StarLab

TECHNOLOGY

- **Near-field** / Spherical
- **Near-field** / Cylindrical

SOLUTIONS FOR

- **Multi-purpose Antenna Measurement**
- **Multi-protocol Antenna Development**
- **Linear Array Antenna Measurement**
- **OTA Testing**

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StarLab: a compact portable solution perfect for use when space and budget are at stake. StarLab is the ultimate tool for antenna pattern measurements in laboratories and production environments and where space is limited, cost is critical and the flexibility of a portable system is required.

MAIN FEATURES

❶ Measurement capabilities
- Gain
- Directivity
- Beamwidth
- Cross polar discrimination
- Sidelobe levels
- 3D radiation pattern
- Radiation pattern in any polarization (linear or circular)
- Antenna efficiency
- TRP, TIS, EIRP and EIS

❷ Frequency bands
- StarLab 6 GHz: 800 MHz to 6 GHz
- StarLab 18 GHz: 800 MHz to 18 GHz

❸ Max. size of DUT
- 45 cm for spherical set-up
- 2.7 m x 45 cm for cylindrical set-up
- Specific lengths available upon request

❹ Max. weight of DUT
- 10 kg with Styrofoam mast
- Custom with ultra rigid mast

❺ Typical dynamic range
- 50 dB

❻ Oversampling
- Arch rotation

SYSTEM CONFIGURATIONS

Software:
- ■ SPM/SatEnv
- ■ SatMap (near-field/far-field transform)
- □ SAM (OTA performance testing)
- □ SatSim (environment simulation)
- □ SatCyl (linear array antenna)
- □ SMM (SATIMO Multi Measurement)
- □ Midas*

Equipment:
- ■ Amplification unit
- ■ Probe Array Controller (built-in)
- ■ USB Control unit
- ■ Instrumentation rack
- ■ AUT positioner
- □ Uninterruptible Power Supply
- ○ Vector Network Analyzer

Add on
- □ Radio Communication Tester (OTA Testing)
- □ Wideband Dynamic Range Adapter (OTA Testing)
- □ Active Switching Unit (OTA Testing)
- □ Small anechoic chamber (OTA Testing)
- □ Linear scanner for BTS antenna or linear array antenna measurement

Accessories:
- ■ Reference horn
- ■ PC
- □ Small antenna mast
- □ Laptop interface
- □ Hand and head phantoms
- □ Reference antennas (sleeve dipoles, loops, linear array antennas)
- □ CTIA ripple antenna set

Services:
- ■ Installation
- ■ Warranty
- □ Training
- □ Extended warranty

* See ORBIT/FR's catalog for more information

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□ Optional ■ Included ○ Required

