

# **ESSCIRC 2021 – IEEE 47th European Solid State Circuits Conference (ESSCIRC 2021)**

**Virtual Conference  
13 – 17 September 2021**



**IEEE Catalog Number: CFP21542-POD  
ISBN: 978-1-6654-3752-3**

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IEEE Catalog Number:	CFP21542-POD
ISBN (Print-On-Demand):	978-1-6654-3752-3
ISBN (Online):	978-1-6654-3751-6

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Time: 17:00 - 18:00  
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<sup>1</sup>Intel Corporation, United States; <sup>2</sup>University of California, Berkeley, United States

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Date: Thursday, September 16, 2021  
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Chair(s): Viola Schaffer; *Texas Instruments*  
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Time: 16:00 - 17:00  
Room: TITANE 1  
Chair(s): Giulio Ricotti; *STMicroelectronics*  
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## SAR ADC

Date: Thursday, September 16, 2021

Time: 17:00 - 18:00

Room: TITANE 1

Chair(s): Piero Malcovati; *University of Pavia*

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<sup>1</sup>*Chengdu Sino Microelectronics Technology, China;* <sup>2</sup>*University of Electronic Science and Technology of China, China*



## Amplifiers

Date: Friday, September 17, 2021  
Time: 15:00 - 16:00  
Room: TITANE 1  
Chair(s): Jens Anders; *University of Stuttgart*  
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## Wireless Architectures

Date: Friday, September 17, 2021  
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Room: PALLADIUM 2  
Chair(s): Salvatore Levantino; *Politecnico di Milano*  
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<sup>1</sup>*Analog Devices Inc., Ireland*; <sup>2</sup>*Qualcomm Technologies, Ireland*; <sup>3</sup>*Robert Bosch Ireland Limited, Ireland*; <sup>4</sup>*University College Dublin, Ireland*

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<sup>1</sup>*IHP – Leibniz-Institut für innovative Mikroelektronik, Germany*; <sup>2</sup>*Leibniz Institute for High Performance Microelectronics, Germany*; <sup>3</sup>*Universität Ulm, Germany*

## SRAM & Memory Interface

Date: Friday, September 17, 2021  
Time: 15:00 - 16:00  
Room: CHROME 2  
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<sup>1</sup>CEA, France; <sup>2</sup>CEA-Leti, Université Grenoble Alpes, France; <sup>3</sup>CEA-List/Leti, Université Grenoble Alpes, France

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<sup>1</sup>Lund University, Sweden; <sup>2</sup>Xenergic AB, Sweden

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*Samsung Electronics, Korea*

## Radar and Wireline

Date: Friday, September 17, 2021  
Time: 16:00 - 17:00  
Room: TITANE 1  
Chair(s): Chris Jacques Rudell; *University of Washington*  
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<sup>1</sup>imec, Belgium; <sup>2</sup>imec, Vrije Universiteit Brussels, Belgium

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<sup>1</sup>ONE Semiconductor, Korea; <sup>2</sup>Seoul National University, Korea; <sup>3</sup>Seoul National University, SK Hynix, Korea

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<sup>1</sup>Huber + Suhner AG, Switzerland; <sup>2</sup>Katholieke Universiteit Leuven, Belgium

## High-speed Data Converters

Date: Friday, September 17, 2021

Time: 16:00 - 17:00

Room: TITANE 2

Chair(s): Lucien Breems; *NXP Semiconductors N.V.*  
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<sup>1</sup>*Ciena Corporation, Canada*; <sup>2</sup>*STMicroelectronics, France*; <sup>3</sup>*University of Toronto, Canada*

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<sup>1</sup>*Eindhoven University of Technology, Netherlands*; <sup>2</sup>*NXP Semiconductors N.V., Netherlands*

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Time: 16:00 - 17:00  
Room: CHROME 2  
Chair(s): Stefan Andersson; *Ericsson*  
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<sup>1</sup>*ASR Microelectronics (Shanghai) Co., Ltd., China;* <sup>2</sup>*ASR Microelectronics Inc., United States*

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## Wireline Circuits & Techniques

Date: Friday, September 17, 2021  
Time: 17:00 - 18:00  
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<sup>1</sup>*Institute of Microelectronics, Chinese Academy of Science, China;* <sup>2</sup>*University of Macau,  
Macau*



## Digital Design Solutions Including AI/ML Techniques (ESSCIRC 2020 SSC-L special edition)

Date: Tuesday, September 14, 2021  
Time: 15:00 - 16:00  
Room: TITANE 1  
Chair(s): Makoto Ikeda; *University of Tokyo*  
Sugako Otani; *Renesas Electronics Corporation*

