

# **2018 IEEE MTT-S Latin America Microwave Conference (LAMC 2018)**

**Arequipa, Peru  
12 – 14 December 2018**



**IEEE Catalog Number: CFP18E52-POD  
ISBN: 978-1-5386-7334-8**

**Copyright © 2018 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 is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.***

IEEE Catalog Number:	CFP18E52-POD
ISBN (Print-On-Demand):	978-1-5386-7334-8
ISBN (Online):	978-1-5386-7333-1

**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](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

CURRAN ASSOCIATES INC.  
**proceedings**  
.com

# Table of Contents

## Modeling, characterization and simulation

A New Sensor for Temperature Self-Protection of Integrated Circuits in CMOS Technology.....1

Luis Antonio Quispe Cartagena (Universidade de São Paulo, Brazil); Silvio E. Barbin (University of Sao Paulo, Brazil)

Accurate and Efficient Radiation Test Solutions for 5G and Millimeter Wave Devices.....5

Francesco Saccardi, Lars Foged, Lucia Scialacqua and Alessandro Scannavini (Microwave Vision Italy, Italy); Luc Duchesne, Nicolas Gross and Fabrice Herbinere (MVG Industries, France); Per Iversen and Roni Braun (Orbit/FR, USA)

Development of an Automatic Passive Coaxial Load Pull Tuner.....9

Valentin Pertierra, Francisco Maiocchi, Lisandro Robles, Uriel Padilla and Javier Esarte (Universidad Tecnológica Nacional - FRBA, Argentina); Alejandro Henze and Guillermo Monasterios (Universidad Tecnológica Nacional & UTN - FRBA, Argentina)

Electromagnetic characterization of hemp concrete in the 2.4 GHz WIFI frequency band.....13

Mehdi Ferhat (Université Paris Saclay, France)

Evaluation of a Segmented Approach to Model PCB-Based Links of a PCIe Bus.....17

Javier Aparicio-Morales and Renato Rimolo-Donadio (Instituto Tecnológico de Costa Rica, Costa Rica); Gabriel Gamboa-Gonzalez, Rolando Moraga-Mora and Juan Rojas-Fernandez (Intel Costa Rica, Costa Rica)

Microwave transistor model including electronic mobility prediction.....20

Guillermo Rafael-Valdivia (Universidad San Pablo. Arequipa Peru, Peru)

Selecting Surrogate-Based Modeling Techniques for Power Integrity Analysis.....23

Felipe Leal-Romo (ITESO - The Jesuit University of Guadalajara & Intel Guadalajara Design Center, Mexico); Jose Luis Chavez-Hurtado and Jose E. Rayas-Sanchez (ITESO - The Jesuit University of Guadalajara, Mexico)

Solution of Electromagnetic Problems in Cartesian, Spherical and Cylindrical Coordinates by Green's Function Method.....26

Sergey Shabunin and Sergey Knyazev (Ural Federal University, Russia)

Two States Devices and Hyperbolic Trigonometry.....30

Manuel Navarro (Universidad San Francisco de Quito (USFQ), Ecuador)

## Passive components and antennas

A Planar Multiband Balanced Bandstop Filter.....33

Dubari Borah and Ts Kalkur (University of Colorado, Colorado Springs, USA)

Alumina Passives Using the Interconnect Layer of Metal-Embedded Chip Assembly Processing.....36

José Estrada and Zoya Popović (University of Colorado at Boulder, USA); Gregor Lasser (University of Colorado, Boulder, USA); Mauricio Pinto (University of Colorado Boulder, USA); Florian Herrault (HRL Laboratories, USA)

An H-Shaped, Differential Antenna, for 5G/FR1 Applications.....40

Rida Gadhafi (Khalifa University of Science and Technology, United Arab Emirates); Dan Cracan (Masdar Institute, United Arab Emirates); Ademola Mustapha and Mihai Sanduleanu (Masdar Institute of Science and Technology, United Arab Emirates)

An Implemented 3D Printed Circular Waveguide Antenna for K Band Applications.....44

Sthefany Alvarez Navarro (Pontificia Universidad Católica del Perú, Peru); Manuel Augusto Yarleque Medina (PUCP, Peru); Hansel Martínez Odiaga (Pontificia Universidad Católica del Perú, Peru)

