

EMBOX XL



TECHNICAL DOCUMENTATION



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COMPANY OVERVIEW

ANYFIELDS is developing tools that offer a new approach to antenna testing, to support the wireless connectivity industry.

Based on a **multi-patented technology** developed from over twenty years of research at **ONERA** (Office National d'Etudes et de Recherches Aéronautiques) **aerospace research laboratories**, these tools rely on **infrared thermography**.

Thanks to this new approach, ANYFIELDS solutions can measure and visualize antenna radiation in high definition, quickly and easily; for an immediate diagnostic of its performance.

They offer **accurate, reliable and repeatable radiation testing**, accessible to all players in the wireless connectivity industry.

PRODUCT LINE

ANYFIELDS offers three families of tools that satisfy complementary needs.



The **EMBox Lab** is an educational antenna measurement tool that enables quick testing and real-time visualization of radiation patterns.



The **EMBox XL** streamlines R&D, AIT for antennas and small satellites (up to 16U), offering a compact, fully integrated, and cleanroom-compatible antenna measurement solution.



The **EMCam** is a flexible tool designed for in-situ testing of large or integrated antennas. With its larger surface sensor, it enables measurements without dismantling the system under test.



EMBOX XL OVERVIEW

PRODUCT INFO

PRODUCT NAME
EMBOX XL

PART NUMBER
EMBox_XL_S1_V0

PRODUCT CATEGORY
Antenna measurement tool

USE
Education



GENERAL OVERVIEW

The **EMBox XL** is a tool designed for instant radiation functional tests on radiating systems. Its larger measurement zone allows one to measure antennas integrated into its functional environment and even small satellites.

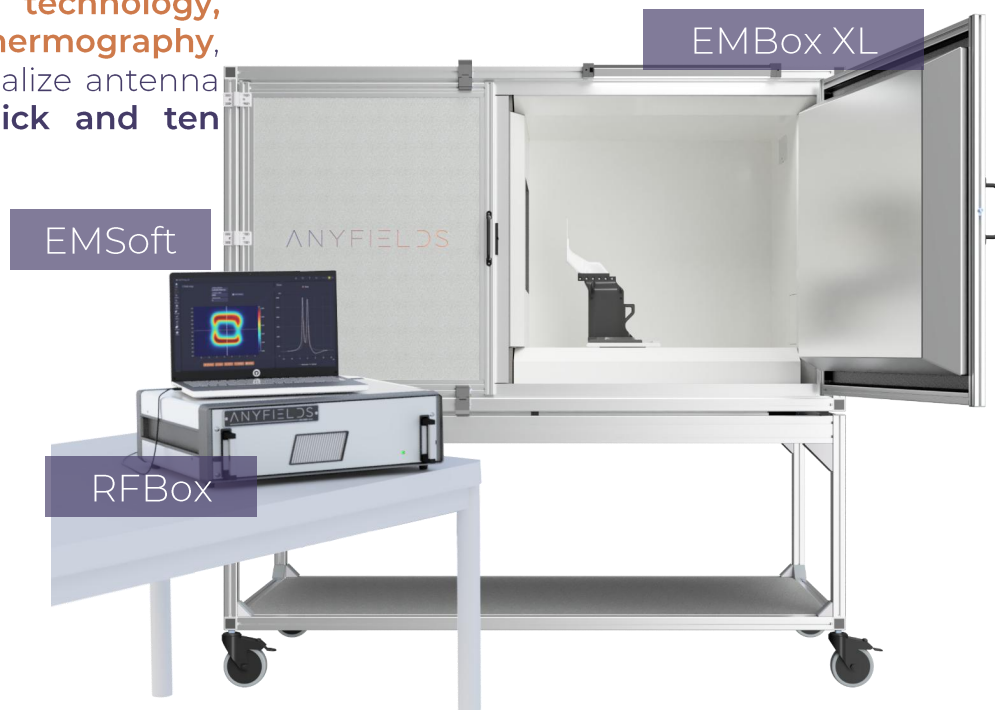
It uses **ANYFIELDS** technology, based on infrared thermography, to measure and visualize antenna radiation **in one click and ten seconds**.

EMBOX XL INCLUDES

EMBox XL an anechoic chamber for antenna and radiating systems measurements

RFBOX a radio-frequency source to feed the antenna under test

EMSOFT a system control software that runs the various functions for one-click measurements





MEASUREMENT CHAMBER

INNER PART

The **EMBox XL** is a compact anechoic chamber incorporating an ANYFIELDS sensor for antenna measurement and a microcomputer for system control. It is covered with broadband electromagnetic absorbers.

The doors, which also include an absorbing panel, are guided by cylinder pistons to close the chamber and ensure its electromagnetic shielding.

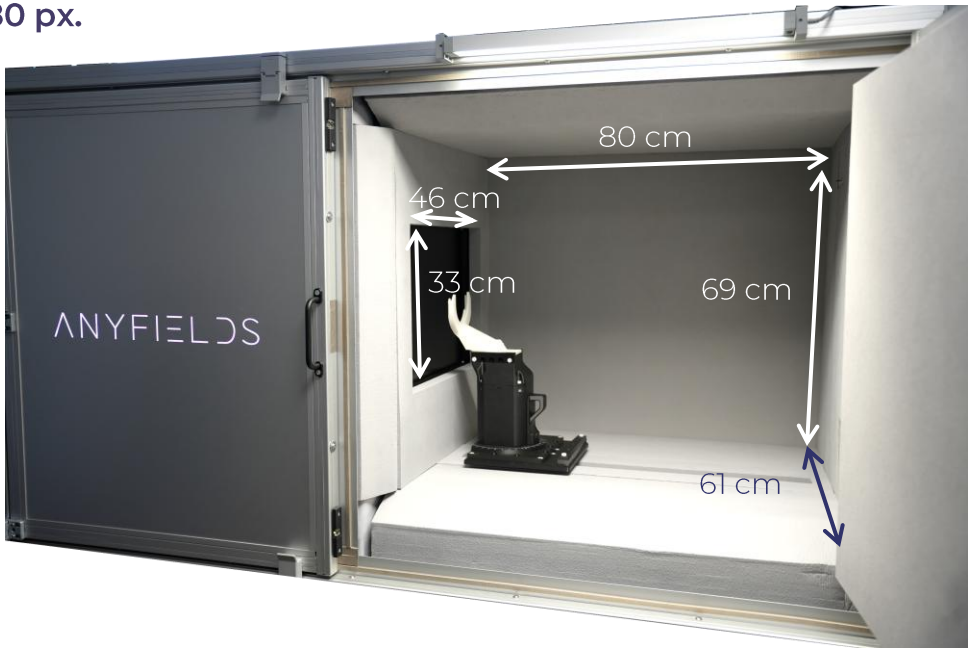
EMBox XL chamber with antenna under test





