

2017 IEEE Wireless Power Transfer Conference (WPTC 2017)

**Taipei, Taiwan
10-12 May 2017**



**IEEE Catalog Number: CFP17WPT-POD
ISBN: 978-1-5090-4586-0**

**Copyright © 2017 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:	CFP17WPT-POD
ISBN (Print-On-Demand):	978-1-5090-4586-0
ISBN (Online):	978-1-5090-4585-3

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

Oral Sessions

Wednesday, May 10, 2017

13:30-15:00 Devices and Systems for WPT

Chairs: Luca Roselli, *University of Perugia, Italy*

Tzuen-Hsi Huang, *National Cheng Kung University, Taiwan*

13:30 Dielectric Resonators for Mid-range Wireless Power Transfer Application 1

Mingzhao Song, Pavel A. Belov, Polina V. Kapitanova

ITMO University, Russia

13:45 Increased Data Rate using Higher-order Digital Modulation for Simultaneous Inductive Data and Power Transfer Systems 4

Benedikt Sanftl, Martin Trautmann, Markus Kleinhenz, Robert Weigel, Alexander Koelpin

Friedrich-Alexander University of Erlangen-Nuremberg, Germany

14:00 kQ-product analysis of inductive power transfer system with two transmitters and two receivers 7

Tatsuki Ujihara, Quang-Thang Duong, Minoru Okada

Nara Institute of Science and Technology, Japan

14:15 Wireless Power Transfer Efficiency of Variable Load Impedance 11

Jian Kai Liao, Yan Kai Huang, Heng Ming Hsu

National Chung Hsing University, Taiwan

14:30 Chip-level Wireless Power Transfer Scheme Design for Next Generation Wireless Interconnected Three-Dimensional Integrated Circuits 14

Jinwook Song, Seungtaek Jeong, Shinyoung Park, Jonghoon Kim, Seokwoo Hong, Joungho Kim

Korea Advanced Institute of Science and Technology, Korea

14:45 Design of a Novel Wireless Power System Using Machine Learning Techniques for Drone Applications 18

Soyeon Jeong, Jo Bito, Manos Tentzeris

Georgia Institute of Technology, USA

Thursday, May 11, 2017
11:10-12:25 Technologies for WPT I

Chairs: Zhizhang (David) Chen, *Dalhousie University, Canada*
Jau-Horng Chen, *National Taiwan University, Taiwan*

11:10 Power Distribution Control Using Switching Devices for Multiple Charging System in Resonant Magnetic Coupling 22

Satoshi Shimokawa, Akiyoshi Uchida, Hirotaka Oshima
Fujitsu Laboratories Limited, Japan

11:25 Acoustic Wireless Power Transfer with Receiver Array for Enhanced Performance 26

Victor Farm-Guoo Tseng, Sarah S. Bedair, Nathan Lazarus
U.S. Army Research Laboratory, USA

11:40 SWIPT with Biased ASK Modulation and Dual-Purpose Hardware 30

Steven Claessens, Dominique Schreurs, Sofie Pollin
University of Leuven, Belgium

11:55 Flexible and Efficient 6.78MHz Wireless Charging for Metal-Cased Mobile Devices Using Controlled Resonance Power Architecture 34

Hengchun Mao, Bo Yang, Zeng Li, Shi Song, Xintao Zhao
NuVolta Technologies Inc., USA

12:10 Multi-sine Wireless Power Transfer with a Realistic Channel and Rectifier Model 38

Ning Pan, Steven Claessens, Mohammad Rajabi, Dominique Schreurs, Sofie Pollin
University of Leuven, Belgium

13:30-15:00 Recetnna Designs

Chairs: Qiang Chen, *Tohoku University, Japan*
Wei-Chung Weng, *National Chi Nan University, Taiwan*

13:30 A 2.45 GHz planar array antenna with harmonic suppression for wireless power transmission applications 42

Chia-Hao Wu, Guan-Pu Pan, Hao-Ming Hsu, Jwo-Shiun Sun
National Taipei University of Technology, Taiwan

