

No more ground-shift challenges to your SMPS designs

Infineon's low-side gate driver ICs with truly differential inputs

All inclusive.



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PCIM Europe Hall 7 Booth 229

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LGA-6



LGA-16



QFN



T0263



SIP-3



SIP-4



SIP-7

A population of powerful people to populate PCIM 2018



With PCIM 2018 making its ponderous way to Nuremberg, our thoughts are churning about the coming seminars and exhibits explaining and showing all the new devices and application solutions that will be there. I have maintained often and loudly recently that “power is sexy again”, and there will be plenty of that energy and excitement on tap at the event.

Power isn't sexy again because people have suddenly fallen in love with power supplies, its that energy efficiency has become a keyword, with advanced components, devices, and intelligent management capability the means to achieve it. From smart low-power sensors to powerful MCUs with near-zero quiescent states to advanced GaN transistors, every aspect of a design can contribute to the overall system efficiency.

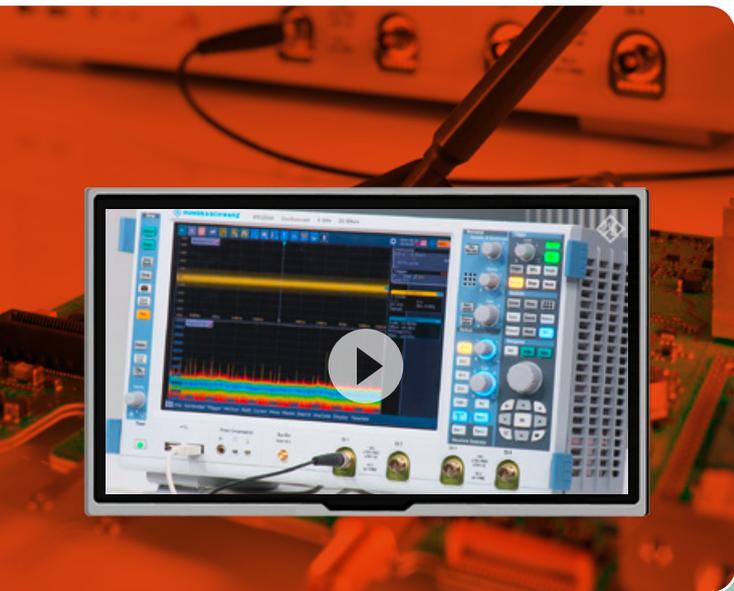
From Analog Devices' (Hall 6, stand 446) demonstrations on advanced motor drive inverter techniques, to AgileSwitch's (Hall 9, stand 133) software-configurable SiC Gate Driver Cores, to Rohde&Schwarz's (Hall 6 stand 239) power-of-ten oscilloscope families, to Toshiba Electronic Devices & Storage's (Hall 9, stand 301) 600V PIMOS IX planar MOSFETs, all the latest pieces are available to create the best power solutions possible.

Yours Sincerely,

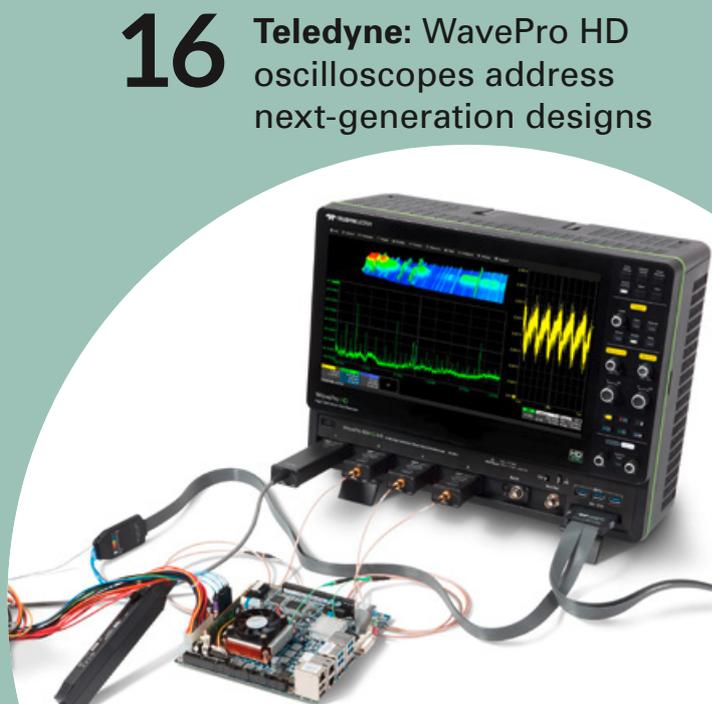
Alix Paultre

Editor Power Electronics News

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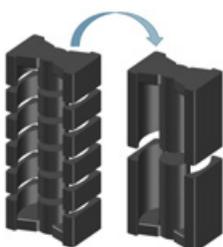
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DTT Creates New Soft Ferrite Core Material with Outstanding High-Saturation Characteristic

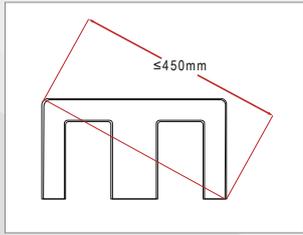
PQ107



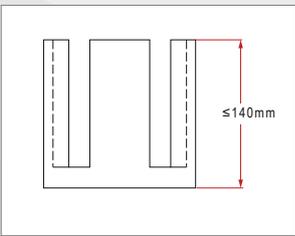
case 01



Product limit size



The maximum length $\leq 450\text{mm}$.



The maximum height $\leq 140\text{mm}$.

case 02



case 03



HIGHLIGHTS

- The highest Bs MnZn ferrite material DTT-D9B™
- High saturation flux density
- For high power and high power density
- Driven by SiC and GaN progressive approach

Created from a standard manganese-zinc ferrite (Mn-Zn) power material, D9B™ is a soft ferrite core material that significantly boosts the saturation limitation by ceramic nature towards new area, the saturation flux density is about 20% higher than reference material, which is suitable for MOSFET application, and greatly suitable for SiC application, like battery and wireless charging application.

It extends the outstanding performance of ferrite down to mid frequency range, as promising alternative for design with metal alloyed powdered materials, offering best price-performance ratio. The use of DTT's original double spray dry powder metallurgy and heat-treatment technologies has

paved the way for this Mn-Zn ferrite material, either in chemical and morphological engineering.

Given its outstanding characteristics suited to high-temperature environments, the addition of D9B™ to our soft ferrite core materials lineup will allow DTT to address an even more extensive range of customer needs as loyal core supplier, especially large sized shaped core. ■

More info

- www.powerlosstester.de
- www.dtkj.com

PCIM 2018
June 5th - 7th
Hall 6-363



No more ground-shift challenges to your SMPS designs

Infineon's low-side gate driver ICs with truly differential inputs

Hubert Baierl, Senior Marketing Manager, Infineon Technologies AG

The best-in-class operation and performance of modern switch-mode power supplies (SMPS) have one thing in common: they are rooted in semiconductor devices that are fundamental to their designs.

Reliable and high-performance semiconductor components always have been the domain of high-end systems.

In this article, Infineon will delve into the topic of low-side gate driver ICs for SMPS applications and look at how they can contribute to achieve the performance required for today's designs.

There are multiple ways how a gate driver can be used in SMPS applications. Low-side gate drivers are often used in SMPS and play a significant role in ensuring that power MOSFETs are properly driven into 'on' and 'off' conditions. In boost power factor correction (PFC) circuits they drive the low-side high-voltage power MOSFET. In high-voltage DC/DC-stages with LLC resonant converters, in zero voltage switching (ZVS) circuits or in two transistor forward (TTF) topologies they turn on and off the high-voltage power MOSFETs via a gate-driver transformer.

