2018 IEEE/MTT-S International Microwave Symposium (IMS 2018)

Philadelphia, Pennsylvania, USA
10-15 June 2018

Pages 1-412

IEEE Catalog Number: CFP18MTT-POD
ISBN: 978-1-5386-5068-4

****** This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.***

IEEE Catalog Number:	CFP18MTT-POD
ISBN (Print-On-Demand):	978-1-5386-5068-4
ISBN (Online):	978-1-5386-5067-7
ISSN:	0149-645X

Additional Copies of This Publication Are Available From:

Curran Associates, Inc
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: (845) 758-0400
Fax: (845) 758-2633
E-mail: curran@proceedings.com
Web: www.proceedings.com

Tu1C: Advances in Combiners and Dividers

Chair: Bayaner Arigong, Washington State University — Co-Chair: Guoan Wang, University of South Carolina
201C, Time 08:00–09:40, Tuesday 12 June 2018

IMS 2018 Table of Contents

Tu1D: Novel Microwave and Millimeter Materials, Devices, and Radiating Structures

Chair: Jan Machac, Czech Technical Unversity in Prague — Co-Chair: David Jackson, University of Houston
202AB, Time 08:00–09:40, Tuesday 12 June 2018

Tu1G: Resonator-Based Sensors

Chair: Kamran Entesari, Texas A&M University — Co-Chair: Nils Pohl, Ruhr-Universität Bochum
204B, Time 08:00–09:40, Tuesday 12 June 2018

IMS 2018 Table of Contents

Tu1H: Advanced Structures Using Additive Manufacturing Process

Chair: Dominique Baillargeat, XLIM (UMR 7252) — Co-Chair: Carlos Saavedra, Queen's University
204C, Time 08:00–09:40, Tuesday 12 June 2018

Tu2C: Recent Developments in Passive Circuits

Chair: Holger Maune, Technische Universität Darmstadt — Co-Chair: Hualiang Zhang, UMass Lowell
201C, Time 10:10–11:50, Tuesday 12 June 2018

IMS 2018 Table of Contents

Tu2D: Advances in Modeling and Design Optimization

Chair: Jose Rayas-Sanchez, ITESO — Co-Chair: Q.J. Zhang, Carleton University
202AB, Time 10:10–11:50, Tuesday 12 June 2018

Tu2E: Radio to Terahertz Waves Toward Nanoscale Sensing, Imaging and Characterization of Biological Samples

Chair: Marco Farina, Università Politecnica delle Marche — Co-Chair: Arnaud Pothier, XLIM (UMR 7252)
203AB, Time 10:10–11:50, Tuesday 12 June 2018

IMS 2018 Table of Contents

Tu2G: Advances in Near-Range Radar Sensors

Chair: Christian Waldschmidt, Universität Ulm — Co-Chair: Lora Schulwitz, Maxar Technologies
204B, Time 10:10–11:50, Tuesday 12 June 2018

Tu2H: 3D-Printed Waveguide Structures

Chair: Valentina Palazzi, Università di Perugia — Co-Chair: Manos Tentzeris, Georgia Tech
204C, Time 10:10–11:50, Tuesday 12 June 2018

IMS 2018 Table of Contents

Tu3B: Nonlinear Circuit Analysis, Modeling, and Distortion Compensation

Chair: Christian Fager, Chalmers University of Technology — Co-Chair: Tushar Sharma, NXP Semiconductors
201B, Time 13:30–15:10, Tuesday 12 June 2018

Tu3C: Advances in Millimeter-Wave Integrated Waveguide Components and Transitions

Chair: Hjalti Sigmarsson, University of Oklahoma — Co-Chair: Kamal Samanta, Sony
201C, Time 13:30–15:10, Tuesday 12 June 2018

IMS 2018 Table of Contents

Tu3D: Advances in Numerical Modelling for Multi-Scale and Multi-Physics Applications

