

Test Report

Report Number:

F221817E3

Equipment under Test (EUT):

CTP3NA

Applicant:

Robert Bosch GmbH

Manufacturer:

Robert Bosch GmbH



Deutsche
Akkreditierungsstelle
D-PL-17186-01-01
D-PL-17186-01-02
D-PL-17186-01-03

References

- [1] **ANSI C63.10-2013**, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices
- [2] **FCC CFR 47 Part 15**, Radio Frequency Devices
- [3] **789033 D02 General UNII Test Procedures New Rules v02r01**
- [4] **662911 D01 Multiple Transmitter Output v02r01 (October 2013)**, Emissions Testing of Transmitters with Multiple Outputs in the Same Band (e.g., MIMO, Smart Antenna, etc)
- [5] **RSS-247, Issue 2 (2017-02)** Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices
- [6] **RSS-Gen, Issue 5 (2021-02)** General Requirements for Compliance of Radio Apparatus
- [7] **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 and written
by:

Signature

Reviewed and
approved by:

Signature

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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.

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1 Identification

1.1 Applicant

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Applicant represented during the test by the following person:	-

1.2 Manufacturer

Name:	Robert Bosch GmbH
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Country:	Germany
Name for contact purposes:	Karin Silberhorn
Phone:	+49 5121-49-7662
eMail address:	karin.silberhorn@de.bosch.com
Manufacturer represented during the test by the following person:	-

1.3 Factory

Name:	Bosch Car Multimedia Portugal, S.A.
Address:	Rua Max Grundig, 35-Lomar, 4705-820 Braga
Country:	Portugal
Name for contact purposes:	-
Phone:	-
eMail address:	-
Manufacturer represented during the test by the following person:	-

1.4 Test Laboratory

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

Accredited by Deutsche Akkreditierungsstelle GmbH (DAkKS) in compliance with DIN EN ISO/IEC 17025 under Reg. No. D-PL-17186-01-05 and D-PL-17186-01-06, FCC Test Firm Accreditation designation number DE0004, FCC Test Firm Registration Number 469623, CAB Identifier DE0003 and ISCED# 3469A.

1.5 EUT (Equipment under Test)

EUT	
Test object: *	Telematic Control Unit
Model name: *	CTP3NA
Model number: *	CTP3NA Ext
Order number: *	-
FCC ID: *	2AUXS-CTP3NA
IC certification number: *	25847- CTP3NA
PMN: *	CTP3NA
HVIN: *	CTP3NA
FVIN: *	NA
HMN: *	Common Telematic Platform

	EUT number	
	1	2
Serial number: *	1150003409	1150003406
PCB identifier: *	3047-05	3047-05
Hardware version: *	C2	C2
Software version: *	DAIMLER_CTP3_HIGHPOINT_RC2_ S.006	DAIMLER_CTP3_ISTANBUL_RC2_S.010 (IST_RC2_S.010)

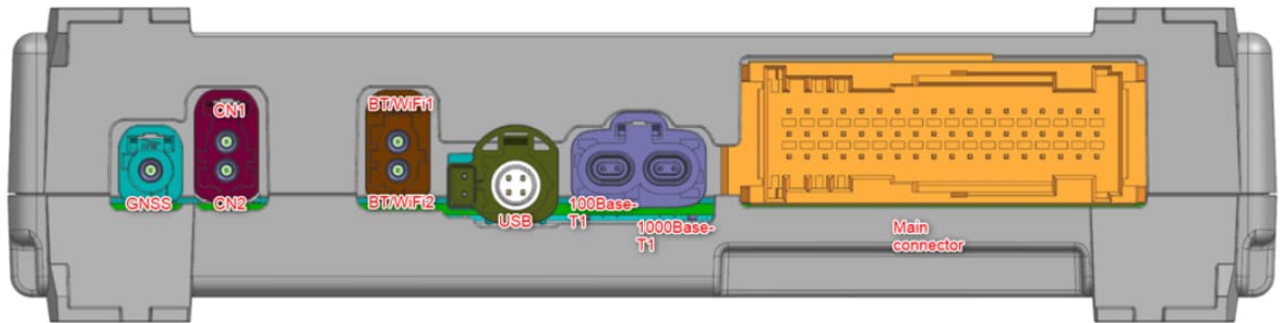
* Declared by the applicant

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.

1.6 Technical Data of Equipment

General EUT data			
Power supply EUT: *	DC		
Supply voltage EUT: *	$U_{Nom} = 12\text{ V}_{DC} + 24\text{ V}_{DC}$	$U_{Min} = 8.0\text{ V}_{DC}$	$U_{Max} = 32.0\text{ V}_{DC}$
Temperature range: *	-40°C to +85°C		
Lowest / highest internal radio frequency: *	LTE Band 12: 738MHz / WiFi 5GHz: 5825 MHz		
Lowest / highest internal clock frequency: *	32.768 kHz (Real time clock oscillator) / 125MHz		



Ports / Connectors				
Identification	Connector		Length during test	Shielding (Yes / No)
	EUT	Ancillary		
Main Connector	54 Pin Connector	Customized	Appr. 3 m	No
GNSS	Fakra HFM single coding C	Fakra (Antenna)	Not connected	Yes
CN1 / CN2	Fakra HFM double coding D	2 x Fakra (Antenna)	Not connected	Yes
BT/WiFi1 / BT/WiFi2	Fakra HFM double coding F	2 x Fakra (Antenna)	Appr. 2 m	Yes
USB	HSD+2 coding C	USB	Appr. 2 m	Yes
100 base T1 / 1000 Base T1	H-MTD	Customized	Not connected	Yes

IEEE 802.11 frequencies (5 GHz)					
20 MHz		40 MHz		80 MHz	
Channel 36	5180 MHz	Channel 38	5190 MHz	-	-
Channel 40	5200 MHz	-	-	Channel 42	5210 MHz
Channel 44	5220 MHz	Channel 46	5230 MHz	-	-
Channel 48	5240 MHz	-	-	-	-
Channel 52	5260 MHz	Channel 54	5270 MHz	-	-
Channel 48	5280 MHz	-	-	Channel 58	5290 MHz
Channel 60	5300 MHz	Channel 62	5310 MHz	-	-
Channel 64	5320 MHz	-	-	-	-
Channel 100	5500 MHz	-	-	-	-
Channel 104	5520 MHz	Channel 102	5510 MHz	-	-
Channel 108	5540 MHz	-	-	Channel 106	5530 MHz
Channel 112	5560 MHz	Channel 110	5550 MHz	-	-
Channel 116	5580 MHz	-	-	-	-
Channel 120	5600 MHz	Channel 118	5590 MHz	-	-
Channel 124	5620 MHz	-	-	Channel 122	5610 MHz
Channel 128	5640 MHz	Channel 126	5630 MHz	-	-
Channel 132	5660 MHz	-	-	-	-
Channel 136	5680 MHz	Channel 134	5670 MHz	-	-
Channel 140	5700 MHz	-	-	-	-
Channel 144	5720 MHz	-	-		
Channel 149	5745 MHz	-	-	-	-
Channel 153	5765 MHz	Channel 151	5755 MHz	-	-
Channel 157	5785 MHz	-	-	Channel 155	5775 MHz
Channel 161	5805 MHz	Channel 159	5795 MHz	-	-
Channel 165	5825 MHz	-	-	-	-

IEEE 802.11 radio mode (5GHz)	
Fulfils radio specification: *	IEEE 802.11 a IEEE 802.11 n (20 MHz) IEEE 802.11 n (40 MHz) IEEE 802.11 ac (20 MHz) IEEE 802.11 ac (40 MHz) IEEE 802.11 ac (80 MHz) IEEE 802.11 ax (20 MHz) IEEE 802.11 ax (40 MHz) IEEE 802.11 ax (80 MHz)
Radio module: *	LGIT ATC6NPL002
Antenna type: *	BT/WiFi 1: PCB antenna BT/WiFi 2: PCB antenna
FCC ID (radio module):	YZP-ATC6NPL002
IC ID (radio module):	7414C-ATC6NPL002
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 n40 BPSK, QPSK, 16-QAM, 64-QAM (up to 150 Mbit/s 1 spatial stream) (up to 300 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 ac40 BPSK, QPSK, 16-QAM, 64-QAM, 256-QAM (up to 200 Mbit/s 1 spatial stream) (up to 400 Mbit/s 2 spatial stream)
	IEEE 802.11 ac80 BPSK, QPSK, 16-QAM, 64-QAM, 256-QAM (up to 433.35 Mbit/s 1 spatial stream) (up to 866.7 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)
Type of modulation: * (cont.)	IEEE 802.11 ax40 BPSK, QPSK, 16-QAM, 64-QAM, 256-QAM, 1024-QAM (up to 286.8 Mbit/s 1 spatial stream) (up to 573.5 Mbit/s 2 spatial stream)
	IEEE 802.11 ax80 BPSK, QPSK, 16-QAM, 64-QAM, 256-QAM, 1024-QAM (up to 600.5 Mbit/s 1 spatial stream) (up to 1201 Mbit/s 2 spatial stream)

IEEE 802.11 radio mode (5GHz)		
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 802.11n 40 MHz	5190 – 5230 MHz, 5270 – 5310 MHz 5510 – 5670 MHz, 5755 – 5795 MHz
	IEEE 802.11ac 20 MHz	5180 – 5240 MHz, 5260 – 5320 MHz 5500 – 5720 MHz, 5745 – 5825 MHz,
	IEEE 802.11ac 40 MHz	5190 – 5230 MHz, 5270 – 5310 MHz 5510 – 5670 MHz, 5755 – 5795 MHz
	IEEE 802.11ac 80 MHz	5210, 5290, 5530, 5610, 5755 MHz
	IEEE 802.11ax 20 MHz	5180 – 5240 MHz, 5260 – 5320 MHz 5500 – 5720 MHz, 5745 – 5825 MHz,
	IEEE 802.11ax 40 MHz	5190 – 5230 MHz, 5270 – 5310 MHz 5510 – 5670 MHz, 5755 – 5795 MHz
	IEEE 802.11ax 80 MHz	5210, 5290, 5530, 5610, 5755 MHz

* Declared by the applicant

Antenna list			
Antenna type	Antenna name	Antenna gain	Antenna connector
Antenna Box	A 006 820 30 75	5.0 dBi (-0.8 dB/m min. cable length of 1 m) ^{*2} = 4.2 dBi	Fakra male, Code I (Beige)
Roof Top Antenna	A 006 820 39 75	8.2 dBi (-0.8 dB/m min. cable length of 1 m) ^{*2} = 7.4 dBi	Fakra male, Code I (Beige)
BT WLAN Antenna	A 006 820 32 75*	6.0 dBi (-0.8 dB/m min. cable length of 0.4 m) ^{*2} = 5.68 dBi	Fakra male, Code K (Curry)
BT WLAN Antenna	A 006 820 82 75	6.0 dBi (-0.8 dB/m min. cable length of 0.4 m) ^{*2} = 5.68 dBi	Fakra male, Code K (Curry)
Worst case combined antenna gain (gain antennas A 006 820 39 75 + A 006 820 32 75) = 9.6 dBi ^{*3}			

* The radiated tests were performed using this antenna on both antenna ports, because it represented the worst case according to the documentation available at the time of testing.

^{*2} The minimum cable length and the associated cable attenuation were declared by the applicant.

^{*3} The theoretical worst case combined antenna gain will be used for all antenna port conducted measurements.

Ancillary Equipment / Equipment used for testing

Equipment used for testing	
Laboratory power supply ^{*1}	Toellner TOE 8752 (PM. NO. 480009)
Test Laptop ^{*1}	Fujitsu Lifebook S760 (PM. No: 200759)

^{*1} Provided by the laboratory

^{*2} Provided by the applicant

Ancillary Equipment	
Golden Sample*	CTP3NA S/N:1240003339

* Golden Sample is used to activate the 802.11axRU modes

1.7 Dates

Date of receipt of test sample:	30.03.2023
Start of test:	30.03.2023
End of test:	07.10.2023

2 Operational States

2.1 Description of function of the EUT

The Daimler Common Telematics Platform 3rd Generation (CTP3) is a telematic Unit to provide fleet management services & remote diagnostics, allows for remote measurement and also serves as AP-Server for Internet via WLAN.

During all test the EUT was supplied with 24.0 V DC via a laboratory power supply. During the tests, a USB connection was established to the EUT via USB-2-optic converter. All relevant HF parameters could be set with a Laptop.

For the radio tests the following settings were used:

A connection to the EUT was established via a USB connection to a Laptop computer. Test Software called "DUT Labtool" version 2.0.0.8.5 was used to set the test-modes on the EUT. Test software and Laptop computer were provided by the applicant.

For the tests of 802.11 ax Resource Unit modes a golden sample was used as companion device. The desired Resource Mode was set on the golden sample and the generated signal was transmitted to the EUT via housing emission by an antenna connected to the golden sample while the antenna ports of the EUT were connected to the measuring unit or external antenna respectively.

2.2 Operation Modes (802.11 – full retest MiMo)* FCC only

Operation mode #	Radio technology	Frequency [MHz]	Channel / Band	Modulation / Mode	Data rate*	Power setting
1	IEEE 802.11	5180	36	a-mode	54 Mbit/s	7
2	IEEE 802.11	5200	40	a-mode	54 Mbit/s	7
3	IEEE 802.11	5240	48	a-mode	54 Mbit/s	7
4	IEEE 802.11	5260	52	a-mode	54 Mbit/s	7
5	IEEE 802.11	5300	60	a-mode	54 Mbit/s	7
6	IEEE 802.11	5320	64	a-mode	54 Mbit/s	7
7	IEEE 802.11	5500	100	a-mode	54 Mbit/s	11
8	IEEE 802.11	5580	116	a-mode	54 Mbit/s	11
9	IEEE 802.11	5700	140	a-mode	54 Mbit/s	11

* As pre-tests have shown, these data rates produced the highest output power.

2.3 Operation Modes (802.11 – full retest MiMo)* ISED only

Operation mode #	Radio technology	Frequency [MHz]	Channel / Band	Modulation / Mode	Data rate*	Power setting
10	IEEE 802.11	5500	100	a-mode	54 Mbit/s	7
11	IEEE 802.11	5580	116	a-mode	54 Mbit/s	7
12	IEEE 802.11	5700	140	a-mode	54 Mbit/s	7

* As pre-tests have shown, these data rates produced the highest output power.

2.4 Operation Modes (802.11 – full retest MiMo)* FCC & ISED

Operation mode #	Radio technology	Frequency [MHz]	Channel / Band	Modulation / Mode	Data rate*	Power setting
13	IEEE 802.11	5745	149	a-mode	54 Mbit/s	11
14	IEEE 802.11	5785	157	a-mode	54 Mbit/s	11
15	IEEE 802.11	5825	165	a-mode	54 Mbit/s	11

* As pre-tests have shown, these data rates produced the highest output power.

