Hirschmann
Car Communication
A Member of USI

EMC SERVICE CENTER

Neckartenzlingen

ELECTROMAGNETIC COMPATIBILITY – AN EXTREMELY IMPORTANT ISSUE!

The amount and complexity of electronic devices and components are increasing significantly. Concurrently, the well-known problems involved are also of significant importance: Electronic devices and components are interacting via electromagnetic radiation. Within a wide range of frequencies the radiation is absorbed and emitted via electric leads as well as via electromagnetic fields. However, the disturbance-free operation of electronic devices in close proximity to each other depends entirely upon their electromagnetic compatibility (EMC).

EMC means:

- Every electronic device emits a minimum of radiation to assure that other nearby devices remain operational without disturbance.
- Every electronic device will not be influenced by the radiation disturbance of any other device and will therefore display a sufficient immunity to disturbance

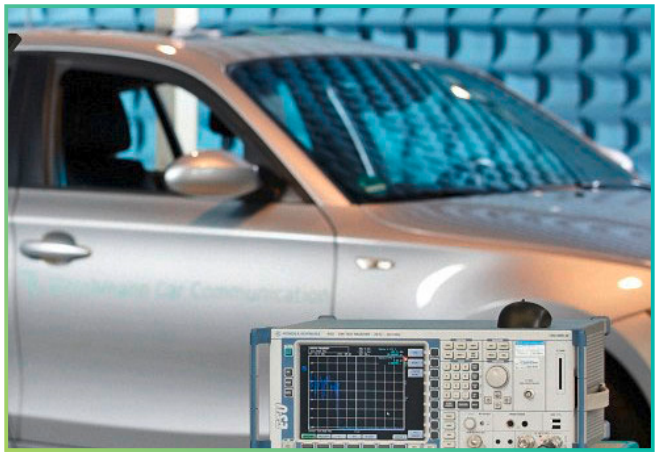
In automotive applications, ignoring the demands for EMC may result in a disturbance of the radio reception or electronically controlled fuel injection system. Even more severe consequences may occur if the airbag is activated by electromagnetic radiation.

In Europe, the electromagnetic compatibility is legally defined by the EMC Directive 89/336/EWG – up-to-date 2014/30/EU –, introduced by the European Community on January 1, 1996. Compliance with this directive is of utmost importance and provides a fundamental benefit for the customer who expects reliability, i.e. the simultaneous, disturbance-free operation of his equipment.

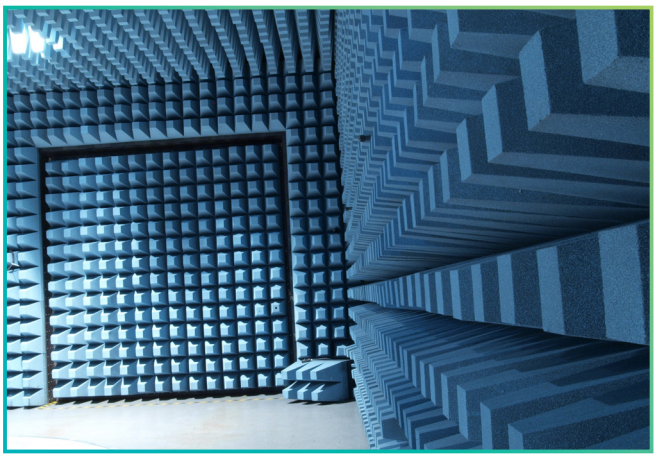
Furthermore: only those electronic devices which are in compliance with or exceed the EMC regulations can be marketed in Europe.

Products and equipment which are in accordance with the EMC Directive must be testified by a „CE declaration of conformity“ which is provided by the manufacturer. The product must be properly labeled with the standardized CE label and accompanied by a corresponding entry in the end user's manual.

