PHOENIX TESTLAB
Königswinkel 10
32825 Blomberg, Germany
Phone: +49 (0) 52 35 / 95 00-0
Fax: +49 (0) 52 35 / 95 00-10
office@phoenix-testlab.de
www.phoenix-testlab.de

Test Report

Report Number:

F153615E1 2nd version

Equipment under Test (EUT):

PitBase TWN4

Applicant:

Scheidt & Bachmann GmbH

Manufacturer:

Scheidt & Bachmann GmbH

ilac-MRA DAkkS Deutsche Akkreditierungsstelle
D-PL-17186-01-01
D-PL-17186-01-02
D-PL-17186-01-03

References

[1] **ANSI C63.10:2013** American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

[2] **FCC CFR 47 Part 15** Radio Frequency Devices

[3] **RSS-210 Issue 9 (August 2016)** Licence-exempt Radio Apparatus (All Frequency Bands): Category I Equipment

[4] **RSS-Gen Issue 4 (November 2014)** General Requirements and Information for the Certification of Radiocommunication Equipment

Test result

The requirements of the tests performed as shown in the overview (chapter 4 of this test report) were fulfilled by the equipment under test.
The complete test results are presented in the following.

Test engineer:	Manuel BASTERT		05/16/2017
	Name	Signature	Date
Authorized reviewer:	Bernd STEINER		05/16/2017
	Name	Signature	Date

Reservation

This test report is only valid in its original form.

Any reproduction of its contents in extracts without written permission of the accredited test laboratory PHOENIX TESTLAB GmbH is prohibited.

The test results herein refer only to the tested sample. PHOENIX TESTLAB GmbH is not responsible for any generalizations or conclusions drawn from these test results concerning further samples. Any modification of the tested samples is prohibited and leads to the invalidity of this test report. Each page necessarily contains the PHOENIX TESTLAB Logo and the TEST REPORT NUMBER.

Contents: Page

1 Identification....4
1.1 Applicant....4
1.2 Manufacturer....4
1.3 Test Laboratory....4
1.4 EUT (Equipment Under Test)....5
1.5 Technical data of equipment....5
1.6 Dates....5
2 Operational states and test setup....6
3 Additional information....7
4 Overview....7
5 Results....8
5.1 20 dB bandwidth....8
5.1.1 Method of measurement....8
5.1.2 Test results....9
5.2 99 % bandwidth....13
5.2.1 Method of measurement....13
5.2.2 Test results....14
5.3 Conducted emissions on power supply lines....18
5.3.1 Test method....18
5.3.2 Conducted emission measurement on AC mains....19
5.4 Radiated emissions....20
5.4.1 General method of measurement....20
5.4.2 Results preliminary measurement 9 kHz to 30 MHz....27
5.4.3 Results preliminary measurement 30 MHz to 1 GHz....42
5.4.4 Result final measurement from 9 kHz to 30 MHz....49
5.4.5 Result final measurement from 30 MHz to 1 GHz....53
6 Test equipment....60
7 Report history....61
8 List of annexes....61

1 Identification

1.1 Applicant

Name:	Scheidt & Bachmann GmbH
Address:	Breite Straße 132 41238 Mönchengladbach
Country:	Germany
Name for contact purposes:	Scheidt & Bachmann GmbH
Applicant represented during the test by the following person:	-

1.2 Manufacturer

Name:	Scheidt & Bachmann GmbH
Address:	Breite Straße 132 41238 Mönchengladbach
Country:	Germany
Name for contact purposes:	-
Manufacturer represented during the test by the following person:	-

1.3 Test Laboratory

The tests were carried out at:

PHOENIX TESTLAB GmbH
Königswinkel 10
32825 Blomberg
Germany

Test Laboratory (CAB) accredited by Deutsche Akkreditierungsstelle GmbH (DAkkS) in compliance with DIN EN ISO/IEC 17025 under the Reg. No. D-PL-17186-01-02, recognized by Bundesnetzagentur under the Reg.-No. BNetzA-CAB-02/21-104.
CAB Designation Number DE0004, listed by FCC 31040/SIT1300F2, IC OATS Listing 3469A-1.

1.4 EUT (Equipment Under Test)

Type of equipment:	RFID Hitag Reader
HVIN:	PitBase TWN4
PMN:	PitBase TWN4
Article number:	04 38882 0
Serial No.:	049274146
FCC ID:	O5K-PITBASETWN4
IC:	8312A-PITBASETWN4
Lowest internal frequency:	500 Hz
Highest internal frequency:	120 MHz

1.5 Technical data of equipment

Power supply: *	$12V_{DC}$ by AC adapter		
Supply voltage: *	U_{nom}= 12 V_{DC}	U_{min}= 11.4V	U_{max}= 12.6V
Type of modulation: *	ASK		
Frequency deviation: *	5kHz		
Operating frequency range: *	125 kHz		
Number of channels: *	1		
Antenna type: *	External loop antennas (7 antenna connection options)		
Duty cycle: *	100%		
Rated RF power: *	Not applicable due to magnetic loop antenna		
Data rate: *	4 kbaud (4 kBit/s)		
Temperature range: *	-25°C to 80°C		

* declared by the applicant.

Ports / Connectors			
Identification	Connector		Length during test
	EUT	Ancillary	
Power supply	3.5 mm jack	3.5 mm plug	1 m
Antenna 1	3 pole jack	fixed	max. 0.9 m
Antenna 2	3 pole jack	fixed	max. 0.9 m

1.6 Dates

Date of receipt of test sample:	09/01/2015
Start of test:	09/09/2015
End of test:	02/01/2016

2 Operational states and test setup

The PitBase TWN4 is a hardware interface for encoding and evaluation of HITAG based ChipCoins and transponder cards.
All tests were carried out with a modified test sample, which activating a transmission each second. A TAG was not read out during the measurements.

The conducted emission measurement on the power supply line was carried with the AC/DC adapter type Group West 12UR-12-0900 (Input 100 – 240 V_{AC}, 50 – 60 Hz, 0.4 A / Output 12 V_{DC}, 0.9 A)
During all tests the EUT was supplied with 12 V_{DC} via an AC/DC adapter which was itself powered by an AC-mains network with 120 V_{AC} / 60 Hz.

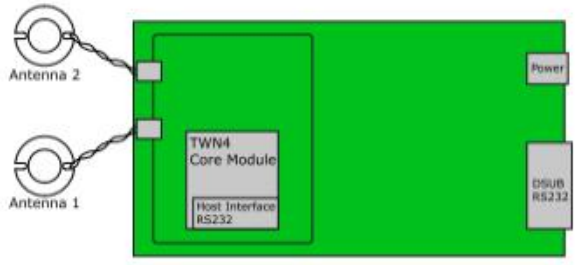
Seven antenna configurations as follows were tested:

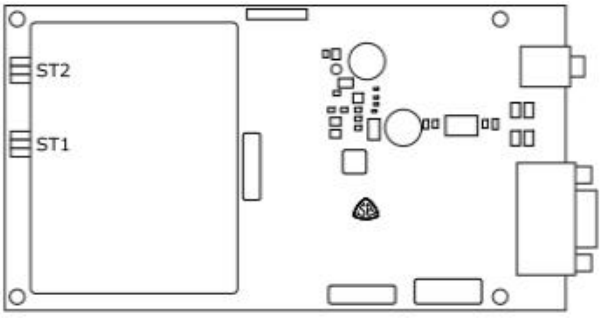
Connection option 1:
Connection terminal ST1: 1 x antenna 0420830 0 (air-core coil 30x30 490µH)
Connection terminal ST2: not used
Connection option 2:
Connection terminal ST1: 1 x antenna 0423652 0 (air-core coil 30x30 490µH)
Connection terminal ST2: not used
Connection option 3:
Connection terminal ST1: 1 x antenna 0434483 0 (air-core coil 30x60 490µH)
Connection terminal ST2: not used
Connection option 4:
Connection terminal ST1: 1 x antenna 0437823 0 (air-core coil 30x60 490µH)
Connection terminal ST2: not used
Connection option 5:
Connection terminal ST1: 1 x antenna 0423652 0 (air-core coil 30x30 490µH)
Connection terminal ST2: 1 x antenna 0418453 0 (air-core coil Ø30 490µH)
Connection option 6:
Connection terminal ST1: 1 x antenna 0420830 0 (air-core coil 30x30 490µH)
Connection terminal ST2: 2 x antenna 0418532 0 connected in parallel (air-core coil Ø30 980µH)
Connection option 7:
Connection terminal ST1: 2 x antenna 0431701 0 connected in parallel (air-core coil 30x30 980µH)
Connection terminal ST2: not used

No spurious emission measurement of the receiver was carried out, because the co-located transmitter transmits continuously.

During the tests the EUT was not labeled with an FCC label.

The schematic drawings below show the EUT and connector assignment:





3 Additional information

Only one antenna setup was used for the conducted emission test because the connected antenna type does not affect the measurement result.

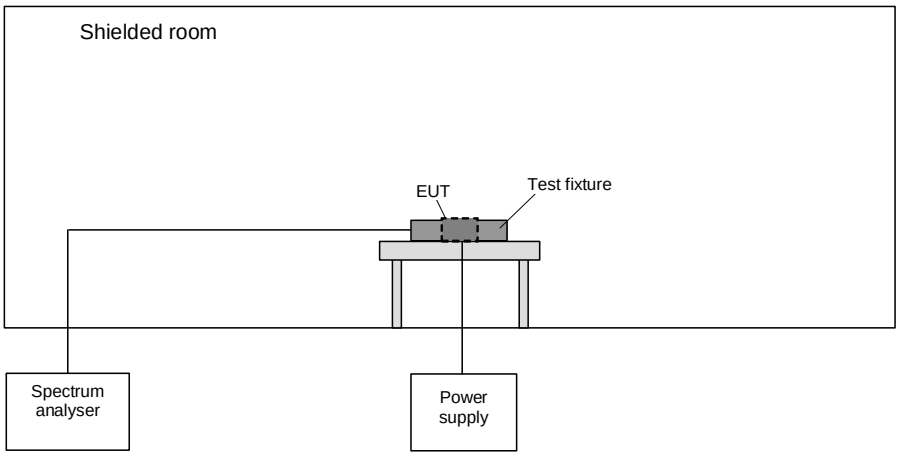
4 Overview

Application	Frequency range [MHz]	FCC 47 CFR Part 15 section [2]	RSS-Gen, Issue 4 [4] and RSS 210, Issue 9 [3]	Status	Refer page
20 dB bandwidth	0.125	15.215 (c)	-	Passed	8 et seq.
99 % bandwidth	0.125	-	6.6 [4]	Passed	13 et seq.
Conducted emissions on supply line	0.15 - 30	15.207 (a)	8.8 [4]	Passed	18 et seq.
Radiated emissions	0.009 - 1,000	15.205 (a) 15.209 (a)	8.9 [4] 4.3, 4.4 [3]	Passed	20 et seq.

5 Results

5.1 20 dB bandwidth

5.1.1 Method of measurement



The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the EMI receiver or spectrum analyzer shall be between two times and five times the OBW.
The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW and video bandwidth (VBW) shall be approximately three times RBW, unless otherwise specified by the applicable requirement.
Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than 10 [log (OBW/RBW)] below the reference level. Specific guidance is given in 4.1.5.2.
Steps a) through c) might require iteration to adjust within the specified tolerances.

5.1.2 Test results

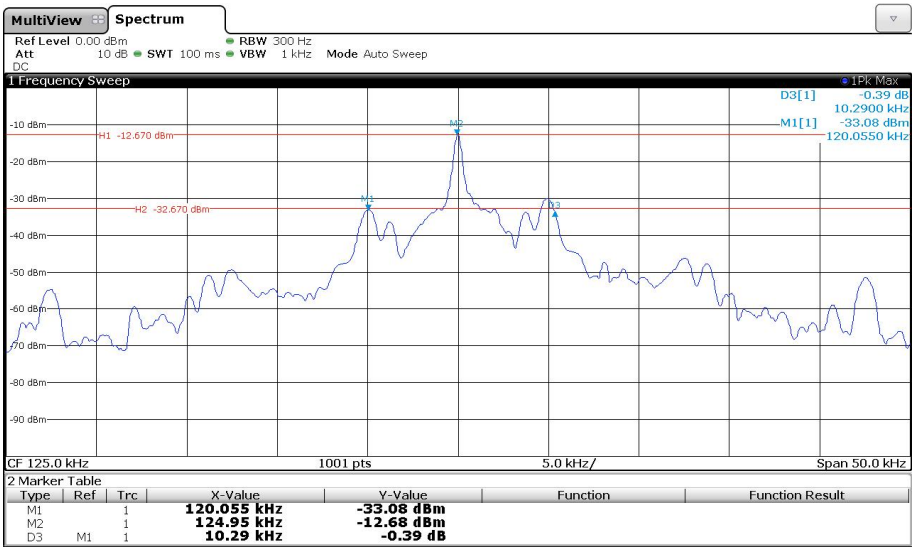
Ambient temperature	22 °C

Relative humidity	35 %

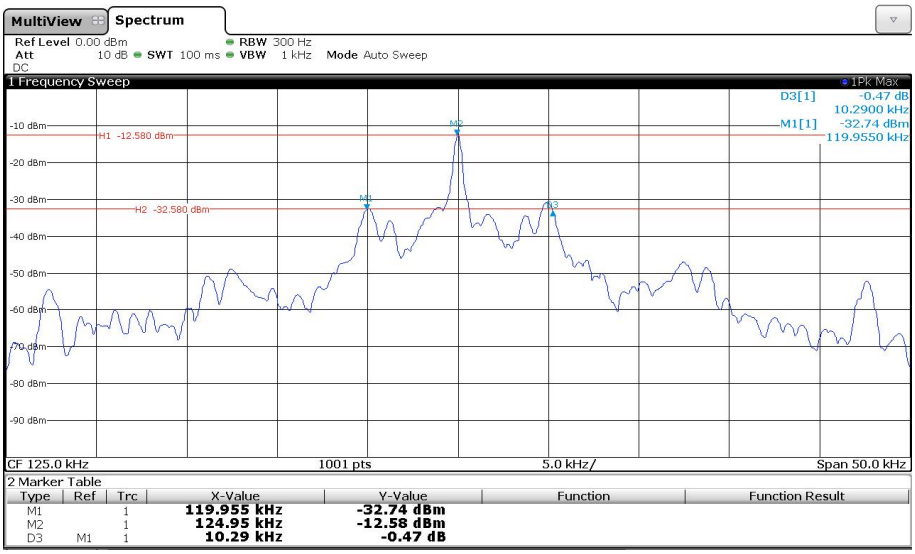
Supply voltage: The EUT was supplied with 12 V_{DC}.

Test record: The test was carried in test mode of the EUT as described in chapter 2.

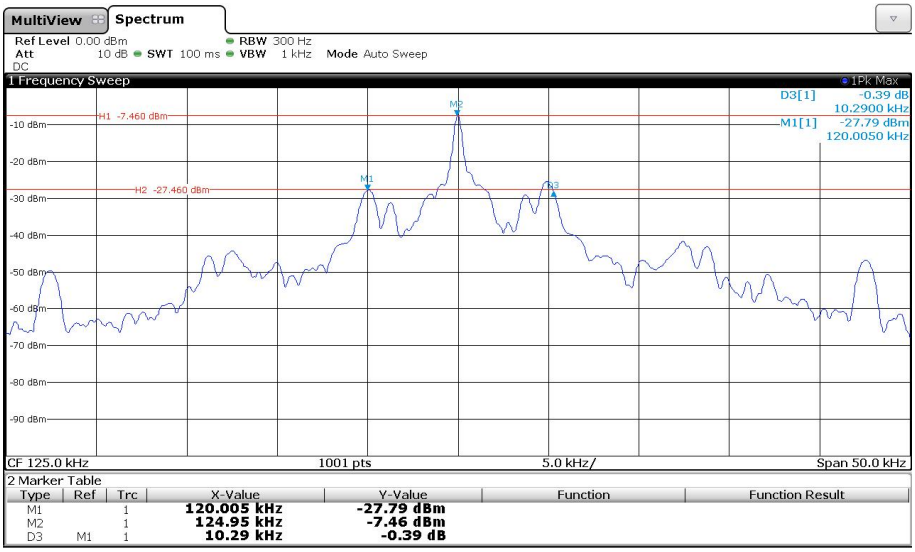
153615_20dB_1.png: 20 dB bandwidth (Connection option 1):



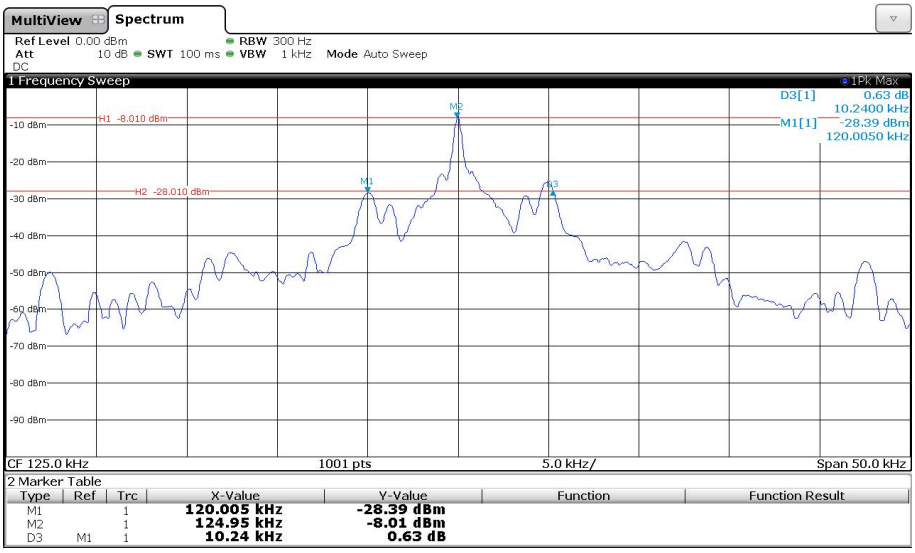
153615_20dB_2.png: 20 dB bandwidth (Connection option 2):



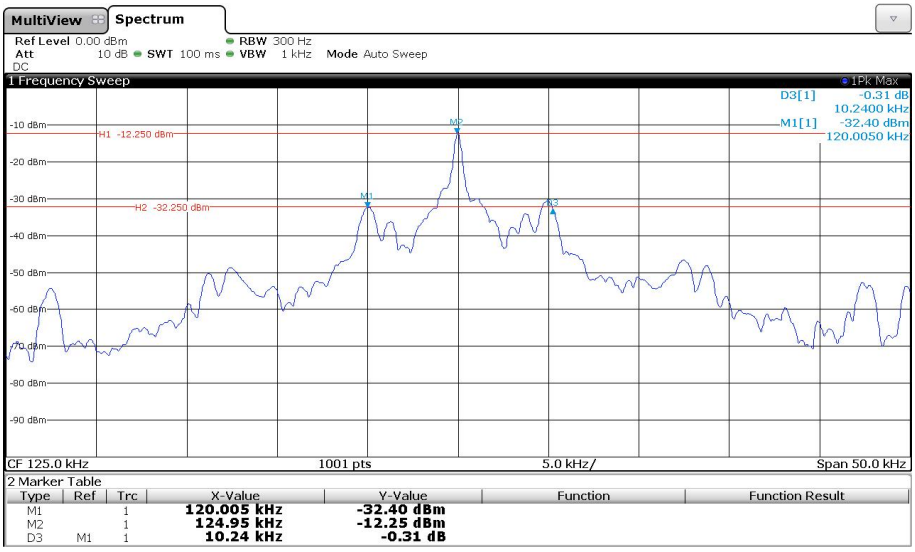
153615_20dB_3.png: 20 dB bandwidth (Connection option 3):



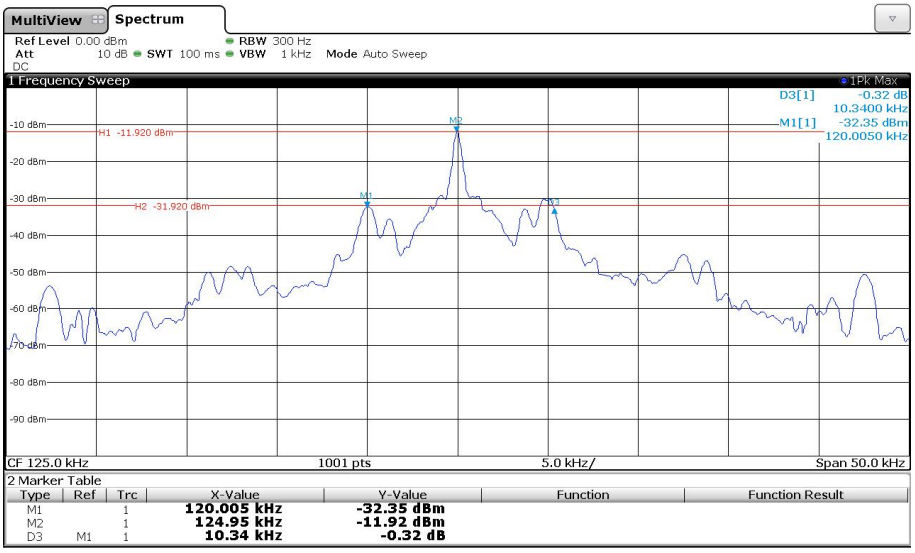
153615_20dB_4.png: 20 dB bandwidth (Connection option 4):



