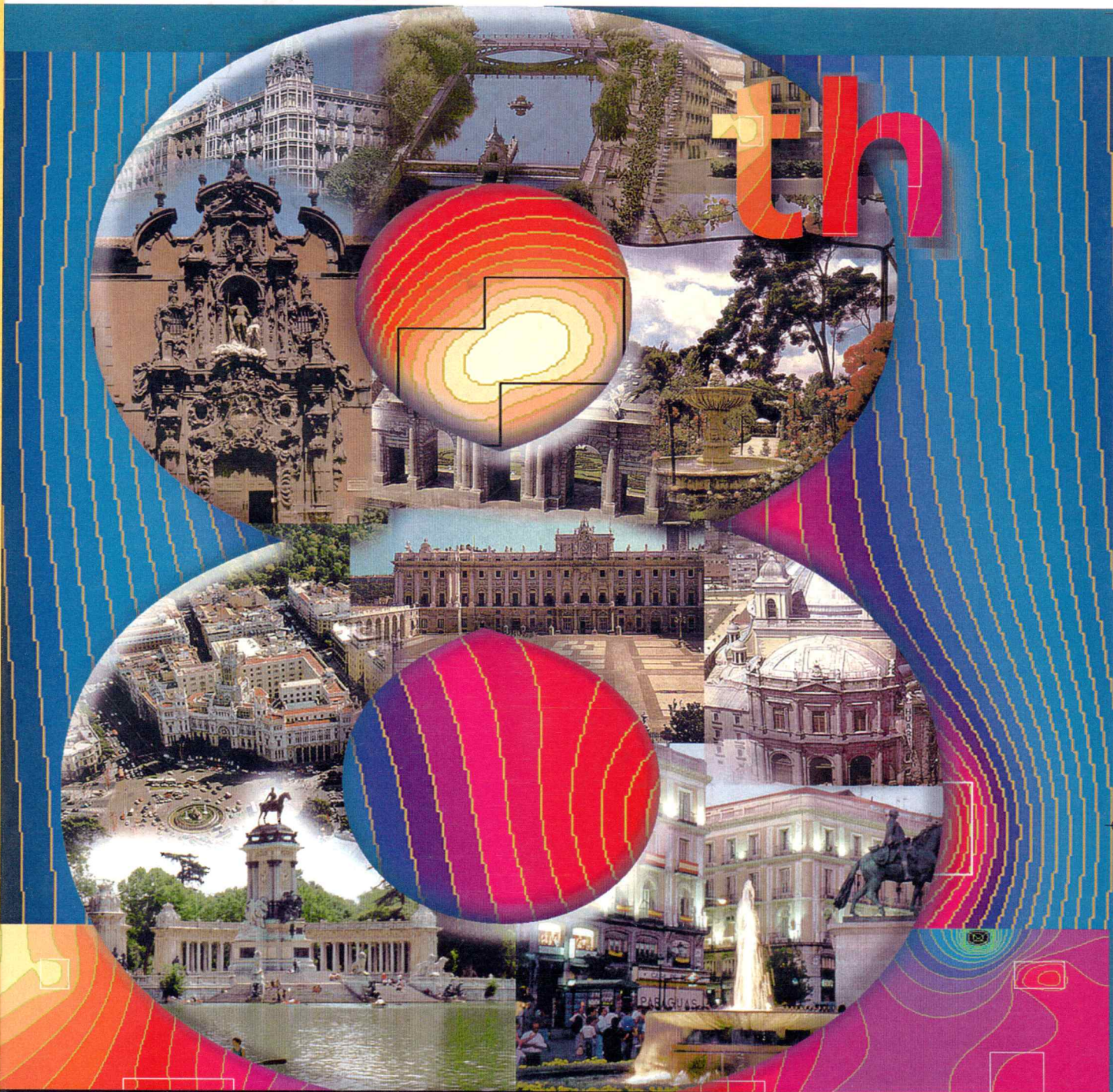




International Workshop on THERMal INvestigations of ICs and Systems

1-4 October / Madrid, Spain

PLUS A SPECIAL
HALF-DAY ON RELIABILITY

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8th International Workshop on THERMal INvestigations of ICs and Systems

1-4 October 2002, 
Madrid, Spain.

