

2- day Seminar:

EMC COMPETENCE “IEC/EN”

Immunity, Harmonics & Flicker

From the topics, Overview:

EMC Directive and standardization

EMC immunity test method in the field of CE marking

Standard range: IEC/EN 61000-4-2/-3/-4/-5/-6/-8/-9/-11/-34/-13/-16

- / Current status of standards, requirements for disturbances and test methods
- / The phenomena, their cause and effects
- / Changes due to current version and outlook on future versions
- / The test equipment: Test generator, coupling networks, coupling clamps, decoupling networks
- / The test method, the test setup and the test procedure
- / Selection of the disturbance and the correct coupling method
- / Practical tips and notes to avoid mistakes during testing

Test procedure for harmonics & Flicker

Standard range: IEC/EN 61000-3-2/-3/ (~~-11/-12 only short overview~~)

- / The phenomenon
- / The test equipment: controlled source, analyzer, flicker impedance Z_{ref} and Z_{test}
- / Product classification, limit classes and resulting requirements
- / The test method for measurement

Seminar Agenda:

- EMC Directive, requirements and standardization, overview generic standard
- Immunity EN/IEC 61000-4-2: electrostatic discharge
- Immunity EN/IEC 61000-4-4: fast transients (Burst)
- Immunity EN/IEC 61000-4-5: high energy surge current
- Immunity EN/IEC 61000-4-6 conducted, RF sinusoidal disturbances
- Immunity EN/IEC 61000-4-3: Radiated, radio-frequency, electromagnetic field
- Immunity EN/IEC 61000-4-16: Conducted, LF common mode disturbances (0 Hz – 150 kHz)
- Immunity EN/IEC 61000-4-11/-34: voltage dips, short interruptions and voltage variations
- Immunity EN/IEC 61000-4-8: power frequency magnetic fields
- Immunity EN/IEC 61000-4-9: Pulse magnetic field
- EN/IEC 61000-3-2: Limits for harmonic current emissions
- EN/IEC 61000-3-3: Limitation of voltage changes, voltage fluctuations and flicker

Additional topics which can be added:

(each of them takes approx.. 0,5h, and have to reduce by the topics before)

- Immunity EN 61000-4-13 Generation of Harmonics & Interharmonics
- Immunity EN 61000-4-39: Radiated fields in close proximity

1- day Seminar:

SEMINAR EMC COMPETENCE Emission CISPR/EN

Test procedure for emission in the area of CE marking

Standard range: CISPR 16-1, CISPR 16-2, EN 55011, EN 55014-1, EN 55015, EN 55032

- / Current status of standards, changed requirements for limit values and test methods
- / Principle structure and functionality of the measuring equipment: measuring receiver, coupler, test environment
- / Differences by the product standards
- / The basic measurement methods conducted and radiated
- / Test setups with and without auxiliary equipment, table-top devices, floor-standing devices
- / Practical tips and notes to avoid mistakes during testing

From the topics, Overview:

Introduction to Emission Measurements

- / Overview of standardization and requirements
- / Operating environment, requirements to class A and class B devices
- / Basics in emission testing and measuring equipment
- / Evaluators: peak value (PK), quasi-peak value (QP), mean value (AV)
- / Configuration and adjustment of the measuring center

Conducted measurements on supply lines (9 kHz – 30 MHz)

- / Interference voltage measurement using an artificial network and probe

Conducted measurements on Telecommunications/ network port (150 kHz – 30 MHz)

- / Interference voltage measurement using ISN / AAN
- / Interference current measurement using a current clamp

Asymmetrical interference voltage measurement according to CISPR 15/EN 55015 (30MHz – 300 MHz)

- / CDNE procedure

Radiated measurement of electric field strength with ground plane (30 MHz – 1 GHz)

- / Measurement in the open area test site (OATS)
- / Measurement in the semi anechoic chamber (SAC)

Radiated measurement of electric field strength without a ground plane (30 MHz – 6 GHz)

- / Measurement in the fully anechoic room (FAR)

Interference power measurement according to CISPR 14-1/EN55014-1 (30 MHz - 300 MHz)

- / Measurement with the MDS absorbing clamp

Seminar Agenda:

- Short overview EMC Directive and standardization
- Emission - general information
- Emission - Measuring of interference voltage
- Emission - Measuring of interference on telecommunication and wired network lines
- Emission - Measuring of asymmetrical interference voltage 30MHz – 300MHz (EN IEC 55015)
- Emission - Measuring of radiated fields
- Emission - Measuring of interference power