

2008 31st International Spring Seminar on Electronics Technology

(ISSE 2008)

**Budapest, Hungary
7 – 11 May 2008**



**IEEE Catalog Number: CFP08509-PRT
ISBN: 978-1-4244-3972-0**

Contents

A - Reliability physics: analysis and life time-prediction in electronics

Reliability of Electronics & Photonics – Managing the Time Bomb	1
The Blocking Leakage Current of Packaged Silicon Devices after Their Storage at 250°C Ambient Temperature	7
Influence of Production Technology to Reliability of Interconnections in the LTCC Modules	13
Life – Time of Lead – free Soldered SMT Joints	17
Ageing of Semiconductor Single Crystals and Metal-Semiconductor Junctions	22
Noise Sources of p-type CdTe Single Crystals.....	25
Relaxation Time in CdTe Single Crystals.....	28
Intermetallic Compound Growth in Lead Free Solder Joints on Ag-Based Thick Film Conductors	32
Calculation of BGA Contact Resistance by Using the Contacts Volume Method	37
Influence of mechanical stress and temperature aging on a change of electrical connection resistance.....	41
Pulsed Stress Behavior of Flexible Thick Film Resistors.....	45
Behavior of Temperature Inside PN Junction During Microplasma Switching	51
Influence of PCBs Coatings Wetability on Solder Joints Reliability Made in SMT	55
Life-time Test of Laser and Reflow Soldered Flexible Substrates	61
Predictive Reliability and Prognostics for Electronic Components: Current Capabilities and Future Challenges	67

B - Non-destructive testing, picture acquisition methods

Thick Film Resistor Testing by Electro – Ultrasonic Spectroscopy with DC Electric Signal	73
Dielectric characteristics of composite systems.....	77
New Mixed Rules.....	82
Dielectric relaxation in Glycerol at long-time exposure to low temperatures	86
Material characterization with the ultrasonic microscope	91
Study of solar cells defects via noise measurement.....	96
Local light to electric energy conversion measurement of silicon solar cells	101

Contents

Calibration Parameters Principles for Matlab S-Function using CANape	105
Ultrasonic Echo Detection: Experiments Using Large Beam Angle Transducers in Narrow Tubes	111
Microcontroller Based Tester for Semiconductor Devices.....	117
Digital Image Processing Applied In Drugs Industry For Detection Of Broken Aspirin Tablets	121
Image Processing Techniques used for Dental X-Ray Image Analysys.....	125
The directive on RoHS, and the examination of the restricted materials with XRF machine	130
In situ non contact temperature measurements on PCB during soldering process	134
Thermal Diffusivity and Thermal Conductivity Measurement in Thick – Film Microsystem.....	139
High Energy Pulse Generator in Research of Mosaic Heater System	145
Model for Categorization of Micro Bonds.....	151
Time minimization of hybrid bist for system-on-chip	153
 C - Nanotechnology, nanomaterials and nanoelectronics	
XRD and AFM Studies of Nanocrystalline TiO ₂ Thin Films Prepared by Modified Magnetron Sputtering.....	159
Nanocomposites for Turn Insulation for Inverter Fed Motors.....	163
Characterization of thin oxide layers by use of the atomic force acoustic microscopy	167
Photothermal Characterization of Polymer-Based Three-Layer Nanoelectronic Structures	170
Simulation Analysis of the Fe ₄₀ Ni ₃₈ B ₁₈ Mo ₄ Nano-Crystalline Thin Films, in the 0.3 – 9.6 GHz Domain	176
Synchronous Detection of Fluorescence Emission.....	181
Electrical connection network within an electrically conductive adhesive	184
Electrochemical characterization of DNA covered gold thin film electrodes for biosensoric applications	189
Parabolic negative magnetoresistance in two-dimensional electron gas in InGaAs/InP	195
Hole Mobility in InP and GaSb.....	201

Contents

Nanomaterials and Technology for Conductive Microstructures	205
Nanotechnology Materials for Electronics Reliability.....	211
D - Advanced packaging, new packages and materials, optoelectronics, optical interconnection technology	
Development of Conductive Phase in Thick-film Resistors; Two Case Studies.....	216
Development of Sol - Gel Integrated Optical Waveguides for EOPCB	222
Modification of Electrically Conductive Adhesives for Better Mechanical and Electrical Properties	228
Comparative Analysis of Electric Permittivity for Some HF Board Materials with PTFE Base.....	234
Investigation the Possibilities for Implementation of Fiber Optic Detection of Damaged Rails	240
Development of a 3 dimensional package for pressure sensors.....	243
Demagnetizing Experiments of Yttrium Orthoferrites for Large Aperture Magneto-optical Switch	249
Manufacturing and Electrical Interconnection of Piezoelectric 1-3 Composite Materials for Phased Array Ultrasonic Transducers	255
Comparing of Simulation and Experimental Results of Chip Power Interconnection	261
High Temperature Applications of Al Wire Connection to SiC Structures.....	264
Capacitive Pressure Sensors Realized With LTCC Technology	269
E - System on a chip, system in a package	
Holding voltage adjustable Silicon Controlled Rectifier	273
LTCC Microreactor with Thermal Stabilization.....	276
High-Entropy Random Number Generators using System on Chip Devices	280
An Improved Architecture to Generate Sinusoidal Signal Using Direct Digital Frequency Synthesis Technique	284
Techniques to Implement A/D Converters using Minimal Hardware and Software.....	288
Use the Imagine Sensor to Detect the Building Vibration.....	294
Electronic Module Based on System on Chip Device for Hydraulic Axis Control.....	298

