

TECHNOLOGY

- Near-field / Spherical
- Far-field

SOLUTIONS FOR

- Antenna Measurement
- OTA Testing
- CTIA Certifiable Measurement
- MIMO Measurement
- Linear Array Antenna Measurement

The most accurate solution to test antennas and wireless devices: SG 64 has been developed to measure stand alone antennas or antennas integrated in subsystems (see specification table on the following page). It is also ideal for CTIA certifiable measurement facilities.

## MAIN FEATURES

### 1 Measurement capabilities

- Gain
- Directivity
- Beamwidth
- Cross polar discrimination
- Sidelobe levels
- Front to Back ratio
- 1D, 2D and 3D radiation patterns
- Radiation pattern in any polarization (linear or circular)
- Antenna efficiency
- TRP, TIS, EIRP and EIS

### 2 Frequency bands

- SG 64 - C, SG 64 - S and SG 64 - L: 400 MHz to 6 GHz
- SG 64 - 18 GHz: 400 MHz to 18 GHz
- SG 64 - LF: 70 MHz to 6 GHz

### 3 Max. size of DUT

- 2.73 m for SG 64 - L

### 4 Max. weight of DUT

- 200 kg

### 5 Typical dynamic range

- 70 dB

### 6 Oversampling

- Elevation tilt of the AUT

## SYSTEM CONFIGURATIONS

### Software:

- SatEnv (measurement control, data acquisition, post processing)
- SatMap (near-field/far-field transform)
- SAM (OTA performance testing)
- SatSim (environment simulation)
- SMM

### Equipment:

- Amplification unit
- Mixer unit
- Probe Array Controller
- Uninterruptible Power Supply
- Instrumentation rack
- AUT positioner
- Primary synthesizer
- Auxiliary synthesizer

### Add on

- Radio Communication Tester
- Wideband Dynamic Range Adapter (OTA Testing)
- Active Switching Unit (OTA Testing)
- MIMO upgrade
- Anechoic chamber\*

