

Near-field probes

Overview



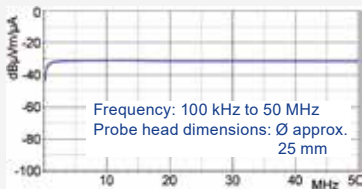
EMC emissions

LF 100 kHz - 50 MHz



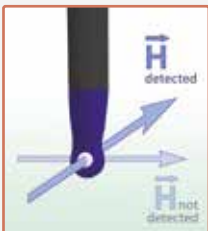
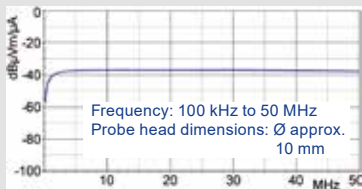
Magnetic field measurement: LF-R 400

Up to a distance of 10 cm around assemblies and devices



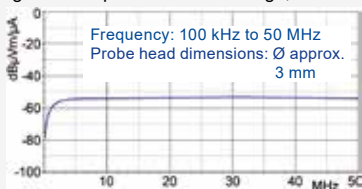
Magnetic field measurement: LF-R 50

At assemblies, devices or cables up to a distance of 3 cm, larger components as potential weak points



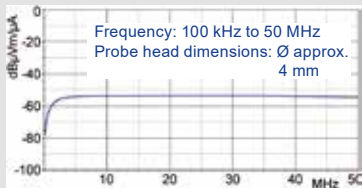
Magnetic field measurement: LF-R 3

On assemblies, e.g. near IC pins and IC housings, conducting paths, decoupling capacitors and EMC components



Magnetic field measurement: LF-B 3

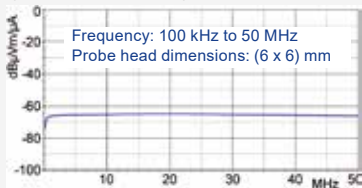
Directly on modules, detection of critical current loops in the layout



RF current measurement: LF-U 5

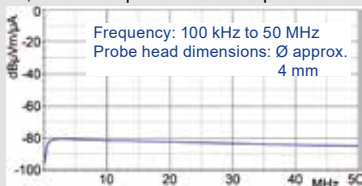
At wide conducting paths, cables, plug-and-socket connectors, electronic components, cables and their connectors

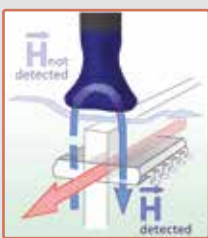
- Works like a coupling clamp



RF current measurement: LF-U 2.5

In conducting paths, SMD-components and IC pins

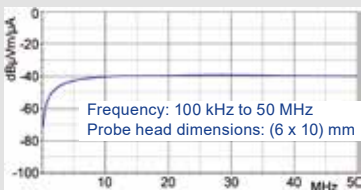




Magnetic field measurement: **LF-K 7**

At lines, rod-shaped structural parts, at cable connectors and along the edges of planar structural parts

- Works like a coupling clamp

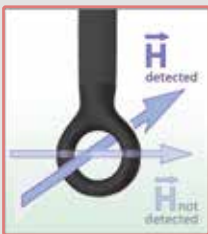
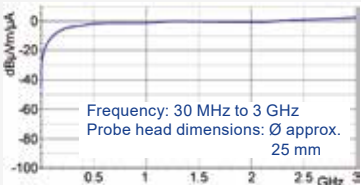


RF 30 MHz - 3 GHz



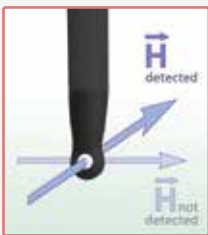
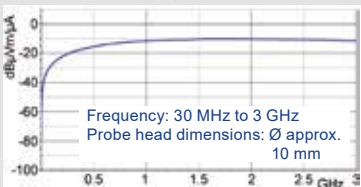
Magnetic field measurement: **RF-R 400-1**

At the edge and in the vicinity of modules and housings, up to a distance of 10 cm



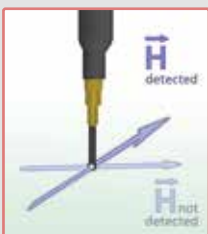
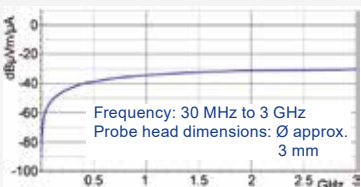
Magnetic field measurement: **RF-R 50-1**