In center-tapped synchronous rectification stages they are directly attached to the low-voltage MOSFETs.

Electrical overstress of power MOSFETs can lead to functional disintegration of the SMPS. False triggering of the gate-drive IC is a prominent reason for such electrical overstress. Shift of the low-side gate-driver IC's ground

potential too far away from the ground potential of the controller IC can be the reason for such false triggering (note: the input signal levels of conventional low-side gate-driver ICs are referenced to the ground potential of the gate driver). Infineon's 1EDN7550 and 1EDN8550 1-channel low-side gate drivers are designed to prevent false triggering of power MOSFETs in industrial, server and telecom SMPS, in wireless charging applications, telecom DC-DC converters, power tools and solar micro inverters.

DESIGN CHALLENGES OF HARD SWITCHING TOPOLOGIES

In hard-switching topologies, such as boost-PFC and TTF stages, the parasitic inductances in the source contact of the power MOSFETs and in the ground-path of the PCB require special attention. Hard-switching goes hand in hand with high di/dt , which when paired with parasitic inductances leads to switching noise on the ground potential. This noise is a high voltage oscillation ranging between 50 MHz and 120 MHz, with amplitudes as high as up to ± 70 V. It is the dominant root-cause for transient shifts of the ground



potential between the controller IC and the gate-driver IC. The higher the power rating of the SMPS is, the more pronounced this effect tends to be. Furthermore, if printed circuit board designs are not optimal due to cost constraints and industrial design requirements the situation can become even more aggravated.

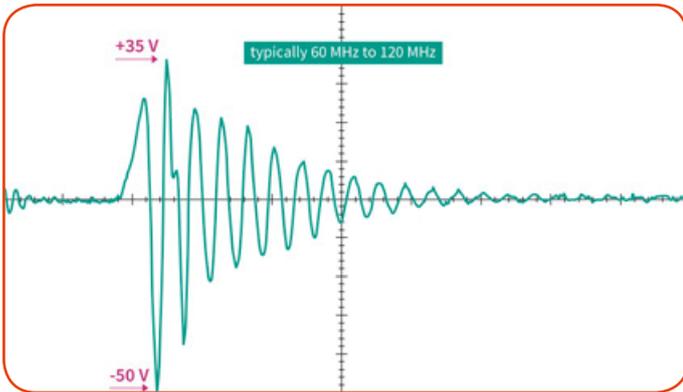


Figure 1: Example of switching noise on ground potential

The challenge is complex and the solution frequently a delicate trade-off. Basically, the lower the parasitic ground inductances in the power loop, the lower the induced ground oscillations will be and the lower the risk of false triggering. To keep the undesired ground shift as low as possible designers have only a few options.

Either they can keep the dynamic gate-loop within a minimum physical PCB area and use separate ground traces in the PCB to provide a current path with the lowest possible inductance, or they design gate driver output traces that are as wide as possible.

Using lead-less power MOSFETs or power MOSFETs with a separate Kelvin Source connection further helps reducing the effects of the hard-switching impact on the gate-driving circuitry.

FALSE TRIGGERING IS A COMMON PHENOMENON

Conventional low-side gate-driver ICs are prone to false triggering. In these gate-driv-

er ICs the interpretation of the control and enable input signal is always done through a comparison which is referenced to the ground potential of that gate-driver IC.

An example is depicted in Figure 2 where the input is understood to be logically 'off' as long as the input signal is not higher than 0.8 V relative to the ground. Conversely, if the input signal-level is at least 2.0 V higher than the ground potential then that input is logically 'on'.

To better understand the problem that arises if the gate-driver IC's GND-potential shifts, consider that the gate-driver inputs are typically connected to a controller IC. From an electrical design perspective, the controller IC is on a more stable ground potential than the gate-driver IC's ground.

In some designs the ground contact of the gate-driver IC is far away from the ground contact of the controller IC, resulting in worse outcomes. For instance this may happen when the controller IC resides on a daughter board which is inserted onto the main power-PCB.

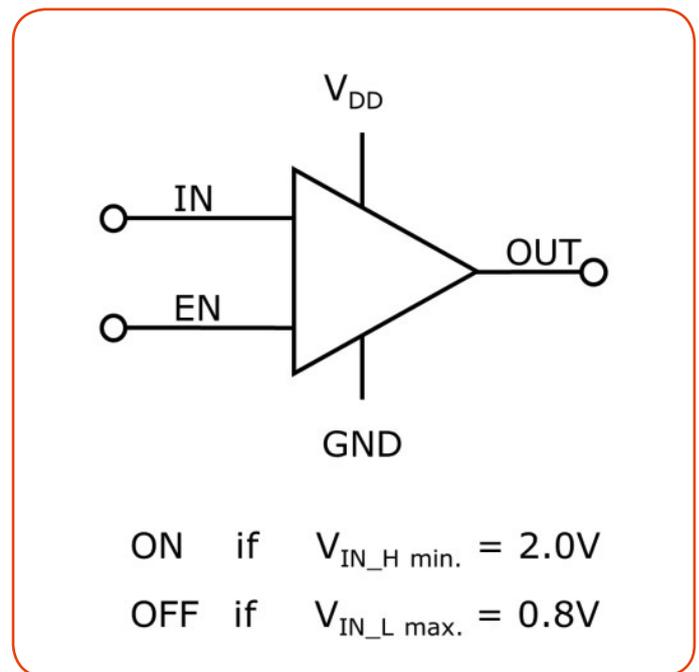


Figure 2: Conventional low-side gate driver IC, inputs are referenced to the gate driver GND

The frequently found recommendation to drive Kelvin Source power MOSFETs is to use galvanically isolated gate-driver IC to cut the ground loop and the parasitic ground inductance. Measurements of such topologies show that the oscillations between the PWM controller IC ground and the gate-driver IC GND2 can still amount to as much as ± 50 V (see Fig. 1).

SMPS designs with longer than desired distances between the gate-driver IC and the controller IC are quite common. Frequently, mechanical design requirements as well as component and PCB costs are in the focal point for design decisions, and in low-power SMPS highest performance is not always the main objective. This may force the designer to use single or dual layer PCBs and preclude the use of isolated gate-driver ICs. This often results in higher parasitic ground inductances than desired. In such applications switching the power MOSFET can easi-

ly lead to a dynamic ground shift between the PWM controller IC and the gate-driver IC of up to ± 20 V.

HOW TO RESOLVE GND SHIFT PROBLEMS

With a low-side gate-driver IC that has truly differential inputs only the voltage difference between its input contacts is relevant to turn its output 'on' or 'off'. Its inputs are largely independent from the gate driver GND potential. For example, if the potential of V_{in+} is higher than the potential of V_{in-} by 1.8 V this is interpreted as a logical 'on'. If the difference is less than 1.5 V, this is interpreted as a logical 'off'.

