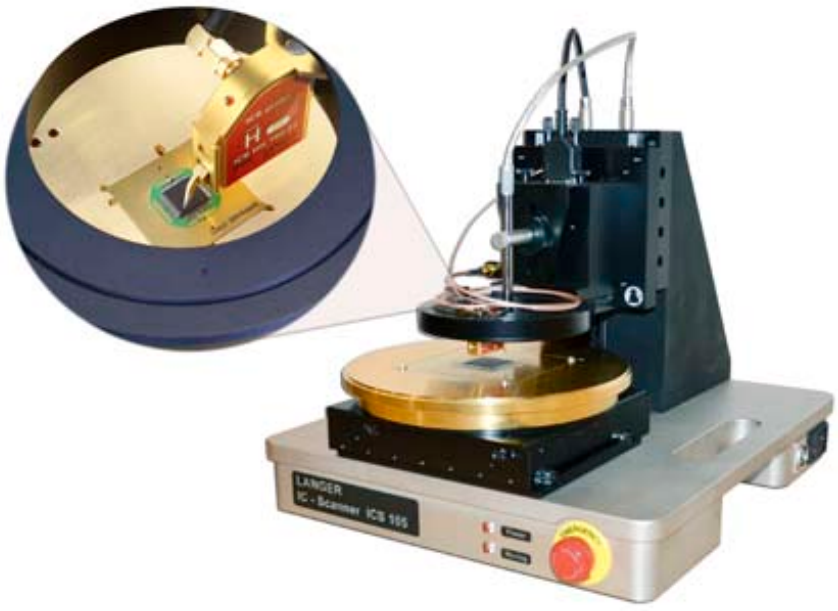
LANGER
EMV-Technik

IC TEST SYSTEM

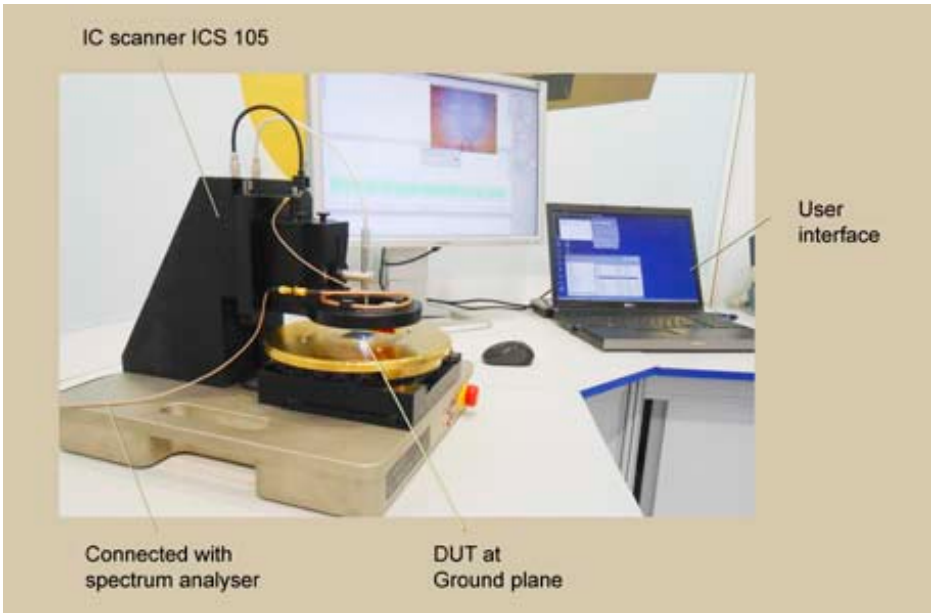
LANGER IC scanner

with
ICR near-field microprobes

(ICR probes)



ICS 105



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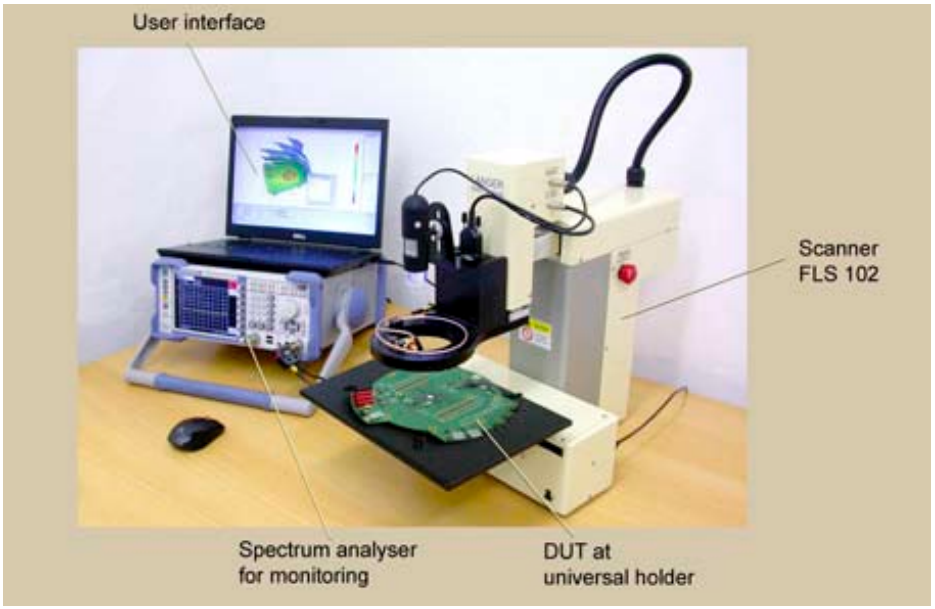
FLS 102



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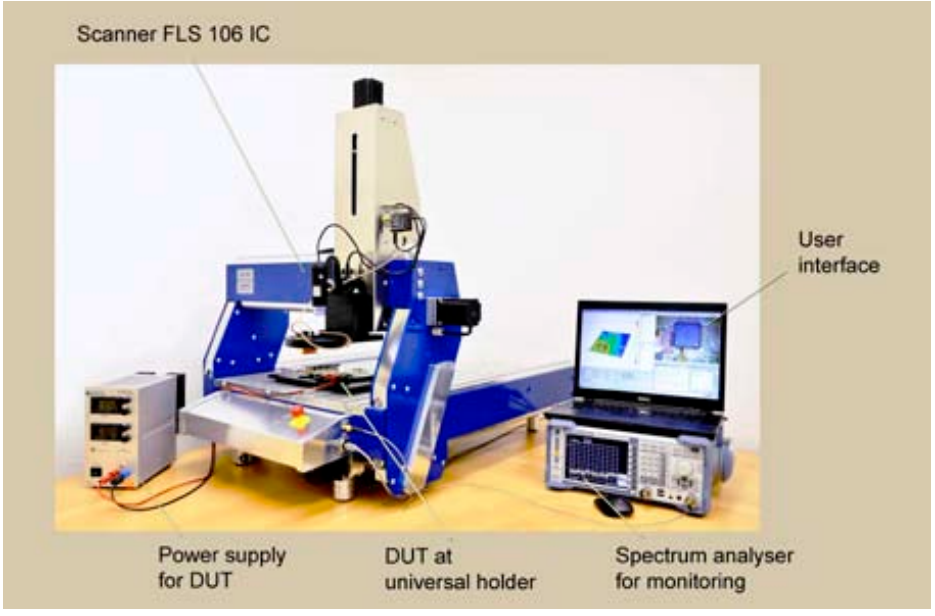
FLS 106



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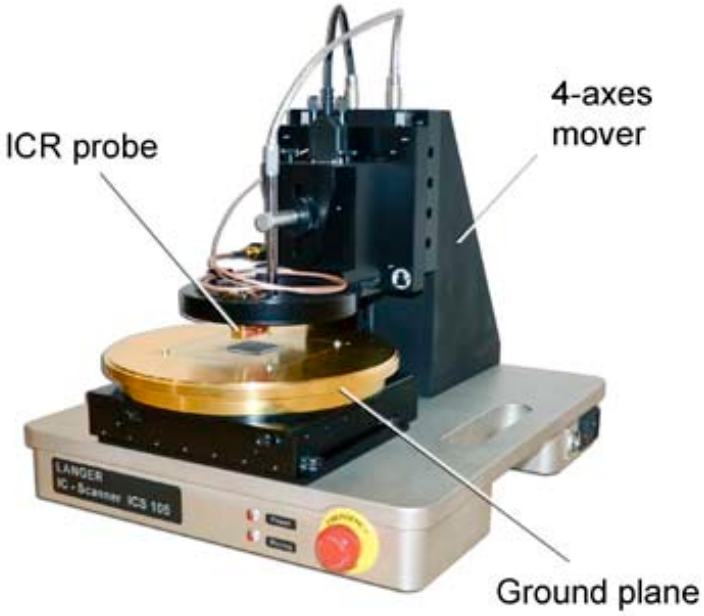
Application:

- Surface scans over ICs in accordance with IEC61967-3
- Volume scans over ICs
- PIN scans

System component parts:

- 4-axis positioning system
- ICR near-field microprobes for E and H fields (type ICR)
- Video microscope
- Ground plane (type GND 25)
- ChipScan-Scanner control and measurement software



Properties:

The IC scanner can be adapted with different ICR probes to measure E- and H-near fields. The probes can be moved above the chip surface in all three axes and around the z-axis.

The scanner allows the user to check the position of the probe tip visually through a video microscope.

The scanner is controlled via PC with the ChipScan-Scanner software.

Axes	**x**	**y**	**z**	**α-rotation**
Max. measuring range	50 mm	50 mm	50 mm	+/- 180°
Accuracy	10 µm	10 µm	10 µm	1°
Repeatability	+/- 1 µm	+/- 1 µm	+/- 1 µm	+/- 1°
Speed	2 mm/s	2 mm/s	2 mm/s	45°/s

Control	USB
Supply voltage	110 / 230 V
Dimensions / total weight	(350 x 400 x 420) mm / 23 kg

Software:	**ChipScan-Scanner** - zero position, manual or script-based probe movement - reading the data from a spectrum analyser - visualisation of the measuring results in 2D or 3D - output as csv and image files
Optional accessories:	- UH-DUT universal holder for receiving the electronics
Scope of delivery:	- ICS 105 IC scanner - ICR near-field microprobes for E and H fields - Video microscope with holder - GND 25 ground plane - ChipScan-Scanner software - Flight case

Application:

- Surface scans over ICs in accordance with IEC61967-3
- Volume scans over ICs
- PIN scans

System component parts:

- 4-axis positioning system
- ICR near-field microprobes for E and H fields (type ICR)
- Video microscope
- Ground plane (type GND 25)
- ChipScan-Scanner control and measurement software

Properties:

The IC scanner can be adapted with different ICR probes to measure E- and H-near fields. The probes can be moved above the chip surface in all three axes and around the z-axis.

The scanner allows the user to check the position of the probe tip visually through a video microscope.

The scanner is controlled via PC with the ChipScan-Scanner software.

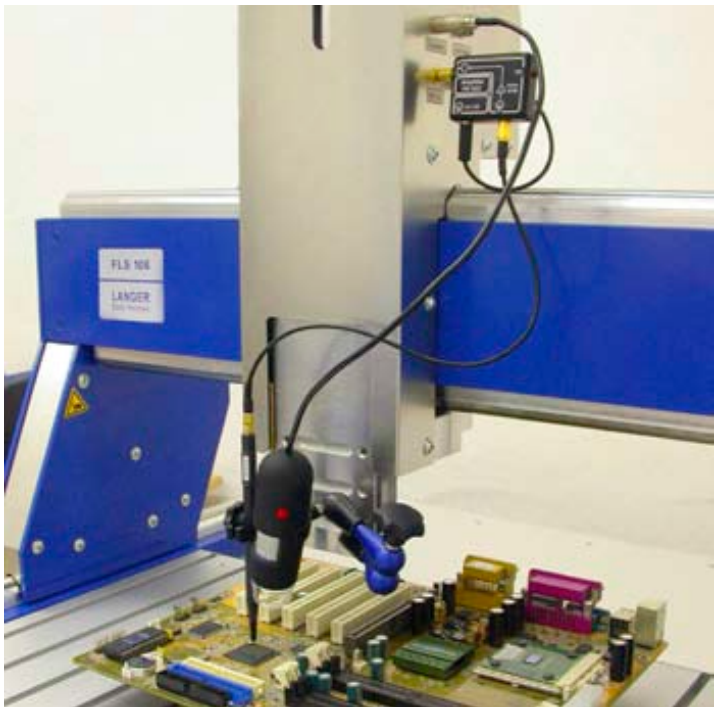
Axes	x	y	z	α-rotation
Max measuring range	200 mm	200 mm	50 mm	+/- 180°
Accuracy	20 µm	20 µm	20 µm	1°
Repeatability	+/- 20µm	+/- 20µm	+/- 20µm	+/- 1°
Speed	65 mm/s	65 mm/s	65 mm/s	90°/s

Control	USB
Supply voltage	110 / 230 V
Dimensions / total weight	(325 x 450 x 450) mm / 12 kg

Software:	**ChipScan-Scanner** - zero position, manual or script-based probe movement - reading the data from a spectrum analyser - visualisation of the measuring results in 2D or 3D - output as csv and image files
Optional accessories:	- UH-DUT universal holder for receiving the electronics
Scope of delivery:	- FLS 102 IC scanner - ICR near-field microprobes for E and H fields - Video inspection microscope with holder - GND 25 ground plane - ChipScan-Scanner software

Application:
- Surface scans over PCBs
- Volume scans over PCBs

System components:
- 3-axis positioning system
- XF, RF, LF near-field probes of the customer‘s choice
- Universal PCB holder
- ChipScan-Scanner control and measurement software



Properties:
The 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.
The „collision protection“ software features:
• protects the probe head against destruction should it touch the DUT during a vertical approach
• measure below the safe height

Axes	**x**	**y**	**z**
Max. measuring range	600 mm	400 mm	125 mm
Accuracy	10 µm	10 µm	10 µm
Repeatability	+/- 20 µm	+/- 20 µm	+/- 20 µm
Speed	50 mm/s	50 mm/s	25 mm/s

Control	USB
Supply voltage	110 / 230 V
Dimensions / total weight	(1030 x 775 x 990) mm / 75 kg

Software:	**ChipScan-Scanner** - zero position, manual or script-based probe movement - reading the data from a spectrum analyser - visualisation of the measuring results in 2D or 3D - output as csv and image files
optinal Accessories:	- SX, XF, RF, LF near-field probes of the customer‘s choice
Scope of delivery:	- FLS 106 PCB IC scanner - UH-DUT universal holder for receiving the electronics - ChipScan-Scanner software
	The FLS 106 PCB can be upgraded to a FLS 106 IC.

Application:
- Surface scans over ICs in accordance with IEC61967-3
- Volume scans over ICs
- PIN scans

System components:
- 4-axis positioning system
- ICR near-field microprobes for E and H fields (type ICR)
- Universal DUT holder
- Video microscope
- ChipScan-Scanner control and measurement software

Properties:

The IC scanner can take up ICR near-field micro-probes for H- and E-field measurements and move them to any circuit of the electronic system.

The probes can be moved above the chip surface in all three axes and can be around the z-axis.

The scanner allows the user to check the position of the probe tip visually through a video microscope. The scanner is controlled via PC with the ChipScan-Scanner software.

Axes	**x**	**y**	**z**	**α-rotation**
Max. measuring range	600 mm	400 mm	125 mm	+/- 180°
Accuracy	10 µm	10 µm	10 µm	1°
Repeatability	+/- 20 µm	+/- 20 µm	+/- 20 µm	+/- 1°
Speed	50 mm/s	50 mm/s	25 mm/s	90°/s

Control	USB
Supply voltage	110 / 230 V
Dimensions / total weight	(1030 x 775 x 990) mm / 75 kg

Software:	**ChipScan-Scanner** - zero position, manual or script-based probe movement - reading the data from a spectrum analyser - visualisation of the measuring results in 2D or 3D - output as csv and image files
optinal Accessories:	- GND 25 ground plane for IC measurement IEC 61967-3
Scope of delivery:	- FLS 106 IC scanner - ICR near-field microprobes for E and H-fields - Video microscope with holder - UH-DUT universal holder for receiving the electronics - ChipScan-Scanner software

Top view of the universal holder with DUT

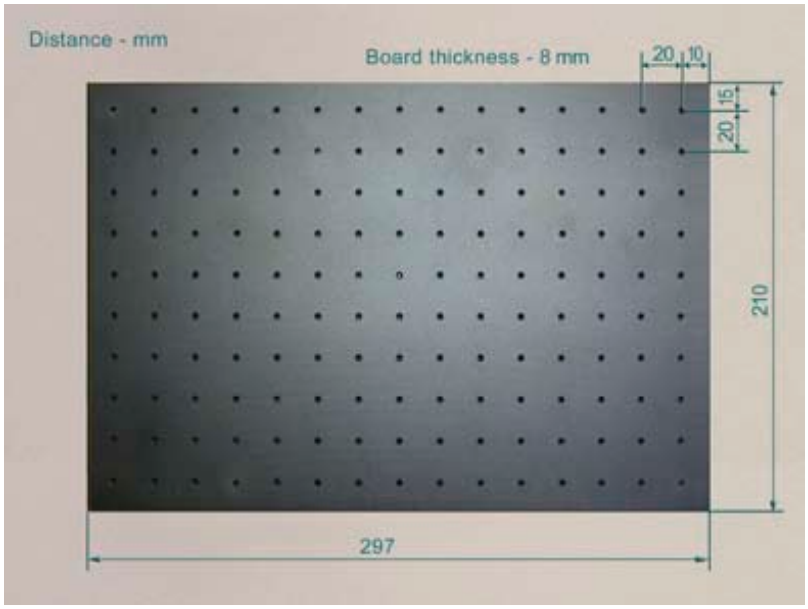
Properties:
The UH-DUT ground plane is fixed on the FLS scanner so that the DUT to be measured can be fastened with several claws.