In the vicinity of modules and on larger components, up to a distance of 3 cm



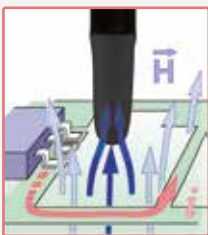
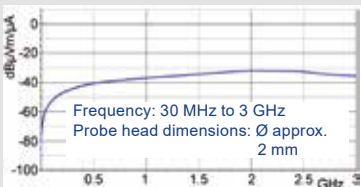
Magnetic field measurement: **RF-R 3-2**

On modules, determination of the direction of the magnetic surface field



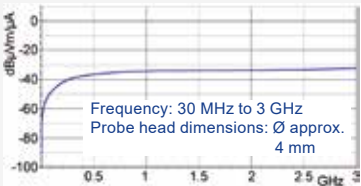
Magnetic field measurement: **RF-R 0.3-3**

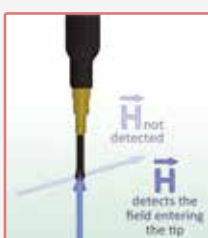
On modules, particularly small probe head for IC pins



Magnetic field measurement: **RF-B 3-2**

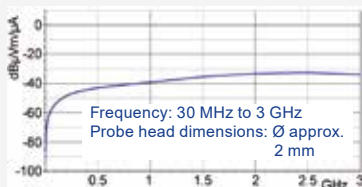
Directly on modules, detection of critical current loops in the layout





Magnetic field measurement: **RF-B 0.3-3**

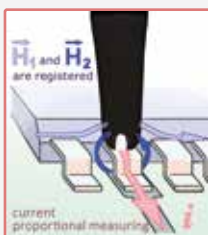
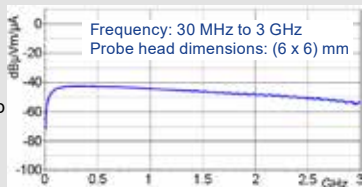
Directly on modules, particularly small probe head for IC pins



RF current measurement: **RF-U 5-2**

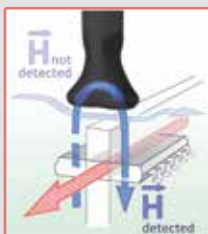
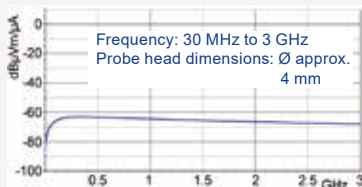
At wide conducting paths, cables, connectors, electronic components and their connections

- Works like a coupling clamp



RF current measurement: **RF-U 2.5-2**

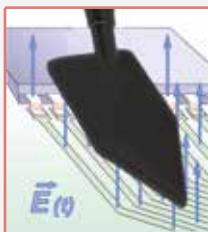
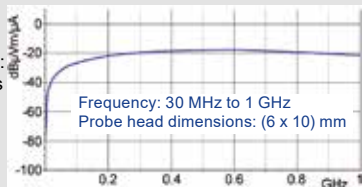
On modules, directly on IC pins, SMD components and individual conducting paths



Magnetic field measurement: **RF-K 7-4**

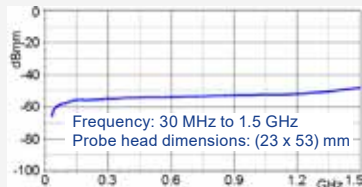
Circular fields at metal edges, large components, wide conducting paths

Special feature: a homogenous magnetic field is compensated



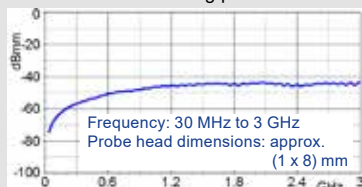
E-field measurement: **RF-E 02**

Bus structures, larger components or supply surfaces at a distance of 1 cm - 2 cm from the component



E-field measurement: **RF-E 05**

Directly on modules or wide conducting paths



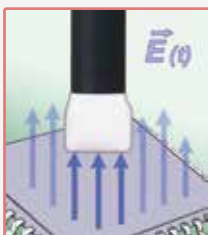
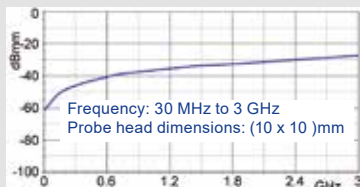
Note:

Determine the direction of the magnetic field by rotating the probe and deduce the path of the current causing the magnetic field.