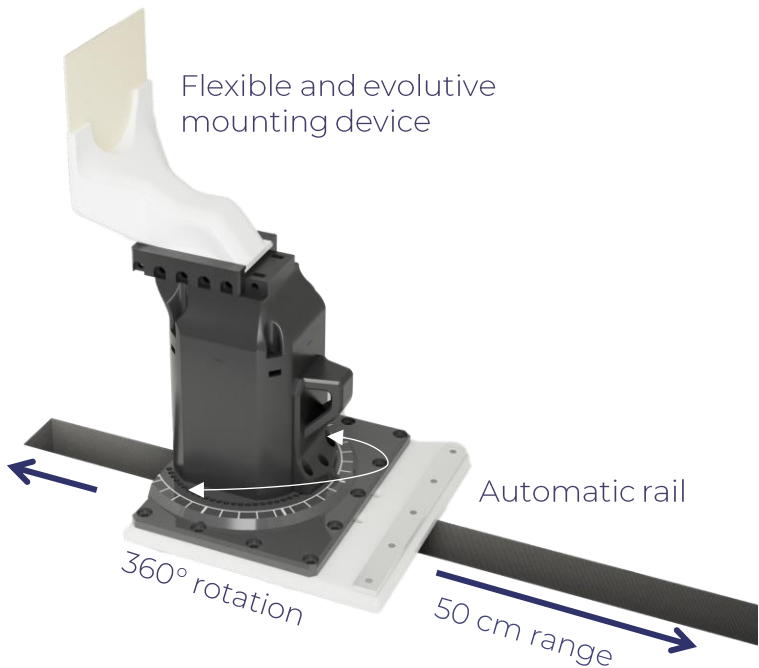
The inner part of the measuring chamber incorporates a measuring sensor consisting of a film and an infrared camera positioned in the absorber.

The dimensions of **the sensitive measuring film** are **46 cm x 33 cm/ 640x480 px.**



The **EMBox XL includes a positioning system for longitudinal translation** of the antenna. It consists of a graduated automatic rail onto which the antenna mount moves. This enables precise evaluation of antenna placement for multiple measurements at different antenna/film distances.

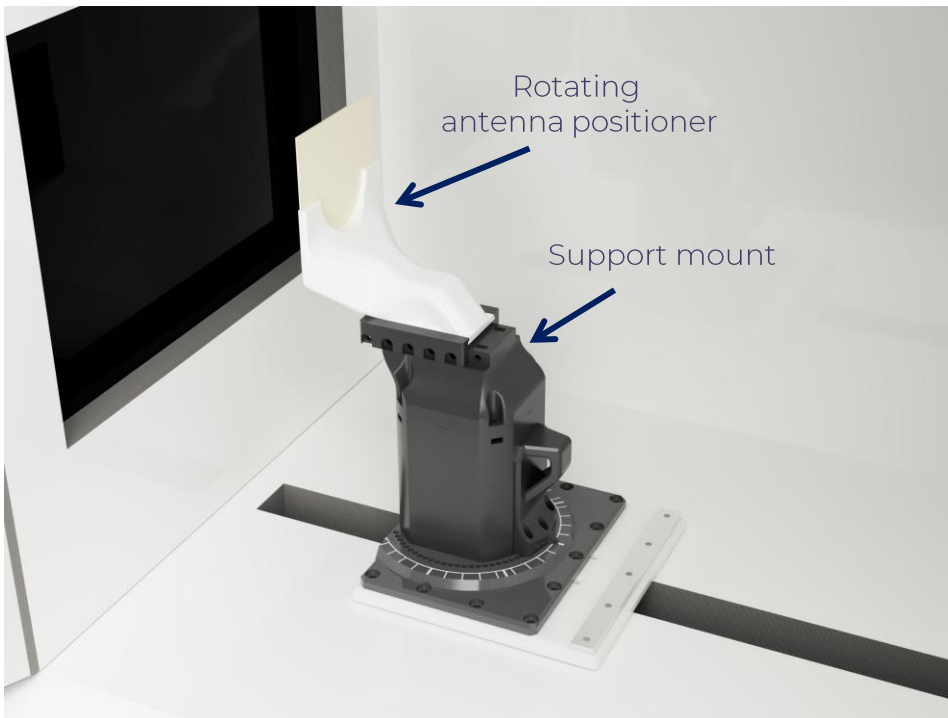
The position of the antenna relative to the film is controlled by the ANYFIELDS software EMSoft. No mechanical effort is needed to move the antenna.





ANYFIELDS antenna supports are optimized for antenna testing. It consists of a fixed part that slides along the rail and a mount part that holds the antenna. This part can be changed to fix another mount suited for a different antenna. Custom-made mounts are dimensioned so that the antenna can rotate along one axis to measure the antenna radiation at different angles.

The mounting platform attached to the rail can accept any positioning system for antenna or radiating systems including antennas.



Suitable mounts on the EMBox XL rail

The EMBox XL is delivered with:

- **Generic antenna mount;**
- **3 customized mounts adapted to the operator's antennas**, provided that the operator supplies the necessary information (design, antenna dimensions).
- **A high-performance RF cables** connects the device under test to the RFBox RF source or any other RF measurement device (VNA, Spectrum analyzer, ...).
- **An RF safety switch** also stops radiation from the antenna under test if the chamber door is opened.



EXTERNAL PART

The front of the EMBox XL displays the ANYFIELDS logo. Storage space for RF measurement tools (VNA, spectrum analyzer, ...) is available on the lower panel.



← The right-hand side of the EMBox XL contains the control panel for powering and connecting the EMBox XL chamber to the other component.

The EMBox XL system is supplied with all cables and connectors required for its nominal functioning.

EMBox XL closed- A handle closes EMBox XL's doors to protect the user from electromagnetic radiation.

The control panel on the right side of the panel is composed of

- **A network ethernet interface** to connect with operator's control computer
- An USB to connect to the RFBBox (control)
- **An AC power plug for EMBox XL power supply**

The left-hand side of this panel is composed of

- **A bulkhead RF feedthrough** enabling connection to an RF box or test equipment for S-parameter measurements.
- An access is also available to run a cable if required.





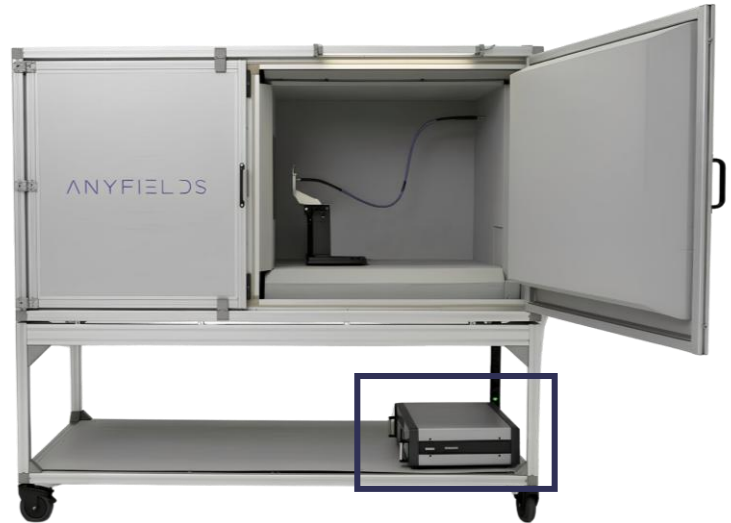
RF SOURCE

The ANYFIELDS **RFBBox** is an RF source that feeds the antenna under test with a signal suitable for measurement. It connects to the EMBox via its control panel.

