

Test Report

Report Number:

F251879E1

Equipment under Test (EUT):

WBS

Applicant:

eologix sensor technology flexco

Manufacturer:

eologix sensor technology flexco



Deutsche
Akkreditierungsstelle
D-PL-17186-01-00

References

- [1] **ANSI C63.10-2020 + Cor. 1-2023 + C63.10a-2024 + Errata to C63.10a-2024***, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices
*Remark: This standard is not in the annex of the laboratory yet
- [2] **FCC CFR 47 Part 15**, Radio Frequency Devices
- [3] **558074 D01 15.247 Meas Guidance v05r02 (April 2019)**, GUIDANCE FOR COMPLIANCE MEASUREMENTS ON DIGITAL TRANSMISSION SYSTEM, FREQUENCY HOPPING SPREAD SPECTRUM SYSTEM, AND HYBRID SYSTEM DEVICES OPERATING UNDER SECTION 15.247 OF THE FCC RULES
- [4] **RSS-247 Issue 4 (2025-7)**, Digital Transmission Systems, Frequency Hopping Systems and Licence-Exempt Local Area Network Devices in 902-928 MHz, 2400-2483.5 MHz, 5150-5350 MHz, and 5470-5895 MHz bands
- [5] **RSS-Gen, Issue 5 Amendment 2 (2021-02)** General Requirements for Compliance of Radio Apparatus

Test Result

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

“Passed” indicates that the equipment under test conforms with the relevant limits of the testing standard without taking any measurement uncertainty into account as stated in [1]. However, the measurement uncertainty is calculated and shown in this test report.

Tested and written
by:



Sebastian KREHS
10.08.2026
Signature

Reviewed and
approved by:



Bernward ROHDE
12.08.2026
Signature

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1 Identification

1.1 Applicant

Name:	eologix sensor technology flexco
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Country:	Austria
Name for contact purposes:	Mr. Michael MOSER
Phone:	+43-316-931215-100
eMail address:	office@eologix-ping.com
Applicant represented during the test by the following person:	None

1.2 Manufacturer

Name:	eologix sensor technology flexco
Address:	Waagner-Biro-Str. 124, 8020 Graz
Country:	Austria
Name for contact purposes:	Mr. Michael MOSER
Phone:	+43-316-931215-100
eMail address:	office@eologix-ping.com
Manufacturer represented during the test by the following person:	None

1.3 Test Laboratory

The tests were carried out by: **NMi TESTLAB GmbH formerly PHOENIX TESTLAB GmbH**
Königswinkel 10
32825 Blomberg
Germany

accredited by **Deutsche Akkreditierungsstelle GmbH (DAkkS)** according to DIN EN ISO/IEC 17025:2018. The accreditation is only valid for the scope of accreditation listed in the annex of the certificate D-PL-17186-01-00. FCC Test Firm Designation Number DE0004, FCC Test Firm Registration Number 469623, CAB Identifier DE0003 and ISED# 3469A.

1.4 EUT (Equipment under Test)

Test object: *	WBS – Wireless Blade Sensor for Wind Turbines
Model name: *	WBS
Model number: *	Version 4
Order number: *	-
FCC ID: *	2APYI-WBSU26
IC certification number: *	24932-WBSU26
PMN: *	WBS
HVIN: *	WBS26
FVIN: *	WBS26-W913-26

* Declared by the applicant

	EUT number		
	1	2	3
Serial number: *	FE20F7	FE20F8	-
PCB identifier: *	WBS	WBS	-
Hardware version: *	WBSV2.6	WBSV2.6	-
Software version: *	WBS-W913-26	WBS-W913-26	-

* Declared by the applicant

2 EUTs were used for the tests. In the overview (chapter 4) is shown which EUT was used for each test case.

Note: NMI TESTLAB GmbH does not take samples. The samples used for tests are provided exclusively by the applicant.

1.5 Technical Data of Equipment

Technical data			
Rated RF output power: *	<10 dBm		
Number of channels: *	1		
Channel spacing: *	None		
Frequency range: *	913 MHz		
Modulation: *	2-FSK		
Bitrate of transmitter: *	250 kBit per second		
Power supply EUT: *	Energy buffer charged by integrated photovoltaic cells. For testing a power supply was connected.		
Supply voltage EUT: *	$U_{nom} = 3.3 V_{DC}$	$U_{min} = 3.0 V_{DC}$	$U_{max} = 3.6 V_{DC}$
Temperature range: *	-40 °C to +60 °C		
Lowest / highest internal frequency: *	DC to 913.2 MHz		

* Declared by the applicant

1.5.1 Ancillary Equipment / Equipment used for testing

Equipment used for testing	
Laptop PC * ²	Fujitsu Lifebook U Series
IR transceiver * ¹	IR transceiver to set the EUT into test mode

*¹ Provided by the applicant

*² Provided by the laboratory

Ancillary Equipment	
-	-
-	-

1.6 Dates

Date of receipt of test sample:	16.06.2026
Start of test:	19.06.2026
End of test:	22.06.2026

2 Operational States

2.1 Description of function of the EUT

The EUT is an autonomous sensor for icing detection and temperature measurement on the surface of wind turbine rotor blades. The EUT transmits the data to a receiving unit.

During all tests the EUT was supplied by 3.6 V_{DC} by a temporary DC power line.

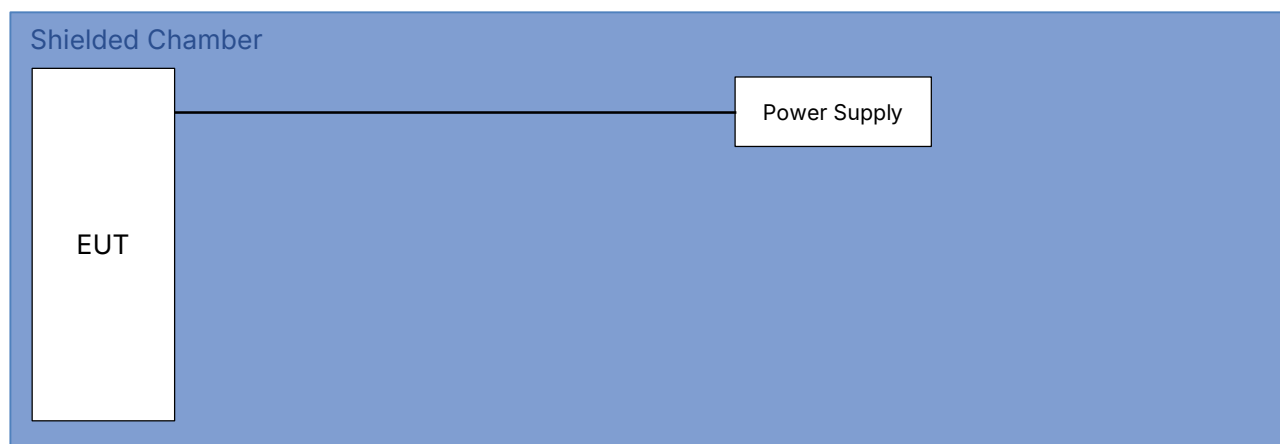
2.1.1 Operation modes

To set the EUT into operation mode a terminal connection via IrDA was established and the EUT was set via the command "FF 00 07 18 00 00 B8 B7" into continuous transmit mode with pseudorandom data (operation mode 1).

2.1.2 Block Diagram (Radiated)



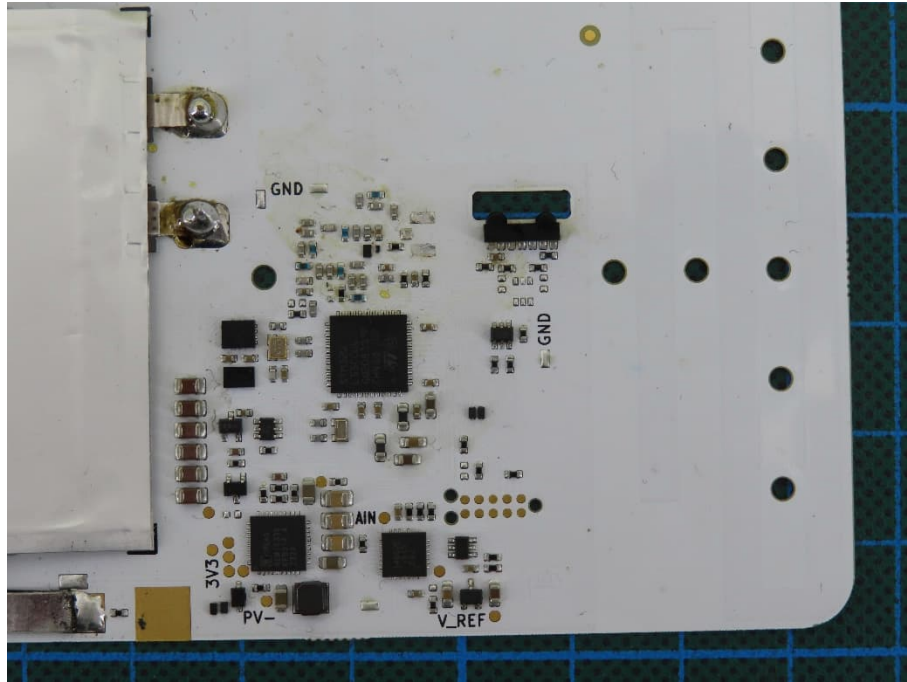
2.1.3 Block Diagram (Conducted)