Analysis of Measured Coupling between Adjacent Elements of a Dual-Polarized Vivaldi-Antenna System for a VHF GPR.....47

Kenny Cucho-meza and Juan Alvarez-Montoya (Instituto Nacional de Investigación y Capacitación en Telecomunicaciones Peru, Peru); Diego Penaloza Aponte and Mark Clemente Arenas (Instituto Nacional de Investigación y Capacitación en Telecomunicaciones & INICTEL-UNI, Peru)

Aperture-Coupled Koch Fractal on-Chip Antennas for 60 GHz ISM Band.....51

Samuel Morais and Ivana Guarany (Federal University of Campina Grande, Brazil); Raimundo Freire (Universidade Federal de Campina Grande - PB, Brazil); Alexandre Serres (UFCG, Brazil); Paulo Fernandes da Silva Júnior (Universidade Estadual do Maranhão, Brazil); Ewaldo Santana (University of State of Maranhao, Brazil); Paulo Silva (Federal Institute of Education, Science and Technology of Paraíba, Brazil)

Compact L-band filter in a k-band radiometer for atmospheric attenuation over line-of-sight links.....54

Celso Gutierrez-Martínez (Instituto Nacional de Astrofísica, Óptica y electrónica (INAOE), Mexico)

Coplanar Stripline Reconfigurable Bandpass Filter with Variable Notch Band Frequency.....57

George E. Ponchak (NASA Glenn Research Center, USA)

Coplanar Stripline Switch Based Lattice Circuit with Even Mode Suppression.....60

George E. Ponchak (NASA Glenn Research Center, USA)

Design and Implementation of a Submersible Split Ring Resonator Based Sensor for Pisco Concentration Measurements.....63

Alana de los Angeles Nuñez Flores (Catholic Saint Pool University, Peru); Patricia Castillo (Catholic Saint Pool University, Peru); Daniel Segovia-Vargas and Alejandro García-Lampérez (Universidad Carlos III de Madrid, Spain)

Design of a 4G/LTE Multiband Antenna Considering Curvature Effects.....67

Rolando Coto-Salazar and Renato Rimolo-Donadio (Instituto Tecnológico de Costa Rica, Costa Rica)

Design of a Butler Matrix for Switched Beam Application.....70

Samuel Morais (Federal University of Campina Grande, Brazil); Arthur Cesare-Herriau and Tanguy Batut (ENSEIRB-MATMECA, France); Alexandre Serres (UFCG, Brazil); Anthony Ghiotto (University of Bordeaux, France)

Design of a C-band High Gain Microstrip Antenna Array for CubeSat Standard.....73

Vladimir Juarez Ortiz (Space Agency of Peru & CONIDA, Peru); Robert Perea-Tamayo (Space Agency of Perú - CONIDA, Peru)

Design of a Multi-band Microwave and Millimeter-Wave 4-bit Step Attenuator for Phased Arrays.....76

Juseok Bae (Qualcomm Technologies, Inc., USA); Cam Nguyen and Meng-Jie Hsiao (Texas A&M University, USA)

Design of a SIW Chebyshev Bandpass Filter with Inductive Coupling.....79

Samuel Morais and Maraiza dos Santos (Federal University of Campina Grande, Brazil); Raimundo Freire (Universidade Federal de Campina Grande - PB, Brazil); Alexandre Serres (UFCG, Brazil); Georgina Serres and Camila Caroline Rodrigues de Albuquerque (Federal University of Campina Grande, Brazil); Henry Baudrand (ENSEEIH, France)

Design of Microstrip Metamaterial-Inspired Antennas for 2.4 GHz Applications.....82

Sebastián Sepúlveda (Universidad de Chile & Centro para el Desarrollo de la Nanociencia y Nanotecnología (CEDENNA), Chile)

Linear Frequency Modulation (LFM) Compression in Surveillance Radars: An Alternative for Target Discrimination in a Multi-Threat Scenario.....86

Renan Richter, Felipe Ivo, Olympio Coutinho and Thiago Pereira (Instituto Tecnológico de Aeronáutica, Brazil)

Metamaterial Inspired Multiband Planar Array to Detect Glyphosate in Water by Real-Time Electromagnetic Wave Sensor.....90

