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# emv<sub>24</sub>

## FACHTAGUNG



21<sup>st</sup> EMC Symposium 2024  
18 – 20 September 2024

## Program



# 21<sup>ST</sup> EMC SYMPOSIUM 2024

The EMC Symposium has become an annual fixture for the exchange of experience and ideas within the EMC community and serves to impart practical EMC knowledge and information about innovations and new developments within the industry.

Austria's most important EMC event will take place for the 21st time in fall 2024. The event will last 3 days and will include an EMC Fundamentals Training, Hands-On EMC Training and specialist presentations as well as an exhibition area for companies in the EMC industry.

## Event venue and date

Technische Universität Graz, Inffeldgasse 25D, 8010 Graz

EMC Symposium: Inffeldgasse 25D, Hörsaal i7

Exhibitors' area: Foyer Inffeldgasse 25D, EG und 1.OG

Evening event: Gösser Bräu, Neutorgasse 48, 8010 Graz

<b>Wednesday, 18 Sept. 2024</b>	<b>EMC Fundamentals Training</b>	<b>9:00 am – 1:00 pm</b>
<b>Wednesday, 18 Sept. 2024</b>	<b>Hands-On EMC-Training</b>	<b>1:00 pm – 5:30 pm</b>
<b>Thursday, 19 Sept. 2024</b>	<b>EMC Symposium</b>	<b>8:30 am – 4:45 pm</b>
<b>Thursday, 19 Sept. 2024</b>	<b>Evening Event</b>	<b>6:30 pm – open end</b>
<b>Friday, 20 Sept. 2024</b>	<b>EMC Symposium</b>	<b>9:00 am – 5:00 pm</b>

## Organizer

Institute of Electronics at Graz University of Technology as the responsible organizer together with the OVE Academy, the Austria Chapter of the IEEE EMC Society and Seibersdorf Labor GmbH.




## Conference fees

Participation in the symposium includes documents, symposium bag, lunch, coffee breaks, drinks and participation at the evening event on 19 September 2024.

<b>EMC Symposium 2024 19 – 20 September 2024</b>	<b>Early Bird Prices Registration until 15 July 2024</b>	<b>Regular Prices Registration from 16 July 2024</b>
Regular	340,- EUR	485,- EUR
OVE/IEEE Member	295,- EUR	425,- EUR
IEEE EMC Chapter and Student fee	160,- EUR	210,- EUR
<b>EMC Fundamentals Training and Hands-On EMC-Training 18 September 2024</b>	<b>Early Bird Prices Registration until 15 July 2024</b>	<b>Regular Prices Registration from 16 July 2024</b>
EMC Fundamentals Training	220,- EUR	250,- EUR
EMC Fundamentals Training Students	110,- EUR	130,- EUR
Hands-On EMC-Training	320,- EUR	350,- EUR
Hands-On EMC-Training Students	150,- EUR	180,- EUR

# PROGRAM 18 SEPTEMBER 2024

## EMC FUNDAMENTALS TRAINING (WILL BE HELD IN ENGLISH)




09:00 – 09:15	OPENING	
09:15– 10:00	<b>Introduction to EMC - Requirements and Compliance Testing</b> (Dr. Kurt Lamedschwandner, Head of EMC Test Laboratory, Seibersdorf Labor GmbH)	
10:00 – 10:45	<b>EMC aware PCB Design – Design Rules and Guidelines</b> (Univ.-Prof. Dipl.-Ing. Dr.techn. Bernd Deutschmann, Graz University of Technology)	
10:45 – 11:00	COFFEE BREAK	
11:00 – 11:45	<b>EMC/ESD aware IC Design with respect to PCB design (a.Univ.-Prof. Dipl.-Ing. Dr. Timm Ostermann, JKU University of Linz)</b>	
11:45 – 13:00	LUNCH (only when booking the Hands-On EMC-Training)	

## HANDS-ON EMC-TRAINING (WILL BE HELD IN ENGLISH)

The electromagnetic compatibility (EMC) of electronic systems has become increasingly important in recent years. From the formulation of the product idea to series production, the integration of EMC measures in the development of electronic systems is indispensable today. Developers not only have the task of developing their products in accordance with economic and functional aspects, but also with the applicable EMC regulations and standards. This means that the product must not generate too much electromagnetic interference and must not be susceptible to interference. It often takes a long time for an electronic system to successfully pass all EMC tests. With the help of the necessary basic knowledge in the field of EMC and some important design guidelines, electromagnetic compatibility can often be ensured very quickly.