Sponsored by the IEEE Computer Society, Test Technology Technical Council and TIMA Laboratory in cooperation with the IEEE Components, Packaging, and Manufacturing Technology Society and with the IEEE Solid-State Circuits Society French Chapter.



Wednesday 2 October 2002

8:00	Registration	
9:30	Welcome address: B. Courtois, TIMA Laboratory, Grenoble, France	
9:40	Invited talk 1: <u>Thermal management of CPUs: A perspective on trends, needs and solution opportunities</u> R. Mahajan , INTEL Group, Chandler, AZ, USA Chair: C.J.M. Lasance , Philips Research Laboratories, Eindhoven, The Netherlands	
10:20	Session 1: Thermal measurements and modelling Chair: P. Rodgers , Electronics Thermal Management, Ireland	
10:20	P.L. Komarov, M.G. Burzo, G. Kaytaz, P.E. Raad, Southern Methodist U., Dallas, USA	Transient thermo-reflectance measurements of the thermal conductivity and interface resistance of metallized natural and isotopically-pure silicon
10:40	M. Rencz, MicReD, Budapest, Hungary V. Székely, TU Budapest, Hungary	Studies on the error resulting from neglecting nonlinearity effects in dynamic compact model generation
11:00	D. Schweitzer, H. Pape, Infineon Technologies AG, München, Germany	Thermal transient modeling and experimental validation of power packages
11:20	S. Carubelli, K. Oulahoum, Z. Khatir, INRETS, Arcueil, France	Experimental validation of a new thermal modelling method dedicated to a multichip power module under working condition
11:40	Break	
12:00	Posters session 1 <i>Posters are introduced by one slide in 2 minutes each</i> Chair: M. Rencz , BUTE, Budapest, Hungary	
	M. Ivanova, Y. Avenas, K. Ouattara, G. Kapelski, Ch. Schaeffer, LEG, Saint Martin d'Hères, France	Application of sintered metal powder in power electronics cooling

	J. Broadbent, S. Lin, Thermacore Europe, Northumberland, United Kingdom	Therma-bus®, next generation telecom cabinet cooling solution
	G.E. Cossali, D.A. Di Pietro, M. Marengo, TFHT - U. of Bergamo, Dalmine, Italy	Design of a cooling system with microchannels for a high energy physics particle detector
	M. Checchetti, MicrOptronics, Milano, Italy	HMW THS - large heat sinks with forced internal convection
	P. He, L. Liu, L. Tian, Z. Li, Tsinghua U., Beijing, China	Measurement of thermal conductivity of buried oxides of SOI by SIMOX
	E. Driessens, B. Vandeveld, E. Beyne, IMEC, Heverlee Belgium D. Corlatan, E. Roose, Alcatel Bell, Antwerpen, Belgium	Experimental validation of a star-shaped thermal compact model of underfilled flip chip assemblies
	Z. Suszynski, R. Arsoba, TU. of Koszalin, Poland A. Napieralski, W. Tylman, TU. of Łódź, Poland	Infrared detection of delaminations using induction heating
	P. Pruja, B. Claudet, M. Polit, LP2A Perpignan, France O. Gagliano, J-J. Serra, DGA/CTA/LOT/GHF, Font Romeu, France	Photothermal microanalysis of thermal discontinuities in metallic samples
	E. Montané, J-L. Merino, M. Puig-Vidal, S. Bota, J. Samitier, U. de Barcelona, Spain	An electronic system to control the ignition of an array of mpyrotechnic nodes
	G.T. Penalva, A.A. López, À.B. del Campo, F-J.O. González, UPM, Madrid, Spain	New indirect electrical method for thermal characterisation of MMIC power amplifiers
	W. Nailong, Z. Runde, L. Miao, IME of Tsinghua U., Beijing, China	Cell-level thermal placement optimization for high-performance VLSI chips design
	S. Koziel, W. Szczesniak, TU of Gdansk, Poland	Reducing average and peak temperatures of VLSI CMOS circuits by means of evolutionary algorithm
	T. Joo Goh, Intel Products, Kedah Darul Aman, Malaysia K.N. Seetharamu, G.A. Quadir, Z.A. Zainal, U. Sains Malaysia, Penang, Malaysia	Thermal investigations of multiple heat sources within silicon chip
	S.P Matova, K.A.A. Makinwa, J.H. Huijsing, Delft U. of Technology, The Netherlands	Modeling and compensation of packaging asymmetry in a 2-D wind sensor
	K. Górecki, W.J. Stepowicz, A. Loziński, Gdynia Maritime U., Poland	Thermal performance of LSCO and LSFO films for IR detectors
	V. Guarnieri, A. Bagolini, V. Micheli, M. Filippi, F. Moscon, F. Giacomozzi, B. Margesin, M. Zen, ITC-IRST, Povo, Italy R. Pal, M. Decarli, G. Soncini, U. of Trento, Mesiano, Italy	Cr/Ni/Au multilayer films for high temperature MEMS applications
13:30	Lunch	

