JOURNAL OF POWER ELECTRONICS



Journal of Power Electronics

Editor-in-Chief

Kyo-Beum Lee, Ajou University, Suwon, Korea

Editors

Wook-Jin Lee, *Publication Editor*, Chungnam National University, Daejeon, Korea Young-Doo Yoon, *Publication Editor*, Hanyang University, Seoul, Korea Sung-Jin Choi, University of Ulsan, Ulsan,

Jee-Hoon Jung, UNIST, Ulsan, Korea

Associate Editors

Dukju Ahn, Incheon National University, Incheon, Korea

Seon-Ju Ahn, Chonnam National University, Daejeon, Korea

Jong-Bok Baek, Korea Institute of Energy Research, Daejeon, Korea

Kaushik Basu, Indian Institute of Science, Bengaluru, India

Honnyong Cha, Kyungpook National University, Daegu, Korea

Wu Chen, Southeast University, Nanjing, China Chun-An Cheng, I-Shou University, Kaohsiung, Taiwan

Younghoon Cho, Konkuk University, Seoul, Korea

Uimin Choi, Seoul National University of Science and Technology, Seoul, Korea Pooya Davari, Aalborg University, Aalborg,

Denmark **Anton Dianov,** Samsung Electronics, Suwon,

Korea **Xiaoqiang Guo,** Yanshan University,

Qinhuangdao, China **Zhiqiang Guo,** Beijing Institute of Technology,

Beijing, China

Peng Han, Ansys, Inc, San Jose, USA Seon-Hwan Hwang, Kyungnam University, Changwon, Korea

Byungtaek Kim, Kunsan National University, Gunsan, Korea

Jonghoon Kim, Chungnam National University, Daejeon, Korea

Sungmin Kim, Hanyang University, ERICA Campus, Ansan, Korea

Sangshin Kwak, Chung-ang University, Seoul, Korea

Byoung-Hee Lee, Hanbat National University, Daejeon, Korea

Dong-Hee Lee, Kyungsung University, Busan,

June-Seok Lee, Dankook University, Cheonan, Korea

Kibok Lee, Korea University, Seoul, Korea Seongjun Lee, Chosun University, Gwangju, Korea Xiao Li, Beihang University, Beijing, China Fuxin Liu, Nanjing University of Aeronautics and Astronautics, Nanjing, China

Jianxing Liu, Harbin Institute of Technology, Harbin, China

Saad Mekhilef, University of Malaya, Kuala Lumpur, Malaysia

Jinyeong Moon, Florida State University, Tallahassee, USA

Woonki Na, California State University, Fresno, USA

Minh-Khai Nguyen, Ho Chi Minh City University of Technology and Education, Ho Chi Minh City, Vietnam

Joung-Hu Park, Soongsil University, Seoul, Korea

N. Prabaharan, SASTRA Deemed University,

Mattia Ricco, Alma Mater Studiorum University of Bologna, Bologna, Italy Subham Sahoo, Aalborg University, Aalborg,

Ariya Sangwongwanich, Aalborg University, Aalborg, Denmark

Gab-Su Seo, Power Systems Engineering Center, National Renewable Energy Laboratory, Golden, USA

Jongwon Shin, Chung-Ang University, Seoul, Korea

Kai Song, Harbin Institute of Technology, Harbin, China

Kai Sun, Tsinghua University, Beijing, China Xiaodong Sun, Jiangsu University, Zhenjiang, China

Gaolin Wang, Harbin Institute of Technology, Harbin, China

Wei Wang, Southeast University, Nanjing, China

Yijie Wang, Harbin Institute of Technology, Harbin, China

Huiqing Wen, Xi'an Jiaotong-Liverpool University, Suzhou, China

Hongfei Wu, Nanjing University of Aeronautics and Astronautics, Nanjing, China

Kang-Hyun Yi, Daegu University, Gyeongsan, Korea

Zhonggang Yin, Xi'an University of Technology, Xi'an, China

Sang-Won Yoon, Seoul National University, Seoul. Korea

Liqiang Yuan, Tsinghua University, Beijing, China

Guoqiang Zhang, Harbin Institute of Technology, Harbin, China

Li Zhang, Hohai University, Nanjing, China **Yongchang Zhang,** North China University of Technology, Beijing, China

Yun Zhang, Tianjin University, Tianjin, China

Advisory Board

Subhashish Bhattacharya, North Carolina State University, North Carolina, USA Frede Blaabjerg, Aalborg University, Aalborg, Denmark

Dushan Boroyevich, Virginia Polytechnic Institute and State University, Blacksburg, USA

Liuchen Chang, University of New Brunswick, New Brunswick, Canada Po-Tai Cheng, National Tsing Hua University, Hsinchu, Taiwan

Bo-Hyung Cho, Seoul National University, Seoul, Korea

Jaeho Choi, Chungbuk National University, Cheongju, Korea

Ilhami Colak, Nisantasi University, Istanbul, Turkey

Jung-Ik Ha, Seoul National University, Seoul, Korea

Dong-Seok Hyun, Hanyang University, Seoul, Korea

Atsuo Kawamura, Yokohama National University, Yokohama, Japan

Marian P. Kazmierkowski, Warsaw University of Technology, Warsaw, Poland Ralph Kennel, Technical University of Munchen, Munchen, Germany

