

Near-Field Antenna Characterization System

DESCRIPTION

Kapteos Near-Field Antenna Characterization System (NFACS) is a comprehensive antenna characterization system that fulfil your needs without any compromise. Therefore, it is manufactured on your specifications.

The minimal configuration embeds:

- an E-field sensor eoProbe™,
- a Cartesian robot eoScan™ with its driver for integration in a near field measurement bench,
- an optoelectronic converter eoSense™ with its driver for integration in the bench.

A comprehensive and stand-alone configuration for vector measurements in Frequency-Domain embeds also:

- a Vector Network Analyzer (VNA - customer's one or provided by Kapteos),
- a removable tunnel-type small-size semi-anechoic chamber (< 1m³),
- a user-friendly complete software for data acquisition, treatment and visualization of results,
- an E-field applicator eoCal™ for probe calibration,
- a metrological linking to a reference power measurement carried out by a bolometer,
- ...

APPLICATIONS

When dealing with E-field mapping, the sensor must not interfere at all with the E field to be measured. Nor must it be completely immune to other physical quantities like magnetic field, currents, pressure, temperature. Such experimental configurations are commonly encountered:

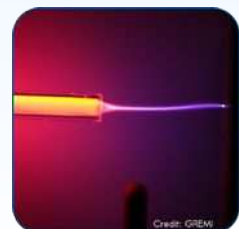
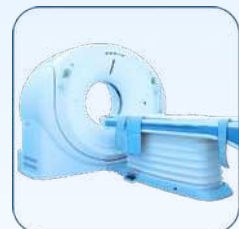
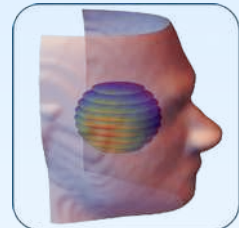
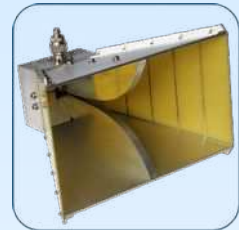
- with **Antennas**,
- for **SAR** assessments,
- in **MRI**,
- with cold **Plasma**,
- or in High Voltage (HV) and high power electronics equipment.

Due to the non-interfering property of Kapteos E-field probes, the data acquisition and treatment software has no hidden algorithm to de-embed or compensate probe interference or setup artefact! NFACS is always **made to specification** on the base of customer request, in order to fulfil customer needs, no more and no less. The frequency bandwidths covered by NFACS correspond to the ones of optoelectronic converter eoSense™.

SERVICES

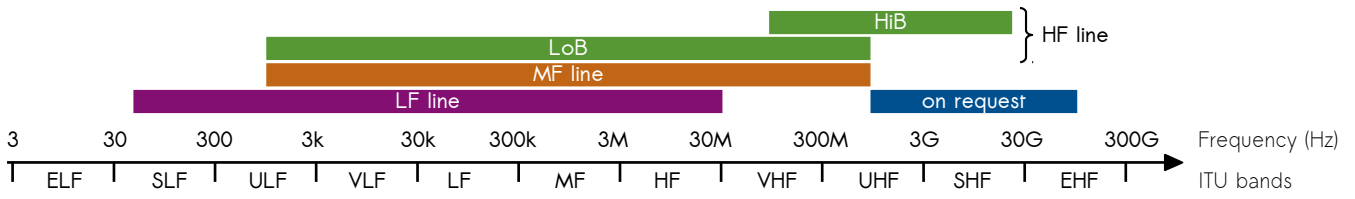
Kapteos offers a recalibration service of your NFACS and will accompany you for your future developments.

Your key partner for electromagnetism in harsh environment

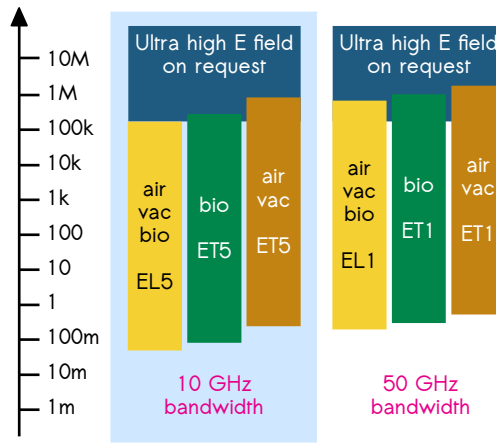


MAIN FEATURES

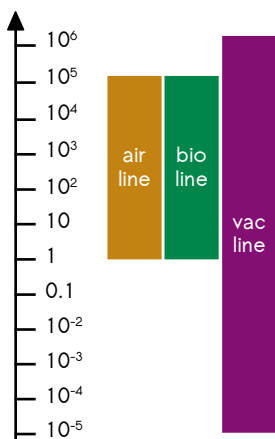
Frequency range with respect to optoelectronic converter line



