

# Table of Contents

## Volume 1

|                                                                              |         |
|------------------------------------------------------------------------------|---------|
| Table of Contents                                                            | iii     |
| Welcome from the 2003 Symposium Chair and Co-Chair                           | vii     |
| 2003 Steering Committee                                                      | xi      |
| Message from the 2003 Technical Program Chair and Co-Chair                   | xxi     |
| Technical Program Committee                                                  | xxii    |
| MTT-S Administrative Committee                                               | xxxviii |
| MTT-S ADCOM Past Presidents                                                  | xl      |
| ADCOM Honorary Life Members and Editors                                      | xljii   |
| ADCOM Past Presidents 1952-2002                                              | xljiii  |
| Radio Frequency Integrated Circuits (RFIC) Symposium Committees              | xliv    |
| Automatic RF Techniques Group (ARFTG) Conference Steering Committee          | xliv    |
| 2003 Awards                                                                  | li      |
| IEEE Fellows: Class of 2003                                                  | lxjii   |
| Future IEEE MTT-S International Microwave Symposia                           | lxvii   |
| Historical Exhibit                                                           | lxviii  |
| 2003 Microwave Symposium Technical Program Schedule                          | lxxi    |
| Technical Sessions                                                           |         |
| TU1A: Plenary Session                                                        | 3       |
| TU1B: Novel Modeling Techniques for Microwave CAD                            | 7       |
| TU2B: Passive Components                                                     | 29      |
| TU3B: High Power Amplifiers                                                  | 67      |
| TU4B: Frequency Conversion and Control                                       | 85      |
| TU5B: Millimeter Wave Monolithic IC Technologies                             | 111     |
| TU6B: Microwave Photonic Devices                                             | 141     |
| TU1C: Microwave CAD Exploring Neural Networks and Fuzzy Logic                | 163     |
| TU2C: Focused Session – Negative Refractive Index Materials and Applications | 185     |
| TU3C: Advances in High Power Transistor Technology                           | 207     |
| TU4C: Amplifiers and Control Circuits                                        | 233     |
| TU5C: Microwave Photonic Systems                                             | 259     |
| TU1D: Frequency-Domain CAD Techniques                                        | 285     |
| TU2D: Negative Index Materials and Microwave Applications                    | 307     |
| TU3D: High Power Amplifier Linearization                                     | 333     |
| TU4D: Focused Session (Joint with RFIC)—                                     |         |
| Ultra-Wideband Communications & Radar: Entering the Marketplace              | 355     |
| TU5D: Biological Effects and Medical Applications                            | 377     |
| TU6D: Ferrite and Control Devices                                            | 411     |
| TUIF: Joint Interactive Forum (IMS Papers)                                   | 441     |
| Joint Interactive Forum (RFIC Papers)                                        | A1      |
| Tutorials/Workshops: Sunday, Monday, and Friday                              | III     |
| Panel and Special Sessions                                                   | XX      |
| Student Paper Competition                                                    | XXI     |
| RFIC Program                                                                 | XXII    |
| μAPS – Microwave Application and Products Seminar                            | XXV     |
| ARFTG Conference                                                             | XXVII   |
| Philadelphia Information                                                     | XXVIII  |
| Guest Program                                                                | XXX     |
| Author Index                                                                 | XXXV    |
| Exhibition Guide                                                             | VLII    |
| Convention Center Layouts and Area Map                                       | LXXVII  |
| Conference Hotel                                                             | LXXX    |

