

2010 Asia-Pacific Microwave Conference Proceedings

(APMC 2010)

**Yokohama, Japan
7-10 December 2010**

Pages 1-741



IEEE Catalog Number: CFP10APM-PRT
ISBN: 978-1-4244-7590-2

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Theory and Implementation of Oscillators

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Transmission Lines and Waveguide 1

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²CEA-LETI Minatec, FRANCE, ³STMicroelectronics, FRANCE

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Y.-H. Kuo¹, J.-H. Tsai², W.-H. Chou¹, T.-W. Huang¹, ¹National Taiwan Univ., TAIWAN, ²National Taiwan Normal Univ., TAIWAN

TH2E-5	116GHz CMOS Injection Locked Oscillator with -99.3dBc/Hz at 1MHz Offset Phase Noise M. Motoyoshi ^{1,2} , M. Fujishima ¹ , ¹ Hiroshima Univ., JAPAN, ² The Univ. of Tokyo, JAPAN	786
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Session TH2F

Miniaturized and Multi-Band Directional Couplers

Room F (313+314) 10:50-12:30

Thursday, December 09

Chairs : C.-H. Tseng, National Taiwan Univ., TAIWAN
T. Kawai, Univ. of Hyogo, JAPAN

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TH2F-3	Dual-Band Rat-Race Coupler Design in Multilayer LTCC T.-M. Shen, C.-R. Chen, T.-Y. Huang, R.-B. Wu, National Taiwan Univ., TAIWAN	798
TH2F-4	A Compact Branch-Line Coupler Using π -Equivalent Shunt-Stub-Band Artificial Transmission Lines C.-H. Wu, C.-H. Tseng, National Taiwan Univ. of Science and Technology, TAIWAN	802
TH2F-5	Directional Couplers from 30 to 140GHz in Silicon B. Laemmle ¹ , K. Schmalz ² , C. Scheytt ² , A. Koelpin ¹ , R. Weigel ¹ , ¹ Univ. of Erlangen-Nuremberg, GERMANY, ² IHP Microelectronics GmbH, GERMANY	806

Session TH3A

Wireless Transciever and Receier IC Design Techniques

Room A (301) 14:00-15:40

Thursday, December 09

Chairs : K. Nishikawa, NTT Corp., JAPAN
T. T. Lee, Boeing, U.S.A.

TH3A-1	A 0.5-5.5GHz Low Even-Order Distortion CMOS Current-Reused Front-End for Wideband RF Receivers R.-F. Ye ¹ , K.-S. Chen ¹ , T.-S. Horng ¹ , J.-M. Wu ² , ¹ National Sun Yat-sen Univ., TAIWAN, ² National Kaohsiung Normal Univ., TAIWAN	810
TH3A-2	A 41-mW Single-IF Dual Conversion CMOS Receiver for 5-GHz Wireless LAN D. Oh, M. Cha, I. Choi, I. Kwon, Ajou Univ., REPUBLIC of KOREA	814

TH3A-3	A 2.5-2.7 GHz Pseudo-Cascode CMOS Receiver Front-End with Integrated Unequal-Turn-Ratio Transformer Balun Y.-C. Lin ¹ , K.-S. Chen ¹ , T.-S. Horng ¹ , J.-M. Wu ² , ¹ National Sun Yat-sen Univ., TAIWAN, ² National Kaohsiung Normal Univ., TAIWAN	818
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Session TH3B

