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For automotive and military EMC radiated immunity susceptibility testing, as well as radar and communication applications, there is now a very attractive alternative to Traveling Wave Tube Amplifiers (TWTAs).

AR's new offerings include various frequency ranges and output power levels to meet several standards, or designs can be tailored to suit your specific application. These amplifiers feature a touchscreen control panel, GPIB interface, TTL gating, fault monitoring, and forced air cooling.

Features & Benefits For These Rugged Amplifiers Are:

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- Narrowband Frequencies: 1.2-1.4 GHz & 2.7-3.1 GHz
- Power Levels: 1 kW to 150 kW
- Harmonic Distortion of -18dBc @ 1dB compression point
- Pulse Widths to 100 μ sec. & Duty Cycles to 10%
- High Mean Time To Failure (MTTF)
- Mismatch Tolerance - Will operate without damage or oscillation with any magnitude and phase of source and load impedance.
- Numerous Applications Possible - Automotive, MIL STD 464, DO-160 and Military Radar

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EMCLIVE 2017

Practical EMC Training. Live. Online. Free.



ABOUT

EMC Live teaches the latest in practical solutions to electromagnetic interference (EMI) challenges – all for FREE, and all LIVE. Learn directly from industry professionals during 3 days of technical webinar presentations, product demonstrations, and an abundance of resources from whitepapers to application notes. Several electromagnetic compatibility (EMC) topics will be covered, including shielding, ground filtering, standards, pre-compliance, and testing, all applicable to electronics, design, and test engineers working in any industry. Enjoy from the comfort of your office chair!

EMCLIVE 2017

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EMC LIVE AT A GLANCE

TUESDAY, APRIL 25, 2017

10:00 – 10:45 am ET | KEYNOTE PRESENTATION

The Keys to Innovation:
Priming Your Brain to Percolate Brilliant Ideas
– Ransom Stevens, Ph.D.

11:00 – 11:45 am ET | TECHNICAL PRESENTATION

Critical Steps in Designing EMC Test Systems
– Flynn Lawrence | AR RF/Microwave Instrumentation

11:50 am – 12:05 pm ET | PRODUCT DEMO

The R&S® ESW EMC Receiver:
EMC Live's 2016 Product of the Year
– Bill Wangard | Rohde & Schwarz

12:15 – 1:00 pm ET | TECHNICAL PRESENTATION

Narrowband/Broadband – Not Just An Arcane
Discrimination, but the Key to System-Level EMC
Demonstration
– Ken Javor | Rohde & Schwarz

1:30 – 2:15 pm ET | TECHNICAL PRESENTATION

EMI Pre-Compliance Troubleshooting
for R & D Engineers
– Chris Armstrong | RIGOL

WEDNESDAY, APRIL 26, 2017

10:00 am – 10:45 pm ET | TECHNICAL PRESENTATION

New European Radio Requirements Could Leave You in
the "RED"
– Michael Derby | Washington Labs

11:00 am – 11:45 pm ET | TECHNICAL PRESENTATION

The Future of EMC Test Laboratory Emissions
Measurement Capability
– Bill Wangard | Rohde & Schwarz

11:50 – 12:05 pm ET | PRODUCT DEMO

New Single Band Amplifier Covers 6 to 18 GHz
Frequency Band
– Elias Neno | AR RF/Microwave Instrumentation

12:15 am – 1:05 pm ET | TECHNICAL PRESENTATION

Test Requirements of LV 123, LV 124, LV 148 and ECE
R-10 for Electric Vehicles' Components and Systems
– Markus Fuhrer | EM Test

2:20 – 2:35 pm ET | PRODUCT DEMO

Automated Pre-compliance Testing: SIGLENT
EasySpectrum Software
– Jason Chonko | Siglent

THURSDAY, APRIL 27, 2017

10:00 – 10:45 am ET | TECHNICAL PRESENTATION

ESD and Efficient Electronic Design – Finding and
Fixing Problems at the IC Level
– Sven König, Dipl.-Ing. (BA) | Langer EMV-Technik

11:00 – 11:45 am ET | TECHNICAL PRESENTATION

Challenged by EMC Compliance?
– David Armitage | Schaffner

11:50 – 12:05 am ET | PRODUCT DEMO

Efficient Testing of IEC 61000-4-6 with the Most
Compact System
– Frank Niechcial | TESEQ

12:15 – 1:00 pm ET | TECHNICAL PRESENTATION

Practical Overview of MIL-STD-461G
– Rohit Vohra | R&B Laboratory

2:20 – 2:35 am ET | PRODUCT DEMO

When Shielding Isn't Enough: Using Multi-Function
Springs to Address Tough Design Demands
– Jin Kim | BAL SEAL

TECHNICAL PROGRAM

TUESDAY, APRIL 25, 2017

KEYNOTE PRESENTATION

The Keys to Innovation: Priming Your Brain to Percolate Brilliant Ideas

10:00 – 10:45 am ET



Overview: The route from problem to solution is a swirling path with Aha! moments lighting the way. In this presentation, we examine the neural processes that percolate insights into consciousness: the physics of lateral thought, the power of perspective, the value of novelty, and how your brain selects and rejects ideas before you're even aware of them. Then we turn to methods that can prime our brains to solve the challenges that we face as individuals as well as those that we face together.