Infineon's EiceDRIVER™ family members, 1EDN7550B and 1EDN8550B, single-channel low-side gate driver ICs can resolve static GND shift problems of up to ± 70 V. If the ground shift is transient, which is typical for MOSFET switching induced ground noise, these gate-driver ICs are robust against

Figure 3: 1EDN7550 driving CoolMOS™ SuperJunction MOSFET on 1-layer PCB

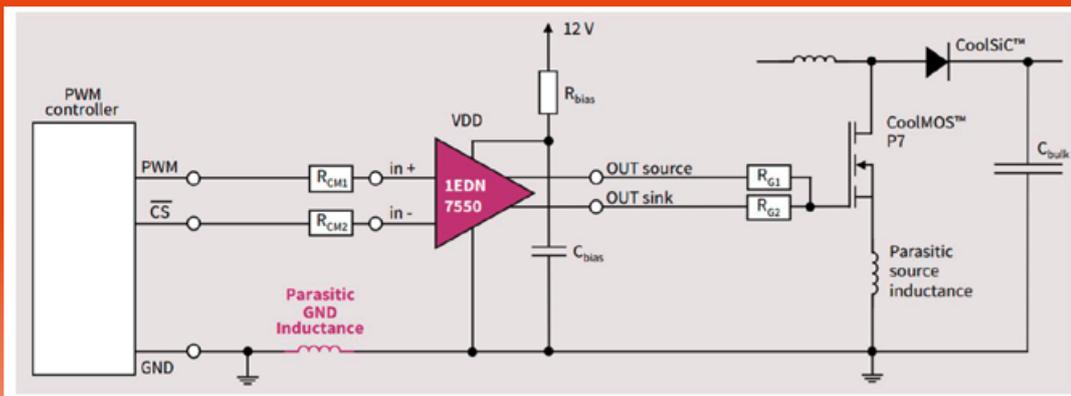


Figure 4: 1EDN8550 driving Kelvin Source CoolMOS™ MOSFET in boost-PFC

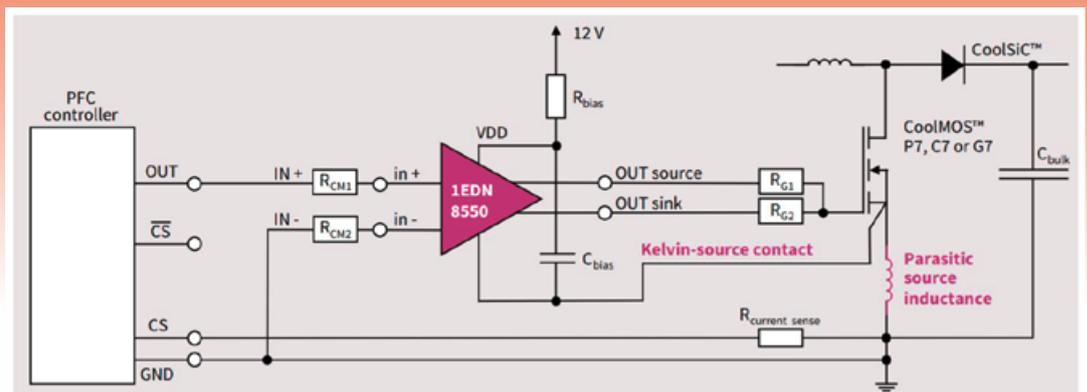


Figure 5: EiceDRIVER™ 1EDN7550B and 1EDN8550B product portfolio and pinout

Type	Ground shift robustness		UVLO	Package
	dynamic	static		
1EDN7550B	+/- 150 V	+/- 70 V	4 V	6pin SOT-23
1EDN8550B	+/- 150 V	+/- 70 V	8 V	6pin SOT-23

shifts of as much as ± 150 V_{peak}. With the EiceDRIVER™ 1EDN7550B and 1EDN8550B components it is possible to use a single-channel low-side gate-driver IC to drive Kelvin Source power MOSFETs such as CoolMOS™ P7, C7 or G7 in applications like 2.5 kW boost-PFCs. There is no need to cut the ground loop with a galvanically isolated gate-driver IC.

As these gate-driver ICs' operation is based on the voltage difference between its two inputs, the most important design rule is to place two common mode resistors (RCM1 and RCM2 depicted in Fig. 3 and Fig. 4) physically close to the two input contacts of the gate driver ICs. That layout has to be done geometrically and parasitically symmetrical. The output pinout arrangement and the VDD pin are in line with commonly used single-channel low-side gate driver ICs. Therefore, when upgrading existing designs with the 1EDN7550 or the 1EDN8550 only the input side of the PCB design must be modified. The small 6-pin SOT 23 package of EiceDRIVER™ 1EDN7550B and 1EDN8550B helps to improve power density, relative to using galvanically isolated gate-driver ICs. Also, this package design enables designers to place these gate-driver ICs in the most optimal location relative to the power MOSFET gate connection.

No matter the technical or design challenges of SMPS applications, combining Infineon's proven quality and reliable low-side gate-

driver ICs with truly differential control inputs translates into faster go-to-market, higher power density, more robust and more efficient designs at a lower cost than traditional solutions. For more detailed information, please visit www.infineon.com/TDI. ■



i More info

- Product Brief – EiceDRIVER™ 1EDN TDI

Kelvin Source CoolMOS™ SJ MOSFETs:

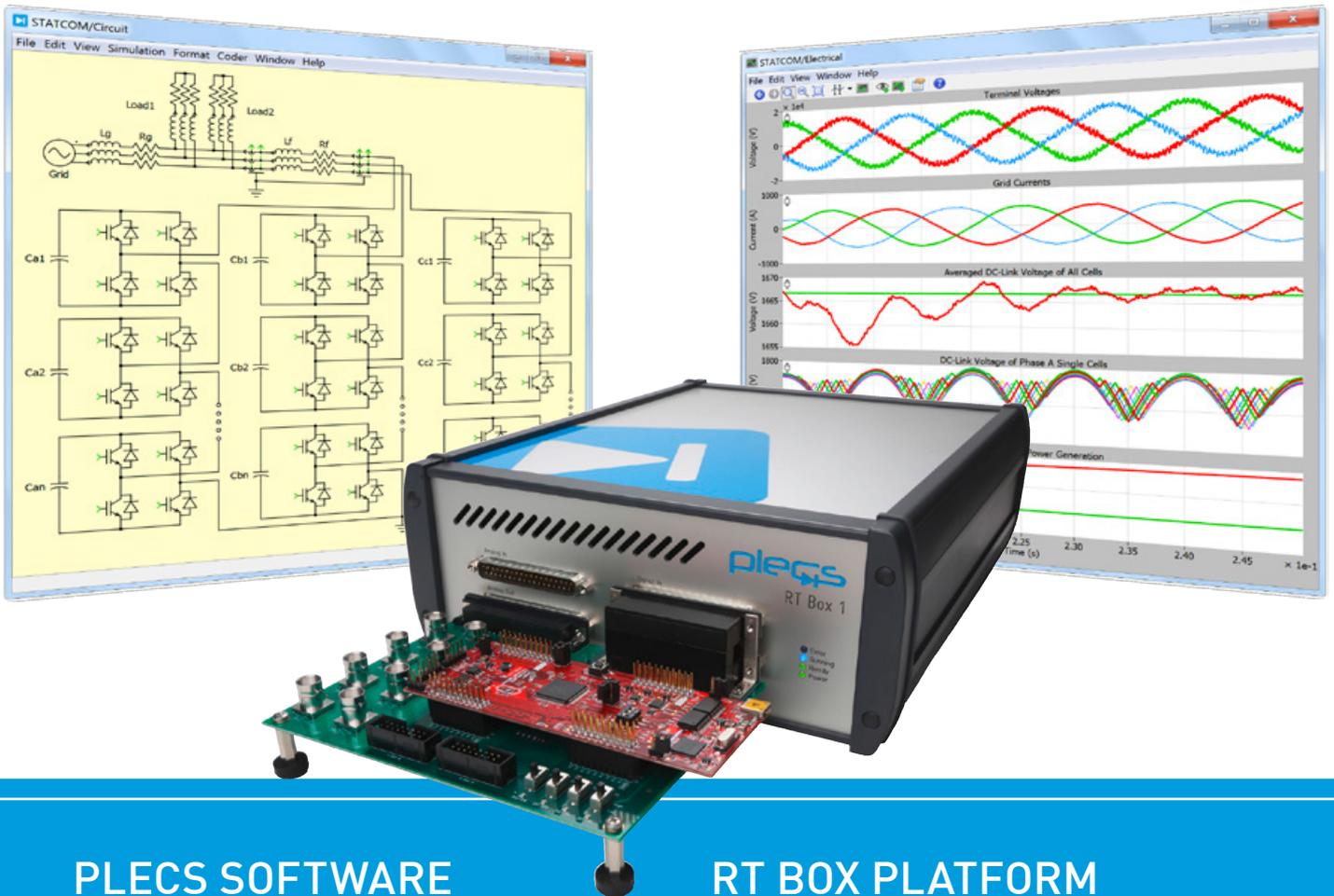
- Double DPAK (DDPAK)
- TO-Leadless (TOLL)
- TO-247 4pin
- ThinPAK 8x8

