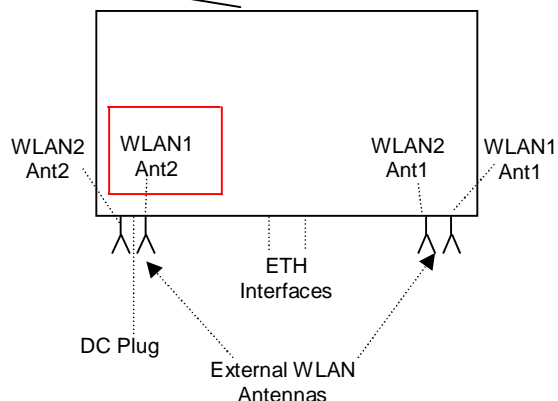
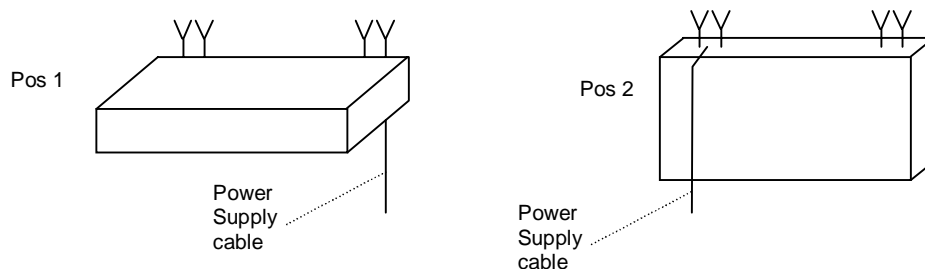


During the tests the test samples were powered with 12 V, provided by a 100-240 V AC/DC adapter, which was provided by the applicant.

Physical boundary of the EUT



For the radiated tests, the worst case positioning of the EUT was investigated through measurements. The WLAN router has two possible operating positions:



Position 1: Device lying horizontally
 Position 2: Device mounted vertically

Preliminary tests were in the two positions, to find worst-case configuration and position. The radiated emission measurements were carried out in the orthogonal direction that emits the highest spurious emission levels. This was found to be Position 2.

2 ADDITIONAL INFORMATION

The firmware was changed to set the power settings according to chapter 2 of the applying test report.

3 OVERVIEW

| Application | Frequency range [MHz] | FCC 47 CFR Part 15 section [2] | RSS 210, Issue 8 [4] or RSS-Gen, Issue 3 [5] | Status | Refer page |
|--------------------|-----------------------|--------------------------------|--|--------|------------|
| Radiated emissions | 1000 - 40,000 | 15.205 (a) 15.209 (a) | 7.2.2 [5], 2.5 [4] | Passed | 3 et seq. |

4 TEST RESULTS

4.1 Maximum unwanted emissions

4.1.1 Method of measurement (radiated emissions)

The radiated emission measurement is subdivided into four stages.

- A preliminary measurement carried out in a fully anechoic chamber with a variable antenna distance and height in the frequency range 1 GHz to 110 GHz.
- A final measurement carried out in a fully anechoic chamber with a fixed antenna height in the frequency range 1 GHz to 110 GHz.

All measurements will be carried out with the EUT working on the middle of the assigned frequency band.

Preliminary and final measurement (1 GHz to 110 GHz)

