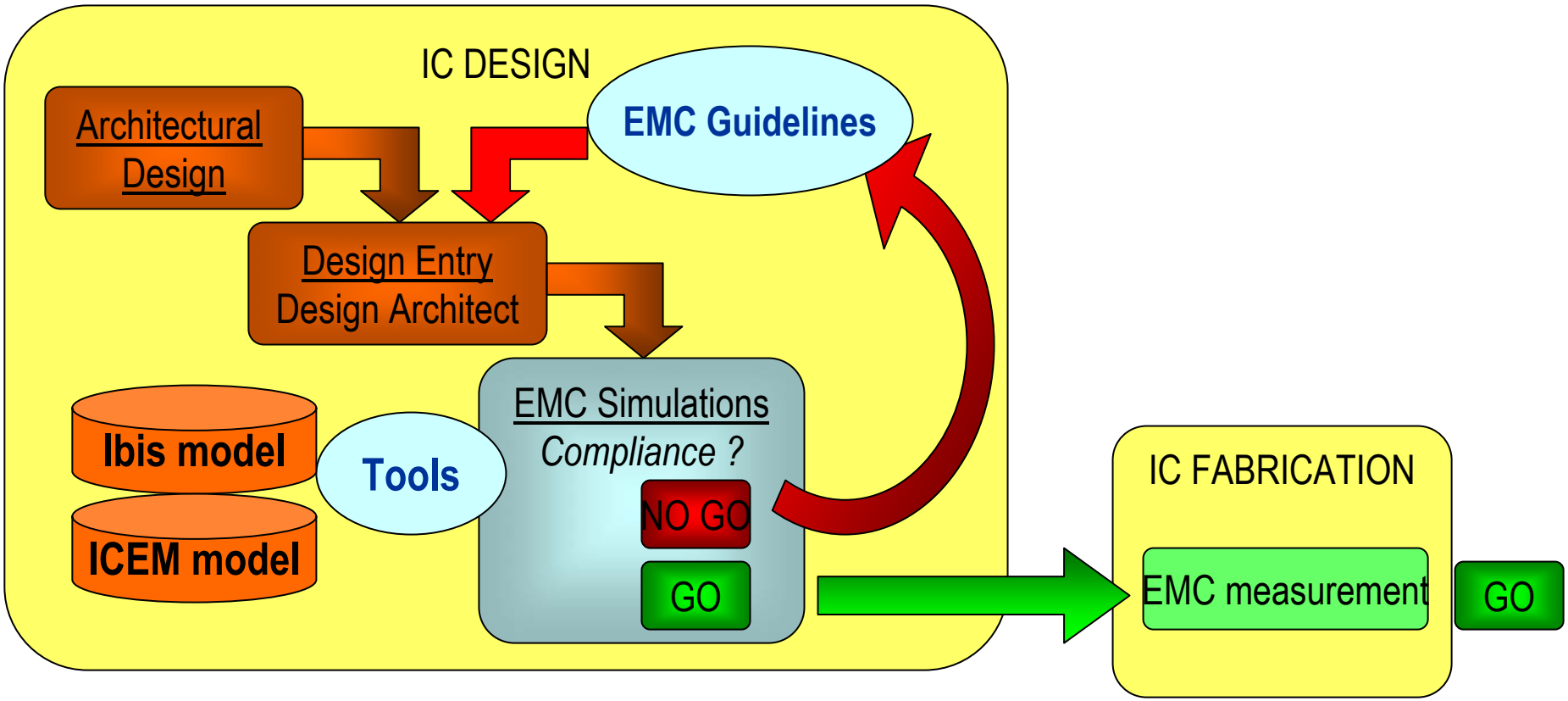
Ibis (Package, I/Os)
ANSI EIA 656



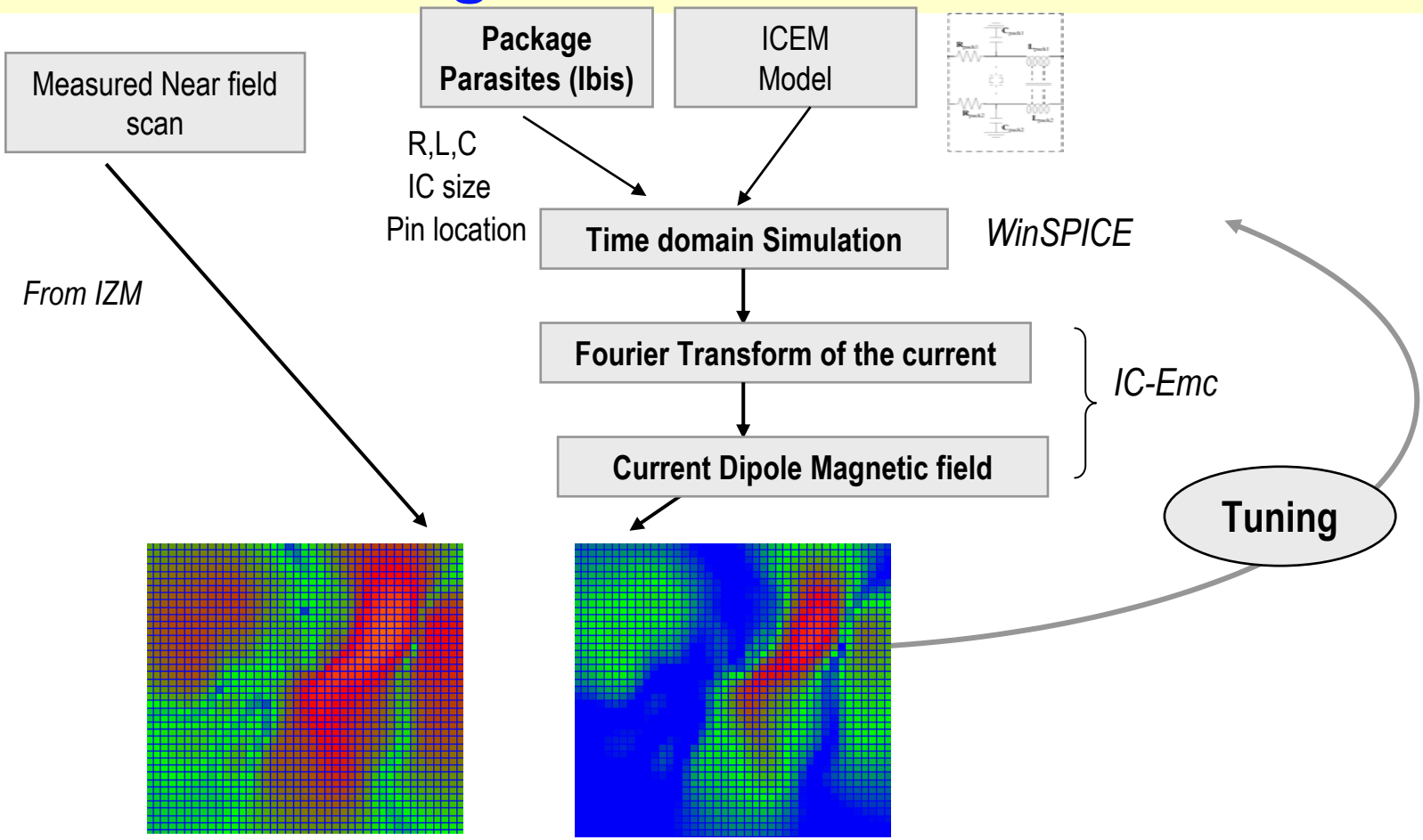
ICEM (Core)
IEC 62014-3

1. Context

Help to simulate IC Electromagnetic Emission before fabrication