### **Programmable Fine-Grained Power Management and System Analysis of RISC-V Vector Processors in 28-nm FD-SOI..... Available on Xplore**

Colin Schmidt<sup>5</sup>, Alon Amid<sup>5</sup>, John Wright<sup>1</sup>, Ben Keller<sup>4</sup>, Howard Mao<sup>3</sup>, Keertana Settaluri<sup>5</sup>, Jarno Salomaa<sup>2</sup>, Jerry Zhao<sup>5</sup>, Albert Ou<sup>5</sup>, Krste Asanović<sup>5</sup>, Borivoje Nikolic<sup>5</sup>  
<sup>1</sup>Amazon, United States; <sup>2</sup>Emberion, Finland; <sup>3</sup>Google, United States; <sup>4</sup>Nvidia Corporation, United States; <sup>5</sup>University of California, Berkeley, United States

### **A 0.8-V, 1.54-pJ/940-MHz Dual-Mode Logic-Based 16×16-B Booth Multiplier in 16-nm FinFET..... Available on Xplore**

Netanel Shavit<sup>1</sup>, Inbal Stanger<sup>1</sup>, Ramiro Taco<sup>2</sup>, Marco Lanuzza<sup>3</sup>, Alexander Fish<sup>1</sup>  
<sup>1</sup>Bar-Ilan University, Israel; <sup>2</sup>Universidad San Francisco de Quito, Ecuador; <sup>3</sup>Università della Calabria, Italy

### **A 9.0TOPS/W Hash-Based Deep Neural Network Accelerator Enabling 128× Model Compression in 10nm FinFET CMOS ..... Available on Xplore**

Raghavan Kumar, Gregory Chen, Ekin Sumbul, Phil Knag, Mark Anders, Himanshu Kaul, Steven Hsu, Amit Agarwal, Monodeep Kar, Seongjong Kim, Vikram Suresh, Ram Krishnamurthy, Vivek De, Sanu Mathew  
*Intel Corporation, United States*

### **A 2.9-33.0 TOPS/W Reconfigurable 1D/2D Compute-Near-Memory Inference Accelerator in 10nm FinFET CMOS ..... Available on Xplore**

H. Ekin Sumbul, Gregory Chen, Phil Knag, Raghavan Kumar, Mark Anders, Himanshu Kaul, Steven Hsu, Amit Agarwal, Monodeep Kar, Seongjong Kim, Ram Krishnamurthy  
*Intel Corporation, United States*

### **Processing-In-Memory-Based On-Chip Learning with Spike-Time-Dependent Plasticity in 65-nm CMOS ..... Available on Xplore**

Daehyun Kim<sup>1</sup>, Xueyuan She<sup>1</sup>, Nael Mizanur Rahman<sup>1</sup>, Venkata Chaitanya Kr Chekuri<sup>2</sup>, Saibal Mukhopadhyay<sup>1</sup>  
<sup>1</sup>Georgia Institute of Technology, United States; <sup>2</sup>Nvidia Corporation, United States

## Analog & Power Management (ESSCIRC 2020 SSC-L special edition)

Date: Tuesday, September 14, 2021  
Time: 15:00 - 16:00  
Room: PALLADIUM 2  
Chair(s): Pavel Horský; *ON Semiconductor*  
Piotr Kmon; *AGH University of Science and Technology*

**An Accurate 0.55V 2.6  $\mu$ W Voltage Level Detector..... Available on Xplore**

Asaf Feldman<sup>1</sup>, Edi Emanović<sup>2</sup>, Joseph Shor<sup>1</sup>  
<sup>1</sup>*Bar-Ilan University, Israel*; <sup>2</sup>*University of Zagreb, Croatia*

**A Low-Power 1-V Supply Dynamic Comparator..... Available on Xplore**

Subhash Chevella, Daniel O'Hare, Ivan O'Connell  
*Tyndall National Institute, Microelectronic Circuits Centre Ireland, Ireland*

**A Bidirectional Current-Mirror-Based Potentiostat Using a Slice-Based Class-AB Amplifier..... Available on Xplore**

Markus Haberler<sup>2</sup>, Inge Siegl<sup>2</sup>, Christoph Steffan<sup>2</sup>, Mario Auer<sup>1</sup>  
<sup>1</sup>*Graz University of Technology, Austria*; <sup>2</sup>*Infineon Technologies Austria AG, Austria*

**A 13.56-MHz Active Rectifier with SAR-Assisted Coarse-Fine Adaptive Digital Delay Compensation for Biomedical Implantable Devices..... Available on Xplore**

Yanzhao Ma, Kai Cui, Zhengjie Ye, Yufei Sun, Xiaoya Fan  
*Northwestern Polytechnical University, China*