### Accessories:

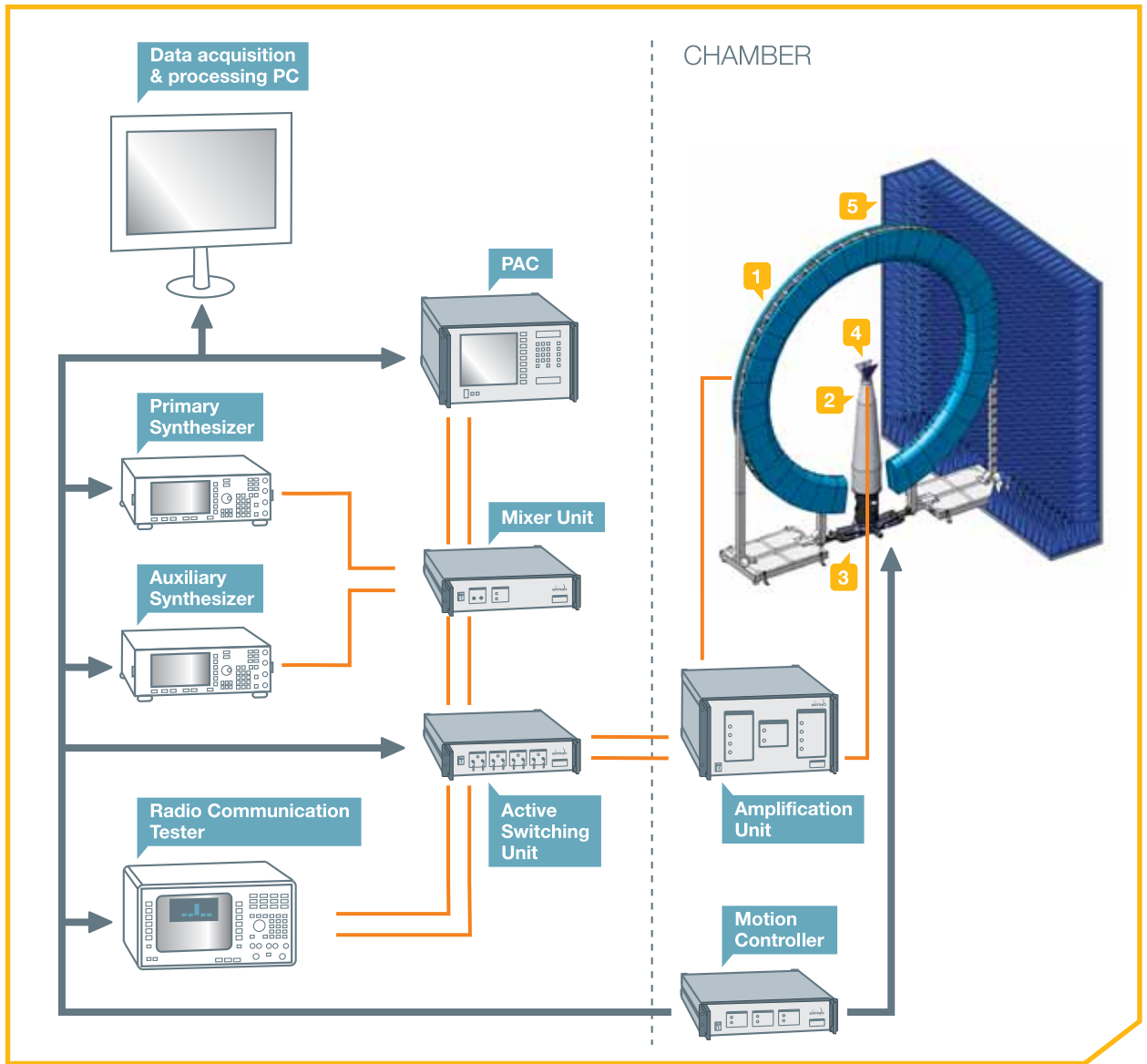
- Styrofoam mast
- PC
- PVC chair
- Hand and head phantoms
- Laptop interface
- Ultra rigid mast
- BTS antenna pole mast
- Reference antennas (horns, sleeve dipoles, loops)
- CTIA ripple antenna test
- Positioning laser pointer

### Services:

- Installation & calibration
- Warranty
- Project management
- CTIA certification assistance
- Training
- Extended warranty

\* See AEMI's catalogs for more information

## SYSTEM OVERVIEW



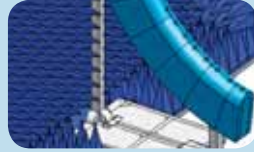
SG 64 can switch between the Probe Array Controller (PAC) for passive measurements and the Radio Communication Tester for active measurements. For passive measurements, it uses Analog RF Signal Generators to emit from the probe array to the Antenna Under Test or vice versa. The PAC is also a RF receiver for antenna measurements. The PAC also controls the electronic

scanning of the probe array. For active measurements, the test is performed through up to three different Radio Communication Testers. Amplification Units are added on both TX and RX chains. It is used to communicate with the DUT and to measure the Total Radiated Power (TRP) and Total Isotropic Sensitivity (TIS).

## STANDARD SYSTEM'S COMPONENTS

### 1 Arch

- 3 sizes (standard, compact or large)
- A choice of 3 probes (DP 70-450, DP 400-6000, DP 6000-18000)



### 4 Antennas

- A choice of reference antennas (horns, dipoles, linear array antennas, biconic and monocone antennas)



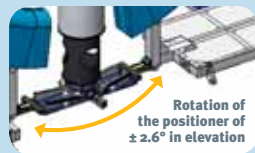
### 2 Mast

- 2 masts according to max. weight of DUT
- BTS antenna mast
- PVC chair
- Laptop interface



### 3 Goniometer

- Goniometers are used to calibrate the system and to perform oversampling.
- A choice of goniometers depending on the size of the arch, the max. weight of the DUT and the frequency range

