

# **2006 29th International Spring Seminar on Electronics Technology**

**St. Marienthal, Germany  
10-14 May 2006**



**IEEE Catalog Number:**  
**ISBN:**

**06EX1493**  
**1-4244-0550-5**

**Copyright © 2006 by The Institute of Electrical and Electronics Engineers, Inc.  
All Rights Reserved**

*Copyright and Reprint Permissions:* Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republications permission, write to IEEE Copyrights Manager, IEEE Operations Center, 445 Hoes Lane, Piscataway, New Jersey USA 08854. All rights reserved.

IEEE Catalog Number: 06EX1493

ISBN: 1-4244-0550-5

**Additional Copies of This Publication Are Available from:**

IEEE Service Center  
445 Hoes Lane  
Piscataway, NJ 08854  
IEEE Service Center  
445 Hoes Lane  
Piscataway, NJ 08854

Phone: (800) 678-IEEE  
(732) 981-1393

Fax: (732) 981-9667

E-mail: [customer-service@ieee.org](mailto:customer-service@ieee.org)

## Table of Contents

<b>Method For Improvement Of Mechanical Assembly Quality Of Precise Electrical Contacts .....</b>	<b>1</b>
<i>I. Valentin Tcenev, Filip Fillipov, Irina Petrova</i>	
<b>Modelling Heat Transfer Efficiency In Forced Convection Reflow Ovens.....</b>	<b>6</b>
<i>Balázs Illés, Olivér Krammer, Gábor Harsányi, Zsolt Illyefalvi-Vitéz</i>	
<b>Resistance Measurements Of Bga Contacts During Reliability Tests.....</b>	<b>12</b>
<i>Rafal Wrona, Zdzislaw Drozd, Marcin Szwech</i>	
<b>Applications And Comparison Of Failure Analysis Methods.....</b>	<b>16</b>
<i>Balint Balogh, Robert Kovacs, Janos Majsai</i>	
<b>Reliability Of Solar Cell's Solder Joints .....</b>	<b>22</b>
<i>Lubo A Jakubka, Marek Novotný, Ji Yí Hladík, Ivan Szendiuch</i>	
<b>Average Current Mode Control Versus Borderline Current Mode Control On Power Factor Correction Circuits .....</b>	<b>27</b>
<i>Dorin Petreu , Ionu C Ciocan, Cristian F Rca</i>	
<b>System In Package For Temperature Logging.....</b>	<b>33</b>
<i>Dorin Petreu, Zoltan Juhos, Dan Pitica</i>	
<b>Investigations Of Electrical Behaviours Of Grain Bounadries In Polycrystalline Silicon Solar Cells By Ebic Nad Obic .....</b>	<b>37</b>
<i>D. Kaczmarek, J. Domaradzki, A. Borkowska</i>	
<b>Studies Of Electrical And Optical Properties Of Thin Films Of Ti-Pd-Eu Oxides Prepared By Magnetron Sputtering .....</b>	<b>42</b>
<i>J. Domaradzki, A. Borkowska, E.L. Prociow, D. Kaczmarek</i>	
<b>Thin Film Heater And Thermopile Built Up Using Some Silicides Under Thermal Test .....</b>	<b>46</b>
<i>Grazyna Beensh-Marchwicka, Eugeniusz Prociów, Tadeusz Berlicki</i>	
<b>OrCad Link Tool For Automated Optical Inspection Of Assembled Boards .....</b>	<b>50</b>
<i>Marius Muresan Phd. Dan Pitica, Phd., Gabriel Chindris</i>	
<b>Methodology For Manufacturing Improvement.....</b>	<b>55</b>
<i>Jiri Tupa, Ales Hamacek, Jan Reboun, Vlastimil Skocil, Frantisek Steiner</i>	
<b>Influence Of The Reduced Oxygen Concentration On The Wetting Force.....</b>	<b>61</b>
<i>Karel Dusek, Jan Urbánek</i>	
<b>Ap-Movpe Growth And Characterization Of GaAs 1-x Nx Epilayers.....</b>	<b>65</b>
<i>Damian Pucicki, Beata Zciana, Damian Radziewicz, Marek T Bacza Ba, Grzegorz S K, Przemys Baw Poloczek, Jaros Baw Serafi Dczuk, Janusz Koz Bowski</i>	
<b>Noise Study Method Of Soldering Joints.....</b>	<b>69</b>
<i>I. Hajdu, Zs. Kincses, O. Krammer</i>	
<b>Investigation On Functional And Reliability Properties Of Ir Heaters For Soldering Processes In Connection With Spectral Characteristics Of Radiation Control.....</b>	<b>72</b>
<i>S. Kontrov, M. Marinova, P. Mashkov, T. Pencheva</i>	
<b>Deploying Simulink Models Into System-On-Chip Structures.....</b>	<b>77</b>
<i>Gabriel Chindris, Marius Muresan</i>	
<b>Material Characterization Of Substrates For Power Modules.....</b>	<b>82</b>
<i>Michael Günther, Klaus-Jürgen Wolter</i>	
<b>Diagnostic Tools For Evaluation Of The Quality Of The Anisotropic Conductive Adhesive Joints.....</b>	<b>88</b>
<i>Ales Durajm, Pavel Mach</i>	
<b>Direct Digital Frequency Synthesis Implemented On A Fpga Chip.....</b>	<b>93</b>
<i>Alin Grama, Gabriel Muntean</i>	

