FCC Measurement/Technical Report on

WeASSIST Transceiver 921 MHz

FCC ID: ZGHWEA2
IC: 9619A-WEA2

Report Reference: MDE_WERMA_2001_FCC_01

Test Laboratory:
7layers GmbH
Borsigstrasse 11
40880 Ratingen
Germany

Deutsche Akkreditierungsstelle D-PL-12140-01-00

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0 Summary

Technical Report Summary

Type of Authorization
Certification for an Intentional Radiator.

Applicable FCC Rules

Prepared in accordance with the requirements of FCC Rules and Regulations as listed in 47 CFR Ch. 1 Parts 2 (10-1-19 Edition) and 15 (10-1-19 Edition). The following subparts are applicable to the results in this test report.

Part 2, Subpart J - Equipment Authorization Procedures, Certification

Part 15, Subpart C – Intentional Radiators

§ 15.201 Equipment authorization requirement

§ 15.205 Restricted bands of operation

§ 15.207 Conducted limits

§ 15.209 Radiated emission limits; general requirements

§ 15.249 Operation within the bands 902-928 MHz, 2400-2483.5 MHz, 5725-5875 MHz, and 24.0-24.25 GHz.

Note:
ANSI C63.10–2013 is applied.

Summary Test Results:

The EUT complied with all performed tests as listed in chapter 0 Measurement Summary.

Correlation of measurement requirements for General Radio Equipment from FCC and IC

General radio equipment

Measurement	FCC reference	IC reference
Conducted emissions on AC Mains	§ 15.207	RSS-Gen Issue 5 & Amdt. 1 2019 & Amdt. 2 2021: 8.8
Transmitter spurious radiated emissions	§ 15.209	RSS Gen Issue 5 & AMD1 & AMD2: 6.10/6.13/8.9/8.10; RSS-210 Issue 10 & AMD1: A1.2 Table 2
Maximum radiated field strength at fundamental frequency	§ 15.249	RSS-210 Issue 10 & AMD1: A1.2 Table 1; RSS Gen Issue 5 & AMD1 & AMD2: 6.12
Operation within the bands 902-928 MHz, 2400-2483.5 MHz, 5725-5875 MHz, and 24.0-24.25 GHz.	§15.249	RSS-210, Issue 10: Annex B.10, Table B2

Measurement Summary

FCC Part 15, Subpart C	§ 15.207		
Conducted emissions (AC power line)			
The measurement was performed according to ANSI C63.10			2013
OP-Mode	**Setup**	**Port**	**Final Result**
op-mode 1	Setup_01	DC Power Supply	passed

FCC Part 15, Subpart C	§ 15.249 (a)		
Field strength of Fundamental / Radiated power output			
The measurement was performed according to ANSI C63.10			2013
OP-Mode	**Setup**	**Port**	**Final Result**
op-mode 1	Setup_01	Enclosure	passed

FCC Part 15, Subpart C	§ 15.249 (a), § 15.35 (b), § 15.209		
Field Strength of Harmonics / Spurious radiated emissions			
The measurement was performed according to ANSI C63.10			2013
OP-Mode	**Setup**	**Port**	**Final Result**
op-mode 1	Setup_01	Enclosure	passed

Revision History

Report version control			
Version	**Release date**	**Change Description**	**Version validity**
initial	2021-06-21	--	valid
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Responsible for Accreditation Scope: Dipl.-Ing. Marco Kullik

Responsible for Test Report: Dipl.-Ing. Dobrin Dobrinov

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1 Administrative Data

Testing Laboratory

Company Name:	7Layers GmbH
Address	Borsigstr. 11 40880 Ratingen Germany

This facility has been fully described in a report submitted to the ISED and accepted under the registration number: Site# 3699A-1.

The test facility is also accredited by the following accreditation organisation:

Laboratory accreditation no:	DAkkS D-PL-12140-01-00
FCC Designation Number:	DE0015
FCC Test Firm Registration:	929146
Responsible for accreditation scope:	Dipl.-Ing. Marco Kullik
Report Template Version:	2017-07-14

Project Data

Responsible for testing and report:	Dipl.-Ing. Dobrin Dobrinov
Date of Test(s):	2021-04-27 to 2021-05-05
Date of Report:	2021-06-21

Applicant Data

Company Name:	WERMA Signaltechnik GmbH + Co. KG
Address:	Dürbheimer Straße 15 D-78604 Rietheim-Weilheim Germany
Contact Person:	Mr. Florian Ott

Manufacturer Data

Company Name:	Please see applicant’s data
Address:	
Contact Person:	

2 Test object Data

General EUT Description

General product description:

Kind of Device product description	The EUT is a non-specific SRD in 921 MHz frequency range
Product name	WeASSIST Transceiver 921 MHz
Type	Wireless Signalling Device
Declared EUT data by the supplier	
Voltage Type	DC
Normal Voltage	24 V
Low Voltage	21.6 V
High Voltage	26.4 V
Normal Temperature	25 °C
Low Temperature	-20 °C
High Temperature	+50 °C
Specific product description for the EUT	Wireless communication device for machine data acquisition
The EUT provides the following ports:	Enclosure and DC Power Supply
Special software used for testing	V3-Test

The main components of the EUT are listed and described in Chapter 0.

EUT Main components

Sample Name	Sample Code	Description
EUT A	DE1382002ab03	radiated sample
Sample Parameter	**Value**	
Serial No.	N 098	
HW Version	00	
SW Version	00	
Comment	used for radiated measurements, continuously modulated	

General description of ancillary equipment

Device	Details (Manufacturer, Type Model, OUT Code)	Reason for using
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General description of auxiliary equipment

Device	Details (Manufacturer, HW, SW, S/N)	Description
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EUT Setups

This chapter describes the combination of EUTs and ancillary equipment used for testing.

Setup No.	Combination of EUTs	Description
Setup_01	EUT A	Setup for radiated measurements

Operating Modes

This chapter describes the operating modes of the EUTs used for testing.

Op. Mode	Description of Operating Modes	Remarks
op-mode 1	Continuous modulated	Transmitter sends continuously modulated signal

Product labelling

2.1.1 FCC ID label

ZGHWEA2

2.1.2 IC Label

9619A-WEA2

2.1.3 Location of the label on the EUT

Please refer to the documentation of the applicant.

3 Test Results

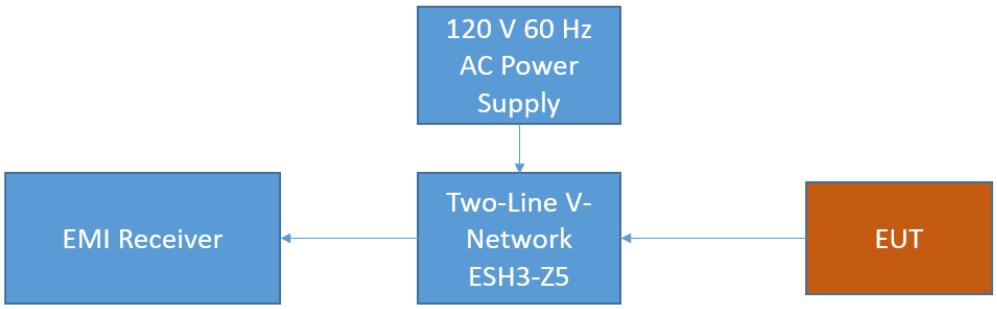
Conducted Emissions at AC Mains

Standard **FCC Part 15 Subpart C**

The test was performed according to:
ANSI C63.10

3.1.1 Test Description

The test set-up was made in accordance with the general provisions of ANSI C 63.10. The Equipment Under Test (EUT) was setup in a shielded room to perform the conducted emissions measurements in a typical installation configuration. The EUT was powered from 50µH || 50 Ohm Line Impedance Stabilization Network (LISN). The LISN's unused connections were terminated with 50 Ohm loads.



FCC Conducted Emissions on AC

The measurement procedure consists of two steps. It is implemented into the EMI test software EMC-32 from R&S.

Step 1: Preliminary scan
Intention of this step is, to determine the conducted EMI-profile of the EUT.
EMI receiver settings:
- Detector: Peak – Maxhold & Average
- Frequency range: 150 kHz – 30 MHz
- Frequency steps: 2.5 kHz
- IF–Bandwidth: 9 kHz
- Measuring time / Frequency step: 100 ms (FFT-based)
- Measurement on phase + neutral lines of the power cords

On basis of this preliminary scan the highest amplitudes and the corresponding frequencies relative to the limit are identified. Emissions above the limit and emissions which are in the 10 dB range below the limit are considered.

Step 2: Final measurement
Intention of this step is, to determine the highest emissions with the settings defined in the test specification for the frequencies identified in step 1.
EMI receiver settings:
- Detector: Quasi-Peak & (CISPR) Average
- IF Bandwidth: 9 kHz
- Measuring time: 1 s / frequency

At each frequency determined in step 1, four measurements are performed in the following combinations:
1) Neutral lead - reference ground (PE grounded)
2) Phase lead - reference ground (PE grounded)
3) Neutral lead - reference ground (PE floating)
4) Phase lead - reference ground (PE floating)

The highest value is reported.

