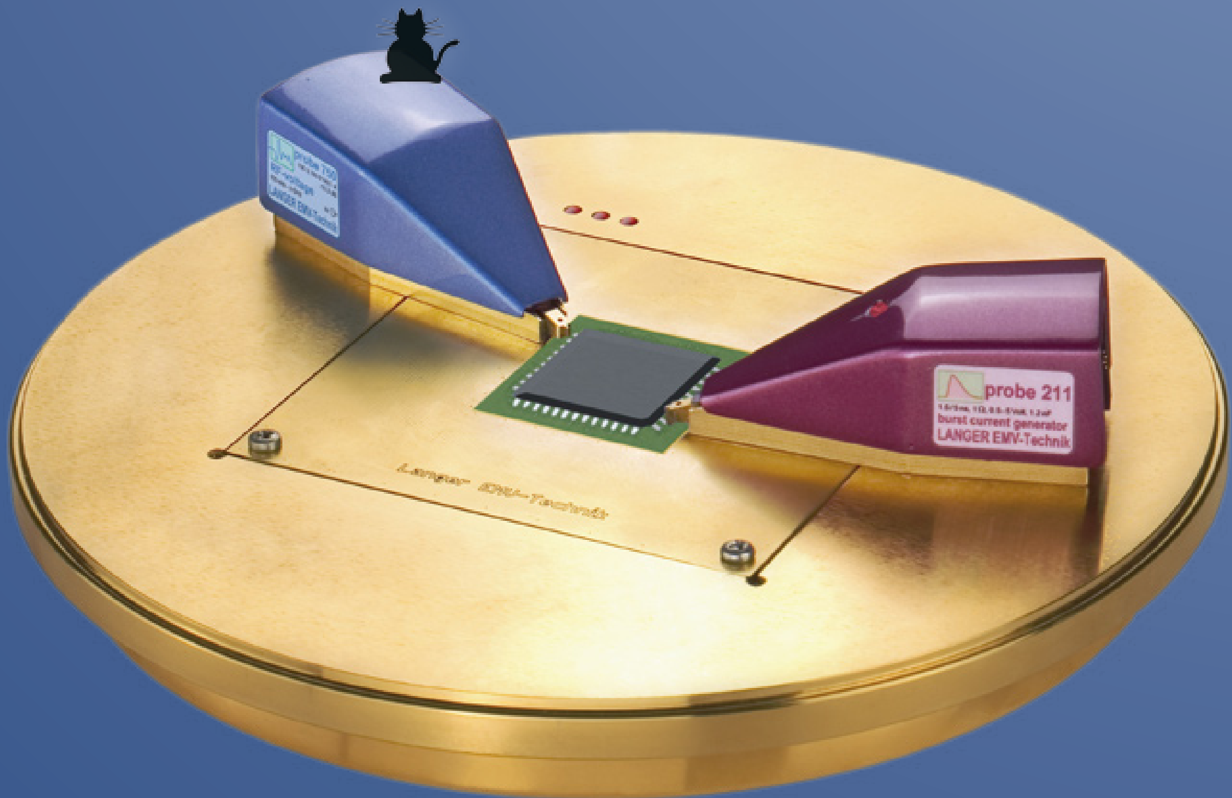
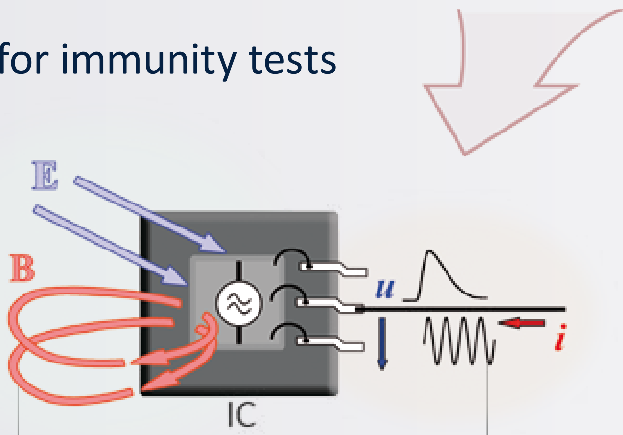
IC EMC measurement technology



