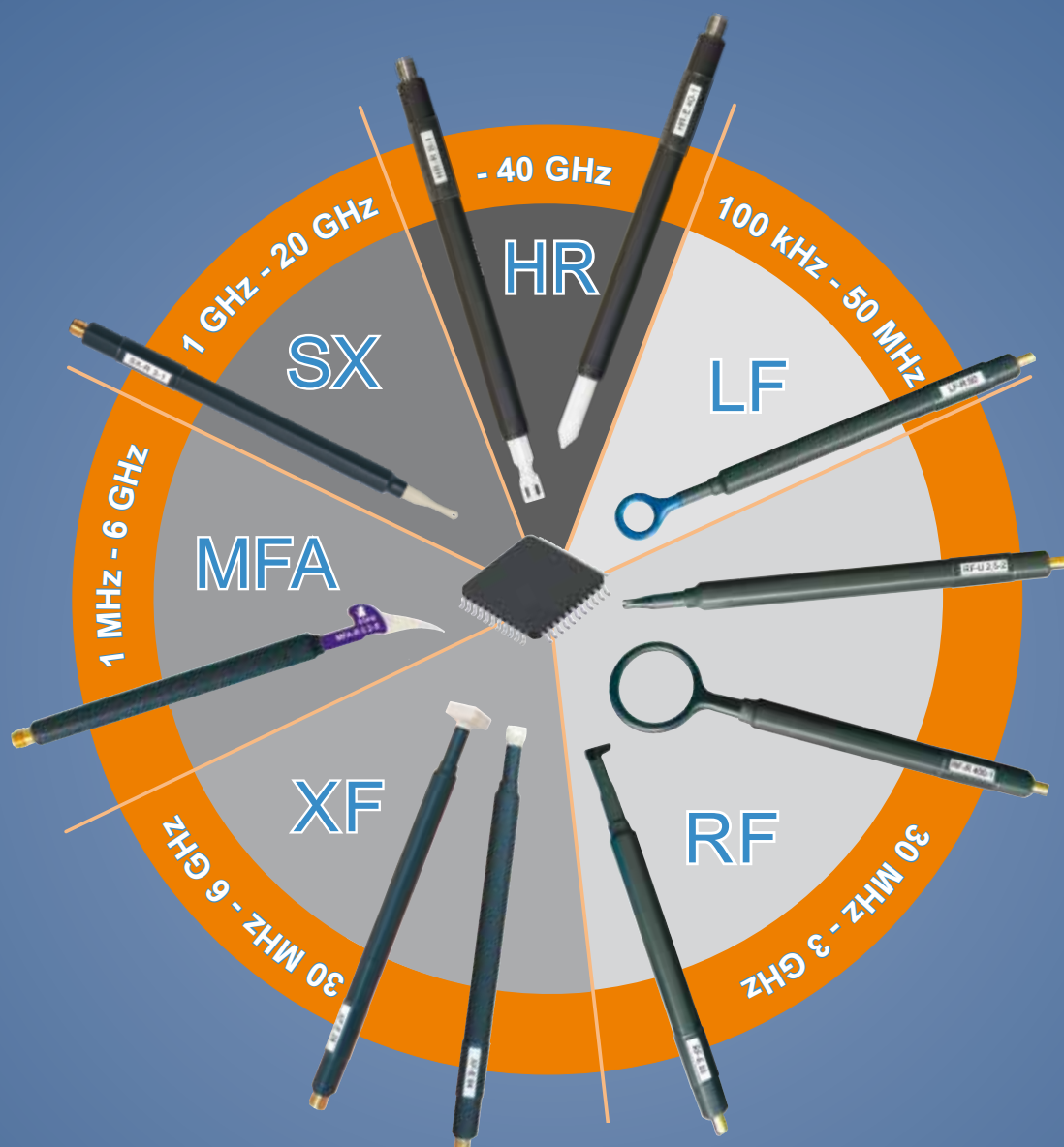


PCB EMC

Measuring Systems for the Development Stage



PCB EMC Development Systems

E1 set Immunity Development System

The E1 is a set of EMC tools for EMI suppression on printed circuit boards and devices during development. The E1 has been designed for use at the developer's workplace to help quickly and

precisely locate weak points which may lead to burst interference and take expedient EMC measures.