## Table of Contents

<b>High-Performance Optimization Of Genetic Algorithms .....</b>	<b>99</b>
<i>Kremena Royachka, Milena Karova</i>	
<b>Test Method For Availability Of Holes In Height -- Temperature Barrier On Cementation Process.....</b>	<b>105</b>
<i>Valentin Tcenev, Filip Fillipov</i>	
<b>Test Of Glass Electrical Solidity For High -- Temperature Protective Layers .....</b>	<b>110</b>
<i>Valentin Tcenev, Filip Fillipov</i>	
<b>FPGA-Based Module For Image Preprocessing .....</b>	<b>116</b>
<i>Yulka P. Petkova</i>	
<b>Applying Of Stacked Microvias In Printed Circuit Board .....</b>	<b>121</b>
<i>Wojciech Falinski, Grazyna Koziol</i>	
<b>Analysis Of A Simple Model Contact Au-Cdte By Detectors Of Gamma Ray .....</b>	<b>126</b>
<i>Alexey Andreev, Jiri Zajacek, Lubomir Grmela</i>	
<b>Realization Of <math>\mu</math>-Vias In Ltcc Tape.....</b>	<b>130</b>
<i>Lars Rebenklau, Klaus-Jürgen Wolter, Gunter Hagen</i>	
<b>Researching Of Biochemical Degradation Of Electronic Materials In Fluid Electrolytic Mediums.....</b>	<b>139</b>
<i>Natalia Beshchasna, Jürgen Uhlemann, Klaus-Jürgen Wolter</i>	
<b>The Evolution Of Spinel-Based Conductive Phase In Thick-Film Ntc Thermistors: .....</b>	<b>146</b>
<i>Marko Hrovat, Janez Holc, Darko Belavic, Jena Cilensek</i>	
<b>Infrared Radiation Spectrum Control During Soldering Processes Applying Low Inert Heaters.....</b>	<b>152</b>
<i>Petko Mashkov, Tamara Pencheva, Berkant Gyoch, Dimitar Popov</i>	
<b>Effects Of Flux Residues On Surface Insulation Resistance And Electrochemical Migration. ....</b>	<b>158</b>
<i>Csaba Dominkovics, Gábor Harsányi</i>	
<b>CFD Simulations Of LTCC Based Microsystems .....</b>	<b>163</b>
<i>Karol Malecha, Leszek J. Golonka</i>	
<b>On The Design Of Low-Voltage Low-Power Bulk-Driven Cmos Current Conveyors .....</b>	<b>168</b>
<i>Ahmad Khateb, Dalibor Biolek, Kamil Novacek</i>	
<b>The Digital Signal Processing Using Fpga .....</b>	<b>172</b>
<i>Tomas Brich, Kamil Novacek, Ahmah Khateb</i>	
<b>Comparison Of Methods For Fiber Bragg Gratings Simulation.....</b>	<b>175</b>
<i>Radek Helán</i>	
<b>Design Of Wide-Band Antireflection Coatings On Gaas Substrates For Long Wavelength IR Spectrum .....</b>	<b>181</b>
<i>M. Nenkov, B. Gyoch, T. Pencheva</i>	
<b>Advanced Cad Methods For Designing High Quality Power Systems.....</b>	<b>187</b>
<i>Ionel Horea Baciú, Serban Lungu</i>	
<b>Dielectric Properties Of E-Gun Evaporated LiNbO3 Thin Films.....</b>	<b>191</b>
<i>George Perentzis, Evangelos E. Horopanitis, Leonidas Papadimitriou, Vladimír Urman, Vladimír Saly, Sona Milovská</i>	
<b>Mechatronic System For Air Pressure Control.....</b>	<b>195</b>
<i>P. Drumea, M. Blejan, L. Dumitrescu, M. Comes, I. Dutu, I. Ilie</i>	
<b>A Novel Topology Based On Forward Converter With Passive Power Factor Correction .....</b>	<b>199</b>
<i>Cristian Farcas, Dorin Petreus, Emil Simion, Niculaie Palaghita, Zoltan Juhos</i>	
<b>Nonuniform Synchronous Sampling Analog Interface .....</b>	<b>204</b>
<i>Emil Saramov, Margarita Georgieva</i>	
<b>Characteristics Of Accelerated Fatigue Tests By Cyclic Flexion Of Smt Pc Boards.....</b>	<b>209</b>
<i>Zdzislaw Drozd, Marcin Szwach, Rafal Wrona</i>	