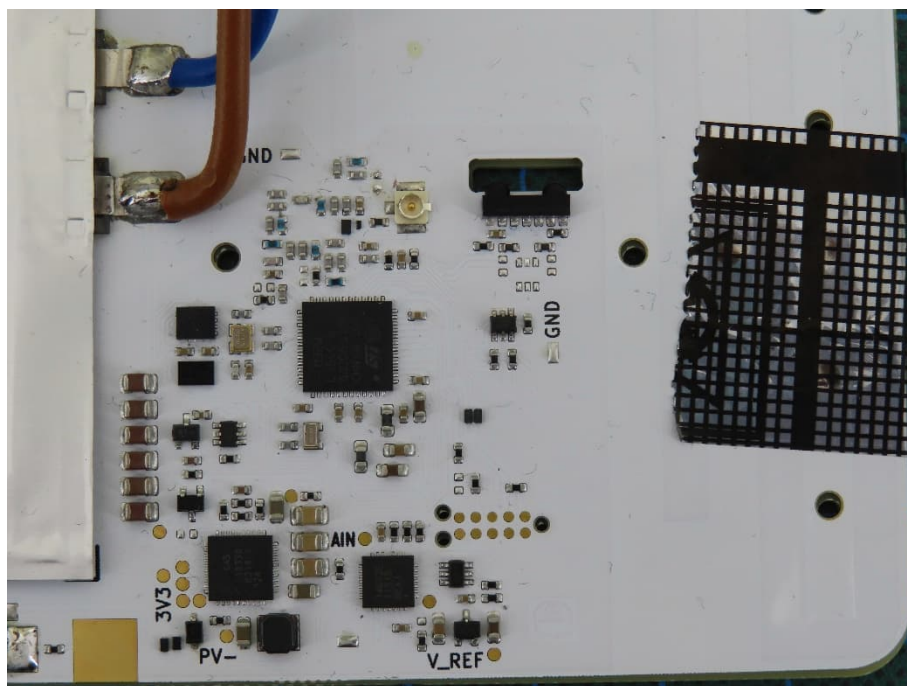
3 Additional Information

The EUT was not labeled as required by FCC / IC.

A temporary antenna connector was installed on EUT 2 by the applicant for the conducted tests.



EUT 1, radiated test sample



EUT 2, conducted test sample

4 Overview

Application	Frequency range [MHz]	FCC 47 CFR Part 15 section [2]	RSS-247 [4] RSS-Gen [5]	Tested EUT	Status
Maximum peak conducted output power	902 - 928	15.247 (b) (3), (4)	6.3.2 [4]	2	Passed
Maximum (average) conducted output power	902 - 928	15.247 (b) (3), (4)	6.3.2 [4]	2	Passed
DTS Bandwidth / 99% Bandwidth	902 - 928	15.247 (a) (2)	6.3.1 [4]	2	Passed
Peak Power Spectral Density	902 - 928	15.247 (e)	6.3.1 [4]	2	Passed
Average Power Spectral Density	902 - 928	15.247 (e)	6.3.1 [4]	2	Passed
Band edge compliance	902 - 928	15.247 (d) 15.205 (a) 15.209 (a)	6.6 [4]	2	Passed
Maximum unwanted emissions	0.009 – 10,000*	15.247 (d) 15.205 (a) 15.209 (a)	8.9 [5]	1	Passed* ¹
Antenna Requirement	-	15.203 15.247 (b)	6.8 [5] 6.5 (c) (ii) [4]	-	Passed
Conducted emissions on supply line	0.15 – 30	15.207 (a)	8.8 [5]	-	Not applicable* ²

*¹: As declared by the applicant the highest radio frequency of the EUT is 913 MHz. Therefore, the radiated emission measurement must be carried out up to the 10th of the highest radio frequency, in this case 10 GHz.

*²: Not applicable because the EUT is battery powered.

5 Results

5.1 Test setups

5.1.1 Radiated: 9 kHz to 30 MHz

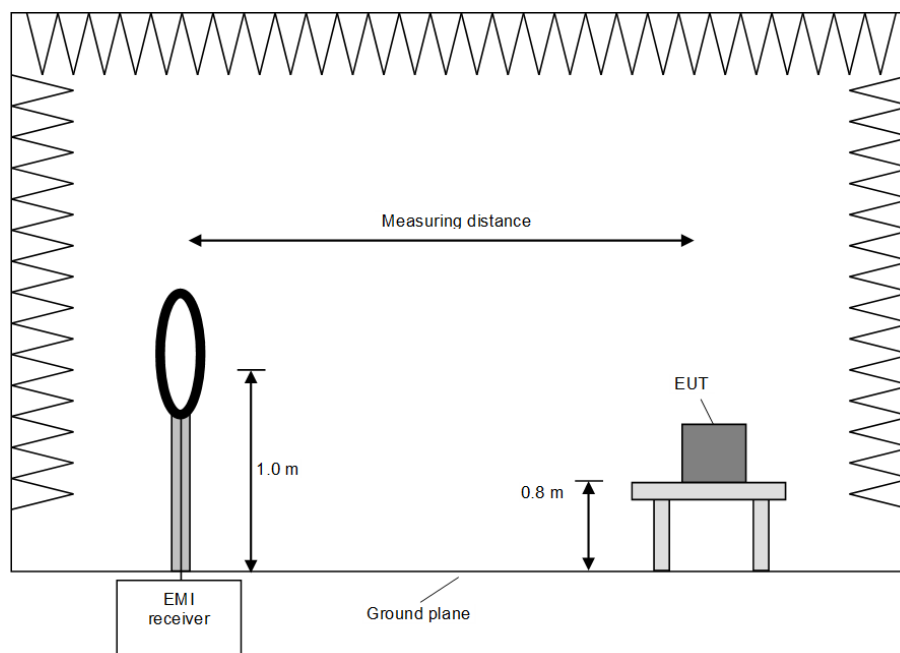
5.1.1.1 Preliminary measurement 9 kHz to 30 MHz

In the first stage a preliminary measurement is performed in a semi-anechoic chamber at a measuring distance of 3 meters. Table-top devices are 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 are placed directly on the turntable / ground plane. The setup of the equipment under test is in accordance with [1].

The frequency range 9 kHz to 30 MHz is monitored with an EMI receiver while the system and its cables are manipulated to find out the configuration with the maximum emission levels if applicable. The EMI receiver is set to MAX hold mode. The EUT and the measuring antenna are rotated around their vertical axis to find the maximum emission levels.

The resolution bandwidth of the EMI receiver is set to the following values:

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



Procedure preliminary measurement:

Pre-scans are performed in the frequency range 9 kHz to 150 kHz and 150 kHz to 30 MHz.

The following procedure is used:

- 1) Monitor the frequency range with the measuring antenna facing the EUT and an EUT / turntable azimuth of 0 °.
- 2) Manipulate the system cables to produce the maximum levels of emissions.
- 3) Rotate the EUT by 360 ° to maximize the detected signals.
- 4) Measure the frequencies of the highest detected emissions with a lower span and resolution bandwidth to increase the accuracy and note the frequency values.
- 5) If the EUT is portable or ceiling mounted, repeat steps 1 to 4 with other orientations (x,y,z) of the EUT.
- 6) Rotate the measuring antenna and repeat steps 1 to 5.

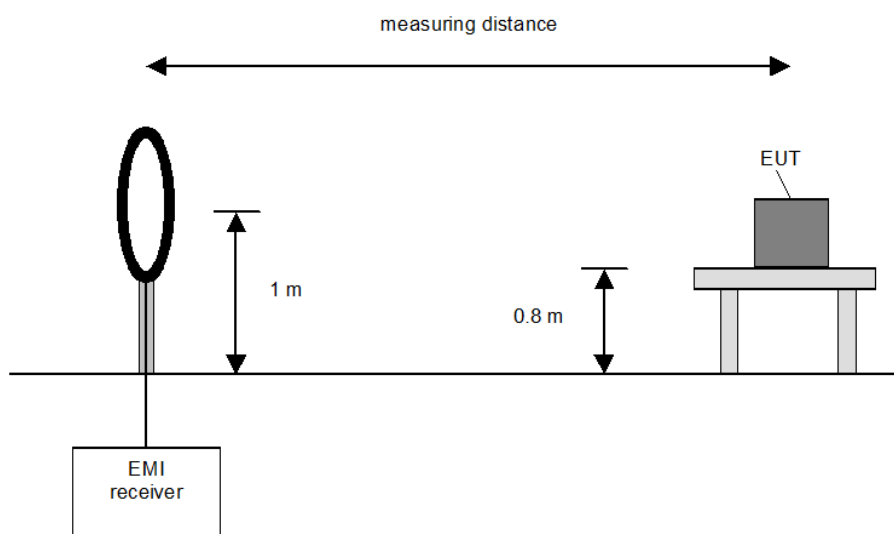
5.1.1.2 Final measurement 9 kHz to 30 MHz

In the second stage a final measurement is performed on an open area test site with no conducting ground plane at a measuring distance of 3 m, 10 m, or 30 m. If the standard requires larger measuring distances for a given frequency, the results are extrapolated according to section 15.31 (f) (2) [2]. The final measurement is performed with an 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 is used according section 15.209 (d) [2].

