

EMBOX LAB



TECHNICAL DOCUMENTATION

EMBOX LAB



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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 LAB OVERVIEW

PRODUCT INFO

PRODUCT NAME
EMBOX LAB

PART NUMBER
EMBox_LAB_S4_V0_1

PRODUCT CATEGORY
Antenna measurement tool

USE
Education



GENERAL OVERVIEW

The **EMBox Lab Education Pack** is an integrated measurement tool designed for instant measurement and visualization of antenna radiation.

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

EMBOX LAB PACK INCLUDES

EMBOX LAB a mini anechoic chamber for antenna measurements

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

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

STARTER PACK a bundle of three adapted antennas and associated turnkey lab exercises

EMBox Lab

Integrated RFBox Lab

EMSoft

Antennas starter pack



MEASUREMENT CHAMBER

INNER PART

The **EMBox Lab** is a compact anechoic chamber embedding an ANYFIELDS sensor for antenna measurement and a microcomputer for system control.

The EMBox doors also include an absorbing panels to ensure its electromagnetic shielding.

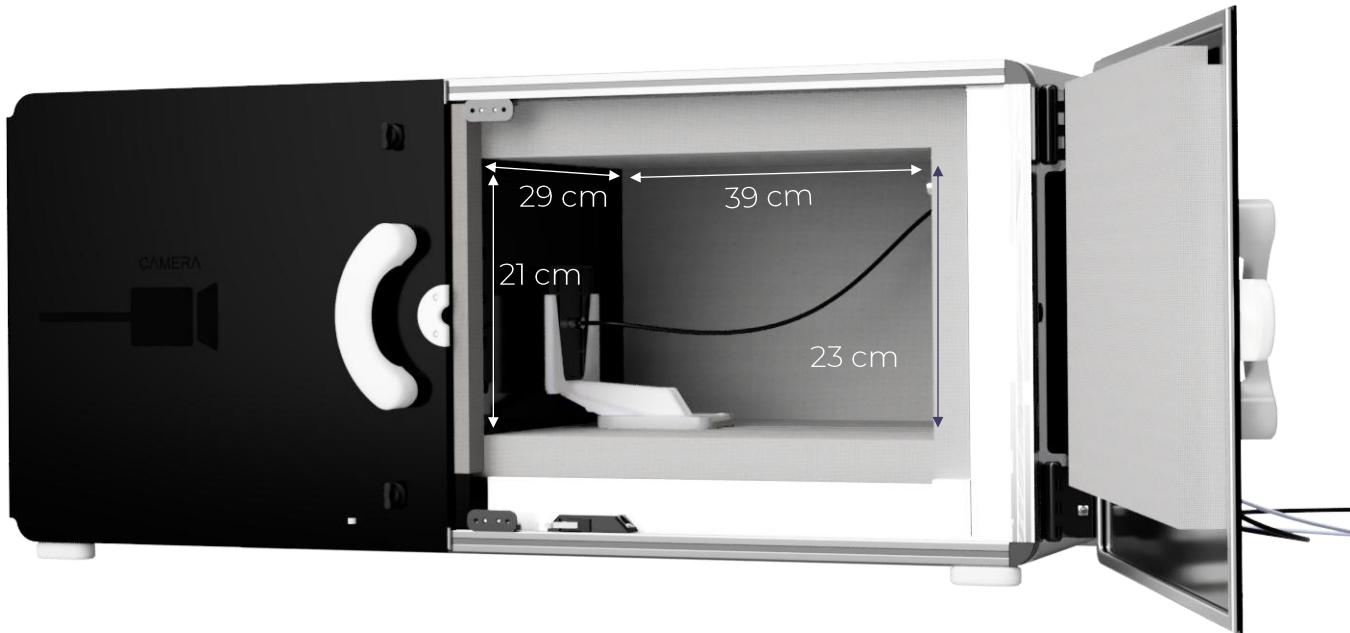
EMBox Lab chamber with patch antenna under test





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

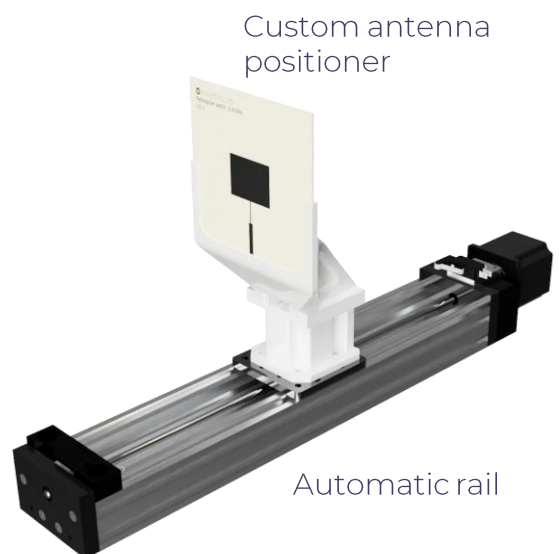
The dimensions of the sensor are 29 cm x 21 cm.



