StarLab

mvg
Microwave Vision Group

StarLab is the ultimate tool for antenna pattern measurements in laboratories and production environments where space is limited, cost is critical, and the flexibility of a portable system is required.

A cost-effective and space-saving portable solution

SOLUTION FOR

- **Antenna Measurement**
- **Linear Array Antenna Measurement**
- **OTA Testing**

Main features

Technology

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

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

Frequency bands

- StarLab 6 GHz: 650 MHz to 6 GHz
- StarLab 18 GHz: 650 MHz to 18 GHz

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

Max. weight of DUT

- 10 kg with styrofoam mast
- 15 kg with heavy DUT mast

Typical dynamic range

- 650 MHz - 6 GHz: 70 dB
- 6 GHz - 18 GHz: 60 dB

Oversampling

- Arch rotation

System configurations

Software

Measurement control, data acquisition and post processing
- ■ SatEnv
- ■ SPM

Near-field/far-field transform
- ■ SatMap
- □ SatCyl

OTA measurement suite
- □ SAM
- □ SMM

Advanced post processing
- □ SatMap back projection modules
- □ Cylindrical back projection modules
- □ Insight
- □ SatSIM

Equipment

- ■ Arch with probe array, AUT positioner, rubberized absorbers and lighting
- ■ Control unit
- ■ Power and control unit
- ■ Tx and Rx amplification units
- ■ Instrumentation rack
- ■ Uninterruptible power supply
- ○ Vector network analyzer

Add-ons

- ○ Shielded anechoic chamber (OTA testing)*
- □ Linear scanner for BTS antenna or linear array antenna measurement (cylindrical testing)

OTA Equipment
- □ Radio communication tester
- □ Active switching unit
- □ Transfer Switching Unit
- □ I/O switch port
- □ WiFi testing

Accessories

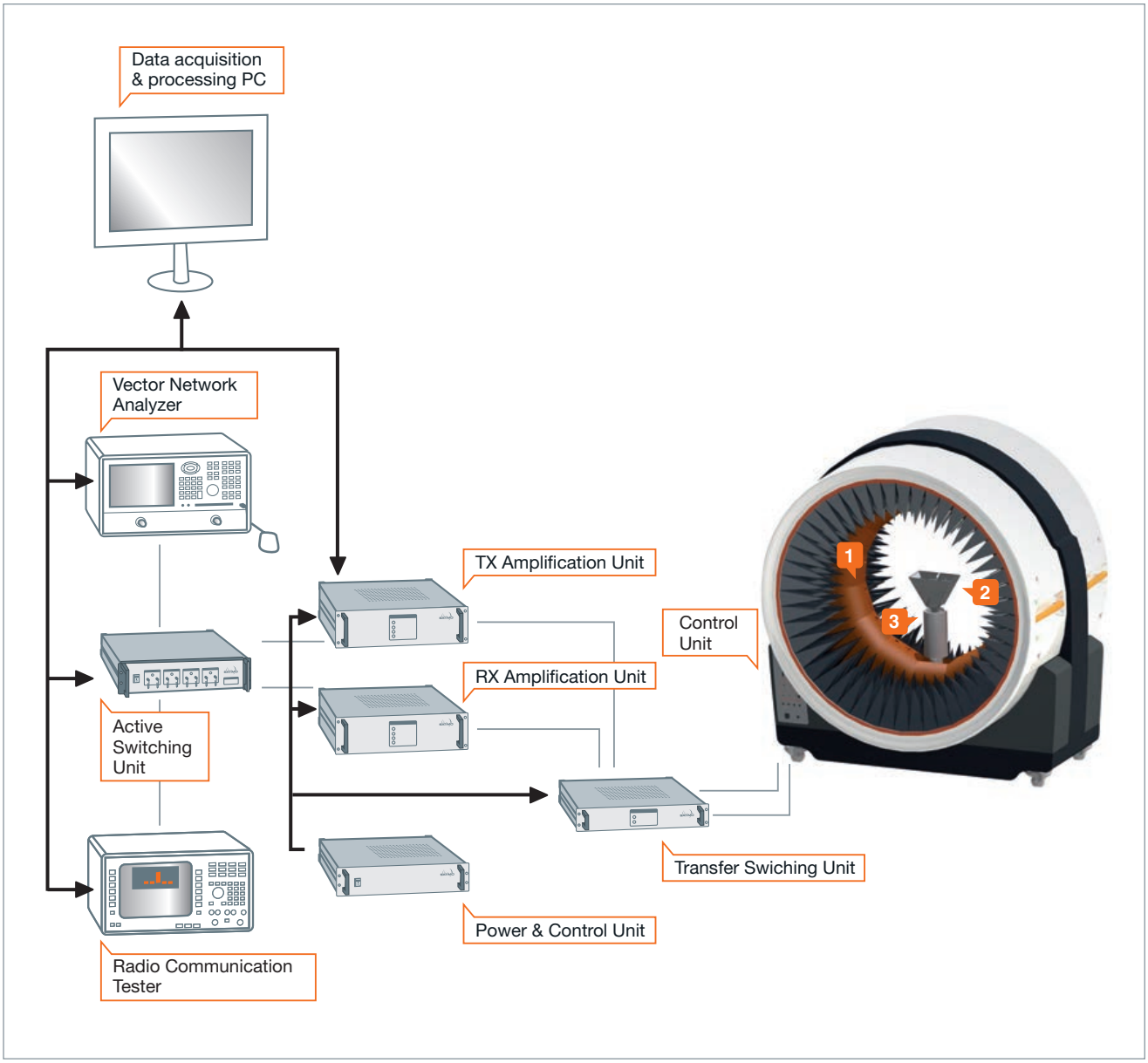
- ■ Reference horns
- ■ PC
- □ Heavy DUT mast
- □ Laptop support interface
- □ Hand and head phantoms
- □ Reference antennas (sleeve dipoles, loops,linear array antennas)

