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Tu1A: Tunable and Active Filters

Chair: Roberto Gómez-García, Universidad de Alcalá — Co-Chair: Rafaat Mansour, University of Waterloo
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Manoj Johnson [1], Abhishek Agrawal [2], Arun Natarajan [1]
[1] Oregon State University, USA ; [2] Intel, USA

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Pei-Ling Chi, Ching-Kai Chiou, National Chiao Tung University, Taiwan

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Xiaohu Wu [1], Mahmoud Nafe [1], Alejandro Alvarez Melcón [2], J. Sebastián Gómez-Díaz [1], Xiaoguang Liu [1]
[1] University of California, Davis, USA ; [2] Universidad Politécnica de Cartagena, Spain

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Mohamed F. Hagag [1], Mohammad Abu Khater [2], Dimitrios Peroulis [3]
[1] Military Technical College, Egypt ; [2] PSUT, Jordan ; [3] Purdue University, USA

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[1] Universitat Politècnica de València, Spain ; [2] Universidad de Alicante, Spain

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Alex H. Pham, Shahrokh Saeedi, Hjalti H. Sigmarsson, University of Oklahoma, USA

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Chair: Jan Machac, Czech Technical University in Prague — Co-Chair: James Skala, Georgia Tech
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Koji Okamoto [1], Tetsuya Ueda [1], Tatsuo Itoh [2]
[1] Kyoto Institute of Technology, Japan ; [2] University of California, Los Angeles, USA

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Ihsan Erdin [1], Ram Achar [2]
[1] Celestica, Canada ; [2] Carleton University, Canada

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Francisco Mesa [1], David R. Jackson [2]
[1] Universidad de Sevilla, Spain ; [2] University of Houston, USA

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Chair: Freek van Straten, MACOM — Co-Chair: Vadim Yakovlev, Worcester Polytechnic Institute
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[1] QWED, Poland ; [2] Warsaw University of Technology, Poland

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J. Cuper, M. Rytel, T. Karpisz, A. Pacewicz, B. Salski, P. Kopyt, Warsaw University of Technology, Poland

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[1] Heuermann HF-Technik, Germany ; [2] FH Aachen, Germany

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[1] Princeton University, USA ; [2] University of Calgary, Canada ; [3] NXP Semiconductors, USA ; [4] Focus Microwaves, Canada

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Hang Liu [1], Xi Zhu [2], Muting Lu [1], Kiat Seng Yeo [1]
[1] SUTD, Singapore ; [2] UTS, Australia

Tu2A : Reconfigurable Filters with Transfer Function and Stopband Reconfiguration Capability

Chair: Hjalti Sigmarsson, University of Oklahoma — Co-Chair: Xiaoguang Liu, University of California, Davis
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[1] University of Colorado Boulder, USA ; [2] Universidad de Alcalá, Spain

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Gowrish B., Raafat R. Mansour, University of Waterloo, Canada

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Mahmoud Abdelfattah, Dimitrios Peroulis, Purdue University, USA

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Thomas R. Jones, Mojgan Daneshmand, University of Alberta, Canada

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Runqi Zhang [1], Li Yang [2], Roberto Gómez-García [2], Dimitrios Peroulis [1]
[1] Purdue University, USA ; [2] Universidad de Alcalá, Spain

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[1] UESTC, China ; [2] Dalhousie University, Canada

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Li Xue, Dan Jiao, Purdue University, USA

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Xingqi Zhang, Kae-An Liu, Costas D. Sarris, University of Toronto, Canada

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Zhuotong Chen [1], Shucheng Zheng [1], Qian Cheng [2], Abdulkadir Yucel [2], Vladimir Okhmatovski [1]
[1] University of Manitoba, Canada ; [2] NTU, Singapore

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R.J. Adams [1], O.T. Wilkerson [1], J.C. Young [1], I. Chowdhury [2], W. Theil [2]
[1] University of Kentucky, USA ; [2] ANSYS, USA

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Chair: Changzhi Li, Texas Tech University — Co-Chair: Chung-Tse Michael Wu, Rutgers University
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[1] Southeast University, China; [2] University of Florida, USA

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Jing Wang [1], Tanja Karp [1], José-María Muñoz-Ferreras [2], Roberto Gómez-García [2], Changzhi Li [1]
[1] Texas Tech University, USA; [2] Universidad de Alcalá, Spain

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[1] imec, The Netherlands; [2] imec, Belgium

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[1] Rutgers University, USA; [2] Taiwan Tech, Taiwan; [3] California State University, Northridge, USA

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[1] NJUST, China; [2] Texas Tech University, USA

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Chair: Shirin Montazeri, Qualcomm — Co-Chair: Luciano Boglione, U.S. Naval Research Laboratory
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Abdurrahman H. Aljuhani, Gabriel M. Rebeiz, University of California, San Diego, USA

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Kamlesh Badiyari, Nagarjuna Nallam, IIT Guwahati, India

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Mohsen Hosseini, Wei-Ting Wong, Joseph C. Bardin, UMass Amherst, USA

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Martin Anderberg [1], Peter Sobis [1], Vladimir Drakinskiy [2], Joel Schleeh [3], Slavko Dejanovic [1], Anders Emrich [1], Jan Stake [2]
[1] Omnisys Instruments, Sweden; [2] Chalmers University of Technology, Sweden; [3] Low Noise Factory, Sweden

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Chair: Christian Damm, Universität Ulm — Co-Chair: Jason Soric, Raytheon
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Takumi Kaneda [1], Tetsuya Ueda [1], Tatsuo Itoh [2]
[1]Kyoto Institute of Technology, Japan A ; [2]University of California, Los Angeles, USA A

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Eric T. Der, Thomas R. Jones, Mojgan Daneshmand, University of Alberta, Canada A

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Ersin Polat, Roland Reese, Matthias Jost, Matthias Nickel, Christian Schuster, Rolf Jakoby, Holger Maune, Technische Universität Darmstadt, Germany A

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Alexander M. Watson [1], Kareem Elassy [2], Thomas Leary [1], M. Arifur Rahman [2], Aaron Ohta [2], Wayne Shiroma [2], Christopher E. Tabor [1]
[1]Air Force Research Laboratory, USA A ; [2]UH Mānoa, USA A

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Tae-Hak Lee, Jean-Jacques Laurin, Ke Wu, Polytechnique Montréal, Canada A

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Chair: Fabrizio Bonani, Politecnico di Torino — Co-Chair: Arvind Sharma, AKSH Research
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Azam Al-Rawachy [1], Thoalfukar Husseini [2], Johannes Benedikt [3], James J. Bell [3], Paul J. Tasker [3]
[1]Mosul University, Iraq A ; [2]Al-Furat Al-Awsat Technical University, Iraq A ; [3]Cardiff University, UK A

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[1]Al-Furat Al-Awsat Technical University, Iraq A ; [2]Mosul University, Iraq A ; [3]Cardiff University, UK A

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Zhang Wen, Shuman Mao, Yunqiu Wu, Ruimin Xu, Bo Yan, Yuehang Xu, UESTC, China A

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Chair: Cristiano Palego, Bangor University — Co-Chair: Arnaud Pothier, XLIM (UMR 7252)
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Xin Jin [1], Marco Farina [2], Xiaopeng Wang [1], Gianluca Fabi [2], Xuanhong Cheng [1], James C.M. Hwang [1]
[1]Lehigh University, USA A ; *[2]Università Politecnica delle Marche, Italy* A

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[1]XLIM (UMR 7252), France A ; *[2]HCP (EA 3842), France* A

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Mohammad-Reza Tofighi, Anilchandra Attaluri, Pennsylvania State University, USA A

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Chair: Chinchun Meng, National Chiao Tung University — Co-Chair: Hiroshi Okazaki, NTT DoCoMo
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Vincent Rieß, David Fritsche, Paul Stärke, Corrado Carta, Frank Ellinger, Technische Universität Dresden, Germany A

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Wei Ling Chang [1], Chinchun Meng [1], Guo-Wei Huang [2]
[1]National Chiao Tung University, Taiwan A ; *[2]NDL, Taiwan* A

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A Single-Path Reconfigurable Frequency Multiplier for 28/39GHz Dual-Band Transceivers
Roee Ben Yishay, Danny Elad, ON Semiconductor, Israel A

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Wen-Cheng Lai [1], Sheng-Lyang Jang [2], Guan-Zhang Li [2]
[1]National Penghu University of Science & Technology, Taiwan A ; *[2]Taiwan Tech, Taiwan* A

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Chair: Costas Sarris, University of Toronto — Co-Chair: Steven Anlage, University of Maryland
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O. Naaman [1], D.G. Ferguson [2], A. Marakov [2], M. Khalil [2], W.F. Koehl [2], R.J. Epstein [2]
[1] Google, USA A *; [2] Northrop Grumman, USA* A

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Firat Solgun, IBM T.J. Watson Research Center, USA A

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[1] MIT, USA A *; [2] MIT Lincoln Laboratory, USA* A

Tu3F: Advances in RFID Systems

Chair: Thomas Ussmueller, Universität Innsbruck — Co-Chair: Smail Tedjini, LCIS (EA 3747)
254AB, 13:30–15:10, Tuesday 4 June 2019

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[1] Universidade de Aveiro, Portugal A *; [2] Heriot-Watt University, UK* A

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Konstantinos Zannas [1], Hatem El Matbouly [1], Yvan Duroc [2], Smail Tedjini [1]
[1] LCIS (EA 3747), France A *; [2] Laboratoire Ampère (UMR 5005), France* A

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Giacomo Paolini, Diego Masotti, Francesco Antoniazzi, Tullio Salmon Cinotti, Alessandra Costanzo, Università di Bologna, Italy A

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Abanob Abdelnour [1], Newton Fonseca [2], Ahmed Rennane [3], Darine Kaddour [1], Smail Tedjini [1]
[1] LCIS (EA 3747), France A *; [2] Universidade Federal de Campina Grande, Brazil* A *; [3] CDER, Algeria* A

Tu3G: Advances in Radar Sensors

Chair: Lora Schulwitz, Maxar Technologies — Co-Chair: Changzhan Gu, Google
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Yi-Chen Lai, Chuan-Chi Chou, Mu-Cyun Tang, Tzyy-Sheng Horng, Fu-Kang Wang, National Sun Yat-sen University, Taiwan A

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[1]Chiba Institute of Technology, Japan A *; [2]AIS Engineering, Japan* A

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Daniel Rodriguez, Changzhi Li, Texas Tech University, USA A

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Patrik Grüner, Tobias Chaloun, Christian Waldschmidt, Universität Ulm, Germany A

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Sam Razavian, M. Mahdi Assefzadeh, Mostafa Hosseini, Aydin Babakhani, University of California, Los Angeles, USA A

Tu3H: Advances in Silicon-Integrated Power Amplifiers

Chair: Wolfgang Heinrich, FBH — Co-Chair: Kenle Chen, University of South Florida
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A 38-GHz-Band Power Amplifier with Analog Pre-Distortion for 1600-MHz Transmission Bandwidth 64-QAM OFDM Modulated Signal
Yu-Chun Chen [1], Tsung-Ching Tsai [1], Jeng-Han Tsai [2], Tian-Wei Huang [1]
[1]National Taiwan University, Taiwan A *; [2]National Taiwan Normal University, Taiwan* A

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Yang Chang, Bo-Ze Lu, Yunshan Wang, Huei Wang, National Taiwan University, Taiwan A

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A Ka-Band Highly Linear Power Amplifier with a Linearization Bias Circuit
Dehan Wang, Wenhua Chen, Long Chen, Xin Liu, Zhenghe Feng, Tsinghua University, China A

PAGE 323 Tu3H-4 14:30
A Fully-Integrated 2.6GHz Stacked Switching Power Amplifier in 45nm SOI CMOS with >2W Output Power and 43.5% Efficiency
Mohammad Khorshidian, Harish Krishnaswamy, Columbia University, USA A

PAGE 327 Tu3H-5 14:50
A 19.1% PAE, 22.4-dBm 53-GHz Parallel Power Combining Power Amplifier with Stacked-FET Techniques in 90-nm CMOS
Wei-Che Sun, Chien-Nan Kuo, National Chiao Tung University, Taiwan A

Tu4A : Advanced Transmission Transitions and Interfaces

Chair: Jun (Brandon) Choi, SUNY Buffalo — Co-Chair: Ke Wu, Polytechnique Montréal
151AB, 15:55–17:15, Tuesday 4 June 2019

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Tu4A-1
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Wide-Band Blazed Grating for All Polarizations
Haozhan Tian, Tatsuo Itoh, University of California, Los Angeles, USA A

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Tu4A-2
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A Full W-Band Waveguide-to-Differential Microstrip Transition
Björn Deutschmann, Arne F. Jacob, Technische Universität Hamburg-Harburg, Germany A

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Tu4A-3
16:35
Compact W-Band Shielded Asymmetrical Coplanar Stripline to Microstrip Transition for Millimeter-Wave Applications
Qun Li, Tao Yang, UESTC, China A

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Tu4A-4
16:55
3D Printed Slotted Rectangular Hollow Waveguides
K. Lomakin [1], S. Herold [1], D. Simon [2], M. Sippel [1], A. Sion [2], M. Vossiek [1], K. Helmreich [1], G. Gold [1]
[1]FAU Erlangen-Nürnberg, Germany A *; [2]NXP Semiconductors, Germany* A

Tu4B : Complexity Reduction for Statistical Analysis and Design Optimization

Chair: Erin Kiley, Massachusetts College of Liberal Arts — Co-Chair: Jose Rayas-Sanchez, ITESO
153AB, 15:55–17:15, Tuesday 4 June 2019

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Tu4B-1
15:55
Efficient Error Estimator for Model Order Reduction of Linear Parametric Systems
Lihong Feng, Peter Benner, MPI for Dynamics of Complex Technical Systems, Germany A

PAGE 350
Tu4B-2
16:15
Low-Cost and Reliable Yield Estimation of Miniaturized Microwave Couplers Using Variable-Fidelity Simulations and Response Features
Slawomir Koziel [1], Adrian Bekasiewicz [2], John W. Bandler [3]
[1]Reykjavik University, Iceland A *; [2]Gdansk University of Technology, Poland* A *; [3]McMaster University, Canada* A

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Tu4B-3
16:35
Space Mapping for Tuning Microwave Waveguide Filters
J.C. Melgarejo, Marco Guglielmi, Santiago Cogollos, Vicente E. Boria, Universitat Politècnica de València, Spain A

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Tu4B-4
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Space-Mapping Inspired Scattering Model Construction Based on Sparse Representation
Tianxu Yan, Dongying Li, Wenxian Yu, Shanghai Jiao Tong University, China A

Tu4C : Advancement in Biomedical Sensing Systems

Chair: Abbas Omar, Universität Magdeburg — Co-Chair: Chung-Tse Michael Wu, Rutgers University
156AB, 15:55–17:15, Tuesday 4 June 2019

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Tu4C-1
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Systolic and Diastolic Blood Pressure Estimation from Pulse Transit Time Using Dual Split-Ring Resonators with Notch Structure
Po-Kai Chan [1], Chi-Chun Chen [2], Chin-Lung Yang [1]
[1]National Cheng Kung University, Taiwan ; [2]NCUT, Taiwan