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- Whitepaper: Wireless charging

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TMR 3WIR and TMR 6WIR Series

World smallest certified 6 Watt SIP8 DC/DC converter for railway applications

- **Ultra wide 4:1 Input:**
9-36, 18-75, 43-160 VDC
- **Miniaturized to the maximum**
- **EN 50155 railway approval**
- **I/O-isolation 3'000 VDC**
- **High efficiency for low thermal loss**
- **Operating temperature range:**
-40°C to +90°C
- **Remote On/Off**
- **Short circuit protection**
- **3-year product warranty**

The TMR 3WIR and the TMR 6WIR series are a set of 3/6 Watt DC/DC converters in a SIP-8 metal case.

The design purpose of these series was to miniaturized low power DC/DC converters for railway application to the maximum without sacrificing highest efficiency. They operate up to 78°C environment temperature at full load and up to 90°C with a 50% load derating. With EN 50155 and UL 62368-1 (UL 60950-1) certification, 3'000 VDC I/O-isolation voltage,



Now from 3 - 300 Watt
Ruggedized DC/DC Converters

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external On/Off, current limitation and short current protection they cover a wide range of application when space is limited. The input of the converters is designed for a wide voltage range (4:1) and minimum load is not required. ■



i More info

- TMR 6WIR Series
- TEQ 300WIR Series
- Railway Catalog





Analyze EMI problems with the R&S®RTO / R&S®RTE

The R&S®RTO / R&S®RTE digital oscilloscope is a valuable tool for analyzing EMI problems in electronic designs. High input sensitivity, high dynamic range and a powerful FFT implementation are key features for capturing and analyzing unwanted emissions.

YOUR TASK

When debugging electromagnetic interference (EMI) problems, the electronic design engineer faces the challenging problem of identifying the sources of unwanted emissions and developing a solution for them. Often, the only information that comes back

from the EMC test laboratory is a spectrum curve indicating the frequencies where emissions are critical or violating the limits.

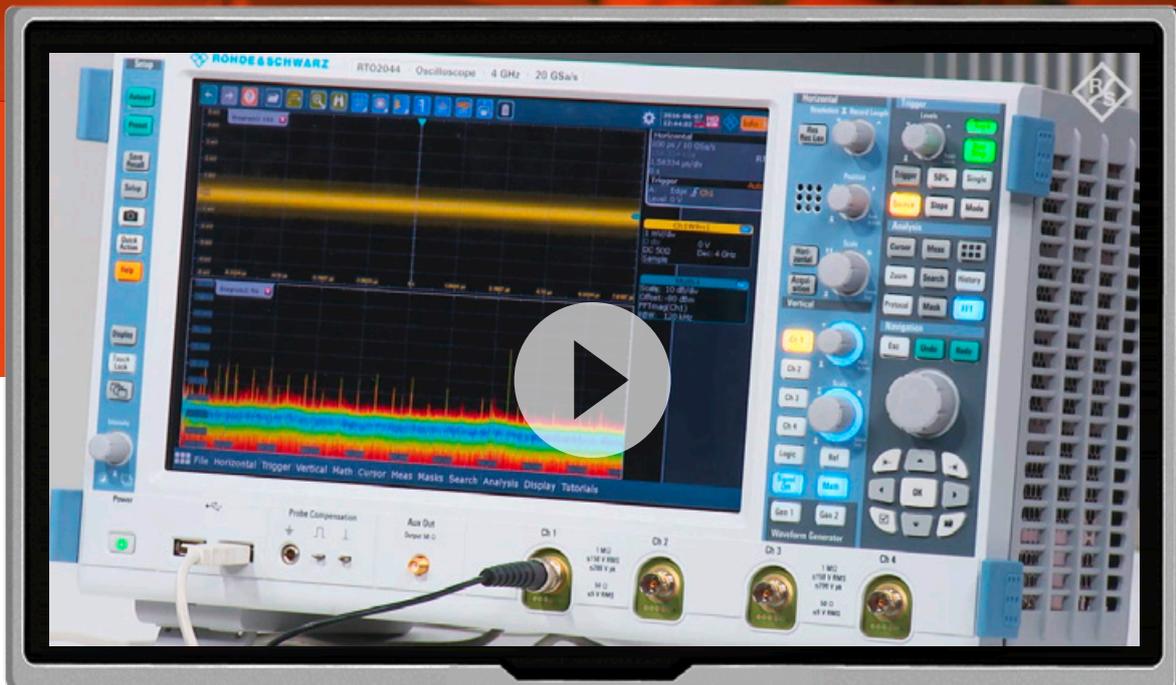
Repetitive testing at the EMC compliance laboratory to identify and resolve the problem is costly and often significantly delays the product launch.

T&M Solution

Rohde & Schwarz offers a range of T&M products that fulfill these needs. The R&S®RTO/RTE digital oscilloscope is a powerful instrument for debugging EMI problems on the design engineer's desk.

■ [Download our AppCard](#)

