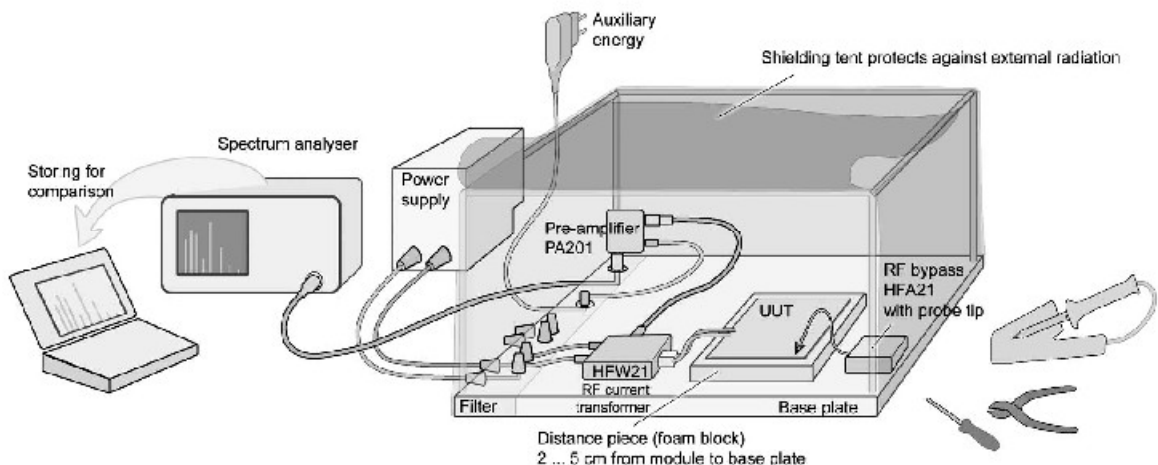


DEVELOPMENT SYSTEM - DISTURBANCE EMISSION ESA 1

*Valuation and reduction of disturbances
emitted by electronic modules
directly at the developer's workplace*



ESA- Development workplace

(The spectrum analyser can be supplied as an optional element. The power supply unit and computer are not included in the scope of delivery.)

CONTENTS ESA 1K COMPLETE SYSTEM

Measuring range: 100 kHz – 1 GHz
 Max. continuous current: 10 A
 Max. operating voltage: 50 V

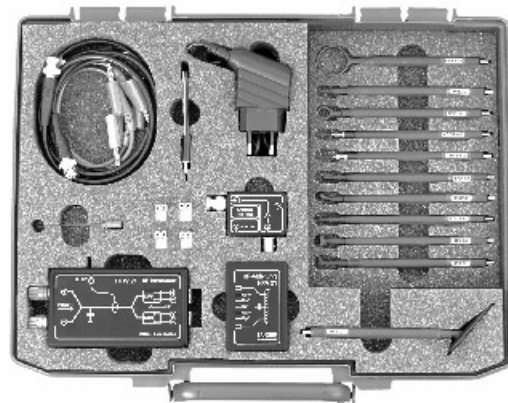
SHIELDING TENT:

- 1 Tent made from conductive materials
- 1 Tent poles, collapsible

BASE PLATE with filter package GP 21

CASE: ESA 1K

- 1 RF current transformer HFW 21
- 1 RF bypass HFA 21
10 pF – 100 pF
- 1 Pre-amplifier for near-field probes PA 201
Amplification: 20 dB
Voltage supply: 12 V DC
Current input: 25 mA
- 1 Power supply cable for pre-amplifier PA 201
- 1 Plug-in power supply unit for pre-amplifier



Near Field Probes:

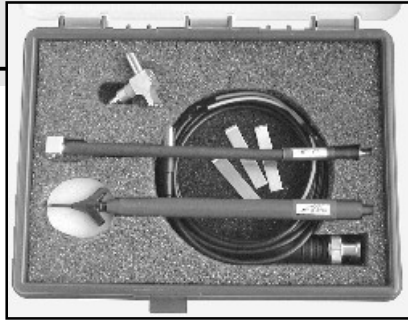
- 1 HF - Magnetic field probe RF-R 3-2
- 1 HF - Magnetic field probe RF-U 2,5-2
- 1 HF - Magnetic field probe RF-K 7-4
- 1 HF - Magnetic field probe RF-R 400-1
- 1 HF - Magnetic field probe RF-R 50-1
- 1 HF - Magnetic field probe RF-U 5-2
- 1 HF - Magnetic field probe RF-B 3-2
- 1 HF - Magnetic field probe RF-B 0,3-3
- 1 HF - Magnetic field probe RF-R 0,3-3
- 1 HF - E-field probe RF-E 02
- 1 HF - E-field probe RF-E 05

Accessoires:

- 1 Probe tip
- 1 Laboratory cable 25 cm red
- 1 Laboratory cable 25 cm blue
- 2 Plug-in terminal 2-pole
- 2 Plug-in terminal 2-pole with plug connector
- 1 HF - cable BNC-BNC double-shielded
- 1 HF - cable SMB-BNC
- 2 Measuring lines 7 cm red
- 2 Measuring lines 12 cm yellow
- 1 Measuring lines 25 cm black
- 1 Insulating material - distance piece for UUT (foam block 25 mm high)

Scope of delivery ESA 1b Basic set: - Shielding tent and poles
 - Base plate GP 21
 - Case ESA 1 *without near field probes*

Set HFW



Contents:

HFI 02	Current transformer
HFU 02	Voltage transformer
1 probe tip	
1 cable	BNC-SMB
2 cables	short
3 mounting brackets	
Case and operating instructions	

Advantages for the developer:

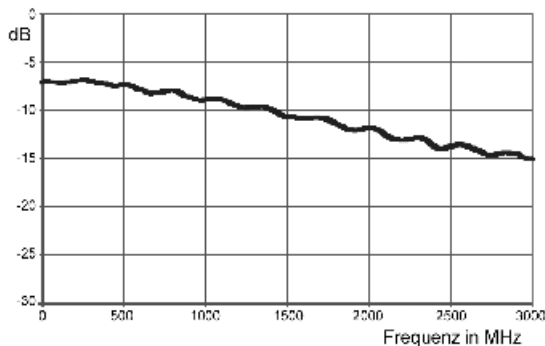
Minimisation of disturbance emissions through optimum circuit dimensioning
Dimensioning of data line filters and evaluation of the IC's RF characteristic

Digital IC's differ considerably with regard to their EMC characteristics depending on technology and manufacturer. IC's can be evaluated and compared with each other by measuring the RF currents and voltages of individual IC outputs or the power supply current.

HFI 02 current transformer

Technical data

Measuring range	100 kHz - 3 GHz
Max. signal voltage	15 V
Output	50 Ω SMB
Signal line diameter	< 0.45 mm



RF measurements on signal lines with a throughput of up to 10 Mbit can be carried out with the **HFI 02**. Controlling a graphic display is a typical example. The corresponding filters can thus be optimized and screenings reduced.

The RF current transformer operates in the frequency range between 100 kHz and 3 GHz and enables RF current measurements in connection with a spectrum analyzer.

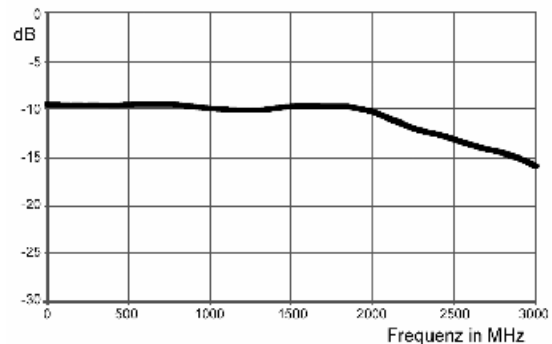
A small mounting bracket (accessory) is fixed on the GND of the unit under test, the RF current transformer plugged on and the current to be measured led through the transformer via a CuL wire to measure the current.