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Microwave Stethoscope for Heart Sound by Near-Field Coherent Sensing
Xiaonan Hui, Pragya Sharma, Edwin C. Kan, Cornell University, USA

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Tu4C-3
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A Perturbation-Injection-Locked Sensor with Self-Oscillating Active CSRR for Vital-Sign Detection from Fingertip
Cheng-Zhou Wu, Chao-Hsiung Tseng, Taiwan Tech, Taiwan

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Tu4C-4
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Designing a Metasurface-Based Tag Antenna for Wearable Vital Sign Sensors
Rezki El Arif [1], Mu-Cyun Tang [1], Wei-Chih Su [1], Tzyy-Sheng Horng [1], Fu-Kang Wang [1], Chao-Hsiung Tseng [2]
[1]National Sun Yat-sen University, Taiwan ; [2]Taiwan Tech, Taiwan

Tu4D : High Frequency Low Phase Noise Oscillator Techniques

Chair: Ruonan Han, MIT — Co-Chair: Emery Chen, National Taiwan University
157BC, 15:55–17:15, Tuesday 4 June 2019

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A *K*-Band CMOS Low-Phase-Noise Sub-Harmonically Injection-Locked QVCO with Divider-Less Frequency-Tracking Loop
Han-Sen Yang, Ian Yi-En Shen, Hong-Yeh Chang, National Central University, Taiwan

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An 100-to-110GHz Low-DC-Power Sub-Harmonically Injection-Locked Quadrature Oscillator Using Stacked Boosting Technique in 90-nm CMOS Process
Wei-Cheng Chen, Han-Nong Yeh, Hong-Yeh Chang, National Central University, Taiwan

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A Dual-Band CMOS Standing-Wave Digitally Controlled Oscillator for Automotive Radars
Chun-Ming Lin, Yu-Ting Lin, Kun-Yao Kao, Kun-You Lin, National Taiwan University, Taiwan

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A 0.1-V 5-GHz VCO Achieving FoM of 190-dBc/Hz
Jun-De Jin, Ying-Ta Lu, TSMC, Taiwan

Tu4F: Chipless RFID

Chair: Mojgan Daneshmand, University of Alberta — Co-Chair: Kazuya Yamamoto, Mitsubishi Electric
254AB, 15:55–17:15, Tuesday 4 June 2019

PAGE 392 Tu4F-1 15:55
All-Dielectric Electromagnetic Encoders Based on Permittivity Contrast for Displacement/Velocity Sensors and Chipless-RFID Tags
Cristian Herrojo [1], Paris Vélez [1], Ferran Paredes [1], Javier Mata-Contreras [2], Ferran Martín [1]
[1] Universitat Autònoma de Barcelona, Spain A ; [2] Universidad de Málaga, Spain A

PAGE 396 Tu4F-2 16:15
A Retrodirective Microwave Barcode
Kevin Xu [1], Dana Koshen [2], Muratkhan Abdirash [2], Jun H. Choi [1]
[1] SUNY Buffalo, USA A ; [2] Nazarbayev University, Kazakhstan A

PAGE 400 Tu4F-3 16:35
Electronically Re-Writable Chipless RFID Tag Using Solid State Metal-Insulator-Metal Switches on Paper Substrate
Jayakrishnan M.P. [1], Arnaud Vena [2], Brice Sorli [2], Etienne Perret [1]
[1] LCIS (EA 3747), France A ; [2] IES (UMR 5214), France A

PAGE 404 Tu4F-4 16:55
A Robust Detection Algorithm Using AC Characteristics of Backscatter Signal for Chipless RFID System
Grishma Khadka, Md. Shamsul Arefin, Nemai Chandra Karmakar, Monash University, Australia A

Tu4G: Novel Radar Technologies

Chair: Nestor Lopez, MIT Lincoln Laboratory — Co-Chair: Mohamed Abouzahra, MIT Lincoln Laboratory
257AB, 15:55–17:15, Tuesday 4 June 2019

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Compensation of the Pulse-to-Pulse Instability of GaN HEMT-Based Power Amplifiers
Pedro M. Tomé, Filipe M. Barradas, Telmo R. Cunha, José C. Pedro, Instituto de Telecomunicações, Portugal A

PAGE 412 Tu4G-2 16:15
Limiting Amplifier with 25THz Gain-Bandwidth-Product and Internal Amplitude Control for Data Rates Beyond 50Gbit/s in 130nm SiGe
Paul Stärke, Corrado Carta, Frank Ellinger, Technische Universität Dresden, Germany A

PAGE 416 Tu4G-3 16:35
UWB Positioning System with Orientation-Independent Characteristic by Using Omnidirectional Circularly Polarized Antenna
Wei-Ting Tsai, Yu-Yao Chen, Chong-Yi Liou, Shau-Gang Mao, National Taiwan University, Taiwan A

PAGE 420 Tu4G-4 16:45
Single Conversion Stepped-Frequency Continuous-Wave Radar Using Self-Injection-Locking Technology
Wei-Chih Su, Mu-Cyun Tang, Rezki El Arif, Tzyy-Sheng Horng, Fu-Kang Wang, National Sun Yat-sen University, Taiwan A

PAGE 424 Tu4G-5 16:55
An Integrated 79GHz Sequential Sampling Pulse Radar
A. Leibetseder [1], C. Wagner [1], A. Stelzer [2]
[1] DICE, Austria A ; [2] Johannes Kepler Universität Linz, Austria A

We1A: Power Combiners and Transformers

Chair: Guoan Wang, University of South Carolina — Co-Chair: Bayaner Arigong, Washington State University
151AB, 08:00–09:40, Wednesday 5 June 2019

PAGE 428 We1A-1 08:00
Reconfigurable Dual-Band Filtering Power Divider with Ultra-Wide Stopband Using Hybrid Microstrip/Square Defected Ground Structure
Zhen Tian, Yunbo Rao, Zhixian Deng, Xun Luo, UESTC, China A

PAGE 432 We1A-2 08:20
A 15–55GHz Low-Loss Ultra-Compact Folded Inductor-Based Multi-Section Wilkinson Power Divider for Multi-Band 5G Applications
Sanghoon Lee, Min-Yu Huang, Yeojoon Youn, Hua Wang, Georgia Tech, USA A

PAGE 436 We1A-3 08:40
A Self-Packaged SISL Dual-Band Power Divider for WLAN Application with Low Loss and Compact Size
Ting Feng, Kaixue Ma, Yongqiang Wang, UESTC, China A

PAGE 440 We1A-4 09:00
A Simple Low Loss Partially-Filled 16-Way Radial Power Combiner
Hendrik J. du Toit, Dirk I.L. de Villiers, Ryno D. Beyers, Stellenbosch University, South Africa A

PAGE 444 We1A-5 09:10
Cavity Balanced-to-Unbalanced Magic-T with Filtering Response
Jing-Yu Lin [1], Sai-Wai Wong [2], Yang Yang [1], Lei Zhu [3]
[1] UTS, Australia A ; *[2] Shenzhen University, China* A ; *[3] University of Macau, China* A

PAGE 448 We1A-6 09:20
Compact Wideband Marchand Balun with Amplitude and Phase Compensation Shield
Xiaohui Liu, Jie Zhou, Zhixian Deng, Xun Luo, UESTC, China A

We1B: Oscillator Analysis, Power Amplifier Design, and MIMO System Characterization

Chair: Anding Zhu, University College Dublin — Co-Chair: Christopher Silva, Aerospace
153AB, 08:00–09:40, Wednesday 5 June 2019

PAGE 452 We1B-1 08:00
Cyclostationary Noise Analysis of Superregenerative Oscillators
Silvia Hernández, Sergio Sancho, Almudena Suárez, Universidad de Cantabria, Spain A

PAGE 456 We1B-2 08:20
Phase-Noise Reduction in Self-Injection Locked Oscillators Using Slow-Wave Structures
Mabel Pontón, Franco Ramírez, Amparo Herrera, Almudena Suárez, Universidad de Cantabria, Spain A

PAGE 460 We1B-3 08:40
On the Efficiency and AM/AM Flatness of Inverse Class-F Power Amplifiers
Tushar Sharma [1], Jeffrey S. Roberts [2], Sagar K. Dhar [3], Shishir Shukla [2], Ramzi Darraji [3], Damon G. Holmes [2], Fadhel M. Ghannouchi [3]
[1] Princeton University, USA A ; *[2] NXP Semiconductors, USA* A ; *[3] University of Calgary, Canada* A

PAGE 464 We1B-4 09:00
Single-DC-Input Multi-Level Envelope Tracking of a High-Efficiency X-Band Power Amplifier
Tommaso Cappello [1], Shane Verploegh [1], Corrado Florian [2], Zoya Popović [1]
[1] University of Colorado Boulder, USA A ; *[2] Università di Bologna, Italy* A

PAGE 468 We1B-5 09:20
Intra-Array Coupling Estimation for MIMO Transceivers Utilizing Blind Over-The-Air Measurements
Sara Hesami [1], Sina Rezaei Aghdam [2], Christian Fager [2], Thomas Eriksson [2], Ronan Farrell [1], John Dooley [1]
[1] Maynooth University, Ireland A ; *[2] Chalmers University of Technology, Sweden* A

We1C: Enabling Technologies for mm-Wave 5G Communication

Chair: Farshid Aryanfar, Peregrine Semiconductor — Co-Chair: Jon Comeau, Anokiwave
156AB, 08:00–09:40, Wednesday 5 June 2019

PAGE 472 We1C-1 08:00
Single-Input Single-Output Digital Predistortion of Multi-User RF Beamforming Arrays
Eric Ng, Ahmed Ben Ayed, Patrick Mitran, Slim Boumaiza, University of Waterloo, Canada A

PAGE 476 We1C-2 08:20
5G mm-Wave Link Range Estimation Based on Over-The-Air Measured System EVM Performance
Marko E. Leinonen, Nuutti Tervo, Markku Jokinen, Olli Kursu, Aarno Pärssinen, University of Oulu, Finland A

PAGE 480 We1C-3 08:40
A 37–42GHz 8×8 Phased-Array for 5G Communication Systems with 48–50dBm EIRP
Yusheng Yin [1], Samet Zihir [2], Tumay Kanar [2], Gabriel M. Rebeiz [1]
[1]University of California, San Diego, USA A ; *[2]IDT, USA* A

PAGE 484 We1C-4 09:00
2×64 Dual-Polarized Dual-Beam Single-Aperture 28GHz Phased Array with High Cross-Polarization Rejection for 5G Polarization MIMO
Ahmed Nafe, Mustafa Sayginer, Kerim Kibaroglu, Gabriel M. Rebeiz, University of California, San Diego, USA A

PAGE 488 We1C-5 09:20
Multi-Gbps Tri-Band 28/38/60-GHz CMOS Transmitter for Millimeter-Wave Radio System-on-Chip
David del Rio [1], Daekeun Yoon [2], Fan-Ta Chen [2], Yan Zhang [3], Chia-Jen Liang [2], Ching-Wen Chiang [2], Mau-Chung Frank Chang [2], Yen-Cheng Kuan [2]
[1]Ceit-IK4, Spain A ; *[2]National Chiao Tung University, Taiwan* A ; *[3]University of California, Los Angeles, USA* A

We1D: mm-Wave and THz Systems for Sensing and Communications

Chair: Adrian Tang, University of California, Los Angeles — Co-Chair: Joachim Oberhammer, KTH
157BC, 08:00–09:40, Wednesday 5 June 2019

PAGE 492 We1D-1 08:00
A Low-Power FSK/Spatial Modulation Receiver for Short-Range mm-Wave Wireless Links
Kai Zhan [1], Yao Liu [1], Telesphor Kamgaing [2], Rahul Khanna [2], Georgios Dogiamis [2], Huaping Liu [1], Arun Natarajan [1]
[1]Oregon State University, USA A ; *[2]Intel, USA* A

PAGE 496 We1D-2 08:20
207–257GHz Integrated Sensing Readout System with Transducer in a 130-nm SiGe BiCMOS Technology
D. Wang [1], J. Yun [2], M.H. Eissa [2], M. Kucharski [2], K. Schmalz [2], A. Malignaggi [2], Y. Wang [2], J. Borngräber [2], Y. Liang [2], H.J. Ng [2], Q.H. Le [1], D.K. Huynh [1], T. Kämpfe [1], K. Seidel [1], Dietmar Kissinger [3]
[1]Fraunhofer IPMS, Germany A ; *[2]IHP, Germany* A ; *[3]Universität Ulm, Germany* A

PAGE 500 We1D-3 08:40
A Broadband Dual-Polarized Terahertz Direct Detector in a 0.13-μm SiGe HBT Technology
Marcel Andree [1], Janusz Grzyb [1], Ritesh Jain [1], Bernd Heinemann [2], Ullrich R. Pfeiffer [1]
[1]Bergische Universität Wuppertal, Germany A ; *[2]IHP, Germany* A

PAGE 504 We1D-4 09:00
A 6-mW-DC-Power 300-GHz CMOS Receiver for Near-Field Wireless Communications
Sangyeop Lee [1], Ruibing Dong [1], Shinsuke Hara [2], Kyoya Takano [1], Shuhei Amakawa [1], Takeshi Yoshida [1], Minoru Fujishima [1]
[1]Hiroshima University, Japan A ; *[2]NICT, Japan* A

PAGE 508 We1D-5 09:20
A 220GHz Dual Channel LNA Front-End for a Direct Detection Polarimetric Receiver
Caitlyn M. Cooke [1], Kevin Leong [1], Alfonso Escorcia [1], Xiao Bing Mei [1], Taylor W. Barton [2], Manuel A. Vega [3], Dong L. Wu [3], William R. Deal [1]
[1]Northrop Grumman, USA A ; *[2]University of Colorado Boulder, USA* A ; *[3]NASA Goddard Space Flight Center, USA* A

We1F: Microwave Acoustic Components and Applications

Chair: Amelie Hagelauer, FAU Erlangen-Nürnberg — Co-Chair: Steven Stitzer, Northrop Grumman
254AB, 08:00–09:40, Wednesday 5 June 2019

PAGE 512 We1F-1 08:00
Laterally Excited Bulk Wave Resonators (XBARs) Based on Thin Lithium Niobate Platelet for 5GHz and 13GHz Filters
Victor Plessky[1], Soumya Yandrapalli[1], Patrick J. Turner[2], Luis G. Villanueva[3], Julius Koskela[1], Muhammad Faizan[3], Annalisa De Pastina[3], Bryant Garcia[2], Jim Costa[2], Robert B. Hammond[2]
[1]GVR Trade, Switzerland [A] ; [2]Resonant, USA [A] ; [3]EPFL, Switzerland [A]

PAGE 516 We1F-2 08:20
A Super-High-Frequency Non-Released Silicon Fin Bulk Acoustic Resonator
Mehrdad Ramezani[1], Mayur Ghatge[1], Valeriy Felmetsger[2], Roozbeh Tabrizian[1]
[1]University of Florida, USA [A] ; [2]OEM Group, USA [A]

PAGE 520 We1F-3 08:40
Demonstration of a Sequentially Switched Delay Line (SSDL) Circulator with SAW Filter Delay Elements
Charles F. Campbell, Qorvo, USA [A]