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i More info

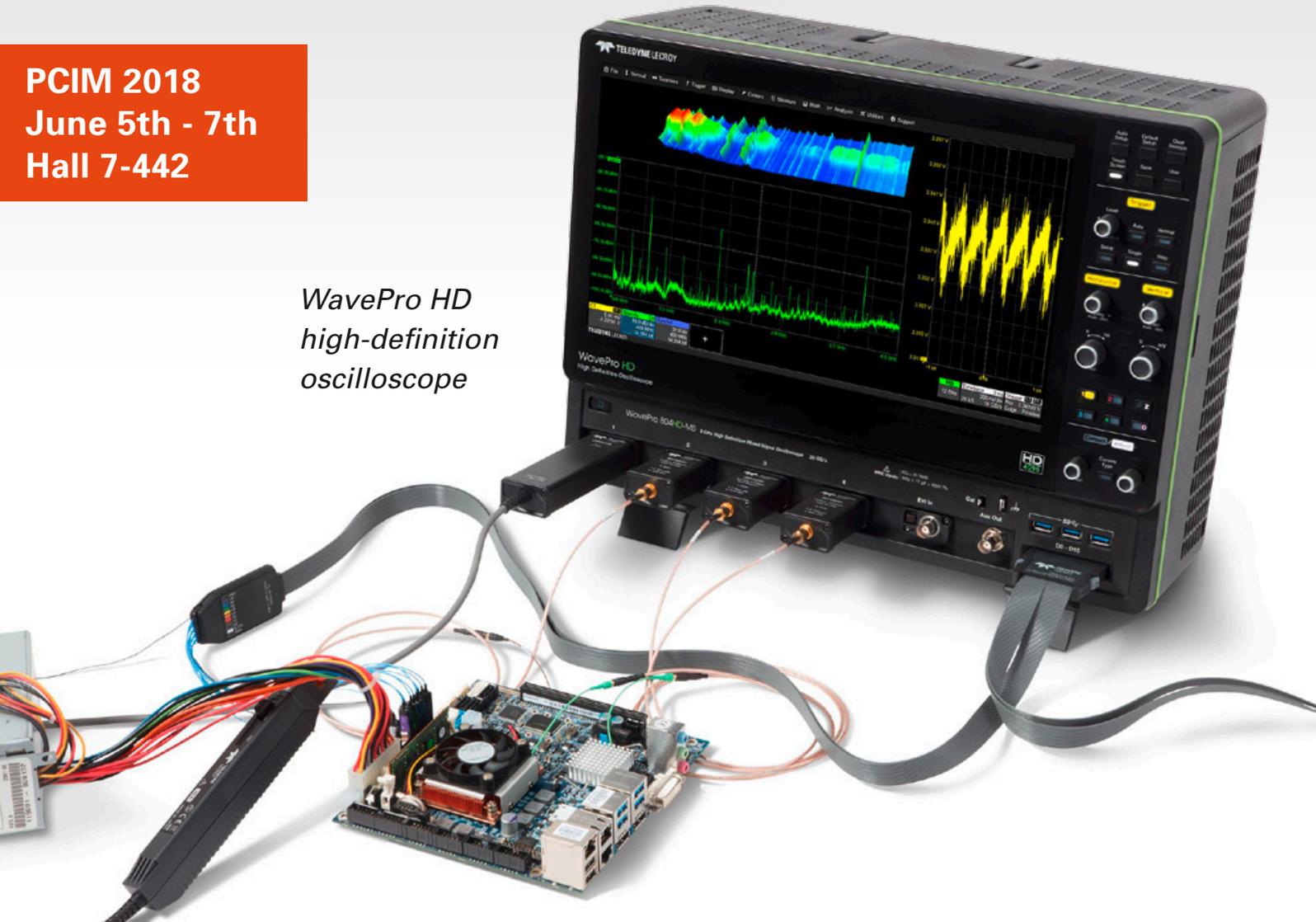
- R&S®RTO
- R&S®RTE
- Application Card

Analyze EMI
problems with the
R&S®RTO/RTE

WavePro HD oscilloscopes address next-generation designs

PCIM 2018
June 5th - 7th
Hall 7-442

*WavePro HD
high-definition
oscilloscope*



Combines 12-bit technology and 8 GHz bandwidth for low noise and pristine signal fidelity

One of the hard parts of testing is that your test gear has to be better than the circuit you are testing. There is no precision without feedback, and unless that information is clean, accurate, comprehensive, and timely, it is less than useless, because the incorrect information will negatively impact your design.

The latest designs must effectively integrate analog sensor inputs, sensitive power-

distribution networks with very low-voltage power rails, high-speed CPUs, and serial-data interfaces requiring a combination of high resolution, low noise, high bandwidth, and very long capture times (at high sample rates). This issue is thrown into high relief today as more and more products are created for Cloud- and Web-based applications, requiring designs that are multifunctional, compact, and energy-

efficient. Integrating RF and sensors and logic and power is a juggling act with too many balls as it is, you don't need to have problems seeing all the balls clearly.

UP TO 5 GPOINTS OF ACQUISITION MEMORY

Raising the bar in benchtop test, Teledyne LeCroy recently announced their new WavePro HD high-definition oscilloscope family, which combines 12-bit technology and 8 GHz bandwidth for low noise and pristine signal fidelity. With up to 5 Gpoints of acquisition memory WavePro HD oscilloscopes also acquire extremely fine waveform details over long periods of time, with a large and powerful toolset to quickly expose underlying issues.

WavePro HD oscilloscopes also feature a large 15.6", 1900 x 1080-pixel capacitive touch screen and come in four models with bandwidths from 2.5 GHz to 8 GHz, all featuring sample rates up to 20 GS/s. At the heart of WavePro HD is a new 8-GHz

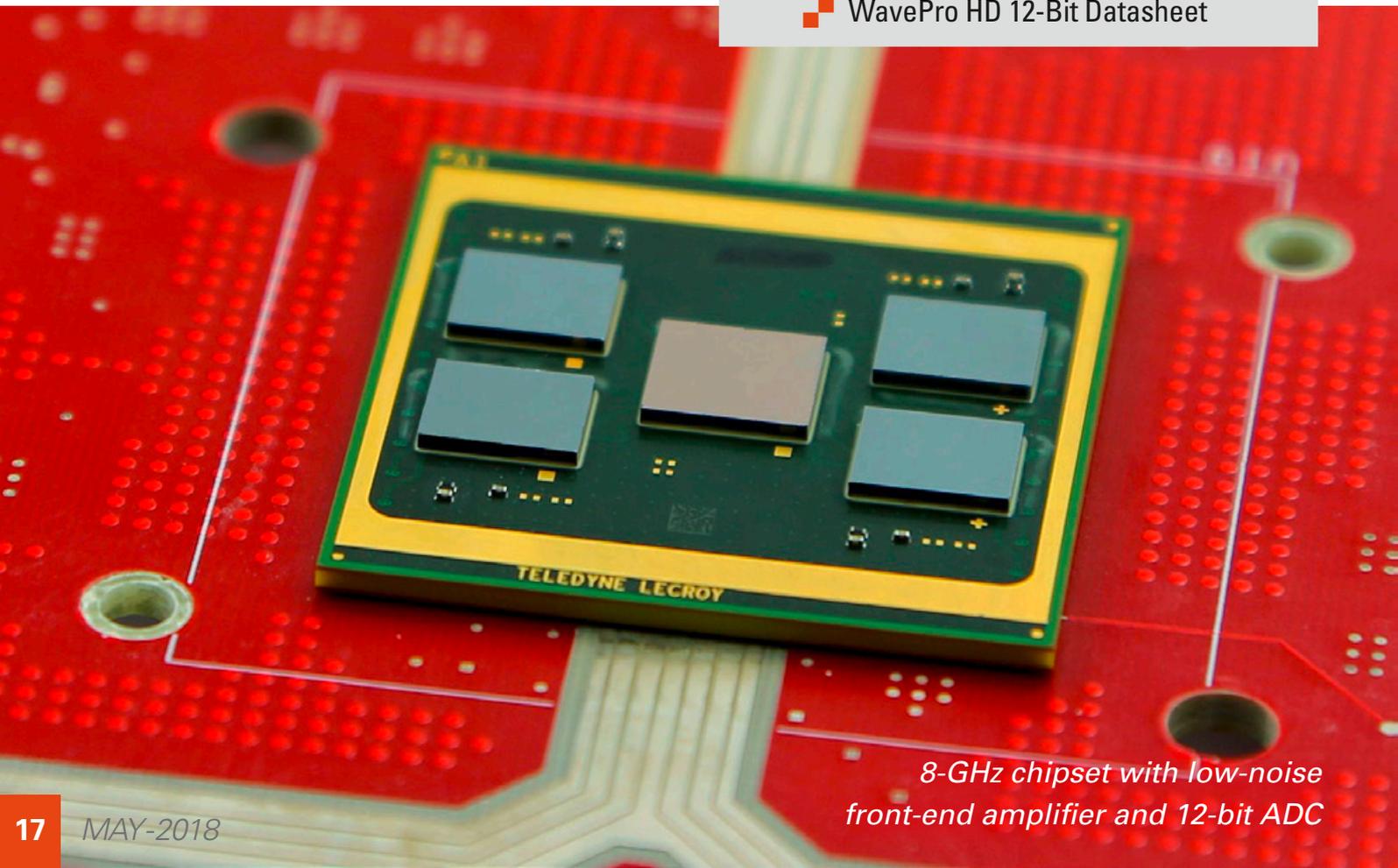
chipset comprising a low-noise front-end amplifier and a 12-bit ADC. That chipset is tightly integrated with a new low-noise, high-bandwidth system architecture for 5-Gpoint acquisitions that are fast and responsive. The instruments can acquire 250 ms at the full 20-GS/s sample rate, and always with 12-bit resolution.