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

The resolution bandwidth of the EMI receiver is set to the following values:

Frequency range	Resolution bandwidth	Measuring time
9 kHz to 150 kHz	200 Hz	1 s
150 kHz to 30 MHz	9 kHz	1 s



Procedure final measurement:

The following procedure is used:

- 1) Monitor the selected frequencies from the preliminary measurement with the measuring antenna facing the EUT and an EUT azimuth of 0 °.
- 2) Rotate the EUT by 360 ° to maximize the detected signals.
- 3) Rotate the measuring antenna and repeat steps 1 to 2 until the maximum value is found and note it.
- 4) If the EUT is portable or ceiling mounted, repeat steps 1 to 3 with other orientations (x,y,z) of the EUT.

5.1.2 Radiated: 30 MHz to 1 GHz

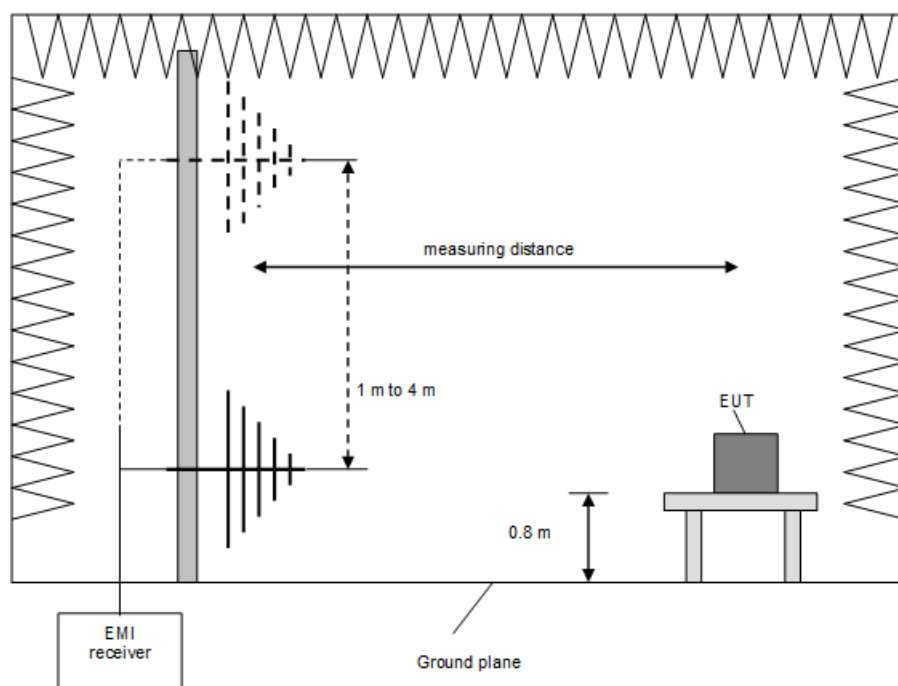
5.1.2.1 Preliminary and final measurement 30 MHz to 1 GHz

The preliminary and final measurements are performed in a semi-anechoic chamber with a metal ground plane at a measuring distance of 3 meters. Table-top devices are 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 are placed directly on the turntable / ground plane. The setup of the equipment under test is in accordance with [1].

During the tests the EUT is rotated in the range of 0 ° to 360 °, the measuring antenna is set to horizontal and vertical polarization 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 is set to the following values:

Test	Frequency range	Step-size	Resolution bandwidth	Measuring time	Detector
Preliminary measurement	30 MHz to 1 GHz	30 kHz	120 kHz	-	Peak Average
Frequency peak search	± 120 kHz	10 kHz	120 kHz	1 s	Peak
Final measurement	30 MHz to 1 GHz	-	120 kHz	1 s	QuasiPeak



Procedure preliminary measurement:

The following procedure is used:

- 1) Set the measuring antenna to 1 m height.
- 2) Monitor the frequency range at horizontal polarization of the measuring antenna and an EUT / turntable azimuth of 0 °.
- 3) Rotate the EUT by 360° to maximize the detected signals.
- 4) Repeat steps 2 to 3 with the vertical polarization of the measuring antenna.
- 5) Increase the height of the measuring antenna for 0.5 m and repeat steps 2 to 4 until the final height of 4 m is reached.
- 6) The highest values for each frequency are saved by the software, including the measuring antenna height and polarization and the turntable azimuth for that value.

Procedure final measurement:

The following procedure is used:

- 1) Select the highest frequency peaks (lowest margin to the limit) for the final measurement.
- 2) The software determines the exact peak frequencies by doing a partial scan with reduced step size of the pre-scan of the selected peaks.
- 3) If the EUT is portable or ceiling mounted, find the worst-case EUT orientation (x,y,z) for the final test.
- 4) The worst-case measuring antenna height is found via varying the height by +/- 0.5 m from the value obtained in the preliminary measurement while monitoring the emission level.
- 5) The worst-case turntable position is found via varying the turntable azimuth by +/- 30° from the value obtained in the preliminary measurement while monitoring the emission level.
- 6) The final measurement is performed at the worst-case measuring antenna height and the worst-case turntable azimuth.
- 7) Steps 2 to 6 are repeated for each frequency peak selected in step 1.

5.1.3 Radiated: 1 GHz to 40 GHz

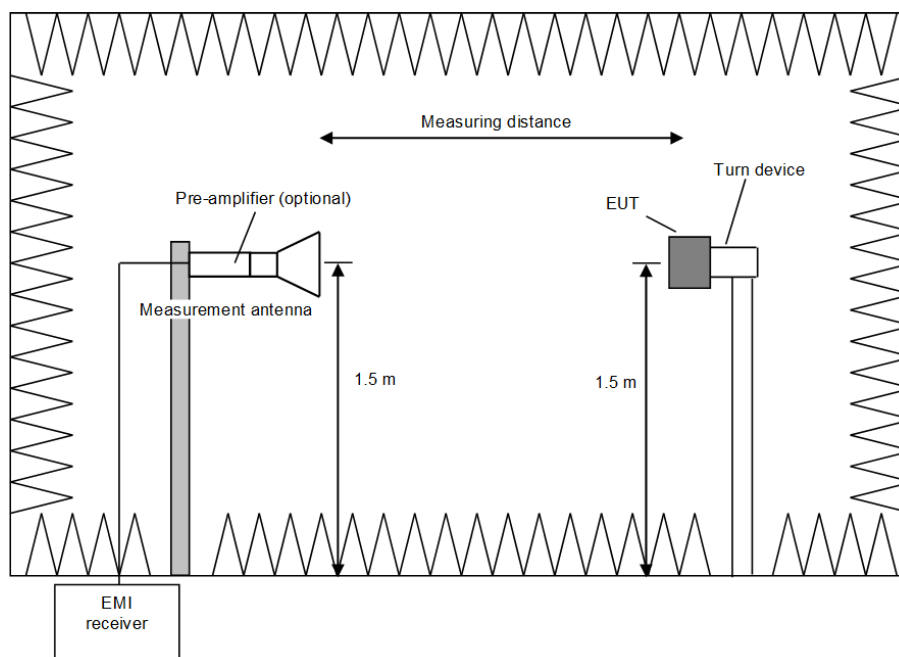
5.1.3.1 Preliminary and final measurement 1 to 40 GHz

The preliminary and final measurements are performed in a fully anechoic chamber at a measuring distance of 3 meters. Table-top devices are set up on a non-conducting turn device at the height of 1.5 m. The setup of the equipment under test is in accordance with [1].

During the tests the EUT is rotated in the range of 0 ° to 360 ° and the measuring antenna is set to horizontal and vertical polarization to find the maximum level of emissions. After these steps, the measurement is repeated after reorientating the EUT in 30 ° steps.

The resolution bandwidth of the EMI receiver is set to the following values:

Test	Frequency range	Step-size	Resolution bandwidth	Measuring time	Detector
Preliminary measurement	1 - 40 GHz	250 kHz	1 MHz	-	Peak Average
Final measurement	1 - 40 GHz	-	1 MHz	100 ms	Peak Average



Procedure preliminary measurement:

The following procedure is used:

- 1) Monitor the frequency range at horizontal polarisation of the measuring antenna and an EUT / turntable azimuth of 0°.
- 2) Rotate the EUT by 360° to maximize the detected signals.
- 3) Repeat steps 1 to 2 with the vertical polarisation of the measuring antenna.
- 4) Repeat steps 1 to 3 with the EUT reorientated by an angle of 30° (60°, 90°, 120° and 150°), according to 6.6.5.4 in [1].
- 5) The highest values for each frequency are saved by the software, including the measuring antenna polarization, the turntable azimuth and the turn device elevation for that value.