An adapter is used to fix the UH-DUT on an ICS scanner and allows the user to take measurements over the IC of the respective DUT board.

Order destination

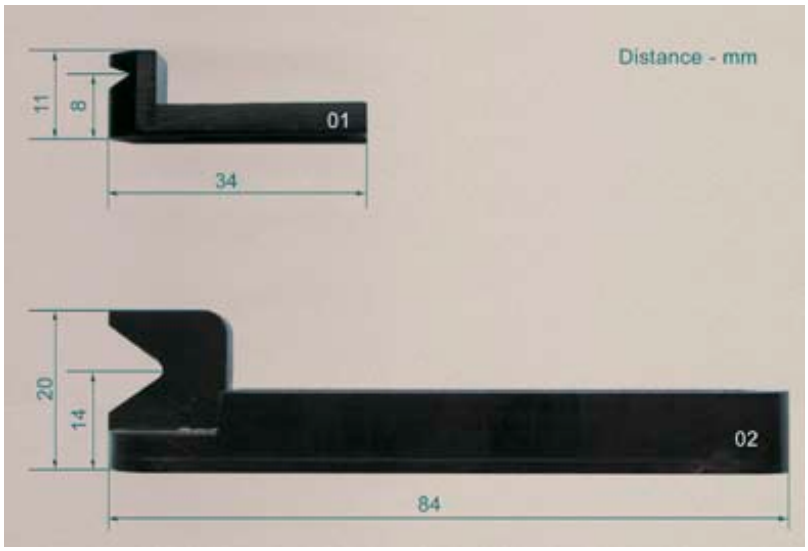
UH-DUT
Universal holder

Thanks to its dimensions and breadboard design, DUT's of different sizes can be attached to it.

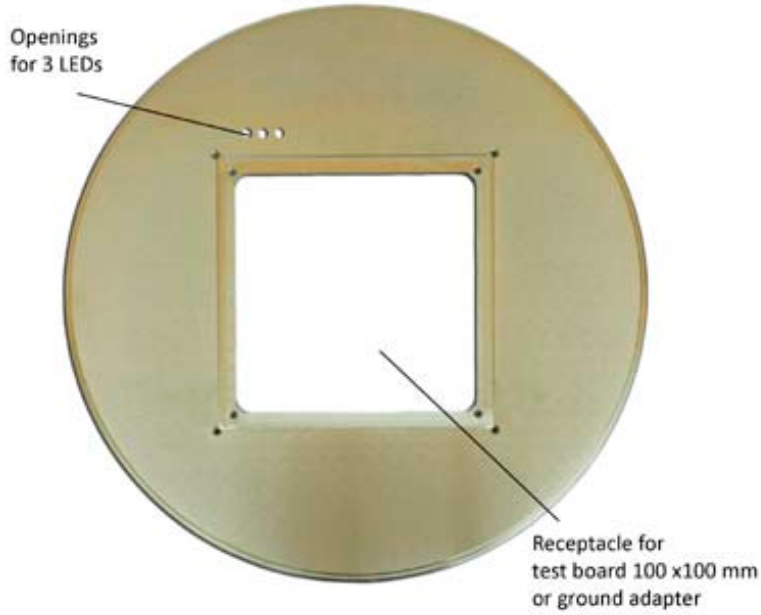


Claw fasteners (01 / 02)

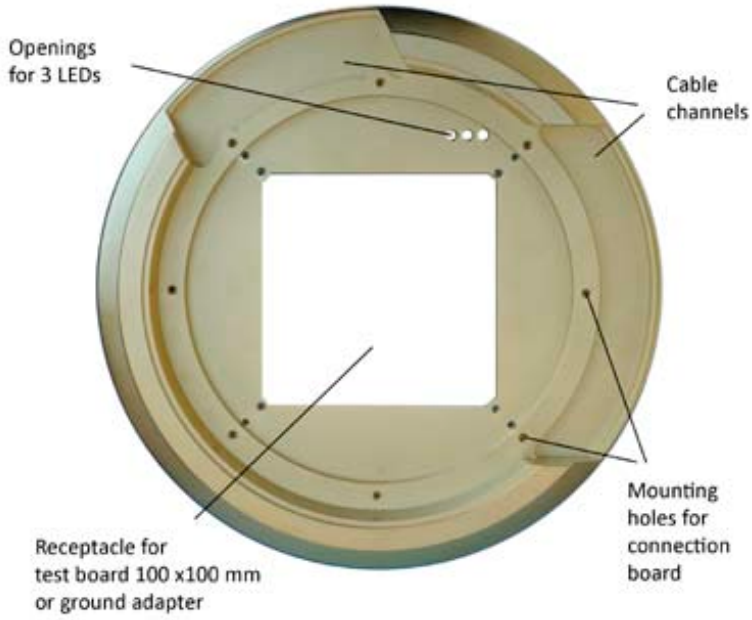
These fasteners are used to fix the DUT and maintain a defined distance between the DUT and universal holder. The claws are fastened to the UH DUT with screws.



Top GND 25



Bottom GND 25



The size of the IC to be tested determines the correct size of the ground adapter.
The plug on the back side of the test board connects the IC to be tested to the connection board CB 0708.

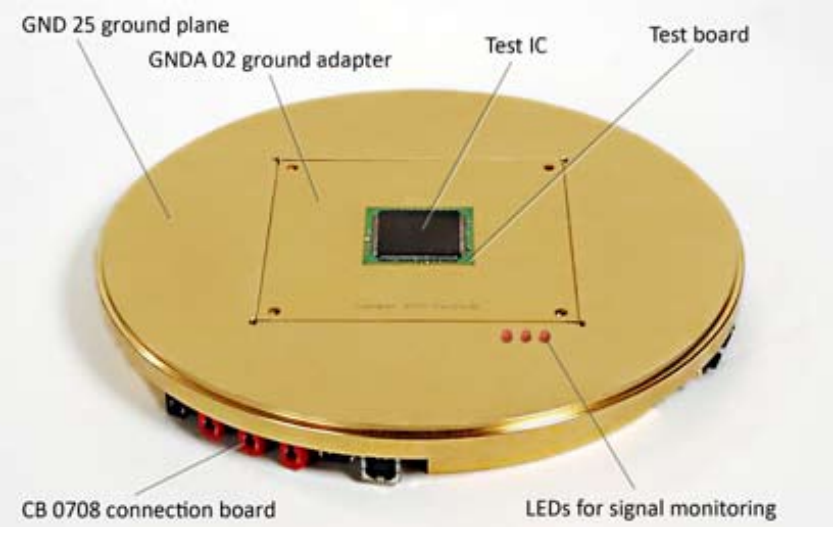
The ground plane GND 25 consists of steel with a gold plated surface to ensure a optimal magnetic adhesion and contacting of the probes.

Diameter: 218 mm

Weight (with CB 0708): 2.0 kg

Height of the receptacle: 1.5 mm

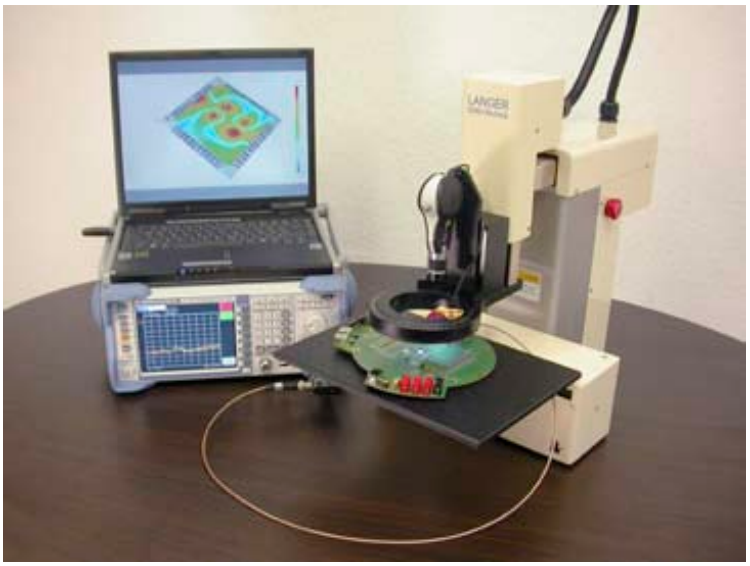
Receptacle: 100 x 100 mm
for test board
or Ground adapter



Order reference

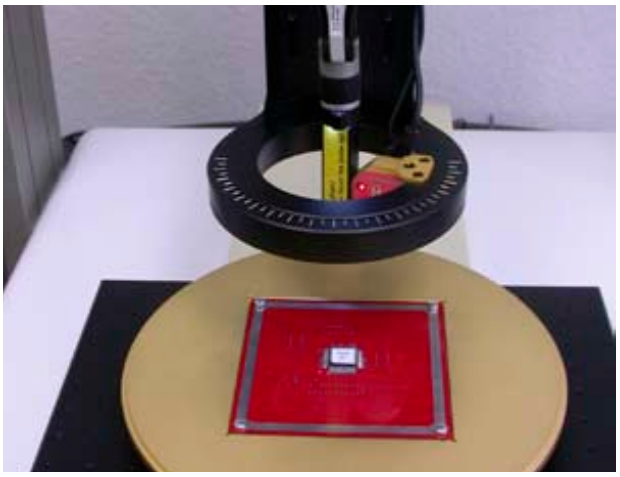
GND 25

above TEM cell print or IC on a PCB

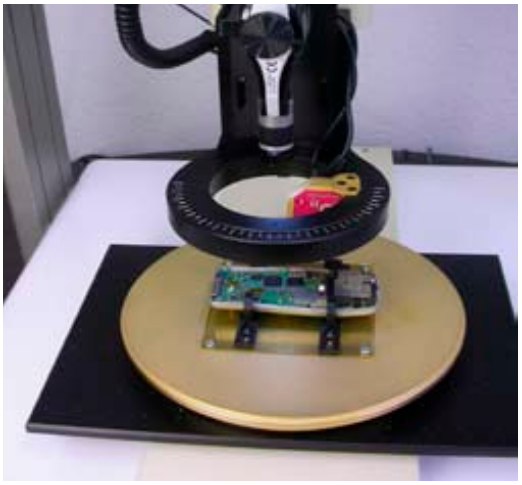


Test setup of IC Scanner FLS 102
with an universal PCB holder (UH-DUT).

A circular solid state circuit board
is mounted on the PCB holder and
fixed with claw fasteners.



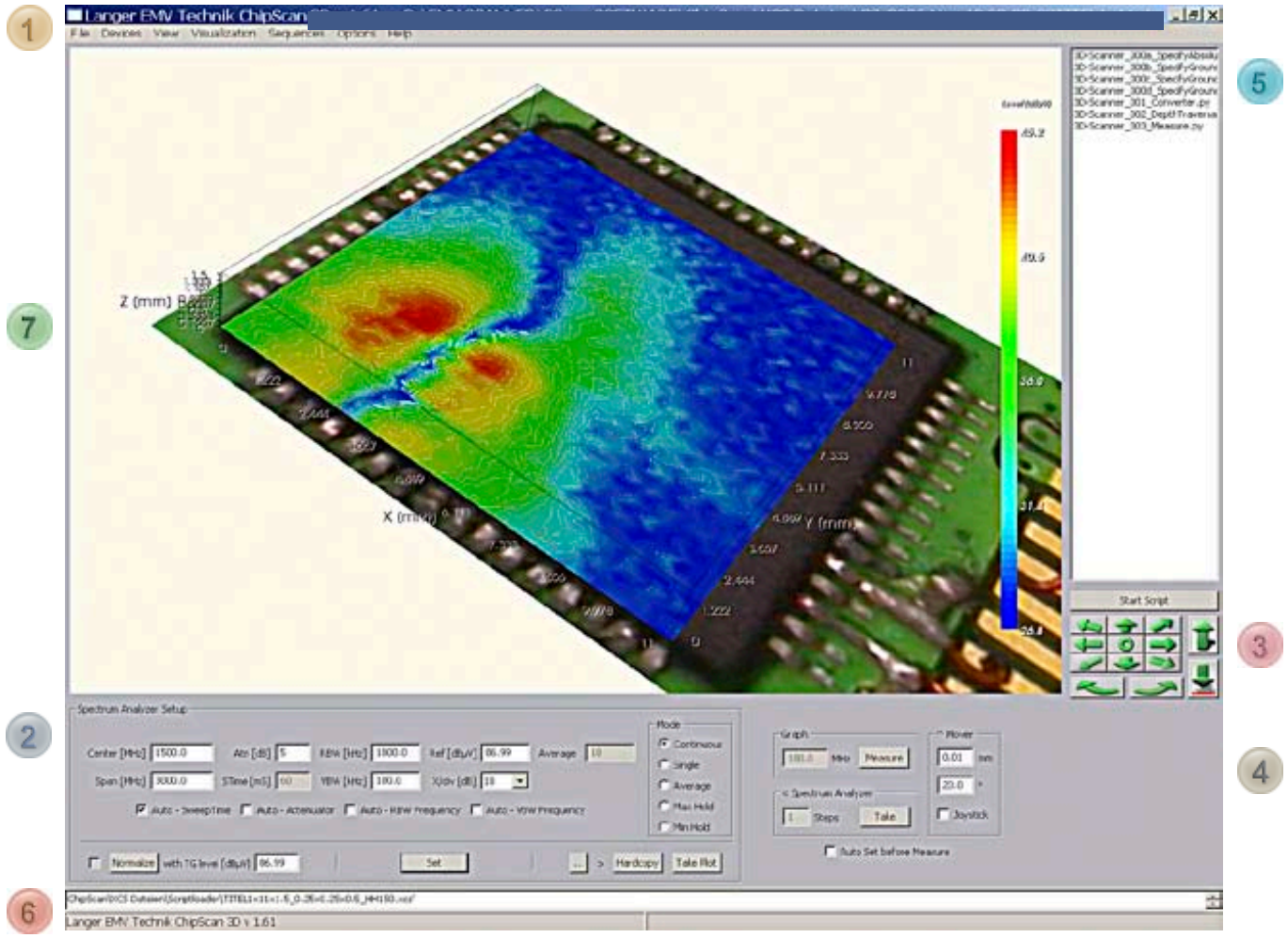
TEM Cell prints can be fixed on
the ground plane GND 25.



Small PCB applications are controled
and fixed by an adapter with
claw fasteners.

The IC scanner from Langer EMV-Technik is operated and controlled with the modular „ChipScan“ program system. The device manager initialises the connected measuring and control devices when the program is started. After this the measurement data ranges can be set for the spectrum analyser and the positioning system via the program‘s user interface. The command control set (script) is now started to execute the measuring algorithms. All measurements are carried out automatically. The measured data can be displayed in the visualisation area in real time.

User interface when the program is started:



Graphical User Interface (GUI) of the modular „ChipScan“ program system

Areas of the user interface:

1. Menu bar
2. Spectrum analyser setup to set up the device via the user interface
3. Graphic joystick to manually guide the positioning device (x, y, z, α)
   (Options: setting the step width in µm and degrees)
4. Spectrum analyser measure for individual measurements
5. Script window and start button for scripts
   (Command scripts for mover control and measuring algorithms)
6. Output window for program messages and alphanumeric script output
7. Visualisation range for 2D and 3D graphics of the measuring results
   (Options in the View and Visualisation menu)

Device initialisation (device manager):
The device manager initialises all connected devices when the program is started. (Menu – Devices – Device Manager – Scan – OK)
The result of the link set-up is displayed as a program message.

The spectrum analyser operating parameters are set for the respective measurement.
The settings carried out on the user interface are sent to the spectrum analyser by the „set“ command.

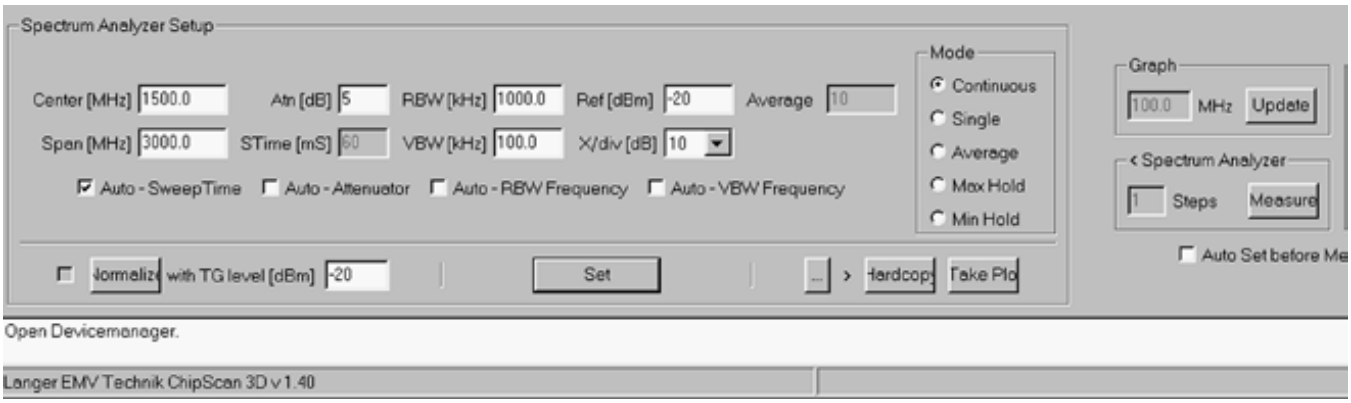


Figure 2: Spectrum analyser set-up data

Control of the positioning device (x, y, z, α)
The near-field microprobe is manually moved to the initial measurement position with the graphic joystick.

