

Test Report

Report Number:

F251358E1

Equipment under Test (EUT):

BT LE & BT classic+EDR Bluetooth Module

IDC747

Applicant:

CEOTRONICS AG

Manufacturer:

IOT747



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

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:



Paul NEUFELD
05.03.2026

Signature

Reviewed and
approved by:



Bernward ROHDE
05.03.2026

Signature

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 generalisations 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	5
1.1 Applicant.....	5
1.2 Manufacturer	5
1.3 Test Laboratory	5
1.4 EUT (Equipment under Test)	6
1.5 Dedicated Host (CT-DECT MULTI M7 G2).....	6
1.6 Technical Data of Equipment	7
1.7 Dates	8
2 Operational States	9
2.1 Description of function of the EUT	9
3 Additional Information	11
4 Overview.....	12
5 Results.....	13
5.2 Duty cycle	16
5.3 Band-edge emission measurements.....	16
5.4 Radiated Emissions.....	19
6 Measurement Uncertainties	30
7 Test Equipment used for Tests	31
8 Test site Verification.....	32
9 Report History.....	32
10 List of Annexes	32

1 Identification

1.1 Applicant

Name:	CEOTRONICS AG
Address:	Adam-Opel-Str. 6, 63322 Rödermark
Country:	Germany
Name for contact purposes:	Mr. Thorsten NEUHAUS
Phone:	+49 6074 8751 631
eMail address:	thorsten.neuhaus@ceotronics.com
Applicant represented during the test by the following person:	-

1.2 Manufacturer

Name:	IOT747
Address:	122 Ross Street, Cambridge, CB1 3BU
Country:	United Kingdom
Name for contact purposes:	Mr. Rafik JALLAD
Phone:	+44 1223 420 252
eMail address:	info@iot747.com
Manufacturer represented during the test by the following person:	-

1.3 Test Laboratory

The tests were carried out by: **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: *	BT LE & BT classic+EDR Bluetooth Module
Model name: *	IDC
FCC ID:*	L52CT-BT747
Model number: *	747
Build: *	AA2022-N

	EUT number		
	1	2	3
MAC ID: *	245DFC002342	-	-
PCB identifier: *	No info provided	-	-
Hardware version: *	747.002	-	-
Software version: *	2.1.30	-	-

* Declared by the applicant

One EUT was used for all tests.

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

1.5 Dedicated Host (CT-DECT MULTI M7 G2)

Test object: *	Mobile communication device		
Model name: *	CT-DECT MULTI M7 G2		
Contains FCC ID's: *	L52CT-BT747 & L52CT-M7CEO1		
Serial number: *	CTX11111111		
PCB identifier: *	4DTT08-1920-011-01-03	4BT08-1920-011-04-02	
Hardware version: *	Rev 3	Rev 2	
Software version: *	Multi-G2 0 12 3 xx		

General Host data			
Power supply EUT: *1	DC by Li-Polymer battery		
Supply voltage EUT: *1	U _{nom} = 3.7 V _{DC}	U _{min} = 3.0 V _{DC}	U _{max} = 4.2 V _{DC}
Temperature range: *1	-32°C to +69°C		
Lowest / highest internal clock frequency: *1	32.768 MHz / 2480 MHz		

1.6 Technical Data of Equipment

Bluetooth radio mode	
Fulfil radio specification: *1	Bluetooth Low Energy 5.2 Bluetooth classic + EDR 5.2
Radio module: *1	IDC747
Antenna type: *2	Chip antenna
Antenna name: *2	No info provided
Antenna gain: *2	0 dBi
Antenna connector: *2	None
Supply voltage radio module: *1	$U_{nom} = 3.7 \text{ V}_{DC}$ $U_{min} = 3.3 \text{ V}_{DC}$ $U_{max} = 4.7 \text{ V}_{DC}$
Type of modulation: *1	Bluetooth LE 1 Mbps (GFSK) 2 Mbps (GFSK)
	Bluetooth classic + EDR 1 Mbps (GFSK) 2 Mbps ($\pi/4$ -DQPSK) 3 Mbps (8DPSK)
Operating frequency range: *1	2402 MHz – 2480 MHz
Number of channels: *1	Bluetooth LE 40
	Bluetooth classic+EDR 79

*1 declared by the applicant

*2 based on the antenna data sheet of the radio module as provided by the manufacturer of the radio module.

Ports / Connectors of the Host				
Identification	Connector		Length during test	Shielding (Yes / No)
	EUT	Ancillary		
Headset	ODU HD-Serie	Headphones HDSG-SSM-CLR	~1m	Yes

Bluetooth Low Energy channels			
Channel 0	2402 MHz	Channel 1	2404 MHz
...	...	...	...
Channel 19	2440 MHz	Channel 20	2442 MHz
...	...	...	...
Channel 38	2478 MHz	Channel 39	2480 MHz

Bluetooth classic + EDR channels			
Channel 0	2402 MHz	Channel 1	2403 MHz
...	...	...	...
Channel 38	2440 MHz	Channel 39	2441 MHz
...	...	...	...
Channel 77	2479 MHz	Channel 78	2480 MHz

1.6.1 Ancillary Equipment / Equipment used for testing

Equipment used for testing	
Laptop computer*1	ThinkPad TP00104A
-	-

*1 Provided by the applicant

Ancillary equipment	
Rechargeable Lithium-Polymer Battery	VARTA EasyPack - Rechargeable Li-Polymer Battery EZPack XL
-	-
-	-

1.7 Dates

Date of receipt of test sample:	27.11.2025
Start of test:	01.12.2025
End of test:	05.12.2025

2 Operational States

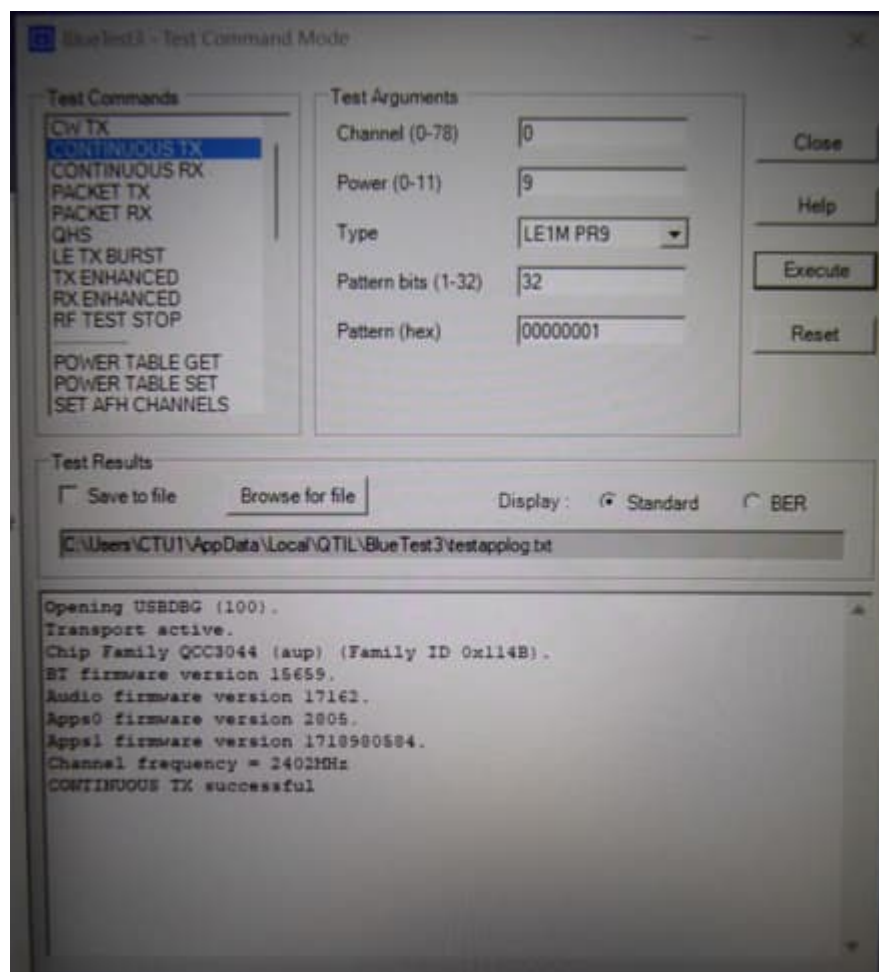
2.1 Description of function of the EUT

The EUT is a BTLE & BT classic+EDR Bluetooth Module incorporated in a dedicated host device (Ceotronics MULTI M7 M2).