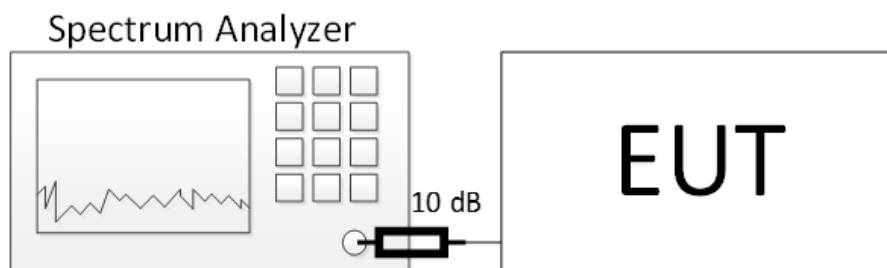
Procedure final measurement:

The following procedure is used:

- 1) Set the turntable and the turn device to the position which leads to the highest emission for the first frequency identified in the preliminary measurements.
- 2) Set the measurement antenna to the polarisation which leads to the highest emission for the first frequency identified in the preliminary measurements.
- 3) Set the spectrum analyser to EMI mode with Peak and Average detector activated.
- 4) The worst-case turntable position is found via varying the turntable azimuth by +/- 30° from the value obtained in the preliminary measurement while monitoring the emission level.
- 5) The final measurement is performed at the worst-case turntable azimuth.
- 6) Repeat steps 1 to 5 for each frequency detected during the preliminary measurements.

5.1.4 Conducted: Antenna port

Test setup (conducted)		
Used	Antenna connector	Comment
☒	Temporary antenna connector	As provided by the applicant
☐	Normal antenna connector	-



The 10 dB external attenuation is considered in all relevant plots

5.2 Transmit antenna performance considerations

Test setup (Transmit antenna performance considerations)		
Integral antenna	Antenna gain ≤ 6dBi	Comment
☒	☒	No output power reduction necessary

Remark: Information has been taken from the antenna data sheet provided by the applicant.

5.3 DTS bandwidth

5.3.1 Test setup (DTS bandwidth)

Test setup (DTS bandwidth)			
Used	Setup	See sub-clause	Comment
☐	Radiated: 1 GHz to 40 GHz	-	-
☒	Conducted: Antenna port	5.1.4	-

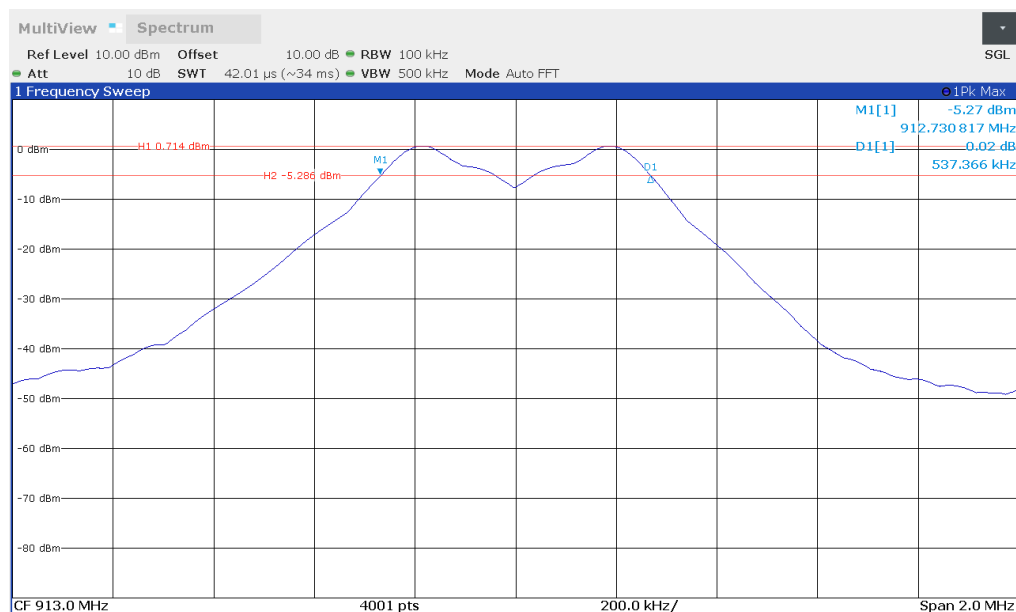
5.3.2 Test method (DTS bandwidth)

Test method (DTS bandwidth)				
Used	Sub-Clause [1]	Name of method	Applicability	Comment
☒	11.8.1	Option 1	No limitations	-
☐	11.8.2	Option 2	No limitations	6 dB down function

5.3.3 Test results (DTS bandwidth)

Ambient temperature:	23 °C
Relative humidity:	76 %

Date:	22.06.2026
Tested by:	S. KREHS



Operation mode	DTS bandwidth [MHz]	Minimum DTS bandwidth limit [MHz]
1	0.537366	0.5

Test result: Passed

Test equipment (please refer to chapter 7 for details)
1

5.4 Occupied bandwidth – power bandwidth (99%)

5.4.1 Test Setup (Occupied bandwidth – power bandwidth (99%))

Test setup (Occupied bandwidth – power bandwidth (99%))			
Used	Setup	See sub-clause	Comment
☐	Radiated: 1 GHz to 40 GHz	-	-
☒	Conducted: Antenna port	5.1.4	-

5.4.2 Test method (Occupied bandwidth – power bandwidth (99%))

Test method (Occupied bandwidth – power bandwidth (99%))				
Used	Sub-Clause [1]	Name of method	Applicability	Comment
☐	6.9.2	Relative measurement procedure	-	n-dB down
☒	6.9.3	Power bandwidth (99%)	*1	99% power function

*1 See RSS-GEN Issue 5 (2018-05) sub-clause 6.7 for details.

5.4.3 Test results (Occupied bandwidth – power bandwidth (99%))

Ambient temperature:	23 °C
Relative humidity:	76 %

Date:	22.06.2026
Tested by:	S. KREHS



Operation mode	99% bandwidth [MHz]
1	0.636503

Test result: Passed

Test equipment (please refer to chapter 7 for details)
1

5.5 DTS fundamental emission output power

5.5.1 Test setup (DTS fundamental emission output power)

Test setup (DTS fundamental emission output power)			
Used	Setup	See sub-clause	Comment
☐	Radiated: 1 GHz to 40 GHz	-	-
☒	Conducted: Antenna port	5.1.4	-

5.5.2 Test method (DTS fundamental emission output power)

Test method (Maximum peak conducted output power)				
Used	Sub-Clause [1]	Name of method	Applicability	Comment
☒	11.9.1.1	RBW $\geq$ DTS bandwidth	-	-
☐	11.9.1.2	PKPM1 Peak power meter method*1	-	-

*1 VBW of the peak power meter must be $>$ OBW of the fundamental.

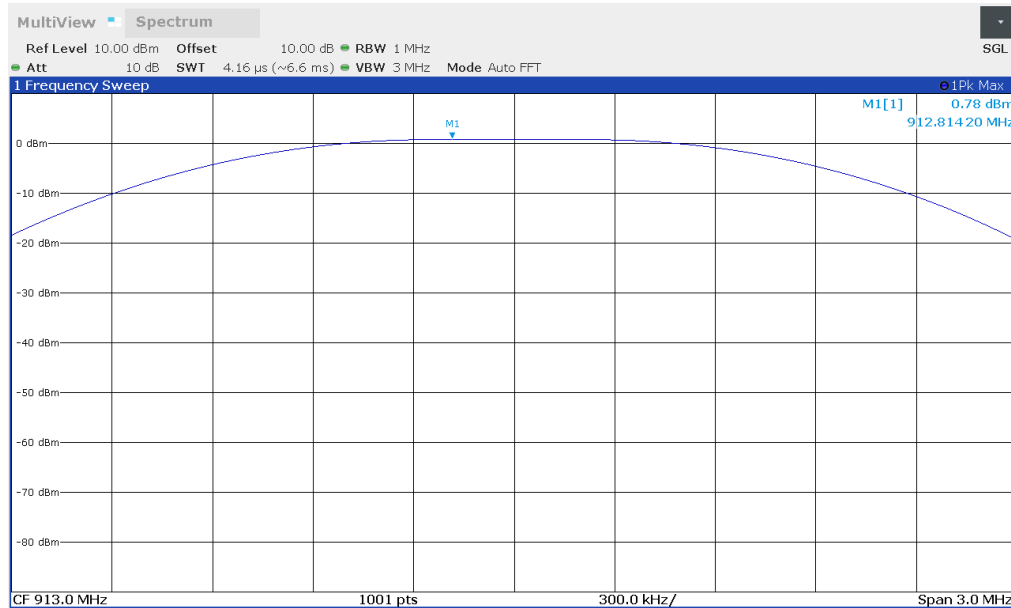
Test method (Maximum conducted (average) output power)				
Used	Sub-Clause [1]	Name of method	Applicability	Comment
☒	11.9.2.2.2	Method AVGSA-1	$D \geq 98\%$	-
☐	11.9.2.2.3	Method AVGSA-1A (alternative)	$D \geq 98\%$	-
☐	11.9.2.2.4	Method AVGSA-2	Constant D ($\pm 2\%$)	-
☐	11.9.2.2.5	Method AVGSA-2A (alternative)	Constant D ($\pm 2\%$)	-
☐	11.9.2.2.6	Method AVGSA-3A	-	-
☐	11.9.2.2.7	Method AVGSA-3A (alternative)	-	-
☐	11.9.2.3.1	Method AVGPM	Constant D ($\pm 2\%$)	-
☐	11.9.2.3.2	Method AVGPM-G	-	-