# Table of Contents

## Volume 2

|                                                                         |        |
|-------------------------------------------------------------------------|--------|
| Table of Contents .....                                                 | iii    |
| 2003 Microwave Symposium Technical Program Schedule .....               | ix     |
| Technical Sessions                                                      |        |
| WE1A: Non-Linear Device Modeling .....                                  | 633    |
| WE2A: Leakage Effects on Planar Structures .....                        | 659    |
| WE3A: Power Amplifiers and Devices for Wireless Applications .....      | 685    |
| WE4A: Advances in Microwave Oscillators .....                           | 715    |
| WE5A: Focused Session --Terahertz Technology .....                      | 737    |
| WE1B: Non-Linear Device and System Simulation Techniques .....          | 767    |
| WE2B: Behavioral Modeling for Nonlinear Microwave Components .....      | 785    |
| WE3B: Guided Wave Structures and New Effects .....                      | 807    |
| WE4B: Power Amplifiers for C to Q Band Application .....                | 841    |
| WE5B: Millimeter Wave Signal Sources .....                              | 875    |
| WE6B: Millimeter Wave Generation and Amplification .....                | 897    |
| WE1C: Cavity Filters and Multiplexers .....                             | 927    |
| WE2C: Si Transmission Lines .....                                       | 957    |
| WE3C: Time-Domain Methods and Applications .....                        | 975    |
| WE4C: Linear Modeling and Passive Devices .....                         | 997    |
| WE5C: System Level Packaging .....                                      | 1027   |
| WE6C: Focused Session — Software Radio .....                            | 1049   |
| WE1D: Planar Technologies for Filters and Multiplexers .....            | 1071   |
| WE2D: Novel Waveguide Structures, Discontinuities and Transitions ..... | 1097   |
| WE3D: Advances in Time-Domain Techniques .....                          | 1119   |
| WE4D: Enabling Packaging Technologies .....                             | 1145   |
| WE5D: ICs for Optical Communication at 40 Gb/s & Beyond .....           | 1171   |
| WEIF: Interactive Forum .....                                           | 1197   |
| Tutorials/Workshops: Sunday, Monday, and Friday .....                   | III    |
| Panel and Special Sessions .....                                        | XX     |
| Student Paper Competition .....                                         | XXI    |
| RFIC Program .....                                                      | XXII   |
| μAPS – Microwave Application and Products Seminar .....                 | XXV    |
| ARFTG Conference .....                                                  | XXVII  |
| Philadelphia Information .....                                          | XXVIII |
| Guest Program .....                                                     | XXX    |
| Author Index .....                                                      | XXXV   |
| Exhibition Guide .....                                                  | VLII   |
| Convention Center Layouts and Area Map .....                            | LXXVII |
| Conference Hotel .....                                                  | LXXX   |

# Table of Contents

## Volume 3

|                                                                             |        |
|-----------------------------------------------------------------------------|--------|
| Table of Contents .....                                                     | iii    |
| 2003 Microwave Symposium Technical Program Schedule .....                   | ix     |
| Technical Sessions                                                          |        |
| TH1A: Microwave Filter Synthesis Techniques .....                           | 1453   |
| TH2A: RF-MEMS Phase Shifters and Micromachined Inductors .....              | 1475   |
| TH3A: Focused Session – High Speed Sampling Circuits and Techniques .....   | 1501   |
| TH4A: Advanced Array Techniques .....                                       | 1523   |
| TH5A: Advances in Semiconductor Technology for Wireless Systems .....       | 1545   |
| TH6A: Low Noise Components Based on Si, GaAs, and InP Technologies .....    | 1567   |
| TH1B: Planar and Periodic Filters .....                                     | 1593   |
| TH2B: Focused Session - Future Material Technologies for RF-MEMS .....      | 1623   |
| TH3B: Time Domain and Nonlinear Measurement Techniques .....                | 1641   |
| TH4B: Advances in Beamsteering and Beamforming Arrays .....                 | 1667   |
| TH5B: Techniques for Enhancing Wireless System Performance .....            | 1693   |
| TH6B: RF Power Amplifiers and Techniques .....                              | 1715   |
| TH1C: Active and Tunable Filters .....                                      | 1745   |
| TH2C: MEMS Techniques for Tunable Filters and Resonators .....              | 1779   |
| TH3C: Microwave Measurement Techniques .....                                | 1805   |
| TH4C: Beam Steering, Metamaterials and Smart Antenna Characterization ..... | 1831   |
| TH5C: Spatial Power Combining .....                                         | 1857   |
| TH1D: Superconducting and Novel Planar Filters .....                        | 1879   |
| TH2D: Modeling and Packaging of MEMS Components .....                       | 1913   |
| TH3D: Microwave and Millimeter-Wave Sensor Applications .....               | 1939   |
| TH4D: Frequency Domain Techniques .....                                     | 1957   |
| TH5D: Ferroelectrics and Acoustic Devices .....                             | 1987   |
| TH6D: Advanced Millimeter-Wave Transceiver and Source Technology .....      | 2013   |
| TH1F: Interactive Forum .....                                               | 2039   |
| Tutorials/Workshops: Sunday, Monday, and Friday .....                       | III    |
| Panel and Special Sessions .....                                            | XX     |
| Student Paper Competition .....                                             | XXI    |
| RFIC Program .....                                                          | XXII   |
| μAPS – Microwave Application and Products Seminar .....                     | XXV    |
| ARFTG Conference .....                                                      | XXVII  |
| Philadelphia Information .....                                              | XXVIII |
| Guest Program .....                                                         | XXX    |
| Author Index .....                                                          | XXXV   |
| Exhibition Guide .....                                                      | VLII   |
| Convention Center Layouts and Area Map .....                                | LXXVII |
| Conference Hotel .....                                                      | LXXX   |