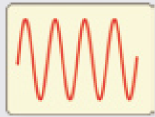
Probes for immunity tests



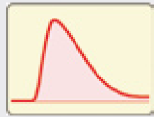
Capacitive/inductive coupling

Conductive coupling

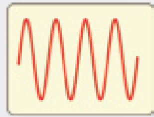
RF



Pulse



RF



Pulse

H E H E i u i u

P1400 P1500

P1202 L-ESD
P1202-2 ESD
P1202-4 EFT

P1301 L-ESD
P1302-4 EFT

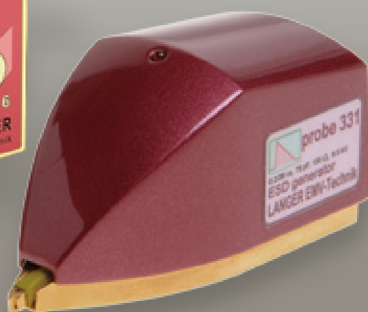
P500 DPI

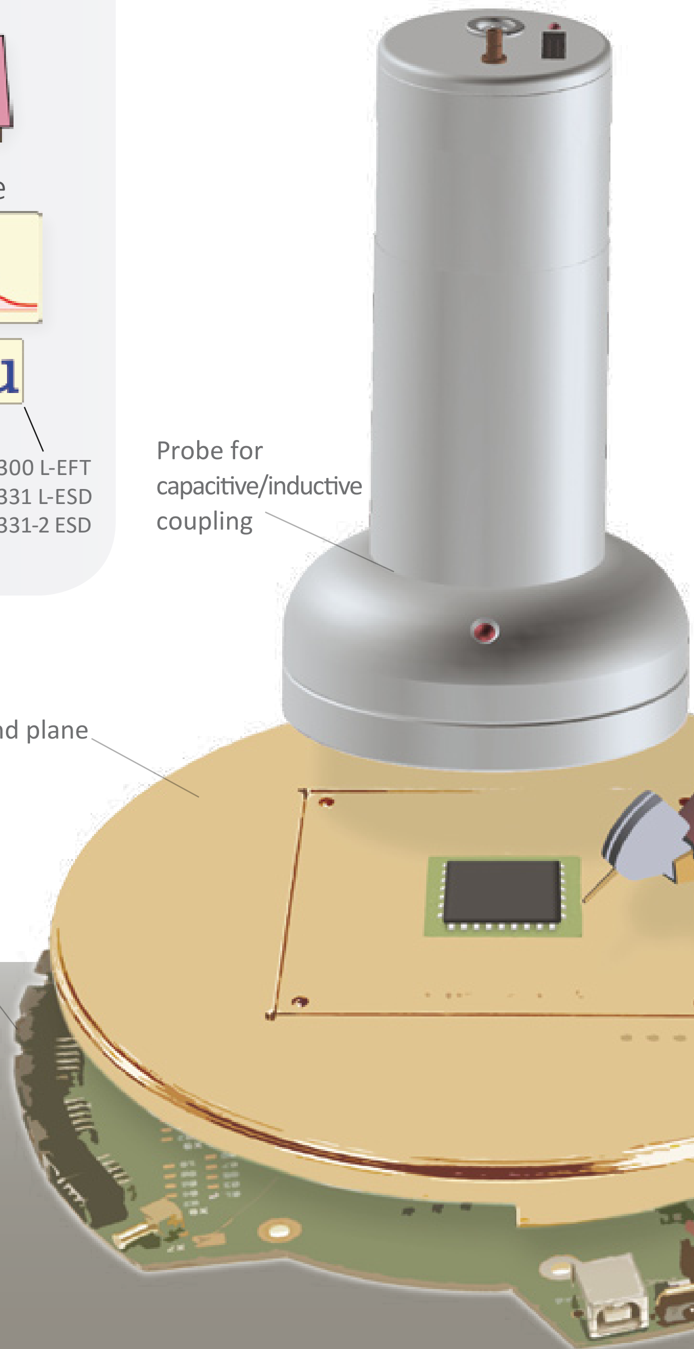
P200 L-EFT
P250 EFT

P300 L-EFT
P331 L-ESD
P331-2 ESD

IC test system

The IC test system has been developed to measure the EMC behaviour of integrated circuits (ICs) under the selective influence of conducted or capacitive/inductive coupling disturbances. In addition, the IC test system can also be used to measure conducted and capacitive/inductive coupled RF emissions from ICs. The IC is tested in operation. The results of these measurements enable semiconductor ma-nufactur-ers to optimise their ICs and IC users to integrate ICs so that they ideally suit their electronics design.