Ebert G San Roman Castillo and Elizabeth Fernandez Aranzamendi (Universidad Católica San Pablo, Peru); Patricia Castillo (Catholic Saint Pool University, Peru); Daniel Segovia-Vargas (Universidad Carlos III de Madrid, Spain)

On the Implementation of a Transmission Line Reflectionless Filter.....93

Charlie Jackson (IEEE, USA)

Replicability of a millimeter-wave microstrip bandpass filter using parallel coupled lines.....97

Marie Mbeutcha (Goethe University Frankfurt, Germany); Tom Johansen, Yunfeng Dong and Bruno Cimoli (Technical University of Denmark, Denmark); Viktor Krozer (Goethe University of Frankfurt am Main, Germany)

V- and W-band Two-Way Waveguide Splitters Fabricated by Metal Additive Manufacturing.....100

Shane Verploegh (University of Colorado Boulder, USA); Zoya Popović (University of Colorado at Boulder, USA)

## RF Design applications

### A Low-cost microwave system for pedestrian speed estimation.....104

Alexis Herrera-Angulo and Efrain Zenteno (Universidad Catolica San Pablo, Peru)

### A method based on RF spectral features for evaluating the porosity degree in ceramic materials.....107

Jimmy Ludeña Choez (Universidad Católica San Pablo, Arequipa, Perú); Rudy Sanchez Suarez (Universidad Católica San Pablo, Arequipa, Perú, Peru); Juan Choquehuanca (Universidad Católica San Pablo, Peru); Fredy Huamán Mamani and Denis Mayta Ponce (Universidad Católica San Pablo, Arequipa, Perú, Peru)

### A Novel High-Performance Length Matching Element for High-Speed Interconnect Differential Channels.....111

Rosa J. Sanchez-Mesa (ITESO - The Jesuit University of Guadalajara & Intel Corporation, Mexico); Diego Cortes-Hernandez and Benjamín Gálvez-Sahagún (Intel, Mexico); Jose E. Rayas-Sanchez (ITESO - The Jesuit University of Guadalajara, Mexico); Zabdiel Brito-Brito (ITESO- The Jesuit University of Guadalajara, Mexico)

### Design Considerations for GaN based X-Band, High Power and High Isolation SPDT T/R Switch.....114

Rehan Akmal and Muhammad Shoaib Arif (National University of Sciences and Technology, Pakistan); Muhammad Saqib and Syed Ali Imran (National University of Science and Technology & College of Aeronautical Engineering, Pakistan)

### Design of a Ka/V-Band CMOS T/R Filter-Switch.....117

Youngman Um (pSemi Corporation, USA); Meng-Jie Hsiao and Cam Nguyen (Texas A&M University, USA)

### EM Parametric Study of Length Matching Elements Exploiting an ANSYS HFSS Matlab-Python Driver.....119

Rosa J. Sanchez-Mesa (ITESO - The Jesuit University of Guadalajara & Intel Corporation, Mexico); Diego Cortes-Hernandez (Intel, Mexico); Jose E. Rayas-Sanchez (ITESO - The Jesuit University of Guadalajara, Mexico); Zabdiel Brito-Brito (ITESO- The Jesuit University of Guadalajara, Mexico); Lizbeth de la Mora-Hernández (ITESO – The Jesuit University of Guadalajara, Mexico)

### Flexible UHF RFID Tag for Human Body Motion Detection.....122

Samuel Morais (Federal University of Campina Grande, Brazil); Alexandre Serres (UFCG, Brazil); Jéssyca Araujo and Camila Caroline Rodrigues de Albuquerque (Federal University of Campina Grande, Brazil); Joabson Nogueira de Carvalho (Instituto Federal de Educação, Ciência e Tecnologia da Paraíba, IFPB, Brazil); Maraiza dos Santos (Federal University of Campina Grande, Brazil)

### Generalized Class-J Theory.....125

Patrick Roblin (The Ohio State University, USA); Hsiu-Chen Chang (Ohio State University, USA); Jose-Maria Gomez-Perez and Jose Martinez-Lopez (Universidad Nacional Autonoma, Mexico)

InP DHBT Ballasted Stacked-Transistor for Millimeter-Wave Power Amplifiers.....128  
Michele Squartecchia and Tom Johansen (Technical University of Denmark, Denmark); Jean-Yves Dupuy (III-V Lab, France); Virginio Midili (Technical University of Denmark, Denmark); Virginie Nodjiadjim (Alcatel-Thales 3-5 Lab, France); Muriel Riet (Alcatel Thales III-V Lab, joint la: Bell Labs and Thales Research and Technology, France); Agnieszka Konczykowska (III-V Lab, France)

