

Twenty-Third Annual IEEE Semiconductor Thermal Measurement and Management Symposium

**San Jose, CA
March 20-22, 2007**



**IEEE Catalog Number:
ISBN:**

**07CH37872
1-4244-0958-6**

Table of Contents

Extracting Thermal Data from High Power MCM Packages Introduction	1
<i>Jesse E. Galloway, Matthew Sutton</i>	
Thermal Analysis of Memory Module Using Transient Testing Method	7
<i>Yan Zhang, Gabor Farkas, Andras Poppe, Andy Manning, Gary Yip, Don Mullen</i>	
Thermal Characteristics of Chip Stack, Package Stack Memory Devices in the Component, Module Level	12
<i>Heejin Lee, Haehyung Lee, Jaebeom Byun, Jin-yang Lee, Joonghyun Baek, Younghee Song</i>	
High-Level Packaging Options for Outdoor Remote Units	18
<i>Younes Shabany</i>	
Investigation of CPU Thermal Solution Designs for BTX Desktop System Subscripts	24
<i>Yaxiong Wang, Yinshan Feng, Robert Dong, Phil Chou</i>	
Red Storm/XT Supercomputers Cooling System Design, Optimization	30
<i>Alexander I. Yatskov</i>	
Thermal Considerations for LED Components in an Automotive Lamp	37
<i>Joseph Bielecki, Ahmad Sameh Jwania, Fadi El Khatib, Thomas Poorman</i>	
Thermal Design, Analysis of a Military Aircraft Intercommunications System	44
<i>James L. Smith, Jr.</i>	
Extraction of Power Dissipation Profile in an IC Chip from Temperature Map	51
<i>Xi Wang, Ali Shakouri, Sina Farsiu, Peyman Milanfar</i>	
Non-Contact Surface Temperature Measurements Coupled with Ultrafast Real-Time Computation	57
<i>Peter E. Raad, Pavel L. Komarov, Mihai G. Burzo</i>	
Development of Junction Temperature Decision (JTD) Map for Thermal Design of Nano-scale Devices Considering Leakage Power	64
<i>Yunhyeok Im, Eun Seok Cho, Kiwon Choi, Sayoon Kang</i>	
On The Correlation Between Multiple Hot Blocks, Package Thermal Resistance	69
<i>Sai Ankireddi, David Copeland</i>	
A Junction Temperature Reduction Technique for a Microprocessor Considering Temperature Coupled Leakage Power	74
<i>Jaewook Yoo, Kiwon Choi, Sayoon Kang</i>	
A Statistical Approach For Characterizing The Thermal Impact Of TIM Voids	79
<i>Sai Ankireddi, David Copeland</i>	
Comparison of Test Methods for High Performance Thermal Interface Materials	83
<i>R.N. Jarrett, C.K. Merritt, J. P. Ross, J. Hisert</i>	
Hierarchical Nested Surface Channels for Reduced Particle Stacking, Low-Resistance Thermal Interfaces	87
<i>R. J. Linderman, T. Brunschwiler, U. Kloter, H. Toy, B. Michel</i>	
A Fixed-Angle Heat Spreading Model for Dynamic Thermal Characterization of Rear-Cooled Substrates	95
<i>Bjorn Vermeersch, Gilbert De Mey</i>	
A Novel Carbon Nano Tube based Wick Structure for Heat Pipes/Vapor Chambers	102
<i>Unni Vadakkan, Gregory M. Chrysler, James Maveety, Murli Tirumala</i>	
Next Generation Heat Sinks for High-power Diode Laser Bars	105
<i>Michael Leers, Christian Scholz, Konstantin Boucke, Myriam Oudart</i>	
Process Development for Heat Sink Attachment Using Thermally Conductive Liquid Adhesives	112
<i>Sang-jeon Cho, Emily Allen, Don Nguyen, Quyen Chu</i>	
Thermal Management of High Density Very Low Profile Memory Module	118
<i>Hongyu Ran, Ilyas Mohammed</i>	
Performance Characteristics of Vapor Chambers with Boiling Enhanced Multi-Wick Structures	125
<i>S. H. K. Lee, S. K. Chu, C. C. C. Choi, Y. Jaluria</i>	