PAGE 524 We1F-4 09:00
Ultra-High Isolation Nonreciprocal Acoustic Filters
Cristian Cassella, Michele Pirro, Giuseppe Michetti, Matteo Rinaldi, Northeastern University, USA [A]

PAGE 528 We1F-5 09:20
Switched Mode Thin Film Bulk Acoustic Wave Resonators
Milad Zolfagharloo Koohi, Amir Mortazawi, University of Michigan, USA [A]

We1G: Recent Advances in Radar Systems Applications

Chair: Martin Vossiek, FAU Erlangen-Nürnberg — Co-Chair: Arne Jacob, Handong University
257AB, 08:00–09:40, Wednesday 5 June 2019

PAGE 532 We1G-1 08:00
Si-Based 94-GHz Phased Array Transmit and Receive Modules for Real-Time 3D Radar Imaging
Jean-Olivier Plouchart, Xiaoxiong Gu, Wooram Lee, Asaf Tzadok, Duixian Liu, Huijian Liu, Mark Yeck, Christian Baks, Alberto Valdes-Garcia, IBM T.J. Watson Research Center, USA [A]

PAGE 536 We1G-2 08:20
2D mm-Wave Imaging Based on Singular Value Decomposition
B. Mamandipoor[1], U. Madhow[2], A. Arbabian[1]
[1]Stanford University, USA [A] ; [2]University of California, Santa Barbara, USA [A]

PAGE 540 We1G-3 08:30
Millimeter-Wave Cost-Effective Phased-Array Radar with Orthogonally Located Linear Tx and Rx Arrays
Mitsuru Hiraki[1], Yuji Motoda[1], Tomoyuki Tanaka[1], Yoshiyuki Ota[1], Nobuyuki Morikoshi[1], Ryo Yokota[1], Takafumi Kuramoto[1], Shinichi Uchida[1], Tomonori Yanagita[1], Takahiro Nakamura[2], Guanghao Sun[3], Tetsuo Kirimoto[3], Satoshi Suzuki[4]
[1]Renesas Electronics, Japan [A] ; [2]Hitachi, Japan [A] ; [3]University of Electro-Communications, Japan [A] ; [4]Kansai University, Japan [A]

PAGE 544 We1G-4 08:40
In-situ Time-Frequency Analysis of the 77GHz Bands Using a Commercial Chirp-Sequence Automotive FMCW Radar Sensor
Markus Gardill[1], Johannes Schwendner[1], Jonas Fuchs[2]
[1]InnoSenT, Germany [A] ; [2]FAU Erlangen-Nürnberg, Germany [A]

PAGE 548 We1G-5 09:00
Vector Velocity and Position Measurement Using a 77-GHz Cooperative Radar System
Stefan Edstaller[1], Dominikus Mueller[2]
[1]FAU Erlangen-Nürnberg, Germany [A] ; [2]Siemens Mobility, Germany [A]

PAGE 552 We1G-6 09:20
An Unambiguous Phase-Based Algorithm for Single-Digit Micron Accuracy Distance Measurements Using FMCW Radar
Lukas Piotrowsky[1], Timo Jaeschke[2], Simon Küppers[2], Nils Pohl[1]
[1]Ruhr-Universität Bochum, Germany [A] ; [2]2π-Labs, Germany [A]

We1H: Advanced GaN Power Amplifiers

Chair: Jonmei Yan, MaXentric Technologies — Co-Chair: Wenhua Chen, Tsinghua University

259AB, 08:00–09:40, Wednesday 5 June 2019

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70% Efficient Dual-Input Doherty-Outphasing Power Amplifier for Large PAPR Signals

Atsushi Yamaoka, Thomas M. Hone, Keiichi Yamaguchi, Toshiba, Japan A

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08:20

A Fully Integrated C-Band GaN MMIC Doherty Power Amplifier with High Gain and High Efficiency for 5G Application

Guansheng Lv, Wenhua Chen, Long Chen, Zhenghe Feng, Tsinghua University, China A

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Design, Analysis and Evaluation of a Broadband High-Power Amplifier for Ka-Band Frequencies

Philipp Neininger [1], Laurenz John [1], Peter Brückner [1], Christian Friesicke [1], Rüdiger Quay [1], Thomas Zwick [2]

[1]Fraunhofer IAF, Germany A *; [2]KIT, Germany* A

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09:00

High-Efficiency, Ka-Band GaN Power Amplifiers

Nicholas Estella, Edmar Camargo, James Schellenberg, Lani Bui, QuinStar Technology, USA A

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A Highly Efficient and Compact 6kW GaN Solid-State Microwave Generator for CW 2.45GHz Applications

Haesoo Jeong, Taesan Yoon, Hojoon Yoo, Hyeonsuk Jung, Samuel Cho, RFHIC, Korea A

We2A: Advances in Passive Components

Chair: Holger Maune, Technische Universität Darmstadt — Co-Chair: Hualiang Zhang, UMass Lowell
151AB, 10:10–11:50, Wednesday 5 June 2019

PAGE 576 We2A-1 10:10
New Embodiments of Static Field Micro-Particle Components for Reconfigurable RF Applications
Nasim Soufizadeh-Balaneji, David A. Rogers, Benjamin D. Braaten, North Dakota State University, USA A

PAGE 580 We2A-2 10:30
A 90° Self-Compensating Slab Air-Filled Substrate Integrated Waveguide Phase Shifter
Nhu-Huan Nguyen [1], Anthony Ghiotto [2], Tifenn Martin [2], Anne Vilcot [1], Ke Wu [3], Tan-Phu Vuong [1]
[1]IMEP-LAHC (UMR 5130), France A *; [2]IMS (UMR 5218), France* A *; [3]Polytechnique Montréal, Canada* A

PAGE 584 We2A-3 10:50
Contra-Directional 3dB 90° Hybrid Coupler in Ridge Waveguides Using Even and Odd TE Modes
Mohamed M. Fahmi [1], Jorge A. Ruiz-Cruz [2], Raafat R. Mansour [3]
[1]DRDC, Canada A *; [2]Universidad Autónoma de Madrid, Spain* A *; [3]University of Waterloo, Canada* A

PAGE 587 We2A-4 11:10
A Wideband Quasi-Circulator with Low NF and High P_{1dB} Using Noise-Canceling Technique
Wen Chen, Yiyang Shu, Zhixian Deng, Huizhen Jenny Qian, Xun Luo, UESTC, China A

We2B: Nonlinear Modeling Methods for Novel Microwave Components

Chair: Shahed Reza, Sandia National Laboratories — Co-Chair: Matthias Rudolph, Brandenburgische Technische Universität
153AB, 10:10–11:50, Wednesday 5 June 2019

PAGE 591 We2B-1 10:10
Coupling Electromagnetic Waves to Spin Waves: A Compact Model for Frequency Selective Limiters
Han Cui, Zhi Yao, Yuanxun Ethan Wang, University of California, Los Angeles, USA A

PAGE 595 We2B-2 10:30
A Phenomenological Model of Non-Linear Loss in Ferrimagnetic Frequency-Selective Limiters
Anatoliy Boryssenko [1], Scott Gillette [2], Marina Koledintseva [2]
[1]A&E Partnership, USA A *; [2]Metamagnetics, USA* A

PAGE 599 We2B-3 10:50
High-Q Anti-Series AlGaN/GaN High Electron-Mobility Varactor
Raul Amirpour, Dirk Schwantuschke, Peter Brückner, Rüdiger Quay, Oliver Ambacher, Fraunhofer IAF, Germany A

PAGE 603 We2B-4 11:10
Consistent Modelling of I-V and C-V Behaviour of GaN HEMTs in Presence of Trapping
Jason Hodges [1], Dirk Schwantuschke [2], Friedbert van Raay [2], Peter Brückner [2], Rüdiger Quay [2], Sourabh Khandelwal [1]
[1]Macquarie University, Australia A *; [2]Fraunhofer IAF, Germany* A

PAGE 607 We2B-5 11:20
A Multi-Box Behavioural Mixer Model and its Validation Using Measurements
Ali Ozgun, Tayfun Nesimoglu, Simsek Demir, METU, Turkey A

We2C: 5G Technologies and Evaluation Techniques

Chair: Vittorio Camarchia, Politecnico di Torino — Co-Chair: Debabani Choudhury, Intel
156AB, 10:10–11:50, Wednesday 5 June 2019

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We2C-1
10:10

A 28GHz MMIC Doherty Power Amplifier in GaN on Si Technology for 5G Applications
Rocco Giofrè, Alessandro Del Gaudio, Ernesto Limiti, Università di Roma "Tor Vergata", Italy A

PAGE 614
We2C-2
10:30

A Spectral Shaper Based Two-Tap RF Self-Interference Canceller for Full-Duplex Radios
Ramasamy Palaniappan, Venkataramanan Gurumurthy, Sankaran Aniruddhan, IIT Madras, India A

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We2C-3
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A Simultaneous Transmit-Receive Quadrature Balanced RF Front-End with Wideband Digital Self Interference Cancellation
Nimrod Ginzberg [1], Dror Regev [2], Genadiy Tsodik [2], Shimi Shilo [2], Doron Ezri [2], Emanuel Cohen [1]
[1] Technion, Israel A *; [2] Toga Networks, Israel* A

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We2C-4
11:10

Large-Signal Network Analysis for Over-The-Air Test of Up-Converting and Down-Converting Phased Arrays
Alec J. Weiss [1], Dylan F. Williams [1], Jeanne Quimby [1], Rod Leonhardt [1], Thomas Choi [2], Zihang Cheng [2], Kate A. Remley [1], Andreas Molisch [2], Benjamin F. Jamroz [1], Jacob D. Rezac [1], Peter Vouras [1], Charlie Zhang [3]
[1] NIST, USA A *; [2] University of Southern California, USA* A *; [3] Samsung, USA* A

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We2C-5
11:20

1.4-GHz Bandwidth Frequency-Dependent I/Q Imbalance Calibration for 5G mmWave Communications
Yuuichi Aoki, Manh Tuan Dao, Kihong Min, Yongan Hwang, Yonghoon Kim, Sung-Gi Yang, Samsung, Korea A

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We2C-6
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A 28/60GHz Dual-Band Power Amplifier
Asad Ali Nawaz, John D. Albrecht, Ahmet Cagri Ulusoy, Michigan State University, USA A

We2D: mm-Wave Building Blocks and Transceivers

Chair: William Deal, Northrop Grumman — Co-Chair: Theodore Reck, Virginia Diodes
157BC, 10:10–11:50, Wednesday 5 June 2019

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A W-Band Switching Rectifier with 27% Efficiency for Wireless Power Transfer in 65-nm CMOS
Pingyang He, Dixian Zhao, Southeast University, China A

PAGE 638 We2D-2 10:30
A WR-3 Band Distributed Frequency Doubler with a Differential Quasi-Cascode Structure
Iljin Lee, Younghwan Kim, Sanggeun Jeon, Korea University, Korea A

PAGE 642 We2D-3 10:50
A 90–98GHz 2×2 Phased-Array Transmitter with High Resolution Phase Control and Digital Gain Compensation
Bingzheng Yang, Huizhen Jenny Qian, Jie Zhou, Yiyang Shu, Xun Luo, UESTC, China A

PAGE 646 We2D-4 11:10
A Highly Linear FMCW Radar Chipset in H-Band with 50GHz Bandwidth
Christopher M. Grötsch [1], Benjamin Schoch [1], Sandrine Wagner [2], Ingmar Kallfass [1]
[1] Universität Stuttgart, Germany A *; [2] Fraunhofer IAF, Germany* A

PAGE 650 We2D-5 11:30
Highly-Integrated Low-Power 60GHz Multichannel Transceiver for Radar Applications in 28nm CMOS
V. Issakov [1], R. Ciocoveanu [1], R. Weigel [2], A. Geiselbrechtinger [1], J. Rimmelspacher [1]
[1] Infineon Technologies, Germany A *; [2] FAU Erlangen-Nürnberg, Germany* A

PAGE 654 We2D-6 11:40
A W-Band Transmitter Channel with 16dBm Output Power and a Receiver Channel with 58.6mW DC Power Consumption Using Heterogeneously Integrated InP HBT and Si CMOS Technologies
Ahmed S.H. Ahmed [1], Arda Simsek [1], Ali A. Farid [1], Andrew D. Carter [2], Miguel Urteaga [2], Mark J.W. Rodwell [1]
[1] University of California, Santa Barbara, USA A *; [2] Teledyne Scientific & Imaging, USA* A

We2F: Phase Change, Ferroelectric and Ferrite Control Devices

Chair: Thomas Lingel, Anaren — Co-Chair: Amir Mortazawi, University of Michigan
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Monolithic PCM Based Miniaturized T-Type RF Switch for Millimeter Wave Redundancy Switch Matrix Applications
Tejinder Singh, Raafat R. Mansour, University of Waterloo, Canada A

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Intrinsically Switchable Miniature Ferroelectric Stacked Crystal Filters
Milad Zolfagharloo Koohi, Suhyun Nam, Amir Mortazawi, University of Michigan, USA A

PAGE 665 We2F-3 10:50
Injection Locked Oscillator Theory for Frequency Selective Limiters
Steven N. Stitzer, Northrop Grumman, USA A

PAGE 669 We2F-4 11:10
Increased Power Handling of Vanadium Dioxide T/R Switches Using a Resonant Topology
N.J. Estes, Jonathan D. Chisum, University of Notre Dame, USA A

We2G: Advances in Broadband Transceiver Chips for Radar and Communication Systems

Chair: Rudy Emrick, Northrop Grumman — Co-Chair: Mohamed Abouzahra, MIT Lincoln Laboratory

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30Gb/s 60.2mW 151GHz CMOS Transmitter/Receiver with Digitally Pre-Distorted Current Mode PAM-4 Modulator for Plastic Waveguide and Contactless Communications

Yanghyo Kim [1], Boyu Hu [2], Yuan Du [2], Rulin Huang [2], Richard Al Hadi [2], Adrian Tang [2], Huan-Neng Chen [3], Chewnpu Jou [3], Tatsuo Itoh [2], Mau-Chung Frank Chang [2]

[1] U.S. Naval Research Laboratory, USA A ; [2] University of California, Los Angeles, USA A ; [3] TSMC, Taiwan A

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A W-Band FMCW Radar System-on-Chip Employing Synchronized Switching Digitally Controlled Artificial Dielectric for Chirp

Adrian Tang [1], Yanghyo Kim [1], Yan Zhang [2], Rulin Huang [2], Mau-Chung Frank Chang [2]

[1] Jet Propulsion Laboratory, USA A ; [2] University of California, Los Angeles, USA A

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An S-Band CMOS Mixer-First Single-RF-Port Duplexing FMCW Radar

Hao-Chung Chou [1], Chun-Chieh Peng [1], Yu-Jiu Wang [2], Ta-Shun Chu [1]

[1] National Tsing Hua University, Taiwan A ; [2] Tron Future Tech, Taiwan A

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A Master/Slave 55.5–64.8GHz 4×4 FMCW Radar Transceiver in 130nm SiGe BiCMOS for Massive MIMO Applications

Efe Öztürk [1], Uroschanit Yodprasit [1], Dietmar Kissinger [2], Wolfgang Winkler [1], Wojciech Debski [1]