The host device (Ceotronics MULTI M7 M2) is a mobile communication device based on DECT technology, allowing users to connect wirelessly to other participants in a DECT group. It supports full duplex communication, enabling users to communicate freely without pressing a button. The device is typically used with a headset, which can be either wired or wireless via Bluetooth. A DECT group consists of a base device and at least one portable device. The MULTI M7 can be configured with different software profiles for various applications and roles, making it versatile for different use scenarios.

During all tests the EUT was supplied by the host device. The host device was supplied by a rechargeable VARTA EasyPack Li-Polymer Battery provided by the applicant.

The test modes were set using the BlueTest3 software installed on a ThinkPad TP00104A laptop computer. Both the test laptop and the test software were provided by the applicant. To set the test modes a temporary programming adaptor was attached to the EUTs PCB.



2.1.1 Operation modes (Bluetooth classic)*

Operation mode #	Radio technology	Frequency [MHz]	Channel / Band	Modulation / Mode	Data rate	Power setting
1	Bluetooth EDR	2402	0	8DPSK	3 Mbps	"9"
2	Bluetooth EDR	2480	0	8DPSK	3 Mbps	"9"

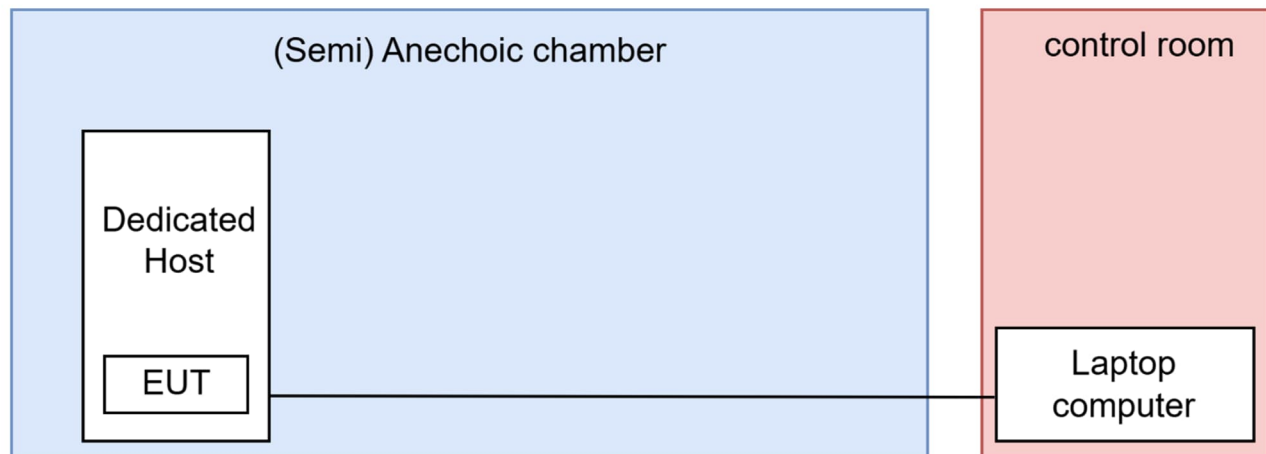
*The worst-case data rates were taken from the original test report of the radio module TCT220104E013 by SHENZHEN TONGCE TESTING LAB (FCC ID: 2A3WYID7).

2.1.2 Operation modes (Bluetooth Low Energy)*

Operation mode #	Radio technology	Frequency [MHz]	Channel / Band	Modulation / Mode	Data rate	Power setting
4	Bluetooth LE	2402	0	GFSK	1 Mbps	"9"
5	Bluetooth LE	2480	39	GFSK	1 Mbps	"9"

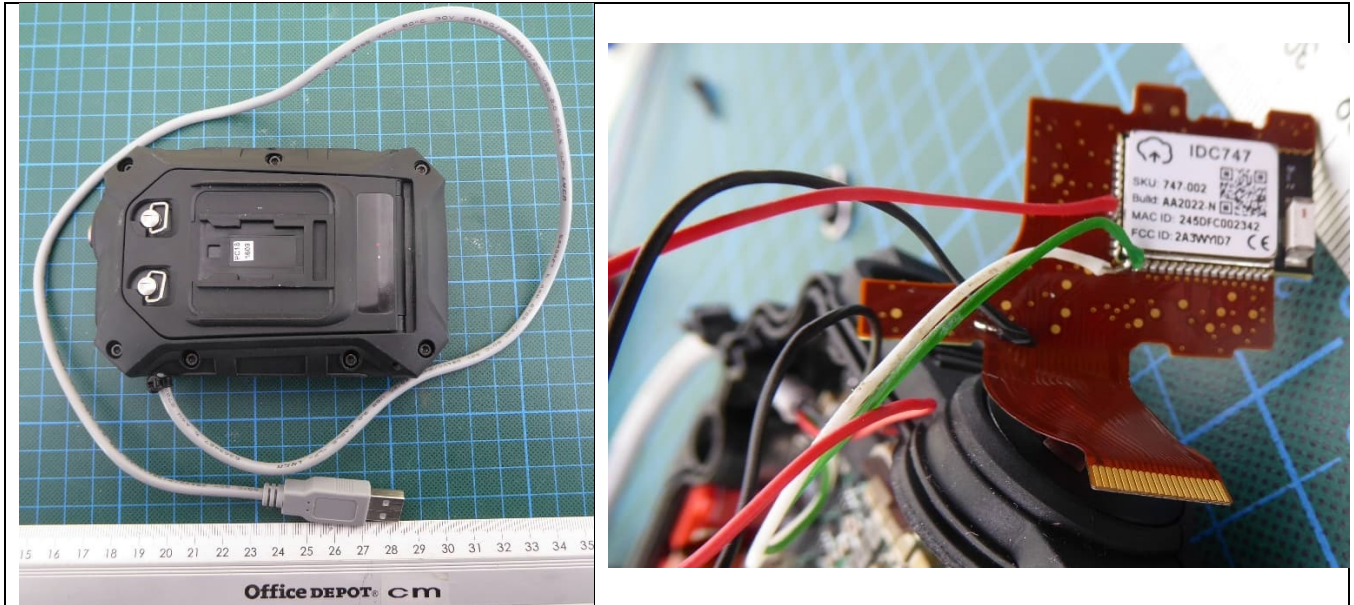
*The worst-case data rates were taken from the original test report of the radio module TCT220104E014 by SHENZHEN TONGCE TESTING LAB (FCC ID: 2A3WYID7).

2.1.3 Block Diagram (Radiated)

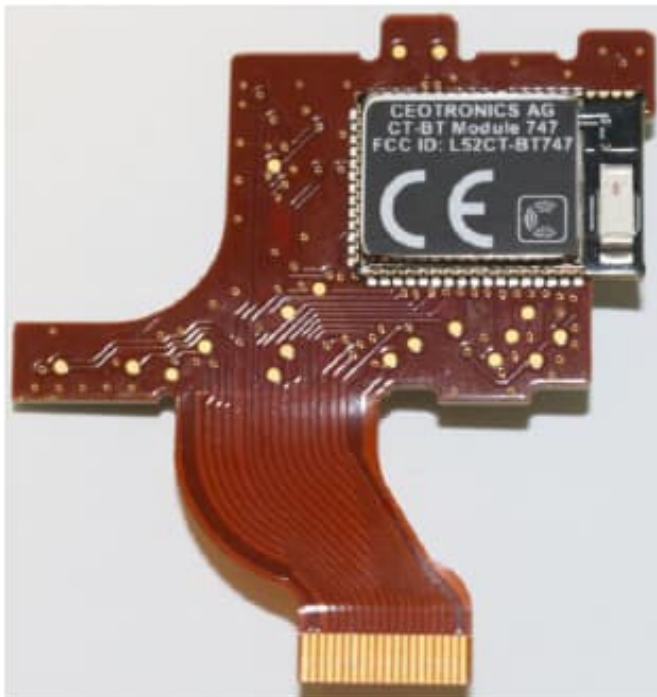


3 Additional Information

For the radio tests, a USB adaptor was soldered to the EUT in the host device by the applicant:



The Bluetooth module in the photograph above still shows the “old” FCC label. The image below shows the same Bluetooth module with the new FCC label following the change in the ID process. The image below was provided by the applicant.