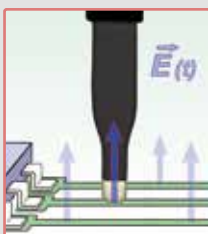
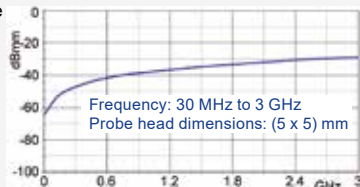
E-field measurement: RF-E 09

At a distance of 0.5 mm to 10 mm on the surface of multi-pin ICs and electronic modules



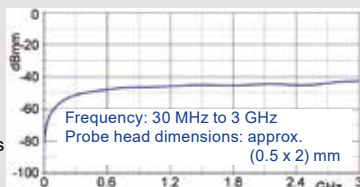
E-field measurement: RF-E 04

Surface measurement on clocked lines and smaller ICs with a distance from 0.5 to 10 mm above the assembly



E-field measurement: RF-E 10

Lateral shielding allows individual evaluation of conducting paths with a width of 0.1 mm or single IC pins at multi-pin ICs

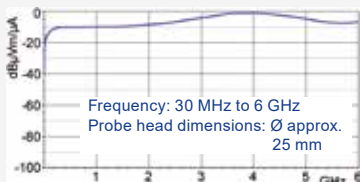


XF 30 MHz - 6 GHz



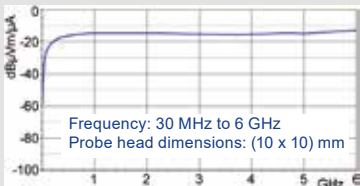
Magnetic field measurement: XF-R 400-1

At the edge and in the vicinity of modules and housings up to a distance of 10 cm



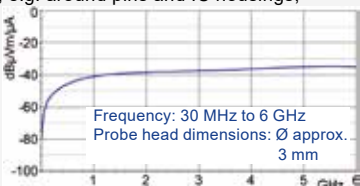
Magnetic field measurement: XF-R 100-1

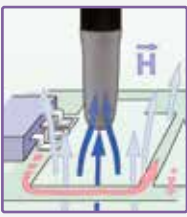
Around assemblies, devices or cables at a distance of up to approx. 3 cm



Magnetic field measurement: XF-R 3-1

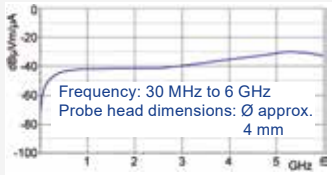
On assemblies, e.g. around pins and IC housings, conducting paths, decoupling capacitors and EMC components





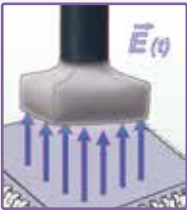
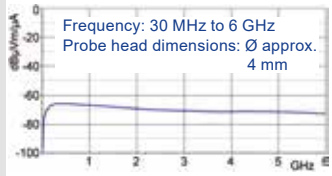
Magnetic field measurement: **XF-B 3-1**

Directly on modules, detection of critical current loops, e.g. between large components of switching controllers



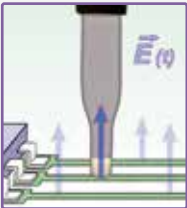
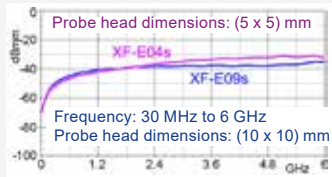
RF current measurement: **XF-U 2.5-1**

In conductor runs, component connections, capacitors and IC pins



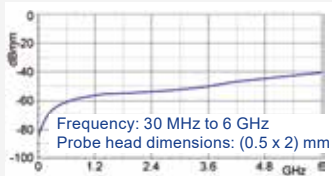
E-field measurement: **XF-E 09s / XF-E 04s**

At a distance of 0.5 mm to 10 mm on the surface of multi-pin ICs and electronic modules



E-field measurement: **XF-E 10**

Conducting paths with a width of 0.1 mm, single IC pins on multi-pin ICs

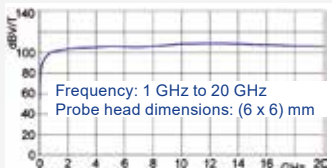


SX 1 GHz - 20 GHz



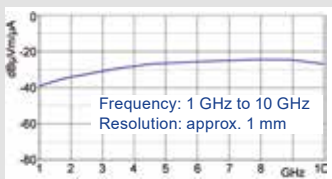
Magnetic field measurement: **SX-R 20-1**

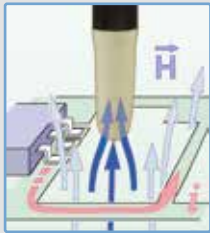
On assemblies, e.g. on individual IC pins, conductors, components and their connections to locate sources of interference