Chair: Werner Thiel, ANSYS — Co-Chair: Johannes Russer, Technische Universität München
202AB, Time 13:30–15:10, Tuesday 12 June 2018

Tu3E: Advances in Microwave and Terahertz Applications in Nanotechnology

Chair: Davide Mencarelli, Università Politecnica delle Marche — Co-Chair: Luca Pierantoni, Università Politecnica delle Marche
203AB, Time 13:30–15:10, Tuesday 12 June 2018

IMS 2018 Table of Contents

Tu3F: Biomedical Radar

Chair: Chung-Tse Michael Wu, Rutgers University — Co-Chair: Alfred Huang, U.S. Army Research Laboratory
204A, Time 13:30–15:10, Tuesday 12 June 2018

Tu3G: Advances in Backscattering and RFID Circuits

Chair: Kazuya Yamamoto, Mitsubishi Electric — Co-Chair: Thomas Ussmueller, Universität Innsbruck
204B, Time 13:30–15:10, Tuesday 12 June 2018

IMS 2018 Table of Contents

Tu3H: Novel Package/PCB Integration Concepts

Chair: Telesphor Kamgaing, Intel — Co-Chair: Rick Sturdivant, Azusa Pacific University
204C, Time 13:30–15:10, Tuesday 12 June 2018

Tu4B : Non-Doherty Load Modulated Power Amplifiers

Chair: Roberto Quaglia, Cardiff University — Co-Chair: Taylor Barton, University of Colorado Boulder
201B, Time 15:55–17:15, Tuesday 12 June 2018

IMS 2018 Table of Contents

Tu4C : Integrated Waveguide Structures and Techniques

Chair: Christian Damm, Universität Ulm — Co-Chair: Jun (Brandon) Choi, SUNY Buffalo
201C, Time 15:55–17:15, Tuesday 12 June 2018

Tu4D: Novel Theoretical Approaches in Microwave Structure Analysis and Design

Chair: James Skala, Georgia Tech — Co-Chair: Tapan Sarkar, Syracuse University
202AB, Time 15:55–17:15, Tuesday 12 June 2018

IMS 2018 Table of Contents

Tu4E: Nano-Scale Devices and Antennas

Chair: Dimitris Pavlidis, Boston University — Co-Chair: Trang Thai, Intel
203AB, Time 15:55–17:15, Tuesday 12 June 2018

Tu4G: Advances in Chipless and RFID Sensors

Chair: Alessandra Costanzo, Università di Bologna — Co-Chair: Smail Tedjini, LCIS (EA 3747)
204B, Time 15:55–17:15, Tuesday 12 June 2018

IMS 2018 Table of Contents

Tu4H: Novel Interconnects for W- and D-Band

Chair: Kamal Samanta, Sony — Co-Chair: Morgan Chen, L3 Technologies
204C, Time 15:55–17:15, Tuesday 12 June 2018

TUIF1 : Interactive Forum #1

Chair: Abbas Omar, Universität Magdeburg — Co-Chair: Aly Fathy, University of Tennessee
Exhibit Hall, Time 15:55–17:15, Tuesday 12 June 2018

IMS 2018 Table of Contents

IMS 2018 Table of Contents

We1A: 5G Sub-Systems: From Predistortion to Complete Link

Chair: Jonathan Comeau, Anokiwave — Co-Chair: Kate Remley, NIST
201A, Time 08:00–09:40, Wednesday 13 June 2018

IMS 2018 Table of Contents

We1B: VHF/UHF Components and Analog Signal Processing

Chair: Marc Franco, Qorvo — Co-Chair: Taylor Barton, University of Colorado Boulder
201B, Time 08:00–09:40, Wednesday 13 June 2018

We1C: Planar Multiplexers and Multi-Band Filters

Chair: Sanghoon Shin, U.S. Naval Research Laboratory — Co-Chair: Laya Mohammadi, Qualcomm Technologies
201C, Time 08:00–09:40, Wednesday 13 June 2018

