PHOENIX TESTLAB

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

Test Report

Report Number:

F231636E2

Equipment under Test (EUT):

Dual band Wi-Fi 6 / Bluetooth 5.3 low energy module

IRIS-W1

Applicant:

u-blox AG

Manufacturer:

u-blox AG

ilac-MRA

DAkkS
Deutsche
Akkreditierungsstelle
D-PL-17186-01-00

References

[1] **ANSI C63.10-2020**, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

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

[3] **789033 D02 General UNII Test Procedures New Rules v02r01**

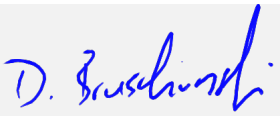
[4] **RSS-247, Issue 3 (2023-08)** Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices

[5] **RSS-Gen, Issue 5 (2021-02)** General Requirements for Compliance of Radio Apparatus

[6] **789033 D02 General UNII Test Procedures New Rules v02r01 (December 2017),** GUIDELINES FOR COMPLIANCE TESTING OF UNLICENSED NATIONAL INFORMATION INFRASTRUCTURE (U-NII) DEVICES PART 15, SUBPART E

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 clause 1.3 of ANSI C63.10 (2013). However, the measurement uncertainty is calculated and shown in this test report.

Tested by:		Daniel BRUSCHINSKI 10.07.2024
	Signature	
Tested and written by:		Paul NEUFELD 10.07.2024
	Signature	
Reviewed and approved by:		Bernward ROHDE 10.07.2024
	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

1.1 Applicant

Name:	u-blox AG
Address:	Zürcherstrasse 68, 8800 Thalwil
Country:	Switzerland
Name for contact purposes:	Mr. Filip Kruzela
Phone:	+46 733 20 71 70
eMail address:	filip.kruzela@u-blox.com
Applicant represented during the test by the following person:	Partly: Mr. Olof Viklund

1.2 Manufacturer

Name:	u-blox AG
Address:	Zürcherstrasse 68, 8800 Thalwil
Country:	Switzerland
Name for contact purposes:	Mr. Filip Kruzela
Phone:	+46 733 20 71 70
eMail address:	filip.kruzela@u-blox.com
Manufacturer represented during the test by the following person:	Partly: Mr. Olof Viklund

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)

EUT	
Test object: *	Dual band Wi-Fi 6 / Bluetooth 5.3 low energy module
Model name: *	IRIS-W1
Model number: *	IRIS-W101-00B IRIS-W106-00B
Order number: *	IRIS-W101-00B IRIS-W106-00B
FCC ID: *	XPYIRISW1
IC certification number: *	8595A-IRISW1
PMN: *	IRIS-W101-00B IRIS-W106-00B
HVIN: *	IRIS-W101-00B IRIS-W106-00B
FVIN: *	922600.0200.000 922700.0200.000
HMN: *	not applicable

	EUT number		
	1*2	2*3	3
Serial number: *	D601E8	F00360	-
PCB identifier: *	UBXH60-0001009	UBXH60-0001008	-
Hardware version: *	922600.0200.000	922700.0200.000	-
Software version: *	MFG-RW61X-1.0.0.12.0-18.80.2.p55.1	MFG-RW61X-1.0.0.12.0-18.80.2.p55.1	-

* Declared by the applicant

*2 This EUT was used for all antenna port conducted tests and for radiated tests with terminated antenna port.
*3 This EUT was only tested radiated in the anechoic chamber.

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

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

1.5 Technical Data of Equipment

Power supply EUT / evaluation board: *	DC		
Supply voltage EUT: *	U_{Nom}= 3.3 V_{DC}	U_{Min}= 3.15 V_{DC}	U_{Max}= 3.45 V_{DC}
Supply voltage Evaluation board: *	U_{Nom}= 4.0 V_{DC}	U_{Min}= 5.0 V_{DC}	U_{Max}= 6.0 V_{DC}
Temperature range: *	-40°C to +85°C		
Lowest internal clock / radio radio frequency: *	40 MHz		
Highest internal clock / radio radio frequency: *	5825 MHz		

Ports / Connectors - EUT				
Identification	Connector		Length during test	Shielding (Yes / No)
	EUT	Ancillary		
J41, U.FL Antenna connector (IRIS-W101 only)	EVB-IRIS-W1	SMA 50Ω termination / Spectrum analyzer	120 mm	Yes
-	-	-	-	-

Ports / Connectors Evaluation board				
Identification	Connector		Length during test	Shielding (Yes / No)
	EUT	Ancillary		
J101, USB-C power supply, MCU-link serial interface	USB-C	USB-C (Laptop computer)	1.8 m	No
J98, USB-C power supply, FTDI 4 x serial interface	USB-C	Not connected	NA	No
J72, USB-C power supply, USB OTG (On The Go)	USB-C	Not connected	NA	No
T1, RJ45 connects to RMII Ethernet phy	RJ45	Not connected	NA	No
-	-	-	-	-
-	-	-	-	-

IEEE 802.11 frequencies (5 GHz)	
20 MHz	
Channel 36	5180 MHz
Channel 40	5200 MHz
Channel 44	5220 MHz
Channel 48	5240 MHz
Channel 52	5260 MHz
Channel 48	5280 MHz
Channel 60	5300 MHz
Channel 64	5320 MHz
Channel 100	5500 MHz
Channel 104	5520 MHz
Channel 108	5540 MHz
Channel 112	5560 MHz
Channel 116	5580 MHz
Channel 120*	5600 MHz
Channel 124*	5620 MHz
Channel 128*	5640 MHz
Channel 132	5660 MHz
Channel 136	5680 MHz
Channel 140	5700 MHz
Channel 149	5745 MHz
Channel 153	5765 MHz
Channel 157	5785 MHz
Channel 161	5805 MHz
Channel 165	5825 MHz

* Only passive scanning on these channels

IEEE 802.11 radio mode (5GHz)		
Fulfils radio specification: *	IEEE 802.11 a IEEE 802.11 n (20 MHz) IEEE 802.11 ac (20 MHz) IEEE 802.11 ax20 (20 MHz)	
Radio IC: *	NXP RW612ET	
Type of modulation: *	IEEE 802.11 a	BPSK, QPSK, 16-QAM, 64-QAM (6/9/12/18/24/36/48/54 Mbit/s)
	IEEE 802.11 n20	BPSK, QPSK, 16-QAM, 64-QAM (up to 72.2 Mbit/s 1 spatial stream) (up to 144.4 Mbit/s 2 spatial stream)
	IEEE 802.11 ac20	BPSK, QPSK, 16-QAM, 64-QAM, 256-QAM (up to 86.65 Mbit/s 1 spatial stream) (up to 173.3 Mbit/s 2 spatial stream)
	IEEE 802.11 ax20	BPSK, QPSK, 16-QAM, 64-QAM, 256-QAM, 1024-QAM (up to 143.4 Mbit/s 1 spatial stream) (up to 286.8 Mbit/s 2 spatial stream)
Operating frequency range: *	IEEE 802.11a	5180 – 5240 MHz, 5260 – 5320 MHz 5500 – 5720 MHz, 5745 – 5825 MHz,
	IEEE 802.11n 20 MHz	5180 – 5240 MHz, 5260 – 5320 MHz 5500 – 5720 MHz, 5745 – 5825 MHz,
	IEEE 802.11ac 20 MHz	5180 – 5240 MHz, 5260 – 5320 MHz 5500 – 5720 MHz, 5745 – 5825 MHz,
	IEEE 802.11ax 20 MHz	5180 – 5240 MHz, 5260 – 5320 MHz 5500 – 5720 MHz, 5745 – 5825 MHz,

* Declared by the applicant

Antenna list			
Antenna type	Antenna name	Antenna gain	Antenna connector
PCB trace*	Abracon	+1.74 dBi (2.4 GHz) / +1. dBi (5 GHz)	None
PCB Patch	PRO-IS-432 by Abracon	+0.8 dBi (2.4 GHz), +3.4 dBi (5 GHz)	U.FL
PCB patch	ANTX100P002B24553 by Pulse Electronics / Yageo	+0.7 dBi (2.4 GHz), +1.9 dBi (5 GHz)	U.FL
Monopole (¼ wave)	W1039B030 by Pulse Electronic / Yageo	+1.5 dBi (2.4 GHz), +3.2 dBi (5 GHz)	U.FL
Monopole (½ wave)	GW.59.3153 by taoglas	+2.37 dBi (2.4 GHz), +2.93 dBi (5 GHz)	Reverse Polarity SMA plug*2
Antenna data was declared by the applicant			

* On-board antenna on the IRIS-W106-00B
*2 Inner thread and pin receptacle; Connection only possible with appropriate adapter cable (U.FL to Reverse polarity SMA)

2.1 Ancillary Equipment / Equipment used for testing

Equipment used for testing	
Evaluation board*1	EVB-IRIS-W1
Laptop computer*1	Latitude 7280 by Dell
-	-

*1 Provided by the applicant

Ancillary Equipment	
-	-

2.2 Dates

Date of receipt of test sample:	13.11.2023
Start of test:	13.11.2023
End of test:	03.04.2024

3 Operational States

3.1 Description of function of the EUT

The u-blox IRIS-W1 is a dual-band Wi-Fi 6 (802.11ac/ax/a/b/g/n), Bluetooth Low Energy 5.3 and Thread connectivity module for country specific specifications.

3.2 Test Setup

For the radio tests, the EUT was soldered to an evaluation board. To activate the test modes and to power the EUT, the evaluation board was connected a laptop computer via USB. Using software named "labtool" the radio test modes were activated. The test laptop and the test software were provided by the applicant.

3.3 Power Settings WLAN

Channel	802.11a	802.11n20	11ac20	802.11ax20	802.11ax20 RU Modes
36	16	16	16	16	13
40	17	17	17	17	13
44	17	17	17	17	13
48	17	17	17	17	13
52	17	17	17	17	14
56	17	17	17	17	14
60	17	17	17	17	14
64	16	16	16	16	14
100	13	13	13	13	11
104	16	16	16	16	11
108	17	17	17	17	11
112	17	17	17	17	11
116	17	17	17	17	11
120	17	17	17	17	11
124	17	17	17	17	11
128	17	17	17	17	11
132	17	17	17	17	11
136	17	17	17	17	11
140	17	17	17	17	11
149	17	17	17	17	17
153	17	17	17	17	17
157	17	17	17	17	17
161	17	17	17	17	17
165	17	17	17	17	17

3.4 Operation Modes (OBW + Band-Edge)

Operation mode #	Radio technology	Frequency [MHz]	Channel / Band	Modulation / Mode	Data rate*	Power setting
1	IEEE 802.11	5180	36	802.11a	12 Mbps	16
2	IEEE 802.11	5200	40	802.11a	12 Mbps	17
3	IEEE 802.11	5240	48	802.11a	12 Mbps	17
4	IEEE 802.11	5260	52	802.11a	12 Mbps	17
5	IEEE 802.11	5300	60	802.11a	12 Mbps	17
6	IEEE 802.11	5320	64	802.11a	12 Mbps	16
7	IEEE 802.11	5500	100	802.11a	12 Mbps	13
8	IEEE 802.11	5580	116	802.11a	12 Mbps	17
9	IEEE 802.11	5700	140	802.11a	12 Mbps	17
10	IEEE 802.11	5180	36	802.11n20	MCS3	16
11	IEEE 802.11	5200	40	802.11n20	MCS3	17
12	IEEE 802.11	5240	48	802.11n20	MCS3	17
13	IEEE 802.11	5260	52	802.11n20	MCS3	17
14	IEEE 802.11	5300	60	802.11n20	MCS3	17
15	IEEE 802.11	5320	64	802.11n20	MCS3	16
16	IEEE 802.11	5500	100	802.11n20	MCS3	13
17	IEEE 802.11	5580	116	802.11n20	MCS3	17
18	IEEE 802.11	5700	140	802.11n20	MCS3	17
19	IEEE 802.11	5180	36	802.11ac20	MCS3	16
20	IEEE 802.11	5200	40	802.11ac20	MCS3	17
21	IEEE 802.11	5240	48	802.11ac20	MCS3	17
22	IEEE 802.11	5260	52	802.11ac20	MCS3	17
23	IEEE 802.11	5300	60	802.11ac20	MCS3	17
24	IEEE 802.11	5320	64	802.11ac20	MCS3	16
25	IEEE 802.11	5500	100	802.11ac20	MCS3	13
26	IEEE 802.11	5580	116	802.11ac20	MCS3	17
27	IEEE 802.11	5700	140	802.11ac20	MCS3	17
28	IEEE 802.11	5180	36	802.11ax20	MCS5	16
29	IEEE 802.11	5200	40	802.11ax20	MCS5	17
30	IEEE 802.11	5240	48	802.11ax20	MCS5	17
31	IEEE 802.11	5260	52	802.11ax20	MCS5	17
32	IEEE 802.11	5300	60	802.11ax20	MCS5	17
33	IEEE 802.11	5320	64	802.11ax20	MCS5	16

34	IEEE 802.11	5500	100	802.11ax20	MCS5	13
35	IEEE 802.11	5580	116	802.11ax20	MCS5	17
36	IEEE 802.11	5700	140	802.11ax20	MCS5	17
37	IEEE 802.11	5180	36	802.11ax20 RU242	MCS5	13
38	IEEE 802.11	5200	40	802.11ax20 RU242	MCS5	13
39	IEEE 802.11	5240	48	802.11ax20 RU242	MCS5	13
40	IEEE 802.11	5260	52	802.11ax20 RU242	MCS5	14
41	IEEE 802.11	5300	60	802.11ax20 RU242	MCS5	14
42	IEEE 802.11	5320	64	802.11ax20 RU242	MCS5	14
43	IEEE 802.11	5500	100	802.11ax20 RU242	MCS5	11
44	IEEE 802.11	5580	116	802.11ax20 RU242	MCS5	11
45	IEEE 802.11	5700	140	802.11ax20 RU242	MCS5	11
46	IEEE 802.11	5745	149	802.11a	12 Mbps	17
47	IEEE 802.11	5785	157	802.11a	12 Mbps	17
48	IEEE 802.11	5825	165	802.11a	12 Mbps	17
49	IEEE 802.11	5745	149	802.11n20	MCS3	17
50	IEEE 802.11	5785	157	802.11n20	MCS3	17
51	IEEE 802.11	5825	165	802.11n20	MCS3	17
52	IEEE 802.11	5745	149	802.11ac20	MCS3	17
53	IEEE 802.11	5785	157	802.11ac20	MCS3	17
54	IEEE 802.11	5825	165	802.11ac20	MCS3	17
55	IEEE 802.11	5745	149	802.11ax20	MCS5	17
56	IEEE 802.11	5785	157	802.11ax20	MCS5	17
57	IEEE 802.11	5825	165	802.11ax20	MCS5	17
58	IEEE 802.11	5745	149	802.11ax20 RU242	MCS5	17
59	IEEE 802.11	5785	157	802.11ax20 RU242	MCS5	17
60	IEEE 802.11	5825	165	802.11ax20 RU242	MCS5	17
61	IEEE 802.11	5745	149	802.11ax20 RU52Low	MCS5	17
62	IEEE 802.11	5825	165	802.11ax20 RU52High	MCS5	17

3.5 Operation Modes (PWR + PSD)

Operation mode #	Radio technology	Frequency [MHz]	Channel / Band	Modulation / Mode	Data rate*	Power setting
63	IEEE 802.11	5180	36	802.11a	6 Mbps	16
64	IEEE 802.11	5200	40	802.11a	6 Mbps	17
65	IEEE 802.11	5240	48	802.11a	6 Mbps	17
66	IEEE 802.11	5180	36	802.11n20	MCS0	16
67	IEEE 802.11	5200	40	802.11n20	MCS0	17
68	IEEE 802.11	5240	48	802.11n20	MCS0	17
69	IEEE 802.11	5180	36	802.11ac20	MCS0	16
70	IEEE 802.11	5200	40	802.11ac20	MCS0	17
71	IEEE 802.11	5240	48	802.11ac20	MCS0	17
72	IEEE 802.11	5180	36	802.11ax20	MCS0	16
73	IEEE 802.11	5200	40	802.11ax20	MCS0	17
74	IEEE 802.11	5240	48	802.11ax20	MCS0	17
75	IEEE 802.11	5180	36	802.11ax20RU52Low	MCS0	13
76	IEEE 802.11	5200	40	802.11ax20RU52Low	MCS0	13
77	IEEE 802.11	5240	48	802.11ax20RU52Low	MCS0	13
78	IEEE 802.11	5180	36	802.11ax20 RU26Low	MCS0	13
79	IEEE 802.11	5200	40	802.11ax20 RU26Low	MCS0	13
80	IEEE 802.11	5240	48	802.11ax20 RU26Low	MCS0	13
81	IEEE 802.11	5260	52	802.11a	6 Mbps	17
82	IEEE 802.11	5300	60	802.11a	6 Mbps	17
83	IEEE 802.11	5320	64	802.11a	6 Mbps	16
84	IEEE 802.11	5260	52	802.11n20	MCS0	17
85	IEEE 802.11	5300	60	802.11n20	MCS0	17
86	IEEE 802.11	5320	64	802.11n20	MCS0	16
87	IEEE 802.11	5260	52	802.11ac20	MCS0	17
88	IEEE 802.11	5300	60	802.11ac20	MCS0	17
89	IEEE 802.11	5320	64	802.11ac20	MCS0	16
90	IEEE 802.11	5260	52	802.11ax20	MCS0	17
91	IEEE 802.11	5300	60	802.11ax20	MCS0	17
92	IEEE 802.11	5320	64	802.11ax20	MCS0	16
93	IEEE 802.11	5260	52	802.11ax20RU52Low	MCS0	14
94	IEEE 802.11	5300	60	802.11ax20RU52Low	MCS0	14
95	IEEE 802.11	5320	64	802.11ax20RU52Low	MCS0	14

96	IEEE 802.11	5260	52	802.11ax20 RU26Low	MCS0	14
97	IEEE 802.11	5300	60	802.11ax20 RU26Low	MCS0	14
98	IEEE 802.11	5320	64	802.11ax20 RU26Low	MCS0	14
99	IEEE 802.11	5500	100	802.11a	6 Mbps	13
100	IEEE 802.11	5580	116	802.11a	6 Mbps	17
101	IEEE 802.11	5700	140	802.11a	6 Mbps	17
102	IEEE 802.11	5500	100	802.11n20	MCS0	13
103	IEEE 802.11	5580	116	802.11n20	MCS0	17
104	IEEE 802.11	5700	140	802.11n20	MCS0	17
105	IEEE 802.11	5500	100	802.11ac20	MCS0	13
106	IEEE 802.11	5580	116	802.11ac20	MCS0	17
107	IEEE 802.11	5700	140	802.11ac20	MCS0	17
108	IEEE 802.11	5500	100	802.11ax20	MCS0	13
109	IEEE 802.11	5580	116	802.11ax20	MCS0	17
110	IEEE 802.11	5700	140	802.11ax20	MCS0	17
111	IEEE 802.11	5500	100	802.11ax20 RU52Low	MCS0	11
112	IEEE 802.11	5580	116	802.11ax20 RU52Low	MCS0	11
113	IEEE 802.11	5700	140	802.11ax20 RU52Low	MCS0	11
114	IEEE 802.11	5500	100	802.11ax20 RU26Low	MCS0	11
115	IEEE 802.11	5580	116	802.11ax20 RU26Low	MCS0	11
116	IEEE 802.11	5700	140	802.11ax20 RU26Low	MCS0	11
117	IEEE 802.11	5745	149	802.11a	6 Mbps	17
118	IEEE 802.11	5785	157	802.11a	6 Mbps	17
119	IEEE 802.11	5825	165	802.11a	6 Mbps	17
120	IEEE 802.11	5745	149	802.11n20	MCS0	17
121	IEEE 802.11	5785	157	802.11n20	MCS0	17
122	IEEE 802.11	5825	165	802.11n20	MCS0	17
123	IEEE 802.11	5745	149	802.11ac20	MCS0	17
124	IEEE 802.11	5785	157	802.11ac20	MCS0	17
125	IEEE 802.11	5825	165	802.11ac20	MCS0	17
126	IEEE 802.11	5745	149	802.11ax20	MCS0	17
127	IEEE 802.11	5785	157	802.11ax20	MCS0	17
128	IEEE 802.11	5825	165	802.11ax20	MCS0	17
129	IEEE 802.11	5745	149	802.11ax20 RU52Low	MCS0	17
130	IEEE 802.11	5785	157	802.11ax20 RU52Low	MCS0	17
132	IEEE 802.11	5825	165	802.11ax20 RU52Low	MCS0	17

133	IEEE 802.11	5745	149	802.11ax20 RU26Low	MCS0	17
134	IEEE 802.11	5785	157	802.11ax20 RU26Low	MCS0	17
135	IEEE 802.11	5825	165	802.11ax20 RU26Low	MCS0	17

3.6 Operation Modes (Spurious Emissions radiated)

Operation mode #	Radio technology	Frequency [MHz]	Channel / Band	Modulation / Mode	Data rate*	Power setting
136	IEEE 802.11	5180	36	802.11ax20 RU26Mid	MCS5	13
137	IEEE 802.11	5200	40	802.11ax20 RU26Mid	MCS5	13
138	IEEE 802.11	5240	48	802.11ax20 RU26Mid	MCS5	13
139	IEEE 802.11	5260	52	802.11ax20 RU26Mid	MCS5	14
140	IEEE 802.11	5300	60	802.11ax20 RU26Mid	MCS5	14
141	IEEE 802.11	5320	64	802.11ax20 RU26Mid	MCS5	14
142	IEEE 802.11	5500	100	802.11ax20 RU26Mid	MCS5	11
143	IEEE 802.11	5580	116	802.11ax20 RU26Mid	MCS5	11
144	IEEE 802.11	5700	140	802.11ax20 RU26Mid	MCS5	11
145	IEEE 802.11	5745	149	802.11ax20 RU26Mid	MCS5	17
146	IEEE 802.11	5785	157	802.11ax20 RU26Mid	MCS5	17
147	IEEE 802.11	5825	165	802.11ax20 RU26Mid	MCS5	17

3.7 Additional Information

The EUT was not labeled as required by FCC / IC.
All radiated tests were performed using an unmodified EUT.

Spurious emissions were tested conducted at the antenna port for IRIS-W101 for all modes listed in 3.5 using the worst case antenna gain. Since all emissions were below the limit, the worst case emissions from these tests were tested radiated for the IRIS-W106 and the IRIS-W101 (with terminated antenna port). Test results can be obtained from the laboratory.

4 Overview

Application	Frequency range in MHz	FCC 47 CFR Part 15 section [2]	RSS-247 [4] RSS-Gen [5]	Tested EUT	Status
Maximum Output Power	5150 – 5350 5470 - 5895	15.407 (a)	6.2.1.1 [4] 6.2.2.1 [4] 6.2.3.1 [4] 6.2.4.2 [4]	1	Passed
UNII Bandwidth 99% Bandwidth	5150 – 5350 5470 - 5895	-	-	1	Passed
6 dB Bandwidth	5725 - 5850	15.407(e)	6.2.4.2 [4]	1	Passed
26 dB Bandwidth Emission Bandwidth	5150 – 5350 5470 - 5895	15.403	6.2.1.2 [4]	1	Passed
Maximum Power Spectral Density	5150 – 5350 5470 - 5895	15.407 (a)(5)	6.2.1.1 [5] 6.2.4.1 [5]	1	Passed
Band edge compliance	5150 – 5350 5470 - 5895	15.407 (b)	6.2.1.2[4] 6.2.2.2 [4] 6.2.3.2 [4] 6.2.4.3[4]	1, 2	Passed
Radiated emissions (transmitter)	0.009 - 40,000	15.407 (b) 15.205 (a) 15.209 (a)	6.13 [5], 6.2.1.2 [4] 6.2.2.2 [4] 6.2.3.2 [4] 6.2.4.3 [4]	1, 2	Passed
Antenna Requirement	-	15.203 15.247 (b)	6.8 [5] 5.4 (f) (ii) [4]	-	-
Conducted emissions on supply line	0.15 - 30	15.207 (a)	7.2 [5]	1, 2	Passed

5 Results

5.1 Test setup

5.1.1 Test Setup (radiated)

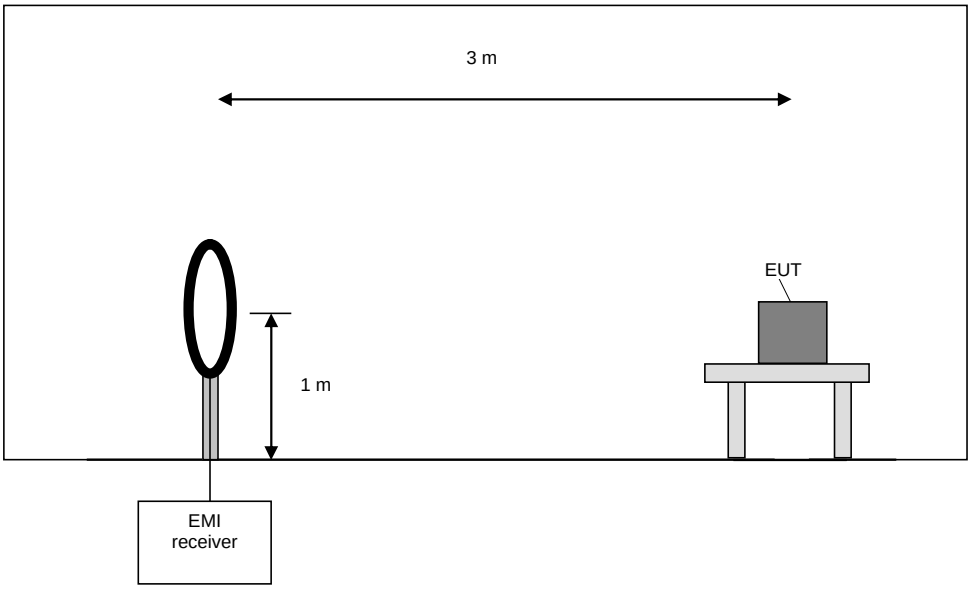
5.1.1.1 Preliminary measurement 9 kHz to 30 MHz

In the first stage a preliminary measurement is performed in an anechoic chamber with a measuring distance of 3 meters. Table-top and portable 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 to [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.

