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EuMIC01 : MMICs for mm-Wave Subsystems

Chair: Ingmar Kallfass, University of Stuttgart, Germany

Co-Chair: Joachim Oberhammer, KTH, Sweden

Kiew, Time 08:30 – 10:10, Monday 9th October 2017

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D. Müller¹, A. Beck¹, H. Massler², Axel Tessmann², Arnulf Leuther², Thomas Zwick¹, Ingmar Kallfass³
¹KIT, Germany; ²Fraunhofer IAF, Germany; ³Universität Stuttgart, Germany
- 5 **A 24.7dB Low Noise Amplifier with Variable Gain and Tunable Matching in 130nm SiGe at 200GHz**
Paul Stärke, David Fritsche, Corrado Carta, Frank Ellinger, Technische Universität Dresden, Germany
- 9 **A 94GHz Programmable Frequency Divider with Inductive Peaking for Wideband and Highly Stable Frequency Synthesizers**
M. van Delden¹, Nils Pohl¹, K. Aufinger², Thomas Musch¹
¹Ruhr-Universität Bochum, Germany; ²Infineon Technologies, Germany
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¹Chalmers University of Technology, Sweden; ²Tarbiat Modares University, Iran; ³Ericsson, Sweden
-

EuMIC02 : RF-Power and Thermal Behaviour of GaN and Silicon Devices

Chair: Frank van den Bogaart, TNO, The Netherlands

Co-Chair: Claudio Lanzieri, Leonardo S.p.A., Italy

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Ibrahim Khalil, Hernan Rueda, Damon Holmes, Partha Chakraborty, Dave Burdeaux, NXP Semiconductors, USA
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Mohammad A. Alim¹, Ali A. Rezazadeh², Christophe Gaquiere³
¹University of Chittagong, Bangladesh; ²University of Manchester, UK; ³SIEMENS, France
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¹Swansea University, UK; ²Liverpool John Moores University, UK; ³Université de Sherbrooke, Canada

EuMIC03: Integrated Receivers and Transceivers

Chair: Frank van Vliet, TNO, The Netherlands

Co-Chair: Massimo C. Comparini, Telespazio, Italy

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¹FAU Erlangen-Nürnberg, Germany; ²Infineon Technologies, Germany; ³IHP, Germany
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¹Universität Ulm, Germany; ²Asia-Pacific Mechanical & Electronic, China; ³Airbus, Germany
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EuMIC05: EuMIC Interactive Session

Chair: Daniel Maassen, Technische Universität Berlin, Germany

Co-Chair: Georg Boeck, Berlin Institute of Technology, Germany

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¹RWTH Aachen University, Germany; ²National Chung Cheng University, Taiwan
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¹FAU Erlangen-Nürnberg, Germany; ²IHP, Germany
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A. Niembro-Martin¹, D. Mercier¹, H. Sibuet¹, C. Dieppedale¹, C. Baret¹, C. Bonnard¹, C. Billard¹, P. Gardes², P. Poveda²
¹CEA-LETI, France; ²STMicroelectronics, France
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G. Christopher Barisich¹, Edward Gebara², Huifang Gu², Craig Storey³, Pouya Aflaki³, John Papapolymerou⁴
¹Georgia Institute of Technology, USA; ²Nanowave Technologies, USA; ³NRCC, Canada; ⁴Michigan State University, USA
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¹Università di Roma "Tor Vergata", Italy; ²OMMIC, France; ³FBH, Germany
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¹University of Calgary, Canada; ²York University, Canada
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¹RWTH Aachen University, Germany; ²AMO, Germany
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Andrea Bentini, Diego Palombini, Daniele Rampazzo, Elettronica, Italy