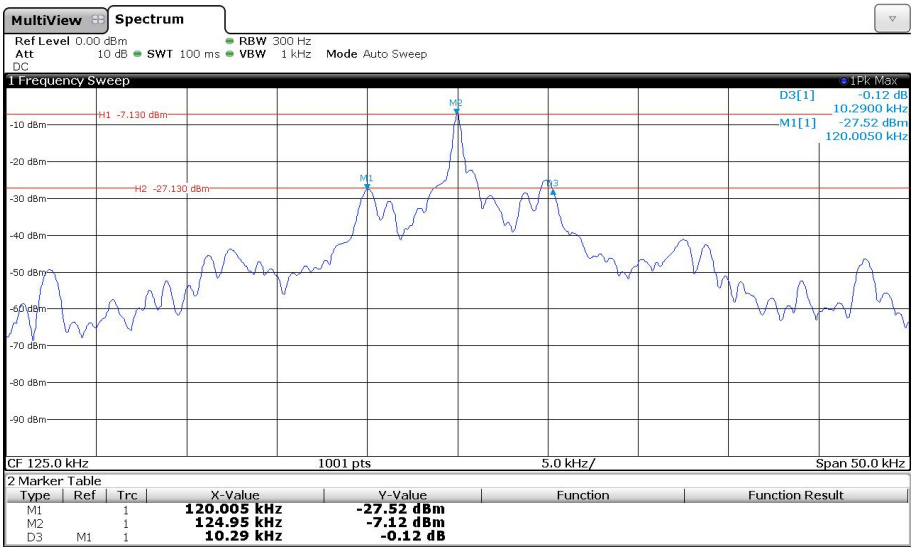
153615_20dB_5.png: 20 dB bandwidth (Connection option 5):



153615_20dB_6.png: 20 dB bandwidth (Connection option 6):



153615_20dB_7.png: 20 dB bandwidth (Connection option 7):



Setup	OBW (20 dB)
Connection option 1	10.29 kHz
Connection option 2	10.29 kHz
Connection option 3	10.29 kHz
Connection option 4	10.24 kHz
Connection option 5	10.24 kHz
Connection option 6	10.34 kHz
Connection option 7	10.29 kHz
Measurement uncertainty: $< \pm 1*10^{-7}$	

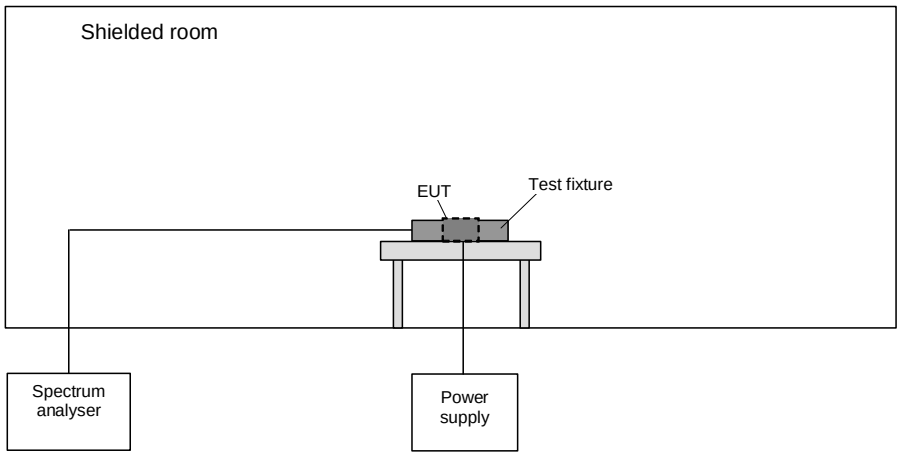
Test result: Passed.

Test equipment used (see chapter 6)

28, 29

5.2 99 % bandwidth

5.2.1 Method of measurement



The following procedure will be used for the occupied bandwidth measurement [1]:

The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts. The resolution bandwidth shall be set to as close to 1% of the selected span as is possible without being below 1%. The video bandwidth shall be set to 3 times the resolution bandwidth. Video averaging is not permitted. Where practical, a sampling detector shall be used since a peak or, peak hold, may produce a wider bandwidth than actual.
The trace data points are recovered and are directly summed in linear terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached and that frequency recorded. The process is repeated for the highest frequency data points. This frequency is recorded.
The span between the two recorded frequencies is the occupied bandwidth.

5.2.2 Test results

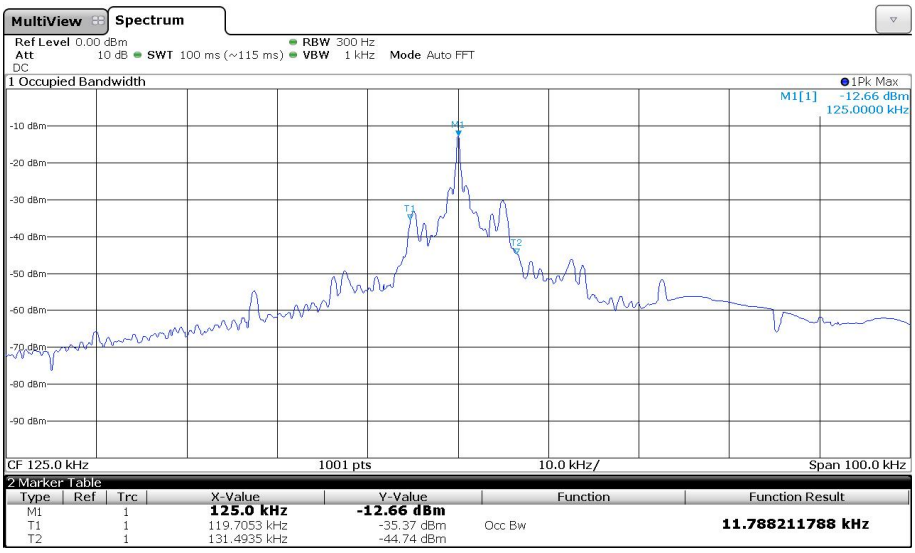
Ambient temperature:	22 °C

Relative humidity:	48 %

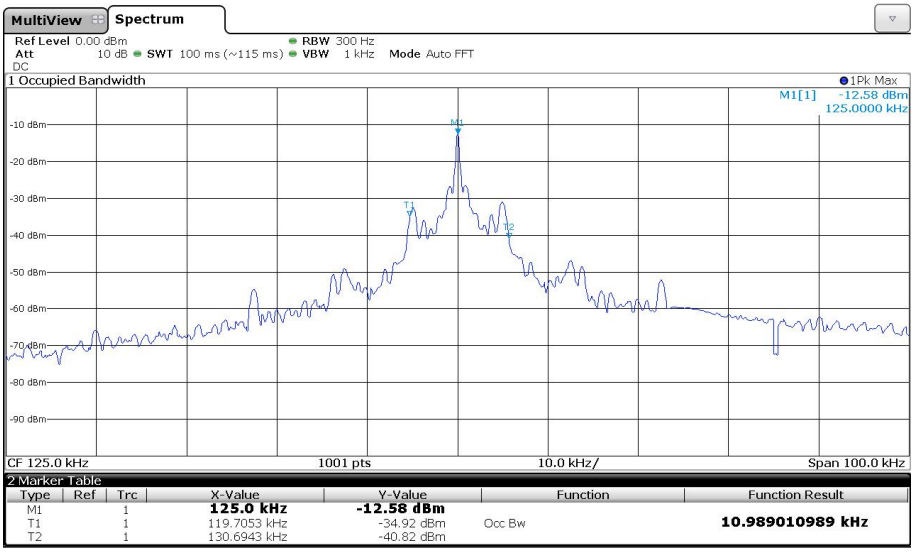
Supply voltage: During all measurements the both EUTs were supplied with 12 V_{DC}.

Test record: The test was carried in test mode of the EUT as described in chapter 2.

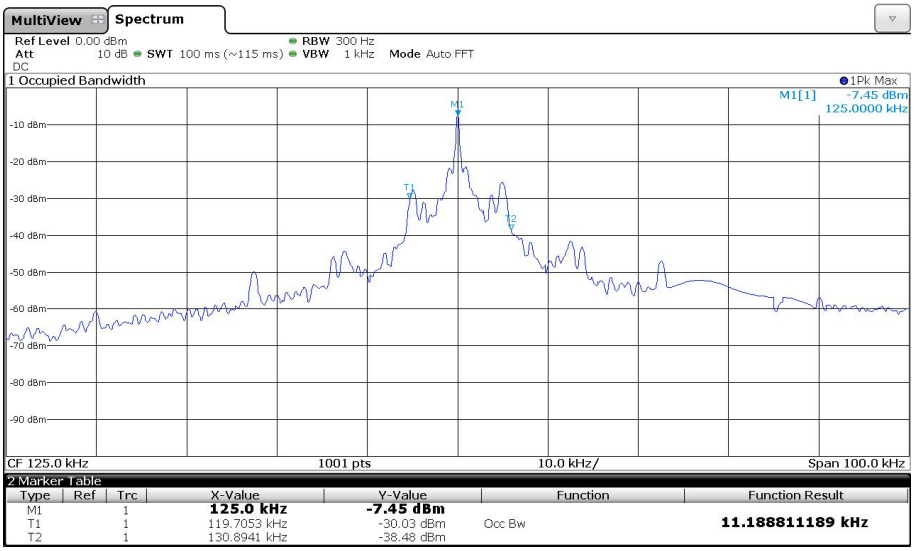
153615_99%_1.png: 99 % bandwidth (Connection option 1):



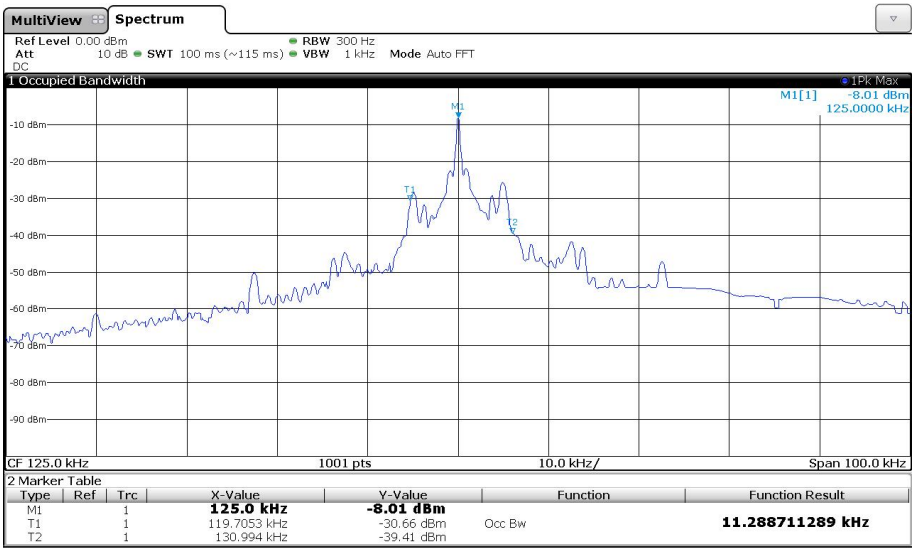
153615_99%_2.png: 99 % bandwidth (Connection option 2):



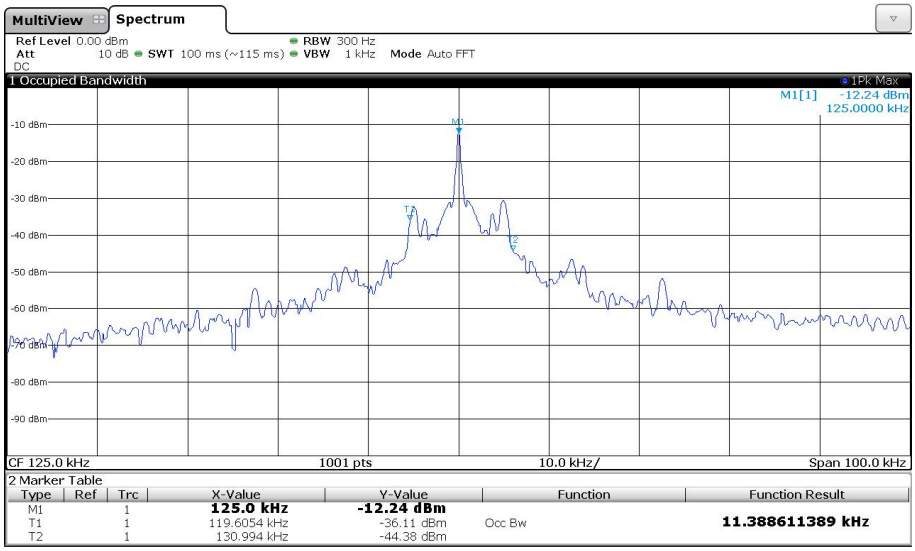
153615_99%_3.png: 99 % bandwidth (Connection option 3):



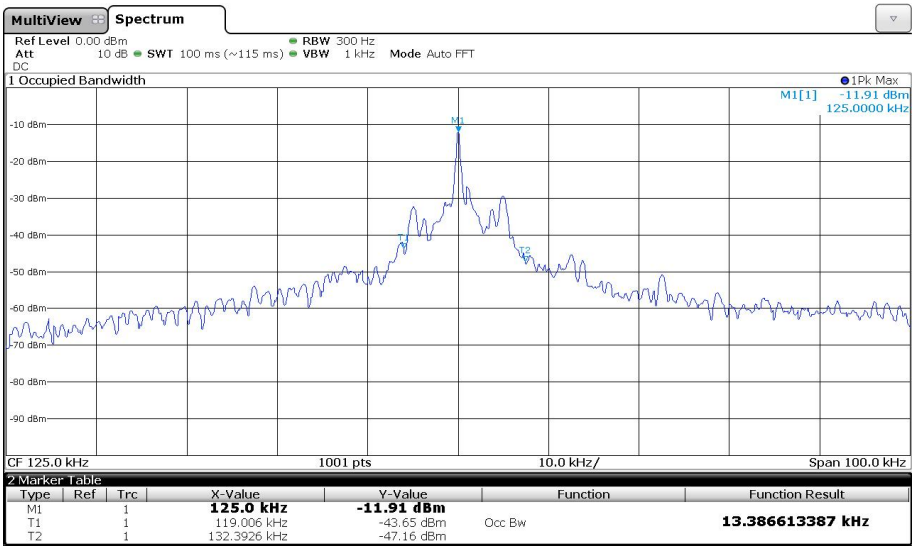
153615_99%_4.png: 99 % bandwidth (Connection option 4):



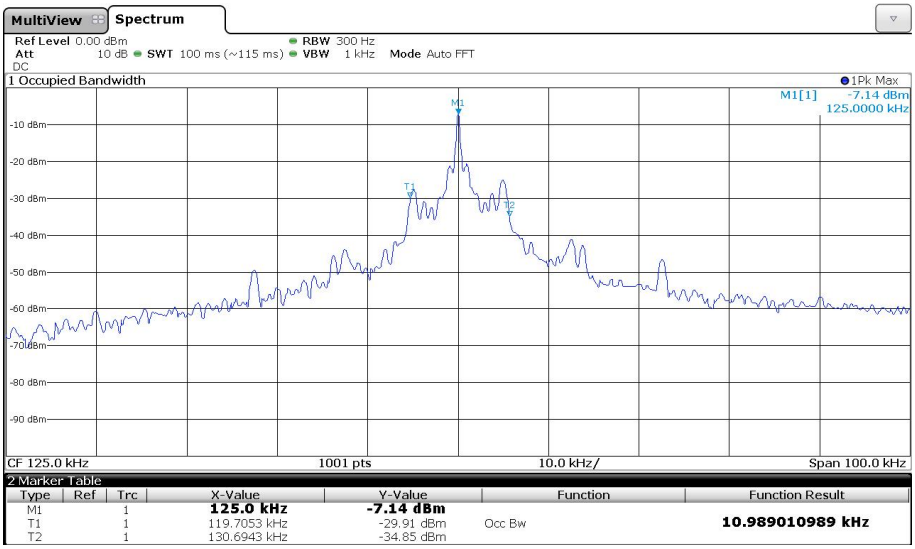
153615_99%_5.png: 99 % bandwidth (Connection option 5):



153615_99%_6.png: 99 % bandwidth (Connection option 6):



153615_99%_7.png: 99 % bandwidth (Connection option 7):



Setup	OBW (99 %)
Connection option 1	10.79 kHz
Connection option 2	10.99 kHz
Connection option 3	11.19 kHz
Connection option 4	11.29 kHz
Connection option 5	11.39 kHz
Connection option 6	11.39 kHz
Connection option 7	10.99 kHz
Measurement uncertainty: $< \pm 1*10^{-7}$	

Test result: Passed.

Test equipment used (see chapter 6)

28, 29

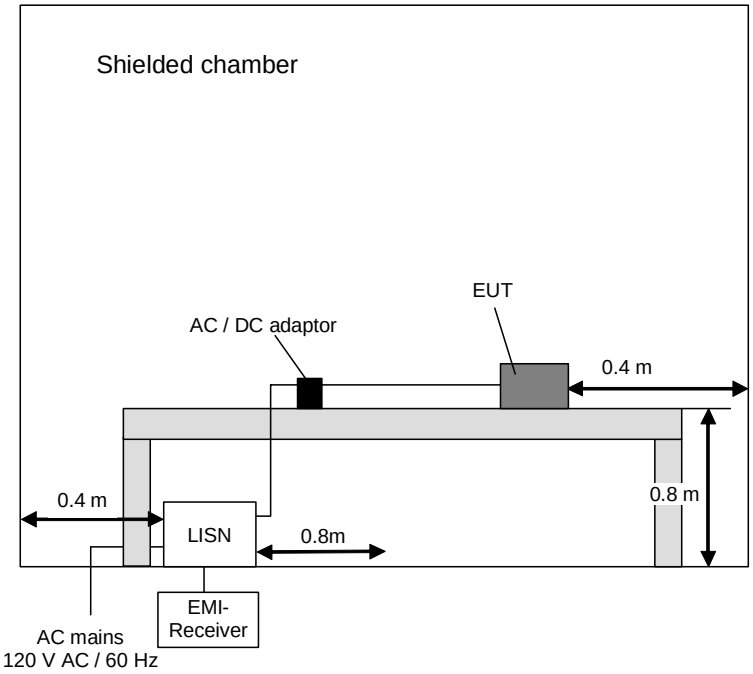
5.3 Conducted emissions on power supply lines

5.3.1 Test method

This test will be carried out in a shielded 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 above the ground plane. Floor-standing devices will be placed directly on the ground plane. The setup of the Equipment under test will be in accordance to ANSI C63.10 [1].

The frequency range 150 kHz to 30 MHz will be measured with an EMI Receiver set to MAX Hold mode with peak and average detector and a resolution bandwidth of 9 kHz. A scan will be carried out on the phase (or plus pole in case of DC powered devices) of the AC mains network. If levels detected 10 dB below the appropriable limit, this emission will be measured with the average and quasi-peak detector on all lines.