13:45 Design of a compact quasi-isotropic antenna for RF energy harvesting 45

Joon-Hong Kim, Hoyeol Kim, Sangwook Nam
Seoul National University, Korea

14:00 Dual-band Crossed-Yagi Antenna for RF-based Power Transmitters with Polarization and Harmonic Detection Functions 48

Sheng-Fan Yang¹, An-Ching Huang¹, Chun-Jung Peng¹, Tzuen-Hsi Huang¹, Fang-Ming Wu², Pei-Jung Chung²

¹National Cheng Kung University, Taiwan, ²Delta Electronics, Inc., Taiwan

14:15 Very Small Size UHF RFID Tag for Racing Pigeon Ring Applications 51

Shu-Yao Liang, Bo-Shau Chen, Chih-Chiang Chen, Chow-Yen-Desmond Sim
Feng Chia University, Taiwan

14:30 High Gain Isotropic Rectenna 54

Erika Vandelle¹, Phi Long Doan¹, Do Hanh Ngan Bui¹, Tan Phu Vuong¹, Gustavo Ardila¹, Ke Wu², Simon Hemour³

¹Université Grenoble Alpes, France, ²Polytechnique Montréal, Canada, ³Université de Bordeaux, France

14:30 Discontinuous phasor model of an inductive power transfer system 58

Giordano Scarciotti
Imperial College London, UK

16:00-17:30 Integrated Circuits and Systems for WPT

Chairs: Simon Hemour, *Université de Bordeaux, France*

Huang-Jen Chiu, *National Taiwan University of Science and Technology, Taiwan*

16:00 A Tri-Mode Fully-Integrated Capacitive Voltage Multiplier for Photovoltaic Energy Harvesting 62

Hao-Chung Cheng, Min-Yen Lin, Po-Hung Chen
National Chiao Tung University, Taiwan

16:15 Automated Layout-integrated Sizing of a 2.45 GHz Differential-Drive Rectifier in 28 nm FDSOI CMOS 66

Pierre-Antoine Haddad, François Stas, Jean-Pierre Raskin, David Bol, Denis Flandre
Université Catholique de Louvain, Belgium

16:30 A Nonlinear Wireless Power Transfer Receiver with Adjustable Interface Impedance 70

Ting-Chung Lin, Tzu-Min Wei, Ping-Hsuan Hsieh
National Tsing Hua University, Taiwan

16:45 Communication Chip of Wireless Power Transfer System 73

Chih-Kai Chang, Chun-Tsai Chien, Chung-Yuan Chen, Heng-Ming Hsu
National Chung-Hsing University, Taiwan

17:00 A 13.56 MHz Pulse-Width Modulation Active Rectifier for Implantable Medical Devices 76

Fu-Bin Yang, Sheng-Kai Hsieh, Po-Hung Chen
National Chiao Tung University, Taiwan

17:15 A High-Performance AC–DC Rectifier with Fully Actively Controlled Switches for Vibration Energy Harvesting 80

Robert Chen-Hao Chang, Wei-Chih Chen, Wen-Ching Hsiao
National Chung Hsing University, Taiwan

Friday, May 12, 2017
11:10-12:25 Technologies for WPT II

Chairs: Shigeo Kawasaki, *ISAS/JAXA, Japan*

Yi-Jan (Emery) Chen, *National Taiwan University, Taiwan*

11:10 Stochastic Modeling Framework for Wireless Power Transfer in the Radiative Near-Field 84

Thomas Deckmyn, Marco Rossi, Dries Vande Ginste, Hendrik Rogier
Ghent University, Belgium

11:25 On the Use of Eddy Currents to Facilitate Wireless Power Transfer Through Metallic Surfaces 88

Vinit Singh, Sina Haji Alizad, Md. Alberto Peralta, Nazmul Alam
NuCurrent, Inc., USA

11:40 Conjugate Image Theory for Non-Symmetric Inductive, Capacitive and Mixed Coupling 92

Ben Minnaert, Nobby Stevens
KU Leuven, Technology Campus Ghent, Belgium

11:55 Harmonic Enhanced Location Detection Technique for Energy Harvesting Receiver with Resonator Coupling Design 96

