



**EMC-Seminar 2023
Budapest**

EMC COMPETENCE

AUTOMOTIVE LV (12/24/48V systems)

- EMC requirement according to ECE Regulation No.10
- Classical test methods of transient interference and ESD
- "LV124" (12 V, 24 V mains) and "LV148" (48 V mains)
- Sinusoidal RF-interferences like magnetic fields, BCI
- Emission of transient disturbances and CISPR 25

2-Day Seminar

28. February - 01. March, Budapest

Hotel Holiday Inn Budapest-Budaörs



From the topics: Overview

Test method of immunity of transient disturbances - LV range

Range: ISO 7637-2, ISO 7637-3, ISO 10605

- / The disturbing phenomena, their cause and their effects
- / Changes due to current version and outlook on future versions
- / The test equipment: Interference generator and its verification
- / The test setup and the test procedure
- / Practical tips and hints for avoiding sources of error during testing

Test method of immunity to voltage anomalies in on-board electrical systems - LV range

Standard range: ISO 16750-2, LV124, LV148

- / The disturbing phenomena, their cause and their effects
- / The test equipment: controlled voltage source - 4-quadrant amplifier, variable internal resistances, power fail generator
- / The test methods for the on-board power supply phenomena such as voltage dips & drops, overvoltage, superimposed alternating voltage,
Voltage variations, reset behavior, pin interruption, reverse polarity, etc.
- / Practical tips and hints for avoiding sources of error during testing

Test methods of immunity to conducted and radiated AF and RF disturbances

Range: ISO 11452-4, ISO 11452-8, ISO 11452-10

- / The phenomenon and the generation of disturbances
- / The test methods, the test setup, verification of disturbances, closed-loop and substitution methods
- / Practical tips and hints for avoiding sources of error during testing

Emission test methods for components in vehicles

Range: CISPR 25

- / Requirements for measurement technology, test setups and test execution
- / Relevant parameters of the receiver setting such as detector, bandwidths, step size, measurement time
- / The measurement methods for detecting interference voltage, interference current and field strength

Seminar Agenda:

- Overview EMC in the field of automotive and ECE R10 Rev. 06

LV - Testing Transient & ESD

- ISO 7637-2:2011
- Voltage transient Emission ISO 7637-2:2011
- Immunity ISO 7637-2:2011 Electrical transient along supply lines
- Verification ISO 7637-2:2011
- Immunity ISO 7637-3:2016 Electrical transient along signal lines
- Immunity ISO 10605:2008+AMD1:2014 Electrostatic discharge

Battery- / Voltage- Abnormalities

- Immunity ISO 16750-2 Battery voltage variations
- Immunity LV124 / LV148 Electrical requirements and testings

RF- Testing

- Immunity ISO 11452-4 Bulk Current Injection
- Immunity ISO 11452-8 Radiated magnetic fields in the LF range 15 Hz - 150 kHz
- Immunity ISO 11452-10 Conducted disturbances fields in the LF range 15 Hz - 250 kHz

Emission- Testing

- EN55025, Emission test method for vehicle components
- ECE R10 and CISPR12 Emission requirements for components

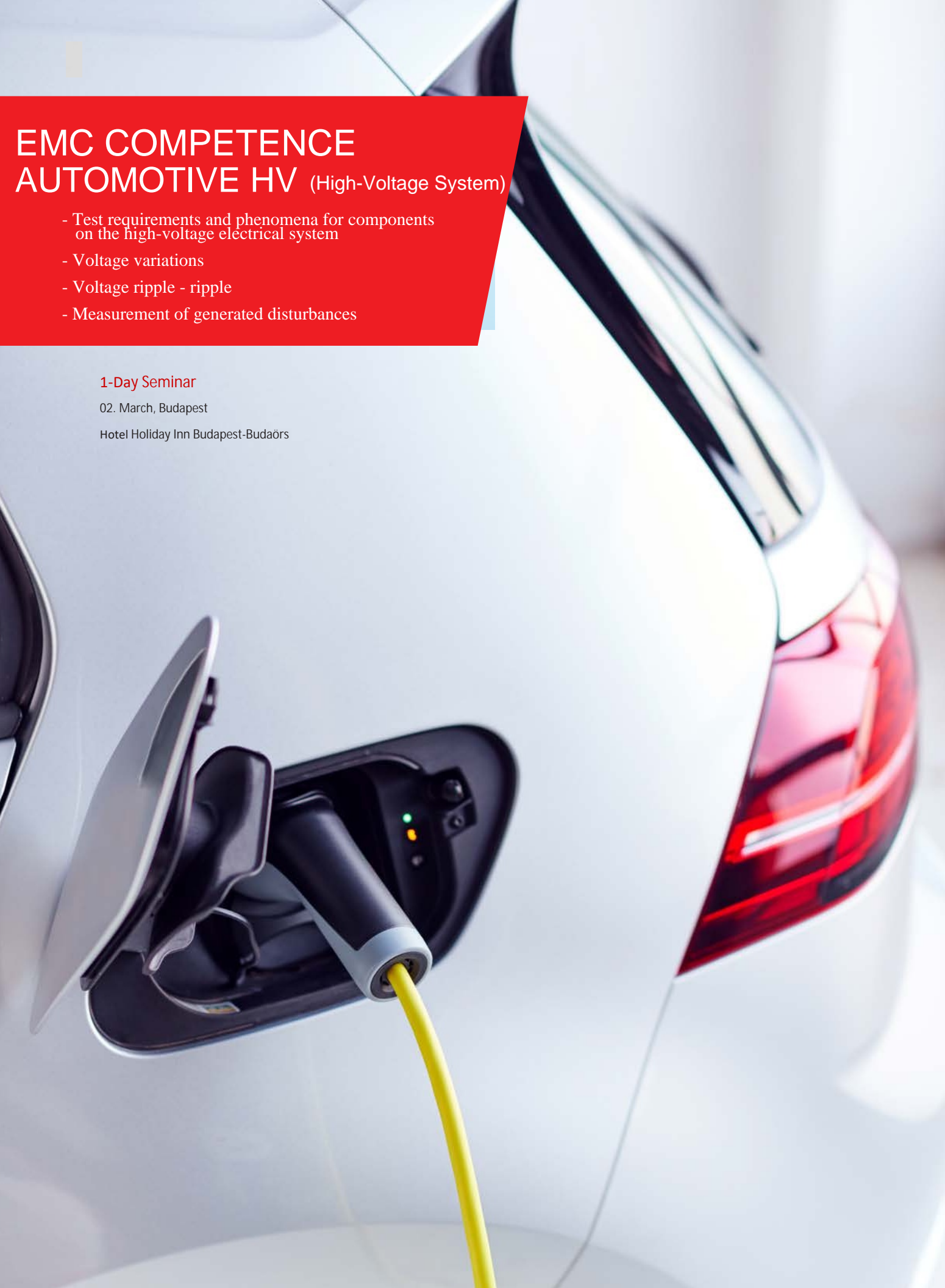
EMC COMPETENCE AUTOMOTIVE HV (High-Voltage System)