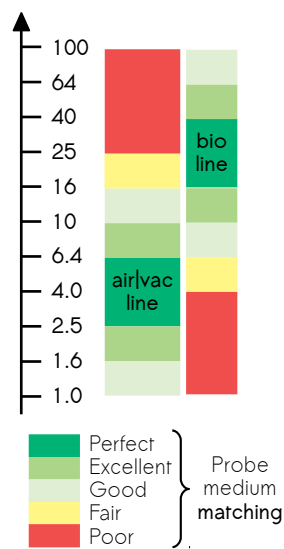
E-field strength range (V_{rms}/m) in Frequency-Domain with respect to E-field probe line



Pressure range (Pa) with respect to E-field probe line



Measurement medium permittivity matching with respect to E-field probe line



- Effective E-field probe permittivity
 - air/vac line → ~3.6 @ 20 GHz
 - bio line → ~25

COMMON FEATURES		Hardware
E-field measurement dynamic range	> 110 dB.Hz	
E-field selectivity (orthogonal components rejection)	> 50 dB	
Optical connector durability	500 matings	
Optical connector IL ¹ repeatability	< 0.2 dB	
E-field probe damage threshold	E > 10 MV/m or permanent PD ² > 10 W/cm ²	
Cartesian robot minimum increment	0.1 mm	
Cartesian robot standard strokes	300 mm on X axis & Y axis, 200 mm on Z axis	
Cartesian robot axis travel speed	Up to 250 mm/s	
Cartesian robot position accuracy ³		
<ul style="list-style-type: none"> • Trueness • Precision 	± 0.05 mm	± 0.10 mm
Data acquisition system	<ul style="list-style-type: none"> • Time-Domain → High Dynamic range Oscilloscope (HDO) • Frequency-Domain <ul style="list-style-type: none"> ◦ Scalar measurements → Automatic Spectrum Analyzer (ASA) ◦ Vector measurements → Vector Network Analyzer (VNA) 	
NFACS implementation	19-inch equipment rack	

¹ Insertion Loss

² Power Density

³ Trueness & precision given at 1 σ

		Software
Main features	<ul style="list-style-type: none"> Converter frequency band selection (HF converter line only) Multi-converter control Operating mode selection <ul style="list-style-type: none"> • Standard mode (Master mode: control via custom NFACS software) <ul style="list-style-type: none"> ◦ 1D E-field mapping ◦ 2D E-field mapping ◦ 3D E-field mapping • Instrumentation mode (Slave mode: control via Eth driver) Data treatment, display and analysis <ul style="list-style-type: none"> • Modulus and phase 2D mapping in Frequency-Domain (FD) • Calculation of far field radiation pattern in FD (Antenna applications) • Rise/fall time, pulse duration 2D mapping, partial discharge detection... (Time-Domain applications, HV applications) 	
Operating System	Windows 10 Linux Fedora 29 and future releases	
Recommended hardware configuration	Full HD display 8 GiB RAM 256 GiB HDD/SSD Intel Core i5 or higher	

OPERATING CONDITIONS

Temperature	15°C → +30°C (+59°F → +86°F)
Pressure	690-1075 hPa (10-15.6 psi)
Relative humidity	< 90% - non-condensing

STORAGE CONDITIONS

Storage	Only in its original case in a clean, dry environment
Temperature	+10°C → +40°C (+50°F → +104°F)
Pressure	690-1075 hPa (10-15.6 psi)
Relative humidity	< 90% - non-condensing

STANDARDS COMPLIANCE

EMC, emissions	IEC 60601-1-2 4 th ed. EN 55032 class B IEC / EN 61000-3-2, class B IEC / EN 61000-3-3, class B
EMC, immunity	IEC / EN 60601-1-2 4 th ed. EN 55024 IEC / EN 61000-4-2, 8kV/6kV perf. criteria A IEC / EN 61000-4-3, 3V/m perf. criteria A IEC / EN 61000-4-4, ± 2kV perf. criteria A IEC / EN 61000-4-5, ± 1kV/± 2kV perf. criteria A IEC / EN 61000-4-6, 20 Vrms perf. criteria A