The following items are included in the scope of delivery:

- SGZ 21 burst generator to generate potential-free, pulsed disturbances
- Magnetic- and electric-field sources to locate weak points
- Optical sensor for non reactive signals transmission from the device under test
- MS 02 magnetic field probe



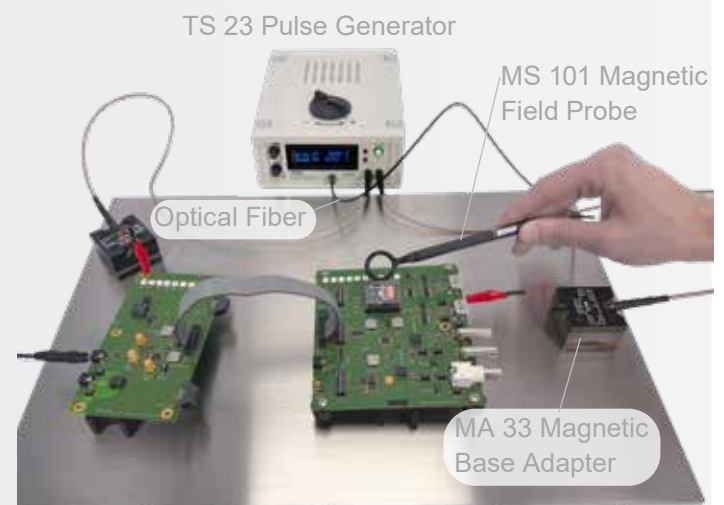
E2 set TS 23 Immunity Development System

The E2 set is a comprehensive system of EMC tools designed for pre-compliance immunity testing. It enables efficient troubleshooting and precise weak-point analysis of electronic systems at all integration levels, from component

to full system. This allows engineers to identify vulnerabilities early in the development process and implement corrective measures well before formal compliance testing.

The following core benefits deliver maximum performance and user value:

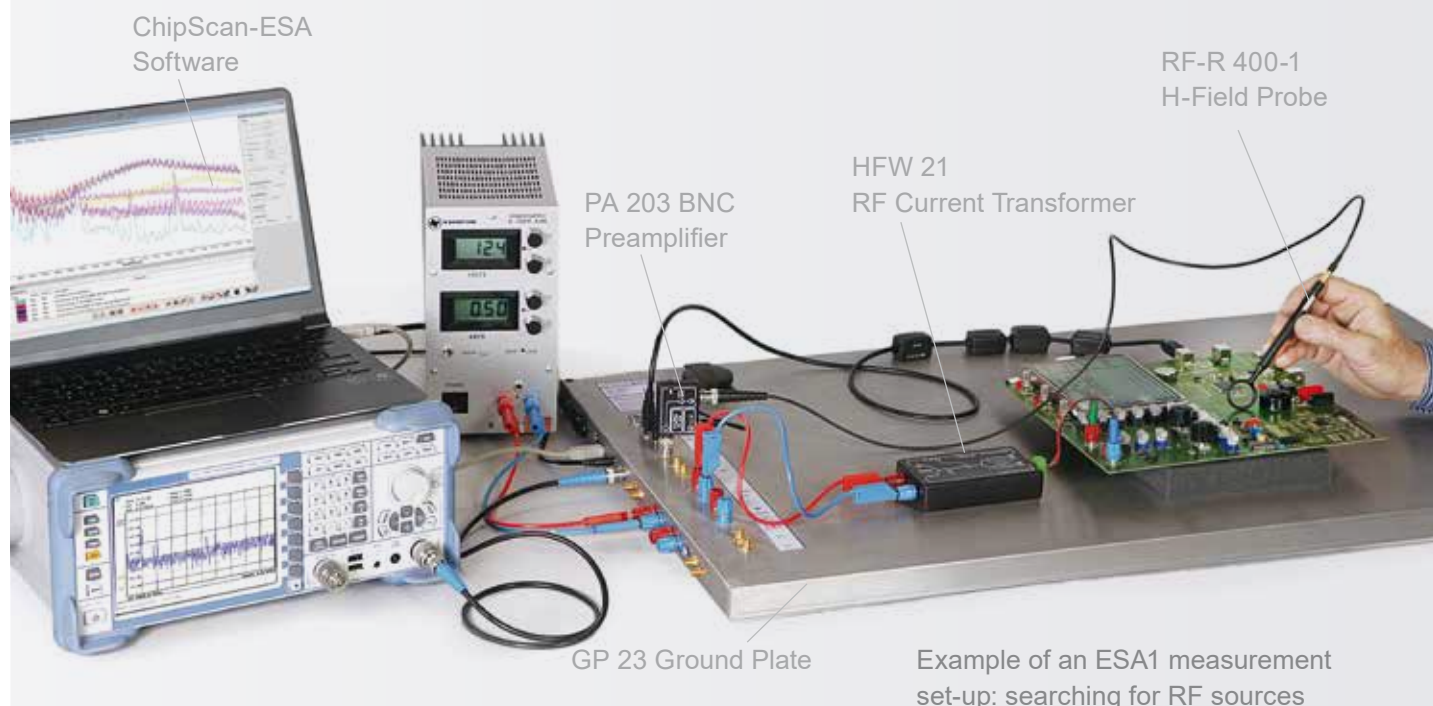
- TS 23 pulse generator for precise pulse-voltage control and adjustable output rate
- Switchable between continuous voltage levels and ramp for different validation application
- Additional functions including pulse repetition patterns, and external triggering
- Newly developed differential probes, differential injectors, and MA 33 magnetic adapters for shortest possible rise times
- ESD-related failure patterns can be reliably reproduced under controlled conditions