4 Overview

Application	Frequency range [MHz]	FCC 47 CFR Part 15 section [2]	Tested EUT	Status
Maximum peak conducted output power	2400.0 - 2483.5	15.247 (b) (3), (4)	1	Passed*
Maximum (average) conducted output power	2400.0 - 2483.5	15.247 (b) (3), (4)	1	Passed*
Maximum peak conducted output power	2400.0 - 2483.5	15.247 (b) (1)	1	Passed*
DTS Bandwidth / 99% Bandwidth	2400.0 - 2483.5	15.247 (a) (2)	-	Not tested* ²
20 dB bandwidth	2400.0 - 2483.5	15.247 (a) (1)	1	Not tested* ²
Carrier frequency separation	2400.0 - 2483.5	15.247 (a) (1)	1	Not tested* ²
Number of hopping channels	2400.0 - 2483.5	15.247 (a) (1) (iii)	1	Not tested* ²
Dwell time	2400.0 - 2483.5	15.247 (a) (1) (iii)	1	Not tested* ²
Peak Power Spectral Density	2400.0 - 2483.5	15.247 (e)	-	Not tested* ²
Average Power Spectral Density	2400.0 - 2483.5	15.247 (e)	-	Not tested* ²
Band edge compliance	2400.0 - 2483.5	15.247 (d) 15.205 (a) 15.209 (a)	1	Passed* ³
Maximum unwanted emissions	0.009 – 26,500* ⁴	15.247 (d) 15.205 (a) 15.209 (a)	1	Passed* ³
Antenna Requirement	-	15.203 15.247 (b)	-	Not tested* ³
Conducted emissions on supply line	0.15 – 30	15.207 (a)	-	Not tested* ³

* Only the worst-case test mode from the original report was tested radiated, because no antenna port conducted test could be done on the fixed on-board antenna. The output power was verified.

*² Not tested, because this test was not ordered by the applicant.

*³ Only the worst-case modes from the original test reports (FCC ID: 2A3WYID7) were re-tested for this report.

*⁴ The maximum unwanted emissions were tested with a frequency range of at least 10 times the maximum internal EUT frequency.

5 Results

5.1.1 Radiated: 30 MHz to 1 GHz

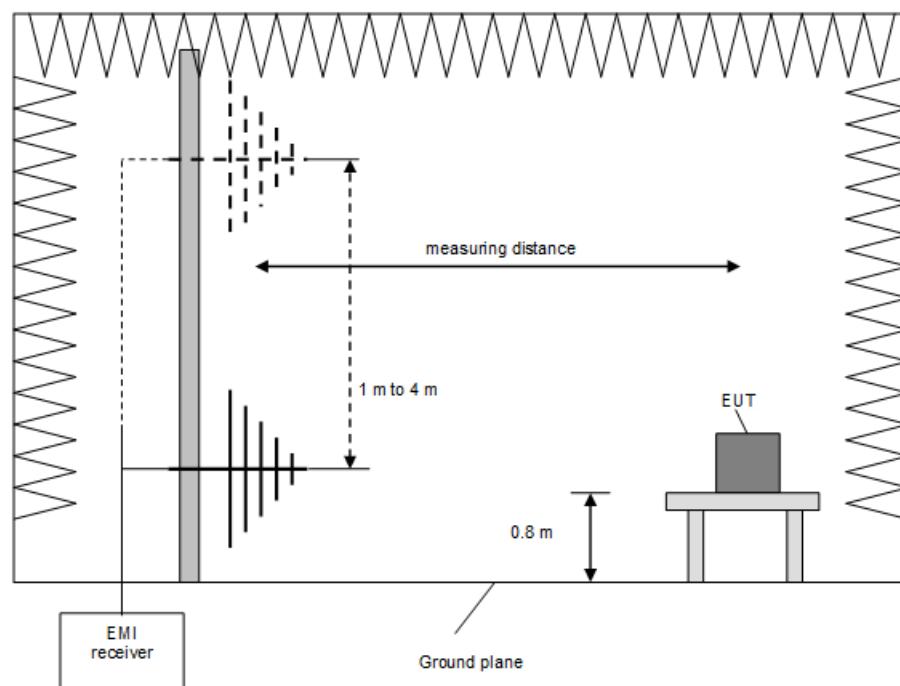
5.1.1.1 Preliminary and final measurement 30 MHz to 1 GHz

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.

5.1.2 Radiated: 1 GHz to 40 GHz

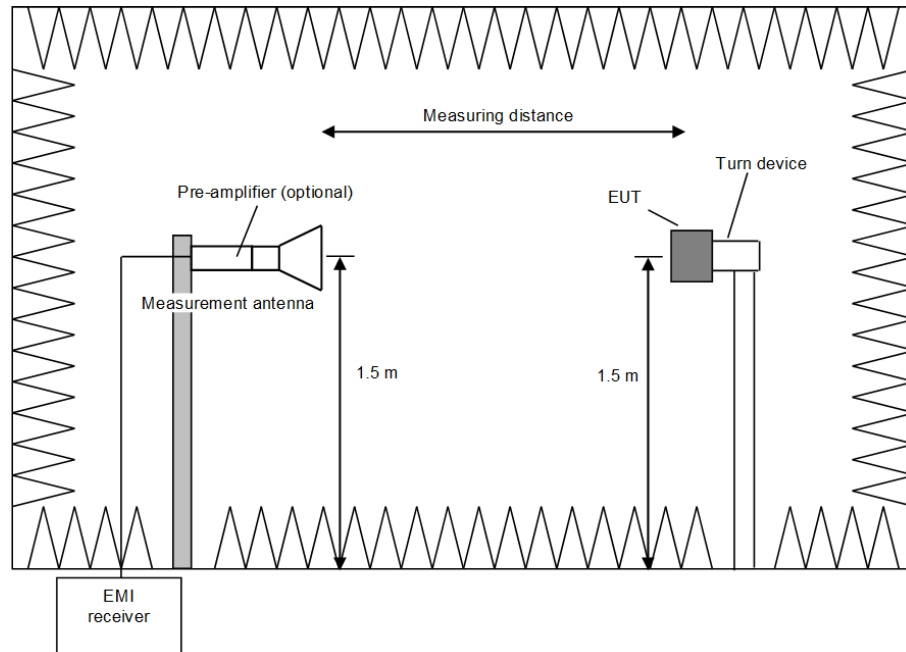
5.1.2.1 Preliminary and final measurement 1 to 40 GHz

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.

5.2 Duty cycle

Duty cycle measurements were not applicable, because all tests were done in a test mode, where the EUT transmitted continuously without pauses.