2.5 Retest worst case output power from original report (FCC)

Operation mode #	Radio technology	Frequency [MHz]	Channel / Band	Modulation / Mode	Data rate*	Power setting
16	IEEE 802.11	5180	36	a-mode	6 Mbit/s	7 dBm
17	IEEE 802.11	5200	40	a-mode	6 Mbit/s	7 dBm
18	IEEE 802.11	5240	48	a-mode	6 Mbit/s	7 dBm
19	IEEE 802.11	5180	36	n-HT20-mode	MCS0	7 dBm
20	IEEE 802.11	5200	40	n-HT20-mode	MCS0	7 dBm
21	IEEE 802.11	5240	48	n-HT20-mode	MCS0	7 dBm
22	IEEE 802.11	5180	36	ax-HE20-SU	MCS0	7 dBm
23	IEEE 802.11	5200	40	ax-HE20-SU	MCS0	7 dBm
24	IEEE 802.11	5240	48	ax-HE20-SU	MCS0	7 dBm
25	IEEE 802.11	5260	52	a-mode	6 Mbit/s	7 dBm
26	IEEE 802.11	5300	60	a-mode	6 Mbit/s	7 dBm
27	IEEE 802.11	5320	64	a-mode	6 Mbit/s	7 dBm
28	IEEE 802.11	5260	52	n-HT20-mode	MCS0	7 dBm
29	IEEE 802.11	5300	60	n-HT20-mode	MCS0	7 dBm
30	IEEE 802.11	5320	64	n-HT20-mode	MCS0	7 dBm
31	IEEE 802.11	5260	52	ax-HE20-SU	MCS0	7 dBm
32	IEEE 802.11	5300	60	ax-HE20-SU	MCS0	7 dBm
33	IEEE 802.11	5320	64	ax-HE20-SU	MCS0	7 dBm
34	IEEE 802.11	5500	100	a-mode	6 Mbit/s	11 dBm
35	IEEE 802.11	5580	116	a-mode	6 Mbit/s	11 dBm
36	IEEE 802.11	5700	140	a-mode	6 Mbit/s	11 dBm
37	IEEE 802.11	5500	100	n-HT20-mode	MCS0	11 dBm
38	IEEE 802.11	5580	116	n-HT20-mode	MCS0	11 dBm
39	IEEE 802.11	5700	140	n-HT20-mode	MCS0	11 dBm
40	IEEE 802.11	5500	100	ax-HE20-SU	MCS0	11 dBm
41	IEEE 802.11	5580	116	ax-HE20-SU	MCS0	11 dBm
42	IEEE 802.11	5700	140	ax-HE20-SU	MCS0	11 dBm

2.6 Retest worst case output power from original report (ISED*²)

Operation mode #	Radio technology	Frequency [MHz]	Channel / Band	Modulation / Mode	Data rate*	Power setting
43	IEEE 802.11	5500	100	a-mode	6 Mbit/s	7 dBm
44	IEEE 802.11	5580	116	a-mode	6 Mbit/s	7 dBm
45	IEEE 802.11	5700	140	a-mode	6 Mbit/s	7 dBm
46	IEEE 802.11	5500	100	n-HT20-mode	MCS0	7 dBm
47	IEEE 802.11	5580	116	n-HT20-mode	MCS0	7 dBm
48	IEEE 802.11	5700	140	n-HT20-mode	MCS0	7 dBm
49	IEEE 802.11	5500	100	ax-HE20-SU	MCS0	7 dBm
50	IEEE 802.11	5580	116	ax-HE20-SU	MCS0	7 dBm
51	IEEE 802.11	5700	140	ax-HE20-SU	MCS0	7 dBm

*² ISED tests were performed using lower output power, as defined by the applicant.

2.7 Retest worst case output power from original report (FCC+ISED)

Operation mode #	Radio technology	Frequency [MHz]	Channel / Band	Modulation / Mode	Data rate*	Power setting
52	IEEE 802.11	5745	149	a-mode	6 Mbit/s	11 dBm
53	IEEE 802.11	5785	157	a-mode	6 Mbit/s	11 dBm
54	IEEE 802.11	5825	165	n-HT20-mode	MCS0	11 dBm
55	IEEE 802.11	5745	149	n-HT20-mode	MCS0	11 dBm
56	IEEE 802.11	5785	157	n-HT20-mode	MCS0	11 dBm
57	IEEE 802.11	5825	165	a-mode	6 Mbit/s	11 dBm

2.8 Retest worst case Spurious emission + band-edge from original report (FCC+ISED)

Operation mode #	Radio technology	Frequency [MHz]	Channel / Band	Modulation / Mode	Data rate*	Power setting
58	IEEE 802.11	5775	155	ax80 RU996	MCS0	4 dBm
59	IEEE 802.11	5210	42	ax80 SU	MCS0	4 dBm
60	IEEE 802.11	5310	62	ax40 SU	MCS0	6 dBm
61	IEEE 802.11	5240	48	ax20 SU	MCS0	7 dBm
62	IEEE 802.11	5240	48	ax20 SU	MCS0	7 dBm
63	IEEE 802.11	5300	60	ax20 RU52-38	MCS0	7 dBm
64	IEEE 802.11	5670	134	ax40 RU52-38	MCS0	6 dBm
65	IEEE 802.11	5825	165	ax20 RU52-38	MCS0	10 dBm
66	IEEE 802.11	5510	102	ax40 SU	MCS0	6 dBm

3 Additional Information

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

4 Overview

Application	Frequency range in MHz	FCC 47 CFR Part 15 section [2]	RSS-247 [5] RSS-Gen [6]	Tested EUT	Status
Maximum Output Power	5150 – 5350 5470 - 5895	15.407 (a)	6.2.1.1 [5] 6.2.4.1 [5]	1, 2*2	Passed
UNII Bandwidth 99% Bandwidth	5150 – 5350 5470 - 5895	-	-	1, 2*2	Passed
6 dB Bandwidth	5725 - 5850	15.407(e)	6.2.4.1 [5]	1	Passed
26 dB Bandwidth Emission Bandwidth	5150 – 5350 5470 - 5895	15.403	6.2.1.2	1, 2*2	Passed
Maximum Power Spectral Density	5150 – 5350 5470 - 5895	15.407 (a)(5)	6.2.1.1 [5] 6.2.4.1 [5]	1, 2*2	Passed
Band edge compliance	5150 – 5350 5470 - 5895	15.407 (b)	6.2.1.2[5] 6.2.4.2[5]	1	Passed
Radiated emissions (transmitter)	0.009 - 40,000	15.407 (b) 15.205 (a) 15.209 (a)	6.13 [6], 6.2.1.2[5] 6.2.2.2[5] 6.2.3.2[5] 6.2.4.2[5]	1	Passed
Antenna Requirement	-	15.203 15.247 (b)	6.8 [6] 5.4 (f) (ii) [5]	-	-
Conducted emissions on supply line	0.15 - 30	15.207 (a)	7.2 [6]	-	Not applicable*

* Not applicable, because the EUT is only used in vehicular environments.

*2 Retest of in-band tests with the lower ISSED power settings. Band-edge and spurious emissions were tested with the higher FCC output power only.

5 Results

5.1 Test setup

5.1.1 Test Setup (radiated)

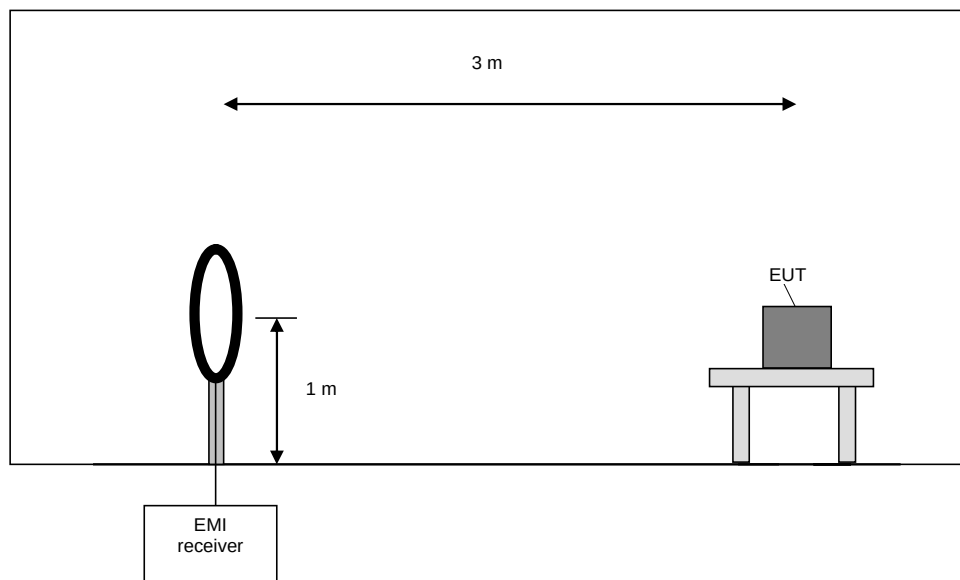
5.1.1.1 Preliminary measurement 9 kHz to 30 MHz

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.

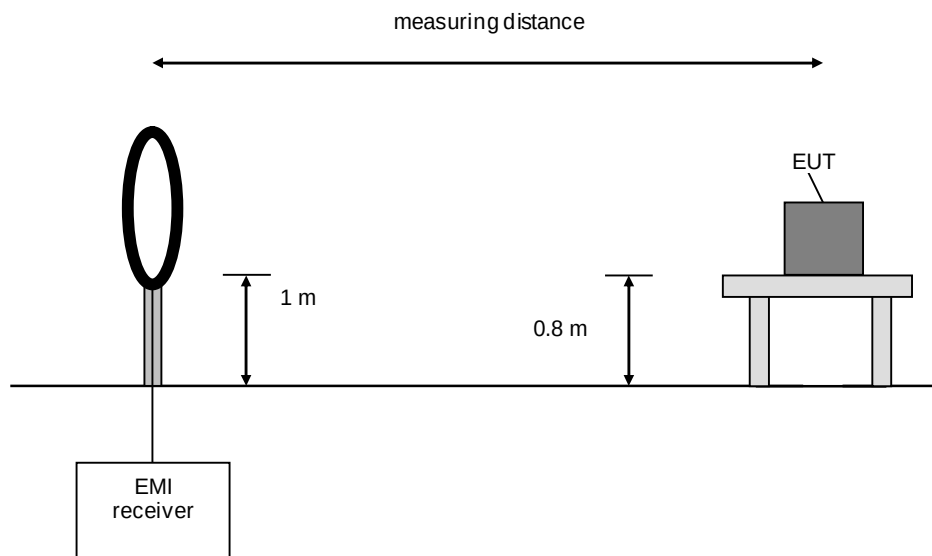
5.1.1.2 Final measurement 9 kHz to 30 MHz

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.

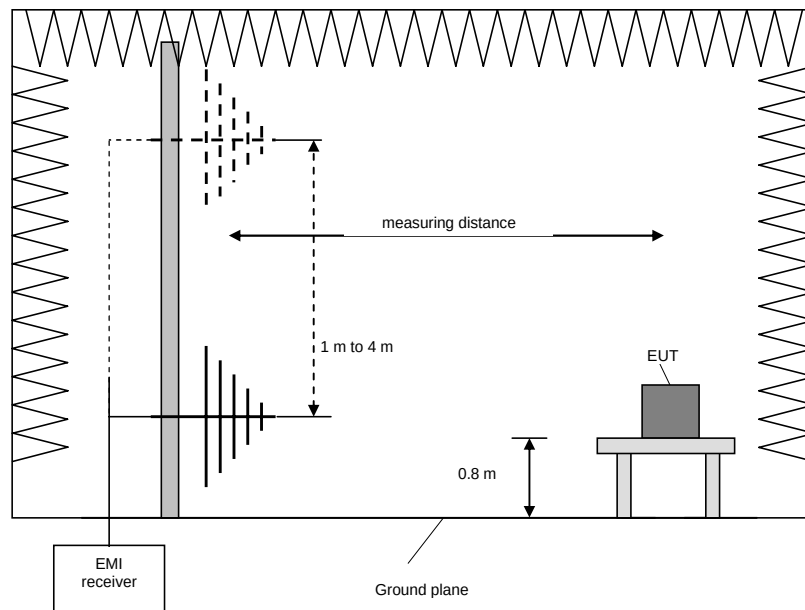
5.1.1.3 Preliminary and final measurement 30 MHz to 1 GHz

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])

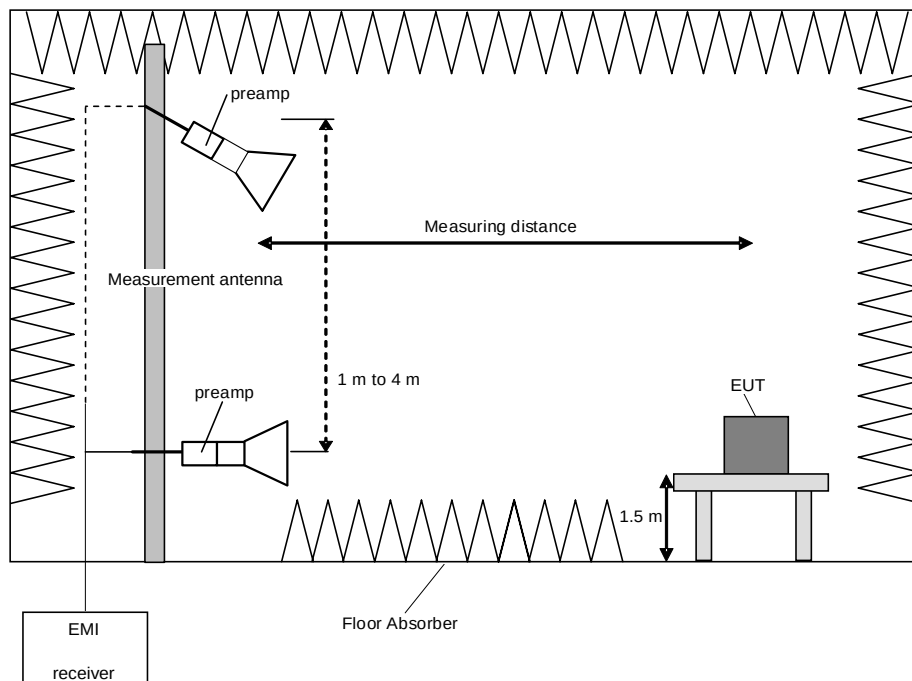
This measurement will be performed in a fully anechoic chamber or in a semi-anechoic chamber with ground absorbers between antenna and EUT. Tabletop and portable devices will set up on a non-conducting turn device on the height of 1.5m. Floor standing devices will be placed directly on the turntable.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

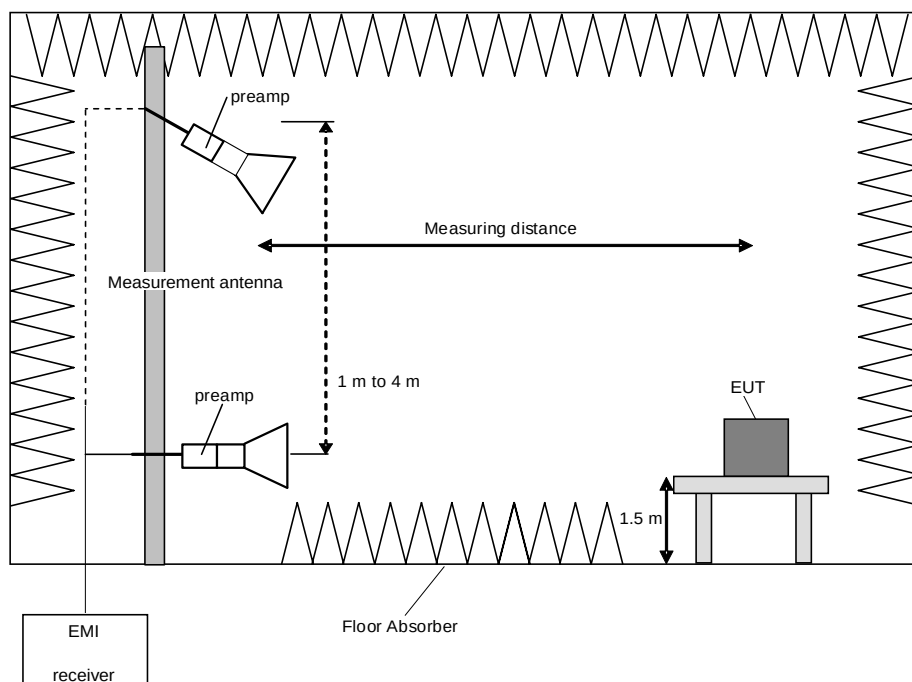
1. Set the measurement antenna to 1 m height.
2. Monitor the frequency range at vertical polarisation and a EUT azimuth of 0 °.
3. Rotate the EUT by 360° to maximize the detected signals.
4. Repeat steps 1. and 2. with the horizontal polarisation of the measuring antenna.
5. Increase the height of the 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 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])

