2011 IEEE International Symposium on Radio-Frequency Integration Technology

(RFIT 2011)

Beijing, China 30 November – 2 December 2011



IEEE Catalog Number: CFP11852-PRT ISBN:

978-1-4577-0517-5

Table of Contents

Technical Program

8:30-8:40

8:40-8:50

K-1

8:50-9:30

K-2

9:30-10:10

(Keynote Address #1)

Kenneth K. O, University of Texas, Dallas, USA

R. Bogdan Staszewski, Delft University, Netherlands

Digital RF and Digitally-Assisted RF (Keynote Address #2)

Plenary Session: Keynote Addresses 8:30 AM - 10:10 AM Thursday, December 1, 2011 **Grand Ballroom 2** Chair: Howard Luong, Hong Kong University of Science and Technology **Welcome Opening Message from General Chair Welcome Opening Message from TPC Chairs Sub-Millimeter Wave CMOS Integrated Circuits and Systems** 1

9

Session TH1A: RF Transceivers and Building Blocks

10:30 AM - 12:10 AM Thursday, December 1, 2011 Grand Ballroom 1

Chair: Pui-In Mak, University of Macau Co-Chair: Frank Henkel, IMST GmbH

TH1A-1	A MEMS-based 2.4-GHz Sub-sampling RF Front-end for	17
	Advanced Healthcare Applications (Invited)	
10:30-10:55	Aravind Heragu, David Ruffieux, Jérémie Chabloz and Christian Enz, Swiss Center for Electronics and Microtechnology (CSEM), Neuchâtel, Switzerland	
TH1A-2	Orthogonal Summing and Power Combining Network in a 65-nm All-Digital RF I/Q Modulator	21
10:55-11:20	Morteza S. Alavi, Robert B. Staszewski, Leo C.N de Vreede, John R. Long, ERL/DIMES, Delft University of Technology, Mekelweg 4, 2628CD Delft, The Netherlands	
TH1A-3	A 0.18 μm Mixer Merged with LNA Exploiting Noise	25
1111110	Cancellation	20
11:20-11:45	Jingye Sun ¹ , Lu Huang ¹ , Honghong Liu ¹ , Da-Peng Chen ² , and Fujiang Lin ¹ , ¹ Dept 23, University of Science and Technology of China (USTC), Hefei, China, ² Institute of Microelectronics of the Chinese Academy of Science (IMECAS), China	
TH1A-4	A 3.5 GHz Phase Shifter of High Input Power Range with	29
	Digitally Controlled VGA	
11:45-12:10	Tzu-Chao Yan, Wei-Zhen Lin, and Chien-Nan Kuo, Department of	

Electronics Engineering National Chiao-Tung University, Hsinchu, Taiwan

Session TH1B: Special Session-Wireless Replacement of Wireline I/Os

10:30 AM - 12:10 AM Thursday, December 1, 2011 Grand Ballroom 2

Chair: Patrick Yue, University Of California Santa Barbara

TH1B-1	Trends and Outlook of Wireless I/O's for Short-Range	33
10:30-10:50	Connectivity and Beyond Byunghoo Jung¹and C. Patrick Yue², ¹Purdue University, West Lafayette, IN, USA, ²University of California Santa Barbara, CA, USA	
TH1B-2	Proximity IOs Using Inductive Coupling	37
10:50-11:10	Tadahiro Kuroda, Keio University, Yokohama, Kanagawa, Japan	
TH1B-3	System Considerations for Wireless Capacitive Chip-to-Chip Signaling	41
11:10-11:30	Alex Chow, Philip Amberg, Michael Dayringer, Hesam Fathi Moghadam, David Hopkins, Jon Lexau, Frankie Liu, Justin Schauer, Ron Ho, Oracle Labs, Oracle; Redwood Shores, CA, USA	
TH1B-4	Wireline/Wireless RF-Interconnect for Future SoC	45
11:30-11:50	Sai-Wang Tam ^{1,2} , M-C. Frank Chang ² , Jongsun Kim ³ , Gyungsu Byun ⁴ , ¹ Marvell Semiconductor, Santa Clara, CA, USA, ² Electrical Engineering Department, University of California Los Angeles, Los Angeles, CA, USA, ³ Electrical Engineering, Hongik University, Seoul, Korea, ⁴ Lane Department of Computer Science and Electrical Engineering, West Virgina University, WV, USA	
TH1B-5	Design Challenges for Ultra-Wideband Wireless	49
	Communications within a Computer Chassis	
11:50-12:10	Changhui Hu ^{1,2} , Lingli Xia ¹ , Stephen Redfield ¹ , Sirikarn Woracheewan ¹ , Rahul Khanna ³ , Jay Nejedlo ³ , Huaping Liu ¹ , and Patrick Y. Chiang ¹ Oregon State University, Corvallis, OR, USA, ² Marvell Semiconductor, Sonta Clara, CA, USA, ³ Intal Hillshore, OR, USA	
	Santa Clara, CA, USA, ³ Intel, Hillsboro, OR, USA	