[1] Silicon Radar, Germany A ; [2] Universität Ulm, Germany A

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A 205GHz Serial Direct-Sequence Spread Spectrum (DS/SS) Radar System-on-Chip in 28nm CMOS

Adrian Tang [1], Yanghyo Kim [1], Gabriel Virbila [2], Mau-Chung Frank Chang [2]

[1] Jet Propulsion Laboratory, USA A ; [2] University of California, Los Angeles, USA A

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A 79-GHz Scalable FMCW MIMO Automotive Radar Transceiver Architecture with Injection-Locked Synchronization

Ahmad Mushtaq [1], Wolfgang Winkler [1], Dietmar Kissinger [2]

[1] Silicon Radar, Germany A ; [2] Universität Ulm, Germany A

We2H: Wideband GaN Power Amplifiers

Chair: Charles Campbell, Qorvo — Co-Chair: Rüdiger Quay, Fraunhofer IAF
259AB, 10:10–11:50, Wednesday 5 June 2019

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A 2–20GHz Distributed GaN Power Amplifier Using a Novel Biasing Technique
Michael Roberg, Scott Schafer, Orlando Marrufo, Terry Hon, Qorvo, USA A

PAGE 698 We2H-2 10:30
High-Efficiency Broadband PA Design Based on Continuous Class-F Mode with Compression
Syed M.H. Syed Anera [1], Thoalfukar Husseini [1], Sattam Alsahali [1], James J. Bell [1], Roberto Quaglia [1], Munawar Kermalli [2], Paul J. Tasker [1], Johannes Benedikt [1]
[1] Cardiff University, UK A *; [2] Futurewei Technologies, USA* A

PAGE 702 We2H-3 10:50
A 10–3100MHz Nested-Mode Highly Efficient Power Amplifier for Multi-Octave Applications
Xiaofan Chen [1], Wenhua Chen [1], Zhenghe Feng [1], Fadhel M. Ghannouchi [2]
[1] Tsinghua University, China A *; [2] University of Calgary, Canada* A

PAGE 706 We2H-4 11:10
A Novel 1.4–4.8GHz Ultra-Wideband, Over 45% High Efficiency Digitally Assisted Frequency-Periodic Load Modulated Amplifier
Yuji Komatsuzaki [1], Rui Ma [2], Mouhacine Benosman [2], Yukimasa Nagai [2], Shuichi Sakata [1], Keigo Nakatani [1], Shintaro Shinjo [1]
[1] Mitsubishi Electric, Japan A *; [2] MERL, USA* A

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A 2 to 18GHz Compact High-Gain and High-Power GaN Amplifier
Haifeng Wu [1], Qian Lin [2], Lin Zhu [2], Shanji Chen [2], Yijun Chen [1], Liulin Hu [1]
[1] Chengdu Ganide Technology, China A *; [2] Qinghai University for Nationalities, China* A

We3A: Substrate-Integrated Waveguide Bandpass Filters

Chair: Dimitra Psychogiou, University of Colorado Boulder — Co-Chair: Masud Hannan, Intel
151AB, 15:55–17:15, Wednesday 5 June 2019

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Dual-Band Bandpass Filter Design with Novel Double-Layer Mixed Coupled SIR/CPW-SIR Resonators
Shanshan Xu [1], Fanyi Meng [2], Kaixue Ma [2], Kiat Seng Yeo [3]
[1] UESTC, China A *; [2] Tianjin University, China* A *; [3] SUTD, Singapore* A

PAGE 718 We3A-2 16:15
Compact Quasi-Elliptic and Highly Selective AFSIW Filter with Multilayer Cross-Coupling
Tifenn Martin [1], Anthony Ghiotto [1], Tan-Phu Vuong [2], Ke Wu [3], Frédéric Lotz [4]
[1] IMS (UMR 5218), France A *; [2] IMEP-LAHC (UMR 5130), France* A *; [3] Polytechnique Montréal, Canada* A *; [4] Cobham Microwave, France* A

PAGE 722 We3A-3 16:35
Mixed-Mode Substrate Integrated Waveguide Bandpass Filter with Controllable Transmission Zeros
Wentao Lin, Tae-Hak Lee, Ke Wu, Polytechnique Montréal, Canada A

PAGE 726 We3A-4 16:55
Highly Configurable Cylindrical-Resonator-Based Bandpass Filter Built of Silica-Based Post-Wall Waveguide and its Application to Compact E-Band Hybrid-Coupled Diplexer
Yusuke Uemichi [1], Osamu Nukaga [1], Xu Han [1], Shuhei Amakawa [2], Ning Guan [1]
[1] Fujikura, Japan A *; [2] Hiroshima University, Japan* A

We3B: Multi-GHz CMOS Mixed-Signal Circuits and Systems

Chair: Christian Carlowitz, FAU Erlangen-Nürnberg — Co-Chair: Markus Gardill, InnoSenT
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A 64-Gb/s 4.2-Vpp Modulator Driver Using Stacked-FET Distributed Amplifier Topology in 65-nm CMOS
Tai-Jun Chen [1], Huan-Min Su [1], Tai-Hsing Lee [2], Shawn S.H. Hsu [1]
[1] National Tsing Hua University, Taiwan (A); [2] ITRI, Taiwan (A)

PAGE 734 We3B-2 16:15
A 1-Bit Digital Transmitter System Using a 20-Gbps Quadruple-Cascode Class-D Digital Power Amplifier with 45nm SOI CMOS
Shinichi Hori, Keiichi Motoi, Tatsuya Soma, Hidemi Noguchi, Soubhik Deb, Masaaki Tanio, Noriaki Tawa, Tomoya Kaneko, Kazuaki Kunihiro, NEC, Japan (A)

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An Inductorless, 0.5mA/15fJ, Small Footprint, SiGe BiCMOS Quasi-Current-Mode Logic Family for Highly Parallelized, 40GHz Clock SAR ADCs
P. Hermansen [1], E. Socher [1], D. Case [2], A. Cathelin [3], P. Chevalier [3], T. Nguyen [2], S.P. Voinigescu [1]
[1] University of Toronto, Canada (A); [2] Finisar, USA (A); [3] STMicroelectronics, France (A)

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Dual-Equalization-Path Energy-Area-Efficient Near Field Inductive Coupling for Contactless 3D IC
Srinivasan Gopal, Mohammad Chahardori, Md. Aminul Hoque, Sheikh Nijam Ali, Mohammad Ali Mokri, Deukhyoun Heo, Washington State University, USA (A)

We3C: High-Capacity Wireless Communication Systems

Chair: Kenneth Kolodziej, MIT Lincoln Laboratory — Co-Chair: Zaher Bardi, Retired
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Demonstration of a 40Gbps Bi-Directional Air-to-Ground Millimeter Wave Communication Link
Qi Tang [1], Abhishek Tiwari [1], Inigo del Portillo [1], Michael Reed [1], Hongyu Zhou [1], Dudi Shmueli [1], Gunnar Ristroph [2], Steven Cashion [1], Dawei Zhang [1], Joseph Stewart [1], Pratheep Bondalapati [1], Qi Qu [1], Yan Yan [1], Bob Proctor [1], Hamid Hemmati [1]
[1] Facebook, USA (A); [2] IJK Controls, USA (A)

PAGE 750 We3C-2 16:15
16,384-QAM Microwave Link with 53% Linearized-Transmitter Efficiency, 2.5 Watt Peak Power, and On-Air EVM Below 1%
Earl McCune, Eridan Communications, USA (A)

PAGE 754 We3C-3 16:35
Evaluation of Distributed MIMO Communication Using a Low-Complexity Sigma-Delta-over-Fiber Testbed
Ibrahim Can Sezgin, Thomas Eriksson, Johan Gustavsson, Christian Fager, Chalmers University of Technology, Sweden (A)

PAGE 758 We3C-4 16:55
A Low-Cost Electronic Scanning Antenna with Two-Wave Mixing
Rui Zhu [1], Qiang Xu [1], Gengye Liu [1], Qi Duan [1], Yuexing Li [1], Yuanxun Ethan Wang [2]
[1] Axend, USA (A); [2] University of California, Los Angeles, USA (A)

We3D : Microwave-through-THz Photonics Devices and Systems

Chair: Jeffrey Nanzer, Michigan State University — Co-Chair: Mona Jarrahi, University of California, Los Angeles
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300-GHz-Band Wireless Communication Using Fermi-Level Managed Barrier Diode Receiver
Tadao Nagatsuma [1], Masato Sonoda [1], Taiki Higashimoto [1], Ryo Kimura [1], Li Yi [1], Hiroshi Ito [2]
[1]Osaka University, Japan A ; [2]Kitasato University, Japan A

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Broadband Photoconductive Terahertz Detection with a 100dB Dynamic Range without Using a Short-Carrier-Lifetime Substrate
Nezih Tolga Yardimci, Deniz Turan, Semih Cakmakyapan, Mona Jarrahi, University of California, Los Angeles, USA A

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High-Power Terahertz Generation from Bias-Free, Telecommunication-Compatible Photoconductive Nanoantennas
Deniz Turan, Nezih Tolga Yardimci, Mona Jarrahi, University of California, Los Angeles, USA A

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A 1 to 20GHz Silicon-Germanium Low-Noise Distributed Driver for RF Silicon Photonic Mach-Zehnder Modulators
Navid Hosseinzadeh, Aditya Jain, Kang Ning, Roger Helkey, James F. Buckwalter, University of California, Santa Barbara, USA A

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Broadband Simultaneous Transmit and Receive from a Single Antenna Using Improved Photonic Architecture
Edward I. Ackerman [1], Charles H. Cox III [1], Harold V. Roussell [1], Preetpaul S. Devgan [2]
[1]Photonic Systems, USA A ; [2]Air Force Research Laboratory, USA A

We3F : Advanced MEMS Component Technologies, Characterization Techniques and Packaging

Chair: Songbin Gong, University of Illinois at Urbana-Champaign — Co-Chair: Matthew Morton, Raytheon
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Highly Integrated RF-MEMS Multi-Frequency Oscillator on a Silicon-Ceramic Composite Substrate
J. Stegner, M. Fischer, S. Gropp, U. Stehr, J. Müller, M. Hoffmann, M.A. Hein, Technische Universität Ilmenau, Germany A

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Single Crystalline ScAlN Surface Acoustic Wave Resonators with Large Figure of Merit ($Q \times k_t^2$)
Zhijian Hao [1], Mingyo Park [1], Dea Gyu Kim [1], Andrew Clark [2], Rytis Dargis [2], Haoshen Zhu [3], Azadeh Ansari [1]
[1]Georgia Tech, USA A ; [2]IQE, USA A ; [3]SCUT, China A

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Monolithically Integrated Reconfigurable RF MEMS Based Impedance Tuner on SOI Substrate
Tejinder Singh, Navjot K. Khaira, Raafat R. Mansour, University of Waterloo, Canada A

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Linearity and RF Power Handling of Capacitive RF MEMS Switches
David Molinero, Samira Aghaei, Art Morris, Shawn Cunningham, Wispry, USA A

We3G: Recent Advances in Non-Destructive Microwave Near-Field Sensing

Chair: Xun Gong, University of Central Florida — Co-Chair: Venkata Chivukula, Qualcomm
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A Silicon Based 4.5-GHz Near-Field Capacitive Sensing Imaging Array
J. Zhou [1], Richard Al Hadi [1], W. Qiao [1], Yan Zhao [1], C. Chen [1], Mehmet Kaynak [2], Xuanhong Cheng [3], James C.M. Hwang [3], Mau-Chung Frank Chang [1]
[1]University of California, Los Angeles, USA A ; [2]IHP, Germany A ; [3]Lehigh University, USA A

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A CMOS Time Domain Microwave Broadband Dielectric Spectroscopy System with a Contact-Less Sensor for Liquid Chemical Detection
Elif Kaya, Ali Pourghorban Saghati, Kamran Entesari, Texas A&M University, USA A

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Open Complementary Split-Ring Resonator for Eye Tracking
Chieh-Sen Lee, Bin Bai, Qinrui Song, Dalian University of Technology, China A

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Smart Clamp-Type Microwave Sensor for Accidental Leak Detection from Pipe Joints
Muhammad Akram Karimi, Atif Shamim, KAUST, Saudi Arabia A

WEIF1 : Interactive Forum Session — Wednesday Morning

Chair: Kenneth Kolodziej, MIT Lincoln Laboratory — Co-Chair: Nestor Lopez, MIT Lincoln Laboratory

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Design and Characterization of Meshed Microstrip Transmission Lines
Zachary J. Silva, Christopher R. Valenta, Gregory D. Durgin, Georgia Tech, USA

PAGE 815 WEIF1-2
Vertical RF Transition Using Spring Contact Probes with Passively Switched DGS Compensating for Impedance Matching
Hiroyuki Aoyama, Hidenori Ishibashi, Hidenori Yukawa, Naofumi Yoneda, Mitsubishi Electric, Japan

PAGE 818 WEIF1-3
A 360-Degree Rotatable RF Switch (360-RS) with Embedded Conductive Micro-Particles
Nasim Soufizadeh-Balaneji, Alan R. Kallmeyer, Sylvio May, Benjamin D. Braaten, North Dakota State University, USA

PAGE 822 WEIF1-4
A Complex Load Matched Microstrip Balun
M.H. Maktoomi [1], M. Zhou [2], Han Ren [1], Y. Gu [3], Bayaner Arigong [1]
[1] Washington State University, USA ; [2] Qorvo, USA ; [3] University of Texas at Arlington, USA

PAGE 826 WEIF1-5
A Microstrip Line Reflection-Type Phase Shifter for 60GHz Phased Array
Hanxiang Zhang [1], Han Ren [1], Hong Tang [2], Bowen Zheng [2], Brian Katz [3], Bayaner Arigong [1], Hualiang Zhang [2]
[1] Washington State University, USA ; [2] UMass Lowell, USA ; [3] SV Microwave, USA

PAGE 830 WEIF1-6
Millimeter-Wave SIW Filter Based on the Stepped-Impedance Face-to-Face E-Shaped DGSs
Guangjun Wen, Jian Li, Fuzhen Xie, Huiru Wang, Yongjun Huang, UESTC, China

PAGE 834 WEIF1-7
A Wideband Bandpass Filter with Broad Stopband and Ultra-Wide Reflectionless Range for 5G Applications
Changkun Liu, Zhixian Deng, Xiaohui Liu, Xun Luo, UESTC, China

PAGE 838 WEIF1-8
Phase Correction of Asymmetrical Chebyshev Polynomials for Extracted-Pole Fully Canonical Filters
Ángel Triano, Patricia Silveira, Jordi Verdú, Pedro de Paco, Universitat Autònoma de Barcelona, Spain

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Frequency-Tunable Substrate-Integrated Waveguide Filter Using Contactless Rotatable Flaps
Seunggoo Nam, Boyoung Lee, Juseop Lee, Korea University, Korea

PAGE 846 WEIF1-10
Synthesis of Microwave Filters with Dispersive Coupling Using Isospectral Flow Method
Yan Zhang, Huan Meng, Ke-Li Wu, CUHK, China

PAGE 849 WEIF1-11
A Low-Loss Continuously Tunable Phase Shifter Based on a Bandpass Filter with Reconfigurable Transmission Zeros
R. Lovato, X. Gong, University of Central Florida, USA