Examples for the Hirschmann Car Communication Test and Measurement Equipment:



Radio interference suppression of a vehicle in the EMC Service Center



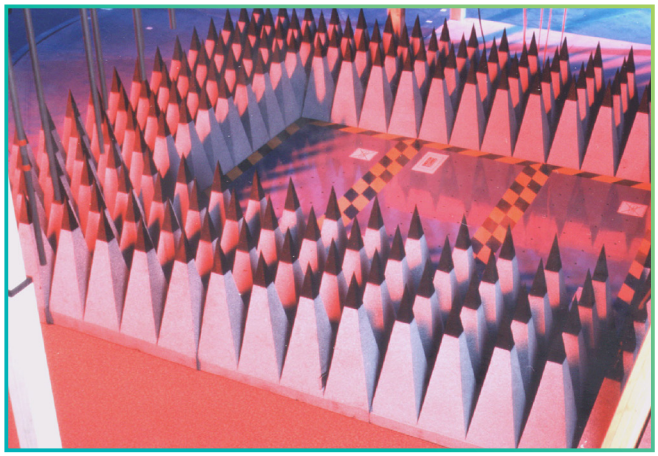
EMC TEST – THE PRINCIPLE

In our Service Center in Neckartenzlingen, all types of electronic devices, e.g. an industrial production unit, vehicles, or even an electric shaver, can be tested with respect to their electromagnetic compatibility according to the EMC Directive. Measurement is performed by advanced computer-controlled equipment which allows very short measuring times.

Our service team will perform any kind of measurements during the entire development phase of your electronic product as well as standardized measurements to obtain the CE certification. We will also perform spot checks on your production line to assure constant quality during the lifetime of your product. In our most sophisticated EMC Service Center we can measure disturbances emerging from leads or radiators as well as the immunity of both against electromagnetic disturbances.

The EMC Service Center offers the most professional measurements to all manufacturers of electric devices or production units. We will also provide assistance in finding your way through the legal demands required to obtain the CE certificate and – upon request – provide you with valuable advice for product modifications to obtain full electromagnetic compatibility.

Let us help you on your way through standards and specifications. No matter what kind of electric product you have – talk to our service team about EMC tests! Our assistance can help you to satisfy your customers in the future. Examine our multifunctional test equipment – we look forward to solving your EMC problem.



Semi-anechoic chamber:
Radiated immunity test

Test assembly:
Surge and burst immunity test

TECHNICAL EQUIPMENT

Semi-Anechoic Chamber

- Frequency range:
  10 kHz - 20 GHz
- Size (LxWxH):
  14 m x 11 m x 4.4 m (45.93 f x 36.09 f x 14.44 f)
- Pneumatic sliding door (WxH):
  3 m x 3 m (9.84 f x 9.84 f)
- Hybrid RF-absorber (ferrite base and matching layer and pyramidally shaped resistive top part)
- Groundplane (can be covered partiall with groundplane absorbers)
- Turntable: diameter 4 m (13.12 f)
  load-carrying capacity 3000 kg (6613.87 lbs).
- Lead-through filters for signal- and control-lines
- Lead-through for coaxial cables and fibre optic cables
- Filtered power supply 230 V, 16 A and 400 V (three-phases), 16 A
- Monitoring of the equipment under test via an EMC hardened video and audio system
- Exhauster
- Fire- and air-observation
- Air condition

Shielded Cabin

- Size (LxWxH):
  3 m x 2 m x 2.2 m (9.84 f x 6.56 f x 7.22 f)
- Door (WxH):
  0.95 m x 2 m (3.12 f x 6.56 f)
- Lead-through for coaxial cables and fibre optic cables
- Filtered power supply 230 V, 16 A

TEST EQUIPMENT

Equipment for Emission Tests

- EMI receivers (also time domain), R&S, up to 44 GHz
- Test system to measure harmonic current emissions and voltage fluctuations or flicker
- Digital oscilloscope
- Special software to control the automatic measurement of disturbance field strength and disturbance voltage or current including automatic documentation
- Calibrated reference antennas, line impedance stabilisation networks, transducers, accessories

Equipment for Immunity Tests

- Signal generators up to 40 GHz
- Power amplifiers from 9 kHz to 6 GHz, up to max. 500 W
- Field monitoring system, E and H field
- Directional couplers, power meters
- Antennas
- Special software to control the immunity test including automatic documentation
- Burst generator, capacitive coupling clamp
- Surge/hybrid generator, coupling decoupling networks
- Stripline 90 Ω according to ISO 11452-5
- Road vehicle testpulse generators
- ESD generator
- Mains interference simulator