Presenter – Ransom Stephens, Ph.D.

Ransom Stephens, Ph.D., is a scientist and technologist. As a research scientist he collaborated on major discoveries at international labs before joining the private sector. He has worked in high tech research, development, and marketing. He's written hundreds of articles on subjects ranging from neuroscience to quantum physics to parenting teenagers and two novels, *The God Patent* and *The Sensory Deception* (both from 47North). His new book, *The Left Brain Speaks but the Right Brain Laughs* (Viva Editions, 2016), is an edgy, somewhat irreverent, accurate look at the neuroscience innovation in art and science. Ransom has given thousands of speeches across the US, Europe, and Asia and has developed a reputation for making complex topics accessible and funny.

TECHNICAL PRESENTATION

Critical Steps in Designing EMC Test Systems

11:00 – 11:45 am ET



Overview: In this presentation, AR will discuss the most critical aspects of designing an EMC test system to meet your specific needs and requirements. Focus will be on selecting and sizing the appropriate equipment and learning the appropriate questions to ask in order to achieve these goals. AR has the experience to develop full-turnkey solutions for a multitude of requirements – not only RI, but CI, RE and CE as well.

Presenter – Flynn Lawrence

Flynn Lawrence is an Applications Engineer for AR RF/Microwave Instrumentation. At AR, Flynn is actively engaged in new application and product development and testing, worldwide sales and customer support, as well as hardware demonstrations and training. Prior to joining AR, Flynn was an EMC Systems and Test engineer, working in requirements maintenance, test planning and test execution on military space components and systems.

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PRODUCT DEMO

The R&S® ESW EMC Receiver: EMC Live's 2016 Product of the Year

11:50 am – 12:05 pm ET



Overview: The R&S® ESW EMI receiver from Rohde and Schwarz delivers superior noise floor, higher dynamic range, and an intuitive graphical user interface. Time domain scan enables to dramatically shorten test time, and a real-time mode with persistence display provides revolutionary insight into the time characteristics of emissions and helps in identifying the sources of those emissions. And these are only some of the features why this instrument will speed up and help to better your EMI measurements. This demonstration will walk you through the steps of creating customer limit lines, setting up and executing a scan with and without time domain scan, interactively analyzing the peaks, and then analyzing the emissions with real-time mode persistency display and spectrogram. Join us and find out what all that hype is about!

Presenter – Bill Wangard

Bill Wangard is the EMI Receiver and Radio monitoring Product Manager at Rohde & Schwarz. He has 20+ years of RF and Receiver experience at Motorola and Rohde & Schwarz. Bill authored numerous patents at Motorola.

Presented by:



TECHNICAL PRESENTATION

Narrowband/Broadband – Not Just An Arcane Discrimination, but the Key to System-Level EMC Demonstration

12:15 – 1:00 pm ET



Overview: Laboratory demonstrations show why modern EMC testing uses the spectrum analyzer noise floor measurement as opposed to the older method of sampling radio channels and listening for noise. The attendee will witness a demonstration of the effects of narrow and broadband noise on both the ability of a victim radio to properly receive a signal, and also the ability of a test engineer to properly discern if there is interference.

Presenter – Ken Javor

Ken Javor has worked in the EMC industry for thirty years. He is a consultant to government and industry, runs a pre-compliance EMI test facility, and curates the Museum of EMC Antiquities, a collection of radios and instruments that were important in the development of the discipline, as well as a library of important documentation. Mr. Javor is an industry representative to the Tri-Service Working Groups that write MIL-STD-464 and MIL-STD-461. He has published numerous papers and is the author of a handbook on EMI requirements and test methods. Mr. Javor can be contacted at ken.javor@emccompliance.com.

TUESDAY, APRIL 25, 2017

TECHNICAL PRESENTATION

EMI Pre-Compliance Troubleshooting for R & D Engineers

1:30 – 2:15 pm ET



Overview: EMI is generally thought of as the last hurdle in new product development. Compliance lab approval is one of the last things a design team needs before going to market, but EMI troubleshooting is considerably more efficient when considered earlier in the design process. RIGOL will discuss techniques for EMI Pre-Compliance design evaluation refined over years of leading the industry in affordable solutions. This includes visual examples of how we identify and analyze design problems that cause EMI.

Presenter – Chris Armstrong

Chris Armstrong is the Director of Product Marketing & SW Applications at Rigol Technologies North America. Chris brings more than 15 years of experience in test & measurement from sensitive measurement applications to multipurpose benchtop test to integrating complete systems controlling instrumentation across a number of platforms.

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The RIGOL logo consists of the word "RIGOL" in a bold, black, sans-serif font, centered within a bright yellow rounded rectangular background.