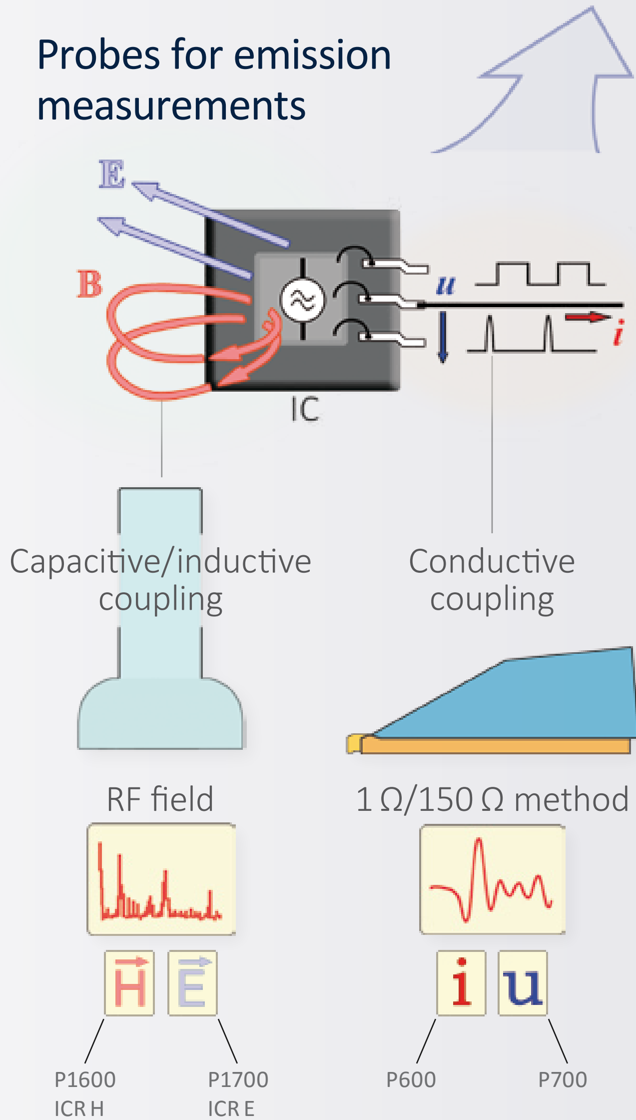




Probe for capacitive/inductive coupling

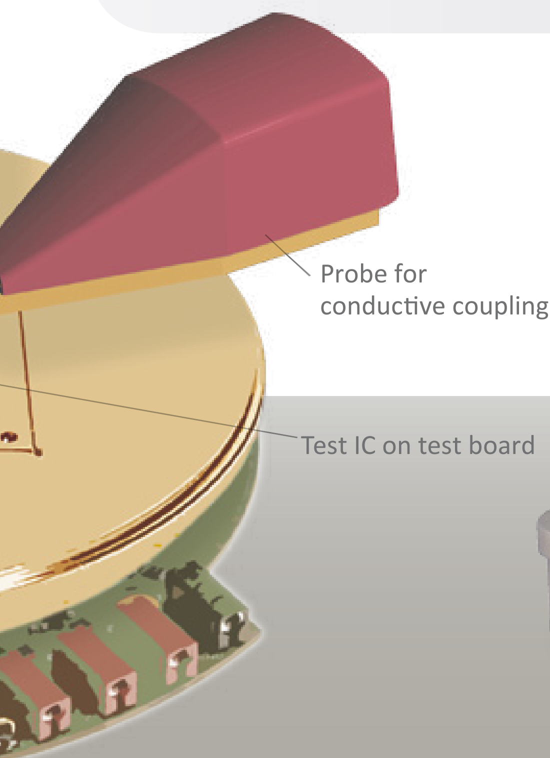
GND 25 ground plane

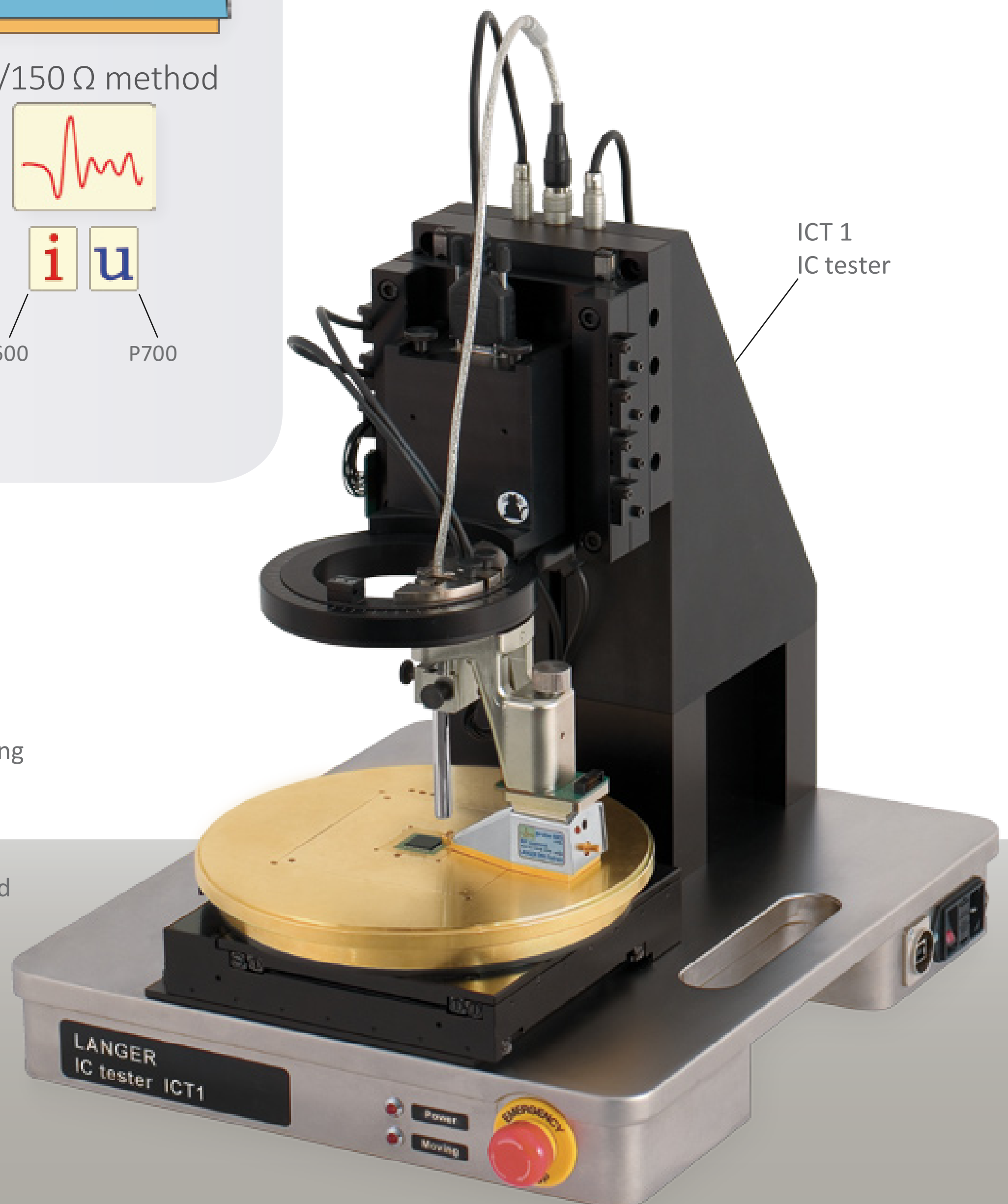
CB 0708 connection board



Automated measurement

The ICT1 automatic IC tester is a positioning system which can be used with the IC test system to run automated EMC tests on ICs. Both conducted and capacitive/inductive coupled immunity and emission tests are possible.
The ICT1's automatic pin recognition and high-precision positioning (10 µm) features ensure that each pin of the test IC is recognized and can be tested separately. The ICs can also be subjected to interference field tests.