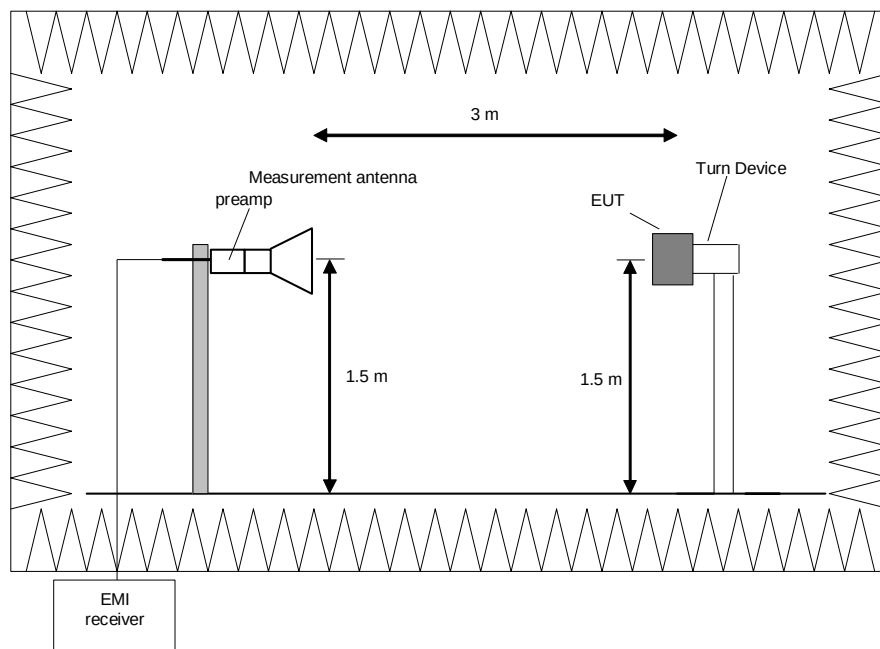
This measurement will be performed in a fully anechoic chamber or in a semi-anechoic chamber with ground absorbers between antenna and EUT. Tabletop and portable devices will set up on a non-conducting turn device on the height of 1.5m. The set-up of the Equipment under test will be in accordance to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

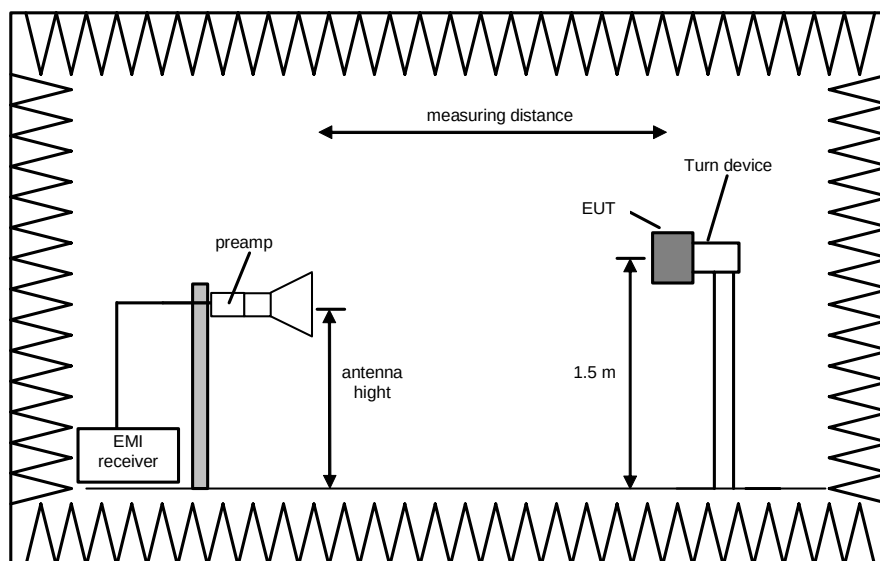
1. Monitor the frequency range at horizontal polarization and a EUT azimuth of 0 °.
2. Rotate the EUT by 360° to maximize the detected signals.
3. Repeat 1) to 2) with the vertical polarization of the measuring antenna.
4. Make a hardcopy of the spectrum.
5. Repeat 1) to 4) with the EUT raised by an 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:

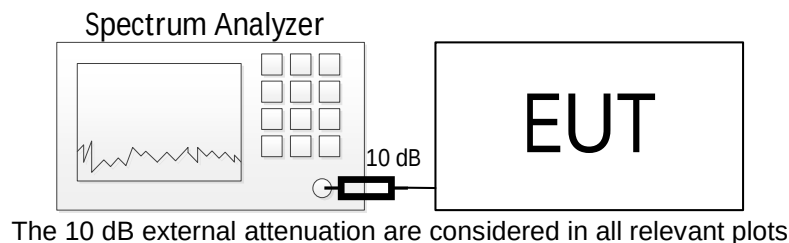
The measurements were performed in the frequency ranges 1 GHz to 4 GHz, 4 GHz to 12 GHz, 12 GHz to 18 GHz, 18 GHz to 25 /26.5 GHz and 26.5 GHz to 40 GHz.

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.

5.1.2 Test setup (conducted)

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



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)

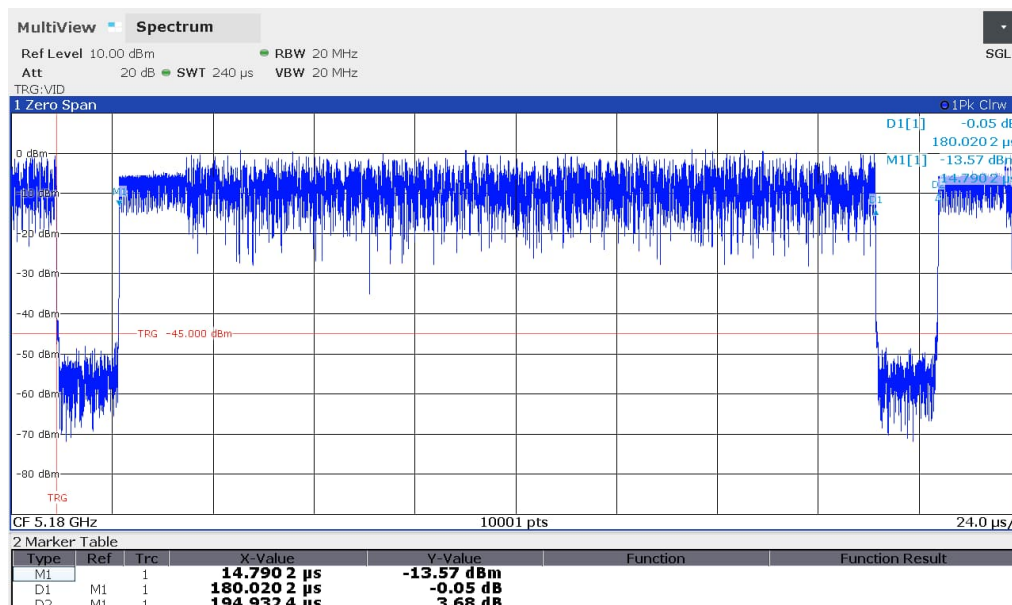
Test method (Duty cycle)				
Used	Sub-Clause [6]	Name of method	Applicability	Comment
☐	II B. 2. a)	Diode detector	No limitation	-
☒	II B. 2. b)	Zero span (analyzer or EMI receiver)	No limitation	-

5.2.3 Test results (Duty cycle)

Ambient temperature:	22 °C
Relative humidity:	63 %

Date	28.09.2023
Tested by	P. NEUFELD

Measurement plot (802.11 a):



Only the duty cycle for 802.11a was tested, because these tests were repeated completely with MiMo activated. For all other tests, the duty cycle correction factors from the original reports OT-223-RWD-044 by LG Innotek Co., Ltd. were used.

Radio technology	TX _{On} [μs]	TX _{Cycle} [μs]	RBW [MHz]	50/T [kHz]	50/T < RBW?
IEEE 802.11a	180	195	20	278	☒

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	10001	240	7500	☒	92.3	0.4	0.8

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

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

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

For average measurements a correction factor of 0.4 dB for power measurements and 0.8 for voltage

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 $\leq 6\text{dBi}$	Result	Comment
☒	☐	Passed	3.0 dB output power necessary

As declared by the applicant for all WLAN modes (mode 1 – 84) “Maximum Ratio Transmission (MRT)” is used.

Antenna gain calculation for WLAN modes (mode 1 – 84) as described in [4], sub-clause F) 2) d) (i)

$$Directional\ gain = 10 \log_{10} \left[\frac{\left(10^{G_1/20} + 10^{G_2/20} \right)^2}{N_{Ant}} \right] dBi$$

Herein:

$G_1 = \text{gain}_{\text{BT/Wifi1}} = 7.4\text{ dBi}$
 $G_1 = \text{gain}_{\text{BT/Wifi2}} = 5.68\text{ dBi}$
 $N_{Ant} = \text{number of antennas} = 2$
 Directional gain for correlated signals = **9.6 dBi** > 6 dBi

All conducted limits will be reduced by **3.6 dB**.

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)

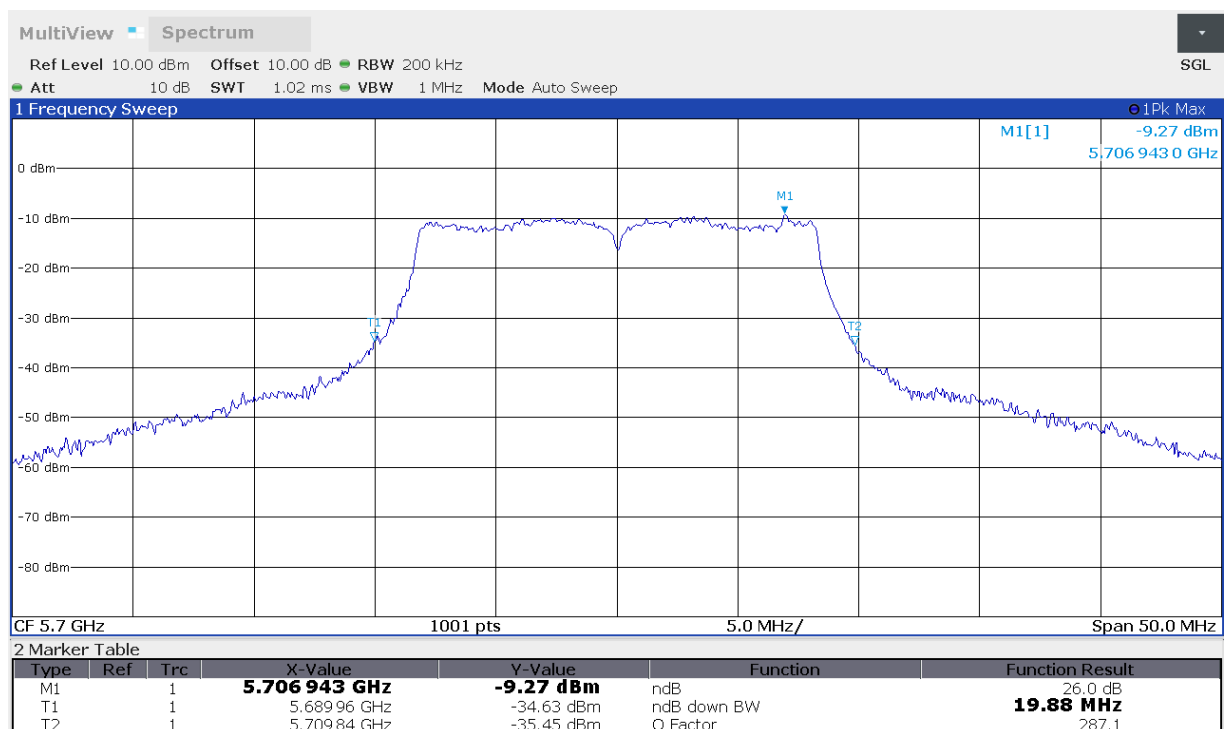
Test method (Maximum peak conducted output power)				
Used	Sub-Clause [6]	Name of method	Applicability	Comment
☒	II C. 1	26 dB Bandwidth	All but 5.725 – 5.85 GHz	-
☒	II C. 2	6 dB Bandwidth	Only 5.725 – 5.85 GHz	-

5.4.3 Test results (EBW - 26 dB BW) – 802.11 – full retest MiMo – FCC only

Ambient temperature:	22°C
Relative humidity:	45%

Date	15.05.2023
Tested by	P. NEUFELD

Worst case plot (operation mode 9 – antenna BT/Wifi2):



Results BT/Wifi1

Operation mode #	26 dB bandwidth [MHz]	f _{Low} [MHz]	f _{High} [MHz]	Limit f _{Low} [MHz]	Limit f _{High} [MHz]
1	19.431	5170.260	5189.690	5150.000	5250.000
2	19.530	5190.160	5209.690	5150.000	5250.000
3	19.730	5230.010	5249.740	5150.000	5250.000
4	19.680	5250.010	5269.690	5250.000	5350.000
5	19.630	5290.060	5309.690	5250.000	5350.000
6	19.680	5310.060	5329.740	5250.000	5350.000
7	19.580	5490.060	5509.640	5470.000	5725.000
8	19.530	5570.160	5589.690	5470.000	5725.000
9	19.880	5689.960	5709.840	5470.000	5725.000

Results BT/Wifi2

Operation mode #	26 dB bandwidth [MHz]	f _{Low} [MHz]	f _{High} [MHz]	Limit f _{Low} [MHz]	Limit f _{High} [MHz]
1	19.431	5170.260	5189.690	5150.000	5250.000
2	19.530	5190.160	5209.690	5150.000	5250.000
3	19.730	5230.010	5249.740	5150.000	5250.000
4	19.580	5250.110	5269.690	5250.000	5350.000
5	19.630	5290.160	5309.790	5250.000	5350.000
6	19.780	5310.010	5329.790	5250.000	5350.000
7	19.481	5490.210	5509.690	5470.000	5725.000
8	19.580	5570.210	5589.790	5470.000	5725.000
9	19.630	5690.110	5709.740	5470.000	5725.000

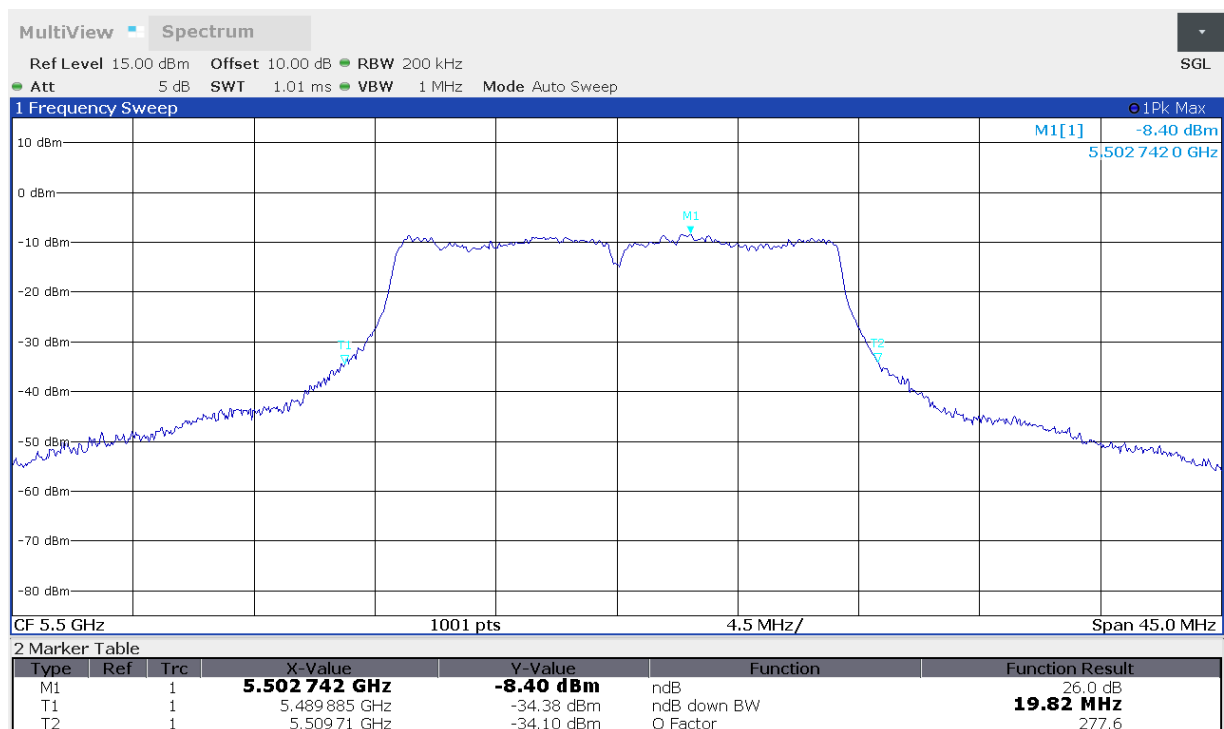
Test: Passed

5.4.4 Test results (EBW - 26 dB BW) – 802.11 – full retest MiMo – ISED only

Ambient temperature:	22°C
Relative humidity:	50%

Date	06.10.2023
Tested by	P. NEUFELD

Worst case plot (operation mode 10 – internal antenna):