5.3 Band-edge emission measurements

5.3.1 Test setup (Band edge – restricted bands)

Test setup (Band edge – restricted bands)			
Used	Setup	See sub-clause	Comment
☒	Radiated: 1 GHz to 40 GHz	5.1.2	
☐	Conducted: Antenna port	-	

5.3.2 Test method (Band edge – restricted bands)

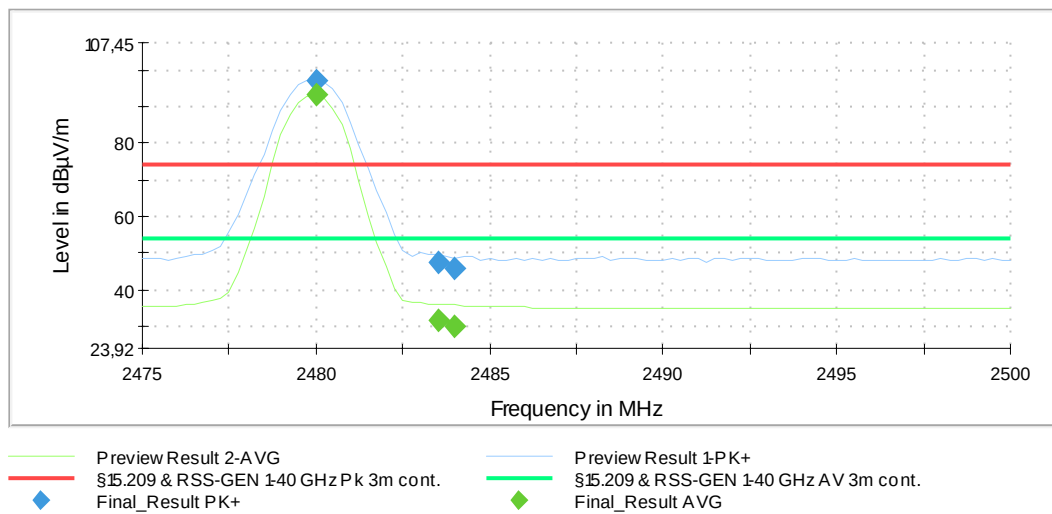
Test method (Band edge – restricted bands)				
Used	Sub-Clause [1]	Name of method	Applicability	Comment
☒	11.12.1	Standard method	No limitations	
☐	11.12.3.1	Marker-delta method		See 6.10.6 [3] 2 MHz from band
☐	11.12.3.2	Integration method		2 MHz from band

5.3.3 Test results (Band edge – restricted bands) (Bluetooth classic+EDR)

Ambient temperature:	22 °C
Relative humidity:	26 %

Date:	01.12.2025
Tested by:	P. Neufeld

Worst case plot upper band edge – Bluetooth classic+EDR (operation mode 2):



Lower band edge (operation mode 1):

Frequency [MHz]	MaxPeak [dB(μV/m)]	Average [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Restr. Band Y/N	Pol [H/V]	Azimuth [deg]	Elevation [deg]	Corr. [dB/m]
2483.500	---	31.4	54.0	22.6	Y	V	129	60	33.7
2483.500	47.3	---	74.0	26.7	Y	V	129	60	33.7
2484.000	45.7	---	74.0	28.3	Y	V	305	60	33.7
2484.000	---	30.1	54.0	23.9	Y	V	305	60	33.7

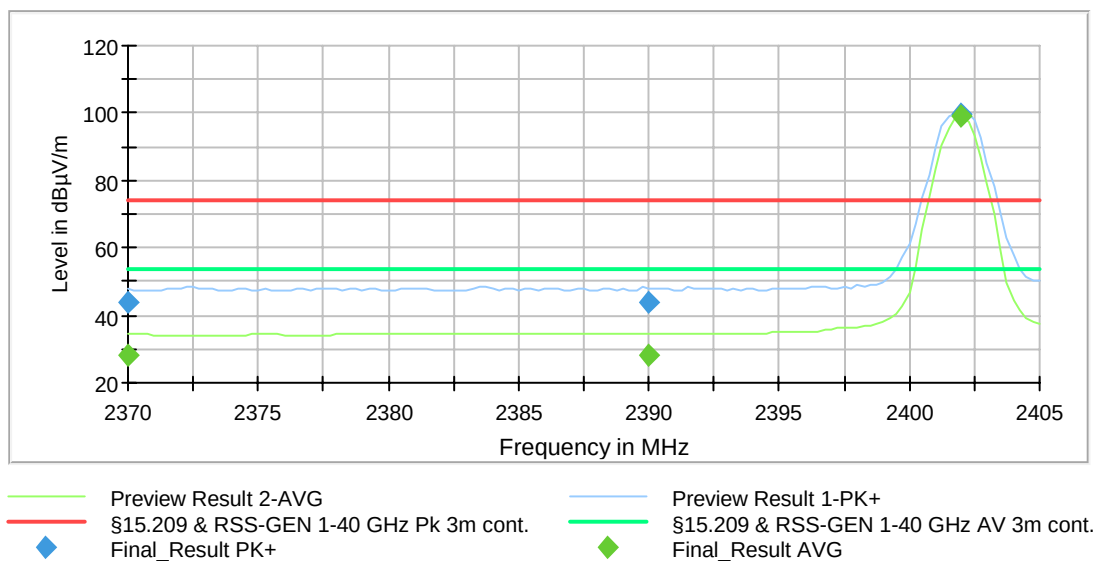
Test result: Passed

5.3.4 Test results (Band edge – restricted bands) Bluetooth LE

Ambient temperature:	22 °C
Relative humidity:	26 %

Date:	01.12.2025
Tested by:	P. Neufeld

Worst case plot lower band edge – Bluetooth LE (operation mode 3):



Upper band edge (operation mode 3):

Frequency [MHz]	MaxPeak [dB(μV/m)]	Average* [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Restr. Band Y/N	Pol [H/V]	Azimuth [deg]	Elevation [deg]	Corr. [dB/m]
2370.000	43.8	---	74.0	30.2	Y	V	27	90	33.3
2370.000	---	28.0	54.0	26.0	Y	V	27	90	33.3
2390.000	---	28.2	54.0	25.8	Y	V	16	90	33.4
2390.000	43.8	---	74.0	30.2	Y	V	16	90	33.4

Test result: Passed

Test equipment (please refer to chapter 7 for details)
1 - 10

5.4 Radiated Emissions

5.4.1 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 40 GHz	5.1.1 / 5.1.2	-
☐	Conducted: Antenna port	-	-

5.4.2 Test method (Maximum unwanted emissions)

☒ Test method (radiated) see sub-clause 5.1.1 to 5.1.2 as described herein

5.4.3 Test results (30 MHz – 1 GHz)

Ambient temperature:	22 °C
Relative humidity:	22 %

Date:	04.12.2025, 05.12.2025
Tested by:	P. Neufeld

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

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

Remark: The EUT was tested in all 3 orthogonal positions.

Calculations:

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

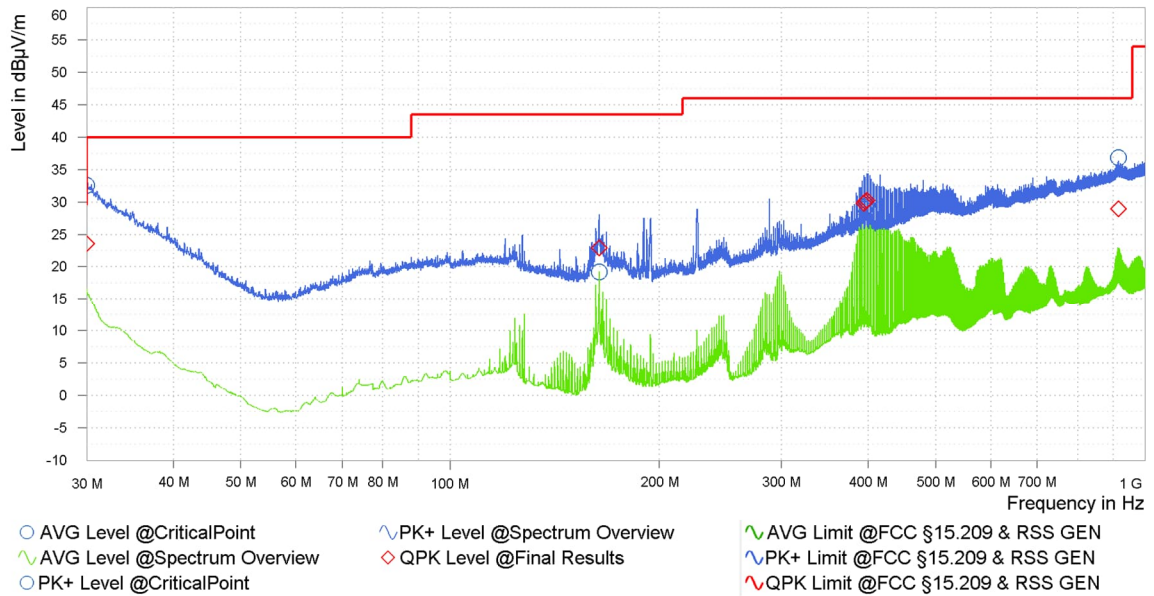
Correction [dB/m] = AF [dB/m] + Cable attenuation [dB] + optional preamp gain [dB]

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.