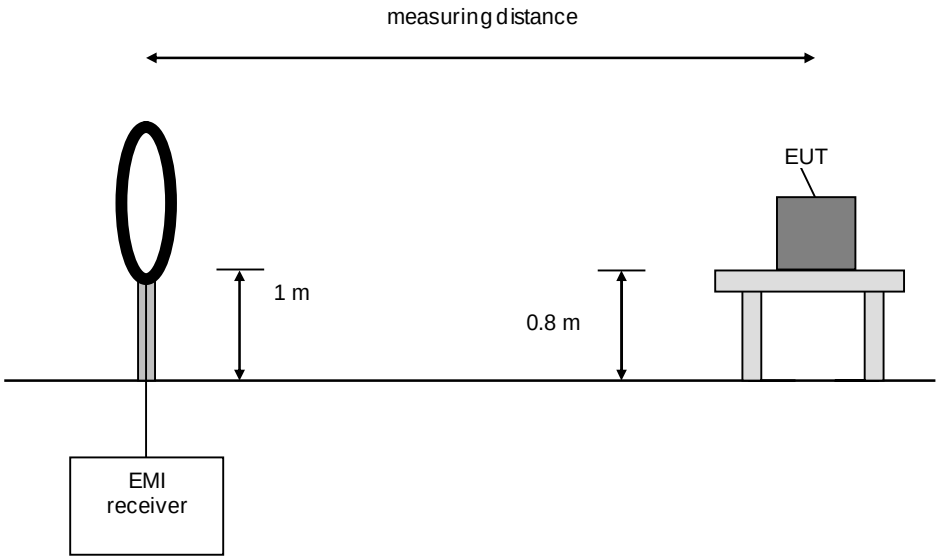
5.1.1.2 Final measurement 9 kHz to 30 MHz

In the second stage a final measurement is performed on an open area test site with no conducting ground plane in measuring distances of 3 m, 10 m or 30 m. In the case where larger measuring distances are required the results are extrapolated based on the values measured on the closer distances 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 to 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
9 kHz to 150 kHz	200 Hz
150 kHz to 30 MHz	9 kHz



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.

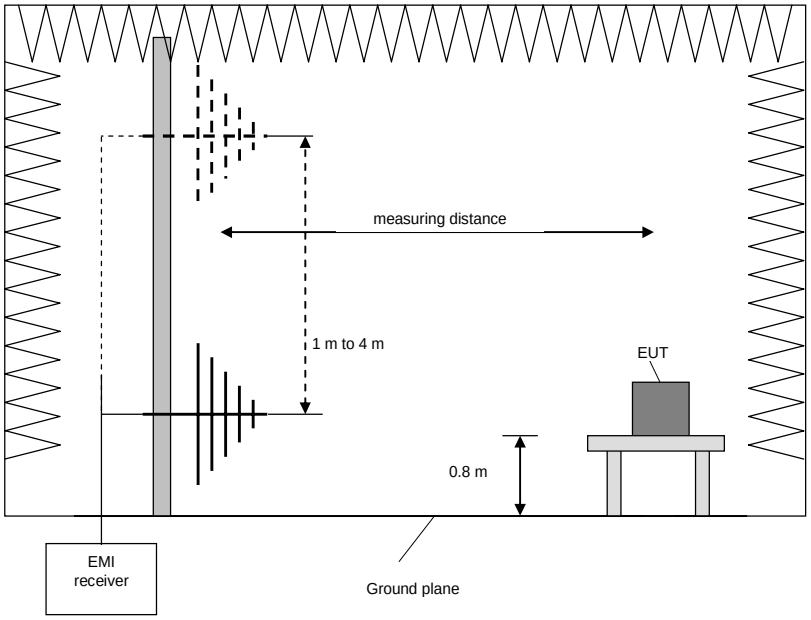
5.1.1.3 Preliminary and final measurement 30 MHz to 1 GHz

The preliminary and final measurements are performed in a semi-anechoic chamber with a metal ground plane in a 3 m distance. Table-top and portable 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.

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	Detector
Preliminary measurement	30 MHz to 1 GHz	30 kHz	120 kHz	Peak Average
Frequency peak search	± 120 kHz	10 kHz	120 kHz	Peak
Final measurement	30 MHz to 1 GHz	-	120 kHz	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.

5.1.1.4 Preliminary and final measurement > 1 GHz (Normal procedure 6.6.4 in [1])

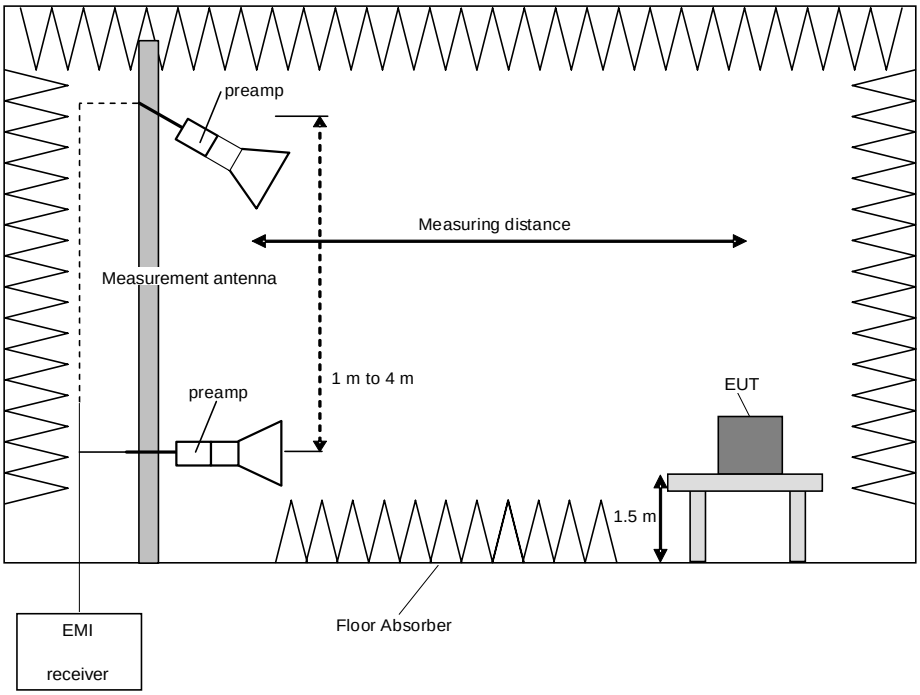
This measurement will be performed in a fully anechoic chamber or in a semi-anechoic chamber with ground absorbers between antenna and EUT. Tabletop and portable devices will set up on a non-conducting turn device on the height of 1.5m. Floor standing devices will be placed directly on the turntable. The set-up of the Equipment under test will be in accordance to [1].

Preliminary measurement (1 GHz to 40 GHz)

The frequency range will be divided into different sub ranges depending on the frequency range of the used antenna. The spectrum analyser set to MAX Hold mode and a resolution bandwidth of 1 MHz. The measurement will be performed in horizontal and vertical polarisation of the measuring antenna and while rotating the EUT in its vertical axis in the range of 0 ° to 360 °. This measurement is repeated with antenna-height-steps of 50 cm starting from 1 m up to 4m . When the EUT is manipulated through three different orientations, the scan height upper range for the measurement antenna is limited to 2.5 m or 0.5 m above the top of the EUT, whichever is higher. At the different height positions, the EUT is always directed at the EUT.

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

Frequency range	Resolution bandwidth
1 GHz to 4 GHz	1 MHz
4 GHz to 12 GHz	1 MHz
12 GHz to 18 GHz	1 MHz
18 GHz to 25 / 26.5 GHz	1 MHz
26.5 GHz to 40 GHz	1 MHz



Procedure preliminary measurement:

Pre-scans were performed in the frequency range 1 to 40 GHz.
The following procedure will be used:

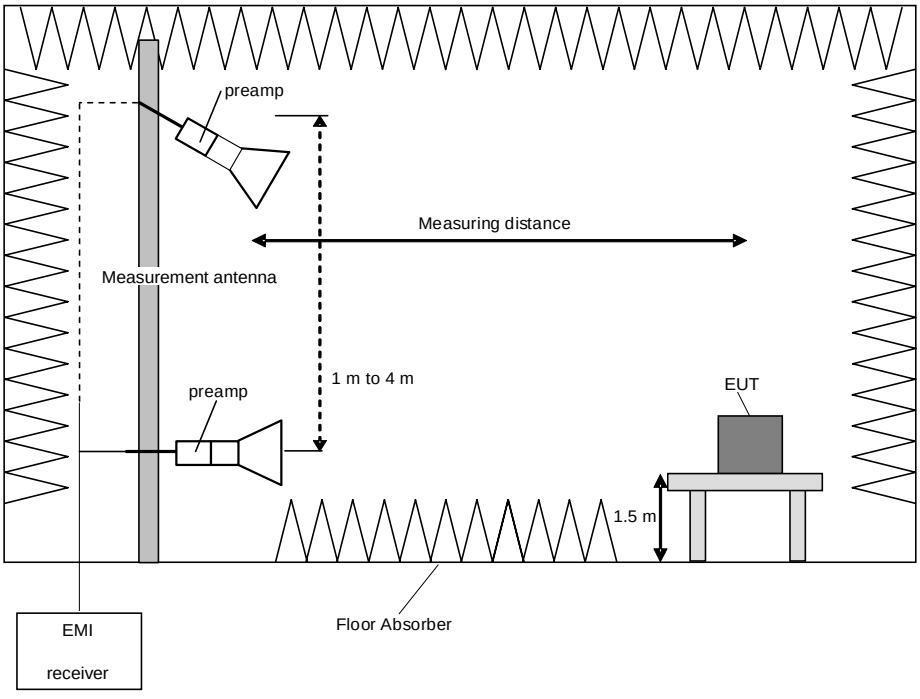
1. Set the measurement antenna to 1 m height.
2. Monitor the frequency range at vertical polarisation and a EUT azimuth of 0 °.
3. Rotate the EUT by 360° to maximize the detected signals.
4. Repeat steps 1. and 2. with the horizontal polarisation of the measuring antenna.
5. Increase the height of the antenna for 0.5 m and repeat steps 2 – 4 until the final height of 4 m is reached. (If the EUT is tested in 3 orientations, the maximum height is 2.5 m or or 0.5 m above the top of the EUT, whichever is higher.)
6. The highest values for each frequency will be saved by the software, including the antenna height, measurement antenna polarization and turntable azimuth for the for each frequency step.

Final measurement (1 GHz to 40 GHz)

The frequency range will be divided into different sub ranges depending on the frequency range of the used antenna. The EMI Receiver set to peak and average mode and a resolution bandwidth of 1 MHz. The measurement will be performed by rotating the turntable through 0 to 360° in the worst-case EUT orientation which was obtained during the preliminary measurements.

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

Frequency range	Resolution bandwidth
1 GHz to 4 GHz	1 MHz
4 GHz to 12 GHz	1 MHz
12 GHz to 18 GHz	1 MHz
18 GHz to 25 / 26.5 GHz	1 MHz
26.5 GHz to 40 GHz	1 MHz



Procedure of measurement:

The measurements were performed in the frequency ranges 1 GHz to 4 GHz, 4 GHz to 12 GHz, 12 GHz to 18 GHz, 18 GHz to 25 /26.5 GHz and 26.5 GHz to 40 GHz.

The following procedure is used:

1. Select the highest frequency peaks to the limit for the final measurement.
2. The software will determine the exact peak frequencies by doing a partial scan with reduced RBW with +/- 10 times the RBW 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 measurement antenna height is found by the measurement software by varying the measurement antenna height by +/- 0.5 m from the worst-case value obtained in the preliminary measurement, and to monitor the emission level.
5. The worst azimuth turntable position is found by varying the turntable azimuth by +/- 30° from the worst-case value obtained in the preliminary measurement, and to monitor the emission level.
6. The final measurement is performed at the worst-case antenna height and the worst case turntable azimuth.
7. Steps 2 – 6 will be repeated for each frequency peak selected in step 1.

5.1.1.5 Preliminary and final measurement > 1 GHz (Alternative procedure 6.6.5 in [1])

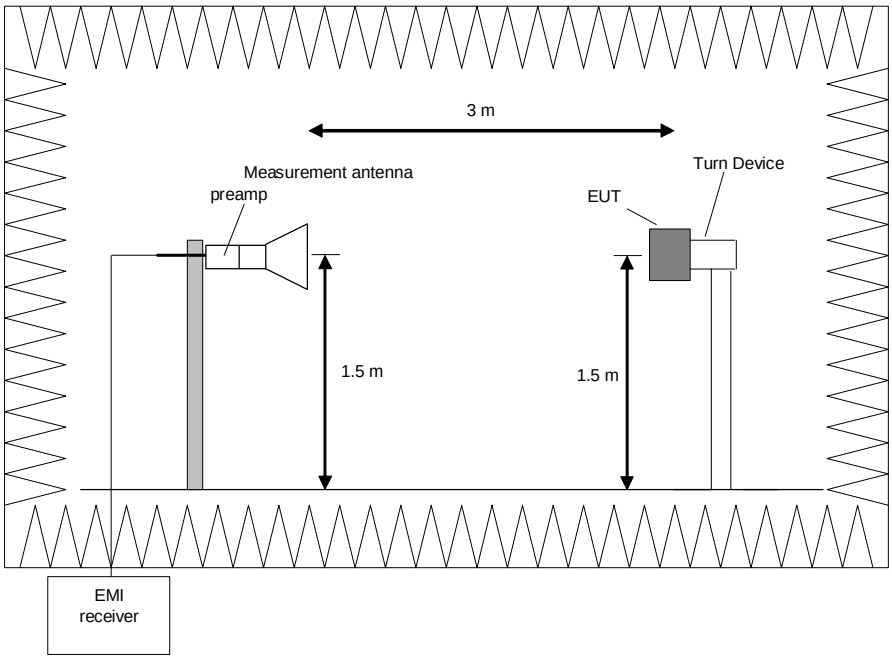
This measurement will be performed in a fully anechoic chamber or in a semi-anechoic chamber with ground absorbers between antenna and EUT. Tabletop and portable devices will set up on a non-conducting turn device on the height of 1.5m. The set-up of the Equipment under test will be in accordance to [1]. Devices with any dimension larger than the beamwidth of the measurement antenna are not suitable for testing with this method; such devices shall be evaluated as tabletop equipment (see procedure 5.1.1.4 above).

Preliminary measurement (1 GHz to 40 GHz)

The frequency range will be divided into different sub ranges depending on the frequency range of the used antenna. The spectrum analyser set to MAX Hold mode and a resolution bandwidth of 1 MHz. The measurement will be performed in horizontal and vertical polarisation of the measuring antenna and while rotating the EUT in its vertical axis in the range of 0 ° to 360 °. This measurement is repeated after raising the EUT in 30° steps according to 6.6.5.4 in [1].

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

Frequency range	Resolution bandwidth
1 GHz to 4 GHz	1 MHz
4 GHz to 12 GHz	1 MHz
12 GHz to 18 GHz	1 MHz
18 GHz to 25 / 26.5 GHz	1 MHz
26.5 GHz to 40 GHz	1 MHz



Procedure preliminary measurement:

Pre-scans were performed in the frequency range 1 to 40 GHz.
The following procedure will be used:

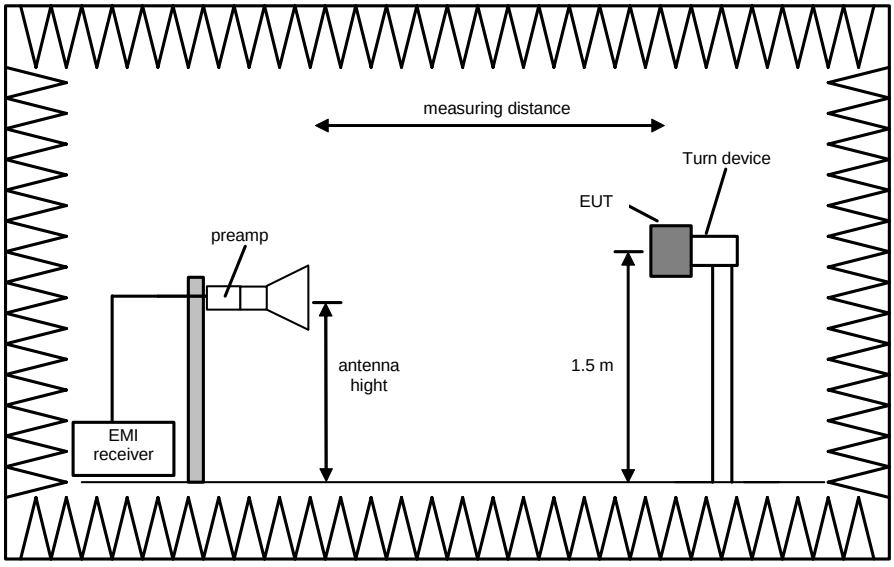
1. Monitor the frequency range at horizontal polarization and a EUT azimuth of 0 °.
2. Rotate the EUT by 360° to maximize the detected signals.
3. Repeat 1) to 2) with the vertical polarization of the measuring antenna.
4. Make a hardcopy of the spectrum.
5. Repeat 1) to 4) with the EUT raised by an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

Final measurement (1 GHz to 40 GHz)

The frequency range will be divided into different sub ranges depending on the frequency range of the used antenna. The EMI Receiver set to peak and average mode and a resolution bandwidth of 1 MHz. The measurement will be performed by rotating the turntable through 0 to 360° in the worst-case EUT orientation which was obtained during the preliminary measurements.

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

Frequency range	Resolution bandwidth
1 GHz to 4 GHz	1 MHz
4 GHz to 12 GHz	1 MHz
12 GHz to 18 GHz	1 MHz
18 GHz to 25 / 26.5 GHz	1 MHz
26.5 GHz to 40 GHz	1 MHz



Procedure of measurement:

The measurements were performed in the frequency ranges 1 GHz to 4 GHz, 4 GHz to 12 GHz, 12 GHz to 18 GHz, 18 GHz to 25 /26.5 GHz and 26.5 GHz to 40 GHz.
The following procedure will be used:

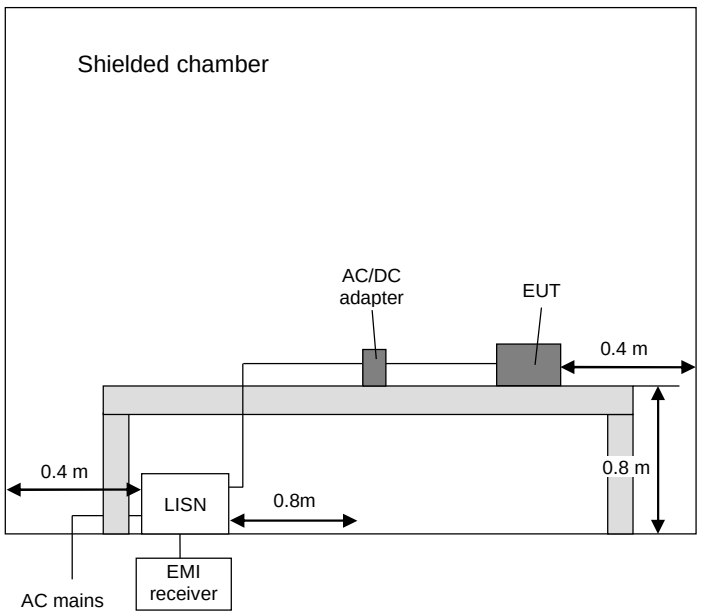
1) Set the turntable and the turn device to obtain the worst-case emission for the first frequency identified in the preliminary measurements.
2) The worst-case turntable position is found via varying the turntable azimuth by +/- 30° from the value obtained in the preliminary measurement while monitoring the emission level.
3) Set the measurement antenna polarization to the orientation with the highest emission for the first frequency identified in the preliminary measurements.
4) Set the spectrum analyzer to EMI mode with peak and average detector activated.
5) Rotate the turntable from 0° to 360° to find the TT Pos. that produces the highest emissions.
6) Note the highest displayed peak and average values
7) Repeat the steps 1) to 5) for each frequency detected during the preliminary measurements.

5.1.1 Conducted: AC power line

The test is carried out in a shielded chamber. 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 above the ground plane. Floor-standing devices are placed directly on the ground plane. In case of DC powered equipment, which is not exclusively powered by a battery, it is connected to the LISN via a suitable AC/DC adaptor. The setup of the equipment under test is in accordance with [1].

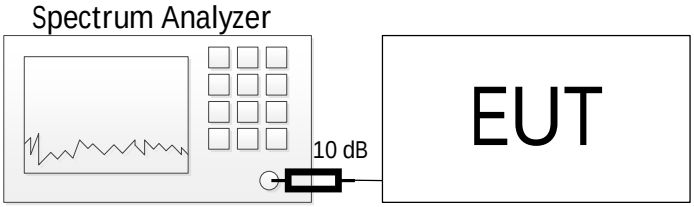
The frequency range 150 kHz to 30 MHz is measured with an EMI receiver set to MAX hold mode with Peak and Average detectors and a resolution bandwidth of 9 kHz. A scan is carried out on the phase and neutral line of the AC mains network. If emissions less than 10 dB below the appropriable limit are detected, these emissions are measured with an Average and Quasi-Peak detector on all lines.

Frequency range	Resolution bandwidth	Measuring time
150 kHz to 30 MHz	9 kHz	5 s



5.1.2 Test setup (conducted)

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



The 10 dB external attenuation are considered in all relevant plots

5.2 Duty cycle

5.2.1 Test setup (Duty cycle)

Test setup			
Used	Setup	See sub-clause	Comment
☐	Test setup (radiated – normal procedure)	5.1.1.4	-
☐	Test setup (radiated – alternative procedure)	5.1.1.5	-
☒	Test setup (antenna port conducted)	5.1.2	-

5.2.2 Test method (Duty cycle)

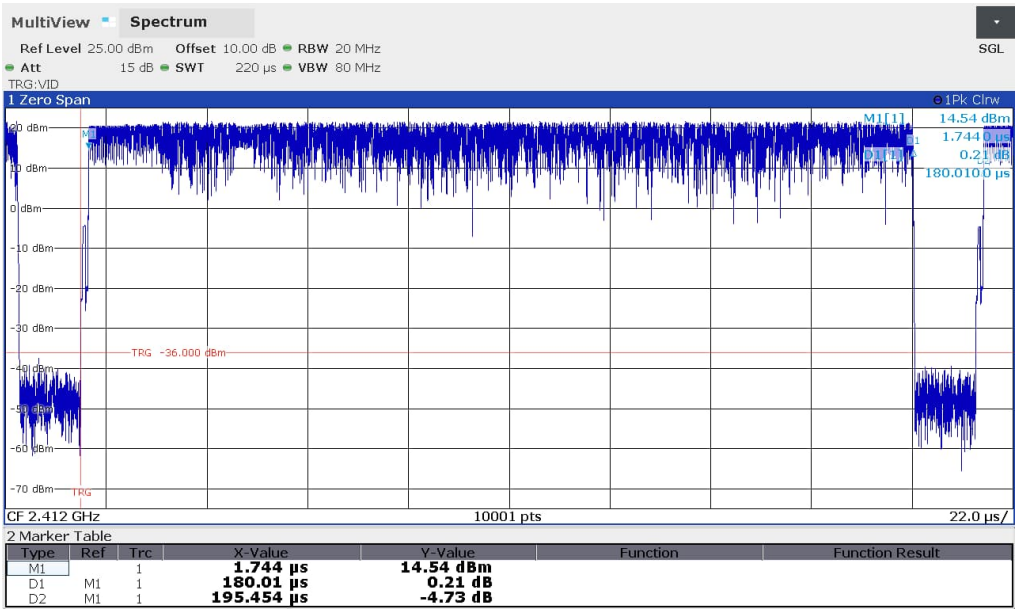
Test method (Duty cycle)				
Used	Sub-Clause [6]	Name of method	Applicability	Comment
☐	II B. 2. a)	Diode detector	No limitation	-
☒	II B. 2. b)	Zero span (analyzer or EMI receiver)	No limitation	-

5.2.3 Test results (Duty cycle)

Ambient temperature:	22 °C
Relative humidity:	37-43 %

Date	16+20.11.2023
Tested by	P. NEUFELD

Measurement plot (IEEE 802.11ax20 MCS5):



Radio technology	TX_{On} [µs]	TX_{Cycle} [µs]	RBW [MHz]	50/T [kHz]	50/T < RBW?
IEEE 802.11a 6Mbps	1432	1447	20	34.916	☒ Yes
IEEE 802.11a 9Mbps	960	975	20	52.083	☒ Yes
IEEE 802.11a 12Mbps	728	744	20	68.681	☒ Yes
IEEE 802.11n20 MCS0	1340	1356	20	37.313	☒ Yes
IEEE 802.11n20 MCS3	472	488	20	105.932	☒ Yes
IEEE 802.11ac20 MCS0	1348	1363	20	37.092	☒ Yes
IEEE 802.11ac20 MCS2	476	492	20	105.042	☒ Yes
IEEE 802.11ac20 MCS3	368	384	20	135.870	☒ Yes
IEEE 802.11ax20 MCS0	1045	1060	20	47.847	☒ Yes
IEEE 802.11ax20 MCS5	180	196	20	277.778	☒ Yes

Operation Mode #	Sweep points	Sweep time [µs]	Meas points For TX_{On}	Meas points >100?	Duty cycle %	DCCF Power [dB]	DCCF Voltage [dB]
IEEE 802.11a 6Mbps	10001	1550	9240	☒ Yes	98.96	-*	-*
IEEE 802.11a 9Mbps	10001	1050	9144	☒ Yes	98.46	-*	-*
IEEE 802.11a 12Mbps	10001	800	9101	☒ Yes	97.85	0.1	0.2
IEEE 802.11n20 MCS0	10001	1400	9572	☒ Yes	98.82	-*	-*
IEEE 802.11n20 MCS3	10001	520	9078	☒ Yes	96.72	0.1	0.3
IEEE 802.11ac20 MCS0	10001	1400	9630	☒ Yes	0.9890	-*	-*
IEEE 802.11ac20 MCS2	10001	520	9155	☒ Yes	0.9675	0.1	0.3
IEEE 802.11ac20 MCS3	10001	410	8977	☒ Yes	0.9583	0.2	0.4
IEEE 802.11ax20 MCS0	10001	1100	9501	☒ Yes	98.58	-*	-*
IEEE 802.11ax20 MCS5	10001	220	8183	☒ Yes	91.84	0.4	0.7

* No duty cycle correction necessary because the duty cycle is above 98%. See 11.9.2.1 in [1] for details.

