

2016 IEEE Compound Semiconductor Integrated Circuit Symposium (CSICS 2016)

**Austin, Texas, USA
23-26 October 2016**



**IEEE Catalog Number: CFP16GAA-POD
ISBN: 978-1-5090-1609-9**

**Copyright © 2016 by the Institute of Electrical and Electronics Engineers, Inc
All Rights Reserved**

Copyright and Reprint Permissions: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

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

IEEE Catalog Number:	CFP16GAA-POD
ISBN (Print-On-Demand):	978-1-5090-1609-9
ISBN (Online):	978-1-5090-1608-2
ISSN:	1550-8781

Additional Copies of This Publication Are Available From:

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

CURRAN ASSOCIATES INC.
proceedings
.com

TABLE OF CONTENTS

SESSION A: Plenary Session

Chairpersons: *Brian Moser, Qorvo*
Peter Zampardi, Qorvo

A.1	Towards Next Generations of Silicon Photonics	1
	<i>S.Cremer¹, C. Baudot¹, N. Vulliet¹, J.Durel¹, C. Durand¹, H. Petiton¹, F. Boeuf¹, and E. Temporiti²</i>	
	¹ <i>STMicroelectronics, France; </i> ² <i>STMicroelectronics, Italy</i>	
A.2	Reconfigurable Electronics for Adaptive RF Systems.....	5
	<i>Roy H. Olsson¹, Kyle Bunch², and Christal Gordon²</i>	
	¹ <i>Defense Advanced Research Projects Agency (DARPA), Microsoft Technologies Office (MTO), United States;</i>	
	² <i>Booz Allen Hamilton, United States</i>	
A.3	The EU DOTSEVEN Project: Overview and Results.....	9
	<i>M. Schroter^{1,2}, J. Boeck³, V. d'Alessandro⁴, S. Fregonese⁵, B. Heinemann⁶, C. Jungemann⁷, W. Liang¹,</i>	
	<i>H. Kamran¹, A. Mukherjee¹, A. Pawlak¹, U. Pfeiffe⁸, N. Rinaldi⁴, N. Sarmah⁸, T. Zimmer⁵, and G. Wedel¹</i>	
	¹ <i>TU Dresden, Germany; </i> ² <i>UC San Diego, United States; </i> ³ <i>Infineon Technologies, Germany; </i> ⁴ <i>U. Napoli, Italy</i>	
	⁵ <i>IMS U. Bordeaux, France; </i> ⁶ <i>IHP, Germany; </i> ⁷ <i>RWTH Aachen, Germany; </i> ⁸ <i>University Wuppertal, Germany</i>	
A.4	Advanced Antenna Architectures for THz Sensing Instruments.....	13
	<i>Andrea Neto, Delft University of Technology, The Netherlands</i>	
A.5	Millimeter Wave: The Future of Commercial Wireless Systems	16
	<i>Robert W. Heath Jr., The University of Texas at Austin, United States</i>	

SESSION B: Reconfigurable RF Components and Systems

Chairpersons: *Tony Quach, Air Force Research Laboratory*
Nabil El-Hinnawy, Northrop Grumman Mission Systems

B.1	Reconfigurable RF Components for Multifunction RF Systems	20
	<i>Stephen Hary¹, Taylor Barton², and John Ebel¹</i>	
	¹ <i>Air Force Research Laboratory, WPAFB, United States; </i> ² <i>University of Colorado Boulder, United States</i>	
B.2	Multi-octave and Frequency-agile LNAs Covering S-C Band using 0.25 μm GaN Technology	24
	<i>A. Mattamana¹, W. Gouty¹, W. Khalil², P. Watson¹, and V. J. Patel¹</i>	
	¹ <i>Air Force Research Laboratory, WPAFB, United States; </i> ² <i>The Ohio State University, United States</i>	
B.3	Integrated Dual-Channel X-Band Offset-Transmitter for Phase Steering and DDMA Arrays.....	29
	<i>Johan C. J. G. Withagen¹, A. J. Annema¹, B. Nauta¹, and F. E. van Vliet^{1,2}</i>	
	¹ <i>University of Twente, The Netherlands; </i> ² <i>TNO, The Netherlands</i>	
B.4	A Wide-Band Complementary Digital Driver for Pulse Modulated Single-Ended and Differential S/C Bands Class-E PAs in 130 nm GaAs Technology	33
	<i>Shahriar Rashid¹, Brian Dupaix¹, Paul Watson², Wagdy Gaber¹, Vipul J. Patel², Aji Mattamana²,</i>	
	<i>Steven Dooley², Matthew LaRue¹, and Waleed Khalil¹</i>	
	¹ <i>The Ohio State University, United States; </i> ² <i>The Air Force Research Laboratory, WPAFB, United States</i>	