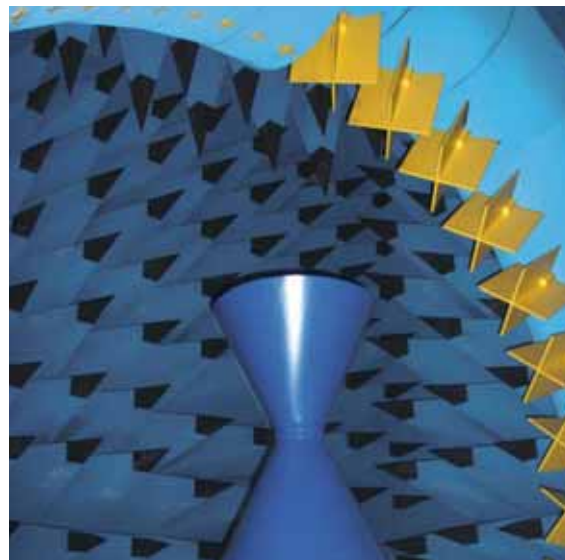


### 5 Absorbers and anechoic chambers

- A choice of standard, adapted and specialty absorbers
- Anechoic chambers with integrated design, production, installation and testing services



### SG LF version



### SG 64 - 18 GHz version

For the 0.4 GHz to 18 GHz version, two probe arrays are interleaved, one with 0.4-6 GHz probes and one with 6-18 GHz probes. SG 64 - 18 has the same capabilities as the standard 6 GHz version.

### SG low frequency version (LF)

For the SG LF version, the arch is divided in two probe arrays. On one side, an array with 0.07-0.4 GHz probes and on the other side, an array with 0.4-6 GHz probes. The SG LF has the same capabilities as the 6 GHz standard version. Specifications are provided upon request.

### Measurement specifications\*

	COMPACT	STANDARD 6 GHz	STANDARD 18 GHz	LARGE 6 GHz
Typical max. size DUT	134 cm	179 cm	179 cm	273 cm
Measurement time for 11 frequencies**	< 3 min	< 3 min	< 3 min	< 3 min
Typical dynamic range	70 dB	70 dB	70 dB	70 dB