The EMBox Lab includes **a positioning system for longitudinal translation of the antenna**. It consists of a **motorized rail** onto which the antenna mount moves. This enables precise antenna placement and **multiple measurements at different antenna/sensor distances**.

The position of the antenna relative to the film is **controlled by the ANYFIELDS software** EMSOFT.

ANYFIELDS antenna mounting systems 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 for various mounting device suited for various antenna designs.

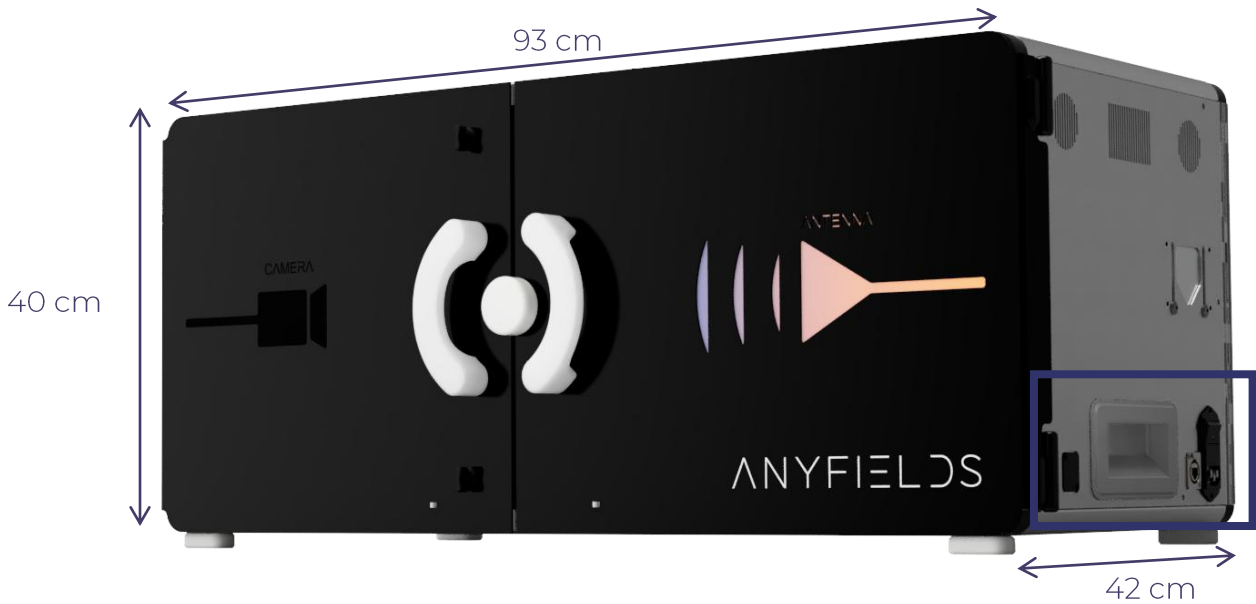




EXTERNAL PART

The front of the EMBox Lab shows two opening doors. Left one encloses the measurement system part and a lock maintains it closed. A camera design indicates its placement. A camera design indicates its placement.

The right door gives access to the measurement chamber, and has an antenna diagram on it. LED lights on the door indicate the system status.



EMBox Lab closed. A handle closes EMBox Lab doors and protect the user from electromagnetic radiation.

The **EMBox Lab contains an integrated control unit** for powering and connecting the EMBox Lab chamber to the other components.

The right side is composed of

- **A network ethernet** interface to connect with operator's control computer
- **A power plug** for power supply

Two handles on both sides of the box allow it to be easily transported.

The **EMBox Lab system is supplied with all cables and connectors required** for its nominal functioning (power supply cable, N-SMA RF cable) and for software control of the EMBox Lab /RFBBox Lab system.