ESA1 set Emissions Development System

The ESA1 is a set of EMC tools to reduce emissions from printed circuit boards and devices. The ESA1 has been designed for the developer's workplace to help locate disturbance sources and identify the paths emissions take.

It allows developers to derive, match and test suitable EMC measures. Improvements achieved with the ESA1 have a proportional effect on the results obtained in far-field measurements.



The following items are included in the scope of delivery:

- RF current converter to measure RF currents of the device under test
- GP 23 ground plate as a ground reference plane
- Shielding tent to shield the measurement set-up from external RF fields
- Magnetic and electric near-field probes to locate disturbance sources, preamplifier
- ChipScan-ESA software to save, protocol log and compare measurement curves



EMC Immunity

P1 set - Mini Burst-Field Generators

The very small mini burst-field generators generate fields at their tip, that occur during Burst and ESD test in the device under test. The mini burst-field generators are guided across the device under test (e.g. printed circuit board) by hand with their field-emitting tip close to its surface. The weak point responds to the pulsed field and malfunctions will occur.

Separate magnetic (P11 and P12) and electric field (P21) injections enable an optimal adaptation of EMC countermeasures to the respective weak point. Also available are P11t and P12t sets with a TLL trigger input and P23 set with an extremely sharp tip.

P21
Mini Burst
Field Generator



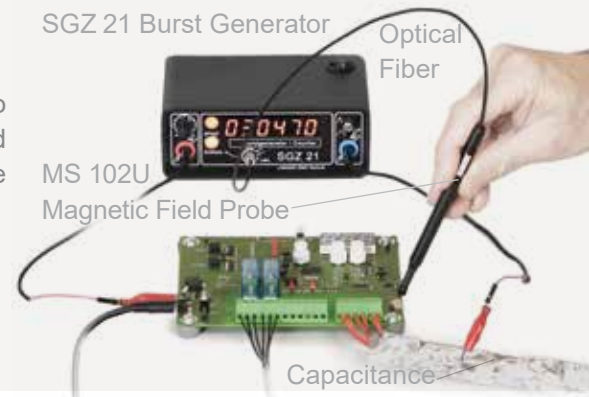
S2 set - Magnetic Field Probes for E1

The active and passive magnetic field probes in the S2 set allow developers to measure fast transient pulsed magnetic fields on electronic devices and printed circuit boards without non reactive. Thus, burst or ESD processes that cause problems in the device under test can be analysed.