3.1.2 **Test Requirements / Limits**

FCC Part 15, Subpart B, §15.207

Frequency (MHz)	QP Limits (dBµV)	AV Limits (dBµV)
0.15 – 0.5	66 - 56	56 - 46
0.5 - 5	56	46
5 - 30	60	50

3.1.3 **Test Protocol**

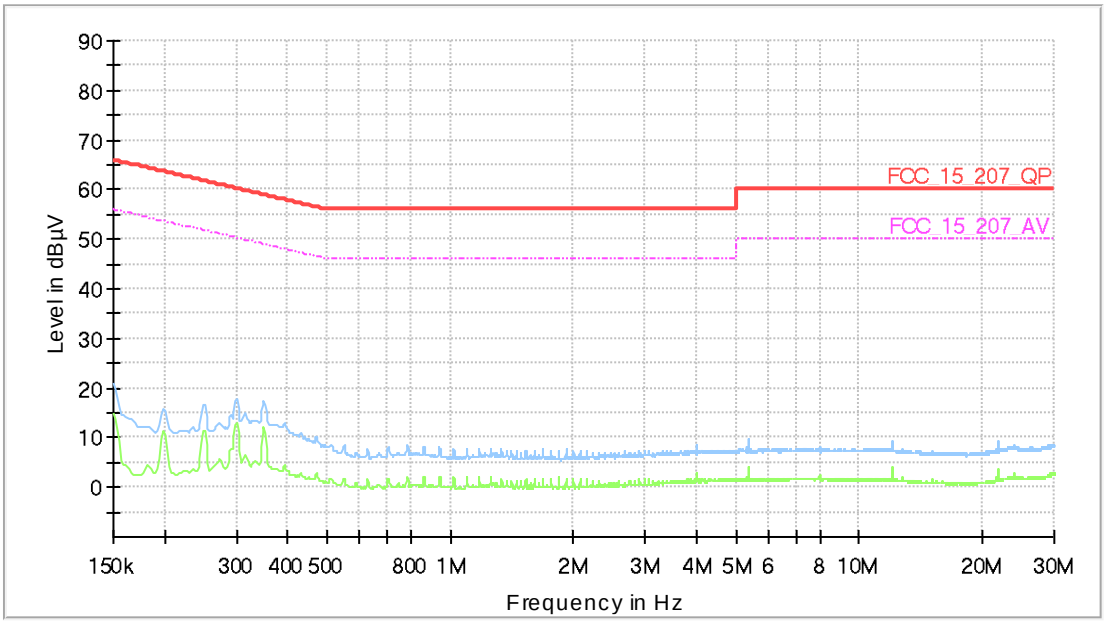
Temperature: 21-23 °C
Air Pressure: 1010 -1015 hPa
Humidity: 31 -36 %
via ancillary equipment, stand-alone

Power line	**PE**	**Frequency [MHz]**	**Level [dBµV]**	**Detector**	**Limit [dBµV]**	**Margin [dB]**
please see diagram 1.01 Measurement with antennas connected	-	-	-	-	-	Outside the fundamental emission band > 6
please see diagram 1.10 Measurement with antennas replace by dummy loads	-	-	-	-	-	> 6

3.1.4 **Test result:**

Common Information

Test Description:	Conducted Emissions
Test Standard:	FCC §15.207, ANSI C63.10
EUT / Setup Code:	DE1382002ab03
Operating Conditions:	120 V 60 Hz for Lab power supply, 24 V DC for EUT, continuous modulated
Operator Name:	RichWol/Dob
Comment:	-
Legend:	Trace: blue = QP, green = CISPR AV; Star: red or blue = critical frequency; Rhombus: blue = final QP, green = final CISPR AV
Tested Port / used LISN:	AC mains => 1st LISN ESH3-Z5
Termination of other ports:	N/A



4 Field strength of Fundamental / Radiated power output

Standard FCC Part 15, Subpart C

The test was performed according to: ANSI C63.10

4.1.1 Test Description

Please refer to the description at sub-clause 5.1.1, esp. item no. 3.

4.1.2 Test Requirements / Limits

FCC Part 15, Subpart C, §15.249

(a) Except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental frequency	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
902-928 MHz	50 (94.0 dBµV/m)	500 (54.0 dBµV/m)
2400-2483.5 MHz	50 (94.0 dBµV/m)	500 (54.0 dBµV/m)
5725-5875 MHz	50 (94.0 dBµV/m)	500 (54.0 dBµV/m)
24.0-24.25 GHz	250 (108.0 dBµV/m)	2500 (68.0 dBµV/m)

Used conversion factor: Limit (dBµV/m) = 20 log (Limit (µV/m)/1µV/m)

(c) Field strength limits are specified at a distance of 3 meters.

(e) As shown in §15.35(b), for frequencies above 1000 MHz, the field strength limits in paragraphs (a) and (b) of this section are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

Test Protocol

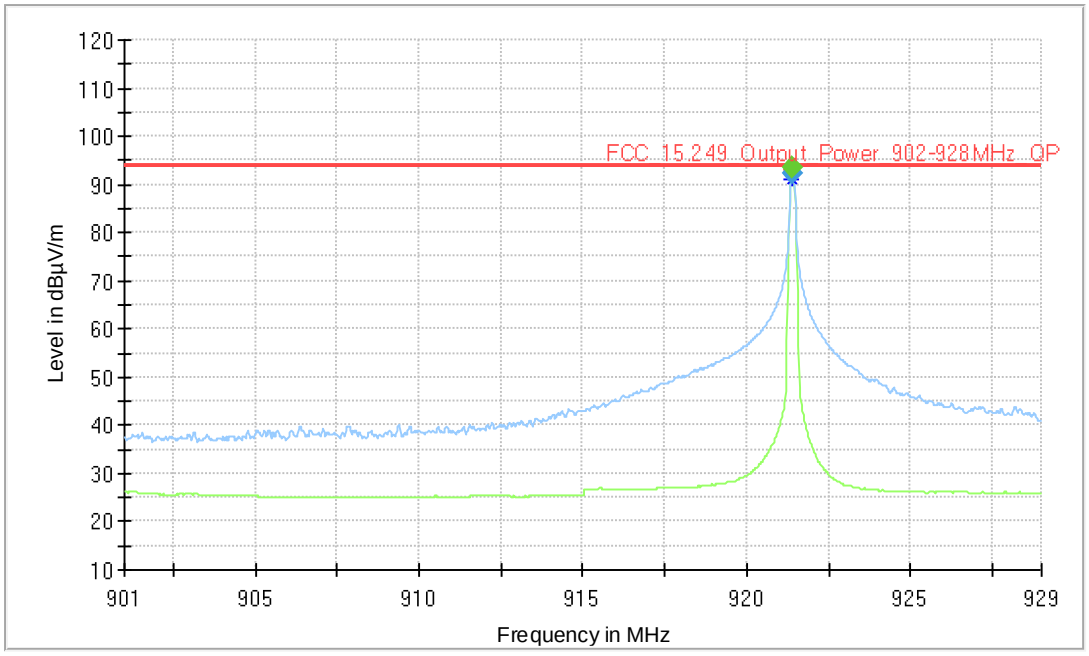
Temperature: 24 °C
Air Pressure: 1009 hPa
Humidity: 38 %

Op. Mode	Setup	Port
op-mode 1	Setup_01	Enclosure

Frequency [MHz]	Output power [dBµV/m]	Limit [dBµV/m]	Margin to Limit [dB]	Remarks
921.4	93.36	94.0	0.64	Maximum radiated field strength at fundamental frequency

TEST RESULT: Maximum radiated field strength at fundamental frequency

FCC Part 15, Subpart C	Op. Mode	Result
	op-mode 1	passed



Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
921.400000	92.49	---	94.00	1.51	1000.0	120.000	107.0	V	248.0	24.7
921.400000	---	93.36	94.00	0.64	1000.0	120.000	107.0	V	248.0	24.7

5 Field Strength of Harmonics / Spurious radiated emissions

Standard FCC Part 15, Subpart C

The test was performed according to: ANSI C63.10

5.1.1 Test Description

The test set-up was made in accordance to the general provisions of ANSI C63.10 in a typical installation configuration. The measurements were performed according the following sub-chapters of ANSI C63.10:

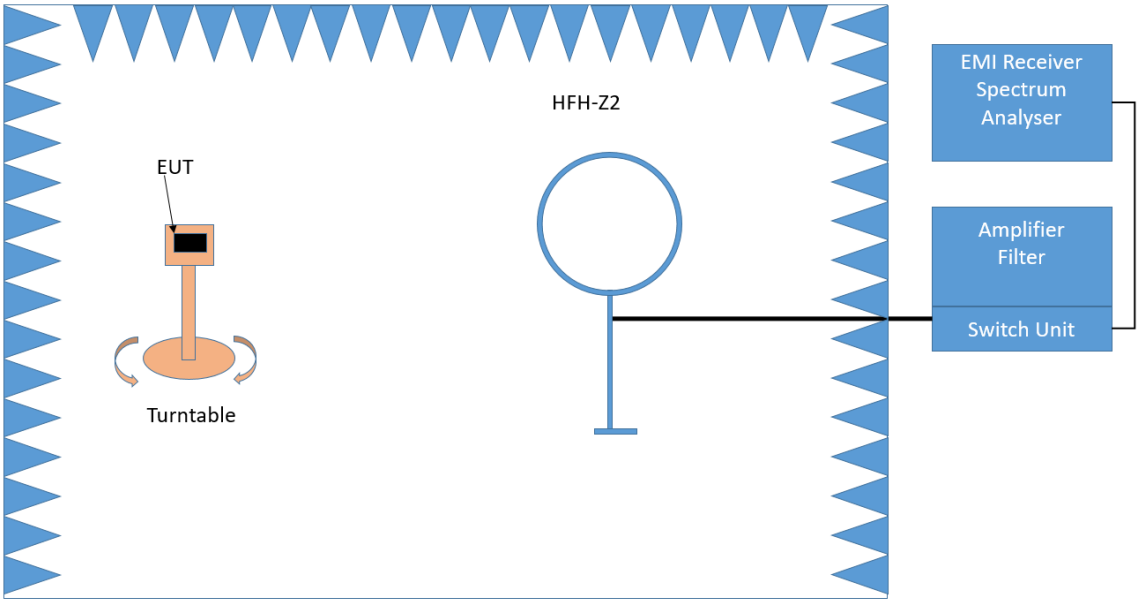
- < 30 MHz: Chapter 6.4
- 30 MHz – 1 GHz: Chapter 6.5
- > 1 GHZ: Chapter 6.6 (procedure according 6.6.5 used)

The measurement procedure is implemented into the EMI test software EMC32 from R&S. Exploratory tests are performed at 3 orthogonal axes to determine the worst-case orientation of a body worn or handheld EUT. The final test on all kind of EUTs is also performed at 3 axes. A pre-check is performed while the EUT is powered.