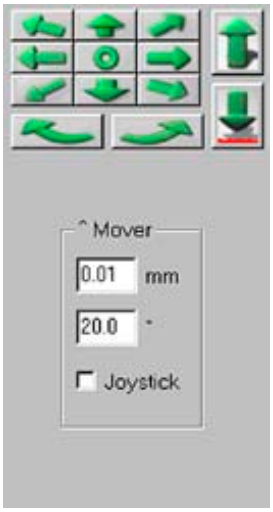


Figure 3: Manual mover control with graphic joystick

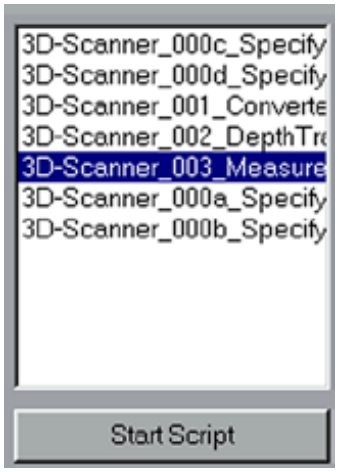


Figure 4: Script window and start button

The command control set (script) for the scheduled measurement is chosen in the script window and started. The measurement process is executed in accordance with the script as a point, line or volume scan.

Possible measurement algorithms are:
- free programable scans through a user definedset of control commands (scripts)

Following measurement algorithms are ready to use:
- point scan
- line scan
- surface scan
- volume scan

Display of the measurement results
The measured spectra are displayed three-dimensionally in the visualisation area in real time during the measurement. The user may choose between a large amount of diffrent views to display the measured curves.

- 2D-view of a set ot measured curves
- 3D-graphics can be viewed from any angle
- 3D-graphics can be zoomed and shifted
- 3D-graphics can be converted into two-dimensional graphics
- Hardcopy function of the measured frequency spectrum
- Export of individual sweeps to Excel (Take plot)
  Export of 2D- and 3D-graphics to Excel
- Save Image Function (*.png, *.jpg, *.tiff)

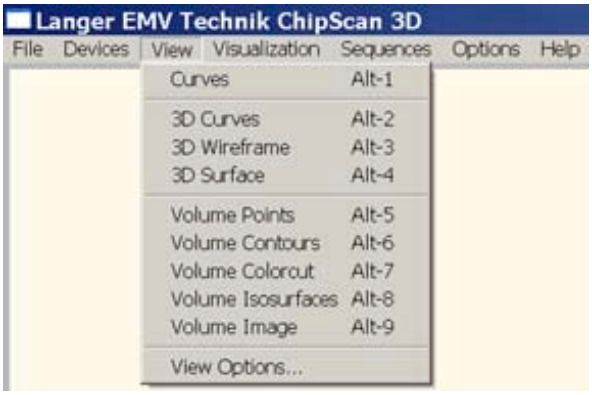


Figure 5: Display of the measurement results

With the data manager in the „Visualisation“ menu a set of measured curves may be selected. Also each curve may be altered in its type of display:

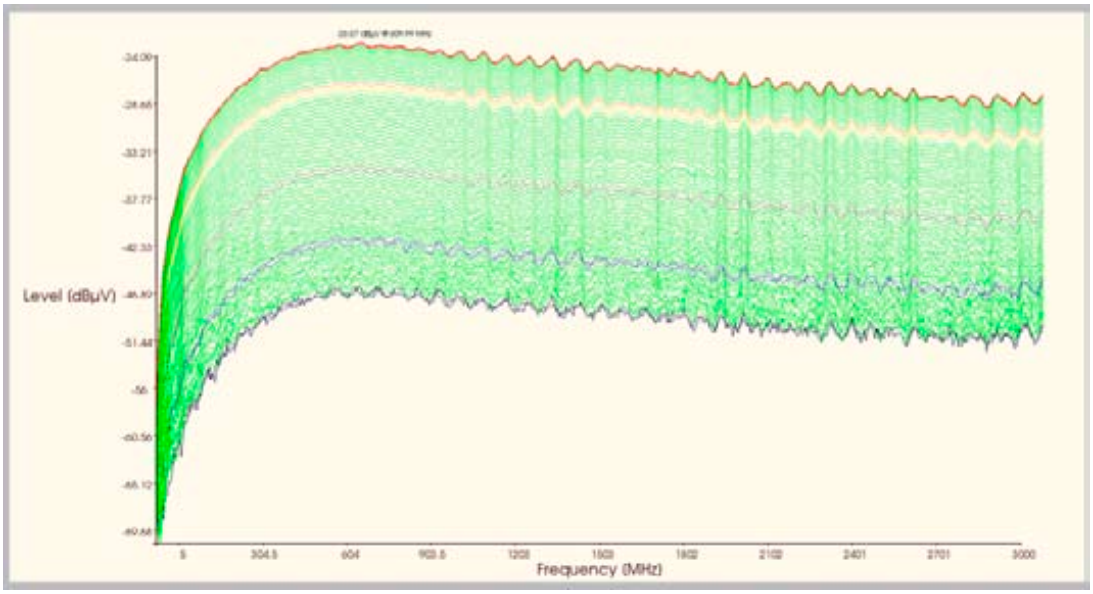


Figure 6: 2D-view of a set ot measured curves

Measurement of the radiated emission of the test IC with the surface scan method IEC 61967-3 using near-field microprobes

The measuring spatial points are defined. At every point the radiated emission up to 3 (6) GHz is meassured.

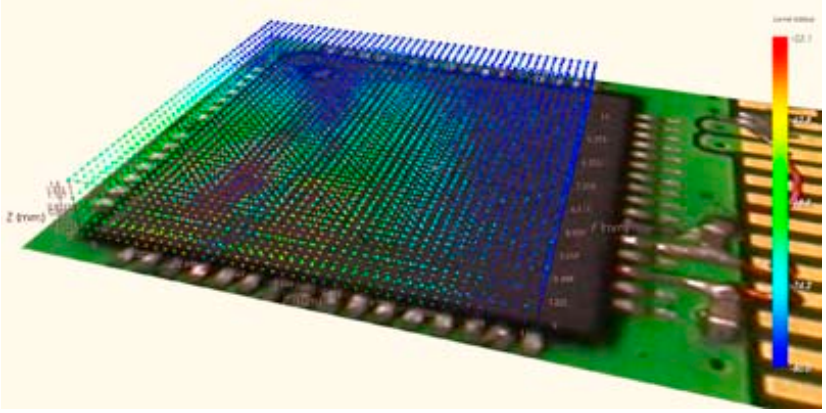


Fig. 7:
Scan volume and measuring range (menu: View – Volume Points Alt-5)

Visualization of the magnetic emission over the scanned IC-area (red: high level). The displayed surface can be moved with the cursor in z-axis.

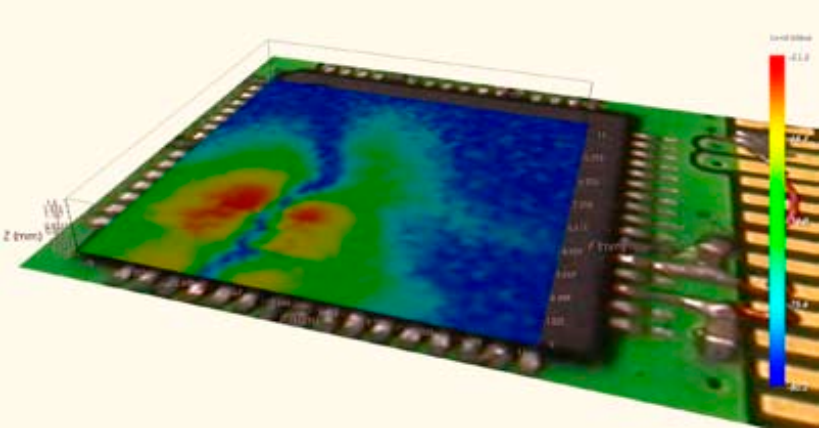


Fig. 8:
Magnetic field of measuring range displayed as colorcut (menu: View – Volume Colorcut Alt-7)

Additionally the colorcut surface may be spinned by 90° and be dragged over the IC. Fig. E9 shows several equidistant snap shots of the magnetic near field. .

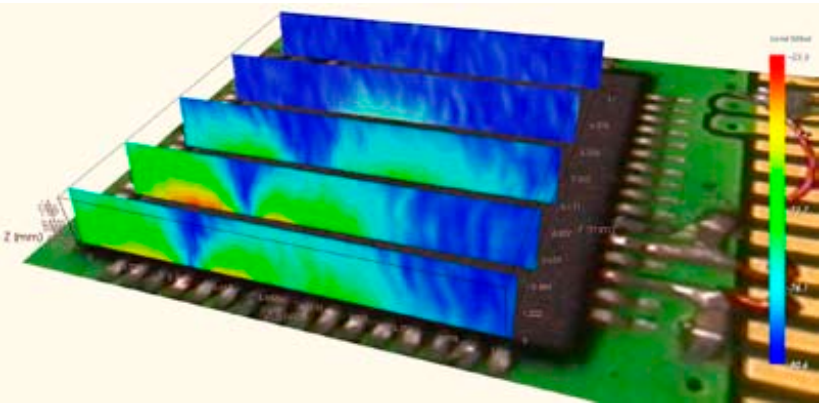


Fig. 9: Magnetic field of measuring range displayed as equidistant colorcuts (menu: View – Volume Colorcut Alt-7))

Spatial visualization of the magnetic field as ISO-surfaces displays equal magnetic field intensities with different colors.

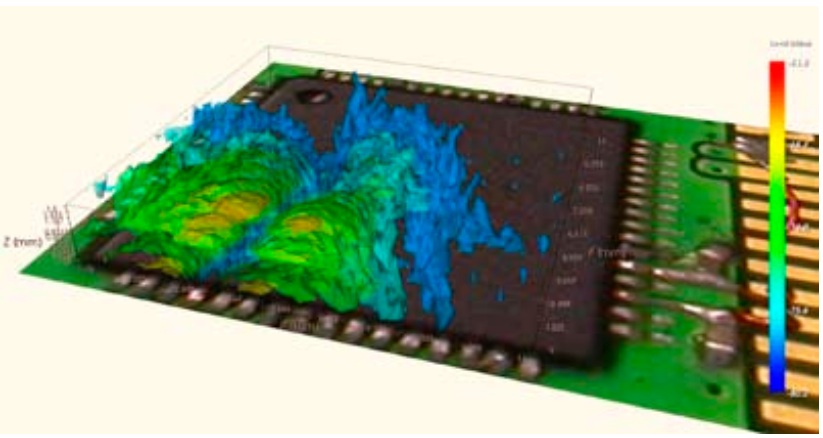


Fig. 10: Magnetic field of measuring range displayed as ISO-surfaces (menu: View-Volume Isosurfaces Alt-8)

The surface scan method is a technique of measuring the radiated emissions from ICs by evaluating the near-field electromagnetic component over the surface of the package or the die in the frequency range up to 3 or 6 GHz. In order to perform such an evaluation, the IC is scanned by near-field microprobe.

This method is capable of providing a detailed pattern of the emission sources within the DUT with a spatial resolution that depends from both the precision of the mechanical positioning system and the employed near-field micro probe. Our technology allows spatial resolution of ICR HH 150 of 100 µm and mechanical precision of ICS 103/105 and FLS 102 up to 10 µm.

In example 1 the surface scan method is used on a mobile phone. Measurement is a “Volume Scan” of an IC area of mobile phone.

Example 1: Volume Scan of a IC area on a mobile phone

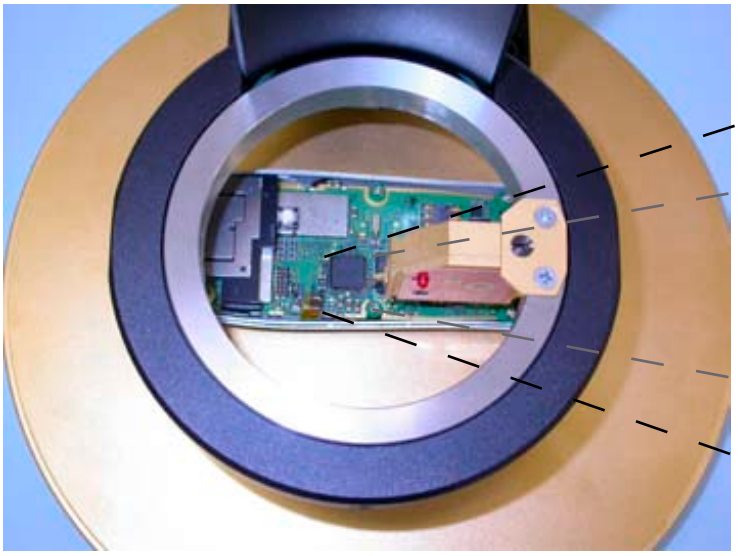


Fig. E1: DUT adapted to the GND-plane

Fig. E2: Zoomed measuring IC area

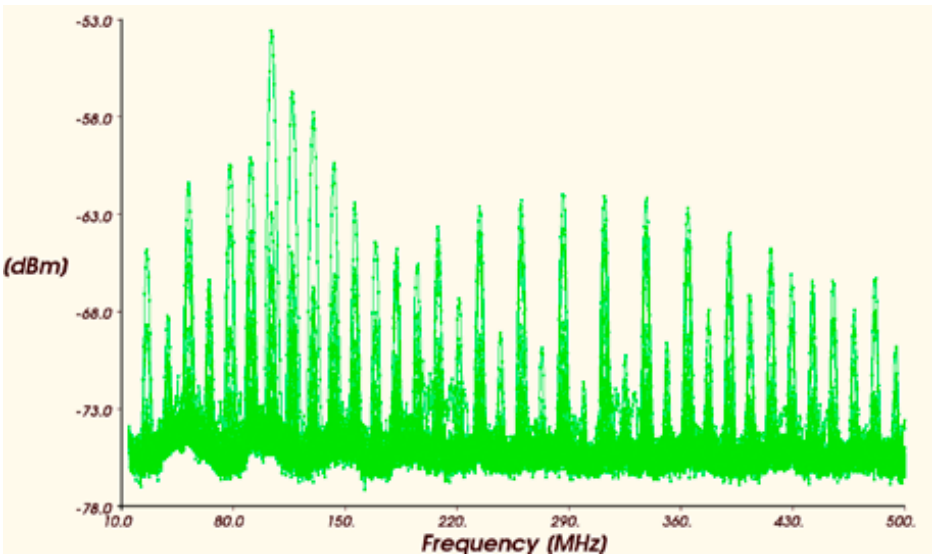


Fig. E3: 2D-graphic of an a array of measured spectra (menu: View - Curves Alt-1)

The DUT has to be mounted onto the ground plane GND 25. It is adapted to the Connection Board CB 0706 via sixty point connector. The near-field microprobe is mechanically scanned by means of a PC-controlled probe positioning system. In particular, the probe is scanned over the DUT surface according to a programmed pattern while an automatic acquisition system enables the control of the scan parameters.

Measuring range and spatial points are defined as input information to the program.

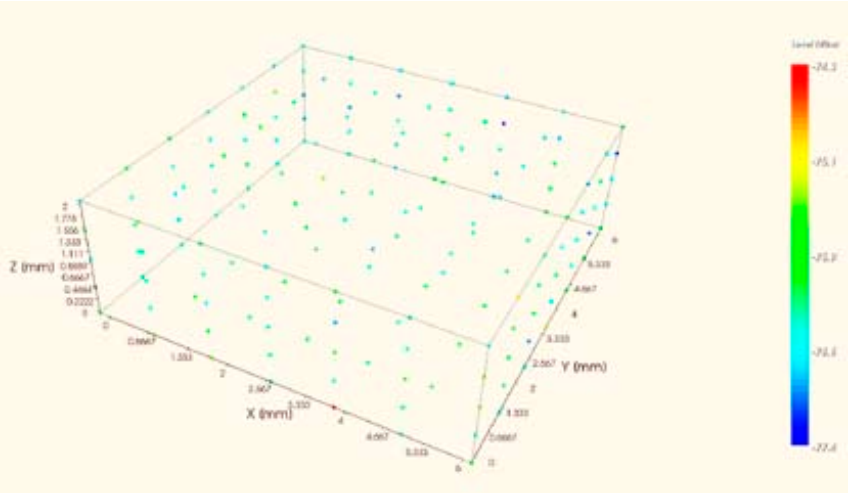


Fig. E4:
Scan volume and measuring range (menu: View – Volume Points Alt-5)

Visualization of magnetic emission over the scanned IC-area (red: high level). The displayed surface can be moved in z-direction.