Results BT/Wifi1

Operation mode #	26 dB bandwidth [MHz]	f _{Low} [MHz]	f _{High} [MHz]	Limit f _{Low} [MHz]	Limit f _{High} [MHz]
10	19.600	5490.065	5509.665	5470.000	5725.000
11	19.690	5570.020	5589.710	5470.000	5725.000
12	19.600	5690.065	5709.665	5470.000	5725.000

Results BT/Wifi2

Operation mode #	26 dB bandwidth [MHz]	f _{Low} [MHz]	f _{High} [MHz]	Limit f _{Low} [MHz]	Limit f _{High} [MHz]
10	19.825	5489.885	5509.710	5470.000	5725.000
11	19.735	5569.975	5589.710	5470.000	5725.000
12	19.870	5689.885	5709.755	5470.000	5725.000

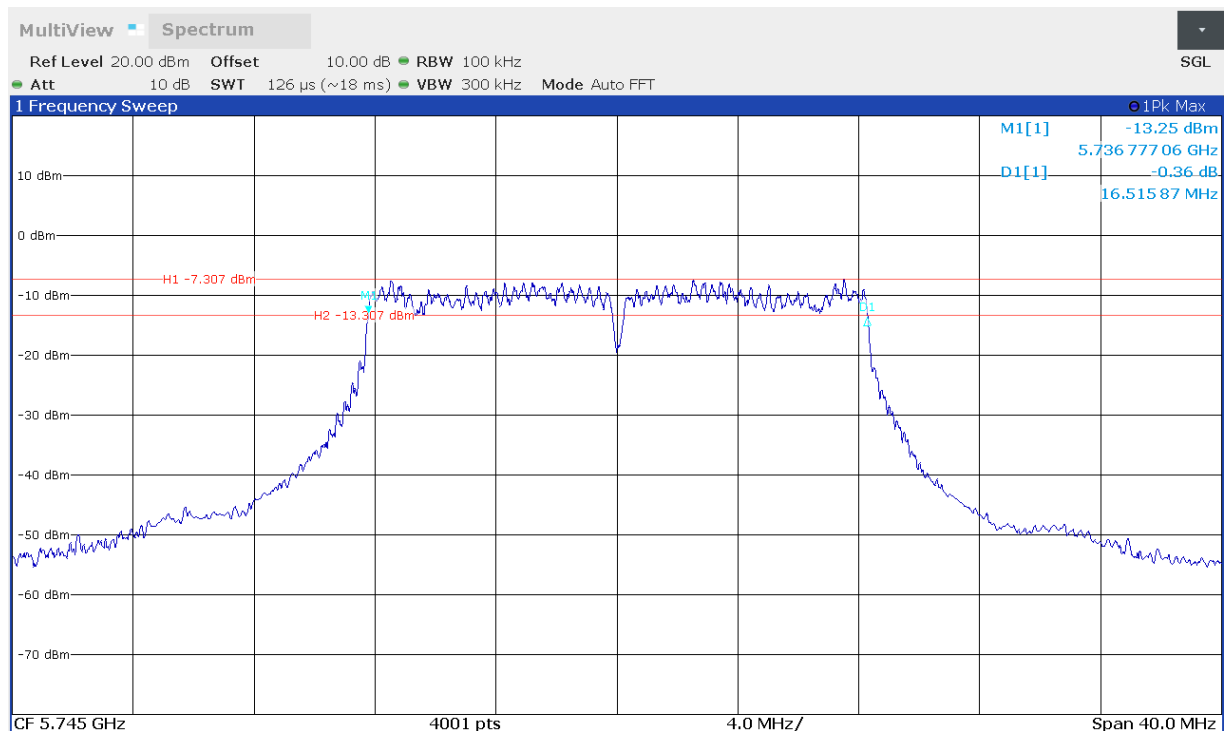
Test: Passed

5.4.5 Test results (EBW - 6 dB BW) 802.11 – full retest MiMo - FCC & ISCED

Ambient temperature:	22°C
Relative humidity:	45%

Date	15.05.2023
Tested by	P. NEUFELD

Worst case plot (operation mode 13 – antenna BT/Wifi2):



Operation mode #	6 dB bandwidth BT/Wifi1 [MHz]	6 dB bandwidth BT/Wifi2 [MHz]	Minimum 6 dB bandwidth [MHz]
13	16.485879	16.515871	0.5
14	16.505874	16.505874	0.5
15	16.475881	16.475881	0.5

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%))

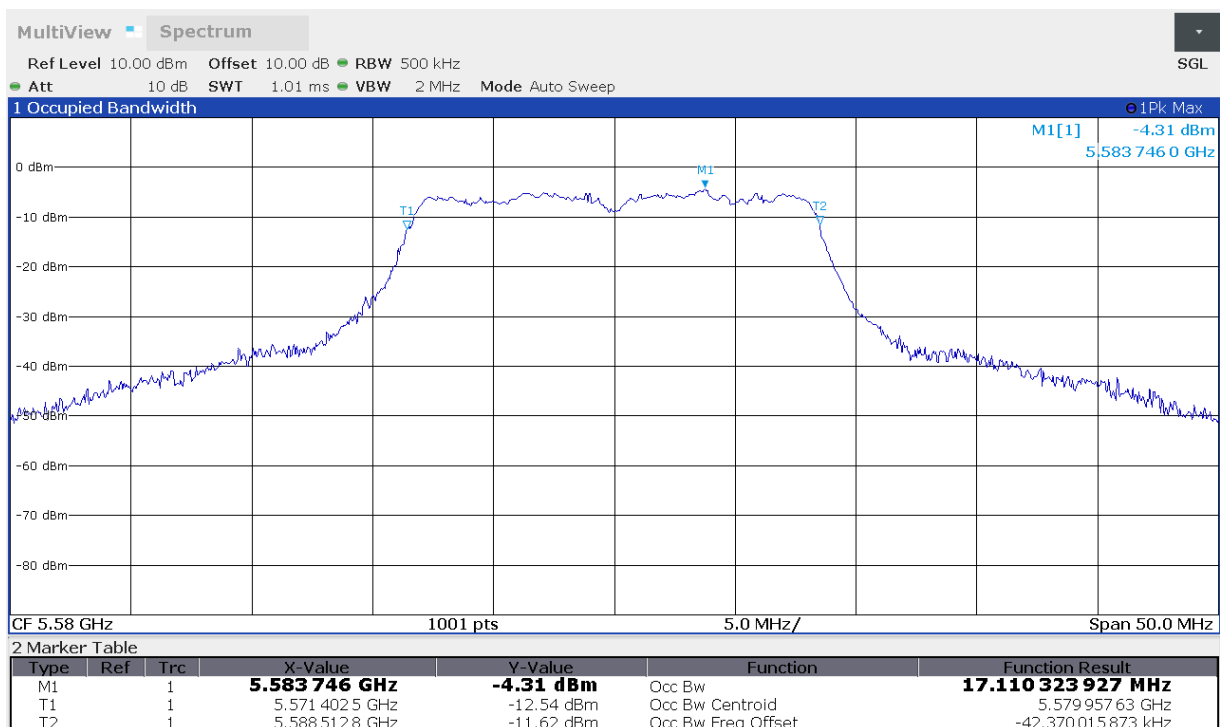
Test method (Maximum peak conducted output power)				
Used	Sub-Clause [6]	Name of method	Applicability	Comment
☒	II D	99% Occupied Bandwidth	No limitations	-

5.5.3 Test results (Occupied bandwidth – power bandwidth (99%))– full retest MiMo FCC only

Ambient temperature:	22°C
Relative humidity:	45%

Date	15.05.2023
Tested by	P. NEUFELD

Worst case plot (operation mode 8 – BT/Wifi1):



Results BT/Wifi1

Operation mode #	99% bandwidth [MHz]	f _{Low} [MHz]	f _{High} [MHz]	Limit f _{Low} [MHz]	Limit f _{High} [MHz]
1	17.073	5171.480	5188.553	5150.000	5250.000
2	17.071	5191.481	5208.551	5150.000	5250.000
3	17.114	5231.431	5248.545	5150.000	5250.000
4	17.103	5251.437	5268.540	5250.000	5350.000
5	17.090	5291.451	5308.542	5250.000	5350.000
6	17.077	5311.472	5328.549	5250.000	5350.000
7	17.102	5491.407	5508.509	5470.000	5725.000
8	17.110	5571.402	5588.513	5470.000	5725.000
9	17.107	5691.453	5708.559	5470.000	5725.000

Results BT/Wifi2

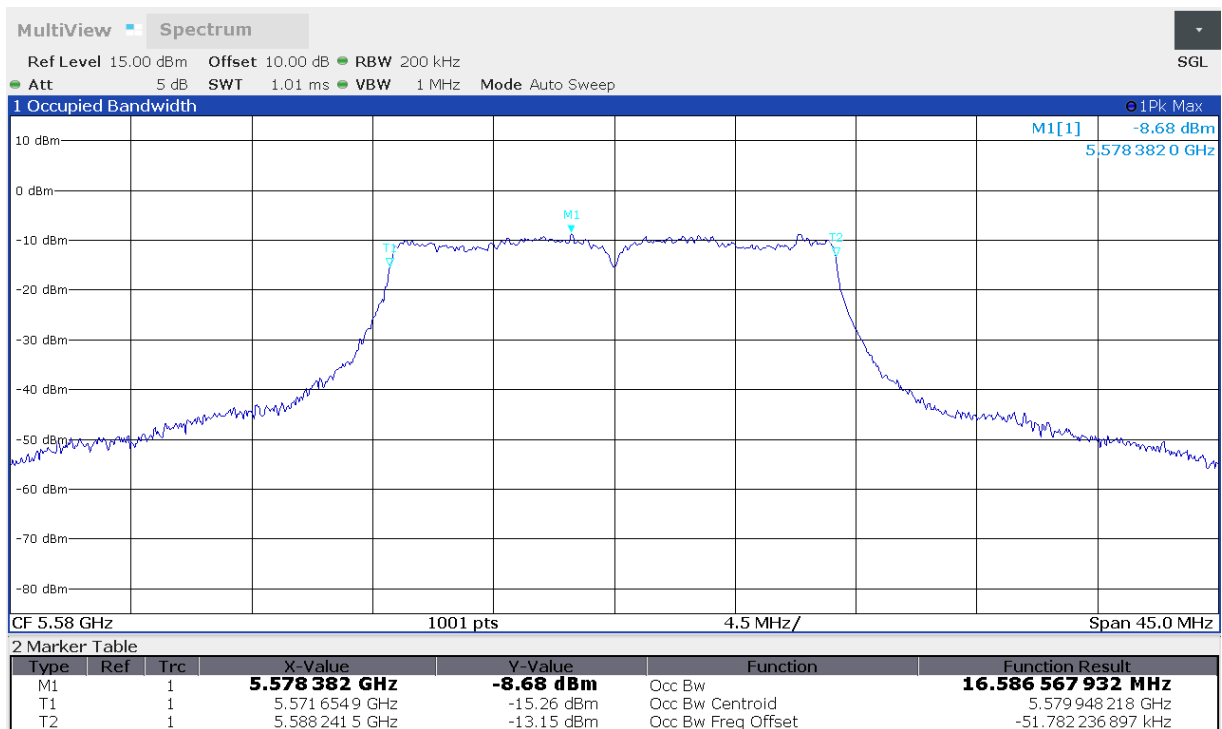
Operation mode #	99% bandwidth [MHz]	f _{Low} [MHz]	f _{High} [MHz]	Limit f _{Low} [MHz]	Limit f _{High} [MHz]
1	17.067	5171.506	5188.573	5150.000	5250.000
2	17.053	5191.500	5208.553	5150.000	5250.000
3	17.072	5231.490	5248.562	5150.000	5250.000
4	17.072	5251.486	5268.559	5250.000	5350.000
5	17.067	5291.505	5308.571	5250.000	5350.000
6	17.063	5311.504	5328.567	5250.000	5350.000
7	17.070	5491.490	5508.561	5470.000	5725.000
8	17.063	5571.495	5588.558	5470.000	5725.000
9	17.076	5691.494	5708.570	5470.000	5725.000

5.5.4 Test results (Occupied bandwidth – power bandwidth (99%))– full retest MiMo ISED only

Ambient temperature:	22°C
Relative humidity:	50%

Date	06.10.2023
Tested by	P. NEUFELD

Worst case plot (operation mode 11 – BT/Wifi1):



Results BT/Wifi1

Operation mode #	99% bandwidth [MHz]	f _{Low} [MHz]	f _{High} [MHz]	Limit f _{Low} [MHz]	Limit f _{High} [MHz]
10	16.578	5491.665	5508.243	5470.000	5725.000
11	16.587	5571.655	5588.242	5470.000	5725.000
12	16.579	5691.666	5708.244	5470.000	5725.000

Results BT/Wifi2

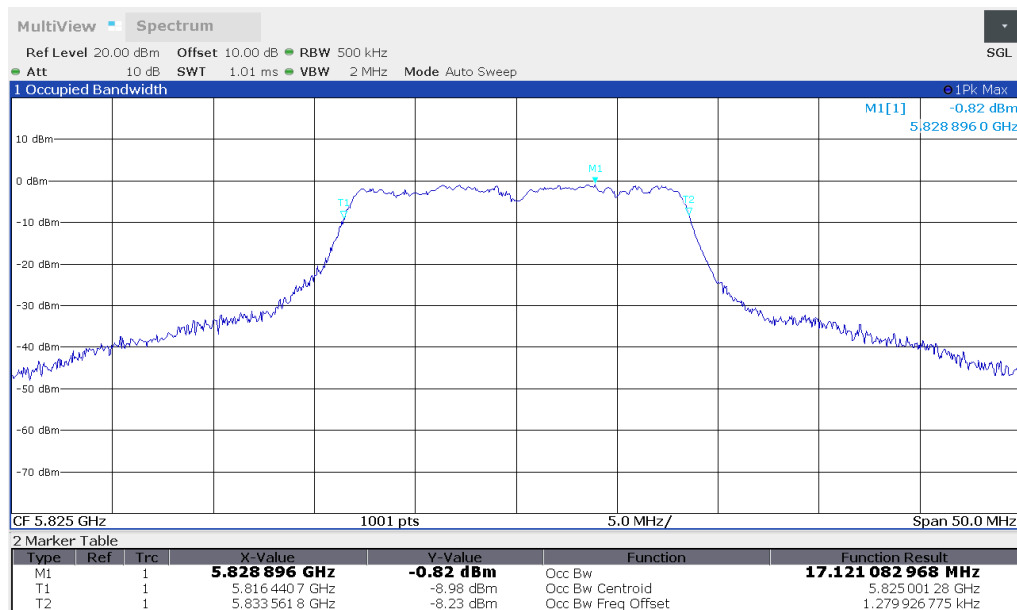
Operation mode #	99% bandwidth [MHz]	f _{Low} [MHz]	f _{High} [MHz]	Limit f _{Low} [MHz]	Limit f _{High} [MHz]
10	16.579	5491.705	5508.284	5470.000	5725.000
11	16.558	5571.729	5588.287	5470.000	5725.000
12	16.569	5691.721	5708.290	5470.000	5725.000

5.5.5 Test results (Occupied bandwidth – power bandwidth (99%)) – full retest MiMo FCC ISCED

Ambient temperature:	22°C
Relative humidity:	45%

Date	15.05.2023
Tested by	P. NEUFELD

Worst case plot (operation mode 15 – BT/Wifi1):



Results BT/Wifi1

Operation mode #	99% bandwidth [MHz]	f _{Low} [MHz]	f _{High} [MHz]	Limit f _{Low} [MHz]	Limit f _{High} [MHz]
13	17.121	5736.440	5753.561	5725.000	5850.000
14	17.100	5776.454	5793.553	5725.000	5850.000
15	17.121	5816.441	5833.562	5725.000	5850.000

Results BT/Wifi2

Operation mode #	99% bandwidth [MHz]	f _{Low} [MHz]	f _{High} [MHz]	Limit f _{Low} [MHz]	Limit f _{High} [MHz]
13	17.072	5736.486	5753.558	5725.000	5850.000
14	17.080	5776.482	5793.562	5725.000	5850.000
15	17.069	5816.485	5833.555	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)