PAGE 853 WEIF1-12
On-Chip Millimeter-Wave Bandpass Filter Design Using Multi-Layer Modified-Ground-Ring Structure
Feng Sun [1], Xi Zhu [2], He Zhu [2], Yang Yang [2], Roberto Gómez-García [3]
[1] Jilin University, China ; [2] UTS, Australia ; [3] Universidad de Alcalá, Spain

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Comprehensive Nonlinear Characterization and Modeling of a BAW Duplexer
David Garcia-Pastor, Jordi Mateu, Carlos Collado, Rafael Perea-Robles, Marta Gonzalez-Rodriguez, Jose M. Gonzalez-Arbesú, Universitat Politècnica de Catalunya, Spain

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Non-Reciprocal Mode Converting Substrate Integrated Waveguide with Unsymmetrical Perturbation
Amir Afshani, Ke Wu, Polytechnique Montréal, Canada A

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A Novel Reconfigurable CMOS Compatible Ka Band Bandstop Structure Using Split-Ring Resonators and Vanadium Dioxide (VO_2) Phase Change Switches
Andrei A. Muller, Riyaz Abdul Khadar, Emanuele A. Casu, Anna Krammer, Matteo Cavalleri, Andreas Schuler, Junrui Zhang, Adrian M. Ionescu, EPFL, Switzerland A

PAGE 869 WEIF1-16
Low-Cost Planar RF MEMS-Based Attenuator
Amir Raeesi, Hussam Al-Saedi, Ardeshir Palizban, Aidin Taeb, W.M. Abdel-Wahab, Suren Gigoyan, Safieddin Safavi-Naeini, University of Waterloo, Canada A

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An Ultra Low-Power Neuromorphic Bandpass Filter for Autonomous Cars
Raunak Borwankar [1], Keval Vora [1], Anurag Desai [1], Reinhold Ludwig [1], Mohammad Haider [2], Yehia Massoud [3]
[1] Worcester Polytechnic Institute, USA A *; [2] University of Alabama at Birmingham, USA* A *; [3] Stevens Institute of Technology, USA* A

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A 2.35GHz Cross-Talk Canceller for 2×2 MIMO Full-Duplex Wireless System
Abhishek Kumar, Sankaran Aniruddhan, IIT Madras, India A

PAGE 881 WEIF1-19
Advancing Lithium Niobate Based Thin Film Devices for 5G Front-Ends
Yansong Yang, Ruochen Lu, Ali Kourani, Songbin Gong, University of Illinois at Urbana-Champaign, USA A

PAGE 885 WEIF1-20
A Quasi-Uniform Transversely Slotted SIW Leaky-Wave Structure with Enhanced Beam-Scanning Rate for Millimeter-Wave Applications
Dongze Zheng [1], Yue-Long Lyu [2], Ke Wu [1]
[1] Polytechnique Montréal, Canada A *; [2] Harbin Institute of Technology, China* A

PAGE 889 WEIF1-21
Experimental Verification of the Behavior of a Double Negative Metamaterial Composed of Planar Resonant Elements
Jan Machac, Czech Technical University in Prague, Czech Republic A

PAGE 893 WEIF1-22
A Stable Meshless Method for Electromagnetic Analysis
Xiaoyan Zhang [1], Liwei Li [1], Zhizhang David Chen [2]
[1] East China Jiaotong University, China A *; [2] Dalhousie University, Canada* A

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Direct Optimization of Electrically Large Reflectors and Feed Chains
Peter Meincke, Michael Palvig, Niels Vesterdal, Erik Jørgensen, TICRA, Denmark A

PAGE 901 WEIF1-24
An Eye Diagram Parameters Measurement Method Based on K-Means Clustering Algorithm
Bo Gao, Keyu Wei, Ling Tong, UESTC, China A

PAGE 905 WEIF1-25
Linearization of a 500-W L-Band GaN Doherty Power Amplifier by Dual-Pulse Trap Characterization
Tommaso Cappello [1], Corrado Florian [2], Alberto Santarelli [2], Zoya Popović [1]
[1] University of Colorado Boulder, USA A *; [2] Università di Bologna, Italy* A

PAGE 909 WEIF1-26
Reduced-Cost Gradient-Based Optimization of Compact Microwave Components Through Adaptive Broyden Updates
Slawomir Koziel [1], Anna Pietrenko-Dabrowska [2], John W. Bandler [3]
[1] Reykjavik University, Iceland A *; [2] Gdansk University of Technology, Poland* A *; [3] McMaster University, Canada* A

PAGE 912 WEIF1-27
Accelerated EM-Driven Microwave Optimization by Means of Design Re-Utilization
Slawomir Koziel [1], Adrian Bekasiewicz [2], John W. Bandler [3]
[1] Reykjavik University, Iceland A *; [2] Gdansk University of Technology, Poland* A *; [3] McMaster University, Canada* A

PAGE 915 WEIF1-28
Nonlinearity Modeling of Contact-Type RF MEMS Switch Based on Passive Intermodulation Analysis
Yulong Zhang, Zhuhao Gong, Zewen Liu, Tsinghua University, China A

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Wideband Filtering Out-of-Phase Power Dividers Using Slotline Resonators and Microstrip-to-Slotline Transitions
He Zhu, Jing-Yu Lin, Y. Jay Guo, UTS, Australia A

PAGE 923 WEIF1-30
Distributed Digital Predistortion Architecture for 5G Active Antenna System
Haiying Cao, Hao Gao, Yunji Zheng, Junfeng Jie, Ericsson, China A

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A Continually-Stepped Variable-Gain LNA in 65-nm CMOS Enabled by a Tunable-Transformer for mm-Wave 5G Communications
Sheikh Nijam Ali, Md. Aminul Hoque, Srinivasan Gopal, Mohammad Chahardori, Mohammad Ali Mokri, Deukhyoun Heo, Washington State University, USA A

WEIF2 : Interactive Forum Session — Wednesday Afternoon

Chair: Nestor Lopez, MIT Lincoln Laboratory — Co-Chair: Ekaterina Kononov, MIT Lincoln Laboratory
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X-Band MMIC Balanced Frequency Doubler Based on Graphene Diodes
Ahmed Hamed [1], Mohamed Saeed [1], Zhenxing Wang [2], Mehrdad Shaygan [2], Daniel Neumaier [2], Renato Negra [1]
[1]RWTH Aachen University, Germany ; [2]AMO, Germany

PAGE 934 WEIF2-2
Borrowing from Microwave Holography a Technique for Broad-Band Nano Imaging at Infrared Wavelengths
Andrea Di Donato, Davide Mencarelli, Luca Pierantoni, Antonio Morini, Marco Farina, Università Politecnica delle Marche, Italy

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Nano-Scale Electronics: Rigorous Quantum Study of a Single Molecule Device
Davide Mencarelli, Luca Pierantoni, Università Politecnica delle Marche, Italy

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Estimation of Parameter Variability for High Dimensional Microwave Problems via Partial Least Squares
M. Larbi, H.M. Torun, Madhavan Swaminathan, Georgia Tech, USA

PAGE 944 WEIF2-5
Design of 24GHz High-Linear High-Gain Low-Noise Amplifiers Using Neutralization Techniques
Yaoshun Ding, Soenke Vehring, Georg Boeck, Technische Universität Berlin, Germany

PAGE 948 WEIF2-6
Coupling-Induced Hysteresis in Free-Running Oscillators
Almudena Suárez [1], Robert Melville [2], Franco Ramírez [1]
[1]Universidad de Cantabria, Spain ; [2]Emecon, USA

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Nonlinear Distortion Suppression of Cooperative Jamming System for Secure Wireless Communication
Chenxing Li, Wenbo Guo, Xin Quan, Qiang Xu, Ying Liu, Ying Shen, Hongzhi Zhao, Youxi Tang, UESTC, China

PAGE 956 WEIF2-8
A Josephson Traveling Wave Parametric Amplifier for Quantum Coherent Signal Processing
Michael Haider, Johannes A. Russer, Jesus Abundis Patino, Christian Jirauschek, Peter Russer, Technische Universität München, Germany

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A 40-GHz High Linearity Transmitter in 65-nm CMOS Technology with 32-dBm OIP3
Tai-Yu Kuo, Yen-Ting Lin, Chun-Nien Chen, Huei Wang, National Taiwan University, Taiwan

PAGE 963 WEIF2-10
The Impact of Layout Dependent Intrinsic Parasitic RLC on High Frequency Performance in 3T and 4T Multi-Finger nMOSFETs
Jyh-Chyurn Guo, Jyun-Rong Ou, Jinq-Min Lin, National Chiao Tung University, Taiwan

PAGE 967 WEIF2-11
A Low Phase Noise Differential Oscillator Employing Stub-Loaded Nested Split-Ring Resonator Inspired Balanced Bandpass Filter
Zongqi Cai [1], Xiaohong Tang [1], Zhiyou Li [1], Ting Zhang [1], Yong Liu [1], Yang Yang [2]
[1]UESTC, China ; [2]UTS, Australia

PAGE 971 WEIF2-12
Monolithically Integrated Parametric Mixers with Time-Varying Transmission Lines (TVTL)
Xiating Zou, Qianteng Wu, Yuanxun Ethan Wang, University of California, Los Angeles, USA

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WEIF2 continued …

PAGE 975
WEIF2-13
A Novel VHF Heating System to Aid Selective Laser Melting
Nyle Parker, Sam Hefford, Jonathan Lees, Steve Cripps, Adrian Porch, Cardiff University, UK A

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WEIF2-14
Dual Gate and Drain Supply Modulation of an X-Band PA
Maxwell R. Duffy, Gregor Lasser, Tommaso Cappello, Zoya Popović, University of Colorado Boulder, USA A

PAGE 983
WEIF2-15
Impedance Sensing Integrated Directly into a Power Amplifier Output Matching Network
Devon Donahue, Paolo de Falco, Taylor W. Barton, University of Colorado Boulder, USA A

PAGE 987
WEIF2-16
Beam-Oriented Digital Predistortion for Hybrid Beamforming Array Utilizing Over-The-Air Diversity Feedbacks
Xin Liu, Wenhua Chen, Long Chen, Zhenghe Feng, Tsinghua University, China A

PAGE 991
WEIF2-17
Spatial Power Combiner Using Cavity Modes in W-Band
Jose Velazco, Lorene Samoska, Mark Taylor, Aaron Pereira, Andy Fung, Robert Lin, Alejandro Peralta, Jet Propulsion Laboratory, USA A

PAGE 995
WEIF2-18
Linearization of a Multi-Band Multi-Target Directional Modulation Transmitter Using Low-Complexity Crosstalk-Cancelled Digital Predistortion
Long Chen [1], Wenhua Chen [1], Youjiang Liu [2], Xin Liu [1], Zhenghe Feng [1]
[1] Tsinghua University, China A *; [2] CAEP, China* A

PAGE 999
WEIF2-19
High Gain Fully-Integrated Broadband Differential LNAs in 0.15-μm GaAs pHEMT Process Using R-L-C Feedback Gain Compensation for Radio Astronomical Receiver
Zhi-Yin Jiang [1], Yang Chang [1], Yunshan Wang [1], Chau-Ching Chiong [2], Huei Wang [1]
[1] National Taiwan University, Taiwan A *; [2] Academia Sinica, Taiwan* A

PAGE 1003
WEIF2-20
Low-Noise and Small-Sized Receiver Frontend with Unified Circuit-Antenna Integration
Srinaga Nikhil Nallandhigal, Ke Wu, Polytechnique Montréal, Canada A

PAGE 1007
WEIF2-21
Highly Robust 130nm SiGe BiCMOS Power Limiter, LNA and Mixer IC for a Wideband 1.5–18GHz MIMO Radar Receiver
Mantas Sakalas, Niko Joram, Frank Ellinger, Technische Universität Dresden, Germany A

PAGE 1011
WEIF2-22
Highly Linear 90–170GHz SPDT Switch with High Isolation for Fully Integrated InP Transceivers
Tanjil Shivan [1], Maruf Hossain [1], Ralf Doerner [1], Steffen Schulz [1], Tom K. Johansen [2], Sebastian Boppel [1], Wolfgang Heinrich [1], Viktor Krozer [1]
[1] FBH, Germany A *; [2] Technical University of Denmark, Denmark* A

PAGE 1015
WEIF2-23
A 10-GHz Code-Modulated Interferometric Imager Using Commercial-Off-The-Shelf Phased Arrays
Vikas Chauhan, Simon Schönherr, Zhangjie Hong, Brian Floyd, North Carolina State University, USA A

PAGE 1019
WEIF2-24
Novel Synthesis Technique of Mixed-Topology Extracted-Pole Resonators with Parallel-Connected Structures for Ladder-Type Acoustic Filters
Ángel Triano, Jordi Verdú, Pedro de Paco, Universitat Autònoma de Barcelona, Spain A

Th1A: Planar Multi-Band Filter Synthesis and Design

Chair: Sanghoon Shin, U.S. Naval Research Laboratory — Co-Chair: Laya Mohammadi, Qualcomm
151AB, 08:00–09:40, Thursday 6 June 2019

PAGE 1023 Th1A-1 08:00
High Selectivity In-Line Topology Dual-Band Filters Based on Direct Synthesis Approach
Yuxing He [1], Zhewang Ma [2], Nobuyuki Yoshikawa [1]
[1] Yokohama National University, Japan; [2] Saitama University, Japan

PAGE 1027 Th1A-2 08:20
Multi-Band Differential Bandpass Filters with Quasi-Elliptic-Type Passbands and Multi-Transmission Zero Common-Mode Suppression
Dakotah Simpson, Dimitra Psychogiou, University of Colorado Boulder, USA

PAGE 1031 Th1A-3 08:40
Input-Reflectionless Negative-Group-Delay Bandstop-Filter Networks Based on Lossy Complementary Duplexers
Roberto Gómez-García [1], José-María Muñoz-Ferreras [1], Wenjie Feng [2], Dimitra Psychogiou [3]
[1] Universidad de Alcalá, Spain; [2] NJUST, China; [3] University of Colorado Boulder, USA

PAGE 1035 Th1A-4 09:00
EM-Based Design Approach for Multiband Filters by Reflected Group Delay Method and Cascade Space Mapping
Xiaolin Fan [1], Song Li [1], Paul D. Laforge [1], Qingsha S. Cheng [2]
[1] University of Regina, Canada; [2] SUSTC, China

PAGE 1038 Th1A-5 09:10
Miniaturized Substrate Integrated Waveguide Filters with Stepped-Impedance Slot Resonators for Millimeter-Wave Application
Zhan Wang, Yuandan Dong, UESTC, China

Th1B: Recent Advances in Packaging, Interconnects and Multi-Chip Modules

Chair: Kamal Samanta, Sony — Co-Chair: Telesphor Kamgaing, Intel
153AB, 08:00–09:40, Thursday 6 June 2019

PAGE 1042 Th1B-1 08:00
An Improved High-Power X-Band 4×4 Tile-Type LTCC T/R Module Based on Liquid Cooling Micro-Channels
Zhigang Wang [1], Jinghan Xiao [1], Junyi Huang [1], Hua Yin [1], Yulin Yang [1], Bo Yan [1], Botao Zhao [2]
[1] UESTC, China; [2] CETC 54, China