The DCCF (duty cycle correction factor) is calculated by:

$$DCCF_{Power} = 10 * log_{10}\left(\frac{1}{Duty\ cycle}\right)$$

$$DCCF_{Fieldstrength} = 20 * log_{10}\left(\frac{1}{Duty\ cycle}\right)$$

Test equipment (please refer to chapter 6 for details)
1

5.3 Transmit Antenna Performance considerations

Test result (Transmit antenna requirements)			
Integral and/or dedicated antenna	Antenna gain ≤ 6dBi	Result	Comment
☒	☒	Passed	No output power reduction necessary

5.4 Emission Bandwidth (EBW)

5.4.1 Test setup (EBW)

Test setup			
Used	Setup	See sub-clause	Comment
☐	Test setup (radiated – normal procedure)	5.1.1.4	-
☐	Test setup (radiated – alternative procedure)	5.1.1.5	-
☒	Test setup (antenna port conducted)	5.1.2	-

5.4.2 Test method (EBW)

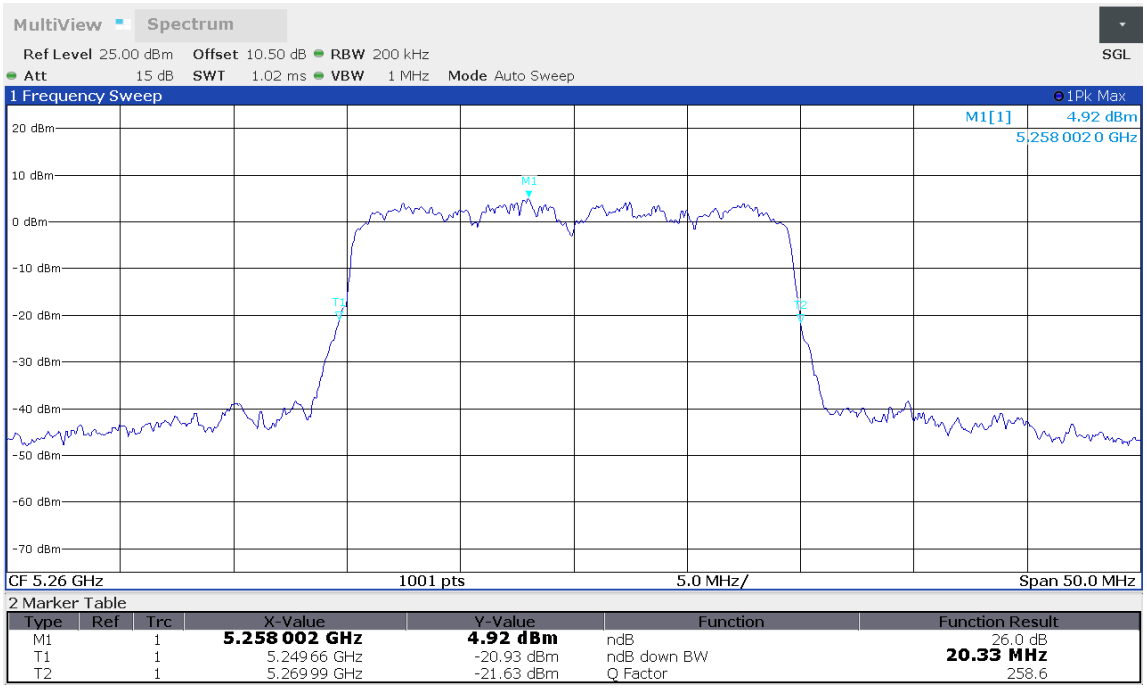
Test method (Maximum peak conducted output power)				
Used	Sub-Clause [6]	Name of method	Applicability	Comment
☒	II C. 1	26 dB Bandwidth	All but 5.725 – 5.85 GHz	-
☒	II C. 2	6 dB Bandwidth	Only 5.725 – 5.85 GHz	-

5.4.3 Test results (EBW - 26 dB BW)

Ambient temperature:	22 °C
Relative humidity:	25 – 42 %

Date	05.12.2023 - 03.04.2024
Tested by	P. NEUFELD

Worst case plot (operation mode 40):



Results

Operation mode #	26 dB bandwidth [MHz]	f_{Low} [MHz]	f_{High} [MHz]	Limit f_{Low} [MHz]	Limit f_{High} [MHz]
1	20.180	5169.860	5190.040	5150.000	5250.000
2	20.230	5189.810	5210.040	5150.000	5250.000
3	20.230	5229.810	5250.040*	5150.000	5250.000
4	20.230	5249.810*	5270.040	5250.000	5350.000
5	20.230	5289.810	5310.040	5250.000	5350.000
6	20.230	5309.810	5330.040	5250.000	5350.000
7	20.230	5489.810	5510.040	5470.000	5725.000
8	20.080	5569.960	5590.040	5470.000	5725.000
9	20.280	5689.760	5710.040	5470.000	5725.000
10	20.130	5169.910	5190.040	5150.000	5250.000
11	20.130	5189.910	5210.040	5150.000	5250.000
12	20.130	5229.910	5250.040*	5150.000	5250.000
13	20.080	5249.910*	5269.990	5250.000	5350.000
14	20.080	5289.960	5310.040	5250.000	5350.000
15	20.180	5309.860	5330.040	5250.000	5350.000
16	20.130	5489.910	5510.040	5470.000	5725.000
17	20.180	5569.860	5590.040	5470.000	5725.000
18	20.130	5689.910	5710.040	5470.000	5725.000
19	20.130	5169.910	5190.040	5150.000	5250.000
20	20.130	5189.910	5210.040	5150.000	5250.000
21	20.030	5229.960	5249.990	5150.000	5250.000
22	20.030	5249.960*	5269.990	5250.000	5350.000
23	20.030	5289.960	5309.990	5250.000	5350.000
24	20.130	5309.910	5330.040	5250.000	5350.000
25	20.080	5489.910	5509.990	5470.000	5725.000
26	20.180	5569.860	5590.040	5470.000	5725.000
27	19.980	5690.010	5709.990	5470.000	5725.000
28	20.579	5169.660	5190.240	5150.000	5250.000
29	20.579	5189.660	5210.240	5150.000	5250.000
30	20.480	5229.710	5250.190*	5150.000	5250.000
31	20.480	5249.710*	5270.190	5250.000	5350.000
32	20.529	5289.660	5310.190	5250.000	5350.000
33	20.529	5309.660	5330.190	5250.000	5350.000
34	20.579	5489.660	5510.240	5470.000	5725.000
35	20.579	5569.660	5590.240	5470.000	5725.000
36	20.480	5689.710	5710.190	5470.000	5725.000
37	20.430	5169.760	5190.190	5150.000	5250.000
38	20.430	5189.760	5210.190	5150.000	5250.000
39	20.480	5229.760	5250.240*	5150.000	5250.000

40	20.330	5249.660*	5269.990	5250.000	5350.000
41	20.180	5289.810	5309.990	5250.000	5350.000
42	20.180	5309.810	5329.990	5250.000	5350.000
43	20.130	5489.760	5509.890	5470.000	5725.000
44	20.130	5569.760	5589.890	5470.000	5725.000
45	20.130	5689.760	5709.890	5470.000	5725.000

* As permitted in TCB Workshop 2017-05-03-3.1 Panel UNII Updates-DT, the 99 % Bandwidth instead of the 26 dB bandwidth is used to determine if the signal is inside an DFS band and subsequently must be implement DFS detection.

Test: Passed

Test equipment (please refer to chapter 6 for details)
1

5.5 Occupied bandwidth – power bandwidth (99%)

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

Test setup			
Used	Setup	See sub-clause	Comment
☐	Test setup (radiated – normal procedure)	5.1.1.4	-
☐	Test setup (radiated – alternative procedure)	5.1.1.5	-
☒	Test setup (antenna port conducted)	5.1.2	-

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

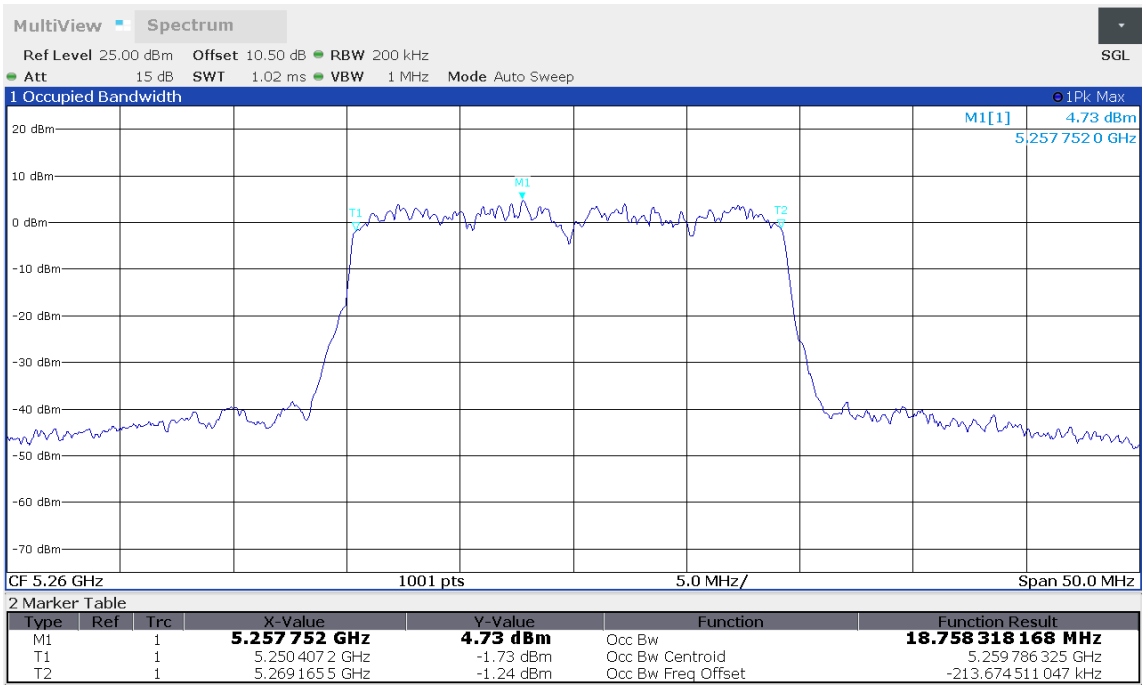
Test method (Maximum peak conducted output power)				
Used	Sub-Clause [6]	Name of method	Applicability	Comment
☒	II D	99% Occupied Bandwidth	No limitations	-

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

Ambient temperature:	22 °C
Relative humidity:	25 - 42 %

Date	05.12.2023 - 03.04.2024
Tested by	P. NEUFELD

Worst case plot (operation mode 40):



Results

Operation mode #	99% bandwidth [MHz]	f_{Low} [MHz]	f_{High} [MHz]	Limit f_{Low} [MHz]	Limit f_{High} [MHz]
1	16.646	5171.625	5188.271	5150.000	5250.000
2	16.635	5191.624	5208.259	5150.000	5250.000
3	16.643	5231.620	5248.263	5150.000	5250.000
4	16.642	5251.616	5268.258	5250.000	5350.000
5	16.641	5291.618	5308.259	5250.000	5350.000
6	16.645	5311.614	5328.259	5250.000	5350.000
7	16.643	5491.628	5508.271	5470.000	5725.000
8	16.643	5571.616	5588.259	5470.000	5725.000
9	16.642	5691.614	5708.257	5470.000	5725.000
10	17.666	5171.147	5188.813	5150.000	5250.000
11	17.668	5191.139	5208.807	5150.000	5250.000
12	17.669	5231.137	5248.806	5150.000	5250.000
13	17.671	5251.136	5268.806	5250.000	5350.000
14	17.669	5291.136	5308.805	5250.000	5350.000
15	17.673	5311.138	5328.810	5250.000	5350.000
16	17.668	5491.145	5508.813	5470.000	5725.000
17	17.702	5571.116	5588.818	5470.000	5725.000
18	17.668	5691.137	5708.804	5470.000	5725.000
19	17.736	5171.116	5188.853	5150.000	5250.000
20	17.662	5191.143	5208.805	5150.000	5250.000
21	17.668	5231.140	5248.809	5150.000	5250.000
22	17.674	5251.137	5268.811	5250.000	5350.000
23	17.666	5291.143	5308.810	5250.000	5350.000
24	17.662	5311.147	5328.809	5250.000	5350.000
25	17.663	5491.149	5508.812	5470.000	5725.000
26	17.705	5571.123	5588.828	5470.000	5725.000
27	17.662	5691.140	5708.803	5470.000	5725.000
28	18.836	5170.523	5189.360	5150.000	5250.000
29	18.821	5190.523	5209.344	5150.000	5250.000
30	18.839	5230.509	5249.348	5150.000	5250.000
31	18.826	5250.522	5269.348	5250.000	5350.000
32	18.820	5290.520	5309.340	5250.000	5350.000
33	18.840	5310.515	5329.355	5250.000	5350.000
34	18.836	5490.517	5509.353	5470.000	5725.000
35	18.873	5570.490	5589.363	5470.000	5725.000
36	18.843	5690.511	5709.354	5470.000	5725.000
37	18.842	5170.592	5189.434	5150.000	5250.000
38	19.313	5190.088	5209.401	5150.000	5250.000
39	18.853	5230.575	5249.428	5150.000	5250.000

40	18.758	5250.407	5269.165	5250.000	5350.000
41	18.754	5290.607	5309.361	5250.000	5350.000
42	18.755	5310.604	5329.360	5250.000	5350.000
43	18.756	5490.557	5509.313	5470.000	5725.000
44	18.753	5570.554	5589.307	5470.000	5725.000
45	18.755	5690.549	5709.305	5470.000	5725.000
46	16.649	5736.616	5753.265	5725.000	5850.000
47	16.670	5776.595	5793.265	5725.000	5850.000
48	16.648	5816.609	5833.257	5725.000	5850.000
49	17.681	5736.135	5753.815	5725.000	5850.000
50	17.676	5776.134	5793.810	5725.000	5850.000
51	17.680	5816.130	5833.810	5725.000	5850.000
52	17.678	5736.136	5753.814	5725.000	5850.000
53	17.682	5776.138	5793.820	5725.000	5850.000
54	17.673	5816.139	5833.811	5725.000	5850.000
55	18.845	5735.514	5754.359	5725.000	5850.000
56	18.849	5775.508	5794.357	5725.000	5850.000
57	18.849	5815.510	5834.359	5725.000	5850.000
58	18.863	5735.544	5754.407	5725.000	5850.000
59	18.864	5775.579	5794.444	5725.000	5850.000
60	18.862	5815.580	5834.442	5725.000	5850.000

Test equipment (please refer to chapter 6 for details)
1

5.6 Maximum (average) Conducted Output Power

5.6.1 Test setup (Maximum (average) Conducted Output Power)

Test setup			
Used	Setup	See sub-clause	Comment
☐	Test setup (radiated – normal procedure)	5.1.1.4	-
☐	Test setup (radiated – alternative procedure)	5.1.1.5	-
☒	Test setup (antenna port conducted)	5.1.2	-

5.6.2 Test method (Maximum (average) Conducted Output Power)

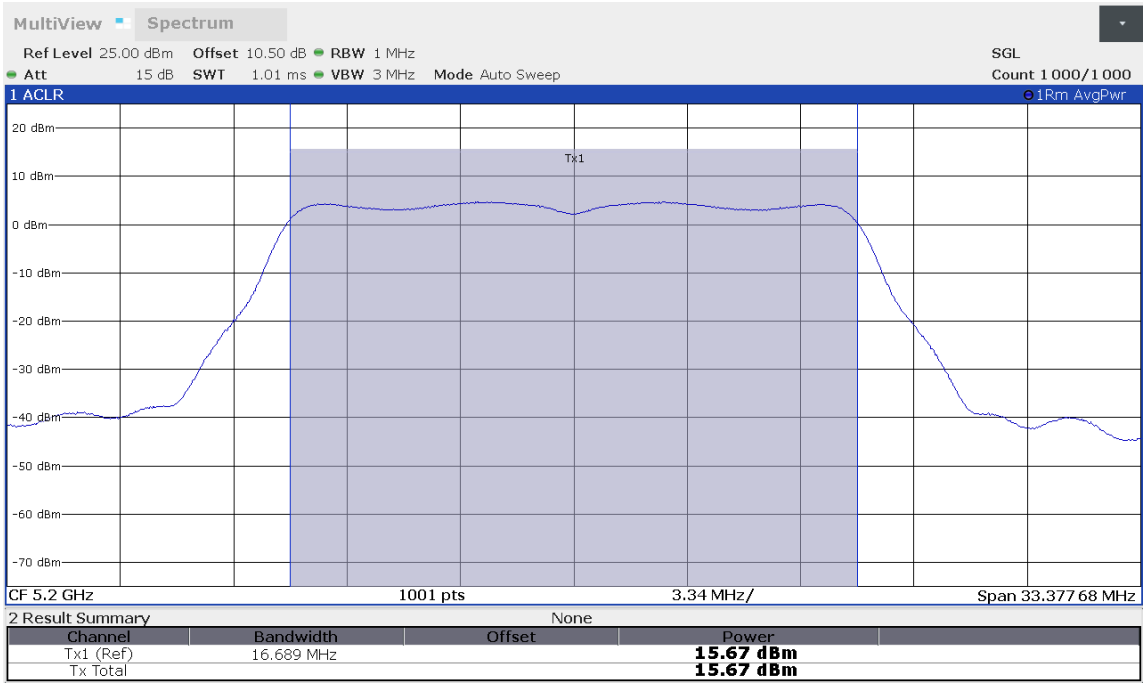
Test method (Maximum conducted (average) output power)				
Used	Sub-Clause [6]	Name of method	Applicability	Comment
☐	II E 2. b)	Method SA-1	D ≥ 98% or video trigger	-
☐	II E 2. c)	Method SA-1A (alternative)	D ≥ 98%	-
☒	II E 2. d)	Method SA-2	Constant D (±2%)	-
☐	II E 2. e)	Method SA-2A (alternative)	Constant D (±2%)	-
☐	II E 2. f)	Method SA-3A	No limitations	-
☐	II E 2. g)	Method SA-3A (alternative)	No limitations	-
☐	II E 3 a)	Method Power Meter	D ≥ 98% or Constant D (±2%)	-
☐	II E 3 a)	Method gated Power Meter	Measure only On time	-

5.6.3 Test results Max. (Average) Conducted Output Power 5.15 – 5.25. GHz

Ambient temperature:	22 °C
Relative humidity:	25 – 35 %

Date	05.12.2023 - 13.12.2023
Tested by	P. NEUFELD

Worst case plot (operation mode 62)



Test results

Operation mode	Reading [dBm]	Ext. Att.* [dB]	DCCF [dB]	Cond. Power [dBm]	Antenna gain [dBi]	EIRP [dBm]	EIRP Limit*2*3 [dBm]
63	14.8	0.0	0.0	14.8	3.4	18.2	21.0
64	15.7	0.0	0.0	15.7	3.4	19.1	21.0
65	15.3	0.0	0.0	15.3	3.4	18.7	21.0
66	14.7	0.0	0.0	14.7	3.4	18.1	21.0
67	15.5	0.0	0.0	15.5	3.4	18.9	21.0
68	15.1	0.0	0.0	15.1	3.4	18.5	21.0
69	14.6	0.0	0.0	14.6	3.4	18.0	21.0
70	15.4	0.0	0.0	15.4	3.4	18.8	21.0
71	15.1	0.0	0.0	15.1	3.4	18.5	21.0
72	14.7	0.0	0.0	14.7	3.4	18.1	21.0
73	15.5	0.0	0.0	15.5	3.4	18.9	21.0
74	15.2	0.0	0.0	15.2	3.4	18.6	21.0
75	12.0	0.0	0.0	12.0	3.4	15.4	21.0
76	11.9	0.0	0.0	11.9	3.4	15.3	21.0
77	11.7	0.0	0.0	11.7	3.4	15.1	21.0

* The external attenuation of the external attenuator and the measurement cable is already taken into account with the reference level offset of 10.5 dB in the spectrum analyzer plot, which represents the attenuation of the 10 dB external attenuator and 0.5 dB for the measurement cable.

*2 Limit acc. to [2]: 21.0 dBm EIRP (calculated) – worst case limit

*3 Limit acc. to [4]: 24.0 dBm limit because of $11+10*\log_{10}$ (Minimum 26-dB Bandwidth) is greater than 24 dBm.

Calculations:
Cond. [dBm]= Reading [dBm] + Ext. Att. [dB] + DCCF [dB]

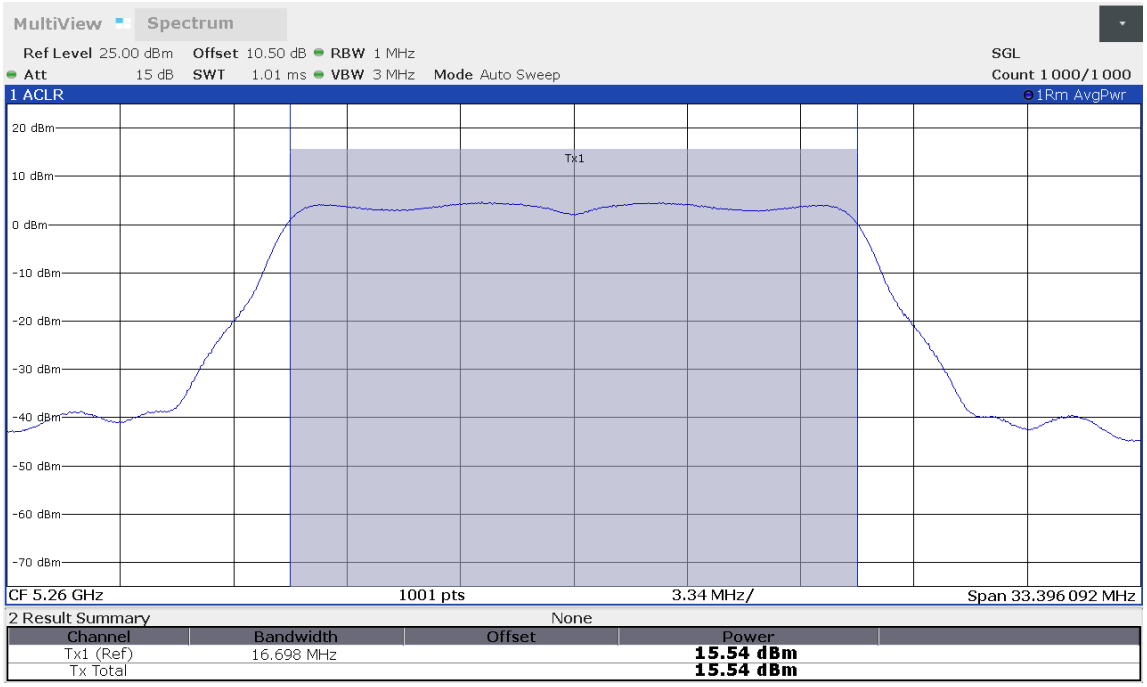
EIRP Corr. Ant. [dBm]= Reading [dBm] + Ext. Att. + DCCF + Antenna gain [dBi]

5.6.4 Test results Max. (Average) Conducted Output Power 5.25 – 5.35 GHz

Ambient temperature:	22 °C
Relative humidity:	25 – 38 %

Date	05.12.2023 - 13.12.2023
Tested by	P. NEUFELD

Worst case plot (operation mode 79)



Test results

Operation mode	Reading [dBm]	Ext. Att.* [dB]	DCCF [dB]	Cond. Power [dBm]	Cond Limit*2*3 [dBm]	Antenna gain [dBi]	EIRP [dBm]	EIRP Limit*4*5 [dBm]
81	15.5	0.0	0.0	15.5	23.2	3.4	18.9	23.0
82	15.2	0.0	0.0	15.2	23.2	3.4	18.6	23.0
83	14.2	0.0	0.0	14.2	23.2	3.4	17.6	23.0
84	15.4	0.0	0.0	15.4	23.2	3.4	18.8	23.0
85	15.1	0.0	0.0	15.1	23.2	3.4	18.5	23.0
86	14.1	0.0	0.0	14.1	23.2	3.4	17.5	23.0
87	15.4	0.0	0.0	15.4	23.2	3.4	18.8	23.0
88	15.1	0.0	0.0	15.1	23.2	3.4	18.5	23.0
89	14.0	0.0	0.0	14.0	23.2	3.4	17.4	23.0
90	15.5	0.0	0.0	15.5	23.2	3.4	18.9	23.0
91	15.2	0.0	0.0	15.2	23.2	3.4	18.6	23.0
92	14.1	0.0	0.0	14.1	23.2	3.4	17.5	23.0
93	12.3	0.0	0.0	12.3	23.2	3.4	15.7	23.0
94	12.1	0.0	0.0	12.1	23.2	3.4	15.5	23.0
95	11.9	0.0	0.0	11.9	23.2	3.4	15.3	23.0

* The external attenuation of the external attenuator and the measurement cable is already taken into account with the reference level offset of 10.5 dB in the spectrum analyzer plot, which represents the attenuation of the 10 dB external attenuator and 0.5 dB for the measurement cable.