We1D: Advanced Behavioral Models of Devices and Systems

Chair: Douglas Teeter, Qorvo — Co-Chair: Rob Jones, Raytheon
202AB, Time 08:00–09:40, Wednesday 13 June 2018

We1E: Advanced MEMS Filters, Resonators, and Waveguides

Chair: Venkata Chivukula, Qualcomm Technologies — Co-Chair: Joachim Oberhammer, KTH
203AB, Time 08:00–09:40, Wednesday 13 June 2018

IMS 2018 Table of Contents

We1F: Si-Based MMW/THz Circuits

Chair: Joe Qiu, U.S. Army Research Office — Co-Chair: Vadim Issakov, Infineon Technologies
204A, Time 08:00–09:40, Wednesday 13 June 2018

IMS 2018 Table of Contents

We1G: Enabling Array Components and Beam Forming Architectures

Chair: Glenn Hopkins, Georgia Tech — Co-Chair: Ahmed Kishk, Concordia University
204B, Time 08:00–09:40, Wednesday 13 June 2018

IMS 2018 Table of Contents

We1H: High Performance Power Amplifiers

Chair: Jonwei Yan, MaXentric Technologies — Co-Chair: Joseph Staudinger, NXP Semiconductors
204C, Time 08:00–09:40, Wednesday 13 June 2018

We2A: Multi GHz all Digital and Mixed Signal Circuits and Systems

Chair: Isar Mostafanezhad, Nalu Scientific — Co-Chair: Greg Lyons, MIT Lincoln Laboratory
201A, Time 10:10–11:50, Wednesday 13 June 2018

We2B: Advances in Mixers and Frequency Multipliers

Chair: Hiroshi Okazaki, NTT DoCoMo — Co-Chair: Chinchun Meng, National Chiao Tung University
201B, Time 10:10–11:50, Wednesday 13 June 2018

We2C: Filter Tuning, Synthesis, and Innovative Coupling Realizations

Chair: Dimitra Psychogiou, University of Colorado Boulder — Co-Chair: Masud Hannan, Intel
201C, Time 10:10–11:50, Wednesday 13 June 2018

IMS 2018 Table of Contents

We2D: Trapping Phenomena in GaN HEMTs

Chair: Matthias Rudolph, Brandenburgische Technische Universität — Co-Chair: Q.J. Zhang, Carleton University
202AB, Time 10:10–11:50, Wednesday 13 June 2018

We2E: Ferrite, Ferroelectric, and Phase-Change Components

Chair: Shamsur Mazumder, Worcester Polytechnic Institute — Co-Chair: Steven Stitzer, Northrop Grumman Mission Systems
203AB, Time 10:10–11:50, Wednesday 13 June 2018

IMS 2018 Table of Contents

We2F: THz and mm-Wave Amplification Multiplication and Control Innovations

Chair: Edward Niehenke, Niehenke Consulting — Co-Chair: Omeed Momeni, University of California, Davis
204A, Time 10:10–11:50, Wednesday 13 June 2018

IMS 2018 Table of Contents

We2G: Phased Array Systems and Applications

Chair: Roberto Vincenti Gatti, Università di Perugia — Co-Chair: Julio Navarro, Boeing
204B, Time 10:10–11:50, Wednesday 13 June 2018

We2H: High Power Doherty Power Amplifiers

Chair: Slim Boumaiza, University of Waterloo — Co-Chair: Manouchehr Ghanevati, Northrop Grumman Aerospace Systems
204C, Time 10:10–11:50, Wednesday 13 June 2018

IMS 2018 Table of Contents

We3A: Novel Microwave Circuits and Systems Applications

Chair: Kavita Goverdhanam, U.S. Army CERDEC — Co-Chair: Ajay Poddar, Synergy Microwave
201A, Time 15:55–17:15, Wednesday 13 June 2018