EuMIC06: THz Integrated Circuits

Chair: Robin Sloan, University of Manchester, UK

Co-Chair: Herbert Zirath, Chalmers University of Technology, Sweden

Kiew, Time 13:50 – 15:30, Monday 9th October 2017

- N/A **Terahertz Integrated Circuits** (Industrial Session Keynote)
W.R. Deal, Northrop Grumman, USA
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Arnulf Leuther¹, Matthias Ohlrogge¹, Lukas Czornomaz², Thomas Merkle¹, Frank Bernhardt¹, Axel Tessmann¹
¹Fraunhofer IAF, Germany; ²IBM Research, Switzerland
- 134 **A 0.3-THz SiGe-Based Frequency Doubler Chip with 3-dB 50GHz Bandwidth and 17dB Peak Conversion Gain**
Faisal Ahmed, Muhammad Furqan, Andreas Stelzer, Johannes Kepler Universität Linz, Austria
- 138 **Ultra-Wideband Signal Generation at 300GHz in a SiGe BiCMOS Technology**
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- 142 **Ultra-Broadband Common Collector-Cascode 4-Cell Distributed Amplifier in 250nm InP HBT Technology with Over 200GHz Bandwidth**
Stavros Giannakopoulos¹, Klas Eriksson², Izzat Darwazeh³, Zhongxia Simon He¹, Herbert Zirath¹
¹Chalmers University of Technology, Sweden; ²Ruag Space, Sweden; ³University College London, UK
-

EuMIC07: Advanced Silicon Devices and Circuits

Chair: Dimitris Pavlidis, National Science Foundation, USA

Co-Chair: Didier Floriot, United Monolithic Semiconductors, France

Riga, Time 13:50 – 15:30, Monday 9th October 2017

- N/A **Frontiers of Information Technology** (Industrial Session Keynote)
Heike Riel, IBM, Switzerland
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Insaf Lahbib¹, Sidina Wane¹, Dominique Lesénéchal¹, Aziz Doukkali¹, Thanh Vinh Dinh¹, Laurent Leyssenne², Cristian Andrei³, Guy Imbert³, Patrick Martin¹, Philippe Descamps¹, Guillaume Boguszewski⁴, Damienne Bajon⁵
¹LaMIPS, France; ²Thales, France; ³NXP Semiconductors, France; ⁴CYLEONE, France; ⁵ISAE, France
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Andreas Bauch¹, M. Dietz¹, Robert Weigel¹, Amelie Hagelauer¹, Dietmar Kissinger²
¹FAU Erlangen-Nürnberg, Germany; ²IHP, Germany
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Vincent Knopik¹, Boris Moret¹, Eric Kerhervé²
¹STMicroelectronics, France; ²IMS (UMR 5218), France

EuMIC08: Wideband Multifunction Components

Chair: Ali A Rezazadeh, University of Manchester, UK

Co-Chair: Frank van Vliet, TNO, The Netherlands

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Christopher T. Coen, Adrian Ildefonso, Zachary E. Fleetwood, John D. Cressler, Georgia Institute of Technology, USA
- 167 **A Phase Coherent 7-Bit Digital Step Attenuator on 0.18 μ m SOI**
Arash Ebrahimi Jarihani¹, Fatih Kocer²
¹Middle East Technical University, Turkey; ²Analog Devices, USA
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Paul Sangaré¹, Christophe Loyez², Kevin Carpentier², Markus Mayer¹, Dirk Hartung¹, François Parickmiller¹, Nathalie Rolland³
¹Arelis, France; ²IEMN, France; ³IRCICA (USR 3380), France
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Chen-Wei Wu, Tzu-Yuan Huang, Yuan-Hung Hsiao, Yi-Ching Wu, Huei Wang, National Taiwan University, Taiwan
- 179 **A 42Gbps VCSEL Driver with Adjustable 2-Tap Feed-Forward Equalizer in 14nm SOI CMOS**
Mahdi Khafaji¹, Jan Pliva¹, Martin Zoldak², Ronny Henker¹, Frank Ellinger¹
¹Technische Universität Dresden, Germany; ²Argotech, Czech Republic
-

