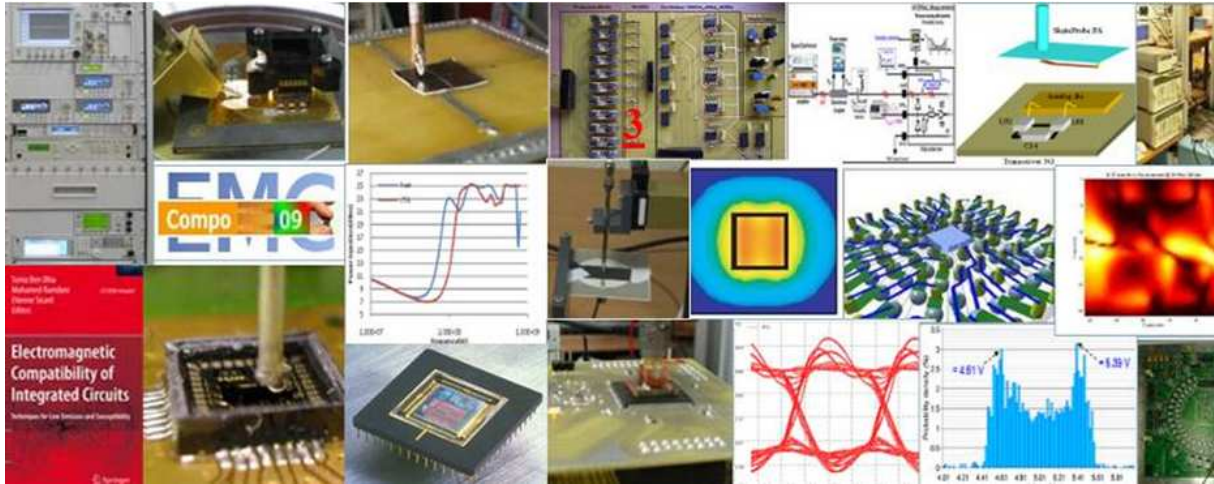


## Electromagnetic Compatibility of Integrated Circuits



### Program focus

This one-day course presents the challenges for electromagnetic compatibility of integrated circuits. A set of basic concepts is proposed as an introduction, covering specific units, parasitic impedance of interconnects, origin of noise, noise margins, time/frequency conversion and 50  $\Omega$  matching. The second focus concerns parasitic emission, how to design low emission circuits and how to measure the IC emission using standard IEC 61967 methods. A third topic concerns susceptibility, with focus on measurement methods (IEC 62132) and hardware/software techniques to improve immunity to interference. The fourth part is related to modeling approaches for predicting EMC (IEC 62433), based on standards such as IBIS, ICEM and ICIM. Finally, roadmaps and future challenges are briefly reviewed. Illustrations of these concepts are made using IC-EMC, an electric circuit schematic editor with interface to analog simulator and EMC-oriented post-processing tools.

### Benefits

At the end of this course, you will understand the mechanisms of parasitic emission; take part in a global emission and susceptibility reduction strategy; handle standard measurements of emission and susceptibility; and design circuits with reduced interference problems.

### Prerequisites

IC design principles.

### Program outline

- EMC of ICs – An Overview
- EMC Basics concepts
- Measurement methods
- EMC Models
- EMC Guidelines
- EMC Challenges & Conclusion

### References

1. [www.emccompo.org](http://www.emccompo.org) , conference focusing on EMC for integrated circuits.



2. S. Ben Dhia, M. Ramdani, E. Sicard, "EMC of integrated circuits", Springer, 2006, ISBN: 0-387-26600-3
3. <http://www.ic-emc.org> web site dedicated to EMC of ICs
4. E. Sicard, A. Boyer "IC-EMC 2.0 User's Manual", INSA editor, July 2009, ISBN 978-2-87649-056-7

### Seminar dates

- April 2011 in Neuchatel, Suizerland
- Feb. 2011 at INSA Toulouse, France
- December 2010 at EPFL, Suizerland
- April 2010 at APEMC, Beijing, China
- Feb 2010 at IUT Tarbes, France
- Feb 2009 at ENSME Gardanne, France
- Feb 2008 at Carleton University, Canada
- July 2009 at Austin, USA
- May 2007 at Nokia, Finland

### Audience

- IC suppliers
- IC users
- IC designers
- Researchers in nano-CMOS design
- Students in nano-electronics and IC design

### Registration:

- For courses in Toulouse (on behalf of INSA de Toulouse), Insa-Continuing Education
- For courses in Suizerland, FSRM - Fondation Suisse pour la Recherche en Microtechnique, [locher@fsrm.ch](mailto:locher@fsrm.ch), <http://www.fsrm.ch>
- For courses at APEMC, contact [alexandre.boyer@insa-toulouse.fr](mailto:alexandre.boyer@insa-toulouse.fr)

### Keywords

EMC, Integrated circuits, parasitic emission, susceptibility, standards, IEC 61967, IEC 62132, IEC 62433, IBIS, ICEM, ICIM, modeling, EMC prediction

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### Speakers



Etienne SICARD graduated from the University of Toulouse (B.S degree in 1984) and obtained a PhD in 1987 at LAAS/CNRS laboratory. His is a professor at INSA Engineering



School. He gives scientific support to industrial projects in electromagnetic compatibility (EMC) of integrated circuits (IC). He was a distinguished lecturer from the IEEE EMC society (2006-2007) on the topic "EMC of ICs". His research interests include CMOS design for improved EMC, software development (Microwind, IC-EMC) & signal processing for speech therapy.

**More on :** <http://www.etienne-sicard.fr>



Alexandre BOYER graduated from INSA engineering school in 2004 and obtained a PhD in 2007 in electromagnetic compatibility of Integrated Circuits. He has been a senior lecturer in electronics, microelectronics and signal processing since September 2008.

His research interest concern the modeling of IC immunity, the ageing effects on EMC, the IC-EMC software tool development and innovative EMC measurement techniques such as near-field probe arrays.

**More on :** [http://lesia.insa-toulouse.fr/~a\\_boyer](http://lesia.insa-toulouse.fr/~a_boyer)

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