2 Cond. Limit acc. to [2]: 24 dBm (or 11+10$\log_{10}$(Minimum 26dB-BW) = 24.0 dBm) = 24.0 dBm

3 Cond. Limit acc. to [4]: 24 dBm (or 11+10$\log_{10}$(Minimum 99%BW) = 23.2 dBm) = **23.2 dBm**

4 EIRP Limit acc. to [2]: 30 dBm (or 17+10$\log_{10}$(Minimum 26dB-BW) = 30.0 dBm) = 30.0 dBm

*5 EIRP Limit acc. to [4]: **23.0 dBm** (Outdoor)

Calculations:
Cond. [dBm]= Reading [dBm] + Ext. Att. [dB] + DCCF [dB]

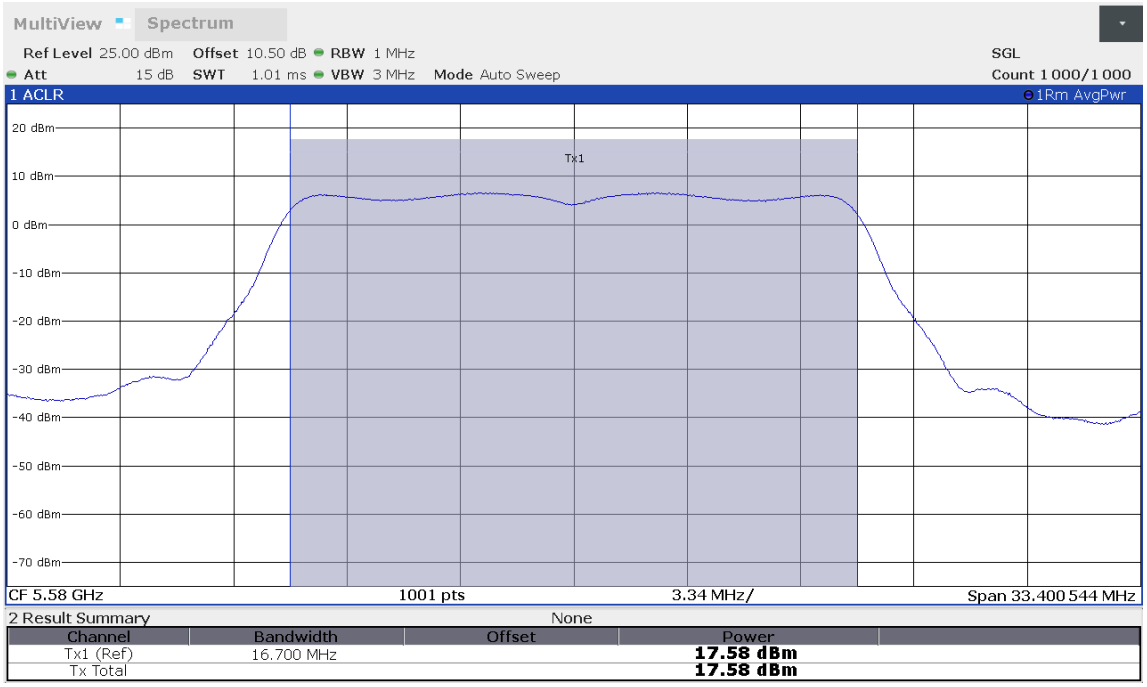
EIRP Corr. Ant. [dBm]= Reading [dBm] + Ext. Att. + DCCF + Antenna gain [dBi]

5.6.5 Test results Max. (Average) Conducted Output Power 5.47 – 5.725 GHz

Ambient temperature:	22 °C
Relative humidity:	25 – 38 %

Date	05.12.2023 - 13.12.2023
Tested by	P. NEUFELD

Worst case plot (operation mode 98)



Test results

Operation mode	Reading [dBm]	Ext. Att.* [dB]	DCCF [dB]	Cond. Power [dBm]	Cond Limit*2*3 [dBm]	Antenna gain [dBi]	EIRP [dBm]	EIRP Limit*4*5 [dBm]
99	14.0	0.0	0.0	14.0	20.2	3.4	17.4	26.2
100	17.6	0.0	0.0	17.6	20.2	3.4	21.0	26.2
101	15.1	0.0	0.0	15.1	20.2	3.4	18.5	26.2
102	13.9	0.0	0.0	13.9	20.2	3.4	17.3	26.2
103	17.5	0.0	0.0	17.5	20.2	3.4	20.9	26.2
104	15.0	0.0	0.0	15.0	20.2	3.4	18.4	26.2
105	13.9	0.0	0.0	13.9	20.2	3.4	17.3	26.2
106	17.5	0.0	0.0	17.5	20.2	3.4	20.9	26.2
107	15.0	0.0	0.0	15.0	20.2	3.4	18.4	26.2
108	14.0	0.0	0.0	14.0	20.2	3.4	17.4	26.2
109	17.6	0.0	0.0	17.6	20.2	3.4	21.0	26.2
110	15.1	0.0	0.0	15.1	20.2	3.4	18.5	26.2
111	12.1	0.0	0.0	12.1	20.2	3.4	15.5	26.2
112	12.3	0.0	0.0	12.3	20.2	3.4	15.7	26.2
113	10.5	0.0	0.0	10.5	20.2	3.4	13.9	26.2

* The external attenuation of the external attenuator and the measurement cable is already taken into account with the reference level offset of 10.5 dB in the spectrum analyzer plot, which represents the attenuation of the 10 dB external attenuator and 0.5 dB for the measurement cable.

2 Cond. Limit acc. to [2]: 24 dBm (or 11+10$\log_{10}$(Minimum 26dB-BW) = 24.0 dBm) = 24.0 dBm

3 Cond. Limit acc. to [4]: 21 dBm (or 8+10$\log_{10}$(Minimum 99%BW) = 23.2 dBm) = **20.2 dBm** (No TPC)

4 EIRP Limit acc. to [2]: 30 dBm (or 17+10$\log_{10}$(Minimum 26dB-BW) = 30.0 dBm) = 30.0 dBm

5 EIRP Limit acc. to [4]: 27 dBm (or 14+10$\log_{10}$(Minimum 99%BW) = 23.2 dBm) = **26.2 dBm** (No TPC)

Calculations:
Cond. [dBm]= Reading [dBm] + Ext. Att. [dB] + DCCF [dB]

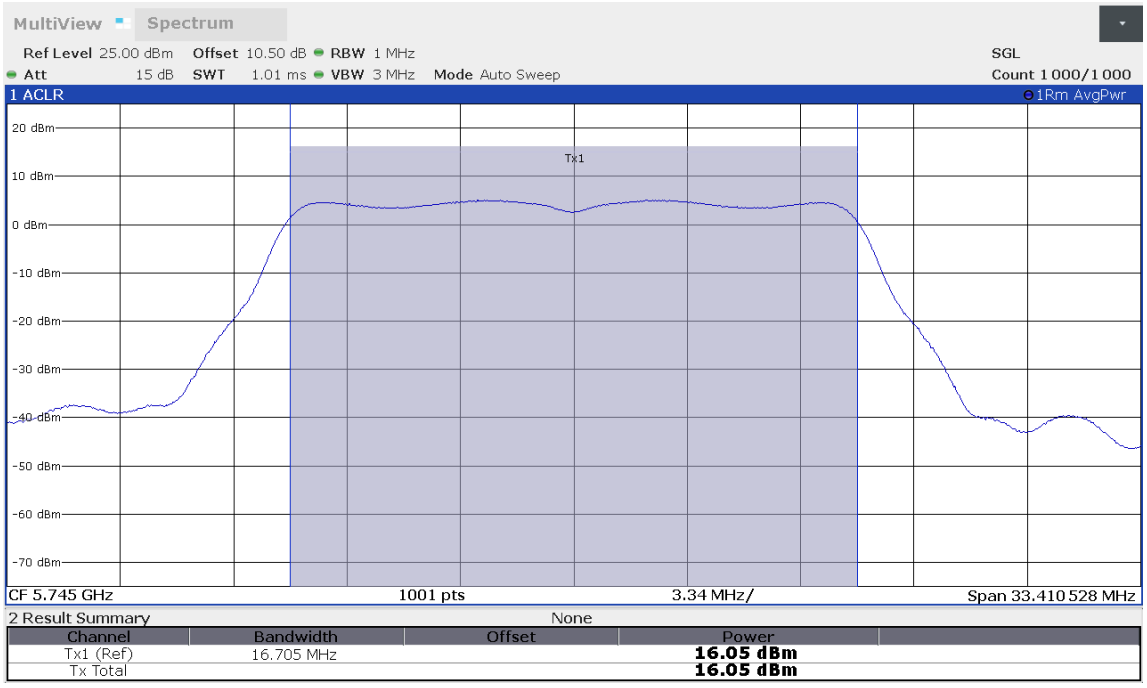
EIRP Corr. Ant. [dBm]= Reading [dBm] + Ext. Att. + DCCF + Antenna gain [dBi]

5.6.6 Test results Max. (Average) Conducted Output Power 5.725 – 5.850 GHz

Ambient temperature:	22 °C
Relative humidity:	25 – 38 %

Date	05.12.2023 - 13.12.2023
Tested by	P. NEUFELD

Worst case plot (operation mode 115)



Test results

Operation mode	Reading [dBm]	Ext. Att.* [dB]	DCCF [dB]	Cond. Power [dBm]	Cond Limit*2 [dBm]	Antenna gain [dBi]	EIRP [dBm]	EIRP Limit*3 [dBm]
117	16.1	0.0	0.0	16.1	30.0	3.4	19.5	36.0
118	15.9	0.0	0.0	15.9	30.0	3.4	19.3	36.0
119	15.7	0.0	0.0	15.7	30.0	3.4	19.1	36.0
120	16.0	0.0	0.0	16.0	30.0	3.4	19.4	36.0
121	15.8	0.0	0.0	15.8	30.0	3.4	19.2	36.0
122	15.6	0.0	0.0	15.6	30.0	3.4	19.0	36.0
123	16.0	0.0	0.0	16.0	30.0	3.4	19.4	36.0
124	15.8	0.0	0.0	15.8	30.0	3.4	19.2	36.0
125	15.6	0.0	0.0	15.6	30.0	3.4	19.0	36.0
126	16.1	0.0	0.0	16.1	30.0	3.4	19.5	36.0
127	15.9	0.0	0.0	15.9	30.0	3.4	19.3	36.0
128	15.7	0.0	0.0	15.7	30.0	3.4	19.1	36.0
129	15.5	0.0	0.0	15.5	30.0	3.4	18.9	36.0
130	15.2	0.0	0.0	15.2	30.0	3.4	18.6	36.0
132	15.4	0.0	0.0	15.4	30.0	3.4	18.8	36.0

* The external attenuation of the external attenuator and the measurement cable is already taken into account with the reference level offset of 10.5 dB in the spectrum analyzer plot, which represents the attenuation of the 10 dB external attenuator and 0.5 dB for the measurement cable.

*2 Cond Limit acc. to [2] + [4]: 30.0 dBm

*3 Cond Limit acc. to [2] + [4]: 30.0 dBm

Calculations:
Cond. [dBm]= Reading [dBm] + Ext. Att. [dB] + DCCF [dB]

EIRP Corr. Ant. [dBm]= Reading [dBm] + Ext. Att. + DCCF + Antenna gain [dBi]

Test equipment (please refer to chapter 6 for details)
1

5.7 Maximum (average) Power Spectral Density

5.7.1 Test setup (Maximum (average) Power Spectral Density)

Test setup			
Used	Setup	See sub-clause	Comment
☐	Test setup (radiated – normal procedure)	5.1.1.4	-
☐	Test setup (radiated – alternative procedure)	5.1.1.5	-
☒	Test setup (antenna port conducted)	5.1.2	-

5.7.2 Test method (Maximum (average) Power Spectral Density)

Test method (Maximum peak power spectral density level in the fundamental emission)				
Used	Sub-Clause [3]	Name of method	Applicability	Comment
☒	II E 2. b)	Method SA-1	D ≥ 98% or video trigger	Peak Search*
☐	II E 2. c)	Method SA-1A (alternative)	D ≥ 98%	Peak Search*
☐	II E 2. d)	Method SA-2	Constant D (±2%)	Peak Search*
☐	II E 2. e)	Method SA-2A (alternative)	Constant D (±2%)	Peak Search*
☐	II E 2. f)	Method SA-3A	No limitations	Peak Search*
☐	II E 2. g)	Method SA-3A (alternative)	No limitations	Peak Search*

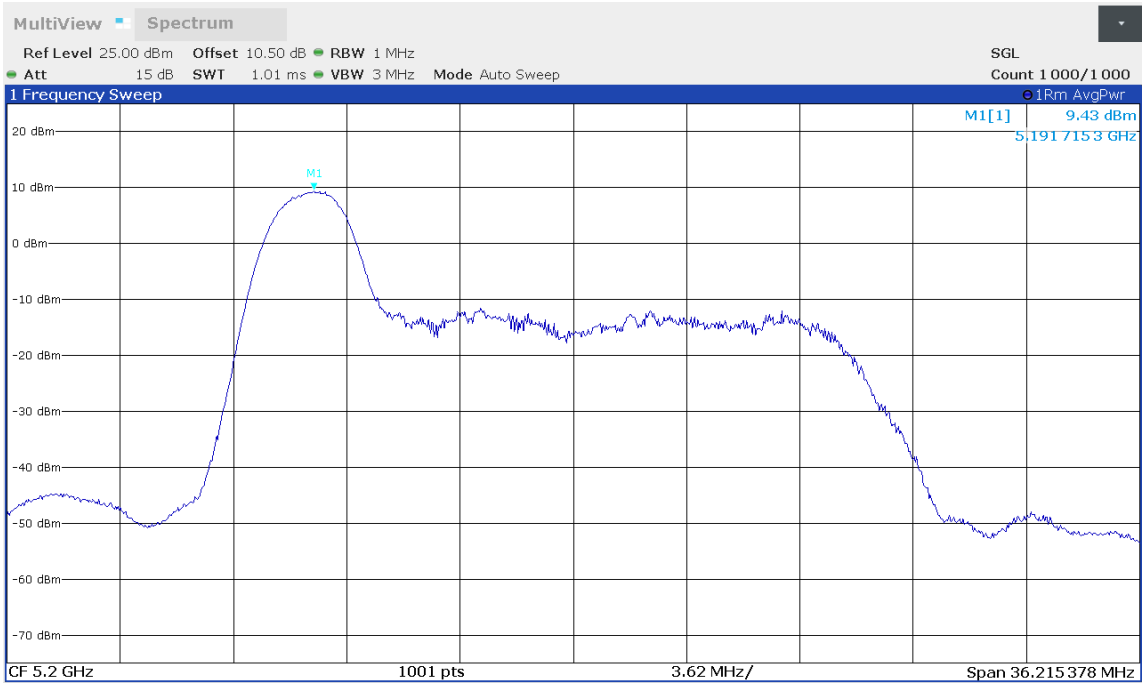
* Use the peak search function on the instrument to find the peak of the spectrum and record its value.
(see II F 2 in document [3] for details.)
The result is the Maximum PSD over 1 MHz reference bandwidth.
For devices operating in the band 5.725−5.85 GHz, the rules specify a measurement bandwidth of 500 kHz.

5.7.3 Test results (Maximum (average) Power Spectral Density) 5.15 – 5.25 GHz

Ambient temperature:	22 °C
Relative humidity:	25 – 38 %

Date	05.12.2024 - 13.12.2024
Tested by	P. NEUFELD

Worst case plot (operation mode 77):



Test results:

Operation mode	Reading [dBm/MHz]	Ext. Att.* [dB]	DCCF [dB]	Result [dBm/MHz]	Limit conducted*2*3 [dBm/MHz]
63	3.9	0.0	0.0	3.9	10.0
64	4.7	0.0	0.0	4.7	10.0
65	4.4	0.0	0.0	4.4	10.0
66	3.4	0.0	0.0	3.4	10.0
67	4.2	0.0	0.0	4.2	10.0
68	3.9	0.0	0.0	3.9	10.0
69	3.4	0.0	0.0	3.4	10.0
70	4.2	0.0	0.0	4.2	10.0
71	3.9	0.0	0.0	3.9	10.0
72	3.4	0.0	0.0	3.4	10.0
73	4.1	0.0	0.0	4.1	10.0
74	3.7	0.0	0.0	3.7	10.0
78	9.4	0.0	0.0	9.4	10.0
79	9.4	0.0	0.0	9.4	10.0
80	9.1	0.0	0.0	9.1	10.0

* The external attenuation of the external attenuator and the measurement cable is already taken into account with the reference level offset of 10.5 dB in the spectrum analyzer plot, which represents the attenuation of the 10 dB external attenuator and 0.5 dB for the measurement cable.

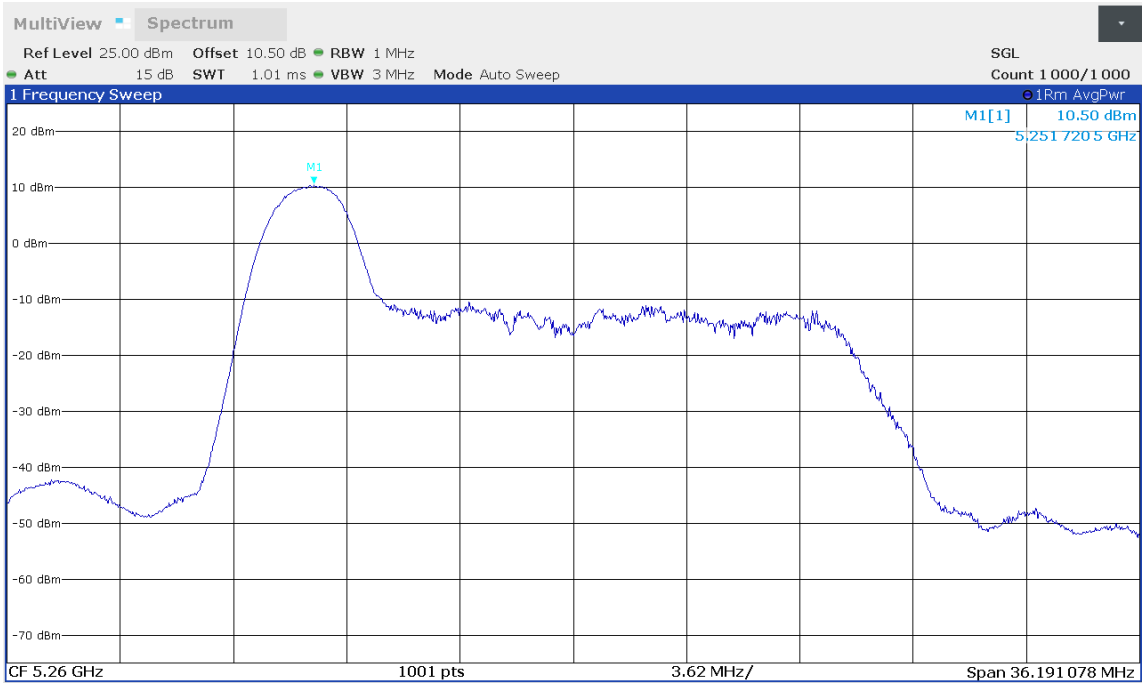
Cond. Both Ant. [dBm]=	Reading [dBm/MHz] + Ext. Att. + DCCF
*[2] Cond Limit acc. to [2]:	17 dBm/MHz (Indoor/Outdoor AP) 11 dBm/MHz (Indoor Client)
*[3] Cond. Limit acc. to [4]:	10 dBm/MHz

5.7.4 Test results (Maximum (average) Power Spectral Density) 5.25 – 5.35 GHz

Ambient temperature:	22 °C
Relative humidity:	25 – 38 %

Date	05.12.2024 - 13.12.2024
Tested by	P. NEUFELD

Worst case plot (operation mode 94):



Test results:

Operation mode	Reading [dBm/MHz]	Ext. Att.* [dB]	DCCF [dB]	Result [dBm/MHz]	Limit conducted*2 [dBm/MHz]
81	4.6	0.0	0.0	4.6	11.0
82	4.3	0.0	0.0	4.3	11.0
83	3.2	0.0	0.0	3.2	11.0
84	4.2	0.0	0.0	4.2	11.0
85	3.9	0.0	0.0	3.9	11.0
86	2.8	0.0	0.0	2.8	11.0
87	4.2	0.0	0.0	4.2	11.0
88	3.8	0.0	0.0	3.8	11.0
89	2.8	0.0	0.0	2.8	11.0
90	4.0	0.0	0.0	4.0	11.0
91	3.8	0.0	0.0	3.8	11.0
92	2.7	0.0	0.0	2.7	11.0
96	10.5	0.0	0.0	10.5	11.0
97	10.3	0.0	0.0	10.3	11.0
98	10.1	0.0	0.0	10.1	11.0

* The external attenuation of the external attenuator and the measurement cable is already taken into account with the reference level offset of 10.5 dB in the spectrum analyzer plot, which represents the attenuation of the 10 dB external attenuator and 0.5 dB for the measurement cable.

Cond. Both Ant. [dBm]= Reading [dBm/MHz] + Ext. Att. + DCCF

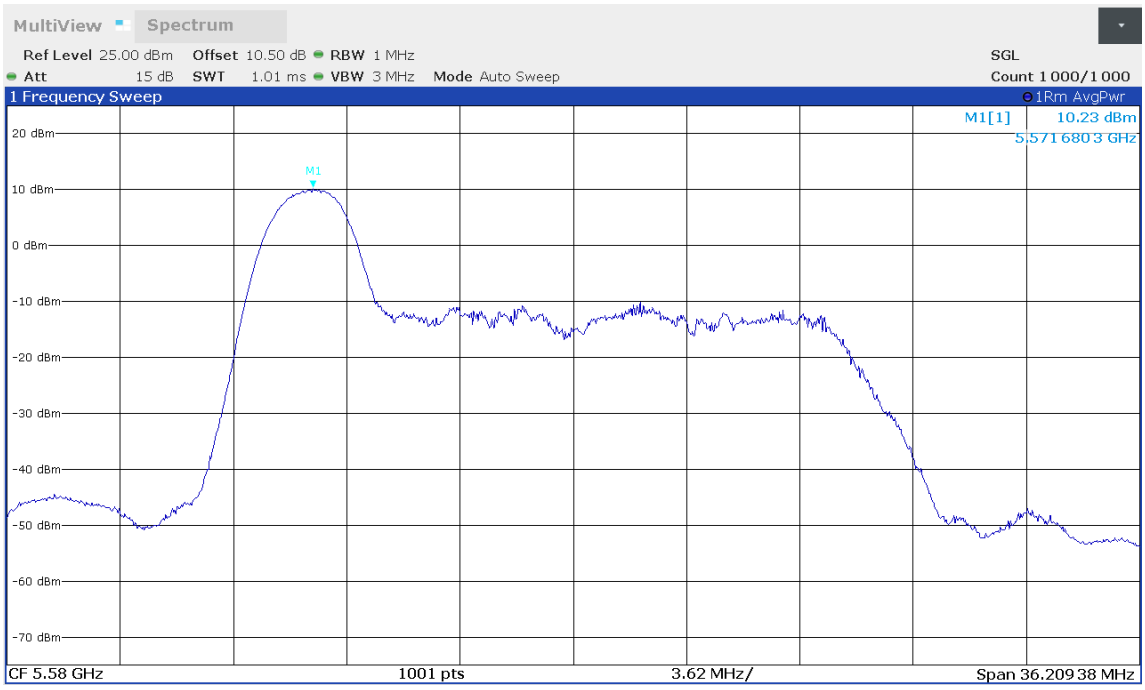
*[2] Cond Limit acc. to [2] + [4]: 11 dBm/MHz

5.7.5 Test results (Maximum (average) Power Spectral Density) 5.47 – 5.725 GHz

Ambient temperature:	22 °C
Relative humidity:	25 – 38 %

Date	05.12.2024 - 13.12.2024
Tested by	P. NEUFELD

Worst case plot (operation mode 113):



Test results:

Operation mode	Reading [dBm/MHz]	Ext. Att.* [dB]	DCCF [dB]	Result [dBm/MHz]	Limit conducted*2 [dBm/MHz]
99	3.0	0.0	0.0	3.0	11.0
100	6.6	0.0	0.0	6.6	11.0
101	4.2	0.0	0.0	4.2	11.0
102	2.7	0.0	0.0	2.7	11.0
103	6.3	0.0	0.0	6.3	11.0
104	3.8	0.0	0.0	3.8	11.0
105	2.7	0.0	0.0	2.7	11.0
106	6.3	0.0	0.0	6.3	11.0
107	3.8	0.0	0.0	3.8	11.0
108	2.5	0.0	0.0	2.5	11.0
109	6.1	0.0	0.0	6.1	11.0
110	3.7	0.0	0.0	3.7	11.0
114	9.8	0.0	0.0	9.8	11.0
115	10.2	0.0	0.0	10.2	11.0
116	8.4	0.0	0.0	8.4	11.0

* The external attenuation of the external attenuator and the measurement cable is already taken into account with the reference level offset of 10.5 dB in the spectrum analyzer plot, which represents the attenuation of the 10 dB external attenuator and 0.5 dB for the measurement cable.