5.5.3 Test results (DTS fundamental emission output power)

Ambient temperature:	23 °C
Relative humidity:	76 %

Date:	22.06.2026
Tested by:	S. KREHS

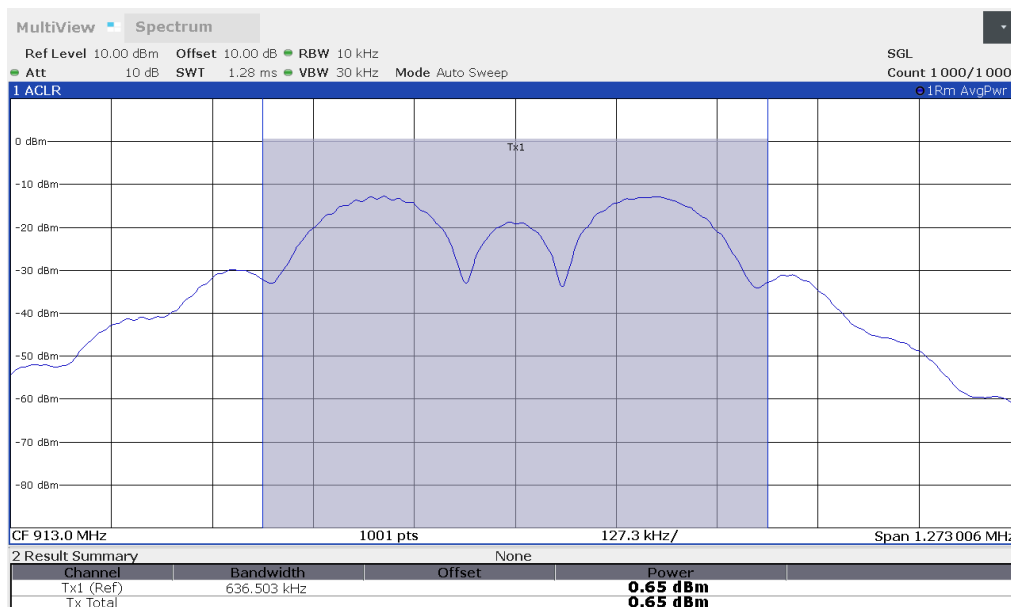
5.5.3.1 Maximum peak conducted output power:



Operation mode	Result [dBm]	Limit [dBm]	Gain [dBi]	e.i.r.p. [dBm]	Limit e.i.r.p. [dBm]
1	0.8	30.0	5.07	5.87	36.0

Test result: Passed

5.5.3.2 Maximum conducted (average) output power



Operation mode	DCCF [dB]	Result [dBm]	Limit [dBm]	Antenna Gain [dBi]	Result e.i.r.p. [dBm]	Limit [dBm]
1	0.0	0.7	30	5.07	5.77	36.0

Test result: Passed

Test equipment (please refer to chapter 7 for details)
1

5.6 DTS maximum power spectral density

5.6.1 Test setup (DTS maximum PSD level in the fundamental emission)

Test setup (DTS fundamental emission output power)			
Used	Setup	See sub-clause	Comment
☐	Radiated: 1 GHz to 40 GHz	-	-
☒	Conducted: Antenna port	5.1.4	-

5.6.2 Test method (DTS maximum PSD level in the fundamental emission)

Test method (Maximum peak power spectral density level in the fundamental emission)				
Used	Sub-Clause [1]	Name of method	Applicability	Comment
☒	11.10.2	Method PKPSD (peak PSD)	No limitations	-

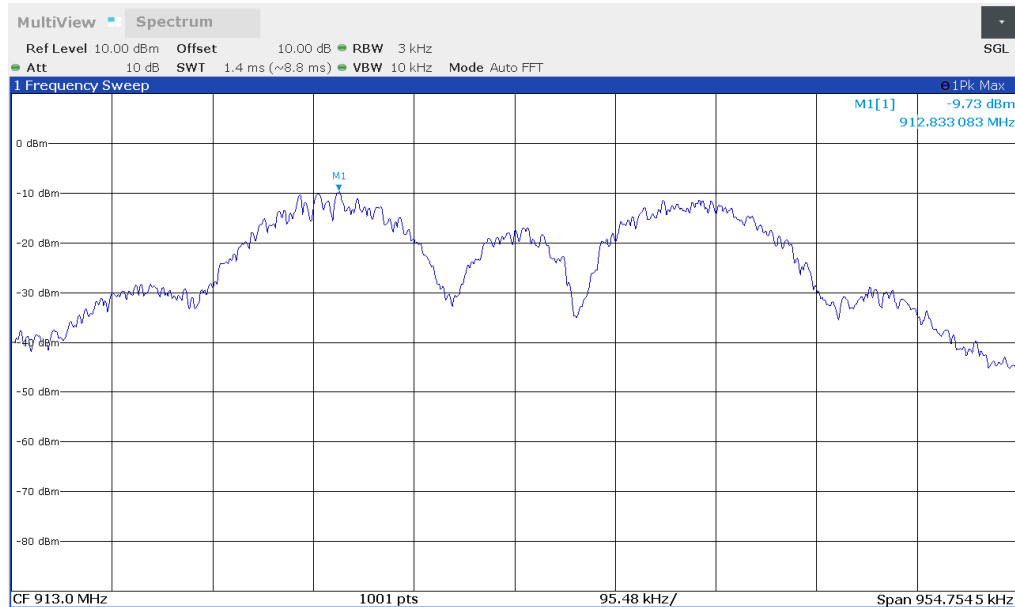
Test method (Maximum average power spectral density level in the fundamental emission)				
Used	Sub-Clause [1]	Name of method	Applicability	Comment
☒	11.10.3	Method AVGPS-1	$D \geq 98\%$	-
☐	11.10.4	Method AVGPS-1A (alternative)	$D \geq 98\%$	-
☐	11.10.5	Method AVGPS-2	Constant D ($\pm 2\%$)	-
☐	11.10.6	Method AVGPS-2A (alternative)	Constant D ($\pm 2\%$)	-
☐	11.10.7	Method AVGPS-3	No limitations	-
☐	11.10.8	Method AVGPS-3A (alternative)	No limitations	-

5.6.3 Test results (DTS maximum PSD level in the fundamental emission)

Ambient temperature:	23 °C
Relative humidity:	76 %

Date:	22.06.2026
Tested by:	S. KREHS

5.6.3.1 Maximum peak PSD



Operation mode	Reading [dBm/3 kHz]	Corr. Fact. [dB]	DCCF [dB]	Result [dBm/3 kHz]	Limit [dBm/3 kHz]
1	-9.7	0.0	0.0	-9.7	8.0

Test result: Passed

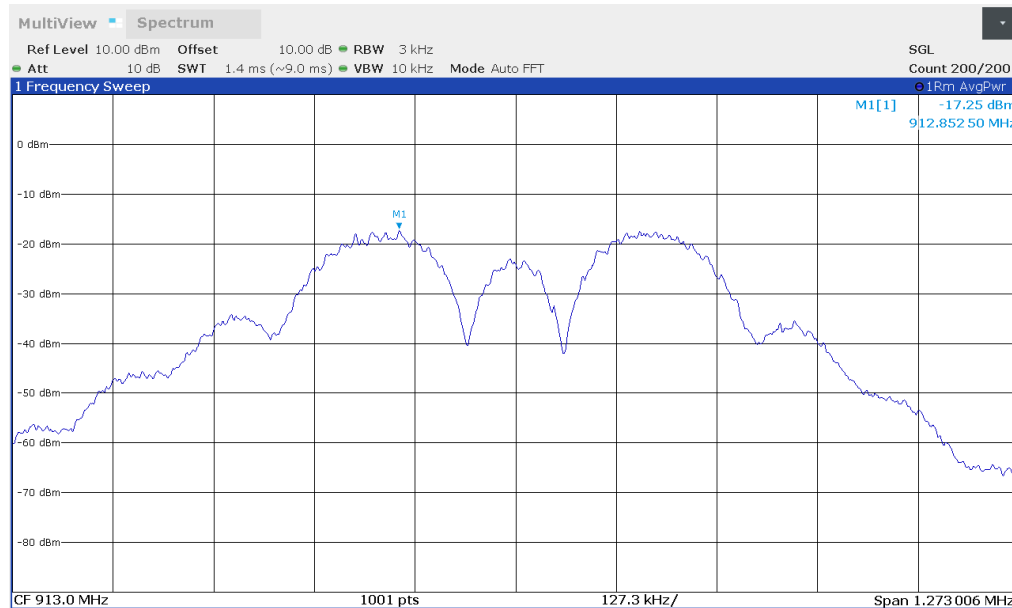
5.6.4 Test results (DTS maximum PSD level in the fundamental emission)