ANYFIELDS offers **three versions of the RFBBox** to meet the different needs of operators:

- **RFBBox 1** : 300 MHz to 6 GHz
- **RFBBox 2** : 2 GHz to 20 GHz
- **RFBBox 3** : 20 GHz to 40 GHz

It is fully controlled by ANYFIELDS software.



The frequency of the antenna under test is selected on the software.

Front (top) and rear (bottom) sides of RFBBox ANYFIELDS





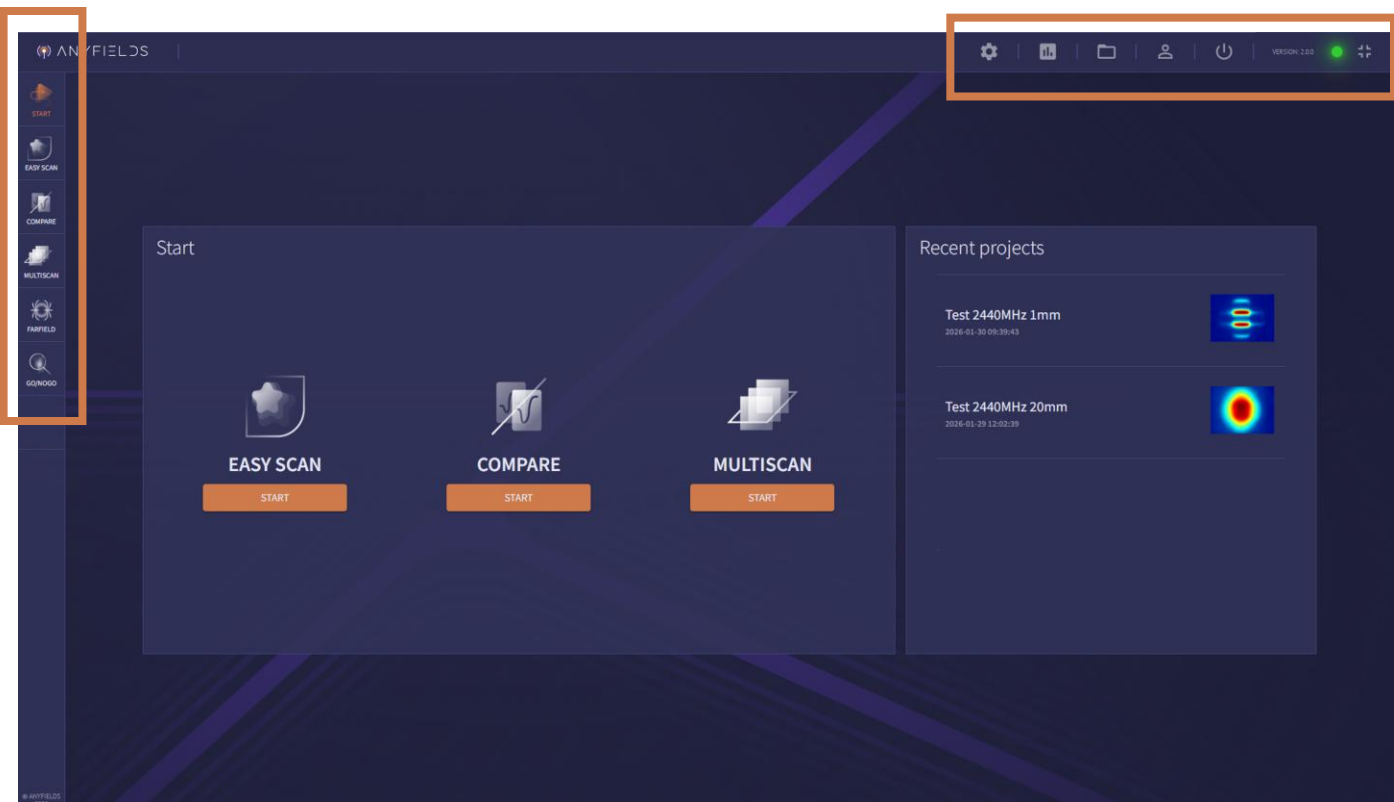
SOFTWARE

The system control software is hosted on the EMBox XL control microcomputer. It is compatible with the various web browsers (Chrome, Edge, Firefox...) and works on different operating systems (Windows, MacOS, Android...). It can be accessed via various client terminals (computer, tablet, etc.).

It offers a platform to set up and launch ANYFIELDS measurements, as well as to display and extract results. The main functionalities are illustrated in the following figures.

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Easy access to all features via two menus.