Below 1 GHz:

The Equipment Under Test (EUT) was set up on a non-conductive table in the semi-anechoic chamber. The influence of the EUT support table that is used between 30–1000 MHz was evaluated.

1. Measurement up to 30 MHz



Test Setup; Spurious Emission Radiated (SAC), 9 kHz – 30 MHz

The Loop antenna HFH2-Z2 is used.

Step 1: premeasurement

- Anechoic chamber

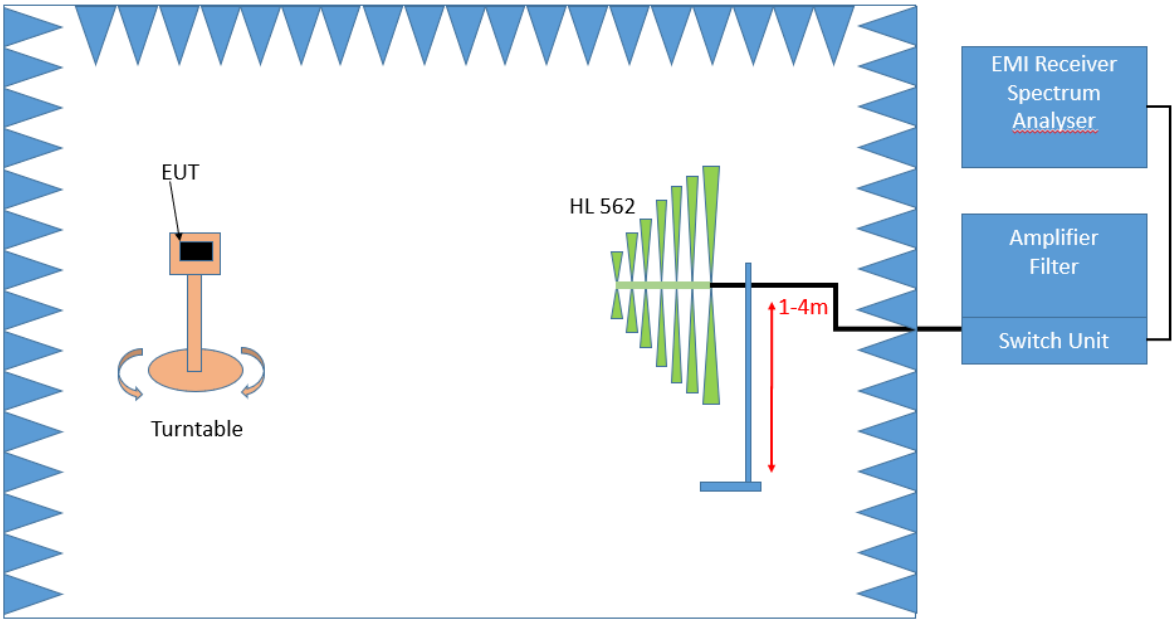
- Antenna distance: 3 m
- Antenna height: 1 m
- Detector: Peak-Maxhold
- Frequency range: 0.009 - 0.15 MHz and 0.15 – 30 MHz
- Frequency steps: 0.05 kHz and 2.25 kHz
- IF–Bandwidth: 0.2 kHz and 9 kHz
- Measuring time / Frequency step: 100 ms (FFT-based)

Intention of this step is, to determine the radiated EMI-profile of the EUT. Afterwards the relevant emissions for the final measurement are identified.

Step 2: final measurement
For the relevant emissions determined in step 1, an additional measurement with the following settings will be performed. Intention of this step is to find the maximum emission level.

- Detector: Quasi-Peak (9 kHz – 150 kHz, Peak / Average 150 kHz- 30 MHz)
- Frequency range: 0.009 – 30 MHz
- Frequency steps: measurement at frequencies detected in step 1
- IF–Bandwidth: 0.2 - 10 kHz
- Measuring time / Frequency step: 1 s

2. Measurement above 30 MHz and up to 1 GHz



Test Setup; Spurious Emission Radiated (SAC), 30 MHz- 1GHz

Step 1: Preliminary scan
This is a preliminary test to identify the highest amplitudes relative to the limit.
Settings for step 1:
- Antenna distance: 3 m
- Detector: Peak-Maxhold / Quasipeak (FFT-based)
- Frequency range: 30 – 1000 MHz
- Frequency steps: 30 kHz
- IF–Bandwidth: 120 kHz
- Measuring time / Frequency step: 100 ms
- Turntable angle range: –180° to 90°
- Turntable step size: 90°

- Height variation range: 1 – 4 m
- Height variation step size: 1.5 m
- Polarisation: Horizontal + Vertical

Intention of this step is, to determine the radiated EMI-profile of the EUT. Afterwards the relevant emissions for the final measurement are identified.

Step 2: Adjustment measurement

In this step the accuracy of the turntable azimuth and antenna height will be improved. This is necessary to find out the maximum value of every frequency.
For each frequency, which was determined the turntable azimuth and antenna height will be adjusted. The turntable azimuth will slowly vary by 360°. During this action, the value of emission is continuously measured. The turntable azimuth at the highest emission will be recorded and adjusted. In this position, the antenna height will also slowly vary between 1 – 4 meter. During this action, the value of emission is also continuously measured. The antenna height of the highest emission will also be recorded and adjusted.

- Detector: Peak – Maxhold
- Measured frequencies: in step 1 determined frequencies
- IF – Bandwidth: 120 kHz
- Measuring time: 100 ms
- Turntable angle range: 360 °
- Height variation range:1 – 4 m
- Antenna Polarisation: max. value determined in step 1

Step 3: Final measurement with QP detector

With the settings determined in step 2, the final measurement will be performed:
EMI receiver settings for step 3:

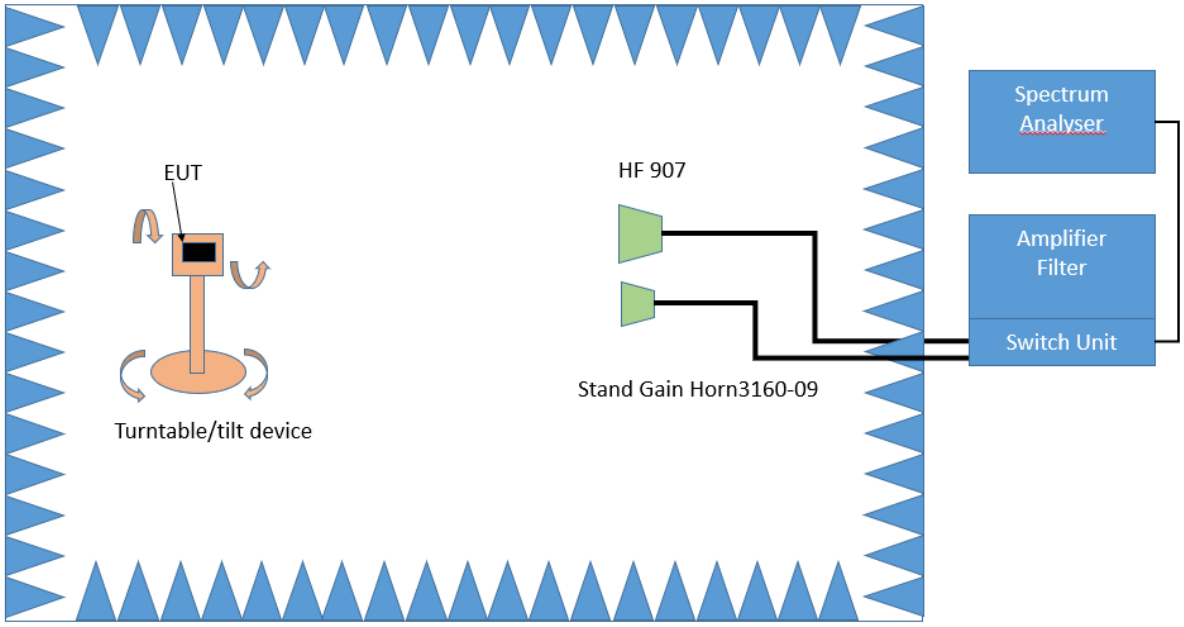
- Detector: Quasi-Peak (< 1 GHz)
- Measured frequencies: in step 1 determined frequencies
- IF – Bandwidth: 120 kHz
- Measuring time: 1 s

After the measurement a plot will be generated which contains a diagram with the results of the preliminary scan and a chart with the frequencies and values of the results of the final measurement.

Above 1 GHz:

The Equipment Under Test (EUT) was set up on a non-conductive support (tilt device) at 1.5 m height in the fully-anechoic chamber.
All steps were performed with one height (1.5 m) of the receiving antenna only.