**Wide Dynamic Range Multichannel Lock-in Amplifier for Contactless Optical Sensors with Sub-Ps Resolution ..... Available on Xplore**

Francesco Zanetto<sup>2</sup>, Emanuele Guglielmi<sup>2</sup>, Fabio Toso<sup>2</sup>, Rossella Gaudiano<sup>3</sup>, Francesco Caruso<sup>1</sup>, Marco Sampietro<sup>2</sup>, Giorgio Ferrari<sup>2</sup>  
<sup>1</sup>*Fastree3D, Switzerland*; <sup>2</sup>*Politecnico di Milano, Italy*; <sup>3</sup>*STMicroelectronics, Italy*

**Memories and 3D Integration (JOINT 2020 TEDbrief special edition & SSC-L special edition)**

Date: Tuesday, September 14, 2021  
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Room: CHROME 2  
Chair(s): Guilhem Larrieu; *Laboratory of Analysis and Architecture of Systems*  
Alyssa Apsel; *Cornell University*

**A 1 Mbit Fully Logic-Compatible 3T Gain-Cell Embedded DRAM in 16nm FinFET..... Available on Xplore**

Robert Giterman<sup>2</sup>, Amir Shalom<sup>1</sup>, Andreas Burg<sup>2</sup>, Alexander Fish<sup>1</sup>, Adam Teman<sup>1</sup>  
<sup>1</sup>*Bar-Ilan University, Israel*; <sup>2</sup>*École Polytechnique Fédérale de Lausanne, Switzerland*

**Area-Efficient Multi-Hop Inductive Coupling Interface for 3D-Stacked Memory with 0.23-V Transmitter and Sub-10- $\mu$ m Coil Design..... Available on Xplore**

Kota Shiba, Tatsuo Omori, Mototsugu Hamada, Tadahiro Kuroda  
*University of Tokyo, Japan*

**Vertically Replaceable Memory Block Architecture for Stacked DRAM Systems by Wafer-on-Wafer (WOW) Technology ..... Available on Xplore**

Shinji Sugatani, Norio Chujo, Koji Sakui, Hiroyuki Ryoson, Tomoji Nakamura, Takayuki Ohba  
*Tokyo Institute of Technology, Institute of Innovative Research, Japan*

**Imaging, MEMS, Sensors (JOINT 2020 TEDbrief special edition & SSC-L special edition)**

Date: Tuesday, September 14, 2021  
Time: 17:00 - 18:00  
Room: PLATINE Auditorium  
Chair(s): Minhao Yang; *École Polytechnique Fédérale de Lausanne*  
Mirjana Banjevic; *Sensirion AG*

**A Bio-Inspired Reservoir-Computer for Real-Time Stress Detection from ECG Signal..... Available on Xplore**  
Sanjeev T Chandrasekaran<sup>2</sup>, Sumukh P Bhanushali<sup>2</sup>, Imon Banerjee<sup>1</sup>, Arindam Sanyal<sup>2</sup>  
<sup>1</sup>*Emory University, United States;* <sup>2</sup>*University at Buffalo, United States*

**Luximos: a 768x64 900-fps Tileable Pipelined X-Ray CMOS Image Sensor for Dental Imaging with 2.6 LSB/nGy Sensitivity ..... Available on Xplore**  
Nicola Massari<sup>3</sup>, Xu Hesong<sup>2</sup>, Alessandro Tarolli<sup>1</sup>, Luca Parmesan<sup>3</sup>, Daniele Perenzoni<sup>2</sup>, Sabrina Colpo<sup>1</sup>, Nicola Fronza<sup>1</sup>, David Stoppa<sup>2</sup>, Matteo Perenzoni<sup>3</sup>, Alfredo Maglione<sup>1</sup>  
<sup>1</sup>*AdvanSid, Italy;* <sup>2</sup>*AMS, Switzerland;* <sup>3</sup>*Fondazione Bruno Kessler, Italy*

**A 2.67  $\mu$ J Per Measurement FMCW Ultrasound Rangefinder System for the Exploration of Enclosed Environments..... Available on Xplore**  
Gönenç Berkol, Peter Baltus, Pieter Harpe, Eugenio Cantatore  
*Eindhoven University of Technology, Netherlands*

**Polarization Independent Band Gaps in CMOS Back-End-of-Line for Monolithic High-Q MEMS Resonator Confinement..... Available on Xplore**  
Richard Hudeczek<sup>2</sup>, Peter Baumgartner<sup>1</sup>  
<sup>1</sup>*Intel Deutschland, Germany;* <sup>2</sup>*Technical University of Munich, Germany*