Johan W. Kolar, Swiss Federal Institute of Tech., Zurich, Switzerland

Fujio Kurokawa, Nagasaki Institute of Applied Science, Nagasaki, Japan

Dong-Choon Lee, Yeungnam University, Gyeongsan, Korea

Tsorng-Juu Liang, National Cheng-Kung University, Tainan City, Taiwan Jinjun Liu, Xi'an Jiaotong University, Xi'an, China

Sanjib Kumar Panda, National University of Singapore, Singapore

Fang Z. Peng, Florida State University, Tallahassee, FL, USA

John Shen, Illinois Institute of Technology, Chicago, USA

Toshihisa Shimizu, Tokyo Metropolitan University, Tokyo, Japan

Seung-Ki Sul, Seoul National University, Seoul, Korea

Jian Sun, Rensselaer Polytechnic Institute, New York, USA

Pat Wheeler, University of Nottingham, Nottingham, UK

Dehong Xu, Zhejiang University, Hangzhou, China

Managing Editor

Sejin Jung, The Korean Institute of Power Electronics Administrative Office, Seoul, Korea

Journal of Power Electronics

Aims and Scope

The *Journal of Power Electronics (JPE)* publishes papers of a high technical standard with a suitable balance of practice and theory. It covers a wide range of applications and apparatus in the power electronics field. The scope of the JPE includes the following:

- · Low Power Converter
- High Power Converters
- · Motor Drives
- · Grid and Power Quality
- · Energy Management Systems
- Devices and Components
- · Consumer Power Electronics
- · Emerging Power Electronics

The official abbreviation is *J. Power Electron*.

Copyright Information

For Authors

As soon as an article is accepted for publication, authors will be requested to assign copyright of the article (or to grant exclusive publication and dissemination rights) to the publisher (respective the owner if other than Springer Nature). This will ensure the widest possible protection and dissemination of information under copyright laws.

More information about copyright regulations for this journal is available at www.springer.com/43236

For Readers

While the advice and information in this journal is believed to be true and accurate at the date of its publication, neither the authors, the editors, nor the publisher can accept any legal responsibility for any errors or omissions that may have been made. The publisher makes no warranty, express or implied, with respect to the material contained herein.

All articles published in this journal are protected by copyright, which covers the exclusive rights to reproduce and distribute the article (e.g., as offprints),

as well as all translation rights. No material published in this journal may be reproduced photographically or stored on microfilm, in electronic data bases, on video disks, etc., without first obtaining written permission from the publisher (respective the copyright owner if other than Springer Nature). The use of general descriptive names, trade names, trademarks, etc., in this publication, even if not specifically identified, does not imply that these names are not protected by the relevant laws and regulations.

Springer Nature has partnered with Copyright Clearance Center's RightsLink service to offer a variety of options for reusing Springer Nature content. For permission to reuse our content please locate the material that you wish to use on link.springer.com or on springerimages.com and click on the permissions link or go to copyright.com and enter the title of the publication that you wish to use. For assistance in placing a permission request, Copyright Clearance Center can be contacted directly via phone: +1-855-239-3415, fax: +1-978-646-8600, or e-mail: info@copyright.com

© The Korean Institute of Power Electronics 2023

Journal Website

www.jpels.org www.springer.com/43236 For the actual version of record please always check the online version of the publication.

Subscription Information

Journal of Power Electronics is published every month (12 times per year). Volume 23 (12 issues) will be published in 2023.

ISSN: 1598-2092 print ISSN: 2093-4718 electronic

For information on subscription rates please contact Springer Nature Customer Service Center: customerservice@springernature.com

The Americas (North, South, Central America and the Caribbean)
Springer Nature Journal Fulfillment
Harborside Plaza II, 200 Hudson Street,
Jersey City, NJ 07302, USA
Tel.: 800-SPRINGER (777-4643);
212-460-1500 (outside North America)

Outside the Americas Springer Nature Customer Service Center GmbH, Tiergartenstraße 15, 69121 Heidelberg, Germany Tel.: +49-6221-345-4303

Advertisements

E-mail contact: anzeigen@springer.com

Disclaimer

Springer Nature publishes advertisements in this journal in reliance upon the responsibility of the advertiser to comply with all legal requirements relating to the marketing and sale of products or services advertised. Springer Nature and the editors are not responsible for claims made in the advertisements published in the journal. The appearance of advertisements in Springer Nature publications does not constitute endorsement, implied or intended, of the product advertised or the claims made for it by the advertiser.