3. Measurement above 1 GHz



Test Setup; Spurious Emission Radiated (FAC), 1 GHz-26.5 GHz

Step 1:
The EUT is turned during the preliminary measurement across the elevation axis, with a step size of 90 °.
The turn table step size (azimuth angle) for the preliminary measurement is 45 °.
Spectrum analyser settings:
- Detector: Peak, Average
- RBW = 1 MHz
- VBW = 3 MHz

Step 2:
The turn table azimuth will slowly vary by ± 22.5°.
The elevation angle will slowly vary by ± 45°
Spectrum analyser settings:
- Detector: Peak

Step 3:
Spectrum analyser settings for step 3:
- Detector: Peak / CISPR Average
- Measured frequencies: in step 1 determined frequencies
- RBW = 1 MHz
- VBW = 3 MHz
- Measuring time: 1 s

5.1.2 **Test Requirements / Limits**

FCC Part 15, Subpart C, §15.249

(a) Except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Fundamental frequency	**Field strength of fundamental (millivolts/meter)**	**Field strength of harmonics (microvolts/meter)**
902-928 MHz	50 (94.0 dBµV/m)	500 (54.0 dBµV/m)
2400-2483.5 MHz	50 (94.0 dBµV/m)	500 (54.0 dBµV/m)
5725-5875 MHz	50 (94.0 dBµV/m)	500 (54.0 dBµV/m)
24.0-24.25 GHz	250 (108.0 dBµV/m)	2500 (68.0 dBµV/m)

Used conversion factor: Limit (dBµV/m) = 20 log (Limit (µV/m)/1µV/m)

(c) Field strength limits are specified at a distance of 3 meters.

(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

(e) As shown in §15.35(b), for frequencies above 1000 MHz, the field strength limits in paragraphs (a) and (b) of this section are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

FCC Part 15, Subpart C, §15.209, Radiated Emission Limits

Frequency (MHz)	Limit (µV/m)	Measurement distance (m)	Calculate Limit (dBµV/m @10m)	Limit (dBµV/m) @10m
0.009 – 0.49	2400/F (kHz)	300	(48.5 – 13.8) + 59.1 dB	107.6 – 72.9
0.49 – 1.705	24000/F (kHz)	30	(33.8 – 23.0) + 19.1 dB	52.9 – 42.1
1.705 – 30	30	30	29.5 + 19.1 dB	39.5

Frequency in MHz	Limit (µV/m)	Measurement distance (m)	Limit (dBµV/m)
30 – 88	100	3	40.0
88 – 216	150	3	43.5
216 – 960	200	3	46.0
above 960	500	3	54.0

§15.35(b)
..., there is also a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit....

Used conversion factor: Limit (dBµV/m) = 20 log (Limit (µV/m)/1µV/m)

§15.35(b) ..., there is also a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit ...

Used conversion factor: Limit (dBµV/m) = 20 log (Limit (µV/m)/1µV/m)

§15.35(c):

[...] when the radiated emission limits are expressed in terms of the average value of the emission, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds.
As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value. The exact method of calculating the average field strength shall be submitted [...].

§15.231(b)(3)
The limits on the field strength of the spurious emissions in the above table are based on the fundamental frequency of the intentional radiator.
Spurious emissions shall be attenuated to the average (or, alternatively, CISPR quasi-peak) limits shown in this table or to the general limits shown in §15.209, whichever limit permits a higher field strength.

Interpretation of the test laboratory:
The last subordinate clause of §15.231(b)(3) is overruled by §15.205/209, therefore within the restricted bands the limits defined at §15.205/209 and outside the restricted bands the limits defined at §15.231(b) resp. §15.231(e) are applied.

5.1.1 **Test Protocol**

Temperature: 24 °C
Air Pressure: 1009 hPa
Humidity: 35 %

- MEASUREMENT UP TO 30 MHZ

Temperature: 24 °C
Air Pressure: 1009 hPa
Humidity: 35 %

Op. Mode		**Setup**			**Port**				
op-mode 1		Setup_01			Enclosure				
Measuring Antenna Polarisation	**Spurious Emission Frequency [MHz]**	**Corrected value [dBµV/m]**			**Limit [dBµV/m]**	**Limit [dBµV/m]**	**Limit [dBµV/m]**	**Margin to limit [dB]**	**Margin to limit [dB]**
		QP	**Peak**	**AV**	**QP**	**Peak**	**AV**	**QP/Peak**	**AV**
0°	---	---	---	---	---	---	---	---	---
90°	---	---	---	---	---	---	---	---	---

Remark: In step 1 no spurious emissions in the range below the limit were found, using a peak detector, therefore step 2 (using a QP-detector) was not performed. For this test the EUT was sending a continuously modulated signal. Please see the measurement plots.

- MEASUREMENT ABOVE 30 MHZ TO 1 GHZ

Op. Mode		**Setup**			**Port**				
op-mode 1		Setup_01			Enclosure				
Polarisation of the antenna and the EUT	**Spurious Emission Frequency [MHz]**	**Corrected value [dBµV/m]**			**Limit [dBµV/m]**	**Limit [dBµV/m]**	**Limit [dBµV/m]**	**Margin to limit [dB]**	**Margin to limit [dB]**
		QP	**Peak**	**AV**	**QP**	**Peak**	**AV**	**QP/Peak**	**AV**
0°	---	---	---	---	---	---	---	---	---
90°	---	---	---	---	---	---	---	---	---

Remarks: - No more spurious emissions in the range 15 dB below the limit were found.

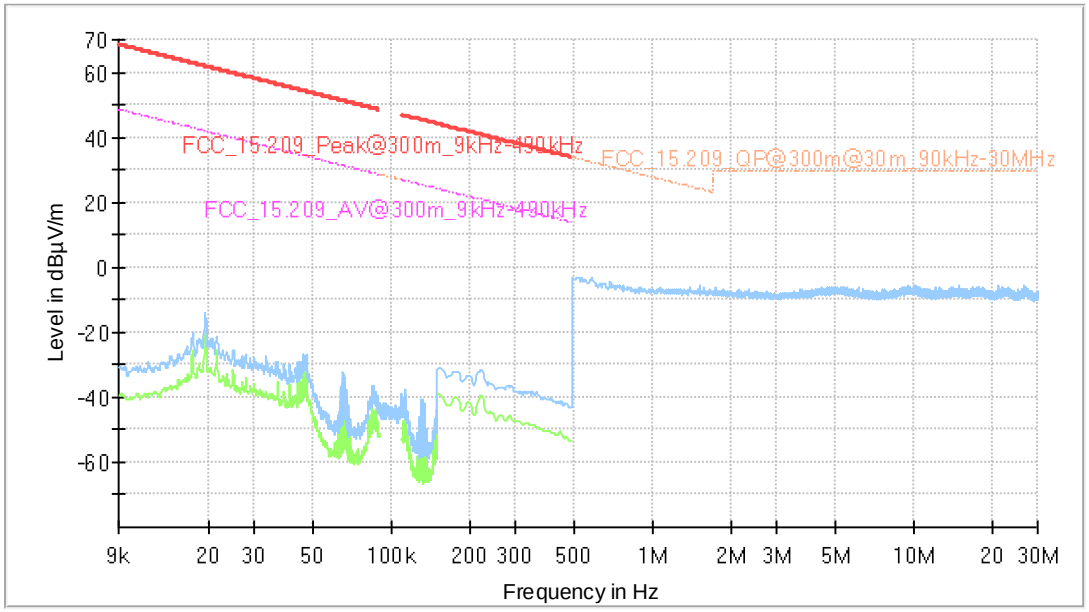
- MEASUREMENT ABOVE 1 GHz TO 10 GHz

Op. Mode		**Setup**			**Port**				
op-mode 1		Setup_01			Enclosure				
Polarisation of the antenna and the EUT	**Spurious Emission Frequency [MHz]**	**Corrected value [dBµV/m]**			**Limit [dBµV/m]**	**Limit [dBµV/m]**	**Limit [dBµV/m]**	**Margin to limit [dB]**	**Margin to limit [dB]**
		QP	**Peak**	**AV**	**QP**	**Peak**	**AV**	**QP/Peak**	**AV**
0°	---	---	---	---	---	---	---	---	---
90°	---	---	---	---	---	---	---	---	---

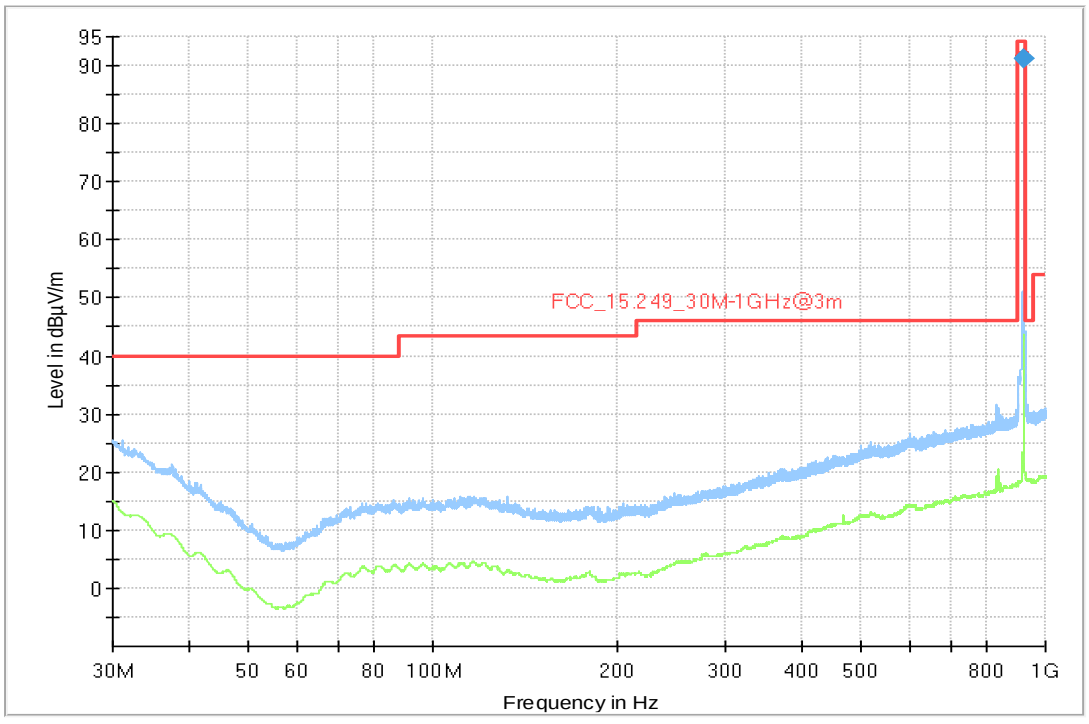
Remarks: - No more spurious emissions in the range 15 dB below the limit were found. The test was performed in the frequency range from 1 GHz to 10 GHz. For this test the EUT was sending a continuously modulated signal.
- Please see the measurement plot.
- The EUT is tested in horizontal position.

