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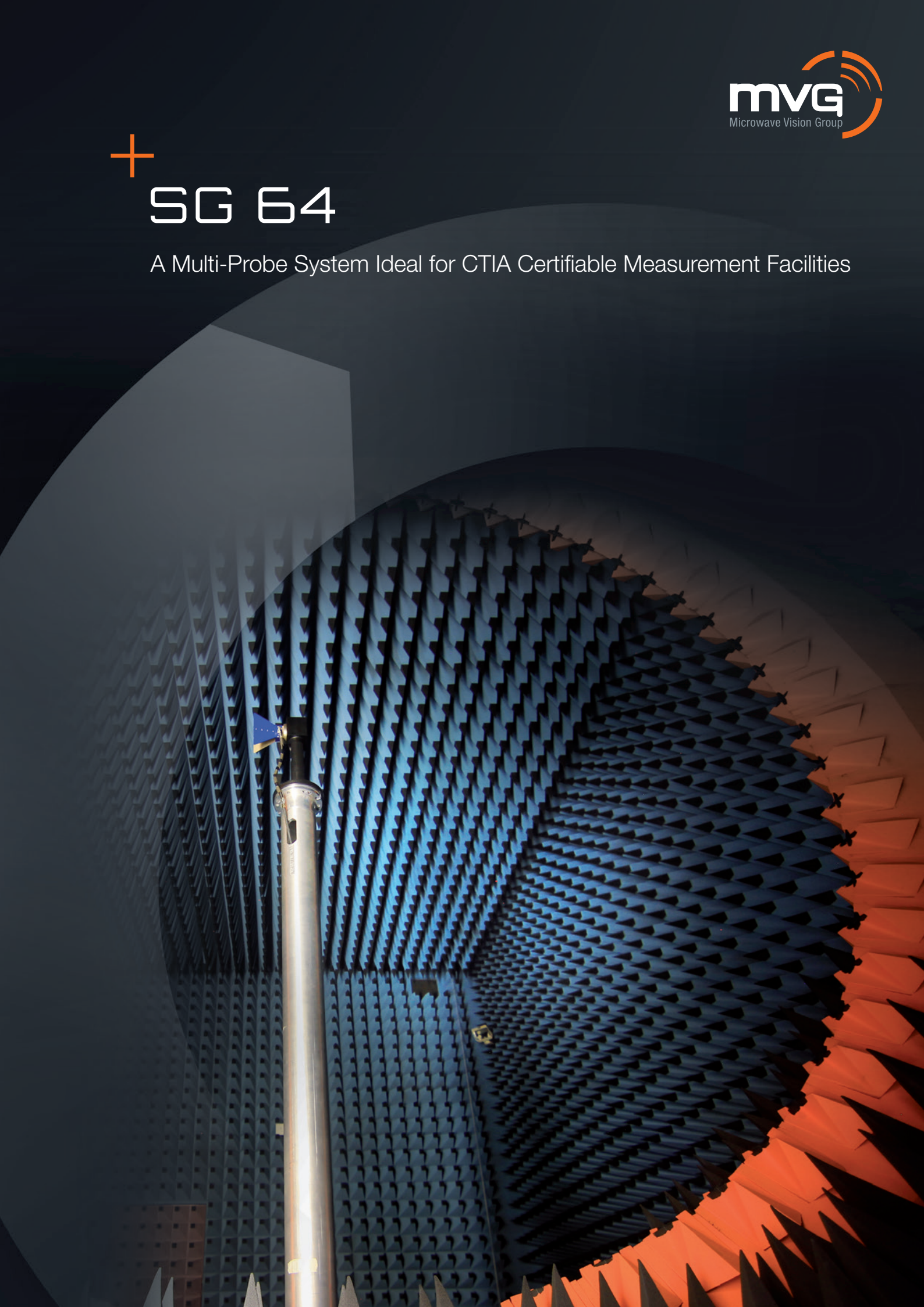
Microwave Vision Group

SG 64

A Multi-Probe System Ideal for CTIA Certifiable Measurement Facilities



The most accurate solution for testing antennas and wireless devices: SG 64 has been developed to measure stand alone antennas or antennas integrated in subsystems. It is also ideal for CTIA certifiable measurement facilities.