Frequency range	Resolution bandwidth
150 kHz to 30 MHz	9 kHz

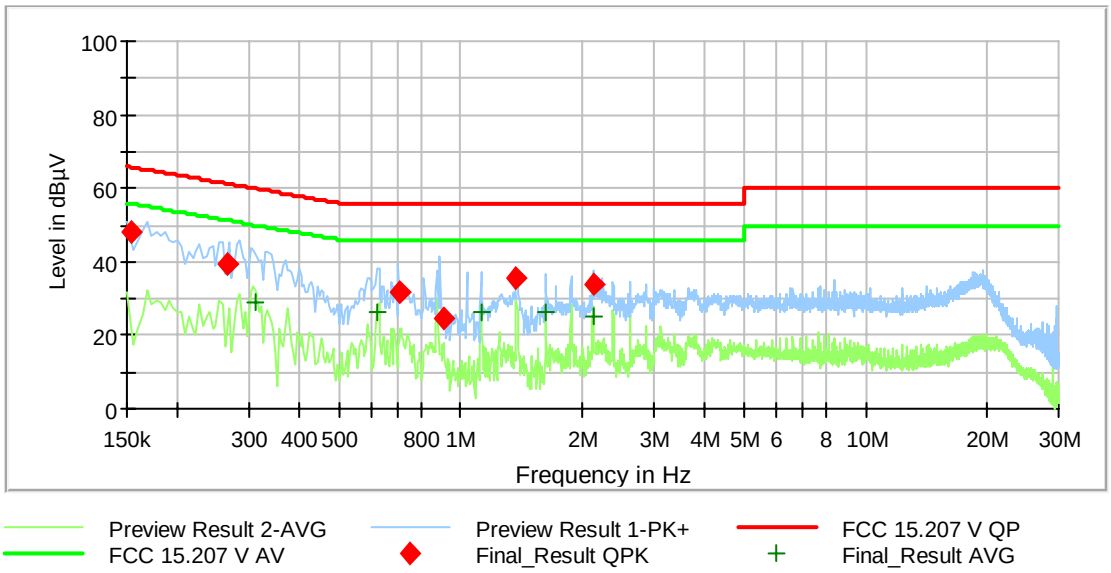


5.3.2 Conducted emission measurement on AC mains

Ambient temperature:	22 °C

Relative humidity:	51 %

Test description:	Conducted emission measurement
EUT:	PITBASE TWN4
Manufacturer:	Scheidt & Bachmann GmbH
Operating conditions:	Continuous TX (Antenna setup 5; worst case)
Test site:	Phoenix TESTLAB GmbH, shielded room M4
Operator:	M. Bastert
Comment:	AC adapter supplied with 120 V_{AC} / 60 Hz



Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Line	PE	Corr. (dB)
0.152700	48.08	---	65.85	17.77	5000.0	9.000	N	FLO	9.8
0.264300	39.14	---	61.30	22.16	5000.0	9.000	N	FLO	9.9
0.311100	---	28.95	49.94	20.99	5000.0	9.000	L1	GND	9.9
0.625200	---	26.36	46.00	19.64	5000.0	9.000	L1	GND	9.9
0.703500	31.50	---	56.00	24.50	5000.0	9.000	N	FLO	9.9
0.910500	24.50	---	56.00	31.50	5000.0	9.000	L1	GND	9.9
1.123800	---	26.33	46.00	19.67	5000.0	9.000	N	GND	9.9
1.374900	35.47	---	56.00	20.53	5000.0	9.000	N	GND	9.9
1.624200	---	25.99	46.00	20.01	5000.0	9.000	N	GND	10.0
2.124600	---	25.17	46.00	20.83	5000.0	9.000	L1	FLO	10.1
2.125500	33.73	---	56.00	22.27	5000.0	9.000	L1	GND	10.1

Test: Passed

Test equipment (refer chapter 6):

1 - 6

5.4 Radiated emissions

5.4.1 General method of measurement

The radiated emission measurement is subdivided into five stages.
A preliminary measurement carried out in a fully anechoic chamber with a fixed antenna height in the frequency range 9 kHz to 1 GHz.
A final measurement carried out on an outdoor test side without reflecting ground plane and a fixed antenna height in the frequency range 9 kHz to 30 MHz.
A final measurement carried out on an open area test side with reflecting ground plane and various antenna height in the frequency range 30 MHz to 1 GHz.
A preliminary measurement carried out in a fully anechoic chamber with a variable antenna distance and height in the frequency range 1 GHz to 25 / 40 GHz.
A final measurement carried out in a fully anechoic chamber with a fixed antenna height in the frequency range 1 GHz to 40 GHz.

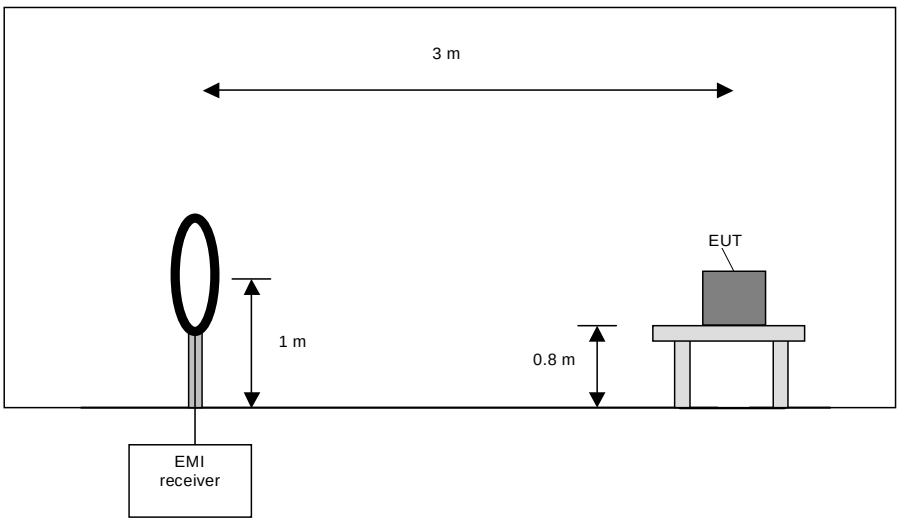
Preliminary measurement (9 kHz to 30 MHz):

In the first stage a preliminary measurement will be performed in a shielded room with a measuring distance of 3 meters. Table-top 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 [1].

The frequency range 9 kHz to 30 MHz will be monitored with a spectrum analyser while the system and its cables will be manipulated to find out the configuration with the maximum emission levels if applicable. The EMI Receiver will be set to MAX Hold mode. The EUT and the measuring antenna will be rotated around their vertical axis to found the maximum emissions.

The resolution bandwidth of the spectrum analyser will be set to the following values:

Frequency range	Resolution bandwidth
9 kHz to 150 kHz	200 Hz
150 kHz to 30 MHz	10 kHz



Preliminary measurement procedure:

Prescans were performed in the frequency range 9 kHz to 150 kHz and 150 kHz to 30 MHz.

The following procedure will be used:
Monitor the frequency range at horizontal polarisation and a EUT azimuth of 0 °.
Manipulate the system cables within the range to produce the maximum level of emission.
Rotate the EUT by 360 ° to maximize the detected signals.
Make a hardcopy of the spectrum.
Measure the frequencies of highest detected emission with a lower span and resolution bandwidth to increase the accuracy and note the frequency value.
Repeat steps 1) to 5) with the other orthogonal axes of the EUT (because of EUT is a module and might be used in a handheld equipment application).
Rotate the measuring antenna and repeat steps 1) to 5).

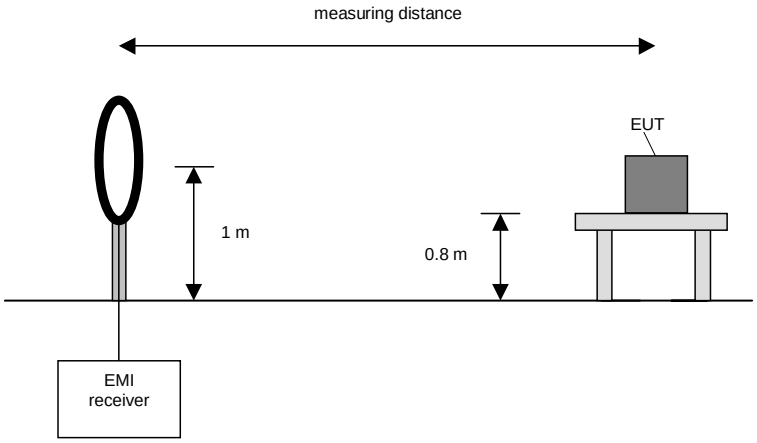
Final measurement (9 kHz to 30 MHz):

In the second stage a final measurement will be performed on an open area test site with no conducting ground plane in a measuring distances of 3 m, 10 m and 30 m. In the case where larger measuring distances are required the results will be extrapolated based on the values measured on the closer distances according to Section 15.31 (f) (2) [2]. The final measurement will be performed with a EMI Receiver set to Quasi Peak detector except for the frequency bands 9 kHz to 90 kHz and 110 kHz to 490 kHz where an average detector will be used according Section 15.209 (d) [2].

On the frequencies, which were detected during the preliminary measurements, the final measurement will be performed while rotating the EUT and the measuring antenna in the range of 0 ° to 360 ° around their vertical axis until the maximum value is found.

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

Frequency range	Resolution bandwidth
9 kHz to 150 kHz	200 Hz
150 kHz to 30 MHz	9 kHz



Final measurement procedure:

The following procedure will be used:
Monitor the frequency range with the measuring antenna at vertical orientation parallel to the EUT at an azimuth of 0 °.
Rotate the EUT by 360 ° to maximize the detected signals and note the azimuth and orientation.
Rotate the measuring antenna to find the maximum and note the value.
Rotate the measuring antenna and repeat steps 1) to 3) until the maximum value is found.
Repeat steps 1) to 4) with the other orthogonal axes of the EUT (if the EUT is a module and might be used in a handheld equipment application).

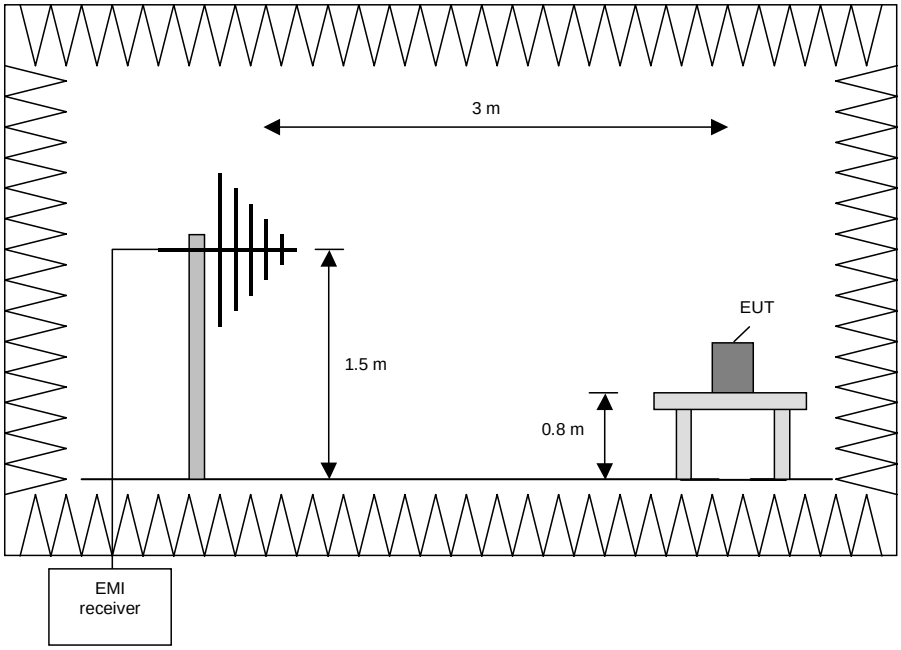
Preliminary measurement (30 MHz to 1 GHz)

In the first stage a preliminary measurement will be performed in a fully anechoic chamber with a measuring distance of 3 meter. Table top devices will set up on a non-conducting turn device on the height of 1.5 m. Floor-standing devices will be placed directly on the turntable/ground plane. The setup of the Equipment under test will be in accordance to [1].

The frequency range 30 MHz to 1 GHz will be measured with an EMI Receiver 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 and while rotating the EUT in its vertical axis in the range of 0 ° to 360 °. This measurement is repeated after raising the EUT in 30 ° steps according 6.6.5.4 in [1].

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

Frequency range	Resolution bandwidth
30 MHz to 230 MHz	100 kHz
230 MHz to 1 GHz	100 kHz



Procedure preliminary measurement:

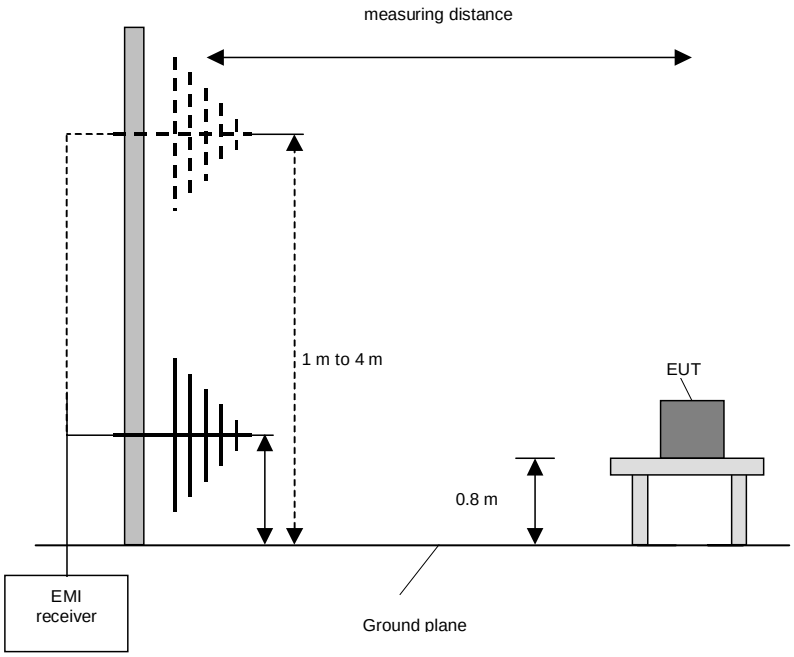
Prescans were performed in the frequency range 30 MHz to 230 MHz and 230 MHz to 1 GHz.
The following procedure will be used:
Monitor the frequency range at horizontal polarisation and a EUT azimuth of 0°.
Manipulate the system cables within the range to produce the maximum level of emission.
Rotate the EUT by 360° to maximize the detected signals.
Repeat 1) to 3) with the vertical polarisation of the measuring antenna.
Make a hardcopy of the spectrum.
Repeat 1) to 5) with the EUT raised by an angle of 30° (60°, 90°, 120° and 150°) according to 6.6.5.4 in [1].
Measure the frequency of the detected emissions with a lower span and resolution bandwidth to increase the accuracy and note the frequency value.

Final measurement (30 MHz to 1 GHz)

A final measurement on an open area test site will be performed on selected frequencies found in the preliminary measurement. During this test the EUT will be rotated in the range of 0° to 360°, the measuring antenna will be set to horizontal and vertical polarisation and raised and lowered in the range from 1 m to 4 m to find the maximum level of emissions.

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

Frequency range	Resolution bandwidth
30 MHz to 1 GHz	120 kHz



Procedure final measurement:

The following procedure will be used:

Measure on the selected frequencies at an antenna height of 1 m and a EUT azimuth of 23°.
Move the antenna from 1 m to 4 m and note the maximum value at each frequency.
Rotate the EUT by 45° and repeat 2) until an azimuth of 337° is reached.
Repeat 1) to 3) for the other orthogonal antenna polarization.
Move the antenna and the turntable to the position where the maximum value is detected.
Measure while moving the antenna slowly +/- 1 m.
Set the antenna to the position where the maximum value is found.
Measure while moving the turntable +/- 45°.
Set the turntable to the azimuth where the maximum value is found.
Measure with Final detector (QP and AV) and note the value.
Repeat 5) to 10) for each frequency.
Repeat 1) to 11) for each orthogonal axes of the EUT (because of EUT is a module and might be used in a handheld equipment application).

Preliminary and final measurement (1 GHz to 40 GHz)

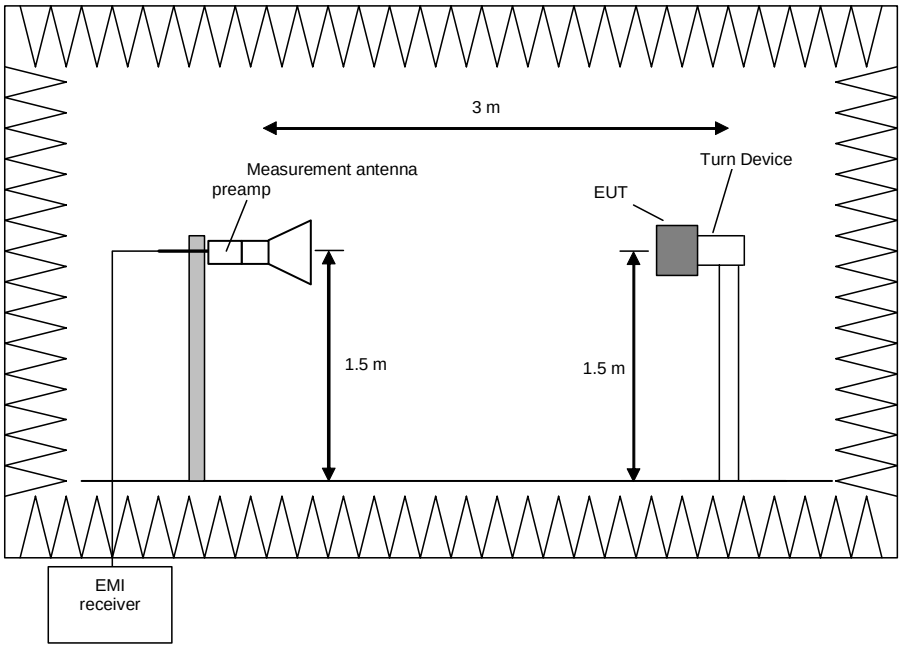
This measurement will be performed in a fully anechoic chamber. Table top devices will set up on a non-conducting turn device on the height of 1.5 m. The set-up of the Equipment under test will be in accordance to [1].

Preliminary measurement (1 GHz to 40 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 and while rotating the EUT in its vertical axis in the range of 0° to 360°. This measurement is repeated after raising the EUT in 30° steps according 6.6.5.4 in [1].

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 25 / 26.5 GHz	100 kHz
26.5 GHz to 40 GHz	100 kHz



Procedure preliminary measurement:

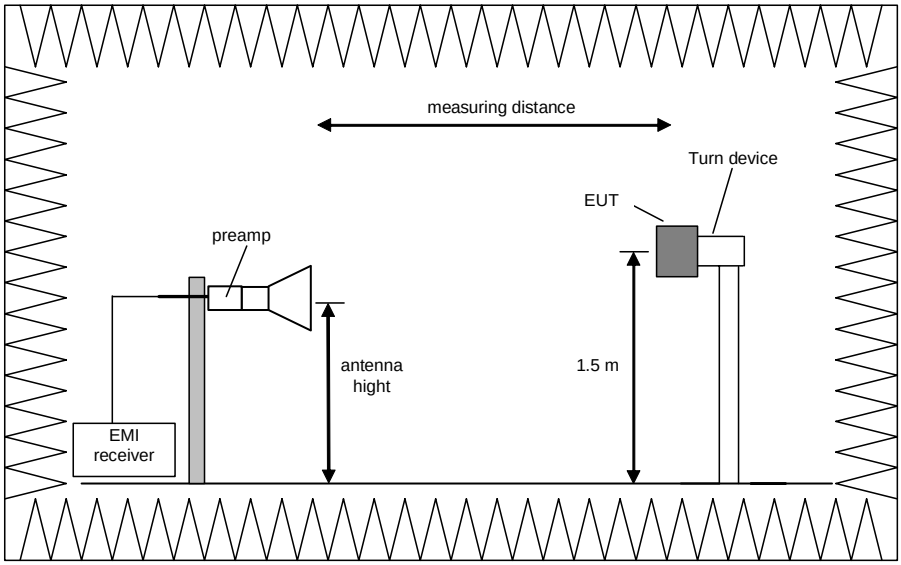
Prescans were performed in the frequency range 1 to 40 GHz.
The following procedure will be used:
Monitor the frequency range at horizontal polarisation and a EUT azimuth of 0 °.
Rotate the EUT by 360° to maximize the detected signals.
Repeat 1) to 2) with the vertical polarisation of the measuring antenna.
Make a hardcopy of the spectrum.
Repeat 1) to 4) with the EUT raised by an angle of 30° (60°, 90°, 120° and 150°) according to 6.6.5.4 in [1].
Measure the frequency of the detected emissions with a lower span and resolution bandwidth to increase the accuracy and note the frequency value.
The measurement antenna polarisation, with the according EUT position (Turntable and Turn device) which produces the highest emission for each frequency will be used for the final measurement. The six closest values to the applicable limit will be used for the final measurement.

Final measurement (1 GHz to 40 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 by rotating the turntable through 0 to 360° in the worst-case EUT orientation which was obtained during the preliminary measurements.

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 25 / 26.5 GHz	1 MHz
26.5 GHz to 40 GHz	1 MHz



Procedure of measurement:

The measurements were performed in the frequency ranges 1 GHz to 4 GHz, 4 GHz to 12 GHz, 12 GHz to 18 GHz, 18 GHz to 25 /26.5 GHz and 26.5 GHz to 40 GHz.
The following procedure will be used:
Set the turntable and the turn device to obtain the worst-case emission for the first frequency identified in the preliminary measurements.
Set the measurement antenna polarisation to the orientation with the highest emission for the first frequency identified in the preliminary measurements.
Set the spectrum analyser to EMI mode with peak and average detector activated.
Rotate the turntable from 0° to 360° to find the EUT angle that produces the highest emissions.
Note the highest displayed peak and average values
Repeat the steps 1) to 5) for each frequency detected during the preliminary measurements.