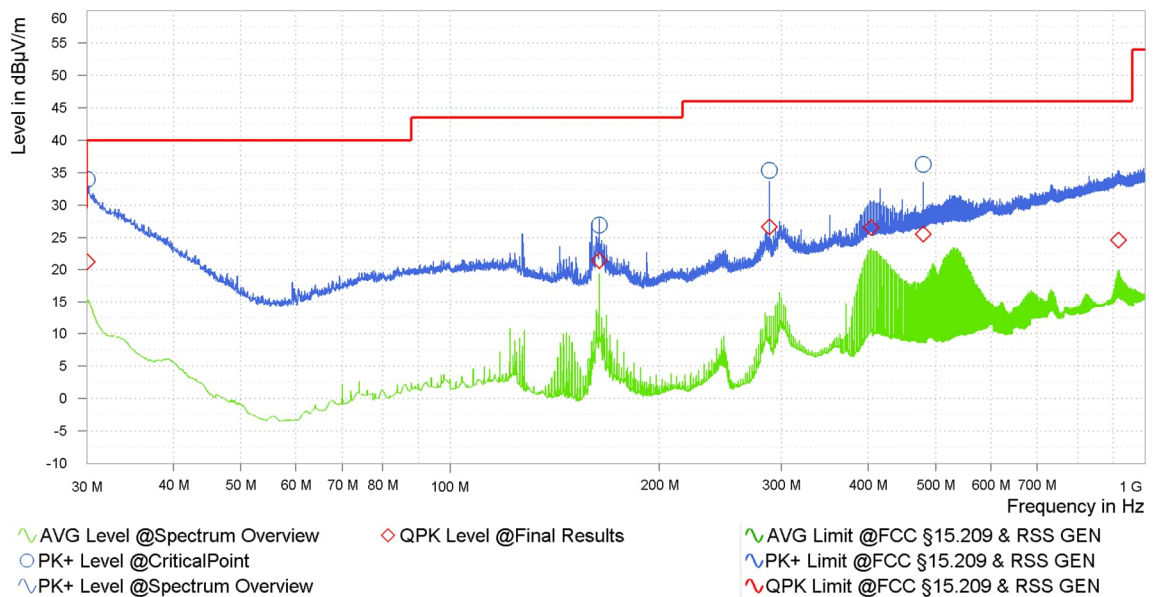
Worst case plot (Bluetooth classic+EDR):

Spurious emissions from 30 MHz to 1 GHz (operation mode 1 – Position 3):



Worst case plot (Bluetooth LE):

Spurious emissions from 30 MHz to 1 GHz (operation mode 4 – Position 2):



Result tables:

(Operation mode 1 – Bluetooth classic+EDR):

Frequency [MHz]	Result (QP) [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Readings [dBμV]	Correction [dB/m]	Pol. (H/V)	Azimuth [deg]	Height [m]	Position #
30.000	21.60	40.00	18.40	26.66	-5.06	V	101	1.43	1
127.170	19.63	43.50	23.87	17.01	2.62	H	257	2.36	1
288.000	19.14	46.00	26.86	18.56	0.58	H	107	1.28	1
300.000	23.98	46.00	22.02	18.87	5.11	H	139	1.20	1
393.990	27.79	46.00	18.21	21.58	6.21	H	55	1.20	1
915.990	27.86	46.00	18.14	29.92	-2.06	V	163	1.47	1

Frequency [MHz]	Result (QP) [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Readings [dBμV]	Correction [dB/m]	Pol. (H/V)	Azimuth [deg]	Height [m]	Position #
30.000	23.59	40.00	16.41	26.66	-3.07	H	130	1.15	3
164.010	22.92	43.50	20.58	15.31	7.61	H	105	1.49	3
393.990	29.77	46.00	16.23	21.58	8.19	V	187	1.46	3
396.000	30.10	46.00	15.90	21.62	8.48	V	183	1.96	3
397.980	30.20	46.00	15.80	21.69	8.51	V	197	2.16	3
915.990	28.93	46.00	17.07	29.92	-0.99	H	223	1.35	3

(Operation mode 4 – Bluetooth LE):

Frequency [MHz]	Result (QP) [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Readings [dBμV]	Correction [dB/m]	Pol. (H/V)	Azimuth [deg]	Height [m]	Position #
30.030	21.20	40.00	18.80	26.64	-5.44	H	51	1.36	2
163.980	21.40	43.50	22.10	15.31	6.09	H	95	1.62	2
288.000	26.59	46.00	19.41	18.56	8.03	H	185	1.07	2
403.980	26.56	46.00	19.44	21.79	4.77	H	221	2.09	2
480.000	25.48	46.00	20.52	23.64	1.84	H	215	1.79	2
915.960	24.57	46.00	21.43	29.92	-5.35	V	222	1.98	2

Test result: Passed

Test equipment (please refer to chapter 7 for details)

13 - 21

5.4.4 Test results (radiated 1 GHz to 40 GHz)

Ambient temperature:	21 °C
Relative humidity:	27 %

Date:	02.12.2025
Tested by:	P. Neufeld

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 detail information of test set-up and the cable guide refer to the pictures in the annex A in the 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)

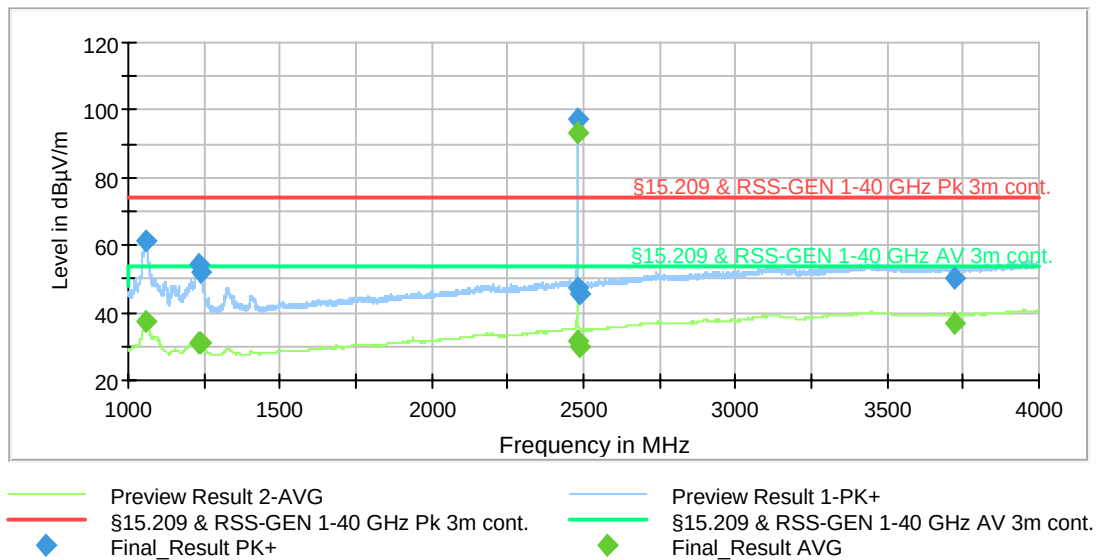
Margin [dB] = Limit [dBμV/m] – Max Peak | Average [dBμV/m]

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.