5.1.2 MEASUREMENT PLOTS

RADIATED EMISSIONS (f < 30 MHz)



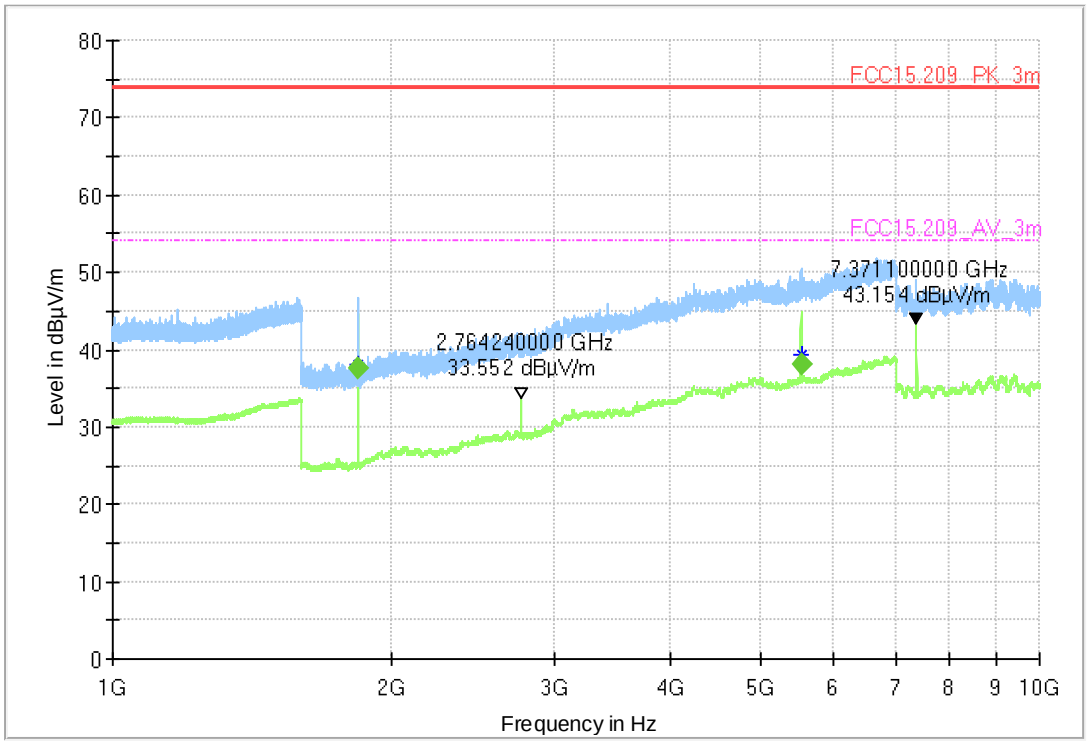
RADIATED EMISSIONS (30 MHz < f < 1 GHz)



Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
921.390000	91.10	94.00	2.9	1000.0	120.000	109.0	V	-98.0	24.7

RADIATED EMISSIONS (f > 1 GHz)



Final_Result

Frequency (MHz)	MaxPeak (dBµV/m)	CAverage (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Elevation (deg)	Corr. (dB/m)
1842.760	---	37.7	53.98	16.27	1000.0	1000.000	150.0	H	-139.0	94.0	-7.0
5528.400	---	38.1	53.98	15.89	1000.0	1000.000	150.0	H	-41.0	-12.0	4.3

6 Occupied Bandwidth

Standard **FCC Part 15 Subpart C**

The test was performed according to ANSI C63.10

6.1.1 Test Description

The Equipment Under Test (EUT) was set up to perform the occupied bandwidth measurements.
The reference level is the level of the highest amplitude signal observed from the transmitter at either the fundamental frequency or first-order modulation products in all typical modes of operation, including the unmodulated carrier, even if atypical.
The EUT was connected to spectrum analyzer via a short coax cable with a known loss.
Analyzer settings:

- Resolution Bandwidth (RBW): 300 Hz
- Video Bandwidth (VBW): 1 kHz
- Span: 250 kHz
- Trace: Maxhold
- Sweeptime: 6.3 ms
- Detector: Max Peak

The 99 % measurement function of the spectrum analyser function was used to determine the 99 % bandwidth.

6.1.2 Test Requirements / Limits

No applicable limit.

6.1.3 Test Protocol

Temperature: 23 °C
Air Pressure: 1009 hPa
Humidity: 42 %

Op. Mode	Setup	Port
op-mode 1	Setup_01	Enclosure

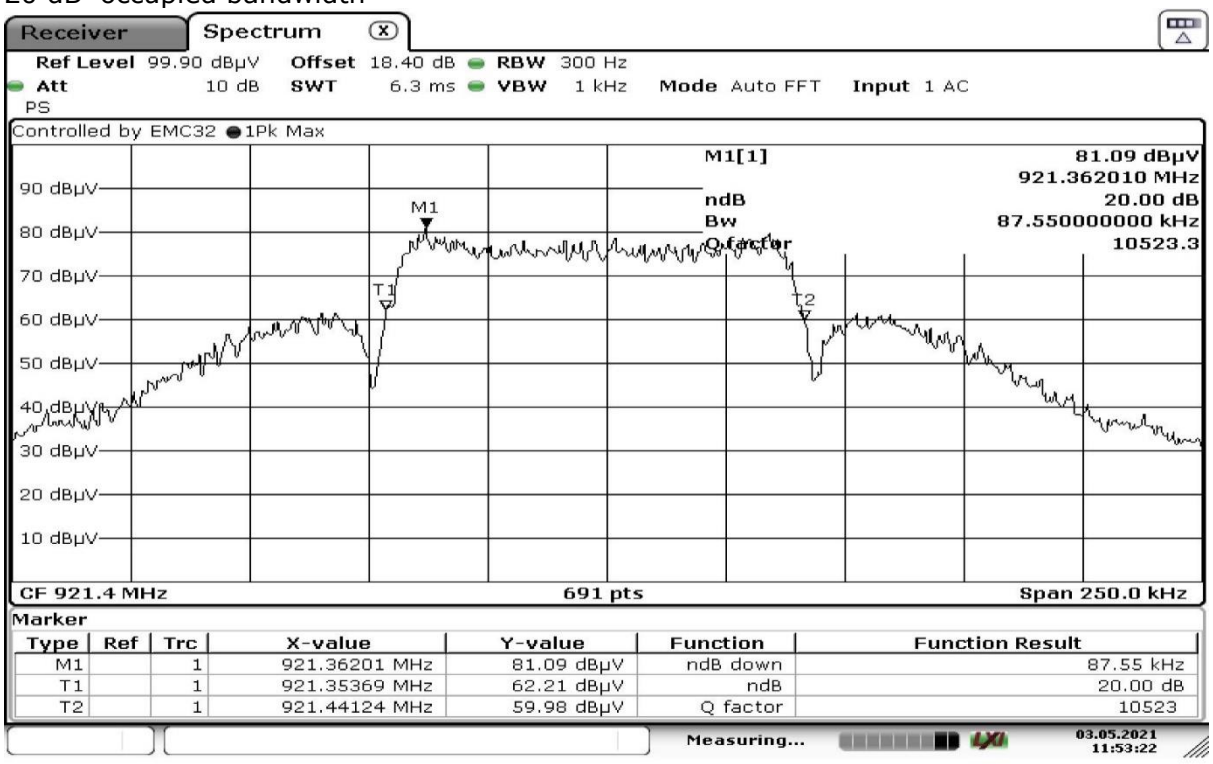
Cannel Frequency [MHz]	20 dB bandwidth [kHz]	99% bandwidth [kHz]
921.4	87.55	106.37