Services

- ■ Installation
- ■ Training
- ■ Warranty
- □ Post warranty service plans

* See MVG-EMC Systems catalogs for more information ■ Included □ Optional ○ Required

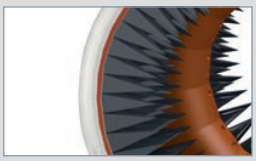
System overview



StarLab uses an Active Switching Unit to switch between near-field passive measurement and OTA measurement RF instrumentation. For near-field passive measurements, a Vector Network Analyzer is used as the RF source/receiver. The Control Unit drives the two positioning motors and the electronic scanning of the probe arrays. For OTA measurements, the tests are performed through the Radio Communication Tester. The amplification unit amplifies the signal on transmission and reception channels according to the frequency bands. The Transfer Switching Unit is used to switch between the emission by AUT and the reception by AUT modes.

The power and control unit supplies the power and drives the RF units.

Standard system components



1 Arch

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

2 Antennas

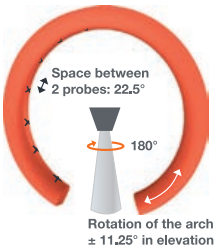
- A choice of reference antennas (sleeve dipoles, loops) etc.

MVG antenna catalog

3 Mast

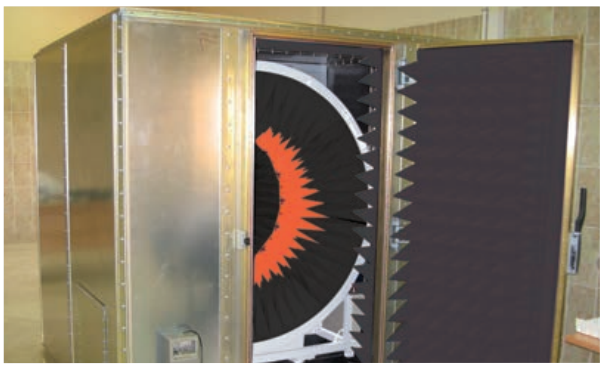
- Styrofoam or ultra rigid mast is provided, according to DUT weight
- Laptop interface

Laptop measurement with StarLab



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).



Compact shielded chamber for OTA performance measurements

System specifications*

	SPHERICAL STARLAB 6 GHz			SPHERICAL STARLAB 18 GHz		
Measurement time for 11 frequencies**	~ 1 min			~ 1 min		
Typical dynamic range	70 dB			0.65 GHz - 6 GHz: 70 dB 6 GHz - 18 GHz: 60 dB		
	10 dBi AUT	**20 dBi AUT**	**30 dBi AUT**	**10 dBi AUT**	**20 dBi AUT**	**30 dBi AUT**
PEAK GAIN ACCURACY						
0.65 GHz - 0.8 GHz	± 1.5 dB	-	-	± 1.5 dB	-	-
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						
0.65 GHz - 0.8 GHz	± 1.6 dB	-	-	± 1.6 dB	-	-
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

System specifications*

	SPHERICAL STARLAB 6 GHz			SPHERICAL 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						
0.65 GHz - 0.8 GHz	± 4.5 dB	-	-	± 4.5 dB	-	-
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						
0.65 GHz - 0.8 GHz	-	-	-	-	-	-
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:
- Near-field measurement in spherical geometry
- Controlled temperature and humidity during measurement
- Specifications on radiation pattern are given for a normalized pattern
- Measurements inside an anechoic chamber or equivalent conditions
- 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 8 cm from arch center
- Measurement performed with a suitable mast, depending on the load and directivity of the DUT