Session TH-IF: Interactive Forum

12:10 AM - 13:30 PM Thursday, December 1, 2011 Foyer of Level 3

TH-IF-1	A 3~5-GHz Low-Phase-Noise Fractional-N Frequency	53
	Synthesizer with AFC for GSM/PCS/DCS/WCDMA	
	<u>Tranceivers</u>	
12:10-13:30	Yaohua Pan, Yumei Huang and Zhiliang Hong, State key Lab of ASIC &	
	Systems, Fudan University, Shanghai, China	
THE 1	A Sub-compline 4.25CS/s 2 bit Flesh ADC with Assumentation	57
TH-IF-2	A Sub-sampling 4.25GS/s 3-bit Flash ADC with Asymmetric	57
12 10 12 20	Spatial Filter Response	
12:10-13:30	Yi Zhao ¹ , Shejie Wang ¹ , Zhiliang Hong ¹ , Zaichen Zhang ² , ¹ State Key	
	Laboratory of ASIC & Systems, Fudan University, Shanghai, China, ² State Key Laboratory of Mobile Communication, Southeast University, Nanjing,	
	China	
	Cillia	
TH-IF-3	A 0-35dB Wideband Variable Gain Amplifier in 0.13μm	61
	CMOS	
12:10-13:30	Xi Qin, Xingli Huang, Yajie Qin, Zhiliang Hong, State key Lab of ASIC &	
	Systems, Fudan University, Shanghai, China	
TH-IF-4	A Novel Adaptive Delay-tracking ADC for DVS Power	65
	Management Applications	
12:10-13:30	Shenglei Wang, Yuan Gao, Haiqi Li, Shiquan Fan, Fengxia Li and Li Geng,	
	School of Electronics and Information Engineering, Xi'an Jiaotong	
	University, Xianning Road 28, Xi'an, China	
TH-IF-5	Active-G _m -RC Bandpass Filter with 60MHz Center	69
111 11 3	Frequency and a Combined Analog-Digital Tuning System	0)
12:10-13:30	Jingbo Shi, Takayuki Konishi, Shoichi Masui, Tohoku University, Sendai,	
12.10 15.50	Miyagi, Japan	
	Tilyugi, vupuii	
TH-IF-6	60 GHz Power Amplifier Utilizing 90 nm CMOS Technology	73
12:10-13:30	A. Hamidian ¹ , V. Subramanian ¹ , R. Doerner ² , R. Shu ¹ , A. Malignaggi ¹ , M.	
	K. Ali ¹ , G. Boeck ¹ , ¹ Microwave Engineering Lab, Berlin Institute of	
	Technology, Berlin, Germany, ² Ferdinand-Braun-Institut, Leibniz-Institut für	