EuMIC09: New Approaches for Broadband GaN Power Amplifiers

Chair: Patrick Schuh, HENSOLDT, Germany

Co-Chair: Paolo Colantonio, Università di Roma “Tor Vergata”, Italy

Kiew, Time 16:10 – 17:50, Monday 9th October 2017

- N/A **The Struggle for Bandwidth — GaN and the Non-Uniform Distributed Power Amplifier (Industrial Session Keynote)**
Charles F. Campbell, Qorvo, USA
- 184 **New Concept to Control the Gain of GaN-Cascodes in Broadband Power Amplifiers**
Thomas Huber¹, Rüdiger Quay², Wolfgang Bösch³
¹Rohde & Schwarz, Germany; ²Fraunhofer IAF, Germany; ³Technische Universität Graz, Austria
- 188 **Highly Efficient GaN RF Power Amplifier MMIC Using Low-Voltage Driver**
Mustafa Acar¹, Osman Ceylan¹, Felicia Kiebler¹, Sergio Pires¹, Stephan Maroldt²
¹Ampleon, The Netherlands; ²Ampleon, France
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T. Quach¹, P. Watson¹, B. Dupaix², T. Barton³, M. LaRue², W. Gouty¹, W. Khalil²
¹AFRL, USA; ²Ohio State University, USA; ³University of Colorado Boulder, USA
- 196 **3.5-GHz Ultra-Compact GaN Class-E Integrated Doherty MMIC PA for 5G Massive-MIMO Base Station Applications**
Stephan Maroldt, Mariano Ercoli, Ampleon, France

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Chair: Michael Schlechtweg, Fraunhofer IAF, Germany

Co-Chair: Alberto Santarelli, University of Bologna, Italy

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- 216 **Load Error Correction for High Power Load Dependent X-Parameter Measurements**
Bernhard Pichler, Norbert Leder, Gottfried Magerl, Holger Arthaber, Technische Universität Wien, Austria
-

EuMIC11: Oscillators and Synthesizers

Chair: Georg Boeck, Berlin Institute of Technology, Germany

Co-Chair: Sébastien Chartier, HENSOLDT, Germany

St. Petersburg, Time 16:10 – 17:50, Monday 9th October 2017

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Thanh Ngoc Thi Do¹, Mikael Hörberg¹, Szchau Lai¹, Sven-Henrik Wollersjö², Daniel Johansson², Herbert Zirath¹, Dan Kuylenstierna¹
¹Chalmers University of Technology, Sweden; ²RUAG Space, Sweden
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¹IIT Madras, India; ²Texas Instruments, India
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- 236 **An Integrated Frequency Synthesizer in 130nm SiGe BiCMOS Technology for 28/38GHz 5G Wireless Networks**
Frank Herzel, Maciej Kucharski, Arzu Ergintav, Johannes Borngräber, Herman Jalli Ng, Jörg Domke, Dietmar Kissinger, IHP, Germany

EuMIC12: Device Characterisation

Chair: Teresa M. Martín-Guerrero, Universidad de Málaga, Spain

Co-Chair: Nils Weimann, FBH, Germany

Riga, Time 08:30 – 10:10, Tuesday 10th October 2017

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¹Technical University of Denmark, Denmark; ²FBH, Germany
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¹Brandenburgische Technische Universität, Germany; ²FBH, Germany
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Gianni Bosi¹, Antonio Raffo¹, Valeria Vadalà¹, Francesco Trevisan¹, Gabriele Formicone², Jeff Burger², James Custer², Giorgio Vannini¹
¹Università di Ferrara, Italy; ²Integra Technologies, USA
- 252 **Poly-Harmonic Distortion Model Extraction in Charge-Controlled One-Port Devices**
Teresa M. Martín-Guerrero, José T. Entrambasaguas, Carlos Camacho-Peñalosa,
Universidad de Málaga, Spain
- 256 **RF Sensitivity Analysis of Independent-Gates FinFETs for Analog Applications Exploiting the Back-Gating Effect**
A.M. Buglio, S. Donati Guerrieri, F. Bonani, G. Ghione, Politecnico di Torino, Italy
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EuMIC13: Highly Integrated mm-Wave Transceivers

Chair: Bill Deal, Northrop Grumman, USA

Co-Chair: Dan Kuylenstierna, Chalmers University of Technology, Sweden

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- 261 **A 219–266GHz Fully-Integrated Direct-Conversion IQ Receiver Module in a SiGe HBT Technology**
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¹Bergische Universität Wuppertal, Germany; ²IHP, Germany
- 265 **A Direct Carrier I/Q Modulator for High-Speed Communication at D-Band Using 130 nm SiGe BiCMOS Technology**
Sona Carpenter, Zhongxia Simon He, Herbert Zirath, Chalmers University of Technology, Sweden
- 269 **A 60GHz SiGe BiCMOS Double Receive Channel Transceiver for Radar Applications**
Efe Öztürk¹, Dieter Genschow¹, Uroschanit Yodprasit¹, Berk Yilmaz¹, Dietmar Kissinger², Wojciech Debski¹, Wolfgang Winkler¹
¹Silicon Radar, Germany; ²IHP, Germany
- 273 **On-Chip Post-Production Tuning of I/Q Frequency Converters Using Adjustable Coupler Terminations**
Christopher Grötsch¹, Axel Tessmann², Sandrine Wagner², Ingmar Kallfass¹
¹Universität Stuttgart, Germany; ²Fraunhofer IAF, Germany