Chun-Jung Peng¹, Sheng-Fan Yang¹, An-Ching Huang¹, Tzuen-Hsi Huang¹, Pei-Jung Chung², Fang-Ming Wu²

¹National Cheng Kung University, Taiwan, ²Delta Electronics Inc., Taiwan

12:10 Pulse-Test for Wireless Power Transfer Systems 99

Benjamin Klaus, Daniel Barth, Thomas Leibfried
Karlsruhe Institute of Technology, Germany

13:30-15:00 Coils and Resonators for WPT

Chairs: Kenji Itoh, *Kanazawa Institute of Technology, Japan*

Chow-Yen-Desmond Sim, *Feng Chia University, Taiwan*

13:30 Design and Optimization of Decoupled Concentric and Coplanar Coils for WPT Systems 103

Benny J. Varghese, Trent Smith, Ahmed Azad, Zeljko Pantic
Utah State University, USA

13:45 Anti-Efficiency Reduction of Coil's Displacement by Using Parasitic Coil 107

Qiaowei Yuan, Satoshi Suzuki, Taku Sato
National Institute of Technology, Sendai College, Japan

14:00 Design and Analysis of Wireless Power Transfer System using Flexible Coil and Shielding Material on Smartwatch Strap 110

Seungtaek Jeong¹, Jinwook Song¹, Hongseok Kim¹, Seongsoo Lee¹, Joungho Kim¹, Jaehak Lee², Yongjin Kim², Seungman Kim², Junyeop Song²

¹KAIST, Korea, ²KIMM, Korea

14:15 Evaluation of a Transcutaneous Energy Transmission System with a Fleible Coil for an Implantable Ventricular Assist Device 113

Seiryu Nagato, Wataru Hijikata, Tadahiko Shinshi
Tokyo Institute of Technology, Japan

14:30 Robust Optimization of Printed Spiral Coil Resonators for Wireless Powering System with Proximal Metal Plates 116

Chong-Yi Liou, Shau-Gang Mao
National Taiwan University, Taiwan

14:45 Development of Helical Circular Coils for Wireless Through-metal Inductive Power Transfer 119

Chi Van Pham, Anh-Vu Pham, Christopher S. Gardner
University of California, Davis, USA

16:00-17:30 Rectifier Designs

Chairs: Ching-Yuan Yang, *National Chung Hsing University, Taiwan*
Seungyoung Ahn, *KAIST, Korea*

16:00 Study on a Microwave Rectifier with Intermittent Input Signal 122

Takashi Hirakawa, Naoki Shinohara
Kyoto University, Japan

16:15 The 2.4GHz band SOI-CMOS bridge rectifier IC 125

Seishu Yanagihara¹, Shunya Tsuchimoto¹, Kenji Itoh¹, Kengo Kawasaki², Tomohiro Yao², Masaomi Tsuru²
¹Kanazawa Institute of Technology, Japan, ²Mitsubishi Electric Corporation, Japan

16:30 Computational Simulation of a Rectifier for Microwave Power Transfer by a Multilayer Substrate 128

Kouta Okazaki¹, Shotaro Ishino², Naoki Shinohara¹, Tomohiko Mitani¹
¹Kyoto University, Japan, ²Furuno Electric Co., Ltd, Japan

16:45 Millimeter-wave Ink-jet Printed RF Energy Harvester for Next Generation Flexible Electronics 131

Jo Bito¹, Valentina Palazzi², Jimmy Hester¹, Ryan Bahr¹, Federico Alimenti², Paolo Mezzanotte², Luca Roselli², Manos M. Tentzeris¹
¹Georgia Institute of Technology, USA, ²University of Perugia, Italy

17:00 A C-Band Microwave Rectifier Based on Harmonic Termination and with Input Filter Removed 135

Pengde Wu, Lei Zhang, Changjun Liu, Yingsheng Zhao
Sichuan University, China

17:15 Integrated Cooperative Radiofrequency (RF) and Kinetic Energy Harvester 139

Xiaoqiang Gu¹, Simon Hemour², Ke Wu¹
¹Polytechnique Montréal, Canada, ²University of Bordeaux, France