TEST RESULT: OCCUPIED BANDWIDTH

FCC Part 15, Subpart C	Op. Mode	Result
	op-mode 1	performed

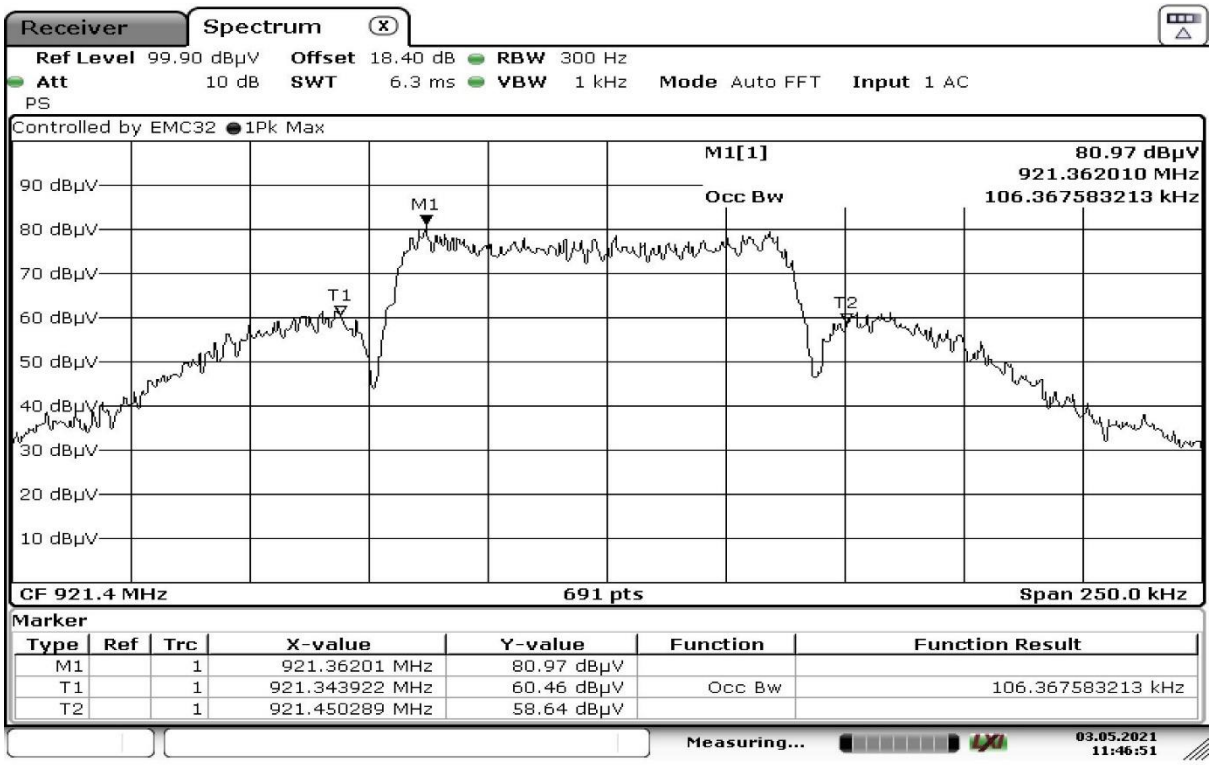
MEASUREMENT PLOTS OCCUPIED BANDWIDTH

20 dB occupied bandwidth



Date: 3.MAY.2021 11:53:22

99% occupied bandwidth between T2 and T1 = 23.83 kHz

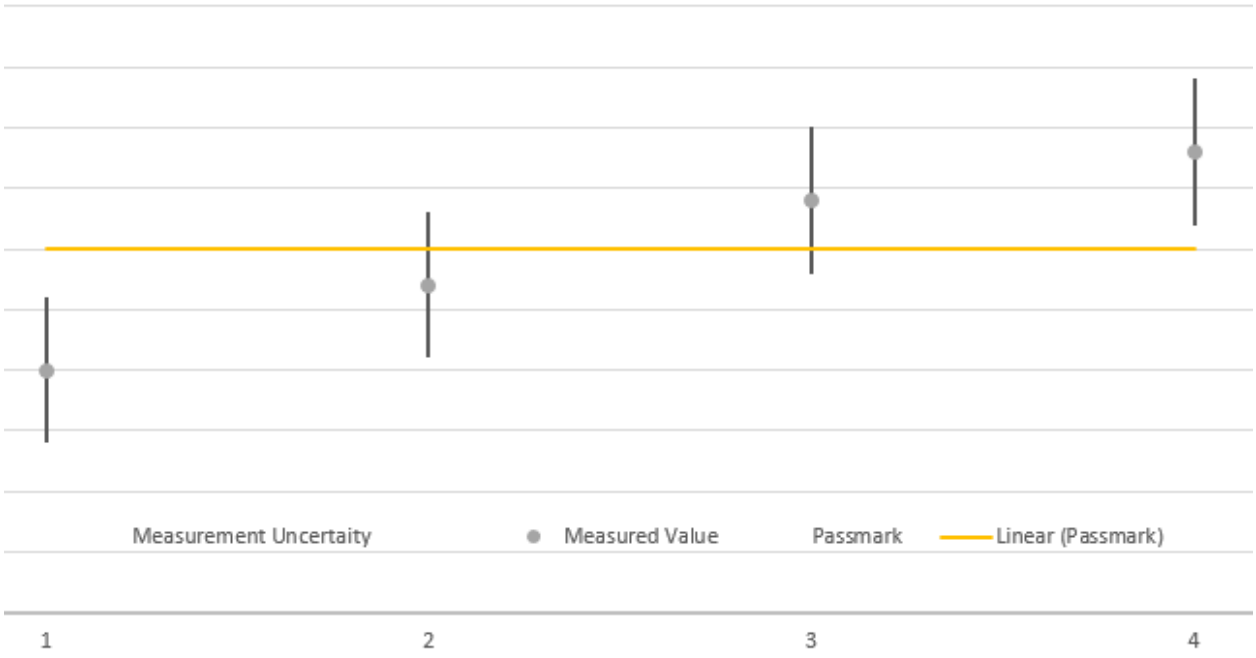


Date: 3.MAY.2021 11:46:51

7 Measurement Uncertainties

Test Case	Parameter	Uncertainty
AC Power Line	Voltage	± 3.4 dB
Field Strength of spurious radiation	Voltage	± 5.5 dB
6 dB / 26 dB / 99% Bandwidth	Power Frequency	± 2.9 dB ± 11.2 kHz
Output Power	Power	± 2.2 dB

The measurement uncertainties for all parameters are calculated with an expansion factor (coverage factor) k = 1.96. This means, that the true value is in the corresponding interval with a probability of 95 %.



The verdicts in this test report are given according the above diagram:

Case	Measured Value	Uncertainty Range	Verdict
1	below pass mark	below pass mark	Passed
2	below pass mark	within pass mark	Passed
3	above pass mark	within pass mark	Failed
4	above pass mark	above pass mark	Failed

8 Test equipment

1 Radiated Emissions

Lab to perform radiated emission tests

Ref.No.	Device Name	Description	Manufacturer	Serial Number	Last Calibration	Calibration Due
1.1	MFS	Rubidium Frequency Normal MFS	Datum GmbH	002	2020-11	2021-11
1.2	N5000/NP	Filter for EUT, 2 Lines, 250 V, 16 A	ETS-LINDGREN	241515		
1.3	ESW44	EMI Receiver / Spectrum Analyzer	Rohde & Schwarz GmbH & Co. KG	101603	2019-12	2021-12
1.4	Anechoic Chamber 01	SAC/FAR, 10.58 m x 6.38 m x 6.00 m	Frankonia	none	2018-06	2021-06
1.5	FS-Z60	Harmonic Mixer 40 - 60 GHz	Rohde & Schwarz Messgerätebau GmbH	100178	2020-03	2023-03
1.6	FS-Z220	Harmonic Mixer 140 - 220 GHz	Rohde & Schwarz Messgerätebau GmbH	101005	2020-03	2023-03
1.7	SGH-05	Standard Gain / Pyramidal Horn Antenna (140 - 220 GHz)	RPG-Radiometer Physics GmbH	075		
1.8	HL 562 ULTRALOG	Biconical-log-per antenna (30 MHz - 3 GHz) with HL 562E biconicals	Rohde & Schwarz GmbH & Co. KG	830547/003	2018-07	2021-07
1.9	AMF-7D00101800-30-10P-R	Broadband Amplifier 100 MHz - 18 GHz	Miteq			
1.10	5HC2700/12750-1.5-KK	High Pass Filter	Trilithic	9942012		
1.11	ASP 1.2/1.8-10 kg	Antenna Mast	Maturo GmbH	-		
1.12	Anechoic Chamber 03	FAR, 8.80m x 4.60m x 4.05m (l x w x h)	Albatross Projects	P26971-647-001-PRB		
1.13	Fluke 177	Digital Multimeter 03 (Multimeter)	Fluke Europe B.V.	86670383	2020-04	2022-04
1.14	WRD1920/1980-5/22-5EESD	Tunable Band Reject Filter	Wainwright Instruments GmbH	11		
1.15	TDS 784C	Digital Oscilloscope [SA2] (Aux)	Tektronix	B021311		
1.16	Opus10 THI (8152.00)	T/H Logger 10	Lufft Mess- und Regeltechnik GmbH	12488	2019-06	2021-06

1.17	foRS232 Unit 2	Fibre optic link RS232	PONTIS Messtechnik GmbH	4031516037		
1.18	PONTIS Con4101	PONTIS Camera Controller		6061510370		
1.19	NRVD	Power Meter	Rohde & Schwarz GmbH & Co. KG	828110/016	2020-08	2021-08
1.20	OLS-1 R	Fibre optic link USB 1.1	Ingenieurbüro Scheiba	018		
1.21	HF 906	Double-ridged horn	Rohde & Schwarz	357357/002	2018-09	2021-09
1.22	JS4-18002600-32-5P	Broadband Amplifier 18 GHz - 26 GHz	Miteq	849785		
1.23	FSW 43	Spectrum Analyzer	Rohde & Schwarz	103779	2019-02	2022-03
1.24	EP 1200/B, NA/B1	AC Source, Amplifier with integrated variable Oscillator	Spitzenberger & Spies GmbH & Co. KG	B6278		
1.25	3160-09	Standard Gain / Pyramidal Horn Antenna 26.5 GHz	EMCO Elektronic GmbH	00083069		
1.26	foRS232 Unit 1	Fibre optic link RS232	PONTIS Messtechnik GmbH	4021516036		
1.27	FSP3	Spectrum Analyzer	Rohde & Schwarz GmbH & Co. KG	836722/011		
1.28	WHKX 7.0/18G-8SS	High Pass Filter	Wainwright Instruments GmbH	09		
1.29	DS 420S	Turn Table 2 m diameter	HD GmbH	420/573/99		
1.30	4HC1600/12750-1.5-KK	High Pass Filter	Trilithic	9942011		
1.31	foUSB-M Converter 2	Fibre optic link USB 2.0	PONTIS Messtechnik GmbH	4471520061		
1.32	WRCD1879.8-0.2/40-10EE	Notch Filter Ultra Stable	Wainwright Instruments GmbH	16		
1.33	Temperature Chamber KWP 120/70	Temperature Chamber Weiss 01	Weiss	59226012190010	2020-05	2022-05
1.34	JS4-00102600-42-5A	Broadband Amplifier 30 MHz - 26 GHz	Miteq	619368		
1.35	HL 562 ULTRALOG	Biconical-log-per Antenna (30 MHz - 3 GHz)	Rohde & Schwarz GmbH & Co. KG	100609	2019-05	2022-05
1.36	foCAN (v 4.0)	Fibre optic link CAN	Audivo GmbH (PONTIS EMC)	492 1607 014		
1.37	FS-Z325	Harmonic Mixer 220 - 325 GHz	Rohde & Schwarz Messgerätebau GmbH	101006	2020-03	2023-03