Ambient temperature:	23 °C
Relative humidity:	76 %

Date:	22.06.2026
Tested by:	S. KREHS

5.6.4.1 Maximum average PSD

Worst case plot (operation mode 1):



Operation mode	Reading [dBm/3 kHz]	Corr. Fact. [dB]	DCCF [dB]	Result [dBm/3 kHz]	Limit [dBm/3 kHz]
1	-17.3	0.0	0.0	-17.3	8.0

Test result: Passed

Test equipment (please refer to chapter 7 for details)
1

5.7 DTS band-edge emission measurements

5.7.1 Test setup (Band edge – unrestricted bands)

Test setup (Band edge – unrestricted bands)			
Used	Setup	See sub-clause	Comment
☐	Radiated: 1 GHz to 40 GHz	-	-
☒	Conducted: Antenna port	5.1.4	-

5.7.2 Test method (Band edge – unrestricted bands)

Test method (Band edge – unrestricted bands)				
Used	Sub-Clause [1]	Name of method	Applicability	Comment
☒	11.11.	20 dBc (Peak)	Peak power	*1
☐	11.11.	30 dBc (Average)	RMS power	*2

*1 As declared in 47 CFR 15.247(d): In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.

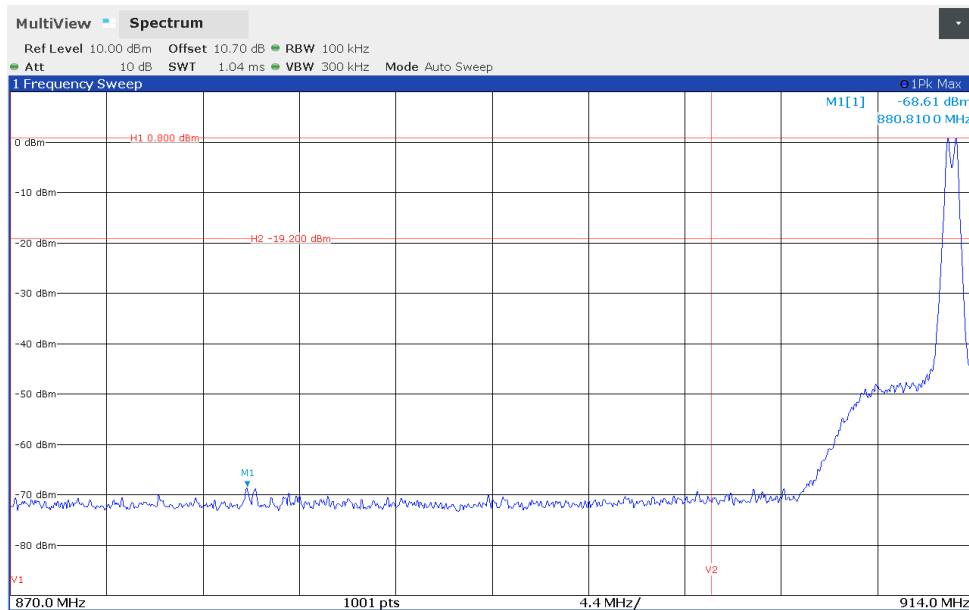
*2 If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval as permitted under 47 CFR 15.247(b)(3), the attenuation required under 47 CFR 15.247(d) shall be 30 dB instead of 20 dB.

5.7.3 Test results (Band edge – unrestricted bands)

Ambient temperature:	23 °C
Relative humidity:	76 %

Date:	22.06.2026
Tested by:	S. KREHS

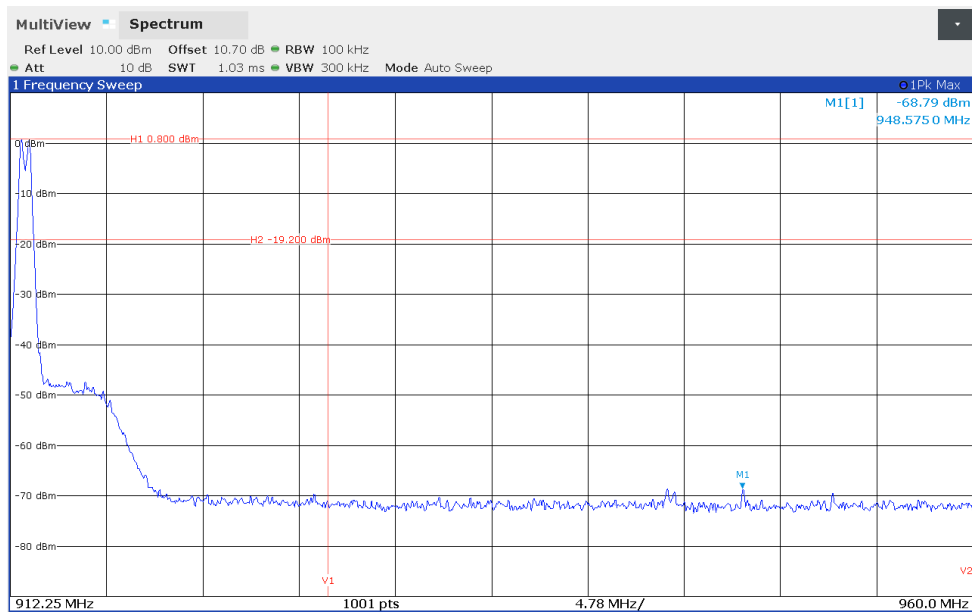
Plot lower band edge:



Lower band edge:

Frequency [MHz]	Reference [dBm]	Limit [dBm]	Unrestricted band emission [dBm]	Margin [dB]
880.810	0.8	-19.2	-68.6	49.4

Plot upper band edge:



Upper band edge:

Frequency [MHz]	Reference [dBm]	Limit [dBm]	Unrestricted band emission [dBm]	Margin [dB]
948.575	0.8	-19.2	-68.8	49.6

Test result: Passed

Test equipment (please refer to chapter 7 for details)
1

5.8 Radiated emissions

5.8.1 Test setup (Maximum unwanted emissions)

Test setup (Maximum unwanted emissions)			
Used	Setup	See sub-clause	Comment
☒	Radiated: 9 kHz to 30 MHz / 30 MHz to 1 GHz / 1 GHz to 10 GHz	5.1.1, 5.1.2, 5.1.3	-
☐	Conducted: Antenna port	5.1.4	-

5.8.2 Test results (Maximum unwanted emissions)

5.8.2.1 Test results preliminary measurement 9 kHz to 30 MHz

Ambient temperature:	23 °C	Date:	22.06.2026
Relative humidity:	67 %	Tested by:	S. KREHS

Position of EUT: For tests for f between 9 kHz to 30 MHz, the EUT was set up on a table with a height of 80 cm. The distance between EUT and antenna was 3 m.

Cable guide: For detailed information of the test setup and the cable guide refer to the pictures in annex A of this test report.

Test record: The measurement value was already corrected by 40 dB/decade as described in 47 CFR 15.31(f)(2) regarding to the measurement distance as requested in 47 CFR 15.209(a)

Remark: All 3 orthogonal planes were tested separately.