WEDNESDAY, APRIL 26, 2017

TECHNICAL PRESENTATION

New European Radio Requirements Could Leave You in the “RED”

10:00 – 10:45 am ET



Overview: As the required implementation date and the end of the R&T-TED to RED transition period rapidly approaches, this training addresses compliance to Directive 2014/53/EU, known as the RED. We have seen a lot of activity in harmonizing standards but it is still expected that Notified Body (NB) involvement will be needed in many cases. This session reviews the requirements and timelines of the RED, the status of the harmonised or draft standards, and the requirements for using a Notified Body including the technical documentation file. Preparation for the June 2017 deadline for maintaining compliance of products on the EU and EEA market must be completed, and this session provides essential information for wireless equipment manufacturers and radio importers.

Presenter – Michael Derby, Director ACB EU

Michael is Director of American Certification Body Europe and has been active in the Wireless Certification Industry for 20 years. He is currently the Chair of the Telecommunications Certification Body Council, Secretary of the EMC Test Lab Association and is a Notified Body for the Radio Equipment and EMC Directives. Michael performs certification and lectures on radio regulatory issue in Europe, the United States and China.

Presented by:



Washington Labs

TECHNICAL PRESENTATION

The Future of EMC Test Laboratory Emissions Measurement Capability

11:00 am – 11:45 pm ET

Presented by:



Overview: Test Laboratories measure customer product spectral emissions and determine pass/fail based on the specification. Customers are provided pass/fail status and in the event of a failure, are typically provided with a plot of the failing spectrum consisting of a max hold trace. Often the max hold trace data provides little diagnostic information necessary to troubleshoot the failing emission and customers are starting to demand more useful information. Test Laboratories are starting to invest in technology that provides their customers with invaluable diagnostic capability and speed of iterative testing to maximize their customer’s success in product certification.

Presenter – Bill Wangard

Bill Wangard is the EMI Receiver and Radio monitoring Product Manager at Rohde & Schwarz. He has 20+ years of RF and Receiver experience at Motorola and Rohde & Schwarz. Bill authored numerous patents at Motorola.

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WEDNESDAY, APRIL 26, 2017

PRODUCT DEMO**New Single Band Amplifier Covers 6 to 18 GHz Frequency Band**

11:50 am – 12:05 pm ET



Overview: AR's new 20S6G18A is a self-contained, air-cooled, broadband, Class A solid-state amplifiers designed for applications where instantaneous bandwidth, high gain and linearity are required. When used with a sweep generator, will provide a minimum of 20 watts of RF output power instantaneously from 6 to 18 GHz. This amplifier is suitable for radiated immunity testing, TWTA replacements, and EW applications.

Presenter – Elias Neno

Elias graduated from Pennsylvania State University in 1984 with a Bachelor of Science in Electrical Engineering. He has worked at Optimax/Alpha Industries, Phoenix Microwave and Ericsson prior to joining AR. Throughout his career he has been involved with Solid State, RF and Microwave Amplifier designs for the Military and Wireless Base Stations. In 1991, he received his Master's Degree in Engineering Science from Penn State University. During the last 10 years at AR, Elias has been involved in the design of the 4-18GHz and 1-6GHz Single Band Solid State Amplifiers.

Presented by:

**TECHNICAL PRESENTATION****Test Requirements of LV 123, LV 124, LV 148 and ECE R-10 for Electric Vehicles' Components and Systems**

12:15 – 1:00 pm ET



Overview: The suppliers of electrical components from the German automotive manufacturers AUDI, BMW, Daimler, Porsche and Volkswagen are obliged to meet the requirements of LV 123 for HV systems and LV 124/148 for components of 12 V / 48 V vehicle networks. The high voltage level for HV systems, as well as the connection of hybrid and electric vehicles (EV / HEV) to the public power grid, requires compliance with further regulations such as the ECE R-10. For the HV components, new test methods with high DC voltages are a challenge for test engineers. The presentation presents new test methods and methods developed from experiences with test houses in recent months. The examinations and interpretations are explained in an easy way and the latest solutions for testing technology are presented. With modern testing technology and practice-oriented examples, frequently emerging questions are discussed and clarified.

Presenter – Markus Fuhrer

EM TEST (Switzerland) GmbH, Reinach, Schweiz

Presented by:

**PRODUCT DEMO****Automated Pre-compliance Testing: SIGLENT EasySpectrum Software**

2:20 – 2:35 pm ET



Overview: Troubleshooting and documenting EMC issues can be tedious and inefficient, especially when implementing manual test methods. In this presentation, we are going to introduce automated test concepts using SIGLENT's EasySpectrum software. When coupled with SIGLENT's affordable SSA3000X Series spectrum analyzer and a computer, EasySpectrum provides an intuitive platform to control pre-compliance test sequencing, data collection, and reporting designed to get the data you need to pass compliance quickly.

Presenter – Jason Chonko

Jason has 17 years of experience in test and measurement and has seen a little bit of everything.. from nanoamps to gigahertz. He is still amazed at how many things do and don't work as expected. His primary role at SIGLENT is to help customers get the gear they need to excel. He graduated with a B.S. in Physics from Kent State University and is dedicated to helping.