EuMC/EuMIC01 : High Performance Si-Based Power Amplifiers

Chair: Franco Giannini, University of Rome "Tor Vergata", Italy

Co-Chair: Renato Negra, RWTH Aachen University, Germany

Kiew, Time 08:30 – 10:10, Tuesday 10th October 2017

- 277 **A 100–145GHz Area-Efficient Power Amplifier in a 130nm SiGe Technology**
Mingquan Bao¹, Zhongxia Simon He², Herbert Zirath²
¹Ericsson, Sweden; ²Chalmers University of Technology, Sweden
- 281 **A 109–137GHz Power Amplifier in SiGe BiCMOS with 16.5dBm Output Power and 12.8% PAE**
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- 289 **High-Efficiency Watt-Level MASMOS Power Amplifier for LTE Applications**
Fabien Mesquita¹, Eric Kerhervé¹, Anthony Ghiotto¹, Yann Creveuil², Myrienne Regis²
¹IMS (UMR 5218), France; ²ACCO Semiconductor, France
- 293 **12/25W Wideband LDMOS Power Amplifier IC (3400–3800MHz) for 5G Base Station Applications**
Xavier Hue¹, Faiza Baroudi¹, Laure Bollinger¹, Margaret Szymanowski², Jean-Christophe Nanan¹
¹NXP Semiconductors, France; ²NXP Semiconductors, USA
-

EuMC/EuMIC02 : Special Session: Funding for Research

Chair: Hermann Schumacher, Ulm University, Germany

Co-Chair: Ingmar Kallfass, University of Stuttgart, Germany

Seoul, Time 08:30 – 10:10, Tuesday 10th October 2017

- N/A **Electrical, Communications and Cyber Systems at the National Science Foundation**
Dimitris Pavlidis, National Science Foundation, USA
- N/A **Managing and Promoting Innovation in Defence: EDA's Activities Related to Microelectronics**
Patrick Langlois, European Defence Agency, Belgium
- N/A **ESA Programs**
Marie-Geneviève Périchaud, Jouni Latti, ESA-ESTEC, The Netherlands
- N/A **Microwaves for Breaking Ground Research: Fundamental Science in Electrical Engineering and Funding Opportunities in Germany**
Damian Dudek, DFG, Germany

EuMC/EuMIC03: Power Amplifier Linearisation

Chair: Geneviève Baudoin, ESYCOM, France

Co-Chair: Claude Duvanaud, XLIM, France

Kiew, Time 13:50 – 15:30, Tuesday 10th October 2017

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J.-F. Villemazet¹, H. Yahi¹, B. Lefebvre¹, F. Baudeigne¹, J. Maynard¹, G. Soubercaze-Pun², L. Lapierre²
¹Thales Alenia Space, France; ²CNES, France
- 306 **A Reconfigurable In-Band Digital Predistortion Technique for mmWave Power Amplifiers Excited by a Signal with 640MHz Modulation Bandwidth**
Chao Yu¹, Debin Hou¹, Honglei Sun¹, Fan Meng¹, Xiao-Wei Zhu¹, Jianfeng Zhai¹, Jixin Chen¹, Pinpin Yan¹, Anding Zhu²
¹Southeast University, China; ²University College Dublin, Ireland
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Siqi Wang, Mazen Abi Hussein, Olivier Venard, Geneviève Baudoin, ESYCOM, France
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Suguru Habu¹, Caoyu Li², Yasushi Yamao¹
¹University of Electro-Communications, Japan; ²UESTC, China
- 318 **Concurrent Dual-Band Digital Predistortion Based on Canonical Piecewise Linear Functions**
Zhijian Yu, Wei Wang, Shanghai Huawei Technologies, China
-