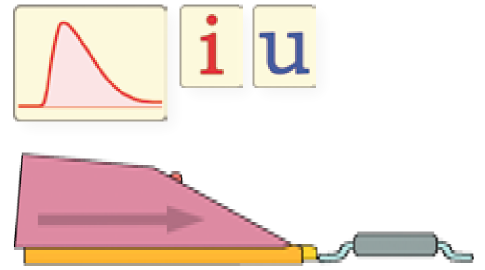




Probes for immunity tests

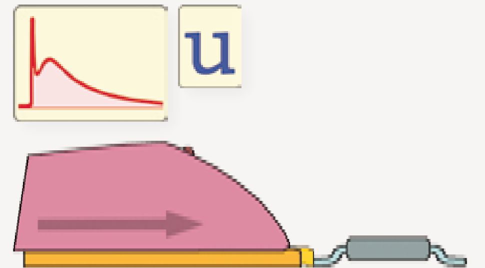
L-EFT **P200/P300** probe series - **Langer Pulses**

The probes are the ideal tool to determine the conducted immunity to pulsed interference of each individual pin of the test IC while this is in operation. The P200 probes for current coupling follow the mechanisms of pulse coupling via the magnetic field and the P300 probes for voltage coup-ling those of pulse coupling via the electric field to electronic mo-dules.