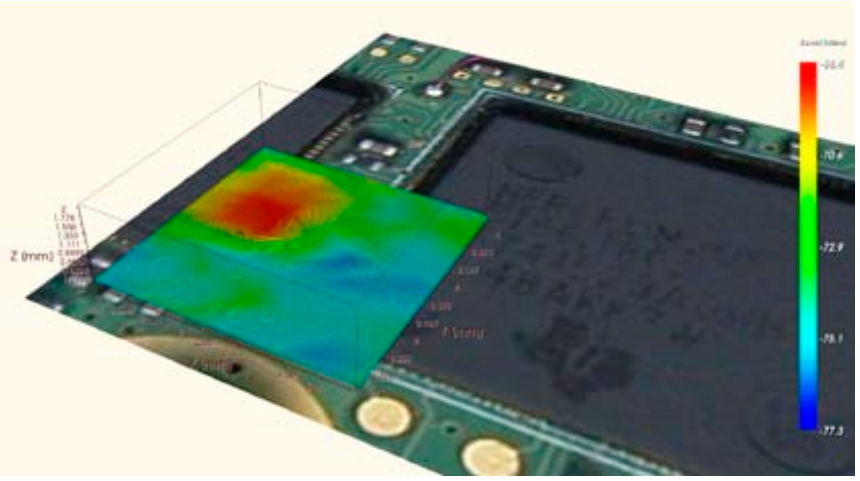
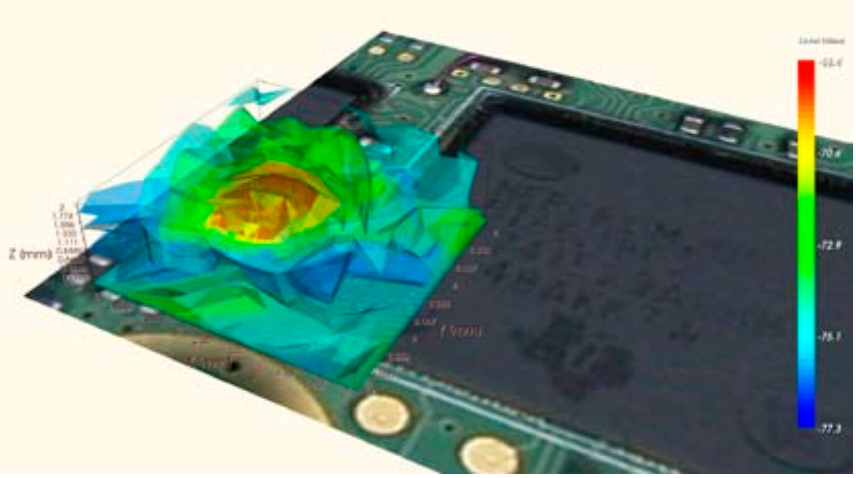


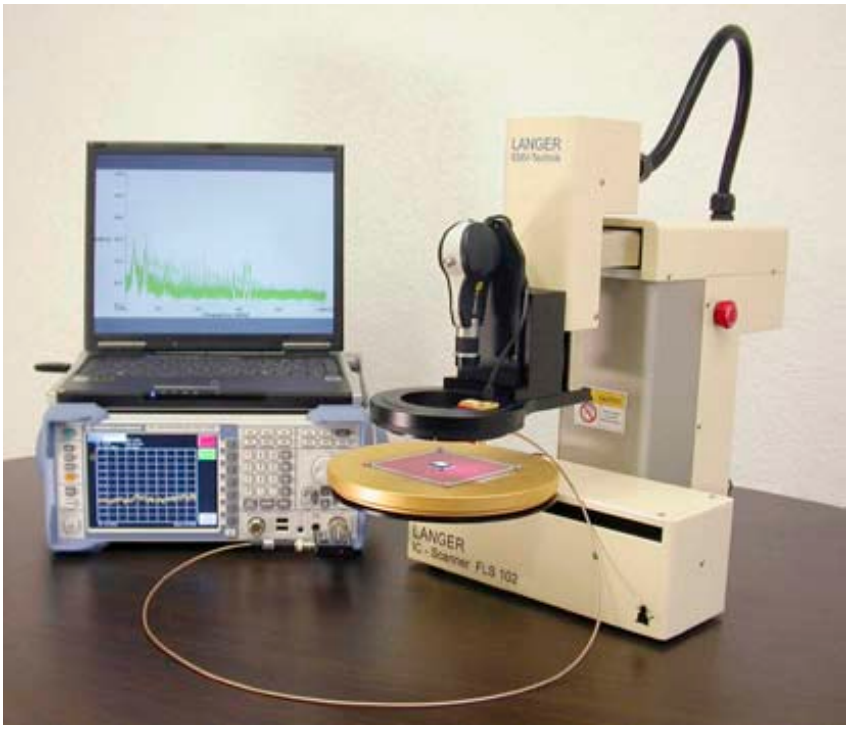
Fig. E5:
Magnetic field of measuring range displayed as colorcut (menu: View – Volume Contours and Colorcut Alt-6 and Alt-7)

Spatial visualization of the magnetic field as ISO-surfaces shows the constant magnetic field intensities with different colors.

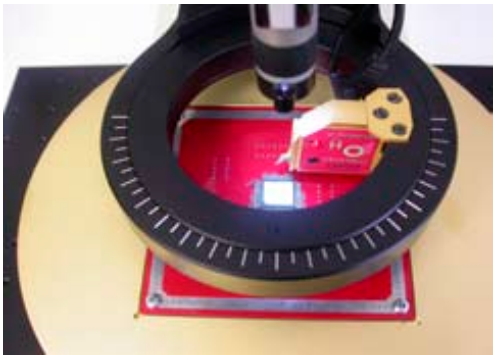


Fig, E6:
Magnetic field of measuring range displayed as ISO-surfaces (menu: View-Volume Isosurfaces Alt-8)

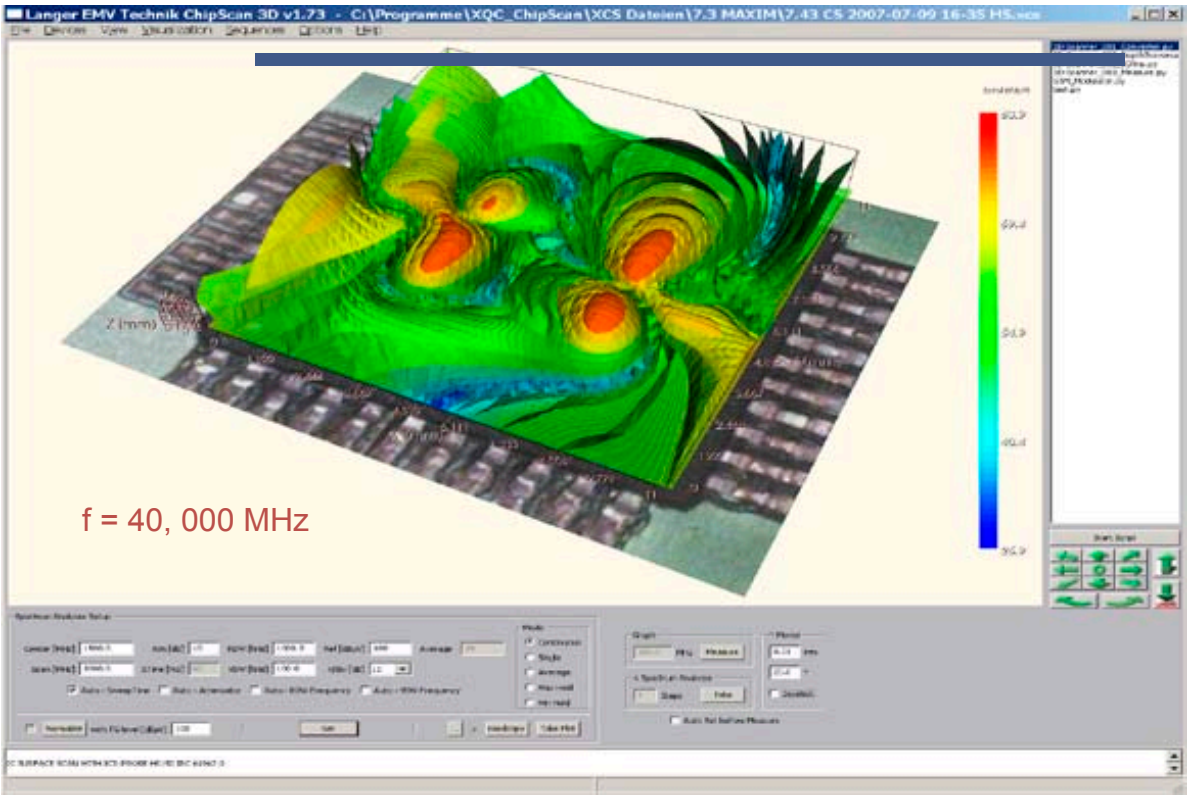
with high resolution and accuracy



IC Scanner System FLS 102



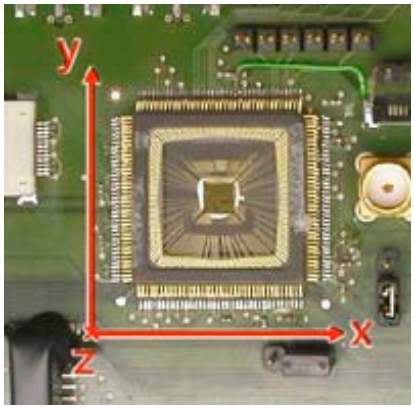
The ICR probe moves in steps of µm above the test IC.



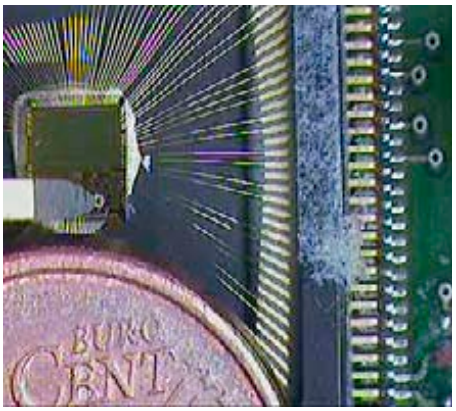
At the result of measurement the ChipScan software displays the spatial amplitude / frequency characteristic of the magnetic near field.

with high resolution and accuracy

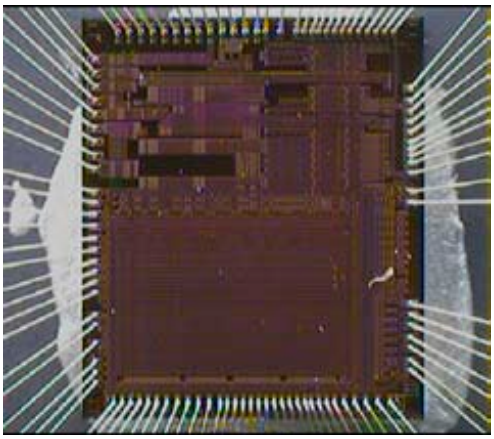
IC Scanner System FLS 102 with DIE test adapter



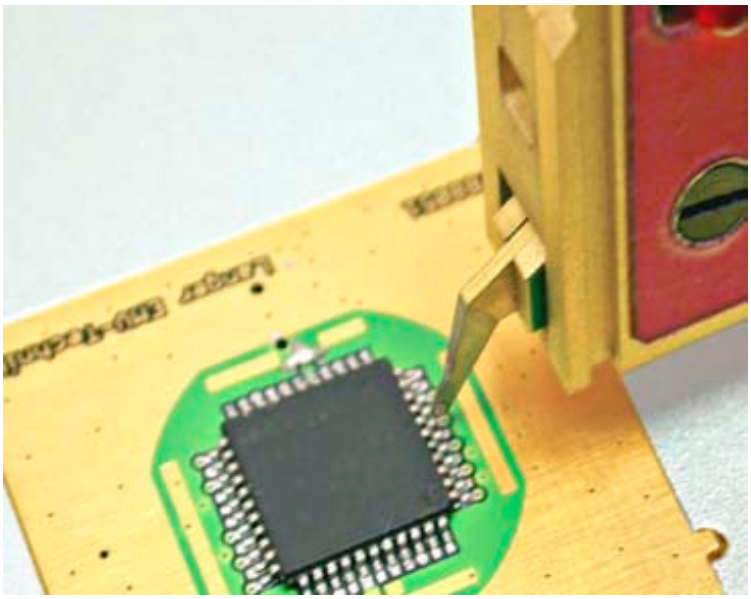
Surface scan with near-field microprobe above the DIE



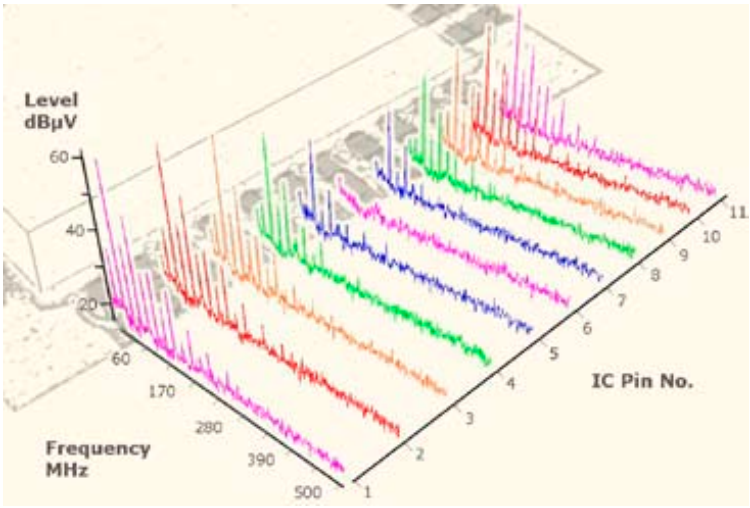
3D Volume scan of the magnetic near field area above the DIE



In this application the emission of an IC-Pin is be measured as a near-field above the IC-Pin. The emission is measured step by step above several IC-Pins.
The measurement is done with the HV or E-field probe.



The results of the near-field scan are shown in ChipScan. IC-Pins with a high emission are visible.
The RF near-fields are source of radiated emission on a PCB. With the knowledge of the IC-Pin Scan this emission can be reduced beforehand, e.g. by using filters on the according pins.

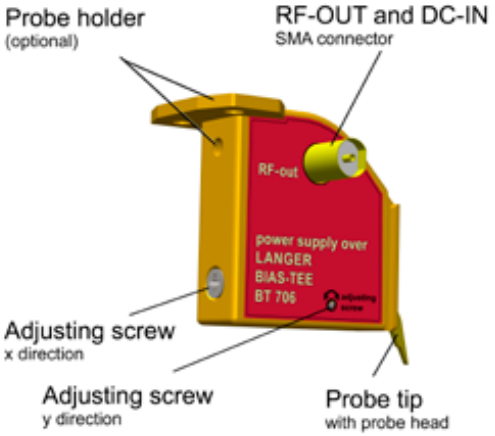


Probe types	Inside diameter	Orientation	Measuring range
ICR HV 100-27	100 µm	 vertical	1.5 MHz to 6 GHz
ICR HV 100-6			2.5 MHz to 6 GHz
ICR HH 100-27	100 µm	 horizontal	1.5 MHz to 6 GHz
ICR HH 100-6			2.5 MHz to 6 GHz
ICR HV 150-27	150 µm	 vertical	1.5 MHz to 6 GHz
ICR HV 150-6			2.5 MHz to 6 GHz
ICR HH 150-27	150 µm	 horizontal	1.5 MHz to 6 GHz
ICR HH 150-6			2.5 MHz to 6 GHz
ICR HV 250-75	250 µm	 vertical	500 kHz to 2 GHz
ICR HV 250-6			2.5 MHz to 6 GHz
ICR HH 250-75	250 µm	 horizontal	500 kHz to 2 GHz
ICR HH 250-6			2.5 MHz to 6 GHz
ICR HV 500-75	500 µm	 vertical	200 kHz to 1 GHz
ICR HV 500-6			2 MHz to 6 GHz
ICR HH 500-75	500 µm	 horizontal	200 kHz to 1 GHz
ICR HH 500-6			2 MHz to 6 GHz
ICR E 150	150 µm x 35 µm	 horizontal	7 MHz to 3 GHz

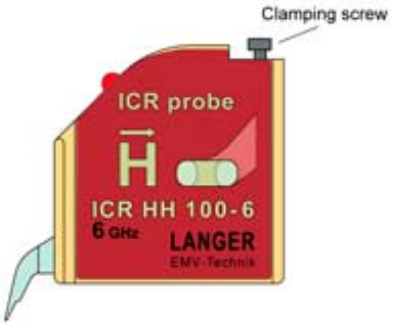
ICR near-field microprobe
The ICR probe comprises
- probe case with integrated amplifier,
- clamping and adjusting screws,
- probe tip with probe head.

Power supply:
- via BT 706 Bias-Tee from LANGER

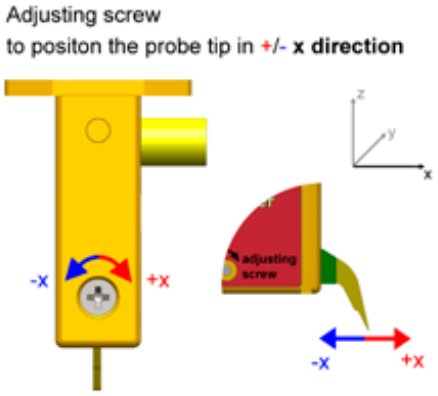
Attention! The ICR probe‘s design makes it sensitive to shocks, which is why it is delivered with a protective shipping and handling cover..