5.4.2 Results preliminary measurement 9 kHz to 30 MHz

Ambient temperature:	20 °C	Relative humidity:	45 %

Position of EUT: The EUT was set-up on a wooden table of a height of 0.8 m.

Cable guide: The cable of the EUT was fixed on the wooden table. For further information of the cable guide refer to the pictures in annex A of this test report.

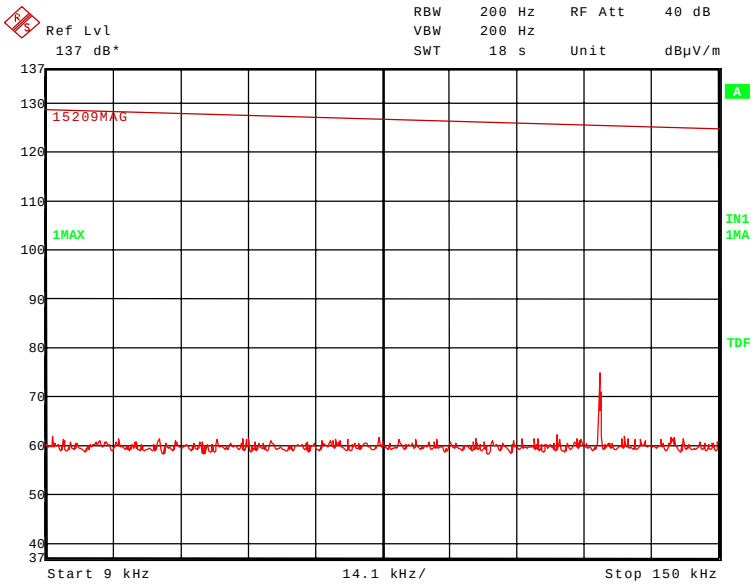
Test record: The test was carried out in normal operation mode of the EUT.
All results are shown in the following.

Power supply: During this test the EUT was powered with 12 V_{DC}.

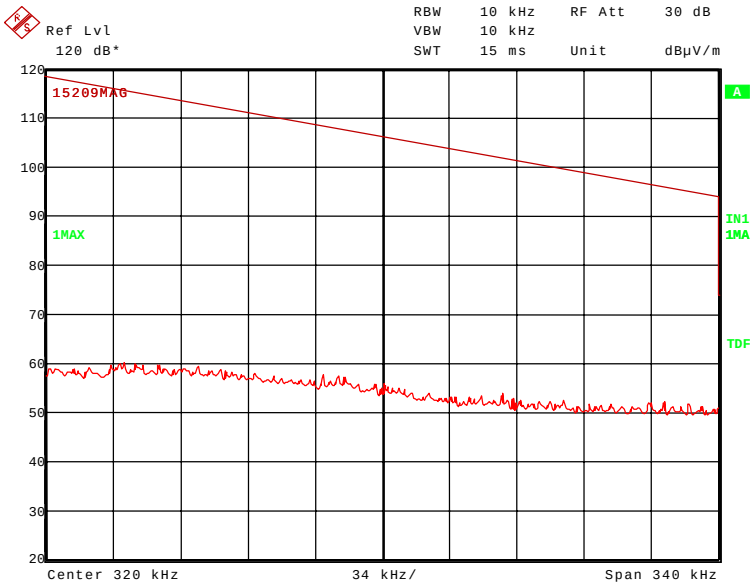
Frequency range: According to [2] from 9 kHz to 30 MHz.

Connection option 1: Antenna 04208300 at connector ST1

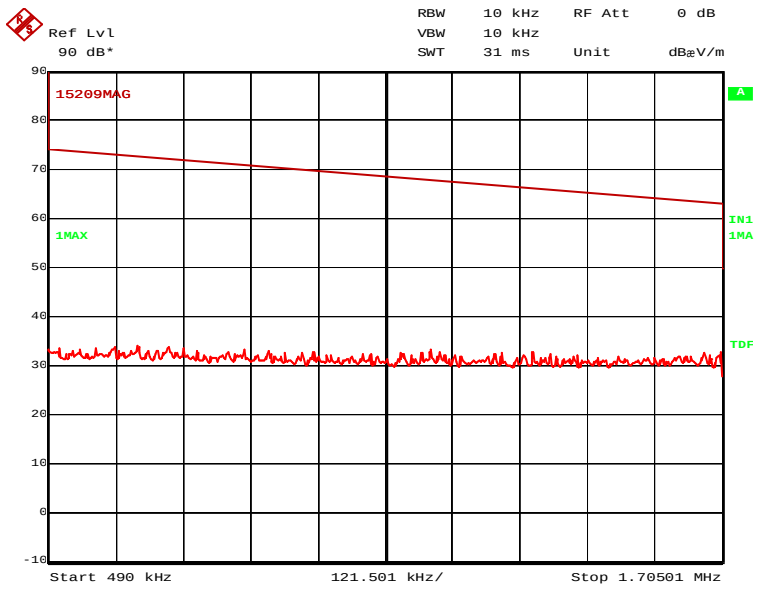
153615_1a4.wmf: Spurious emissions from 9 kHz to 150 kHz



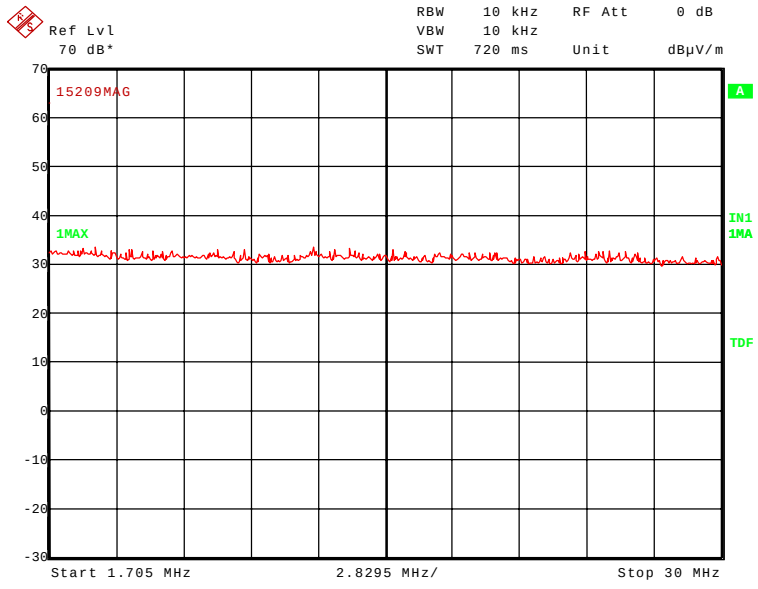
153615_1b3.wmf: Spurious emissions from 150 kHz to 490 kHz



153615_1c2.wmf: Spurious emissions from 490 kHz to 1.705 MHz

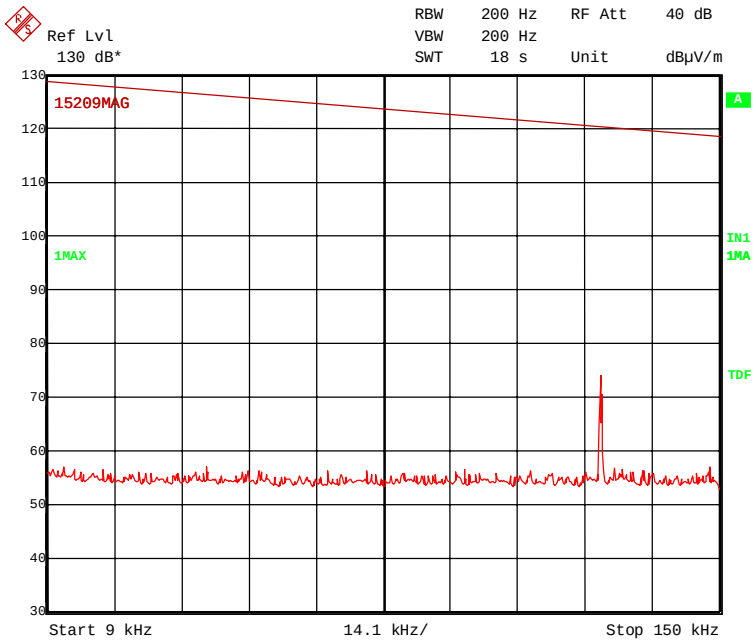


153615_1d1.wmf: Spurious emissions from 1.705 MHz to 30 MHz

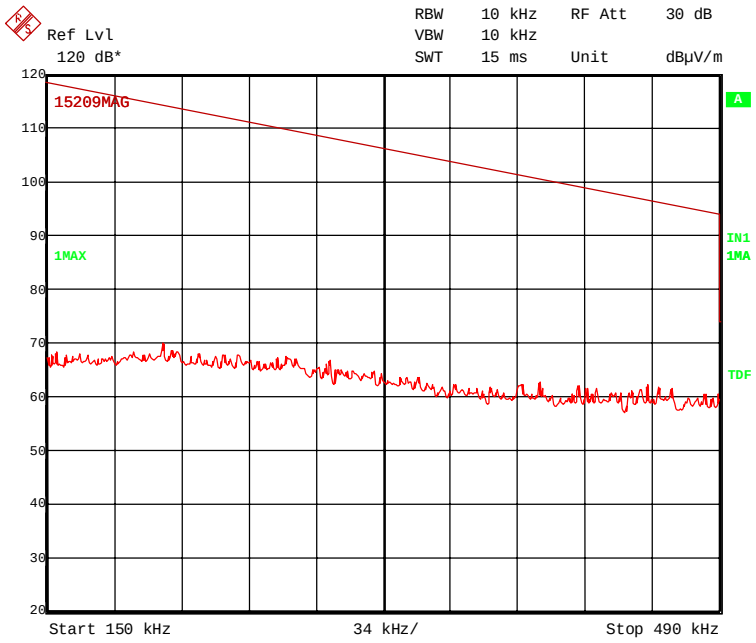


Connection option 2: Antenna 04236520 at connector ST1

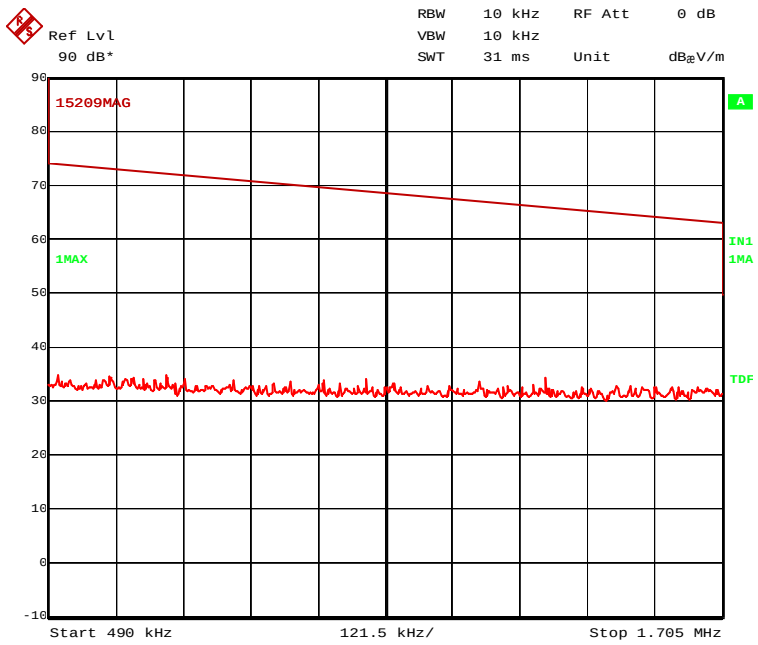
153615_2a.wmf: Spurious emissions from 9 kHz to 150 kHz



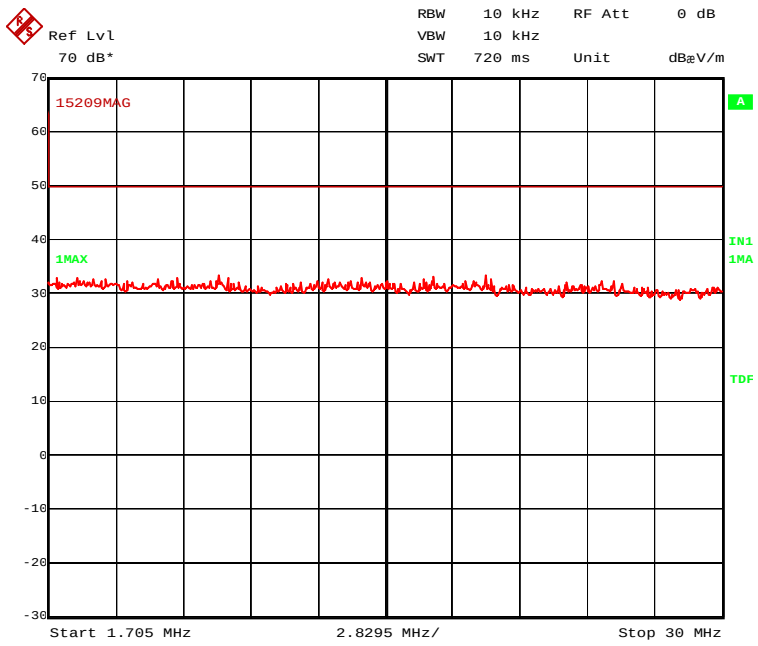
153615_2b.wmf: Spurious emissions from 150 kHz to 490 kHz



153615_2c.wmf: Spurious emissions from 490 kHz to 1.705 MHz

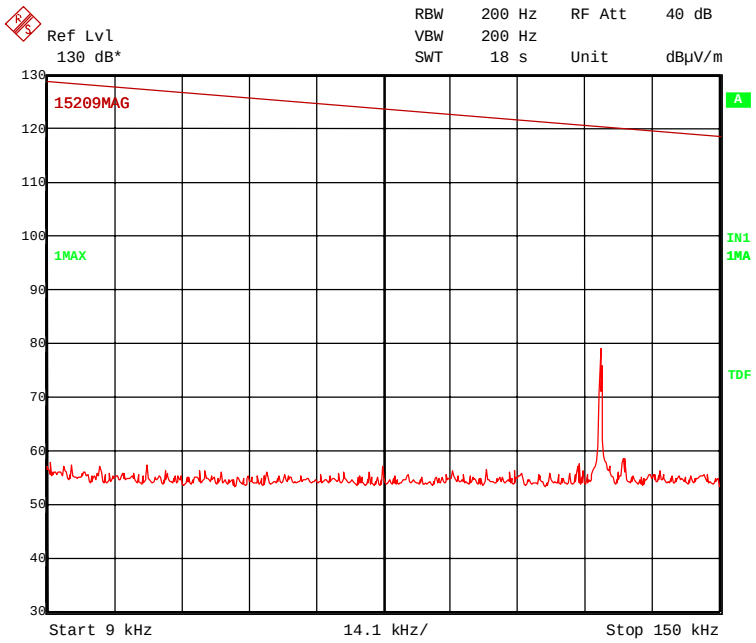


153615_2d.wmf: Spurious emissions from 1.705 MHz to 30 MHz

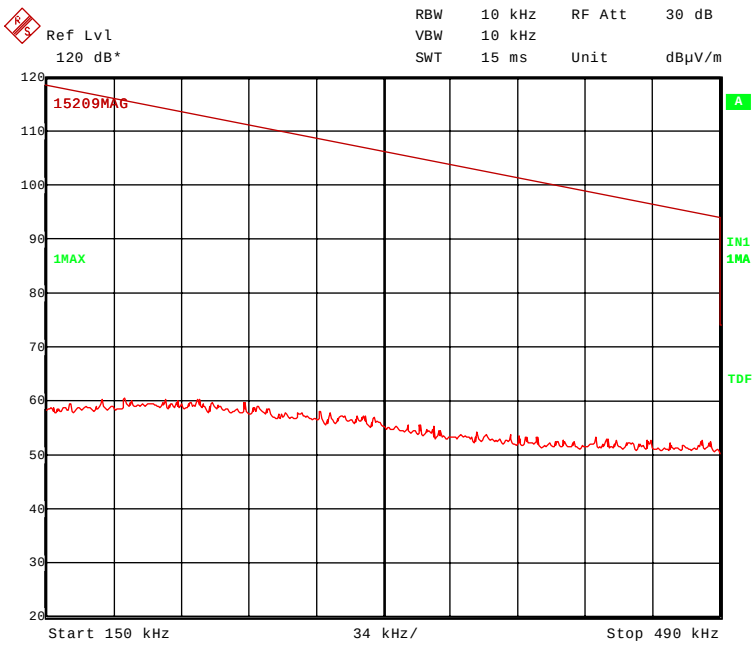


Connection option 3: Antenna 04344830 at connector ST1

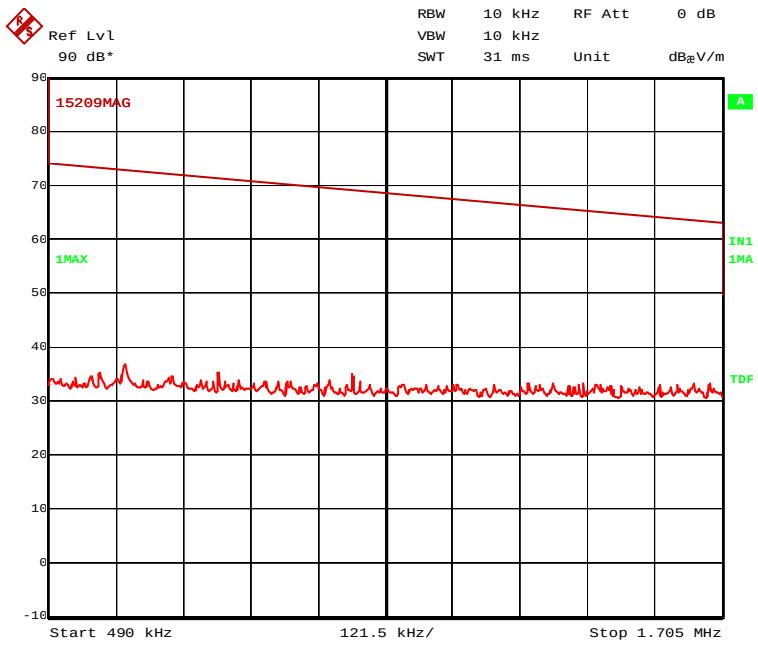
153615_3a.wmf: Spurious emissions from 9 kHz to 150 kHz



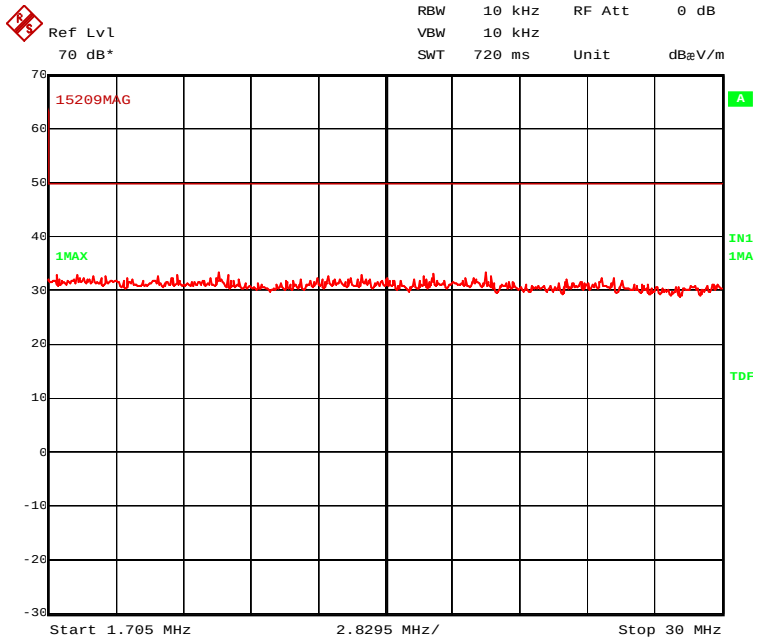
153615_3b.wmf: Spurious emissions from 150 kHz to 490 kHz