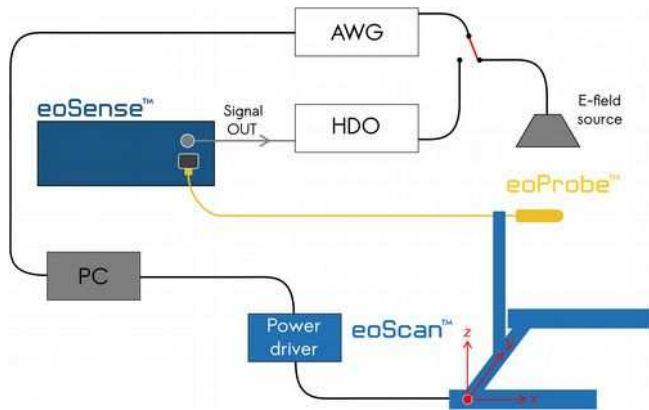
COMPATIBLE DEVICES & ACCESSORIES

E-field probe	eoProbe (cf. related data sheet FT-eoProbe)
Optoelectronic converter	eoSense (cf. related data sheet FT-eoSense)
Calibration cell	eoCal (cf. related data sheet FT-eoCal)
Fibre extension	eoLink (cf. related data sheet FT-eoLink)
Cartesian robot	eoScan (cf. related data sheet FT-eoScan)
Vacuum feed-through	eoVac (cf. related data sheet FT-eoVac)

APPLICATIONS INFORMATION

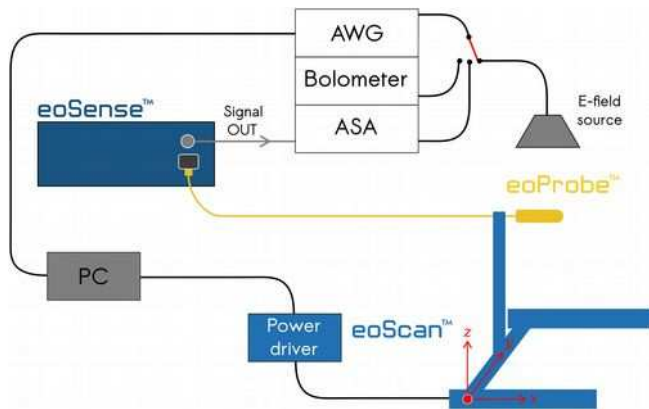
Standard setup for Time-Domain

Recommended setup in most cases (1D, 2D & 3D field mapping)



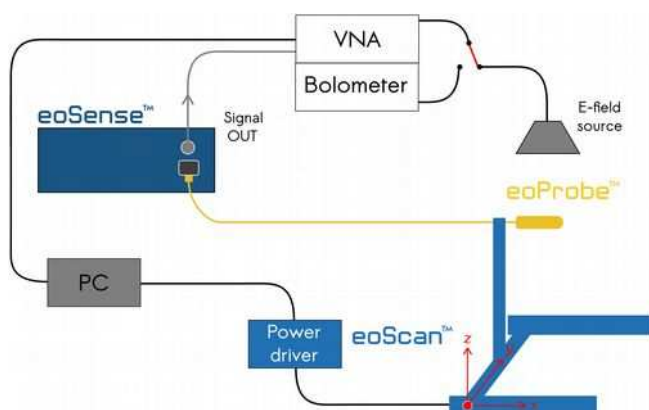
Standard setup for Frequency-Domain & Scalar measurements

Recommended setup in most cases (1D, 2D & 3D field mapping)



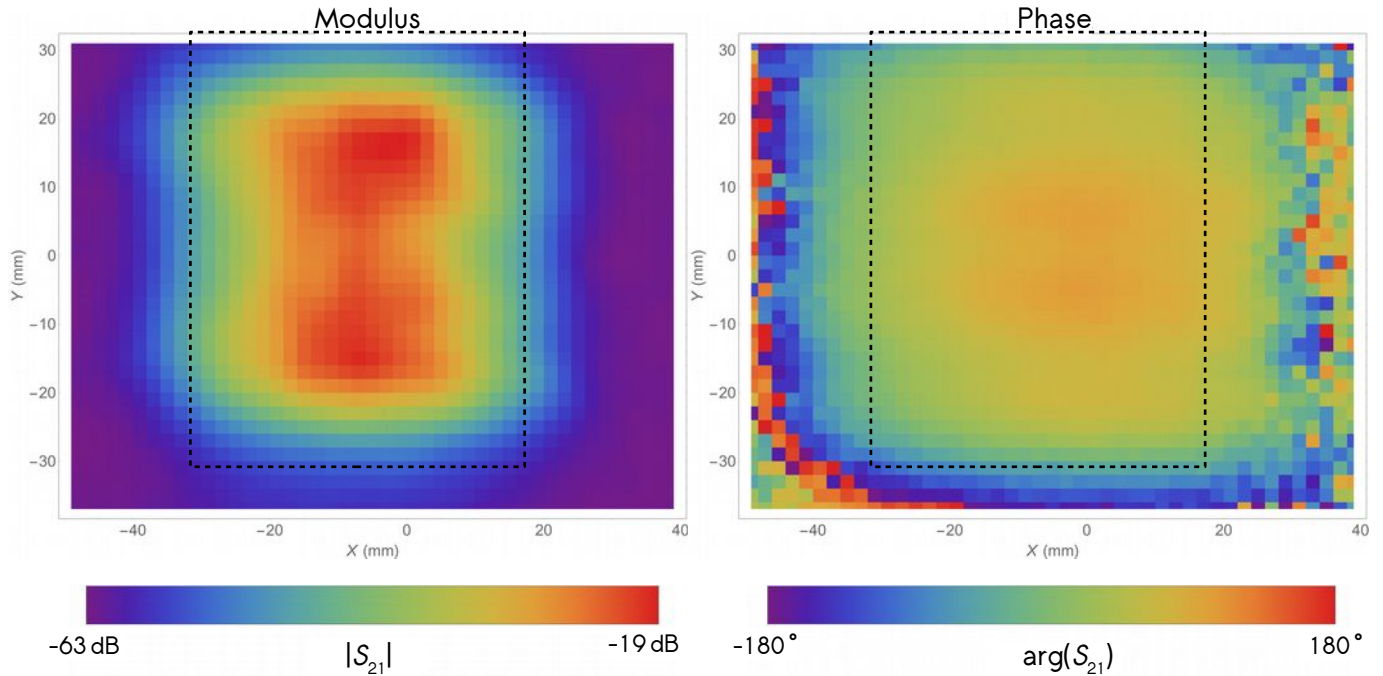
Standard setup for Frequency-Domain & Vector measurements