We3B: Emerging RF Switch Technologies for 5G and Defense Applications

Chair: Jeong-sun Moon, HRL Laboratories — Co-Chair: Aly Fathy, University of Tennessee
201B, Time 15:55–17:15, Wednesday 13 June 2018

IMS 2018 Table of Contents

We3E: Microwave Acoustic Components for Wireless Applications

Chair: Amelie Hagelauer, FAU Erlangen-Nürnberg — Co-Chair: Robert Weigel, FAU Erlangen-Nürnberg
203AB, Time 15:55–17:15, Wednesday 13 June 2018

We3F: Terahertz and mm-Wave Technologies and Applications

Chair: John Kuno, QuinStar Technology — Co-Chair: Jae-Sung Rieh, Korea University
204A, Time 15:55–17:15, Wednesday 13 June 2018

IMS 2018 Table of Contents

We3G: Broadband Radar Systems and Technologies

Chair: Rudy Emrick, Orbital ATK — Co-Chair: Nestor Lopez, MIT Lincoln Laboratory
204B, Time 15:55–17:15, Wednesday 13 June 2018

We3H : Women in Microwaves: Research on Biomedical Applications

Chair: Katia Grenier, CNES — Co-Chair: Dominique Schreurs, Katholieke Universiteit Leuven
204C, Time 15:55–17:15, Wednesday 13 June 2018

WEIF1 : Interactive Forum #2

Chair: Aly Fathy, University of Tennessee — Co-Chair: Kiki Ikossi, IEEE
Exhibit Hall, Time 10:10–11:50, Wednesday 13 June 2018

IMS 2018 Table of Contents

IMS 2018 Table of Contents

WEIF2 : Interactive Forum #3

Chair: Kiki Ikossi, IEEE — Co-Chair: Abbas Omar, Universität Magdeburg
Exhibit Hall, Time 15:55–17:15, Wednesday 13 June 2018

IMS 2018 Table of Contents

IMS 2018 Table of Contents

Th1A: Advanced Technologies for Non-Planar Filters and Diplexers

Chair: Giuseppe Macchiarella, Politecnico di Milano — Co-Chair: Richard Snyder, RS Microwave
201A, Time 08:00–09:40, Thursday 14 June 2018

IMS 2018 Table of Contents

Th1B: Advanced Rectifiers and Energy Harvesters for Wireless Power Transfer

Chair: David Ricketts, North Carolina State University — Co-Chair: Kenjiro Nishihkawa, Kagoshima University
201B, Time 08:00–09:40, Thursday 14 June 2018

Th1C: Electromagnetic Biosensing

Chair: Arnaud Pothier, XLIM (UMR 7252) — Co-Chair: Wenquan Che, NJUST
201C, Time 08:00–09:40, Thursday 14 June 2018

Th1D: Advanced High Frequency Large Signal Measurement Techniques

Chair: Matt King, Georgia Tech — Co-Chair: Nuno Carvalho, Universidade de Aveiro
202AB, Time 08:00–09:40, Thursday 14 June 2018

Th1E: Recent Advances in Terahertz and Photonics

Chair: Goutam Chattopadhyay, Jet Propulsion Laboratory — Co-Chair: Jianping Yao, University of Ottawa
203AB, Time 08:00–09:40, Thursday 14 June 2018

IMS 2018 Table of Contents

Th1F: RF Transceiver Architecture for MIMO and Beam Steering

Chair: Steven Rosenau, SSL — Co-Chair: Zaher Bardai, IMN Epiphany
204A, Time 08:00–09:40, Thursday 14 June 2018

Th1H: Doherty and Load-Modulated Power Amplifiers

Chair: Paul Draxler, Qualcomm Technologies — Co-Chair: Kenle Chen, University of Rhode Island
204C, Time 08:00–09:40, Thursday 14 June 2018