153615_3c.wmf: Spurious emissions from 490 kHz to 1.705 MHz

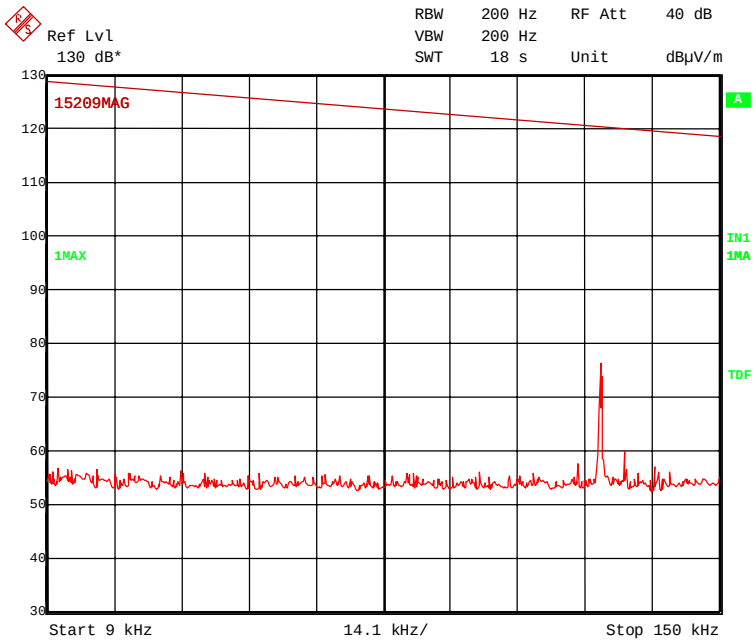


153615_3d.wmf: Spurious emissions from 1.705 MHz to 30 MHz

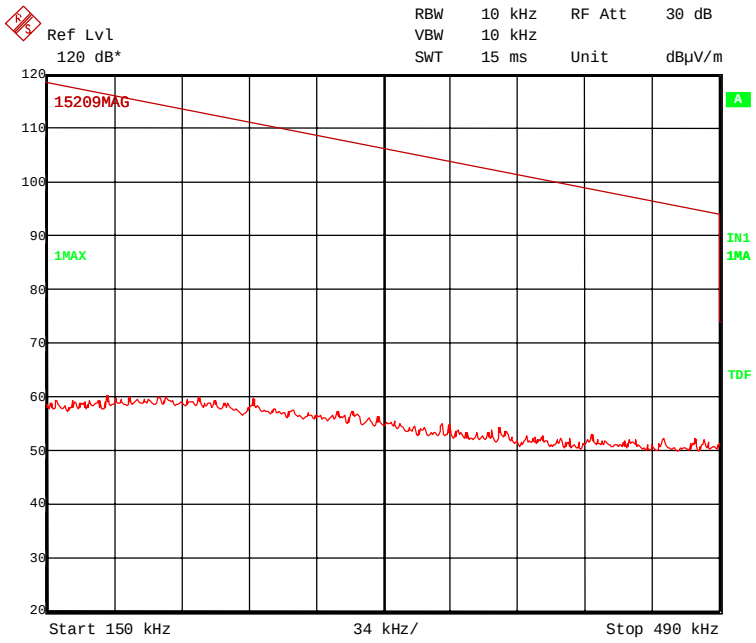


Connection option 4: Antenna 04378230 at connector ST1

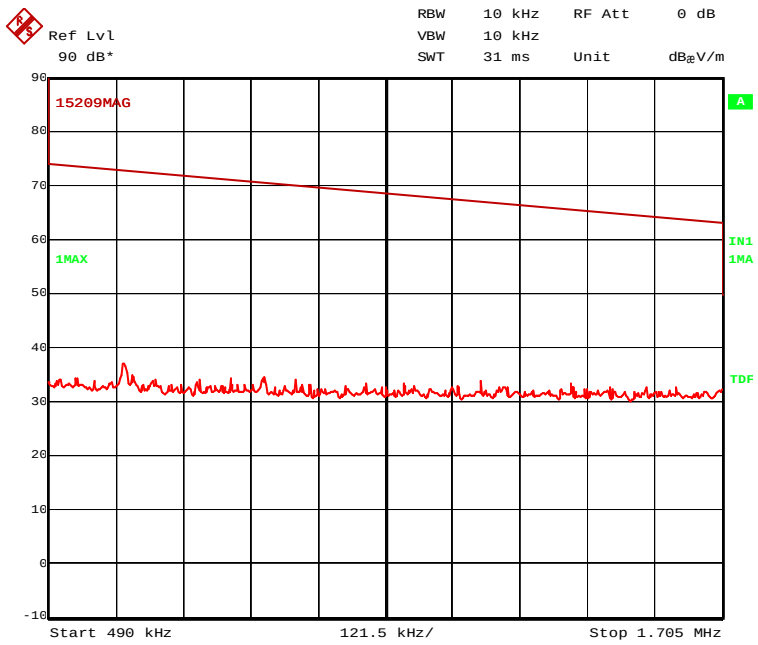
153615_4a.wmf: Spurious emissions from 9 kHz to 150 kHz



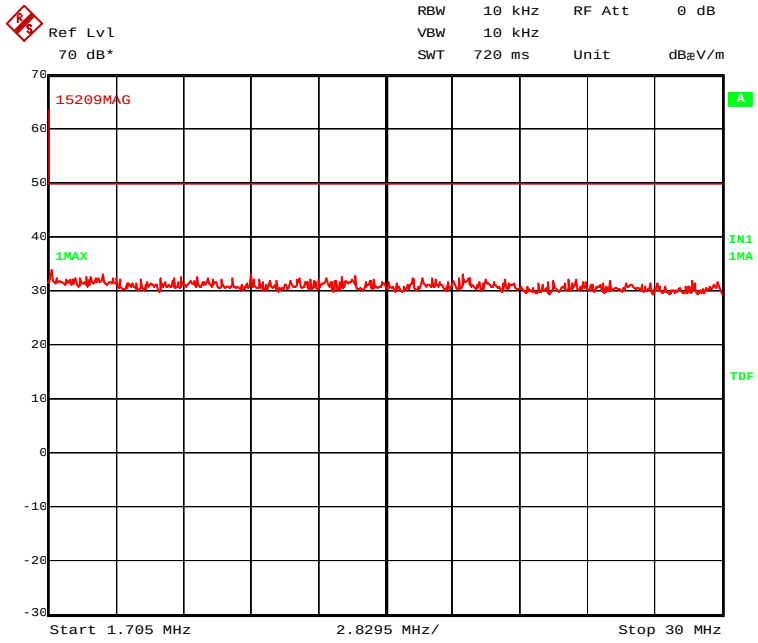
153615_4b.wmf: Spurious emissions from 150 kHz to 490 kHz



153615_4c.wmf: Spurious emissions from 490 kHz to 1.705 MHz

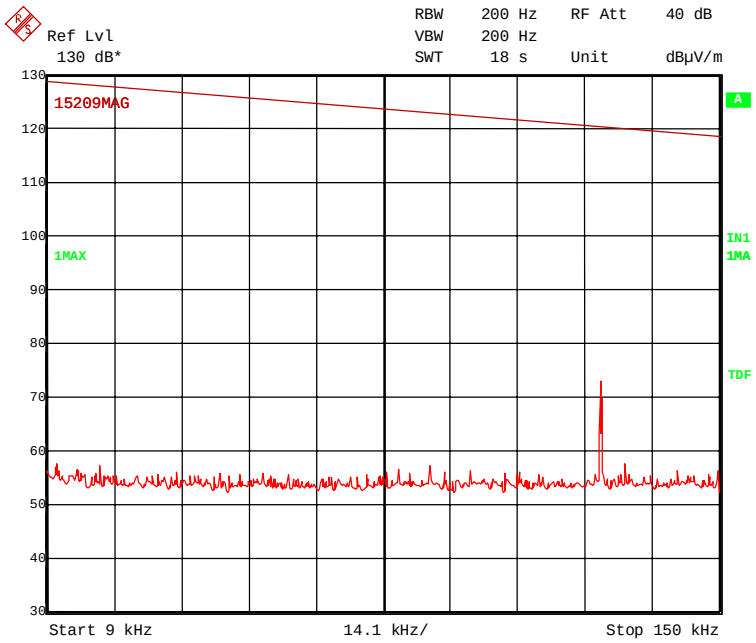


153615_4d.wmf: Spurious emissions from 1.705 MHz to 30 MHz

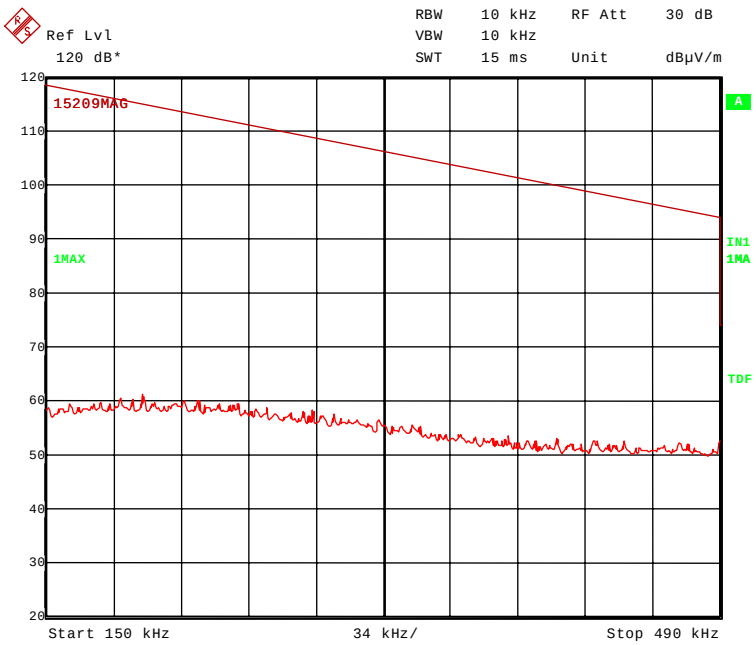


Connection option 5: Antenna 04236520 at connector ST1 and antenna 04184530 at connector ST2

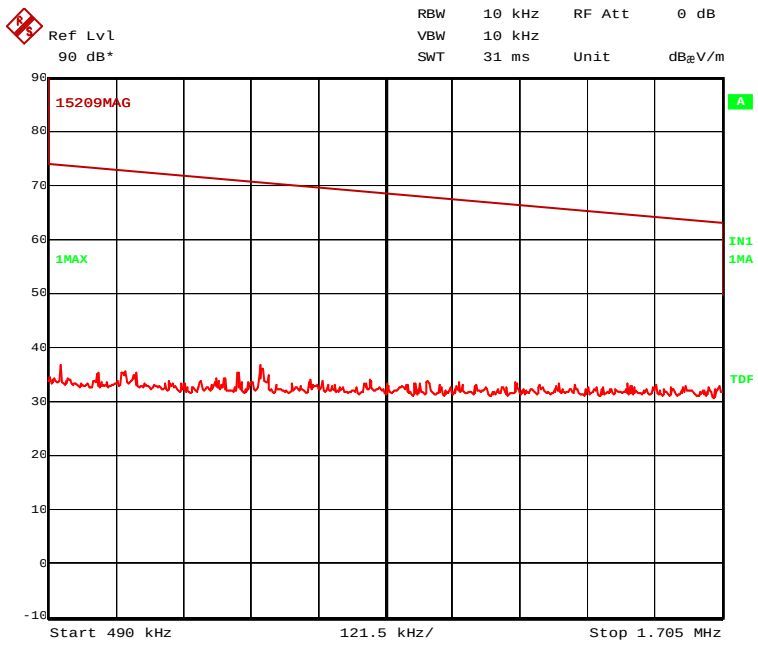
153615_5a.wmf: Spurious emissions from 9 kHz to 150 kHz



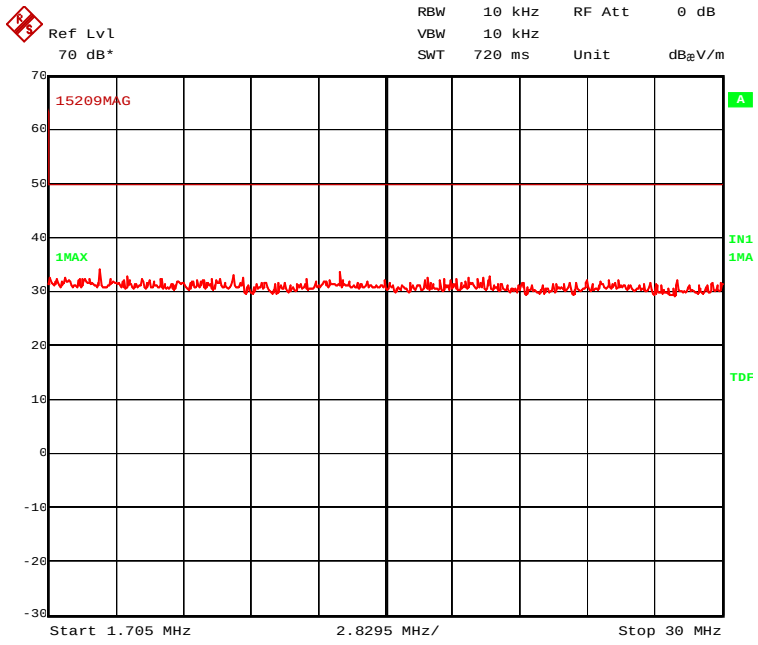
153615_5b.wmf: Spurious emissions from 150 kHz to 490 kHz



153615_5c.wmf: Spurious emissions from 490 kHz to 1.705 MHz

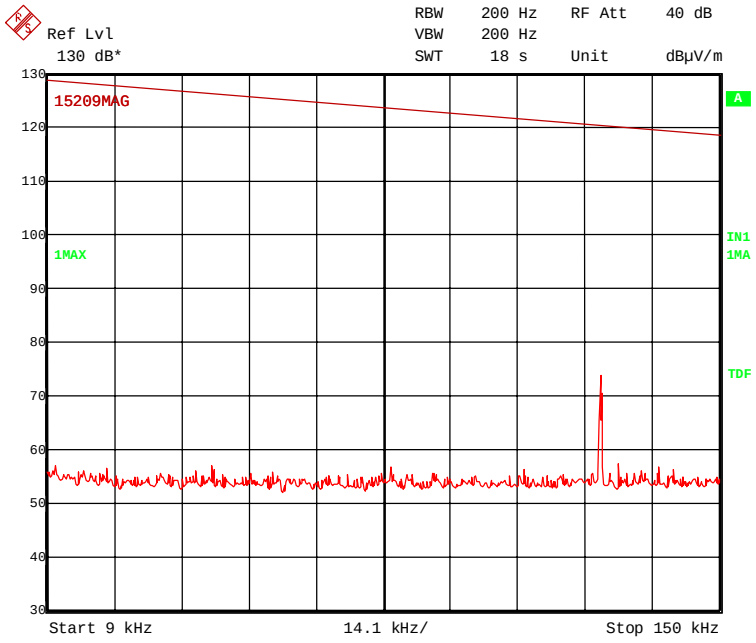


153615_5d.wmf: Spurious emissions from 1.705 MHz to 30 MHz

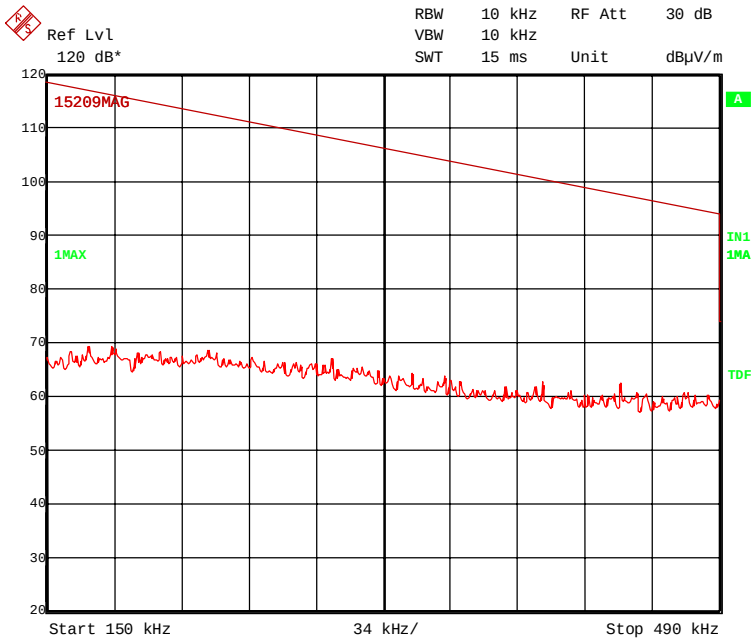


Connection option 6: Antenna 04208300 at connector ST1 and 2 antennas 04185320 parellel at connector ST2

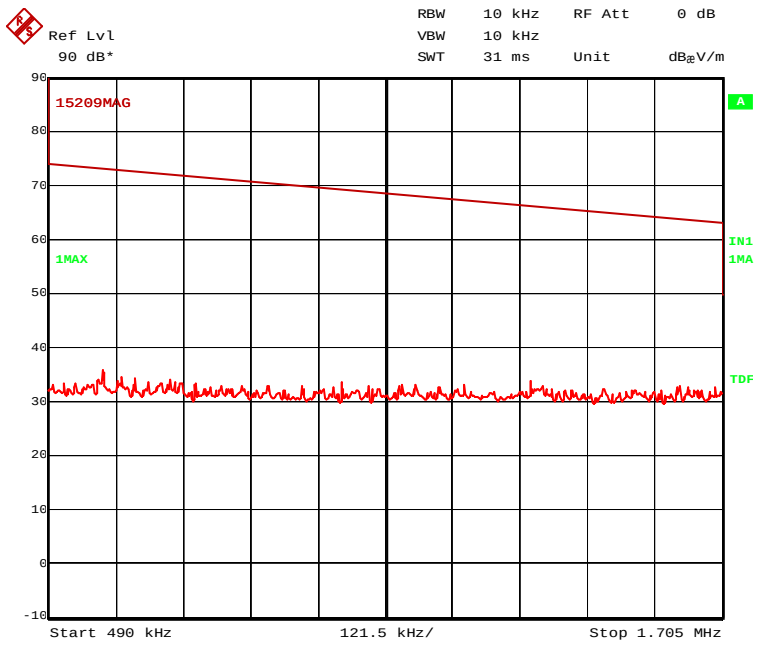
153615_6a.wmf: Spurious emissions from 9 kHz to 150 kHz



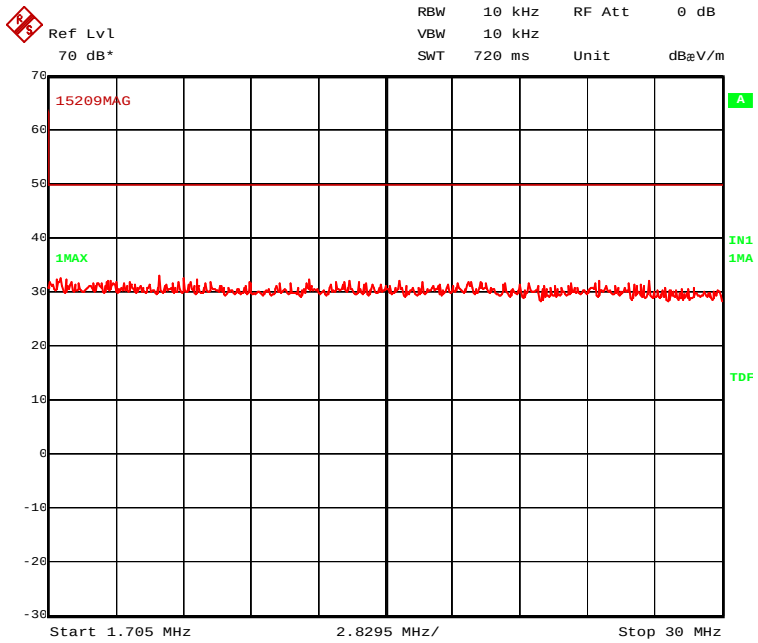
153615_6b.wmf: Spurious emissions from 150 kHz to 490 kHz