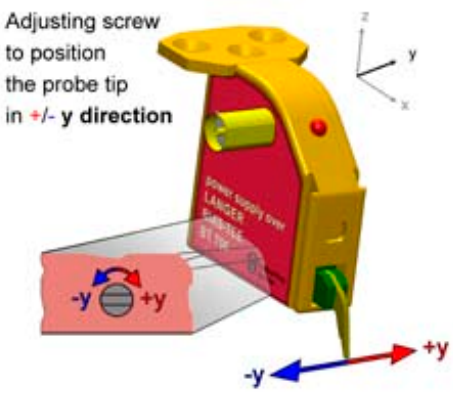
Clamping screw:
to fasten the enclosed probe holder or to fix the probe in connection with an alternative probe mover.



Adjusting screw 1:
to adjust the probe head in the centre of the rotary unit.
to position the probe tip in the x-direction;
the adjustment path in the x-direction is +/- 1 mm.

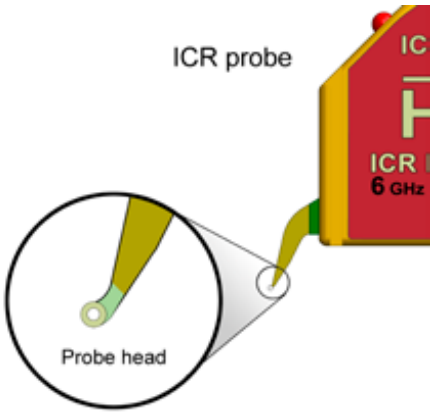


Adjusting screw 2:
to adjust the probe head in the centre of the rotary unit.
to position the probe tip in the y-direction;
the adjustment path in the y-direction is +/- 1 mm.



Probe tip
The probe tip protrudes from the amplifier case The ICR probe can thus be positioned optically above the DUT.

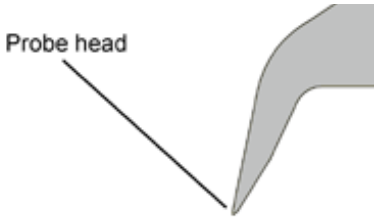
Probe head
The probe head is the sensor element of the near-field microprobe.
Horizontal and vertical probe heads are available with different inner diameters to measure the magnetic field.



Probe protection

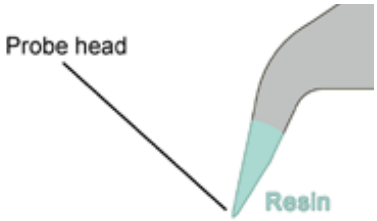
- without protection
(ideal for positioning with an IC scanner)

The probe head gets closer to the measurement object and measures higher signal intensities.
The probe head is more easily visible to allow its exact positioning relative to the object to be measured.



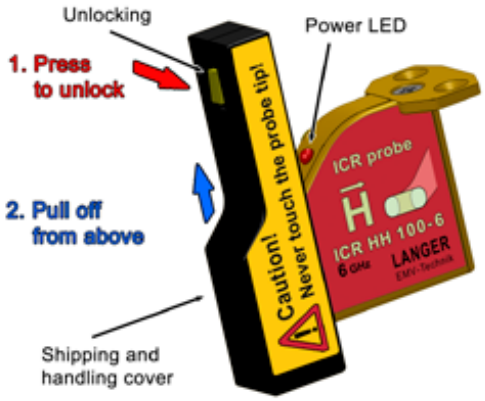
- with protection
(ideal for manual positioning)

The probe head is reinforced with resin.
The probe head's stability is increased and helps prevent damage.



Removing the shipping and handling cover
Refer to the figure on the right on how to remove the shipping and handling cover. Refit the protective cover before packing the probe away.

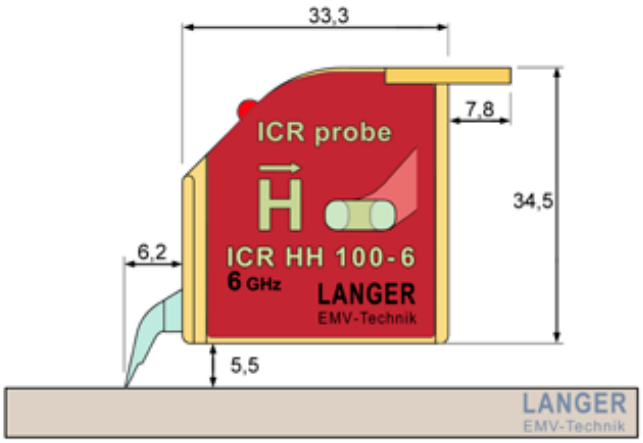
The power LED shows the probe's power supply via the Bias Tee.



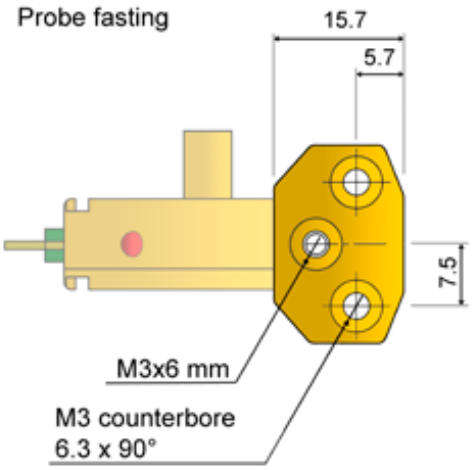
BT 706 Bias Tee
The power to the integrated amplifier is supplied via a bias tee. The BT 706 stabilises the ICR probe's power supply (9 V, 100 mA).

Frequency range: 500 kHz to 6 GHz
Connection: SMA connector
Power supply: 12 V / 70 mA plug-in power supply unit
Note:
The bias tee from LANGER EMV-Technik GmbH has an integrated voltage stabilisation to 9 V. Consequently, the ICR probes can only be used with this bias tee.

Front view
Details of:
- probe type
- resolution
- frequency range



Top view
The probe is delivered with a holder so that it can be fitted to the scanner from LANGER EMV-Technik GmbH.



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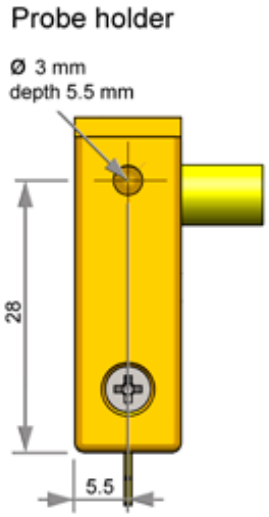
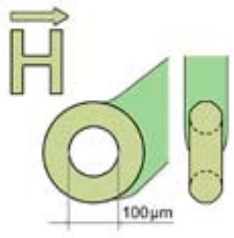
Rear view
As an alternative, the probe can also be connected to a probe mover.
There is an opening under the scanner holder for this purpose.



Probes	Characteristic

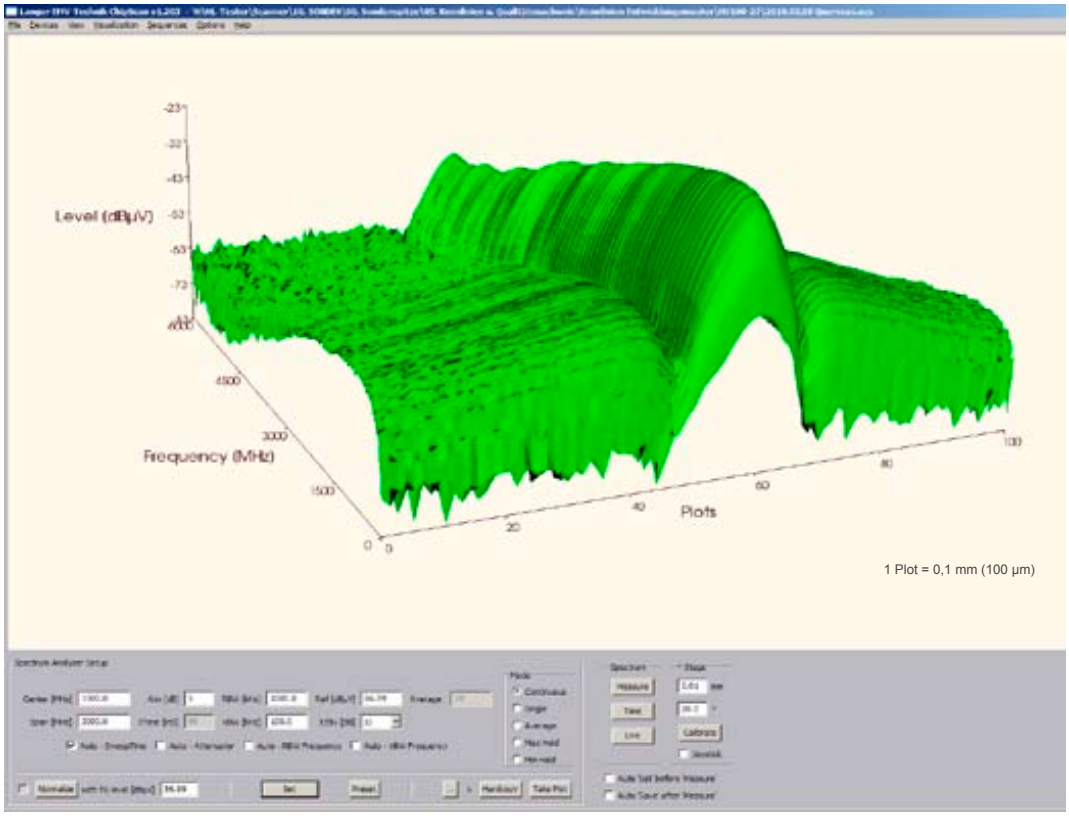


H field probes

ICR HV 100-27
1.5 MHz - 6 GHz

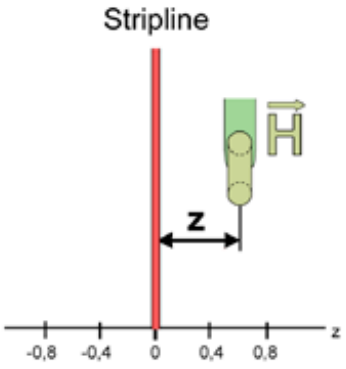
ICR HV 100-6
2.5 MHz - 6 GHz

- Resolution 60 µm
- Vertical measuring coil
- Inside diameter 100 µm
- Screened measuring coil

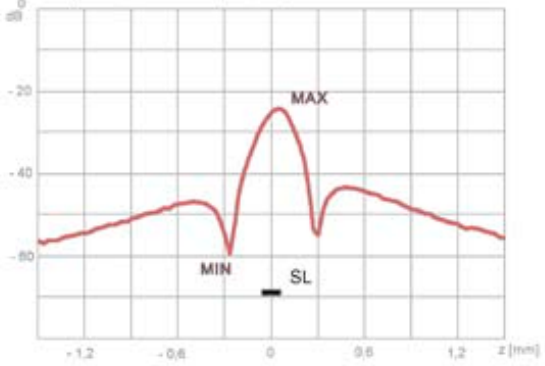


Transverse profile

Position z of the HV probe variable relative to the strip line SL

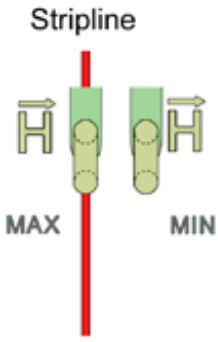


ICR HV 100 on 20 µm strip line
Transverse profile, distance 10 µm, frequency 500 MHz, step width 20 µm

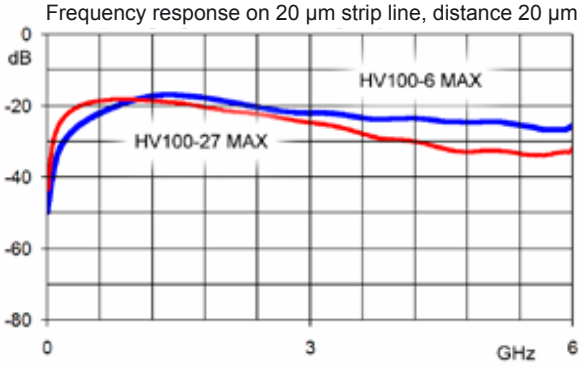


Frequency response

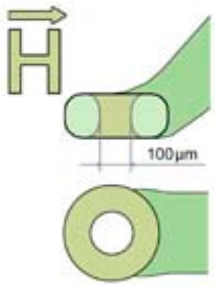
of the HV probe measured at minimum and maximum



ICR HV 100-27 and HV 100-6
Frequency response on 20 µm strip line, distance 20 µm



Probes	Characteristic



H field probes

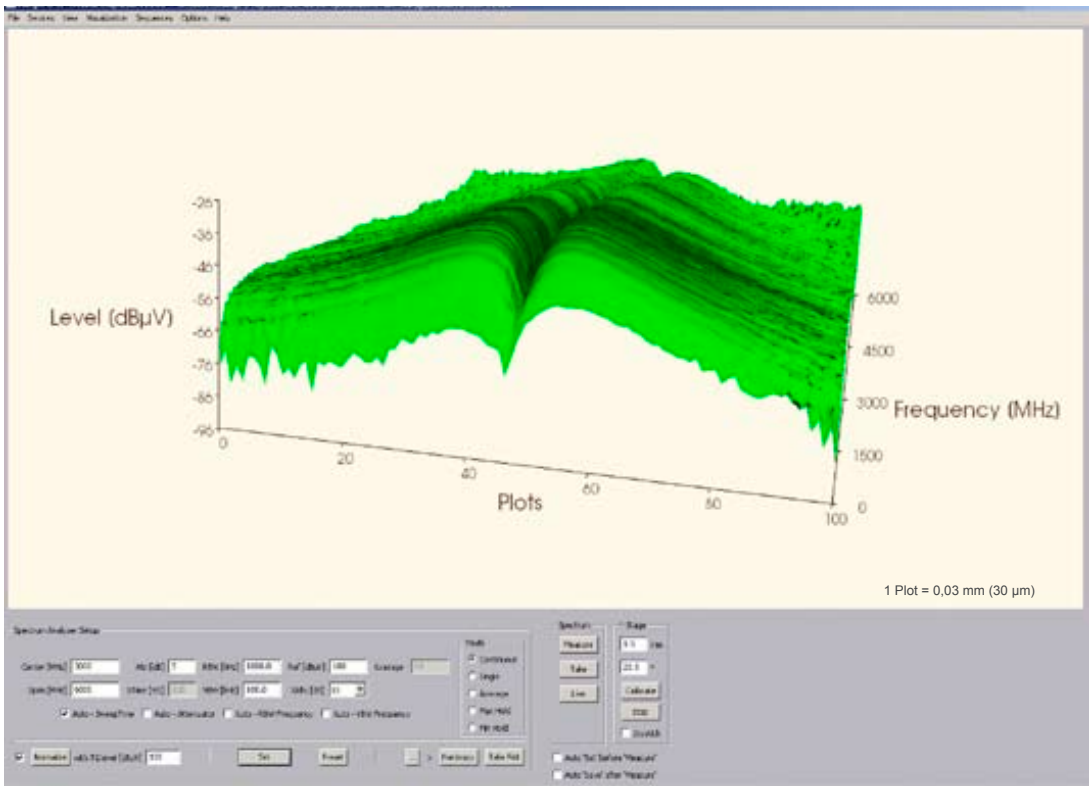
ICR HH 100-27

1.5 MHz - 6 GHz

ICR HH 100-6

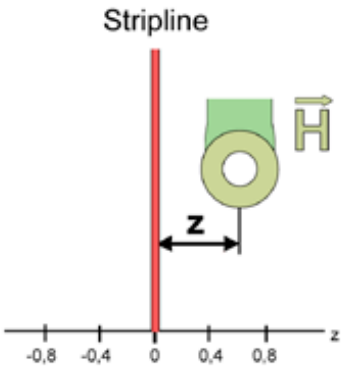
2.5 MHz - 6 GHz

- Resolution 70 µm
- Horizontal measuring coil
- Inside diameter 100 µm
- Screened measuring coil

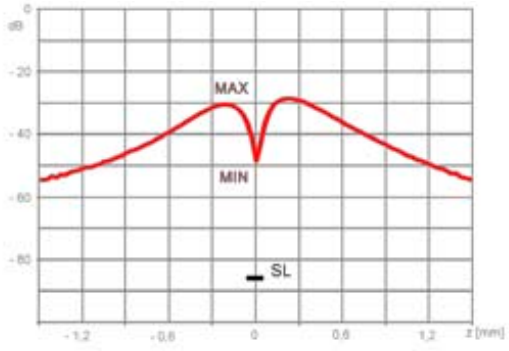


Transverse profile

Position z of the HH probe variable relative to the strip line SL

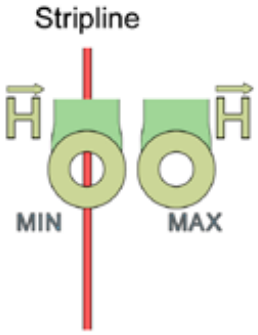


ICR HH 100 on 20 µm strip line
Transverse profile, distance 10 µm, frequency 500 MHz, step width 20 µm