NEW 8- AND 6-GHZ PROBUS2 PROBES

There is also a new 8 GHz, BNC-compatible ProBus2 probe interface, with new 8- and 6-GHz ProBus2 probes that connect directly to the WavePro HD, as well as to the 4 GHz ProBus interface on other Teledyne LeCroy oscilloscopes. Additionally, ProBus-compatible probes also work with the new ProBus2 interface without adapters, ensuring compatibility with Teledyne LeCroy's extensive range of existing probes. ■

More info

- [WavePro HD Oscilloscopes](#)
- [WavePro HD 12-Bit Datasheet](#)



8-GHz chipset with low-noise front-end amplifier and 12-bit ADC



Alix Paultre presents highlights from APEC

Over 5,000 power electronics engineering professionals attended this year's Applied Power Electronics Conference (APEC) in San Antonio/Texas. The event broke records in two significant categories – the number of “full conference” attendees, and the number of attendees who also signed up for the Sunday and Monday seminars occurring outside of the exhibition. Power Electronics News editor Alix Paultre was on the spot and looking for new products and technologies.

GAN SYSTEMS' JIM WITHAM WALKS ALIX PAULTRE THROUGH THEIR BOOTH AT APEC 2018

In this video Jim Witham, CEO of GaN Systems, walks Alix Paultre through their booth at APEC 2018 in San Antonio, Texas. Among the solutions on display are improved packaging for GaN-based power devices, design-ins from major power supply manufacturers showing the increased power density attainable, and an example of how a data center can save using GaN.



TI SHOWS AN 8-KW 3-PHASE BIDIRECTIONAL GAN-BASED GRID CONVERTER

Watch TI's a demonstration of an 8-kW 3-phase bidirectional GaN-based grid converter created in a joint effort with Siemens. In the demonstration the power circuit, operating at 150 kHz, showed excellent thermal performance (under a thermal camera) and output (on an oscilloscope) in a smaller, higher density, form factor.

ONSEMI DESCRIBES THEIR LATEST FLYBACK LED CONTROLLER DEMO

In this video On Semiconductor shows the demo of their latest LED controller demo. The dimmable NCL30386 is a power factor corrected flyback controller targeting isolated constant-current LED drivers, operating in a quasi-resonant mode to provide high efficiency. The device is able to tightly regulate a constant LED current from the primary side, removing the need for secondary side feedback circuitry, its biasing, and an optocoupler.



POWER INTEGRATIONS' IMPRESSIVE DEMO OF THEIR NEW DIGITAL POWER SOLUTION

Andy Smith of Power Integrations talks to Alix Paultre about their newest Innoswitch3 power IC, now with digital control capability. In a dramatic demonstration of the flexibility and speed of the device, Andy shows how the Innoswitch3 can draw images on a power oscilloscope.

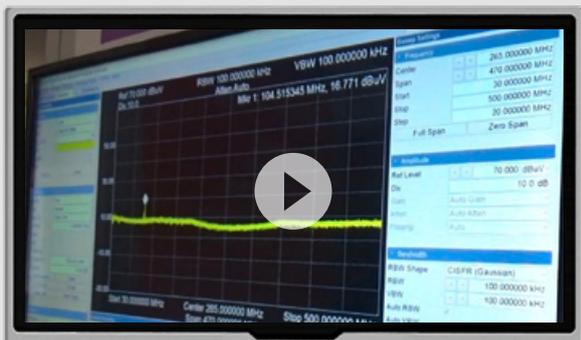
UNITED CHEMI-CON TALKS ABOUT THE CHALLENGES TO THE CAPACITOR INDUSTRY

Tony Alito of United Chemi-Con speaks about the challenges to the capacitor and passives industry. Between the opportunities provided by wide-bandgap semiconductors and new power topologies and the challenges presented by the next generation of demanding automation and energy applications, the company is keeping busy.



COGNIPOWER EXPLAINS THE IMPORTANCE OF PREDICTIVE ENERGY BALANCING

In this video Tom Lawson, Founder and President of CogniPower talks about the importance of predictive energy balancing in advanced power systems. He explains their live demo using an audio signal to demonstrate the agility of the power system to track a dynamic signal.



ADI DEMONSTRATES THEIR UPDATED SILENT SWITCHER POWER TECH FOR REDUCED EMI

Analog Device's Tony Armstrong explains how they updated ADI Silent Switcher power tech with improved magnetic cancellation for reduced EMI. In a demonstration Tony shows how the radiated conducted emissions are over 60% less than legacy solutions. Low noise in electronic systems, especially power, is very important to the performance of systems in application spaces from automotive to medical.

ADVANCED THERMAL SOLUTIONS TALKS ABOUT THEIR LATEST COLD PLATES AND HEAT PIPES

In this video Advanced Thermal Solutions introduces their cold plates for high-density power systems. Their latest heat-pipe solutions improve the ability to transfer heat away from hot areas in critical systems.





Combining excellent performance and ease-of-use with a cost-effective package solution

CoolMOS™ P7 in SOT-223 package

Infineon introduces a SOT-223 package for high-voltage and high-ohmic CoolMOS™ P7 superjunction MOSFETs. This package choice combines all the benefits of the very latest CoolMOS™ Superjunction MOSFET technology with the cost and size advantages of using a SOT-223 package. The result is a cost-effective space saving device choice which offers an outstanding performance.

Available in 600 V, 700 V and 800 V voltage classes, the new CoolMOS™ P7 in SOT-223 directly addresses the need for cost reduction in price sensitive applications. It maintains similar thermal performance and one-to-one footprint compatibility with the long established DPAK packages. The CoolMOS™ P7 in SOT-223 is a perfect fit for low power SMPS applications such as charger for smartphone, laptop adapters, TV power supply, and lighting.

Key features

- › Best-fit superjunction technology in terms of efficiency, thermals, and ease-of-use
- › Increased switching frequencies support
- › Integrated Zener diode
- › Adherence to common EMI criteria
- › Drop-in replacement for DPAK
- › Space savings in designs with low power dissipation
- › Comparable thermal performance to DPAK

Key Benefits

- › Lower MOSFET chip temperature
- › Higher efficiency compared to previous technologies
- › Improved form factors enabling slim designs
- › High ESD ruggedness
- › Attractive price positions for high performance devices
- › Direct DPAK replacement in existing PCB designs

For further information please visit our websites:

www.infineon.com/sot-223

www.infineon.com/p7



Deep Dive into Power Electronics Innovations

pcim
EUROPE

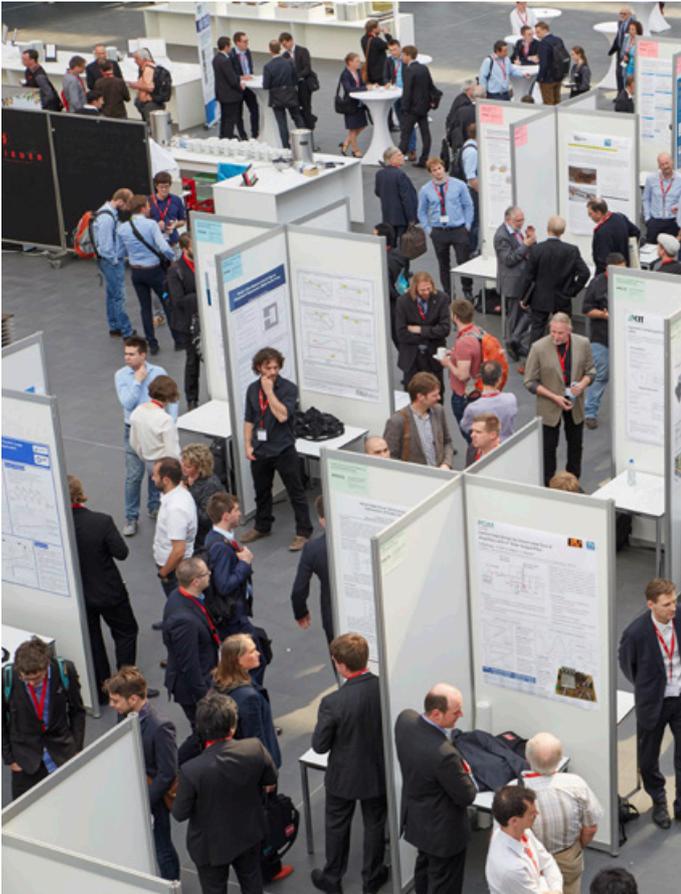
Nuremberg, 5 – 7 June 2018

PCIM Europe, Exhibition & Conference, will take place from 5 - 7 June 2018 in Nuremberg/Germany