Highly-Integrated Planar Filter / Resonator

Room B (302) 14:00-15:40

Thursday, December 09

Chairs :	E. Rius, Université de Bretagne Occidentale, FRANCE S. Narahashi, NTT DOCOMO INC., JAPAN	
TH3B-1	A 77-GHz CMOS On-Chip Bandpass Filter Using Slow-Wave Stepped-Impedance Resonators H.-R. Lin ¹ , C.-Y. Hsu ¹ , L.-K. Yeh ¹ , H.-R. Chuang ¹ , C.-Y. Chen ² , ¹ National Cheng Kung Univ., TAIWAN, ² National Univ. of Tainan, TAIWAN	826
TH3B-2	A Compact Millimeter-Wave CMOS Bandpass Filter Using Stepped-Impedance Cross Resonator Y.-M. Chen, S.-F. Chang, C.-L. Wei, National Chung Cheng Univ., TAIWAN	829
TH3B-3	High Performance Resonators for MM-Wave ICs F. Aghamoradi, I. McGregor, K. Elgaid, Univ. of Glasgow, U.K.	833
TH3B-4	A Compact Second Harmonic-Suppressed Bandpass Filter Using π -Equivalent Transmission Lines C.-L. Chang, C.-H. Tseng, National Taiwan Univ. of Science and Technology, TAIWAN	837
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Session TH3C

Electromagnetic Wave Theory 1

Room C (303) 14:00-15:40

Thursday, December 09

Chairs :	S. Watanabe, Aoyama Gakuin Univ., JAPAN K. Okubo, Okayama Prefectural Univ., JAPAN	
TH3C-1	Creating a Terahertz Wave Source Through Nonlinear Sum Frequency Generation in a Microwave Pumped Ferroelectric Crystal	845

J.F. Webb, Swinburne Univ. of Technology, MALAYSIA

TH3C-2	Efficiency Analysis and Optimal Design of a Circular Loop Resonant Coil for Wireless Power Transfer H.-C. Son ¹ , J.-W. Kim ² , Y.-J. Park ¹ , K.-H. Kim ¹ , ¹ KERI, REPUBLIC of KOREA, ² Univ. of Science and Technology, REPUBLIC of KOREA	849
TH3C-3	Frequency Shift in a Single Dielectric Resonator and in a Chain of Coupled Resonators Due to Time Change in Permittivity N.K. Sakhnenko, A.G. Nerukh, Kharkov National Univ. of Radio Electronics, UKRAINE	853
TH3C-4	Poynting Theorem for the Natural Modes of Open Dielectric Resonators with Active Regions A.I. Nosich ¹ , E.I. Smotrova ¹ , V.O. Byelobrov ¹ , R. Sauleau ² , ¹ IRE NASU, UKRAINE, ² Université de Rennes ¹ , FRANCE	857
TH3C-5	Scattering by Cylindrical Objects Buried in a Dielectric Layer F. Frezza ¹ , L. Pajewski ² , C. Ponti ² , G. Schettini ² , ¹ Sapienza Univ. of Rome, ITALY, ² Roma Tre Univ., ITALY	861

Session TH3D
Metamaterial Antennas
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Thursday, December 09

Chairs :	Z. Shen, Nanyang Technological Univ., SINGAPORE N. Michishita, National Defense Academy of Japan, JAPAN	
TH3D-1	Realization of a Composite Right / Left-Handed Leaky-Wave Antenna with Circular Polarization Y. Dong, T. Itoh, UCLA, U.S.A.	865
TH3D-2	Leakage Control in the CRLH Uniform Ferrite-Loaded Open Waveguide Leaky-Wave Antenna Using a Transversally Extending Evanescent Waveguide Structure T. Kodaera ¹ , C. Caloz ² , ¹ Yamaguchi Univ., JAPAN, ² École Polytechnique de Montréal, CANADA	869
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TH3D-4	Dual-Frequency Reflectarray Design Using Sandwiched FSS J.-F. Li ¹ , Q. Chen ¹ , S.-W. Qu ¹ , Q. Yuan ² , K. Sawaya ¹ , ¹ Tohoku Univ., JAPAN, ² Sendai National College of Technology, JAPAN	877
TH3D-5	Multifeed Triangular Lattice Dielectric EBG Antennas C. Biancotto, P. Record, Heriot-Watt Univ., U.K.	881

Session TH3E
Emerging Technologies on Active Circuits
Room E (311+312) 14:00-15:40
Thursday, December 09

Chairs : Y. Itoh, Shonan Institute of Technology, JAPAN
T. Tsukii, Raytheon, JAPAN