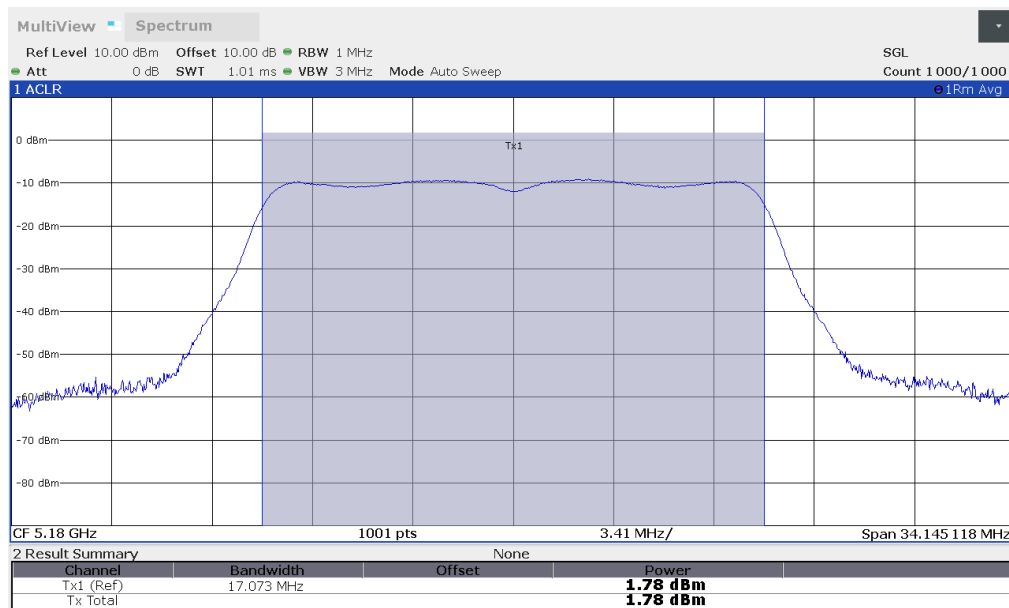
Test method (Maximum conducted (average) output power)				
Used	Sub-Clause [6]	Name of method	Applicability	Comment
☐	II E 2. b)	Method SA-1	D ≥ 98% or video trigger	-
☐	II E 2. c)	Method SA-1A (alternative)	D ≥ 98%	-
☒	II E 2. d)	Method SA-2	Constant D (±2%)	-
☐	II E 2. e)	Method SA-2A (alternative)	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– full retest MiMo – FCC

Ambient temperature:	22°C
Relative humidity:	45%

Date	15.05.2023
Tested by	P. NEUFELD

Worst case plot (operation mode 1 – BT/Wifi1):



Operation mode	Reading Ant. BT/Wifi1 [dBm]	Reading Ant. BT/Wifi2 [dBm]	Ext. Att.* [dB]	DCCF [dB]	Cond. Both Ant. [dBm]	Antenna gain [dBi]	EIRP Corr. Ant. [dBm]	EIRP Limit* ² [dBm]
1	1.8	0.4	2.0	0.4	6.6	9.6	16.2	21.0
2	1.8	0.4	2.0	0.4	6.6	9.6	16.2	21.0
3	1.8	0.3	2.0	0.4	6.5	9.6	16.1	21.0

Operation mode	Reading Internal Ant [dBm]	Reading External Ant [dBm]	Ext. Att.* [dB]	DCCF [dB]	Cond. Both Ant. [dBm]	Cond. Limit* ³ [dBm]
4	1.5	-0.2	2.1	0.4	6.2	20.3
5	1.3	0.6	2.1	0.4	6.5	20.3
6	1.3	0.9	2.1	0.4	6.6	20.3
7	-0.1	0.1	2.5	0.4	5.9	20.3
8	-0.2	0.3	2.5	0.4	6.0	20.3
9	-0.7	0.1	2.5	0.4	5.6	20.3

* The external attenuation of the external attenuator is already taken into account with 10 dB offset in the spectrum analyzer. Therefore, only the cable attenuation "Ext. Att." is added to the power values.

*² Limit acc. to [2]: 21 dBm EIRP (calculated)

*³ Limit acc. to [2]: 23.9 limit because of $11 + 10 \cdot \log_{10}$ (Minimum 26-dB Bandwidth) is below 24 dBm. Conducted limit is also decreased by 3.6 dB, because of combined antenna gain of $9.6 > 6$ dBi.

Calculations:

Cond. Both Ant. [dBm]= $10 \times \log_{10} (\text{Reading Ant BT/Wifi1 [mW]} + \text{Reading Ant BT/Wifi2 [mW]}) + \text{Ext. Att.} + \text{DCCF}$

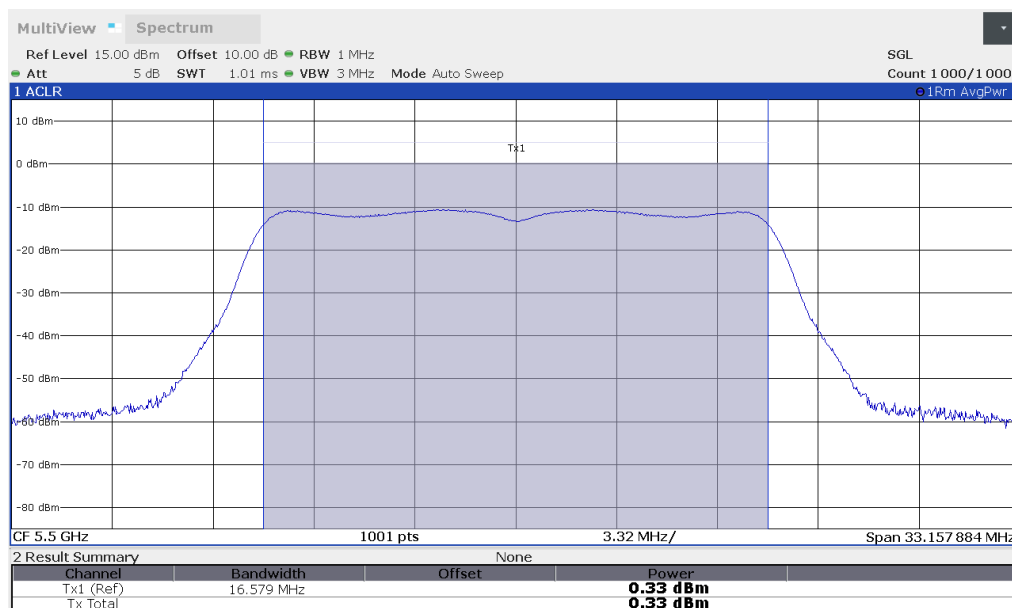
EIRP Corr. Ant. [dBm]= $10 \times \log_{10} (\text{Reading Ant BT/Wifi1 [mW]} + \text{Reading Ant BT/Wifi2 [mW]}) + \text{Ext. Att.} + \text{DCCF} + \text{Antenna gain [dBi]}$

5.6.4 Test results Max. (Average) Conducted Output Power for ISED – 5470 – 5725 MHz

Ambient temperature:	22°C
Relative humidity:	50%

Date	06.10.2023
Tested by	P. NEUFELD

Worst case plot (operation mode 10 – BT/Wifi2):



Operation mode	Reading Ant. BT/Wifi1 [dBm]	Reading Ant. BT/Wifi2 [dBm]	Ext. Att.* [dB]	DCCF [dB]	Cond. Both Ant. [dBm]	Cond. Limit*2 [dBm]	Antenna gain [dBi]	EIRP Corr. Ant. [dBm]	EIRP Limit*2 [dBm]
10	0.1	0.3	2.0	0.4	5.6	23.2	9.6	15.2	29.2
11	-0.3	0.2	2.0	0.4	5.4	23.2	9.6	15.0	29.2
12	-1.4	-0.1	2.0	0.4	4.7	23.2	9.6	14.3	29.2

* The external attenuation of the external attenuator is already considered with 10 dB offset in the spectrum analyzer. Therefore, only the cable attenuation "Ext. Att." is added to the power values.

Calculations:

Cond. Both Ant. [dBm] = $10 \times \log_{10}(\text{Reading Ant BT/Wifi1 [mW]} + \text{Reading Ant BT/Wifi2 [mW]}) + \text{Ext. Att.} + \text{DCCF}$

EIRP Corr. Ant. [dBm] = $10 \times \log_{10}(\text{Reading Ant BT/Wifi1 [mW]} + \text{Reading Ant BT/Wifi2 [mW]}) + \text{Ext. Att.} + \text{DCCF} + \text{Antenna gain [dBi]}$

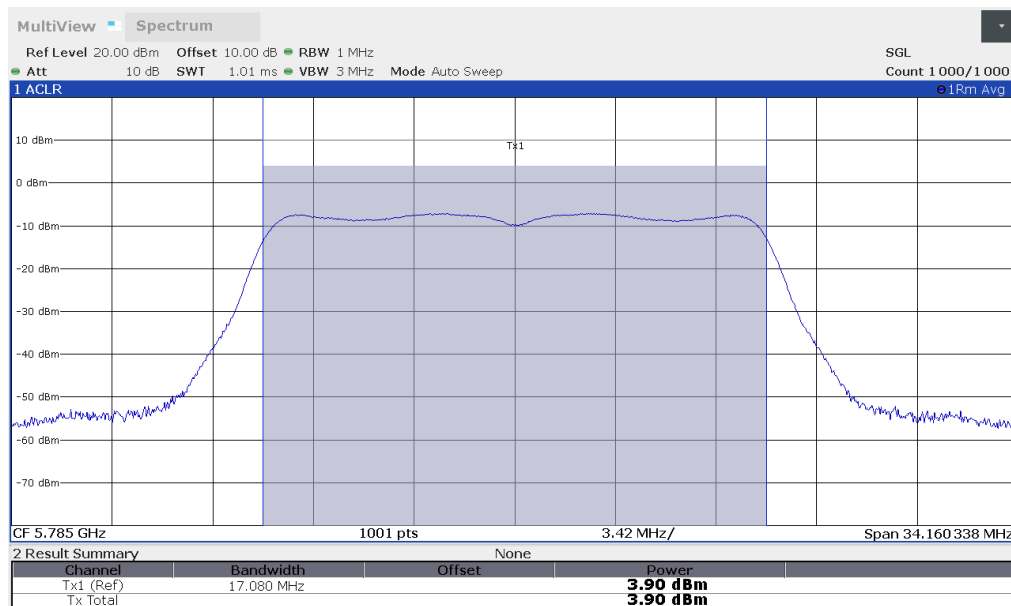
*2 Limit acc. to [5]: Maximum Conducted shall not exceed 24 dBm or $11 + 10 \log_{10}(99\% \text{ BW})$, dBm, whichever is less.
Maximum e.i.r.p. shall not exceed 30 dBm or $17 + 10 \log_{10}(99\% \text{ BW})$, dBm, whichever is less.
Worst case (smallest OBW) was used to calculate the limit

5.6.5 Test results Max. (Average) Conducted Output Power for FCC ISCED – 5725 – 5850 MHz

Ambient temperature:	22°C
Relative humidity:	45%

Date	15.05.2023
Tested by	P. NEUFELD

Worst case plot (operation mode 14 – BT/Wifi2):



Operation mode	Reading Ant. BT/Wifi1 [dBm]	Reading Ant. BT/Wifi2 [dBm]	Ext. Att.* [dB]	DCCF [dB]	Cond. Both Ant. [dBm]	Limit*2 Cond. [dBm]
13	3.6	4.3	2.4	0.4	9.8	26.4
14	3.7	3.9	2.4	0.4	9.6	26.4
15	3.8	3.8	2.4	0.4	9.6	26.4

* The external attenuation of the external attenuator is already considered with 10 dB offset in the spectrum analyzer. Therefore, only the cable attenuation "Ext. Att." is added to the power values.

Calculations:

Cond. Both Ant. [dBm] = $10 \times \log_{10}(\text{Reading Ant BT/Wifi1 [mW]} + \text{Reading Ant BT/Wifi2 [mW]}) + \text{Ext. Att.} + \text{DCCF}$

See [4] E 1) for details

*2 Limit acc. to [2]+[5]: 30 dBm – 3.6 dB for Antenna gain correction, see Transmit Antenna Performance considerations for details

Test equipment (please refer to chapter 6 for details)

1

5.6.6 Test results Max. (Average) Conducted Output Power FCC

Ambient temperature:	23°C
Relative humidity:	44%

Date	09.05.2023
Tested by	P. NEUFELD

Remark: Retest worst case output power from original report (FCC)

No plot available because the tests were done using a thermal power meter.

Operation mode	Reading Ant. BT/Wifi1 [dBm]	Reading Ant. BT/Wifi2 [dBm]	Ext. Att.* [dB]	DCCF [dB]	Cond. Both Ant. [dBm]	Antenna gain [dBi]	EIRP Corr. Ant. [dBm]	EIRP Limit*2 [dBm]
16	2.9	1.3	1.8	0.045	7.0	9.6	16.6	21.0
17	3.1	1.4	1.8	0.045	7.2	9.6	16.8	21.0
18	3.2	1.4	1.8	0.045	7.2	9.6	16.8	21.0
19	3.1	0.7	1.8	0.048	6.9	9.6	16.5	21.0
20	3.2	0.8	1.8	0.048	7.0	9.6	16.6	21.0
21	3.3	0.8	1.8	0.048	7.1	9.6	16.7	21.0
22	2.6	1.1	1.8	0.066	6.8	9.6	16.4	21.0
23	2.7	1.2	1.8	0.066	6.9	9.6	16.5	21.0
24	2.9	1.3	1.8	0.066	7.0	9.6	16.6	21.0

Operation mode	Reading Internal Ant [dBm]	Reading External Ant [dBm]	Ext. Att.* [dB]	DCCF [dB]	Cond. Both Ant. [dBm]	Cond. Limit*3 [dBm]
25	2.9	1.0	1.9	0.045	7.0	20.3
26	2.7	1.5	1.9	0.045	7.1	20.3
27	2.8	1.8	1.9	0.045	7.3	20.3
28	3.0	0.3	1.9	0.048	6.8	20.3
29	2.9	0.6	1.9	0.048	6.9	20.3
30	2.8	0.9	1.9	0.048	6.9	20.3
31	2.6	0.8	1.9	0.066	6.8	20.3
32	2.5	1.3	1.9	0.066	6.9	20.3
33	2.4	1.6	1.9	0.066	7.0	20.3
34	5.5	4.6	2.4	0.045	10.5	20.3
35	5.2	5.1	2.4	0.045	10.6	20.3
36	3.5	5.0	2.4	0.045	9.8	20.3
37	5.4	4.3	2.4	0.048	10.3	20.3
38	5.3	4.5	2.4	0.048	10.4	20.3
39	3.9	4.2	2.4	0.048	9.5	20.3
40	5.1	4.4	2.4	0.066	10.2	20.3
41	5.1	4.7	2.4	0.066	10.4	20.3
42	3.4	4.7	2.4	0.066	9.6	20.3

* The external attenuation of the external attenuator is already taken into account with 10 dB offset in the spectrum analyzer. Therefore, only the cable attenuation "Ext. Att." is added to the power values.

*² Limit acc. to [2]: 21 dBm EIRP (calculated)

*³ Limit acc. to [2]: 23.9 limit because of $11 + 10 \cdot \log_{10}$ (Minimum 26-dB Bandwidth) is below 24 dBm. Conducted limit is also decreased by 3.6 dB, because of combined antenna gain of $9.6 > 6$ dBi.

Calculations:

Cond. Both Ant. [dBm]= $10 \times \log_{10}(\text{Reading Ant BT/Wifi1 [mW]} + \text{Reading Ant BT/Wifi2 [mW]}) + \text{Ext. Att.} + \text{DCCF}$

EIRP Corr. Ant. [dBm]= $10 \times \log_{10}(\text{Reading Ant BT/Wifi1 [mW]} + \text{Reading Ant BT/Wifi2 [mW]}) + \text{Ext. Att.} + \text{DCCF} + \text{Antenna gain[dBi]}$

5.6.7 Test results Maximum (Average) Conducted Output Power ISSED

Ambient temperature:	23°C
Relative humidity:	44%

Date	09.05.2023
Tested by	P. NEUFELD

Remark: Retest worst case output power from original report (FCC)

No plot available, because the tests were done using a thermal power meter.