The transformer couples an induced voltage to the 50 Ω SMB output. Common-mode and sheath currents are damped in the transformer shaft. The measured values are transferred to a spectrum analyser or oszillograph via a shielded cable.

HFU 02 voltage transformer

Technical data

Measuring range type A:	10 MHz - 3 GHz
Measuring range type B	150 kHz - 3 GHz
Max. signal voltage	15 V
Output	50 Ω SMB
Transformer ratio	5:1



RF voltage measurement can be carried out with the **HFU 02** on critical signal pins, microcontroller pins, quartz terminals and metallic structural parts with no interference. Due to its high sensitivity the HFU 02 is particularly suitable for modules with a low RF voltage such as modules typical for the automotive industry.

The very high resolution and low interference with the unit under test enable the evaluation of data lines operating at 100 MHz, for example.

The HFU 02 type A (coupling capacity near 20 pF) is used for measurements on quartz pins or other high impedance pins in the frequency range between 10 MHz and 3 GHz.

The HFU 02 type B (coupling capacity near 3 nF) is used for measurements especially in lower frequency range.

The HFU 02 is connected to GND of the module and the relevant line is contacted via a probe tip (included in the scope of delivery).

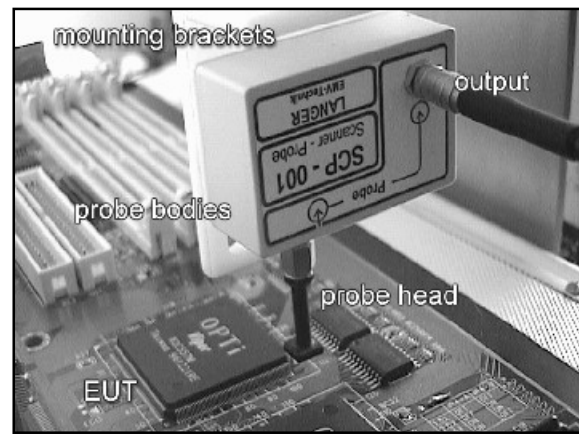


EMC – SCANNER PROBES

SCP 001 SCA 201

Usage:

Complying with the emission limits for modules and devices requires the developer to optimise his products as to EMC. It is a quite common but time-consuming procedure to evaluate implemented layout modifications with regard to their disturbance emission behaviour in the far field by means of a broadband antenna positioned 3 m away, and to test new possibilities. The causes of disturbances have to be searched for in digital circuits or analogue systems featuring high clock-pulse rates. Depending on the specific resonance characteristics of the modules, these currents result in limit violations at particular frequencies in the far field. The idea of analysing limit violations in the far field via the module's near fields in order to derive countermeasures seems to suggest itself.



It is really easy for you to pin-point locate magnetic and electric near fields through scanner probes. This near field analysis makes it possible to detect disturbance sources and their coupling mechanisms. Unlike hand-held near field probes, the scanner probe has the advantage that all development states are documented by the complete near field image and improvements can be evaluated more exactly.