## Table of Contents

<b>Eco-Design -- New Part Of Technological Integration .....</b>	<b>213</b>
<i>Ivan Szendiuch, Karsten Schischke</i>	
<b>Lead-Free Solder Quality Investigation.....</b>	<b>219</b>
<i>Ivan Szendiuch, Cyril VaKo, Pavel Cejtchaml</i>	
<b>Modeling Of Evaporation Of Thin Films Using DOE .....</b>	<b>223</b>
<i>Pavel Mach, Miroslav Kocián</i>	
<b>Heuristic Optimization Strategies For Scheduling Of Manufacturing Processes .....</b>	<b>228</b>
<i>S. Horn, G. Weigert, E. Beier</i>	
<b>Investigation Into The Pressure Sensing Properties Of PvdF And Pvb Thick Film Capacitors .....</b>	<b>234</b>
<i>Khalil Arshak, Deirdre Morris, Arousian Arshak, Olga Korostynska, Kelly Kaneswaran</i>	
<b>Lead-Free Soldering Technology Review - Evaluating Solder Pastes And Stencils.....</b>	<b>240</b>
<i>Olivér Kramer, Balázs Illés</i>	
<b>The Thermoelectrical Behaviour Of Tantalum-Antimony-Germanium Thin Films.....</b>	<b>246</b>
<i>Eugeniusz Prociów, A. Dziedzic , T.M. Berlicki</i>	
<b>Current Operational Amplifier .....</b>	<b>250</b>
<i>Kamil Nováček, Tomás Brich, Ahmad Khateb</i>	
<b>Lifetime Modeling Based On An Advanced Test Chip Configuration For Lead-Free Solder Joints.....</b>	<b>255</b>
<i>Björn Böhme, Mike Röllig, Steffen Wiese, Klaus-Jürgen Wolter</i>	
<b>Gamma Radiation Sensing Using Zno And Sno2 Thick Film Interdigitated Capacitors.....</b>	<b>261</b>
<i>K. Arshak, O. Korostynska, E. Jafer, A. Arshak, D. Morris, E. Gill</i>	
<b>Electronic System Of Measuring Locomotive Wheels Load And Defining Operations Necessary To Minimize Existing Differences.....</b>	<b>267</b>
<i>N. G. Nenov, E. N. Dimitrov , G. S. Mihov, T. G. Ruzhekov</i>	
<b>System Of Hydraulic Dampers Diagnostics.....</b>	<b>273</b>
<i>N. G. Nenov, E. N. Dimitrov, T. G. Ruzhekov, E. Georgiev</i>	
<b>Ceramic Interposer For Optoelectronic Array Devices .....</b>	<b>277</b>
<i>Krzysztof Niewegłowski, Patryk Galardziak, Klaus-Jürgen Wolter</i>	
<b>Near Sinusoidal DSP Based Power Inverter.....</b>	<b>283</b>
<i>Ovidiu Pop, Serban Lungu, Gabriel Chindris</i>	
<b>Cost Effective Design For Six Sigma In Component Placement.....</b>	<b>289</b>
<i>Mihály Janóczki, Balázs Illés</i>	
<b>Comparing Of Flip-Chip And Wire-Bonding Interconnection .....</b>	<b>295</b>
<i>Marek Novotny, Lubos Jakubka, Ivan Szendiuch</i>	
<b>Solidification Behavior Of Lead-Free SnAgCu Alloys .....</b>	<b>299</b>
<i>Maik Müller, Steffen Wiese, Klaus-Jürgen Wolter</i>	
<b>Simulation And Efficient Implementation Of Low Power Time Diversity Receiver For Mobile Communications .....</b>	<b>305</b>
<i>Ioan Lita, Daniel Alexandru Visan, Ilie Popa</i>	
<b>Localization System Based On Enhanced Software Gps Receiver.....</b>	<b>310</b>
<i>Ioan Lita, Daniel Alexandru Visan, Ilie Popa</i>	
<b>Testing FPGA Based Digital System Using XILINX Chipscope™ Logic Analyzer.....</b>	<b>315</b>
<i>Khalil Arshak, Essa Jafer, Christian Ibala</i>	
<b>Design Of Telemetry Platform System For Biomedical Pressure Monitoring .....</b>	<b>321</b>
<i>K. Arshak, E. Jafer</i>	
<b>Investigation Of Solder Joints Strength.....</b>	<b>327</b>
<i>Cyril Vasko, Jiri Ohera, Ivan Szendiuch</i>	