153615_6c.wmf: Spurious emissions from 490 kHz to 1.705 MHz

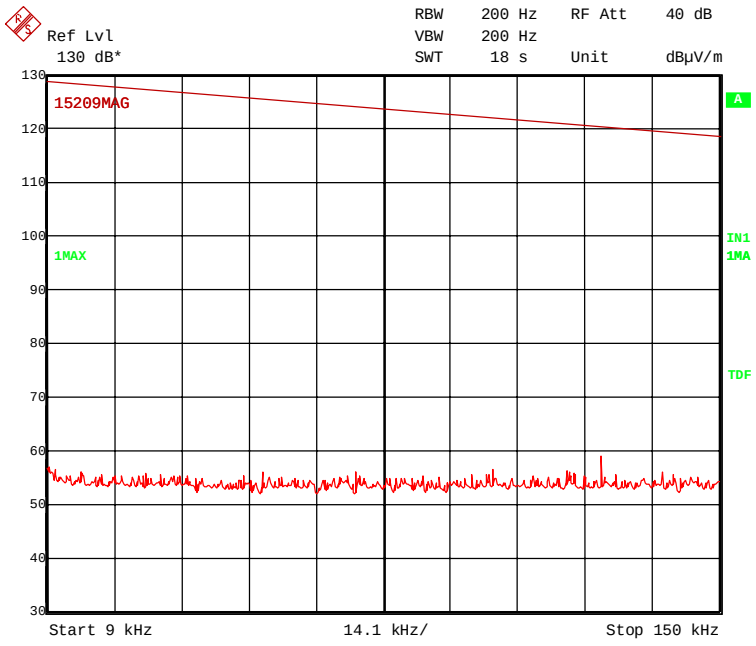


153615_6d.wmf: Spurious emissions from 1.705 MHz to 30 MHz

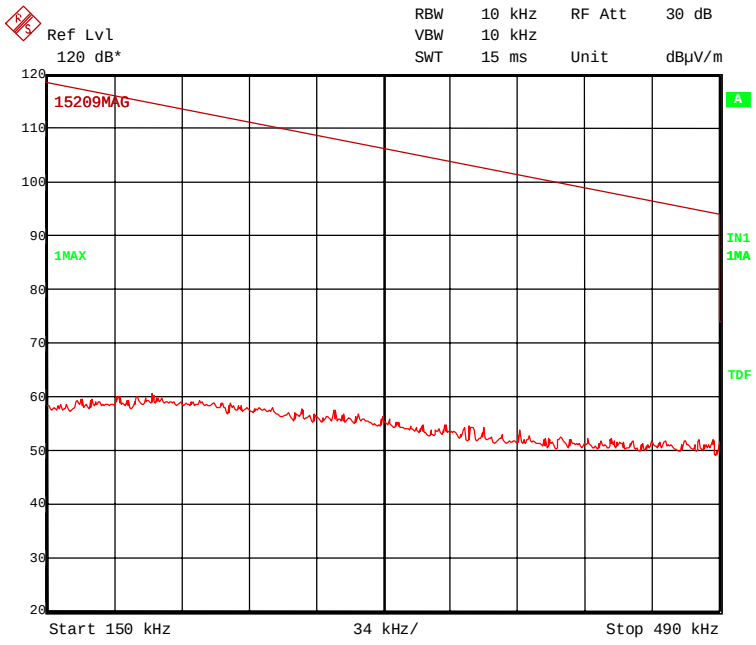


Connection option 7: 2 antennas 04317010 at connector ST1 parallel

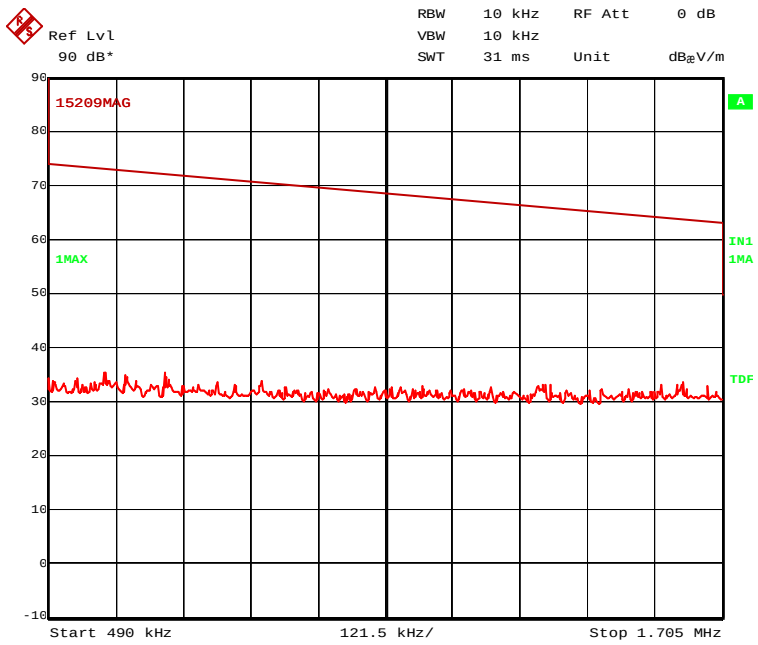
153615_7a.wmf: Spurious emissions from 9 kHz to 150 kHz



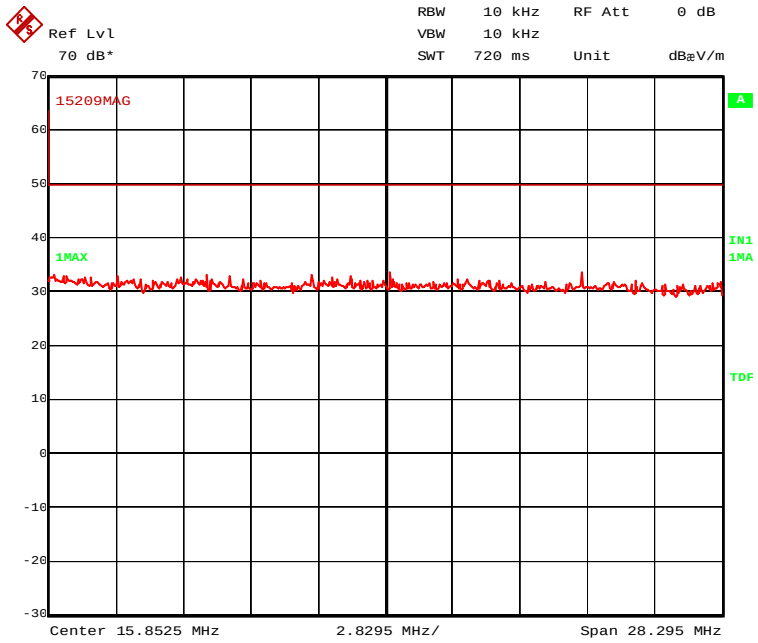
153615_7b.wmf: Spurious emissions from 150 kHz to 490 kHz



153615_7c.wmf: Spurious emissions from 490 kHz to 1.705 MHz



153615_7d.wmf: Spurious emissions from 1.705 MHz to 30 MHz



For preliminary measurement scenarios the same transmitter was used. Therefore the emitted frequency is the same for each measurement but with different levels depending on the used antenna setup. The wanted signal was found at 124.95 kHz. No other emissions in the range from 9 kHz to 30 MHz were found during the preliminary measurement. The wanted emission had to be measured in a final measurement on the outdoor test site for each connection option. The results are shown in chapter 5.4.5.

Test equipment (refer chapter 6):

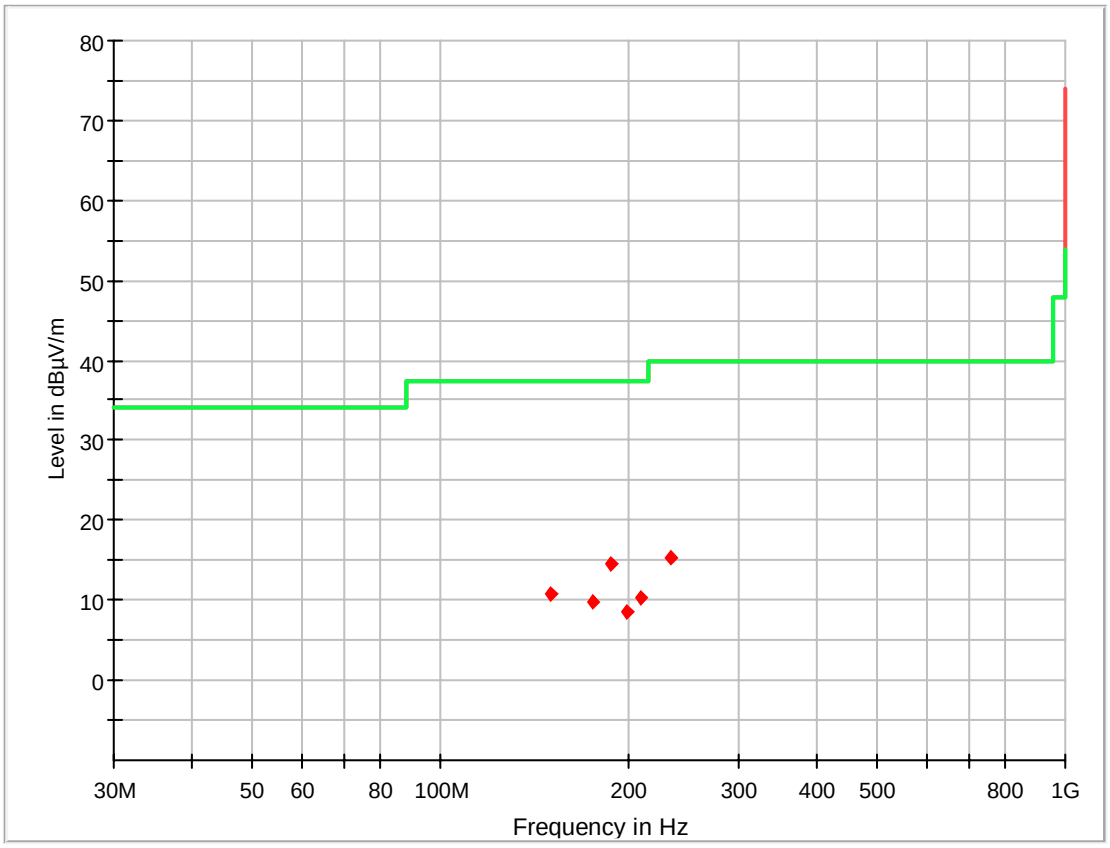
14 -17, 21

5.4.3 Results preliminary measurement 30 MHz to 1 GHz

Ambient temperature	22 °C	Relative humidity	36 %

Test Description:	Radiated emission measurement according to CFR47 Part 15.209
EUT:	PitBase TWN4 RFID module
Manufacturer:	Scheidt & Bachmann GmbH
Operating Conditions:	Continuous transmission
Test Site:	PhoenixTESTLAB GmbH, anechoic chamber M20
Operator Name:	M. Bastert
Comment:	AC adapter supplied with 120 V_{AC} / 60 Hz

Connection option 1

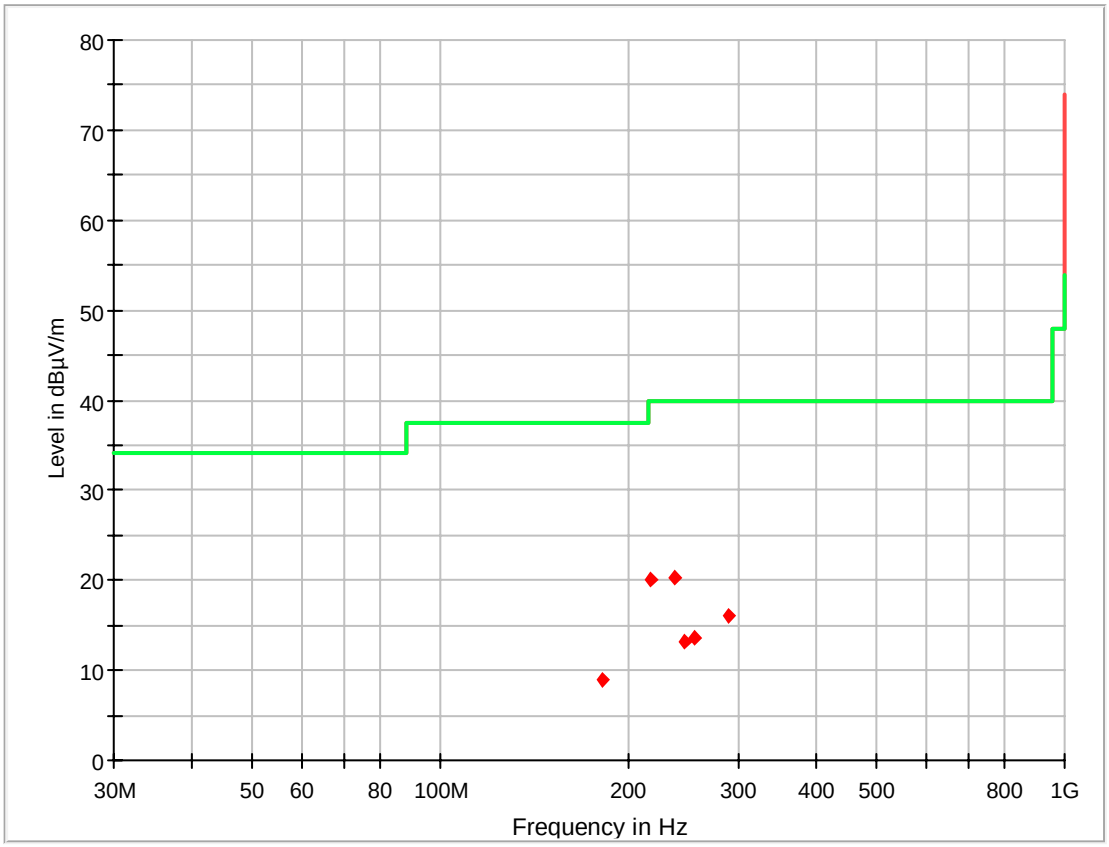


The following frequencies were found during the preliminary emission measurement:

Inside restricted bands: 149.976 MHz.
Outside restricted bands: 174.612 MHz, 186.66 MHz, 198.804 MHz, 209.184 MHz and 233.352 MHz.

These frequencies have to be measured on the open area test side. Please refer to 5.4.5 for final measurements.

Connection option 2

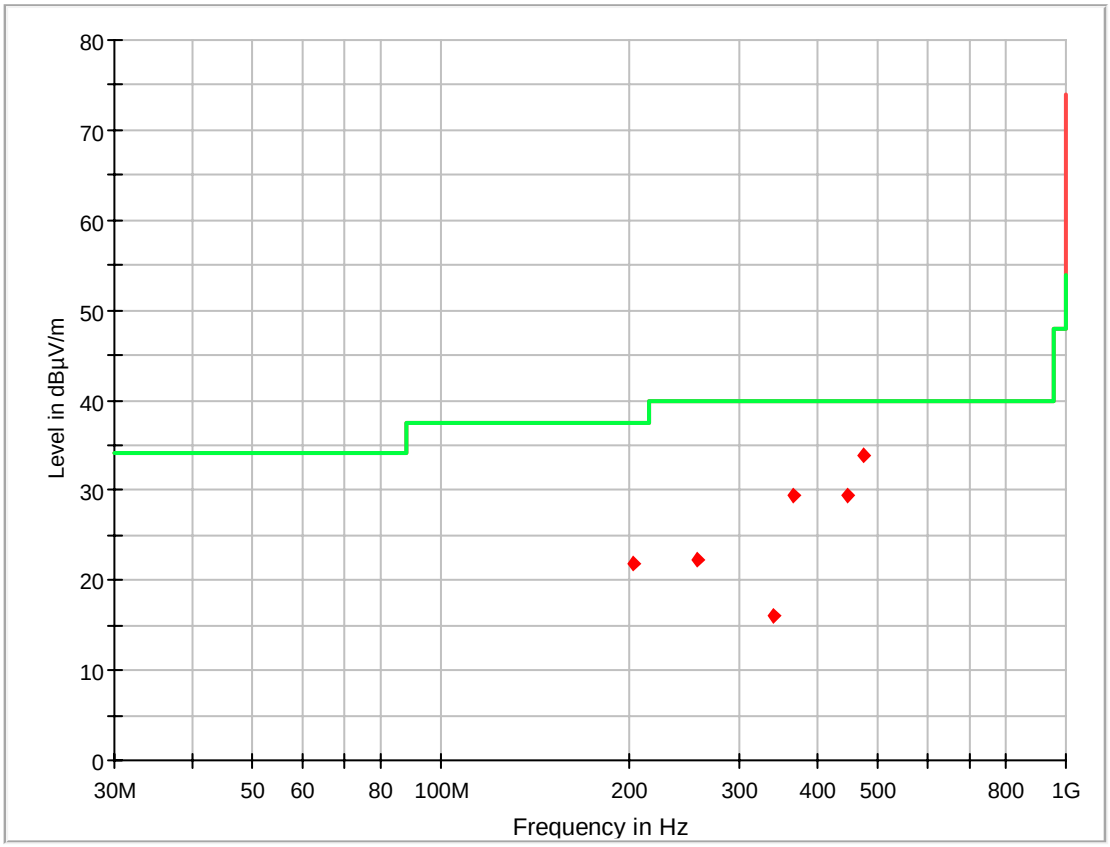


The following frequencies were found during the preliminary emission measurement:

Inside restricted bands: 245.7MHz and 255.276 MHz.
Outside restricted bands: 182.088 MHz, 217.404 MHz, 236.232 MHz, and 289.344 MHz.

These frequencies have to be measured on the open area test side. Please refer to 5.4.5 for final measurements.

Connection option 3

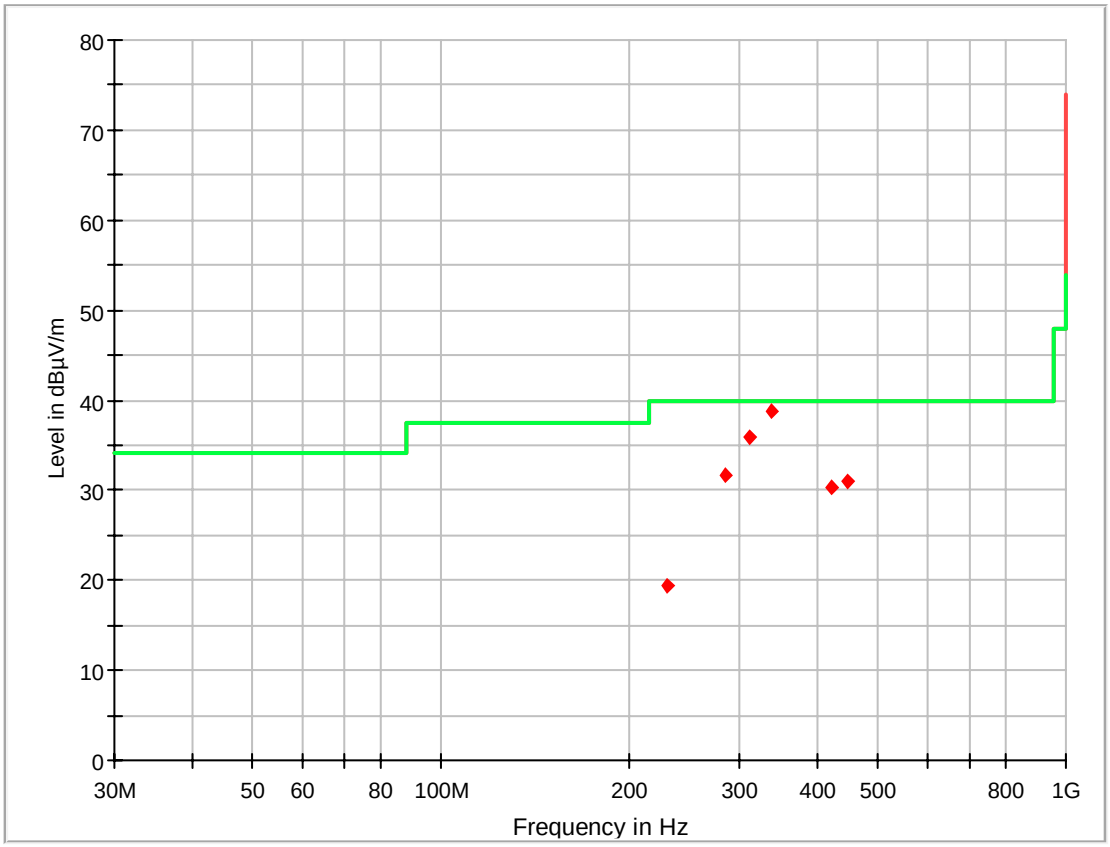


The following frequencies were found during the preliminary emission measurement:

Inside restricted bands: 257.53 MHz.
Outside restricted bands: 203.41 MHz, 339.13 MHz, 366.16 MHz, 447.53 MHz and 474.61 MHz.

These frequencies have to be measured on the open area test side. Please refer to 5.4.5 for final measurements.