Measurement of wood moisture content using microwaves.....131

Nicolás Reyes (Universidad de Chile, Observatorio Cerro Calan, Chile); Diego Gallardo (Universidad de Chile, Ingeniería Eléctrica, Chile); David Monasterio (Universidad de Chile, Chile); Ricardo Finger (University of Chile, Chile)

Power and Performance Analysis for a Small L- Band Total Power Radiometer.....134

Daniel Mera (University of Puerto Rico Mayaguez Campus, USA)

## Wireless Communications systems

A pulse generator using Pulse Amplitude Modulation for IR-UWB in 130nm CMOS process.....138

Luiz Moreira (Catholic University of Santos, Brazil); José Fontebasso, Neto (Universidade Católica de Santos - Unisantos & Universidade de São Paulo - USP, Brazil); Walter Silva Oliveira (Federal University of ABC, Brazil); Thiago Ferauche (Universidade Católica de Santos - Unisantos, Brazil)

Analysis and numeric determination of difference between SNR and CNR in Digital Television ISDB-Tb.....142

Erick Iglesias Rodriguez (Universidad Mayor de San Andres, Bolivia)

Broadcast Emitters Localization Using Power Difference of Arrival.....146

Andres Navarro, William Cruz, Yor J Castaño and Christian Amu (Universidad Icesi, Colombia)

Channel Characterization on Vehicle to Infrastructure Scenarios in 5.8 GHz.....149

Fernando José de Oliveira (Fluminense Federal University, Brazil); Pedro Gonzalez Castellanos (Federal Fluminense University, Brazil); Leni Matos (Fluminense Federal University, Brazil); Orlando M. Alvarenga, Neto (Universidade Federal Fluminense, Brazil); Luiz da Silva Mello (CETUC-PUC-Rio & Inmetro, Brazil); Wilyam Torres Meza (Universidad ALAS Peruanas, Peru)

Design and Evaluation of a Low-Cost CubeSat Communication Relay Constellation.....152

Robert Perea-Tamayo (Space Agency of Perú - CONIDA)

Digital Outphasing Exponential Modulation: A Constant Amplitude Pulsed Modulation for High Efficiency/Linearity, Switched-Mode PA.....156

Yue Xu (Khalifa University, United Arab Emirates)

EBPSK-Based Quadrature Ultra Narrow Band Modulation System.....160

Alex Cartagena Gordillo (Universidad Catolica San Pablo & Universidad Nacional de San Agustín, Peru); Heydi Andrea Murguía Velasquez (Universidad Catolica San Pablo, Peru)

Experimental Characterization of Indoor Mobile Radio Channel in 700 MHz Band.....164

Leonardo G Ribeiro (UFF, Brazil); Leni Matos (Fluminense Federal University, Brazil); Pedro Gonzalez Castellanos (Federal Fluminense University, Brazil); Vitor Luiz Mota (Universidade Federal Fluminense, Brazil); Wilyam Torres Meza (Universidad ALAS Peruanas, Peru)

Implementation of Spectrum Occupancy Measurements Using Cyclostationary Detection.....167

Andres Navarro, Leonardo Vargas and Jaime Aristizabal (Universidad Icesi, Colombia)

Radiopropagation Simulations in 28 GHz, 38 GHz and 60 GHz with 128 Elements Massive MIMO Array for 5G Networks.....170

Javier Arevalo (Fundacion Universidad Autonoma de Colombia & Universidad Nacional de Colombia, Colombia)

Spectrum Sensing for ISDB-TB Systems with Cognitive Radio.....173

Euler Apaza Medina (Universidade de São Paulo, Brazil); Silvio E. Barbin (University of Sao Paulo, Brazil)

Strategic Planning for RF Technologies - Implications for 5G and IoT Emerging Radio Products.....176

John Golio (Golio Endeavors, USA)

Through-Wall Movement Detection based on S-Band FMCW radar: An Experimental Assessment.....180

Sthefany Alvarez Navarro and Hansel Martínez Odiaga (Pontificia Universidad Católica del Perú, Peru); Manuel Augusto Yarleque Medina (PUCP, Peru)