Office of Publication

Springer Nature Singapore Pte Ltd. / Springer Singapore

Springer is part of Springer Science+Business Media

Funding

This work was supported by the Korean Federation of Science and Technology Societies Grant funded by the Korean Government (Ministry of Education)

Co-Publisher

The Korean Institute of Power Electronics

Journal of Power Electronics

Volume 23 · Number 12 · December 2023

LOW POWER CONVERTERS

Improved Watkins–Johnson topology-based photovoltaic MPPT converter

L. Hu · Y. Luo 1789

Multiobjective design optimization of transformers for battery cell balancing converters considering bidirectional power flow

T.-Y. Im · N.-A. Nguyen · S.-J. Choi **1798**

Stray capacitances influences of various parallel primary windings in input-series transformer-integration flyback converters

J. Xie · Y. Chang · T. Meng **1808**

Three-level boost inverter with capacitor voltage self-balancing and high conversion efficiency for low DC voltage systems

B. Hu \cdot Z. Tang \cdot Z. Zhang \cdot J. Linghu \cdot J. Qian \cdot X. Qin \cdot B. Meng \cdot R. Han **1820**

HIGH POWER CONVERTERS

Soft-switching modulation strategy based on hybrid control for three-phase wireless power transfer systems J. Huang · H. Zhu · Y. Wang · K. Li 1833

MOTOR DRIVES

Stator flux oriented sensorless DTFC for IPMSMs using pseudo-random HF signal injection

J. Chen · X. Wu **1846**

GRID AND POWER QUALITY

Constant on-time variable frequency control for critical conduction mode GaN-based totem-pole PFC converters S. Zhang · Y. Fang · K. Shu · Q. Gu · X. Wang 1856

Online broadband grid impedance estimation method based on multi-objective optimized random PWM Y. Du · S. Yang · C. Gao · X. Yang · H. Wu · J. Su 1867

DEVICES AND COMPONENTS

Analysis model for thermal resistance of double-sided cooling power module with pin-fin heat sink used in xEVs

S. Cho · S.W. Yoon **1880**

Analysis of perforated pin design use in automotive SiC power module heatsink

S. Pyun · S. Cho · S.W. Yoon **1888**

Improving differential mode inductance in toroidal common mode inductors

K. Fu \cdot Z. Lian \cdot W. Lan \cdot D. Zhang **1896**

CONSUMER POWER ELECTRONICS

Adjusted power of class D-ZVS resonant inverter controlled by buck converter for LCLC resonant tank

J. Jittakort · S. Kitcharoenwat 1907

Analysis of uninterruptable power supply critical-to-quality factors

P.M. Neelamraju · S. Yellampalli 1919

Overview of charging technology evolution in smartphones

H. Choi **1931**

EMERGING POWER ELECTRONICS

Joint estimation for SOC and capacity after current measurement offset redress with two-stage forgetting factor recursive least square method

W. Huo · Y. Jia · Y. Chen · A. Wang 1942

Further articles can be found at link.springer.com

Indexed in Astrophysics Data System (ADS), BFI List, Baidu, CLOCKSS, CNKI, CNPIEC, Dimensions, EBSCO Academic Search, EBSCO Discovery Service, El Compendex, Google Scholar, Journal Citation Reports/Science Edition, Korea Citation Index (KCI), Naver, Norwegian Register for Scientific Journals and Series, OCLC WorldCat Discovery Service, Portico, ProQuest-ExLibris Primo, ProQuest-ExLibris Summon, SCImago, SCOPUS, Science Citation Index Expanded (SCIE), TD Net Discovery Service, UGC-CARE List (India), WTI AG, Wanfang

Instructions for Authors for *J. Power Electron*. are available at www.springer.com/43236



Table of Contents

Journal of Power Electronics Vol. 23, No. 12 December 2023

Low Power Converters
Improved Watkins–Johnson topology-based photovoltaic MPPT converter Liang Hu, Yuan Luo 1789
Multiobjective design optimization of transformers for battery cell balancing converters considering
bidirectional power flow
Stray capacitances influences of various parallel primary windings in input-series transformer-integration
flyback converters
Three-level boost inverter with capacitor voltage self-balancing and high conversion efficiency for low DC
voltage systems Bihua Hu, Zhaohong Tang, Zhi Zhang, Jinqing Linghu,
Jihong Qian, Xiangyun Qin, Bumin Meng, Rong Han 1820
High Power Converters
Soft-switching modulation strategy based on hybrid control for three-phase wireless power transfer systems
Motor Dives
Stator flux oriented sensorless DTFC for IPMSMs using pseudo-random HF signal injection
Grid and Power Quality
Constant on-time variable frequency control for critical conduction mode GaN-based totem-pole PFC
converters Shuang Zhang, Yu Fang, Kaixin Shu, Qiuyang Gu, Xuehua Wang 1856
Online broadband grid impedance estimation method based on multi-objective optimized random PWM
Devices and Components
Analysis model for thermal resistance of double-sided cooling power module with pin-fin heat sink used in
xEVs Seongmoo Cho, Sang Won Yoon 1880
Analysis of perforated pin design use in automotive SiC power module heatsink
Improving differential mode inductance in toroidal common mode inductors
Consumer Power Electronics
Adjusted power of class D-ZVS resonant inverter controlled by buck converter for LCLC resonant tank
Analysis of uninterruptable power supply critical-to-quality factors
Overview of charging technology evolution in smartphones
Emerging Power Electronics
Joint estimation for SOC and capacity after current measurement offset redress with two-stage forgetting factor