PAGE 1046 Th1B-2 08:20
Microcoaxial Interconnects for Signals, Bias, and Supply of MMICs
Daniela Torres, Anthony Kopa, Mitch Meinhold, Peter Lewis, Jeff Delisio, Caprice Gray, Draper, USA

PAGE 1050 Th1B-3 08:40
A D-Band Rectangular Waveguide-to-Coplanar Waveguide Transition Using Metal Ridge
Yunfeng Dong, Vitaliy Zhurbenko, Peter Jesper Hanberg, Tom K. Johansen, Technical University of Denmark, Denmark

PAGE 1054 Th1B-4 09:00
Free Space Vertical Interconnects Using Near Field Coupling Antennas in a Fabry-Perot Cavity Environment
Aditya Dave, Rhonda Franklin, University of Minnesota, USA

PAGE 1057 Th1B-5 09:10
A Novel e-Textile Integrated Wideband Monopole Antenna for Body-Worn Energy Harvesting Systems
Yutong Jiang, Ting Leng, Yixian Fang, Lulu Xu, Kewen Pan, Zhirun Hu, University of Manchester, UK

Th1C: Active Phased Arrays Systems

Chair: Julio Navarro, Boeing — Co-Chair: Glenn Hopkins, Georgia Tech
156AB, 08:00–09:40, Thursday 6 June 2019

PAGE 1060 Th1C-1 08:00
Monolithically Fabricated 4096-Element, PolyStrata Broadband D-Band Array Demonstrator
Jared Williams Jordan [1], Seth Lynch [1], Michael Clark [1], Benjamin L. Cannon [1], Luis A. Adames [1], Darel Wrenn [1], Kimberly Jackson [1], Neal Erickson [1], Justin Clough [1], Darryl Brown [1], Jean-Marc Rollin [1], Pierre Lopez [2], Pascal Boutet [2], Maurizio Moretto [2]
[1] Nuvotronics, USA (A); [2] Nokia, France (A)

PAGE 1064 Th1C-2 08:20
A Scalable Circularly-Polarized 256-Element Ka-Band Phased-Array SATCOM Transmitter with ±60° Beam Scanning and 34.5dBW EIRP
Kevin Kai Wei Low [1], Ahmed Nafe [1], Samet Zihir [2], Tumay Kanar [2], Gabriel M. Rebeiz [1]
[1] University of California, San Diego, USA (A); [2] IDT, USA (A)

PAGE 1068 Th1C-3 08:40
A Scalable 60GHz Tx/Rx 2×64-Element Dual-Polarized Dual-Beam Wafer-Scale Phased-Array with Integrated Dual-Transceivers
Umut Kodak [1], Bhaskara Rupakula [1], Samet Zihir [2], Gabriel M. Rebeiz [1]
[1] University of California, San Diego, USA (A); [2] IDT, USA (A)

PAGE 1072 Th1C-4 09:00
A 128-Element 54–63GHz 2-Dimensional Tx/Rx Phased-Array with 64-QAM/30Gbps Communication Links
Bhaskara Rupakula [1], Samet Zihir [2], Gabriel M. Rebeiz [1]
[1] University of California, San Diego, USA (A); [2] IDT, USA (A)

PAGE 1076 Th1C-5 09:20
A Modular Architecture for Wide Scan Angle Phased Array Antenna for K/Ka Mobile SATCOM
W.M. Abdel-Wahab [1], Hussam Al-Saedi [1], E. Haj Mirza Alian [1], M. Raeis-Zadeh [1], A. Ehsandar [1], Ardeshir Palizban [1], N. Ghafarian [1], G. Chen [1], H. Gharaee [2], M.R. Nezhad-Ahmadi [1], Safieddin Safavi-Naeini [1]
[1] University of Waterloo, Canada (A); [2] ICT Research Institute, Iran (A)

Th1D: Innovative Systems and Applications

Chair: Kavita Goverdhanam, U.S. Army CERDEC — Co-Chair: Rui Ma, Mitsubishi Electric
157BC, 08:00–09:40, Thursday 6 June 2019

PAGE 1080 Th1D-1 08:00
Sensitive Spectroscopy Using DSRR Array and Linvill Negative Impedance
Mohammad Abdolrazzaghi, Nazli Kazemi, Mojgan Daneshmand, University of Alberta, Canada (A)

PAGE 1084 Th1D-2 08:20
A Bidirectional 36Gbps Connectorless Connector at 2–4cm Using a 28GHz 2×2 Phased-Array with Position-Offset Compensation
Yusheng Yin, Berktug Ustundag, Kerim Kibaroglu, Mustafa Sayginer, Gabriel M. Rebeiz, University of California, San Diego, USA (A)

PAGE 1088 Th1D-5 08:40
Multi-Functional Composite RF Four-Way Switch
Grzegorz Beziuk [1], Thomas C. Baum [2], Kamran Ghorbani [1], Kelvin J. Nicholson [2]
[1] RMIT University, Australia (A); [2] DST Group, Australia (A)

PAGE 1092 Th1D-6 09:00
Leakage Phase Noise Mitigation for Monostatic FMCW Radar Sensors Using Carrier Transmission
André Dürr, Benedikt Schweizer, Christian Waldschmidt, Universität Ulm, Germany (A)

PAGE 1096 Th1D-7 09:20
A Novel Physical Layer Security Technique Using Master-Slave Full Duplex Communication
Najme Ebrahimi, Behzad Yektakhah, Kamal Sarabandi, Hun Seok Kim, David Wentzloff, David Blaauw, University of Michigan, USA (A)

Th1E: Nanoscale Devices for RF to THz Applications

Chair: Luca Pierantoni, Università Politecnica delle Marche — Co-Chair: Dimitris Pavlidis, Florida International University
252AB, 08:00–09:40, Thursday 6 June 2019

PAGE 1100
Th1E-1
08:00

Magnetic Nanowires for RF Applications: Ferromagnetic Resonance and Permeability Characterization
Yali Zhang, Joseph Um, Wen Zhou, Bethanie Stadler, Rhonda Franklin, University of Minnesota, USA A

PAGE 1104
Th1E-2
08:20

Black Phosphorus MOSFET for Future-Generation Thin-Film Electronics Capable of Microwave Operation
Kuanchen Xiong [1], Cheng Li [2], Lei Li [1], Qiushi Guo [2], Kenji Watanabe [3], Takashi Taniguchi [3], Asher Madjar [1], Fengnian Xia [2], James C.M. Hwang [1]
[1]Lehigh University, USA A *; [2]Yale University, USA* A *; [3]NIMS, Japan* A

PAGE 1107
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On-Wafer Graphene Devices for THz Applications Using a High-Yield Fabrication Process
Panagiotis C. Theofanopoulos, Georgios C. Trichopoulos, Arizona State University, USA A

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Exploiting Graphene Quantum Capacitance in Subharmonic Parametric Downconversion
Mohamed Saeed, Eduard Heidebrecht, Ahmed Hamed, Renato Negra, RWTH Aachen University, Germany A

PAGE 1115
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08:50

Inverted Scanning Microwave Microscopy for Nanometer-Scale Imaging and Characterization of Platinum Diselenide
Gianluca Fabi [1], Xin Jin [2], James C.M. Hwang [2], C.H. Joseph [1], Eleonora Pavoni [1], Lei Li [2], Kuanchen Xiong [2], Yaqing Ning [2], Davide Mencarelli [1], Andrea Di Donato [1], Antonio Morini [1], Yan Zhao [3], Richard Al Hadi [3], Marco Farina [1]
[1]Università Politecnica delle Marche, Italy A *; [2]Lehigh University, USA* A *; [3]Alcatera, USA* A

PAGE 1118
Th1E-6
09:00

Compact BandStop Filter Utilizing Low Cost Solution Cast Nanomagnetic Thin Films
Yuxiao He [1], Eric Drew [2], Z. John Zhang [2], Timothy Hogan [1], John Papapolymerou [1]
[1]Michigan State University, USA A *; [2]Georgia Tech, USA* A

Th1F: Emerging mm-Wave Transistor Technologies for 5G and DoD Applications

Chair: Jeong-sun Moon, HRL Laboratories — Co-Chair: Joe Qiu, U.S. Army Research Office
254AB, 08:00–09:40, Thursday 6 June 2019

PAGE 1122 Th1F-1 08:00
Broadband, Linear, and High-Efficiency mm-Wave PAs in Silicon — Overcoming Device Limitations by Architecture/Circuit Innovations
Hua Wang, Fei Wang, Tso-Wei Li, Huy Thong Nguyen, Sensen Li, Tzu-Yuan Huang, Georgia Tech, USA A

PAGE 1126 Th1F-2 08:20
Recent Developments on SiGe BiCMOS Technologies for mm-Wave and THz Applications
Matthias Wietstruck, Steffen Marschmeyer, Sebastian Schulze, Selin Tolunay Wipf, Christian Wipf, Mehmet Kaynak, IHP, Germany A

PAGE 1130 Th1F-3 08:40
Novel High-Speed Linear GaN Technology with High Efficiency
Jeong-sun Moon, Joel Wong, Bob Grabar, Mike Antcliffe, Peter Chen, Erdem Arkun, Isaac Khalaf, Andrea Corrion, Taylor Post, HRL Laboratories, USA A

PAGE 1133 Th1F-4 09:00
GaN-Based Multi-Channel Transistors with Lateral Gate for Linear and Efficient Millimeter-Wave Power Amplifiers
K. Shinohara [1], C. King [1], E.J. Regan [1], Josh Bergman [1], Andrew D. Carter [1], Andrea Arias [1], Miguel Urteaga [1], Bobby Brar [1], R. Page [2], R. Chaudhuri [2], M. Islam [2], H. Xing [2], D. Jena [2]
[1] Teledyne Scientific & Imaging, USA A *; [2] Cornell University, USA* A

PAGE 1136 Th1F-5 09:20
High Power Density ScAlN-Based Heterostructure FETs for mm-Wave Applications
Thomas E. Kazior [1], Eduardo M. Chumbes [1], Brian Schultz [1], Jay Logan [1], David J. Meyer [2], Matthew T. Hardy [2]
[1] Raytheon, USA A *; [2] U.S. Naval Research Laboratory, USA* A

Th1G: Design and Characterization of Wireless Power Transfer Systems

Chair: Paolo Mezzanotte, Università di Perugia — Co-Chair: Shigeo Kawasaki, JAXA
257AB, 08:00–09:40, Thursday 6 June 2019

PAGE 1140 Th1G-1 08:00
Experimenting Waveforms and Efficiency in RF Power Transfer
Nachiket Ayir, Marcelo Fabián Trujillo Fierro, Taneli Riihonen, Markus Allén, Tampere University, Finland A

PAGE 1144 Th1G-2 08:20
Smart Wireless Sensor System by Microwave Powering for Space-by-Wireless
Daisuke Kobuchi [1], Kentaro Matsuura [1], Yoshiaki Narusue [1], Satoshi Yoshida [2], Kenjiro Nishikawa [2], Shigeo Kawasaki [3]
[1] University of Tokyo, Japan A *; [2] Kagoshima University, Japan* A *; [3] JAXA, Japan* A

PAGE 1148 Th1G-3 08:40
Low-Power Receiver Architecture for 5G and IoT-Oriented Wireless Information and Power Transfer Applications
Intikhab Hussain, Ke Wu, Polytechnique Montréal, Canada A

PAGE 1152 Th1G-4 09:00
Estimation of Required Transmit Power to Realize Zero Maintenance Sensor System with Space Time Beam Forming Algorithm
Gurusanthosh Pabbisetty, Kentaro Murata, Kentaro Taniguchi, Hiroki Mori, Toshiba, Japan A

PAGE 1156 Th1G-5 09:20
Log-Spiral Antenna Integrated with GaAsSb-Base Backward Diodes for Microwave Energy Harvesting
Masaru Sato [1], Kenichi Kawaguchi [1], Tsuyoshi Takahashi [1], Naoya Okamoto [1], Tasuku Kurosawa [2], Xinyu Liu [2], Shinpei Yamashita [2], Michihiko Suhara [2]
[1] Fujitsu, Japan A *; [2] Tokyo Metropolitan University, Japan* A

Th1H: PA Design Techniques and Baseband Terminations

Chair: Gayle Collins, Obsidian Microwave — Co-Chair: John Wood, Wolfspeed
259AB, 08:00–09:40, Thursday 6 June 2019

PAGE 1160 Th1H-1 08:00
Current Mode Outphasing Power Amplifier
Luís C. Nunes, Filipe M. Barradas, Diogo R. Barros, Pedro M. Cabral, José C. Pedro, Universidade de Aveiro, Portugal A

PAGE 1164 Th1H-2 08:20
Comprehensive Analysis of Input Waveform Shaping for Efficiency Enhancement in Class B Power Amplifiers
Sagar K. Dhar [1], Tushar Sharma [2], Ning Zhu [3], Damon G. Holmes [3], Ramzi Darraji [1], Fadhel M. Ghannouchi [1]
[1]University of Calgary, Canada A ; *[2]Princeton University, USA* A ; *[3]NXP Semiconductors, USA* A

PAGE 1168 Th1H-3 08:40
Analysis of the Baseband Termination of High Power RF Transistors
Hussain Ladhani [1], Jeffrey K. Jones [1], J. Stevenson Kenney [2]
[1]NXP Semiconductors, USA A ; *[2]Georgia Tech, USA* A

PAGE 1171 Th1H-4 09:00
Impact of the Input Baseband Impedance on the Instantaneous Bandwidth of Wideband Power Amplifiers
Diogo R. Barros, Luís C. Nunes, Pedro M. Cabral, José C. Pedro, Universidade de Aveiro, Portugal A

PAGE 1175 Th1H-5 09:20
Compact High-Efficiency High-Power Wideband GaN Amplifier Supporting 395MHz Instantaneous Bandwidth
Ning Zhu, Roy McLaren, Jeffrey S. Roberts, Damon G. Holmes, Mir Masood, Jeffrey K. Jones, NXP Semiconductors, USA A

Th2A: Non-Planar Filters 1

Chair: Ming Yu, CUHK — Co-Chair: Vicente Boria, Universitat Politècnica de València
151AB, 10:10–11:50, Thursday 6 June 2019

PAGE 1179 Th2A-1 10:10
A Compact Waveguide Quasi-Elliptic Dual-Band Filter
Li Zhu [1], Raafat R. Mansour [2], Ming Yu [3]
[1]Telesat, Canada A ; *[2]University of Waterloo, Canada* A ; *[3]CUHK, China* A

PAGE 1183 Th2A-2 10:20
Evaluation of High Performance Aluminum for Microwave Filters
P. Martín-Iglesias [1], T. Raadik [1], Fernando Teberio [2], Jon M. Percaz [2], S. Martín-Iglesias [3], L. Pambaguian [1], Iván Arregui [2], Israel Arnedo [2], Txema Lopetegi [2], Miguel A.G. Laso [2]
[1]ESA-ESTEC, The Netherlands A ; *[2]Universidad Pública de Navarra, Spain* A ; *[3]INTA, Spain* A

PAGE 1187 Th2A-3 10:30
The Stubbed Waveguide Cavity
Simone Bastioli, Richard V. Snyder, RS Microwave, USA A