1.38	ESR 7	EMI Receiver / Spectrum Analyzer	Rohde & Schwarz	101424	2021-01	2023-01
1.39	SB4-100.OLD20-3T/10 Airwin 2 x 1.5 kW	Air compressor (oil-free)	airWin Kompressoren UG	901/00503		
1.40	UNI-T UT195E	True RMS Digital Multimeter	UNI-T UNI-TREND TECHNOLOGY (CHINA) CO., LTD.	C190729561		
1.41	foEthernet_M	Fibre optic link Ethernet / Gb-LAN	PONTIS Messtechnik GmbH	4841516022		
1.42	JS4-00101800-35-5P	Broadband Amplifier 30 MHz - 18 GHz	Miteq	896037		
1.43	AS 620 P	Antenna Mast (pneumatic polarisation)	HD GmbH	620/37		
1.44	CMW500	Callbox OIL-RE, SUA-160 MHz	Rohde & Schwarz GmbH & Co. KG	167766-By		
1.45	FSU26	Spectrum Analyser (20 Hz to 26.5 GHz)	Rohde & Schwarz GmbH & Co. KG	100136		
1.46	6005D (30 V / 5 A)	Laboratory Power Supply 120 V 60 Hz	PeakTech	81062045		
1.47	foUSB-M Converter 1	Fibre optic link USB 2.0	Audivo GmbH (PONTIS EMC)	4461520060		
1.48	FS-Z90	Harmonic Mixer 60 - 90 GHz	Rohde & Schwarz Messgerätebau GmbH	101686	2020-03	2023-03
1.49	NRV-Z1	Sensor Head B	Rohde & Schwarz GmbH & Co. KG	827753/006	2020-08	2021-08
1.50	HF 907-2	Double-ridged horn	Rohde & Schwarz	102817	2019-04	2022-04
1.51	foCAN (v 4.0)	Fibre optic link CAN	Audivo GmbH (PONTIS EMC)	492 1607 013		
1.52	PAS 2.5 - 10 kg	Antenna Mast	Maturo GmbH	-		
1.53	AFS42-00101800-25-S-42	Broadband Amplifier 25 MHz - 18 GHz	Miteq	2035324		
1.54	WRCA800/960-0.2/40-6EEK	Tunable Notch Filter	Wainwright Instruments GmbH	20		
1.55	AM 4.0	Antenna Mast 4 m	Maturo GmbH	AM4.0/180/11920513		
1.56	HF 907	Double-ridged horn	Rohde & Schwarz	102444	2018-07	2021-07
1.57	E4408B	Spectrum Analyser (9 kHz to 26.5 GHz)	Agilent Technologies Deutschland GmbH	MY45103714		

2 Radio Lab
Conducted Radio Test Lab

Ref.No.	Device Name	Description	Manufacturer	Serial Number	Last Calibration	Calibration Due
2.1	1575	Broadband Resistive Power Divider DC to 40 GHz	API Weinschel, Inc.	4070		
2.2	FSV30	Signal Analyzer 10 Hz - 30 GHz	Rohde & Schwarz	103005	2020-05	2022-05
2.3	Fluke 177	Digital Multimeter 03 (Multimeter)	Fluke Europe B.V.	86670383	2020-04	2022-04
2.4	SMP03	Signal Generator 2 GHz - 27 GHz	Rohde & Schwarz	833680/003		
2.5	Temperature Chamber KWP 120/70	Temperature Chamber Weiss 01	Weiss	59226012190010	2020-05	2022-05
2.6	FSIQ26	Signal Analyser 20 Hz to 26.5 GHz	Rohde & Schwarz GmbH & Co. KG	840061/005	2019-06	2021-06
2.7	SMB100A	Signal Generator 100 kHz - 40 GHz	Rohde & Schwarz Vertriebs-GmbH	181486	2019-11	2021-11
2.8	Chroma 6404	AC Source	Chroma ATE INC.	64040001304		
2.9	EX520	Digital Multimeter 07	Extech Instruments Corp	06110393	2020-04	2022-04
2.10	Temperature Chamber VT 4002	Temperature Chamber Vötsch 03	Vötsch	58566002150010	2020-05	2022-05
2.11	A8455-4	4 Way Power Divider (SMA)		-		
2.12	Opus10 THI (8152.00)	T/H Logger 03	Lufft Mess- und Regeltechnik GmbH	7482	2019-06	2021-06
2.13	FSU26	Spectrum Analyser (20 Hz to 26.5 GHz)	Rohde & Schwarz GmbH & Co. KG	100136		
2.14	Temperature Chamber VT 4002	Temperature Chamber Vötsch 05	Vötsch	58566080550010	2020-05	2022-05

The calibration interval is the time interval between “Last Calibration” and “Calibration Due”

9 Antenna Factors, Cable Loss and Sample Calculations

This chapter contains the antenna factors with their corresponding path loss of the used measurement path for all antennas as well as the insertion loss of the LISN.

ANTENNA R&S HFH2-Z2 (9 KHZ – 30 MHZ)

Frequency	AF HFH-Z2)	Corr.	cable loss 1 (inside chamber)	cable loss 2 (outside chamber)	cable loss 3 (switch unit)	cable loss 4 (to receiver)	distance corr. (-40 dB/ decade)	d_{Limit} (meas. distance (limit)	d_{used} (meas. distance (used)
MHz	dB (1/m)	dB	dB	dB	dB	dB	dB	m	m
0.009	20.50	-79.6	0.1	0.1	0.1	0.1	-80	300	3
0.01	20.45	-79.6	0.1	0.1	0.1	0.1	-80	300	3
0.015	20.37	-79.6	0.1	0.1	0.1	0.1	-80	300	3
0.02	20.36	-79.6	0.1	0.1	0.1	0.1	-80	300	3
0.025	20.38	-79.6	0.1	0.1	0.1	0.1	-80	300	3
0.03	20.32	-79.6	0.1	0.1	0.1	0.1	-80	300	3
0.05	20.35	-79.6	0.1	0.1	0.1	0.1	-80	300	3
0.08	20.30	-79.6	0.1	0.1	0.1	0.1	-80	300	3
0.1	20.20	-79.6	0.1	0.1	0.1	0.1	-80	300	3
0.2	20.17	-79.6	0.1	0.1	0.1	0.1	-80	300	3
0.3	20.14	-79.6	0.1	0.1	0.1	0.1	-80	300	3
0.49	20.12	-79.6	0.1	0.1	0.1	0.1	-80	300	3
0.490001	20.12	-39.6	0.1	0.1	0.1	0.1	-40	30	3
0.5	20.11	-39.6	0.1	0.1	0.1	0.1	-40	30	3
0.8	20.10	-39.6	0.1	0.1	0.1	0.1	-40	30	3
1	20.09	-39.6	0.1	0.1	0.1	0.1	-40	30	3
2	20.08	-39.6	0.1	0.1	0.1	0.1	-40	30	3
3	20.06	-39.6	0.1	0.1	0.1	0.1	-40	30	3
4	20.05	-39.5	0.2	0.1	0.1	0.1	-40	30	3
5	20.05	-39.5	0.2	0.1	0.1	0.1	-40	30	3
6	20.02	-39.5	0.2	0.1	0.1	0.1	-40	30	3
8	19.95	-39.5	0.2	0.1	0.1	0.1	-40	30	3
10	19.83	-39.4	0.2	0.1	0.2	0.1	-40	30	3
12	19.71	-39.4	0.2	0.1	0.2	0.1	-40	30	3
14	19.54	-39.4	0.2	0.1	0.2	0.1	-40	30	3
16	19.53	-39.3	0.3	0.1	0.2	0.1	-40	30	3
18	19.50	-39.3	0.3	0.1	0.2	0.1	-40	30	3
20	19.57	-39.3	0.3	0.1	0.2	0.1	-40	30	3
22	19.61	-39.3	0.3	0.1	0.2	0.1	-40	30	3
24	19.61	-39.3	0.3	0.1	0.2	0.1	-40	30	3
26	19.54	-39.3	0.3	0.1	0.2	0.1	-40	30	3
28	19.46	-39.2	0.3	0.1	0.3	0.1	-40	30	3
30	19.73	-39.1	0.4	0.1	0.3	0.1	-40	30	3

Sample calculation

E (dB µV/m) = U (dB µV) + AF (dB 1/m) + Corr. (dB)
U = Receiver reading
AF = Antenna factor
Corr. = sum of single correction factors of used cables, switch unit, distance correction, amplifier (if applicable)
distance correction = -40 * LOG (d_{Limit}/ d_{used})
Linear interpolation will be used for frequencies in between the values in the table.
Table shows an extract of values

ANTENNA R&S HL562 (30 MHZ – 1 GHZ)

(d_{Limit} = 3 m)

