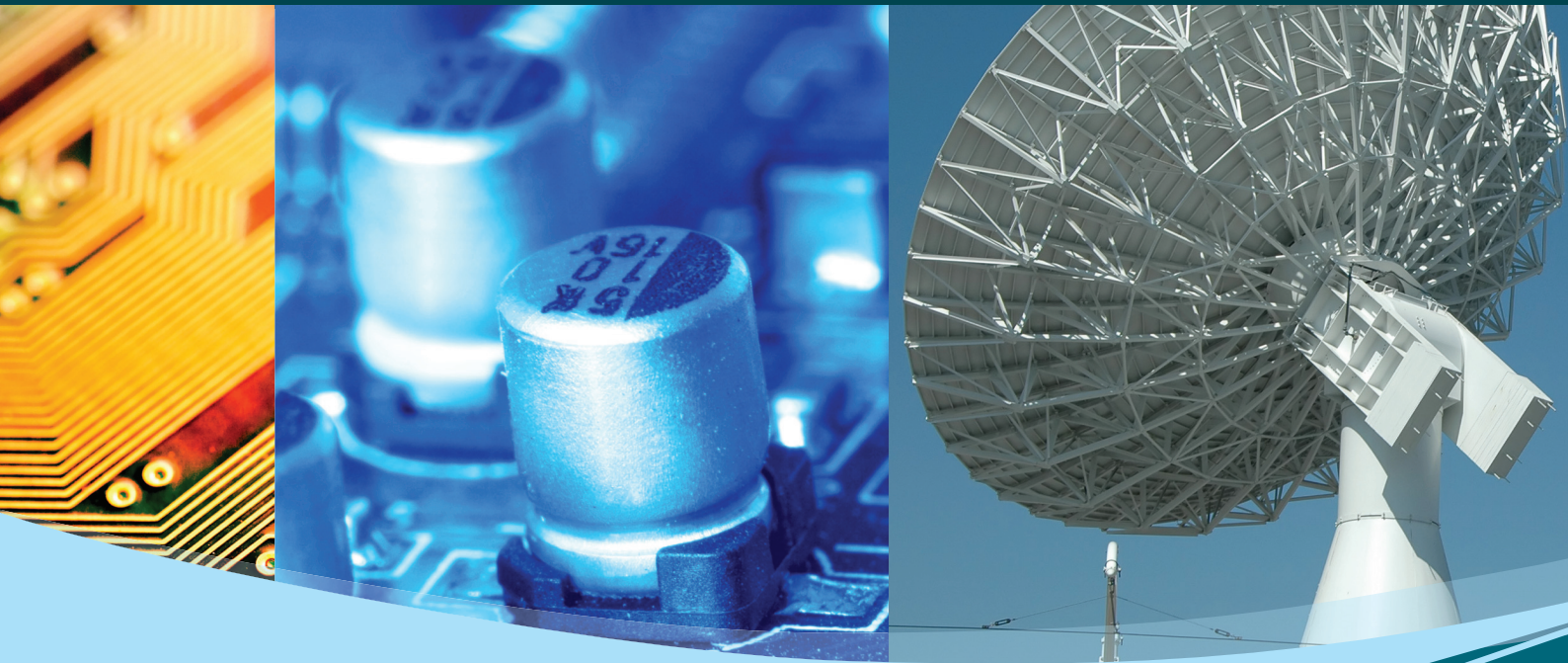


INTERNATIONAL JOURNAL OF
**MICROWAVE
AND WIRELESS
TECHNOLOGIES**

journals.cambridge.org/mrf



EuMA

**CAMBRIDGE
UNIVERSITY PRESS**

INTERNATIONAL JOURNAL OF MICROWAVE AND WIRELESS TECHNOLOGIES

EDITOR-IN-CHIEF

Prof. Francisco Medina-Mena,
Professor of Electromagnetism
Department of Electronics &
Electromagnetism
University of Sevilla
Av. Reina Mercedes s/n
41012-Seville, Spain
medina@us.es

EDITORIAL BOARD

Dr Luigi Boccia, University of Calabria,
Italy

Dr. Eduardo Carrasco, IT'IS, Switzerland

Prof. Paolo Colantonio, Università di Tor
Vergata Roma, Italy

Prof. Alessandra Costanzo, University of
Bologna, Italy

Prof. Philippe Ferrari, IMEP Grenoble,
France

Prof. Gaspare Galati, Università di Tor
Vergata Roma, Italy

Prof. Alessandro Galli, Sapienza
University of Rome, Italy

Prof. Antonio Garcia-Pino, University of
Vigo, Spain

Dr. Anthony Ghiotto, IMS Laboratory,
Talence, France

Dr. J. Sebastian Gomez-Diaz, UC Davis,
USA

Prof. Roberto Gomez-Garcia, University
of Alcalá, Spain

Prof. Shiban K Koul, Indian Institute of
Technology Delhi, India

Prof. Krzysztof S Kulpa, Warsaw
University of Technology, Poland

Prof. Asher Madjar, M2Microwaves LLC,
Philadelphia, USA and Tel Aviv University,
Israel

Dr. Steve Nightingale, Cobham, UK

Prof. Marco Pasian, Università Pavia, Italy

Dr. Xianming Qing, Institute for
Infocomm Research, Singapore

Dr. Ruediger Quay, Fraunhofer Institute
Freiburg, Germany

Prof. Raymond Quéré, XLIM-University
of Limoges, France.