SESSION C: GaN HEMT Physical Characterization

Chairpersons: *Tomoya Kaneko, NEC*
Robert Howell, Northrop Grumman

C.1	Mechanism of Current-Collapse-Free Operation in E-mode GaN Gate Injection Transistors Employed for Efficient Power Conversion	37
	<i>Kenichiro Tanaka, Tatsuo Morita, Hidekazu Umeda, Satoshi Tamura, Hidetoshi Ishida, Masahiro Ishida, and Tetsuzo Ueda Panasonic Corporation, Japan</i>	
C.2	Electron Mobility and Self-Heat Modeling of AlN/GaN MIS-HEMTs with Embedded Source Field-Plate Structures	41
	<i>H. Aoki¹, N. Tsukiji¹, H. Sakairi², K. Chikamatsu², N. Kuroda², S. Shibuya¹, K. Kurihara¹, M. Higashino¹, H. Kobayashi¹, and K. Nakahara² ¹<i>Gunma University, Japan; ²ROHM Co., Ltd., Japan</i></i>	
C.3	Time-resolved Micro-beam X-ray Absorption Fine Structure (XAFS) Measurement to Investigate the Cause of a Current Collapse of GaN-HEMTs	45
	<i>Yasunori Tateno¹, Tsuyoshi Kouchi¹, Tsutomu Komatani², Hiroshi Yamamoto², Takumi Yonemura¹, Junji Iihara¹, Yoshihiro Saito¹, and Takashi Nakabayashi¹ ¹<i>Sumitomo Electric Industries, Ltd, Japan; ²Sumitomo Electric Device Innovation, Inc., Japan</i></i>	

SESSION D: Millimeter-wave Circuits Using State-of-the-Art Transistors

Chairpersons: *Kazuya Yamamoto, Mitsubishi Electric*
Marc Roccia, OMMIC

D.1	SiGe Technology as a Millimeter-wave Platform: Scaling Issues, Reliability Physics, Circuit Performance, and New Opportunities	49
	<i>John D. Cressler, Chris Coen, Saeed Zeinolabedinzadeh, Peter Song, Rob Schmid, Michael Oakley, and Partha Chakraborty, Georgia Institute of Technology, United States</i>	
D.2	Ka-band LNA MMIC's Realized in $f_{\max} > 580$ GHz GaN HEMT Technology	62
	<i>Miro Micovic, David Brown, Dean Regan, Joel Wong, Joe Tai, Ara Kurdoghlian, Florian Herrault, Yan Tang, Shawn D. Burnham, Helen Fung, Adele Schmitz, Isaac Khalaf, Dayward Santos, Eric Prophet, Hector Bracamontes, Chuck McGuire, and Robert Grabar HRL Laboratories LLC, United States</i>	
D.3	Broadband E-band Power Amplifier MMIC based on an AlGaN/GaN HEMT Technology with 30 dBm Output Power	66
	<i>Dirk Schwantuschke, Birte-Julia Godejohann, Steffen Breuer, Peter Brückner, Michael Mikulla, Rüdiger Quay, and Oliver Ambacher Fraunhofer Institute for Applied Solid-State Physics, Germany</i>	
D.4	6W Ka Band Power Amplifier and 1.2dB NF X-band Amplifier using a 100nm GaN/Si Process	70
	<i>Rémy Leblanc, Noelia Santos Ibeas, Ahmed Gasmi, Francis Auvray, Julien Poulain, François Lecourt, Gulnar Dagher, and Peter Frijlink OMMIC, France</i>	