15:00	Vendor's session: B. Courtois, TIMA Laboratory, Grenoble, France	
16:00	Session 2: Sensors and MEMS Chair: P. Raad, Southern Methodist U., Dallas, USA	
16:00	V. Székely ¹ , M. Rencz ¹⁻² , E. Kollár ¹ , J. Mizsei ¹ ¹ BUTE, Budapest, Hungary ² MicReD, Budapest, Hungary	Heat-flux sensor for the thermal measurement of IC packages
16:20	D. Meunier, D. Tsamados, J. Boussey, IMEP, ENSERG, Grenoble, France S. Tardu, LEGI, Grenoble, France	Realization and simulation of wall shear stress integrated sensor
16:40	Break	
17:00	L. Chu ¹ , Y. Gianchandani ¹⁻² ¹ U. of Wisconsin, Madison, USA ² U. of Michigan, Ann Arbor, USA	An electrothermally actuated, feedback controlled 2D micropositioner with sub-nanometer resolution
17:20	L. Chu, D. Nelson, A.D. Oliver, Y.B. Gianchandani, U. of Michigan, Ann Arbor, USA	Polysilicon grain transformations and performance drift in electrothermal microactuators
17:40	O. Slattery, D. O'Mahoney, E. Sheehan, F.Waldron, NMRC, Cork, Ireland	Source of variation in piezoresistive stress sensor measurements
18:00	J.H. Lee ¹ , M.H. Li ¹ , Y.B. Gianchandani ¹⁻² ¹ U. of Wisconsin, Madison, USA ² U. of Michigan, Ann Arbor, USA	Photoresist metrology and microcalorimetry using an ultracompliant micromachined scanning thermal probe
18:30	Cocktail	

Thursday 3 October 2002

8:30	Invited talk 2: <u>Advanced cooling concepts and their challenges</u> K. Azar, Advanced Thermal Solutions, Inc., Norwood, USA Chair: G. De Mey, Ghent U., Belgium	
9:10	Session 3: Liquid cooling Chair: A. Ortega, U. of Arizona, USA	
9:10	S. Murthy, U. of Maryland, College Park, USA Y. Joshi, Georgia Institute of Technology, Atlanta, USA W. Nakayama, ThermTech International, Kanagawa, 255-0004, Japan	Orientation independent two-phase heat spreaders for space constrained applications
9:30	R. Khodabandeh, B. Palm, Royal Institute of Technology, Stockholm, Sweden	Thermosyphon concept for cooling of PCB
9:50	S.N. Heffington, W.Z. Black, A. Glezer, Georgia Institute of Technology, Atlanta, USA	Two-phase spray cooling thermal management of microelectronic