EuMC/EuMIC04: Interconnects and Packaging

Chair: Shmuel Auster, Elta Systems, Israel

Co-Chair: Jan Hesselbarth, University of Stuttgart, Germany

Riga, Time 13:50 – 15:30, Tuesday 10th October 2017

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Thomas Gottwald, Schweizer Electronic, Germany
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- 325 **Low-Loss mm-Wave Transition from On-Chip Microstrip to Rectangular Waveguide**
Daniel López Cuenca, Jan Hesselbarth, Golzar Alavi, Universität Stuttgart, Germany
- 329 **SiP Solutions for Wireless Transceiver Impedance Matching Networks**
Graciele Batistell¹, Timo Holzmann¹, Stephan Leuschner², Andreas Wolter², Antonio Passamani³, Johannes Sturm¹
¹CUAS, Austria; ²Intel, Germany; ³Intel, Austria
- 333 **Scalable Ka Band Switch Matrix in Compact LTCC Package for Satellite Communication Application**
A. Barigelli¹, Franco Diaferia¹, P. Panfili¹, M. Scipioni¹, Francesco Vitulli¹, A. Biondi², D. Resca², F. Scappaviva², G. Nicolai³, D. Di Gregorio³
¹Thales Alenia Space, Italy; ²MEC, Italy; ³Elital, Italy

EuMC/EuMIC05: Reconfigurable and Tuneable RF and Microwave Circuits

Chair: Patrick Scheele, HENSOLDT, Germany

Co-Chair: Anthony Ghiotto, IMS, France

St. Petersburg, Time 13:50 – 15:30, Tuesday 10th October 2017

- 337 **Novel Phase Reconfigurable Synthesized Transmission Line and its Application to Reconfigurable Hybrid Coupler**
Huy Nam Chu, Hua-Chien Liao, Gao-Yi Li, Tzyh-Ghuang Ma, Taiwan Tech, Taiwan
- 341 **Realizing Reconfigurable Stub Impedance Matching Networks Using MEMS Switches**
Farzad Yazdani, Raafat R. Mansour, University of Waterloo, Canada
- 345 **Liquid-Crystal-Based Amplitude Tuner Fabricated in LTCC Technology**
A.E. Prasetiadi¹, M. Jost¹, B. Schulz², M. Quibeldey³, T. Rabe², R. Follmann³, Rolf Jakoby¹
¹Technische Universität Darmstadt, Germany; ²BAM, Germany; ³IMST, Germany
- 349 **Design of a Reconfigurable Rectangular Waveguide Phase Shifter with Metallic Posts**
Lucas Polo-López, J.L. Masa-Campos, Jorge A. Ruiz-Cruz, Universidad Autónoma de Madrid, Spain
- 353 **Liquid Crystal Based Phase Shifter in a Parallel-Plate Dielectric Waveguide Topology at V-Band**
R. Reese, E. Polat, M. Jost, M. Nickel, Rolf Jakoby, Holger Maune, Technische Universität Darmstadt, Germany
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EuMC/EuMIC06: EuMC/EuMIC Interactive Session

Chair: Felix Rautschke, Berlin Institute of Technology, Germany

Co-Chair: Ilona Rolfes, Ruhr-University Bochum, Germany

Exhibition Hall, Time 14:30 – 16:10, Tuesday 10th October 2017

- 357 **6–18GHz 13W Reactive Matched GaN Power Amplifier MMIC**
Hong-Qi Tao¹, Wei Hong¹, Bin Zhang²
¹Southeast University, China; ²CETC 55, China
- 361 **Low-Loss and Compact 2.4-GHz CMOS Bandpass Filter with Finite Transmission Zeros**
Ru-Yu Wang, Sen Wang, Taipei Tech, Taiwan
- N/A **A Q-Band Broadband On-Chip Antenna with Switches Backed by an Off-Chip Reflector in 0.18- μ m CMOS SOI Technology**
Yexi Song¹, Yunqiu Wu¹, Yin Tian², Chao Yu¹, Kai Kang¹
¹UESTC, China; ²Sichuan Jiuzhou Electric Group, China
- N/A **Theory of Resonant Frequency Spectrum of Tunable Multi-Loop Spin-Wave Optoelectronic Oscillators**
A.A. Nikitin, V.V. Vitko, A.V. Kondrashov, A.B. Ustinov, B.A. Kalinikos, St. Petersburg Electrotechnical University, Russia
- 372 **Ultra Wideband 3D Interconnects Using Aerosol Jet Printing up to 110GHz**
Jubaid Abdul Qayyum¹, Marvin Abt², Aljoscha Roch², Ahmet Cagri Ulusoy¹, John Papapolymerou¹
¹Michigan State University, USA; ²Fraunhofer CCD, USA
- 376 **Substrate-Less Oscillator Module Realized by Gap Waveguide Technology for Millimeter Wave Applications**
B. Ahmadi, A. Banai, Sharif University of Technology, Iran
- N/A **Controlling the Oscillator Frequency Synchronization by a Low-Frequency Drive**
Anastasiia Y. Nimets¹, Klaus Schuenemann¹, Dmytro M. Vavriv²
¹Technische Universität Hamburg-Harburg, Germany; ²NASU, Ukraine