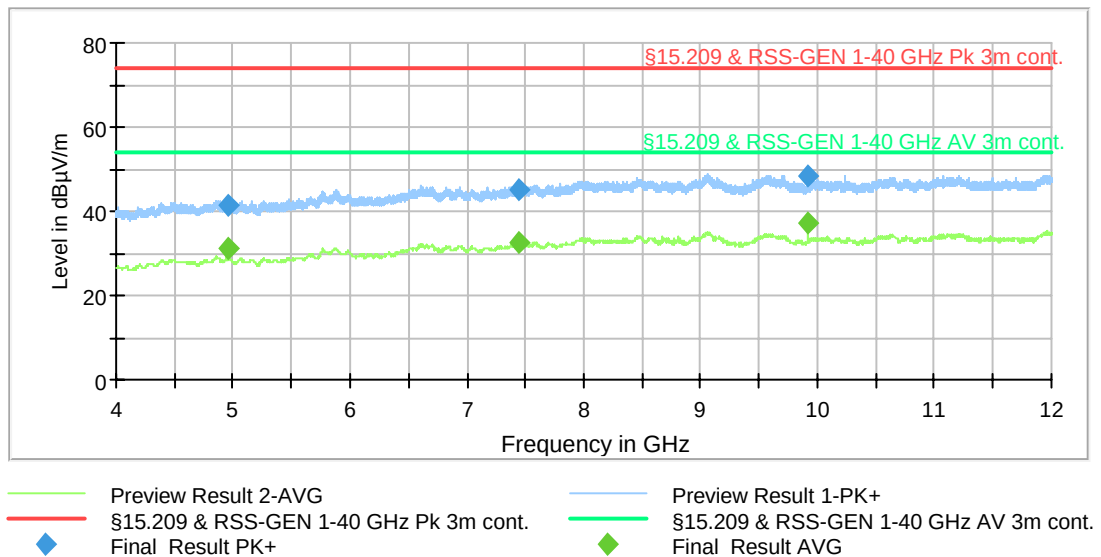
The top measured curve represents the peak measurement. The measured points marked with "◆" are frequency points for the final peak detector measurement. These values are indicated in the following table. The bottom measured curve represents the average measurement. The measured points marked with "◆"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

Worst case plots (Bluetooth classic+EDR):

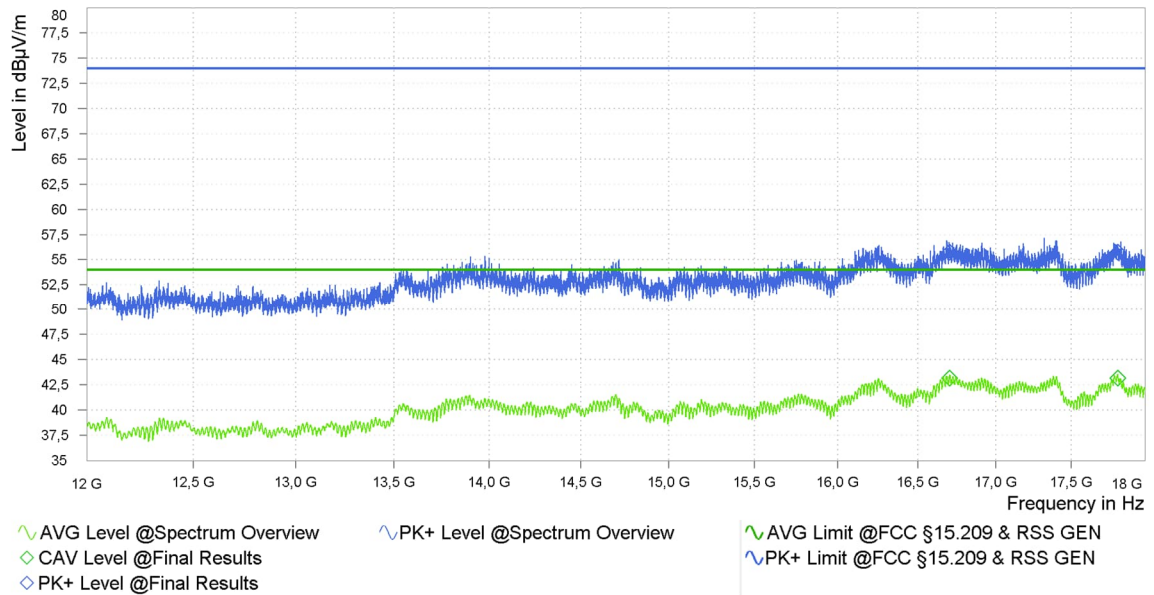
Spurious emissions from 1 GHz to 4 GHz (operation mode 2):



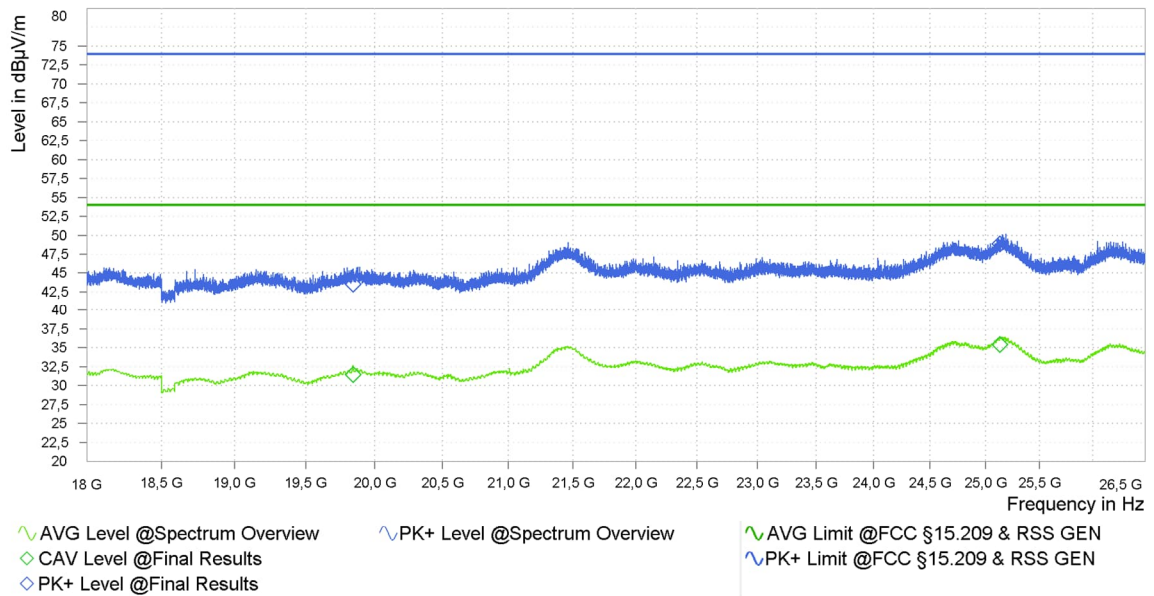
Spurious emissions from 4 GHz to 12 GHz (operation mode 2):



Spurious emissions from 12 GHz to 18 GHz (operation mode 2):

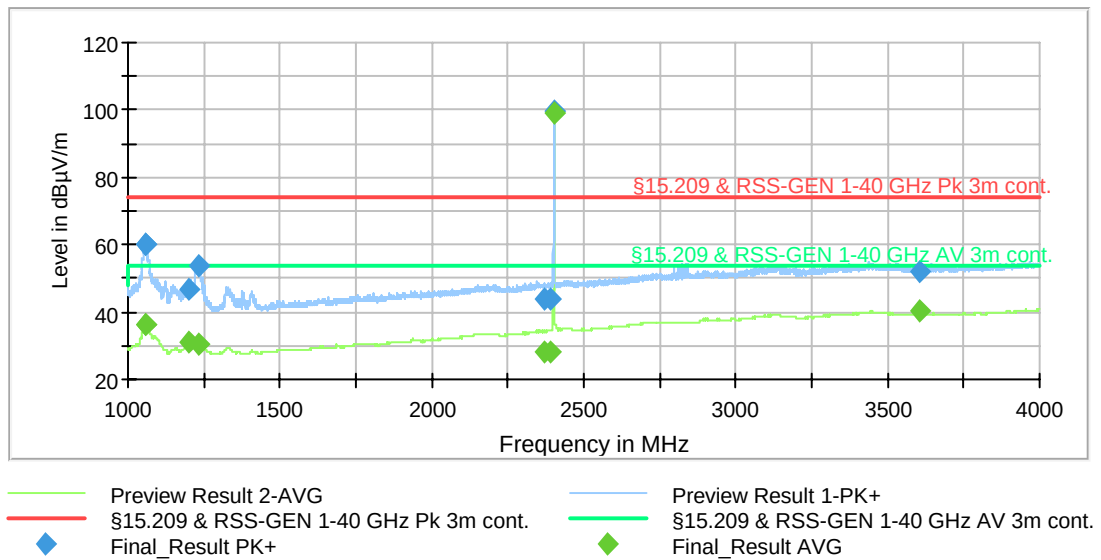


Spurious emissions from 18 GHz to 26.5 GHz (operation mode 2):