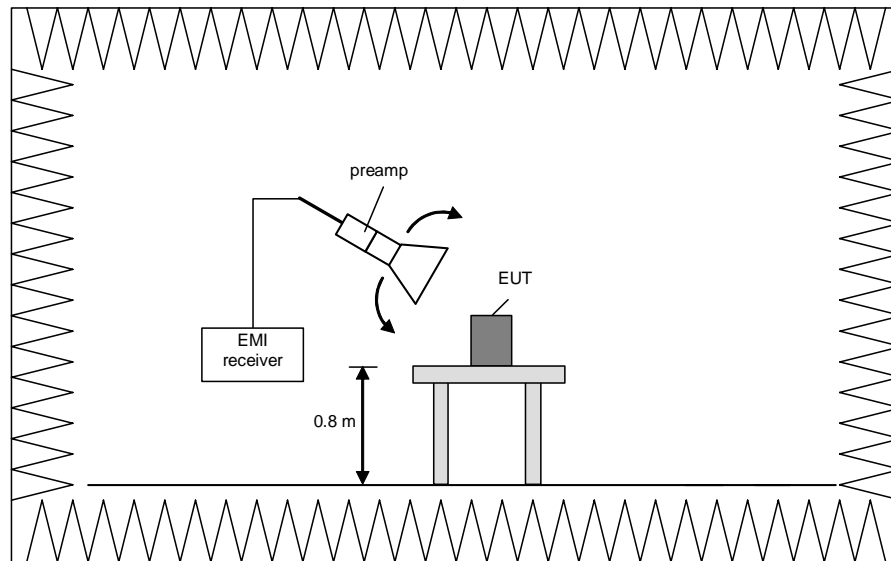
This measurement will be performed in a fully anechoic chamber. Tabletop devices will set up on a non-conducting support with a size of 1 m by 1.5 m and a height of 80 cm. Floor-standing devices will be placed directly on the turntable/ground plane. The set up of the Equipment under test will be in accordance to ANSI C63.4-2009 [1].

Preliminary measurement (1 GHz to 110 GHz)

The frequency range will be divided into different sub ranges depending of the frequency range of the used horn antenna. The spectrum analyser set to MAX Hold mode and a resolution bandwidth of 100 kHz. The measurement will be performed in horizontal and vertical polarisation of the measuring antenna, the antenna close to the EUT and while moving the antenna over all sides of the EUT. With the spectrum analyser in CLEAR / WRITE mode the cone of the emission should be found and than the measuring distance will be set to 3 m with the receiving antenna moving in this cone of emission. At this position the final measurement will be carried out.

The resolution bandwidth of the EMI Receiver will be set to the following values:

| Frequency range | Resolution bandwidth |
|--------------------|----------------------|
| 1 GHz to 4 GHz | 100 kHz |
| 4 GHz to 12 GHz | 100 kHz |
| 12 GHz to 18 GHz | 100 kHz |
| 18 GHz to 26.5 GHz | 100 kHz |
| 26.5 GHz to 40 GHz | 100 kHz |
| 40 GHz to 60 GHz | 100 kHz |
| 50 GHz to 75 GHz | 100 kHz |
| 75 GHz to 110 GHz | 100 kHz |

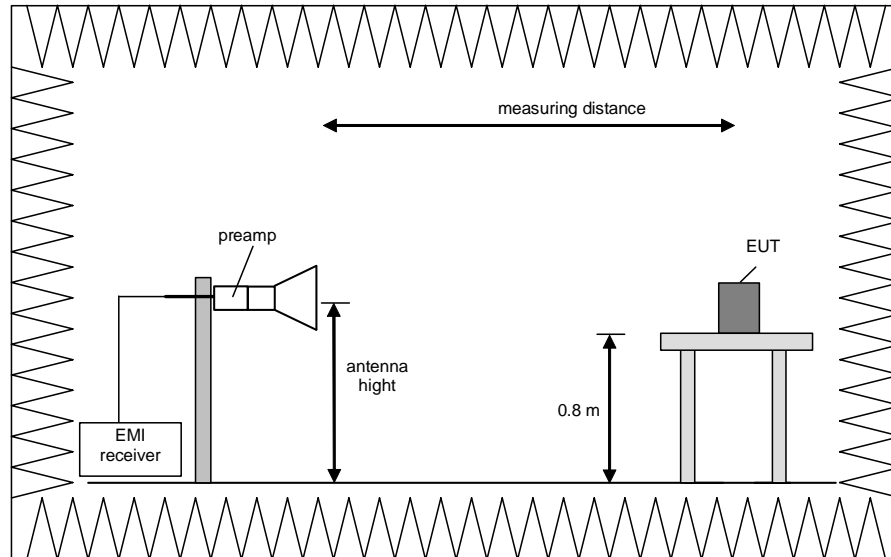


Final measurement (1 GHz to 110 GHz)

The frequency range will be divided into different sub ranges depending of the frequency range of the used horn antenna. The EMI Receiver set to peak and average mode and a resolution bandwidth of 1 MHz. The measurement will be performed in horizontal and vertical polarisation of the measuring antenna and while rotating the EUT in its vertical axis in the range of 0 ° to 360 ° in order to have the antenna inside the cone of radiation.