**Compact Modeling and Behavioral Simulation of an Optomechanical Sensor in Verilog a..... Available on Xplore**  
Houssein Elmi Dawale, Loïc Sibeud, Sébastien Regord, Guillaume Jourdan, Sébastien Hentz, Franck Badets  
*CEA, France*

## RF & Wireless Communications (ESSCIRC 2020 SSC-L special edition)

Date: Thursday, September 16, 2021  
Time: 16:00 - 17:00  
Room: TITANE 2  
Chair(s): David Ruffieux; CSEM SA  
Gernot Hueber; Silicon Austria Labs

**A Reconfigurable Passive Switched-Capacitor TX RF Front End with -57 dB ACLR2 ..... Available on Xplore**

Konstantinos Vasilakopoulos, Antonio Liscidini  
*University of Toronto, Canada*

**A 0.6–4.0 GHz RF-Resampling Beamforming Receiver with Frequency-Scaling True-Time-Delays Up to Three Carrier Cycles ..... Available on Xplore**

Kalle Spoof<sup>2</sup>, Mahwish Zahra<sup>1</sup>, Vishnu Unnikrishnan<sup>1</sup>, Kari Stadius<sup>1</sup>, Marko Kosunen<sup>1</sup>,  
Jussi Rynänen<sup>1</sup>  
<sup>1</sup>Aalto University, Finland; <sup>2</sup>Saab, Finland

**Power Calibration Loop with High Accuracy of 10 dBm ±0.5 dB for a 77-GHz Radar Application ..... Available on Xplore**

Masato Kohtani<sup>2</sup>, Shuya Kishimoto<sup>2</sup>, Ikuma Ando<sup>1</sup>, Satoshi Iwahashi<sup>2</sup>, Kazuhiro  
Matsunaga<sup>1</sup>, Tomoyuki Arai<sup>1</sup>, Shinji Yamaura<sup>2</sup>  
<sup>1</sup>DENSO Corporation, Japan; <sup>2</sup>MIRISE Technologies Corporation, Japan

**A 280-GHz Digitally Controlled Four Port Chip-Scale Dielectric Resonator Antenna Transmitter with DiCAD True Time Delay ..... Available on Xplore**

Nadav Buadana<sup>2</sup>, Samuel Jameson<sup>1</sup>, Eran Socher<sup>1</sup>  
<sup>1</sup>Tel Aviv University, Israel; <sup>2</sup>Tel-Aviv University, Israel

**A 112–134-Gb/S PAM4 Receiver Using a 36-Way Dual-Comparator TI-SAR ADC in 7-nm FinFET ..... Available on Xplore**

Pedro Wilson de Abreu Farias Neto, Kay Hearne, Ilias Chlis, Declan Carey, Ronan  
Casey, Ben Griffin, Frantz Stephane Flor Ngankem Ngankem, James Hudner, Asma  
Laraba, Haritha Eachempatti, Jae Wook Kim, Hongtao Zhang, Santiago Assuncion,  
Yohan Frans  
*Xilinx, Inc., Italy; Xilinx, Inc., Ireland; Xilinx, Inc., United States*

## Frequency Synthesis & Related Circuits (ESSCIRC 2020 SSC-L special edition)

Date: Thursday, September 16, 2021  
Time: 16:00 - 17:00  
Room: PALLADIUM 2  
Chair(s): Jose Luis Gonzalez Jimenez; CEA  
Piero Andreani; Lund University

**Impact of the Base Resistance Noise and Design of a -190-dBc/Hz  
FoM Bipolar Class-C VCO..... Available on Xplore**

Alessandro Garghetti<sup>1</sup>, Fabio Quadrelli<sup>2</sup>, Matteo Bassi<sup>1</sup>, Andrea Mazzanti<sup>2</sup>  
<sup>1</sup>Infineon Technologies AG, Austria; <sup>2</sup>Università degli Studi di Pavia, Italy

**A 250-Mb/S Direct Phase Modulator with -42.4-dB EVM Based on a  
14-GHz Digital PLL ..... Available on Xplore**

Dmytro Cherniak<sup>1</sup>, Mario Mercandelli<sup>2</sup>, Luca Bertulesi<sup>2</sup>, Fabio Padovan<sup>1</sup>, Luigi  
Grimaldi<sup>1</sup>, Alessio Santiccioli<sup>2</sup>, Michael Aichner<sup>1</sup>, Carlo Samori<sup>2</sup>, Salvatore Levantino<sup>2</sup>  
<sup>1</sup>Infineon Technologies AG, Austria; <sup>2</sup>Politecnico di Milano, Italy