Operation mode	Reading Ant. BT/Wifi1 [dBm]	Reading Ant. BT/Wifi2 [dBm]	Ext. Att.* [dB]	DCCF [dB]	Cond. Both Ant. [dBm]	Cond. Limit* ² [dBm]	Antenna gain [dBi]	EIRP Corr. Ant. [dBm]	EIRP Limit* ² [dBm]
43	1.5	0.7	2.1	0.045	6.3	23.2	9.6	15.9	29.2
44	1.7	1.2	2.1	0.045	6.6	23.2	9.6	16.2	29.2
45	0.2	1.2	2.1	0.045	5.9	23.2	9.6	15.5	29.2
46	1.3	0.4	2.1	0.048	6.0	23.2	9.6	15.6	29.2
47	1.3	0.7	2.1	0.048	6.2	23.2	9.6	15.8	29.2
48	0.1	0.7	2.1	0.048	5.6	23.2	9.6	15.2	29.2
49	1.0	0.5	2.1	0.066	5.9	23.2	9.6	15.5	29.2
50	1.1	0.9	2.1	0.066	6.2	23.2	9.6	15.8	29.2
51	-0.3	1.0	2.1	0.066	5.6	23.2	9.6	15.2	29.2

* The external attenuation of the external attenuator is already considered with 10 dB offset in the spectrum analyzer. Therefore, only the cable attenuation "Ext. Att." is added to the power values.

Calculations:

Cond. Both Ant. [dBm]= $10 \times \log_{10}(\text{Reading Ant BT/Wifi1 [mW]} + \text{Reading Ant BT/Wifi2 [mW]}) + \text{Ext. Att.} + \text{DCCF}$

EIRP Corr. Ant. [dBm]= $10 \times \log_{10}(\text{Reading Ant BT/Wifi1 [mW]} + \text{Reading Ant BT/Wifi2 [mW]}) + \text{Ext. Att.} + \text{DCCF} + \text{Antenna gain[dBi]}$

^{*2} Limit acc. to [5]: Maximum Conducted shall not exceed 24 dBm or $11 + 10 \log_{10}(99\% \text{ BW})$, dBm, whichever is less.
Maximum e.i.r.p. shall not exceed 30 dBm or $17 + 10 \log_{10}(99\% \text{ BW})$, dBm, whichever is less.
Worst case (smallest OBW) was used to calculate the limit

5.6.8 Test results Maximum (Average) Conducted Output Power (FCC+ ISED)

Ambient temperature:	23°C
Relative humidity:	44%

Date	09.05.2023
Tested by	P. NEUFELD

Remark: Retest worst case output power from original report (FCC)

No plot available because the tests were done using a thermal power meter.

Operation mode	Reading Ant. BT/Wifi1 [dBm]	Reading Ant. BT/Wifi2 [dBm]	Ext. Att.* [dB]	DCCF [dB]	Cond. Both Ant. [dBm]	Limit* ² Cond. [dBm]
52	4.5	5.1	2.1	0.045	10.0	26.4
53	4.4	4.9	2.1	0.045	9.8	26.4
54	4.5	4.6	2.1	0.045	9.7	26.4
55	4.6	4.8	2.1	0.048	9.9	26.4
56	4.7	4.5	2.1	0.048	9.8	26.4
57	4.6	4.4	2.1	0.048	9.7	26.4

* The external attenuation of the external attenuator is already taken into account with 10 dB offset in the spectrum analyzer. Therefore, only the cable attenuation "Ext. Att." is added to the power values.

Calculations:

Cond. Both Ant. [dBm]= $10 \times \log_{10}(\text{Reading Ant BT/Wifi1 [mW]} + \text{Reading Ant BT/Wifi2 [mW]}) + \text{Ext. Att.} + \text{DCCF}$

See [4] E 1) for details

*² Limit acc. to [2]+[5]: 30 dBm – 3.6 dB for Antenna gain correction, see Transmit Antenna Performance considerations for details

Test equipment (please refer to chapter 6 for details)

19 - 21

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.

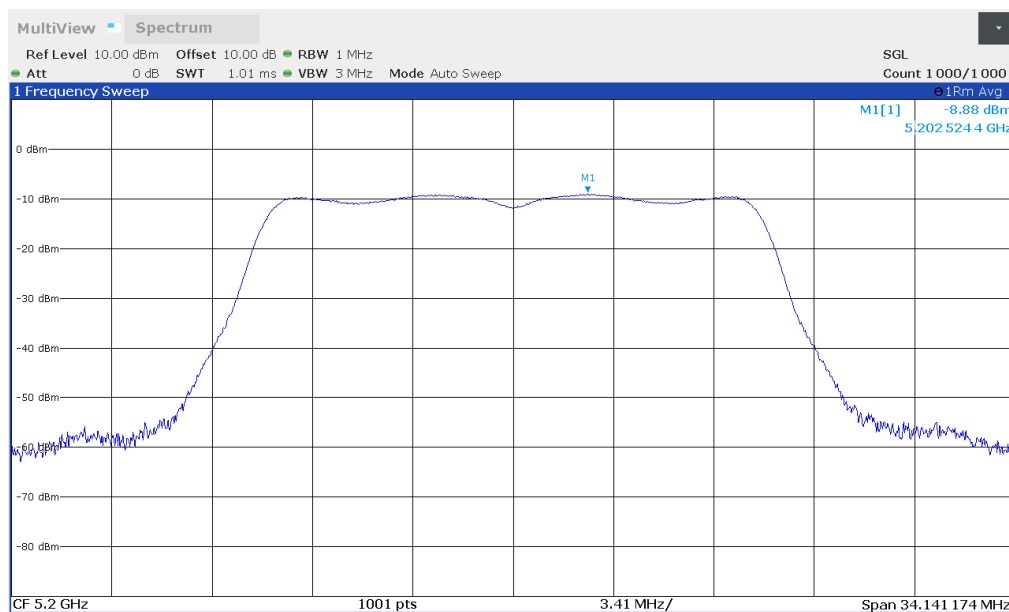
For devices operating in the band 5.725–5.85 GHz, the rules specify a measurement bandwidth of 500 kHz.

5.7.3 Test results (Maximum (average) Power Spectral Density) full retest MiMo - FCC

Ambient temperature:	22°C
Relative humidity:	45%

Date	15.05.2023
Tested by	P. NEUFELD

Worst case plot (operation mode 2 – Ant. BT/Wifi1):



Internal antenna

Operation mode	Reading Ant. BT/Wifi1 [dBm/MHz]	Reading Ant. BT/Wifi2 [dBm/MHz]	Ext. Att.* [dB]	DCCF [dB]	Result [dBm/MHz]	Limit conducted*2 [dBm/MHz]
1	-9.1	-10.5	2.0	0.4	2.6	13.4
2	-8.9	-10.5	2.0	0.4	2.6	13.4
3	-9.1	-10.7	2.0	0.4	2.6	13.4
4	-9.5	-11.1	2.1	0.4	2.7	7.4
5	-9.6	-10.3	2.1	0.4	2.7	7.4
6	-9.6	-10.1	2.1	0.4	2.7	7.4
7	-11.0	-10.9	2.5	0.4	3.1	7.4
8	-11.1	-10.7	2.5	0.4	3.1	7.4
9	-11.6	-10.9	2.5	0.4	3.1	7.4

* The external attenuation of the external attenuator is already taken into account with 10 dB offset in the spectrum analyzer. Therefore, only the cable attenuation "Ext. Att." is added to the power values.

Cond. Both Ant. [dBm]= $10 \times \log_{10}(\text{Reading Ant BT/Wifi1 [mW]} + \text{Reading Ant BT/Wifi2 [mW]}) + \text{Ext. Att.} + \text{DCCF}$

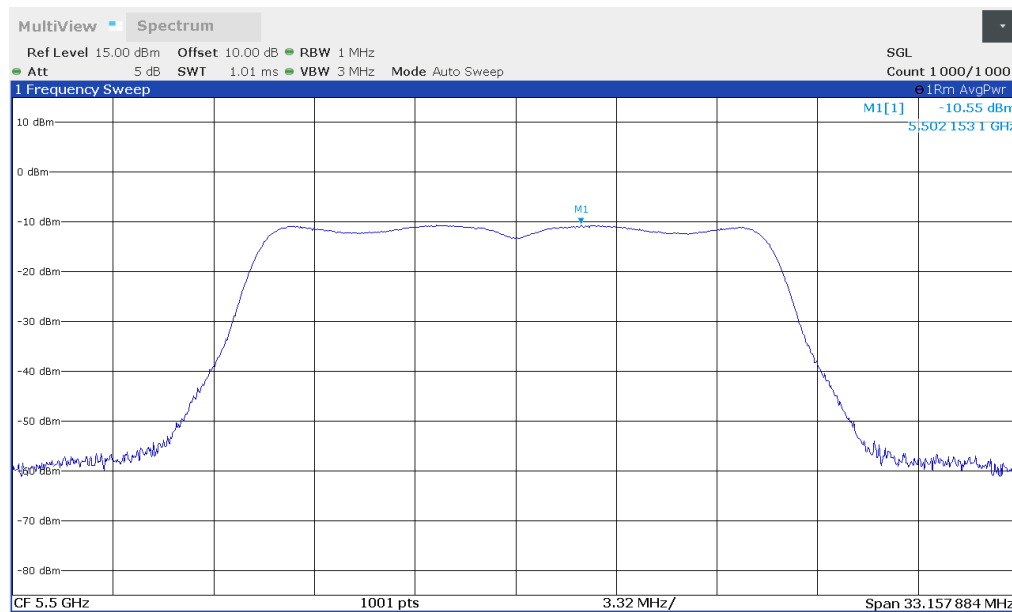
*2 Limit according to [2] – 3.6 dB reduction because 9.6 dBi antenna gain.

5.7.4 Test results (Maximum (average) Power Spectral Density) – full retest MiMo - ISED

Ambient temperature:	22°C
Relative humidity:	45%

Date	15.05.2023
Tested by	P. NEUFELD

Worst case plot (operation mode 10 – Ant. BT/Wifi2):



Internal antenna

Operation mode	Reading Ant. BT/Wifi1 [dBm/MHz]	Reading Ant. BT/Wifi2 [dBm/MHz]	Ext. Att.* [dB]	DCCF [dB]	Result [dBm/MHz]	Limit conducted*2 [dBm/MHz]
10	-10.8	-10.6	2.5	0.4	3.1	8.4
11	-11.2	-10.6	2.5	0.4	3.1	8.4
12	-12.3	-11.1	2.5	0.4	3.0	8.4

* The external attenuation of the external attenuator is already considered with 10 dB offset in the spectrum analyzer. Therefore, only the cable attenuation "Ext. Att." is added to the power values.

Cond. Both Ant. [dBm]= $10 \times \log_{10}(\text{Reading Ant BT/Wifi1 [mW]} + \text{Reading Ant BT/Wifi2 [mW]}) + \text{Ext. Att.} + \text{DCCF}$

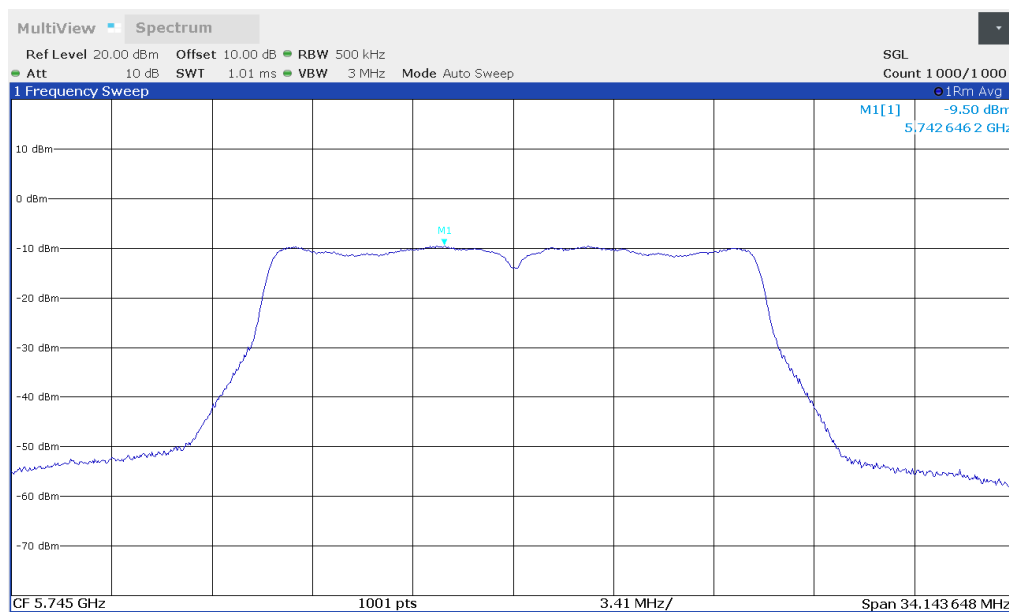
*2 Limit according to [5] – 3.6 dB reduction because 9.6 dBi antenna gain.

5.7.5 Test results (Maximum (average) Power Spectral Density) – full retest MiMo -FCC+ISED

Ambient temperature:	22°C
Relative humidity:	45%

Date	15.05.2023
Tested by	P. NEUFELD

Worst case plot (operation mode 13 – Ant. BT/Wifi2):



Internal antenna

Operation mode	Reading Ant. BT/Wifi1 [dBm/500kHz]	Reading Ant. BT/Wifi2 [dBm/500kHz]	Ext. Att.* [dB]	DCCF [dB]	Result [dBm/500kHz]	Limit conducted*2 [dBm/500kHz]
13	-10	-9.5	2.4	0.4	3.0	26.4
14	-10	-9.8	2.4	0.4	3.0	26.4
15	-9.8	-9.9	2.4	0.4	3.0	26.4

* The external attenuation of the external attenuator is already taken into account with 10 dB offset in the spectrum analyzer. Therefore, only the cable attenuation "Ext. Att." is added to the power values.

Cond. Both Ant. [dBm]= $10 \times \log_{10}(\text{Reading Ant BT/Wifi1 [mW]} + \text{Reading Ant BT/Wifi2 [mW]}) + \text{Ext. Att.} + \text{DCCF}$

*2 Limit according to [2]+[4] – 3.6 dB reduction because 9.6 dBi antenna gain.

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)

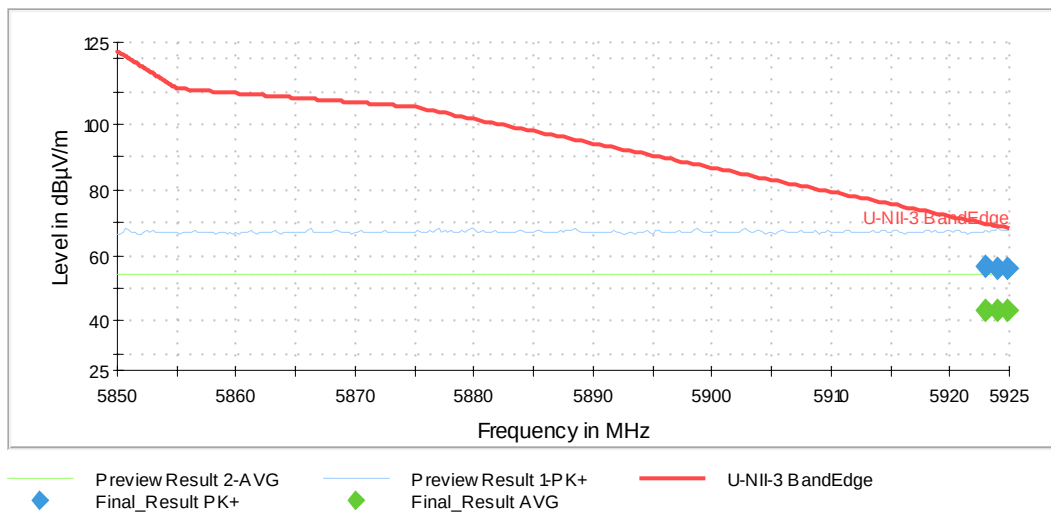
Test method (Band edge – unrestricted bands)				
Used	Sub-Clause [3]	Name of method	Applicability	Comment
☒	II G 2, 3 & 5.	Unwanted emissions outside restricted bands	No limitations	-

5.8.3 Test results (Band edge – unrestricted bands) for – full retest MiMo FCC & ISCED

Ambient temperature:	21°C
Relative humidity:	52%

Date	16.06.2023
Tested by	P. NEUFELD

Worst case plot (operation mode 13):



Lower band edge (operation mode 13):

Frequency [MHz]	PK+ [dBμV/m]	Pk+ Limit* [dBμV/m]	PK+ Margin [dB]	Pol	Elevation [deg]	Azimuth [deg]	Corr. [dB/m]
5650.000	55.8	68.2	12.4	H	243	60	42.1
5723.750	66.8	68.2	1.4	H	150	60	41.9
5725.000	66.4	68.2	1.8	H	151	60	41.9

Upper band edge (operation mode 15):

Frequency [MHz]	PK+ [dBμV/m]	Pk+ Limit* [dBμV/m]	PK+ Margin [dB]	Pol	Elevation [deg]	Azimuth [deg]	Corr. [dB/m]
5650.000	55.8	68.2	12.4	H	243	60	42.1
5723.750	66.8	68.2	1.4	H	150	60	41.9
5725.000	66.4	68.2	1.8	H	151	60	41.9

Remark: For simplification, all results were compared to the hardest limit, which is – 27 dBm/MHz or 68.2 dBuV/m.