Presented by:



Presented by:



TECHNICAL PRESENTATION

ESD and Efficient Electronic Design – Finding and Fixing Problems at the IC Level

10:00 – 10:45 am ET



Overview: Imagine, your production-ready electronic device has just failed an ESD test. Wouldn't it have been better to discover and solve this problem much earlier, during the initial design cycle? In this webinar we will discuss the impact of IC behavior on electronic design, specifically the characteristics of ESD and how they influence a device by influencing the ICs. To identify ESD problems, a special test setup must be used to recreate the disturbance at the IC level during the design process. This will save the engineer developing time and effort. Some ESD problems will be explained and supplemented by a practical example at both the electronic and IC level.

Presenter – Sven König, Dipl.-Ing. (BA)

After finishing High School, Sven studied (very successfully) electrical engineering. During his studies he gained practical experiences in EMC/EMI developing electronic devices. Having finished his scholastics he advanced experiences in different small sized enterprises. In 2007 Sven joined the team of Langer EMV-Technik GmbH as developing engineer. Langer EMV-Technik GmbH is an electro technical company that is active in the field of electromagnetic compatibility-related research, development and production of measurement tools. Sven is currently involved in the development of new measurement tools, practical troubleshooting on electronic devices, EMC/ESD tests on IC's, teaching the effects of EMC and ESD in Langer EMV-Technik seminars and competent customer care.

TECHNICAL PRESENTATION

Challenged by EMC Compliance?

11:00 – 11:45 am ET



Overview: Exploring the use of filters on various applications, installations and designs. This will include a review of how filter components react at different frequencies.

Topics include: Overview of EMC, Components at High Frequencies, How to Choose a Line Filter, Grounding and Cable Layout, Coupling Mechanisms, Good/Bad Examples of Different Configurations, and Examples of How Different Filters React in Similar Configurations.

Presenter – David Armitage

David Armitage is the Manager of Engineering for Schaffner EMC and has worked in the EMC industry for over 20 years. In his current role he manages the engineering, design, quality and technical efforts for North and South America. David has also worked for an EMC compliance test house where he evaluated products to ensure they met the various FCC, CE and Mil standards. He has served as the Expert for Interference Technology's "Ask the Expert" EMI filtering forum and Co-Authoring an article for EC&M magazine. He has a BSEE from Wilkes University, an MBA from Pepperdine University and is a PMI credentialed Project Management Professional.

Presented by:



THURSDAY, APRIL 27, 2017

PRODUCT DEMO**Efficient Testing of IEC 61000-4-6 with the most Compact System**

11:50 – 12:05 pm ET



Presenter – Frank Niechcial,
TESEQ

Presented by:

**TECHNICAL PRESENTATION****Practical Overview of MIL-STD-461G**

12:15 – 1:00 pm ET



Overview: The purpose of MIL-STD-461G is to establish interface and associated verification requirements for the control of the EMI emission and susceptibility characteristics of electronic, electrical, and electromechanical equipment and subsystems. This presentation is a brief overview of the changes in MIL-STD-461G and what practical effect they will have on testing.

Presenter – Rohit Vohra

Rohit has over 25 years of experience in EMI, EMC, Lightning and EMP, including testing, planning, failure analysis on a variety of systems ranging from small commercial products to large avionic and military sub-systems. He assists customers in getting their electronic product to meet EMC, Lightning and EMP regulatory standards, and prepares and reviews a variety of EMC documentation. This includes EMI control plans and design guidelines, EMI test plans and procedures and EMI test reports with corrective actions. Rohit has also planned and implemented automation of all test equipment to perform EMC test methods in the ISO /IEC 17025 accredited laboratory. He manages a variety of test programs for commercial and Military customers.

Presented by:

**PRODUCT DEMO****When Shielding Isn't Enough: Using Multi-Function Springs to Address Tough Design Demands**

2:20 – 2:35 am ET



Overview: Participants in this session will learn how to leverage the electrical and mechanical properties of the canted coil spring to shield against EMI while reducing system complexity, size and weight, and improving overall service life and reliability. Specific examples of combined fastening (latching, locking and holding) and EMI shielding applications will be shown, as will spring shielding performance data in a range of frequencies. The presentation will also compare springs with other available shielding technologies, and explore the roles that wire materials, plating types and thicknesses, coil angles and other design factors play in the determination of spring insertion and removal forces and shielding effectiveness.

Presenter – Jin Kim

Jin Kim is a senior applications engineer at Bal Seal Engineering, where he plays an integral role in designing EMI shielding solutions for applications in aerospace, automotive, medical, analytical, energy and other industries. He has several patents related to canted coil spring technology used for electrical conducting and EMI shielding. Kim received his Bachelor of Science degree in Materials Science Engineering from the University of California, Irvine.