** No oversampling, no averaging

System specifications*

CYLINDRICAL STARLAB 6 GHz	
Measurement time**	3 min
Maximum DUT size***	45 cm
Typical cross polar level that can be measured	< -30 dB
PEAK GAIN ACCURACY	
892 MHz	± 1.0 dB
1880 MHz	± 0.7 dB
Peak gain repeatability	± 0.3 dB
-10 dB SIDELOBES ACCURACY	
892 MHz	± 0.8 dB
1880 MHz	± 0.6 dB
-20 dB SIDELOBES ACCURACY	
892 MHz	± 1.1 dB
1880 MHz	± 0.9 dB
BEAM WIDTH ACCURACY	
892 MHz	± 5%
1880 MHz	± 5%
FRONT TO BACK RATIO ACCURACY****	
892 MHz	± 2.5 dB
1880 MHz	± 2.0 dB

* Specifications given according to the following assumptions:
- Near-field measurement in cylindrical geometry
- Controlled temperature and humidity during measurement
- Specifications on radiation pattern are given for a normalized pattern
- Usage of an Agilent PNA with 1kHz IF BW except for typical dynamic range with 100 Hz 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

** 3m scan, no oversampling
*** Diameter of the maximum cylinder that can be measured
**** Typical specifications in a ± 30° cone

Mechanical characteristics

External dimensions of StarLab	1.82 x 1.08 x 2.00 m (L x W x H)
Probe array internal diameter	0.9 m
Optional anechoic chamber size	1.92 x 1.97 x 2.08 m
Angle between probes in the same frequency band	22.5°
DUT MAX. WEIGHT*	
Styrofoam mast	10 kg
Ultra rigid mast	25 kg

* Centered load

RF equipment characteristics

Number of probes		
StarLab 6 GHz		15 + 1 reference channel
StarLab 18 GHz	0.65 to 6 GHz	15 + 1 reference channel
	6 to 18 GHz	14 + 1 reference channel
Frequency range		
StarLab 6 GHz		0.65 GHz to 6 GHz
StarLab 18 GHz		0.65 GHz to 18 GHz

Maximum diameter of the DUT (m)

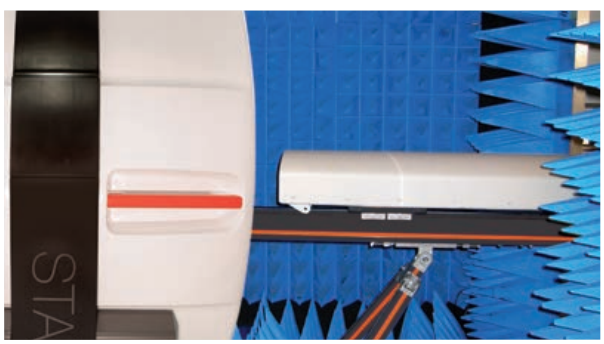
FREQUENCY (GHz)	NUMBER OF OVERSAMPLING x 1	x 2	x 3	x 5	x 10
0.65	0.45	0.45	0.45	0.45	0.45
1	0.45	0.45	0.45	0.45	0.45
2	0.38	0.45	0.45	0.45	0.45
3	0.25	0.45	0.45	0.45	0.45
4	0.19	0.38	0.45	0.45	0.45
5	0.15	0.31	0.45	0.45	0.45
6	0.13	0.25	0.38	0.45	0.45
7	0.11	0.22	0.33	0.45	0.45
8	0.10	0.19	0.29	0.45	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

Linear scanner option

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

Linear antenna measurement characteristics

Geometry	Cylindrical
Standard rail length	6 or 9 meters
Linear antenna max. weight	80 kg



StarLab with linear scanner option

OTA performance testing

StarLab can perform both TRP and TIS measurements. For TIS measurements, or where external interference is a concern 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.

OTA performance measurement specifications*

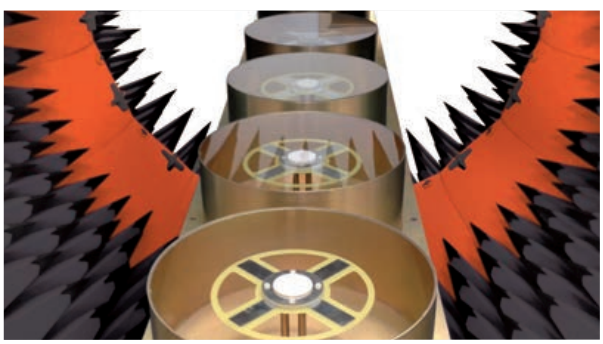
ACCORDING TO CTIA SPECIFICATIONS	
TRP accuracy free space	<± 1.9 dB
TRP accuracy talk position	<± 2.0 dB
TRP repeatability	± 0.3 dB
Typical TRP measurement time**	< 2 min
TIS accuracy free space	<± 2.0 dB
TIS accuracy talk position	<± 2.1 dB
TIS repeatability	± 0.5 dB
Typical TIS measurement time***	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 gain 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 18 GHz with linear scanner option