2011 16th IEEE European Test Symposium

(ETS 2011)

Trondheim, Norway
23 – 27 May 2011

IEEE Catalog Number: CFP11216-PRT
ISBN: 978-1-4577-0483-3

Sixteenth IEEE European Test Symposium

ETS 2011

Table of Contents

Foreword x

Organizing Committee xi

Steering and Program Committee xiii

Best Paper Award xiv

Test Technology Technical Council xv

Plenary Presentation Keynotes xviii

ETS 2010 Best Paper

Diagnosis of Failing Scan Cells through Orthogonal Response Compaction 1
Brady Benware, Grzegorz Mrugalski, Artur Pogiel, Janusz Rajski, Jędrzej Solecki, and Jerzy Tyszer

Power Switches

Improved DFT for Testing Power Switches 7
Saqib Khursheed, Sheng Yang, Bashir M. Al-Hashimi, Xiaoyu Huang, and David Flynn

Signature Analysis for Testing, Diagnosis, and Repair of Multi-mode Power Switches 13
Zhaobo Zhang, Xrysovalantis Kavousianos, Yan Luo, Yiorgos Tsiatouhas, and Krishnendu Chakrabarty

Security

Scan Attacks and Countermeasures in Presence of Scan Response Compactors 19
Jean DaRolt, Giorgio Di Natale, Marie-Lise Flottes, and Bruno Rouzeyre

Converter Testing

Memory Optimized Two-Stimuli INL Test Method for DAC-ADC Pairs 25
Esa Korhonen and Juha Kostamovaara

Signature Testing and Diagnosis of High Precision ΣΔ ADC Dynamic Specifications Using Model Parameter Estimation 33
S. Kook, A. Banerjee, and A. Chatterjee

3D Technology

A Pre- and Post-bond Self-Testing and Calibration Methodology for SAR ADC Array in 3-D CMOS Imager 39
Xuan-Lun Huang, Ping-Ying Kang, Jiun-Lang Huang, Yung-Fa Chou, Yung-Pin Lee, and Ding-Ming Kwai

Layer Redundancy Based Yield Improvement for 3D Wafer-to-Wafer Stacked Memories 45
Mottaqiallah Taouil and Said Hamdioui

DfT Architecture for 3D-SICs with Multiple Towers 51
Chun-Chuan Chi, Erik Jan Marinissen, Sandeep Kumar Goel, and Cheng-Wen Wu

Emerging Technologies

Power Aware Post-manufacture Tuning of Analog Nanocircuits 57
Aritra Banerjee, Subho Chatterjee, Azad Naeemi, and Abhijit Chatterjee

Tomographic Testing and Validation of Probabilistic Circuits 63
Alexandru Paler, Armin Alaghi, Ilia Polian, and John P. Hayes

Fault Masking and Diagnosis in Reversible Circuits 69
Masoud Zamani, Navid Farazmand, and Mehdi B. Tahoori

Mixed-Signal and RF Test

Extraction of EVM from Transmitter System Parameters 75
Afsaneh Nassery, Sule Ozev, Marian Verhelst, and Mustapha Slamani

A Mixed-Signal Test Bus and Analog BIST with 'Unlimited' Time and Voltage Resolution 81
Stephen Sunter and Aubin Roy

Dependability

AVF Analysis Acceleration via Hierarchical Fault Pruning 87
Michail Maniatakos, Chandra Tirumurti, Abhijit Jas, and Yiorgos Makris

Efficient Fault Detection Architecture Design of Latch-Based Low Power DSP/MCU Processor 93
Hai Yu, Michael Nicolaidis, Lorena Anghel, and Nacer-Eddine Zergainoh

Test Data Compression, Compaction, and Diagnosis

Reduced ATE Interface for High Test Data Compression 99
Dariusz Czysz, Grzegorz Mrugalski, Nilanjan Mukherjee, Janusz Rajski, and Jerzy Tyszer

Toggle-Based Masking Scheme for Clustered Unknown Response Bits 105
Ozgur Sinanoglu

Structural In-Field Diagnosis for Random Logic Circuits 111
Alejandro Cook, Melanie Elm, Hans-Joachim Wunderlich, and Ulrich Abelein

Advances in Test

Accelerating RTL Fault Simulation through RTL-to-TLM Abstraction 117
N. Bombieri, F. Fummi, and V. Guarnieri

Improving Reliability in NoCs by Application-Specific Mapping Combined with Adaptive Fault-Tolerant Method in the Links 123
Anelise Kologeski, Caroline Concatto, Luigi Carro, and Fernanda Lima Kastensmidt

Latency Analysis for Sequential Circuits 129
Alexander Finder, André Sülflow, and Görschwin Fey

Contactless and Memory Testing

Input/Output Pad for Direct Contact and Contactless Testing 135
M. Scandiuzzo, S. Cani, L. Perugini, S. Spolzino, R. Canegallo, C. Gozzi, F. Maggioni, L. Perilli, R. Cardu, and E. Franchi

ATPG 1

An Approach for Quantifying Path Correlation in Digital Circuits without any Path or Segment Enumeration 141
Stelios Neophytou, Kyriakos Christou, and Maria K. Michael