The S2 set can only be operated with the SGZ 21 burst generator.

SGZ 21 Burst Generator
Optical Fiber

MS 102U
Magnetic Field Probe



Accessories for EFT/Burst Generators acc. to IEC 61000-4-4

H3 set - Field Sources

The H3 set field sources are used to analyse the EMC immunity of printed circuit boards and devices. They couple pulsed fields (IEC 61000-4-4) into the device under test.

During the analysis, the field sources are guided by hand across the device under test close to its surface. The weak point responds to the pulsed field and malfunctions will occur. A EFT/burst generator supplies the field sources.

BS 04DB-h Magnetic Field Source

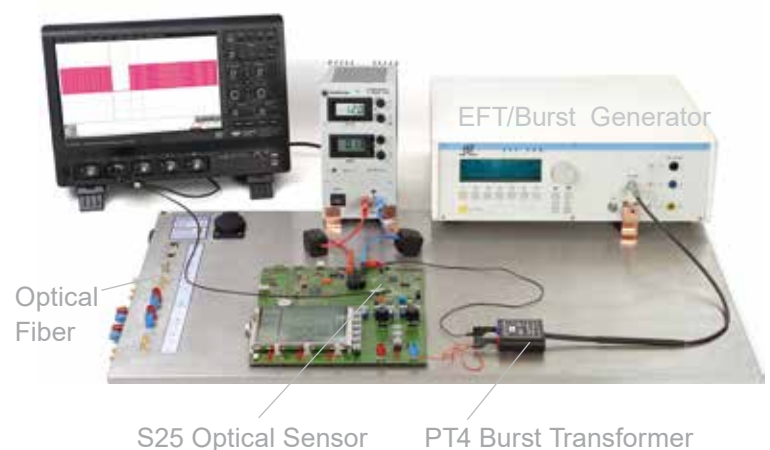
EFT/Burst
Generator



PT4 set - Burst Transformer

The PT4 set is used to perform efficient EMC immunity analyses on printed circuit boards and devices. The PT4 burst transformer converts the pulses of the EFT/burst generator into potential-free burst pulses, that are then injected into individual sections of the device under test, enabling the developer to locate its susceptible areas.

In addition, the set includes a magnetic and an electric field source that are also supplied by the EFT/burst generator. The field that emerges from the head of the field source is used to scan the surface of the device under test. Weak points can, thus, be located with great precision and assigned to the fault patterns that occur in compliance tests.



Systems for Immunity and Emission Measurements

Optical systems transmit signals to and from the device under test during EMC immunity and emission tests. Electromagnetic fields in the environment of the device under test do not interfere with the measuring and testing systems, nor do they affect the device under test.

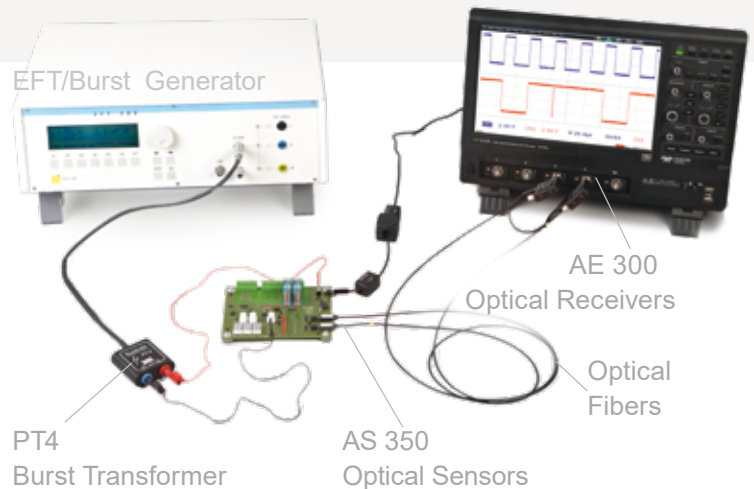
The probe head is connected directly to the signal to be

transmitted on the device under test. The signal is converted into light signals in the probe head and sent to the receiver via an optical waveguide. The optical receiver converts the light signals back into electrical signals that are then shown on the oscilloscope.