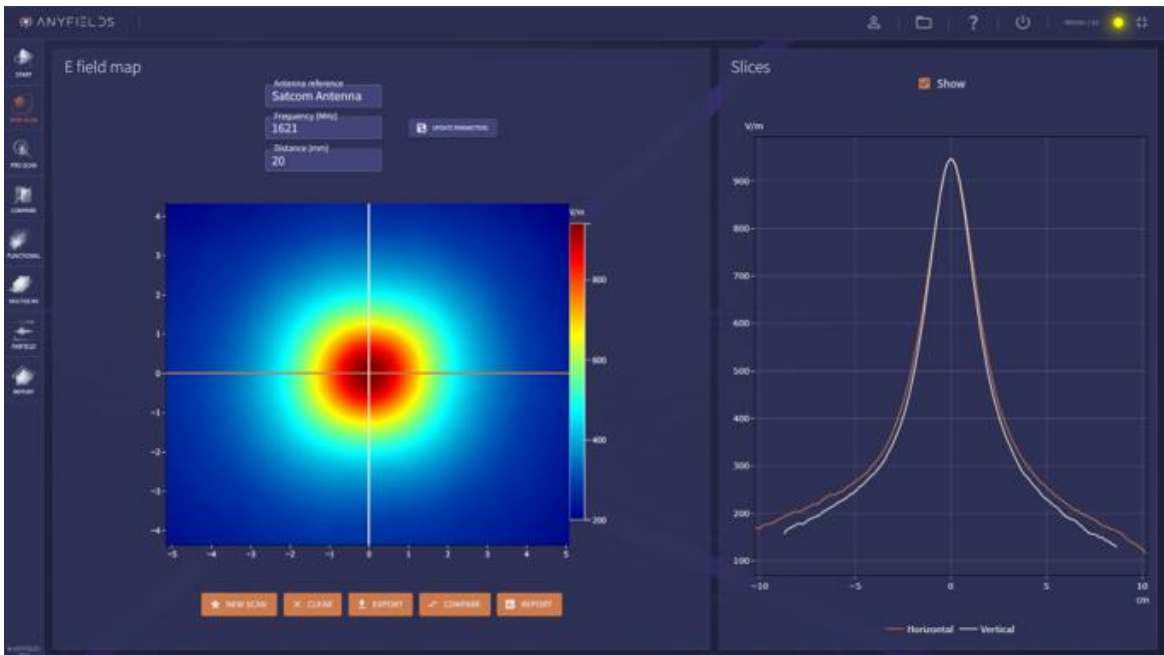




FUNCTIONALITIES

EASY SCAN

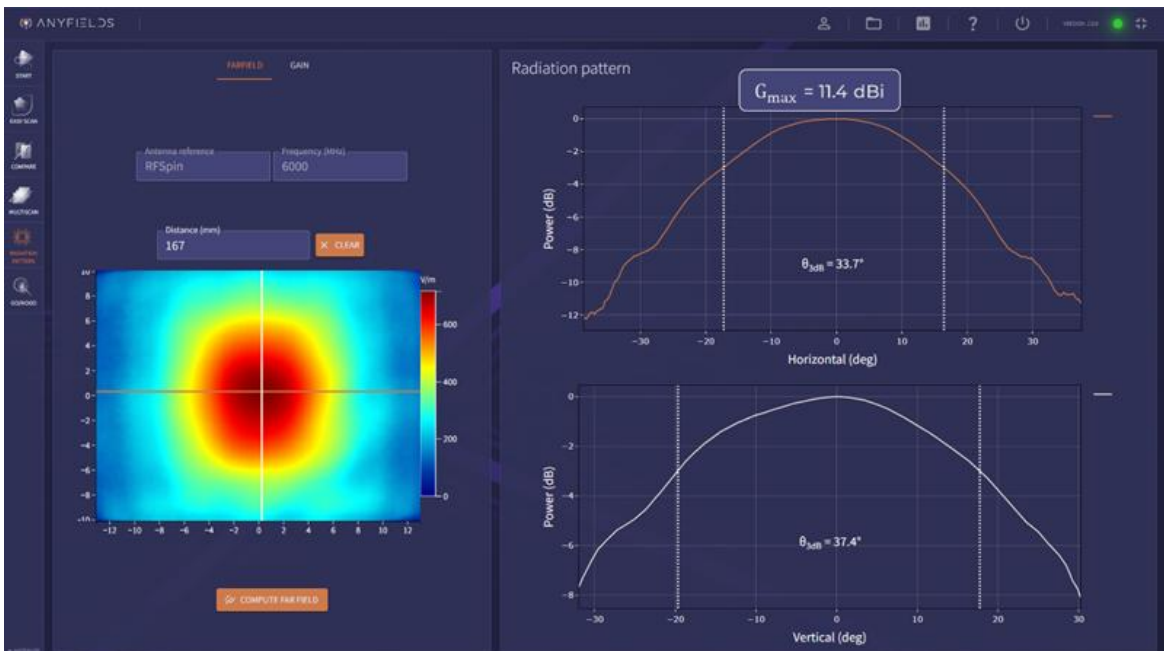
The EASY SCAN mode performs single-point measurements at user-defined distance and frequency.



Measurement of the radiated field of a Satcom antenna.

FAR-FIELD

The **FAR-FIELD** mode enables the calculation of the radiation pattern (gain and HPBW).

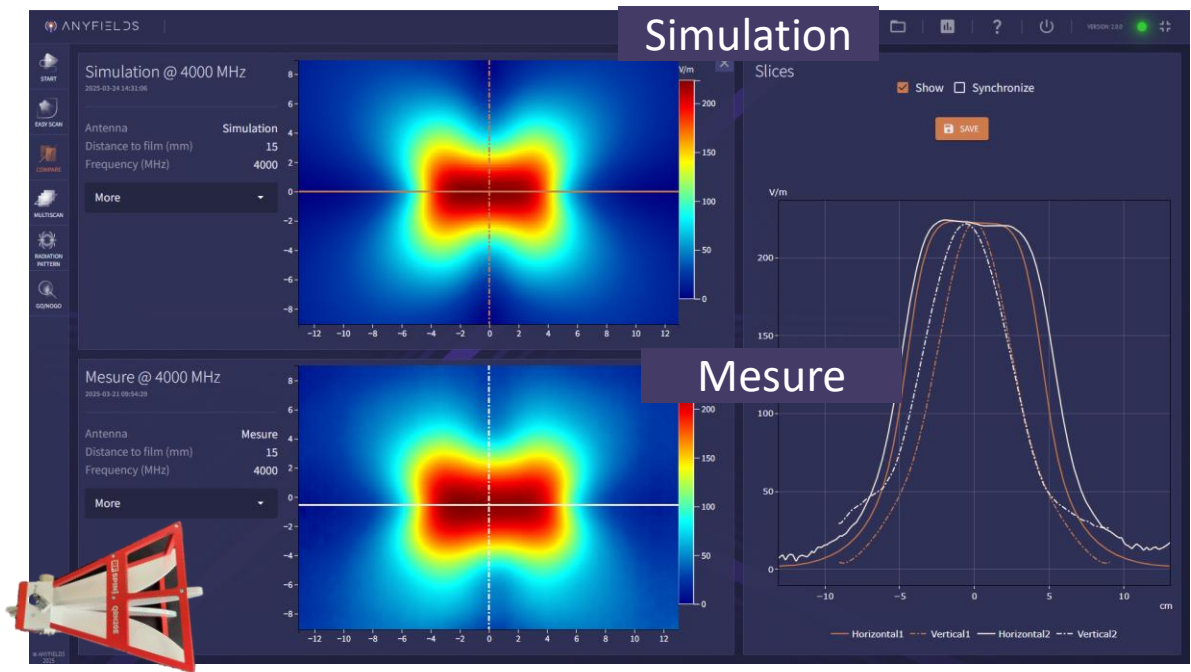


Computation of the radiation pattern of a horn antenna in Far-field.

