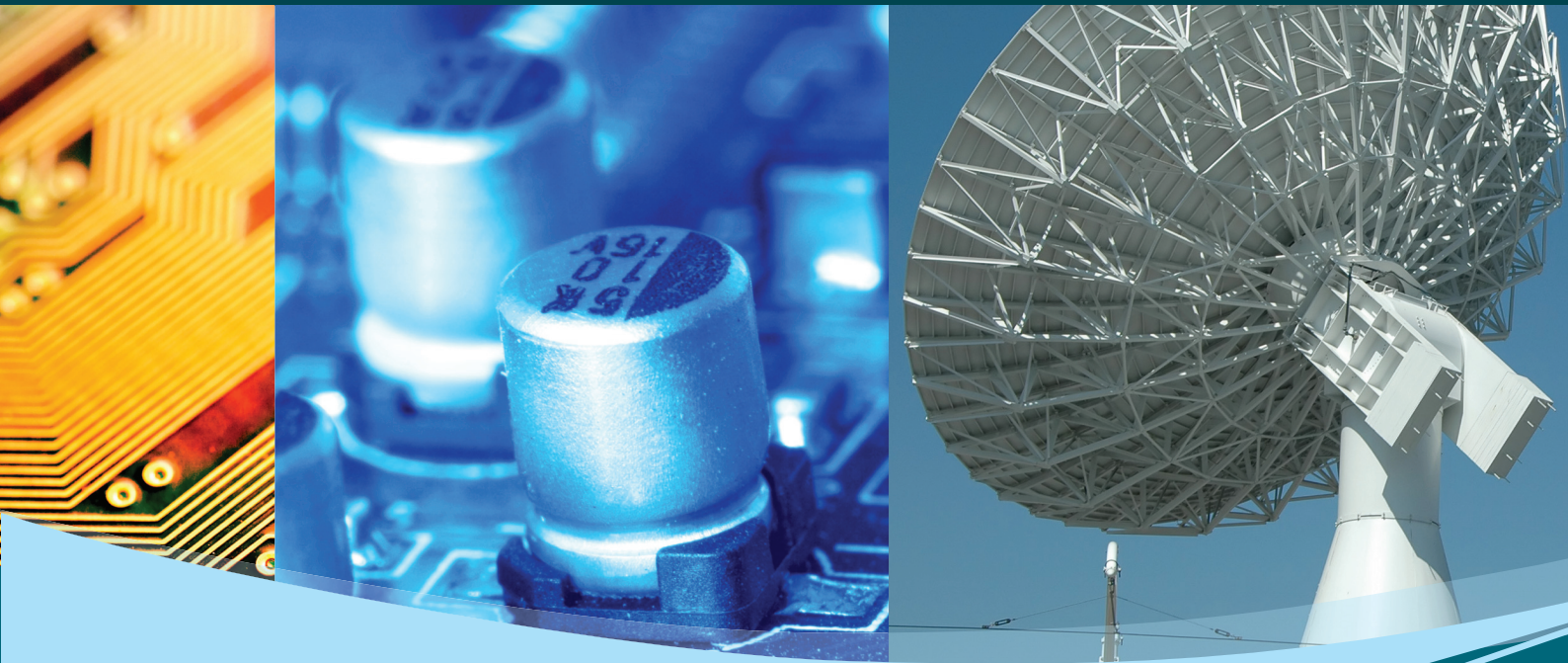


INTERNATIONAL JOURNAL OF  
**MICROWAVE  
AND WIRELESS  
TECHNOLOGIES**

[journals.cambridge.org/mrf](http://journals.cambridge.org/mrf)



**EuMA**

**CAMBRIDGE  
UNIVERSITY PRESS**

# INTERNATIONAL JOURNAL OF MICROWAVE AND WIRELESS TECHNOLOGIES

## EDITOR-IN-CHIEF

**Prof. Almudena Suarez**,  
R&D Laboratories of Telecommunications  
Engineering  
Universidad de Cantabria  
Avenida de los Castros s/n  
39005, Spain.  
almudena.suarez@unican.es

## EDITORIAL BOARD

**Dr. Eduardo Carrasco**, IT'IS, Switzerland  
**Prof. Wenhua Chen**, Tsinghua University,  
Beijing, China

**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

**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

**Prof. Francisco Medina**, University of  
Sevilla, Spain

**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 Quééré**, XLIM-University  
of Limoges, France.

**Dr. Fred Schindler**, RFMD, USA

**Prof. Dominique Schreurs**, KU Leuven,  
Belgium

**Prof. Roberto Sorrentino**, University of  
Perugia, Italy

**Prof. Roberto Sorrentino**, University of  
Perugia, Italy

**Prof. Luciano Tarricone**, University of  
Salento, Italy

**Prof. Huei Wang**, NTU, Taiwan

**Prof. Robert Weigel**, University of  
Erlangen, Germany

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

**Prof. Felix Yanovsky**, National Aviation  
University, Ukraine

**Prof. Alex Yarovsky**, TU Delft, The  
Netherlands

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 10 (2018) (which includes postage by air, plus electronic access) is £1095 net (US \$2042 in the USA, Canada and Mexico) for institutions; the electronic only price for institutional subscribers is £796 net (US \$1493 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 £112 (US \$210 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](mailto:ad_sales@cambridge.org) Address enquiries in the USA, Mexico and Canada only to: [journals\\_advertising@cup.org](mailto: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](http://cambridge.org/mrf). For further information on other Press titles access <http://www.cambridge.org>

© Cambridge University Press and the European Microwave Association 2018 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](http://www.fsc.org) for information.

## Scope of the journal

*International Journal of Microwave and Wireless Technologies* is