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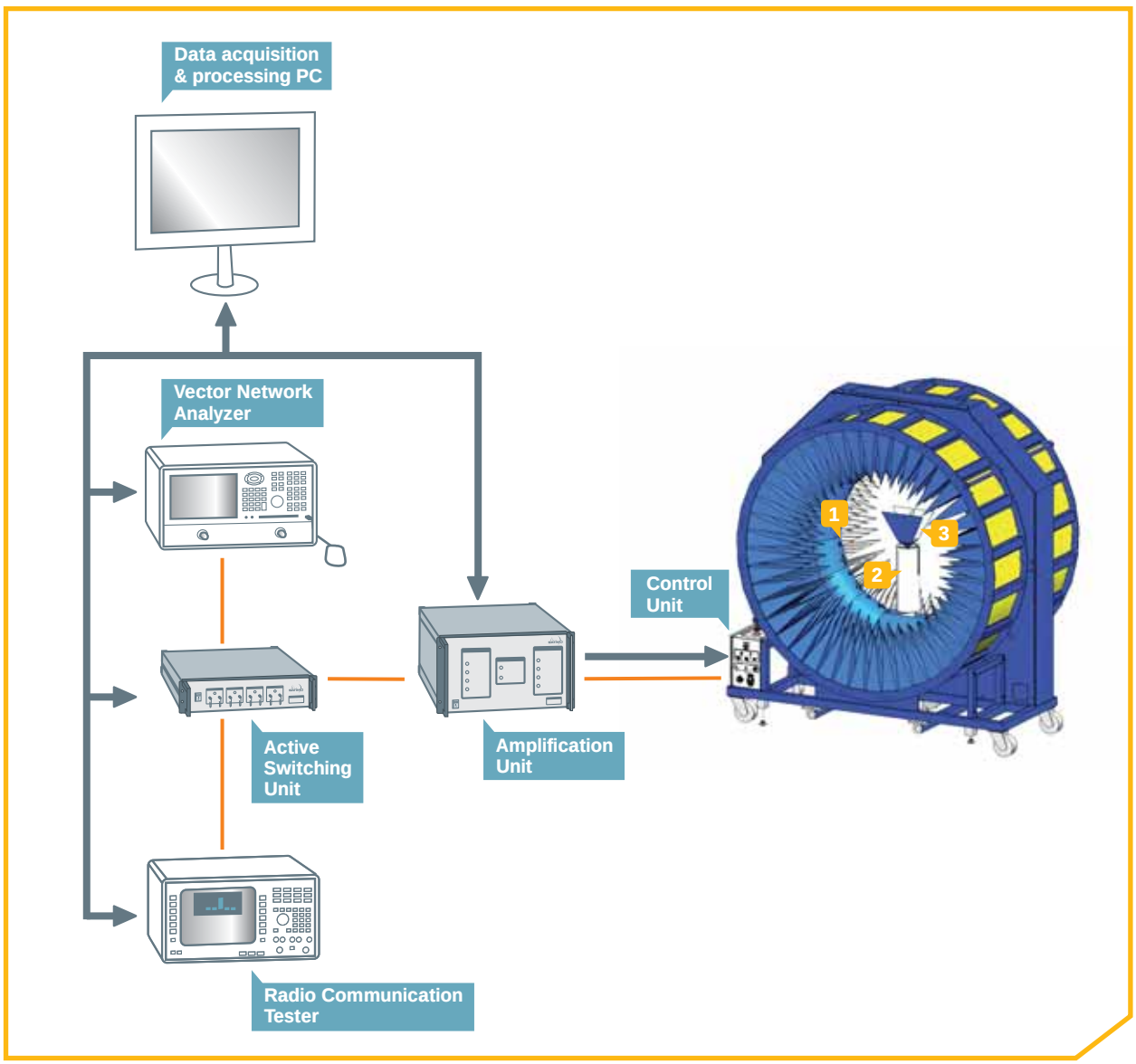
SYSTEM OVERVIEW



StarLab uses a Switching Unit to switch between passive and active measurement RF instrumentation. For passive measurements, a Vector Network Analyzer is used as the RF source/receiver for antenna measurements. The Control Unit drives the two positioning motors and the electronic scanning of the probe array. For active measurements, the test is perfomed through up to three different Radio Communication Testers. Amplification Units are added on both TX and RX chains.

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STANDARD SYSTEM'S COMPONENTS

1 Arch

- A choice of two probes can be interleaved (DP 400-6000, DP 6000-18000)

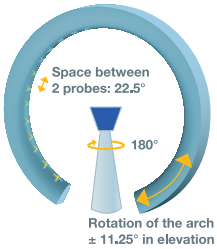
3 Antennas

- A choice of reference antennas (sleeve dipoles, loops)

2 Mast

- Styrofoam or ultra rigid mast, according to DUT weight
- PC mast
- Laptop interface

Oversampling with StarLab



On a StarLab system, oversampling is performed by a mechanical rotation of the arch in elevation. Oversampling capability is integrated in the mechanical architecture of the system itself (no need for an extra goniometer).