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AR RF/Microwave Instrumentation manufactures and distributes products for various EMC and wireless telecommunication requirements:

- RF Solid State Amplifiers 1 to 50,000 watts, dc to 1 GHz
- Microwave Amplifiers 1 to 10,000 watts, 0.8 to 50 GHz
- Antennas Up to 15,000 watts input power, 10 kHz to 50 GHz
- RF Conducted Immunity Test Systems
- EMC/RF Test Systems
- Hybrid Power Modules
- Power Measuring Equipment
- Accessories and Software
- Electromagnetic Safety Products
- SunAR positioning equipment and antennas for EMC and Wireless testing

AR RF/MICROWAVE INSTRUMENTATION EMC PAVILION

FEATURED PRODUCTS

**Multistar Multi-Tone**

The Model MT06000A (Multistar™ Multi-tone tester) is a state-of-the-art system designed to test RF Radiated Immunity faster than ever before possible. By testing multiple frequencies (tones) at once, test times can be reduced by a factor equivalent to the number of tones selected.

**10000W1000A**

The Model 10000W1000A is a self-contained, air-cooled, broadband, completely solid-state amplifier designed for applications where instantaneous bandwidth and high gain are required.

Push-pull circuitry is utilized in all high power stages in the interest of lowering distortion and improving stability.

**8000SP2z7G3z1**

The Model 8000SP2z7G3z1 is a self-contained, forced-air-cooled, broadband solid-state microwave amplifier designed for pulse applications at low duty factors where instantaneous bandwidth and high gain are required.

The unit provides a conservative 8000 watts minimum peak RF pulse power at the amplifier output connector.

**1000S1G4**

The Model 1000S1G4 is a portable, self-contained, air-cooled, broadband, completely solid-state amplifier designed for applications where instantaneous bandwidth, high gain and linearity are required.

Quadrature-coupled circuitry is utilized in all high power stages in the interest of lowering distortion and improving stability.

**20000A225A-L**

The Model 20000A225A-L is a self-contained, broadband, completely solid state amplifier designed for applications where instantaneous bandwidth and high gain are required.

The amplifier is liquid-cooled for high performance and reliability (majority of the heat is removed via liquid cooling).

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- RF Solid State Amplifiers 1 to 50,000 watts, dc to 1 GHz
- Microwave Amplifiers 1 to 10,000 watts, 0.8 to 50 GHz
- Antennas Up to 15,000 watts input power, 10 kHz to 50 GHz
- RF Conducted Immunity Test Systems
- EMC/RF Test Systems
- Hybrid Power Modules
- Power Measuring Equipment
- Accessories and Software
- Electromagnetic Safety Products
- Sunar positioning equipment and antennas for EMC and Wireless testing



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AMETEK CTS is a leading manufacturer of test and measurement instrumentation for electromagnetic compatibility (EMC) testing, with manufacturing sites in Switzerland, Germany, the United Kingdom, and USA, producing a broad range of conducted and radiated EMC compliance testing systems and RF amplifiers.



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We're more than a canted coil spring manufacturer. By applying our unique Bal Spring™ canted coil spring technology and material science expertise, we provide OEMs and tier suppliers everywhere with innovative, custom-engineered sealing, connecting, conducting and EMI shielding and grounding solutions.



balseal.com

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Keysight Technologies (NYSE:KEYS) is a global electronic measurement technology and market leader helping to transform its customers' measurement experience through innovations in wireless, modular, and software solutions. Keysight's electronic measurement instruments, systems, software and services are used in the design, development, manufacture, installation, deployment and operation of electronic equipment.

keysight.com



Since the founding of Gunter Langer's engineering office in 1992 and the starting of the spin-off company Langer EMV-Technik GmbH in 1998 we have achieved an excellent reputation as a competent and globally acting EMC provider.

langer-emv.com/en



R&B Laboratory, located outside Philadelphia, PA offers clients EMC testing ranging from automotive to avionics to military and additionally provides EMC Engineering. Our highly skilled technicians and engineers work closely with clients to fulfill their testing needs. The Laboratory facility includes 8 shielded rooms and a reverberation chamber, each equipped with multiple power capabilities and automated data acquisition.

rblaboratory.com



Founded in 1998, RIGOL Technologies, Inc. is an ISO9001:2000 Quality Management System and ISO14001:2004 Environmental Management System Certified company, an emerging T&M leader and a technology innovator in Electronic Measurement and Chemical Analysis. RIGOL's premium line of products includes Digital Oscilloscopes, RF Spectrum Analyzers, Digital Multimeters, Function/Arbitrary Waveform Generators, Digital Programmable Power Supplies, HPLC and UV-Vis Spectrophotometers, which help the engineers, researchers, educators to address their measurement challenges in confidence with affordability than ever before.

rigolna.com



For more than 80 years, Rohde & Schwarz has stood for quality, precision and innovation in all fields of wireless communications. The privately owned company is strategically based on four pillars: test and measurement, broadcasting, secure communications, radiomonitoring and radiolocation. The electronics group, headquartered in Munich (Germany), has a global presence and is among the world market leaders in all of its business fields.

rohde-schwarz.com



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The Schaffner Group is a global leader in providing solutions that ensure the efficient and reliable operation of power electronic systems by shaping electrical power. The Company's portfolio includes EMI filters, power magnetic components and power quality filters with related services.