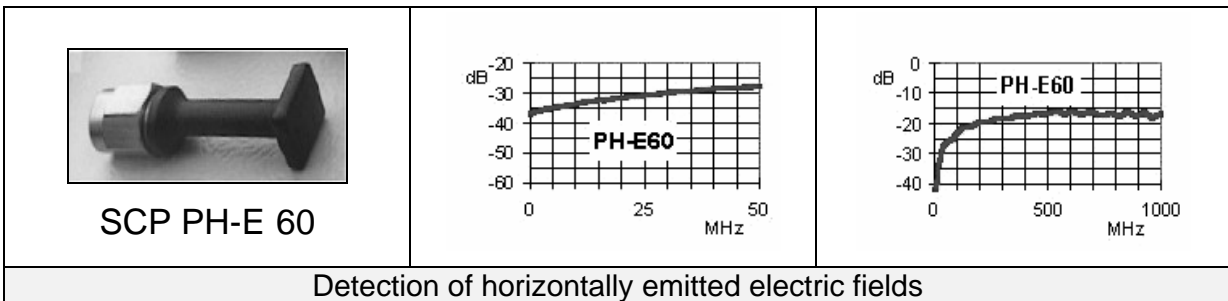
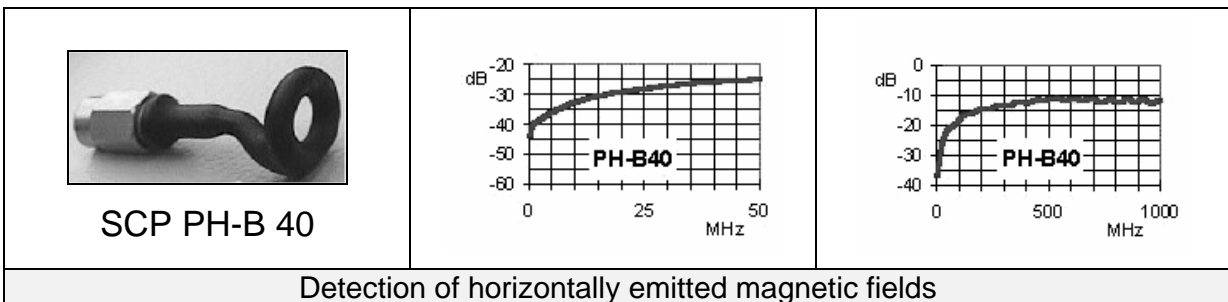
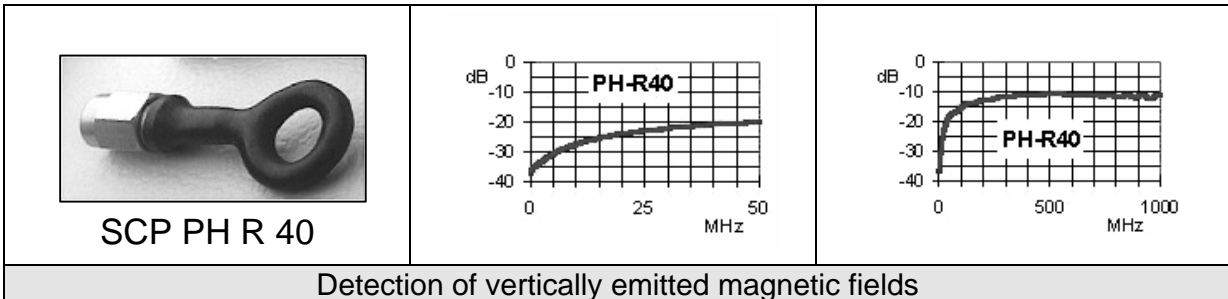
Fields of application:

- to detect modules, layout areas featuring critical frequencies
- to locate and evaluate magnetic and electric fields as vector quantities
- to determine emission sources, coupling mechanisms and functional chains
- to compare and evaluate module modifications
- to document development stages

Type of construction:

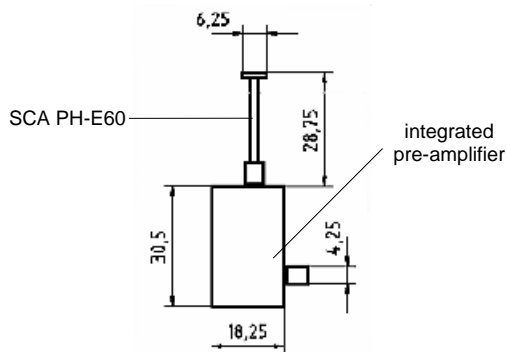
- electrically and/or magnetically shielded probe heads
- passive design (SCP 001: probe bodies without integrated preamplifier)
- active design (SCA 201: probe bodies with integrated 20 dB preamplifier)
- Probe body output with SMB-connector system on RG 174 cable basis