Cond. Both Ant. [dBm]= Reading [dBm/MHz] + Ext. Att. + DCCF

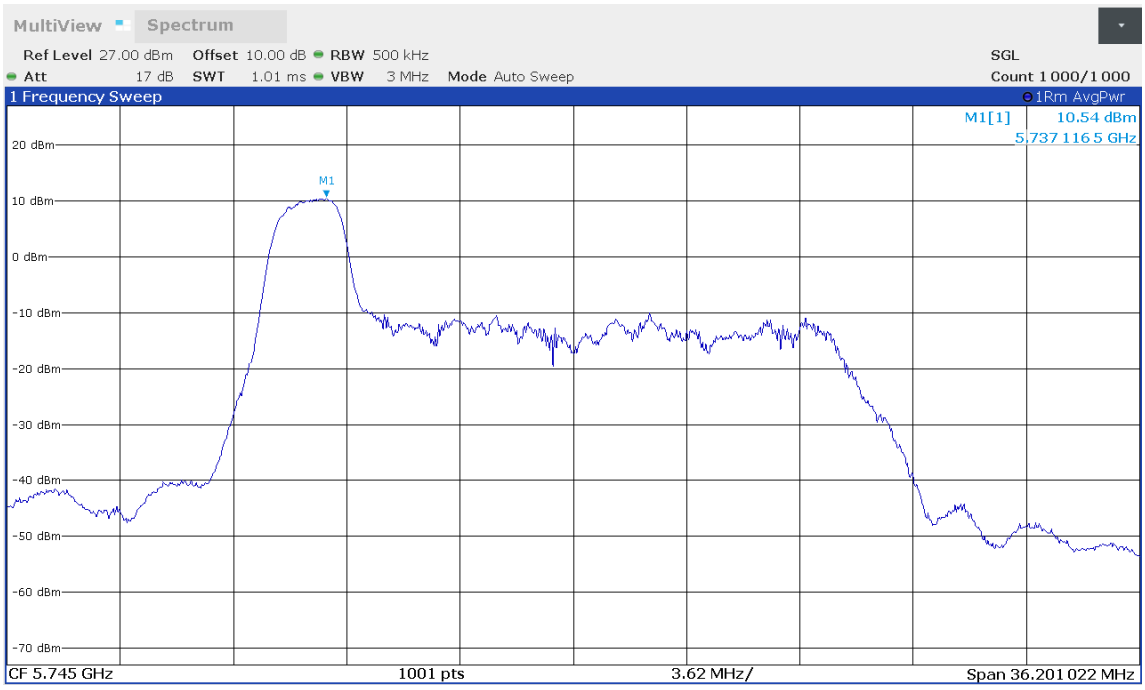
*[2] Cond Limit acc. to [2] + [4]: 11 dBm/MHz

5.7.6 Test results (Maximum (average) Power Spectral Density) 5.47 – 5.725 GHz

Ambient temperature:	22 °C
Relative humidity:	25 – 38 %

Date	05.12.2024 - 13.12.2024
Tested by	P. NEUFELD

Worst case plot (operation mode 130):



Test results:

Operation mode	Reading [dBm/MHz]	Ext. Att.* [dB]	DCCF [dB]	Result [dBm/MHz]	Limit conducted*2 [dBm/MHz]
117	2.2	0.0	0.0	2.2	30.0
118	2.0	0.0	0.0	2.0	30.0
119	1.8	0.0	0.0	1.8	30.0
120	1.8	0.0	0.0	1.8	30.0
121	1.7	0.0	0.0	1.7	30.0
122	1.6	0.0	0.0	1.6	30.0
123	1.9	0.0	0.0	1.9	30.0
124	1.8	0.0	0.0	1.8	30.0
125	1.5	0.0	0.0	1.5	30.0
126	1.8	0.0	0.0	1.8	30.0
127	1.7	0.0	0.0	1.7	30.0
128	1.6	0.0	0.0	1.6	30.0
133	10.5	0.0	0.0	10.5	30.0
134	10.1	0.0	0.0	10.1	30.0
135	10.2	0.0	0.0	10.2	30.0

* The external attenuation of the external attenuator and the measurement cable is already taken into account with the reference level offset of 10.5 dB in the spectrum analyzer plot, which represents the attenuation of the 10 dB external attenuator and 0.5 dB for the measurement cable.

Cond. Both Ant. [dBm]= Reading [dBm/MHz] + Ext. Att. + DCCF

*[2] Cond Limit acc. to [2] + [4]: 30 dBm/500kHz

Test: Passed

Test equipment (please refer to chapter 6 for details)
1

5.8 Band-edge

5.8.1 Test setup (Band edge – unrestricted bands)

Test setup			
Used	Setup	See sub-clause	Comment
☐	Test setup (radiated – normal procedure)	5.1.1.4	-
☒	Test setup (radiated – alternative procedure)	5.1.1.5	-
☒	Test setup (antenna port conducted)	5.1.2	-

*1 Only worst-case mode from the antenna port conducted pretests were tested as radiated tests.
The antenna port conducted limits for 15.407 unrestricted band were calculated as radiated limit line using formula 12.7.2 in [1], by correcting the radiated value by 95.2 dB for 3 m measurement distance.

5.8.2 Test method (Band edge – unrestricted bands)

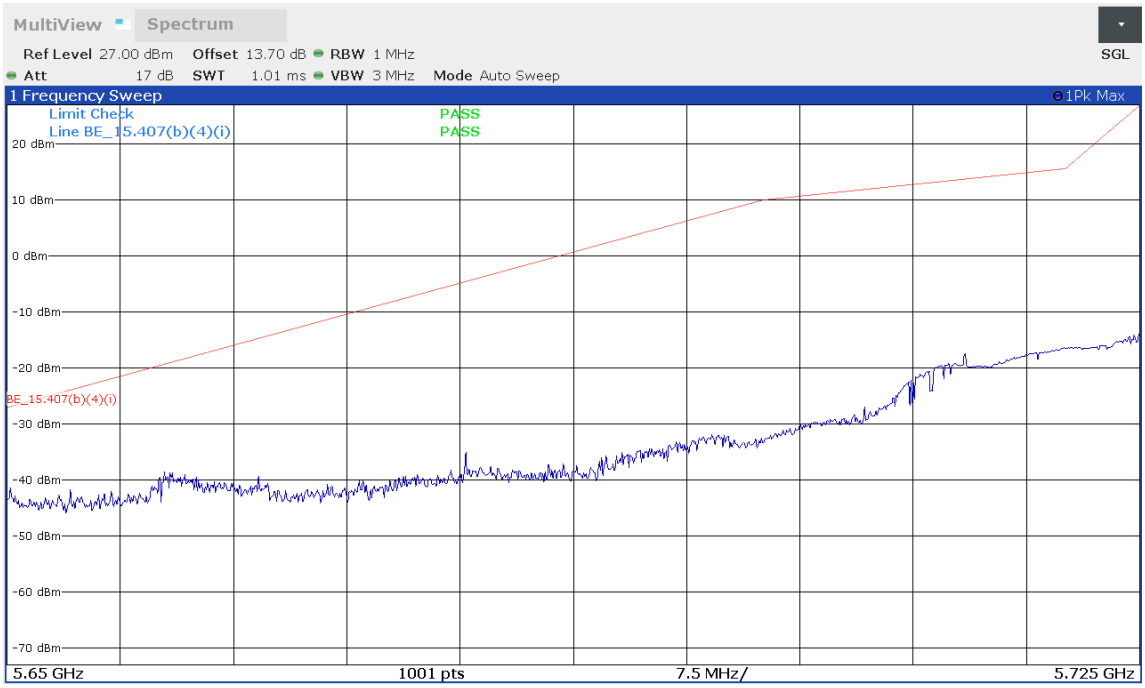
Test method (Band edge – unrestricted bands)				
Used	Sub-Clause [3]	Name of method	Applicability	Comment
☒	II G 2, 3 & 5.	Unwanted emissions outside restricted bands	No limitations	-

5.8.3 Test results (Band edge – unrestricted bands) – IRIS – W101 - antenna port conducted

Ambient temperature:	22 °C
Relative humidity:	25 – 38 %

Date	05.12.2023 - 13.12.2023
Tested by	P. NEUFELD

Worst case plot (operation mode 52):



Operation mode	Peak frequency [MHz]	Reading* [dBm/MHz]	Limit [dBm/MHz]	Margin [dBm/MHz]	Result
46	5650.600	-45.6	-26.6	19.0	Passed
48	5923.200	-45.9	-25.7	20.3	Passed
49	5650.075	-42.5	-26.9	15.6	Passed
51	5924.850	-45.0	-26.9	18.1	Passed
52	5650.225	-41.3	-26.8	14.5	Passed
54	5924.850	-46.3	-26.9	19.4	Passed
55	5650.150	-42.1	-26.9	15.3	Passed
57	5924.325	-46.2	-26.5	19.7	Passed
61	5925.000	-45.4	-27.0	18.4	Passed
62	5651.125	-43.7	-26.2	17.5	Passed

* The external attenuation of the external attenuator and the measurement cable is already taken into account with the reference level offset of 13.7 dB in the spectrum analyzer plot, which represents the attenuation of the 10 dB external attenuator, 0.5 dB for the measurement cable and 3.2 dBi for the maximum antenna gain.

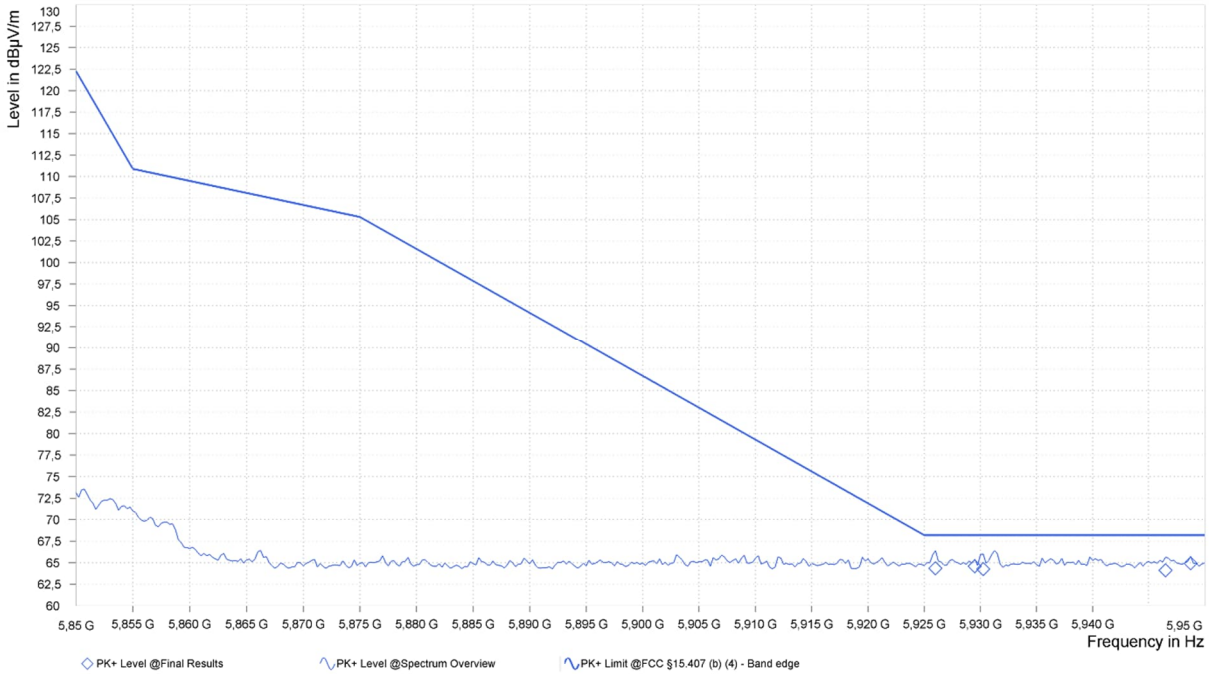
5.8.4 Test results (Band edge – unrestricted bands) radiated – IRIS W106

Ambient temperature:	22 °C
Relative humidity:	26 – 35 %

Date	01.03.2024 + 25.03.2024
Tested by	P. NEUFELD

Retest worst case from original report

Worst case plot (operation mode 54):



Lower band edge (operation mode 52):

Frequency [MHz]	PK+ [dBµV/m]	Pk+ Limit* [dBµV/m]	PK+ Margin [dB]	Corr. [dB/m]	Pol	Elevation [deg]	Azimuth [deg]
5612.250	59.1	68.2	9.1	44.8	V	150	245
5627.250	58.5	68.2	9.7	44.7	H	150	91

Upper band edge (operation mode 54):

Frequency [MHz]	PK+ [dBµV/m]	Pk+ Limit* [dBµV/m]	PK+ Margin [dB]	Pol	Elevation [deg]	Azimuth [deg]	Corr. [dB/m]
5926.000	64.4	68.2	3.9	46.0	V	30	302
5929.500	64.6	68.2	3.6	45.9	H	0	68
5930.250	64.3	68.2	4.0	45.9	V	30	341
5946.500	64.1	68.2	4.1	45.9	V	30	303
5948.750	64.9	68.2	3.3	45.9	V	30	281

Test result: Passed

Test equipment (please refer to chapter 6 for details)
3 – 9, 16

5.8.5 Test setup (Band edge – restricted bands)

Test setup			
Used	Setup	See sub-clause	Comment
☐	Test setup (radiated – normal procedure)	5.1.1.4	-
☒	Test setup (radiated – alternative procedure)	5.1.1.5	-
☐	Test setup (antenna port conducted)	5.1.2	-

5.8.6 Test method (Band edge – restricted bands)

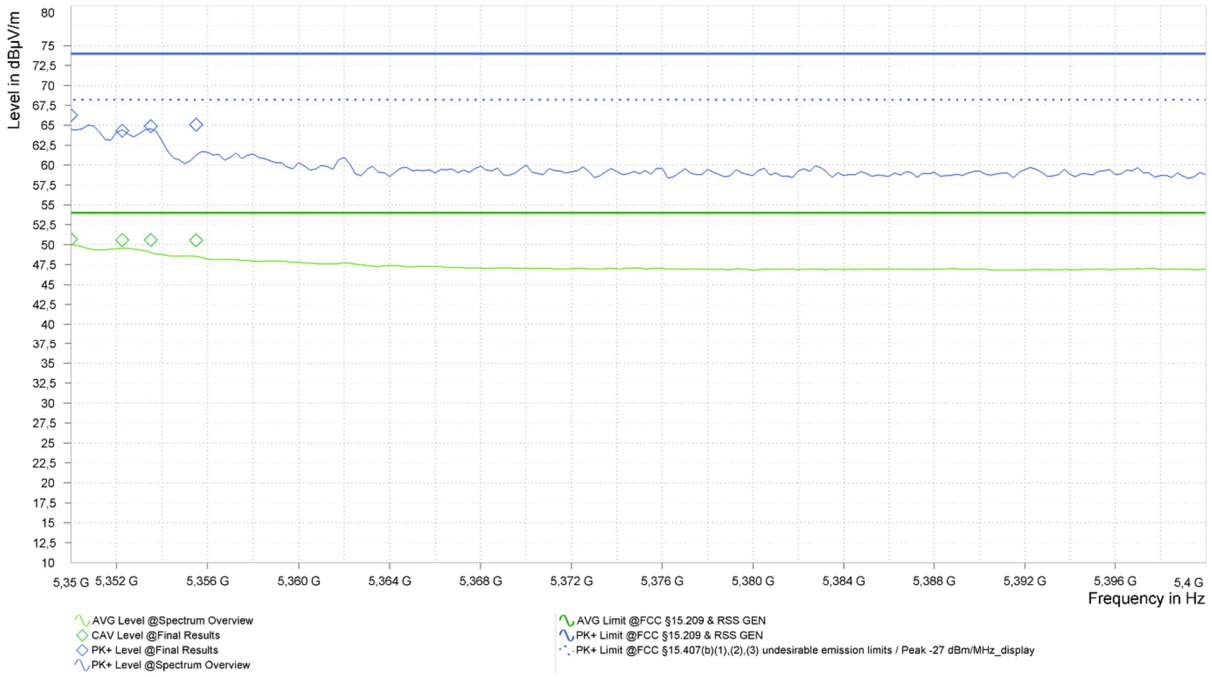
Test method (Band edge – restricted bands)				
Used	Sub-Clause [3]	Name of method	Applicability	Comment
☒	II G 1 & 3 - 6	Unwanted Emissions in the restricted bands	No limitations	-

5.8.7 Test results (Band edge – restricted bands) – radiated - IRIS-W106

Ambient temperature:	22°C
Relative humidity:	28 - 36%

Date	26+29.03.2024
Tested by	P. NEUFELD

Worst case plot (operation mode 24):



Only the worst-case emissions from the antenna port conducted pre-tests were repeated as radiated tests.

The peak limit is set to -27 dBm (68.2 dBµV/m). Since if the stricter unrestricted peak limit is passed for all frequencies, the peak limit for restricted bands (74 dBµV/m) is also fulfilled.

Lower band edge (operation mode 28):

Frequency [MHz]	PK+ [dBµV/m]	Pk+ Limit [dBµV/m]	PK+ Margin [dB]	AV [dBµV/m]	AV Limit [dBµV/m]	AV Margin [dB]	Corr. [dB/m]	Pol	Elevation [deg]	Azimuth [deg]
5140.750	58.6	68.2	9.6	44.6	54.0	9.8	43.6	H	0	58
5149.000	59.9	68.2	8.3	44.5	54.0	9.5	43.6	H	0	47

Upper band edge (operation mode 24):

Frequency [MHz]	PK+ [dBµV/m]	Pk+ Limit [dBµV/m]	PK+ Margin [dB]	AV [dBµV/m]	AV Limit [dBµV/m]	AV Margin [dB]	Corr. [dB/m]	Pol	Elevation [deg]	Azimuth [deg]
5350.000	66.3	68.2	1.9	50.7	54.0	3.3	44.3	V	150	234
5352.250	64.3	68.2	3.9	50.6	54.0	3.4	44.4	V	150	226
5353.500	64.9	68.2	3.3	50.6	54.0	3.4	44.4	V	150	235
5355.500	65.1	68.2	3.1	50.6	54.0	3.5	44.4	V	150	226

Lower band edge (operation mode 34):

Frequency [MHz]	PK+ [dBµV/m]	Pk+ Limit [dBµV/m]	PK+ Margin [dB]	AV [dBµV/m]	AV Limit [dBµV/m]	AV Margin [dB]	Corr. [dB/m]	Pol	Elevation [deg]	Azimuth [deg]
5435.500	59.3	68.2	8.9	45.1	54.0	8.9	44.8	H	0	10
5470.000	61.5	68.2	6.7	45.5	54.0	8.5	44.7	H	0	305

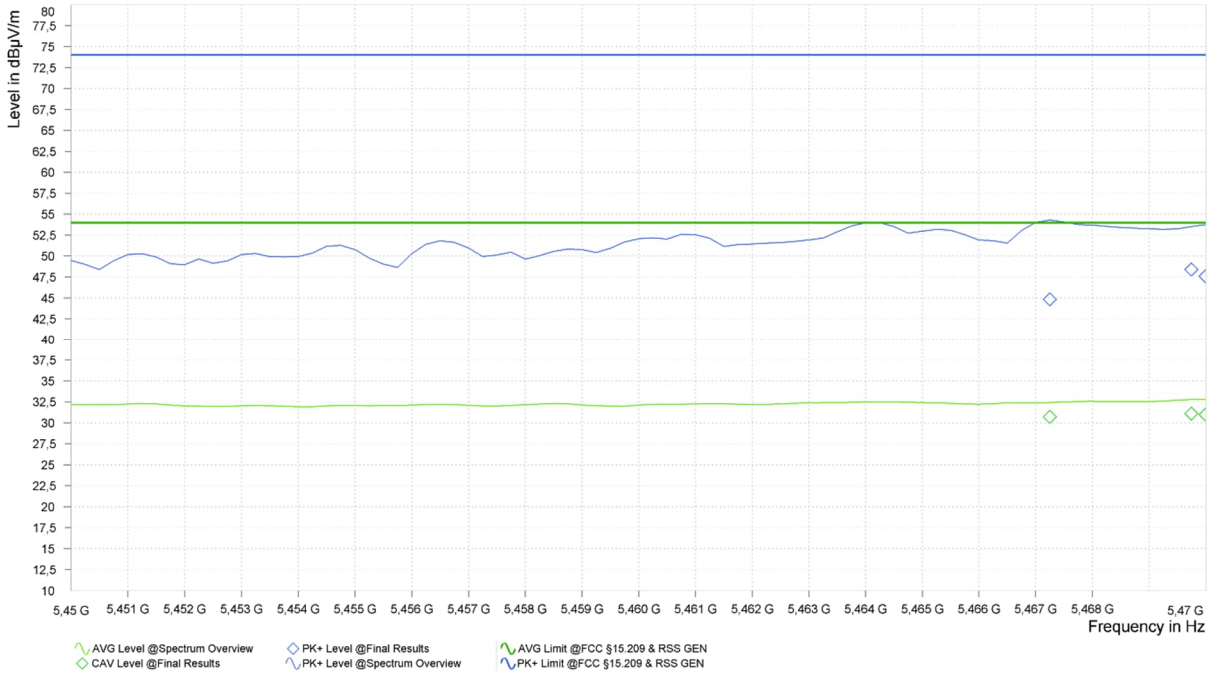
Test result: Passed

5.8.8 Test results (Band edge – restricted bands) – radiated - IRIS-W101

Ambient temperature:	22 °C
Relative humidity:	23 %

Date	25.03.2024
Tested by	P. NEUFELD

Worst case plot (operation mode 34):



Only the worst-case emissions from the antenna port conducted pre-tests were repeated as radiated tests.

The peak limit is set to -27 dBm (68.2 dBµV/m). Since if the stricter unrestricted peak limit is passed for all frequencies, the peak limit for restricted bands (74 dBµV/m) is also fulfilled.

Lower band edge (operation mode 28):

Frequency [MHz]	PK+ [dBµV/m]	Pk+ Limit [dBµV/m]	PK+ Margin [dB]	AV [dBµV/m]	AV Limit [dBµV/m]	AV Margin [dB]	Corr. [dB/m]	Pol	Elevation [deg]	Azimuth [deg]
5140.750	43.2	68.2	25.0	29.8	54.0	24.2	9.9	V	150.0	120.0
5150.000	48.5	68.2	19.8	30.0	54.0	24.0	10.0	V	150.0	112.0

Upper band edge (operation mode 24):

Frequency [MHz]	PK+ [dBµV/m]	Pk+ Limit [dBµV/m]	PK+ Margin [dB]	AV [dBµV/m]	AV Limit [dBµV/m]	AV Margin [dB]	Corr. [dB/m]	Pol	Elevation [deg]	Azimuth [deg]
5350.000	43.9	68.2	24.3	30.5	54.0	23.5	10.7	V	60.0	51.0

Lower band edge (operation mode 34):

Frequency [MHz]	PK+ [dBµV/m]	Pk+ Limit [dBµV/m]	PK+ Margin [dB]	AV [dBµV/m]	AV Limit [dBµV/m]	AV Margin [dB]	Corr. [dB/m]	Pol	Elevation [deg]	Azimuth [deg]
5467.250	44.8	68.2	23.4	30.7	54.0	23.3	11.1	V	60.0	114.0
5469.750	48.4	68.2	19.8	31.1	54.0	22.9	11.1	V	30.0	256.0
5470.000	47.6	68.2	20.6	31.0	54.0	23.0	11.1	V	60.0	122.0

Test result: Passed

Test equipment (please refer to chapter 6 for details)
3 – 9, 16

5.9 Maximum unwanted emissions

5.9.1 Test setup (Maximum unwanted emissions)

Test setup			
Used	Setup	See sub-clause	Comment
☒	Test setup (radiated – normal procedure)	5.1.1.4	f < 1 GHz
☐	Test setup (radiated – normal procedure)	5.1.1.4	f > 1 GHz
☒	Test setup (radiated – alternative procedure)	5.1.1.5	f > 1 GHz
☐	Test setup (antenna port conducted)	5.1.2	No limitations

5.9.2 Test method (Maximum unwanted emissions)

Test method				
Used	Sub-Clause [3]	Name of method	Applicability	Comment
☒	II G 2, 3 & 5.	Unwanted emissions outside restricted bands	No limitations	-
☒	II G 1 & 3 - 6	Unwanted Emissions in the restricted bands	No limitations	-

5.9.3 Test results (Maximum unwanted emissions)

5.9.3.1 Test results (9 kHz – 30 MHz)

Ambient temperature:	22 °C
Relative humidity:	20 %

Date	26.03.2024
Tested by	D. Bruschinsky

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 detail information of test set-up and the cable guide refer to the pictures in the annex A in the 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
No emissions closer than 20 dB to the limit were found during the preliminary measurements, therefore only one exemplary test was submitted below.