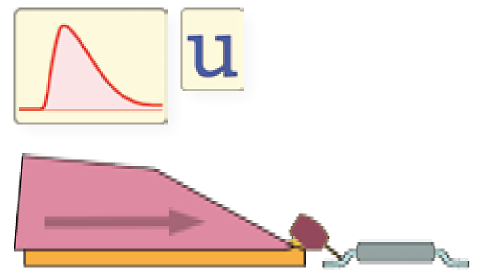
ESD **P331/P331-2** pulses according to **IEC 61000-4-2**

The P331-2 (according to IEC 61000-4-2 / HMM) and P331 (200ps rise time) probes have been designed for conducted ESD pulse pulse injection. They can be used to couple ESD pulses into IC pins directly or through a coupling network. The P331-2 probe is ideal for measure-ments on high speed interfaces such as USB, LVDS, Ethernet, etc.



EFT **P250** probe according to **IEC 62215-3** and **IEC 61000-4-4**

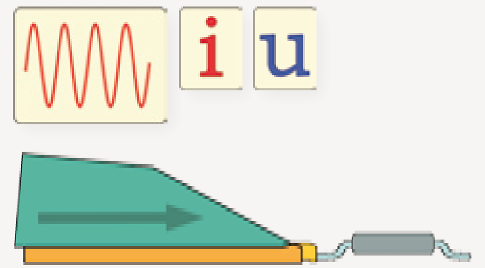
The probe has been designed for the conducted coupling of standard burst pulses into the pins of an IC while this is in operation. The coup-ling capacitances as required by the standard IEC 62215-3 are provided through the use of exchangeable probe tips. The P250 probe can only be operated with an EFT/burst generator (according to IEC 61000-4-4).