	Hoechstfrequenztechnik (FBH), Berlin, Germany	
TH-IF-7	Fully integrated ultra-low-power passive UHF RFID	77
	transponder IC	
12:10-13:30	Chelho Chung, Young-Han Kim, Tae-Hun Ki, Kyusung Bae, and Jongbae	
	Kim Microwave, SoC Team, System Semiconductor Laboratory, Advanced	
	Technology R&D Center LS Industrial Systems Co., Ltd., Anyang-si,	
	Gyeonggi-do, Republic of Korea	
TH-IF-8	An Improved Mixer With High-Precision Automatic	81
111 11 0	Sweet-Spot Biasing and Active-Inductor-Based Harmonic	01
	Suppression	
12:10-13:30	Song Hu, Yumei Huang, and Zhiliang Hong, State Key Laboratory of ASIC	
12.10-13.30	& System, Fudan University, Shanghai, China	
	& System, I ddan Oniversity, Shanghai, China	
TH-IF-9	A 1.2-V CMOS Front-End for LTE Direct Conversion	85
	SAW-less Receiver	
12:10-13:30		
	Zeng Longyue ¹ , ¹ Guangzhou Runxin Information Technology Co., Ltd,	
	Guangzhou, China, ² College of Physics and Information Engineering,	
	Fuzhou University, Fuzhou, China, ³ Institute of RF-&OE IC, Southeast	
	University, Nanjing, China	
TH-IF-10	Integrated K-Band CMOS Passive Mixers Utilizing Balun	89
	and Polyphase Filters	
12:10-13:30	Tao Zhang, Viswanathan Subramanian, Mohammed K. Ali and Georg Boeck,	
	Microwave Engineering Laboratory, Berlin Institute of Technology, Berlin,	
	Germany	

Session TH2A: Millimeter-wave ICs and systems

13:30 PM - 15:10 PM

Thursday, December 1, 2011

Grand Ballroom 1

Chair: Geoi	rg Boeck, Berlin Institute of Technology	
Co-Chair: (Qun Jane Gu, University of Florida	
TH2A-1	Short Range and Long Range Millimeter Wave Systems and	93
	RF/BB SoCs (invited)	
13:30-13:55	Akira Matsuzawa and Kenichi Okada, Tokyo Institute of Technology,	
	O-okayama, Meguro-ku, Tokyo Japan	
TH2A-2	Millimeter Wave and Sub-millimeter Wave Circuits for	97
	Integrated System-On-a-Chip	
13:55-14:20	¹ Qun Jane Gu, ² Zhiwei Xu and ³ Mau-Chung Frank Chang, ¹ Electrical and	
	Computer Engineering Department, University of Florida, Gainesville,	
	USA, ² HRL Laboratories LLC, Malibu, USA, ³ Electrical Engineering	
	Department, University of California, Los Angeles, USA	
TH2A-3	A 60 GHz Fully Integrated CMOS Transceiver with	101
	Amplitude/Phase Imbalance Cancellation Technique	
14:20-14:45	Junji Sato, Takahiro Shima, Mitsuhiro Iwamoto, Taiji Akizuki, Koichi	
	Mizuno, Communication Core Devices Development Center, Tokyo R&D	
	Center, Panasonic Corporation	
TH2A-4	CMOS Broadband Amplifiers for Optical Communications	105
	and Optical Interconnects (invited)	
14:45-15:10	Shawn S. H. Hsu, Wei-Han Cho, Sheng-Wen Chen, and Jun-De Jin, Dept.	
	of Electrical Engineering and Institute of Electronics Engineering, National	
	Tsing Hua University, Hsinchu, Taiwan	

Session TH2B: Analog and Mixed-signal circuits and systems

13:30 PM - 15:10 PM

Thursday, December 1, 2011

Grand Ballroom 2

Chair: Hyunchol Shin, Kwangwoon University
Co-Chair: Sai-Weng Sin, University of Macau

TH2B-1	A 83-d	B SFDR	10-MHz	Bandwid	lth Continuous-Tim	<u>e</u> 109
	Delta-Si	gma Modi	ulator Emj	ploying a	One-Element-Shiftin	g
	Dynami	Element 1	Matching			

- 13:30-13:55 Hong Phuc Ninh, Masaya Miyahara, and Akira Matsuzawa, Department of Physical Electronics, Tokyo Institute of Technology, Japan
- TH2B-2 A 18mW 20-MHz Continuous-Time ΔΣ Modulator for LTE 113