Using Femtocells in TV White Space: Overview and Challenges.....183

Euler Apaza Medina (Universidade de São Paulo, Brazil); Silvio E. Barbin (University of Sao Paulo, Brazil)

## Special Session: Microwave Research and Technology Activities in Spain

A Systematic Investigation of Admittance Domain Behavioral Model Complexity Requirements.....187

M. Rocio Moure (University of Vigo, Spain); Michael Casbon (Cardiff University, United Kingdom (Great Britain)); Nicolas Ladero and Monica Fernandez-Barciela (University of Vigo, Spain); Paul J Tasker (Cardiff University, United Kingdom (Great Britain))

A W-band feeding network design for a single balanced mixer in GCPW technology.....191

Alberto Moreno Montes, Alejandro Rivera-Lavado, Guillermo Carpintero, Alejandro García-Lampérez, Luis Enrique García Muñoz, Magdalena Salazar-Palma and Daniel Segovia-Vargas (Universidad Carlos III de Madrid, Spain)

Additive Manufacturing and Liquid Crystals for New Millimeter-Wave Devices.....194

Adrián Tamayo-Domínguez (Universidad Politecnica de Madrid, Spain); Jose Manuel Fernández González and Manuel Sierra-Castañer (Universidad Politécnica de Madrid, Spain)

Detecting Critical Resonances in Microwave Amplifiers through Noise Simulations.....197

Juan-Mari Collantes (UPV/EHU, Spain); Nerea Otegi, Aitziber Anakabe, Libe Mori and Asier Barcenilla (University of the Basque Country, Spain); Jose M Gonzalez-Perez (UPV/EHU & KAUST, Spain)

New methodologies for the analysis and synthesis of oscillator circuits.....200

Almudena Suarez, Mabel Ponton, Sergio Sancho and Franco Ramirez (University of Cantabria, Spain)

Stub-Loaded Microstrip Line Loaded with Half-Wavelength Resonators and Application to Near-Field Chipless-RFID.....204

Cristian Herrojo (Universitat Autònoma de Barcelona, Spain); Javier Mata-Contreras (University of Malaga, Spain); Jaroslav Havlíček (Czech Technical University in Prague, Czech Republic); Ferran Paredes (Universitat Autònoma de Barcelona, Spain); Ferran Martín (Universidad autónoma de Barcelona, Spain)

Synthesis of tapers using the Coupled-Mode Theory.....207

Jon Percz (Public University of Navarra, Spain); Israel Arnedo, Ivan Arregui, Luis Miranda, Ibai Calero, David Santiago, Magdalena Chudzik and Fernando Teberio (Public University of Navarre, Spain); Petronilo Martin-Iglesias (European Space Agency, The Netherlands); Txema Lopetegui and Miguel Laso (Public University of Navarre, Spain)

Volterra-based behavioral modeling, parameter estimation, and linearization.....211

Carlos Crespo-Cadenas and Maria J. Madero-Ayora (Universidad de Sevilla, Spain); Juan A. Becerra (Universidad de Sevilla, Spain & University of Delaware, USA)

#### ADDITIONAL PAPERS

A High Power and High Linearity 16.5-25.5 GHz 0.18- $\mu\text{m}$  BiCMOS Power Amplifier..... 215

Meng-Jie Hsiao (Texas A&M University, USA), Kyoungwoon Kim (GLOBALFOUNDRIES US INC, USA), Cam Nguyen (Texas A&M University, USA)

On the Continuity of Continuous Inverse Class F Power Amplifiers..... 218

Sagar K. Dhar, Tushar Sharma, Ramzi Darraji, Mohamed Helaoui, and Fadhel M. Ghannouchi (University of Calgary, Canada)

Analysis and Design of Chireix Outphasing Switched Mode Power Amplifier..... 221

Ekta Aggrawal, Karun Rawat (Indian Institute of Technology, India)

GaN-HEMT MMIC with Integrated Class-G Switching Stage for Discrete Level Supply Modulation for 20 GHz Space Applications..... 224

O. Bengtsson, N. Wolff, S. Preis, F. Schnieder, S. Chevtchenko, and W. Heinrich (Leibniz-Institut für Höchstfrequenztechnik, Germany)