**Ultralow-Power Class-C Complementary Colpitts Crystal Oscillator ..... Available on Xplore**

Zule Xu<sup>4</sup>, Noritoshi Kimura<sup>2</sup>, Kenichi Okada<sup>3</sup>, Masaya Miyahara<sup>1</sup>  
<sup>1</sup>High Energy Accelerator Research Organization, Japan; <sup>2</sup>Piezo Studio, Inc., Japan;  
<sup>3</sup>Tokyo Institute of Technology, Japan; <sup>4</sup>University of Tokyo, Japan

**Reflection-Based Short Pulse Generation in CMOS ..... Available on Xplore**

Farzad Khoeini<sup>2</sup>, Bahareh Hadidian<sup>2</sup>, Keshu Zhang<sup>1</sup>, Ehsan Afshari<sup>2</sup>  
<sup>1</sup>Hefei Shinning Star Optical Electronics Ltd, China; <sup>2</sup>University of Michigan, United  
States

**A 2.5-GHz Clock Recovery Circuit Based on a Back-Bias-Controlled  
Oscillator in 28-nm FDSOI ..... Available on Xplore**

Maxime Schramme<sup>2</sup>, Cecilia Gimeno<sup>2</sup>, Andreia Cathelin<sup>1</sup>, Denis Flandre<sup>2</sup>, David Bol<sup>2</sup>  
<sup>1</sup>STMicroelectronics, France; <sup>2</sup>Université Catholique de Louvain, Belgium

## In/Near-Memory Computing (JOINT 2020 TEDbrief special edition & SSC-L special edition)

Date: Thursday, September 16, 2021  
Time: 17:00 - 18:00  
Room: PLATINE Auditorium  
Chair(s): Nitin Chawla; *STMicroelectronics*  
Elisa Vianello; *CEA-Leti*

### **Ultrahigh-Density 3-D Vertical RRAM with Stacked Junctionless Nanowires for In-Memory-Computing Applications ..... Available on Xplore**

Mona Ezzadeen<sup>5</sup>, Daphnée Bosch<sup>2</sup>, Bastien Giraud<sup>4</sup>, Sylvain Barraud<sup>3</sup>, Jean-Philippe Noël<sup>4</sup>, Didier Lattard<sup>2</sup>, Joris Lacord<sup>2</sup>, Jean-Michel Portal<sup>1</sup>, François Andrieu<sup>4</sup>  
<sup>1</sup>*Aix-Marseille University, Université de Toulon, CNRS, IM2NP, France;* <sup>2</sup>*CEA, France;*  
<sup>3</sup>*CEA-Leti, Université Grenoble Alpes, France;* <sup>4</sup>*CEA-List/Leti, Université Grenoble Alpes, France;* <sup>5</sup>*CEA, Aix-Marseille University, Université de Toulon, CNRS, IM2N*

### **IGZO-Based Compute Cell for Analog In-Memory Computing—DTCO**

#### **Analysis to Enable Ultralow-Power AI at Edge ..... Available on Xplore**

Daisuke Saito<sup>2</sup>, Jonas Doevenspeck<sup>1</sup>, Stefan Cosemans<sup>1</sup>, Hyungrock Oh<sup>1</sup>, Manu Perumkunnil<sup>1</sup>, Papistas Ioannis<sup>1</sup>, Belmonte Attilio<sup>1</sup>, Rassoul Nouredine<sup>1</sup>, Delhougne Romain<sup>1</sup>, Kar Gouri<sup>1</sup>, Debacker Peter<sup>1</sup>, Mallik Arindam<sup>1</sup>, Verkest Diederik<sup>1</sup>, Na Nyung-Hee<sup>1</sup>  
<sup>1</sup>*imec, Belgium;* <sup>2</sup>*Sony Semiconductor Solutions Corporation, Japan*

### **A 35.6 TOPS/W/mm<sup>2</sup> 3-Stage Pipelined Computational SRAM with**

#### **Adjustable Form Factor for Highly Data-Centric Applications..... Available on Xplore**

Jean-Philippe Noël<sup>3</sup>, Manuel Pezzin<sup>1</sup>, Roman Gauchi<sup>1</sup>, Jean-Frédéric Christmann<sup>1</sup>, Maha Kooli<sup>1</sup>, Henri-Pierre Charles<sup>1</sup>, Lorenzo Ciampolini<sup>1</sup>, Mariam Diallo<sup>1</sup>, Florent Lepin<sup>1</sup>, Benjamin Blampey<sup>2</sup>, Pascal Vivet<sup>1</sup>, Subhasish Mitra<sup>1</sup>, Bastien Giraud<sup>3</sup>  
<sup>1</sup>*CEA, France;* <sup>2</sup>*CEA-Leti, Université Grenoble Alpes, France;* <sup>3</sup>*CEA-List/Leti, Université Grenoble Alpes, France*