Poster Sessions

Thursday, May 11, 2017
10:10-11:10 Poster Session I

Chair: Wei-Liang Lin, *National Chung Hsing University, Taiwan*

PS1-01 Method of Wireless Power Transmission to Multiple Separated Sensors using Contact-less Power Line 142

Tetsuya Kusumoto¹, Takashi Saito¹, Yoshikazu Furuta²

¹Nippon Soken Inc., Japan, ²DENSO Corporation, Japan

PS1-02 A Novel Compact and Frequency-Tunable Rectenna for Wireless Energy Harvesting 145

Chaoyun Song¹, Yi Huang¹, Jiafeng Zhou¹, Paul Carter²

¹University of Liverpool, UK, ²Global Wireless Solutions, Inc., USA

PS1-03 Design and Optimization of Deep Sub-Wavelength Metamaterials Using a Hybrid Search Algorithm 148

Hui Zhu, Xudong Luo, Chunyu Zhao, Zhenxiang Hong, Zhenyu Huang

Shanghai Jiao Tong University, China

PS1-04 Modeling and Optimization of Single-turn Printed Coils for Powering Biomedical Implants 152

Yuhua Cheng, Xiang Su, Dongdong Xuan, Luwen Wang, Yan Liu, Maysam Ghovanloo, and Gaofeng Wang

Hangzhou Dianzi University, China

PS1-05 Three-way cascade power divider and combiner for satellite communications 155

Abdulelah A. Alshehri¹, Saleh M. Alsaif¹, Abdulrahman Alshehry¹, Hamed Alsuraistry¹, Hatim M.

Behairy¹, Ruey-Beei Wu²

¹King Abdulaziz City for Science and Technology, Saudi Arabia, ²National Taiwan University, Taiwan

PS1-06 Optimizing Three-Phase Three-Layer Coil Array for Omnidirectional Wireless Power Transfer N/A

Yuhua Cheng¹, Guoxiong Chen¹, Gaorong Qian¹, Maysam Ghovanloo², and Gaofeng Wang¹

¹Hangzhou Dianzi University, China, ²Georgia Institute of Technology, USA

PS1-07 Meander Mesh for Two-Dimensional Wireless Power 159

Bing Zhang¹, Takashi Matsuda¹, Toshinori Kagawa¹, Fumihide Kojima¹, Kenshi Horihata², Yoshio Koyanagi²

¹National Institute of Information and Communications Technology, Japan, ²Panasonic Corporation

PS1-08 Retro-directive Beamforming versus Retro-reflective Beamforming for Wireless Power Transmission 163

Xin Wang¹, Bodong Ruan¹, Hang Wong², Chi Hou Chan², Mingyu Lu³

¹Nanjing University of Aeronautics and Astronautics, China, ²City University of Hong Kong, Hong Kong, ³West Virginia University Institute of Technology, USA

PS1-09 Microstrip antenna and rectifier for wireless power transfer at 94GHz 167

Kosumo Matsui¹, Kimiya Komurasaki¹, Waku Hatakeyama¹, Yuki Okamoto¹, Ayako Mizushima¹, Shunsuke Minakawa², Masatoshi Suzuki², Kohei Shimamura², Kohei Fujiwara³, Hidehiko Yamaoka³
¹University of Tokyo, Japan, ²University of Tsukuba, Japan, ³Tokyo Metropolitan Industrial Technology Research Institute, Japan

PS1-10 High Q-factor WPT System with Negative Impedance Converter 170

Se-Hwa Yoon¹, Tae-Hyung Kim¹, Jong-Gwan Yook¹, Gi-Ho Yun², Woong-Yong Lee³
¹Yonsei University, Korea, ²Sungkyul University, Korea, ³Amotech, Korea

PS1-11 Maximum Power Transfer Scheme for Magnetic Resonance Charging System 174

Qi Jiang^{1,2,3}, Yuannian Qin¹, Yubin Zhao^{2,3}, Cheng-Zhong Xu², Xiaodong Wang⁴
¹Guilin University of Electronic Technology, China, ²Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences, China, ³Shenzhen Yaoyuan Technology Co. Ltd., China, ⁴Columbia University, USA