The resolution bandwidth of the EMI Receiver will be set to the following values:

| Frequency range | Resolution bandwidth |
|--------------------|----------------------|
| 1 GHz to 4 GHz | 1 MHz |
| 4 GHz to 12 GHz | 1 MHz |
| 12 GHz to 18 GHz | 1 MHz |
| 18 GHz to 26.5 GHz | 1 MHz |
| 26.5 GHz to 40 GHz | 1 MHz |
| 40 GHz to 60 GHz | 1 MHz |
| 50 GHz to 75 GHz | 1 MHz |
| 75 GHz to 110 GHz | 1 MHz |



Procedure of measurement:

The measurements were performed in the frequency range 1 GHz to 4 GHz, 4 GHz to 12 GHz, 12 GHz to 18 GHz, 18 GHz to 26.5 GHz, 26.5 GHz to 40 GHz, 40 GHz to 60 GHz, 60 GHz to 75 GHz and 75 GHz to 110 GHz.

The following procedure will be used:

- 1) Monitor the frequency range at horizontal polarisation and move the antenna over all sides of the EUT (if necessary move the EUT to another orthogonal axis).
- 2) Change the antenna polarisation and repeat 1) with vertical polarisation.
- 3) Make a hardcopy of the spectrum.
- 4) Measure the frequency of the detected emissions with a lower span and resolution bandwidth to increase the accuracy and note the frequency value.
- 5) Change the analyser mode to Clear / Write and found the cone of emission.
- 6) Rotate and move the EUT, so that the measuring distance can be enlarged to 3 m and the antenna will be still inside the cone of emission.
- 7) Measure the level of the detected frequency with the correct resolution bandwidth, with the antenna polarisation and azimuth and the peak and average detector, which causes the maximum emission.
- 8) Repeat steps 1) to 7) for the next antenna spot if the EUT is larger than the antenna beamwidth.

Step 1) to 6) are defined as preliminary measurement.

4.1.2 Test results (radiated emissions)

4.1.2.1 Preliminary radiated emission measurement

| | | | |
|---------------------|-------|-------------------|------|
| Ambient temperature | 20 °C | Relative humidity | 30 % |
|---------------------|-------|-------------------|------|

Position of EUT: The EUT was set-up on a non-conducting table of a height of 0.8 m. The distance between EUT and antenna was 3 m.

Cable guide: For detail information of test set-up and the cable guide refer to the pictures in annex A of the applying test report.

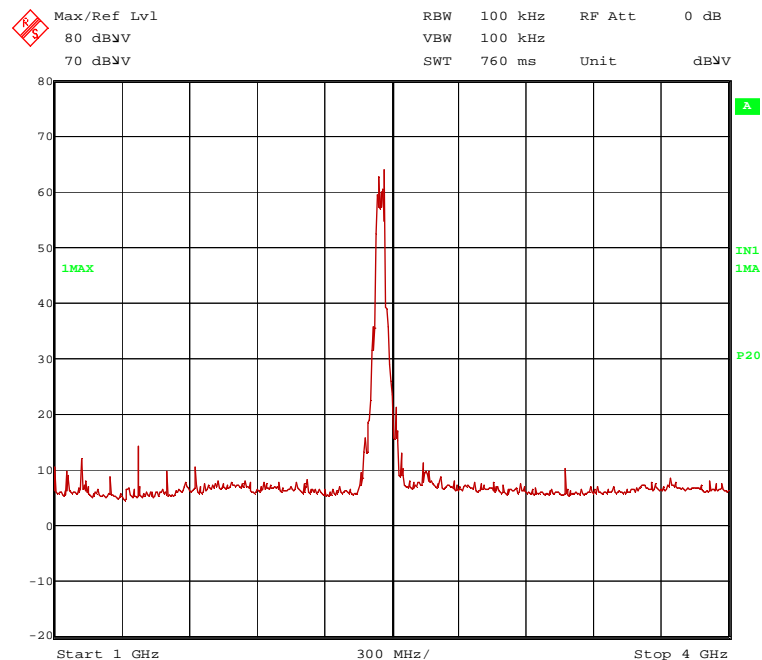
Test record: All results are shown in the following.