- 384 **Relationship Between a Pruned Volterra Model Structure and Impairments in an I/Q Modulator**
Carlos Crespo-Cadenas, Javier Reina-Tosina, María J. Madero-Ayora, Juan A. Becerra-González, Universidad de Sevilla, Spain
- 388 **An Investigation on Current Collapse Induced Memory Effects of GaN Power Amplifier for LTE Base Station Applications**
Yoji Murao, Tomoya Kaneko, NEC, Japan
- 392 **Power Amplifier Efficiency Ceilings Due to Signal Modulation Type**
Earl McCune, Eridan Communications, USA
- 396 **Digital Predistortion Based on B-Spline CPWL Models in a RoF LTE Mobile Fronthaul**
Carlos Mateo, Pedro L. Carro, Paloma Garcia-Ducar, Jesus de Mingo, Iñigo Salinas, Universidad de Zaragoza, Spain
- 400 **A Concurrent Triple-Band Digital Transmitter Using Feedforward Noise Cancellation for Delta-Sigma Modulation**
SungWon Chung¹, Rui Ma¹, Shintaro Shinjo², Koji Yamanaka², Koon Hoo Teo¹
¹MERL, USA; ²Mitsubishi Electric, Japan
- 404 **Performance of the First Three Preproduction 35–50GHz Receiver Front-Ends for Atacama Large Millimeter/Submillimeter Array**
Yuh-Jing Hwang¹, Chau-Ching Chiong¹, Yau-De Huang¹, Chi-Den Huang², Ching-Tang Liu², Fang-Chia Hsieh², Yen-Hsiang Tseng², Po-Han Chiang¹, Chih-Cheng Chang¹, Chin-Ting Ho¹, Shou-Ting Jian¹, Chien-Feng Lee¹, Yi-Wei Lee¹, Alvaro Gonzalez³, John Effland⁴, Kamaljeet Saini⁴, Marian Pospieszalski⁴, Ricardo Finger⁵, Valeria Tapia⁵, Nicolas Reyes⁵
¹Academia Sinica, Taiwan; ²NCSIST, Taiwan; ³NAOJ, Japan; ⁴NRAO, USA; ⁵Universidad de Chile, Chile
- 408 **Microstrip Fractal-Based Phase Shifter: An UHF Phase Shifter Based on with Hilbert's Fractal Delay Lines**
Elias M.F. de Oliveira¹, Leon P. Pontes², Crislane P.N. da Silva², Marcos T. de Melo², Bruno G.M. de Oliveira³, Ignacio Llamas-Garro⁴
¹UFRPE, Brazil; ²UFPE, Brazil; ³IFPE, Brazil; ⁴CTTC, Spain
- 411 **An UHF Rectifier with 100% Bandwidth Based on a Ladder LC Impedance Matching Network**
Spyridon Nektarios Daskalakis¹, Apostolos Georgiadis¹, Ana Collado¹, Manos M. Tentzeris²
¹Heriot-Watt University, UK; ²Georgia Institute of Technology, USA
- 415 **Wide Dynamic Range Rectifier Circuit with Sequential Power Delivery Technique**
Koshi Hamano¹, Ryuya Tanaka¹, Satoshi Yoshida¹, Hiroto Sakaki¹, Kenjiro Nishikawa¹, Shigeo Kawasaki², Kunihiro Kawai³, Hiroshi Okazaki³, Shoichi Narahashi³, Naoki Shinohara⁴
¹Kagoshima University, Japan; ²JAXA, Japan; ³NTT DOCOMO, Japan; ⁴Kyoto University, Japan
- 419 **Towards New Vistas in Preamplifier Design for MRI**
Daniel H. Johansen, Juan D. Sanchez-Heredia, Vitaliy Zhurbenko, Jan H. Ardenkjær-Larsen, Technical University of Denmark, Denmark