The aim of this hands-on training course is to provide important basic knowledge of EMC measurement technology. In small groups, the participants perform various exercises on the characterization of the electromagnetic emission, coupling mechanisms, effects of the choice of decoupling capacitors, and many more. Participants learn about important EMC measuring devices such as EMI receiver, Spectrum analyzer, Vector network analyzer and how to use these devices.

The Hands-On EMC-Training is presented to you as a collaboration between Rohde & Schwarz and IFE/TU Graz.

	  
13:00 – 13:15	INTRODUCTION
13:15– 14:15	<p><b>Workshop I: Coupling Mechanisms (Johannes Illenberger)</b></p> <p>Explore galvanic, inductive, capacitive, and radiated coupling on a single PCB. Learn about simple mitigation techniques, multi-layer PCBs, EMI-hardened opamps, and compare your results to calculations and simulations.</p>
14:15 – 15:15	<p><b>Workshop II: Characterizing Passive Components (Ko Odreitz)</b></p> <p>Learn how to use a vector network analyzer (VNA) to characterize the impedance of capacitors. Compare your results to the impedance curve in the data sheet. Explore the pros and cons of 1-port and 2-port measurements in series-through and shunt-through configurations. Perform voltage-dependent measurements using bias tees.</p>
15:15 – 15:30	COFFEE BREAK
15:30 – 16:30	<p><b>Workshop III: Decoupling Capacitors and 150-Ohm Method (Bernd Deutschmann)</b></p> <p>Choose between different decoupling capacitors and immediately see the effect on conducted electromagnetic emissions of integrated circuits. Examine how the capacitor's impedance curve affects the emissions measured in a 150-Ohm IC-level test setup. Learn the settings of EMI receivers and how they differ from spectrum analyzers.</p>
16:30 – 17:30	<p><b>Workshop IV: Conducted Emissions (Jan Henninger)</b></p> <p>Examine a CISPR25 standardized test setup to measure the conducted electromagnetic emissions of a GaN half-bridge circuit. Separate differential and common mode noise mathematically, and learn how the measurement setup affects the latter. Experiment with various filter structures and figure out how interferences can be mitigated. Furthermore, measure the influence of differential mode filters on the common mode interference and vice versa. Ultimately, build the most effective filter for a certain load.</p>

# PROGRAM 19 SEPTEMBER 2024

## EMC SYMPOSIUM

08:30 – 09:00	REGISTRATION, OPENING	
09:00 – 09:30	<i>Well Stirred is Half Measured – EMC Tests in Reverberation Chambers</i> <u>Mathias Magdowski, IEEE EMC Society</u>	
09:30 – 10:00	<i>EMI testing – From stepped scan to wideband FFT</i> <u>Tobias Groß, Rhode &amp; Schwarz</u>	
10:00 – 11:00	COFFEE BREAK, EXHIBITION	
11:00 – 11:30	<i>Speed-Up your Reverberation Chamber Measurements</i> <u>Eike Suthau, LUMILOOP GmbH</u>	
11:30– 12:00	<i>ESD lessons learned</i> <u>Johannes Illenberger, TU Graz</u> <u>Helmut Senn, Senn System Design GmbH</u> <u>David Pommerenke, TU Graz</u>	
12:00 – 13:30	LUNCH	
13:30 – 14:00	<i>E-Fahrzeug Komponenten testing gemäß ISO 21498-2, LV 123 &amp; RELATED, ISO TS 7637-4 verständlich</i> <u>Rüdiger Späth, AMETEK CTS Europe GmbH</u>	
14:00 – 14:30	<i>Untersuchung zu verschiedenen Aufbauten für E-Achsen und zum Einfluss der Peripherie auf Störsendungsergebnisse mittels LongWire Methode</i> Martin Heinisch, BMW Motoren GmbH Daniel Feyerlein, Frankonia Germany EMC Solutions GmbH <u>Alexander Babi, EMV BABI</u>	
14:30 – 14:45	<i>Poster Pitch</i>	
14:45 – 15:45	POSTER SESSION, COFFEE BREAK, EXHIBITION	
15:45 – 16:15	<i>Einführung in die CS115 und CS116 Testmethoden gemäß MIL-STD-461</i> <u>Imad Qaddi, EMC PARTNER AG</u>	
16:15 – 16:45	<i>Aktuelle Entwicklungen bei Vor-Ort Messungen</i> <u>Johann Wilhelm, Dipl.-Ing. Johann Maximilian Wilhelm</u>	
18:30	<b>Get Together Open End, Gösser Bräu</b>	