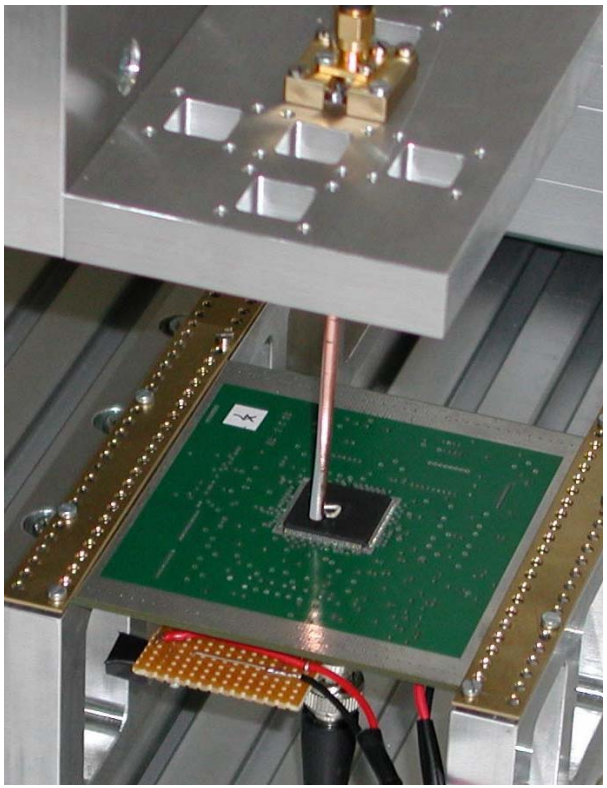


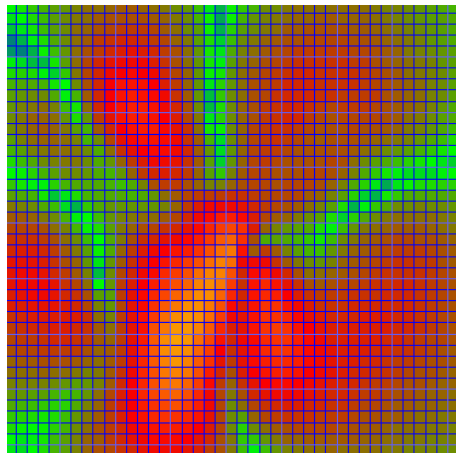
2. Near-Field scanning



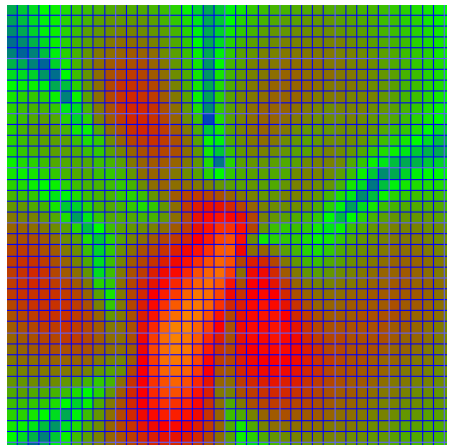
2. Near-Field scanning

Measurement





Hx, 40MHz

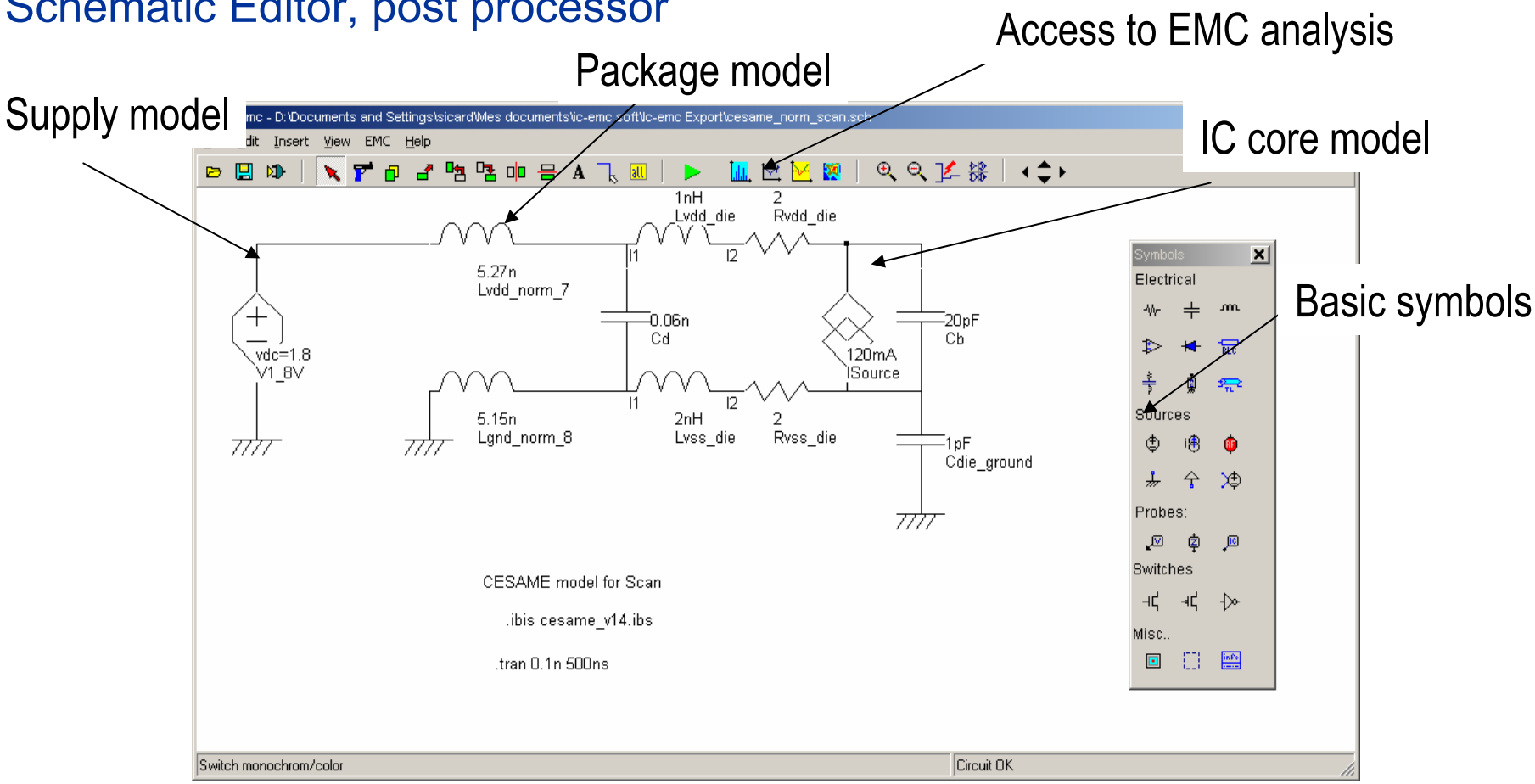