## Table of Contents

<b>Examining The Effects Of Polymer Binder In Fe<sub>2</sub>O<sub>3</sub>/Zno Thick Film Sensors On The Response To Propanol Vapour .....</b>	<b>331</b>
<i>K.I Arshak, M. Nicholson, A. Arshak, E. G. Moore, I. Gaidan, C. Cunniffe</i>	
<b>Technologies For Remote Data Acquisition Systems In Environmental Monitoring.....</b>	<b>337</b>
<i>Ioan Lita, Ion Bogdan Cioc, Ilie Popa</i>	
<b>A New Approach Of Automobile Localization System Using Gps And Gsm/Gprs Transmission .....</b>	<b>343</b>
<i>Ioan Lita, Ion Bogdan Cioc, Daniel Alexandru Visan</i>	
<b>The Use Of System On Packaging Algorithms With Development Of Generic Module For Dvb-S Mpe And Ule Protocols For Wireless Based Internet Networks Devices.....</b>	<b>348</b>
<i>Ilian Costov, Philip Philipov</i>	
<b>Polymer Thick Film Technology For Realization Of Fine Line Structures On Different Substrates.....</b>	<b>353</b>
<i>Markus Detert, Lars Rebenklau, Thomas Zerna, Klaus-Jürgen Wolter</i>	
<b>Micro Proton-Exchange-Membrane Fuel Cell System In Ltcc (Low Temperature Cofired Ceramics).....</b>	<b>359</b>
<i>Adrian Goldberg</i>	
<b>Aspects Of Serial Communication In A Network Of Medical Devices .....</b>	<b>364</b>
<i>Andrei Drumea, Alexandru Vasile</i>	
<b>Infusion Pump Medical System Controlled With Modern System On Chip Devices.....</b>	<b>369</b>
<i>Andrei Drumea, Alexandru Vasile</i>	
<b>Low Temperature Non-Viscous Adhesive Bonding In Mems.....</b>	<b>373</b>
<i>Daniela Andrijasevic, Krzysztof Malecki, Ioanna Gioroudi</i>	
<b>Leadout Training Course On Pb-Free Soldering.....</b>	<b>378</b>
<i>Zsolt Illyefalvi-Vitéz, Simon Mason, Marta Freitas</i>	
<b>Equipment For Measurement Of Nonlinearity Of Nominally Linear Components.....</b>	<b>384</b>
<i>Pavel Mach, Václav Papež, David Busek, Ales Duraj</i>	
<b>Transformation Of Data For Statistical Processing .....</b>	<b>388</b>
<i>Pavel Mach, Josef Thuring, David Sámal</i>	
<b>Quality Of Pcb Interconnections Based On Blind Microvias Metallized By Magnetron Sputtering Deposition.....</b>	<b>393</b>
<i>Janusz Borecki, Jan Felba, Witold M. Posadowski</i>	
<b>Design Of Ccd Optical System For Thermal Ir Spectral Region.....</b>	<b>398</b>
<i>T. Pencheva, D. Pulov, B. Gyoch, M. Nenkov</i>	
<b>Using Clustering To Achieve Quality Software Structure .....</b>	<b>404</b>
<i>Violeta Bozhikova</i>	
<b>Simulation Of Contact Effects In Multiterminal Thick-Film And Ltcc Microresistors.....</b>	<b>408</b>
<i>Edward Mis, Andrzej Dziedzic</i>	
<b>Correlation Among Mechanical And Electrical Properties Of Conductive Adhesive Joints.....</b>	<b>413</b>
<i>Ales Duraj, Pavel Mach, David Sámal, Marcus Friese, David Busek</i>	
<b>Semantically-Enriched Service-Oriented Business Applications.....</b>	<b>417</b>
<i>Peter Martinek, József Kerekes, Béla Szikora</i>	
<b>Modeling And Simulation Of Inductive Planar Structures With Non-Homogenous Magnetic Medium .....</b>	<b>421</b>
<i>Ciprian Ionescu, Virgil Golubeanu, Paul Svasta</i>	
<b>Three Dimensional Rc Model Of Heat Transfer In Thick-Film Multilayer Structure.....</b>	<b>427</b>
<i>Grzegorz Bład, Włodzimierz Kalita, Dariusz Klepacki, Mariusz Weglarski</i>	
<b>Modelling Of Dynamic Temperature States In Layer Microelectronics Systemsc.....</b>	<b>431</b>
<i>Grzegorz Bład, Włodzimierz Kalita, Dariusz Klepacki, Feliks Rózak, Mariusz Weglarski, Robert Smusz</i>	