 Communication System With Power Efficient Multi-Stage

 Amplifier
- 13:55-14:20 Ran Li¹, Jing Li¹, Ting Yi¹, Zhiliang Hong¹, Bill Yang Liu², ¹State Key-Laboratory of ASIC & Systems, Fudan University, Shanghai, China, ²Analog Devices, Shanghai, China

TH2B-3 <u>A Novel High-Order Temporal Moving Average Filter in</u> 117 Sampler-Based Discrete-Time Receiver

- 14:20-14:45 Soo-Hwan Shin, Yong-Ho Cho, Sung-Hun Jo, and Hyung-Joun Yoo, Department of Electrical Engineering, KAIST, Daejeon, Korea
- TH2B-4 A Reconfigurable Spatial Moving Average Filter in 121 Sampler-Based Discrete-Time Receiver
- 14:45-15:10 Yong-Ho Cho, Soo-Hwan Shin, Soon-Jae Kweon, and Hyung-Joun Yoo, Department of Electrical Engineering, KAIST, Daejeon, Korea

Session TH3A: Synthesizers (VCO,DCO,PLL and divider)

15:30 PM - 17:10 PM Thursday, December 1, 2011 Grand Ballroom 1

Co-Chair: Kai Kang, University of Electronic Science and Technology of China

TH3A-1	Fractional-N	Frequency	Synthesis:	Overview	and	Design	125
	Perspectives (invited)					

- 15:30-15:55 Woogeun Rhee, Bo Zhou, and Zhihua Wang, Institute of Microelectronics, Tsinghua University, Beijing, China
- TH3A-2 <u>Current Reusing Low Power Fast Settling Multi-Standard</u> 129 CMOS Fractional-N Frequency Synthesizer
- 15:55-16:20 Wenfeng Lou, Peng Feng, and Nanjian Wu, State Key Laboratory for Superlattices and Microstructures Institute of Semiconductors, Chinese Academy of Sciences, China
- TH3A-3 Spur Suppression Technique for Multiplied Delay Locked 133 Loop (invited)
- 16:20-16:45 Cheng-Yu Liu, Wei-Zen Chen, Department of Electronics Engineering, National Chiao-Tung University, Hsinchu, TAIWAN
- TH3A-4 Low Phase Noise and Linear Gain VCO using Self-Switched 137 Biasing
- 16:45-17:10 Nan Chen¹, Lu Huang¹, Chenluan Wang¹, Yuepeng Yan², and Fujiang Lin^{1*},
 ¹Dept 23, University of Science and Technology of China (USTC), Hefei,
 China, ²Institute of Microelectronics of the Chinese Academy of Science
 (IMECAS), China

Session TH3B: Emerging RF Technologies

15:30 PM - 17:10 PM Thursday, December 1, 2011

Grand Ballroom 2

Chair: Baoyong Chi, Tsinghua University	
---	--

Co-Chair: Volkan Kursun, Hong Kong University of Science and Technology

TH3B-1	Evaluation of Substrate Noise Coupling in RFICs (invited)	14
15:30-15:55	Makoto Nagata ¹ ,Xihua Lin ¹ ,Naoya Azuma ¹ , MasahiroYamaguchi ² ,	
	¹ Department of Information Science, Graduate School of System	
	Informatics, Kobe University, ² Department of Electrical and Communication	
	Engineering, Graduate School of Engineering, Tohoku University	
TH3B-2	An Energy Harvesting Circuit for GHz On-chip Antenna	145
	Measurement	
15:55-16:20	Huyen Le ¹ , Neric Fong ² , Howard Cam Luong ¹ , ¹ ECE Dept. Hong Kong	
	University of Science and Technology, Hong Kong, ² EEE Dept. Hong Kong	
	University, Hong Kong	
TH3B-3	900 MHz CMOS RF-to-DC Converter Using a Cross-Coupled	149
	Charge Pump for Energy Harvesting	
16:20-16:45	Kwangrok You, Hyungchul Kim, Minsu Kim, Youngoo Yang, School of	
	Information and Communication Engineering, SungKyunKwan University,	
	Republic of Korea	
TH3B-4	Development of a Compact Total Power Passive	153
1113D-4		13.
	Millimeter-wave Imaging System	
16:45-17:10	Chen-Ming Li ¹ , Chun-Yen Huang ¹ , Li-Yuan Chang ¹ , Ya-Chung Yu ¹ ,	