Schaffner components are deployed in electronic motor controls, in wind power and photovoltaic systems, rail technology applications, machine tools and robotics, electrical infrastructure, as well as in power supplies for a wide range of electronic devices in sectors such as medical technology. For the automobile industry, Schaffner develops and manufactures components for convenience and safety features in cars and filter solutions for electric vehicles as well as their charging infrastructure. Headquartered in Switzerland, Schaffner serves its global customers through its engineering and manufacturing centers in Europe, Asia and in North America. Through significant investments into research and development, the Company strives to expand its leading position in growing markets.

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SIGLENT Technologies manufactures oscilloscopes, spectrum analyzers, and other gear with a focus on being the best value in test and measurement.

SIGLENT began developing digital oscilloscopes in 2002. After 13 years of research and development, our products include digital oscilloscopes, isolated handheld oscilloscopes, function/arbitrary waveform generators, DC power supplies, digital multi-meters, spectrum analyzers and other general test instruments. In 2005 SIGLENT produced the ADS 7000 series digital oscilloscope. From that point on our annual growth has been 50% or more every year. We're proud to announce today that SIGLENT represents — The Best Value in Electronic Test & Measurement.

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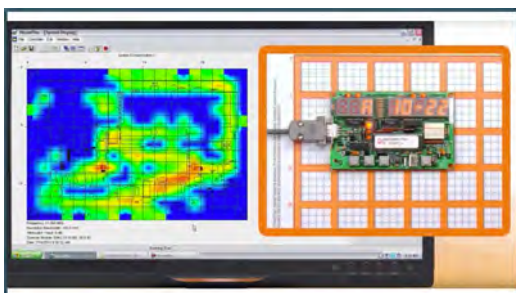
AR's new 20000SP1G2 broadband solid state microwave pulsed amplifier provides 20,000 watts of output power from 1 to 2 GHz at a maximum pulse width of 50 μ sec and duty cycle of 5%. It uses state-of-the-art technology to obtain excellent performance at a relatively small size and weight. Applications include EMC testing, radar systems, Research, and product development.



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EMxpert is a real-time, compact, bench-top EMC/EMI diagnostic tool enabling designers to rapidly diagnose & solve EMC/EMI problems in a single design cycle. Gain insights about why designs fail something no chamber can give. No more waiting for chamber time to redesign & test by trial & error. Rapidly diagnose intermittent problems, which may go undetected when using handheld/automated probes.



Micronor's MR386 ZapFREE® Microswitch, the world's first fiber optic micro switch, is purposely designed to meet the challenging requirements of MRI, medical and industrial applications. The entirely non-electrical, totally-passive sensor provides EMI and RFI immunity, high voltage isolation, inherent safety in explosive atmospheres, and can operate interference-free over long distances. Two models are offered – Industrial and non-metallic MRSafe.



Masach is the industry leader of Standard Drawn EMI/RFI Shields. Our standard, Seamless Protective Cage, Two-piece shields offer optimal planarity and robust solid construction. The Drawn shields are all tooled items which are optimized for small, medium and large-scale runs (SMT compatible), designed to meet the electronic industries ever-growing high frequency and RF application.



TDEMI eXtreme test receiver– 18GHz real-time scanning as well as a real-time bandwidth of 645MHz are the brand-new features of the worldwide fastest EMI Receiver TDEMI X of GAUSS INSTRUMENTS. It allows full compliance testing with a real-time scanning over several GHz as well as a fully gapless real-time analysis of 645MHz with Quasi-Peak, of course with excellent accuracy and highest dynamic range.



The IsoLOG 3D Mobile is a broadband, 3-dimensional antenna designed specifically for field monitoring and surveillance applications. The 3D antenna covers the frequency range of 9kHz to 6 GHz and can be used with any Spectrum Analyzer. It comes with detailed calibration data and internal bypass-preamplifier. One Antenna for every challenge with world's largest frequency range for 3D antennas.



AE Techron's 3110 Audio-Bandwidth Standards Waveform Generator: The 3110 features a powerful yet simple-to-use interface and a large library of Automotive and Aviation tests. Tests are easy to link, build from scratch, or customize using time-saving controls like triggers and repeats with changing variables. Use with AE Techron amplifiers to create a complete AC/DC solution for audio-bandwidth testing.

NARROWBAND VERSUS BROADBAND HARMONIC SIGNALS

by: Kenneth Wyatt

Radiated and conducted emissions measurements are often comprised of both narrowband and broadband sources. So what differentiates “narrowband” and “broadband” signals?

Narrowband Versus Broadband Signals

The definition of whether a signal is narrowband or broadband as measured using a spectrum analyzer, depends entirely on the receiver bandwidth (resolution bandwidth, or RBW). For commercial EMI signals, the test standards define what the RBW should be.