Transmission of Analog Signals

Various bandwidths, scanning frequencies and channels are available to detect the signals in the device under test:

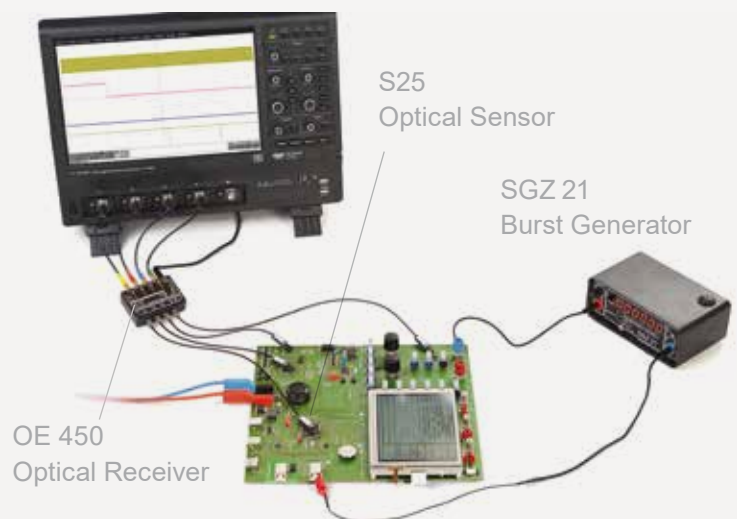
- A100 set: DC ... 25 kHz, 125 kbps, 1 and 2 channels
- A200 set: DC ... 500 kHz, 3 Msp, 1 and 2 channels
- A300 set: DC ... 5 MHz, 12.5 Msp, 1 and 2 channels



Transmission of Digital Signals

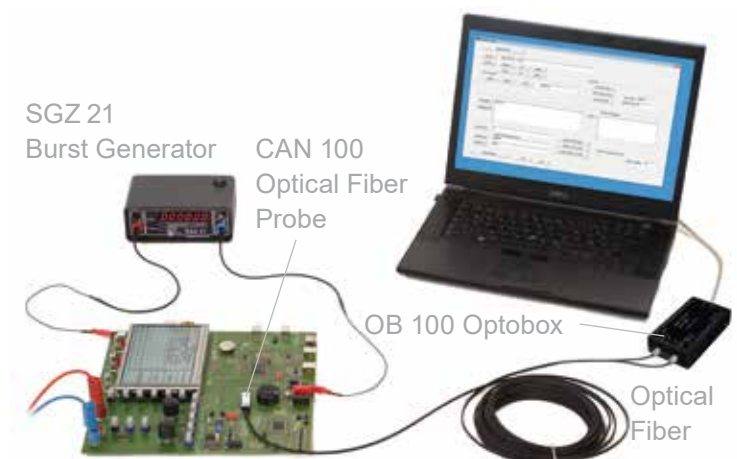
Various transmission ranges and channels are available to detect the signals in the device under test:

- OSE 150 set: DC ... 50 Mbps, 1 and 2 channels
- OSE 450 set: DC ... 50 Mbps, 4 channels



LIN and CAN Bus Systems

The LIN 100 and CAN 100 sets allow an isolated, bi-directional transmission of LIN or CAN signals via optical waveguides during EMC tests or with large electric potential differences (high voltage).



EMC Emissions

Near-Field Probes

Near-field probes are used to measure high-frequency electric and magnetic RF-fields on printed circuit boards and devices. Probe heads of various shapes and sizes enable developers to locate an emission source on the printed circuit board and on the RF coupling path to the antenna. Langer EMV-Technik GmbH offers a wide variety of near-field probes for sophisticated RF-field measurements.