Constraint-Based Hierarchical Untestability Identification for Synchronous Sequential Circuits 147
Jaan Raik, Anna Rannaste, Maksim Jenihhin, Taavi Viilukas, Raimund Ubar, and Hideo Fujiwara

A Functional Power Evaluation Flow for Defining Test Power Limits during At-Speed Delay Testing 153
M. Valka, A. Bosio, L. Dilillo, P. Girard, S. Pravossoudovitch, A. Virazel, E. Sanchez, M. De Carvalho, and M. Sonza Reorda

Analog Production Test

A Robust Metric for Screening Outliers from Analogue Product Manufacturing Tests Responses 159
Shaji Krishnan and Hans G. Kerkhoff

Fast and Accurate DPPM Computation Using Model Based Filtering 165
Ender Yilmaz and Sule Ozev

Post-silicon Debug

Optimization of Assertion Placement in Time-Constrained Embedded Systems 171
Viacheslav Izosimov, Zebo Peng, Michele Lora, Graziano Pravadelli, Franco Fummi, Giuseppe Di Guglielmo, and Masahiro Fujita

ATPG 2

Critical Fault-Based Pattern Generation for Screening SDDs 177
Fang Bao, Ke Peng, Mahmut Yilmaz, Krishnendu Chakrabarty, LeRoy Winemberg, and Mohammad Tehranipoor

Diagnosis

Structural Test for Graceful Degradation of NoC Switches 183
Atefe Dalirsani, Stefan Holst, Melanie Elm, and Hans-Joachim Wunderlich

On Transition Fault Diagnosis Using Multicycle At-Speed Broadside Tests 189
Irith Pomeranz

Ranking of Suspect Faulty Blocks Using Dataflow Analysis and Dempster-Shafer Theory for the Diagnosis of Board-Level Functional Failures 195
Hongxia Fang, Zhiyuan Wang, Xinli Gu, and Krishnendu Chakrabarty

Posters

Online Univariate Outlier Detection in Final Test: A Robust Rolling Horizon Approach 201
H.C.M. Bossers, J.L. Hurink, and G.J.M. Smit

Timing Vulnerability Factors of Ultra Deep-sub-micron CMOS 202
Massoud Mokhtarpour Ghahroodi, Mark Zwoliński, Rick Wong, and Shi-Jie Wen

F-Scan Test Generation Model for Delay Fault Testing at RTL Using Standard Full Scan ATPG 203
Marie Engelene J. Obien, Satoshi Ohtake, and Hideo Fujiwara

Viterbi-Based Efficient Test Data Compression 204
Dongsoo Lee and Kaushik Roy

Memory Test Optimization for Parasitic Bit Line Coupling in SRAMs 205
Sandra Irobi, Zaid Al-Ars, and Said Hamdioui

A Novel SRAM-Cell Based Input Vector Monitoring Concurrent BIST Architecture 206
I. Voyiatzis, C. Efstathiou, and H. Antonopoulou

FPGA Soft Error Recovery Mechanism with Small Hardware Overhead 207
Uroš Legat, Anton Biasizzo, and Franc Novak

I-BIRAS: Interconnect Built-In Self-Repair and Adaptive Serialization in 3D Integrated Systems 208
Michael Nicolaidis, Vladimir Pasca, and Lorena Anghel

A Hardware-Based Approach for Fault Detection in RTOS-Based Embedded Systems 209
D. Silva, K. Stangherlin, L. Bolzani, and F. Vargas

High-Performance Diagnostic Fault Simulation on GPUs 210
Min Li and Michael S. Hsiao

Dynamic Test Set Selection Using Implication-Based On-Chip Diagnosis 211
N. Alves, Y. Shi, N. Imbriglia, J. Dworak, K. Nepal, and R.I. Bahar

A Low-Cost Emulation System for Fast Co-verification and Debug 212
J. Lagos-Benites, M. Grosso, L. Sterpone, M. Sonza Reorda, G. Audisio, M. Pipponzi, and M. Sabatini

Revisiting Application-Dependent Test for FPGA Devices 213
Alessandro Cilardo, Carmelo Lofiego, Antonino Mazzeo, and Nicola Mazzocca

Temperature-Variation-Aware Test Pattern Optimization 214
Tomokazu Yoneda, Makoto Nakao, Michiko Inoue, Yasuo Sato, and Hideo Fujiwara

Analysis and Mitigation of Electromigration in RF Circuits: An LNA Case Study 215
Ramachandran Venkatasubramanian, Doohwang Chang, and Sule Ozev

Enhancement of Clock Delay Faults Testing 216
Yoshinobu Higami, Hiroshi Takahashi, Shin-ya Kobayashi, and Kewal K. Saluja

Dual Edge Triggered Flip-Flops for Noise Aware Design 217
Yukiya Miura

On High-Quality Test Pattern Selection and Manipulation 218
Feng Yuan, Xiao Liu, and Qiang Xu

Embedded Tutorial

Towards Variation-Aware Test Methods 219
Ilia Polian, Bernd Becker, Sybille Hellebrand, Hans-Joachim Wunderlich, and Peter Maxwell

Author Index 226