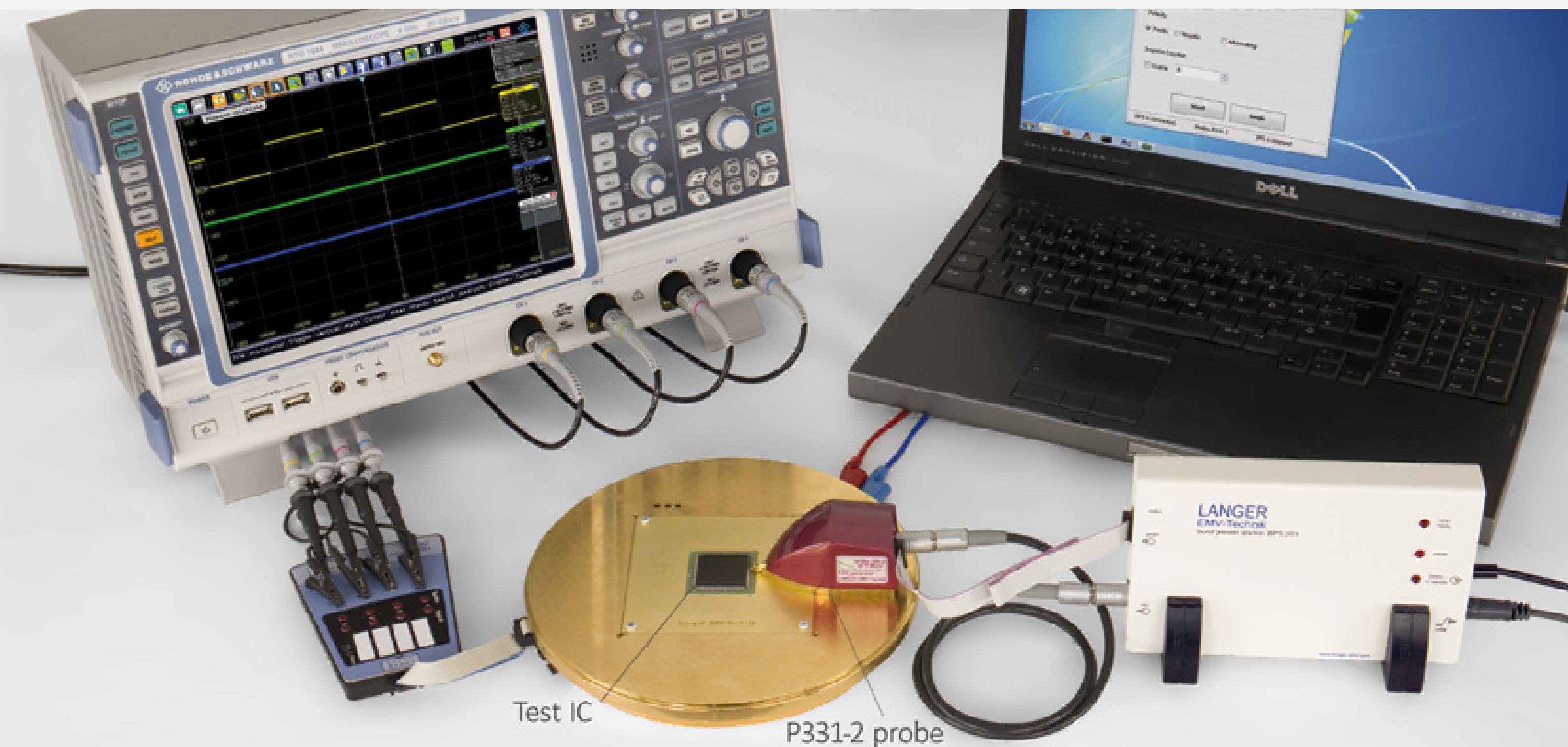


DPI **P500** probe series according to **IEC 62132-4**

Frequency range: **16 kHz - 3 GHz**

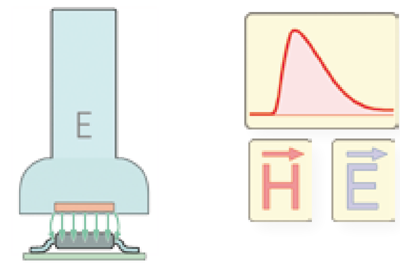
The probes in the P500 series have been designed to couple RF (DPI) di-rectly into a pin of the IC with a power amplifier. Current and voltage meas-urements are performed in the probe while the disturbance is applied to the test IC. The parameters that are obtained from these measurements allow engineers to draw more detailed conclusions about an IC's EMC.





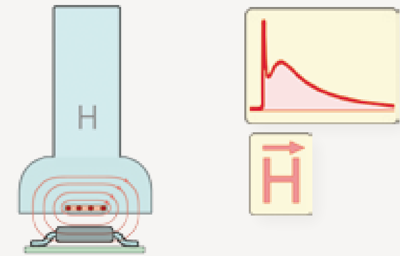
L-ESD **P1202/P1301** probes - **Langer Pulses**

The field sources generate fast ESD H- and E-fields to test ICs in defined conditions. The fields have a rise time of 200 ps and are used to simulate transients of 200 ps such as may develop during ESD events. Modern ICs are particularly sensitive to transients of 200 ps.



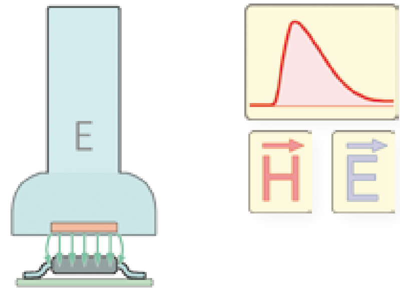
ESD **P1202-2** pulse according to **IEC 61000-4-2**

The field source generates an ESD H-field to test ICs in defined conditions. The field's waveform is analogous to the waveform according to standard IEC 61000-4-2. The field has a rise time of 1 ns.



EFT **P1202-4/P1302-4** pulses according to **IEC 61000-4-4**

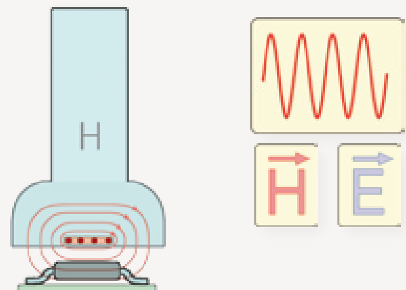
The probes generate electric and magnetic fields in combination with an EFT/burst generator. These defined and reproducible fields are applied to ICs to test their immunity to pulsed EFT fields which are coupled in directly.



DPI **P1401/P1501** test methode alternative to **IEC 62132-2**

Frequency range: **0 - 1 GHz**

The field sources are used to generate electric or magnetic RF fields in combination with a power amplifier. These defined and reproducible fields are applied to ICs to test their immunity to RF fields which are coup-led in directly.



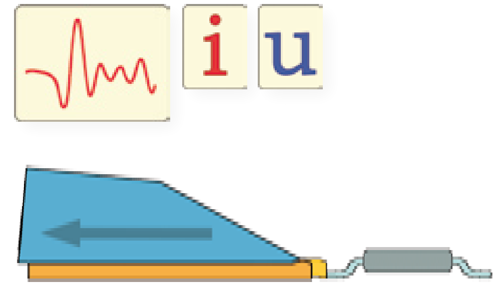
Probes for emission measurements

1Ω/150Ω method

P600/P700 probe series according to **IEC 61967-4**

Frequency range P600: **0.2 kHz - 3 GHz**
Frequency range P700: **20 kHz - 3 GHz**

The probes have been designed for conducted measurements of RF currents and RF voltages on IC pins according to IEC 61967-4. The probes in the P600 series are ideal for RF current measurements on supply or GND pins. The probes in the P700 series can be used to measure RF voltages on the test IC's output and input pins without a significant current stress-ing the pins.