Connection option 4

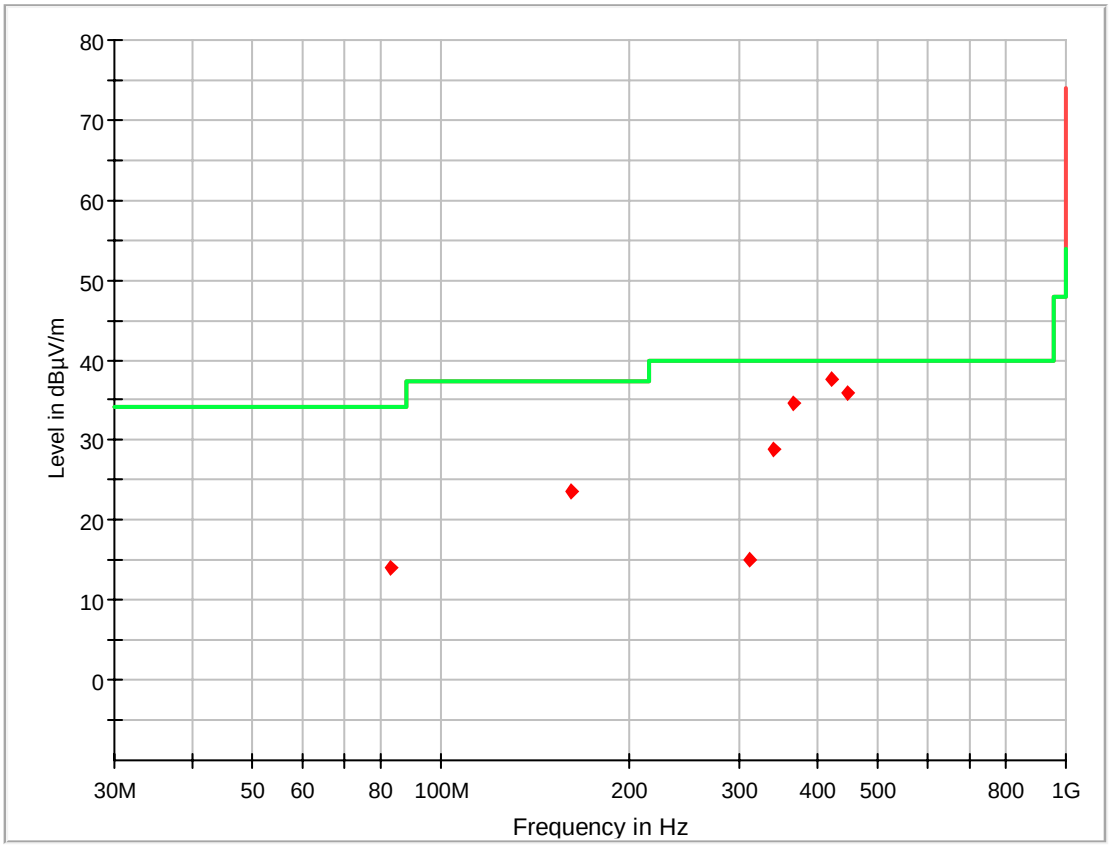


The following frequencies were found during the preliminary emission measurement:

Inside restricted bands: 284.748 MHz.
Outside restricted bands: 230.496 MHz, 311.88 MHz, 338.988 MHz, 420.336 MHz and 447.504 MHz.

These frequencies have to be measured on the open area test side. Please refer to 5.4.5 for final measurements.

Connection option 5

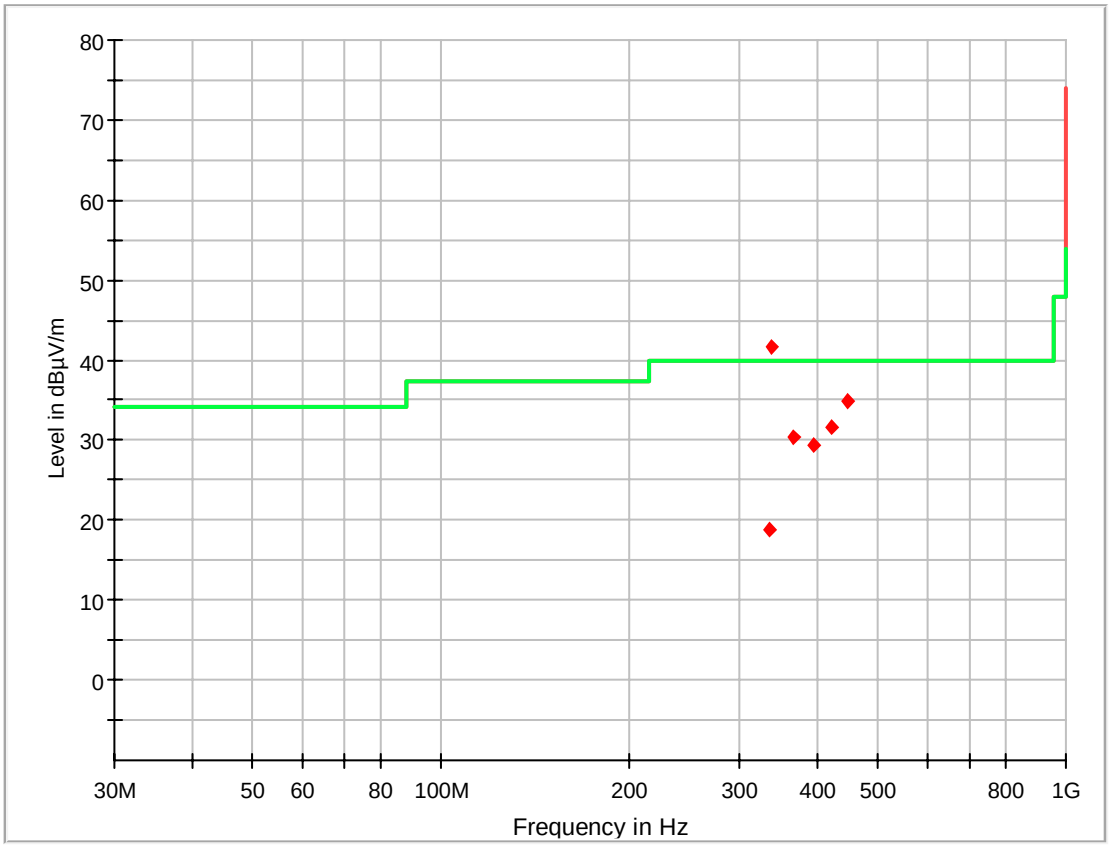


The following frequencies were found during the preliminary emission measurement:

Inside restricted bands: None.
Outside restricted bands: 82.944 MHz, 161.232 MHz, 311.772 MHz, 339.096 MHz 366.18 MHz, 420.408 MHz and 447.504 MHz.

These frequencies have to be measured on the open area test side. Please refer to 5.4.5 for final measurements.

Connection option 6

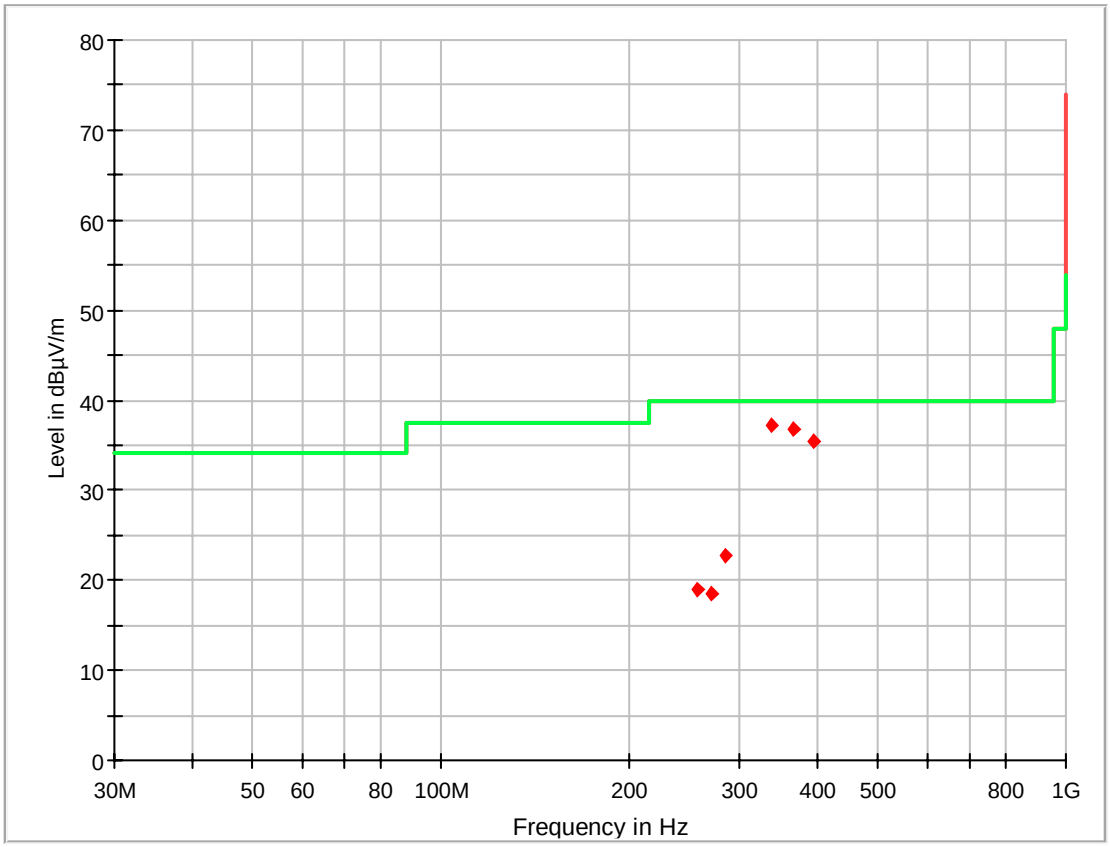


The following frequencies were found during the preliminary emission measurement:

Inside restricted bands: None.
Outside restricted bands: 336.3 MHz, 339.0 MHz, 366.12 MHz, 393.24 MHz, 420.36 MHz and 447.48 MHz.

These frequencies have to be measured on the open area test side. Please refer to 5.4.5 for final measurements.

Connection option 7



The following frequencies were found during the preliminary emission measurement:

Inside restricted bands: 257.748 MHz, 271.428 MHz and 284.856 MHz.
Outside restricted bands: 339.048 MHz, 366.168 MHz and 393.264 MHz.

These frequencies have to be measured on the open area test side. Please refer to 5.4.5 for final measurements.

Test equipment (refer chapter 6):

14 – 20, 22 - 24

5.4.4 Result final measurement from 9 kHz to 30 MHz

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 10 m.
Cable guide:	The cable of the EUT was fixed on the non-conducting table. For further information of the cable guide refer to the pictures in annex A of this test report.
Test record:	The tests were carried out in test mode. All results are shown in the following.
Power supply:	During this test the EUT was powered with 12 V_{DC}.
Test results:	The test results were calculated with the following formula:
	Result [dBµV/m] = reading [dBµV] + antenna factor [dB/m]

Connection option 1

Results with measuring distance of 10 m						
Frequency kHz	Result dBµV/m	Limit [2] dBµV/m	Margin dB	Detector	Readings dBµV	Antenna factor [1] dB/m
125.95	52.5	85.7	33.2	AV	52.5	20.0
Results with measuring distance of 30 m (calculated)						
Frequency kHz	Result dBµV/m	Limit [2] dBµV/m	Margin dB	Detector	Readings dBµV	Antenna factor [1] dB/m
125.95	32.5 [3]	65.7	33.2	AV	-	20.0
Signal was below the noise floor of the measuring system at 30 m distance						
Measurement uncertainty: +2.2 dB / -3.6 dB						

[1]: Cable loss included
[2]: Limits according to 15.209 and [3]
[3]: Level extrapolated with a factor (40 dB/decade) from the result at 10 m according to Part 15.31 (f)(2) and [3]

Connection option 2

Results with measuring distance of 10 m						
Frequency kHz	Result dBµV/m	Limit [2] dBµV/m	Margin dB	Detector	Readings dBµV	Antenna factor [1] dB/m
125.95	52.6	85.7	33.1	AV	52.6	20.0
Results with measuring distance of 30 m (calculated)						
Frequency kHz	Result dBµV/m	Limit [2] dBµV/m	Margin dB	Detector	Readings dBµV	Antenna factor [1] dB/m
125.95	32.6 [3]	65.7	33.1	AV	-	20.0
Signal was below the noise floor of the measuring system at 30 m distance						
Measurement uncertainty: +2.2 dB / -3.6 dB						

[1]: Cable loss included
[2]: Limits according to 15.209 and [3]
[3]: Level extrapolated with a factor (40 dB/decade) from the result at 10 m according to Part 15.31 (f)(2) and [3]

Connection option 3

Results with measuring distance of 10 m						
Frequency kHz	Result dBµV/m	Limit [2] dBµV/m	Margin dB	Detector	Readings dBµV	Antenna factor [1] dB/m
125.95	56.7	85.7	29.0	AV	56.7	20.0
Results with measuring distance of 30 m (calculated)						
Frequency kHz	Result dBµV/m	Limit [2] dBµV/m	Margin dB	Detector	Readings dBµV	Antenna factor [1] dB/m
125.95	36.7 [3]	65.7	29.0	AV	-	20.0
Signal was below the noise floor of the measuring system at 30 m distance						
Measurement uncertainty: +2.2 dB / -3.6 dB						

[1]: Cable loss included
[2]: Limits according to 15.209 and [3]
[3]: Level extrapolated with a factor (40 dB/decade) from the result at 10 m according to Part 15.31 (f)(2) and [3]

Connection option 4

Results with measuring distance of 10 m						
Frequency kHz	Result dBµV/m	Limit [2] dBµV/m	Margin dB	Detector	Readings dBµV	Antenna factor [1] dB/m
125.95	57.6	85.7	28.1	AV	57.6	20.0
Results with measuring distance of 30 m (calculated)						
Frequency kHz	Result dBµV/m	Limit [2] dBµV/m	Margin dB	Detector	Readings dBµV	Antenna factor [1] dB/m
125.95	37.6 [3]	65.7	28.1	AV	-	20.0
Signal was below the noise floor of the measuring system at 30 m distance						
Measurement uncertainty: +2.2 dB / -3.6 dB						

[1]: Cable loss included
[2]: Limits according to 15.209 and [3]
[3]: Level extrapolated with a factor (40 dB/decade) from the result at 10 m according to Part 15.31 (f)(2) and [3]

Connection option 5

Results with measuring distance of 10 m						
Frequency kHz	Result dBµV/m	Limit [2] dBµV/m	Margin dB	Detector	Readings dBµV	Antenna factor [1] dB/m
125.95	51.7	85.7	34.0	AV	51.7	20.0
Results with measuring distance of 30 m (calculated)						
Frequency kHz	Result dBµV/m	Limit [2] dBµV/m	Margin dB	Detector	Readings dBµV	Antenna factor [1] dB/m
125.95	31.7 [3]	65.7	34.0	AV	-	20.0
Signal was below the noise floor of the measuring system at 30 m distance						
Measurement uncertainty: +2.2 dB / -3.6 dB						

[1]: Cable loss included
[2]: Limits according to 15.209 and [3]
[3]: Level extrapolated with a factor (40 dB/decade) from the result at 10 m according to Part 15.31 (f)(2) and [3]

Connection option 6

Results with measuring distance of 10 m						
Frequency kHz	Result dBµV/m	Limit [2] dBµV/m	Margin dB	Detector	Readings dBµV	Antenna factor [1] dB/m
125.95	52.4	85.7	33.3	AV	52.4	20.0
Results with measuring distance of 30 m (calculated)						
Frequency kHz	Result dBµV/m	Limit [2] dBµV/m	Margin dB	Detector	Readings dBµV	Antenna factor [1] dB/m
125.95	32.4 [3]	65.7	33.3	AV	-	20.0
Signal was below the noise floor of the measuring system at 30 m distance						
Measurement uncertainty: +2.2 dB / -3.6 dB						

[1]: Cable loss included
[2]: Limits according to 15.209 and [3]
[3]: Level extrapolated with a factor (40 dB/decade) from the result at 10 m according to Part 15.31 (f)(2) and [3]

Connection option 7

Results with measuring distance of 10 m						
Frequency kHz	Result dBµV/m	Limit [2)] dBµV/m	Margin dB	Detector	Readings dBµV	Antenna factor [1)] dB/m
125.95	59.3	85.7	26.4	AV	59.3	20.0
Results with measuring distance of 30 m (calculated)						
Frequency kHz	Result dBµV/m	Limit [2)] dBµV/m	Margin dB	Detector	Readings dBµV	Antenna factor [1)] dB/m
125.95	39.3 [3)]	65.7	26.4	AV	-	20.0
Signal was below the noise floor of the measuring system at 30 m distance						
Measurement uncertainty: +2.2 dB / -3.6 dB						

[1)]: Cable loss included
[2)]: Limits according to 15.209 and [3]
[3)]: Level extrapolated with a factor (40 dB/decade) from the result at 10 m according to Part 15.31 (f)(2) and [3]

Test result: Passed.

Test equipment (refer chapter 6):

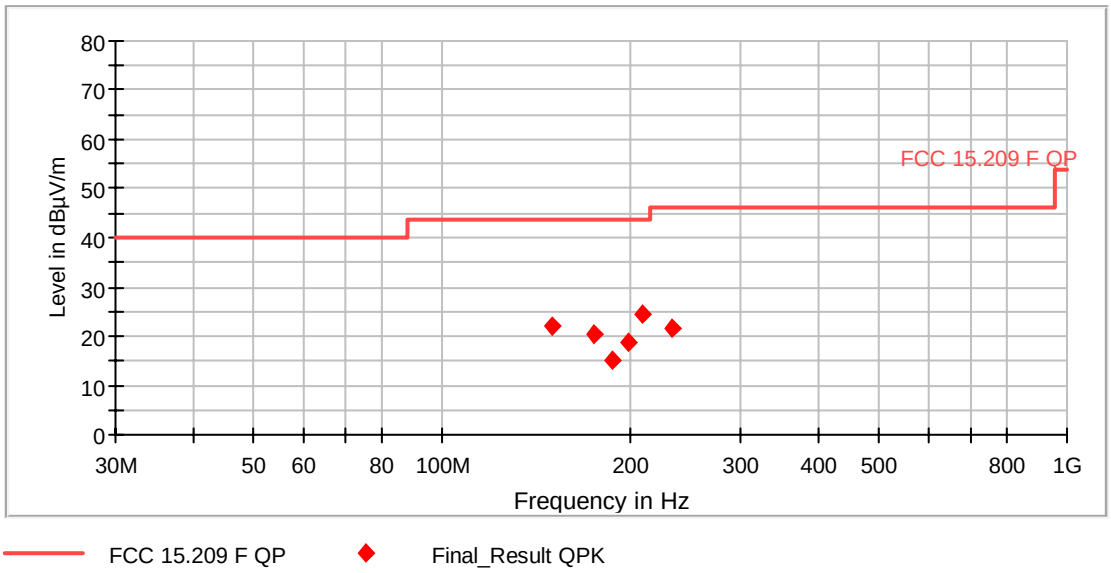
28, 29

5.4.5 Result final measurement from 30 MHz to 1 GHz

Ambient temperature	20 °C	Relative humidity	35 %

Test description:	Radiated emission measurement
EUT:	PITBASE TWN4
Manufacturer:	Scheidt & Bachmann GmbH
Operating conditions:	Continuous TX
Test site:	Phoenix TESTLAB GmbH, OATS M6
Operator:	M. Bastert
Comment:	Supplied with 120 V_{AC} / 60 Hz

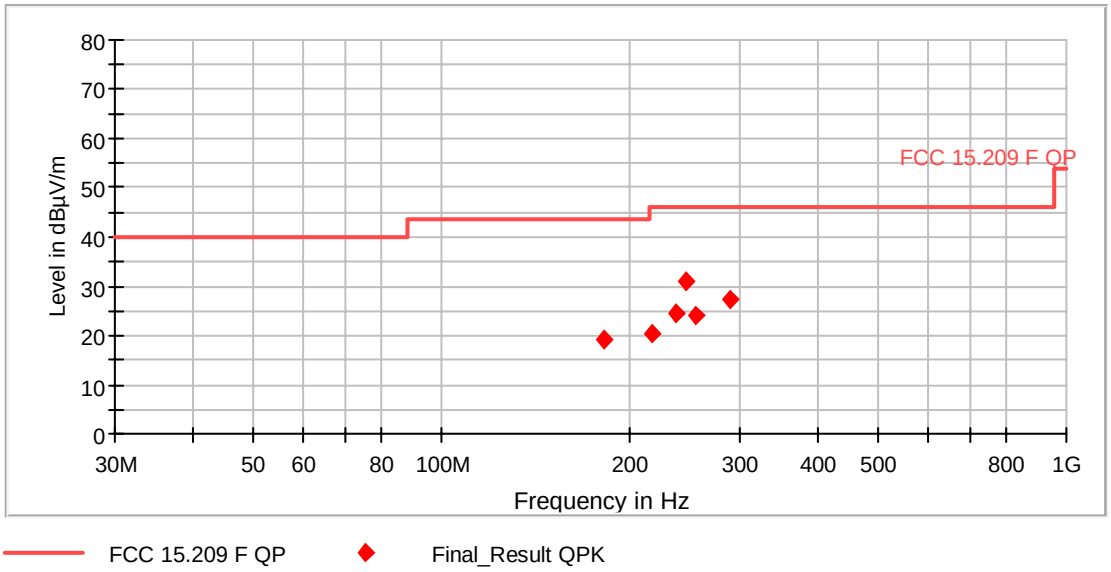
Connection option 1



Result measured with the quasipeak detector (marked by ♦):