## Measurement specifications\*

	COMPACT			STANDARD 6 GHz			STANDARD 18 GHz			LARGE 6 GHz		
	10 dBi AUT	20 dBi AUT	30 dBi AUT	10 dBi AUT	20 dBi AUT	30 dBi AUT	10 dBi AUT	20 dBi AUT	30 dBi AUT	10 dBi AUT	20 dBi AUT	30 dBi AUT
<b>PEAK GAIN ACCURACY</b>												
0.4 GHz - 0.8 GHz	± 1.1 dB	± 1.0 dB	-	± 0.9 dB	± 0.8 dB	-	± 0.9 dB	± 0.8 dB	-	± 0.8 dB	± 0.7 dB	± 0.7 dB
0.8 GHz - 1 GHz	± 0.6 dB	± 0.6 dB	-	± 0.5 dB	± 0.5 dB	± 0.5 dB	± 0.5 dB	± 0.5 dB	± 0.5 dB	± 0.5 dB	± 0.5 dB	± 0.5 dB
1 GHz - 6 GHz	± 0.6 dB	± 0.6 dB	± 0.5 dB	± 0.5 dB	± 0.5 dB	± 0.5 dB	± 0.5 dB	± 0.5 dB	± 0.5 dB	± 0.5 dB	± 0.5 dB	± 0.5 dB
6 GHz - 18 GHz	-	-	-	-	-	-	± 0.7 dB	± 0.6 dB	± 0.5 dB	-	-	-
Peak gain repeatability	± 0.3 dB	± 0.3 dB	± 0.3 dB	± 0.3 dB	± 0.3 dB	± 0.3 dB	± 0.3 dB	± 0.3 dB	± 0.3 dB	± 0.3 dB	± 0.3 dB	± 0.3 dB
<b>- 10 dB SIDELOBES ACCURACY</b>												
0.4 GHz - 0.8 GHz	± 1.1 dB	± 0.7 dB	-	± 1.0 dB	± 0.6 dB	-	± 1.0 dB	± 0.6 dB	-	± 0.9 dB	± 0.6 dB	± 0.4 dB
0.8 GHz - 1 GHz	± 0.9 dB	± 0.6 dB	-	± 0.8 dB	± 0.5 dB	± 0.4 dB	± 0.8 dB	± 0.5 dB	± 0.4 dB	± 0.7 dB	± 0.5 dB	± 0.4 dB
1 GHz - 6 GHz	± 0.7 dB	± 0.5 dB	± 0.4 dB	± 0.7 dB	± 0.5 dB	± 0.4 dB	± 0.7 dB	± 0.5 dB	± 0.4 dB	± 0.7 dB	± 0.5 dB	± 0.4 dB
6 GHz - 16 GHz	-	-	-	-	-	-	± 0.7 dB	± 0.5 dB	± 0.4 dB	-	-	-
16 GHz - 18 GHz	-	-	-	-	-	-	± 0.7 dB	± 0.5 dB	± 0.4 dB	-	-	-
<b>- 20 dB SIDELOBES ACCURACY</b>												
0.4 GHz - 0.8 GHz	± 3.5 dB	± 1.1 dB	-	± 3.2 dB	± 1.0 dB	-	± 3.2 dB	± 1.0 dB	-	± 3.0 dB	± 0.9 dB	± 0.6 dB
0.8 GHz - 1 GHz	± 2.7 dB	± 0.9 dB	-	± 2.4 dB	± 0.8 dB	± 0.5 dB	± 2.4 dB	± 0.8 dB	± 0.5 dB	± 2.2 dB	± 0.7 dB	± 0.5 dB
1 GHz - 6 GHz	± 2.1 dB	± 0.7 dB	± 0.5 dB	± 2.1 dB	± 0.7 dB	± 0.5 dB	± 2.1 dB	± 0.7 dB	± 0.5 dB	± 2.1 dB	± 0.7 dB	± 0.5 dB
6 GHz - 16 GHz	-	-	-	-	-	-	± 2.1 dB	± 0.7 dB	± 0.5 dB	-	-	-
16 GHz - 18 GHz	-	-	-	-	-	-	± 2.1 dB	± 0.7 dB	± 0.5 dB	-	-	-
<b>- 30 dB SIDELOBES ACCURACY</b>												
0.4 GHz - 0.8 GHz	-	± 3.5 dB	-	-	± 3.2 dB	-	-	± 3.2 dB	-	-	± 3.0 dB	± 0.9 dB
0.8 GHz - 1 GHz	-	± 2.7 dB	-	-	± 2.4 dB	± 0.8 dB	-	± 2.4 dB	± 0.8 dB	-	± 2.2 dB	± 0.7 dB
1 GHz - 6 GHz	-	± 2.1 dB	± 0.7 dB	-	± 2.1 dB	± 0.7 dB	-	± 2.1 dB	± 0.7 dB	-	± 2.1 dB	± 0.7 dB
6 GHz - 16 GHz	-	-	-	-	-	-	-	± 2.1 dB	± 0.7 dB	-	-	-
16 GHz - 18 GHz	-	-	-	-	-	-	-	± 2.1 dB	± 0.7 dB	-	-	-

\* 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

- Specifications on radiation pattern are given for a normalized pattern
- Peak gain is given for a ± 0.3 dB of gain error on the reference antenna
- Measurement performed with a suitable mast depending on the load and directivity of the DUT