PS1-12 Effect of Load Dependence of Efficiency in a Multi-Receiver WPT System 178

Akiyoshi Uchida, Satoshi Shimokawa, Hirotaka Oshima
Fujitsu Laboratories Limited, Japan

PS1-13 Standards and Methods of Power Control for Variable Power Bidirectional Wireless Power Transfer 182

Graham Sanborn, Alex Phipps
SPAWAR Systems Center Pacific, USA

PS1-14 Litz Wire Design for Wireless Power Transfer in Electric Vehicles 186

Daniel Barth, Benjamin Klaus, Thomas Leibfried
Karlsruhe Institute of Technology, Germany

PS1-15 A Q-enhancement Method for Resonant Inductive Coupling Wireless Power Transfer System 190

Nobuyuki Nitta, Ning Li, Kento Fujimori, Yasuhiro Sugimoto
Chuo University, Japan

PS1-16 Prototyping and Experimentation of a Closed-Loop Wireless Power Transmission with Channel Acquisition and Waveform Optimization 193

Junghoon Kim, Bruno Clerckx, Paul D. Mitcheson
Imperial College London, UK

PS1-17 The system of dynamic wireless charging for transport using transmitter and receiver parameters adjustment N/A

Rodions Saltanovs
TransfoElectric, Latvia

Chair: Yen-Chung Chiang, *National Chung Hsing University, Taiwan*

PS2-01 Impedance Matching in Magnetic-Coupling-Resonance Wireless Power Transfer for Small Implantable Devices 197

Sota Masuda¹, Tetsuya Hirose¹, Yuki Akihara¹, Nobutaka Kuroki¹, Masahiro Numa¹, Masanori Hashimoto²

¹Kobe University, Japan, ²Osaka University, Japan

PS2-02 An Improved Energy Harvesting System on Power Transmission Lines 200

Y Zhuang¹, C Xu¹, S Yuan¹, C He¹, A Chen¹, W W. Lee², J Zhou¹ and Y Huang¹

¹University of Liverpool, UK, ²Zhejiang University of Technology, China

PS2-03 A Fully Autonomous Ultra-low Power Hybrid RF/Photovoltaic Energy Harvesting System with -25 dBm Sensitivity 203

Jo Bito, Jimmy G. Hester, Manos M. Tentzeris

Georgia Institute of Technology, USA

PS2-04 Magnetic Beamforming with Non-coupling Coil Pattern for High Efficiency and Long Distance Wireless Power Transfer 207

Kyungtae Kim, Han-Joon Kim, Ji-Woong Choi

Daegu Gyeongbuk Institute of Science and Technology, Korea

PS2-05 Optimal design of a small circular wire coil for maximum Q-factor in the MHz frequency 211

Do-Hyeon Kim, Young-Jin Park

KERI & UST, Korea

PS2-06 A Scaled Model for Investigations of Three-Phase Contactless Energy Transfer Systems 215

Philipp Seitz, Nejila Parspour, Marco Zimmer

University of Stuttgart, Germany

PS2-07 A Simple Structure of Planar Transmitting Array for Multi-Receiver Wireless Power Reception 219

Zhu Liu¹, Zhizhang Chen², Huapeng Zhao¹

¹The University of Electronic Science and Technology of China, China, ²Dalhousie University, Canada

PS2-08 DC-Based Impedance Tuning Method Using Magnetic Saturation for Wireless Power Transfer 221

Takuya Sasatani, Yoshiaki Narusue, Yoshihiro Kawahara, Tohru Asami

The University of Tokyo, Japan

PS2-09 Distributed Reactance Compensation for Printed Spiral Coils in Wireless Power Transfer 225

Yoshiaki Narusue, Yoshihiro Kawahara

The University of Tokyo, Japan

PS2-10 Design of Single-Sided AC Magnetic Field Generating Coil for Wireless Power Transfer 229

Hongkyun Kim, Karam Hwang, Jaehyung Park, Dongwook Kim, Seungyoung Ahn

KAIST, Korea

PS2-11 Single-Switch Soft-Switched Power Flow Controller for Wireless Power Transfer Applications 232