Hx, 120MHz

- Hy similar, Hz less important
- Also Ex, Ey, Ez, but less important

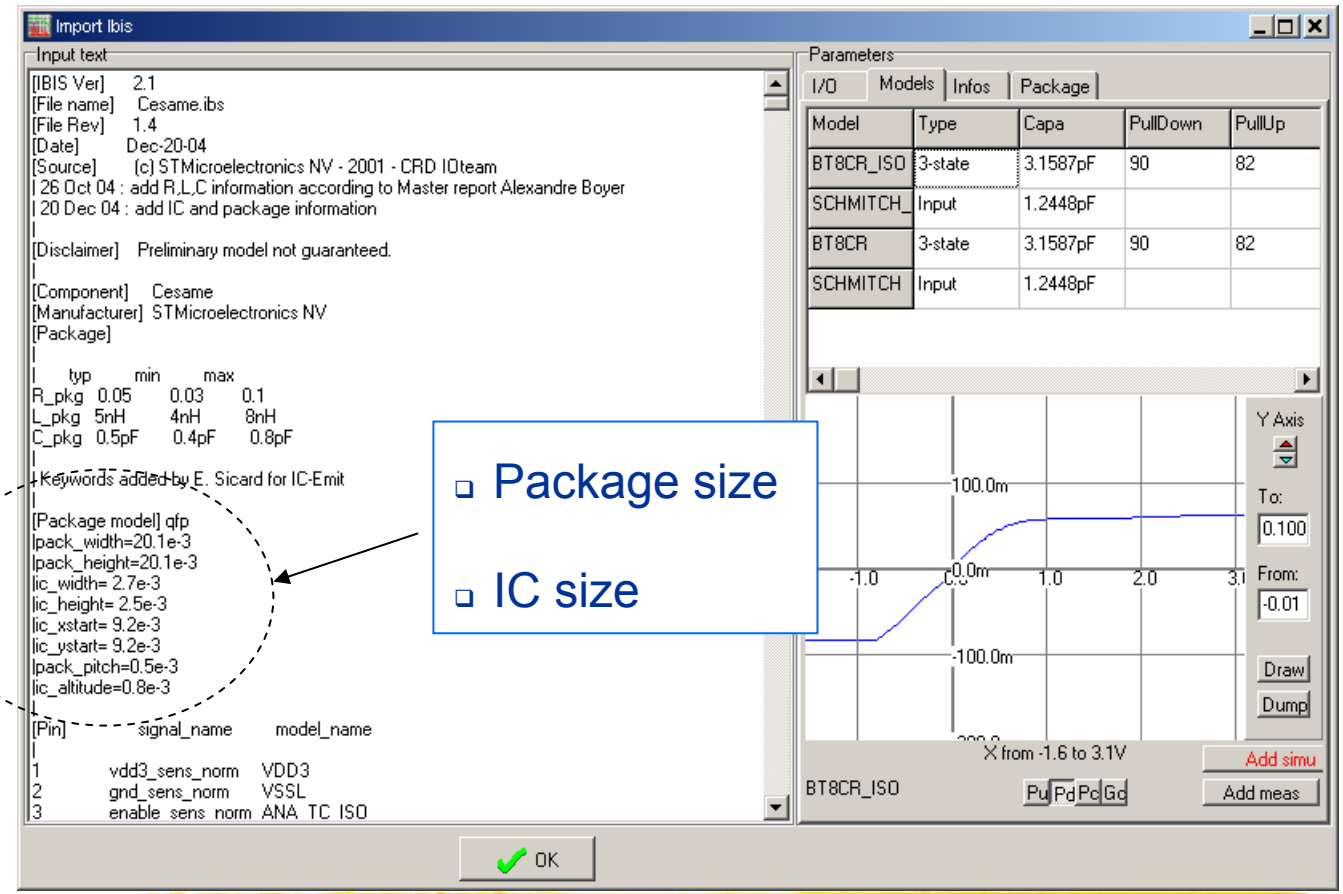
3. The IC-EMC software

Schematic Editor, post processor



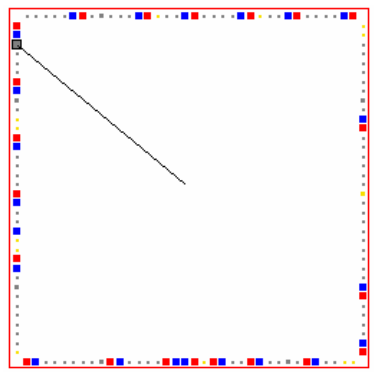