Calculations:

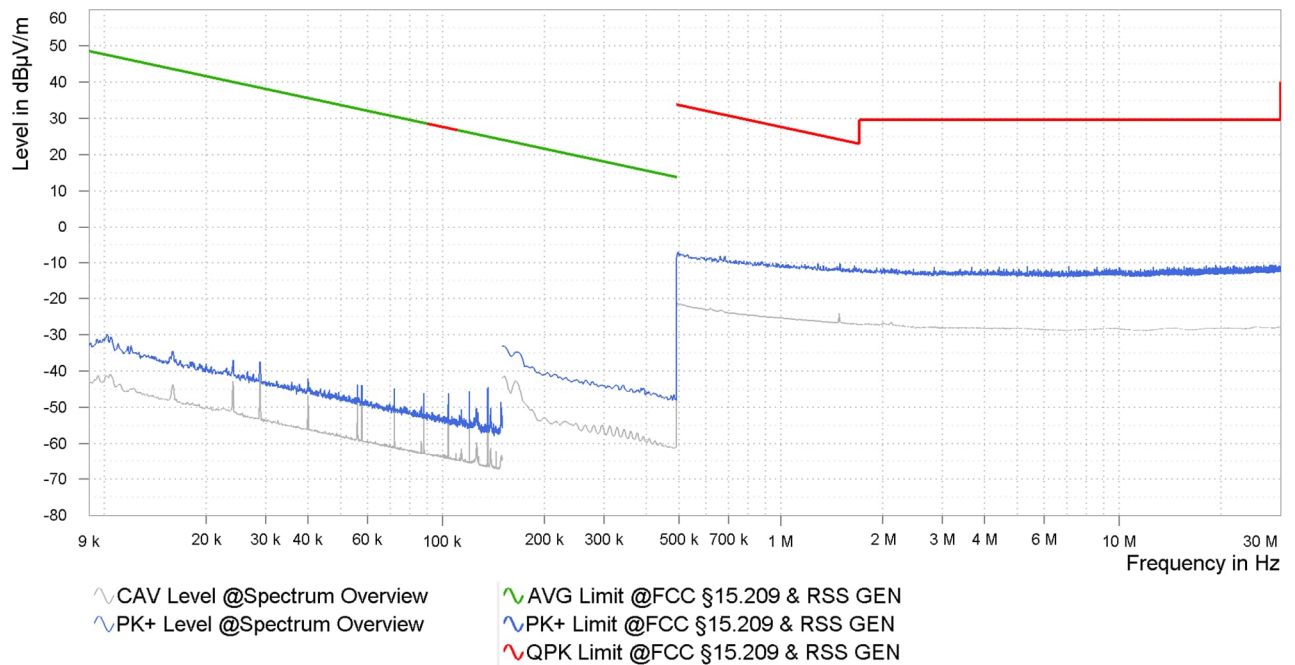
Result @ norm. dist. [dBμV/m] = Reading [dBμV] + AF [dB/m] + Distance corr. fact. [dB]

Result @ norm. dist. [dBμA/m] = Result @ norm. dist. [dBμV/m] – 20 x log₁₀ (377 Ω)

Margin [dB] = Limit [dB(μV|μA)/m] - Result [dB(μV|μA)/m]

Worst case plot:

Spurious emissions from 9 kHz to 30 MHz (EUT position 2: standing):



Remark: No emissions closer than 20 dB to the limit, so no final measurement was carried out.

Test result: Passed

Test equipment (please refer to chapter 7 for details)

2 - 8

5.8.2.2 Test results (30 MHz – 1 GHz)

Ambient temperature:	22 °C to 23 °C
Relative humidity:	67 % to 71 %

Date:	19.06.2026 / 22.06.2026
Tested by:	S. KREHS

Position of EUT: For tests for f between 30 MHz to 1 GHz, the EUT was set up on a table with a height of 80 cm. The distance between EUT and antenna was 3 m.

Cable guide: For detailed information of test setup and the cable guide refer to the pictures in annex A of this test report.

Test record: Plots for each frequency range are submitted below.

Remark: All 3 orthogonal planes were tested separately.

Calculations:

Result [dBμV/m] = Reading [dBμV] + Correction [dB/m]

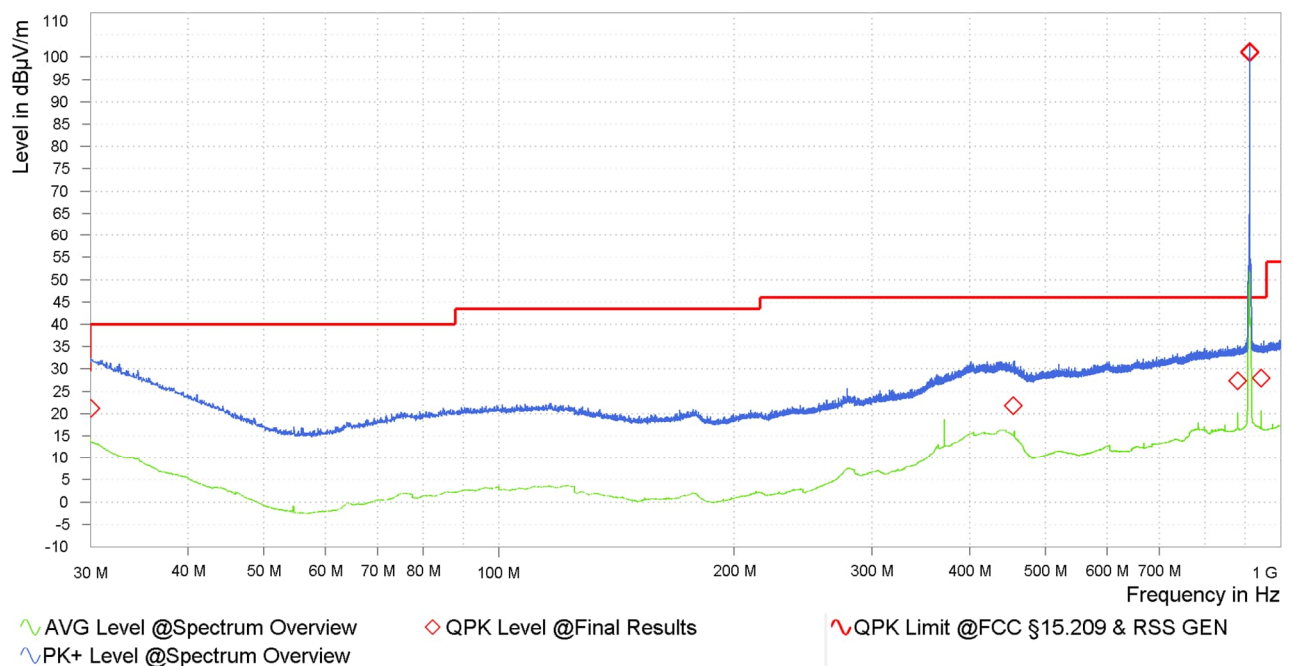
Correction [dB/m] = AF [dB/m] + Cable attenuation [dB] + optional preamp gain [dB]

Margin [dB] = Limit [dBμV/m] - Result [dBμV/m]

The measured points and the limit line in the following diagram refer to the standard measurement of the emitted interference in compliance with the above-mentioned standard. The measured points marked with "◇" are the measured results of the standard subsequent measurement in a semi-anechoic chamber.

Worst case plot:

Spurious emissions from 30 MHz to 1 GHz (EUT position 2: standing):



Result tables:

Operation mode 1, position 1:

Frequency [MHz]	Result (QP) [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Correction [dB/m]	Polarization (H/V)	Azimuth [deg]	Height [m]
30.330	21.0	40.0	19.0	26.5	V	341	1.72
406.560	22.0	46.0	24.0	21.8	H	133	1.00
880.830	22.9	46.0	23.1	29.3	H	309	1.49
944.820	26.7	46.0	19.3	29.8	H	277	1.42

Operation mode 1, position 2:

Frequency [MHz]	Result (QP) [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Correction [dB/m]	Polarization (H/V)	Azimuth [deg]	Height [m]
30.030	21.1	40.0	18.9	26.7	V	87	1.41
455.100	21.7	46.0	24.3	22.9	V	89	1.21
880.830	27.4	46.0	18.6	29.3	V	95	1.10
944.820	28.0	46.0	18.0	29.8	V	133	1.03

Operation mode 1, position 3:

Frequency [MHz]	Result (QP) [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Correction [dB/m]	Polarization (H/V)	Azimuth [deg]	Height [m]
30.900	20.5	40.0	19.5	26.1	H	25	2.91
880.830	24.5	46.0	21.5	29.3	H	12	1.39
945.180	24.5	46.0	21.5	29.8	V	303	1.04

Test result: Passed

Test equipment (please refer to chapter 7 for details)
2 – 7, 9 – 11

5.8.2.3 Test results (radiated 1 GHz to 10 GHz)

Ambient temperature:	22 °C
Relative humidity:	71 %

Date:	19.06.2026
Tested by:	S. KREHS

Position of EUT: For tests for f between 1 GHz and the 10th harmonic, the EUT was set-up on a positioner device with a height of 150 cm. The distance between EUT and antenna was 3 m.

Cable guide: For detailed information of test setup and the cable guide refer to the pictures in annex A of this test report.

Test record: Plots for each frequency range are submitted below.

