G-DualScan

Microwave Vision Group

G-DualScan represents a step forward in spherical near-field measurements. It measures antennas with large dimensions and analyzes a very broad range of frequency bands from 200 MHz to 18 GHz. It consists of a single-probe gantry arm and a multi-probe arch up to 12 meters (40 feet) in diameter.

Measures antennas with large dimensions and analyzes a very broad range of frequency bands

SOLUTION FOR

- **Antenna Measurement**
- **Pulsed Measurement**
- **Phased Array Antenna Measurement**

Main features

Technology

- Near-field / Spherical

Measurement capabilities

- Gain
- Directivity
- Beamwidth
- Cross polar discrimination
- Sidelobe levels
- 3D radiation pattern
- Radiation pattern in any polarization (linear or circular)
- Antenna efficiency

Frequency bands

- Single-probe: 200 MHz - 18 GHz, divided in sub-bands (up to 40 GHz upon request)
- Multi-probe: 400 MHz - 6 GHz (400 MHz - 18 GHz or 70 - 400 MHz upon request)

Max. size of DUT

- 7 m diameter

Max. weight of DUT

- 1000 kg

Typical dynamic range

- 50 dB

Oversampling

- Elevation tilt of the AUT

System configurations

Software

Measurement control, data acquisition and post processing

- ■ MiDAS
- □ SatEnv
- □ 959 Spectrum (North America only)

Equipment

- ■ Mixer unit
- ■ N-PAC
- ■ Primary synthesizer
- ■ Auxiliary synthesizer
- ■ Amplification unit
- ■ Transfer switching unit
- ■ Power and control unit
- ■ Probe array power supply
- ■ Heavy DUT positioner, azimuth over goniometer
- ■ Elevation positioner for gantry arm
- ■ Positioner controller
- ■ E-Stop unit
- ■ Local control unit
- ■ Real time controller
- ■ Control interface unit
- ■ Uninterruptible power supply
- ■ Instrumentation rack
- ■ Ethernet switch
- □ AUT Port switch

Add-on

- ○ Shielded anechoic chamber*

Accessories

2 PCs:

- ■ Data acquisition and analysis computer inside the chamber
- ○ Secondary computer outside the chamber for remote control with extra analysis license (optional)
- ■ Metallic mast for calibration space
- □ Reference antennas: wideband horns, standard gain horns etc.
- ○ Probes for gantry arm

