



RF Lumination

Seminar tour

The seminar tour kicks off in Madrid (Spain) during June 2023, and there will be two days of seminars with different topics each day.

DAY 1: June 27th

Demystifying the Vector Network Analyzer

Seminar Overview:

- | This seminar is focused on the practical use and understanding of vector network analyzers within the RF and Microwave industry.

- | The course is designed for engineers or graduates that are new to the field of network analysis or those already in the field that require a brush up to increase understanding and efficiency in their day to day work. As well as covering the fundamental aspects, the course will also introduce some of the capabilities within a modern network analyser platform. The day will be a blend of presentations and practical demonstrations:
 - Introduction to the network analyser and S-Parameters
 - Calibration basics and de-embedding
 - Basic considerations for making measurements on an amplifier
 - Making pulsed measurements with a vector network analyzer
 - Performing noise figure measurements with a network analyzer

Madrid
June 27th - 28th, 2023

Location:

Escuela de Teleco de la UPM
Av. Complutense nº 30, 28040
(Building B "García Redondo",
2 floor, room B-223)

- ▶ Agenda Day 2 - June 28th
- ▶ Intervenants

Fell free to register to any of the days or both:

- ▶ Inscrition Day 1 - June 27th
- ▶ Inscrition Day 2 - June 28th



RF Lumination

Seminar tour

AGENDA - Day 1 (June 27th)

Demystifying the Vector Network Analyzer

Time	Program
09:00 - 09:45	Welcome reception
09:45 - 10:00	Connector Care
10:00 - 10:45	Introduction to S-Parameters
10:45 - 11:15	Morning Coffee Break
11:15 - 12:00	Calibration basics and De-embedding
12:00 - 13:00	Basic consideration for making measurements on an amplifier
13:00 - 14:00	Lunch
14:00 - 14:45	Making pulsed measurements with a vector network analyzer
14:45 - 15:30	Performing noise figure measurements with a network analyzer

Madrid

June 27th - 28th, 2023

Location:

Escuela de Teleco de la UPM
 Av. Complutense nº 30, 28040
 (Building B "García Redondo",
 2 floor, room B-223)

- ▶ Agenda Day 2 - June 28th
- ▶ Intervenants

Fell free to register to any of the days or both:

- ▶ Inscryption Day 1 - June 27th
- ▶ Inscryption Day 2 - June 28th



RF Lumination

Seminar tour

DAY 2: June 28th

Demystifying non-linear PA behaviour

- ▮ Rohde & Schwarz is joined by our partners: Hitech, Maury and Altaix.

Seminar Overview:

- ▮ Transistors used for modern wireless applications are commonly used within advanced Amplifier designs. Highest efficiency is achieved in the non-linear region of these complex amplifier designs, but come along with higher harmonics which again decrease gain and thus power added efficiency (PAE).
- ▮ Harmonic load pull measurement optimizes not only on the target frequency f_0 but also at higher harmonics $2f_0$ and $3f_0$. Since non-linear behavior will be included within the extracted models, they help to optimize amplifier designs with more complete models in simulation stages of the design process.
- ▮ The same modeling approach could be used at the PA level. The amplifier's enhanced poly-harmonic distortion (EPHD) model could be used to simulate the response of the circuit when this one is loaded by an isolator followed by a band-pass filter for instance. Indeed, in such configuration, the influence of the harmonic terminations may impact the circuit performances. Such a model will then help the PA user to choose the best on-the-shelf elements represented by their equivalent S parameters files in a virtual system design flow. The combination of the performance Rohde & Schwarz 4-port VNA R&S ZNA, Maury Microwave automated tuner with IVCAD automated measurement and modelling software powered by AMCAD Engineering is a turn-key solution for doing fast (Hybrid-) active harmonic load-pull measurements.
- ▮ The ZNA has four internal sources which means no additional external sources are required to control amplitude and phase for the harmonic frequencies $2f_0$ and $3f_0$.

