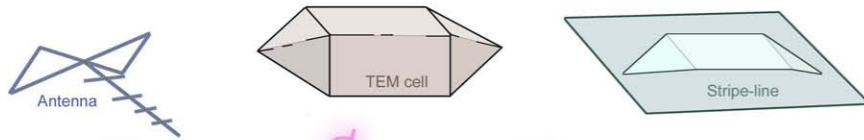
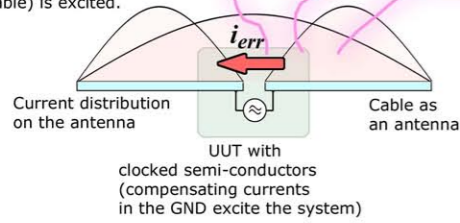


Traditional procedures to measure emissions - absolute measurement



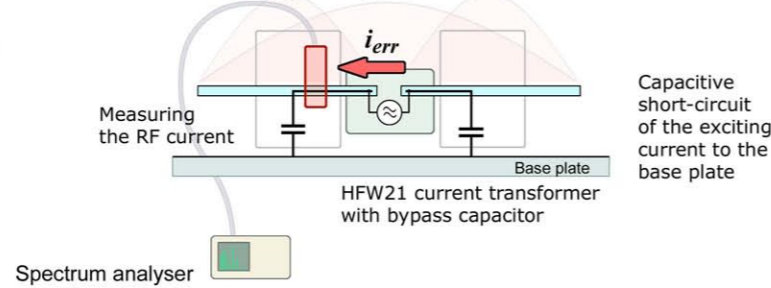
Theory:

The UUT feeds an exciting current i_{err} into the cable terminals. The entire metal system (UUT, cable) is excited.



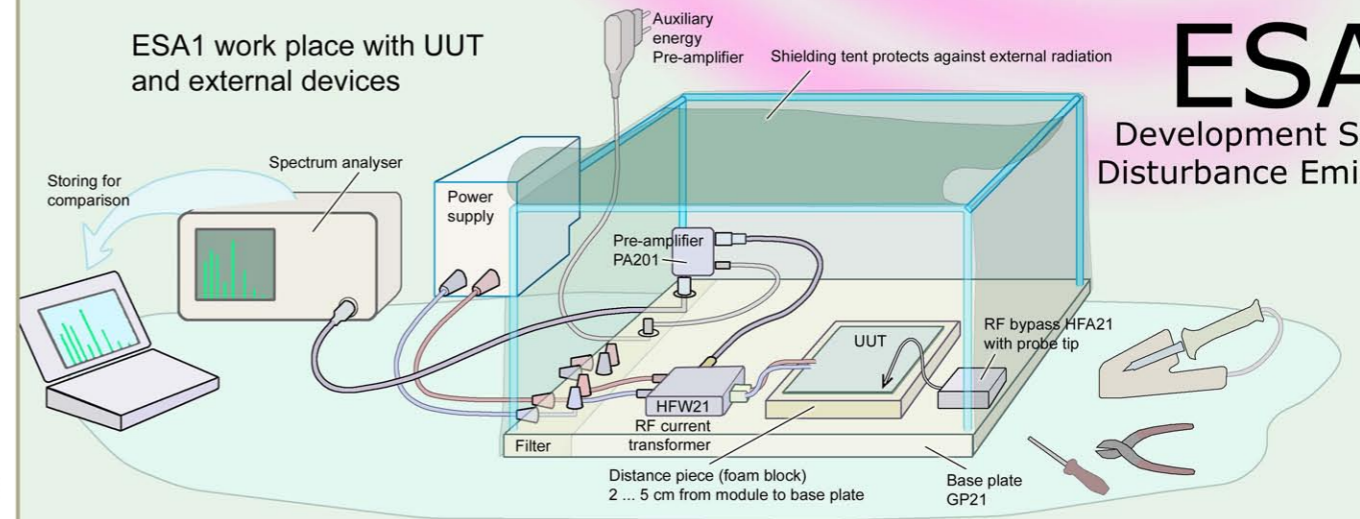
Using the **ESA** is a **fast comparative method** of measurement whose results have to be correlated to absolute measured values.

Measuring principle:



ESA1

Development System Disturbance Emissions



1 UUT with one cable connected

- Electrical connection is led through the HFW21 (power supply)
- Electrical connection is disconnected (cap. load of the HFW21 is too high) GND connection is led through the HFW21

2 UUT with several cables connected

The power supply connection or a GND connection is led through the HFW21. Other cable connections are disconnected and short-circuited at the UUT relative to the base plate via a capacitive connection.

3 Set-up with several cables connected

The cables are positioned and fixed on the base plate to form a capacitive short-circuit. If the cable leaves the shielding tent, it can be led through a ferrite block to reduce external influences.