Ali Abdolkhani

Power by Proxi Ltd, New Zealand

PS2-12 A Triple-Band Bow-Tie Rectenna for RF Energy Harvesting without Matching Network 236

Ana López-Yela, Daniel Segovia-Vargas

Carlos III University of Madrid, Spain

PS2-13 Magnetic Resonance Wireless Power Transfer with a Current Source Transmitter and a Voltage Source Receiver 240

Byoung-Hee Lee¹, Kang Hyun Yi²

¹Hanbat National University, Korea, ²Daegu University, Korea

PS2-14 Design Considerations for an Active Rectifier Circuit for Bidirectional Wireless Power Transfer 243

Maxwell Kerber, Bruce Offord, Alex Phipps

SPAWAR Systems Center Pacific, USA

PS2-15 A Wideband Planar Rectenna for WLAN Wireless Power Transmission 247

Min-Chi Chang, Wei-Chung Weng, Wen-Hong Chen, Tse-Yi Li

National Chi Nan University, Taiwan

PS2-16 Shaped Reflector Antennas for Outdoor BTS of 4G/5G Mobile Communications 250

Li-Ruei Kuo¹, Hsi-Tseng Chou², Sheng-Ju Chou³

¹Whayu Industrial Co., Ltd., Taiwan, ²National Taiwan University, Taiwan, ³Yuan Ze University, Taiwan

Friday, May 12, 2017
10:10-11:10 Poster Session III

Chair: Yen-Chung Chiang, *National Chung Hsing University, Taiwan*

PS3-01 Front-end of Bluetooth Antenna with Filter and Sigma-Delta Modulator for Wireless Power Transfer 253

Wen-Cheng Lai, Ho-Chang Lee, Yen-Jung Su
National Taiwan University of Science and Technology, Taiwan

PS3-02 A Low-Power-Consumption Boost Converter with Maximum Power Tracking Algorithm for Indoor Photovoltaic Energy Harvesting 257

Dian-Lin Tsai, Hung-Hsien Wu, Chia-Ling Wei
National Cheng Kung University, Taiwan

PS3-03 Rectifying Circuit with High Impedance Microstrip Line for Wide Dynamic Range Characteristics 260

Ryousuke Kashimura¹, Tomohiro Seki¹, Koichi Sakaguchi¹ and Kenjiro Nishikawa²
¹Nihon University, Japan, ²Kagoshima University, Japan

PS3-04 Hybrid Semiconductor Integrated Rectifier for Wireless Power Transmission into Spacecraft 264

Ryoko Kishikawa^{1,2}, Harunobu Seita³, Akihira Miyachi⁴, Yuki Furuse⁵, Toshiya Nakaoka⁵, Satoshi Yoshida⁶, Kenjiro Nishikawa⁶, Masahiro Horibe¹, Shigeo Kawasaki^{2,4}
¹National Institute of Advanced Industrial Science and Technology, Japan, ²The Graduate University for Advanced Studies, Japan, ³UM-Services, LTD., Japan, ⁴Japan Aerospace Exploration Agency, Japan, ⁵Sophia University, Japan, ⁶Kagoshima University, Japan

PS3-05 One-side Automated Discrete Impedance Matching Scheme for Wireless Power Transmission 268

Jingsheng Liu^{1,2}, Yubin Zhao^{1,2}, Cheng-Zhong Xu¹, Xiaodong Wang³
¹Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences, China, ²Shenzhen Yaoyuan Technology Co. Ltd., China, ³Columbia University, USA

PS3-06 Evaluation of a C-Band Rectifier Using Si Substrate for HySIC Application 272

Satoshi Yoshida¹, Koshi Hamano¹, Akihira Miyachi², Kenjiro Nishikawa¹, Shigeo Kawasaki²
¹Kagoshima University, Japan, ²Japan Aerospace Exploration Agency, Japan