SESSION E: Mixed-Signal Circuits and Interconnects for 100G+ Systems

Chairpersons: *Yuriy Greshishchev, Ciena
James Buckwalter, UCSB*

E.1	CMOS ADCs Towards 100 GS/s and Beyond	74
	<i>Lukas Kull, Danny Luu, Pier Andrea Francese, Christian Menolfi, Matthias Braendli, Marcel Kossel, Thomas Morf, Alessandro Cevrero, Ilter Oezkaya, Hazar Yueksel, and Thomas Toifl IBM Research, Switzerland</i>	
E.2	Analog and Mixed-Signal Millimeter-Wave SiGe BiCMOS Circuits: State of the Art and Future Scaling.....	78
	<i>Sorin P. Voinigescu, Stefan Shopov, James Hoffman, and Konstantinos Vasilakopoulos, University of Toronto, Canada</i>	
E.3	Interconnect Technologies for Terabit-per-second Die-to-Die Interfaces	82
	<i>Behzad Dehlaghi¹, Rudy Beerken², Davide Tonietto², and Anthony Chan Carusone¹ ¹University of Toronto, Canada; ² Huawei Canada Research Centre, Canada</i>	

SESSION F: Broadband THz Systems and Applications

Chairpersons: *William Peatman, II-VI, Inc
Zach Griffith, Teledyne Scientific*

F.1	Terahertz Sources and Receivers for Science Applicationsand Test & Measurement Systems	86
	<i>Thomas W. Crowe, Jeffrey L. Hesler, Eric Bryerton, and Steven A. Retzloff Virginia Diodes Inc. (VDI), United States</i>	
F.2	Broadband GaN DHFET Traveling Wave Amplifiers with up to 120 GHz Bandwidth.....	90
	<i>David F. Brown, Ara Kurdoghlian, Robert Grabar, Dayward Santos, Jesus Magadia, Helen Fung, Joe Tai, Isaac Khalaf, and Miroslav Micovic HRL Laboratories LLC, United States</i>	
F.3	Terahertz Detection and Imaging Systems and Applications.....	94
	<i>Erich N. Grossman and J. G. Cheron National Institute of Standards and Technology,United States</i>	
F.4	Ultra-wideband mm-Wave InP Power Amplifiers in 130 nm InP HBT Technology	98
	<i>Robert Maurer¹, Seong-Kyun Kim¹, Miguel Urteaga², and Mark Rodwell¹ ¹ University of California at Santa Barbara, United States ²Teledyne Scientific and Imaging, United States</i>	

SESSION G: GaN on Diamond

Chairpersons: *Bruce Green, NXP Semiconductors
Avram Bar-Cohen, University of Maryland*

G.1	Prospects for Gallium Nitride-on-Diamond Transistors	102
	<i>J. D. Blevins and G. D. Via Air Force Research Laboratory (AFRL), United States</i>	
G.2	Characterization of the Thermal Conductivity of CVD Diamond for GaN-on-Diamond Devices.....	106
	<i>Luke Yates¹, Aditya Sood², Zhe Cheng¹, Thomas Bougher¹, Kirkland Malcolm¹, Jungwan Cho², Mehdi Asheghi², Kenneth Goodson², Mark Goorsky³, Firooz Faili⁴, Daniel J. Twitchen⁴, and Samuel Graham¹</i>	
	<i>¹Georgia Institute of Technology, United States; ²Stanford University, United States ³University of California Los Angeles, United States; ⁴ Element Six Technologies, United States</i>	
G.3	Investigation of Stresses in GaN HEMT Layers on a Diamond Substrate using Micro-Raman Spectroscopy.....	110
	<i>B. Logan Hancock, Mohammad Nazari, Jonathan Anderson, Edwin L. Piner, and Mark W. Holtz Texas State University, United States</i>	
G.4	Elimination of Leakage in GaN-on-diamond.....	114
	<i>B. Alvarez¹, D. Francis¹, F. Faili¹, F. Lowe¹, D. Twitchen¹, K.B. Lee², P. Houston² ¹Element Six, Santa Clara, United States; ²University of Sheffield, United Kingdom</i>	

SESSION H: High-Speed Circuits for Optical and Electrical Links

Chairpersons: *Thé Linh Nguyen, Finisar Corporation
Cheng Li, Hewlett Packard Labs*