Frequency MHz	Result dBµV/m	Limit dBµV/m	Margin dB	Readings dBµV	Antenna factor dB/m	Cable loss dB	Height cm	Azimuth deg	Pol.	Restr. Band
149.976	22.12	43.5	21.4	9.1	11.7	1.3	103	85	Vert.	Yes
174.612	20.38	43.5	23.1	9.0	9.9	1.5	149	43	Vert.	No
186.660	14.92	43.5	28.6	4.3	9.1	1.5	135	26	Vert.	No
198.804	18.62	43.5	24.9	8.2	8.9	1.5	105	19	Vert.	No
209.184	24.41	43.5	19.1	13.6	9.3	1.5	106	36	Vert.	No
233.352	21.48	46.0	24.5	9.3	10.5	1.7	117	333	Hor.	No
Measurement uncertainty: +2.2 dB / -3.6 dB										

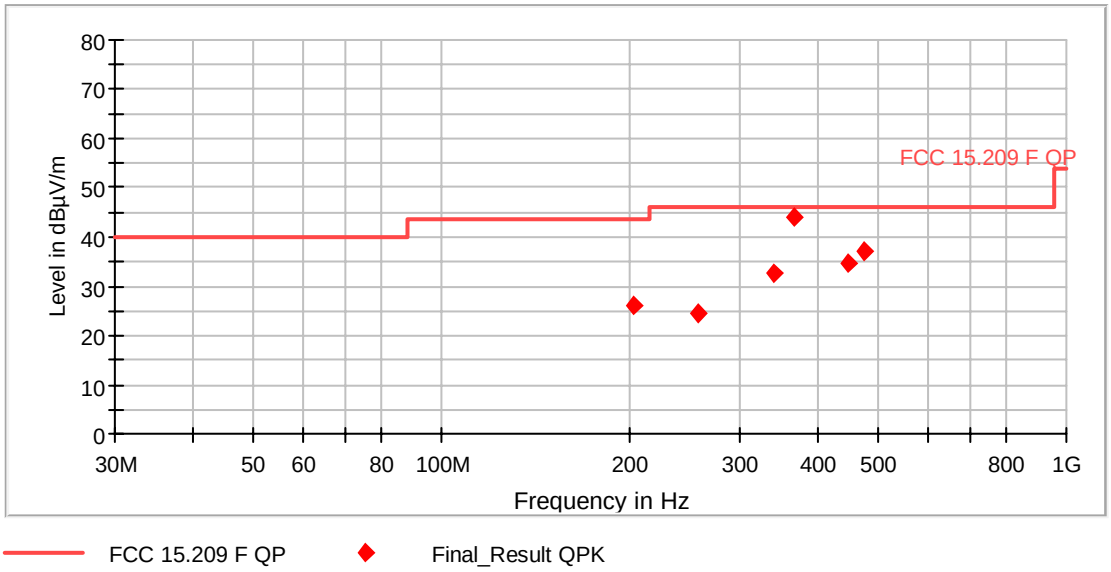
Connection option 2



Result measured with the quasipeak detector (marked by ♦):

Frequency MHz	Result dBµV/m	Limit dBµV/m	Margin dB	Readings dBµV	Antenna factor dB/m	Cable loss dB	Height cm	Azimuth deg	Pol.	Restr. Band
182.088	19.11	43.5	24.4	8.3	9.3	1.5	100	46	Vert.	No
217.404	20.34	46.0	25.7	9.1	9.6	1.6	132	294	Vert.	No
236.232	24.48	46.0	21.5	12.1	10.7	1.7	117	298	Vert.	No
245.700	30.97	46.0	15.0	17.5	11.8	1.7	113	117	Vert.	Yes
255.276	24.13	46.0	21.9	9.7	12.6	1.8	123	102	Vert.	Yes
289.344	27.41	46.0	18.6	12.6	13.0	1.9	104	351	Vert.	No
Measurement uncertainty: +2.2 dB / -3.6 dB										

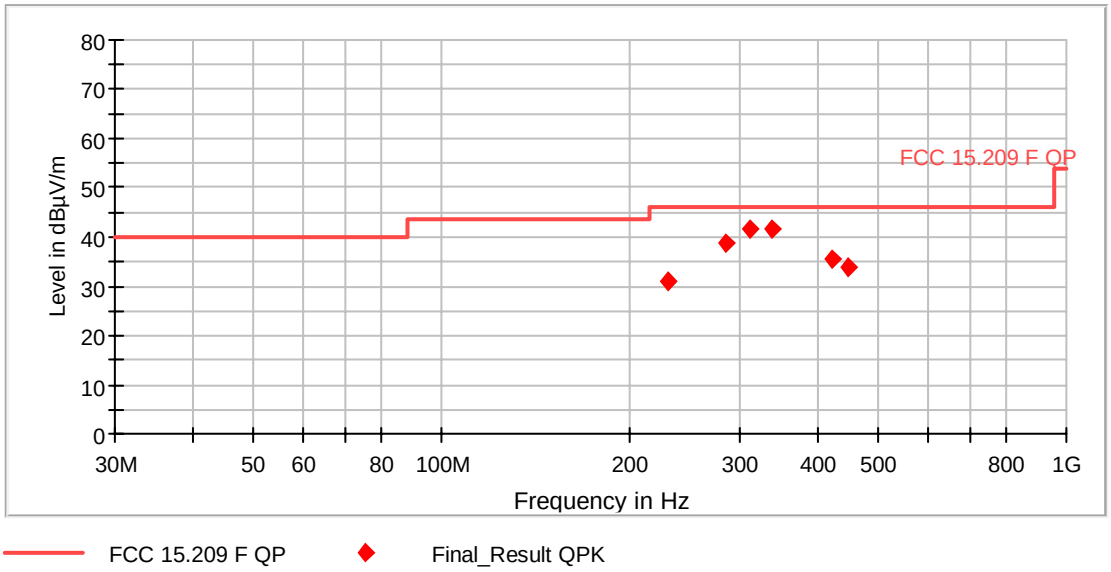
Connection option 3



Result measured with the quasipeak detector (marked by ♦):

Frequency MHz	Result dBµV/m	Limit dBµV/m	Margin dB	Readings dBµV	Antenna factor dB/m	Cable loss dB	Height cm	Azimuth deg	Pol.	Restr. Band
203.412	25.98	43.5	17.5	15.4	9.1	1.5	117	90	Vert.	No
257.532	24.69	46.0	21.3	10.4	12.5	1.8	107	328	Vert.	Yes
339.132	32.61	46.0	13.4	16.6	14.0	2.0	102	201	Vert.	No
366.156	44.12	46.0	1.9	27.6	14.4	2.1	104	211	Vert.	No
447.528	34.87	46.0	11.1	15.9	16.6	2.4	192	202	Vert.	No
474.612	37.1	46.0	8.9	17.9	16.8	2.4	179	189	Vert.	No
Measurement uncertainty: +2.2 dB / -3.6 dB										

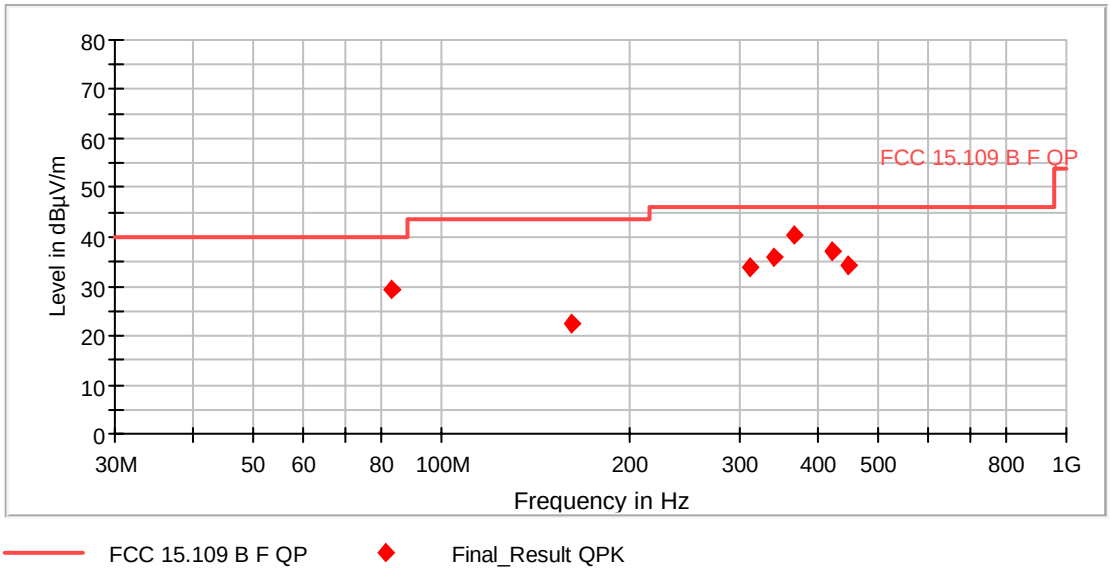
Connection option 4



Result measured with the quasipeak detector (marked by ♦):

Frequency MHz	Result dBµV/m	Limit dBµV/m	Margin dB	Readings dBµV	Antenna factor dB/m	Cable loss dB	Height cm	Azimuth deg	Pol.	Restr. Band
230.496	30.98	46.0	15.0	19.0	10.3	1.6	125	184	Vert.	No
284.748	38.8	46.0	7.2	24.1	12.8	1.9	102	191	Vert.	Yes
311.880	41.81	46.0	4.2	26.9	13.0	1.9	102	186	Vert.	No
338.988	41.57	46.0	4.4	25.6	14.0	2.0	104	226	Vert.	No
420.336	35.63	46.0	10.4	17.3	16.0	2.3	102	341	Vert.	No
447.504	33.76	46.0	12.2	14.8	16.6	2.4	191	226	Vert.	No
Measurement uncertainty: +2.2 dB / -3.6 dB										

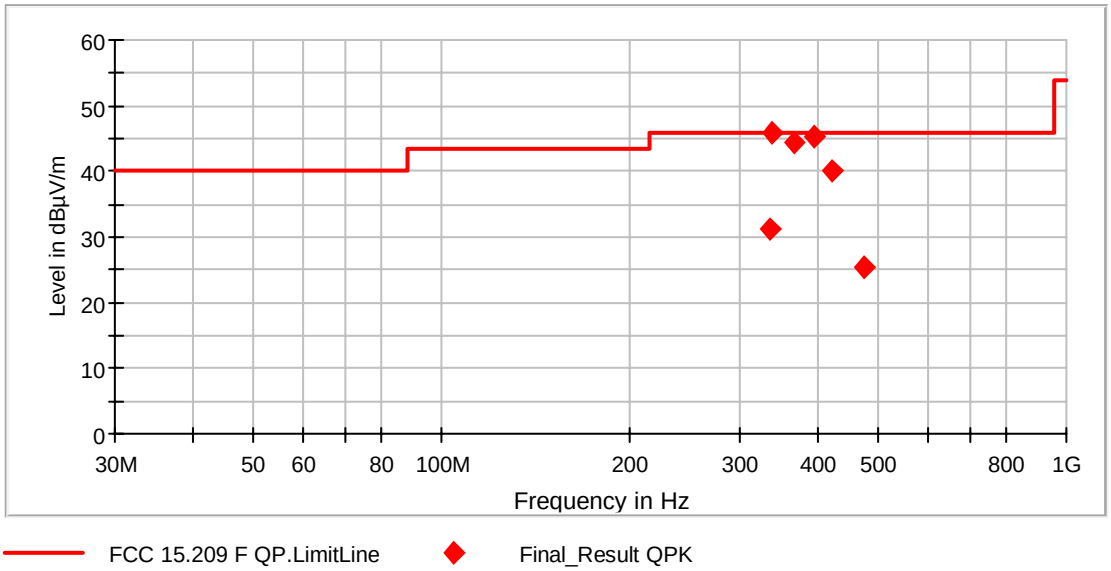
Connection option 5



Result measured with the quasipeak detector (marked by ♦):

Frequency MHz	Result dBµV/m	Limit dBµV/m	Margin dB	Readings dBµV	Antenna factor dB/m	Cable loss dB	Height cm	Azimuth deg	Pol.	Restr. Band
82.944	29.43	40.0	10.6	19.8	8.6	1.0	376	3	Hor.	No
161.232	22.4	43.5	21.1	9.9	11.0	1.5	101	54	Vert.	No
311.772	33.69	46.0	12.3	18.8	13.0	1.9	102	187	Hor.	No
339.096	35.75	46.0	10.3	19.8	14.0	2.0	119	181	Hor.	No
366.180	40.44	46.0	5.6	23.9	14.4	2.1	100	68	Hor.	No
420.408	37.3	46.0	8.7	19.0	16.0	2.3	104	264	Hor.	No
447.504	34.14	46.0	11.9	15.1	16.6	2.4	116	66	Vert.	No
Measurement uncertainty: +2.2 dB / -3.6 dB										

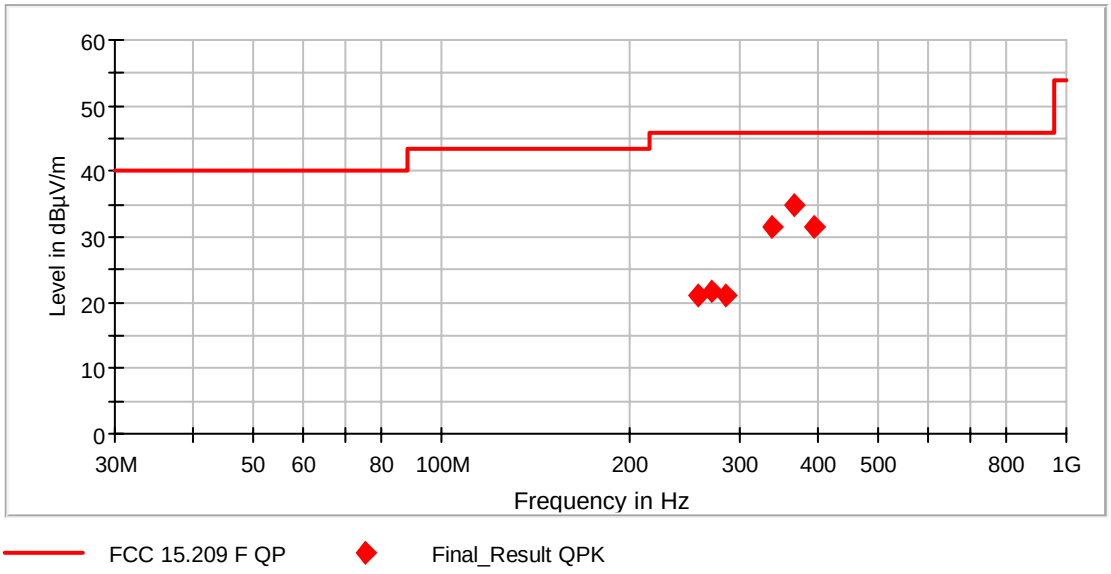
Connection option 6



Result measured with the quasipeak detector (marked by ♦):

Frequency MHz	Result dBµV/m	Limit dBµV/m	Margin dB	Readings dBµV	Antenna factor dB/m	Cable loss dB	Height cm	Azimuth deg	Pol.	Restr. Band
336.300	31.26	46.0	14.7	15.4	13.9	2.0	100	12	Hor.	No
339.000	45.82	46.0	0.2	29.8	14.0	2.0	115	12	Hor.	No
366.120	44.4	46.0	1.6	27.9	14.4	2.1	172	342	Hor.	No
393.240	45.29	46.0	0.7	27.6	15.5	2.2	104	180	Hor.	No
420.360	40.03	46.0	6.0	21.7	16.0	2.3	104	115	Hor.	No
447.480	25.29	46.0	20.7	6.4	16.5	2.4	105	157	Hor.	No
Measurement uncertainty: +2.2 dB / -3.6 dB										

Connection option 7



Result measured with the quasipeak detector (marked by ♦):

Frequency MHz	Result dBµV/m	Limit dBµV/m	Margin dB	Readings dBµV	Antenna factor dB/m	Cable loss dB	Height cm	Azimuth deg	Pol.	Restr. Band
257.748	21.1	46.0	24.9	6.8	12.5	1.8	126	63	Hor.	Yes
271.428	21.77	46.0	24.2	7.6	12.3	1.9	97	5	Hor.	Yes
284.856	21.03	46.0	25.0	6.4	12.8	1.9	101	18	Hor.	Yes
339.048	31.58	46.0	14.4	15.6	14.0	2.0	105	44	Hor.	No
366.168	34.81	46.0	11.2	18.3	14.4	2.1	97	235	Hor.	No
393.264	31.61	46.0	14.4	13.9	15.5	2.2	101	229	Hor.	No
Measurement uncertainty: +2.2 dB / -3.6 dB										

Test result: Passed

Test equipment (refer chapter 6):

7 - 13

6 Test equipment

No.	Test equipment	Type	Manufacturer	Serial No.	PM. No.	Cal. Date	Cal. due
1	Shielded chamber M4	-	Siemens	B83117S1-X158	480088	Weekly verification (system cal.)	
2	Measuring receiver	ESIB 26	Rohde & Schwarz	100292	481182	02/21/2014	03/2016
3	LISN	NSLK8128	Schwarzbeck	8128155	480058	01/22/2015	01/2016
4	Limiter	CFL9206A	Teseq	38268	481982	12/18/2014	02/2016
5	AC-filter	B84299-D87-E3	Siemens	930262292	480097	Weekly verification (system cal.)	
6	EMI-Software	EMC32	Rohde & Schwarz	-	481022	-	
7	Open area test site	-	Phoenix Test-Lab	-	480085	Weekly verification (system cal.)	
8	Measuring receiver	ESIB7	Rohde & Schwarz	100304	480521	02/06/2014	02/2015
9	Controller	HD100	Deisel	100/670	480139	-	
10	Turntable	DS420HE	Deisel	420/620/80	480087	-	
11	Antenna support	AS615P	Deisel	615/310	480086	-	
12	Antenna	CBL6111 D	Chase	25761	480894	09/18/2014	09/2017
13	EMI Software	EMC32	Rohde & Schwarz	-	481022	-	
14	Fully anechoic chamber M20	-	Albatross Projects	B83107-E2439-T232	480303	Weekly verification (system cal.)	
15	Measuring receiver	ESI 40	Rohde & Schwarz	100064	480355	02/26/2014	02/2016
16	Controller	MCU	Maturo	MCU/043/971107	480832	-	
17	Turntable	DS420HE	Deisel	420/620/80	480315	-	
18	Antenna support	AS615P	Deisel	615/310	480187	-	
19	Antenna	CBL6112 B	Chase	2688	480328	04/14/2014	04/2017
20	Antenna	3115A	EMCO	9609-4918	480183	11/10/2014	11/2017
21	Loop antenna	HFH2-Z2	Rohde & Schwarz	100417	481912	09/15/2015	09/2016
22	RF-cable No. 3	Sucoflex 106B	Suhner	0563/6B	480670	Weekly verification (system cal.)	
23	RF-cable No. 36	Sucoflex 106B	Suhner	0522/6B	480571	Weekly verification (system cal.)	
24	RF-cable No. 40	Sucoflex 106B	Suhner	0708/6B	481330	Weekly verification (system cal.)	
25	EMI Software	EMC32	Rohde & Schwarz	-	481800	-	
26	Shielded chamber M21	-	Albatross Projects	B83117-B1232-T162	481967	Weekly verification (system cal.)	
27	Spectrum analyzer	FSW43	Rohde & Schwarz	100586	481720	02/07/2014	02/2016
28	Test fixture	-	Phoenix Testlab GmbH	-	410160	-	
29	Outdoor test site	-	Phoenix Testlab GmbH	-	480293	Monthly verification (system cal.)	
30	Measuring receiver	ESPC	Rohde & Schwarz	843756/006	480150	02/24/2014	02/2016

7 Report history

Report Number	Date	Comment
F153615E1	03/03/2016	Document created
F153615E1 2nd version	05/16/2017	Actualization because of renewal of [3]

8 List of annexes

Annex A Test setup photos 5 pages

153615_1	Test setup anechoic chamber
153615_2	Test setup anechoic chamber
153615_3	Test setup open area test site
153615_4	Test setup outdoor test site
153615_5	Test setup conducted emission

Annex B External photos 12 pages

153615_6	EUT, top view
153615_7	EUT, bottom view
153615_8	EUT, connector view 1
153615_9	EUT, connector view 2
153615_10	AC power adapter
153615_11	Antenna 1 (0420830 0)
153615_12	Antenna 2 (0423652 0)
153615_13	Antenna 3 (0434483 0)
153615_14	Antenna 4 (0437823 0)
153615_15	Antenna 5 (0418453 0)
153615_16	Antenna 6 (0418532 0)
153615_17	Antenna 7 (0431701 0)

Annex C Internal photos 4 pages

153615_18	EUT, top view, shielding removed
153615_19	EUT, top view, shielding and radio module removed
153615_20	EUT, radio module, top view
153615_21	EUT, radio module, bottom view