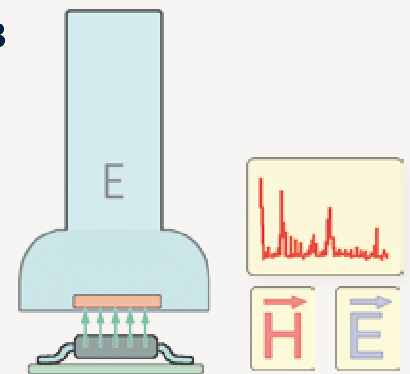


RF field

P1602/P1702 test methode alternative to **IEC 61967-2/IEC 61967-3**

Frequency range P1601: **0 - 1 GHz**
Frequency range P1602/P1702: **0 - 3 GHz**

The P1601, 1602 and P1702 probes are field probes. They are used to measure electric or magnetic RF fields emitted from ICs. Precise infor-mation on the electric or magnetic field emissions from the IC is neces-sary if technically sound, physical root-cause analyses are performed or values have to be provided for EMC simulations. The fields thus have to be meas-ured separately with dedicated field probes.



ChipScan-ESA analysis software

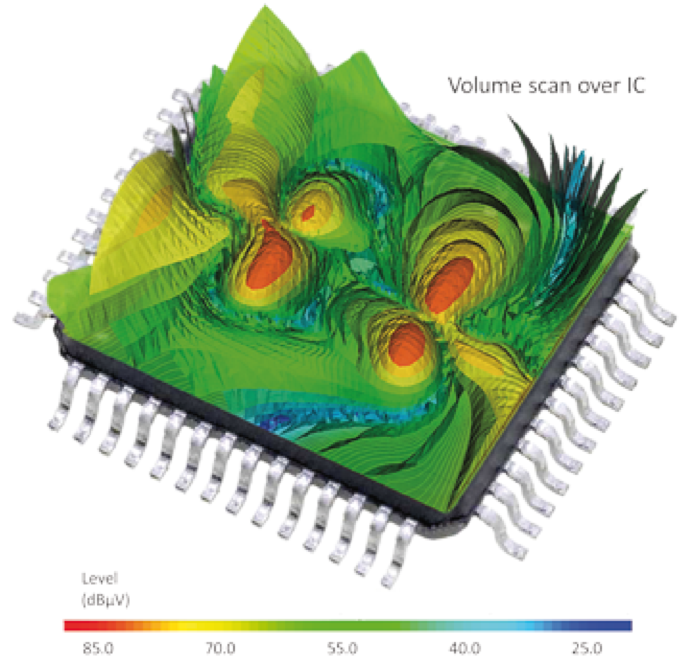
The ChipScan-ESA software has been developed for the clear and comparable recording, documentation and ana-lysis of a spectrum analyser's measurement curves. It is a versatile tool for mathematical data processing.
The measured values can be automatically corrected with correction curves. The correction curves can be imported into the ChipScan-ESA software or created by the user.

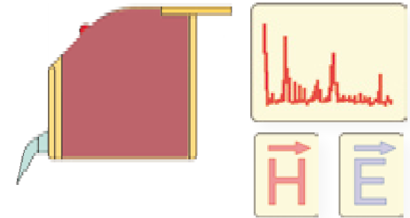
ICR H/ICR E near field microprobe series according to IEC 61967-3

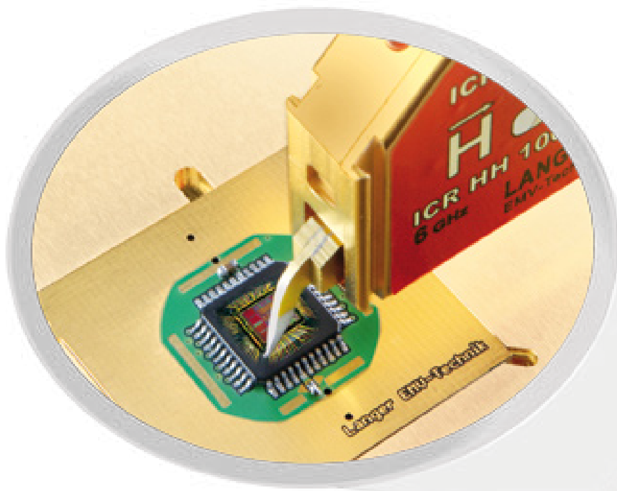
Frequency range ICR: **200 kHz - 10 GHz**