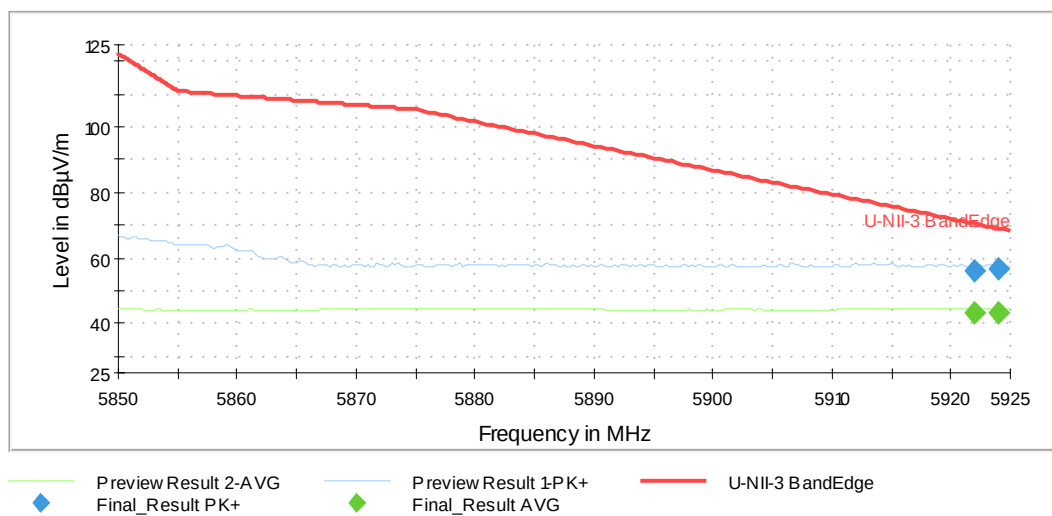
5.8.4 Test results (Band edge – unrestricted bands) FCC & ISED

Ambient temperature:	21°C
Relative humidity:	52%

Date	16.06.2023
Tested by	P. NEUFELD

Retest worst case from original report

Worst case plot (operation mode 58):



Lower band edge (operation mode 58):

Frequency [MHz]	PK+ [dBµV/m]	Pk+ Limit* [dBµV/m]	PK+ Margin [dB]	Pol	Elevation [deg]	Azimuth [deg]	Corr. [dB/m]
5650.750	55.3	68.9	13.5	H	350	60	42.1
5653.750	55.5	71.1	15.6	H	228	0	42.1

Upper band edge (operation mode 58):

Frequency [MHz]	PK+ [dBµV/m]	Pk+ Limit* [dBµV/m]	PK+ Margin [dB]	Pol	Elevation [deg]	Azimuth [deg]	Corr. [dB/m]
5922.000	56.4	70.5	14.2	V	150	60	42.8
5924.000	56.7	69.0	12.3	H	16	120	42.8

Test equipment (please refer to chapter 6 for details)

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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	-

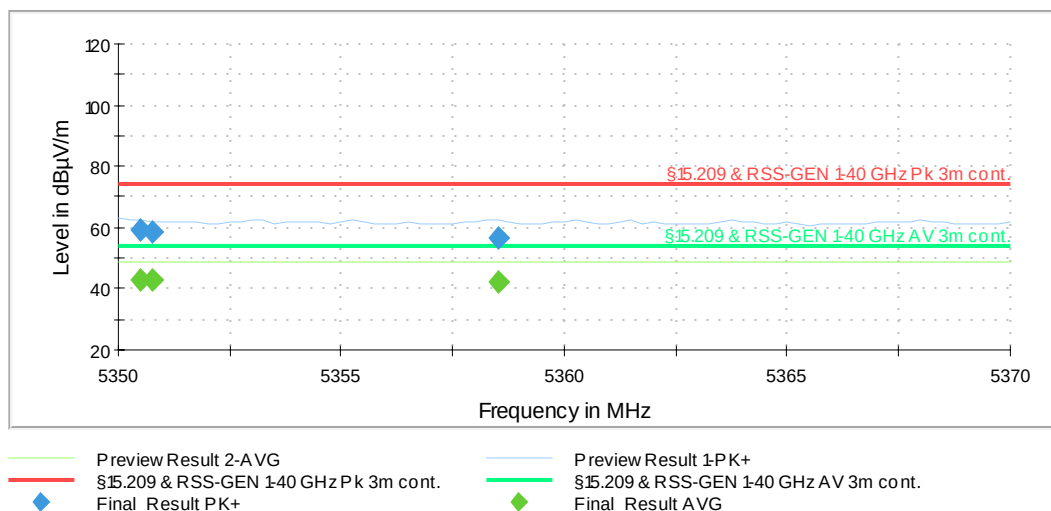
5.8.7 Test results (Band edge – restricted bands)– full retest MiMo FCC & ISED

Ambient temperature:	21°C
Relative humidity:	52%

Date	16.06.2023
Tested by	P. NEUFELD

Remark: The tests in this band-edge were only performed for FCC power settings, because test with the highest output power settings result in the worst case for the tests.

Worst case plot (operation mode 6):



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 (68.3 dB μ V/m). Since if the stricter unrestricted peak limit is passed for all frequencies, the peak limit for restricted bands (74 dB μ V/m) is also fulfilled.

Lower band edge (operation mode 1):

Frequency [MHz]	PK+ [dB μ V/m]	AV [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Pol	Azimuth [deg]	Elevation [deg]	Corr. [dB/m]
5131.750	---	39.2	54.0	14.8	V	215	0	40.7
5131.750	53.2	---	68.3	15.1	V	215	0	40.7
5140.000	---	39.5	54.0	14.5	H	179	120	40.7
5140.000	55.0	---	68.3	13.3	H	179	120	40.7
5148.750	---	40.0	54.0	14.0	H	206	90	40.8
5148.750	57.8	---	68.3	10.5	H	206	90	40.8

Upper band edge (operation mode 6):

Frequency [MHz]	PK+ [dB μ V/m]	AV [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Pol	Azimuth [deg]	Elevation [deg]	Corr. [dB/m]
5350.500	---	42.7	54.0	11.3	V	159	0	41.7
5350.500	59.4	---	68.3	8.9	V	159	0	41.7
5350.750	---	42.7	54.0	11.3	V	159	0	41.7
5350.750	58.8	---	68.3	9.5	V	159	0	41.7
5358.500	---	42.2	54.0	11.8	V	190	150	41.6
5358.500	56.5	---	68.3	11.8	V	190	150	41.6

Lower band edge (operation mode 7):

Frequency [MHz]	PK+ [dB μ V/m]	AV [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Pol	Azimuth [deg]	Elevation [deg]	Corr. [dB/m]
5465.250	---	41.70	54.0	12.3	H	180	90	41.7
5465.250	56.00	---	68.3	12.3	H	180	90	41.7
5469.500	---	41.60	54.0	12.4	H	247	90	41.7
5469.500	55.70	---	68.3	12.6	H	247	90	41.7

Upper band edge (operation mode 9):

Frequency [MHz]	PK+ [dB μ V/m]	AV [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Pol	Azimuth [deg]	Elevation [deg]	Corr. [dB/m]
5749.000	---	41.9	54.0	12.1	V	177	30	42.3
5749.000	56.0	---	68.3	12.3	V	177	30	42.3
5750.000	---	41.9	54.0	12.1	H	128	60	42.3
5750.000	55.2	---	68.3	13.1	H	128	60	42.3

5.8.8 Test results (Band edge – restricted bands) for FCC & ISCED

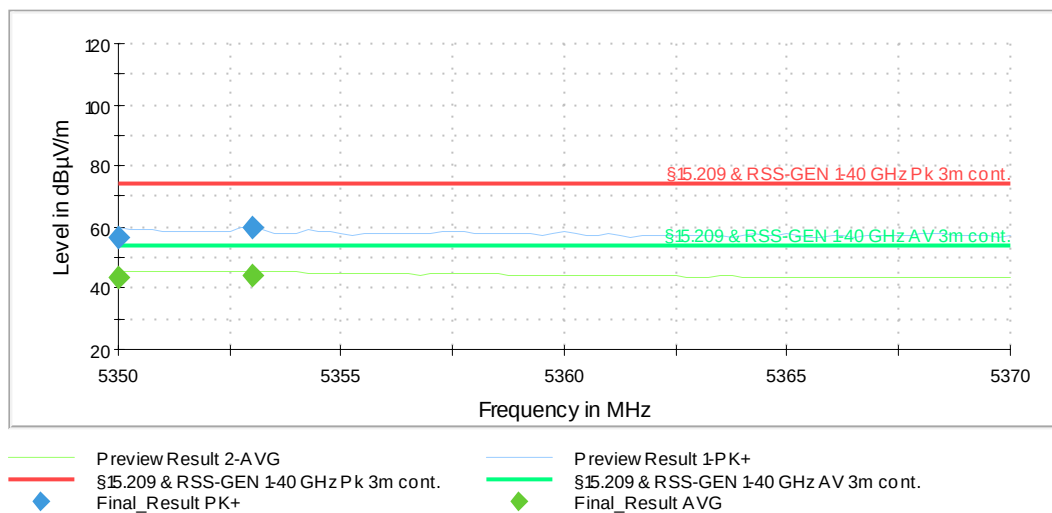
Ambient temperature:	21°C
Relative humidity:	52%

Date	16.06.2023
Tested by	P. NEUFELD

Remark: Retest worst case from original report

* The tests in this band-edge were only performed for FCC power settings, because test with the highest output power settings result in the worst case for the tests.

Worst case plot (operation mode 60):



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 (68.3 dB μ V/m). Since if the stricter unrestricted peak limit is passed for all frequencies, the peak limit for restricted bands (74 dB μ V/m) is also fulfilled.

Lower band edge (operation mode 59):

Frequency [MHz]	PK+ [dB μ V/m]	AV [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Pol	Azimuth [deg]	Elevation [deg]	Corr. [dB/m]
5468.250	---	41.8	54.0	12.2	V	146	0	41.7
5468.250	55.8	---	68.3	12.5	V	146	0	41.7
5470.000	---	42.6	54.0	11.4	V	170	0	41.6
5470.000	56.3	---	68.3	12.0	V	170	0	41.6

Upper band edge (operation mode 60):

Frequency [MHz]	PK+ [dB μ V/m]	AV [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Pol	Azimuth [deg]	Elevation [deg]	Corr. [dB/m]
5350.000	56.8	---	68.3	11.5	V	152	30	41.7
5350.000	---	43.4	54.0	10.6	V	152	30	41.7
5353.000	60.1	---	68.3	8.2	H	214	90	41.7
5353.000	---	44.2	54.0	9.8	H	214	90	41.7

Lower band edge (operation mode 66):

Frequency [MHz]	PK+ [dB μ V/m]	AV [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Pol	Azimuth [deg]	Elevation [deg]	Corr. [dB/m]
5468.250	---	41.8	54.0	12.2	V	146	0	41.7
5468.250	55.8	---	68.3	12.5	V	146	0	41.7
5470.000	---	42.6	54.0	11.4	V	170	0	41.6
5470.000	56.3	---	68.3	12.0	V	170	0	41.6

Test equipment (please refer to chapter 6 for details)

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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:	23°C
Relative humidity:	55%

Date	09.06.2023
Tested by	P. NEUFELD

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

Calculations:

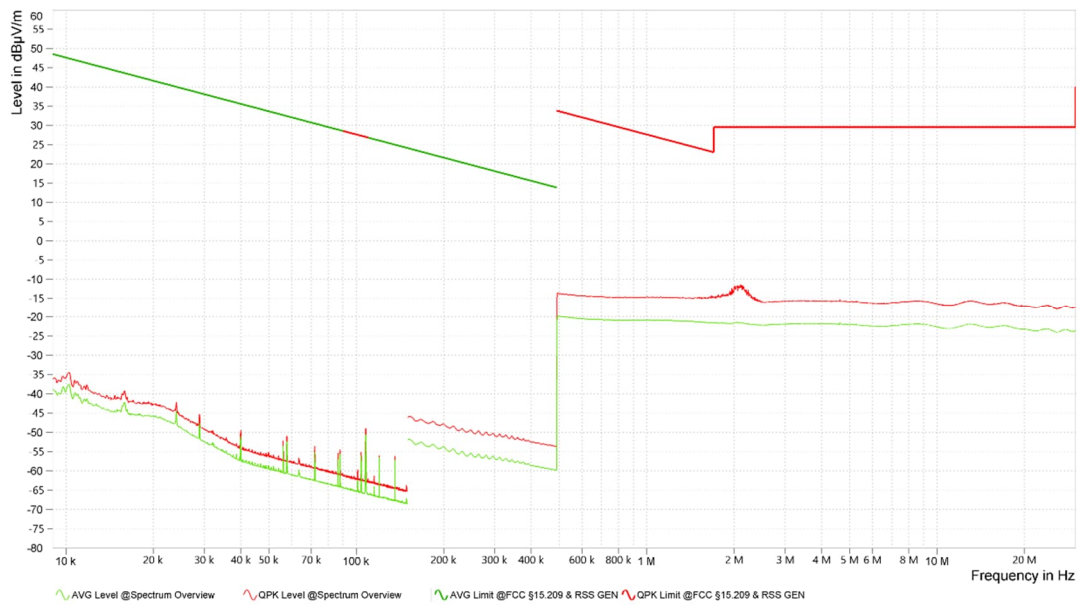
Result @ norm. dist. [dBμV/m] = Reading [dBμV] + AF [dB/m] + Distance corr. fact. [dBμV/m]

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

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

802.11 – full retest MiMo:

Spurious emissions from 9 kHz to 30 MHz (operation mode 1 - 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.