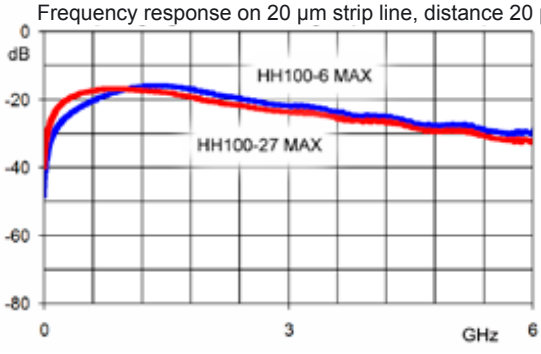


Frequency response

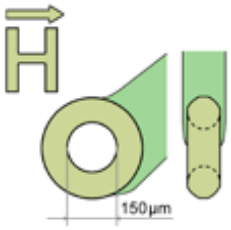
of the HH probe measured at minimum and maximum



ICR HH 100-27 and HH 100-6
Frequency response on 20 µm strip line, distance 20 µm



Probes	Characteristic

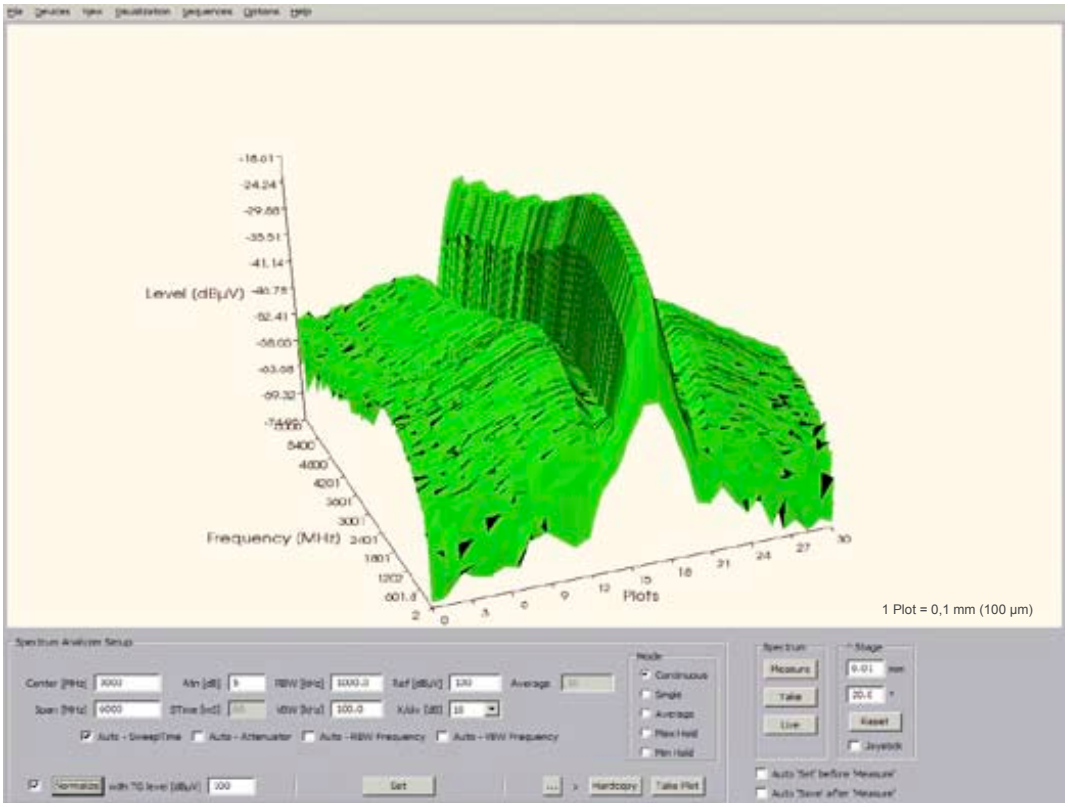


H field probes

ICR HV 150-27
1.5 MHz - 6 GHz

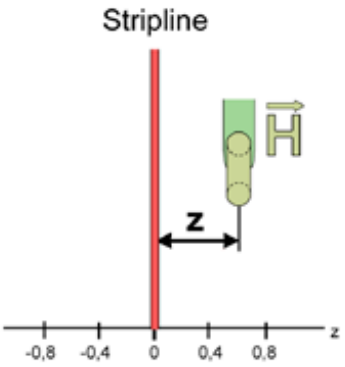
ICR HV 150-6
2.5 MHz - 6 GHz

- Resolution 80 µm
- Vertical measuring coil
- Inside diameter 150 µm
- Screened measuring coil

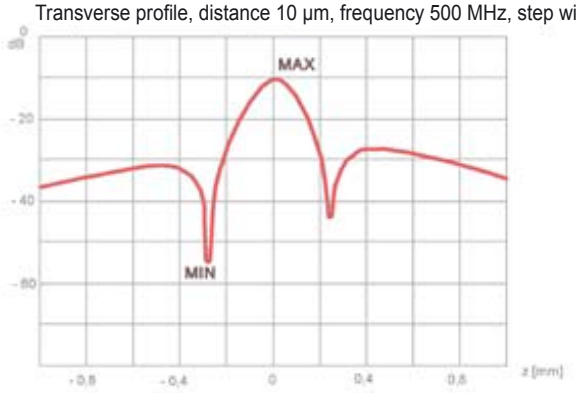


Transverse profile

Position z of the HV probe variable relative to the strip line SL

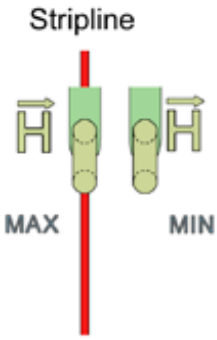


ICR HV 150 on 20 µm strip line
Transverse profile, distance 10 µm, frequency 500 MHz, step width 20 µm

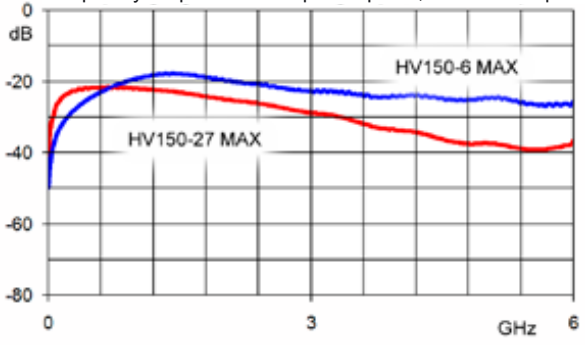


Frequency response

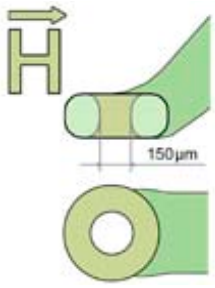
of the HV probe measured at minimum and maximum



ICR HV 150-27 and HV 150-6
Frequency response on 20 µm strip line, distance 20 µm



Probes	Characteristic



H field probes

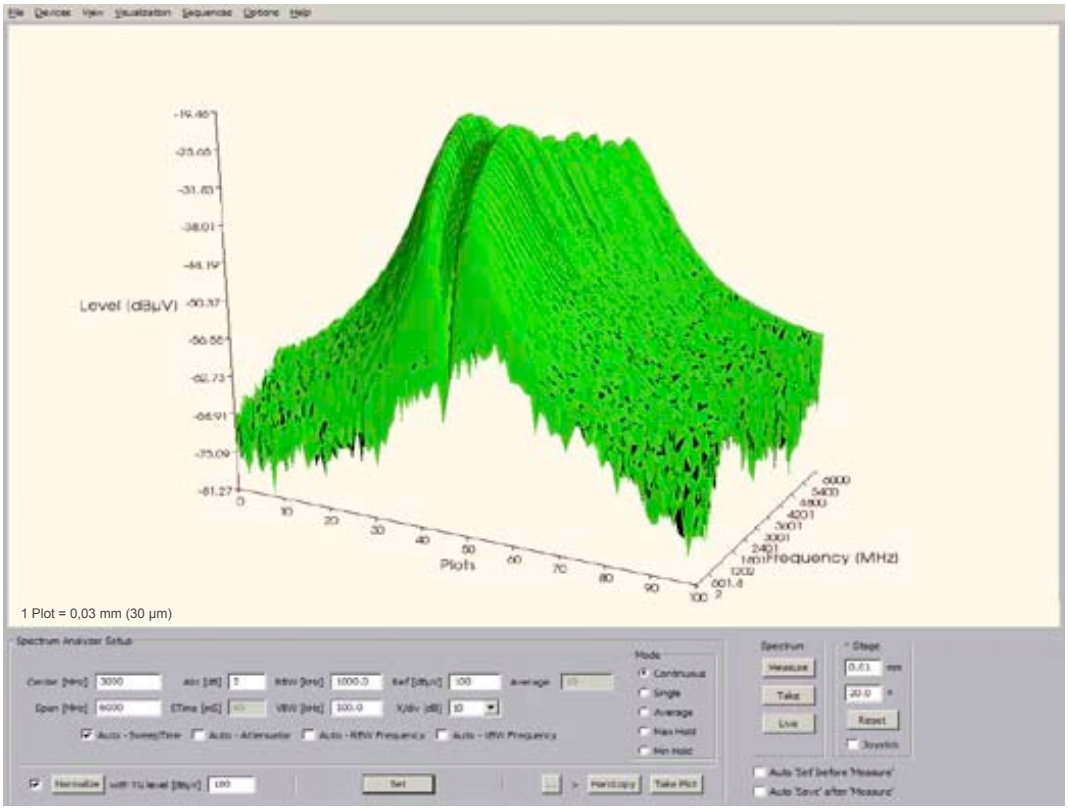
ICR HH 150-27

1.5 MHz - 6 GHz

ICR HH 150-6

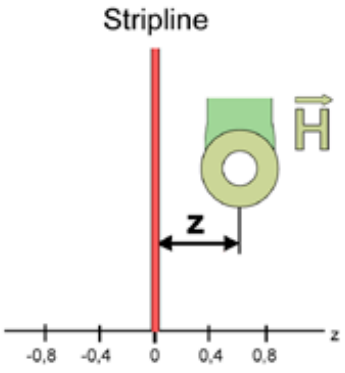
2.5 MHz - 6 GHz

- Resolution 100 µm
- Horizontal measuring coil
- Inside diameter 150 µm
- Screened measuring coil

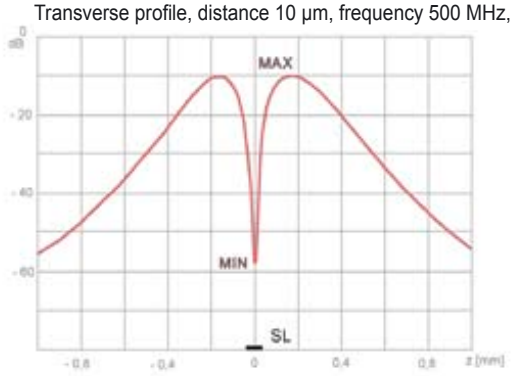


Transverse profile

Position z of the HH probe variable relative to the strip line SL

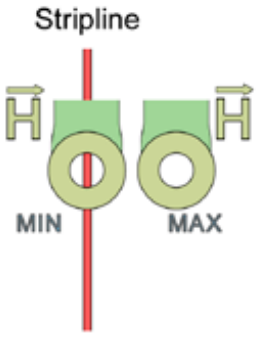


ICR HH 150 on 20 µm strip line
Transverse profile, distance 10 µm, frequency 500 MHz, step width 20 µm

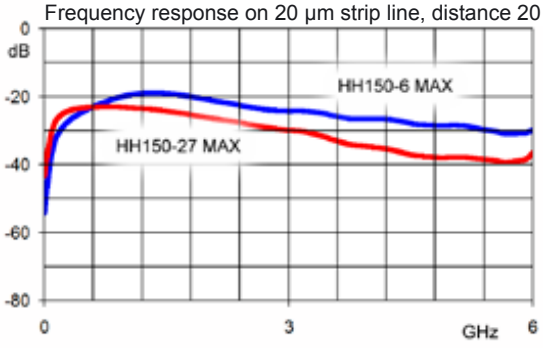


Frequency response

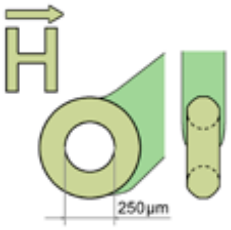
of the HH probe measured at minimum and maximum



ICR HH 150-27 and HH 150-6
Frequency response on 20 µm strip line, distance 20 µm



Probes	Characteristic

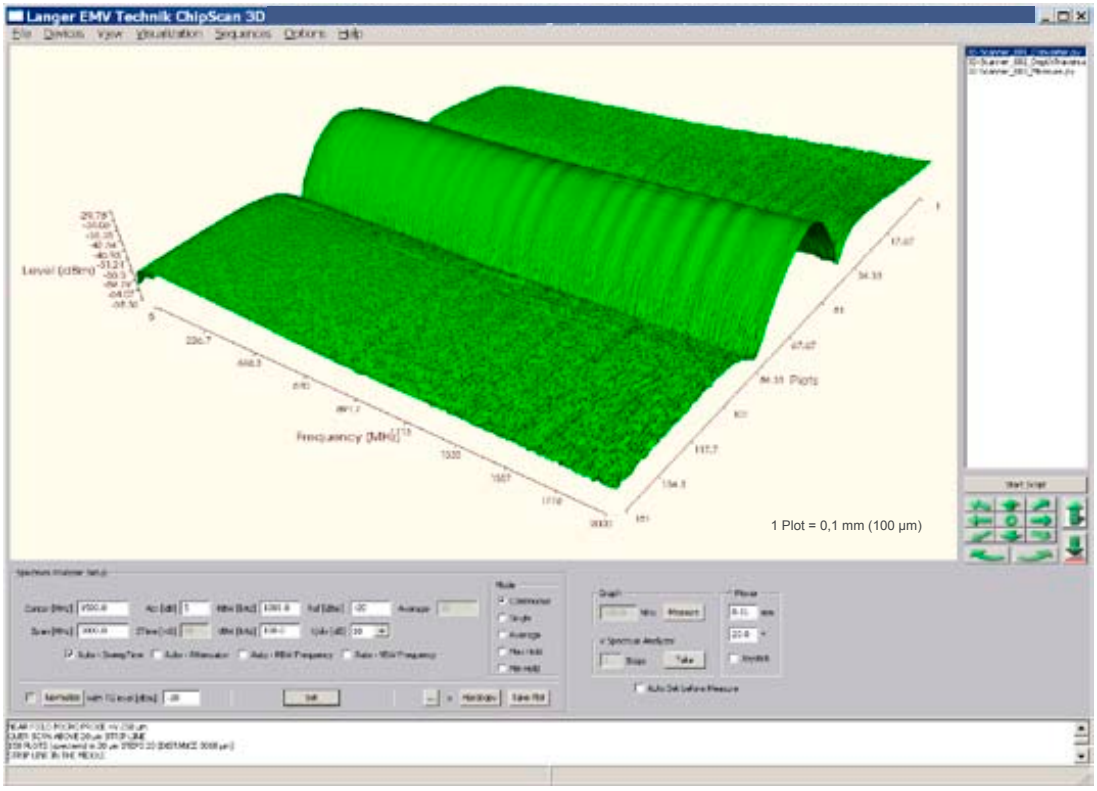


H-field probes

ICR HV 250-75
500 kHz - 2 GHz

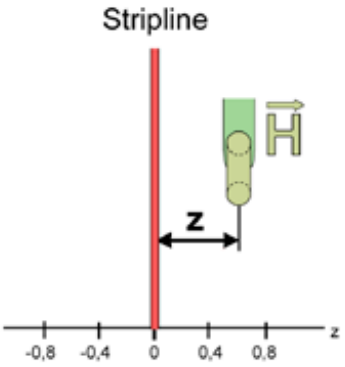
ICR HV 250-6
2.5 MHz - 6 GHz

- Resolution 110 µm
- Vertical measuring coil
- Inside diameter 250 µm
- Screened measuring coil

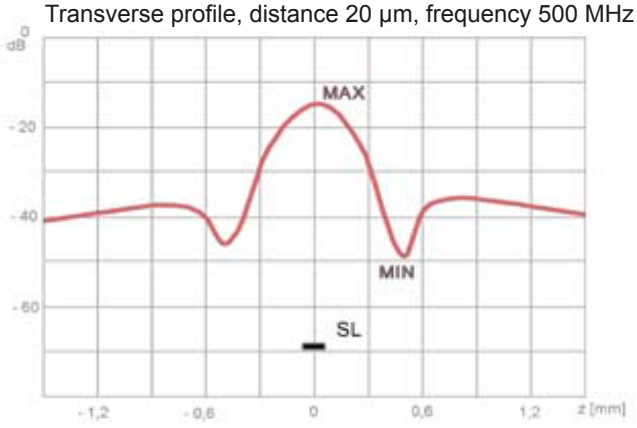


Transverse profile

Position z of the HV probe variable relative to the strip line SL

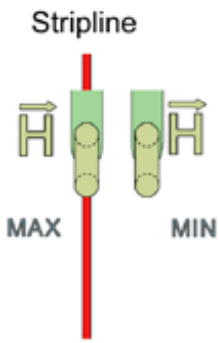


ICR HV 250 on 20 µm strip line
Transverse profile, distance 20 µm, frequency 500 MHz