PC measurement with StarLab

Compact shielded chamber for OTA performance measurements

Measurement specifications*

	STARLAB 6 GHz	STARLAB 18 GHz
Measurement time for 11 frequencies**	~ 1 min	~ 1 min
Typical dynamic range	50 dB	50 dB

	10 dBi AUT	20 dBi AUT	30 dBi AUT	10 dBi AUT	20 dBi AUT	30 dBi AUT
PEAK GAIN ACCURACY						
0.8 GHz - 1 GHz	± 1.1 dB	-	-	± 1.1 dB	-	-
1 GHz - 6 GHz	± 0.8 dB	± 0.7 dB	-	± 0.8 dB	± 0.7 dB	-
6 GHz - 18 GHz	-	-	-	± 0.9 dB	± 0.7 dB	± 0.6 dB
Peak gain repeatability	± 0.3 dB	± 0.3 dB	± 0.3 dB	± 0.3 dB	± 0.3 dB	± 0.3 dB
- 10 dB SIDELOBES ACCURACY						
0.8 GHz - 1 GHz	± 1.1 dB	-	-	± 1.1 dB	-	-
1 GHz - 6 GHz	± 0.9 dB	± 0.6 dB	-	± 0.9 dB	± 0.6 dB	-
6 GHz - 16 GHz	-	-	-	± 0.8 dB	± 0.5 dB	± 0.4 dB
16 GHz - 18 GHz	-	-	-	± 1.0 dB	± 0.6 dB	± 0.4 dB

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Measurement specifications*

	STARLAB 6 GHz			STARLAB 18 GHz		
	10 dBi AUT	20 dBi AUT	30 dBi AUT	10 dBi AUT	20 dBi AUT	30 dBi AUT
- 20 dB SIDELOBES ACCURACY						
0.8 GHz - 1 GHz	± 3.5 dB	-	-	± 3.5 dB	-	-
1 GHz - 6 GHz	± 2.7 dB	± 0.9 dB	-	± 2.7 dB	± 0.9 dB	-
6 GHz - 16 GHz	-	-	-	± 2.4 dB	± 0.8 dB	± 0.5 dB
16 GHz - 18 GHz	-	-	-	± 3.2 dB	± 1.0 dB	± 0.6 dB
- 30 dB SIDELOBES ACCURACY						
0.8 GHz - 1 GHz	-	-	-	-	-	-
1 GHz - 6 GHz	-	± 2.7 dB	-	-	± 2.7 dB	-
6 GHz - 16 GHz	-	-	-	-	± 2.4 dB	± 0.8 dB
16 GHz - 18 GHz	-	-	-	-	± 3.2 dB	± 1.0 dB

* Specifications given according to the following assumptions:
- Controlled temperature and humidity during measurement
- Specifications on radiation pattern are given for a normalized pattern
- Measurements inside an anechoic chamber or equivalent conditions, except for StarLab BTS measurements
- Usage of an Agilent PNA with 1kHz IF BW
- Peak gain is given for a ± 0.3 dB of gain error on the reference antenna
- DUT phase center does not exceed 15 cm from arch center
- Measurement performed with a suitable mast, depending on the load and directivity of the DUT

** No oversampling, no averaging

Mechanical characteristics*

External dimensions of StarLab		1.82 x 1.08 x 1.98 m (L x W x H)
Probe array internal diameter		0.9 m
Optional chamber size		1.92 x 1.97 x 2.08 m
Angle between probes in the same frequency band		22.5°
Azimuth accuracy		0.02°
Azimuth max. speed		50°/s
Elevation accuracy		0.01°
DUT MAX. WEIGHT		
Styrofoam mast		10 kg
Ultra rigid mast		Custom
RF EQUIPMENT CHARACTERISTICS		
Number of probes		
StarLab 6 GHz		15 + 1 reference channel
StarLab 18 GHz	0.8 to 6 GHz	15 + 1 reference channel
	6 to 18 GHz	14 + 1 reference channel
Frequency range		
StarLab 6 GHz		0.8 GHz to 6 GHz
StarLab 18 GHz		0.8 GHz to 18 GHz

* Centered load without oversampling

Maximum diameter of the DUT (m)