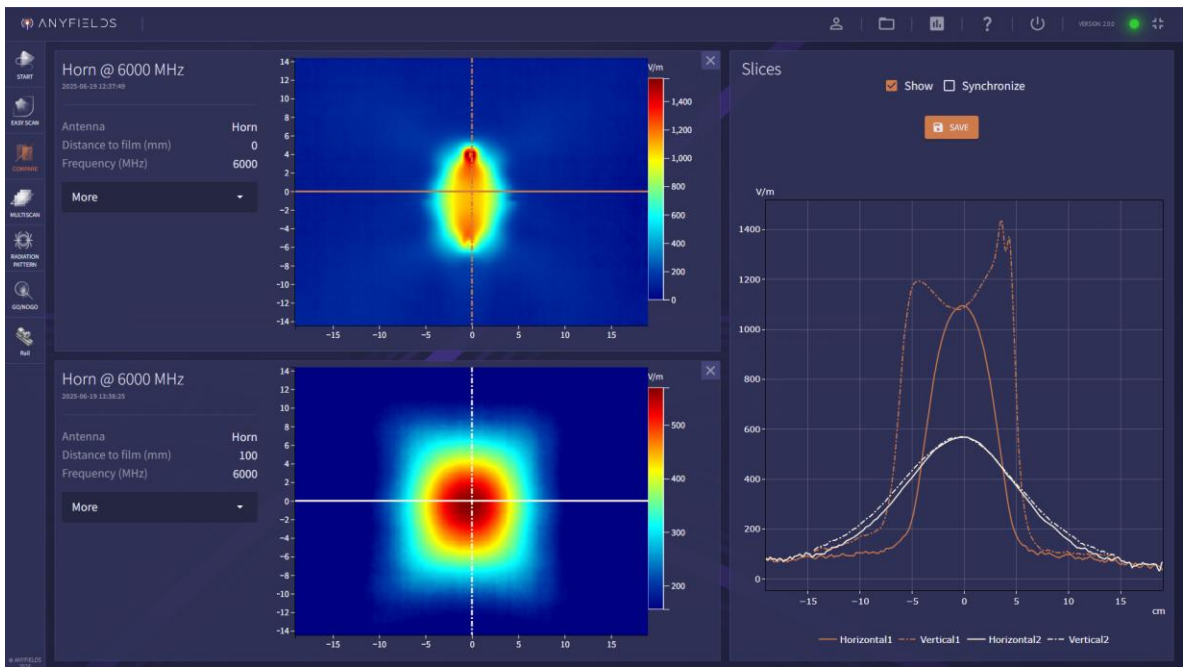


COMPARE

The **COMPARE** mode facilitates comparison between two measurements and/or simulations.



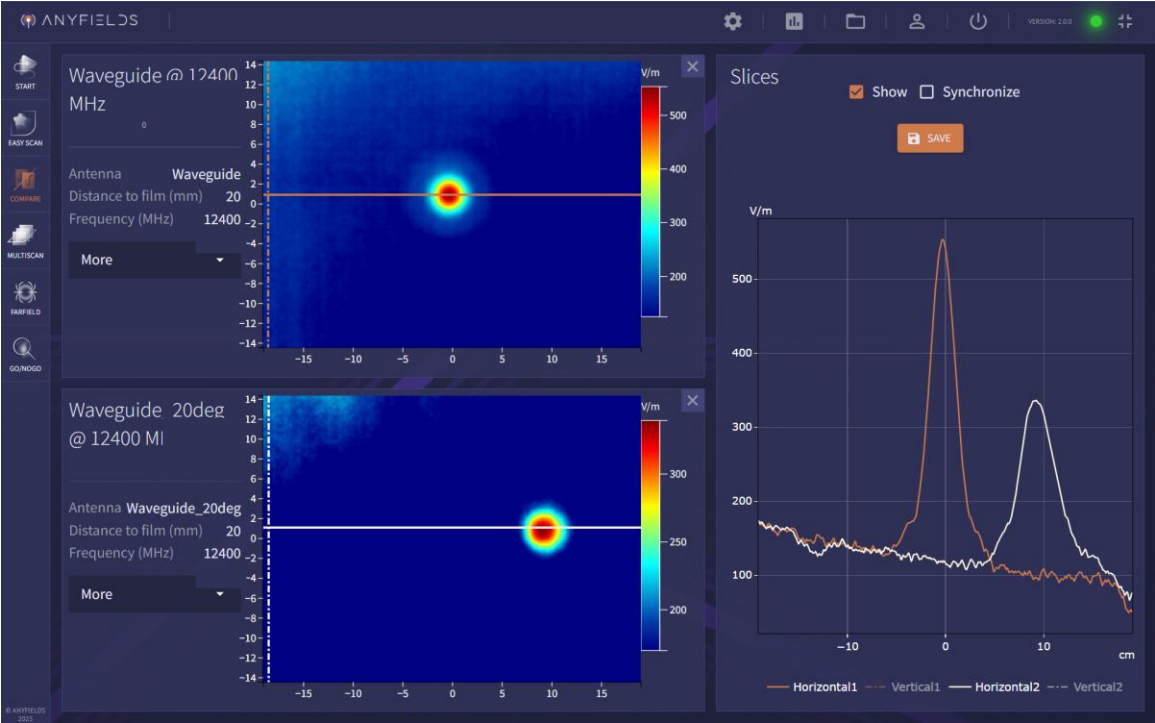
Measurement and comparison between simulation results and experimental measurements of the quad ridged horn antenna.



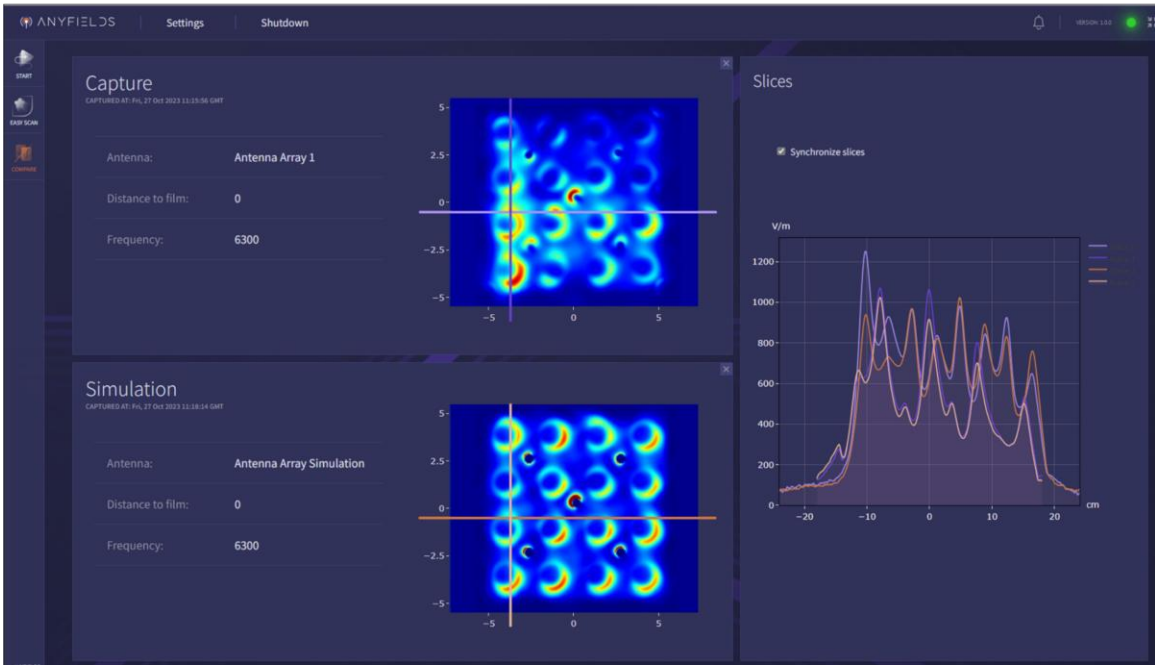
Measurement and comparison of the radiation of a horn antenna at different distances.