Recommended setup in most cases (1D, 2D & 3D field mapping)



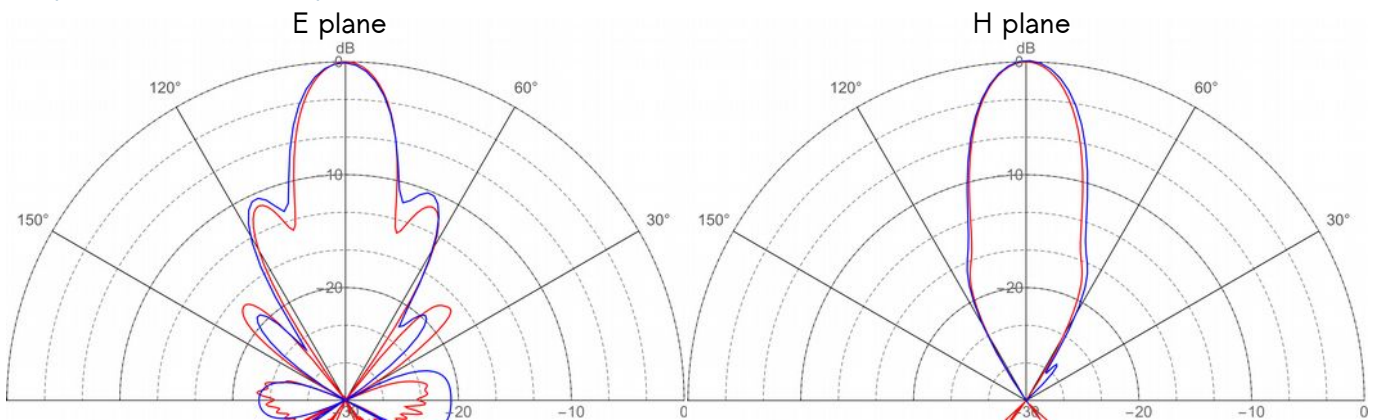
TYPICAL PERFORMANCE CHARACTERISTICS (MEASURED IN FREQUENCY-DOMAIN)

Reactive near-field 2D mapping: modulus $|S_{21}|$ and phase $\arg(S_{21})$ (Raw data)



- Frequency \rightarrow 20 GHz ($\lambda = 15$ mm)
- Distance from probe to antenna aperture \rightarrow 5 mm ($\lambda/3$)
- Spatial sampling \rightarrow 2 mm x 2 mm ($\lambda/7.5$)
- Measured E-field component \rightarrow co-polarization
- Horn \rightarrow Narda ATM 51-442-6 (20 dBi gain)
- Horn aperture (inside dimension) \rightarrow 63,75 mm x 49 mm (see  on above figures)
- Injected power on horn \rightarrow 20 dBm

Co-polarization radiation pattern



-  HFSS electromagnetic simulation²
-  Near to far field transformation from raw data

² Collaboration with IMEP-LAHC laboratory (Savoie-Mont-Blanc University)



Kapteos SAS
 Bâtiment Cleanspace
 354 voie Magellan
 73800 Sainte-Hélène du Lac
 FRANCE

Email: contact@kapteos.com
 ☎ +33 (0)4 79 62 88 34

Follow us on



Our website



www.kapteos.com