- **CTIA certifiable**
- **Unmatched accuracy**

SOLUTION FOR

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

MAIN FEATURES

Technology

- Near-field / Spherical
- Far-field

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

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

Max. size of DUT

- 2.73 m for SG 64 - L
- 5.6 m for SG 64 - SGLF

Max. weight of DUT

- 5 kg on polystyrene mast
- 25 kg on fiberglass mast
- 50 kg on metal mast

Typical dynamic range

- 70 dB

Oversampling

- Elevation tilt by goniometer

SYSTEM CONFIGURATIONS

Software

Measurement control, data acquisition and post processing
- ■ MVG WaveStudio

Near-field/far-field transform
- ■ MV-Sphere

OTA measurement suite
- □ MVG WaveStudio

Advanced post processing
- □ Insight

Equipment

- ■ Amplification unit
- ■ Mixer unit
- ■ N-PAC
- ■ Uninterruptible power supply
- ■ Instrumentation rack
- ■ DUT positioner
- ○ Primary synthetizer
- ○ Auxiliary synthetizer

Add-ons

- ○ Shielded anechoic chamber*

OTA Equipment
- □ Radio communication tester
- □ Active switching unit
- □ MIMO upgrade

Accessories

- ■ Polystyrene mast
- ■ Acquisition PC & touch screen PC (tablet PC also possible)
- □ PVC chair
- □ Hand and head phantoms
- □ Laptop interface
- □ CTIA ripple antenna test
- □ Positioning laser pointer
- □ Polystyrene platform mast for wide devices (tv, laptop)
- □ Fiberglass mast
- □ Metal mast
- □ Linear antenna pole mast
- ○ Reference antennas (horns, sleeve dipoles, loops)