3. The IC-EMC software

Use IBIS information to build the supply network



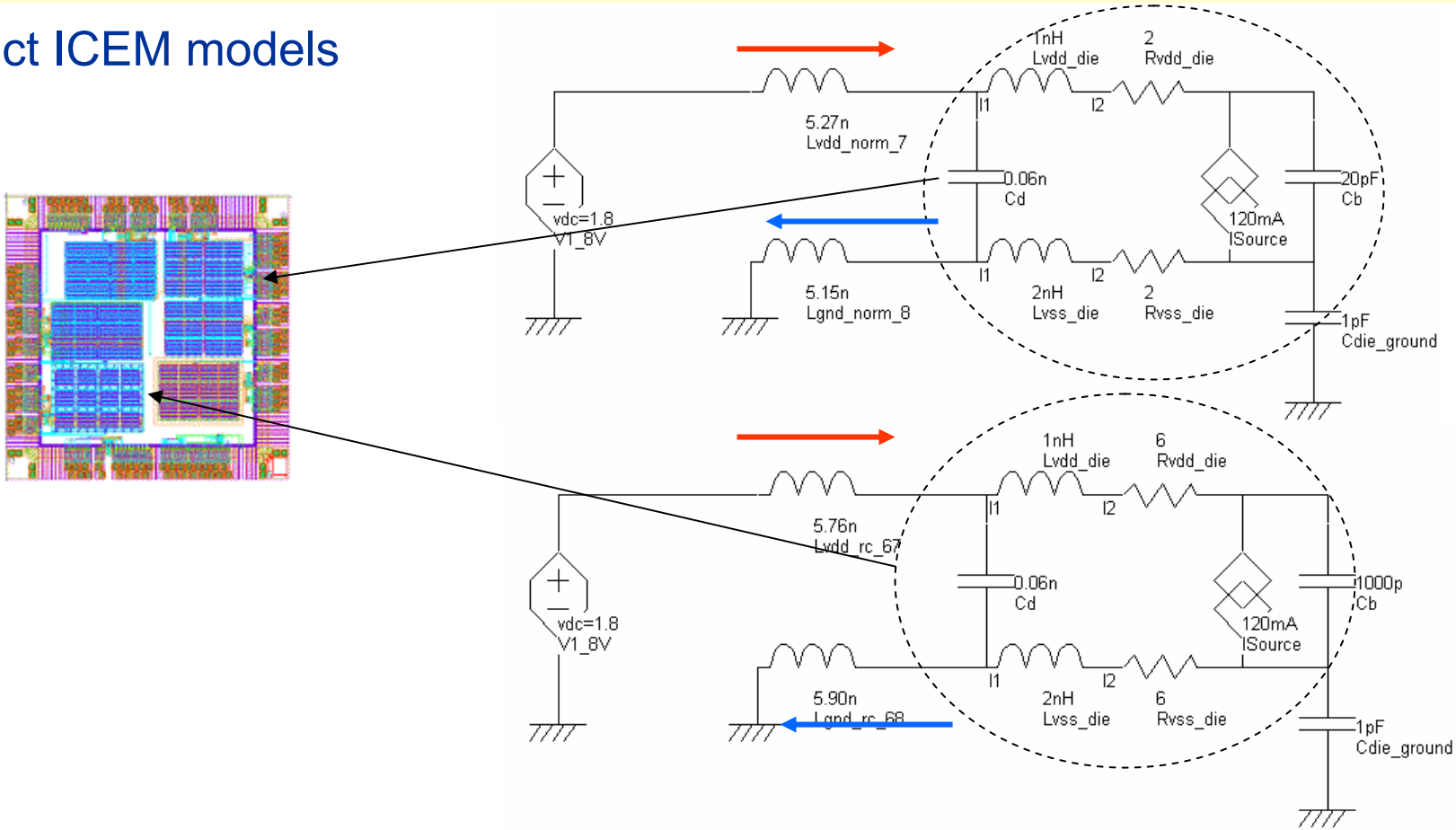
- Package size
- IC size

- Equivalent R,L,C of supply networks
- Buffer strength



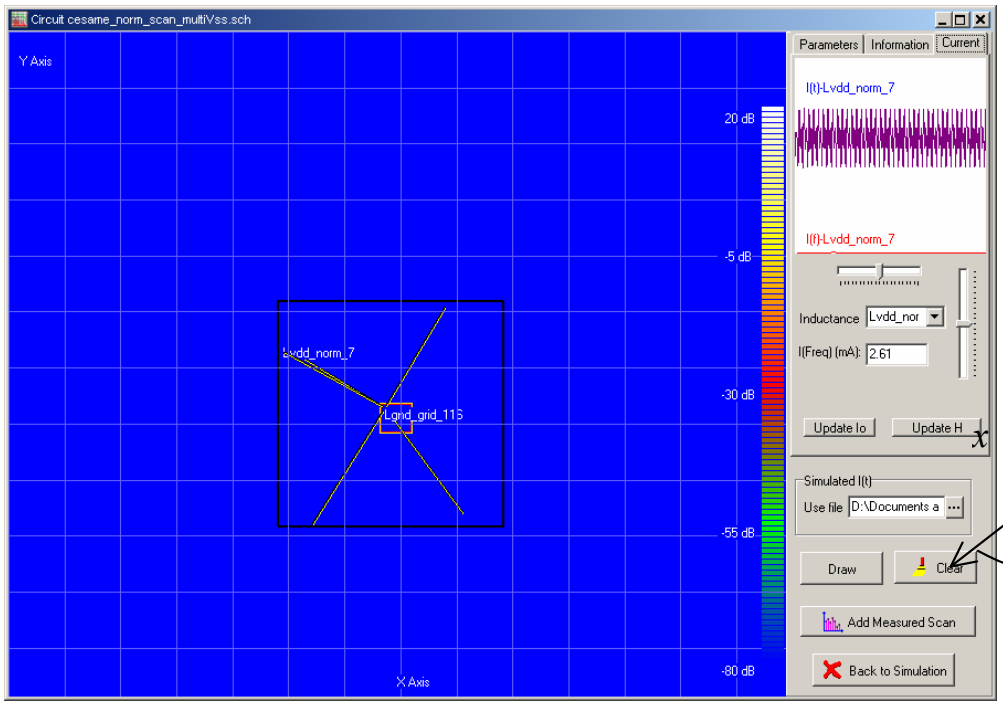