H.1	70+Gb/s VCSEL-based Multimode Fiber Links	118
	<i>Daniel M. Kuchta, Alexander V. Rylyakov¹, Fuad E. Doany, Clint L. Schow², Jonathan E. Proesel, Christian W. Baks, Petter Westbergh³, Johan S. Gustavsson⁴, and Anders Larsson⁴ IBM T. J. Watson Research Center, United States</i>	
	<i>¹Now at Coriant Advanced Technology Group, United States ²Now at UC Santa Barbara, United States ³Finisar Inc., United States; ⁴Chalmers University of Technology, Sweden</i>	
H.2	A 45-mW 50-Gb/s Linear Shunt LD Driver in 0.5-um InP HBT Technology	122
	<i>Toshiki Kishi¹, Munehiko Nagatani¹, Shigeru Kanazawa², Wataru Kobayashi¹, Takahiko Shindo¹, Hiroshi Yamazaki¹, Minoru Ida¹, Kenji Kurishima¹, and Hideyuki Nosaka¹ ¹NTT Device Technology Laboratories, Japan; ²NTT Device Innovation Center, Japan</i>	
H.3	Digital Clock and Data Recovery Circuits for Optical Links.....	126
	<i>Guanghua Shu, Woo-Seok Choi, and Pavan Kumar Hanumolu University of Illinois, United States</i>	
H.4	A 16/32 Gb/s Dual-Mode NRZ/PAM4 SerDes in 65nm CMOS	130
	<i>Ashkan Roshan Zamir, Osama Elhadidy, Hae-Woong Yang, and Samuel Palermo Texas A&M University, United States</i>	

SESSION I: High-Power Amplifier Technology

Chairpersons: *Taylor Barton, University of Colorado Boulder
Jon Mooney, Raytheon*

I.1	Microwave Transistor Power Rectifiers and Applications.....	134
	<i>Zoya Popovic, Ignacio Ramos, Tibault Reveyrand, and Michael Litchfield University of Colorado Boulder, United States</i>	
I.2	X-Band GaN Multi-Level Chireix Outphasing PA with a Discrete Supply Modulator MMIC	138
	<i>Michael Litchfield¹, Tommaso Cappello², Corrado Florian², and Zoya Popovic¹ ¹University of Colorado at Boulder, United States; ²University of Bologna, Italy</i>	
I.3	A 14-GHz, 22-dBm Series Doherty Power Amplifier in 45-nm CMOS SOI	142
	<i>Cooper S. Levy¹, Voravit Vorapipat¹, and James F. Buckwalter² ¹University of California San Diego, United States; ² University of California Santa Barbara, United States</i>	
I.4	High Efficiency 5W/10W 32 - 38GHz Power Amplifier MMICs Utilizing Advanced 0.15µm GaN HEMT Technology	146
	<i>Shuoqi Chen, Sabyasachi Nayak, Charles Campbell, and Elias Reese Qorvo, United States</i>	
I.5	Analysis of Odd-mode Parametric Instabilities at Fundamental Frequency in an X-band MMIC Power Amplifier	150
	<i>S. Dellier¹, L. Mori², J. M. Collantes², A. Anakabe², and C. Campbell³ ¹AMCAD Engineering, France; ²University of the Basque Country (UPV/EHU), Spain ³Qorvo, United States</i>	

SESSION J: Late Breaking News I

Chairpersons: *Pete Zampardi, Qorvo
Simon Wood, Wolfspeed*

J.1	Suitability of InP DHBTs in ET/APT Systems	154
	<i>Peter J. Zampardi¹, Brian Moser², James C. Li³, Divya Gamini², Denny Limanto², and Kathy Muhonen² ¹Qorvo, CA, United States; ² Qorvo, NC, United States; ³HRL Laboratories, United States</i>	
J.2	A High Efficiency High Power Density Harmonic-tuned Ka Band Stacked-FET GaAs Power Amplifier	158
	<i>Duy P. Nguyen, Thanh Pham, Binh L. Pham, and Anh-Vu Pham University of California, Davis, United States</i>	
J.3	A 40 Gbps Micro-Ring Modulator Driver implemented in a SiGe BiCMOS Technology.....	162
	<i>Adel Fatemi¹, Heinrich Klar¹, Friedel Gerfers¹, and Dietmar Kissinger² ¹Technische Universität Berlin, Germany; ²Leibniz-Institut für innovative Mikroelektronik, Germany</i>	
J.4	The Role of Measurement Uncertainty in Achieving First-Pass Design Success	166
	<i>Dylan F. Williams¹, Richard A. Chamberlin¹, Wei Zhao², Jerome Cheron¹, and Miguel E. Urteaga³ ¹ National Institute of Standards and Technology (NIST), United States ²Xidian University, China; ³Teledyne Scientific, United States</i>	