The **COMPARE** mode can be used for all types of antenna.



Examples of beam measurement visualisations for validation

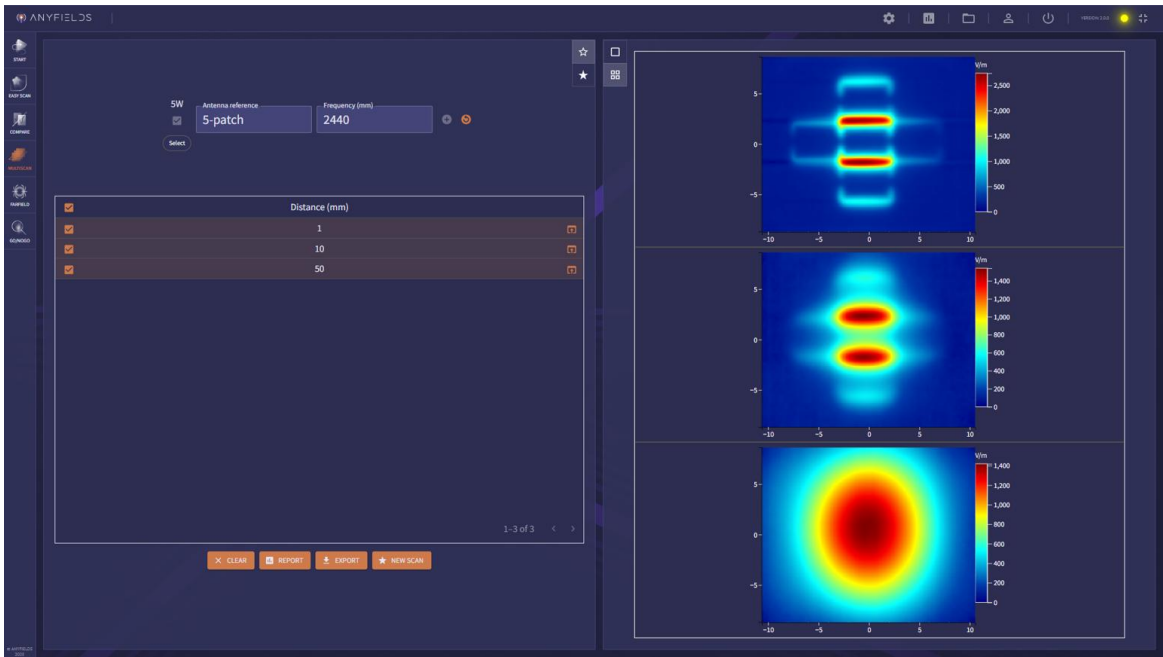


*Quick near-field diagnostic of a defect on a multi-element antenna.
Power distribution issue on the upper part of the antenna.*

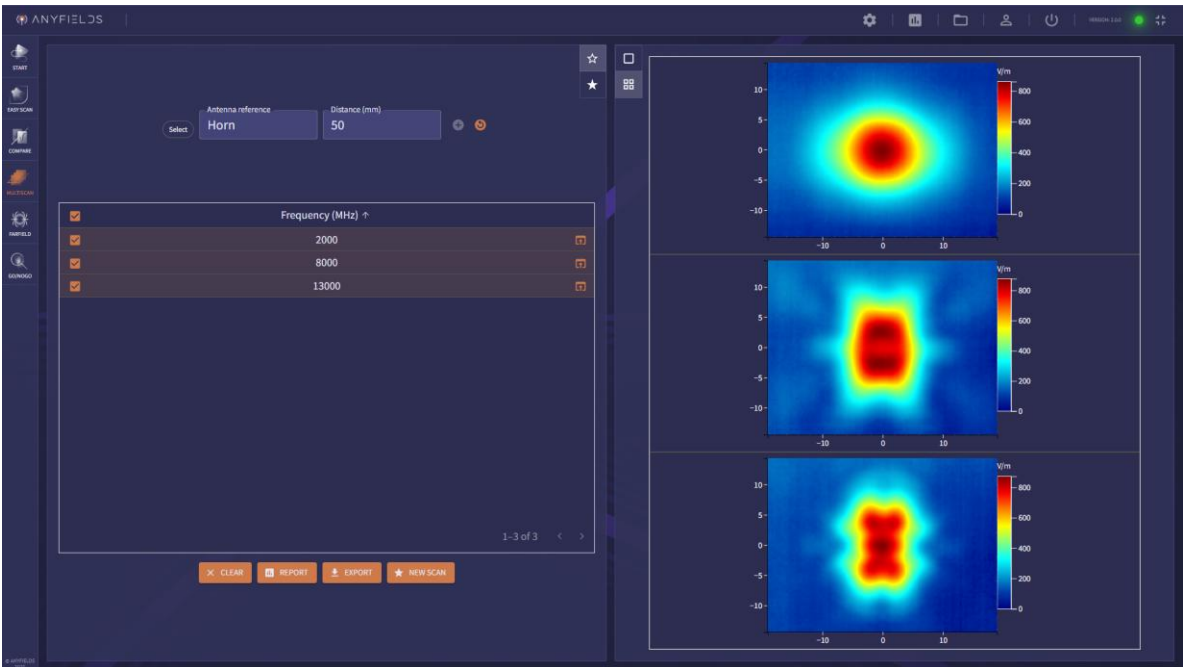


MULTI-SCAN

ANYFIELD software offers a **MULTI-SCAN mode** in which you can **parameterize and launch multi frequency and multi distance measurements**. You can make sweeps in frequency and in distance or enter a list of parameters.



Measurement of a 5-patch antenna at distances ranging from 1 mm to 50 mm.