EMC TESTING CAPABILITIES: IMMUNITY TESTS

TESTS	PARAMETERS	STANDARDS
Electrostatic discharge immunity test (ESD)	Contact discharge: up to 30 kV Air discharge: up to 30 kV RC-combination: • 330 Ω / 150 pF • 2 kΩ / 150 pF • 2 kΩ / 330 pF • 330 Ω / 330 pF • 1.5 kΩ / 100 pF	IEC 61000-4-2 EN 61000-4-2 ISO 10605
Radiated, radio-frequency electromagnetic field immunity test	80 MHz - 6 GHz • up to 10 V/m (3 m distance) • up to 20 V/m (1.5 m distance)	IEC 61000-4-3 EN 61000-4-3 Antenna
	80 MHz - 6 GHz depending on the frequency range up to 200 V/m	ISO 11452-2 Antenna
	10 kHz - 400 MHz (1 GHz) 400 V/m	ISO 11452-5 Stripline 90 Ω
Electrical fast transient / burst immunity test	up to 4.4 kV 5 kHz or 100 kHz on DC/AC supply lines on signal lines	IEC 61000-4-4 EN 61000-4-4
Surge immunity test	up to 7 kV / up to 3.5 kA 1.2/50 µs (open-circuit voltage) 8/20 µs (short-circuit current) on DC/AC supply lines on signal lines	IEC 61000-4-5 EN 61000-4-5
Immunity to conducted disturbances, induced by radio frequency fields	150 kHz – 80 / 230 MHz up to 10 V (20 V) EMK on DC/AC supply lines on signal lines	IEC 61000-4-6 EN 61000-4-6
	100 kHz – 400 MHz depending on the method (substitution or closed-loop) up to 350 mA	ISO 11452-4 BCI
Pulse magnetic field immunity test	up to 1000 A/m 6.4/16 µs max. dimensions of test sample: 0.6 m x 0.6 m x 0.5 m (L x W x H)	IEC 61000-4-9 EN 61000-4-9
Voltage dips, short interruptions and voltage variations immunity tests	U_{Dips}: (0 - 100) % of $U_{nominal}$ $U_{Variations}$: (0 - 115) % of $U_{nominal}$ $U_{nominal}$: max. 300 V Phase: (0 – 360) °	IEC 61000-4-11 EN 61000-4-11
Electrical transient conduction along supply lines and electrical transient transmission by capacitive and inductive coupling via lines other than the supply lines in vehicle on-board electrical systems, ...	Test pulses 1 to 5, Jump start, Load Dump, Electrical Requirements, ...	ISO 7637-2 ISO 7637-3 ISO 16750-2 LV 124-1

Customer specific tests on request

EMC TESTING CAPABILITIES: EMISSION TESTS

TESTS	PARAMETERS	STANDARDS
Conducted emission	150 kHz – 30 MHz Artificial mains network (AMN) • and current probe • and impedance stabilisation network (ISN)	CISPR 11 / 32 EN 55011 / 55032 EN 61000-6-3 and -6-4 ...
	Artificial mains network (AMN) 150 kHz – 120 MHz	CISPR 25 EN 55025
	Current probe 150 kHz – 250 MHz	
	Measurement vehicle (antenna) 100 kHz – 6 GHz	
Radiated emission **(Electric and magnetic field)**	150 kHz - 6 GHz Antenna Measurement distance 3 m	CISPR 11 / 32 EN 55011 / 55032 EN 61000-6-3 and -6-4 ...
	Antenna 150 kHz – 6 GHz	CISPR 25 EN 55025
	Stripline 90 Ω 150 kHz – 1 GHz	
Screening attenuation **Transfer impedance** **Coupling attenuation**	Triaxial method 300 kHz – 3 GHz radio-frequency cables and connectors 300 kHz – 1.2 GHz screened balances pairs 100 Ω	EN 50289-1-6
Harmonic current emissions	50 Hz – 2 kHz (Harmonics of 50 Hz) 230 Vac equipment	IEC 61000-3-2 EN 61000-3-2
Voltage fluctuations and flicker in low-voltage supply systems	Determination of P_{st}, P_{lt}, T_{max}, d_c, d_{max} 230 Vac equipment	IEC 61000-3-3 EN 61000-3-3

Customer specific tests on request

Hirschmann Car Communication GmbH | *A Member of* ***USI*** | Stuttgarter Straße 45 – 51 | 72654 Neckartenzlingen | Germany
Phone +49 7127 14-0 | Fax +49 7127 14-1060 | info@hirschmann-car.com | **www.hirschmann-car.com**