SESSION K : Noise and Non-Linear Modeling

Chairpersons: *Mikael Garcia, Analog Devices
Michael Schroter, TU Dresden/UCSD*

K.1	Microwave Noise Analysis in InP and GaAs HBTs.....	170
	<i>Paulius Sakalas^{1,2}, Tobias Nardmann¹, Artur Šimukovic² Michael Schroter^{1,3}, and Herbert Zirath⁴</i>	
	<i>¹Technische Universität Dresden, Germany; ²FRL Semiconductor Physics Institute of Center of Physical Sciences and Technology, Lithuania; ³University of California, La Jolla, United States ⁴Chalmers University of Technology, Sweden</i>	
K.2	VNA Based Measurements and Nonlinear Modeling for Efficient RF Circuit Design	174
	<i>S. Dellier, A. Xiong, C. Charbonniaud, C.Maziere, C. Enguehard, and T.Gasseling Amcad Engineering, France</i>	
K.3	Distortion in Difference Frequency under Two-Tone Signal Input Evaluated with Volterra Series Analysis.....	178
	<i>Keiichi Tamesue, Takashi Egawa, and Akio Wakejima Nagoya Institute of Technology, Japan</i>	

SESSION L: GaN HEMT Modeling

Chairpersons: *Subrata Halder, Qorvo
Parrish Ralston, Northrop Grumman*

L.1	Physical Model of RF Leakage in GaN HEMTs on Si Substrates based on Atomic Diffusion Analysis at Buffer/Substrate Interface.....	182
	<i>Yutaro Yamaguchi¹, Jun Kamioka¹, Shintaro Shinjo¹, Koji Yamanaka¹, and Toshiyuki Oishi²</i>	
	<i>¹Mitsubishi Electric Corporation, Japan; ²Saga University, Japan</i>	
L.2	Transient Thermal Response Impact of 3.5GHz GaN HEMT Amplifier on TDD LTE Spectrum and its Improvement Based on a Thermal Equivalent Circuit Approach	186
	<i>Kazuya Ohgami, Yoji Murao and Tomoya Kaneko NEC Corporation, Japan</i>	
L.3	The Impact of AlN Spacer on Forward Gate Current and Stress-Induced Leakage Current (SILC) of GaN HEMT	190
	<i>Chung-hsu Chen, Dave Wang, Daniel Hou, Yuefei Yang, Wing Yau, Robert Sadler, William Sutton, JeoungChill Shim, and Shiguang Wang Global Communication Semiconductors, LLC, United States</i>	
L.4	Compact Thermal Modeling of GaN HEMT Devices for Pulsed and CW Applications	194
	<i>Jiang Liu¹, Miriam Calvo¹, Larry Dunleavy¹, Hugo Morales¹, Richard Martin², Mark Woods², and Neil Craig²</i>	
	<i>¹Modelithics, Inc., United States; ²Qorvo, Inc., United States</i>	

SESSION M: E- and W-band Technology and Circuits

Chairpersons: *Herbert Knapp, Infineon
Miro Micovic, HRL Laboratories*

M.1	Si-based Technologies for mmWave Automotive Radar	198
	<i>J. P. John, J. Kirchgessner, R. Ma, D. Morgan, I. To, and V. P. Trivedi</i>	
	<i>NXP Semiconductors, United States</i>	
M.2	Ultra-Low-Power Components for a 94 GHz Transceiver	202
	<i>Seong-Kyun Kim¹, Robert Maure¹, Arda Simsek¹, Miguel Urteaga² and Mark J. W. Rodwell¹</i>	
	<i>¹University of California at Santa Barbara, United States;</i>	
	<i>²Teledyne Scientific and Imaging, United States</i>	
M.3	A 20 Gbit/s RFDAC-based Direct-Modulation W-band Transmitter in 32nm SOI CMOS	206
	<i>Hasan Al-Rubaye and Gabriel M. Rebeiz</i>	
	<i>University of California at San Diego, United States</i>	
M.4	35nm InP HEMT LNAs at E/W-Band Frequencies	210
	<i>Nicholas Estella, Lani Bui, Edmar Camargo, and James Schellenberg</i>	
	<i>QuinStar Technology, Inc., United States</i>	