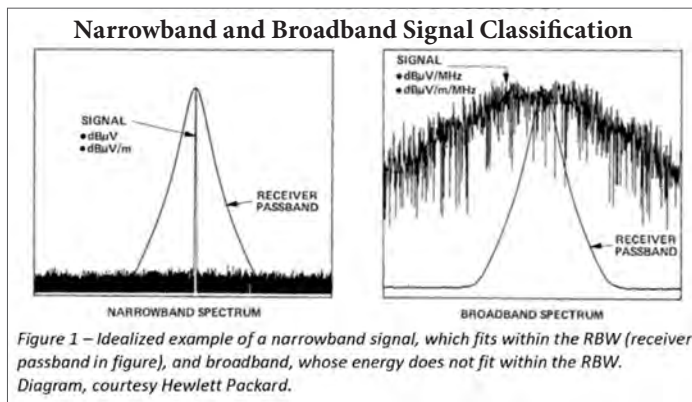
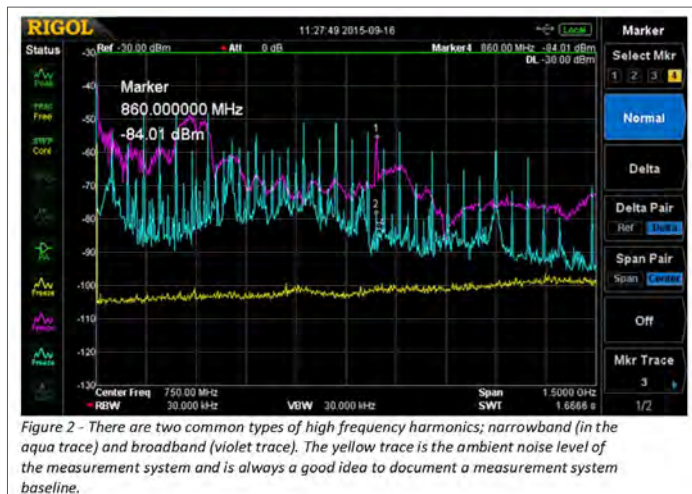


Figure 2 shows the difference between the two measured sets of harmonic signals as we’re looking from 9 kHz to 1.5 GHz. The RBW has been adjusted to 30 kHz for this example. Typically, DC-DC converters or data/address bus data will appear as a very broad signal with several resonant peaks (violet trace in Figure 2), while crystal oscillators or high speed clocks (anything with fast switching edge speeds) will appear as a series of narrow spikes (aqua trace in Figure 2). Unless the product is designed for EMC compliance, both these types of signals can radiate or conduct high frequency energy well into the mobile phone bands.



Note that by reducing the RBW way down to 1 kHz or so, you’ll be able to start resolving the harmonics from DC-DC converters or other switching power supplies. You’ll see that the signals are actually narrowband! This illustrates that a series of harmonic signals can be both narrowband and broadband. It all depends on the RBW.

Rohde & Schwarz has two useful references that describe this concept in much more detail, and will be presenting a webinar on this subject during the upcoming EMC Live event April 25 through 27, 2017. Their presentation is scheduled for Tuesday, April 25th. Registration is now open. Check out the program at EMC.Live.

Presentation details:

Narrowband/Broadband – Not Just An Arcane Discrimination, but the Key to System-Level EMC Demonstration

Laboratory demonstrations show why modern EMC testing uses the spectrum analyzer noise floor measurement as opposed to the older method of sampling radio channels and listening for noise. The attendee will witness a demonstration of the effects of narrow and broadband noise on both the ability of a victim radio to properly receive a signal, and also the ability of a test engineer to properly discern if there is interference.

References:

1. Rohde & Schwarz, Measuring with Modern Spectrum Analyzers, https://cdn.rohde-schwarz.com/pws/dl_downloads/dl_application/application_notes/1ma201_1/1MA201_9e_spectrum_analyzers_meas.pdf
2. Rohde & Schwarz, Making Spectrum Measurements with Rode & Schwarz Network Analyzers, https://cdn.rohde-schwarz.com/pws/dl_downloads/dl_application/application_notes/1ez62/1EZ62_0e.pdf

ESD EFFECTS OF DIGITAL ICs

by: Kenneth Wyatt

One issue I see fairly often with unshielded consumer or commercial products is CPU resets during periods of immunity testing, such as during electrostatic discharge (ESD) testing. Untreated, this can lead to field failures and associated customer satisfaction issues.

The remedy is usually quite simple and IC manufacturers even mention the solution, but it's usually buried deep within the data sheet. That is, an R-C low pass filter.

Figure 1 shows a simplified depiction of an ESD waveform (from the IEC 61000-4-2 standard). ESD current pulses will typically have rise times much less than 1 ns.