FREQUENCY (GHz)	NUMBER OF OVERSAMPLING				
	x 1	x 2	x 3	x 5	x 10
0.8	0.45	0.45	0.45	0.45	0.45
1	0.45	0.45	0.45	0.45	0.45
2	0.38	0.45	0.45	0.45	0.45
3	0.25	0.45	0.45	0.45	0.45
4	0.19	0.38	0.45	0.45	0.45
5	0.15	0.31	0.45	0.45	0.45
6	0.13	0.25	0.38	0.45	0.45
7	0.11	0.22	0.33	0.45	0.45
8	0.10	0.19	0.29	0.45	0.45
9	0.08	0.17	0.25	0.42	0.45
10	0.08	0.15	0.23	0.38	0.45
11	0.07	0.14	0.21	0.35	0.45
12	0.06	0.13	0.19	0.32	0.45
13	0.06	0.12	0.18	0.29	0.45
14	0.05	0.11	0.16	0.27	0.45
15	0.05	0.10	0.15	0.25	0.45
16	0.05	0.10	0.14	0.24	0.45
17	0.04	0.09	0.13	0.22	0.45
18	0.04	0.08	0.13	0.21	0.42

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OTA PERFORMANCE TESTING WITH STARLAB

StarLab can perform both TRP and TIS measurements. For TIS measurements, or where external interference is a concern, a shielded chamber is necessary. A small shielded chamber for StarLab is available. The chamber is lined with pyramid absorbers on the two walls facing the openings of the StarLab anechoic cylinders.

LINEAR SCANNER OPTION (BTS ANTENNA MEASUREMENT)

By adding a linear scanner, StarLab is converted from a spherical to a cylindrical near-field measurement system, which is particularly suitable to BTS antenna measurements. In addition to the standard features, this configuration allows the measurements of the beam tilt. StarLab BTS can measure sidelobes up to 70° (typical) from boresight.

OTA performance measurement specifications*

ACCORDING TO CTIA SPECIFICATIONS	
TRP accuracy free space	<± 1.9 dB
TRP accuracy talk position	<± 2.0 dB
TRP repeatability	± 0.3 dB
Typical TRP measurement time**	< 2 min
TIS accuracy free space	<± 2.0 dB
TIS accuracy talk position	<± 2.1 dB
TIS repeatability	± 0.5 dB
Typical TIS measurement time***	15 min → 60 min

CTIA COMPARABLE	
• GSM/WCDMA protocols:	
TIS based on Rx Level accuracy	<± 2.8 dB
TIS based on Rx Level repeatability	<± 1.5 dB
Typical TIS based on Rx level measurement time***	< 6 min
• CDMA2000 protocol:	
TIS optimized accuracy	<± 2.0 dB
TIS optimized repeatability	<± 0.5 dB
Typical TIS optimized measurement time***	< 11 min

* Specifications given according to the following assumptions:
- Controlled temperature and humidity during measurement
- Measurements inside an anechoic chamber
- DUT phase center does not exceed 15 cm from arch center
- Calibration done with dipole efficiency reference values
- Measurement performed with a suitable mast depending on the load and directivity of the DUT.

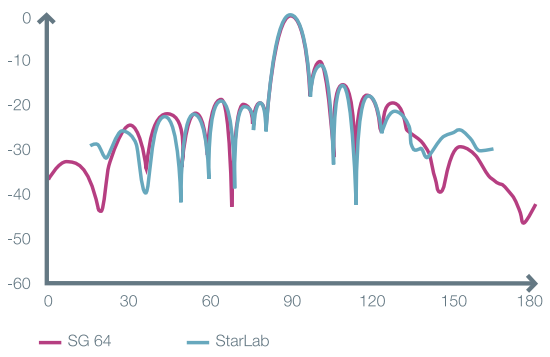
Specifications also depend on Radio Communication Tester and Protocol

** One channel, 15 deg sampling, one time each probe, measurement time depends on protocol

*** One channel, 30 deg sampling, one time each probe, measurement time depends on protocol

StarLab with linear scanner option

Comparison between measurements performed with SG64 and StarLab BTS



Base station antenna measurement characteristics

Geometry	Cylindrical
Standard rail length	6 meters
BTS antenna max. weight	80 kg

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