Remark: -

Calculation:

Max Peak [dBμV/m] = Reading [dBμV] + Correction [dB/m]

Average [dBμV/m] = Reading [dBμV] + Correction [dB/m]

Correction [dB/m] = AF [dB/m] + Cable attenuation [dB] + optional preamp gain [dB] + DCCF* [dB]
* (if applicable – only for Average values, that are fundamental related)

Margin [dB] = Limit [dBμV/m] – Max Peak | Average [dBμV/m]

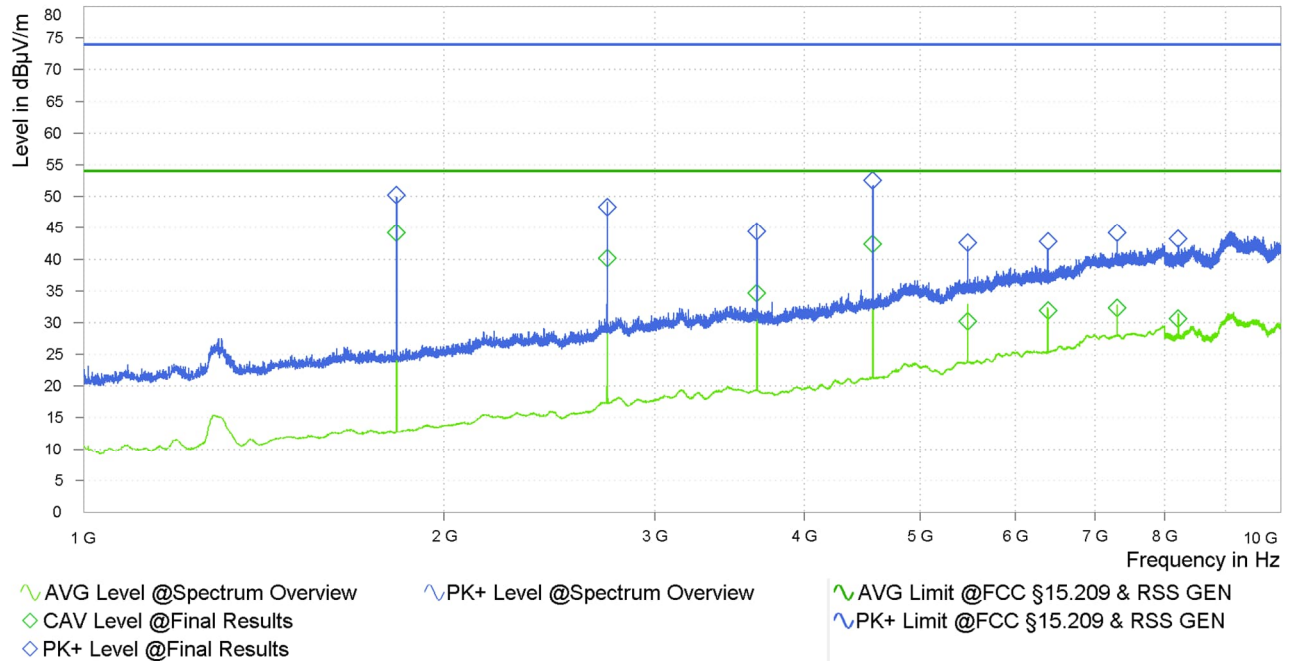
The curves in the diagram only represent the maximum measured value for each frequency point of all preliminary measurements, which were carried out with various EUT and antenna positions.

The top measured curve represents the peak measurement. The measured points marked with "◇" are frequency points for the final peak detector measurement. These values are indicated in the following table.

The bottom measured curve represents the average measurement. The measured points marked with "◇" are frequency points for the final average detector measurement.

Worst case plots:

Spurious emissions from 1 GHz to 10 GHz (operation mode 1):



Result tables:

Operation mode 1:

Frequency [MHz]	Pk Level [dB(μV/m)]	Pk Limit [dB(μV/m)]	Pk Margin [dB]	AV Level [dB(μV/m)]	AV Limit [dB(μV/m)]	AV Margin [dB]	Corr. [dB/m]	Pol [H/V]	Elevation [deg]	Azimuth [deg]	Restr. Band Y/N
1825.500	50.3	74.0	23.7	44.1	54.0	9.9	-6.3	V	120	188	-*
2738.250	48.3	74.0	25.7	40.1	54.0	13.9	-0.2	H	0	156	-*
3651.000	44.4	74.0	29.6	34.7	54.0	19.3	2.5	H	0	216	-*
4563.750	52.6	74.0	21.4	42.4	54.0	11.6	5.9	V	120	284	-*
5476.500	42.6	74.0	31.4	30.2	54.0	23.8	8.3	V	0	278	-*
6392.250	42.8	74.0	31.2	31.9	54.0	22.1	10.4	V	120	276	-*
7305.750	44.2	74.0	29.8	32.3	54.0	21.7	12.56	V	150	272	-*
8215.250	43.2	74.0	30.8	30.6	54.0	23.4	13.8	V	120	140	-*

* All results were below the stricter limits for the restricted bands. Therefore, the indication is omitted.

Test result: Passed

Test equipment (please refer to chapter 7 for details)
2 – 7, 11 – 14

6 Measurement Uncertainties

Conducted measurements		
Measurement method	Standard used for calculating measurement uncertainty	Expanded measurement uncertainty (95 %) U_{lab}
Frequency error	ETSI TR 100 028	4.5×10^{-8}
Bandwidth measurements	-	9.0×10^{-8}
Conducted emissions using a spectrum analyzer		
< 3.6 GHz	ETSI TR 100 028	2.3 dB
3.6 – 8 GHz	ETSI TR 100 028	2.8 dB
8 – 22 GHz	ETSI TR 100 028	3.2 dB
22 – 40 GHz	ETSI TR 100 028	3.6 dB
Power measurements		
Power meter	ETSI TR 100 028	0.9 dB
Conducted emissions from 150 kHz to 30 MHz with LISN		
	CISPR 16-4-2	2.8 dB

Radiated measurements		
Frequency error		
(Semi-) Anechoic chamber	ETSI TR 100 028	4.5×10^{-8}
OATS	ETSI TR 100 028	4.5×10^{-8}
Test fixture	ETSI TR 100 028	4.5×10^{-8}
Bandwidth measurements		
(Semi-) Anechoic chamber	-	9.0×10^{-8}
OATS	-	9.0×10^{-8}
Test fixture	-	9.1×10^{-8}
Radiated field strength M20		
CBL6112B @ 3 m 30 MHz – 1 GHz	CISPR 16-4-2	5.3 dB
R&S HL050 @ 3 m		
1 – 6 GHz	CISPR 16-4-2	5.1 dB
6 – 18 GHz	CISPR 16-4-2	5.4 dB
Flann Standard Gain Horns 12 – 40 GHz	-	5.9 dB
Radiated field strength M276		
R&S HL562E @ 3 m 30 MHz – 1 GHz	CISPR 16-4-2	4.8 dB
R&S HL050 @ 3 m		
1 – 6 GHz	CISPR 16-4-2	5.1 dB
6 – 18 GHz	CISPR 16-4-2	5.4 dB
Flann Standard Gain Horns 12 – 40 GHz	-	5.9 dB
OATS		
Field strength measurements below 30 MHz on OATS without ground plane	-	4.4 dB

7 Test Equipment used for Tests

No.	Test equipment	Type	Manufacturer	Serial No.	PM. No.	Cal. Date	Cal Due
1	Signal & spectrum analyser	FSW43	Rohde & Schwarz	102954	483957	04.02.2026	02.2027
2	EMC test software	Elektra V5.21	Rohde & Schwarz	---	483755	Calibration not necessary	
3	RF Switch Matrix	OSP220	Rohde & Schwarz	101391	482976	Calibration not necessary	
4	Turntable	TT3.0-3t	Maturo	825/2612/.01	483224	Calibration not necessary	
5	Controller	NCD	Maturo	474/2612.01	483226	Calibration not necessary	
6	Semi Anechoic Chamber M276	SAC5-2	Albatross Projects	C62128-A540-A138-10-0006	483227	Calibration not necessary	
7	EMI receiver / Spectrum analyser	ESW44	Rohde & Schwarz	101828	482979	06.02.2026	02.2028
8	Loop Antenna	FMZB 1519-60D	Schwarzbeck	00215	484105	25.11.2025	11.2027
9	Attenuator 6 dB	WA2-6	Weinschel		482793	Calibration not necessary	
10	Ultralog antenna 30 MHz - 6 GHz	HL562E	Rohde & Schwarz	101079	482978	24.04.2024	04.2027
11	Antenna support tilt mast	BAM 4.5-P-10kg	Maturo	222/2612.01	483225	Calibration not necessary	
12	Low Noise Amplifier 10 MHz - 18 GHz	LNA-30-00101800-25-10P	Narda-Miteq	2110917	482967	04.02.2026	02.2028
13	Log.-Per. antenna 850 MHz - 26.5 GHz	HL050	Rohde & Schwarz	100908	482977	10.10.2025	10.2028
14	1 GHz High pass filter	WHKX12-935-1000-15000-40ST	Wainwright Instruments	12	482908	Calibration not necessary	

8 Test Site Verification

Test equipment	PM. No.	Frequency range	Type of validation	According to	Val. Date	Val Due
Semi anechoic chamber M276	483227	30 MHz – 1000 MHz	NSA	ANSI C63.4-2014 ANSI C63.4a-2017	05.06.2025	05.06.2028
Semi anechoic chamber M276	483227	1 GHz - 18 GHz	SVSWR	CISPR 16-1-4 + Cor1:2010 + A1:2012 + A2:2017	21.02.2024	21.02.2027

9 Report History

Report Number	Date	Comment
F251879E1	10.08.2026	Initial test report
-	-	-
-	-	-

10 List of Annexes

Annex A Test Setup Photos

8 pages

----- end of test report -----