**Substrates & Design Techniques for RF/mmW Applications (JOINT 2020 TEDbrief special edition & SSC-L special edition)**

Date: Thursday, September 16, 2021  
Time: 17:00 - 18:00  
Room: TITANE 2  
Chair(s): David Ruffieux; CSEM SA  
Jean-Pierre Raskin; *Université catholique de Louvain*

**Influence of Substrate Resistivity on Porous Silicon Small Signal RF**

**Properties** ..... Available on Xplore

Geoffroy Godet<sup>1</sup>, Emmanuel Augendre<sup>1</sup>, Jose Lugo-Alvarez<sup>1</sup>, H el ene Jacquinet<sup>1</sup>,  
Fr ed eric Xavier Gaillard<sup>1</sup>, Thomas Lorne<sup>1</sup>, Emmanuel Rolland<sup>1</sup>, Thierry Taris<sup>2</sup>, Florence  
Servant<sup>1</sup>

<sup>1</sup>CEA-Leti, France; <sup>2</sup>IMS Laboratory, IMS Bordeaux, CNRS, France

**Analysis of Gate Metal Resistance in CMOS Compatible**

**RF GaN HEMTs** ..... Available on Xplore

Rana Elkashlan<sup>1</sup>, Raul Rodriguez<sup>1</sup>, Sachin Yadav<sup>1</sup>, Ahmad Khaled<sup>1</sup>, Uthayasankaran  
Peralagu<sup>1</sup>, Alireza Alian<sup>1</sup>, Niamh Waldron<sup>1</sup>, Ming Zhao<sup>1</sup>, Piet Wambacq<sup>2</sup>, Bertrand  
Parvais<sup>1</sup>, Nadine Collaert<sup>1</sup>

<sup>1</sup>imec, Belgium; <sup>2</sup>imec, Vrije Universiteit Brussels, Belgium

**A 108 Gb/S 64-QAM CMOS D-Band Rx with Integrated Lo Generation** ..... Available on Xplore

Abdelaziz Hamani, Alexandre Siligaris, Cedric Dehos, Nicolas Cassiau, Benjamin  
Blampey, Fabrice Chaix, Marjorie Gary, Jos e Luis Gonzalez-Jimenez

CEA-Leti, *Universit e Grenoble Alpes, France*

**A 84.48Gb/S 64-QAM CMOS D-Band channel-Bonding Tx front-End**

**with Integrated multi-Lo Frequency Generation** ..... Available on Xplore

Abdelaziz Hamani, Alexandre Siligaris, Fernando Barrera, Cedric Dehos, Nicolas  
Cassiau, Benjamin Blampey, Fabrice Chaix, Marjorie Gary, Jos e Luis Gonzalez-Jimenez

CEA-Leti, *Universit e Grenoble Alpes, France*; CEA-Leti, *Universit e Grenoble Alpes, Finland*



## **Cryogenic Electronics (JOINT 2020 TEDbrief special edition & SSC-L special edition)**

Date: Friday, September 17, 2021  
Time: 16:00 - 17:00  
Room: PLATINE Auditorium  
Chair(s): Sorin Voinigescu; *University of Toronto*  
David Esseni; *University of Udine*

### **Cryogenic Operation of Thin-Film FDSOI nMOS Transistors: the Effect of Back Bias on Drain Current and Transconductance ..... Available on Xplore**

Mikaël Cassé<sup>2</sup>, Bruna Cardoso Paz<sup>3</sup>, Gérard Ghibaudo<sup>5</sup>, Thierry Poiroux<sup>2</sup>, Sylvain Barraud<sup>3</sup>, Maud Vinet<sup>2</sup>, de Franceschi Silvano<sup>1</sup>, Tristan Meunier<sup>4</sup>, Frédéric Xavier Gaillard<sup>2</sup>

<sup>1</sup>CEA-IRIG, France; <sup>2</sup>CEA-Leti, France; <sup>3</sup>CEA-Leti, Université Grenoble Alpes, France; <sup>4</sup>CNRS Institut Néel, France; <sup>5</sup>IMEP-LaHC, University Grenoble Alpes, University Savoie Mont Blanc, CNRS, Grenoble INP, France

### **Performance and Low-Frequency Noise of 22-nm FDSOI Down to 4.2 K for Cryogenic Applications ..... Available on Xplore**

Bruna Cardoso Paz<sup>3</sup>, Mikaël Cassé<sup>2</sup>, Christoforos Theodorou<sup>6</sup>, Gérard Ghibaudo<sup>6</sup>, Thorsten Kammler<sup>5</sup>, Luca Pirro<sup>5</sup>, Maud Vinet<sup>2</sup>, Silvano de Franceschi<sup>1</sup>, Tristan Meunier<sup>4</sup>, Frédéric Xavier Gaillard<sup>2</sup>