Key players in power electronics and smaller, specialized companies, will be presenting their portfolio at the PCIM Europe from 5 - 7 June 2018 in Nuremberg/Germany. The focus of products will be on power semiconductors and passive components which are offered by 36% of the almost 500 exhibitors; this is followed by power converters / power supply and thermal management (25% respectively) as well as coils and magnetic materials (20%).

These areas of focus make this event relevant for visitors from the fields of industrial electronics, electric mobility, automobiles, automation and power supply. Many of these visitors will also be interested in the diverse offering on E-mobility.

The spectrum includes a special exhibition area and focused lecture forum as well as keynote talk, two lecture sessions and a poster presentation from the conference program.

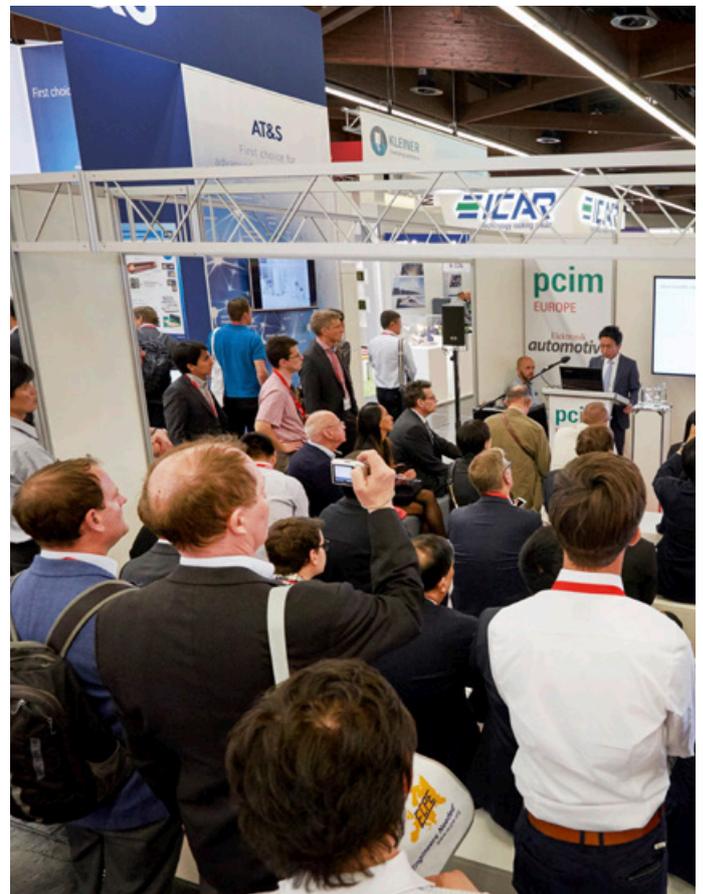


MEETING POINT FOR INDUSTRY EXPERTS AND USERS

The international conference, which will take place at the same time as the Exhibition, connects the worlds of research and industry with over 300 high-quality first-publications, making it the meeting point for experts in power electronics and users around the world. On every day of the conference, a renowned keynote speaker will provide insights into the future of the field. Topics this year include “Electric Vehicles Charging - An Ultrafast Overview” (Professor Drazen Dujic, EPFL Lausanne), “New Passive Devices in Power Conversion - Nice to Have or a MUST?” (Dr. Petar J. Grbovic, Huawei Technologies) and “Modular Multi-level Submodules for Converters, from the State of the Art to Future Trends” (Dipl.-Ing. Markus Billmann, Fraunhofer Institute IISB). ■

FOCUSING ON TRENDS AND DEVELOPMENTS

Over three days, a diverse program is offered by the trade forum in hall 6 focusing on current trends and developments in the industry. Talks on the agenda include “From Niche to Mainstream – SiC Power Devices as Enabler for Revolutionary Designs” (Infineon Technologies) and “Automotive Power Modules - Design Changes and Technology Innovations to Come?” (Yole Développement) as well as two panel discussions organized by the trade publication “Bodo’s Power Systems” on “SiC – Devices for the Future Design” and “GaN – Devices for the Future Design”. The Exhibition Forum, hall 7, will showcase the latest product innovations by renowned companies such as Fuji Electric, Rohde & Schwarz, Semikron and Vacuumschmelze.





PCIM 2018
June 5th - 7th
Hall 6-446



Analog Devices to show their latest power monitoring and controlling solutions

Visitors to the Analog Devices stand at PCIM 2018 (Hall 6, stand 446) will see demonstrations highlighting the company's technologies that span the power-electronics domain, taking in advanced motor drive inverter techniques, driving of the latest SiC and GaN power semiconductors, and precision

management of battery-based energy-storage systems. ADI application engineers will be available on the exhibition stand to discuss these, and many other power-related topics from motion control and electric vehicles, to simulation of power-control algorithms. A highlight of the ADI stand will be the

first public presentation of the brand-new ADuM5020, a low-emission, 500 mW, isolated DC/DC converter/digital isolator.

This demonstration will show how the new device can facilitate easy and economical design of isolated power converters, readily achieving radiated emissions that are well within the limits set in the CISPR 22 standard, when constructed on a simple 2-layer PCB. A test set-up of shielded enclosure, spectrum analyzer and PC monitor will allow visitors to explore the performance of the example circuit under changing conditions. ■

Featured demonstrations at the Analog Devices stand will include:

- New SiC-based, bi-directional, 30 kW converter
- Isolated gate-drivers for SiC power devices
- Battery management for EVs and Energy Stores
- Accurate simulation saves power-stage prototyping



Smallest footprint of a TRACO POWER 10 Watt DC/DC converter.

TEL 10WI Series

- Most compact 10 Watt converter in DIP-16 metal casing
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- High efficiency for low thermal loss
- Operating temperature range -40 °C to +88 °C
- Built-In EN 55032 class A filter
- Protection against short circuit
- 3-year product warranty

i More info

■ Technical Details about the ADuM5020 isolated DC-to-DC Converter

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Rohde & Schwarz to present innovative test for next-gen designs at PCIM



PCIM 2018
June 5th - 7th
Hall 6-239

Power-of-ten oscilloscopes

At PCIM 2018, Rohde & Schwarz will be exhibiting its power-of-ten oscilloscope families, new probes and the R&S FPC1500 spectrum analyzer

The oscilloscopes R&S RTB2000, R&S RTM3000 and R&S RTA4000 with 10-bit A/D converters, 10 times as much memory as comparable instruments, and large 10.1" touchscreen displays will be presented at the Rohde & Schwarz booth 6-239. The R&S RTB2000 oscilloscope is ideal for education, R&D and production, with a starting price of EUR 1,250. It is the first in its class to offer 10-bit vertical resolution and an acquisition memory of 10 Msample per channel.