Supply voltage: During all measurements the EUT with 12 V via an AC/DC Adapter.

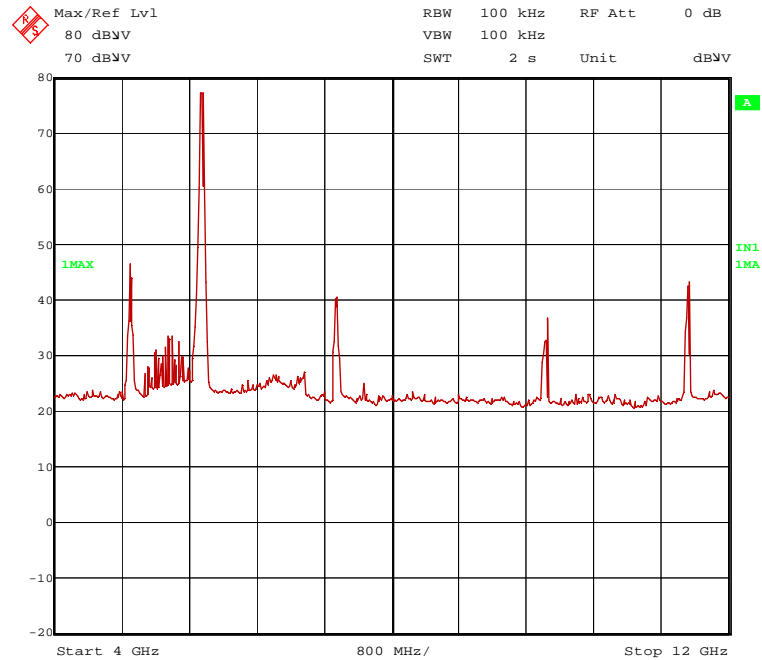
Remark: The measurement was performed from 1 to 40 GHz, because no interferences from the two modules were expected at frequencies below 1 GHz.

Transmitter operates at the lower end of the assigned frequency band (n20-mode)

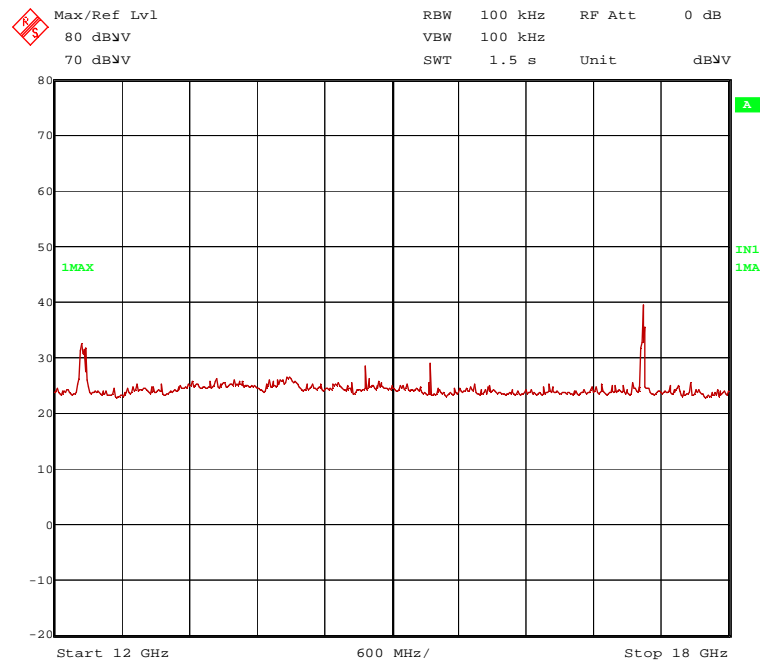
122165_179.wmf: Spurious emissions from 1 GHz to 4 GHz:



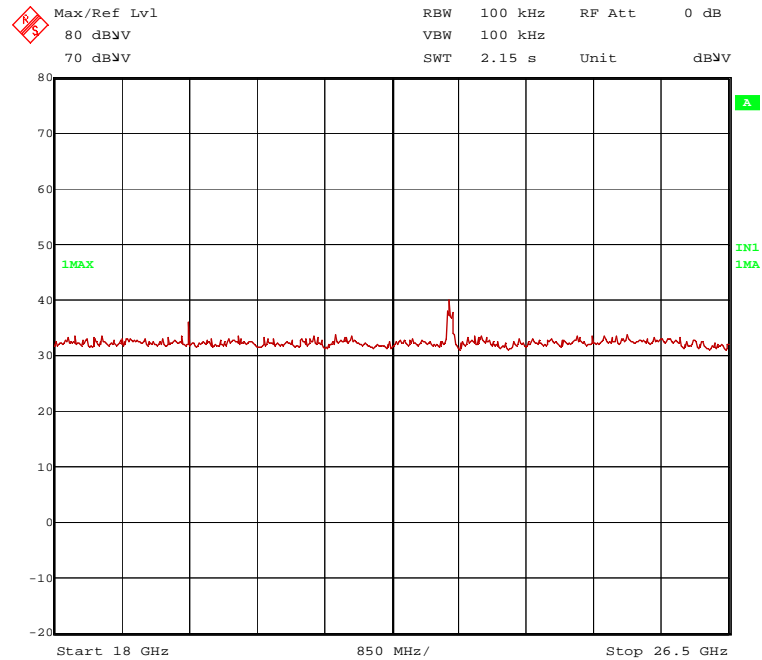
2165_180.wmf: Spurious emissions from 4 GHz to 12 GHz:



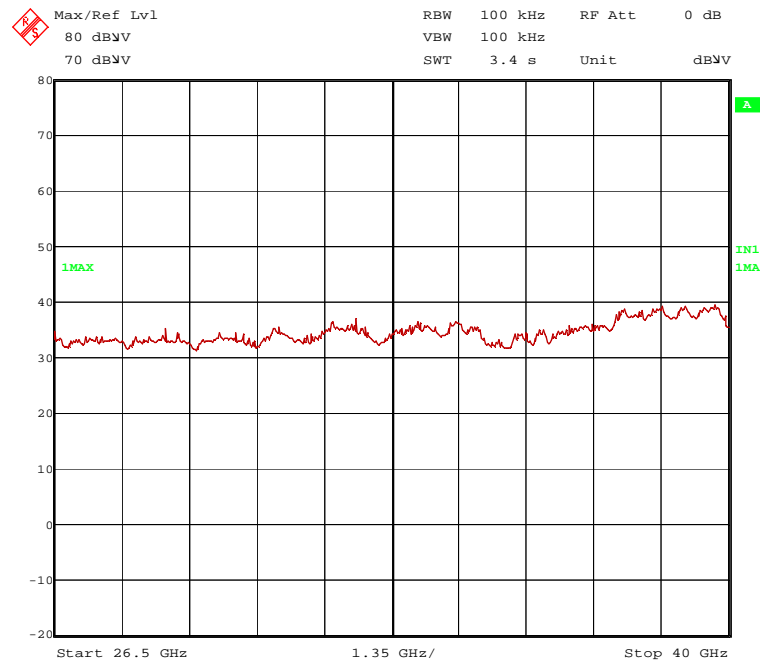
122165_182.wmf: Spurious emissions from 12 GHz to 18 GHz:



122165_183.wmf: Spurious emissions from 18 GHz to 25 GHz:



122165_184.wmf: Spurious emissions from 18 GHz to 25 GHz:



The following frequency was found inside the restricted bands during the preliminary radiated emission test:

- 1125 MHz, 1375 MHz, 4924 MHz, 5400 MHz, 7363 MHz, 11511 MHz, 12273 MHz, 19696 MHz, 23000 MHz.