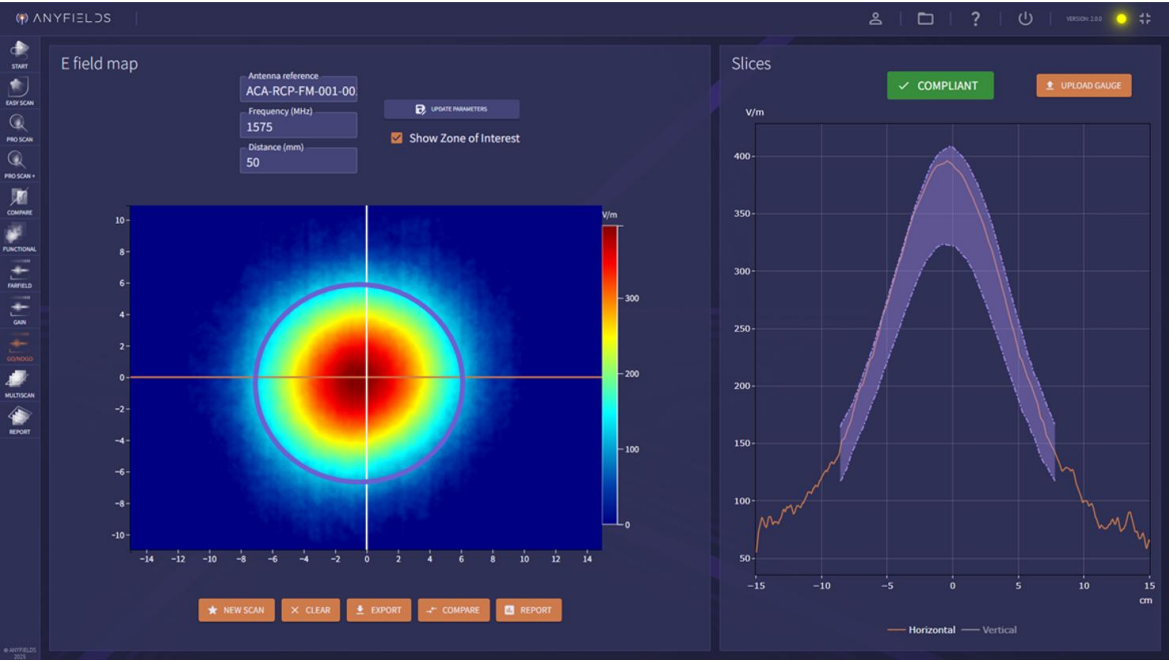


Measurement of quad ridged horn antenna at various frequencies.

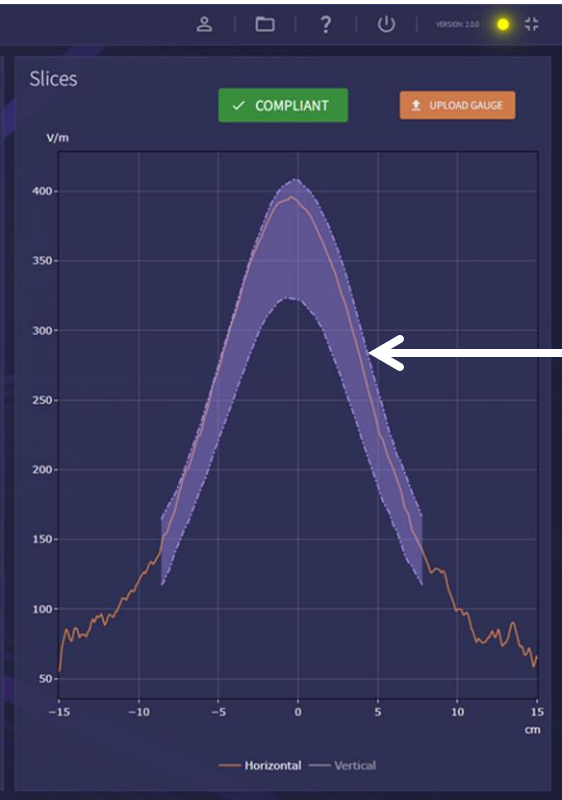


GO/NO GO

The **GO/NO GO** mode enables validation of the measurement based on a gauge reference



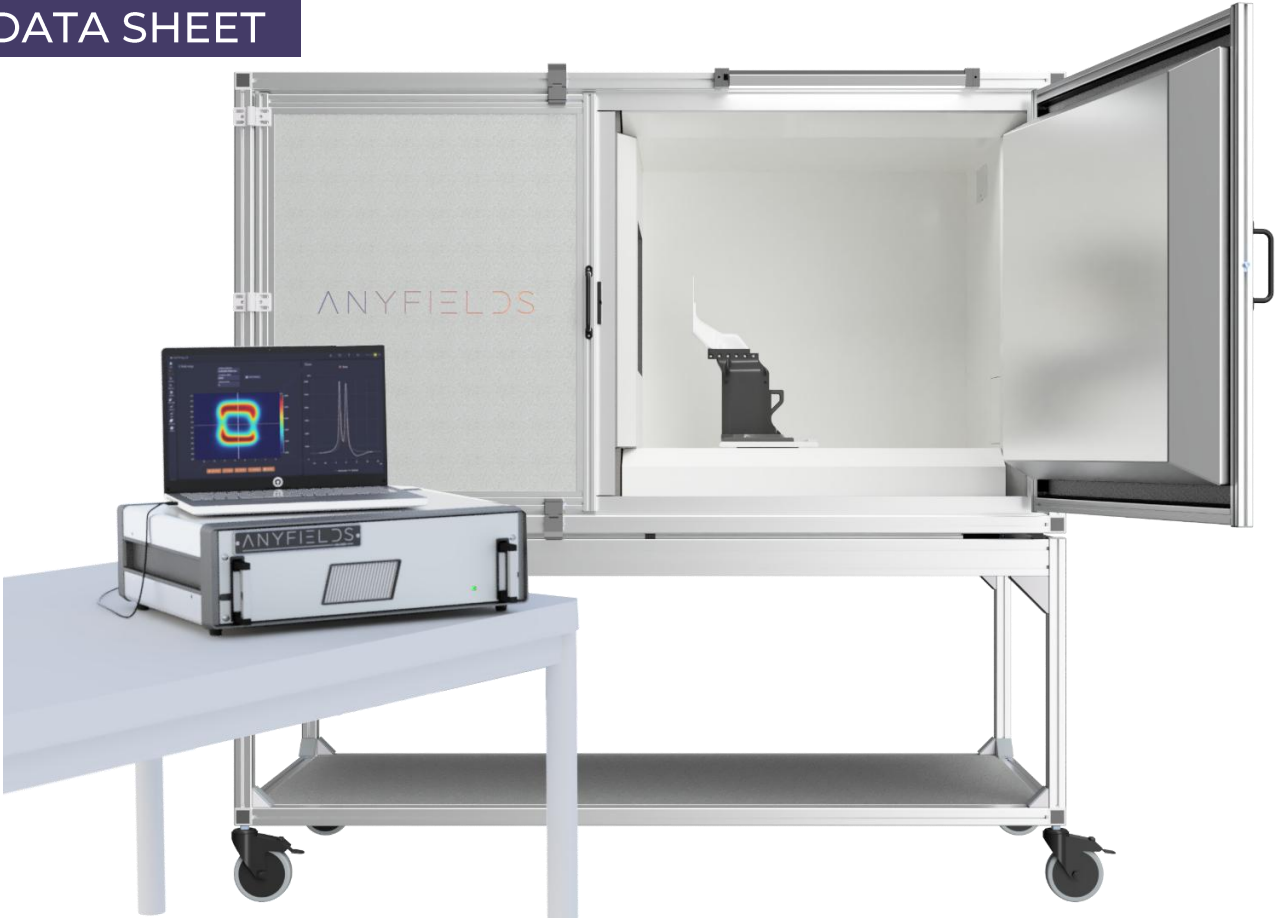
Computation of the calibrated gauge reference in the software, with automatic validation of antenna measurements.