\*\* No oversampling, no averaging

## Mechanical characteristics\*

	COMPACT 6 GHz	STANDARD 6 GHz	STANDARD 18 GHz	LARGE	SG LF
Probe array diameter (int/ext)	2.4/ 3.52 m	3.2/4.194 m	3.2/4.194 m	4.2/5.194 m	Custom
Chamber size	4.0 x 4.0 x 4.0 m	5.0 x 5.0 x 5.0 m	5.0 x 5.0 x 5.0 m	6.0 x 6.0 x 6.0 m	Custom
Angle between probes in the same frequency band	5,29°	5,29°	5,29°	5,29°	Custom
Azimuth accuracy	0.02°	0.02°	0.02°	0.02°	0.02°
Azimuth max. speed	30°/s	30°/s	30°/s	30°/s	30°/s
Oversampling capability	Yes	Yes	Yes	Yes	Yes
AUT max. weight	200 kg	200 kg	200 kg	200 kg	200 kg
<b>DUT MAX. WEIGHT</b>					
Styrofoam mast	50 kg	50 kg	50 kg	50 kg	50 kg
Ultra rigid mast	200 kg	200 kg	200 kg	200 kg	200 kg
PVC chair	100 kg	100 kg	100 kg	100 kg	100 kg
BTS antenna pole mast	Not applicable	Option	Option	Option	Option

## Mechanical characteristics\*

RF EQUIPMENT CHARACTERISTICS	COMPACT 6 GHz	STANDARD 6 GHz	STANDARD 18 GHz	LARGE	SG LF
Number of probes	63 + 1 ref. channel	63 + 1 ref. channel	63 + 1 ref. channel and 62 + 1 (18 GHz)	63 + 1 ref. channel	Custom
Frequency range	0.4 GHz to 6 GHz	0.4 GHz to 6 GHz	0.4 GHz to 18 GHz	0.4 GHz to 6 GHz	0.07 GHz to 6 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
0.4	1.60	1.60	1.60	1.60	1.60
1	1.79	1.79	1.79	1.79	1.79
2	1.62	1.79	1.79	1.79	1.79
3	1.08	1.79	1.79	1.79	1.79
4	0.81	1.62	1.79	1.79	1.79
5	0.65	1.30	1.79	1.79	1.79
6	0.54	1.08	1.62	1.79	1.79
7	0.46	0.93	1.39	1.79	1.79
8	0.41	0.81	1.22	1.79	1.79
9	0.36	0.72	1.08	1.79	1.79
10	0.32	0.65	0.97	1.62	1.79
11	0.30	0.59	0.89	1.48	1.79
12	0.27	0.54	0.81	1.35	1.79
13	0.25	0.50	0.75	1.25	1.79
14	0.23	0.46	0.70	1.16	1.79
15	0.22	0.43	0.65	1.08	1.79
16	0.20	0.41	0.61	1.01	1.79
17	0.19	0.38	0.57	0.95	1.79
18	0.18	0.36	0.54	0.90	1.79

\* For standard model

## OTA PERFORMANCE TESTING WITH SG 64

SG 64 can perform both TRP and TIS measurements according to CTIA specifications.

### OTA performance measurement specifications\*

#### ACCORDING TO CTIA SPECIFICATIONS

TRP accuracy free space	<± 1.4 dB
TRP accuracy talk position	<± 1.5 dB
TRP repeatability	± 0.3 dB
Typical TRP measurement time**	< 90 s
TIS accuracy free space	<± 1.5 dB
TIS accuracy talk position	<± 1.6 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	<± 2.2 dB
TIS based on Rx Level repeatability	<± 1.5 dB
Typical TIS based on Rx level measurement time***	< 5 min

##### • CDMA2000 protocol:

TIS optimized accuracy	<± 1.5 dB
TIS optimized repeatability	<± 0.5 dB
Typical TIS optimized measurement time***	<10 min

\* Specifications for standard model 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

## BTS ANTENNA MEASUREMENT WITH SG 64

### Base station antenna measurement characteristics

	COMPACT	STANDARD 6 GHz	STANDARD 18 GHz	LARGE 6 GHz
BTS antenna measurement capability	Not applicable	Yes	Yes	Yes
Geometry	-	Spherical	Spherical	Spherical
BTS antenna Max Length/Weight	-	179 cm/200 kg	179 cm/200 kg	273 cm/200 kg
Measurement Time for 11 frequency*	-	< 3 min	< 3 min	< 3 min

\* 1 port (no oversampling, no averaging), BTS antenna of 160 cm at GSM900 © SATIMO 2010

Product specifications and descriptions in this document are subject to change without notice. Actual products may differ in appearance from images shown.