4. Near field simulation

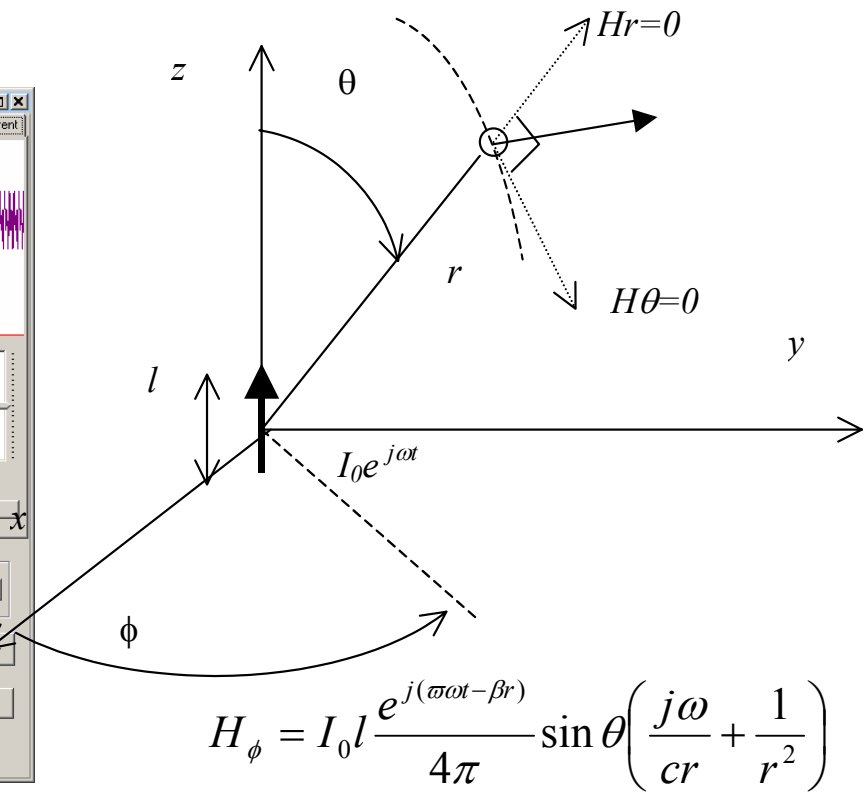
Construct ICEM models



4. Near field simulation

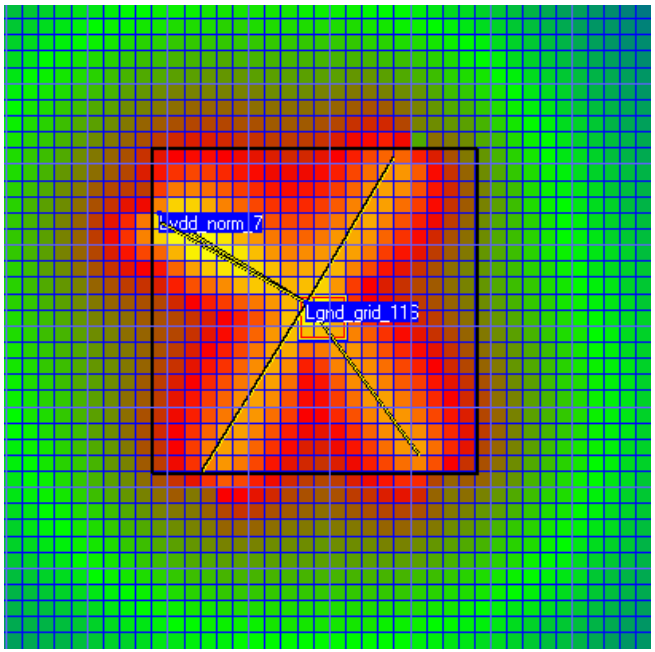
Specific Interface for Near-field scan



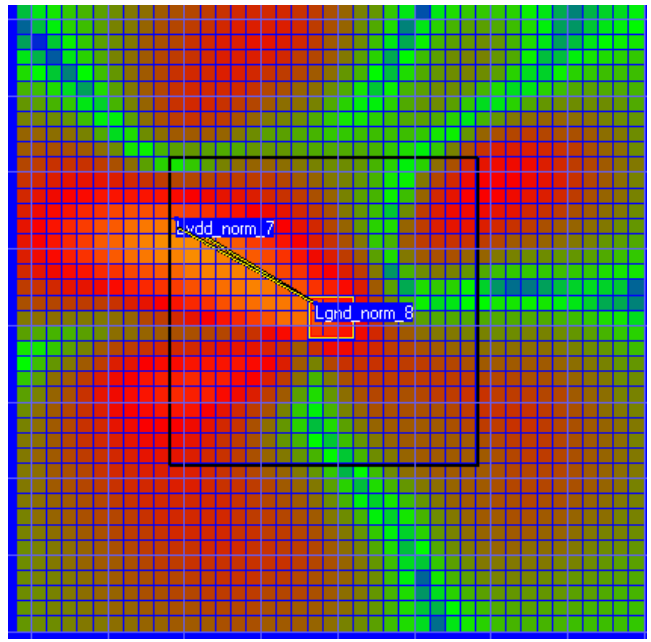