Calculations:

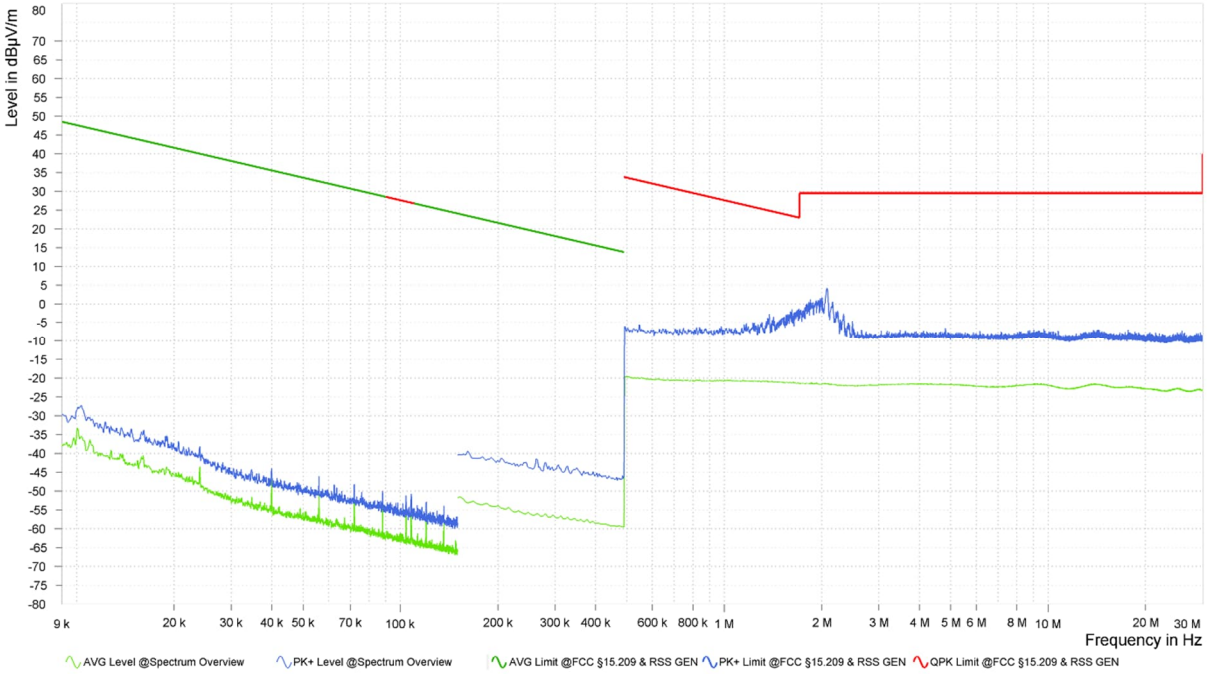
Result @ norm. dist. [dBµV/m] = Reading [dBµV] + AF [dB/m] + Distance corr. fact. [dBµV/m]

Result @ norm. dist. [dBµA/m] = Result @ norm. dist. [dBµV/m] – 20 x $\log_{10}$ (377 Ω)

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

Test results – IRIS-W106 (On-board antenna)

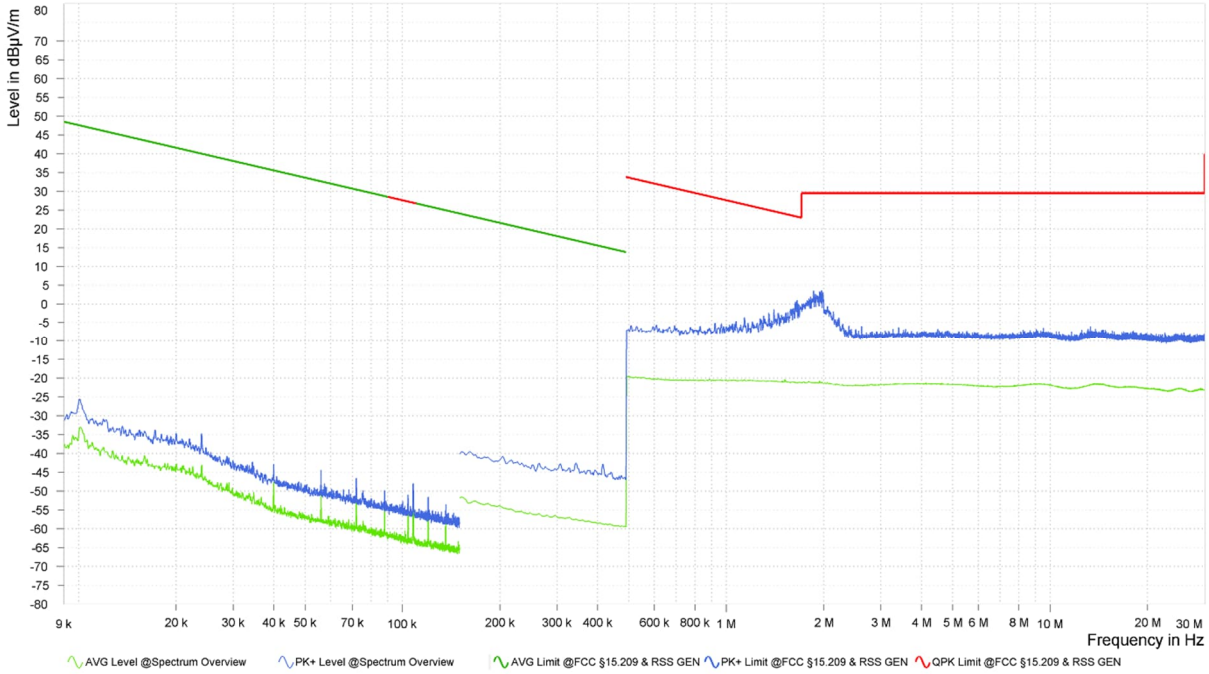
Spurious emissions from 9 kHz to 30 MHz (operation mode 137 - Pos 2):



Remark: No emissions closer than 20 dB to the limit for all modes, so no final measurement will be carried out and only an example plot is submitted above.

Test results – IRIS-W101 (antenna port terminated)

Spurious emissions from 9 kHz to 30 MHz (operation mode 137 - Pos 1):



Remark: No emissions closer than 20 dB to the limit for all modes, so no final measurement will be carried out and only an example plot is submitted above.

Test result: Passed

Test equipment (please refer to chapter 6 for details)
2 – 9

5.9.3.2 Test results (30 MHz – 1 GHz) – IRIS-W106

Ambient temperature:	22 °C
Relative humidity:	20 – 27 %

Date	18.03.2024 - 27.03.2024
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: All 3 orthogonal planes were tested separately

Calculations:

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

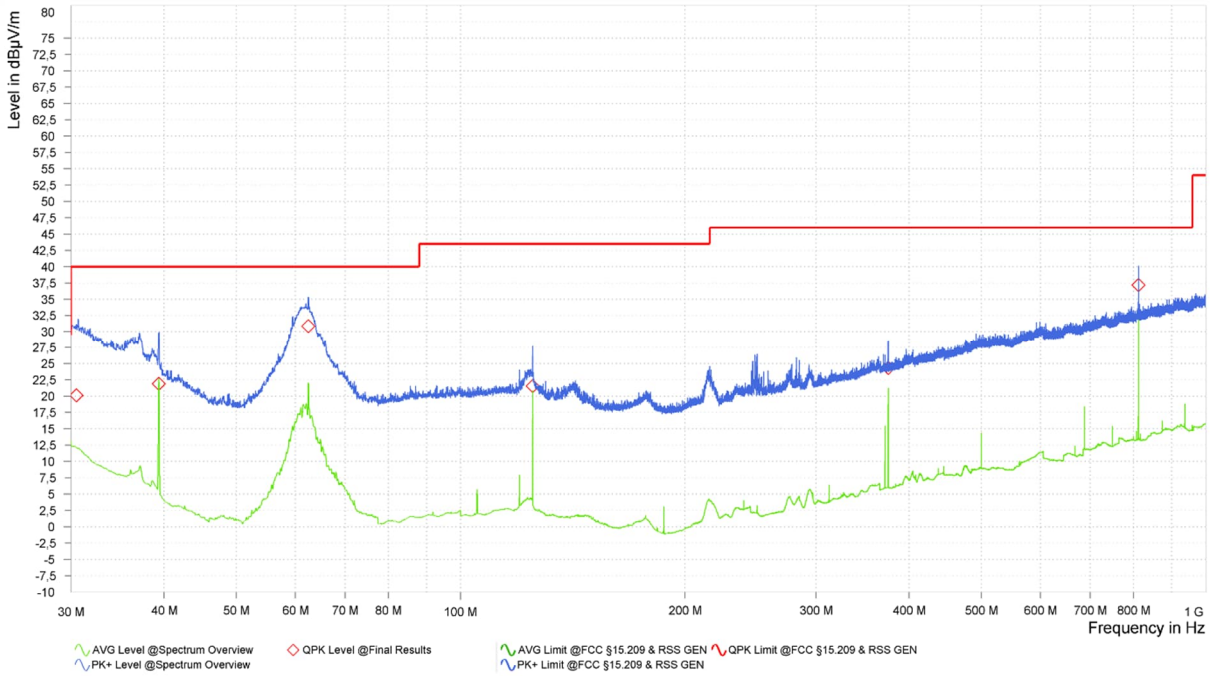
Correction [dBµV/m] = AF [dB/m] + Cable attenuation [dB] + optional preamp gain [dB]

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 (operation mode 136 – Pos 1):



Result tables

(operation mode 136):

Frequency [MHz]	Result (QP) [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Readings [dBµV]	Correction [dB/m]	Pol. (H/V)	Azimuth [deg]	Height [cm]	Position #
30.510	20.1	40.0	19.9	-5.4	25.6	V	127.0	1.5	1
39.360	21.9	40.0	18.1	1.6	20.4	V	298.0	2.6	1
62.490	30.9	40.0	9.1	18.1	12.8	V	199.0	1.2	1
125.010	21.6	43.5	22.0	4.5	17.0	H	101.0	3.5	1
375.000	24.3	46.0	21.7	3.4	20.9	V	122.0	1.4	1
812.490	37.2	46.0	8.8	8.5	28.6	V	157.0	1.1	1

(operation mode 137):

Frequency [MHz]	Result (QP) [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Readings [dBµV]	Correction [dB/m]	Pol. (H/V)	Azimuth [deg]	Height [cm]	Position #
30.420	20.1	40.0	19.9	-5.6	25.6	H	283.0	1.2	2
140.490	16.7	43.5	26.8	0.8	15.9	H	258.0	2.3	2
214.530	18.1	43.5	25.4	2.0	16.1	H	111.0	1.3	2
214.560	18.0	43.5	25.5	2.0	16.1	H	104.0	1.2	2
524.100	17.8	46.0	28.2	-6.7	24.4	V	98.0	2.0	2
926.190	23.3	46.0	22.7	-6.4	29.7	H	33.0	1.4	2

(operation mode 138):

Frequency [MHz]	Result (QP) [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Readings [dBµV]	Correction [dB/m]	Pol. (H/V)	Azimuth [deg]	Height [cm]	Position #
128.040	10.0	43.5	33.5	-6.8	16.8	H	102.0	2.3	3
175.920	16.9	43.5	26.6	0.4	16.5	V	113.0	1.1	3
214.650	15.7	43.5	27.8	-0.4	16.1	V	351.0	1.1	3
523.260	17.7	46.0	28.3	-6.7	24.4	V	137.0	3.3	3
942.870	23.1	46.0	22.9	-6.5	29.7	H	119.0	3.4	3
951.030	23.2	46.0	22.8	-6.5	29.7	V	151.0	2.6	3

(operation mode 139):

Frequency [MHz]	Result (QP) [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Readings [dBµV]	Correction [dB/m]	Pol. (H/V)	Azimuth [deg]	Height [cm]	Position #
30.000	20.7	29.5	8.8	-5.2	25.9	H	361.0	1.0	1
30.420	20.2	40.0	19.8	-5.5	25.6	V	173.0	3.0	1
85.920	9.5	40.0	30.5	-7.4	16.9	H	17.0	1.8	1
214.680	14.8	43.5	28.7	-1.3	16.0	H	273.0	1.8	1
521.400	17.7	46.0	28.3	-6.7	24.4	V	168.0	3.8	1
923.550	23.4	46.0	22.7	-6.3	29.7	V	333.0	3.1	1
958.770	23.3	46.0	22.7	-6.6	29.9	H	309.0	3.8	1

(operation mode 140):

Frequency [MHz]	Result (QP) [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Readings [dBµV]	Correction [dB/m]	Pol. (H/V)	Azimuth [deg]	Height [cm]	Position #
30.090	20.2	40.0	19.8	-5.6	25.8	V	371.0	2.3	2
140.340	16.8	43.5	26.7	1.0	15.9	H	263.0	2.1	2
214.650	17.9	43.5	25.6	1.9	16.1	H	103.0	1.4	2
530.370	17.6	46.0	28.4	-6.9	24.5	H	151.0	1.1	2
917.640	23.5	46.0	22.5	-6.2	29.7	H	76.0	1.2	2
934.830	23.2	46.0	22.8	-6.5	29.7	H	128.0	4.0	2

(operation mode 141):

Frequency [MHz]	Result (QP) [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Readings [dBµV]	Correction [dB/m]	Pol. (H/V)	Azimuth [deg]	Height [cm]	Position #
30.720	19.9	40.0	20.1	-5.5	25.5	V	251.0	1.8	3
86.340	9.5	40.0	30.5	-7.4	16.9	V	339.0	1.1	3
174.900	11.1	43.5	32.4	-5.2	16.3	V	-15.0	1.1	3
214.200	13.7	43.5	29.8	-2.3	16.1	V	169.0	1.7	3
533.520	17.6	46.0	28.4	-7.0	24.5	V	42.0	1.6	3
920.490	23.3	46.0	22.7	-6.3	29.7	H	259.0	3.9	3

(operation mode 142):

Frequency [MHz]	Result (QP) [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Readings [dBµV]	Correction [dB/m]	Pol. (H/V)	Azimuth [deg]	Height [cm]	Position #
30.120	20.3	40.0	19.7	-5.5	25.8	H	297.0	2.9	1
214.740	14.2	43.5	29.3	-1.8	16.0	H	279.0	1.1	1
506.490	17.4	46.0	28.6	-6.7	24.2	H	15.0	1.8	1
519.210	17.8	46.0	28.3	-6.7	24.4	V	-5.0	3.1	1
917.940	23.3	46.0	22.7	-6.4	29.7	H	85.0	3.5	1
950.520	23.2	46.0	22.9	-6.6	29.7	H	185.0	3.8	1

(operation mode 143):

Frequency [MHz]	Result (QP) [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Readings [dBµV]	Correction [dB/m]	Pol. (H/V)	Azimuth [deg]	Height [cm]	Position #
140.460	16.5	43.5	27.0	0.7	15.9	H	112.0	2.1	2
140.550	16.7	43.5	26.8	0.9	15.9	H	271.0	2.0	2
214.260	17.4	43.5	26.1	1.3	16.1	H	81.0	1.3	2
214.410	17.6	43.5	25.9	1.6	16.1	H	85.0	1.4	2
917.340	23.5	46.0	22.5	-6.2	29.7	V	166.0	3.4	2
940.320	23.2	46.0	22.8	-6.5	29.7	V	183.0	3.4	2

(operation mode 144):

Frequency [MHz]	Result (QP) [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Readings [dBµV]	Correction [dB/m]	Pol. (H/V)	Azimuth [deg]	Height [cm]	Position #
30.480	20.0	40.0	20.0	-5.6	25.6	V	254.0	3.1	3
86.940	9.3	40.0	30.7	-7.5	16.8	V	120.0	4.1	3
175.740	17.6	43.5	25.9	1.1	16.5	V	161.0	1.0	3
215.100	15.4	43.5	28.1	-0.6	16.0	H	131.0	1.5	3
531.660	17.5	46.0	28.5	-7.0	24.5	V	79.0	3.9	3
911.580	23.4	46.0	22.7	-6.4	29.7	V	240.0	4.1	3

(operation mode 145):

Frequency [MHz]	Result (QP) [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Readings [dBµV]	Correction [dB/m]	Pol. (H/V)	Azimuth [deg]	Height [cm]	Position #
30.480	20.0	40.0	20.0	-5.6	25.6	H	49.0	4.3	1
215.700	14.7	43.5	28.8	-1.3	16.0	H	129.0	1.3	1
520.380	17.8	46.0	28.2	-6.6	24.4	V	207.0	3.7	1
556.800	17.4	46.0	28.6	-7.4	24.8	V	275.0	2.3	1
918.960	23.3	46.0	22.7	-6.4	29.7	V	251.0	3.8	1
922.050	23.3	46.0	22.7	-6.4	29.7	H	67.0	3.9	1

(operation mode 146):

Frequency [MHz]	Result (QP) [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Readings [dBµV]	Correction [dB/m]	Pol. (H/V)	Azimuth [deg]	Height [cm]	Position #
30.420	20.1	40.0	19.9	-5.6	25.6	V	113.0	2.5	2
139.710	16.5	43.5	27.0	0.6	15.9	H	271.0	2.1	2
140.940	16.5	43.5	27.0	0.7	15.9	H	108.0	2.1	2
214.140	16.7	43.5	26.9	0.6	16.1	H	109.0	1.0	2
214.830	16.8	43.5	26.7	0.8	16.0	H	87.0	1.5	2
904.860	23.1	46.0	22.9	-6.4	29.5	H	183.0	3.8	2

(operation mode 147):

Frequency [MHz]	Result (QP) [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Readings [dBµV]	Correction [dB/m]	Pol. (H/V)	Azimuth [deg]	Height [cm]	Position #
84.930	9.4	40.0	30.6	-7.4	16.7	H	65.0	3.1	3
173.040	14.5	43.5	29.0	-1.4	16.0	V	131.0	1.1	3
214.230	15.8	43.5	27.7	-0.3	16.1	H	127.0	1.1	3
214.980	16.5	43.5	27.0	0.5	16.0	H	146.0	1.3	3
531.510	17.5	46.0	28.5	-7.0	24.5	H	143.0	1.4	3
909.090	23.2	46.0	22.8	-6.5	29.7	H	13.0	4.5	3

Test result: Passed

5.9.3.3 Test results (30 MHz – 1 GHz) – IRIS-W101

Ambient temperature:	22 °C
Relative humidity:	20 – 27 %

Date	27.03.2024 + 28.3.2024
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: All 3 orthogonal planes were tested separately

Calculations:

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

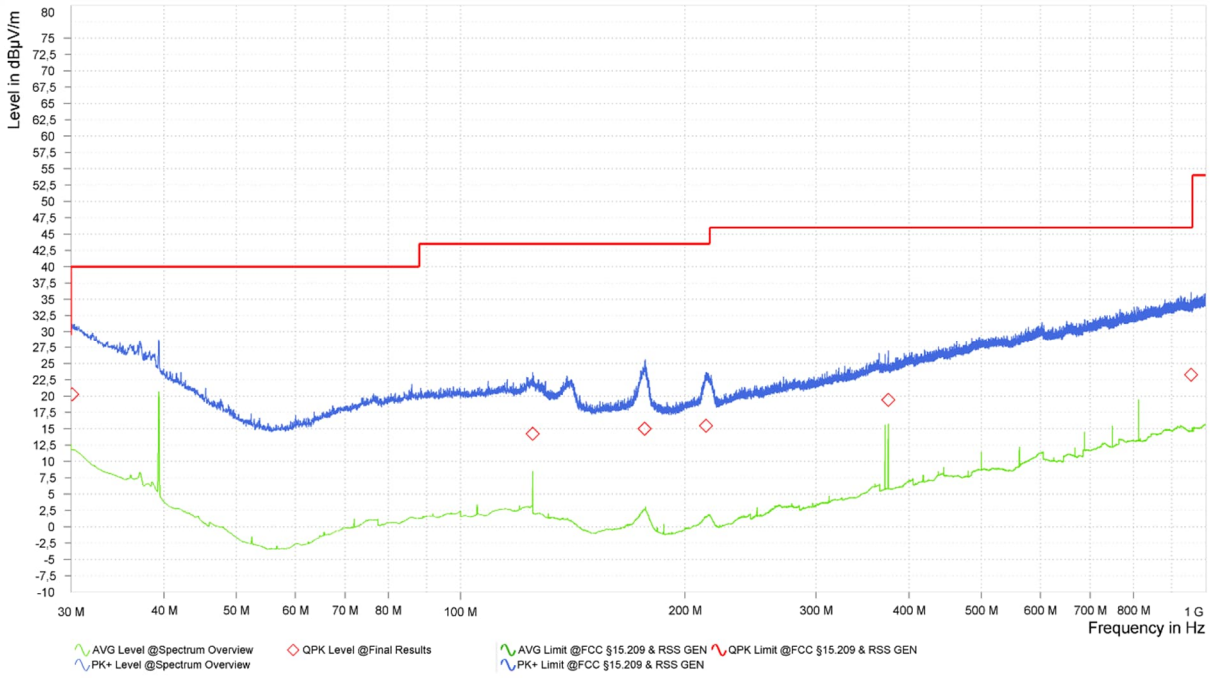
Correction [dBµV/m] = AF [dB/m] + Cable attenuation [dB] + optional preamp gain [dB]

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 (operation mode 137 – Pos 3):



Result tables

(operation mode 137):

Frequency [MHz]	Result (QP) [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Readings [dBµV]	Correction [dB/m]	Pol. (H/V)	Azimuth [deg]	Height [cm]	Position #
30.120	20.3	40.0	19.7	-5.5	25.8	H	190.0	3.2	3
125.010	14.2	43.5	29.3	-2.8	17.0	H	271.0	2.2	3
176.700	15.0	43.5	28.5	-1.7	16.7	V	198.0	1.0	3
213.510	15.5	43.5	28.0	-0.6	16.1	V	178.0	1.6	3
375.000	19.5	46.0	26.6	-1.5	20.9	V	233.0	1.9	3
956.370	23.3	46.0	22.7	-6.5	29.8	H	23.0	4.3	3

(operation mode 140):

Frequency [MHz]	Result (QP) [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Readings [dBµV]	Correction [dB/m]	Pol. (H/V)	Azimuth [deg]	Height [cm]	Position #
30.240	20.1	40.0	19.9	-5.6	25.7	V	137.0	2.8	3
125.010	14.0	43.5	29.5	-3.1	17.0	H	278.0	2.3	3
176.370	14.4	43.5	29.2	-2.2	16.6	V	195.0	1.1	3
214.710	14.6	43.5	28.9	-1.5	16.0	V	177.0	1.7	3
731.760	20.8	46.0	25.2	-6.9	27.7	V	195.0	4.3	3
883.950	23.0	46.0	23.0	-6.3	29.3	H	222.0	1.4	3

(operation mode 143):

Frequency [MHz]	Result (QP) [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Readings [dBµV]	Correction [dB/m]	Pol. (H/V)	Azimuth [deg]	Height [cm]	Position #
30.810	19.8	40.0	20.2	-5.6	25.4	V	66.0	3.5	3
124.500	10.8	43.5	32.7	-6.2	17.0	H	283.0	3.5	3
176.280	14.6	43.5	28.9	-2.0	16.6	V	202.0	1.0	3
214.860	15.1	43.5	28.4	-0.9	16.0	V	170.0	1.5	3
371.280	19.7	46.0	26.3	-1.2	20.9	V	140.0	2.1	3
919.860	23.4	46.0	22.6	-6.2	29.7	H	42.0	3.6	3

(operation mode 146):

Frequency [MHz]	Result (QP) [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Readings [dBµV]	Correction [dB/m]	Pol. (H/V)	Azimuth [deg]	Height [cm]	Position #
124.350	10.8	43.5	32.7	-6.2	17.0	H	293.0	2.6	3
140.670	11.7	43.5	31.8	-4.1	15.9	H	269.0	2.3	3
177.030	9.7	43.5	33.8	-7.0	16.7	V	9.0	1.4	3
213.660	15.8	43.5	27.7	-0.2	16.1	V	179.0	1.5	3
731.040	20.8	46.0	25.3	-6.9	27.7	H	355.0	4.0	3
949.380	23.2	46.0	22.8	-6.5	29.7	H	253.0	3.9	3

Test equipment (please refer to chapter 6 for details)
3 - 11

5.9.3.4 Test results (above 1 GHz) – IRIS-W106

Ambient temperature:	22 – 23 °C
Relative humidity:	18 – 37 %

Date	13.02.2024 - 28.03.2024
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: Worst case plots for each frequency range are submitted below. No emissions closer than 20 dB to the limit were found for f > 12 GHz, therefore only exemplary plots for this frequency are submitted below.

Remark: The peak limit is set to -27 dBm (68.2 dBµV/m). Since if the stricter unrestricted peak limit is passed for all frequencies, the peak limit for restricted bands (74 dBµV/m) is also fulfilled.

Calculation:

Max Peak [dBµV/m] = Reading (Pk+) [dBµV] + Correction [dBµV/m]

Average [dBµV/m] = Reading (Av) [dBµV] + Correction [dBµV/m]

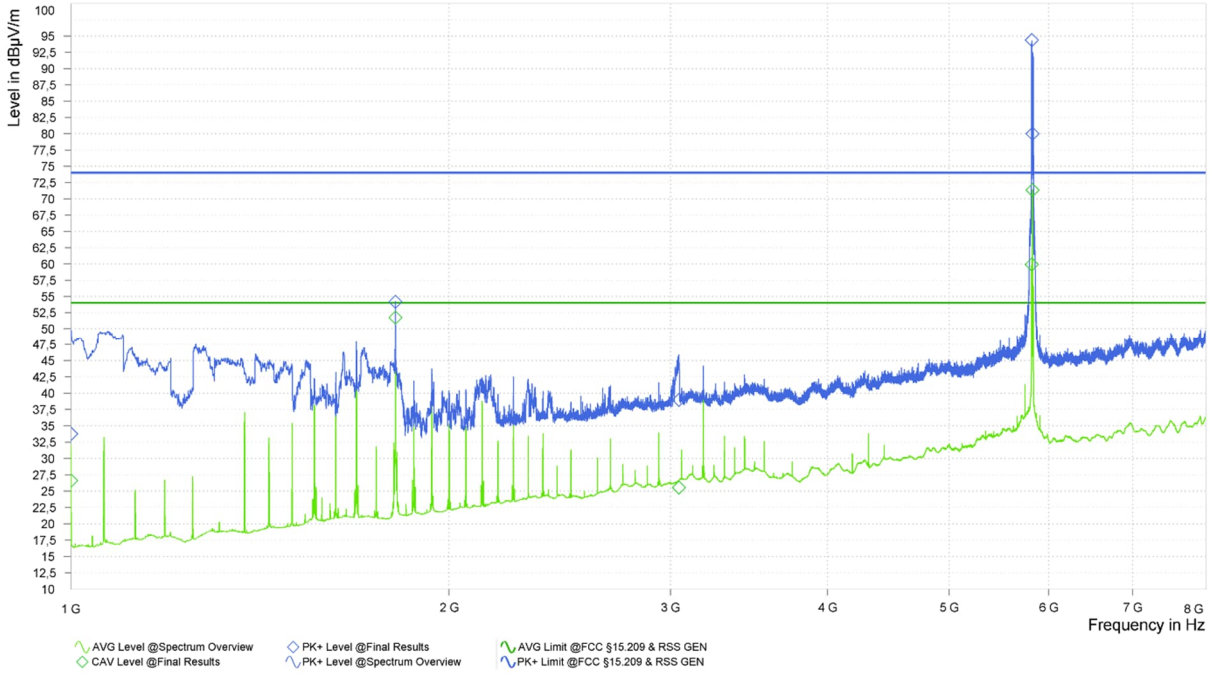
Correction [dBµV/m] = AF [dB/m] + Cable attenuation [dB] + optional preamp gain [dB]+DCCF* [dB]
* (if applicable – only for Average values, that are fundamental related)