<sup>1</sup>CEA-IRIG, France; <sup>2</sup>CEA-Leti, France; <sup>3</sup>CEA-Leti, Université Grenoble Alpes, France; <sup>4</sup>CNRS Institut Néel, France; <sup>5</sup>GlobalFoundries Inc., Germany; <sup>6</sup>IMEP-LaHC, University Grenoble Alpes, University Savoie Mont Blanc, CNRS, Grenoble INP, France

### **A Cryo-CMOS Digital Cell Library for Quantum Computing Applications ..... Available on Xplore**

Edwin Schriek<sup>3</sup>, Fabio Sebastiano<sup>1</sup>, Edoardo Charbon<sup>2</sup>

<sup>1</sup>Delft University of Technology, Netherlands; <sup>2</sup>École Polytechnique Fédérale de Lausanne, Switzerland; <sup>3</sup>Independent, Netherlands

### **Bias Voltage DAC Operating at Cryogenic Temperatures for Solid-State Qubit Applications ..... Available on Xplore**

Patrick Vliex<sup>1</sup>, Carsten Degenhardt<sup>1</sup>, Christian Grewing<sup>1</sup>, Dennis Nielinger<sup>1</sup>, Stefan van Waasen<sup>1</sup>, Stefan Heinen<sup>2</sup>

<sup>1</sup>Forschungszentrum Jülich GmbH, Germany; <sup>2</sup>RWTH Aachen University, Germany

## Digital Design Solutions for Wireless Communications (ESSCIRC 2020 SSC-L special edition)

Date: Friday, September 17, 2021  
Time: 16:00 - 17:00  
Room: PALLADIUM 2  
Chair(s): Liesbet Van Der Perre; *Katholieke Universiteit Leuven*  
Atila Alvandpour; *Linköping University*

### **A Triple-Mode Cellular IoT SoC Achieving -136.8-dBm eMTC**

**Sensitivity** ..... Available on Xplore

Stefan Lippuner<sup>2</sup>, Mauro Salomon<sup>2</sup>, Matthias Korb<sup>2</sup>, Michael Gautschi<sup>1</sup>, Thomas Dellsperger<sup>1</sup>, Stefan Altorfer<sup>1</sup>, Jürgen Rogin<sup>1</sup>, Samuel Willi<sup>1</sup>, David Tschopp<sup>1</sup>, Benjamin Weber<sup>1</sup>, Qiuting Huang<sup>2</sup>

<sup>1</sup>ACP Advanced Circuit Pursuit AG, Switzerland; <sup>2</sup>Integrated Systems Laboratory, ETH Zürich, Switzerland

### **0.36mW, 52Mbps True Random Number Generator Based on a**

**Stochastic Delta-Sigma Modulator** ..... Available on Xplore

Sanjeev T Chandrasekaran, Vinay Elkoori Ghantala Karnam, Arindam Sanyal  
*University at Buffalo, United States*

### **A Flexible Precision Multi-Format In-Memory Vector Matrix Multiplication**

**Engine in 65 nm CMOS with RF Machine Learning Support** ..... Available on Xplore

Mandovi Mukherjee, Yun Long, Jongseok Woo, Daehyun Kim, Nael Mizanur Rahman, Saurabh Dash, Saibal Mukhopadhyay  
*Georgia Institute of Technology, United States*

### **A Wide Tuning Range Delay Element for Event-Driven Processing of**

**Low-Frequency Signals in 28-nm FD-SOI CMOS** ..... Available on Xplore

Angel de Dios González Santos<sup>2</sup>, Antoine Frappé<sup>1</sup>, Benoit Larras<sup>1</sup>, Andreas Kaiser<sup>1</sup>, Philippe Cathelin<sup>2</sup>

<sup>1</sup>ISEN-Junia/IEMN, France; <sup>2</sup>STMicroelectronics, France

## Data Converters & Chip-to-Chip Interfaces (ESSCIRC 2020 SSC-L special edition)

Date: Friday, September 17, 2021  
Time: 17:00 - 18:00  
Room: TITANE 2  
Chair(s): Mattias Palm; *Ericsson*  
Turner Walker; *Nvidia Corporation*

**21fJ/Step OTA-Less, Mismatch-Tolerant Continuous-Time VCO-Based Band-Pass ADC** ..... Available on Xplore

Sanjeev T Chandrasekaran<sup>2</sup>, Stefano Pietri<sup>1</sup>, Arindam Sanyal<sup>2</sup>  
<sup>1</sup>*NXP Semiconductors N.V., United States*; <sup>2</sup>*University at Buffalo, United States*