Magnetic field measurement: **SX-R 3-1**

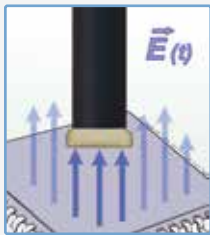
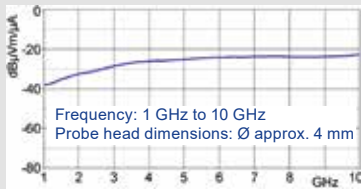
On assemblies, e.g. around the pins and IC housings, conducting paths, decoupling capacitors and EMC components





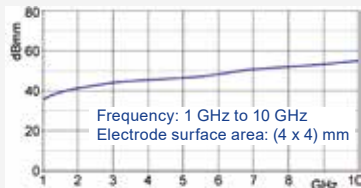
Magnetic field measurement: **SX-B 3-1**

Directly on modules, detection of critical current loops in the layout

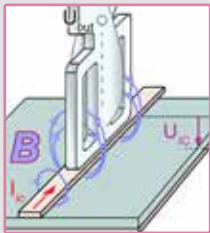


E-field measurement: **SX-E 03**

Bus structures, larger components and supply areas



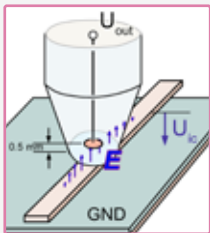
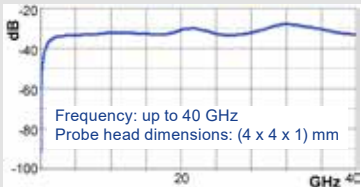
HR up to 40 GHz



Magnetic field measurement: **HR-R 8-1**

On IC pins or individual conductor tracks

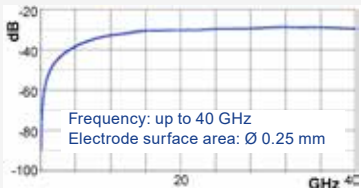
- Use only with a HR SF550S microwave cable



E-field measurement: **HR-E 40-1**

Directly on individual conductor tracks

- Use only with a HR SF550S microwave cable



LF, RF, XF, SX
and **HR probe sets**
are supplied with:

- Probes
- Measurement cable
- Quick guide
- Case



MFA probe sets
are supplied with:

- Probes
- Bias Tee
- Power supply
- Measurement cable
- Quick guide
- Case



Note:

All probes and amplifiers are designed and manufactured in Germany.

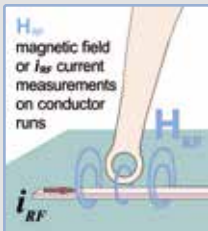
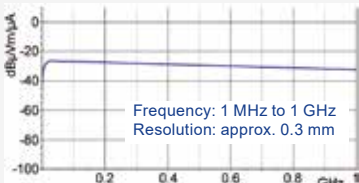
MFA 1 MHz - 6 GHz (active)



Magnetic field measurement: **MFA-R 0.2-75**

On components, e.g. close to IC pins, very fine conducting paths or small SMD components

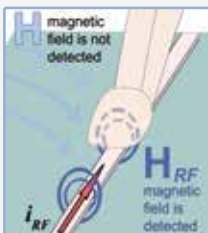
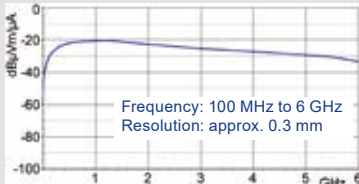
- Use only with BT 706 bias tee



Magnetic field measurement: **MFA-R 0.2-6**

On components, e.g. close to IC pins, very fine conducting paths or small SMD components

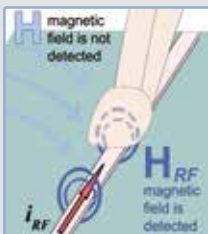
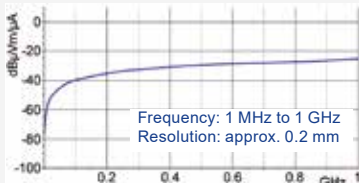
- Use only with BT 706 bias tee



Current measurement: **MFA-K 0.1-30**

Lateral shielding allows measurements at very fine conducting paths and IC pins

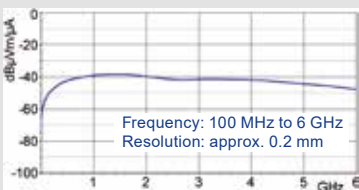
- Use only with BT 706 bias tee



Current measurement: **MFA-K 0.1-12**

Lateral shielding allows measurements at very fine conducting paths and IC pins

- Use only with BT 706 bias tee



Bias Tee

BT 706 bias tee - only for MFA probes

The bias tee supplies the preamplifier with a direct voltage via the signal transfer lines without interfering with the measurement signal which is transferred by an alternating voltage. The bias tee is connected to the 50 Ω input of a spectrum analyser or oscilloscope. The bias tee is supplied by a separate power-supply unit.