Better: Disconnect cables and simulate acc. to 2

External data lines

- Determining RF emission
- Dimensioning line filters and cable shielding

The filters (behind the RF source not shown here) are optimised step by step. The effect of filter circuits/shielding is determined using the measuring set-up.

Measuring the effect

The data cable is connected to the UUT, it forms a capacitive coupling to the base plate. The common-mode charging current is measured with the HFW21 between GND of the UUT and base plate (e.g. power supply connection).

RF share of the data stream

The data cable is replaced with an equivalent capacitance (50 ... 100 p/m). RF of the data stream is coupled to HFW21 via the equivalent capacitance.

Current measurement with RF current transformer

Attention! Do not charge electrolytic capacitors via DIFF. Risk of destroying the pre-amplifier / spectrum analyser input.

Change by rearranging: 5 to 10 cm line to UUT, Plug-in terminal

Differential-mode input for comparative measurement of conducted emissions

Common-mode input for comparative measurement of radiated emissions

OR by rearranging the UUT: **Differential-mode measurement** OR **Common-mode measurement**

Field measurement with near-field probes

1st step Exciting fields in the surroundings

magnetic field with RF-R400

electric field with RF-E02

2nd step Sources of the exciting fields on the module

magnetic field with RF-R2, 5U

electric field of clocked lines with RF-E05

Set-up acc. to 2 HFA21 connection

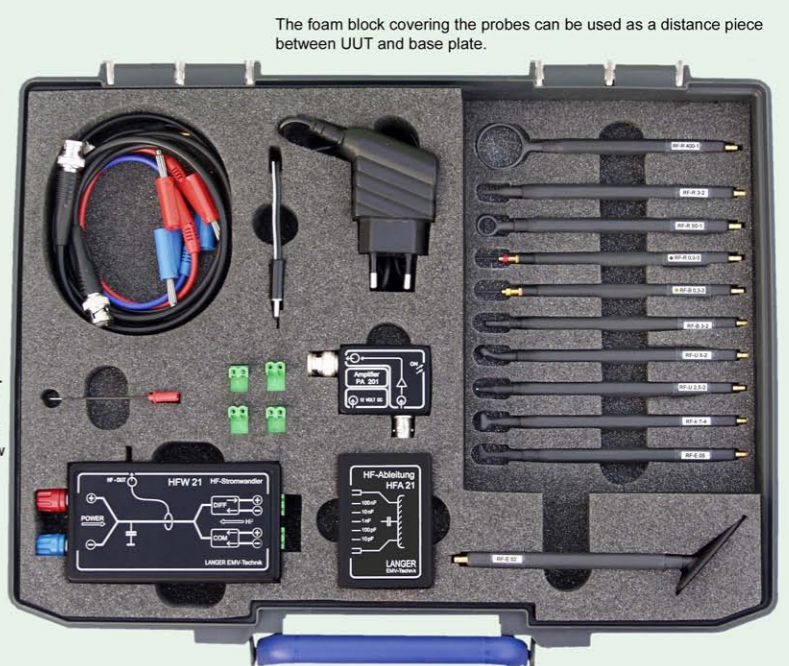
Either probe tip or permanent connection (GND) with yellow cable

Connect to:
1. HFA 21
2. Plug-in terminal with pin to HFW

Scope of delivery:

- 2 pcs. laboratory cable 25 cm, 4 mm plug connection HFW 21 - filter block
- 1 pcs. RF cable BNC-SMB connection HFW 21 - pre-amplifier
- 1 pcs. BNC cable, double-shielded to connect spectrum analyser
- 1 pcs. Power supply cable pre-amplifier
- 1 pcs. probe tip
- 2 pcs. plug-in terminal, green, to connect UUT to HFW 21
- 2 pcs. plug-in terminals, green, with contact pin, to connect measuring cables and probe tip

Arranged below the HFW 21 current transformer in the case:
1 pcs. measuring cable 25 cm, black
2 pcs. measuring cable 12 cm, yellow
2 pcs. measuring cable 7 cm, red



Sequence of the new method of measurement

1 Measuring with ESA

- Reduce the measurement set-up wherever possible, to
 - one module (source of disturbance)
 - one cable (power supply)
- Measurement
- Storing the spectrum for comparison
- Comparison to previous measurement. If reduction of emission is sufficient, verification acc. to standard measurement.

2 Localisation through global changes to the UUT

- Functional effects; activating/deactivating
 - Software
 - Hardware
- Effect of the measurement set-up
 - Distance from the base plate
 - Neighbouring modules
 - Cables
 - Structural parts

3 Reason analysis using near-field probes

The tent can be swivelled upward for ease of accessibility.

4 Modification of the module

- Changes to the metal system of the p.c.b., GND, Vcc, signal lines
- Confining RF dissipation through components R, L, C
- Functional changes

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