## Table of Contents

<b>Mathematical Model Of Coupling Capacitances In Two Layer Hybrid Structures.....</b>	<b>437</b>
<i>Boguslaw Wisz</i>	
<b>Ultrasonic Flowmeter .....</b>	<b>443</b>
<i>M. Comes, P. Drumea, M. Blejan, I. Dutu, A. Vasile</i>	
<b>SAC Alloys Implementation In Electronic Products Manufacturing .....</b>	<b>448</b>
<i>N. D. Codreanu, C. Turcu, T. C. Cucu, I. Plotog, P. Svasta, A. Stan, S. Jianu, Al. Marin</i>	
<b>Electrochemical Dna Sensor Development For Diagnostic Application .....</b>	<b>454</b>
<i>Dóra Makai, Dr. András Gyorrffy, Dr. Gábor Harsányi, Dr. Zsolt Tulassay</i>	
<b>Electrical Properties Of Low Temperature Cofired Ceramics With Integrated Bulk Metals.....</b>	<b>458</b>
<i>Michael Hintz, Ruben Perrone, Heiko Thust, Matthias Hein</i>	
<b>Heated Microchamber Made Of LTCC.....</b>	<b>464</b>
<i>Paweł Bemnowicz, Leszek J. Golonka, Karol Malecha</i>	
<b>Minimization Of The Thermal Interface Resistance Of Power Smd Assemblies For High-Temperature Applications.....</b>	<b>469</b>
<i>J. Nicolics, M. Mündlein, M. Fasching</i>	
<b>Rheological Characterization Of Solder Pastes With Different Procedures .....</b>	<b>475</b>
<i>M. Winter, R. Durairaj, N.N. Ekere, R. Bauer</i>	
<b>Theoretical Investigation Of Torque Measuring By A Vibration Motor In A Mobile Phone.....</b>	<b>481</b>
<i>Attila Lukács, Attila Halmai</i>	
<b>Two-Level Pipeline Scheduling Of Adiabatic Logic .....</b>	<b>485</b>
<i>László Varga, Gábor Hosszú, Ferenc Kovács</i>	
<b>Way To The “Intelligent” Vehicles .....</b>	<b>490</b>
<i>Róbert Fekete, György Ábrahám</i>	
<b>Step Standard - Perspective And Futurity .....</b>	<b>495</b>
<i>Martin Molhanec</i>	
<b>Utilization Of Anisotropic Adhesive Joints As An Alternative To Standard Snpb Solder Joints .....</b>	<b>500</b>
<i>Slavomír Kardo, Alena Pietriková, Milo Somora</i>	
<b>Optimisation Of Lead Free Solders Reflow Profile .....</b>	<b>504</b>
<i>Alena Pietriková, Lubomír Livovský, Ján Urbancik, Radoslav Bucko</i>	
<b>Micro-Modular Training System In Electronic Technology - Alternative Tqm Tool .....</b>	<b>510</b>
<i>Ján Urbancik, Alena Pietriková</i>	
<b>Laser Welding Process And Packaging For Magnetic Field Sensors.....</b>	<b>515</b>
<i>Johann Nicolics, Laszlo Musiejovsky, Martin Mündlein, Hans Zehetner, J. Steurer, I. Giouroudi, Hans Hauser</i>	