ANTENNAS STARTER PACK

TYPE

Rectangular patch

DIMENSIONS

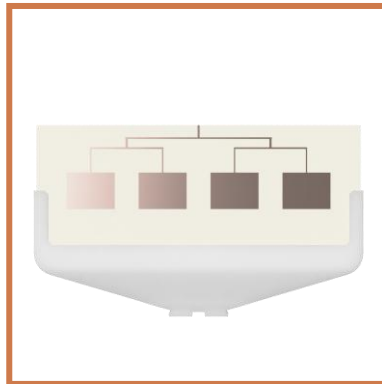
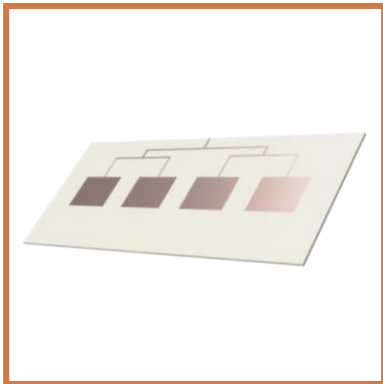
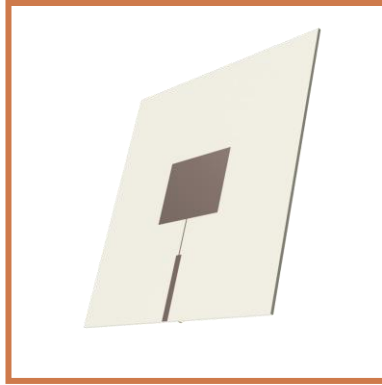
12.5 x 12.5 cm²

FREQUENCY

2.4 GHz

CONNECTOR

SMA



TYPE

Array of 4 rectangular patches

DIMENSIONS

27.5 x 11 cm²

FREQUENCY

2.4 GHz

CONNECTOR

SMA

TYPE

Rat Race 2 patch array

DIMENSIONS

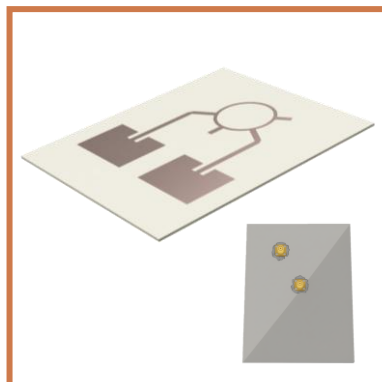
15 x 12.5 cm²

FREQUENCY

2.4 GHz

CONNECTOR

SMA (two ports)





RF SOURCE

The ANYFIELDS **RFBox Lab** is an **RF source operating from 2.3 GHz to 2.65 GHz** with an option 5.7-5.9 GHz that feeds the antenna under test with a signal suitable for measurement. It is embedded within the right wall part of the EMBox Lab and it is fully controlled by ANYFIELDS EMSoft software.

A bulkhead pass-through is integrated to enable user-supplied cables to be routed alongside the cables provided with the EMBox Lab.



SOFTWARE

The system control software is hosted on the EMBox Lab control microcomputer. It is compatible with the various web browsers (Chrome, Edge, Firefox...) and works on different operating systems (Windows, MacOS, Android, etc.). 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.