SESSION N: High Power GaN

Chairpersons: *Kazutaka Inoue, Sumitomo Electric
Ken Chu, BAE*

N.1	High-Power-Density InAlGaN/GaN-HEMT Technology for W-band Amplifier	213
	<i>K. Makiyama,^{1,2,3}, Y. Niida^{1,2}, S. Ozaki^{1,2}, T. Ohki^{1,2}, N. Okamoto^{1,2}, Y. Minoura^{1,2},</i>	
	<i>M. Sato^{1,2}, Y. Kamada^{1,2}, K. Joshin^{1,2}, K. Watanabe^{1,2}, and Y. Miyamoto³,</i>	
	<i>¹Fujitsu Ltd, Japan; ²Fujitsu Laboratories Ltd., Japan; ³Tokyo Institute of Technology, Japan</i>	
N.2	A GaN-based 10.1MHz Class-F⁻¹ 300 W Continuous Wave Amplifier Targeting Industrial Power Applications	217
	<i>Florian A. Maier¹, Daniel Krausse¹, Daniel Gruner¹, Richard Reine²,</i>	
	<i>Patrick Waltereit², Ruediger Quay², and Oliver Ambacher²</i>	
	<i>¹TRUMP Huettinger GmbH & Co. KG, Germany</i>	
	<i>²Fraunhofer Institute of Applied Solid State Physics, Germany</i>	
N.3	650 V Highly Reliable GaN HEMTs on Si Substrates over Multiple Generations- Matching Silicon CMOS Manufacturing Metrics and Process Control	221
	<i>Saurabh Chowdhury, YiFeng Wu, Likun Shen, Kurt Smith, Peter Smith, Toshihide Kikkawa, John Gitters,</i>	
	<i>Lee McCarthy, Rakesh Lal, Ronald Barr, Zhan Wang, Umesh Mishra, and Primit Parikh</i>	
	<i>Transphorm, United States</i>	
N.4	150 V-Bias RF GaN for 1 kW UHF Radar Amplifiers	225
	<i>Gabriele Formicone, Jeff Burger, and James Custer</i>	
	<i>Integra Technologies, Inc., United States</i>	

SESSION O: Components for Advanced Optical Front-End

Chairpersons: *Munehiko Nagatani, NTT Corporation*
Craig Steinbeiser, Qorvo

O.1	InP Segmented Mach-Zehnder Modulators with Advanced Electro-Optical Functionalities	229
	<i>Alessandro Aimone</i> <i>Fraunhofer Heinrich-Hertz-Institut, Germany</i>	
O.2	A 56-Gb/s Transimpedance Amplifier in 0.13-um SiGe BiCMOS for an Optical Receiver with -18.8-dBm Input Sensitivity	233
	<i>Kentaro Honda¹, Hiroaki Katsurai², Masahiro Nada², Masafumi Nogawa², and Hideyuki Nosaka²</i> ¹ <i>NTT Device Innovation Center, Japan;</i> ² <i>NTT Device Technology Labs, Japan</i>	
O.3	Highly-Integrated Quad-Channel Transimpedance Amplifier for Next Generation Coherent Optical Receiver	237
	<i>Rajanish Pandey¹, Greg Takahashi¹, Shanthi Bhagavatheevaran¹, Eric Tangen¹, Matt Heins¹, and Jens Muellrich³</i> ¹ <i>Qorvo, TX, United States;</i> ² <i>Qorvo, CA, United States;</i> ³ <i>Micram Microelectronic GmbH, Germany</i>	
O.4	Silicon Electronics-Photonics Integrated Circuits for Datacenters	241
	<i>Sudip Shekhar, Lukas Chrostowski, Shahriar Mirabbasi, Spoorthi Nayak, Mohammed W. AlTaha, Ahmed Naguib, Ajith S. Ramani, and Hasitha Jayatilleka</i> <i>University of British Columbia, Canada</i>	