		packages using vibration-induced droplet atomization heat transfer cells
10:10	R. Mahalingam, N. Rumigny, A. Glezer, Georgia Institute of Technology, Atlanta, USA	Synthetic jet ejector heat sinks for high heat transfer at low flow rates
10:30	Break	
11:00	Posters session 2 <i>Posters are introduced by one slide in 2 minutes each</i> Chair: M. Rencz , BUTE, Budapest, Hungary	
	L. Codecasa, D. D'Amore, P. Maffezzoni, Politecnico di Milano, Italy W. Batty, U. of Leeds, United Kingdom	Multi-point moment matching reduction of distributed thermal networks
	L. Codecasa, D. D'Amore, P. Maffezzoni, Politecnico di Milano, Italy	Parameters for multi-point moment matching reduction of thermal networks
	Y. Tal, A. Nabi, Rafael, Haifa, Israel	Generating engineering-boundary-condition-independent two-resistors compact-thermal-model by means of the MTSA approach
	L-D. Patino-Lopez, S. Dilhaire, S. Grauby, J-M. Rampnoux, S. Jorez, W. Claeys, U. Bordeaux I, France	Thermal self induction in PN thermoelectric couple. Determination of the dynamic electrical equivalent model
	S. Du, Andrew Corporation, Addison, USA	A new effective thermal resistance parameter for RF transistors
	K. Skadron, M. Stan, M. Barcella, A. Dwarka, W. Huang, Y. Li, Y. Ma, A. Naidu, D. Parikh, P. Re, G. Rose, K. Sankaranarayanan, R. Suryanarayan, S. Velusamy, H. Zhang, Y. Zhang, U. of Virginia, Charlottesville, USA	HotSpot: techniques for modeling thermal effects at the processor-architecture level
	N. Cordero, J. West, H. Berney, NMRC, Cork, Ireland	Thermal modelling of ohmic heating micro-reactors
	T.S. Shelar, G.S. Visweswaran, Indian Institute of Technology Delhi, New Delhi, India	Electro thermal modeling of MOSFET and it's application to analog integrated circuit simulation
	M. Macchiaroli, V. d'Alessandro, G. Breglio, N. Rinaldi, P. Spirito, U. of Naples "Federico II", Italy	Improved electro-thermal simulation of power devices
	J. Palacín, M. Salleras, S. Marco, J. Samitier, U. de Barcelona, Spain	Optimization of dynamic compact thermal models using genetic algorithms
	X. Lin, P. He, L. Tian, Y. Dong, M. Chen, X. Wang, Tsinghua U., Beijing, China	Thermal analysis of DSOI (Drain/Source On Insulator) MOSFETs
	M. Malinski, TU of Koszalin, Poland	A modified approach to the analysis of piezoelectric photoacoustic spectra

	N. Semmar, C. Georges, C. Boulmer-Leborgne, GREMI-CNRS-U. d'Orléans, France	The melting kinetics of thin film coatings irradiated by nanosecond pulsed lasers
	I. Godovitsyn, O. Sveen, U. of Oslo, Norway	Electro-thermo-mechanical simulation of surface-micromachined piezoresistive pressure sensors
13:00	Lunch	
14:30	Session 4: Thermal and Electro thermal simulation Chair: A. Poppe , BUTE, Budapest, Hungary	
14:30	L. Codecasa, D. D'Amore, P. Maffezzoni, Politecnico di Milano, Italy	Electro-thermal analysis of silicon junctions at second breakdown
14:50	W. Batty, C.M. Snowden, U. of Leeds, United Kingdom C.E. Christoffersen, Lakehead U., Ontario, Canada A.B. Yakovlev, The U. of Mississippi, Oxford, USA J.F. Whitaker, A. Mortazawi, R. Reano, K. Yang, L.P.B. Katehi, U. of Michigan, Ann Arbor, USA A. Al-Zayed, M. Ozkar, S. Ortiz, M.B. Steer, North Carolina State U., Raleigh, USA	Electro-thermal simulation a complex design example: the spatial power combining MMIC array
15:10	M.R. Casu, M. Graziano, G. Maserà, G. Piccinini, M. Zamboni, Politecnico di Torino, Italy	Coupled electro-thermal modeling and optimization of clock networks
15:30	X. Jorda, M. Vellvehi, F. Madrid, P. Godignon, S. Hidalgo, Centre Nacional de Microelectronica, Cerdanyola del Valles, Spain N. Schofield, U. of Sheffield, Sheffield, United Kingdom	Thermal characterisation and simulation of water-cooled igbt power modules for electric vehicle application
15:50	Break	
16:10	Session 5: Thermal modelling Chair: D. Blackburn , NIST Gaithersburg, USA	
16:10	Embedded tutorial: <u>Dynamic compact thermal models: an overview of current and potential advances</u> M.N. Sabry , Mentor Graphics, Egypt	
16:40	L. Codecasa, D. D'Amore, P. Maffezzoni, Politecnico di Milano, Italy W. Batty, U. of Leeds, United Kingdom	Multi-point moment matching reduction of distributed thermal networks
17:00	M. Janicki, A. Napieralski, TU of Łódź, Poland	Analytical transient solution of heat equation with variable heat transfer coefficient
17:20	V. Kyyhkynen, Nokia Research Center, Helsinki, Finland J. Valtanen, R. Heikkilä, E. Ristolainen, Tampere U. of Technology, Finland	Synthesis of thermal RC-networks for system-in-packages
20:30	Social event: Café de Chinitas	