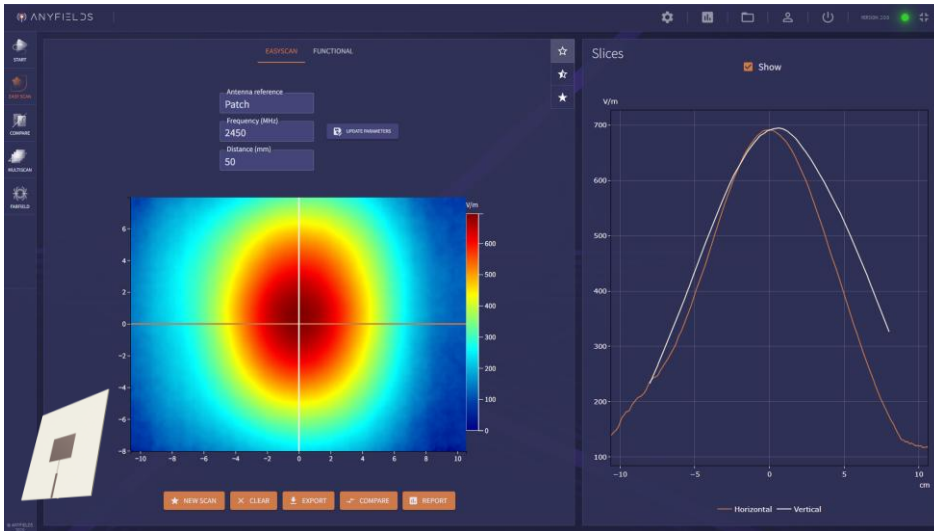




FUNCTIONALITIES

EASY SCAN

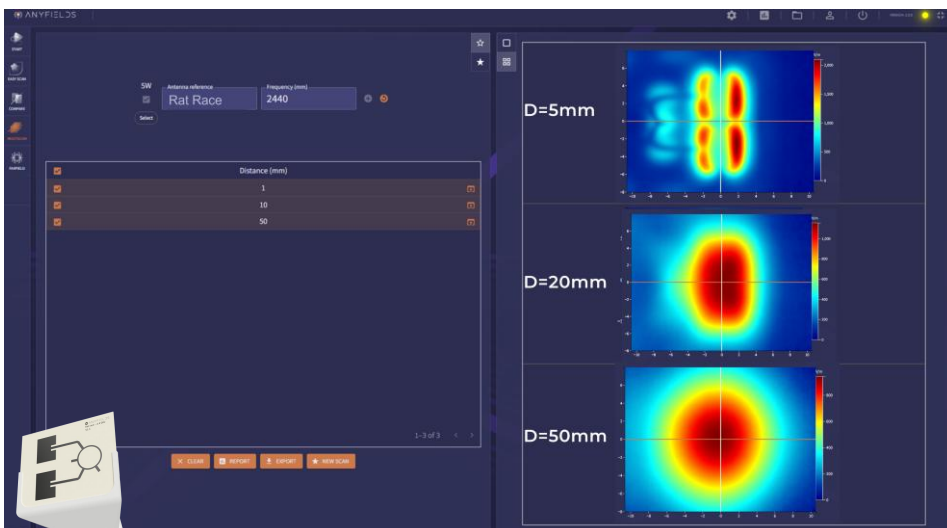
The EASY SCAN mode performs single-point measurement at user-defined distance and frequency.



Observation of the radiated field of a patch antenna at a specific distance and frequency

MULTI-SCAN

ANYFIELDS 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.

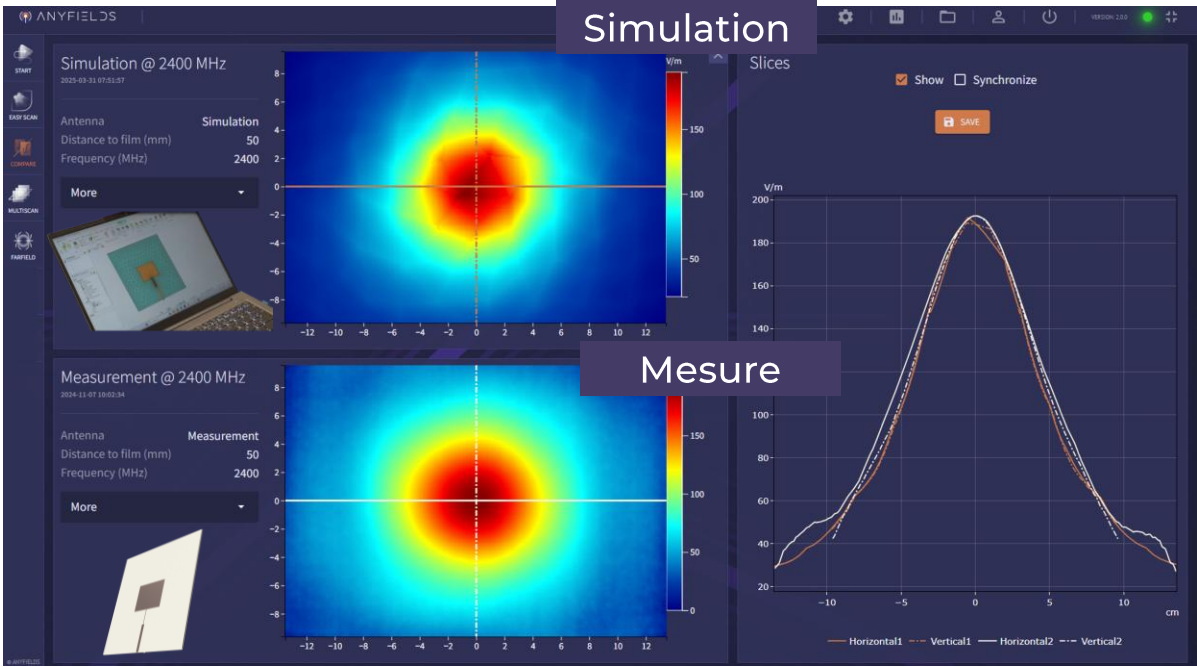


Observation of the radiated field by a Rat 2x1 patch array antenna at different distances