¹¹

The following frequencies were found outside the restricted bands during the preliminary radiated emission test:

- 2467 MHz and 2642 MHz, 3269 MHz, 9813 MHz, 14772 MHz, 15347 MHz, 17272 MHz.

These frequencies have to be measured in a final measurement. The results are presented in the following.

4.1.2.2 Final radiated emission measurement (1 GHz to 40 GHz)

| | | | |
|---------------------|-------|-------------------|------|
| Ambient temperature | 20 °C | Relative humidity | 30 % |
|---------------------|-------|-------------------|------|

Position of EUT: The EUT was set-up on a non-conducting table of a height of 0.8 m. The distance between EUT and antenna was 3 m.

Cable guide: For detail information of test set-up and the cable guide refer to the pictures in annex A of this test report.

Test record: All results are shown in the following.

Supply voltage: During all measurements the EUT with 12 V via an AC/DC Adapter.

Resolution bandwidth: For all measurements a resolution bandwidth of 1 MHz was used.

Transmitter operates at the lower end of the assigned frequency band (operation mode 1)

Result measured with the peak detector:

| Frequency MHz | Corr. Value dBμV/m | Limit dBμV/m | Margin dB | Readings dBμV | Antenna factor 1/m | Preamp dB | Cable loss dB | Height cm | Pol. | Restr. Band | Pos. |
|-------------------------|--------------------------|-----------------|--------------|------------------|--------------------------|-------------------|---------------------|--------------|-------|----------------|------|
| 2467 | 99.6 | | | 67.4 | 28.5 | 0.0 | 3.7 | 150 | Vert. | carrier | 2 |
| 1125 | 45.2 | 74.0 | 28.8 | 18.1 | 24.6 | 0.0 | 2.5 | 150 | Vert. | Yes | 2 |
| 1375 | 46.9 | 74.0 | 27.1 | 19.0 | 25.0 | 0.0 | 2.9 | 150 | Hor. | Yes | 2 |
| 2642 | 54.2 | 79.6 | 25.4 | 21.5 | 28.6 | 0.0 | 4.1 | 150 | Vert. | No | 2 |
| 3269 | 51.5 | 79.6 | 28.1 | 16.3 | 30.9 | 0.0 | 4.3 | 150 | Vert. | No | 2 |
| 4924 | 66.6 | 74.0 | 7.4 | 54.0 | 32.9 | 25.6 | 5.3 | 150 | Vert. | Yes | 2 |
| 5400 | 53.1 | 74.0 | 20.9 | 39.0 | 33.8 | 25.4 | 5.7 | 150 | Vert. | Yes | 2 |
| 7363 | 71.9 | 74.0 | 2.1 | 53.4 | 36.3 | 24.6 | 6.8 | 150 | Vert. | Yes | 2 |
| 9813 | 69.0 | 79.6 | 10.6 | 47.6 | 37.3 | 23.9 | 8.0 | 150 | Hor. | No | 2 |
| 11511 | 73.1 | 74.0 | 0.9 | 49.7 | 38.8 | 24.1 | 8.7 | 150 | Hor. | Yes | 2 |
| 12273 | 46.9 | 74.0 | 27.1 | 36.6 | 33.7 | 25.9 | 2.5 | 150 | Vert. | Yes | 2 |
| 14772 | 43.5 | 79.6 | 36.1 | 34.0 | 33.7 | 26.7 | 2.5 | 150 | Hor. | No | 2 |
| 15347 | 43.6 | 79.6 | 36.0 | 34.4 | 33.7 | 27.0 | 2.5 | 150 | Hor. | No | 2 |
| 17272 | 54.3 | 79.6 | 25.3 | 45.2 | 33.9 | 27.3 | 2.5 | 150 | Vert. | No | 2 |
| 19696 | 45.0 | 74.0 | 29.0 | 43.7 | 37.1 | 38.3 | 2.5 | 150 | Vert. | Yes | 2 |
| 23000 | 43.1 | 74.0 | 30.9 | 41.8 | 37.2 | 38.4 | 2.5 | 150 | Vert. | Yes | 2 |
| Measurement uncertainty | | | | | | +2.2 dB / -3.6 dB | | | | | |