Madrid

June 27th - 28th, 2023

Location:

Escuela de Teleco de la UPM
Av. Complutense nº 30, 28040
(Building B "García Redondo",
2 floor, room B-223)

- ▶ Agenda Day 1 - June 27th
- ▶ Intervenants

Fell free to register to any of the days or both:

- ▶ Inscription Day 1 - June 27th
- ▶ Inscription Day 2 - June 28th



RF Lumination

Seminar tour

- With Maury's IVCAD software we demonstrate how to control the setup and perform harmonic load pull measurements. These results will be exported into equivalent models and used in Cadence Microwave Office simulation software for an accurate simulation on an amplifier design.

AGENDA - Day 2 (June 28th)

Demystifying non-linear PA behaviour

Time	Program
09:00 - 09:45	Welcome reception
09:45 - 10:45	Load-Pull measurements to improve efficiency of power amplifiers
10:45 - 11:00	Coffee break
11:00 - 12:00	Transistor / Amplifier characterization by doing load pull measurements to find best efficiency behavior
12:00 - 13:00	Understand linearity improvement possibilities on a physical amplifier
13:00 - 14:00	Lunch
14:00 - 15:00	From Modelling to Simulation
15:00 - 15:15	Break
15:15 - 16:15	Behavioural Modelling based on Amcad 3 tone Method plus verification on measurements

Madrid
June 27th - 28th, 2023

Location:

Escuela de Teleco de la UPM
Av. Complutense nº 30, 28040
(Building B "García Redondo",
2 floor, room B-223)

- ▶ Agenda Day 1 - June 27th
- ▶ Intervenants

Fell free to register to any of the days or both:

- ▶ Inscription Day 1 - June 27th
- ▶ Inscription Day 2 - June 28th



RF Lumination

Seminar tour

INTERVENANTS

Presentations

DAY 1: June 27th Demystifying the Vector Network Analyzer



Laura Gonzalo
Application Engineer
Rohde & Schwarz

Laura Gonzalo is Team Leader of Test & Measurement Application Engineers team for Spain and Portugal at Rohde & Schwarz. She joined the company in 2001, always working as an application engineer. She studied Telecommunications Engineering at the Polytechnic University of Madrid. After finishing the studies she worked at Vodafone España for 1 year, starting work later in R&S so far. Laura is specialist in RF and microwave applications and responsible for the development of R&S products in this area. She is very focused in customer demonstrations, trainings and technical support.

DAY 2: June 28th Demystifying non-linear PA behaviour



Markus Lörner
Manager RF Components
Rohde & Schwarz

Markus Lörner is a Market Segment Manager at Rohde & Schwarz focusing on the RF and Microwave Component market looking at the test requirements today and tomorrow. Markus has 20 years plus experience in the test & measurement industry. Before moving into the market segment role, Markus worked as a product manager for signal generators and power meters at Rohde & Schwarz where he was looking at different application areas including the mobile industry, positioning, satellite and EW applications. He received his Dipl.-Ing. degree from the University Erlangen-Nuremberg, Germany.



Dirk Faber
Business Development
RF&Microwave Solutions
Hitech

Since 2020 Dirk Faber is Business Development Manager for RF& μ -wave solutions at Hitech BV. Hitech BV is premier European partner for Maury Microwave and AMCAD engineering and looking for Loadpull- and Pulsed IV test requirements for RF-Amplifiers. He has 24 year experience in electronic test- & measurement covering roles as support engineer and technical sales working for different companies like HP/Agilent and Acal BFi. During his career, Dirk's always touching RF& μ -wave solutions but also deeply involved supporting solutions for telecommunications, Electronic- and temperature calibration and Thermal imaging. Now for three years and technically partnering with Rohde & Schwarz across Europe he's successful developing challenging (on-wafer) device characterization test solutions.

Madrid
June 27th - 28th, 2023

Location:
Escuela de Teleco de la UPM
Av. Complutense nº 30, 28040
(Building B "García Redondo",
2 floor, room B-223)

- ▶ Agenda Day 1 - June 27th
- ▶ Agenda Day 2 - June 28th

Fell free to register to any of the days or both:

- ▶ Inscription Day 1 - June 27th
- ▶ Inscription Day 2 - June 28th