Contents

Wireless technologies for distributed sensor networks used in measurement and automation systems	303
Smart Pressure Sensor based on PSoC	308
A New Lossy ELIN Integrator Implementation by Unbalanced the Bias Currents of a „Sinh” Ideal ELIN Integrator	312
A New Low Voltage Linearization Technique Employing Plurality of CCII Coupled Pairs	318
Contactless Conductivity Detection in LTCC Technology for Microfluidic Devices.....	324
F - Manufacturing Processes, process simulation and optimization	
Optimization of PCB Design Assembly Using Yield Prediction	329
Numerical simulation and experimental identification of the laser controlled modular system purposefully created for equipping the terrace leveling installations	334
Electronic intelligent module for a hydraulic briquetting press.....	340
Signal conditioner for piezoelectric force sensors	343
Numerical Analysis of Thermal Stresses Induced During VFM Curing of Encapsulant	348
Surface tension measurement of the solders by non-wetting specimen.....	354
Analysis and Prediction of Electrical Contact Resistance for Anisotropic Conductive Adhesives.....	358
Microstructure Analysis and Measurement of Nonlinearity of Vapour Phase Reflowed Solder Joints	363
Minimising the Risk of Defects in Nano-Imprint Forming	367
Adaptive Algorithm for Error Correction from Sensors Measurements.....	373
Double-sided Preheating Influence on Solderability	379
Development of a fine pitch copper wire bond process for integrated circuit devices	385
Mechatronics system for recovering braking energy conceived for the medium and heavy motor vehicles.....	389
Failure Mode and Effects Analysis of a Process of Reflow Lead-Free Soldering	394
Agile Project Management in Product Design.....	399
Sandwich-type three-dimensional thick-film thermoelectric microgenerators.....	404
Investigations on Electronics Assembling on Glass Substrates using Pb-free Technology.....	409

Contents

Optimization of Cavity Fabrication for Micro-fluidic Systems.....	414
Investigate Heat Conduction Ability of Power Components with Dijkstra Algorithm	420
Method for selective solder paste application for BGA rework	426
Selective laser soldering on flexible boards using through foil heating	431
Integrating HR offices over semantically enriched SOA.....	437
Impact of solder pad shape on lead-free solder joint reliability.....	443
Automatic transformation generation in service oriented architecture	446
Simulation and modeling of laser ablation	452
Balancing between cost and tester acceptance in case of new product introduction for PCB assembly	458
 G - Innovations in printed circuit board, thin film and thick film techniques	
Electropolymerization of Thin Film Sensor Layer on Interdigital Structure.....	462
Interfacing fluidic sensors based on LTCC.....	468
Organic Materials for Humidity Sensors	473
Conductimetric pH Sensor Based on Novel Conducting Polymer Composite Thick Films	478
3D-microfluidic reactor in LTCC	484
LTCC Fluidic Potentiometric Detector.....	490
A Novel Microfluidic Sensor System Fabricated by SU-8 Femtosecond Pulsed Laser Prototyping.....	496
The Contact Resistance at Interface of Two Different Thick Film Layers.....	501
The Use of Ultrasonic Bonding for Components Assembly in Printed Circuit Boards	505
Bonding in 3D Structure	511
Reference Electrodes for Thick-Film Sensors	514
Sol-gel optical waveguides on LTCC substrates	518
Properties study of the heterostructure CdS - CdO.....	523
Thin Film Structuring on LTCC	526
The electrochemical sensor with integrated chip of potentiostat.....	531
Experimental Characterization of 3D Micro-contacts	535

Contents

Performance of Laser Machined and Metallized Via Holes in LTCC Tape Materials.....	540
Chosen electrical and stability properties of surface and embedded planar PCB inductors	545
H - Education and information technology in electronics technology	
A Study on Sensors for Measuring Load of Railway Vehicle Wheels in Motion	550
Train Spring System Electronic Diagnostic Equipment Using Accelerometer Sensors.....	556
Comparison Between Different Method to Obtain the Solution for Differential Equations of Half Bridge Inverter.....	562
On Backward Stochastic Differential Equations and Control of Electronic Circuits	566
A Computational Algorithm for Electromagnetic Measurements of the Circuit Parameters.....	570
Universal Development Board for Education in Embedded Systems	575
Assessment of lead-free solder pastes with different type of powder for fine-pitch application	579
1D and 2D Solutions for Traceability in a EMS Company	585
Switches Made Simple with Step-Up and Voltage Inverting Converters.....	589
IEEE-HKN: The New International ECE Honor Society.....	595
I - System modeling, CAD/CAE in packaging	
An Improvement on Empirical Modelling of Photovoltaic Cells.....	598
Analysis of the Effect of Nonlinear Input/Output Characteristics of Digital Integrated Circuits on Signal Integrity.....	604
Propagation Model for Coupled Lines.....	610
A New Method for Via Capacitance Control for High Speed PCB Design	616
Developing a Via-Prototype Library for Capacitance Estimation	622
Energetic Framework for the Description of Temperature Dependent Magnetization in Ferromagnetic Thin Films.....	627
Problem of Interrogation Zone Synthesis in Anticollision RFID Systems	633
LabVIEW Application for Systems With Automatic Modulation Recognition	639
Characterization of a Reactor Module by Means of 3-Dimensional Finite Element- Analyses	644

Contents

J - Bio-compatible electronics packaging, environmental, ecology, and toxicology issues in electronics technology

Membrane behaviour of Parylene C as housing material	650
Surface degradation of Sn-contained electronic packaging materials in simulated body fluids	656
Influence of power consumption over the input current harmonics pollution for a half-bridge power inverter	662
Monitoring of the Temperature Profile of Vapour Phase Reflow Soldering.....	667
Hysteresis Modelling of NiZn–Ferrites	670

Author Index