Friday 4 October 2002

8:30

PROFIT special half-day on reliability

Chair: K. Azar, Advanced Thermal Solutions, Inc., Norwood, USA

8:30

Session 6: Characterisation of thermal systems

8:30

C.J.M. Lasance, Philips Research Laboratory,
Eindhoven, The Netherlands

About the influence of area-averaged
heat transfer coefficients on the
accuracy of BCI compact thermal
models in CFD simulations

8:50

O. Leon, G. De Mey, E. Dick, U. of Ghent, Belgium

Study of the optimal layout of cooling
fins in forced convection cooling

9:10

C.A. Tomazeti, C. Altemani, State U. of Campinas,
Brazil

A compact model for heat sinks with
experimental verification

9:30

G. Janssen, A. Leroux, A. Kole, P. Maessen, E. Eggink
R. van Galen, Philips CFT, Eindhoven, The
Netherlands

The use of thermal maps in thermal
management

9:50

M.N. Poyyapakkam, Y.K. Joshi, Georgia Institute of
Technology, Atlanta, USA

Computational simulations of server
room cooling - a parametric study

10:10

J. Parry, Flomerics Ltd, Hampton Court, United
Kingdom
H. Pape, D. Schweitzer, Infineon Technologies,
München, Germany
J. Janssen, Philips Semiconductors, Nijmegen, The
Netherlands

Transient performance of common
modeling assumptions used in detailed
thermal package models

10:30

Break

11:00

Embedded tutorial: Emerging thermal challenges in electronics driven by performance, reliability and energy efficiency.

Y. Joshi, Georgia Institute of Technology, Atlanta, GA, USA

11:30

Panel: How well can we assess thermally driven reliability issues in electronic systems today ?

Moderator: Yogendra Joshi, Georgia Institute of Technology, Atlanta, GA, USA

Panelists:

- **Dave Blackburn**, NIST, USA
- **Clemens Lasance**, Philips Research, The Netherlands
- **Kaveh Azar**, Advanced Thermal Solutions, Inc., Norwood, USA
- **Ravi Mahajan**, Intel, USA
- **Jukka Rantala**, Nokia, Finland

13:00

Lunch

14:30

Session 7: Thermal aspects of ICs and PCBs

Chair: M-N. Sabry, Mentor Graphics, Egypt

14:30	Y.C. Gerstenmaier, N. Seliger, Siemens, München, Germany G. Wachutka, München U. of Technology, Germany	Efficient calculation of transient temperature fields responding to fast changing heat-sources over long duration in high frequency DC/DC converter
14:50	K. Torki, F. Ciontu, TIMA, Grenoble, France	IC thermal map from digital and thermal simulations
15:10	I. Kazymyra, M. Blyzniuk, I. Farmaga, Lviv Polytechnic National U., The Ukraine	Pre-layout estimation of ICS schematic susceptibility to the non-uniform temperature field distribution
15:30	A. Nabi, L. Keysar, Y. Tal, Rafael, Haifa, Israel	Application of thermal-vias to reduce conduction thermal resistance at the edge of electronic boards
15:50	Closing remarks: B. Courtois, TIMA Laboratory, Grenoble, France	

Friday 4 October 2002

17:00	Tutorial <i>An Evening Tutorial is being offered on Friday 3rd October 2002 from 17.00 to 19.00. Attendance to the tutorial is free of charge.</i> ■ Raising the awareness of electrical engineering students for thermal issues by A. Poppe, BUTE, Budapest, Hungary. This evening tutorial is organised in co-operation with the REASON IST-2000-30193 project of the EU, aiming to raise system designers' awareness of thermal problems in university and continuing education. The topics covered by this tutorial include among others the following subjects: the need to consider thermal dynamics of systems, thermal measurement techniques, evaluation of thermal measurement results, affordable thermal simulation techniques, simulation vs. measurement, thermal model generation, etc. After the discussion, a few case studies will highlight the above-mentioned topics. About Andras Poppe: <i>Andras Poppe has been with BUTE since 1989. He received his PhD in 1996. He has been a member of Prof. Szekely's thermal research team for more then 7 years. Now he is an associate professor at the Department of Electron Devices of BUTE and is actively participating in the development of different software tools in the thermal field.</i>
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