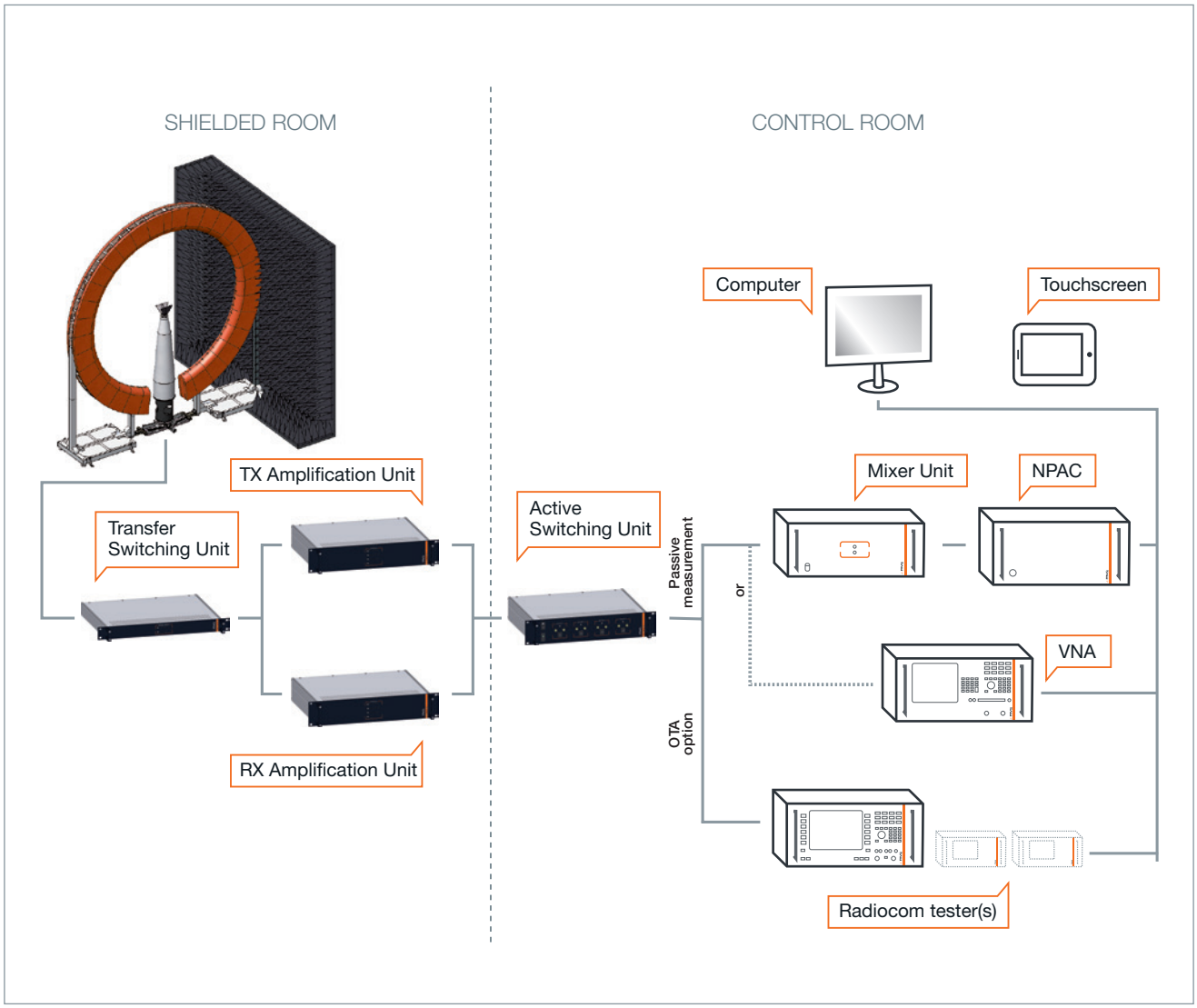
Services

- ■ Installation & calibration
- ■ Warranty
- ■ Project management
- ■ Training
- □ CTIA certification assistance
- □ Post warranty service plans

■ Included □ Optional ○ Required

* See MVG-EMC product pages: mvg.link/EMC for more information

System Overview



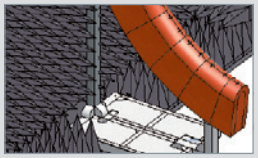
SG 64 uses analog RF signal generators to emit EM waves from the probe array to the antenna under test (AUT) or vice versa. It uses the NPAC as an RF receiver for antenna measurements. The NPAC also drives the electronic scanning of the probe array. The NPAC includes the fastest and most accurate sources and receivers on the market.

For OTA measurements, the tests are performed through the radio communication tester. The amplification units amplify the signal on transmission/reception channels to achieve optimum dynamic range. The Transfer Switching Unit is used to switch between the emission and reception modes of the AUT.

Adding the NPAC to your configuration is a great way to boost your SG 64 system capabilities. Alternatively, an existing VNA can be used if dedicated to the SG 64 system.

Standard system components

1 Arch

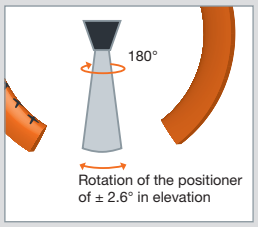


- 3 sizes (compact, standard or large)
- A choice of 3 probe types (DP 70-450, DP 400-6000, DP 6000-18000)

2 Mast

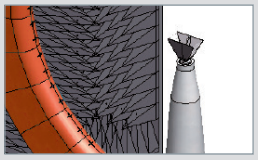
- Mast selection according to max. weight of DUT
- Linear antenna mast
- PVC chair
- Laptop interface
- TV mast

3 Patented Oversampling



- Goniometer below positioner – size of arch, weight of DUT, and frequency range dependent.