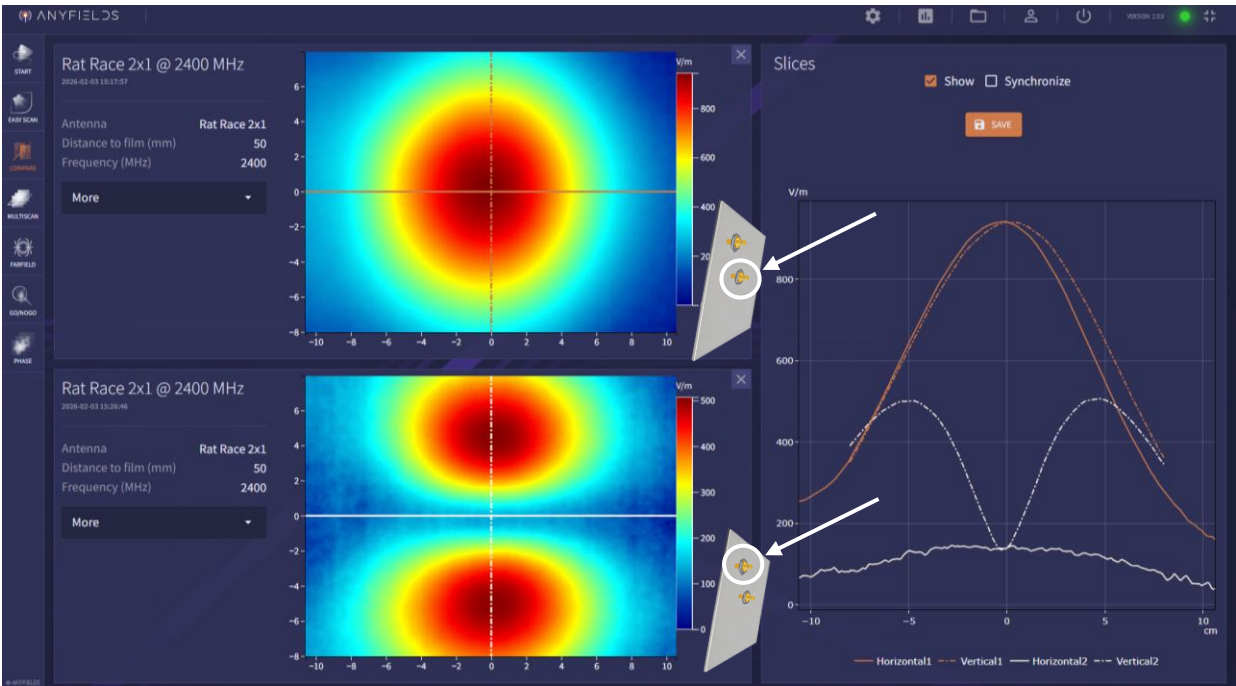


COMPARE

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



Observation and comparison of simulation results with experimental measurements

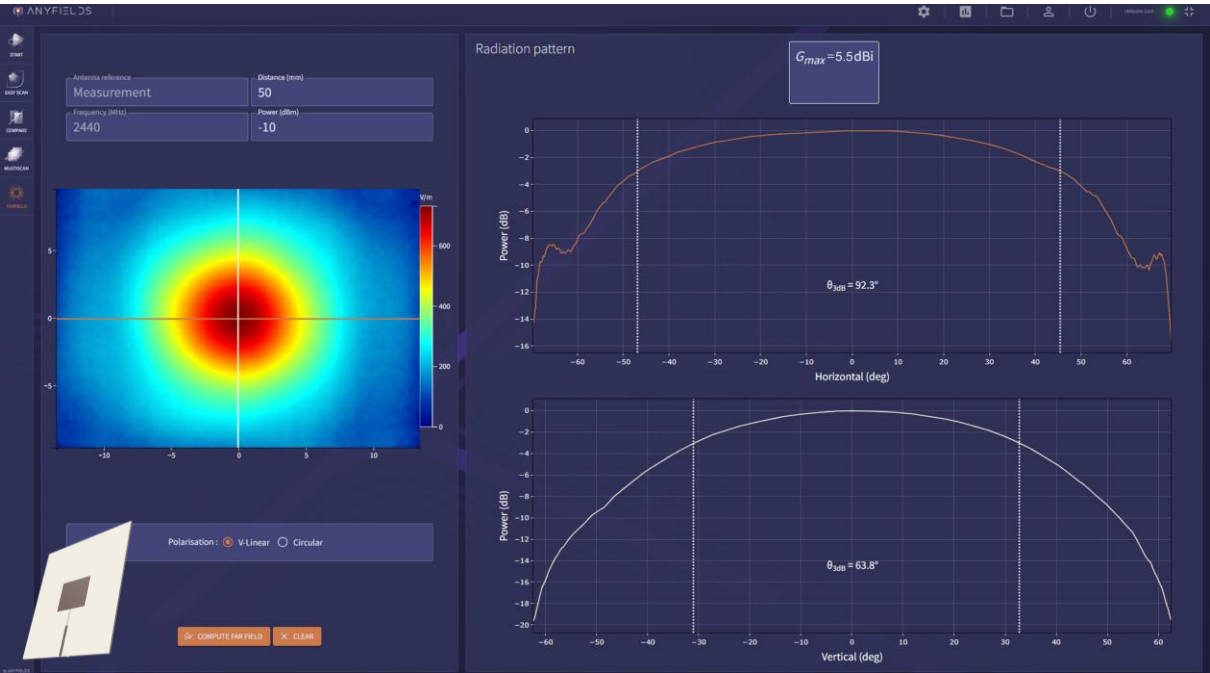


Observation and comparison of the array radiation for in-phase and 180° out-of-phase excitations.