PS3-07 2.45GHz Wide Input Range CMOS Rectifier for RF Energy Harvesting 275

Wendy Wee Yee Lau, Liter Siek
Nanyang Technological University, Singapore

PS3-08 Parallel-Connected Bilayer Coil for a 3.3-kW Electric Vehicle Wireless Charging System 279

Kentaro Furiya, Naoki Omura, Hideki Nagano, Kenji Nishimura, Akio Ueda, Susumu Tokura
IHI Corporation, Japan

PS3-09 The wireless power transfer systems using the Class E push-pull inverter for industrial robots 283

Masayoshi Sugino¹, Tatsuya Masamura²
¹Nippon Soken Inc., Japan, ²DENSO Corporation, Japan

PS3-10 Distance and Load Insensitive Inductive Powering for Implantable Medical Devices Through Wireless Communication 286

Guijie Zhu, Songping Mai, Chun Zhang, Zhihua Wang
Tsinghua University, China

PS3-11 Optimal Energy Storage Solution for an Inductively Powered System for Dairy Cows 289

Ben Minnaert¹, Bart Thoen¹, David Plets², Wout Joseph², Nobby Stevens¹
¹KU Leuven, Belgium, ²IMEC-Ghent University, Belgium

PS3-12 Data Transmission System using Magnetic Resonance Wireless Power Transfer 293

Kouki Nakanishi, Masahiro Sasaki
Shibaura Institute of Technology, Japan

PS3-13 De-embedding Transformer-based Method for Characterizing the Chip of HF RFID Cards 296

Shrief Rizkalla¹, Ralph Prestros², Christoph F. Mecklenbräuer¹
¹Technische Universität Wien, Austria, ²NXP Semiconductors Austria GmbH, Austria

PS3-14 Network under Limited Energy: New Technique for Using Limited Number of Mobile Devices for Charging and Collecting Data 300

Tan Dat Nguyen¹, Shao-I Chu¹, Bing-Hong Liu¹, Liwen Hu², Ze-Hao Lai²
¹National Kaohsiung University of Applied Sciences, Taiwan, ²Missouri University of Science and Technology, USA

PS3-15 Novel Design of Pixelated Charging Electrodes for Capacitive Power Transfer 304

Yun-Tseng Liu¹, Ching-Lieh Li¹, Yu-Jen Chi¹, Yang-Han Lee¹, Qiaowei Yuan², Qiang Chen³
¹Tamkang University, Taiwan, ²Sendai National College of Technology, Japan, ³Tohoku University, Japan

PS3-16 Design and Analysis of Dual-Frequency Power Amplifier for Wireless Power and Data Transfer Application 308

Tao-Cheng Yu, Chin-Lung Yang
National Cheng Kung University, Taiwan

PS3-17 Low EMI high-k Tightly-coupled Resonant Magnetic Field (TCR-HMF) Charger with Impedance Design for a 3-wheeler Vehicle 312

Chiuk Song, Dong-hyun Kim, Kibum Yoon, Sunkyu Kong, Yeonje Cho, Seongsoo Lee, Seungtaek Jeong, Kyunghwan Song, Seokwoo Hong, Jonghoon Kim, Joungho Kim
Korea Advanced Institute of Science and Technology, Korea

Chair: Wei-Liang Lin, *National Chung Hsing University, Taiwan*

PS4-01 Research on Multi-channel Wireless Power Distribution Switch 322

Longlong Zhang, Zhanguo Cui, Wenxiao Li, Dele Shi
Shandong Institute of Space Electronic Technology, China

PS4-02 A Drone-Based Wireless Power Transfer and Communications Platform 315

Xuanke He, Jo Bito, Manos M. Tentzeris
Georgia Institute of Technology, USA

PS4-03 Design and Analysis of Hybrid Loop-array for High Efficiency and Low EMF Level in Wireless High Power Transfer System 319

Seongsoo Lee, Yeonje Cho, Hongseok Kim, Chiuk Song, Seungtaek Jeong, Joungho Kim
KAIST, Korea

PS4-04 Hybrid Class-E Synchronous Rectifier for Wireless Powering of Quadcopters 326

George Kkelis, Samer Aldhaher, Juan Manuel Arteaga, David C. Yates, Paul D. Mitcheson
Imperial College London, UK