Dr. Fred Schindler, RFMD, USA

Prof. Dominique Schreurs, KU Leuven,
Belgium

Prof. Roberto Sorrentino, University of
Perugia, Italy

Prof. Almudena Suarez, Universidad de
Cantabria, Spain

Prof. Luciano Tarricone, University of
Salento, Italy

Prof. Huei Wang, NTU, Taiwan

Dr. Hung-Wei Wu, Kun Shan University,
Taiwan

Prof. Felix Yanovsky, National Aviation
University, Ukraine

Scope of the journal

International Journal of Microwave and Wireless Technologies is interdisciplinary and application oriented, providing a platform for the microwave industry. Subjects covered include: applied electromagnetic field theory, components, analogue and mixed-signal circuits, systems, optical-microwave interactions, electromagnetic compatibility, industrial applications, biological effects and medical applications.

Submission of Manuscripts

All manuscripts should be submitted online at <http://mc.manuscriptcentral.com/mrf>. Please consult the instructions for authors at <http://cambridge.org/mrf>

Subscriptions

International Journal of Microwave and Wireless Technologies (ISSN 1759-0787) is published ten times a year in February, March, April, May, June, July, September, October, November and December. The subscription price (excluding VAT) of Volume 11 (2019) (which includes postage by air, plus electronic access) is £1150 net (US \$2144 in the USA, Canada and Mexico) for institutions; the electronic only price for institutional subscribers is £836 net (US \$1568 in the USA, Canada and Mexico). Members of the European Microwave Association receive free online access to the Journal, and may order print subscriptions at a reduced rate for their personal use only. Single parts are £122 (US \$209 in the USA, Canada and Mexico) plus postage. Orders, which must be accompanied by payment, may be sent to a bookseller, subscription agent or direct to the publisher: Cambridge University Press, Journals Fulfillment Dept, UPH, Shaftesbury Road, Cambridge CB2 8BS, UK; or in the USA, Canada and Mexico: Cambridge University Press, Journals Fulfillment Department, 1 Liberty Plaza, Floor 20, New York, NY, 10006, USA. EU subscribers (outside the UK) who are not registered for VAT should add VAT at their country's rate. VAT registered subscribers should provide their VAT registration number. Japanese prices for institutions are available from Kinokuniya Company Ltd, P.O. Box 55, Chitose, Tokyo 156, Japan. Copies of the journal for subscribers in the USA, Canada and Mexico are sent by air to New York to arrive with minimum delay. Periodicals postage paid at New York, NY, and at additional mailing offices. POSTMASTER: send address changes in the USA, Canada and Mexico to: *International Journal of Microwave and Wireless*

Technologies, 1 Liberty Plaza, Floor 20, New York, NY, 10006, USA. Claims for missing issues should be made immediately on receipt of the subsequent issue.

Advertising

For all parts of the world except USA, Canada and Mexico to Journals Advertising: ad_sales@cambridge.org
Address enquiries in the USA, Mexico and Canada only to: journals_advertising@cup.org

Copying

This journal is registered with the Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923, USA. Organizations in the USA who are also registered with C.C.C. may therefore copy material (beyond the limits permitted by sections 107 and 108 of U.S. Copyright law) subject to promotional or commercial purposes. Code 0266-4674/2018.

ISI Tear Sheet Service, 3501 Market Street, Philadelphia, PA 19104, USA, is authorized to supply single copies of separate articles for private use only.

Organizations authorized by the Copyright Licensing Agency may also copy material subject to the usual conditions. For all other use, permission should be sought from Cambridge or the American Branch of Cambridge University Press.

Internet Access

This journal is included in Cambridge Core and can be found at cambridge.org/mrf. For further information on other Press titles access <http://www.cambridge.org>

© Cambridge University Press and the European Microwave Association 2019
Cambridge University Press, UPH, Shaftesbury Road, Cambridge CB2 8BS, United Kingdom 1 Liberty Plaza, Floor 20, New York, NY, 10006, USA USA 477 Williamstown Road, Port Melbourne, VIC 3207, Australia Ruiz de Alarcón 13, 28014 Madrid, Spain Dock House, The Waterfront, Cape Town 8001, South Africa

Printed in the United Kingdom by Bell & Bain Ltd, Glasgow.

This journal issue has been printed on FSC™-certified paper and cover board. FSC is an independent, non-governmental, not-for-profit organization established to promote the responsible management of the world's forests. Please see www.fsc.org for information.