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

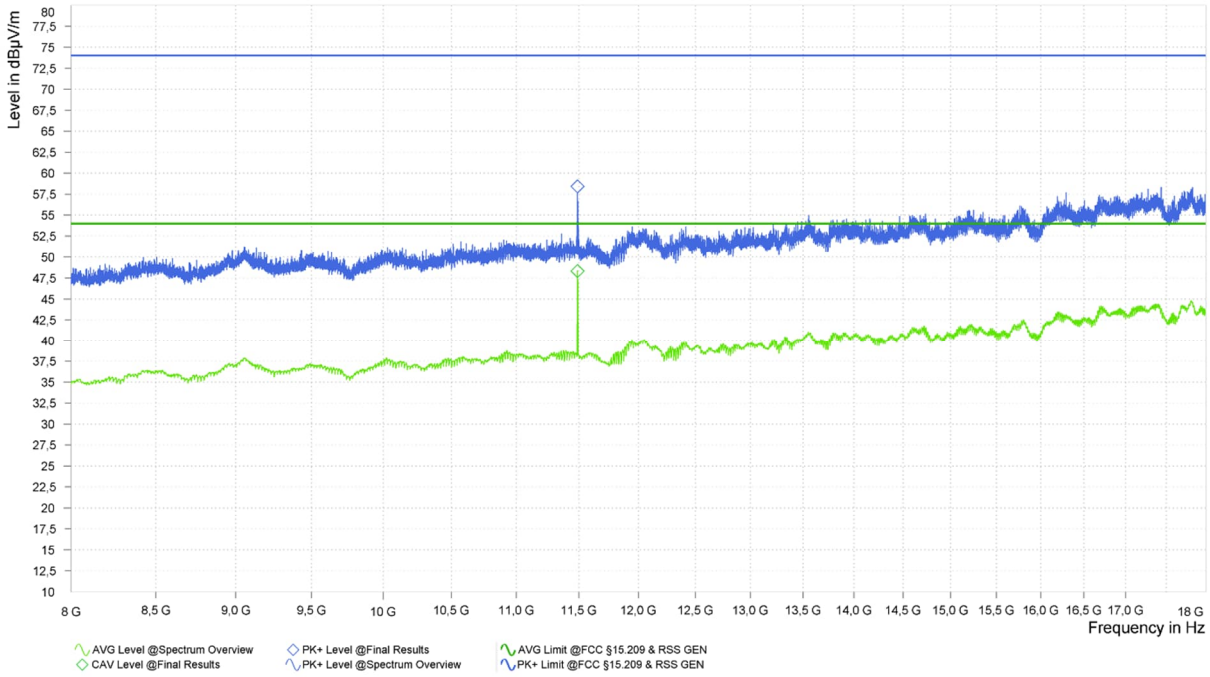
The curves in the diagram only represent the maximum measured value for each frequency point of all preliminary measurements, which were carried out with various EUT and antenna positions.
The top measured curve represents the peak measurement. The measured points marked with "◇" are frequency points 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:

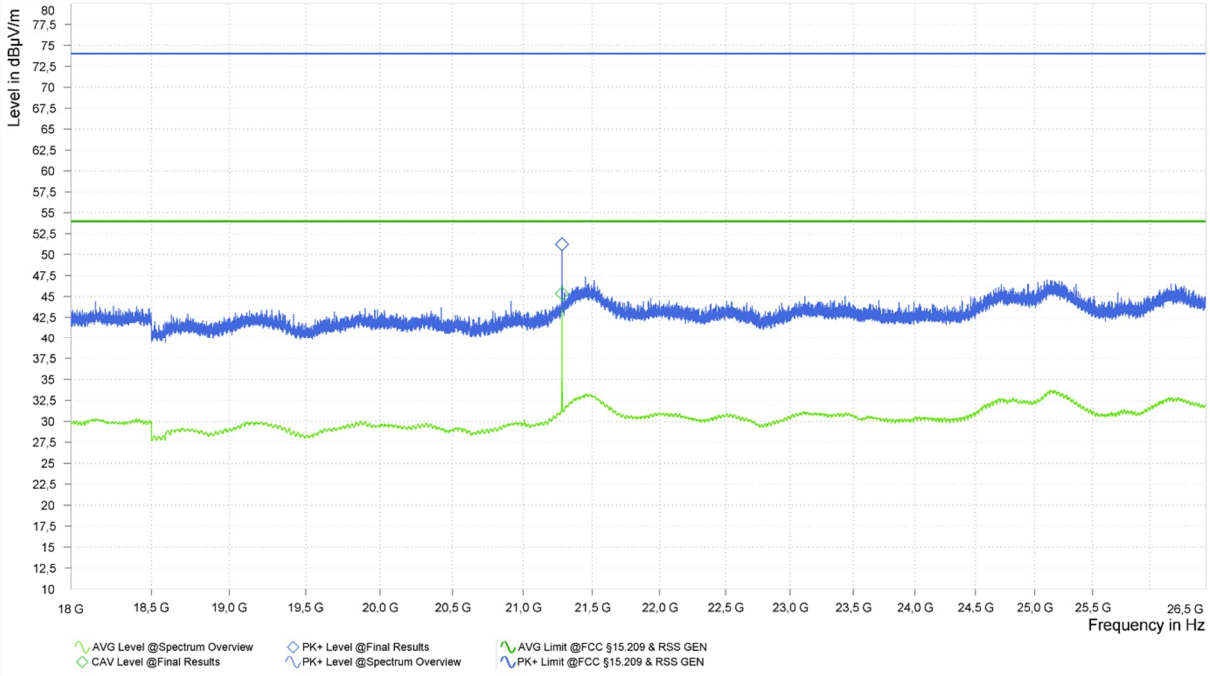
Spurious emissions from 1 GHz to 8 GHz (operation mode 147):



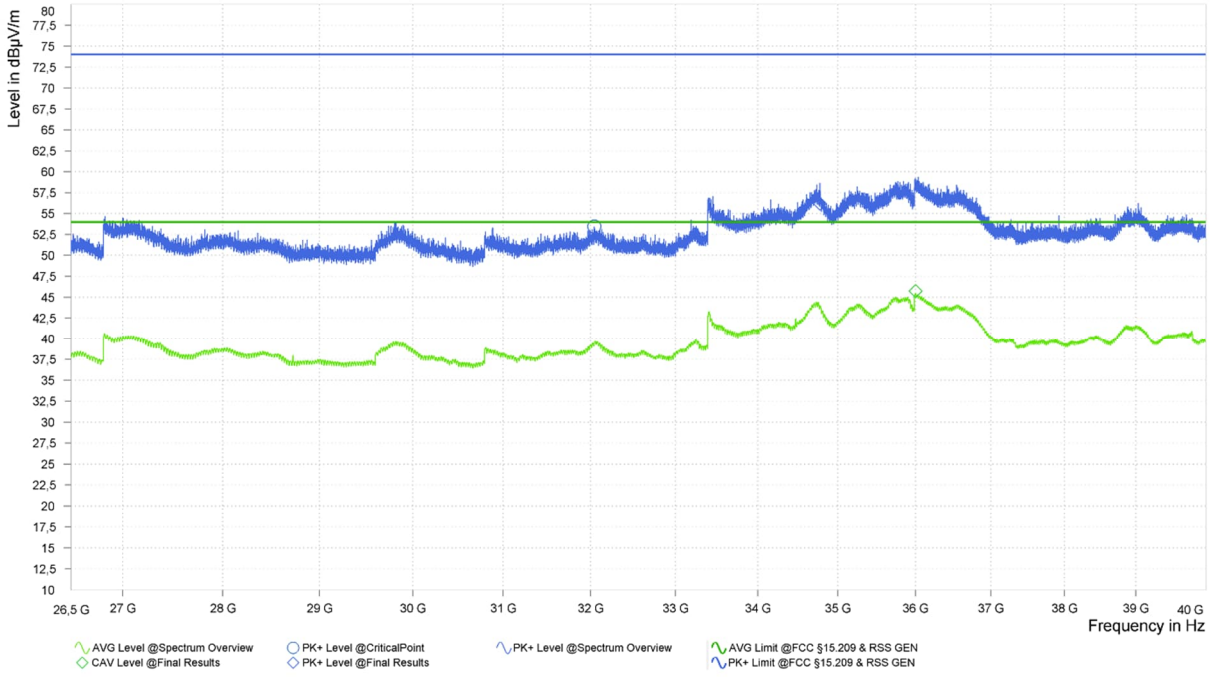
Spurious emissions from 8 GHz to 18 GHz (operation mode 145):



Spurious emissions from 18 GHz to 26.5 GHz (operation mode 141):



Spurious emissions from 26.5 GHz to 40 GHz (operation mode 145):



5.9.3.4.1 Result tables

Operation mode 136:

Frequency [MHz]	PK+ [dBµV/m]	Pk+ Limit [dBµV/m]	PK+ Margin [dB]	AV [dBµV/m]	AV Limit [dBµV/m]	AV Margin [dB]	Corr. [dB/m]	Pol	Elevation [deg]	Azimuth [deg]
3187.250	45.7	68.2	22.5	39.0	54.0	15.0	3.4	H	60.0	216.0
5172.750	62.6	68.2	5.6	35.6	54.0	18.5	10.0	V	30.0	238.0
5179.000	72.9	Fund.	-	62.6	Fund.	-	10.0	H	30.0	242.0
5180.750	72.7	Fund.	-	63.2	Fund.	-	10.0	H	30.0	246.0
5186.500	64.2	68.2	4.0	35.4	54.0	18.6	10.0	H	30.0	246.0
10359.750	-	-	-	39.3	54.0	14.7	19.6	H	90.0	157.0
10360.000	52.2	68.2	16.0	-	-	-	19.6	H	90.0	157.0
20719.750	-	-	-	43.0	54.0	11.0	11.0	H	60.0	119.0
20720.000	48.9	68.2	19.3	-	-	-	11.0	H	90.0	135.0
36003.250	-	-	-	45.6	54.0	8.4	19.8	H	145.0	366.0
36007.750	58.6	68.2	9.6	-	-	-	19.8	V	60.0	189.0

Operation mode 137:

Frequency [MHz]	PK+ [dBµV/m]	Pk+ Limit [dBµV/m]	PK+ Margin [dB]	AV [dBµV/m]	AV Limit [dBµV/m]	AV Margin [dB]	Corr. [dB/m]	Pol	Elevation [deg]	Azimuth [deg]
3187.750	45.2	68.2	23.1	38.8	54.0	15.2	3.4	H	150.0	274.0
5199.250	65.7	Fund.	-	57.2	Fund.	-	10.0	H	30.0	242.0
5200.750	66.5	Fund.	-	57.2	Fund.	-	10.0	H	30.0	242.0
10400.500	-	-	-	39.3	54.0	14.7	19.6	H	90.0	141.0
10401.250	52.4	68.2	15.8	-	-	-	19.6	H	90.0	145.0
20799.750	48.8	68.2	19.4	42.9	54.0	11.1	11.0	H	60.0	123.0
36001.750	-	-	-	45.6	54.0	8.4	19.8	H	69.0	125.0
36026.250	58.5	68.2	9.7	-	-	-	19.8	V	60.0	126.0

Operation mode 138:

Frequency [MHz]	PK+ [dBµV/m]	Pk+ Limit [dBµV/m]	PK+ Margin [dB]	AV [dBµV/m]	AV Limit [dBµV/m]	AV Margin [dB]	Corr. [dB/m]	Pol	Elevation [deg]	Azimuth [deg]
3187.500	47.1	68.2	21.1	41.9	54.0	12.2	3.4	V	0.0	2.0
5239.000	72.9	Fund.	-	63.7	Fund.	-	10.2	H	30.0	310.0
5240.750	71.5	Fund.	-	63.1	Fund.	-	10.2	H	30.0	312.0
10480.000	-	-	-	39.9	54.0	14.1	20.0	H	60.0	149.0
10480.250	52.8	68.2	15.4	-	-	-	20.0	H	90.0	145.0
20959.750	-	-	-	43.0	54.0	11.0	11.1	H	60.0	128.0
20960.000	49.1	68.2	19.1	-	-	-	11.1	H	60.0	123.0
36004.000	-	-	-	45.6	54.0	8.4	19.8	H	95.0	325.0
36007.500	58.4	68.2	9.9	-	-	-	19.8	V	123.0	-1.0

Operation mode 139:

Frequency [MHz]	PK+ [dBµV/m]	Pk+ Limit [dBµV/m]	PK+ Margin [dB]	AV [dBµV/m]	AV Limit [dBµV/m]	AV Margin [dB]	Corr. [dB/m]	Pol	Elevation [deg]	Azimuth [deg]
3187.250	44.7	68.2	23.5	38.0	54.0	16.0	3.4	H	60.0	208.0
5268.000	51.5	68.2	16.7	29.2	54.0	24.8	10.5	V	30.0	248.0
5280.250	51.1	68.2	17.1	31.3	54.0	22.7	10.6	H	0.0	328.0
10476.500	50.1	68.2	18.1	-	-	-	20.0	V	120.0	36.0
10518.750	-	-	-	41.7	54.0	12.3	20.1	H	90.0	145.0
21039.750	-	-	-	42.1	54.0	12.0	11.1	V	150.0	65.0
21040.000	47.8	68.2	20.4	-	-	-	11.1	V	150.0	63.0
36003.750	-	-	-	45.6	54.0	8.4	19.8	V	125.0	201.0
36027.500	58.3	68.2	9.9	-	-	-	19.8	H	0.0	83.0

Operation mode 140:

Frequency [MHz]	PK+ [dBµV/m]	Pk+ Limit [dBµV/m]	PK+ Margin [dB]	AV [dBµV/m]	AV Limit [dBµV/m]	AV Margin [dB]	Corr. [dB/m]	Pol	Elevation [deg]	Azimuth [deg]
2125.000	37.3	68.2	30.9	33.7	54.0	20.3	-2.3	H	0.0	163.0
3187.500	39.0	68.2	29.2	30.5	54.0	23.5	3.4	H	90.0	121.0
5291.000	47.9	68.2	20.3	28.7	54.0	25.3	10.7	V	30.0	232.0
5380.250	45.6	68.2	22.6	32.0	54.0	22.0	10.9	V	30.0	233.0
10599.250	-	-	-	41.3	54.0	12.7	20.4	H	90.0	153.0
10599.750	54.3	68.2	13.9	-	-	-	20.4	H	90.0	157.0
21199.750	50.3	68.2	17.9	44.3	54.0	9.7	11.1	H	60.0	119.0
36004.250	-	-	-	45.5	54.0	8.5	19.8	H	-18.0	127.0
36062.750	59.5	68.2	8.8	-	-	-	19.7	H	78.0	243.0

Operation mode 141:

Frequency [MHz]	PK+ [dBµV/m]	Pk+ Limit [dBµV/m]	PK+ Margin [dB]	AV [dBµV/m]	AV Limit [dBµV/m]	AV Margin [dB]	Corr. [dB/m]	Pol	Elevation [deg]	Azimuth [deg]
3187.500	45.9	68.2	22.3	40.1	54.0	13.9	3.4	H	120.0	40.0
5319.250	72.3	Fund.	-	64.3	Fund.	-	10.7	H	30.0	246.0
5320.750	72.7	Fund.	-	64.5	Fund.	-	10.7	H	30.0	246.0
10472.000	50.2	68.2	18.0	-	-	-	20.0	V	60.0	15.0
10639.250	-	-	-	39.5	54.0	14.6	20.4	H	90.0	151.0
21279.750	51.2	68.2	17.0	45.4	54.0	8.7	11.2	H	60.0	127.0
35999.500	55.3	68.2	12.9	-	-	-	19.8	H	45.0	336.0
36002.750	-	-	-	45.7	54.0	8.4	19.8	V	-9.0	145.0

Operation mode 142:

Frequency [MHz]	PK+ [dBµV/m]	Pk+ Limit [dBµV/m]	PK+ Margin [dB]	AV [dBµV/m]	AV Limit [dBµV/m]	AV Margin [dB]	Corr. [dB/m]	Pol	Elevation [deg]	Azimuth [deg]
3187.500	45.5	68.2	22.7	39.7	54.0	14.3	3.4	H	60.0	45.0
5491.500	83.8	Fund.	-	48.9	Fund.	-	11.1	H	0.0	44.0
5508.000	63.7	68.2	4.5	36.7	54.0	17.3	11.0	H	0.0	50.0
11000.000	55.8	68.2	12.4	-	-	-	21.9	H	90.0	155.0
11000.250	-	-	-	44.4	54.0	9.7	21.9	H	90.0	149.0
21999.750	49.4	68.2	18.8	44.0	54.0	10.0	11.4	H	120.0	173.0
35764.000	56.5	68.2	11.7	-	-	-	20.3	H	90.0	165.0
36004.000	-	-	-	45.7	54.0	8.4	19.8	V	39.0	321.0

Operation mode 143:

Frequency [MHz]	PK+ [dBµV/m]	Pk+ Limit [dBµV/m]	PK+ Margin [dB]	AV [dBµV/m]	AV Limit [dBµV/m]	AV Margin [dB]	Corr. [dB/m]	Pol	Elevation [deg]	Azimuth [deg]
3187.250	44.9	68.2	23.4	38.2	54.0	15.8	3.4	H	120.0	38.0
5571.500	87.1	Fund.	-	51.8	Fund.	-	11.2	V	120.0	280.0
5580.500	74.0	Fund.	-	67.1	Fund.	-	11.2	H	150.0	291.0
5587.750	81.6	Fund.	-	47.2	Fund.	-	11.2	H	0.0	49.0
11159.000	54.8	68.2	13.4	41.2	54.0	12.9	21.6	H	90.0	151.0
22319.750	49.0	68.2	19.2	42.6	54.0	11.4	11.6	V	150.0	65.0
36002.000	58.8	68.2	9.5	-	-	-	19.8	H	-15.0	319.0
36003.500	-	-	-	45.6	54.0	8.4	19.8	V	108.0	15.0

Operation mode 144:

Frequency [MHz]	PK+ [dBµV/m]	Pk+ Limit [dBµV/m]	PK+ Margin [dB]	AV [dBµV/m]	AV Limit [dBµV/m]	AV Margin [dB]	Corr. [dB/m]	Pol	Elevation [deg]	Azimuth [deg]
1812.500	-	-	-	51.0	54.0	3.0	-4.3	H	120.0	70.0
5691.750	83.1	Fund.	-	-	-	-	11.6	H	0.0	38.0
5692.250	-	-	-	49.4	Fund.	-	11.6	H	0.0	42.0
5692.500	82.8	Fund.	-	-	-	-	11.6	H	0.0	44.0
5699.250	-	-	-	55.2	Fund.	-	11.7	H	120.0	14.0
5700.750	-	-	-	58.1	Fund.	-	11.7	H	0.0	72.0
5707.750	80.7	Fund.	-	-	-	-	11.8	H	0.0	339.0
10029.250	49.8	68.2	18.4	-	-	-	20.3	V	150.0	156.0
11400.000	-	-	-	42.4	54.0	11.6	21.7	H	90.0	151.0
22799.750	-	-	-	41.0	54.0	13.0	11.4	V	60.0	127.0
22800.000	47.6	68.2	20.7	-	-	-	11.4	V	60.0	127.0
36005.000	-	-	-	45.7	54.0	8.3	19.8	V	120.0	21.0
36058.500	58.7	68.2	9.5	-	-	-	19.7	H	-24.0	303.0

Operation mode 145:

Frequency [MHz]	PK+ [dBµV/m]	Pk+ Limit [dBµV/m]	PK+ Margin [dB]	AV [dBµV/m]	AV Limit [dBµV/m]	AV Margin [dB]	Corr. [dB/m]	Pol	Elevation [deg]	Azimuth [deg]
1001.000	28.3	68.2	39.9	15.7	54.0	38.3	-10.8	V	120.0	98.0
1812.500	54.2	68.2	14.1	51.7	54.0	2.3	-4.3	H	150.0	62.0
3187.750	44.0	68.2	24.2	37.4	54.0	16.6	3.4	H	150.0	98.0
5737.500	90.4	Fund.	-	56.5	Fund.	-	12.0	H	0.0	340.0
5745.750	80.9	Fund.	-	72.6	Fund.	-	12.0	V	30.0	284.0
11490.000	-	-	-	48.3	54.0	5.7	21.5	H	90.0	155.0
11490.250	58.4	68.2	9.8	-	-	-	21.5	H	90.0	145.0
22979.750	51.5	68.2	16.7	44.1	54.0	9.9	11.5	V	60.0	124.0
22981.500	47.4	68.2	20.8	-	-	-	11.5	V	120.0	124.0
34775.500	56.2	68.2	12.0	-	-	-	19.3	H	81.0	343.0
36005.750	-	-	-	45.8	54.0	8.3	19.8	V	3.0	315.0

Operation mode 146:

Frequency [MHz]	PK+ [dBµV/m]	Pk+ Limit [dBµV/m]	PK+ Margin [dB]	AV [dBµV/m]	AV Limit [dBµV/m]	AV Margin [dB]	Corr. [dB/m]	Pol	Elevation [deg]	Azimuth [deg]
1812.500	52.6	68.2	15.6	50.0	54.0	4.0	-4.3	V	90.0	212.0
3187.500	45.2	68.2	23.0	39.1	54.0	14.9	3.4	H	150.0	98.0
5776.000	83.4	Fund.	-	48.3	Fund.	-	12.1	H	0.0	336.0
5786.000	75.0	Fund.	-	66.8	Fund.	-	12.1	H	0.0	34.0
11570.250	-	-	-	45.9	54.0	8.1	21.5	H	90.0	161.0
11570.500	58.1	68.2	10.2	-	-	-	21.5	H	90.0	155.0
23139.750	-	-	-	43.1	54.0	10.9	11.7	V	60.0	126.0
23140.000	50.5	68.2	17.7	-	-	-	11.7	V	60.0	127.0
23141.500	46.1	68.2	22.1	-	-	-	11.7	V	120.0	129.0
36003.000	59.0	68.2	9.2	45.7	54.0	8.3	19.8	H	103.0	25.0
36036.750	58.0	68.2	10.2	45.5	54.0	8.5	19.7	V	3.0	309.0

Operation mode 147:

Frequency [MHz]	PK+ [dBµV/m]	Pk+ Limit [dBµV/m]	PK+ Margin [dB]	AV [dBµV/m]	AV Limit [dBµV/m]	AV Margin [dB]	Corr. [dB/m]	Pol	Elevation [deg]	Azimuth [deg]
1000.250	33.8	68.2	34.4	26.6	54.0	27.4	-10.8	V	90.0	62.0
1812.500	54.2	68.2	14.0	51.8	54.0	2.2	-4.3	H	30.0	244.0
3046.750	39.0	68.2	29.2	25.5	54.0	28.5	2.8	V	90.0	20.0
5817.250	94.4	Fund.	-	59.9	Fund.	-	12.1	V	120.0	270.0
5825.500	80.0	Fund.	-	71.4	Fund.	-	12.1	H	30.0	70.0
11650.000	-	-	-	46.0	54.0	8.0	21.1	0.0	90.0	157.0
11651.750	56.3	68.2	11.9	-	-	-	21.1	0.0	90.0	126.0
23297.750	-	-	-	37.3	54.0	16.7	11.9	H	120.0	117.0
23298.000	50.5	68.2	17.7	-	-	-	11.9	H	120.0	126.0
23299.750	53.3	68.2	14.9	43.1	54.0	11.0	11.9	V	60.0	130.0
29122.000	53.4	68.2	14.8	39.1	54.0	14.9	18.0	V	110.0	110.0
29125.250	51.1	68.2	17.1	36.6	54.0	17.4	18.1	V	180.0	23.0

Test result: Passed

5.9.3.5 Test results (above 1 GHz) – IRIS-W101

Ambient temperature:	22 °C
Relative humidity:	26 - 38 %

Date	12.03.2024 - 25.03.2024
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: Worst case plots for each frequency range are submitted below. No emissions closer than 20 dB to the limit were found for f > 12 GHz, therefore only exemplary plots for this frequency are submitted below.

Remark: The peak limit is set to -27 dBm (68.2 dBµV/m). Since if the stricter unrestricted peak limit is passed for all frequencies, the peak limit for restricted bands (74 dBµV/m) is also fulfilled.