# PROGRAM 20 SEPTEMBER 2024

## EMC SYMPOSIUM

09:00 – 09:30	<i>EMV-Tests von wasserstoffbetriebenen Systemen</i> <u>Michael Unterreiner, AVL</u>	
09:30 – 10:00	<i>Equivalent circuit modelling of automotive powertrains for EMI prediction of conducted emissions</i> <u>Jose Romero Lopera, Silicon Austria Labs</u> Jan Hansen, TU Graz, Silicon Austria Labs Patrick Gsöls, Silicon Austria Labs Bernhard Auinger, Silicon Austria Labs Herbert Hackl, Silicon Austria Labs	 
10:00 – 10:30	<i>Catenary-free railway operation and its significance for the design of EMF-reduced settlements</i> <u>Maria Baumgartner, Ingenieurbüro für Landschaftsplanung &amp; Landschaftsarchitektur, Austria; TU Graz, Institute of Urbanism; FH Joanneum Graz. Institute of Architecture and Civil engineering; BOKU, Institute of Landscape Planning</u>	 
10:30 – 11:30	COFFEE BREAK, EXHIBITION	
11:30 – 12:00	<i>Die GB-Ethernet Schnittstelle mit PoE unter EMV-Gesichtspunkten</i> <u>Heinz Zenkner, Würth Elektronik eiSos GmbH &amp; Co. KG</u>	
12:00 – 12:30	<i>Einfluss von Stromzangen bei der Störstrommessung</i> <u>Alexander Kriz, Thomas Nakovits, Seibersdorf Labor GmbH</u>	
12:30 – 13:30	LUNCH	
13:30 – 14:00	<i>Measurement setup and simulation model – what to consider when creating a simulation model to identify EMC problems</i> <u>Rene Fuger, CADFEM GmbH</u> Steffen Seewald, CADFEM Germany GmbH Frank Weiland, CADFEM Germany GmbH	
14:00 – 14:30	<i>Circuit-Level conducted EMC Modelling – Challenges and Mitigation</i> <u>Christoph Maier, Andree Scambor, TU Graz</u>	
14:30 – 15:30	COFFEE BREAK, EXHIBITION	
15:30 – 16:00	<i>Optimierung und Auslegung von Netzfiltern</i> <u>Bernd Deutschmann, Johannes Illenberger, Gunter Winkler, Nikolaus Juch, TU Graz</u>	
16:00 – 16:30	<i>Electrical Noise Area Measuring System (ENAMS)-Global monitoring of the radio HF spectrum</i> Klaus Eichel, Andreas Lock, DARC <u>Wolfgang Mahr, International Amateur Radio Union (IARU)</u>	
16:30 – 17:00	Best Poster Award	
17:00	Closing	

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# TRAVEL

## By train:

Please inform yourself on [www.busbahnbim.at](http://www.busbahnbim.at) and on [www.oebb.at](http://www.oebb.at) about the possibilities to travel to the event in an **environmentally friendly way!**

Tram lines will leave the train station every few minutes heading towards the city center.

The easiest way getting from the main station to the conference venue is by taking the tram line 6 direction St. Peter. Get off at the stop 'Schulzentrum St. Peter'. Walk along Inffeldgasse.

You will find Inffeldgasse 25D on the left-hand side.

## By bus:

Another option is the Flixbus: <https://www.flixbus.at>

## By plane:

The airport of Graz ('Graz Thalerhof') can be reached by direct flights from several destinations.

The airport shuttle service runs by Gazer Verkehrsbetriebe from the airport directly to your hotel. More information [www.flughafen-graz.at](http://www.flughafen-graz.at) ('Taxi & Shuttle').

You also have the possibility to take the train (SBahn) from 'Flughafen Graz-Feldkirchen' to the 'Hauptbahnhof'.