SESSION P: Low Noise Amplifiers

Chairpersons: *Don Kimball, MaXentric*
Shuoqi Chen, Qorvo

P.1	Wideband W-Band GaN LNA MMIC with State-of-the-Art Noise Figure	245
	<i>S. Lardizabal¹, K. C. Hwang¹, J. Kotce¹, A. Brown¹, and A. Fung²</i> ¹ <i>Raytheon Company, United States;</i> ² <i>California Institute of Technology, United States</i>	
P.2	Low Power Ultra-Wide Band LNA based on Active Impedance Matching Technique for UWB Wireless Communication	249
	<i>Mantas Sakalas¹, Paulius Sakalas², and Frank Ellinger¹</i> ¹ <i>Chair for Circuit Design and Network Theory, Helmholtzstr., Germany;</i> ² <i>Chair for Electronic Devices and Integrated Circuits, Helmholtzstr., Germany</i>	
P.3	Broadband (100MHz -1GHz), High Power Active Circulator Architecture	253
	<i>Jongchan Kang, Hasan Sharifi, H.P. Moyer, and Eric Prophet</i> <i>HRL Laboratories LLC, United States</i>	
P.4	X-band Robust Current-Shared GaN Low Noise Amplifier for Receiver ApplicationsSubstrate	257
	<i>Bumjin Kim and Weixiang Gao</i> <i>Qorvo, TX, United States</i>	

SESSION Q: Next Generation Device Technologies

Chairpersons: Noriyuki Watanabe, NTT AT Akio Wakejima, Nagoya Institute of Technology	
Q.1 Research and Development of InP, GaN and InSb-based HEMTs and MMICs for Terahertz-wave Wireless Communications	261
<i>I. Watanabe¹, Y. Yamashita¹, A. Endoh^{1,3}, S. Hara¹, A. Kasamatsu¹, I. Hosako¹, H. Hamada², T. Kosugi², M. Yaita², A. E. Moutaouakil², H. Matsuzaki², O. Kagami², T. Takahashi³, Y. Kawano³, Y. Nakasha³, N. Hara³, D. Tsuji⁴, K. Isono⁴, S. Fujikawa⁴, and H. I. Fujishiro⁴</i>	
<i>¹National Institute of Information and Communications Technology (NICT), Japan;</i>	
<i>²NTT Corporation, Japan; ³Fujitsu Laboratories Ltd., Japan;</i>	
<i>⁴Tokyo University of Science, Japan</i>	
Q.2 Recent Progress of Diamond Devices for RF Applications.....	265
<i>Makoto Kasu and Toshiyuki Oishi, Saga University, Japan</i>	
Q.3 H-Terminated Diamond MISFETs with V2O5 as Insulator	269
<i>S. Colangelo¹, C. Verona¹, W. Ciccognani¹, M. Marinelli¹, G. Verona Rinati¹, E. Limiti¹, M. Benetti³, D. Cannata³, and F. Di Pietrantonio³</i>	
<i>¹Electronic Eng. dept., Università di Roma Tor Vergata, Italy;</i>	
<i>²Industrial Eng. dept., Università di Roma Tor Vergata, Italy;</i>	
<i>³CNR, Istituto di Acustica e Sensoristica, Italy</i>	
Q.4 High-Performance SLCFETs for Switched Filter Applications	273
<i>Justin Parke, Ron Freitag, Matt Torpey, Robert S. Howell, Eric J. Stewart, Megan Snook, Ishan Wathuthanthri, Shalini Gupta, Bettina Neschay, Matthew King, Pavel Borodulin, Karen Renaldo, and H. George Henry Northrop Grumman Corporation (Mission Systems), United States</i>	

SESSION R: Late-Breaking News II

Chairpersons: Thé Linh Nguyen, Finisar Corporation Craig Steinbeiser, Qorvo	
---	--

R.1 A Wideband 341-386 GHz Transmitter in SiGe BiCMOS Technology	277
<i>Jidan Al-Eryani^{1,2}, Herbert Knapp², Jonas Wursthorn^{1,2}, Klaus Aufinger², Muhammad Furqan³, Faisal Ahmed³, Hao Li², Soran Majied², and Linus Maurer¹</i>	
<i>¹Universität der Bundeswehr München, Germany; ²Infineon Technologies AG, Germany</i>	
<i>³Johannes Kepler University, Austria</i>	
R.2 A 10-Gb/s, 100-GHz RF Power-DAC Transmitter with On-Die I/Q Driven Antenna Elements and Free-Space Constellation Formation.....	281
<i>S. Shopov¹, O. D. Gurbuz², G. M. Rebeiz², and Sorin P. Voinigescu¹</i>	
<i>¹University of Toronto, Canada; ²University of California, San Diego, United States</i>	