Calculation:

Max Peak [dBµV/m] = Reading (Pk+) [dBµV] + Correction [dBµV/m]

Average [dBµV/m] = Reading (Av) [dBµV] + Correction [dBµV/m]

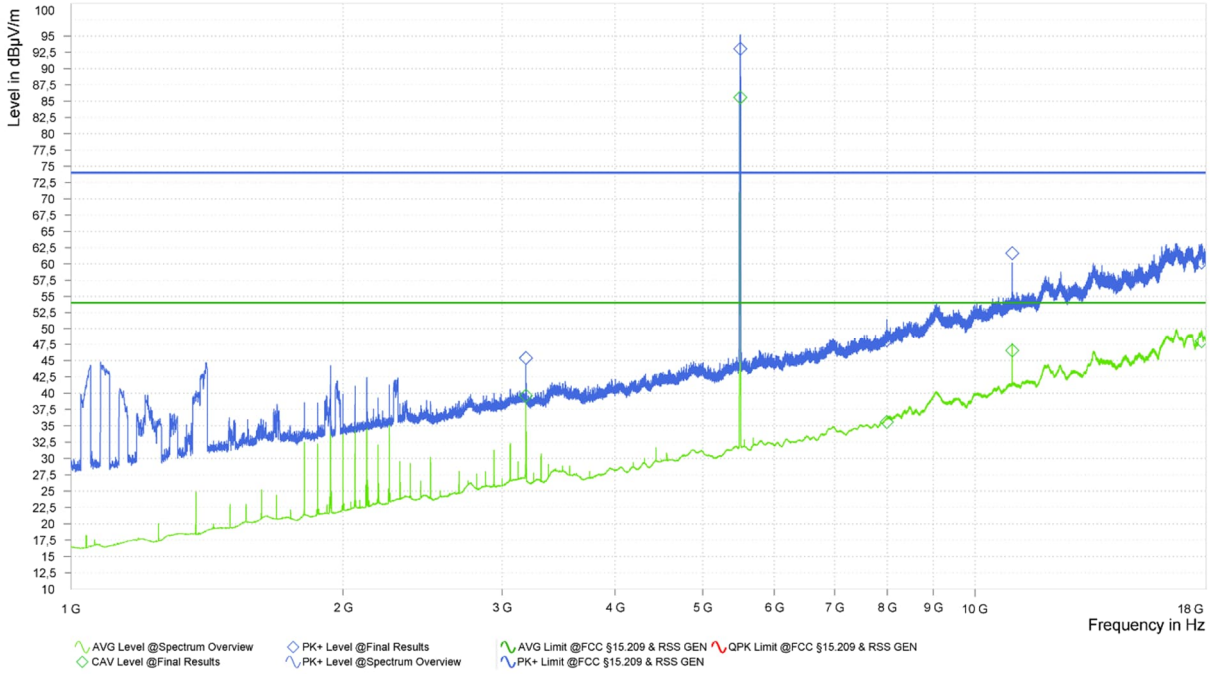
Correction [dBµV/m] = AF [dB/m] + Cable attenuation [dB] + optional preamp gain [dB]+DCCF* [dB]
* (if applicable – only for Average values, that are fundamental related)

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

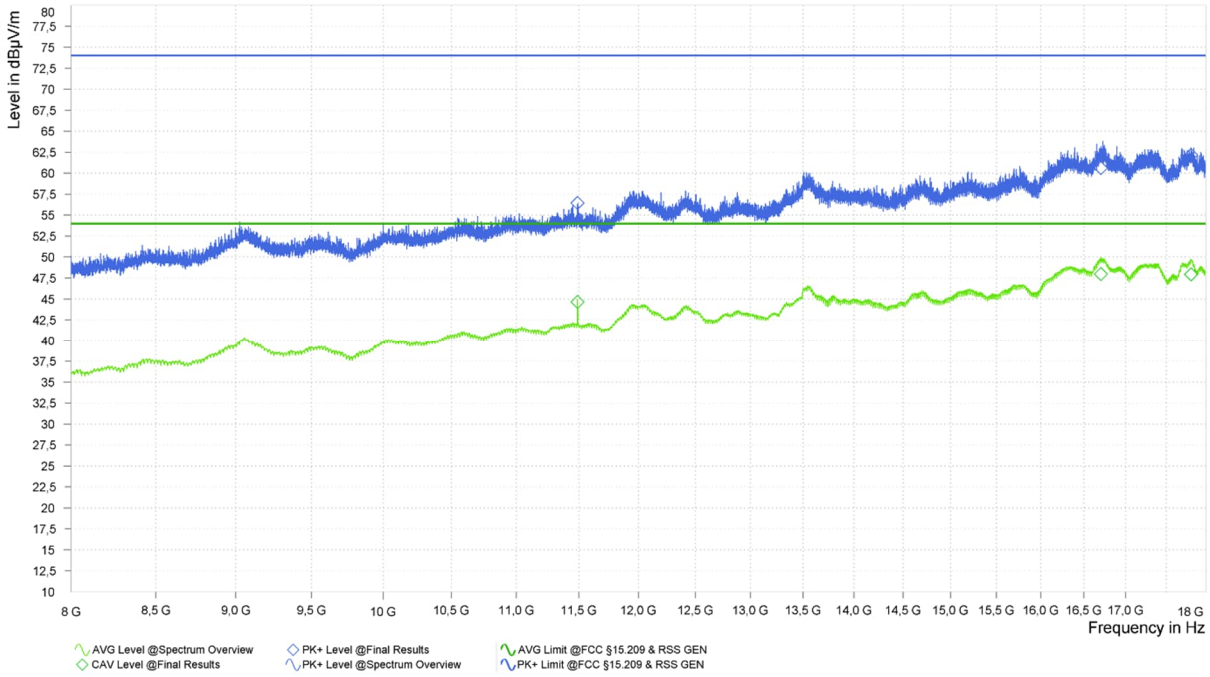
The curves in the diagram only represent the maximum measured value for each frequency point of all preliminary measurements, which were carried out with various EUT and antenna positions.
The top measured curve represents the peak measurement. The measured points marked with "◇" are frequency points 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:

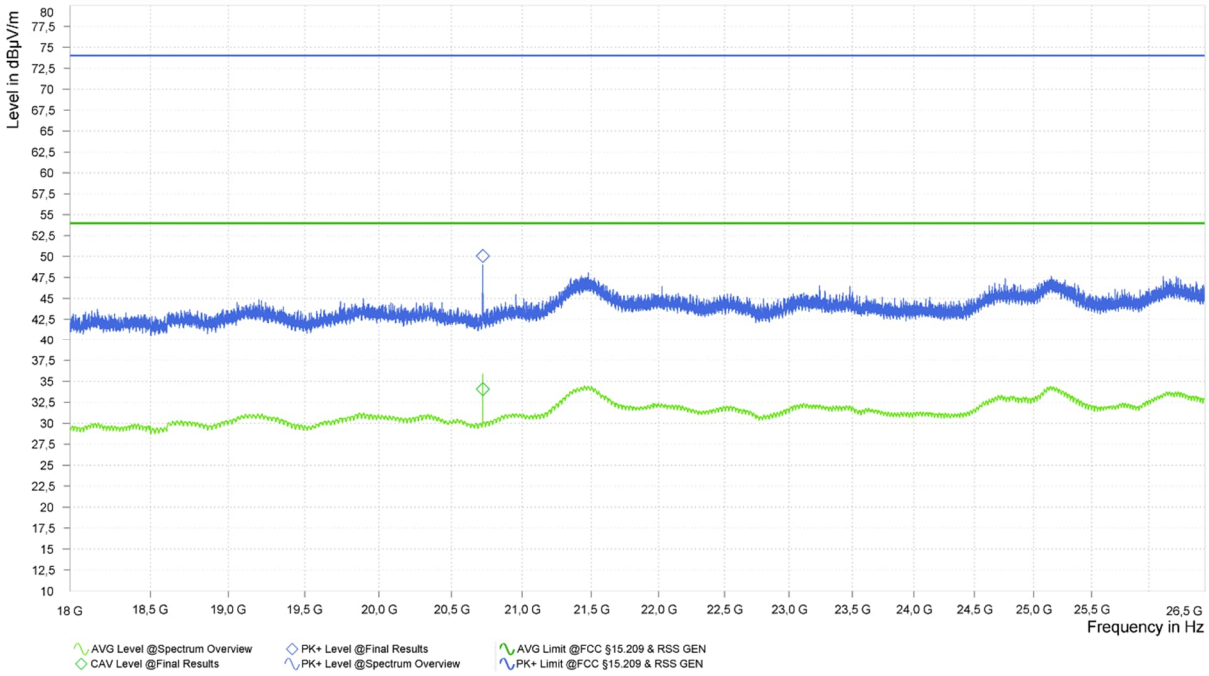
Spurious emissions from 1 GHz to 8 GHz (operation mode 142):



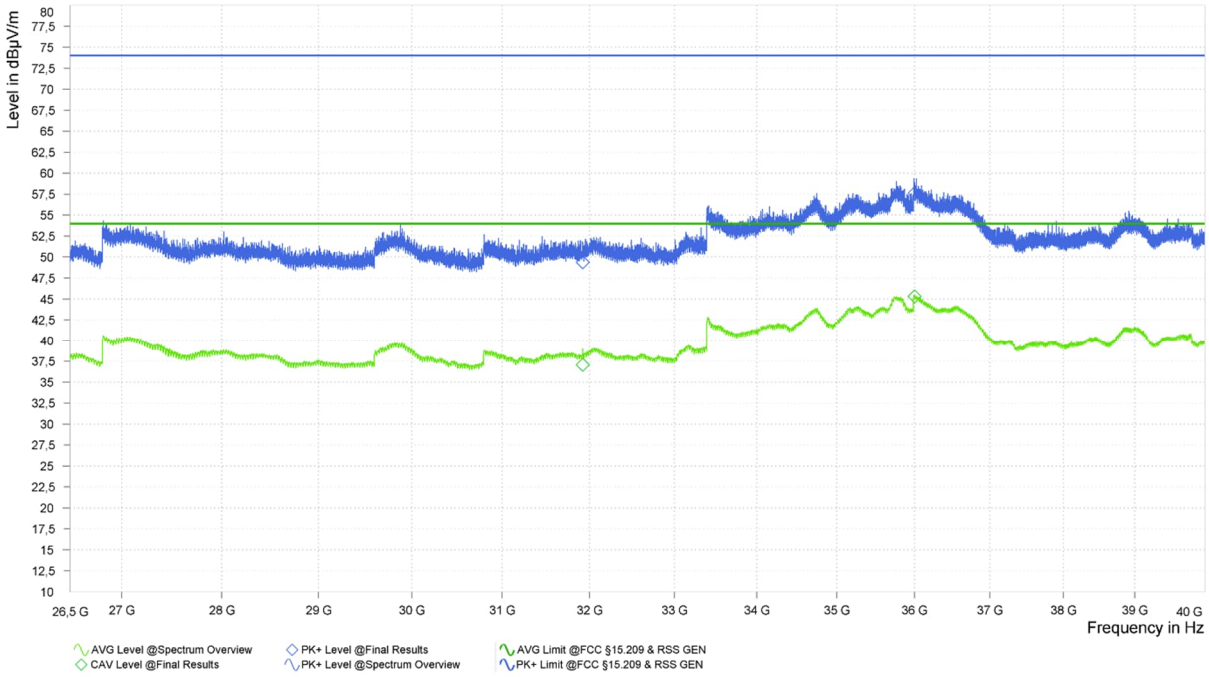
Spurious emissions from 8 GHz to 18 GHz (operation mode 145):



Spurious emissions from 18 GHz to 26.5 GHz (operation mode 136):



Spurious emissions from 26.5 GHz to 40 GHz (operation mode 141):



5.9.3.5.1 Result tables

Operation mode 136:

Frequency [MHz]	PK+ [dBµV/m]	Pk+ Limit [dBµV/m]	PK+ Margin [dB]	AV [dBµV/m]	AV Limit [dBµV/m]	AV Margin [dB]	Corr. [dB/m]	Pol	Elevation [deg]	Azimuth [deg]
17809.750	62.0	68.2	6.2	-	-	-	30.7	V	90.0	49.0
17813.750	-	-	-	48.0	54.0	6.0	30.7	V	150.0	131.0
20720.000	50.1	68.2	18.1	34.1	54.0	19.9	11.0	H	90.0	137.0

Operation mode 137:

Frequency [MHz]	PK+ [dBµV/m]	Pk+ Limit [dBµV/m]	PK+ Margin [dB]	AV [dBµV/m]	AV Limit [dBµV/m]	AV Margin [dB]	Corr. [dB/m]	Pol	Elevation [deg]	Azimuth [deg]
31199.750	45.7	68.2	22.6	34.3	54.0	19.7	18.0	H	90.0	156.0
33489.250	46.2	68.2	22.0	32.5	54.0	21.5	19.6	H	0.0	342.0

Operation mode 138:

Frequency [MHz]	PK+ [dBµV/m]	Pk+ Limit [dBµV/m]	PK+ Margin [dB]	AV [dBµV/m]	AV Limit [dBµV/m]	AV Margin [dB]	Corr. [dB/m]	Pol	Elevation [deg]	Azimuth [deg]
5239.000	90.8	Fund.	-	82.9	Fund.	-	10.2	V	150.0	271.0
5240.250	91.5	Fund.	-	82.5	Fund.	-	10.2	V	150.0	270.0
10478.750	58.9	68.2	9.3	-	-	-	20.0	V	150.0	270.0
10479.250	-	-	-	46.1	54.0	7.9	20.0	V	150.0	270.0
10479.500	59.4	68.2	8.8	-	-	-	20.0	V	150.0	270.0

Operation mode 139:

Frequency [MHz]	PK+ [dBµV/m]	Pk+ Limit [dBµV/m]	PK+ Margin [dB]	AV [dBµV/m]	AV Limit [dBµV/m]	AV Margin [dB]	Corr. [dB/m]	Pol	Elevation [deg]	Azimuth [deg]
5259.000	93.6	Fund.	-	-	-	-	10.4	V	150.0	271.0
5260.000	93.3	Fund.	-	-	-	-	10.4	V	150.0	270.0
5260.250	-	-	-	85.8	Fund.	-	10.4	V	150.0	270.0
10519.750	60.9	68.2	7.4	-	-	-	20.1	V	150.0	271.0
10520.000	-	-	-	46.8	54.0	7.2	20.1	V	150.0	265.0
16711.500	-	-	-	48.0	54.0	6.0	29.5	H	60.0	183.0
16731.000	-	-	-	48.0	54.0	6.0	29.5	H	150.0	-3.0

Operation mode 141:

Frequency [MHz]	PK+ [dBµV/m]	Pk+ Limit [dBµV/m]	PK+ Margin [dB]	AV [dBµV/m]	AV Limit [dBµV/m]	AV Margin [dB]	Corr. [dB/m]	Pol	Elevation [deg]	Azimuth [deg]
21280.000	52.3	68.2	15.9	34.8	54.0	19.2	11.2	H	90.0	113.0
31919.750	49.4	68.2	18.8	37.1	54.0	17.0	18.0	H	0.0	328.0
36004.750	57.6	68.2	10.6	45.3	54.0	8.7	19.8	H	150.0	231.0

Operation mode 142:

Frequency [MHz]	PK+ [dBµV/m]	Pk+ Limit [dBµV/m]	PK+ Margin [dB]	AV [dBµV/m]	AV Limit [dBµV/m]	AV Margin [dB]	Corr. [dB/m]	Pol	Elevation [deg]	Azimuth [deg]
3187.500	45.4	68.2	22.8	39.6	54.0	14.4	3.4	H	0.0	146.0
5500.500	93.0	Fund.	-	85.6	Fund.	-	11.0	H	0.0	304.0
7993.250	48.1	68.2	20.1	35.6	54.0	18.4	16.3	V	120.0	110.0
10999.750	61.7	68.2	6.6	46.6	54.0	7.4	21.9	V	30.0	123.0
17815.000	60.2	68.2	8.0	48.0	54.0	6.0	30.7	H	120.0	-4.0
22000.000	48.8	68.2	19.4	34.1	54.0	19.9	11.4	V	150.0	67.0

Operation mode 144:

Frequency [MHz]	PK+ [dBµV/m]	Pk+ Limit [dBµV/m]	PK+ Margin [dB]	AV [dBµV/m]	AV Limit [dBµV/m]	AV Margin [dB]	Corr. [dB/m]	Pol	Elevation [deg]	Azimuth [deg]
35742.000	56.7	68.2	11.5	44.0	54.0	10.0	20.3	H	0.0	90.0
36004.000	58.7	68.2	9.5	45.3	54.0	8.7	19.8	H	120.0	68.0

Operation mode 145:

Frequency [MHz]	PK+ [dBµV/m]	Pk+ Limit [dBµV/m]	PK+ Margin [dB]	AV [dBµV/m]	AV Limit [dBµV/m]	AV Margin [dB]	Corr. [dB/m]	Pol	Elevation [deg]	Azimuth [deg]
4187.500	44.7	68.2	23.5	31.9	54.0	22.1	6.8	H	30.0	145.0
5745.750	101.6	Fund.	-	92.6	Fund.	-	12.0	H	0.0	305.0
11490.000	56.4	68.2	11.8	44.7	54.0	9.3	21.5	V	120.0	105.0
16701.250	60.6	68.2	7.6	48.0	54.0	6.0	29.4	V	150.0	245.0
17814.250	62.2	68.2	6.0	47.9	54.0	6.1	30.7	H	150.0	156.0
22978.250	50.4	68.2	17.8	-	-	-	11.5	V	60.0	129.0
22980.000	52.6	68.2	15.6	34.4	54.0	19.6	11.5	V	150.0	69.0

Operation mode 147:

Frequency [MHz]	PK+ [dBµV/m]	Pk+ Limit [dBµV/m]	PK+ Margin [dB]	AV [dBµV/m]	AV Limit [dBµV/m]	AV Margin [dB]	Corr. [dB/m]	Pol	Elevation [deg]	Azimuth [deg]
28723.750	48.7	68.2	19.5	35.7	54.0	18.3	18.2	H	30.0	246.0
36000.750	58.3	68.2	9.9	45.3	54.0	8.7	19.8	V	120.0	260.0

Test result: Passed

Test equipment (please refer to chapter 6 for details)
3 - 9, 12 – 19

5.9.4 Test setup (Conducted emissions on power supply lines)

Test setup (Conducted emissions on power supply lines)			
Used	Setup	See sub-clause	Comment
☒	Conducted: AC power line	4.1.1	-
☐	Not applicable, because …	-	-

5.9.5 Test method (Conducted emissions on power supply lines)

Test setup (Conducted emissions on power supply lines)				
Used	Clause [1]	Name of method	Sub-clause	Comment
☒	7.3; 11.5; 11.8	Tabletop equipment testing	4.1.1	Provided AC switching power adaptor
☐	7.3; 11.6; 11.8	Floor-standing equipment testing	-	-

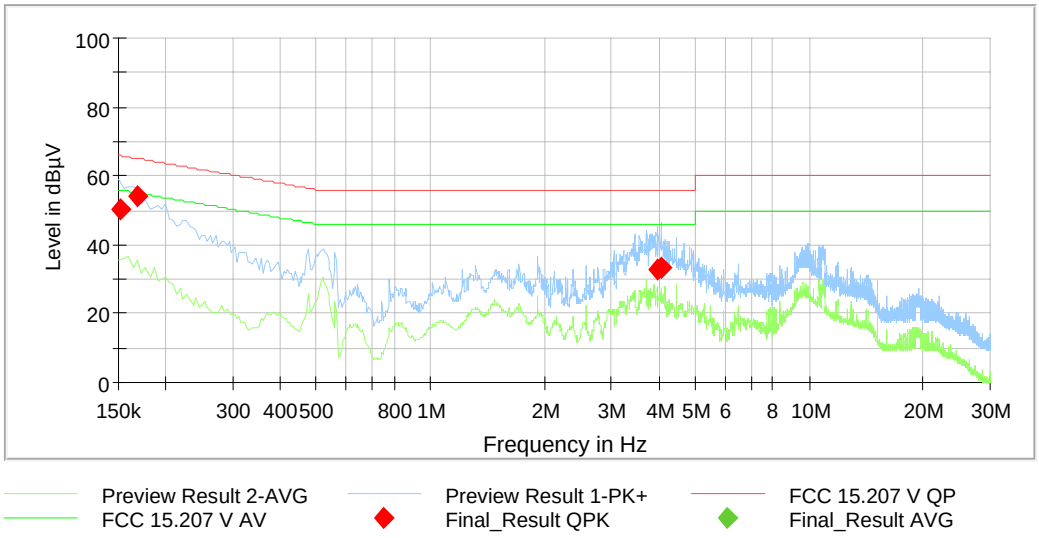
EUT on evaluation board was connected to a Laptop PC “Latitude 7280” by “Dell” during the tests. The Laptop computer was supplied by AC Adapter Model “LA65NM130 LPS” by “Dell” during the tests.
The power adaptor itself was supplied by $120V_{AC}$ 60Hz.

5.9.6 Test results (Conducted emissions on power supply lines) – IRIS-W106

Ambient temperature:	22 °C
Relative humidity:	42 %

Date:	03.04.2024
Tested by:	P. NEUFELD

The curves in the diagrams below only represent for each frequency point the maximum measured value of all preliminary measurements which were made for each power supply line. The top measured curve represents the peak measurement and the bottom measured curve the average measurement. The quasi-peak measured points are marked by ◆ and the average measured points by ◆.



Frequency [MHz]	QuasiPeak [dB(µV)]	Average [dB(µV)]	Limit [dB(µV)]	Margin [dB]	Line	PE
0.151800	50.09	---	65.90	15.81	L1	FLO
0.168000	54.30	---	65.06	10.76	N	FLO
3.997500	33.00	---	56.00	23.00	L1	FLO
4.048800	33.46	---	56.00	22.54	L1	GND

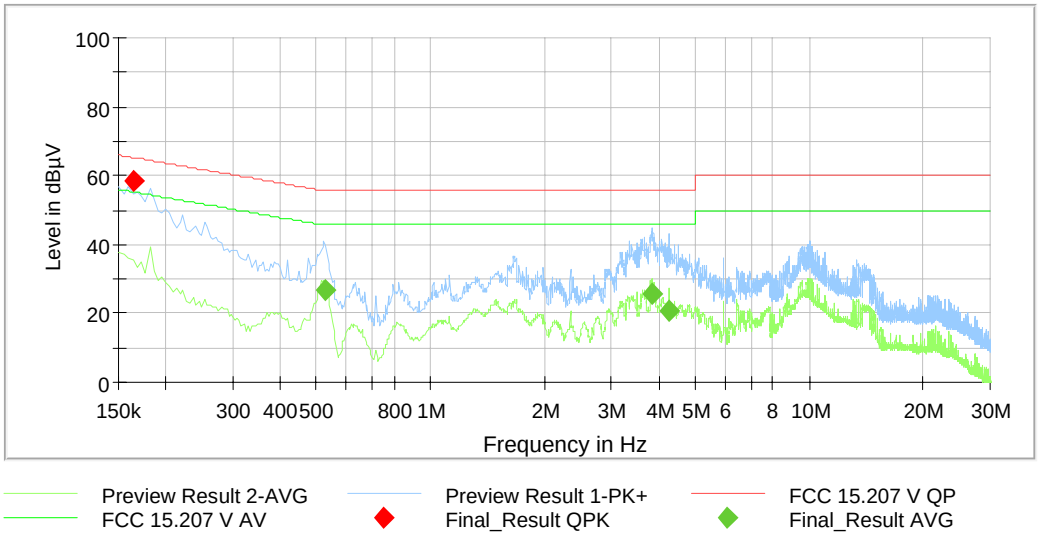
Test result: Passed

5.9.7 Test results (Conducted emissions on power supply lines) – IRIS-W101

Ambient temperature:	22 °C
Relative humidity:	42 %

Date:	03.04.2024
Tested by:	P. NEUFELD

The curves in the diagrams below only represent for each frequency point the maximum measured value of all preliminary measurements which were made for each power supply line. The top measured curve represents the peak measurement and the bottom measured curve the average measurement. The quasi-peak measured points are marked by ◆ and the average measured points by ◆.



Frequency [MHz]	QuasiPeak [dB(µV)]	Average [dB(µV)]	Limit [dB(µV)]	Margin [dB]	Line	PE
0.164400	58.49	---	65.24	6.75	L1	FLO
0.527100	---	26.79	46.00	19.21	N	FLO
3.844500	---	25.71	46.00	20.29	N	FLO
4.272000	---	20.58	46.00	25.42	L1	GND

Test result: Passed

Test equipment (please refer to chapter 7 for details)
20 - 24

6 Test Equipment used for Tests

No.	Test equipment	Type	Manufacturer	Serial No.	PM. No.	Cal. Date	Cal Due
1	Signal & Spectrum Analyzer	FSW43	Rohde & Schwarz	100586 & 100926	481720	19.11.2021 17.03.2023	11.2023 03.2025
2	Loop antenna	HFH2-Z2	Rohde & Schwarz	832609/014	480059	22.02.2022 21.02.2024	02.2024 02.2026
3	Testsoftware M276	Elektra V5.01	Rohde & Schwarz	101381	483755	Calibration not necessary	
4	RF Switch Matrix	OSP220	Rohde & Schwarz		482976	Calibration not necessary	
5	Turntable	TT3.0-3t	Maturo	825/2612/.01	483224	Calibration not necessary	
6	Antenna support	BAM 4.5-P-10kg	Maturo	222/2612.01	483225	Calibration not necessary	
7	Controller	NCD	Maturo	474/2612.01	483226	Calibration not necessary	
8	Semi Anechoic Chamber M276	SAC5-2	Albatross Projects	C62128-A540-A138-10-0006	483227	Calibration not necessary	
9	EMI Testreceiver	ESW44	Rohde & Schwarz	101828	482979	08.12.2021 21.02.2024	02.2024 2102.2026
10	Ultralog Antenna	HL562E	Rohde & Schwarz	101079	483152	18.05.2021	05.2024
11	Attenuator 6dB	WA-2	Weinschel Corp	BG0931	483499	Calibration not necessary	
12	Standard Gain Horn 20 dB, 18 GHz -26 GHz	20240-20	Flann	266399	483026	Calibration not necessary	
13	Standard Gain Horn 26 GHz - 40 GHz	22240-20	Flann	266405	483027	Calibration not necessary	
14	Low Noise Amplifier 18 GHz - 26.5 GHz	LNA-30-18002650-20-10P	Narda Miteq	2110911	482969	18.02.2022 19.02.2024	02.2024 02.2026
15	Low Noise Amplifier 100 MHz - 18 GHz	LNA-30-00101800-25-10P	Narda Miteq	2110917	482967	18.02.2022 20.02.2024	02.2024 02.2026
16	Log.Per Antenna 850 MHz - 26 GHz	HL050	Rohde&Schwarz	100908	482977	22.09.2022 19.02.2024	09.2025 02.2026
17	Highpass Filter	WHK2.8/18G-10SS	Wainwright Instuments GmbH	1	480867	Calibration not necessary	
18	Low Noise Amplifier 26 MHz - 40 GHz	LNA-30-26004000-27-10P	Narda-Miteq	2110293	482970	18.02.2022 19.02.2024	02.2024 02.2026
19	Standard Gain Horn 20 dB, 26 GHz - 40 GHz	22240-20	Flann	266405	483027	Calibration not necessary	
20	Transient Filter Limiter	CFL 9206A	Teseq GmbH	38268	481982	05.03.2024	03.2026
21	Artificial mains network	NSLK8128	Schwarzbeck	8128161	480138	28.02.2024	02.2026
22	EMI Receiver / Spectrum Analyser	ESIB 26	Rohde & Schwarz	100292	481182	22.02.2024	02.2026
23	Power supply AC	AC6803A AC Quelle 2000VA	Keysight	JPVJ002509	482350	Calibration not necessary	
24	Shielded chamber M4	B83117-S1-X158	Siemens	190075	480088	Calibration not necessary	

7 Test site Validation

Test equipment	PM. No.	Frequency range	Type of validation	According to	Val. Date	Val Due
Semi anechoic chamber M276	483227	30 – 1000 MHz	NSA/RSM	CISPR 16-1-4 + Cor1:2010 + A1:2012 +A2:2017	03.03.2021 01.03.2023	02.03.2023 28.02.2025
Semi anechoic chamber M276	483227	1 -18 GHz	SVSWR	CISPR 16-1-4 Amd. 1	25.02.2021* 28.02.2023*	24.02.2023 27.03.2025
Shielded chamber M4	480088	9 kHz – 30 MHz	GND-Plane	ANSI C63.4-2014	08.11.2022	07.11.2025

* All tests were performed during a time period when the SVSWR for the anechoic chamber was valid.

8 Report History

Report Number	Date	Comment
F221817E3	10.07.2024	Initial Test Report
-	-	
-	-	-

9 List of Annexes

Annex A	Test Setup Photos (IRIS-W101-00B)	21 pages
Annex B	Test Setup Photos (IRIS-W106-00B)	22 pages