Scanner probe heads available for SCP 001 or SCA 201:

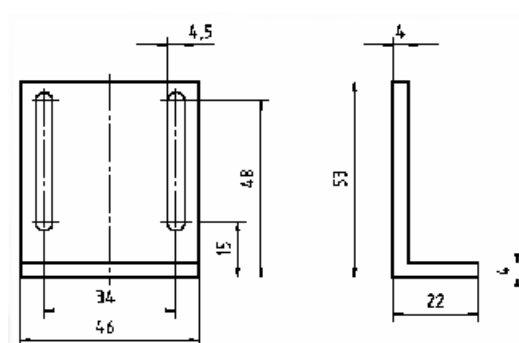


The probe heads are adapted to XYZ positioning systems by mounting brackets.

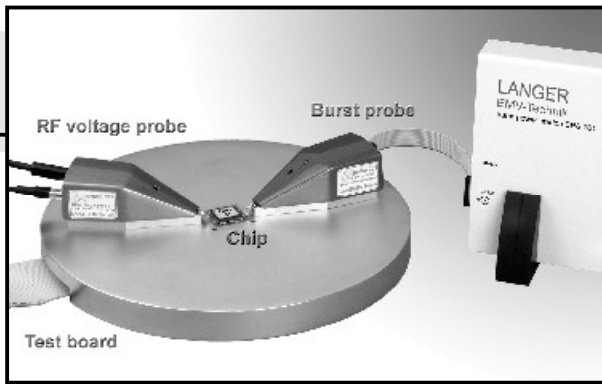
Example: Adconet scanner



Active E-field scanner probe (SCA 201)



Mounting bracket for XYZ positioning




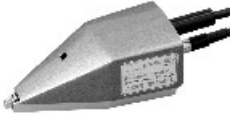


IC Test Board

Contents:

Test board
 RF probes : Typ 602, 603, 622, 623, 701
 Burst probes : Typ 201, 211, 301
 Burst power station BPS 201
 Instruction

The **IC test board** has been designed for developers and manufacturers of digital ICs such as processors or ASICs. The design phase is the best time to determine IC pin characteristics, to identify coupling mechanisms within the IC and to specifically influence them during redesign. Based on various parameters of the injected burst pulses, for example, the designer can determine whether electric or magnetic effects are responsible for disturbances in the chip and can improve the chip's design.

IC TEST BOARD

Consituents	Description			
	Test board			
	GND plane:	Closed and gold-plated GND – plane for a correct connection of high frequency measuring devices		
	Chip adapter:	Small PCB to connect the IC under test with the connection board – is placed into the GND plane and includes all necessary filters		
	Connection board:	PCB to connect the Chip-adapter with the environment and to run the LED		
	RF probes:	Probes 602 / 603	Probes 622 / 623	Probe 701
	Input resistance	0,1 Ω / 1 Ω Shunt	0,1 Ω / 1 Ω Shunt	1,5 k Ω
	Measuring range	0,2 kHz-3 GHz	9 kHz-3 GHz	16 kHz-3 GHz
	Internal preamplifier	without	with	with
	Transfer factor	-6 dB	20 dB	1:1; 0 dB
	RF output	50 Ω	50 Ω	50 Ω
	Burst generators:	Probe 201	Probe 211	Probe 301
	Pulse shape	1,5 / 5 ns	1,5 / 5 ns	1,5 / 20 ns
	Coupling capacitance	1,2 μ F	1,2 μ F	18 pF
	Internal resistance	1 Ω	1 Ω	100 Ω
	Pulse voltage	\pm 5-35 V	\pm 0,5-5 V	\pm 5-140 V
	Burst power station:	BPS 201		
		<ul style="list-style-type: none"> - supplies and drives the Burst probes - PC - controlled by RS 232 - powered by 12V DC Power plug 		