PS4-05 Dual-Directional Near Field Communication Tag Antenna with Effective Magnetic Field Isolation from Wireless Power Transfer System 330

Seokwoo Hong, Seongsoo Lee, Seungtaek Jeong, Dong-Hyun Kim, Jinwook Song, Hongseok Kim, Joungho Kim
Korea Advanced Institute of Science and Technology, Korea

PS4-06 Compact Model of a Wireless Power Transfer System 333

Tamara Bechtold¹, Jairo Andres Pico Acevedo², Dennis Hohlfeld²
¹Jade University of Applied Sciences, ²University of Rostock, Germany

PS4-07 Evaluation of Power Transfer Efficiency with Ferrite Sheets in WPT System 336

Tae-Hyung Kim¹, Sehwa Yoon¹, Jong-Gwan Yook¹, Gi-Ho Yun², Woong Yong Lee³
¹Yonsei University, Korea, ²Sungkyul University, Korea, Amotech, Korea

PS4-08 A V-band Power Amplifier Using Marchand Balun for Power Combining in 90nm CMOS Process 340

Juo-Chen Chen^{1,2}, Tong-Yu Chang¹, Yen-Chung Chiang¹
¹National Chung Hsing University, Taiwan, ²National Ching-Yi University of Technology, Taiwan

PS4-09 One- and Two-Dimensional Antenna Arrays for Microwave Wireless Power Transfer (MWPT) Systems 343

Chun-Hao Hu, Yo-Sheng Lin, Chi-Ho Chang, Ping-Chang Tsao, Kai-Siang Lan, Chi-Hung Yeh
National Chi Nan University, Taiwan

PS4-10 A Low-Power UHF Passive RFID Transponder Chip in 0.18 μ m CMOS 347

Yo-Sheng Lin, Zong-Ying Guo, Yi-Shan Huang, Chi-Hung Yeh
National Chi Nan University, Taiwan

PS4-11 Auto Tracking DC/DC Converter for Adaptive LED Driving System 351

Shih-Chang Hsia, Ming-Hwa Sheu, Po-Yu Hsiao, Kuan-Cheng Chen
National Yunlin University of Science and Technology, Taiwan

PS4-12 Study on LCC-C Wireless Power Transfer 355

Cheng-Yen Chou, Marojahan Tampubolon, Jing-Yuan Lin, Yao-Ching Hsieh, Huang-Jen Chiu
National Taiwan University of Science and Technology, Taiwan

PS4-13 A Wireless Sensor Utilizing Ultrasound for Wireless Power and Data Transmission 359

Yu-Chien Lin, Ming-Chien Chiang, Jau-Horng Chen
National Taiwan University, Taiwan

PS4-14 Wireless power IoT system using polarization switch antenna as polling protocol for 5G mobile network 362

Yang-Han Lee¹, An-Sung Wang¹, Yu-De Liao¹, Ting-Wei Lin¹, Yu-Jen Chi¹, Ching-Chang Wong¹, Naoki Shinohara², Qiaowei Yuan³, Qiang Chen⁴

¹Tamkang University, Taiwan, ²Kyoto University, Japan, ³Sendai National College of Technology, Japan, ⁴Tohoku University, Japan

PS4-15 Charger Topology Selection for Group Charging of Volume Tablet Scale Devices through Wireless Power Transfer 365

Wei-Liang Lin, Lung-Yang Chung
National Chung Hsing University, Taiwan

PS4-16 Composite Ceramics for Power Beaming 368

BenMaan Jawdat^{1,2}, Brad Hoff¹, Martin Hilario¹, Anthony Baros¹, Paul Pelletier¹, Thomas Sabo², Frederick Dynys²

¹Air Force Research Laboratory, USA, ²NASA Glenn Research Center, USA

ADDITIONAL PAPER:

Optimizing Three-Phase Three-Layer Coil Array for Omnidirectional Wireless Power Transfer 372

Yuhua Cheng, Guoxiong Chen, Gaorong Qian, Mohammad S.E. Sendi, M. Ghovanloo, G. Wang