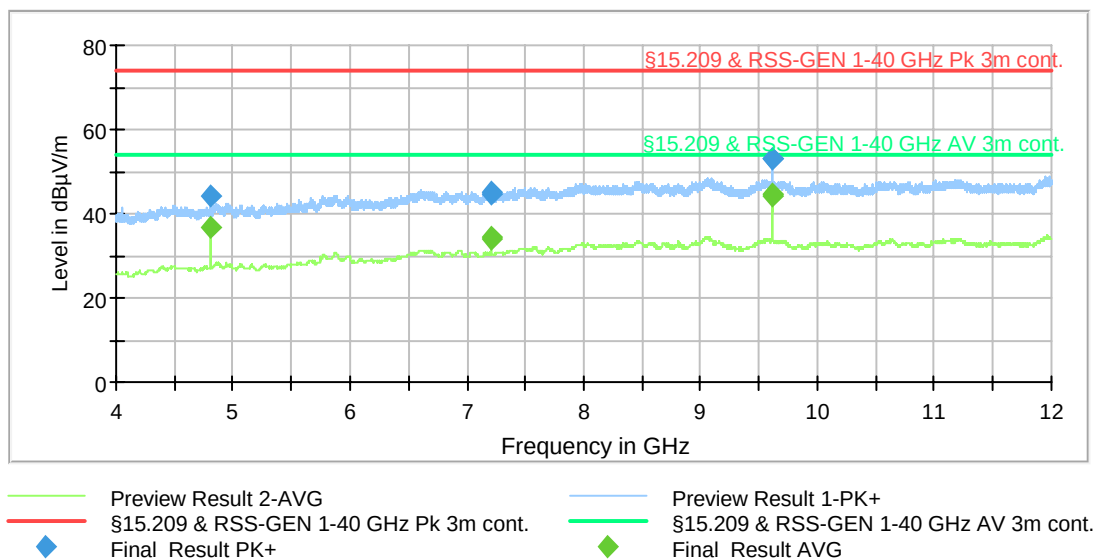


Worst case plots (Bluetooth LE):

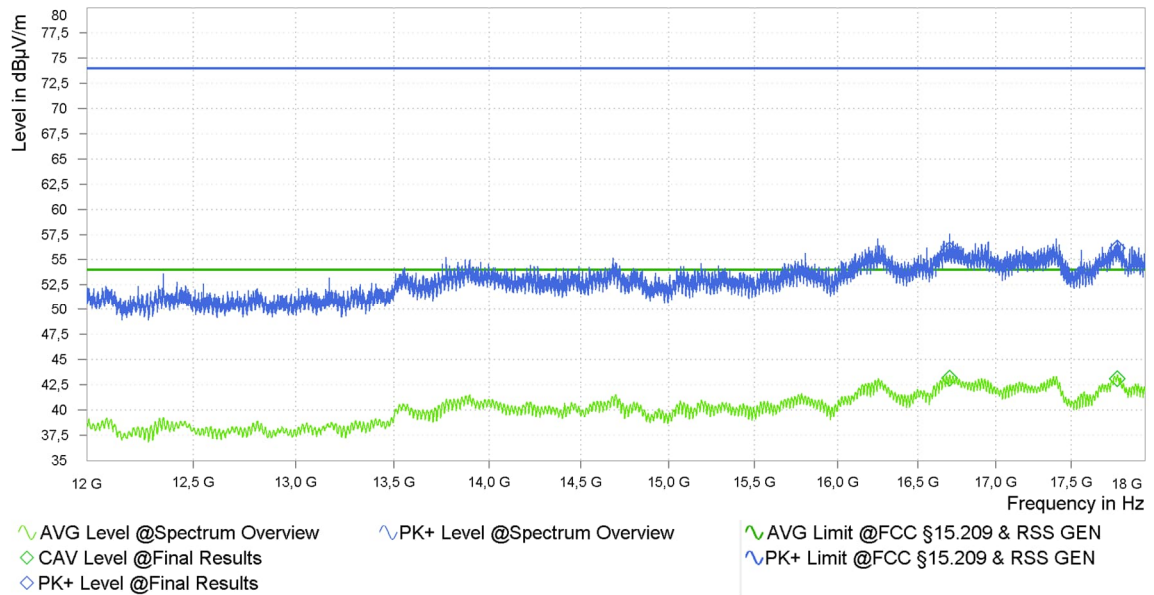
Spurious emissions from 1 GHz to 4 GHz (operation mode 4):



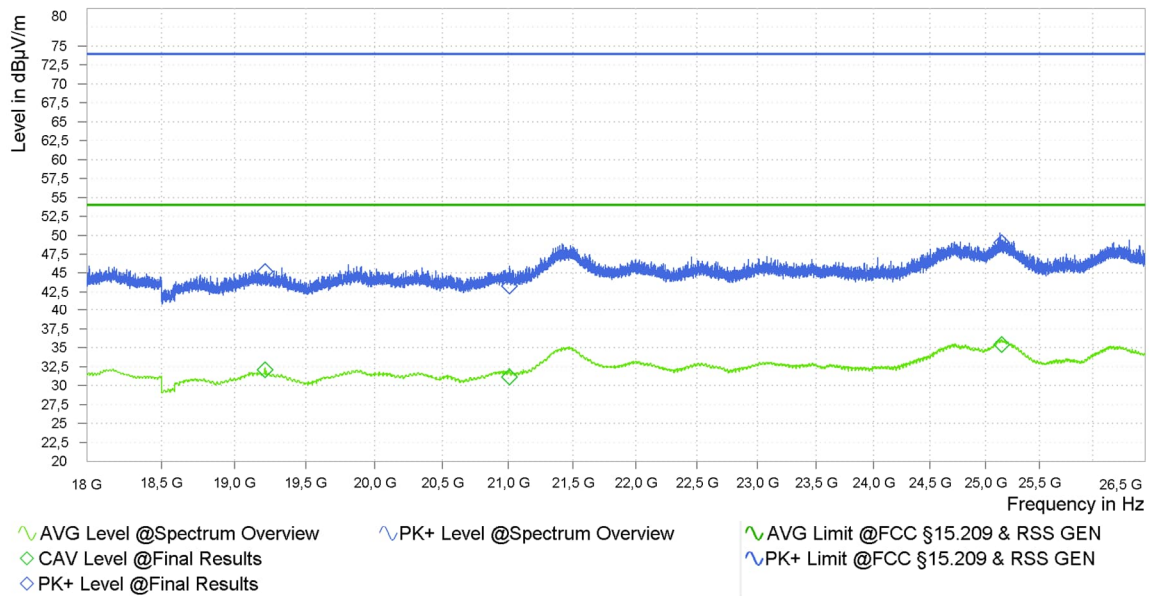
Spurious emissions from 4 GHz to 12 GHz (operation mode 4):



Spurious emissions from 12 GHz to 18 GHz (operation mode 4):



Spurious emissions from 18 GHz to 26.5 GHz (operation mode 4):



Result tables (Bluetooth classic+EDR):

Operation mode 2:

Frequency [MHz]	MaxPeak [dB(μV/m)]	Average [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Restr. Band Y/N	Pol [H/V]	Azimuth [deg]	Elevation [deg]	Corr. [dB/m]
1056.250	---	37.4	54.0	16.6	-*	H	158	150	25.2
1056.250	61.2	---	74.0	12.8	-*	H	158	150	25.2
1231.750	54.2	---	74.0	19.8	-*	H	224	60	26.3
1231.750	---	30.8	54.0	23.2	-*	H	224	60	26.3
1240.000	51.8	---	74.0	22.2	-*	H	221	90	26.2
1240.000	---	31.0	54.0	23.0	-*	H	221	90	26.2
2480.000	---	93.4	Fund.	-	-*	V	144	60	33.7
2480.000	97.3	---	Fund.	-	-*	V	144	60	33.7
2483.500	---	31.4	54.0	22.6	-*	V	129	60	33.7
2483.500	47.3	---	74.0	26.7	-*	V	129	60	33.7
2484.000	45.7	---	74.0	28.3	-*	V	305	60	33.7
2484.000	---	30.1	54.0	23.9	-*	V	305	60	33.7
3720.000	50.1	---	74.0	23.9	-*	V	300	60	37.2
3720.000	---	36.8	54.0	17.2	-*	V	300	60	37.2
4960.000	---	31.3	54.0	22.7	-*	H	14	0	-1.4
4960.000	41.6	---	74.0	32.4	-*	H	14	0	-1.4
7439.750	---	32.5	54.0	21.5	-*	H	329	90	5.3
7439.750	44.9	---	74.0	29.1	-*	H	329	90	5.3
9920.250	---	37.4	54.0	16.6	-*	V	126	90	7.2
9920.250	48.2	---	74.0	25.8	-*	V	126	90	7.2

Operation mode 2:

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
16702.750	55.7	74.0	18.3	43.2	54.0	10.8	27.8	H	150	260	-*
17813.250	55.8	74.0	18.2	43.1	54.0	10.9	29.0	V	90	193	-*
19839.500	43.5	74.0	30.5	31.4	54.0	22.6	12.7	H	120	320	-*
25130.500	48.8	74.0	25.2	35.4	54.0	18.6	13.9	V	60	314	-*

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

Test result: Passed

Result tables (Bluetooth LE):

Operation mode 4:

Frequency [MHz]	MaxPeak [dB(μV/m)]	Average [dB(μV/m)]	Limit [dB(μV/m)]	Margin [dB]	Restr. Band Y/N	Pol [H/V]	Azimuth [deg]	Elevation [deg]	Corr. [dB/m]
1058.000	60.2	---	74.0	13.8	-*	H	188	30	25.3
1058.000	---	36.2	54.0	17.8	-*	H	188	30	25.3
1058.250	---	36.0	54.0	18.0	-*	H	166	150	25.3
1058.250	60.3	---	74.0	13.7	-*	H	166	150	25.3
1201.000	---	31.0	54.0	23.0	-*	H	252	0	26.5
1201.000	46.8	---	74.0	27.2	-*	H	252	0	26.5
1231.500	53.6	---	74.0	20.4	-*	H	227	60	26.3
1231.500	---	30.3	54.0	23.7	-*	H	227	60	26.3
2370.000	43.8	---	74.0	30.2	-*	V	27	90	33.3
2370.000	---	28.0	54.0	26.0	-*	V	27	90	33.3
2390.000	---	28.2	54.0	25.8	-*	V	16	90	33.4
2390.000	43.8	---	74.0	30.2	-*	V	16	90	33.4
2402.000	---	98.9	Fund.	-	-*	V	146	90	33.5
2402.000	99.8	---	Fund.	-	-*	V	146	90	33.5
3603.000	51.7	---	74.0	22.3	-*	V	83	60	37.1
3603.000	---	40.5	54.0	13.5	-*	V	83	60	37.1
4803.750	---	36.9	54.0	17.1	-*	H	15	0	-1.7
4803.750	44.4	---	74.0	29.6	-*	H	15	0	-1.7
7205.250	45.3	---	74.0	28.7	-*	H	301	120	4.3
7205.250	---	34.3	54.0	19.7	-*	H	301	120	4.3
7206.500	44.7	---	74.0	29.3	-*	H	295	120	4.3
7206.500	---	33.9	54.0	20.1	-*	H	295	120	4.3
9607.000	52.8	---	74.0	21.2	-*	H	293	60	8.1
9607.000	---	44.4	54.0	9.6	-*	H	293	60	8.1
9608.500	52.9	---	74.0	21.1	-*	H	293	60	8.1
9608.500	---	44.5	54.0	9.5	-*	H	293	60	8.1

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
16703.500	56.0	74.0	18.0	43.1	54.0	10.9	27.8	H	90	102	-*
17813.000	56.2	74.0	17.8	43.1	54.0	10.9	29.0	V	120	344	-*
19211.500	45.2	74.0	28.8	32.1	54.0	21.9	12.47	H	90	322	
21009.000	43.3	74.0	30.7	31.1	54.0	22.9	13.11	H	90	167	-*
25147.000	49.0	74.0	25.0	35.4	54.0	18.6	13.82	V	90	18	-*

* 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)

1 - 12, 15 - 25

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	Fully anechoic chamber M20	B83117-E2439-T232	Albatross Projects	103	480303	Calibration not necessary	
2	Turntable	DS420 HE	Deisel	420/620/00	480315	Calibration not necessary	
3	Antenna support	AS620P	Deisel	620/375	480325	Calibration not necessary	
4	Multiple Control Unit	MCU	Maturo GmbH	MCU/043/971107	480832	Calibration not necessary	
5	Log.-Per. antenna 850 MHz - 26.5 GHz	HL050	Rohde & Schwarz	100438	481170	Calibration not necessary	
6	Software	EMC32 V10.60.20	Rohde & Schwarz	---	483261	Calibration not necessary	
7	RF-cable No.38	Sucoflex 106B	Suhner	0709/6B / Kabel 38	481328	Calibration not necessary	
8	HF-Cable	Sucoflex 104	Huber+Suhner	517402	482392	Calibration not necessary	
9	Positioner	TDF 1.5- 10Kg	Maturo	15920215	482034	Calibration not necessary	
10	EMI receiver / Spectrum analyser	ESW44	Rohde & Schwarz	101635	482467	27.02.2024	02.2026
11	Preamplifier 100 MHz - 16 GHz	AFS6-00101600-23-10P-6-R	Narda MITEQ	2011215	482333	20.02.2024	02.2026
12	High-pass filter	WHKX4.0/18G-8SS	Wainwright	1	480587	Calibration not necessary	
13	Attenuator 6 dB	WA2-6	Weinschel	8254	410119	Calibration not necessary	
14	Ultralog antenna 30 MHz - 6 GHz	HL562E	Rohde & Schwarz	101079	482978	24.04.2024	04.2027
15	EMC test software	Elektra V5.21	Rohde & Schwarz	---	483755	Calibration not necessary	
16	RF Switch Matrix	OSP220	Rohde & Schwarz	101391	482976	Calibration not necessary	
17	Turntable	TT3.0-3t	Maturo	825/2612/.01	483224	Calibration not necessary	
18	Antenna support tilt mast	BAM 4.5-P-10kg	Maturo	222/2612.01	483225	Calibration not necessary	
19	Controller	NCD	Maturo	474/2612.01	483226	Calibration not necessary	
20	Semi Anechoic Chamber M276	SAC5-2	Albatross Projects	C62128-A540-A138-10-0006	483227	Calibration not necessary	
21	EMI receiver / Spectrum analyser	ESW44	Rohde & Schwarz	101828	482979	21.02.2024	02.2026
22	Low Noise Amplifier 18 GHz - 26.5 GHz	LNA-30-18002650-20-10P	Narda-Miteq	2110911	482969	19.02.2024	02.2026
23	Standard gain horn 18 GHz - 26 GHz	20240-20	Flann	266399	483026	Calibration not necessary	
24	Standard gain horn 12 GHz - 18 GHz	18240-20	Flann	269813	483215	Calibration not necessary	

No.	Test equipment	Type	Manufacturer	Serial No.	PM. No.	Cal. Date	Cal Due
25	Low Noise Amplifier 12 GHz - 18 GHz	LNA-30- 12001800-13- 10P	Narda-Miteq	2089798	482968	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 – 1000 MHz	NSA	ANSI C63.4-2014 ANSI C63.4a-2017	01.03.2023	28.02.2026
Fully anechoic chamber M20	480303	1 -18 GHz	SVSWR	CISPR 16-1-4 Amd. 1	04.02.2025	03.02.2028

9 Report History

Report Number	Date	Comment
F251358E1	05.03.2026	Initial test report
-	-	-
-	-	-

10 List of Annexes

Annex A	Test setup photos	6 pages
Annex B	Void	
Annex C	Void	
Annex D	Void	

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