TH3E-2	A Novel 8-Way Active Splitter for Broadband Gateway Applications A. Noll, M/A-COM Technology Solutions, Inc., U.S.A.	888
TH3E-3	A Power Combining Amplifier Based on Composite Right / Left-Handed Transmission Line J.-H. Yoo ¹ , E.-K. Kim ¹ , Y. Kim ¹ , Y.-C. Yoon ² , ¹ Kumoh National Institute of Technology, REPUBLIC of KOREA, ² Kwandong Univ., REPUBLIC of KOREA	892
TH3E-4	Design of a Highly Efficient CMOS Rectifier for Passive Communication Systems J. Essel ¹ , D. Brenk ¹ , J. Heidrich ¹ , G. Hofer ² , G. Holweg ² , R. Weigel ¹ , ¹ Univ. of Erlangen-Nuremberg, GERMANY, ¹ Infineon Technologies, AUSTRIA	896
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Session TH3F
Packaging Techniques and Functional Devices
Room F (313+314) 14:00-15:40
Thursday, December 09

Chairs : R.-B. Wu, National Taiwan Univ., TAIWAN
T. Kosugi, NTT Corp., JAPAN

TH3F-1	Copper Balls Interconnection Technology for 60GHz Band 3-D System-in-Package Modules S. Yoshida, S. Tanifuji, S. Kameda, N. Suematsu, T. Takagi, K. Tsubouchi, Tohoku Univ., JAPAN	904
TH3F-2	Misalignment Effects in Inter-Chip Wireless Connection with Open-Ring Resonators M. Abe, Y. Okuyama, J.-P. Ao, Y. Ohno, The Univ. of Tokushima, JAPAN	908
TH3F-3	Cost-Effective 60-GHz Surface-Mount Antenna-Package for Wireless File-Transfer System R. Suga ¹ , H. Nakano ² , Y. Hirachi ² , J. Hirokawa ¹ , M. Ando ¹ , ¹ Tokyo Institute of Technology, JAPAN, ² AMMSYS, Inc., JAPAN	912
TH3F-4	Radio-Frequency Bulk Acoustic Wave Duplexer with a Differential Receiver Port H. Zhang, W. Pang, Tianjin Univ., CHINA	916
TH3F-5	Plate Wave Resonator Using Rotated Y-Cut Single Crystal LiTaO ₃ Thin Film Made by Ion Implant Technology H. Kando, T. Iwamoto, T. Yoneda, N. Hayakawa, H. Iwamoto, K. Araki, I. Hatsuda, Y. Nagao, Y. Yoshii, Murata Manufacturing Co., Ltd., JAPAN	920

Session TH4A
Broadband and Millimeter-Wave Circuit Designs
Room A (301) 16:00-18:00
Thursday, December 09

Chairs :	T. Tokumitsu, Sumitomo Electric Industries, Ltd., JAPAN R. Kagiwada, Northrop Grumman Aerospace System, U.S.A.	
TH4A-1	(Invited) Broadband Design Techniques and Technology for Future Wireless and Wire-Line Applications Dr. K.W. Kobayashi, K. Krishnamurthy, R. Vetury, Y. McCleary, R. Hillermeier, J.B. Shealy, RF Micro Devices, U.S.A.	924
TH4A-2	A 60GHz High Gain Transformer-Coupled Differential Power Amplifier in 65nm CMOS J.Y.-C. Liu ¹ , Q.J. Gu ¹ , T. LaRocca ² , N.-Y. Wang ¹ , Y.-C. Wu ¹ , M.-C.F. Chang ¹ , ¹ UCLA, U.S.A., ² Northrop Grumman Aerospace System, U.S.A.	932
TH4A-3	A 60GHz Frequency Down-Converter with Divided LO Output in an 80GHz SiGe HBT Technology G. Liu, A.C. Ulusoy, A. Trasser, H. Schumacher, Ulm Univ., GERMANY	936
TH4A-4	A Dual-Gate Subharmonic Injection-Locked Oscillator Using 0.5 μ m GaAs pHEMT Technology F.-H. Huang, M.-H. Tsai, H.-Y. Chang, Y.-M. Hsin, National Central Univ., TAIWAN	940
TH4A-5	A Low DC Power High Conversion Gain Frequency Doubler IC for 22-29GHz UWB Applications J. Sun ¹ , Q. Liu ¹ , Y.-J. Suh ¹ , T. Shibata ² , T. Yoshimasu ¹ , ¹ Waseda Univ., JAPAN, ² Denso Corp., JAPAN	944