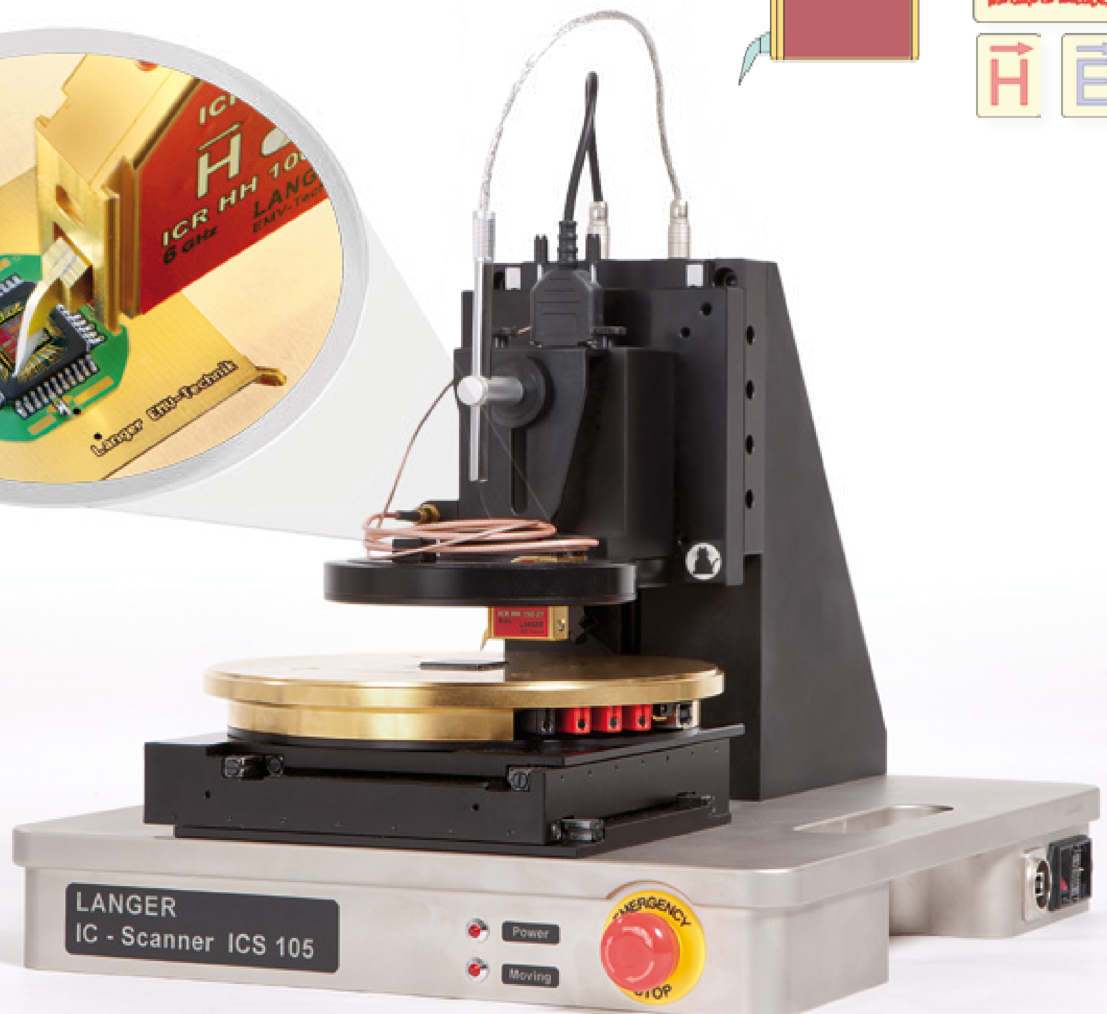
High-frequency magnetic or electric fields can be measured above an integrated circuit or a small module with a very high measuring resolution (up to 50µm) if the ICS 105 scanner is combined with an ICR micro-probe in the frequency range between 200 kHz and 6 GHz. The near-field micro-probes can be moved on all three axes over the chip surface and also rotated around the z axis.

The ICR probe tip's position above the object to be measured can be optically checked with a video microscope. The ICS 105 IC scanner is controlled with the ChipScan-Scanner software via a PC. This software lets the user 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 all at the same time. Near-field probes up to 10 GHz with a lower measuring resolution (above 1 mm) can be used for the surface scan over a module with a probe holder.









ICS 105 IC scanner

Langer EMV-Technik GmbH is a German company that focuses on research, development, production and vvfurther 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 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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