IMS 2018 Table of Contents

Th2A: Synthesis and Design of Non-Planar Filters and Multiplexers

Chair: Ming Yu, Chinese University of Hong Kong — Co-Chair: Vicente Boria, Universitat Politècnica de València
201A, Time 10:10–11:50, Thursday 14 June 2018

Th2B : Recent Developments in Wireless Power Transfer Techniques

Chair: Paolo Mezzanotte, Università di Perugia — Co-Chair: Kamran Ghorbani, RMIT University

201B, Time 10:10–11:50, Thursday 14 June 2018

IMS 2018 Table of Contents

Th2C: Hyperthermia Treatment and Implants Wireless Powering

Chair: Robert Caverly, Technische Universität Wien — Co-Chair: Abbas Omar, Universität Magdeburg
201C, Time 10:10–11:50, Thursday 14 June 2018

IMS 2018 Table of Contents

Th2D: Innovative mm-Wave Calibration and Measurement Techniques

Chair: Jon Martens, Anritsu — Co-Chair: Andrea Ferrero, Keysight Technologies
202AB, Time 10:10–11:50, Thursday 14 June 2018

Th2E: Integrated Microwave Photonics for Millimeter-Wave and 5G Applications

Chair: James Buckwalter, University of California, Santa Barbara — Co-Chair: Ed Ackerman, Photronics
203AB, Time 10:10–11:50, Thursday 14 June 2018

IMS 2018 Table of Contents

Th2F: 5G Millimeter-Wave Beamformers and Phased-Arrays

Chair: Gabriel Rebeiz, University of California, San Diego — Co-Chair: Aly Fathy, University of Tennessee
204A, Time 10:10–11:50, Thursday 14 June 2018

Th2H: Millimeter Wave Broadband Power Amplifiers

Chair: Charles Cambell, Qorvo — Co-Chair: Robert Leoni, Raytheon
204C, Time 10:10–11:50, Thursday 14 June 2018

Th3A: New Tuning Concepts for 3-D, Planar, and Integrated Filters and Duplexers

Chair: Eric Naglich, U.S. Naval Research Laboratory — Co-Chair: Xiaoguang Leo Liu, University of California, Davis
201A, Time 13:30–15:10, Thursday 14 June 2018

Th3B: Techniques and Components for High-Power Microwave Technology

Chair: Malgorzata Celuch, QWED — Co-Chair: Vadim Yakovlev, Worcester Polytechnic Institute
201B, Time 13:30–15:10, Thursday 14 June 2018

IMS 2018 Table of Contents

Th3C: Biomedical Devices

Chair: Changzhi Li, Texas Tech University — Co-Chair: Yanzhu Zhao, Medtronic
201C, Time 13:30–15:10, Thursday 14 June 2018

Th3D: Advances in CMOS Microwave and Millimeter Wave Signal Sources

Chair: Deukhyoun Heo, Washington State University — Co-Chair: Yi-Jan Emery Chen, National Taiwan University
202AB, Time 13:30–15:10, Thursday 14 June 2018

Th3E: Advances in Semiconductor Monolithic Integrated Circuit Technology

Chair: Amin Ezzeddine, Amcom Communications — Co-Chair: Cynthia Hang, Raytheon
203AB, Time 13:30–15:10, Thursday 14 June 2018

Th3F: THz and mm-Wave Sensing and Communication Systems

Chair: Steven Bowers, University of Virginia — Co-Chair: Lei Liu, University of Notre Dame
204A, Time 13:30–15:10, Thursday 14 June 2018

IMS 2018 Table of Contents

Th3H: Advances in Low Noise Technology

Chair: James Sowers, SSL — Co-Chair: James Whelehan, Innovative Technology
204C, Time 13:30–15:10, Thursday 14 June 2018

THIF1 : Interactive Forum #4

Chair: Aly Fathy, University of Tennessee — Co-Chair: Abbas Omar, Universität Magdeburg
Exhibit Hall, Time 10:10–11:50, Thursday 14 June 2018

IMS 2018 Table of Contents