Services

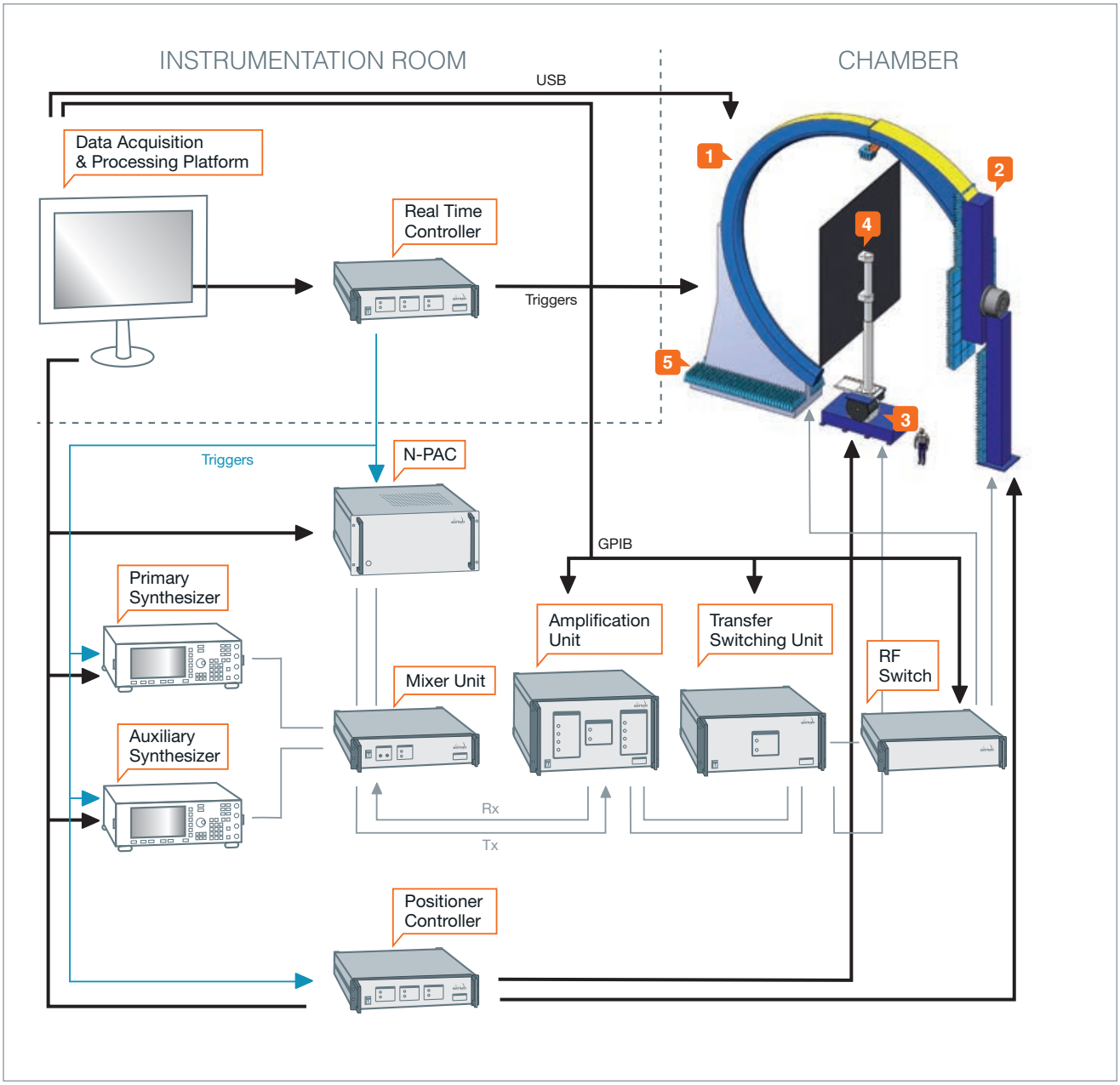
- ■ Installation and calibration
- ■ Project management
- ■ Training
- ■ Warranty
- □ Post warranty service plans**

* See AEMI/ Rainford EMC Systems catalogs for more information

■ Included □ Optional ○ Required

** Refer to Orbit/FR service brochure for more information

System overview



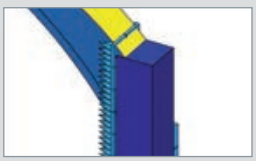
G-DualScan uses a Vector Network Analyzer as the RF source/receiver for antenna measurements. The Amplification Unit has RF amplifiers for each of the RX and TX channels. G-DualScan uses a Transfer Switching Unit to emit from the AUT to the probe(s) or vice versa. A dedicated RF switch allows the selection of either the single-probe or the multi-probe set-up. The Positioner Controller drives the goniometer and azimuth axes for the AUT, and the elevation axis for the gantry arm. Measurements can be performed in both continuous wave and optional pulsed mode. In the case of phased array antenna measurement, the system utilizes an optional real time controller to control and synchronize the measurement system with the device under test.