Table of Contents

Acoustic Noise Cancellation by Phase Alignment of Cooling Fans	131
<i>Scott Guthridge, Richard E. Harper, Harry Marr, Bulent Abali</i>	
Stress Minimization During Deflection of Thermally Conductive Gap Pads.....	136
<i>Karen Bruzda</i>	
Spray Cooling with Mixtures of Dielectric Fluids.....	144
<i>Andrea C. Ashwood, Timothy A. Shedd</i>	
EHD Enhanced Heat Transfer with Needle-Arrayed Electrodes.....	149
<i>H. Y. Li, R. T. Huang, W. J. Sheu, C. C. Wang</i>	
Geometric Optimization of 2D Cellular Metals Cooled by Forced Convection Subjected to Fixed Pumping Power, Pressure Drop or Mass Flowrate.....	155
<i>T. Wen, F. Xu, T.J. Lu, N. Collings</i>	
Condenser Design for Thermosyphons Utilizing Segregated Hydrofluoroether Working Fluids.....	162
<i>Phillip E. Tuma, Bamidele O. Fayemi, Lawrence J. Stang</i>	
Junction Temperature During Burn-in: How Variable is It, How Can We Control It?	168
<i>James Forster, Chris Lopez</i>	
Low Profile-High Performance Vapor Chamber Heat Sinks For Cooling High-Density Blade Servers.....	174
<i>Xiao Ping Wu, Masataka Mochizuki, Thang Nguyen, Yuji Saito, Vijit Wuttijumnong, Horia Ghisoiu, Vichan Kumthonkittikul, Parichart Sukkasaem, Pichit Nimitkiatklai, F.Kiyooka</i>	
Fundamental Behaviors, Limits of Impingement Cooling	179
<i>Timothy A. Shedd</i>	
Development of a Micro-diaphragm Pump with Piezoelectric Device.....	184
<i>H. K. Ma, B. R. Hou, H. Y. Wu, C.Y. Lin, J. J. Gao</i>	
Evaluation of a Liquid Cooling Concept for High Power Processors	190
<i>Guoping Xu</i>	
Modeling of Synthetic Jet Ejectors for Electronics Cooling	196
<i>Raghav Mahalingam</i>	
Modeling Air-Cooled Heat Sinks as Heat Exchangers	200
<i>Robert J. Moffat</i>	
Experimental Investigations on Airside Performance of Heat Sinks Having Pin Fin Configurations.....	208
<i>Kai-Shing Yang, Wei-Hsin Chu, Ing-Yong Chen, Chi-Chuan Wang</i>	
In Situ Optimization of Blower Blade Geometry of an Active Heat Sink in a Laptop	213
<i>Hossam M. Metwally, Mark Landon, Dimitrios Tselepidakis, Antoine Dozolme</i>	
Influence of Bypass on Flow Through Plate Fin Heat Sinks.....	220
<i>Rakib Hossain, J. Richard Culham, M. Michael Yovanovich</i>	
A New Approach to Boundary Condition Independent Compact Dynamic Thermal Models	228
<i>Adam Augustin, Torsten Hauck</i>	
CFD Analysis of an Avionic Module for Evaluating Power Distribution as a Thermal Management Measure for a Double-sided PCB.....	233
<i>Jonas Johansson, Ilja Belov, Peter Leisner</i>	
Heat Transfer in a Three Dimensional Stacked Chip Scale Package (CSP) Module Keywords	244
<i>Srivathsan Ragunathan, Douglas J.Goering, Pramod C.Karulkar</i>	
DELPHI Style Compact Modeling of Stacked Die Packages.....	248
<i>András Poppe, Gábor Farkas, John Parry, Péter Szabó, Márta Rencz, Vladimír Székely</i>	
Accuracy Comparison of a Standard CFD Code for the Thermal Analysis of Non-Simple Geometries with Baseline Experiments	255
<i>Clemens J.M. Lasance, Comilo Rindt</i>	