Gauge reference based on a golden sample



DATA SHEET



EMBOX LAB - MEASUREMENT TOOL	
Measurement time	From 10 sec
External dimensions	188 x 90 x 181 cm ³
Internal dimensions	80 x 61 x 69 cm ³
Surface sensor	46 x 33 cm ² 640 x 480 px High Definition
Weight	200 kg
Capabilities	Standalone or embedded antennas Passive & active antennas
Electromagnetic shielding	Internal walls feature broadband electromagnetic absorbers
Transport / carrying	Wheels allow the box to be moved



EMSOFT	
Runs on the EMBox XL control microcomputer	
Integrated control system	Ethernet network interface Power connector
Multi-device access	PC, tablet, etc.
Smart data management	Test, store, organize, compare, share, archive
Data export	ASCII (.csv, .json) and image (.png) formats

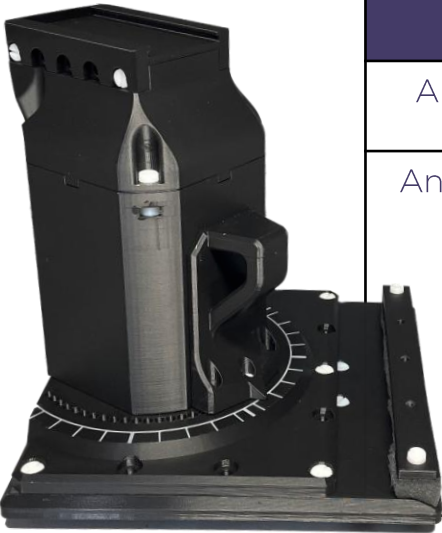
RF SOURCE

RF Source	V1 300 MHZ to 6 GHZ V2 2 GHZ to 20 GHZ V3 20 GHZ to 40 GHZ
RF source input Power	100-240V AC / 150VAm _{ax}



MOUNTING DEVICE

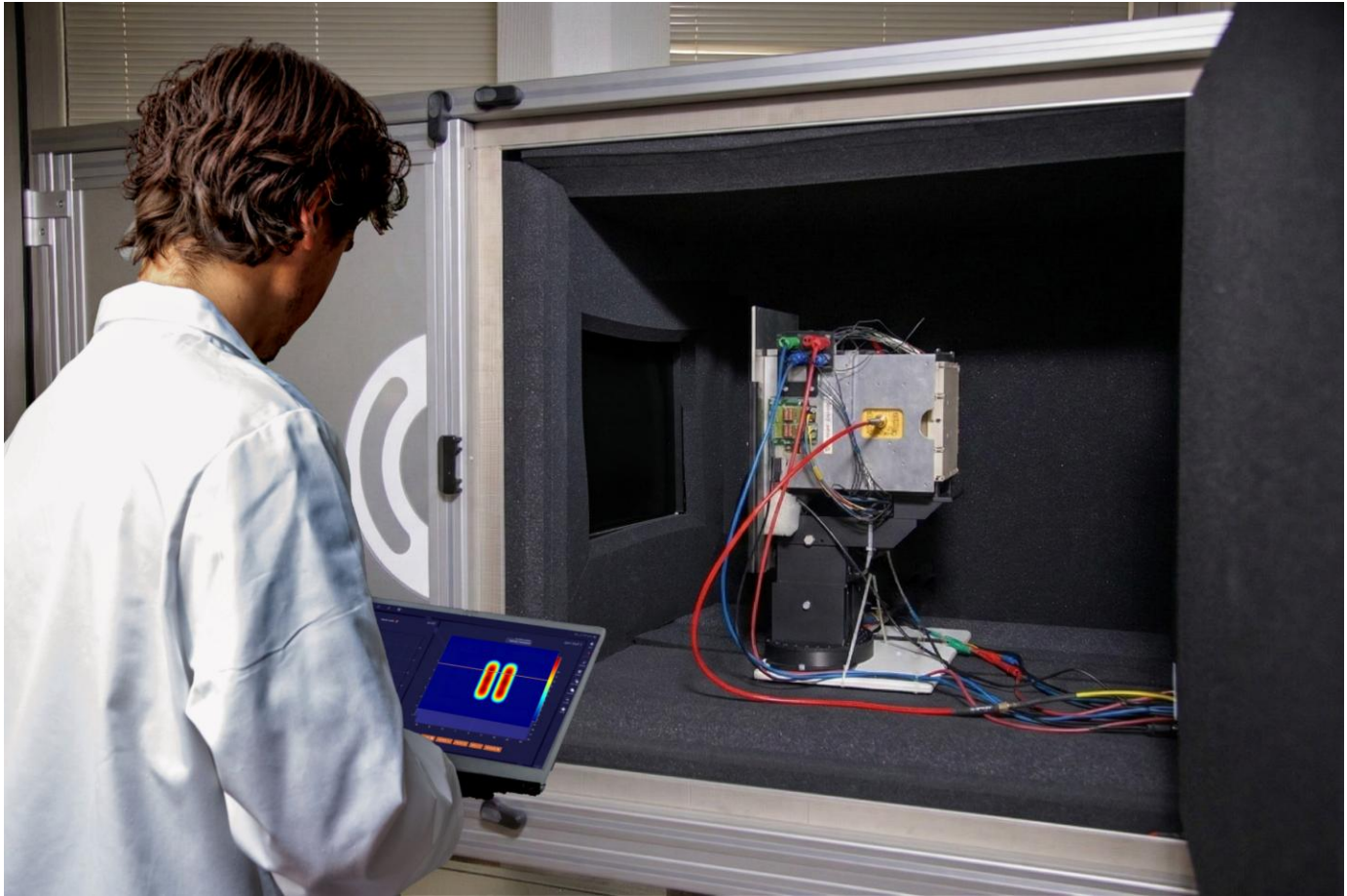
Automatic rail	50 cm range
Antenna mount	Generic mounting for quick or large-antenna 360° rotation 3 customized mounts adapted to the operator's antennas





EMBOX XL

Accelerate your processes



- ✓ **EASY SCAN** Single-point measurements at user-defined distance and frequency.
- ✓ **MULTISCAN** Parameterize and launch multi frequency and multi distance measurements
- ✓ **COMPARE** Facilitated comparison between all measurement types
- ✓ **FAR-FIELD** Calculation of the radiation pattern (gain and HPBW)
- ✓ **GO/NO GO** Validation of the measurement based on a gauge reference



EMBOXXL



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