

# Electronics WORLD

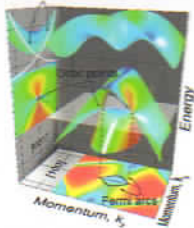
THE ESSENTIAL ELECTRONICS ENGINEERING MAGAZINE

## High power outputs and small solution footprints

By Analog Devices



### INSIDE THIS ISSUE



#### Latest

▶ Electron states in solids could revolutionise electronic devices

#### NEW Series

▶ Analogue input/output modules

#### Trend

▶ Hiring embedded designers for the IoT

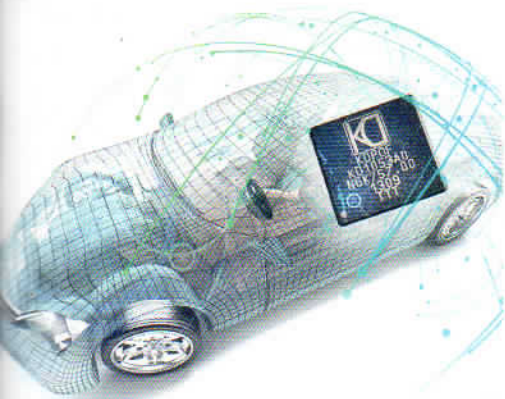
#### SPECIAL REPORT Communications:

- \* LoRa
- \* PAs
- \* Filters
- \* Antennas

# CONTENTS

## REGULARS

- 04 > **Trend**  
Hiring the right embedded designers for the IoT
- 05 > **Technology**
- 42 > **Products**



## COLUMNS

- 06 > **Digitisers**  
By Oliver Rovini and Greg Tate, Spectrum Instrumentation, and Arthur Pini, Independent Consultant
- 10 > **PCB cleaning**  
By Mike Jones, MicroCare
- 14 > **NEW Analogue input/output modules**  
By Dr Murat Uzam



## FEATURES

- 16 > **LoRa in private and public networks**  
By Martin Keenan, Technical Director, Avnet Abacus
- 20 > **Optical fibre speeds up automotive applications**  
By Carlos Pardo, CEO and Co-Founder, KDPOF
- 24 > **Using low-voltage drivers to boost RF power amplifier efficiency**  
By Mustafa Acar, Osman Ceylan, Felicia Kiebler, Sergio Pires and Stephan Maroldt, Ampleon
- 28 > **VHF-band path-loss model for low-rise antennas**  
By Jiawei Zang and Xuetian Wang, Beijing Institute of Technology, China
- 34 > **New quad-mode crossed resonator and its use in bandpass filters**  
By Jun Cheng, Qin Zhang, Xiu Shan Liu, Yi Fan, Li Gong Wang and Xiong Ying Liu
- 38 > **A 60GHz CMOS differential power amplifier with capacitive cross-coupling neutralisation**  
By Wang Wei, Huang Meng Jia, Yang Hao, Chen Ting, Yang Zheng Lin, Yuan Jun and Wang Guan Yu, Chongqing University of Post and Telecommunications, China



*Disclaimer: We work hard to ensure that the information presented in Electronics World is accurate. However, the publisher will not take responsibility for any injury or loss of earnings that may result from applying information presented in the magazine. It is your responsibility to familiarise yourself with the laws relating to dealing with your customers and suppliers, and with safety practices relating to working with electrical/electronic circuitry – particularly as regards electric shock, fire hazards and explosions.*

# RIGOL

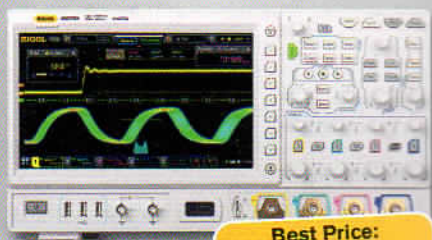
Innovation or nothing

**Typical RIGOL:  
The Next Generation  
of Oscilloscopes  
Best in Class!**

**NEW!**

UltraVision II  
TECHNOLOGY

- Memory depth up to 500 Mpts
- Fast 10 GS/sec. Sample Rate
- Large 10.1" Touchscreen Display



Best Price:  
from € 2.199,-  
plus VAT

## DS/MSO7000 Series

- 100, 200, 350 and 500 MHz Bandwidth (via Software Upgrade)
- 4 Analog Channels (Standard) + 16 Digital Channels (MSO Version)
- 600,000 wfrm/sec. Waveform Capture Rate
- Interfaces: LAN (LXI), USB, HDMI, USB-GPIB (Option)
- Up to 450,000 Frames Real-Time Signal Capture and Display
- Enhanced FFT@1 Mio. points and fast Peak Search Function
- Optional: Decoding RS232, I2C, SPI, I2S, CAN, LIN, MIL, FlexRay etc.
- Web Control Interface

### 6-in-1 Instrument:

Digital Scope, Volt Meter, Logic Analyzer, Frequency Counter, Arbitrary Generator, Protocol Analyzer

- 3 Years Warranty – extendable
- Comprehensive Documentation
- Incl. PC Software UltraScope

For more information please contact your local RIGOL Partner or visit: [www.rigol.eu/sales](http://www.rigol.eu/sales)