Preamplifier

Preamplifier up to 22 GHz

The preamplifier is used to amplify measurement signals such as weak signals of high-resolution near-field probes. The input and output of the preamplifiers are designed either as a 50 Ω BNC or SMA connector. The PA 303 is also available with N connector.

PA 203 (BNC/SMA)

best for LF, RF probes
Amplification: 20 dB
Frequency range: 100 kHz - 3 GHz



PA 303 (N/ BNC/SMA)

best for LF, RF probes
Amplification: 30 dB
Frequency range: 100 kHz - 3 GHz



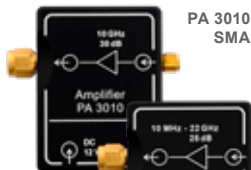
PA 306 (SMA)

best for XF probes
Amplification: 30 dB
Frequency range: 100 kHz - 6 GHz



PA 3010 (SMA)

best for SX probes
Amplification: 30 dB
Frequency range: 10 MHz - 10 GHz



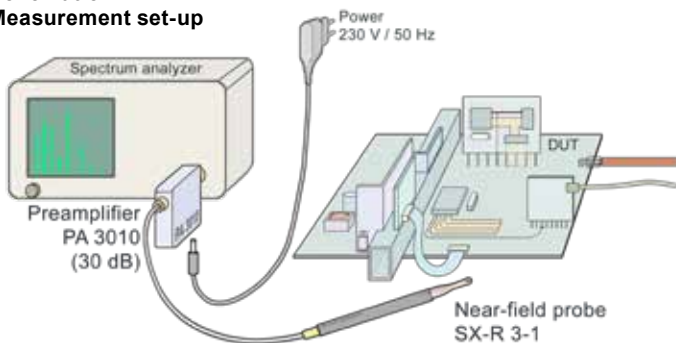
PA 2522 (SMA)

best for SX and HR probes
Amplification: 25 dB
Frequency range: 10 MHz - 22 GHz



Schematic

Measurement set-up



Measurement method

The probes can be used

- to examine the nature, direction and size of near-fields on electronic modules
- to identify structural parts or components as sources of interference
- to verify the measures taken to improve the EMC of an electronic module

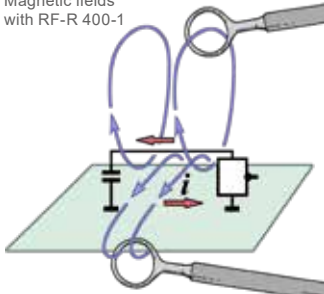
Field measurement with near-field probes

Near-field probes are guided over the module by hand. The developer can turn and rotate them to get an idea of the spatial distribution of the near-fields. Special field densification at components, traces or structural parts indicates emission sources. Selected EMC countermeasures can be derived from these important findings to improve the module's EMC in terms of its emissions.

The probes are ideal for two basic tasks

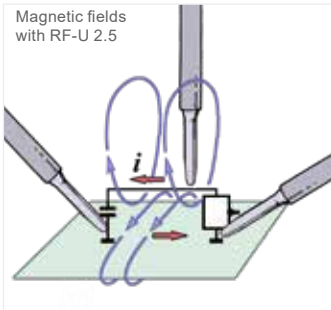
To measure fields that may excite emissions

Magnetic fields
with RF-R 400-1

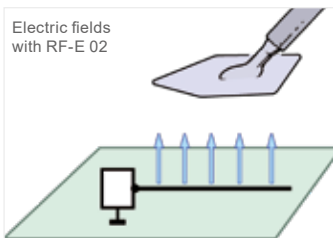


To locate the source of emissions on the module

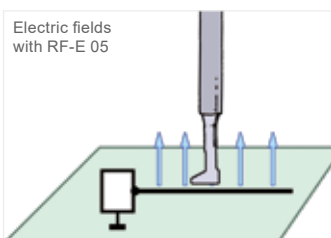
Magnetic fields
with RF-U 2.5



Electric fields
with RF-E 02



Electric fields
with RF-E 05



Langer EMV-Technik GmbH
Nöthnitzer Hang 31
01728 Bannewitz / Germany

E-mail: mail@langer-emv.de
www.langer-emv.com



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[langeremv](https://www.youtube.com/langeremv)



[langer.emv](https://www.facebook.com/langer.emv)



[langer-emv](https://www.ep.com/langer-emv)



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