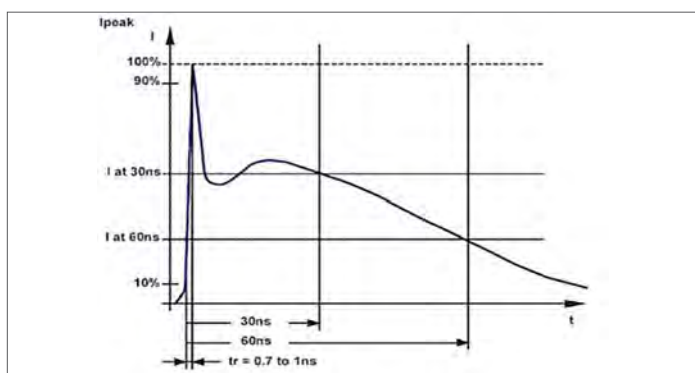


Figure 1 – An idealized ESD pulse, according to the IEC 61000-4-2 standard.

As measured using just a 1.5 GHz bandwidth oscilloscope, the mean rise time was measured at 575 ps, as shown in Figure 2. It's obviously bandwidth-limited, as I've measured rise times as fast as 35 ps on some very fast oscilloscopes.

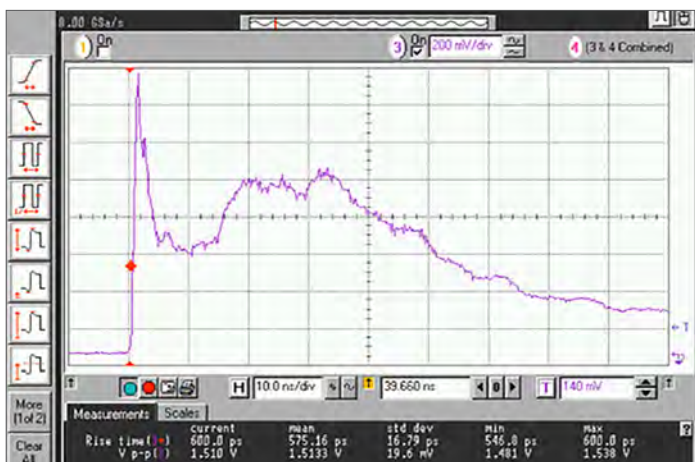


Figure 2 – Measured ESD current pulse showing rise times of 546 to 600 ps.

One client of mine was having quite a challenge with ESD tripping the CPU reset of their embedded processor. The board

they were using was a general purpose one with many I/O connectors arranged around the edges. Merely connecting a USB cable would reset the processor. Even the ESD generated by people walking by, would cause a reset to occur.

I examined the PC board layout and have drawn in arrows showing how the CPU reset signal traces are leading out to all the connectors and crisscross the board over several inches (Figure 3). Of course, these long reset traces served as quite good receive antennas and easily coupled the ESD fields into the CPU.

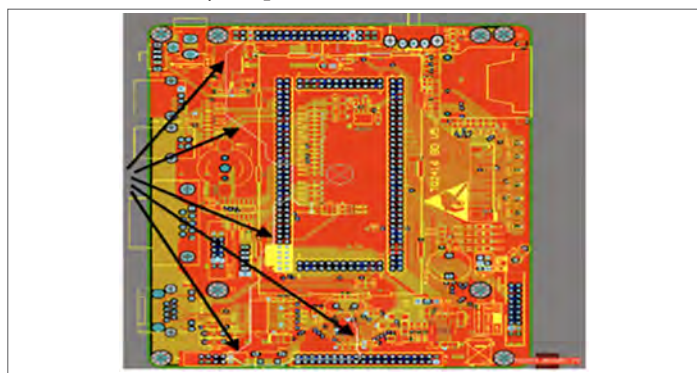


Figure 3 – Arrows indicate all the CPU reset traces.

As mentioned, the solution is a simple R-C low pass filter. The values are not critical and typically, the resistor might be 1k to 10k Ohms and the capacitor, 1 to 10 nF (Figure 4).

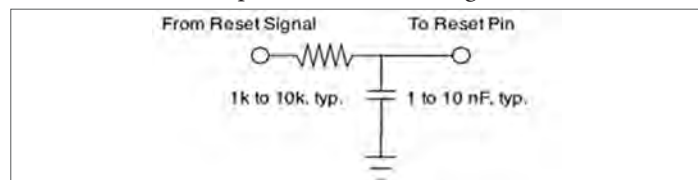


Figure 4 – A simple R-C low pass filter should be used on all CPU reset pins to filter out transient currents, such as ESD or EFT.

For more information on testing and troubleshooting ESD effects on ICs, we have a special guest speaker, Sven König, from Langer EMV-Technik GmbH, who will be presenting a free webinar, ESD and Efficient Electronic Design Finding and Fixing Problems at the IC Level, at the 2017 EMC Live series, April 25 through 27.

In this webinar we will discuss the impact of IC behavior on electronic design, specifically the characteristics of ESD and how they influence a device by influencing the ICs. To identify ESD problems, a special test setup must be used to recreate the disturbance at the IC level during the design process. This will save the engineer developing time and effort. Some ESD problems will be explained and supplemented by a practical example at both the electronic and IC level.

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