The R&S RTB2000 also features an impressive 10.1" capacitive touchscreen. Oscilloscopes in the R&S RTB2000 family are available with two or four channels and with bandwidths of 70 MHz, 100 MHz, 200 MHz or 300 MHz.

PROBES FOR MEASUREMENTS ON POWER ELECTRONICS

In addition to its oscilloscopes, Rohde & Schwarz will be presenting new probes to meet current challenges of measuring power electronics components.

The R&S RT-ZHD high-voltage differential probes enable measurements with excellent signal integrity.

Users can make floating voltage measurements up to 6,000 V with a high common mode rejection ratio (CMRR). The probes have a DC measurement accuracy of 0.5 %. With a bandwidth of up to 200 MHz, they can be used to measure fast switching edges. They also feature offset compensation up to 2,000 V.



R&S FPC1500 spectrum analyzer

3-IN-1 SPECTRUM ANALYZER

R&S will also be exhibiting the new R&S FPC1500 spectrum analyzer. This compact instrument provides a spectrum analyzer, a single-port vector network analyzer, and a CW signal generator in a single box.

It is ideal for university and education applications, in service and repair, and for discerning hobbyists.

The R&S FPC1500 is the first commercially available spectrum analyzer to combine the three instruments most often used in RF engineering in a single economical product. ■

i More info

■ Rohde & Schwarz presence at PCIM

MORNSUN®

100-1500VDC Input DC/DC Converter Designed for PV Power System

► PV Series

- Power: 5W, 10W, 15W, 40W, 45W, **200W**
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- Operating temperature: -40°C to +85°C
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- Protection: UVP, RVP, SCP, OCP, OVP
- PCB, Chassis mounting, Din-Rail mounting, Metal cage

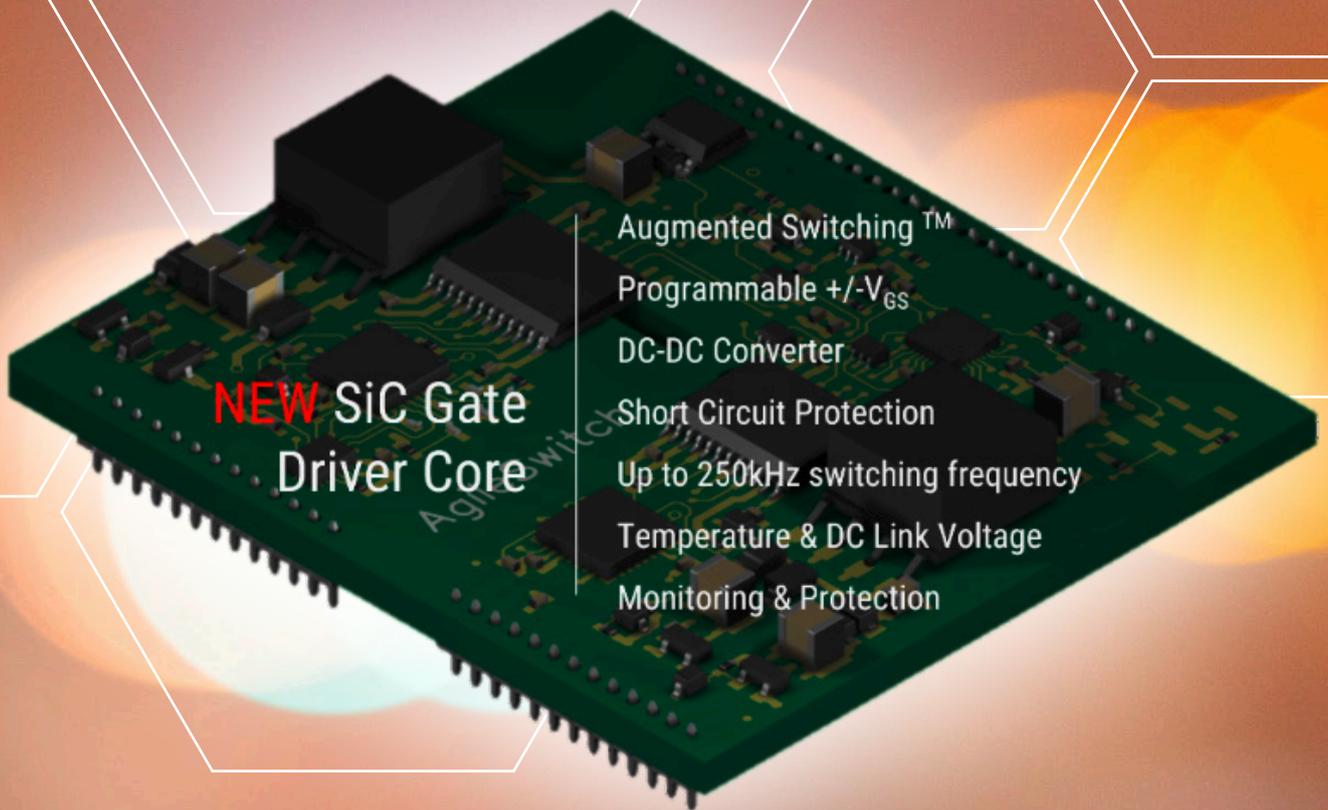


* For the detailed information, please refer to datasheet.

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- Short Circuit Protection
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- Temperature & DC Link Voltage Monitoring & Protection

AgileSwitch to show their new line of SiC gate-driver cores

PCIM 2018
June 5th - 7th
Hall 9-133

AgileSwitch's new line of SiC Gate Driver Cores will be on display at PCIM. The fully software configurable SiC Gate Driver Cores will include a DC-DC converter, configurable protection, monitoring functions, as well as AgileSwitch's patented Augmented Switching™ technology.

AgileSwitch has developed a patent pending line of programmable Gate Drive Boards (GDBs) that control the turn-off di/dt by varying the gate voltage level and dwell time to one or more intermediate levels referred to as Augmented Turn-Off or ATOff. These features enable this core to be a safe and rugged solution for driving SiC MOSFETs in many different applications – saving design and qualification time. The AgileSwitch team looks forward to meet-

ing you at PCIM at their Booth, 9-133. Please visit us to learn more about our new products, as well as our Gate Driver Boards, Stack Electronics, and IPM Reference Designs for both SiC MOSFETs and IGBTs. ■

More info

www.agileswitch.com



**Save the date:
PCIM 2018
June 5th - 7th
Hall 9 - 301**

POWER

Toshiba: comprehensive portfolio of power semiconductor devices and solutions

Toshiba Electronic Devices & Storage announced their participation in PCIM Europe (Power Conversion and Intelligent Motion) 2018, where they will showcase their comprehensive portfolio of power semiconductor devices and solutions. Included on the booth will be several extensions to existing product lines as well as some completely new products and technologies.

- The latest generation of 30-100V class LV MOSFETs delivering best in class efficiency
- 600V planar MOSFETs (PIMOS IX) with low noise, high efficiency & avalanche ruggedness
- The latest automotive MOSFETs line-up
- Automotive photocouplers with IC-, transistor-, photovoltaic- and MOSFET-output
- Photocouplers for high-speed data transmission, gate driving, and isolation amplifiers
- Photorelays for mechanical relay replacement
- Motor control solutions for improved efficiency and higher precision
- Toshiba's innovative circuit technology for improving energy efficiency (A-SRB™)

FOCUSING ON TRENDS AND DEVELOPMENTS

Toshiba also anticipate unveiling two new 40V N-channel MOSFETs designed specifically for demanding automotive applications during the show.

At PCIM Toshiba can be found in Hall 9, on Booth 301 where their technical team will be available to discuss new and existing products and answer customer questions. ■

i More info

■ Toshiba's PCIM highlights



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