- Test requirements and phenomena for components on the high-voltage electrical system
- Voltage variations
- Voltage ripple - ripple
- Measurement of generated disturbances

1-Day Seminar

02. March, Budapest

Hotel Holiday Inn Budapest-Budaörs



From the topics: Overview

Introduction to HV Component Tests

Stress Variations - Stress Profiles

- / Test methods and requirements according to ISO 21498-2, LV123, VW 80300
- / Voltage ranges
- / Requirements for the source and measurement technology
- / present transients like voltage slope, overvoltage, load dump
- / HV offset tests

Voltage ripple - ripple

- / Ripple phenomenon, applied voltage ripple
- / Test methods, test setup and requirements according to ISO 21498-2, LV123, VW 80300, MBN 11123, ISO/TS 7637-4
- / Relevant factors such as: DUT impedance, technical realization, control factors, Requirements for frequency range and amplitude
- / Coupling methods
- / Ripple generator (application, functionality, selection)
- / Testing of typical HV components (battery, inverter, auxiliary units)

Measurement of generated disturbances

- / Phenomenon of generated voltage ripple and stress dynamics
- / Test methods, test setup and requirements according to ISO 21498-2, LV123, VW 80300, ISO/TS 7637-4
- / Load Dump Emission according to ISO 21498-2
- / HV network replicas

Other HV pulses and phenomena

- / ISO 7637-4: Pulse A - pulsed sinusoidal disturbances 1 MHz - 10 MHz
- / Load dump according to ISO 21498-2 and similar
- / Load Dump #2 according to VW 80300
- / EHV-16 HV pulse according to VW 80300

Seminar Agenda:

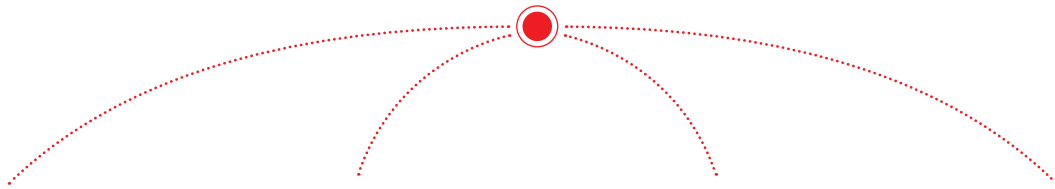
- Overview EV /HV Testing acc. to ISO 21489-2, ISO/TS 7637-4 and LV123
- Immunity „present“ Voltage variations and Voltage profiles
- Immunity „present“ Voltage Ripple
- Emission „generated“ Ripple, voltage dynamics, load dump
- Immunity pulsed sinusoidal disturbances ISO/TS 7637-4

For more details and registration, please contact:



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Conducted immunity testing

Transients
Power anomalies

Magnetic fields

Conducted low frequencies

ESD testing

Harmonics & Flicker
measurements

Electrical and electronic
component testing

Conducted immunity testing

ESD testing

Radiated immunity testing

Radiated emission testing

Conducted emission testing

Amplifier for EMC applications
up to 18 GHz

GTEM cells

Reverberation chambers

RF system solutions

**Solid state high power
amplifier up to 6 GHz for:**

EMC testing
Communications testing
Medical diagnostics testing
Defense components

**CW, Pulse & Gridded TWT
amplifier**

**CW, Pulse & Blanking Solid State
amplifier**

From 4 kHz to 40 GHz

For Military, Avionics and
EMC applications

EW and outdoor ruggedized
amplifier

HIRF amplifier systems

Customized solutions