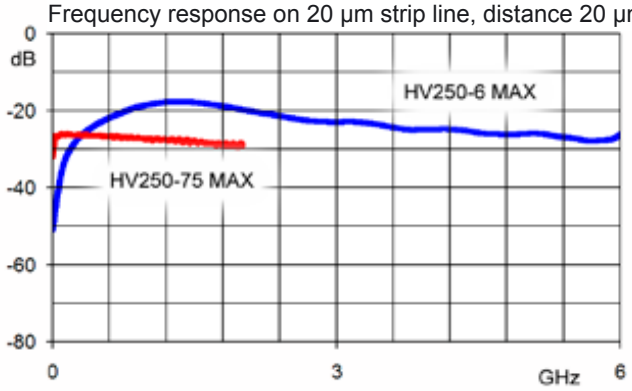


Frequency response

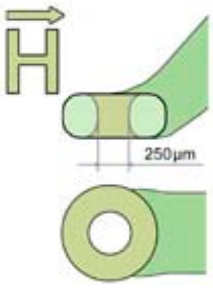
of the HV probe measured at minimum and maximum



ICR HV 250-75 and HV 250-6
Frequency response on 20 µm strip line, distance 20 µm



Probes	Characteristic

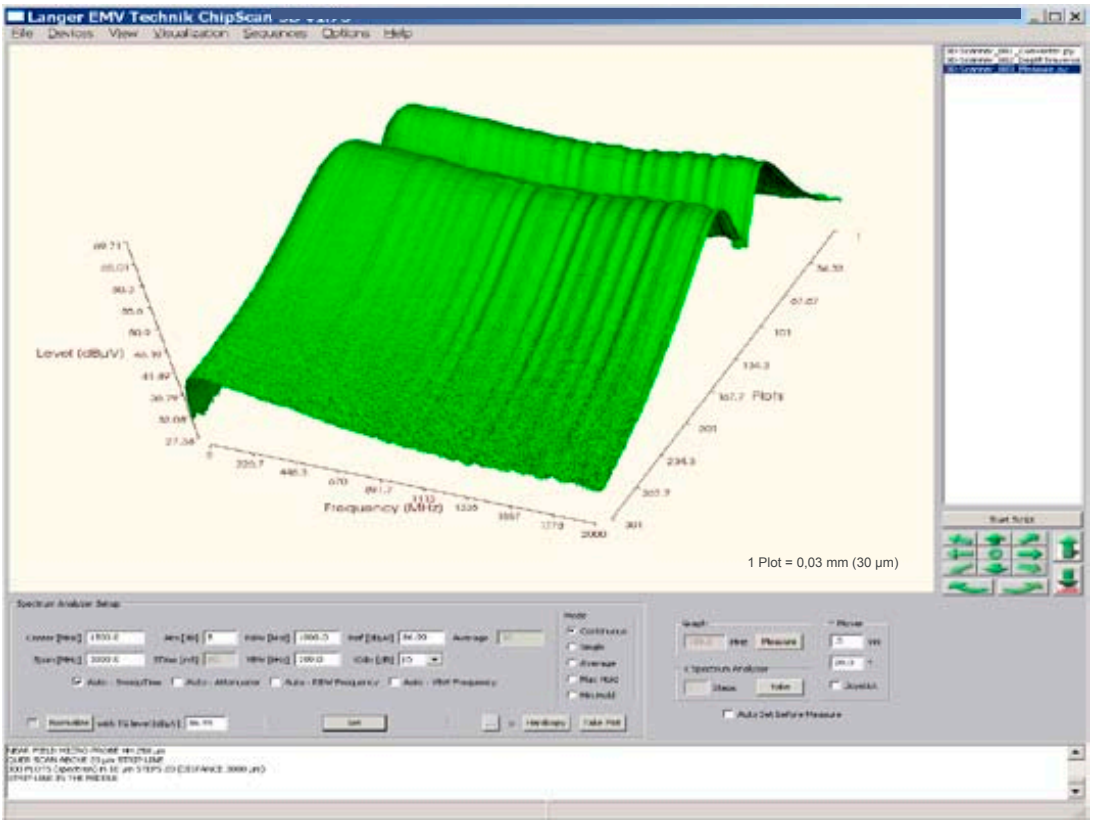


H-field probes

ICR HH 250-75
500 kHz - 2 GHz

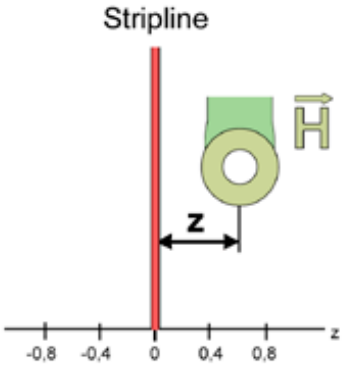
ICR HH 250-6
2.5 MHz - 6 GHz

- Resolution 150 µm
- Horizontal measuring coil
- Inside diameter 250 µm
- Screened measuring coil

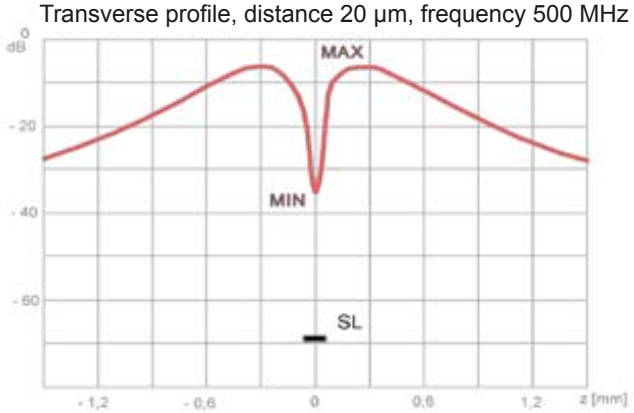


Transverse profile

Position z of the HH probe variable relative to the strip line SL

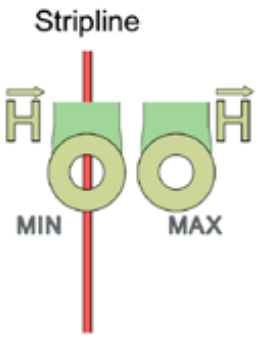


ICR HH 250 on 20 µm strip line
Transverse profile, distance 20 µm, frequency 500 MHz

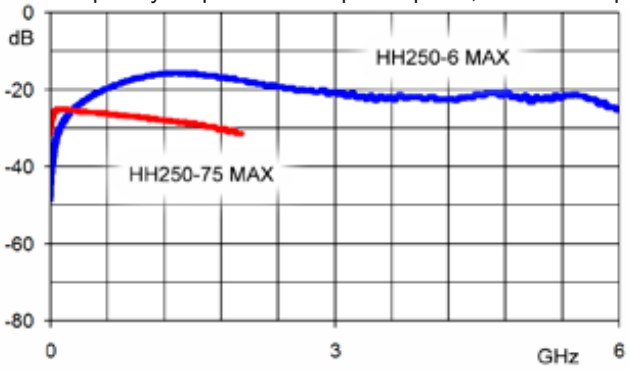


Frequency response

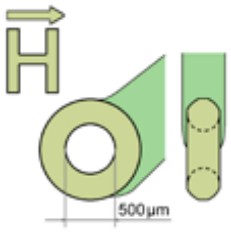
of the HH probe measured at minimum and maximum



ICR HH 250-75 and HH 250-6
Frequency response on 20 µm strip line, distance 20 µm



Probes	Characteristic

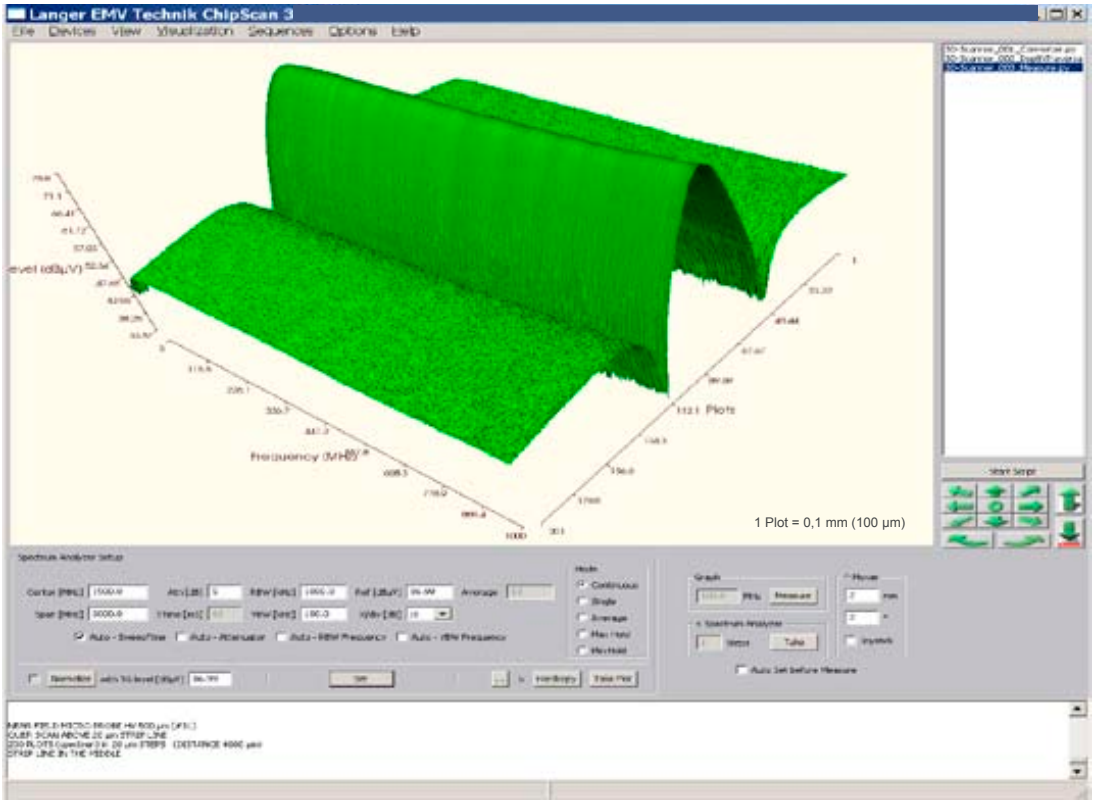


H-field probes

ICR HV 500-75
200 kHz - 1 GHz

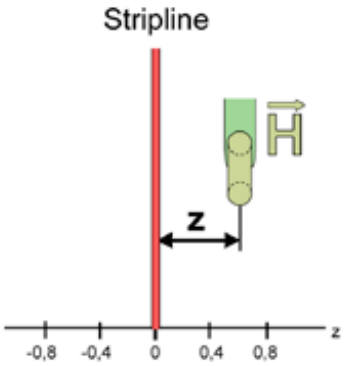
ICR HV 500-6
2 MHz - 6 GHz

- Resolution 300 µm
- Vertical measuring coil
- Inside diameter 500 µm
- Screened measuring coil

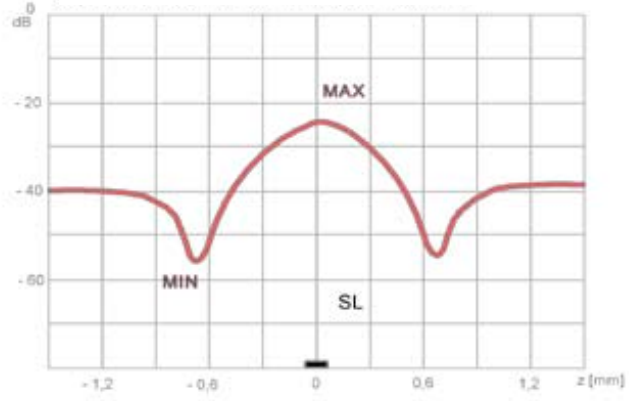


Transverse profile

Position z of the HV probe variable relative to the strip line SL

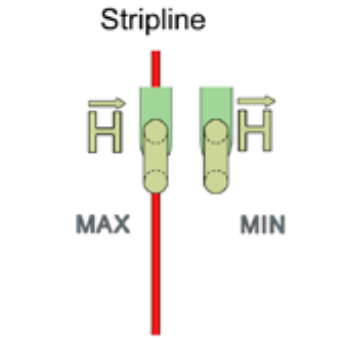


ICR HV 500 on 20 µm strip line
Transverse profile, distance 20 µm, frequency 500 MHz

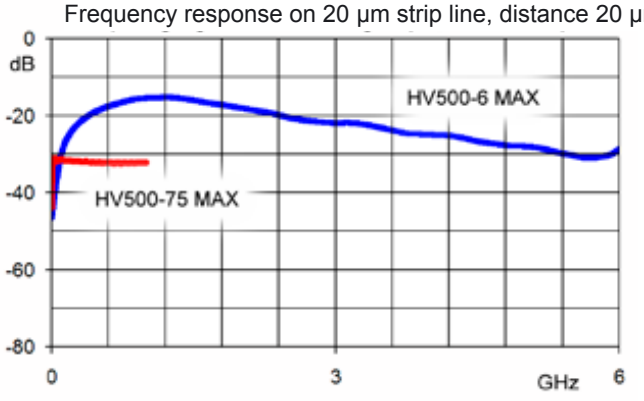


Frequency response

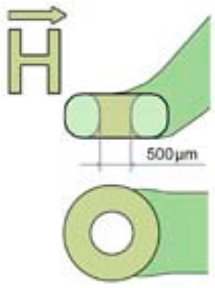
of the HV probe measured at minimum and maximum



ICR HV 500-75 and HV 500-6
Frequency response on 20 µm strip line, distance 20 µm



Probes	Characteristic

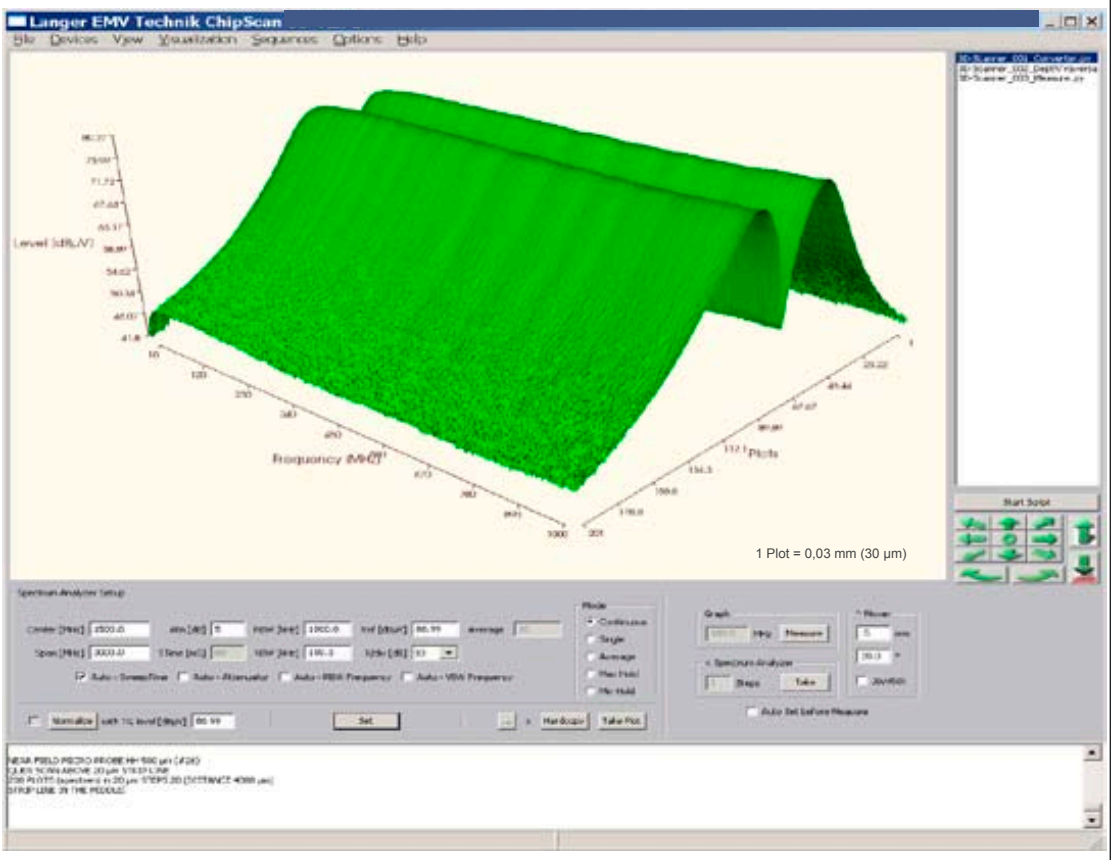


H-field probes

ICR HH 500-75
200 kHz - 1 GHz

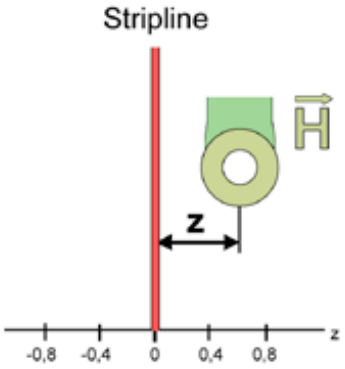
ICR HH 500-6
2 MHz - 6 GHz

- Resolution 300 µm
- Horizontal measuring coil
- Inside diameter 500 µm
- Screened measuring coil