Session TH4B
APMC Special Session
Room B (302) 16:00-18:00
Thursday, December 09

Chairs :	N. Suematsu, Tohoku Univ., JAPAN K. Ghorbani, RMIT Univ., AUSTRALIA	
TH4B-1	(Invited) Digitally Enhanced Linear Power Amplifiers Prof. B. Kim, D. Kang, J. Moon, D. Kim, Pohang Univ. of Science and Technology, REPUBLIC of KOREA	948
TH4B-2	(Invited) Antenna-in-Package Technology: the Key to Success of 60-GHz Radio Prof. Y.P. Zhang, Nanyang Technological Univ., SINGAPORE	954
TH4B-3	(Invited) Millimeter Wave Integrated Circuit Techniques and Technology Prof. S.K. Koul, Indian Institute of Technology Delhi, INDIA	958

Session TH4C
Electromagnetic Wave Theory 2
Room C (303) 16:00-18:00
Thursday, December 09

Chairs : A.I. Nosich, IRE NASU, UKRAINE
T. Shibata, NTT Corp., JAPAN

TH4C-1	(Invited) A History of Applied Planar Electromagnetic Analysis Dr. J.C. Rautio, Sonnet Software, Inc., U.S.A.	966
TH4C-2	WCIP Acceleration N. Raveu ¹ , L. Giraud ² , H. Baudrand ¹ , ¹ Université de Toulouse, INPT, Laplace, ENSEEIHT, CNRS, FRANCE, ² NRIA Bordeaux Sud Ouest, FRANCE	971
TH4C-3	Moment Method Solution Using Expansion Functions Defined in an Infinite Domain for Antenna Problems D. Malka, H. Matzner, HIT, ISRAEL	975
TH4C-5	Complex Waves on Three-Dimensional Periodic Arrays of Lossy or Lossless Magnetodielectric Spheres R.A. Shore, A.D. Yaghjian, Air Force Research Lab., U.S.A.	983

Session TH4D
Antennas for Wireless Systems
Room D (304) 16:00-18:00
Thursday, December 09

Chairs : S. Lucyszyn, Imperial College London, U.K.
Y. Okano, Tokyo City Univ., JAPAN

TH4D-1	(Invited) Design of a Compact Wideband UHF RFID Tag Antenna Prof. J. Choi, U. Kim, Hanyang Univ., REPUBLIC of KOREA	987
TH4D-2	Fractal GPS Antenna Design on Piezoelectric Substrate T.-C. Tang ¹ , C.-H. Tsai ¹ , K.-H. Lin ¹ , Y.-T. Huang ² , C.-Y. Chen ² , ¹ National Sun Yat-sen Univ., TAIWAN, ² TAI-SAW Technology Co., Ltd., TAIWAN	991
TH4D-3	A Planar Yagi-Uda Antenna with a Meandered Driven Dipole and a Concave Parabolic Reflector H.-C. Huang ¹² , J.-C. Lu ¹ , P. Hsu ¹ , ¹ National Taiwan Univ., TAIWAN, ² Nokia Corp., CHINA	995
TH4D-4	Reconfigurable Multi-Slot Multi-Port Antennas Using RF-MEMS Switches for Handheld Devices C.-Y. Chiu, R.D. Murch, The Hong Kong Univ. of Science and Technology, HONG KONG	999
TH4D-5	A New Compact Filtering Antenna Using Defected Ground Resonator C.-T. Chuang, S.-J. Chung, National Chiao Tung Univ., TAIWAN	1003