Passive

Passive near-field probes are connected to the 50 ohm input of the spectrum analyser or oscilloscope via the measuring cable. There are various probe families for different frequency ranges:

- LF probes: 100 kHz - 50 MHz
- RF probes: 30 MHz - 3 GHz
- XF probes: 30 MHz - 6 GHz
- SX probes: 1 GHz - 20 GHz
- HR probes: - 40 GHz

Preamplifier

Various frequency ranges and gains are available to amplify measurement signals such as weak signals from high-resolution, near-field probes or antennas:

- PA 203: 100 kHz - 3 GHz, 20 dB
- PA 303: 100 kHz - 3 GHz, 30 dB
- PA 306: 100 kHz - 6 GHz, 30 dB
- PA 3010: 10 MHz - 10 GHz, 30 dB
- PA 2522: 10 MHz - 22 GHz, 25 dB

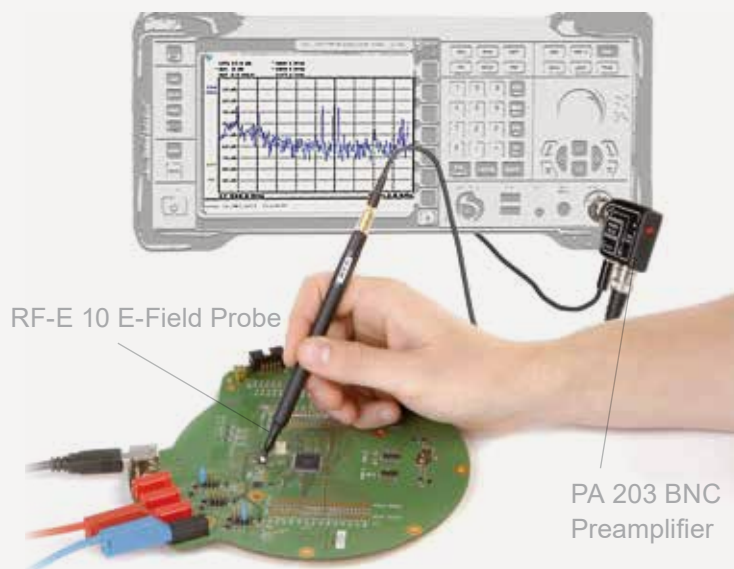
Langer EMV-Technik provides to all their near-field probes correction characteristics.

With these correction characteristics you may calculate the current in the conductor and the according H-Field if the output voltage of the near-field probe. With the Langer software ChipScan ESA the calculation can be done immediately during the measurement.

Active

Active near-field probes are connected to the 50 ohm input of the spectrum analyser or oscilloscope via a bias tee. The bias tee powers the preamplifier in the probe head.

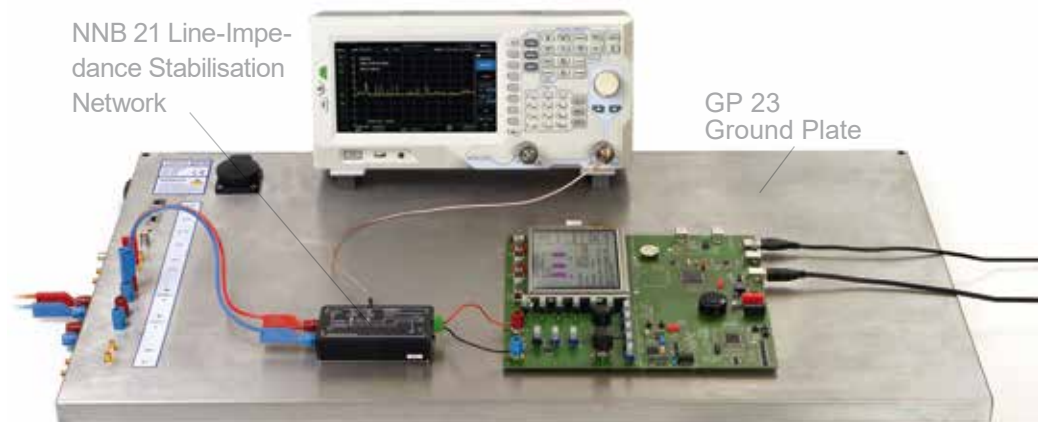
- MFA probes: 1 MHz - 6 GHz
Measurement resolution: 300 µm



NNB 21 set - Line-Impedance Stabilisation Network

The NNB 21 line-impedance stabilisation network is used to measure conducted emissions from device under test according to the standard CISPR 25/ISO 7637.