PAGE 1190 Th2A-4 10:50
A Tunable Diplexer Using Filters with Redundant Couplings
Y. Yang [1], Ming Yu [1], Q. Wu [2]
[1]CUHK, China A ; *[2]Xidian University, China* A

PAGE 1194 Th2A-5 11:10
Star-Junction Multiplexer Design Under Minimum Susceptance Networks Approach
Patricia Silveira, Jordi Verdú, Pedro de Paco, Universitat Autònoma de Barcelona, Spain A

PAGE 1198 Th2A-6 11:30
Stepped-Impedance Band-Pass Filters with Improved Selectivity
Luis Miranda [1], Fernando Teberio [1], P. Martín-Iglesias [2], Ibai Calero [1], Iván Arregui [1], Israel Arnedo [1], Jon M. Percaz [1], David Santiago [1], Txema Lopetegi [1], Miguel A.G. Laso [1]
[1]Universidad Pública de Navarra, Spain A ; *[2]ESA-ESTEC, The Netherlands* A

PAGE 1201 Th2A-7 11:40
Miniaturized Quartz Waveguide Filter Using Double-Folded Structure
Kei Matsutani, Hiroshi Kojima, Manabu Nakahori, Katsuhito Kuroda, Kengo Onaka, Masayoshi Koshino, Takanori Toi, Murata Manufacturing, Japan A

Th2B: 3D-Printed RF Components and Interconnects

Chair: Valentina Palazzi, Università di Perugia — Co-Chair: Weijing Su, Google
153AB, 10:10–11:50, Thursday 6 June 2019

PAGE 1205 Th2B-1 10:10
Shaping and Slotting High-Q Spherical Resonators for Suppression of Higher Order Modes
Cheng Guo [1], Jin Li [2], Yang Yu [3], Fan Zhang [3], Sheng Li [3], Moataz M. Attallah [3], Xiaobang Shang [4], Anxue Zhang [1], Yi Wang [3], Michael J. Lancaster [3]
[1]Xi'an Jiaotong University, China ; [2]Shenzhen University, China ; [3]University of Birmingham, UK ; [4]NPL, UK

PAGE 1209 Th2B-2 10:30
A Full X-Band Fully 3-D Printed E-Plane Rectangular-Coax-to-Waveguide Transition
Jin Li [1], Cheng Guo [2], Yang Yu [3], Guan-Long Huang [1], Tao Yuan [1], Yi Wang [3], Jun Xu [4], Anxue Zhang [2]
[1]Shenzhen University, China ; [2]Xi'an Jiaotong University, China ; [3]University of Birmingham, UK ; [4]UESTC, China

PAGE 1213 Th2B-3 10:50
W-Band Finite Ground Coplanar Waveguide (FG-CPW) Using Laser Enhanced Direct-Print Additive Manufacturing (LE-DPAM)
Mohamed M. Abdin [1], W. Joel D. Johnson [2], Jing Wang [1], Thomas M. Weller [3]
[1]University of South Florida, USA ; [2]Harris, USA ; [3]Oregon State University, USA

PAGE 1217 Th2B-4 11:10
Ultra Wideband Transition from Coaxial Line to Two Parallel Lines Manufactured Using Additive Manufacturing Technology
J. Haumant [1], R. Allanic [2], C. Quendo [2], D. Diedhiou [1], A. Manchec [1], C. Person [2], R.-M. Sauvage [3]
[1]Elliptika, France ; [2]Lab-STICC (UMR 6285), France ; [3]DGA, France

PAGE 1221 Th2B-5 11:30
Study of 3D-Printed Helical-Microstrip Transmission Lines
J.M. Lopez-Villegas, A. Salas, N. Vidal, J. Sieiro, Universitat de Barcelona, Spain

Th2C: Beamforming Architectures, Components and Calibration Techniques

Chair: Ahmed Kishk, Concordia University — Co-Chair: Roberto Vincenti Gatti, Università di Perugia
156AB, 10:10–11:50, Thursday 6 June 2019

PAGE 1225 Th2C-1 10:10
Free-Space Phased-Array Characterization and Calibration Using Code-Modulated Embedded Test
Zhangjie Hong, Simon Schönherr, Vikas Chauhan, Brian Floyd, North Carolina State University, USA

PAGE 1229 Th2C-2 10:30
An in-situ Self-Test and Self-Calibration Technique Utilizing Antenna Mutual Coupling for 5G Multi-Beam TRX Phased Arrays
Ahmed Nafe, Kerim Kibaroglu, Mustafa Sayginer, Gabriel M. Rebeiz, University of California, San Diego, USA

PAGE 1233 Th2C-3 10:50
Mitigation of Interferers and Nonlinear Spurious Products for Digital Array and MIMO Systems
Nicholas Peccarelli, Robin Irazoqui, Caleb Fulton, University of Oklahoma, USA

PAGE 1237 Th2C-4 11:10
A Fully Integrated S-Band 1-Watt Phased Array T/R IC in 0.13μm SOI-CMOS Technology
Zengqi Wang [1], Nan Li [1], Weitian Liu [1], Jichao Zhan [1], Qiao Zhang [1], Dong Ren [1], Lei Huang [1], Yi Xu [1], Shaoqin Yao [1], Jianwei Ma [1], Shuailin Zhou [1], Li Li [1], Jie Ma [1], Na Yan [2], Jianhua Lu [1]
[1]Archiwave Microelectronics, China ; [2]Fudan University, China

PAGE 1241 Th2C-5 11:30
Very Concise Eight-Port Coupler for Two-Dimensional Beamforming Application
Kejia Ding, Ahmed A. Kishk, Concordia University, Canada

Th2D: mm-Wave and THz Power Amplifiers

Chair: James Buckwalter, University of California, Santa Barbara — Co-Chair: Ed Niehenke, Niehenke Consulting
157BC, 10:10–11:50, Thursday 6 June 2019

PAGE 1245 Th2D-1 10:10
A 140-GHz 0.25-W PA and a 55–135GHz 115–135mW PA, High-Gain, Broadband Power Amplifier MMICs in 250-nm InP HBT
Zach Griffith, Miguel Urteaga, Petra Rowell, Teledyne Scientific & Imaging, USA A

PAGE 1249 Th2D-2 10:30
300GHz Broadband Power Amplifier with 508GHz Gain-Bandwidth Product and 8dBm Output Power
Benjamin Schoch [1], Axel Tessmann [2], Arnulf Leuther [2], Sandrine Wagner [2], Ingmar Kallfass [1]
[1] Universität Stuttgart, Germany A *; [2] Fraunhofer IAF, Germany* A

PAGE 1253 Th2D-3 10:50
A 175GHz Bandwidth High Linearity Distributed Amplifier in 500nm InP DHBT Technology
Tanjil Shivan [1], Maruf Hossain [1], Ralf Doerner [1], Steffen Schulz [1], Tom K. Johansen [2], Sebastian Boppel [1], Wolfgang Heinrich [1], Viktor Krozer [1]
[1] FBH, Germany A *; [2] Technical University of Denmark, Denmark* A

PAGE 1257 Th2D-4 11:10
190-GHz G-Band GaN Amplifier MMICs with 40GHz of Bandwidth
Maciej Ćwikliński, Peter Brückner, Stefano Leone, Christian Friesicke, Roger Lozar, Hermann Maßler, Rüdiger Quay, Oliver Ambacher, Fraunhofer IAF, Germany A

PAGE 1261 Th2D-5 11:30
Investigation of Compact Power Amplifier Cells at THz Frequencies Using InGaAs mHEMT Technology
Laurenz John [1], Axel Tessmann [1], Arnulf Leuther [1], Philipp Neininger [1], Thomas Zwick [2]
[1] Fraunhofer IAF, Germany A *; [2] KIT, Germany* A

Th2E: Measurement at the Limits

Chair: Leonard Hayden, Qorvo — Co-Chair: Matt King, HRL Laboratories
252AB, 10:10–11:50, Thursday 6 June 2019

PAGE 1265 Th2E-1 10:10
Silicon-Micromachined Waveguide Calibration Shims for Terahertz Frequencies
James Campion, Umer Shah, Joachim Oberhammer, KTH, Sweden A

PAGE 1269 Th2E-2 10:30
A Differential Probe with Integrated Balun for On-Wafer Measurements in the WR-3.4 (220–330 GHz) Waveguide Band
Chunhu Zhang [1], Matthew Bauwens [2], Michael E. Cyberey [1], Linli Xie [1], Arthur W. Lichtenberger [1], N. Scott Barker [1], Robert M. Weikle II [1]
[1] University of Virginia, USA A *; [2] Dominion MicroProbes, USA* A

PAGE 1272 Th2E-3 10:50
A Novel Contactless Dielectric Probe for On-Wafer Testing and Characterization in the V-Band
Mohamed A. Basha [1], A. Zekrallah [2], Mohamed S. Abdelkhalek [3], Safieddin Safavi-Naeini [1]
[1] University of Waterloo, Canada A *; [2] Ain Shams University, Egypt* A *; [3] KIT, Germany* A

PAGE 1276 Th2E-4 11:10
Multiport Vector Network Analyzer Configured in RF Interferometric Mode for Reference Impedance Renormalization
K. Haddadi [1], E. Okada [1], K. Daffé [1], F. Mubarak [2], D. Théron [1], G. Dambrine [1]
[1] IEMN (UMR 8520), France A *; [2] VSL, The Netherlands* A

PAGE 1279 Th2E-5 11:30
Accurate Monte Carlo Uncertainty Analysis for Multiple Measurements of Microwave Systems
Benjamin F. Jamroz, Dylan F. Williams, Jacob D. Rezac, Michael Frey, Amanda A. Koepke, NIST, USA A

Th2F: Advances in CMOS, and HBT Technologies for Monolithic ICs

Chair: Tony Ivanov, U.S. Army — Co-Chair: Cynthia Hang, Raytheon
254AB, 10:10–11:50, Thursday 6 June 2019

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A 27-GHz Transformer Based Power Amplifier with 513.8-mW/mm^2 Output Power Density and 40.7% Peak PAE in 1-V 28-nm CMOS
Kun-Chan Chiang [1], Tsung-Ching Tsai [1], Ian Huang [1], Jeng-Han Tsai [2], Tian-Wei Huang [1]
[1]National Taiwan University, Taiwan A ; [2]National Taiwan Normal University, Taiwan A

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Th2F-2
10:30

A 0.1-to-10GHz Digital Frequency Discriminator IC with Time to Digital Converter and Adaptive Control of Frequency Division Ratio for Instantaneous Frequency Measurement
Akihito Hirai, Koji Tsutsumi, Masaomi Tsuru, Kazutomi Mori, Mitsuhiro Shimozawa, Mitsubishi Electric, Japan A

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Th2F-3
10:50

Post-Process Local Porous Silicon Integration Method for RF Application
Gilles Scheen, Romain Tuyaerts, M. Rack, Lucas Nyssens, Jonathan Rasson, Jean-Pierre Raskin, Université catholique de Louvain, Belgium A

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Th2F-4
11:10

Silicon-Substrate Enhancement Technique Enabling High Quality Integrated RF Passives
M. Rack, Lucas Nyssens, Jean-Pierre Raskin, Université catholique de Louvain, Belgium A

PAGE 1299
Th2F-5
11:20

InGaP/GaAs HBT Broadband Power Amplifier IC with 54.3% Fractional Bandwidth Based on Cascode Structure
Wooseok Lee [1], Hyunuk Kang [1], Hwiseob Lee [2], Wonseob Lim [1], Jongseok Bae [1], Hyungmo Koo [1], Jangsup Yoon [3], Youngoo Yang [1]
[1]Sungkyunkwan University, Korea A ; [2]University of Calgary, Canada A ; [3]Samsung, Korea A

PAGE 1303
Th2F-6
11:30

185mW InP HBT Power Amplifier with 1 Octave Bandwidth (25–50GHz), 38% Peak PAE at 44GHz and Chip Area of 276×672μm^2
Andrea Arias [1], Petra Rowell [1], Miguel Urteaga [1], Zach Griffith [1], K. Shinohara [1], Josh Bergman [1], Andrew D. Carter [1], Richard Pierson [1], Bobby Brar [1], James F. Buckwalter [2], Mark J.W. Rodwell [2]
[1]Teledyne Scientific & Imaging, USA A ; [2]University of California, Santa Barbara, USA A

Th2G: Microwave and mm-Wave Wireless Energy Harvesting

Chair: Alessandra Costanzo, Università di Bologna — Co-Chair: Quenton Bonds, NASA
257AB, 10:10–11:50, Thursday 6 June 2019

PAGE 1306 Th2G-1 10:10
A 58–64GHz Transformer-Based Differential Rectifier in 40nm CMOS with -12dBm Sensitivity for 1V at 64GHz
Hao Gao, Domine M.W. Leenaerts, Peter Baltus, Technische Universiteit Eindhoven, The Netherlands A

PAGE 1309 Th2G-2 10:30
A Scalable High-Gain and Large-Beamwidth mm-Wave Harvesting Approach for 5G-Powered IoT
Aline Eid, Jimmy Hester, Manos M. Tentzeris, Georgia Tech, USA A

PAGE 1313 Th2G-3 10:50
A 2.45GHz RF Power Harvesting System Using Textile-Based Single-Diode Rectennas
Dieff Vital, Shubhendu Bhardwaj, John L. Volakis, Florida International University, USA A

PAGE 1316 Th2G-4 11:10
High-Efficiency Rectifier with Wide Input Power Rage Based on a Small Capacitor in Parallel with the Diode
Pengde Wu, Xiaojie Chen, Hang Lin, Changjun Liu, Sichuan University, China A

PAGE 1320 Th2G-5 11:30
A Highly Efficient Dual-Band Harmonic-Tuned GaN RF Synchronous Rectifier with Integrated Coupler and Phase Shifter
Md. Aminul Hoque [1], Sheikh Nijam Ali [2], Mohammad Ali Mokri [1], Srinivasan Gopal [3], Mohammad Chahardori [1], Deukhyoun Heo [1]
[1] Washington State University, USA A ; *[2] Skyworks Solutions, USA* A ; *[3] Intel, USA* A

Th2H: Load-Modulated Power Amplifiers

Chair: Paul Draxler, Qualcomm — Co-Chair: Zoya Popović, University of Colorado Boulder
259AB, 10:10–11:50, Thursday 6 June 2019

PAGE 1324 Th2H-1 10:10
A 750-W High Efficiency LDMOS New Four-Way Doherty Amplifier for Base-Station Applications
Xiaochuan Jiang [1], Tao Zhang [1], Jingchu He [2], Steve Loysel [2], Binghui Zhang [1], John Gajadharsing [2]
[1] Ampleon, China A ; *[2] Ampleon, The Netherlands* A

PAGE 1328 Th2H-2 10:30
An 80W Power Amplifier with 50% Efficiency at 8dB Power Back-Off Over 2.6–3.8GHz
Paul Saad, Rui Hou, Richard Hellberg, Bo Berglund, Ericsson, Sweden A

PAGE 1331 Th2H-3 10:50
Fully Integrated Wideband Doherty PA with Additive-Voltage Supported Load-Modulation in CMOS 130nm
Eduard Heidebrecht, Muh-Dey Wei, Renato Negra, RWTH Aachen University, Germany A