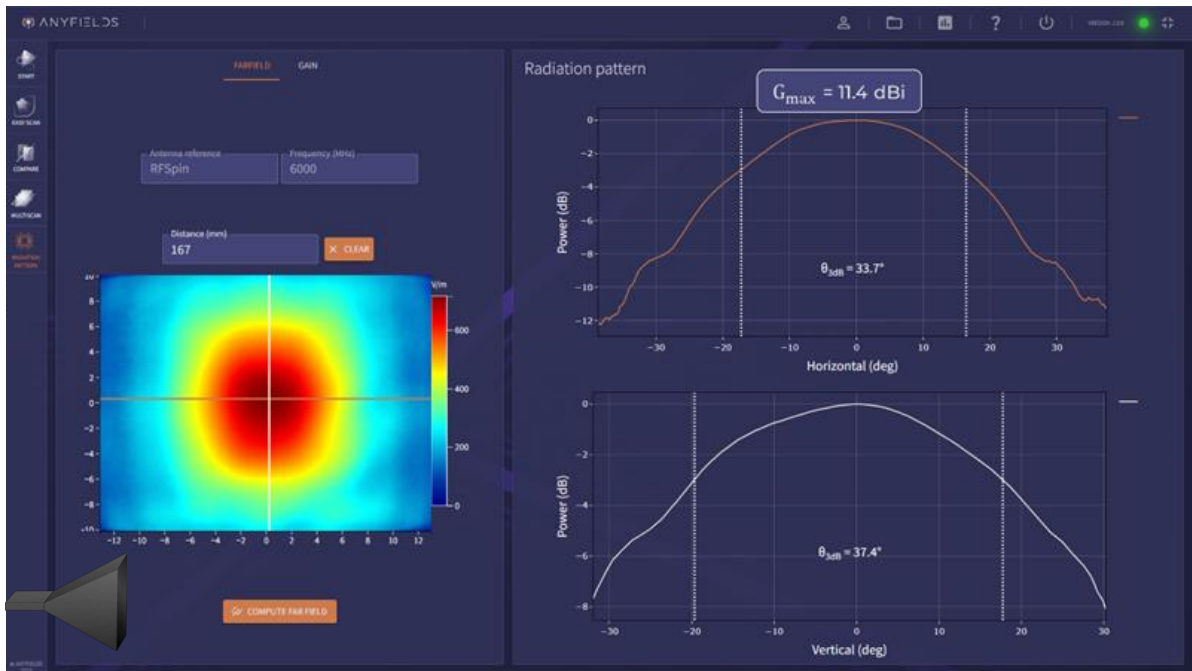


FAR-FIELD FUNCTION

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



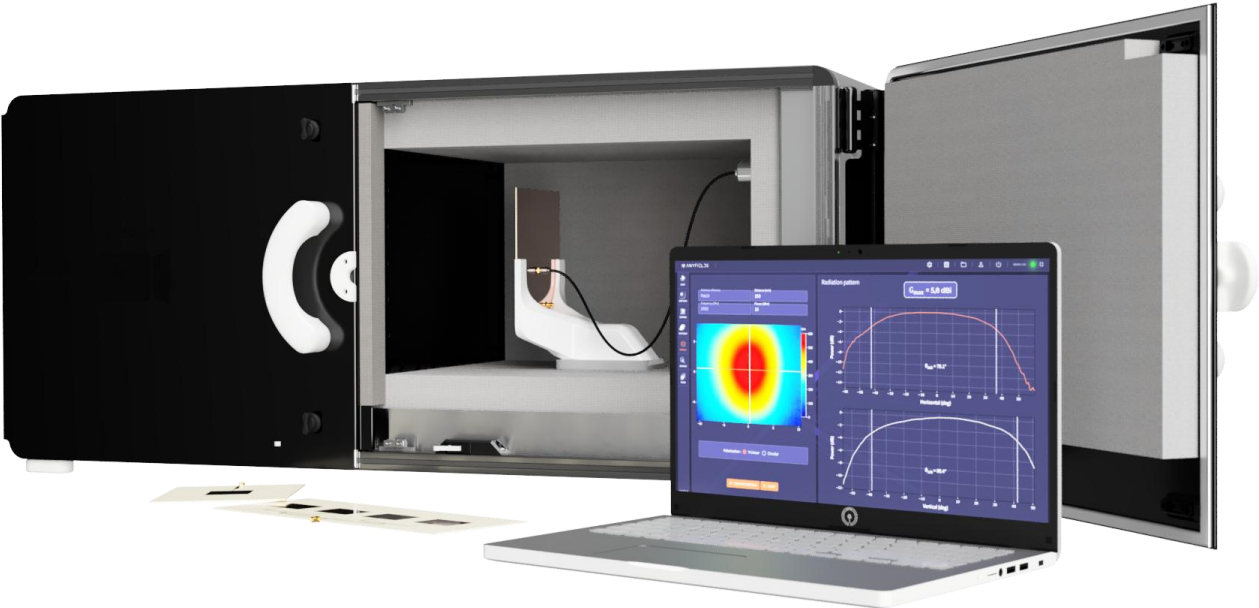
Calculation of the radiation pattern of a patch antenna.



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

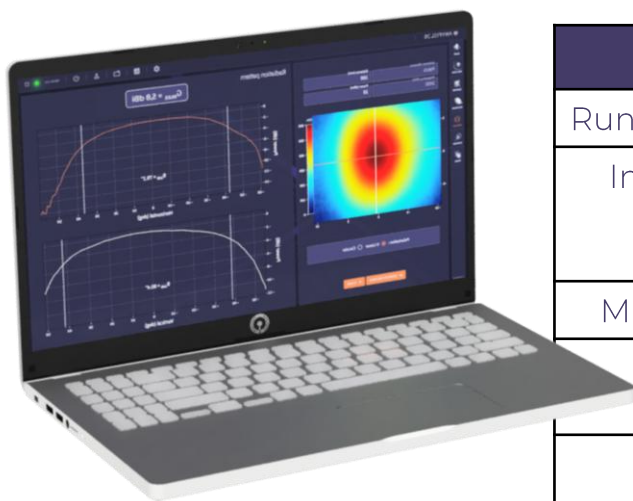


DATASHEET



EMBOX LAB - MEASUREMENT TOOL

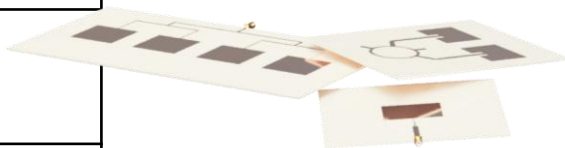
Measurement time	From 10 sec
External dimensions	93 x 42 x 40 cm ³
Internal dimensions	39 x 32 x 23 cm ³
Weight	21 kg
Electromagnetic shielding	Internal walls feature broadband electromagnetic absorbers
RF Source	2.3-2.65 GHz
Surface sensor	29 x 21 cm ² High Definition
Automatic rail	25 cm range
Transport / carrying	Two handles on both sides of the box