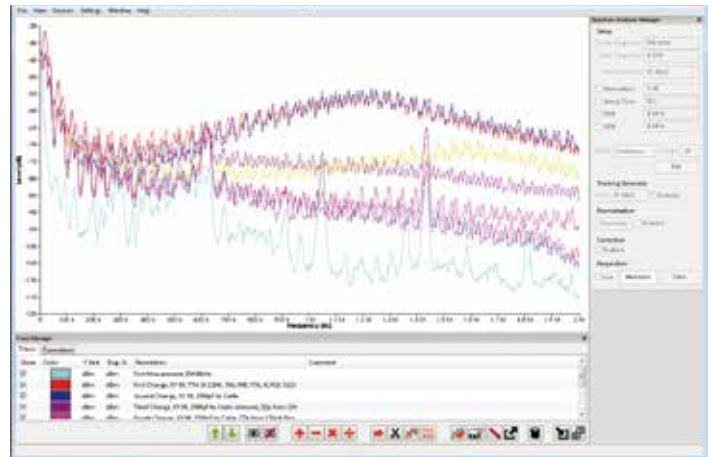
It measures RF emissions that couple to a vehicle's on-board power supply. Measurements in the frequency range between 100 kHz and 1 GHz can be carried out during development.



CS-ESA - ChipScan-ESA Software

ChipScan-ESA is a software for the remote control of a spectrum analyser. The measurement curves are stored and logged in ChipScan-ESA. They can be calculated with each other or with correction curves, frequency-dependent functions (curves) and constants to form a new curve. Any number of threshold value curves can be created or imported and displayed as a csv-file.

The functions of the ChipScan-ESA software offer developers valuable support and greatly facilitate their work when carrying out measurements with a spectrum analyser during development. They can, thus, compare different curves quickly and systematically.

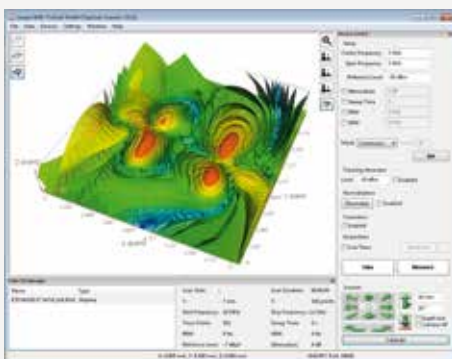


Langer Scanner

Scanner - 4-Axis Positioning System

The Langer scanners are positioning systems for near-field probes to measure magnetic or electric fields above a printed circuit board. Field sources can be used to systematically apply pulsed fields to the device under test.

The near-field probes or field sources can be moved in three different axes and can be rotated vertically. The digital microscope camera is used for positioning the probe above the device under test. The positioning system stops as soon as the probe slightly touches the device under test (collision protection system).



The scanners are controlled via a PC with the ChipScan-Scanner software.

This software lets developers read out the measured data via a spectrum analyser, present this graphically in 2D or 3D, as well as store and output this in a CSV file.



FLS 106 PCB set

Langer EMV-Technik GmbH is a German company that focuses on research, development, production and further training in the field of electromagnetic compatibility (EMC).

Our interference emission and interference immunity EMC measurement technology as well as the IC test system are used mainly in the development stage and are in worldwide demand.

The EMC know-how and measurement technology from Langer EMV-Technik GmbH allow developers and designers

to gain new insights into and establish more efficient work strategies for module and IC development.

The individual consultancy services provided by Langer EMV-Technik GmbH in the field of EMC during development help developers and designers to find solutions to complex EMC problems in IC, device and module development fast.

We make our research results and comprehensive EMC know-how available to the public via practical experimental EMC seminars and in-house events.



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