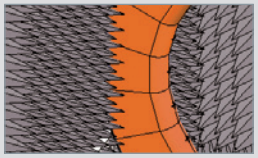
4 Antennas



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

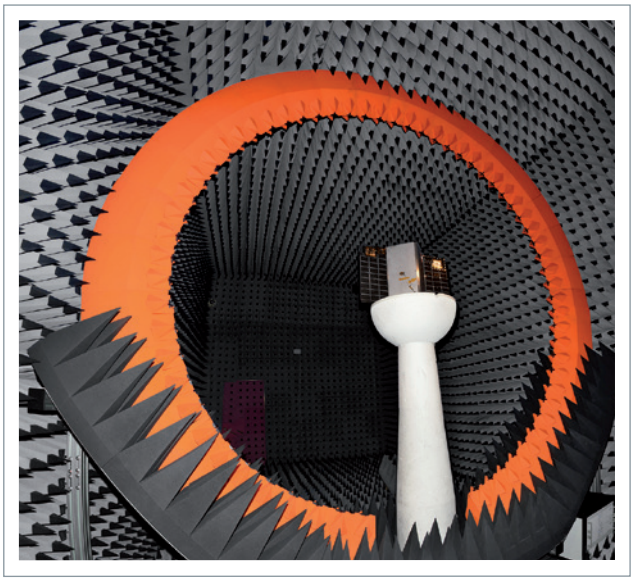
See Antenna Product Overview
www.mvg.link/antennas

5 Absorbers and anechoic chambers



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

See Absorber Product Overview
www.mvg.link/absorbers



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. RF specifications are provided upon request.

System specifications*

	COMPACT	STANDARD 6 GHz	STANDARD 18 GHz	LARGE 6 GHz	SG LF
Typical max. size DUT	134 cm	179 cm	179 cm	273 cm	560 cm
Measurement time for 11 frequencies**	< 3 min	< 3 min	< 3 min	< 3 min	< 3 min
Typical dynamic range	70 dB	70 dB	70 dB	70 dB	60 dB

** No oversampling, no averaging

System specifications*

	COMPACT			STANDARD 6 GHz			STANDARD 18 GHz			LARGE 6 GHz			SG LF **
	10 dBi	20 dBi	30 dBi	10 dBi	20 dBi	30 dBi	10 dBi	20 dBi	30 dBi	10 dBi	20 dBi	30 dBi	
	AUT	AUT	AUT	AUT	AUT	AUT	AUT	AUT	AUT	AUT	AUT	AUT	
PEAK GAIN ACCURACY													
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	
- 10 dB SIDELOBES ACCURACY													
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	-	-	-	
- 20 dB SIDELOBES ACCURACY													
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	-	-	-	
- 30 dB SIDELOBES ACCURACY													
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

**RF specifications provided upon request

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	8.6/10.52 m
Shielded anechoic 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	14 x 14 x 12 m
Angle between probes in the same frequency band	5,29°	5,29°	5,29°	5,29°	5° (LF) / 2.5° (HF)
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	Goniometer	Goniometer	Goniometer	Goniometer	Goniometer (option)
DUT MAX. WEIGHT					
Styrofoam mast	5 kg	5 kg	5 kg	5 kg	5 kg
Ultra rigid mast	50 kg	50 kg	50 kg	50 kg	50 kg
PVC chair	100 kg	100 kg	100 kg	100 kg	100 kg
Linear antenna pole mast	Not applicable	Option	Option	Option	Option

* Centered load without oversampling

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 ref. channel	63 + 1 ref. channel	31 + 1 ref. channel and 63 + 1 ref. channel
Frequency range	0.4 GHz - 6 GHz	0.4 GHz - 6 GHz	0.4 GHz - 6 GHz 6 GHz - 18 GHz	0.4 GHz - 6 GHz	0.07 - 0.4 GHz 0.4 - 6 GHz

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

FREQUENCY (GHz)	NUMBER OF OVERSAMPLING x 1	x 2	x 3	x 5	x 10
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

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

* 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

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

** 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

+ Linear antenna measurement

Linear antenna measurement characteristics

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

* 1 port (no oversampling, no averaging), Linear antenna of 160 cm at GSM900

MVG - Testing Connectivity for a Wireless World

The Microwave Vision Group offers cutting-edge technologies for the visualization of electromagnetic waves. With advanced test solutions for antenna characterization, radar signature evaluation and electromagnetic measurements, we support company R&D teams in their drive to innovate and boost product development.

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