Chin-Chung Nien¹, Jenn-Hwan Tarng^{1, 2}, Chih-Chien Chiang², Tzu-Yu Tseng², and Shyh-Jong Chung², ¹Industrial Technology Research Institute

(ITRI), Taiwan, ²National Chiao Tung University (NCTU), Taiwan

Session FR1A: RF transceiver and building blocks

8:30 AM - 10:10 AM Friday, December 2, 2011 Grand Ballroom 1

Chair: Frank Henkel, IMST GmbH
Co-Chair: Pui-In Mak, University of Macau

FR1A-1	Trends in Low Power Frontend Development for IEEE	157
8:30-8:55	802.15.4/ZigBee (Invited) Frank Henkel, Andreas Neyer, Mohamed Gamal El Din, IMST GmbH,	
	Kamp-Lintfort, D-47475, Germany	
FR1A-2		161
	High-Performance 25%-Duty-Cycle LO Generator for WCDMA/GSM Applications	
8:55-9:20	Song Hu, Weinan Li, Yumei Huang, and Zhiliang Hong, State Key Laboratory of ASIC & System, Fudan University, Shanghai, China	
FR1A-3	Digital I/Q RF Transmitter Using Time-Division Duplexing	165
9:20-9:45	Robert Bogdan Staszewski and Morteza S.Alavi, ERL/DIMES, Technische	
	Universiteit Delft, Mekelweg 4, 2628CD Delft, Netherlands	
FR1A-4	Mismatch Considerations in an RF-DAC Design for a Digital Polar EDGE Transmitter	169
9:45-10:10	Jaimin Mehta, R. Bogdan Staszewski ² , Gennady Feygin, Oren Eliezer, Michel Frechette, and Poras Balsara ³ , Texas Instruments, ² Delft University of Technology ³ University of Texas at Dallas	

Session FR1B: Special Session-Power-Efficient Data Converter Techniques

8:30 AM - 10:10 AM Friday, December 2, 2011 Grand Ballroom 2

Chair: Seng-Pan U, University of Macau
Co-Chair: Tai-Cheng Lee, National Taiwan University

FR1B-1	Design Techniques for Nanometer Wideband Power-Efficient CMOS ADCs	173
8:30-8:50	Seng-Pan U, Sai-Weng Sin, Yan Zhu, U-Fat Chio, He-Gong Wei and, R. P. Martins ¹ , State Key Laboratory of Analog and Mixed Signal VLSI Faculty of Science and Technology, University of Macau, Macao, China, ¹ On leave from Instituto Superior Técnico/TU of Lisbon, Portugal	
FR1B-2	A 1.0 GS/s 7bit Pipelined-Folding-Interpolating ADC with 6.0 ENOB at Nyquist Frequency	177
8:50-9:10	Mingshuo WANG, Li LIN, Jiefeng XIA, Fan YE, Ning LI and Junyan REN, State Key Laboratory of ASIC and System, Fudan University, Shanghai, China	
FR1B-3	A 10-bit 400-MS/s 36-mW Interleaved ADC	181
9:10-9:30	Yen-Chuan Huang, Chin-Yu Lin, and Tai-Cheng Lee	
FR1B-4	Time-interleaved Single-slope ADC using Counter-based Time-to-digital converter	185
9:30-9:50	Hyoung-Taek Choi, Young-Hwa Kim, KwangSeok Kim, Jaewook Kim and SeongHwan Cho, Department of Electrical Engineering Korea Advanced Institute of Science and Technology (KAIST) Daejeon, Republic of Korea	
FR1B-5	Analysis and simulation of a 2^{nd} order $\Delta\Sigma$ modulator with	189
	single-comparator multi-bit quantizer	
9:50-10:10	Liyuan Liu ¹ , Dongmei Li ¹ , Yafei Ye ² and Zhihua Wang ² , ¹ Department of	
	Electronic Engineering, ² Institute of Microelectronics, Tsinghua University	
	Beijing, P.R.China	