**A 1.67-GSps Ti 10-Bit Ping-Pong SAR ADC with 51-dB SNDR in 16-nm FinFET** ..... Available on Xplore

Davide Dermit<sup>1</sup>, Mithlesh Shrivastava<sup>2</sup>, Keigo Bunsen<sup>3</sup>, Jorge Lagos Benites<sup>2</sup>, Jan Craninckx<sup>2</sup>, Ewout Martens<sup>2</sup>  
<sup>1</sup>*arQana Technologies, Belgium*; <sup>2</sup>*imec, Belgium*; <sup>3</sup>*Sony Semiconductor Solutions Corporation, Japan*

**A 0.01-mm<sup>2</sup> 0.83-V Input Range SAR-Based Bridge-to-Digital Converter** ..... Available on Xplore

Annamaria Fordymacka<sup>1</sup>, Ivan O'Connell<sup>2</sup>  
<sup>1</sup>*ON Semiconductor, Ireland*; <sup>2</sup>*Tyndall National Institute, Microelectronic Circuits Centre Ireland, Ireland*

**A 0.38pJ/B Simplex and a 1.2pJ/B Full Duplex Chip-to-Chip Digital Communication Interface with Data Rate and Load Capacitance Adaptability** Available on Xplore

Yuting Shen, Hanyue Li, Eugenio Cantatore, Pieter Harpe  
*Eindhoven University of Technology, Netherlands*

**A 10-Gbps Continuous-Time Linear Equalizer for mm-Wave Dielectric Waveguide Communication** ..... Available on Xplore

Oscar Mattia<sup>2</sup>, Mahmoud Sawaby<sup>1</sup>, Kevin Zheng<sup>3</sup>, Amin Arbabian<sup>2</sup>, Boris Murmann<sup>2</sup>  
<sup>1</sup>*Samsung Semiconductor Inc., United States*; <sup>2</sup>*Stanford University, United States*; <sup>3</sup>*Xilinx, Inc., United States*

## A-SSCC 2020 Guest Invited Papers

Date: Tuesday, September 14, 2021  
Time: 15:00 - 16:00  
Room: TITANE 2  
Chair(s): Andreia Cathelin; *STMicroelectronics*  
Qiuting Huang; *ETH Zürich*

**A Redistributable Capacitive Power Converter for Indoor Light-Powered Batteryless IoT Devices ..... Available on Xplore**

Hao-Chung Cheng, Po-Han Chen, Po-Hung Chen  
*National Yang Ming Chiao Tung University, Taiwan*

**An Energy-Efficient GAN Accelerator with On-Chip Training for Domain Specific Optimization ..... Available on Xplore**

Soyeon Kim, Sanghoon Kang, Donghyeon Han, Sangyeob Kim, Sangjin Kim, Hoi-Jun Yoo  
*Korea Advanced Institute of Science and Technology, Korea*

**Broad-Purpose In-Memory Computing for Signal Monitoring and Machine Learning Workloads ..... Available on Xplore**

Saurabh Jain, Longyang Lin, Massimo Alioto  
*National University of Singapore, Singapore*

**A Time-Domain Computing-in-Memory Based Processor Using Predictable Decomposed Convolution for Arbitrary Quantized DNNs ..... Available on Xplore**

Jianxun Yang<sup>3</sup>, Yuyao Kong<sup>2</sup>, Zhao Zhang<sup>3</sup>, Zhuangzhi Liu<sup>3</sup>, Jing Zhou<sup>3</sup>, Yiqi Wang<sup>3</sup>, Yonggang Liu<sup>3</sup>, Chenfu Guo<sup>3</sup>, Te Hu<sup>3</sup>, Congcong Li<sup>3</sup>, Leibo Liu<sup>3</sup>, Jin Zhang<sup>1</sup>, Shaojun Wei<sup>3</sup>, Jun Yang<sup>2</sup>, Shouyi Yin<sup>3</sup>  
<sup>1</sup>Ingenic Semiconductor CO., China; <sup>2</sup>Southeast University, China; <sup>3</sup>Tsinghua University, China

**A 6.4 nW 1.7% Relative Inaccuracy CMOS Temperature Sensor Utilizing Sub-Thermal Drain Voltage Stabilization and Frequency Locked Loop ..... Available on Xplore**

Teruki Someya<sup>2</sup>, A.K.M. Mahfuzul Islam<sup>1</sup>, Kenichi Okada<sup>2</sup>  
<sup>1</sup>Kyoto University, Japan; <sup>2</sup>Tokyo Institute of Technology, Japan