Frequency	AF R&S HL562	Corr.	cable loss 1 (inside chamber)	cable loss 2 (outside chamber)	cable loss 3 (switch unit)	cable loss 4 (to receiver)	distance corr. (-20 dB/ decade)	d_{Limit} (meas. distance (limit)	d_{used} (meas. distance (used)
MHz	dB (1/m)	dB	dB	dB	dB	dB	dB	m	m
30	18.6	0.6	0.29	0.04	0.23	0.02	0.0	3	3
50	6.0	0.9	0.39	0.09	0.32	0.08	0.0	3	3
100	9.7	1.2	0.56	0.14	0.47	0.08	0.0	3	3
150	7.9	1.6	0.73	0.20	0.59	0.12	0.0	3	3
200	7.6	1.9	0.84	0.21	0.70	0.11	0.0	3	3
250	9.5	2.1	0.98	0.24	0.80	0.13	0.0	3	3
300	11.0	2.3	1.04	0.26	0.89	0.15	0.0	3	3
350	12.4	2.6	1.18	0.31	0.96	0.13	0.0	3	3
400	13.6	2.9	1.28	0.35	1.03	0.19	0.0	3	3
450	14.7	3.1	1.39	0.38	1.11	0.22	0.0	3	3
500	15.6	3.2	1.44	0.39	1.20	0.19	0.0	3	3
550	16.3	3.5	1.55	0.46	1.24	0.23	0.0	3	3
600	17.2	3.5	1.59	0.43	1.29	0.23	0.0	3	3
650	18.1	3.6	1.67	0.34	1.35	0.22	0.0	3	3
700	18.5	3.6	1.67	0.42	1.41	0.15	0.0	3	3
750	19.1	4.1	1.87	0.54	1.46	0.25	0.0	3	3
800	19.6	4.1	1.90	0.46	1.51	0.25	0.0	3	3
850	20.1	4.4	1.99	0.60	1.56	0.27	0.0	3	3
900	20.8	4.7	2.14	0.60	1.63	0.29	0.0	3	3
950	21.1	4.8	2.22	0.60	1.66	0.33	0.0	3	3
1000	21.6	4.9	2.23	0.61	1.71	0.30	0.0	3	3

(d_{Limit} = 10 m)

30	18.6	-9.9	0.29	0.04	0.23	0.02	-10.5	10	3
50	6.0	-9.6	0.39	0.09	0.32	0.08	-10.5	10	3
100	9.7	-9.2	0.56	0.14	0.47	0.08	-10.5	10	3
150	7.9	-8.8	0.73	0.20	0.59	0.12	-10.5	10	3
200	7.6	-8.6	0.84	0.21	0.70	0.11	-10.5	10	3
250	9.5	-8.3	0.98	0.24	0.80	0.13	-10.5	10	3
300	11.0	-8.1	1.04	0.26	0.89	0.15	-10.5	10	3
350	12.4	-7.9	1.18	0.31	0.96	0.13	-10.5	10	3
400	13.6	-7.6	1.28	0.35	1.03	0.19	-10.5	10	3
450	14.7	-7.4	1.39	0.38	1.11	0.22	-10.5	10	3
500	15.6	-7.2	1.44	0.39	1.20	0.19	-10.5	10	3
550	16.3	-7.0	1.55	0.46	1.24	0.23	-10.5	10	3
600	17.2	-6.9	1.59	0.43	1.29	0.23	-10.5	10	3
650	18.1	-6.9	1.67	0.34	1.35	0.22	-10.5	10	3
700	18.5	-6.8	1.67	0.42	1.41	0.15	-10.5	10	3
750	19.1	-6.3	1.87	0.54	1.46	0.25	-10.5	10	3
800	19.6	-6.3	1.90	0.46	1.51	0.25	-10.5	10	3
850	20.1	-6.0	1.99	0.60	1.56	0.27	-10.5	10	3
900	20.8	-5.8	2.14	0.60	1.63	0.29	-10.5	10	3
950	21.1	-5.6	2.22	0.60	1.66	0.33	-10.5	10	3
1000	21.6	-5.6	2.23	0.61	1.71	0.30	-10.5	10	3

Sample calculation

E (dB µV/m) = U (dB µV) + AF (dB 1/m) + Corr. (dB)
U = Receiver reading
AF = Antenna factor
Corr. = sum of single correction factors of used cables, switch unit, distance correction, amplifier (if applicable)
distance correction = -20 * LOG (d_{Limit}/ d_{used})
Linear interpolation will be used for frequencies in between the values in the table.
Tables show an extract of values.

ANTENNA R&S HF907 (1 GHZ – 18 GHZ)

Frequency	AF R&S HF907	Corr.	cable loss 1 (relay + cable inside chamber)	cable loss 2 (outside chamber)	cable loss 3 (switch unit, atten-uator & pre-amp)	cable loss 4 (to receiver)		
MHz	dB (1/m)	dB	dB	dB	dB	dB		
1000	24.4	-19.4	0.99	0.31	-21.51	0.79		
2000	28.5	-17.4	1.44	0.44	-20.63	1.38		
3000	31.0	-16.1	1.87	0.53	-19.85	1.33		
4000	33.1	-14.7	2.41	0.67	-19.13	1.31		
5000	34.4	-13.7	2.78	0.86	-18.71	1.40		
6000	34.7	-12.7	2.74	0.90	-17.83	1.47		
7000	35.6	-11.0	2.82	0.86	-16.19	1.46		

Frequency	AF R&S HF907	Corr.	cable loss 1 (relay inside chamber)	cable loss 2 (inside chamber)	cable loss 3 (outside chamber)	cable loss 4 (switch unit, atten-uator & pre-amp)	cable loss 5 (to receiver)	used for FCC 15.247
MHz	dB (1/m)	dB	dB	dB	dB	dB	dB	
3000	31.0	-23.4	0.47	1.87	0.53	-27.58	1.33	
4000	33.1	-23.3	0.56	2.41	0.67	-28.23	1.31	
5000	34.4	-21.7	0.61	2.78	0.86	-27.35	1.40	
6000	34.7	-21.2	0.58	2.74	0.90	-26.89	1.47	
7000	35.6	-19.8	0.66	2.82	0.86	-25.58	1.46	

Frequency	AF R&S HF907	Corr.	cable loss 1 (relay inside chamber)	cable loss 2 (High Pass)	cable loss 3 (pre-amp)	cable loss 4 (inside chamber)	cable loss 5 (outside chamber)	cable loss 6 (to receiver)
MHz	dB (1/m)	dB	dB	dB	dB	dB	dB	dB
7000	35.6	-57.3	0.56	1.28	-62.72	2.66	0.94	1.46
8000	36.3	-56.3	0.69	0.71	-61.49	2.84	1.00	1.53
9000	37.1	-55.3	0.68	0.65	-60.80	3.06	1.09	1.60
10000	37.5	-56.2	0.70	0.54	-61.91	3.28	1.20	1.67
11000	37.5	-55.3	0.80	0.61	-61.40	3.43	1.27	1.70
12000	37.6	-53.7	0.84	0.42	-59.70	3.53	1.26	1.73
13000	38.2	-53.5	0.83	0.44	-59.81	3.75	1.32	1.83
14000	39.9	-56.3	0.91	0.53	-63.03	3.91	1.40	1.77
15000	40.9	-54.1	0.98	0.54	-61.05	4.02	1.44	1.83
16000	41.3	-54.1	1.23	0.49	-61.51	4.17	1.51	1.85
17000	42.8	-54.4	1.36	0.76	-62.36	4.34	1.53	2.00
18000	44.2	-54.7	1.70	0.53	-62.88	4.41	1.55	1.91

Sample calculation

E (dB µV/m) = U (dB µV) + AF (dB 1/m) + Corr. (dB)
U = Receiver reading
AF = Antenna factor
Corr. = sum of single correction factors of used cables, switch unit, distance correction, amplifier (if applicable)
Linear interpolation will be used for frequencies in between the values in the table.
Tables show an extract of values.

ANTENNA EMCO 3160-09 (18 GHZ – 26.5 GHZ)

Frequency	AF EMCO 3160-09	Corr.	cable loss 1 (inside chamber)	cable loss 2 (pre-amp)	cable loss 3 (inside chamber)	cable loss 4 (switch unit)	cable loss 5 (to receiver)
MHz	dB (1/m)	dB	dB	dB	dB	dB	dB
18000	40.2	-23.5	0.72	-35.85	6.20	2.81	2.65
18500	40.2	-23.2	0.69	-35.71	6.46	2.76	2.59
19000	40.2	-22.0	0.76	-35.44	6.69	3.15	2.79
19500	40.3	-21.3	0.74	-35.07	7.04	3.11	2.91
20000	40.3	-20.3	0.72	-34.49	7.30	3.07	3.05
20500	40.3	-19.9	0.78	-34.46	7.48	3.12	3.15
21000	40.3	-19.1	0.87	-34.07	7.61	3.20	3.33
21500	40.3	-19.1	0.90	-33.96	7.47	3.28	3.19
22000	40.3	-18.7	0.89	-33.57	7.34	3.35	3.28
22500	40.4	-19.0	0.87	-33.66	7.06	3.75	2.94
23000	40.4	-19.5	0.88	-33.75	6.92	3.77	2.70
23500	40.4	-19.3	0.90	-33.35	6.99	3.52	2.66
24000	40.4	-19.8	0.88	-33.99	6.88	3.88	2.58
24500	40.4	-19.5	0.91	-33.89	7.01	3.93	2.51
25000	40.4	-19.3	0.88	-33.00	6.72	3.96	2.14
25500	40.5	-20.4	0.89	-34.07	6.90	3.66	2.22
26000	40.5	-21.3	0.86	-35.11	7.02	3.69	2.28
26500	40.5	-21.1	0.90	-35.20	7.15	3.91	2.36

Sample calculation

E (dB µV/m) = U (dB µV) + AF (dB 1/m) + Corr. (dB)
U = Receiver reading
AF = Antenna factor
Corr. = sum of single correction factors of used cables, switch unit, distance correction, amplifier (if applicable)
Linear interpolation will be used for frequencies in between the values in the table.
Table shows an extract of values.

10 Photo Report

Photos are included in an external report.