PAGE 1335 Th2H-4 11:10
Load Modulated Balanced Amplifier with Reconfigurable Phase Control for Extended Dynamic Range
Yuchen Cao, Haifeng Lyu, Kenle Chen, University of Central Florida, USA A

PAGE 1339 Th2H-5 11:30
Doherty-to-Balanced Switchable Power Amplifier
Haifeng Lyu, Yuchen Cao, Kenle Chen, University of Central Florida, USA A

Th3A: Non-Planar Filters 2

Chair: Giuseppe Macchiarella, Politecnico di Milano — Co-Chair: Miguel Laso, Universidad Pública de Navarra
151AB, 13:30–15:10, Thursday 6 June 2019

PAGE 1343
Th3A-1
13:30
W-Band Quintuple-Mode Filter Using Quarter-Mode Substrate-Integrated Waveguide Resonators
Xiao-Long Huang, Liang Zhou, Cheng-Rui Zhang, Jun-Fa Mao, SJTU, China A

PAGE 1347
Th3A-2
13:40
Miniaturized Microwave Filter Using Circular Spiral Resonators in a Single Metal Cavity
Rui-Sen Chen [1], Sai-Wai Wong [1], Jing-Yu Lin [2], Yejun He [1]
[1] Shenzhen University, China A *; [2] UTS, Australia* A

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Th3A-3
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Iterative Synthesis of Equi-Ripple Dual-Band Filtering Functions with One Additional Transmission Zero
Ping Zhao, Ke Wu, Polytechnique Montréal, Canada A

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Th3A-4
14:10
Spurious Bypass Method for Increasing Passband Width
Richard V. Snyder, RS Microwave, USA A

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Th3A-5
14:30
Rectangular Waveguide Quadruplet Filter for Satellite Applications
Javier Ossorio, Santiago Cogollos, Vicente E. Boria, Marco Guglielmi, Universitat Politècnica de València, Spain A

Th3B: 3D Printed Wireless Modules and Systems

Chair: Matt Tyhach, Raytheon — Co-Chair: Dominique Baillargeat, XLIM (UMR 7252)
153AB, 13:30–15:10, Thursday 6 June 2019

PAGE 1363
Th3B-1
13:30
Fully Inkjet-Printed Multi-Layer Tunable Origami FSS Structures with Integrated Thermal Actuation Mechanism
Syed Abdullah Nauroze, Manos M. Tentzeris, Georgia Tech, USA A

PAGE 1367
Th3B-2
13:50
Novel 3D-Printed Reconfigurable Origami Frequency Selective Surfaces with Flexible Inkjet-Printed Conductor Traces
Yepu Cui, Syed Abdullah Nauroze, Manos M. Tentzeris, Georgia Tech, USA A

PAGE 1371
Th3B-3
14:10
Microfluidics-Based 3D-Printed 4×4 Butler Matrix in Coaxial Technology for Applications up to K Band
V. Palazzi [1], P. Mezzanotte [1], F. Alimenti [1], Manos M. Tentzeris [2], L. Roselli [1]
[1] Università di Perugia, Italy A *; [2] Georgia Tech, USA* A

PAGE 1375
Th3B-4
14:30
Achieving Fully Autonomous System-on-Package Designs: An Embedded-on-Package 5G Energy Harvester Within 3D Printed Multilayer Flexible Packaging Structures
Tong-Hong Lin [1], Spyridon Nektarios Daskalakis [1], Apostolos Georgiadis [2], Manos M. Tentzeris [1]
[1] Georgia Tech, USA A *; [2] Heriot-Watt University, UK* A

Th3E: The Art of Large Signal Measurement and Calibration

Chair: Tibault Reveyrand, XLIM (UMR 7252) — Co-Chair: Alfred Riddle, Quanergy Systems
252AB, 13:30–15:10, Thursday 6 June 2019

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Th3E-1
13:30

Characterization of Electromagnetic Coupling Effects in MIMO Antenna Array Beamforming
Marina Jordão [1], Daniel Belo [1], Rafael Caldeirinha [2], Arnaldo S.R. Oliveira [1], Nuno Borges Carvalho [1]
[1] Universidade de Aveiro, Portugal A ; [2] Politécnico de Leiria, Portugal A

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Th3E-2
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Ultra-Fast (13ns) Low Frequency/Microwave Transient Measurements, Application to GaN Transistors Characterization of Pulse to Pulse Stability
M. Ben-Sassi, G. Neveux, D. Barataud, XLIM (UMR 7252), France A

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Th3E-3
14:10

An Approach for Characterizing the Frequency Response of Sampling-Oscilloscopes Using a Large-Signal Network Analyzer
Alirio S. Boaventura [1], Dylan F. Williams [1], Paul D. Hale [1], Gustavo Avolio [2]
[1] NIST, USA A ; [2] Anteverta-mw, The Netherlands A

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Th3E-4
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Large-Signal-Network-Analyzer Phase Calibration on an Arbitrary Grid
Aric Sanders [1], Dylan F. Williams [2], Joshua M. Kast [3], Kate A. Remley [1], Robert D. Horansky [1]
[1] University of Colorado Boulder, USA A ; [2] NIST, USA A ; [3] Colorado School of Mines, USA A

Th3F: GaN Semiconductor Devices and Monolithic ICs

Chair: Ali Darwish, U.S. Army — Co-Chair: Nicholas Kolias, Raytheon
254AB, 13:30–15:10, Thursday 6 June 2019

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A GaN/Diamond HEMTs with 23W/mm for Next Generation High Power RF Application
Won Sang Lee [1], Kyung Won Lee [2], Seung Hyun Lee [2], Kevin Cho [2], Samuel Cho [2]
[1] RFHIC, USA A ; [2] RFHIC, Korea A

PAGE 1399
Th3F-2
13:50

GaN MMIC Differential Multi-Function Chip for Ka-Band Applications
Boris Berthelot [1], Jean-Guy Tartarin [1], Christophe Viallon [1], Remy Leblanc [2], Hassan Maher [3], François Boone [3]
[1] LAAS, France A ; [2] OMMIC, France A ; [3] LN2, Canada A

PAGE 1403
Th3F-3
14:10

Millimeter-Wave Single-Pole Double-Throw Switches Based on a 100-nm Gate-Length AlGaN/GaN-HEMT Technology
Fabian Thome, Peter Brückner, Rüdiger Quay, Oliver Ambacher, Fraunhofer IAF, Germany A

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Th3F-4
14:30

High-Power (>2 W) E-Band PA MMIC Based on High Efficiency GaN-HEMTs with Optimized Buffer
Erdin Ture, Stefano Leone, Peter Brückner, Rüdiger Quay, Oliver Ambacher, Fraunhofer IAF, Germany A

Th3G : Novel Techniques and Applications for Near Field Wireless Power Transfer

Chair: Kenjiro Nishikawa, Kagoshima University — Co-Chair: Costas Sarris, University of Toronto

257AB, 13:30–15:10, Thursday 6 June 2019

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Th3G-1
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Triple-Band Near-Field Wireless Power Transfer System Using Coupled Defected Ground Structure Band Stop Filters

Adel Barakat, Shimaa Alshhawy, Kuniaki Yoshitomi, Ramesh K. Pokharel, Kyushu University, Japan A

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Th3G-2
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Capacitive Coupler Utilizing Electric Double Layer for Wireless Power Transfer Under Seawater

Masaya Tamura, Kousuke Murai, Yasumasa Naka, Toyohashi University of Technology, Japan A

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14:10

45% RF-to-DC Conversion Efficiency Wireless Power Transfer System Through Biological Tissues Using Complex Conjugate Impedance Matching Taking Account of Tissue's Properties

Sumin Chalise, Mitsuki Nakao, Fairus Tahar, Adel Barakat, Kuniaki Yoshitomi, Ramesh K. Pokharel, Kyushu University, Japan A

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Th3G-4
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Range-Adaptive Impedance Matching of Wireless Power Transfer System Using a Machine Learning Strategy Based on Neural Networks

Soyeon Jeong, Tong-Hong Lin, Manos M. Tentzeris, Georgia Tech, USA A

THIF1 : Interactive Forum Session — Thursday Afternoon

Chair: Nestor Lopez, MIT Lincoln Laboratory — Co-Chair: Patrick Bell, MIT Lincoln Laboratory
253ABC, 13:30–15:10, Thursday 6 June 2019

PAGE 1426 THIF1-1 **Integrated 2-b Riemann Pump RF-DAC in GaN Technology for 5G Base Stations**
Markus Weiß, Christian Friesicke, Rüdiger Quay, Oliver Ambacher, Fraunhofer IAF, Germany A

PAGE 1430 THIF1-2 **A 241-GHz-Bandwidth Distributed Amplifier with 10-dBm P1dB in 0.25-μm InP DHBT Technology**
Teruo Jyo, Munehiko Nagatani, Minoru Ida, Miwa Mutoh, Hitoshi Wakita, Naoki Terao, Hideyuki Nosaka, NTT, Japan A

PAGE 1434 THIF1-3 **A 10W Fully-Integrated LDMOS MMIC Doherty in LGA Package for 2.7GHz Small Cell Application**
Liang Lin, Lin Yang, Shuangshuang Zheng, Jiangyan Peng, Ampleon, China A

PAGE 1438 THIF1-4 **Microwave Materials: Dielectric Compositions for Use in High-Frequency LTCC, Filter, Resonator, and Antenna Applications**
Peter M. Marley, Walt Symes, Mohammed Megherhi, Cody Gleason, Ferro, USA A

PAGE 1442 THIF1-5 **A Fully Printed Backscatter Radio Transceiver**
Andrew Walla, Basem Hassan, Jason Yong, You Liang, Yang Yu, Babak Nasr, Ampalavanapillai Nirmalathas, Efstratios Skafidas, University of Melbourne, Australia A

PAGE 1446 THIF1-6 **A Microfluidic Spherical Helix Module Using Liquid Metal and Additive Manufacturing for Drug Delivery Applications**
Yangyang Guan [1], Shicong Wang [2], Manos M. Tentzeris [3], Yuanan Liu [1]
[1]BUPT, China A ; *[2]Tongji University, China* A ; *[3]Georgia Tech, USA* A

PAGE 1450 THIF1-7 **Microwave Breast Imaging Incorporating Material Property Dependencies**
Max Hughson, Joe LoVetri, Ian Jeffrey, University of Manitoba, Canada A

PAGE 1454 THIF1-8 **Rhodamine B Temperature Dosimetry of Biological Samples Interacting with Electromagnetic Fields in Macrosystems**
Amani Nefzi, Lynn Carr, Claire Dalmay, Arnaud Pothier, Philippe Leveque, Delia Arnaud-Cormos, XLIM (UMR 7252), France A

PAGE 1458 THIF1-9 **Flexible, Conformal Phased Arrays with Dynamic Array Shape Self-Calibration**
Austin C. Fikes, Amirreza Safaripour, Florian Bohn, Behrooz Abiri, Ali Hajimiri, Caltech, USA A

PAGE 1462 THIF1-10 **Full-Sphere Frequency Scanning Array Antenna Based on Passive Dual-Band CRLH Series Integrated Feeding Network**
Dongyin Ren, Jun H. Choi, SUNY Buffalo, USA A

PAGE 1466 THIF1-11 **Fast Frequency-Agile Real-Time Optimization of High-Power Tuning Network for Cognitive Radar Applications**
Jose Alcala-Medel [1], Austin Egbert [1], Caleb Calabrese [1], Angelique Dockendorf [1], Charles Baylis [1], Garrett Shaffer [2], Abbas Semnani [2], Dimitrios Peroulis [2], Ed Viveiros [3], Kyle Gallagher [3], Anthony Martone [3]
[1]Baylor University, USA A ; *[2]Purdue University, USA* A ; *[3]U.S. Army Research Laboratory, USA* A

PAGE 1470 THIF1-12 **Human Motion Analysis Based on Multi-Channel Doppler Radar System**
Hsiang-Shuo Chang, Han-Chiang Chu, Po-Tsung Chen, Chia-Chan Chang, Sheng-Fuh Chang, National Chung Cheng University, Taiwan A

THIF1 continued …

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THIF1-13
AMCW Radar of Micrometer Accuracy Distance Measurement and Monitoring
Frida Strömbeck, Zhongxia Simon He, Herbert Zirath, Chalmers University of Technology, Sweden A

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THIF1-14
Enabling Safe Autonomous Vehicles by Advanced mm-Wave Radar Simulations
Juan D. Castro, Sahitya Singh, Akshaj Arora, Sara Louie, Damir Senic, ANSYS, USA A

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THIF1-15
A Reconfigurable Modulator for Digital Outphasing Transmitters
Florian Hühn, A. Wentzel, Wolfgang Heinrich, FBH, Germany A

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THIF1-16
Reconfigurable GaN Digital Tx Applying BST Bandpass Filter
A. Wentzel [1], Christian Schuster [2], Rolf Jakoby [2], Holger Maune [2], Wolfgang Heinrich [1]
[1]FBH, Germany A *; [2]Technische Universität Darmstadt, Germany* A

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THIF1-17
100MHz to 1GHz On-Chip Circulator with Integrated Driver Amplifiers
Mathew Biedka [1], Paul Rodgers [2], Nick Gutierrez [1], Tim LaRocca [2], Yuanxun Ethan Wang [1]
[1]University of California, Los Angeles, USA A *; [2]Northrop Grumman, USA* A

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THIF1-18
A Miniaturized 3–10GHz Dual-Comb Spectroscopy System for Chemical Detection
Reza Ebrahimi Ghiri, Kamran Entesari, Texas A&M University, USA A

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THIF1-19
Sensitivity Optimization in SRRs Using Interferometry Phase Cancellation
Mohammad Abdolrazzaghi, Mojgan Daneshmand, University of Alberta, Canada A

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THIF1-20
Triode-Mode Envelope Detectors for Near Zero Power Wake-Up Receivers
Jesse Moody, Steven M. Bowers, University of Virginia, USA A

PAGE 1503
THIF1-21
W-Band Measurements of Low-Loss Dielectrics with a Fabry-Perot Open Resonator
T. Karpisz, B. Salski, P. Kopyt, J. Krupka, Warsaw University of Technology, Poland A

PAGE 1507
THIF1-22
Robust and High-Efficiency Wireless Body Area Networks with Spoof Surface Plasmons on Clothing
Xi Tian, Mengying Zhang, John S. Ho, NUS, Singapore A

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THIF1-23
Concurrent Multi-Directional Beam-Forming Receiving Network for Full-FoV High-Efficiency Wireless Power Transfer
Min-Yu Huang, Tzu-Yuan Huang, Madhavan Swaminathan, Hua Wang, Georgia Tech, USA A

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THIF1-24
Compact Harmonic-Tuned Rectifier Using Inductive Matching Network
Muh-Dey Wei, Chun-Yu Fan, Florian Dietrich, Renato Negra, RWTH Aachen University, Germany A

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THIF1-25
Time-Reversal Microwave Tomography Using Frequency Domain Sampling
John Doroshewitz [1], Saptarshi Mukherjee [2], Edward J. Rothwell [1], Lalita Udpa [1], Jeffrey A. Nanzer [1]
[1]Michigan State University, USA A *; [2]LLNL, USA* A