Standard system components

1 Multi-probe half arch

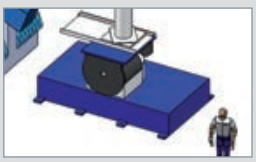
A choice of probes…

- A semi-circular arch of 1280 cm internal diameter with 128 channels (127 probes + 1 reference channel) operating from 400 MHz up to 6 GHz



2 Single-probe gantry arm

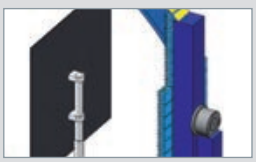
- A single-probe scanner operating from 200 MHz to 18 GHz in 3 sub-bands (up to 40 GHz upon request)



3 DUT positioner

- An azimuth turntable that enables 360° rotation of the DUT and a goniometer to calibrate the system and perform oversampling. Azimuth axis: Accuracy (± 0.005 deg) and max. speed (7.8 deg/s)

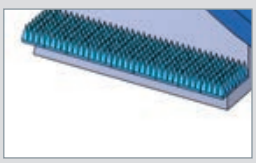
See the Goniometer section page 86



4 Antennas

- A complete range of measurement probes (dual polarized) and reference antennas (horns, standard gain horns) is available

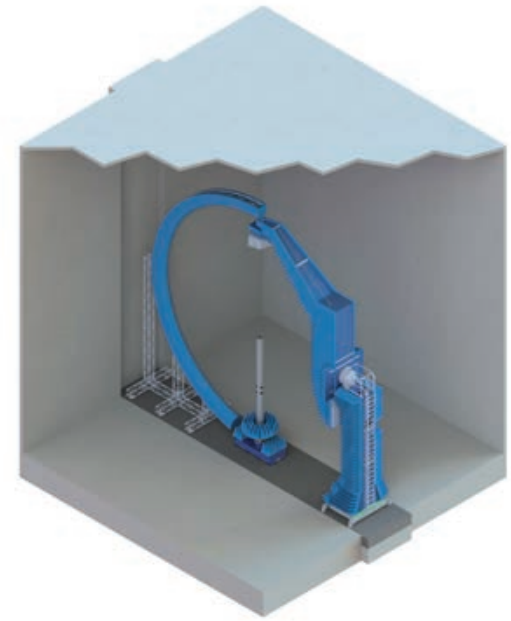
MVG antenna catalog



5 Absorbers and anechoic chambers

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

AEMI absorber catalog



G-DualScan in a shielded anechoic chamber

System specifications*

	10 dBi AUT	20 dBi AUT	30 dBi AUT
PEAK GAIN ACCURACY			
0.2 - 0.4 GHz	± 1.5 dB	± 1.46 dB	± 1.46 dB
0.4 - 1 GHz	± 0.9 dB	± 0.86 dB	± 0.86 dB
1 - 18 GHz	± 0.5 dB	± 0.44 dB	± 0.42 dB
PEAK GAIN REPEATABILITY	± 0.3 dB	± 0.3 dB	± 0.3 dB
- 10 dB SIDELOBES ACCURACY			
0.4 - 0.8 GHz	± 0.8 dB	± 0.5 dB	± 0.4 dB
0.8 - 1 GHz	± 0.7 dB	± 0.5 dB	± 0.4 dB
1 - 6 GHz	± 0.7 dB	± 0.5 dB	± 0.4 dB
6 - 18 GHz	± 0.7 dB	± 0.5 dB	± 0.4 dB

	10 dBi AUT	20 dBi AUT	30 dBi AUT
- 20 dB SIDELOBES ACCURACY			
0.4 - 0.8 GHz	± 2.6 dB	± 0.8 dB	± 0.5 dB
0.8 - 1 GHz	± 2.1 dB	± 0.7 dB	± 0.5 dB
1 - 6 GHz	± 2.1 dB	± 0.7 dB	± 0.5 dB
6 - 18 GHz	± 2.1 dB	± 0.7 dB	± 0.5 dB
- 30 dB SIDELOBES ACCURACY			
0.4 - 0.8 GHz	-	± 2.6 dB	± 0.8 dB
0.8 - 1 GHz	-	± 2.1 dB	± 0.7 dB
1 - 6 GHz	-	± 2.1 dB	± 0.7 dB
6 - 18 GHz	-	± 2.1 dB	± 0.7 dB