5. Experimental Results

CESAME Norm Core



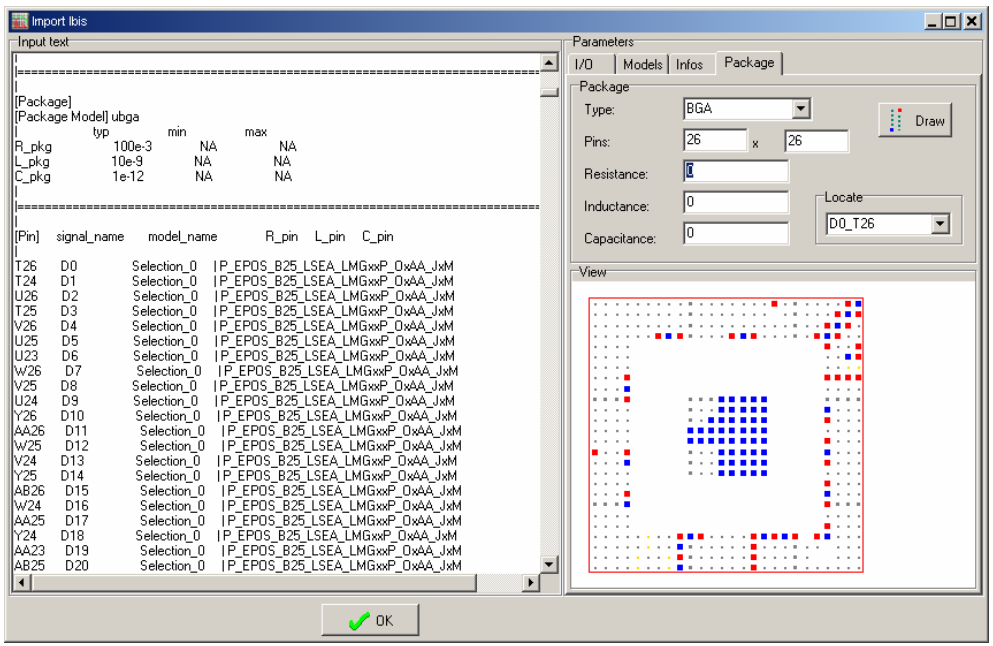
Simulation at 80MHz



Measurement at 80MHz

5. Experimental Results

- Good correlation also obtained with C51 near-field scan
- Similar study undergoing on Infineon Tricore



Conclusion

- An environment for near-field simulation has been developed
- The schematic diagram uses IBIS information for package and I/Os
- A post processor computes Hx,Hy from lead currents
- Interesting correlations have been demonstrated on CESAME test chip
- Other chips are being tested to validate the methodology
- The package is online at www.ic-emc.org
- Demos at Iconic 05, EmcCompo 05, IEEE EMC 2005 Chicago