EMSOFT	
Runs on the EMBox Lab 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
Input Power	100-240V AC-3A

ANTENNAS STARTER PACK (mounts included)

Rectangular Patch	12.5 x 12.5 cm ² 2.4 GHz SMA
Array of 4 rectangular patches	27.5 x 11 cm ² 2.4 GHz SMA
Rat Race 2 patch array	15 x 12.5 cm ² 2.4 GHz SMA (two connectors)

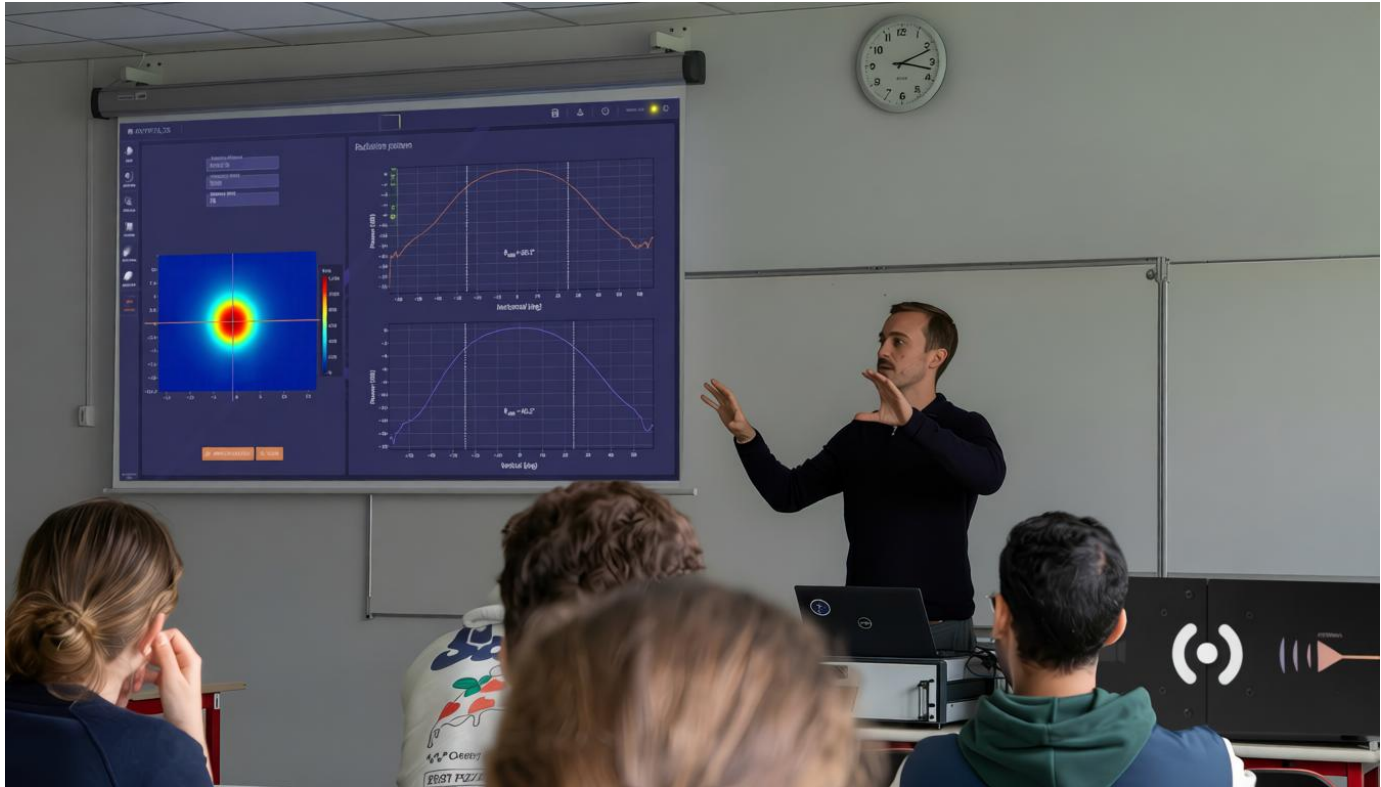


OPTIONS	
<i>Can be integrated throughout the entire product lifecycle.</i>	
Trolley	86.2 × 38.5 × 85.9 cm ³
RF Source	5.7-5.9 GHz



EMBOX LAB

LET'S INSPIRE THEM



EASY SCAN Single-point measurement 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)

EMBBOX LAB



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