Result measured with the average detector:

| Frequency MHz | Corr. Value dBμV/m | Limit dBμV/m | Margin dB | Readings dBμV | Antenna factor 1/m | Preamp dB | Cable loss dB | Height cm | Pol. | Restr. Band | Pos. |
|-------------------------|--------------------------|-----------------|--------------|------------------|--------------------------|-------------------|---------------------|--------------|-------|----------------|------|
| 2467 | 68.7 | | | 36.5 | 28.5 | 0.0 | 3.7 | 150 | Vert. | carrier | 2 |
| 1125 | 36.8 | 54.0 | 17.2 | 9.7 | 24.6 | 0.0 | 2.5 | 150 | Vert. | Yes | 2 |
| 1375 | 40.0 | 54.0 | 14.0 | 12.1 | 25.0 | 0.0 | 2.9 | 150 | Hor. | Yes | 2 |
| 2642 | 37.8 | 54.0 | 16.2 | 5.1 | 28.6 | 0.0 | 4.1 | 150 | Vert. | No | 2 |
| 3269 | 38.0 | 54.0 | 16.0 | 2.8 | 30.9 | 0.0 | 4.3 | 150 | Vert. | No | 2 |
| 4924 | 33.0 | 54.0 | 21.0 | 20.4 | 32.9 | 25.6 | 5.3 | 150 | Vert. | Yes | 2 |
| 5400 | 38.8 | 54.0 | 15.2 | 24.7 | 33.8 | 25.4 | 5.7 | 150 | Vert. | Yes | 2 |
| 7363 | 45.7 | 54.0 | 8.3 | 27.2 | 36.3 | 24.6 | 6.8 | 150 | Vert. | Yes | 2 |
| 9813 | 48.0 | 54.0 | 6.0 | 26.6 | 37.3 | 23.9 | 8.0 | 150 | Hor. | No | 2 |
| 11511 | 51.1 | 54.0 | 2.9 | 27.7 | 38.8 | 24.1 | 8.7 | 150 | Hor. | Yes | 2 |
| 12273 | 31.2 | 54.0 | 22.8 | 20.9 | 33.7 | 25.9 | 2.5 | 150 | Vert. | Yes | 2 |
| 14772 | 30.2 | 54.0 | 23.8 | 20.7 | 33.7 | 26.7 | 2.5 | 150 | Hor. | No | 2 |
| 15347 | 29.4 | 54.0 | 24.6 | 20.2 | 33.7 | 27.0 | 2.5 | 150 | Hor. | No | 2 |
| 17272 | 29.7 | 54.0 | 24.3 | 20.6 | 33.9 | 27.3 | 2.5 | 150 | Vert. | No | 2 |
| 19696 | 30.0 | 54.0 | 24.0 | 28.7 | 37.1 | 38.3 | 2.5 | 150 | Vert. | Yes | 2 |
| 23000 | 29.9 | 54.0 | 24.1 | 28.6 | 37.2 | 38.4 | 2.5 | 150 | Vert. | Yes | 2 |
| Measurement uncertainty | | | | | | +2.2 dB / -3.6 dB | | | | | |

Test: Passed

TEST EQUIPMENT USED FOR THE TEST:

29, 31 – 37, 39 - 44, 46, 49 – 51, 55, 72, 73

5 TEST EQUIPMENT AND ANCILLARIES USED FOR TESTS

| No. | Test equipment | Type | Manufacturer | Serial No. | PM. No. | Cal. Date | Cal. Due |
|-----|--|----------------------------|-----------------------|-------------------------|---------|---|----------|
| 1 | Shielded chamber M47 | - | Albatross Projects | B83117-C6439-T262 - | 480662 | Weekly verification (system cal.) | |
| 2 | EMI Receiver | ESIB 26 | Rohde & Schwarz | 1088.7490 | 481182 | 03/09/2012 | 03/2014 |
| 4 | High pass filter | HR 0.13- 5ENN | FSY Microwave Inc. | DC 0109 SN 002 | 480340 | Weekly verification (system cal.) | |
| 14 | Open area test site | - | Phoenix Test-Lab | - | 480085 | Weekly verification (system cal.) | |
| 15 | Measuring receiver | ESIB7 | Rohde & Schwarz | 100304 | 480521 | 02/15/2012 | 02/2014 |
| 16 | Controller | HD100 | Deisel | 100/670 | 480139 | - | - |
| 17 | Turntable | DS420HE | Deisel | 420/620/80 | 480087 | - | - |
| 18 | Antenna support | MA240-0 | Inn-Co GmbH | MA240- 0/030/6600603 | 480086 | - | - |
| 19 | Antenna | CBL6111 D | Chase | 25761 | 480894 | 09/28/2011 | 09/2014 |
| 20 | EMI Software | ES-K1 | Rohde & Schwarz | - | 480111 | - | - |
| 29 | Fully anechoic chamber M20 | - | Albatross Projects | B83107-E2439-T232 | 480303 | Weekly verification (system cal.) | |
| 30 | Spectrum analyser | FSU | Rohde & Schwarz | 200125 | 480956 | 02/15/2012 | 02/2014 |
| 31 | Measuring receiver | ESI 40 | Rohde & Schwarz | 100064 | 480355 | 02/13/2012 | 02/2014 |
| 32 | Controller | MCU | Maturo | MCU/043/971107 | 480832 | - | - |
| 33 | Turntable | DS420HE | Deisel | 420/620/80 | 480315 | - | - |
| 34 | Antenna support | AS615P | Deisel | 615/310 | 480187 | - | - |
| 35 | Antenna | CBL6112 B | Chase | 2688 | 480328 | 04/21/2011 | 04/2014 |
| 36 | Antenna | 3115 A | EMCO | 9609-4918 | 480183 | 11/09/2011 | 11/2014 |
| 37 | Standard Gain Horn 11.9 GHz – 18 GHz | 18240-20 | Flann Microwave | 483 | 480294 | Six month verification (system cal.) | |
| 39 | Standard Gain Horn 17.9 GHz – 26.7 GHz | 20240-20 | Flann Microwave | 411 | 480297 | Six month verification (system cal.) | |
| 40 | Standard Gain Horn Antenne 26.4 – 40.1 GHz | 22240-20 | Flann Microwave | 469 | 480229 | Six month verification (system cal.) | |
| 41 | RF-cable No. 3 | Sucoflex 106B | Huber&Suhner | 0563/6B / Kabel 3 | 480670 | Weekly verification (system cal.) | |
| 42 | RF-cable No. 40 | Sucoflex 106B | Huber&Suhner | 0708/6B / Kabel 40 | 481330 | Weekly verification (system cal.) | |
| 43 | RF-cable No. 30 | RTK 081 | Rosenberger | - | 410141 | Weekly verification (system cal.) | |
| 44 | RF-cable No. 31 | RTK 081 | Rosenberger | - | 410142 | Weekly verification (system cal.) | |
| 46 | RF-cable 1 m | KPS-1533- 400-KPS | Insulated Wire | - | 480301 | Six month verification (system cal.) | |
| 49 | Preamplifier | JS3- 00101200- 23-5A | Miteq | 681851 | 480337 | Six month verification (system cal.) | |
| 50 | Preamplifier | JS3- 12001800- 16-5A | Miteq | 571667 | 480343 | Six month verification (system cal.) | |

| | | | | | | | |
|----|------------------------|--------------------|--------------------------|----------------|--------|--------------------------------------|---------|
| 51 | Preamplifier | JS3-18002600-20-5A | Miteq | 658697 | 480342 | Six month verification (system cal.) | |
| 55 | Loop antenna | HFH2-Z2 | Rohde & Schwarz | 832609/014 | 480059 | 02/16/2012 | 02/2014 |
| 72 | 4 GHz High Pass Filter | WHKX4.0/18 G-8SS | Wainwright Instruments | 1 | 480587 | Weekly verification (system cal.) | |
| 73 | Single Control Unit | SCU | Maturo GmbH | SCU/006/971107 | 480831 | Calibration not necessary | |
| 80 | Hochpass Filter | H26G40G1 | Microwave Circuits, Inc. | 33471 | 480593 | Six month verification (system cal.) | |