*Specifications given according to the following assumptions:
- The standard deviation of the reference data is 0.1dB
- The S11 & the directivity of the reference antenna are the same as those of the AUT
- Absorbers in the anechoic room are AEP-36 from AEMI.
- The given peak gain accuracy values are for 0 dB AUT efficiency

Measurement time comparison

Typical ‘on the fly’ measurement

Single-probe set-up

Frequency	Number of measured frequencies	Measurement time (in hours)
3 GHz, AUT Diameter is 3 m	10	1.2
6 GHz, AUT Diameter is 5 m	10	3.8

Typical ‘on the fly’ measurement

Multi-probe set-up

Frequency	Number of measured frequencies	Measurement time (in hours)
3 GHz, AUT Diameter is 3 m	10	0.1
6 GHz, AUT Diameter is 5 m	10	1.5

Mechanical characteristics

Single-probe

Positioner series	AL–1760–1P
Bending moment	20,000 ft-lbs 2,765 kg-m
Operating load	20,000 lbs 9,090 kg
Delivered torque	2,800 ft-lbs 390 kg-m
Withstand torque	4,200 ft-lbs 580 kg-m
Drive power	¾ hp
Nominal speed	0.5 rpm
Standard angle transducer format	Dual speed synchro
Standard accuracy	± 0.02°
Maximum backlash	0.05°

Probe array

The probe array mechanical characteristics are limited to
• Internal diameter of 12.8 m
• Angle between the probes is 1.304°

Maximum diameter of DUT* (m) Single-probe

FREQUENCY (GHz)	ANGULAR STEP IN DEGREES 1.5° sampling	2° sampling	3° sampling	5° sampling	10° sampling
0.4	9,04	9,04	9,04	8,59	4,30
1	9,04	8,59	5,73	3,44	1,72
2	6,59	4,30	2,86	1,72	0,86
3	4,39	2,86	1,91	1,15	0,57
4	3,30	2,15	1,43	0,86	0,43
5	2,64	1,72	1,15	0,69	0,34
6	2,20	1,43	0,95	0,57	0,29
7	1,88	1,23	0,82	0,49	0,25
8	1,65	1,07	0,72	0,43	0,21
9	1,46	0,95	0,64	0,38	0,19
10	1,32	0,86	0,57	0,34	0,17
11	1,20	0,78	0,52	0,31	0,16
12	1,10	0,72	0,48	0,29	0,14
13	1,01	0,66	0,44	0,26	0,13
14	0,94	0,61	0,41	0,25	0,12
15	0,88	0,57	0,38	0,23	0,11
16	0,82	0,54	0,36	0,21	0,11
17	0,78	0,51	0,34	0,20	0,10
18	0,73	0,48	0,32	0,19	0,10

* Gantry Arm Arch with 11,3 m internal diameter

Maximum diameter of DUT* (m) Multi-probe

FREQUENCY (GHz)	NUMBER OF OVERSAMPLING X1	X2	X3	X5	X10
0.4	10,24	10,24	10,24	10,24	10,24
1	10,24	10,24	10,24	10,24	10,24
2	6,59	10,24	10,24	10,24	10,24
3	4,39	8,79	10,24	10,24	10,24
4	3,30	6,59	9,89	10,24	10,24
5	2,64	5,27	7,91	10,24	10,24
6	2,20	4,39	6,59	10,24	10,24
7	1,88	3,77	5,65	9,42	10,24
8	1,65	3,30	4,94	8,24	10,24
9	1,46	2,93	4,39	7,32	10,24
10	1,32	2,64	3,95	6,59	10,24
11	1,20	2,40	3,59	5,99	10,24
12	1,10	2,20	3,30	5,49	10,24
13	1,01	2,03	3,04	5,07	10,14
14	0,94	1,88	2,82	4,71	9,42
15	0,88	1,76	2,64	4,39	8,79
16	0,82	1,65	2,47	4,12	8,24
17	0,78	1,55	2,33	3,88	7,75
18	0,73	1,46	2,20	3,66	7,32

* Half Arch with 1,304° between probes, 12,8 m internal diameter