Session FR2A: Synthesizers (VCO,DCO,PLL and divider)

10:30 AM - 12:10 AM Friday, December 2, 2011 Grand Ballroom 1

Chair: Wei-Zen Chen, National Chiao-Tung University
Co-Chair: Zhiliang Hong, Fudan University

FR2A-1 Area Efficiency PLL Design Using Capacitance Multiplication 193 Based on Self-Biased Architecture

10:30-10:55 Xu Meng¹, Lu Huang¹, Lan Chen², and Fujiang Lin¹, ¹Dept 23, University of Science and Technology of China (USTC), Hefei, China, ²Institute of Microelectronics of the Chinese Academy of Science (IMECAS), China

FR2A-2 <u>A Monolithic AlGaN/GaN HEMT VCO Using BST Film</u> 197 Varactor

10:55-11:20 Cen Kong¹, Hui Li¹, Shuwen Jiang², Jianjun Zhou¹, Xiaojian Chen¹, Chen Chen¹, ¹Science and Technology on Monolithic Integrated Circuits and Modules Laboratory, Nanjing Electronic Device Institute, Nanjing, China, ²State Key Laboratory of Electronic Thin-Film and Integrated Devices, University of Electronic Science and Technology of China, Chengdu, China

FR2A-3 A 0.65 mW 2.3-2.5GHz low phase noise LC-VCO with 201 adaptive body biasing technique

205

11:20-11:45 Chenluan Wang^{1,2}, Lu Huang¹, Nan Chen¹, Tianchun Ye², and Fujiang Lin¹,

¹Dept 23, University of Science & Technology of China (USTC), Hefei,

China, ²Institute of Microelectronics of the Chinese Academy of Sciences
(IMECAS), China

FR2A-4 Design of Ka-band Miller Divider in 130 nm CMOS

11:45-12:10 Mohammed K. Ali, Viswanathan Subramanian, Tao Zhang, and Georg Boeck, Microwave Lab., Berlin Institute of Technology, Einsteinufer 25, D-10587 Berlin, Germany

Session FR2B: RF device technologies and modeling

10:30 AM - 12:10 AM

Friday, December 2, 2011 Grand Ballroom 2

Co-Chair: Patrick Yue, University of California Santa Barbara

FR2B-1 Scaling and High-Frequency Performance of AlN/GaN 209 HEMTs (invited)

- 10:30-10:55 Xi Luo¹, Subrata Halder¹, Walter R. Curtice¹, James C. M. Hwang¹, Kelson D. Chabak², Dennis E. Walker, Jr.², and Amir M. Dabiran³, ¹Lehigh University, Bethlehem, USA; ²Air Force Research Lab, WPAFB, USA; ³SVT Associates, Inc., Eden Prairie, USA
- FR2B-2 Sub 100 nm In_{0.53}Ga_{0.47}As/In_{0.52}Al_{0.48}As InP-based HEMT with 213 f_T =204 GHz, f_{max} =352 GHz, and $g_{m,max}$ =918 mS/mm
- 10:55-11:20 Zhong Yinghui^{1, 2}, Wang Xiantai¹, Su Yongbo¹, Cao Yuxiong¹, Jin Zhi¹, Zhang Yuming², Liu Xinyu¹, ¹Institute of Microelectronics, Chinese Academy of Sciences, Beijing, China, ²Microelectronics Institute, Xidian University, Xi'an, China
- FR2B-3 Extraction of Lumped RC Elements Representing Substrate 217
 Coupling of RF Devices
- 11:20-11:45 Naoya Azuma, Yasutaka Kanda, Makoto Nagata, Graduate School of System Informatics, Kobe University, Kobe, Japan
- FR2B-4 A Design Method of Microstrip Directional Coupler with 221 Multi-Elements Compensation
- 11:45-12:10 Lei Han, Key Laboratory of MEMS of Ministry of Education, Southeast University, Nanjing, Jiangsu Province, China