Session TH4E

Advanced Technologies on Devices, Amplifiers, and Oscillators

Room E (311+312) 16:00-18:00

Thursday, December 09

Chairs :	R. Pokharel, Kyushu Univ., JAPAN K. Okada, Tokyo Institute of Technology, JAPAN	
TH4E-1	(Invited) Radio-Frequency Nanoelectronics: a New Paradigm in Electronic System Design Prof. L. Pierantoni ¹ , Dr. F. Coccetti ² , ¹ Universita Politecnica delle Marche, ITALY, ² LAAS-CNRS, and Universit� de Toulouse, FRANCE	1007
TH4E-2	A New Estimation Method of Efficiency for Class-E Power Amplifier Operated above Theoretical Maximum Operation Frequency C.-C. Shen ¹ , H.-Y. Chang ¹ , C.-S. Chen ² , ¹ National Central Univ., TAIWAN, ² ITRI, TAIWAN	1015
TH4E-3	A Highly Efficient Reconfigurable 130nm CMOS-SOI RF Power Amplifier for Multi-Radio Emitter L. Andia ^{1,2} , D. Belot ¹ , M. Villegas ² , G. Baudoin ² , ¹ STMicron Electronics, FRANCE, ² Universit� Paris-Est, FRANCE	1019
TH4E-4	Microwave Transmitter Module Integrating Slot Array Antenna, Push-Push Oscillator and PSK Modulator T. Tanaka, H. Otani, M. Aikawa, Saga Univ., JAPAN	1023
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Session TH4F

CMOS Frequency Converters

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Thursday, December 09

Chairs :	N. Itoh, Okayama Prefectural Univ., JAPAN K. Suyama, Epoch Microelectronics, Inc., U.S.A.	
TH4F-1	Wide-Band Direct Sampling Mixer with Complex-Pole Synthesis H. Shiozaki, K. Araki, Tokyo Institute of Technology, JAPAN	1031
TH4F-2	Design Optimization of a 1.4GHz Low Power Bulk-Driven Mixer C.-H. Li, C.-N. Kuo, National Chiao Tung Univ., TAIWAN	1035
TH4F-3	5GHz Band Low Phase Noise Si-CMOS Oscillator with Flip-Chip Mounted FBAR T.T. Ta, K. Ando, S. Tanifuji, S. Kameda, N. Suematsu, T. Takagi, K. Tsubouchi, Tohoku Univ., JAPAN	1039
TH4F-4	A Switched-Transformer, 76% Tuning-Range VCO in 90nm CMOS Y. Huo ¹ , T. Mattsson ² , P. Andreani ^{1,2} , ¹ Lund Univ., SWEDEN, ² ST-Ericsson AB, SWEDEN	1043
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Session TH1G
Open Forum (Poster Session)
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Thursday, December 09

TH1G-01	Ultra-Wideband (UWB) Bandpass Filters with Multiple Notched Bands Using Asymmetric Dual-Line Coupling Structur K. Song ^{1,2} , Q. Xue ¹ , ¹ City Univ. of Hong Kong, HONG KONG, ² UESTC, CHINA	1055
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TH1G-03	An Improved Wide-Band Model of CRF Filters Using Two Different Approaches W. Sahyoun, P. Benech, J.-M. Duchamp, IMEP-LAHC Lab., FRANCE	1063
TH1G-04	The Design of Wireless Express Band Pass Filter Using a Close Loop Concept S.-S. Lee ¹ , J.-N. Leer ² , S.-S. Choi ¹ , ¹ ETRI, REPUBLIC of KOREA, ² Hanbat National Univ., REPUBLIC of KOREA	1067
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TH1G-06	A Triangular UWB Bandpass Filter with Wide Out-of-Band Rejection A. Namsang ¹ , P. Akkaraekthalin ² , ¹ Rajamangula Univ. of Technologu Thunayaburi, THAILAND, ² KMUTNB, THAILAND	1074
TH1G-07	Quasi Multi-Mode Resonator for Wideband Filter Applications M. Nosrati ¹ , B.S. Virdee ² , M. Mirzaee ¹ , ¹ Islamic Azad Univ., IRAN, ² London Metropolitan Univ., U.K.	1078
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TH1G-10	Miniaturized Dual Mode Microwave Filter W.P. Wong, Universiti Teknologi Petronas, MALAYSIA	1090
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