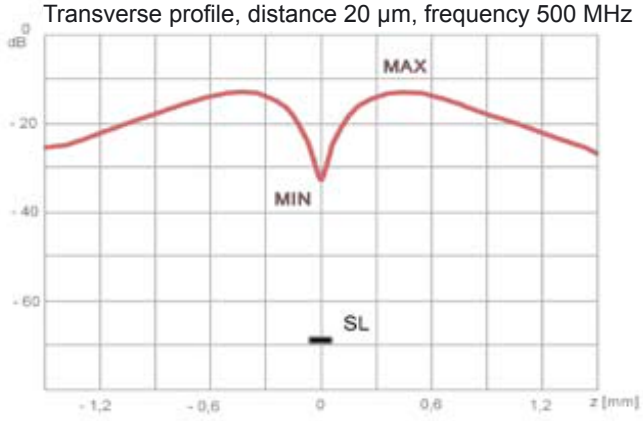


Transverse profile

Position z of the HH probe variable relative to the strip line SL

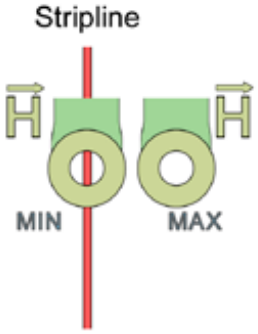


ICR HH 500 on 20 µm strip line
Transverse profile, distance 20 µm, frequency 500 MHz

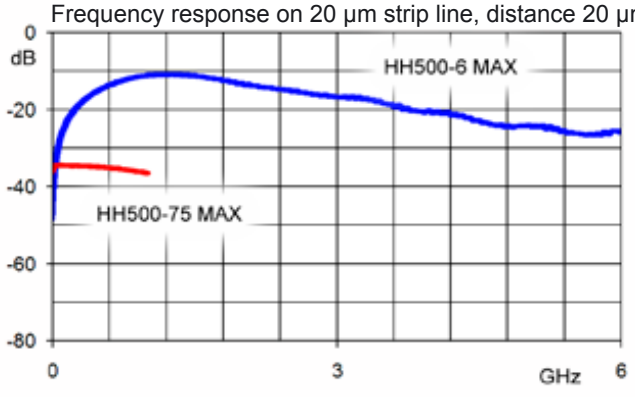


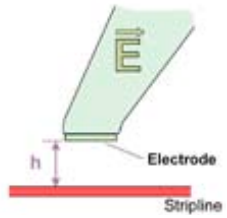
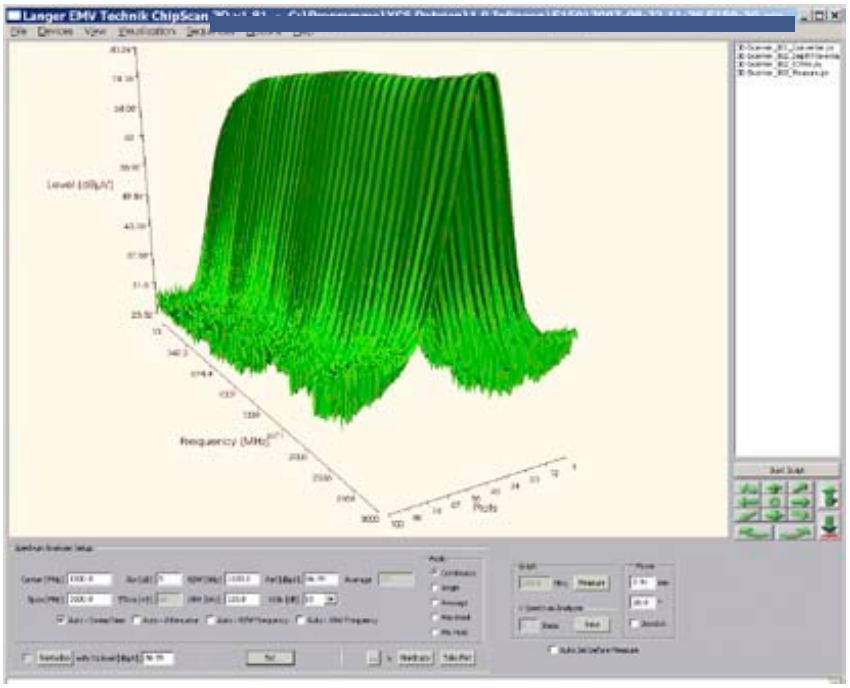
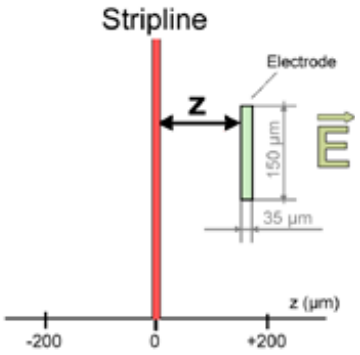
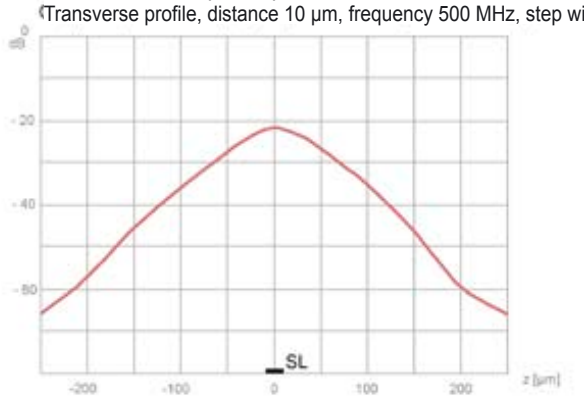
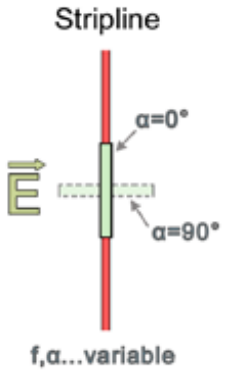
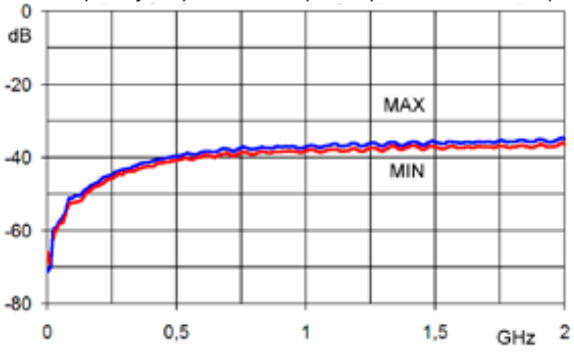
Frequency response

of the HH probe measured at minimum and maximum



ICR HH 500-75 and HH 500-6
Frequency response on 20 µm strip line, distance 20 µm

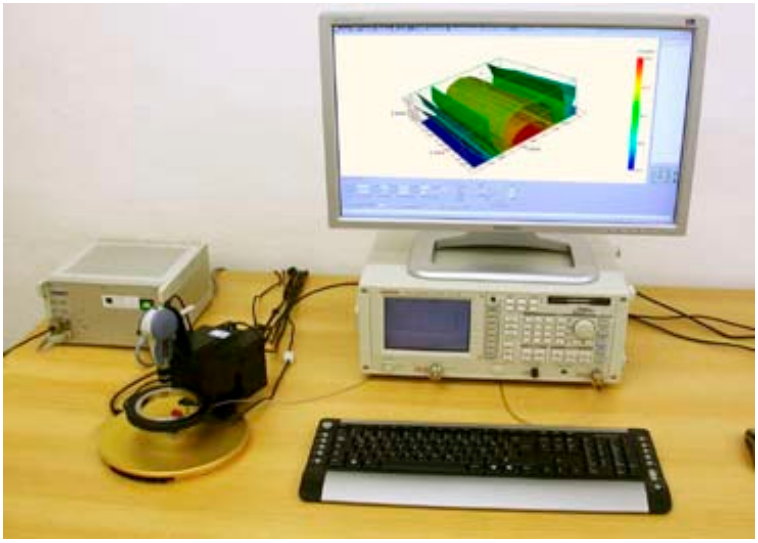


Probe	Characteristic
 **E-field probe** ICR E 150 **7 MHz - 3 GHz** - Resolution 65 µm - Horizontal Electrode - Diameter Electrode 150 µm x 35 µm	
Transverse profile Position z of the E probe variable relative to the strip line SL		ICR E 150 on 20 µm strip line Transverse profile, distance 10 µm, frequency 500 MHz, step width 5 µm 
Angel α of the E probe variable relative to the strip line SL		ICR E 150 Frequency response on 20 µm strip line, distance 10 µm 

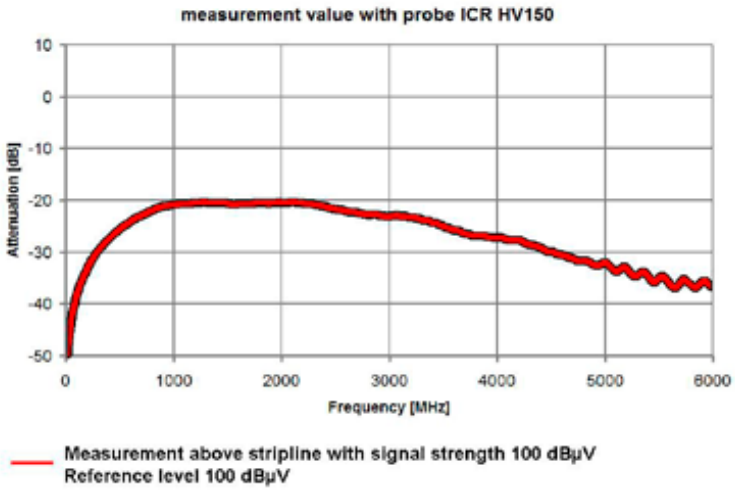
The characteristics show the dependence of the probe position s (x, y, z) relative to the space, probe angle α and signal frequency f of the ICR E 150 E-field microprobe.

above Stripline analogue to IEC 61967-6

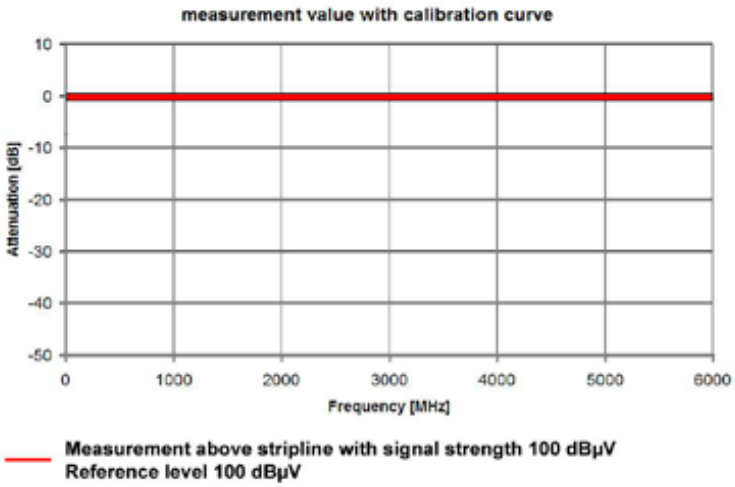
IC Scanner System ICS 103/105
In this application the scanner is used as the probe test setup to calibrate the near field microprobes.
The near-field microprobes are calibrated above a stripline.



The calibration data is measured above the stripline. The measurement takes place analogue to norm IEC 61967-6.



For practical measurement the calibration data for the individual probe is used.
The measured curve is corrected by the calibration curve.
The measurement above the stripline with calibration results in a horizontal line.
So the measurements with different microprobes are compareable.



-This product complies with the requirements of the following European Community Directives:
89/336/EC (Electromagnetic Compatibility) and
73/23/EC (Low Voltage) as amended by 93/68/EC **(CE-Marking).**

Safety precautions
When using the near-field microprobes please observe the following basic safety instructions to protect the near-field microprobes against the risk of injury:

- Read and comply with the operating manual.
- Keep the operating manual in a safe place for subsequent use.
- Follow the safety instructions and warnings on the unit.
- Always perform a visual check of the near-field microprobes before use.
- Keep hands away from probe tips.
- Do not leave the IC scanner with near-field microprobes unsupervised.
- Read the explanation of the symbols on the probe case and in the operating manual.
- The near-field micro probe has been designed for IC measurements of magnetic or electric field. Any other use is not permitted.
- Do not switch the IC scanner with ICR probes on until it has been completely assembled.
- Damaged connection cables are extremely dangerous!

Safety symbol 
This CAUTION symbol indicates a potentially hazardous situation which could result in minor or moderate injury or damage to the near-field micro probes if ignored.
This symbol indicates that the operator must refer to an explanation in the operating instructions.

The warranty is only valid under the following conditions:

- the near-field microprobes have been treated properly,
- the operating instructions have been followed,
- for maintenance only original parts have to be used,
- external components like video microscope, spectrum analyzer, motor control unit seperate warranty terms of the relevant manufacturer apply.

The warranty is forfeited if:

- attempts have been made to repair the near-field microprobe,
- the near-field microprobe has been altered,
- the near-field micro probe has been used incorrectly.

- The near-field microprobes‘ (ICR probes‘) original packaging is a special case that is also used for delivery.
  One probe case contains 1 to 3 ICR probes according to the options ordered.
  Each ICR probe is provided with a protective cap.

- There is a Caution symbol on the probe‘s protective cap.
- The protective cap is labelled:

  „**Never, under any circumstances, touch the probe tip!**“ 

- Always insert the ICR probe into a probe holder or IC scanner with the probe‘s cap locked in place.

- Move the probe holder or IC scanner manually to its maximum height position on the z-axis before inserting the ICR probe.

- Only remove the protective cap just before you start to prepare an automatic measurement. This is particularly true when approaching the DUT starting position.

- Return the probe holder or IC scanner manually to its maximum height position on the z-axis at the end of each automatic measurement or if it is in the idle state.

  Then fit and lock the ICR probe‘s protective cap.

- Only transport a probe mover or probe holder with the ICR probe removed.
  Proceed according to the following sequence when removing the probe:
  > Bring the probe mover into its maximum height position by hand.
  > Fit and lock the protective cap before removing the ICR probe from the probe holder or an IC scanner.
  > Place the removed ICR probe into the probe case.

CERTIFICATION

LANGER EMV-Technik

IC TEST SYSTEM

Nöthnitzer Hang 31
Germany 01728 Bannewitz
Phone: +49 (351) 43 00 93 – 0
Fax: +49 (351) 43 00 93 – 22
email: mail@langer-emv.de

CERTIFICATE OF CALIBRATION

Cert. No. 090210QSHH150

This Probe has been individually calibrated using the following procedure for monitoring the frequency response:

Publication:
Magnetic Near Field Probe

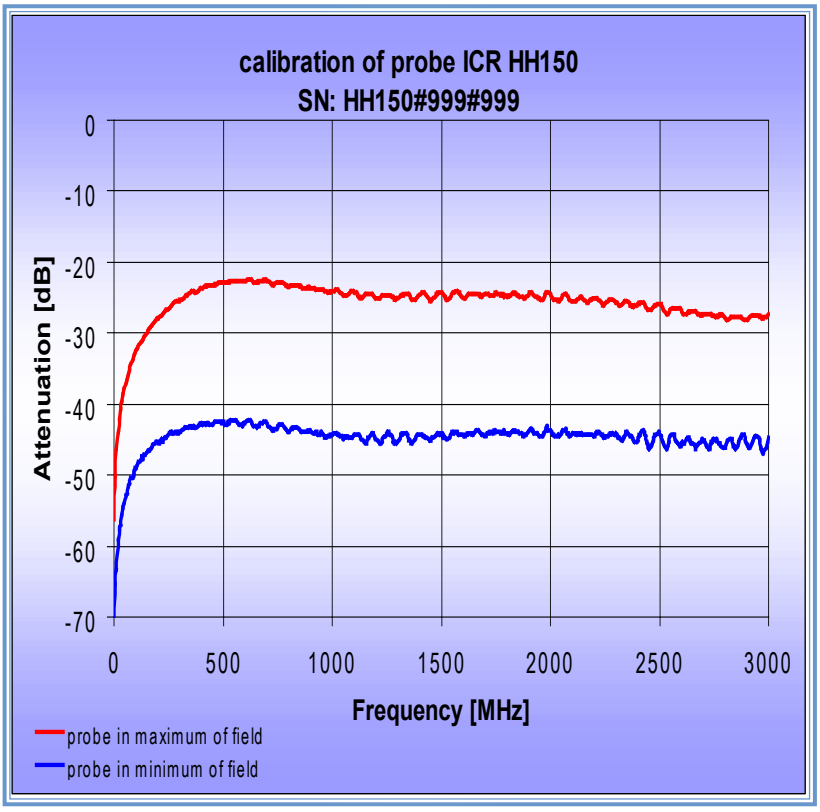
Calibration
Procedure: LACPICR01
Uncertainty: +/- 1.5 dB

Date of Cal.: Feb 02, 2012
Cal. Interval: 12 months

Model: ICR HH150
Serial: #999#999

Manufacturer:
Langer EMV–Technik

Temperature: 20°C
Humidity: 51 %



Test and Measurement Equipment

Manufacturer	Model	Serial	Due Date
Rohde & Schwarz	FLS-6	100407	2010/03/30

TG = 100dBµV, Att = 5dB, RBW = 1MHz, VBW = 100kHz, SWT = 120ms, normalized

C. Stange

Dipl.-Ing. C. Stange
Development

LANGER
EMV-Technik GmbH
Nöthnitzer Hang 31
DE-01728 Bannewitz

This calibration is in compliance with the International EMC Standard of ICs IEC 61967. Supporting Documentation relative to traceability is on file and available for examination upon request.