Retest worst case Spurious emission + band-edge from original report (FCC+ISED):

Spurious emissions from 9 kHz to 30 MHz (operation mode 61 - Pos 1):



Test equipment (please refer to chapter 6 for details)

2 – 9

5.9.3.2 Test results (30 MHz – 1 GHz) - Operation Modes– full retest MiMo FCC

Ambient temperature:	22 - 23°C
Relative humidity:	45 - 55%

Date	06 - 19.06.2023
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]

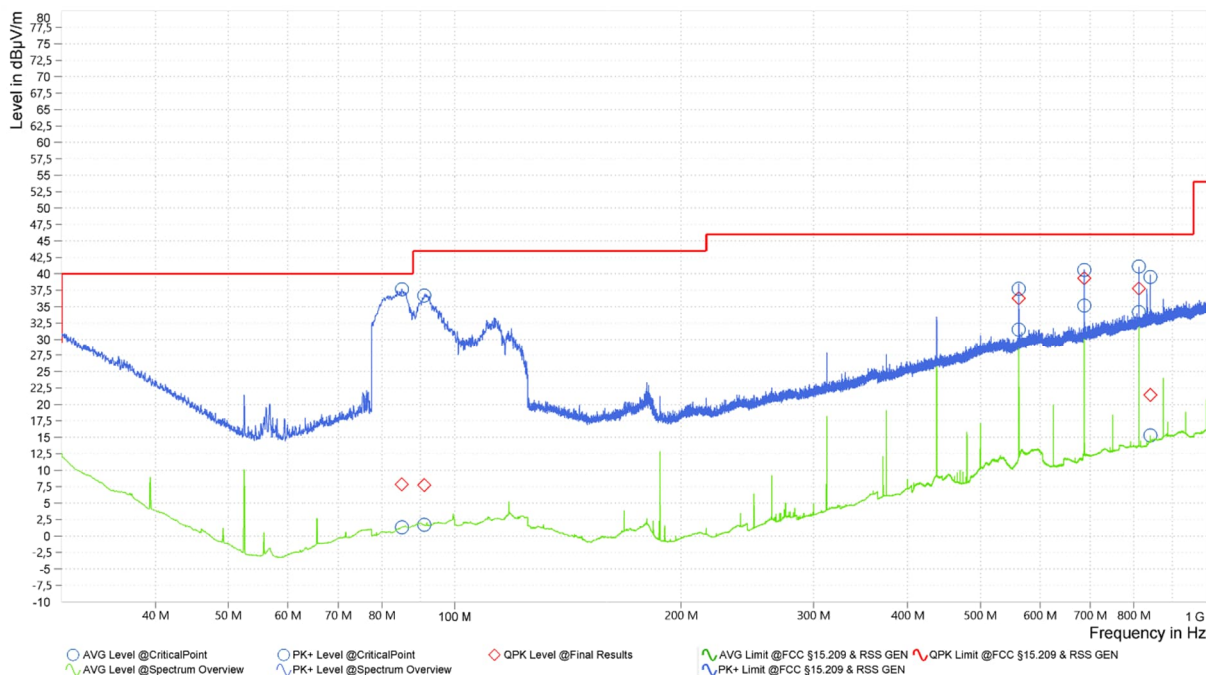
Correction [dBμV/m] = AF [dB/m] + Cable attenuation [dB] + optional preamp gain [dB]

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 1 – Pos 1-3):



Result tables

(operation mode 1):

Frequency [MHz]	Result (QP) [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Readings [dBμV]	Correction [dB/m]	Pol. (H/V)	Azimuth [deg]	Height [cm]	Position #
85.000	7.8	40.0	32.2	-9.1	16.9	V	13.4	1.7	
91.060	7.7	43.5	35.8	-9.3	17.0	V	13.2	1.7	
562.480	36.3	46.0	9.7	10.9	25.4	V	194.9	1.3	
687.490	39.3	46.0	6.7	12.3	27.1	H	49.3	1.3	
812.500	37.8	46.0	8.2	8.7	29.1	H	73.2	1.0	
841.390	21.4	46.0	24.6	-8.0	29.4	H	182.0	1.3	

(operation mode 2):

Frequency [MHz]	Result (QP) [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Readings [dBμV]	Correction [dB/m]	Pol. (H/V)	Azimuth [deg]	Height [cm]	Position #
437.500	26.6	46.0	19.4	3.8	22.7	V	212.0	1.0	1 - 3
562.480	26.1	46.0	19.9	0.8	25.4	H	306.2	1.4	1 - 3
687.490	32.8	46.0	13.2	5.7	27.1	H	134.7	1.1	1 - 3
812.500	29.1	46.0	16.9	0.0	29.1	H	32.0	1.0	1 - 3
852.700	21.0	46.0	25.0	-8.4	29.4	V	111.4	1.6	1 - 3
874.990	31.0	46.0	15.0	1.4	29.6	H	92.0	1.0	1 - 3

(operation mode 3):

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	19.2	29.5	10.3	-6.8	26.0	V	229.3	3.5	1 - 3
437.500	25.8	46.0	20.3	3.0	22.7	H	223.6	1.8	1 - 3
562.480	38.6	46.0	7.4	13.3	25.4	H	242.6	1.3	1 - 3
687.490	27.1	46.0	18.9	0.1	27.1	H	276.4	1.0	1 - 3
812.500	28.3	46.0	17.7	-0.8	29.1	H	92.0	1.0	1 - 3
874.990	29.5	46.0	16.5	0.0	29.6	H	340.4	1.0	1 - 3

(operation mode 4):

Frequency [MHz]	Result (QP) [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Readings [dBμV]	Correction [dB/m]	Pol. (H/V)	Azimuth [deg]	Height [cm]	Position #
437.500	29.3	46.0	16.7	6.6	22.7	H	246.2	1.7	1 - 3
562.480	36.4	46.0	9.6	11.0	25.4	V	194.9	1.3	1 - 3
687.490	39.3	46.0	6.7	12.3	27.1	H	52.0	1.3	1 - 3
812.500	37.7	46.0	8.3	8.6	29.1	H	73.4	1.0	1 - 3
841.030	21.5	46.0	24.5	-7.9	29.4	V	142.0	1.3	1 - 3
874.990	29.8	46.0	16.2	0.3	29.6	V	182.0	1.5	1 - 3

(operation mode 5):

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	18.5	29.5	11.0	-7.5	26.0	V	154.9	1.4	1 - 3
437.500	26.4	46.0	19.6	3.7	22.7	V	199.3	1.0	1 - 3
562.480	26.1	46.0	19.9	0.7	25.4	H	306.2	1.5	1 - 3
687.490	32.4	46.0	13.6	5.4	27.1	H	134.9	1.1	1 - 3
812.500	29.0	46.0	17.1	-0.2	29.1	H	34.9	1.0	1 - 3
874.990	29.5	46.0	16.5	-0.1	29.6	H	152.6	1.5	1 - 3

(operation mode 6):

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	18.6	29.5	10.9	-7.4	26.0	V	78.9	3.5	1 - 3
437.500	25.6	46.0	20.4	2.9	22.7	H	220.6	1.8	1 - 3
562.480	38.8	46.0	7.3	13.4	25.4	H	242.6	1.3	1 - 3
687.490	27.7	46.0	18.3	0.6	27.1	H	242.0	1.0	1 - 3
812.500	28.3	46.0	17.7	-0.9	29.1	H	92.0	1.0	1 - 3
874.990	29.4	46.0	16.6	-0.1	29.6	H	340.8	1.0	1 - 3

(operation mode 7):

Frequency [MHz]	Result (QP) [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Readings [dBμV]	Correction [dB/m]	Pol. (H/V)	Azimuth [deg]	Height [cm]	Position #
437.500	29.3	46.0	16.7	6.6	22.7	H	246.4	1.8	1 - 3
562.480	36.2	46.0	9.8	10.9	25.4	V	201.4	1.3	1 - 3
687.490	39.3	46.0	6.7	12.2	27.1	H	52.0	1.3	1 - 3
812.500	37.9	46.0	8.1	8.8	29.1	H	73.2	1.0	1 - 3
832.480	21.8	46.0	24.2	-7.5	29.3	H	62.0	1.3	1 - 3
874.990	29.2	46.0	16.8	-0.3	29.6	H	126.2	1.5	1 - 3

(operation mode 8):

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	18.2	29.5	11.3	-7.8	26.0	H	199.1	1.3	1 - 3
437.500	26.2	46.0	19.8	3.5	22.7	V	212.0	1.0	1 - 3
562.480	26.1	46.0	19.9	0.8	25.4	H	306.2	1.5	1 - 3
687.490	32.6	46.0	13.4	5.5	27.1	H	134.7	1.1	1 - 3
812.500	28.8	46.0	17.2	-0.3	29.1	H	34.9	1.1	1 - 3
874.990	31.0	46.0	15.0	1.5	29.6	H	92.0	1.0	1 - 3

(operation mode 9):

Frequency [MHz]	Result (QP) [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Readings [dBμV]	Correction [dB/m]	Pol. (H/V)	Azimuth [deg]	Height [cm]	Position #
30.030	18.6	40.0	21.4	-7.3	26.0	V	215.3	1.3	1 - 3
437.500	25.0	46.0	21.0	2.3	22.7	H	216.6	1.7	1 - 3
562.480	38.7	46.0	7.3	13.3	25.4	H	242.6	1.3	1 - 3
687.490	27.3	46.0	18.7	0.2	27.1	H	276.4	1.0	1 - 3
812.500	28.2	46.0	17.8	-0.9	29.1	H	92.0	1.0	1 - 3
874.990	29.3	46.0	16.7	-0.2	29.6	H	340.6	1.0	1 - 3

5.9.3.3 Test results (30 MHz – 1 GHz) - full retest MiMo FCC&ISED

Ambient temperature:	23°C
Relative humidity:	55%

Date	09.06.2023
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]

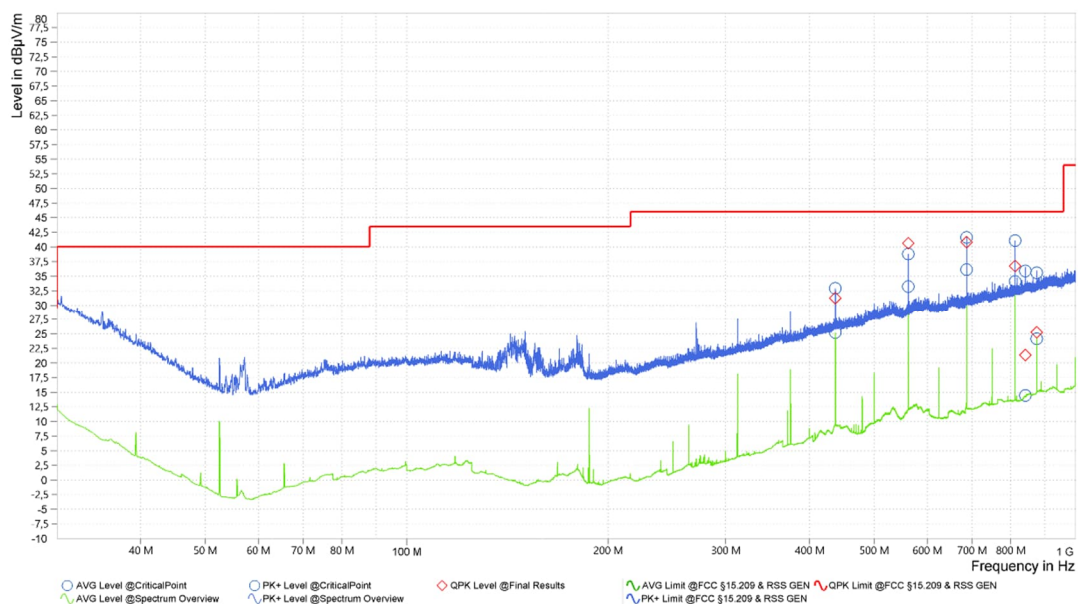
Correction [dBμV/m] = AF [dB/m] + Cable attenuation [dB] + optional preamp gain [dB]

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 13 – Pos 1-3):



Result tables

(operation mode 13):

Frequency [MHz]	Result (QP) [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Readings [dBμV]	Correction [dB/m]	Pol. (H/V)	Azimuth [deg]	Height [cm]	Position #
437.500	31.2	46.0	14.8	8.5	22.7	H	246.2	1.8	1 - 3
562.480	40.6	46.0	5.4	15.3	25.4	V	202.0	1.3	1 - 3
687.490	40.8	46.0	5.2	13.7	27.1	H	49.3	1.3	1 - 3
812.500	36.7	46.0	9.3	7.6	29.1	H	73.6	1.0	1 - 3
841.330	21.4	46.0	24.6	-8.0	29.4	V	47.6	1.3	1 - 3
874.990	25.3	46.0	20.7	-4.3	29.6	H	152.0	1.3	1 - 3

(operation mode 14):

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	18.3	29.5	11.2	-7.7	26.0	H	220.6	1.3	1 - 3
375.010	21.4	46.0	24.6	0.1	21.3	H	126.4	1.0	1 - 3
437.500	26.4	46.0	19.6	3.6	22.7	V	202.0	1.0	1 - 3
562.480	26.2	46.0	19.8	0.9	25.4	H	352.0	1.4	1 - 3
687.490	32.6	46.0	13.4	5.5	27.1	H	134.9	1.1	1 - 3
874.990	30.9	46.0	15.1	1.3	29.6	H	94.9	1.0	1 - 3

(operation mode 15):

Frequency [MHz]	Result (QP) [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Readings [dBμV]	Correction [dB/m]	Pol. (H/V)	Azimuth [deg]	Height [cm]	Position #
437.500	23.2	46.0	22.8	0.5	22.7	V	92.0	1.1	1 - 3
562.480	32.6	46.0	13.5	7.2	25.4	H	254.7	1.2	1 - 3
687.490	30.8	46.0	15.2	3.7	27.1	H	223.6	1.0	1 - 3
812.500	32.6	46.0	13.4	3.5	29.1	H	246.6	1.5	1 - 3
858.290	25.4	46.0	20.6	-3.9	29.3	V	9.3	1.0	1 - 3
874.990	29.0	46.0	17.0	-0.5	29.6	V	220.6	1.0	1 - 3

Test result: Passed

5.9.3.4 Test results (30 MHz – 1 GHz) - (FCC+ISED)

Ambient temperature:	22°C
Relative humidity:	31 - 48%

Date	19.05 - 06.06.2023
Tested by	P. NEUFELD

Remark: Retest worst case Spurious emission + band-edge from original report

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]

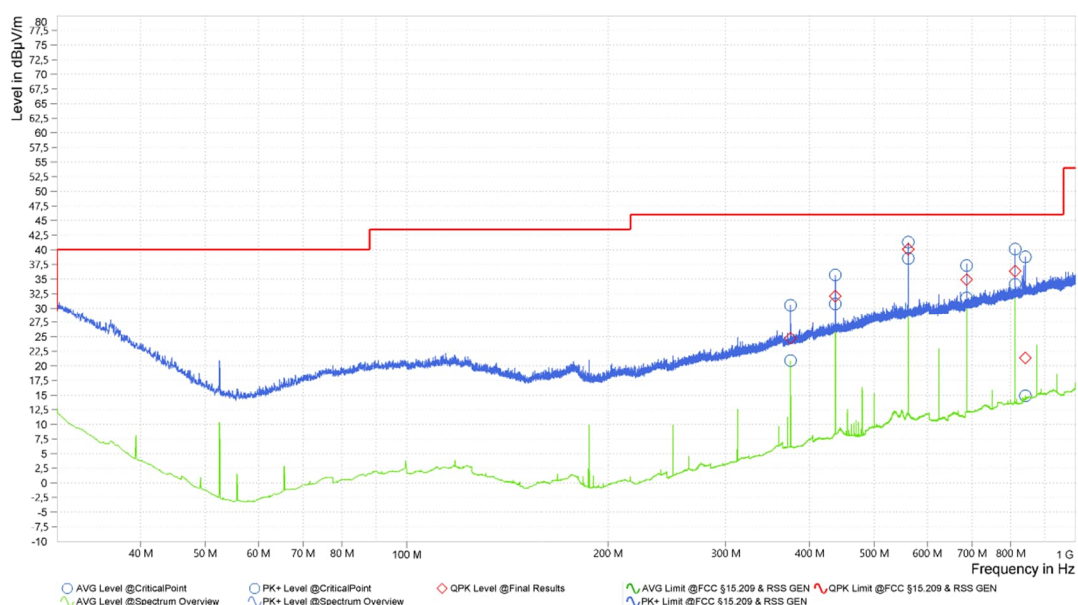
Correction [dBμV/m] = AF [dB/m] + Cable attenuation [dB] + optional preamp gain [dB]

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 65 – Pos 1-3):



Result tables

(operation mode 62):

Frequency [MHz]	Result (QP) [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Readings [dB μ V]	Correction [dB/m]	Pol. (H/V)	Azimuth [deg]	Height [cm]	Position #
30.000	18.3	29.5	11.2	-7.7	26.0	V	319.3	1.3	1 - 3
437.500	23.1	46.0	22.9	0.3	22.7	V	258.9	1.3	1 - 3
562.480	31.2	46.0	14.8	5.8	25.4	H	122.0	1.6	1 - 3
687.490	30.1	46.0	15.9	3.0	27.1	H	223.2	1.0	1 - 3
812.500	31.9	46.0	14.1	2.8	29.1	H	246.2	1.5	1 - 3
874.990	29.8	46.0	16.2	0.2	29.6	H	242.0	1.3	1 - 3

(operation mode 63):

Frequency [MHz]	Result (QP) [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Readings [dB μ V]	Correction [dB/m]	Pol. (H/V)	Azimuth [deg]	Height [cm]	Position #
437.500	32.1	46.0	13.9	9.3	22.7	H	246.4	1.6	1 - 3
562.480	39.9	46.0	6.1	14.5	25.4	V	202.0	1.3	1 - 3
687.490	34.7	46.0	11.3	7.6	27.1	H	49.1	1.3	1 - 3
812.500	36.5	46.0	9.5	7.3	29.1	H	73.4	1.0	1 - 3
833.380	21.8	46.0	24.2	-7.5	29.3	H	82.0	1.4	1 - 3
931.270	22.2	46.0	23.8	-7.9	30.2	H	190.6	1.2	1 - 3

(operation mode 64):

Frequency [MHz]	Result (QP) [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Readings [dB μ V]	Correction [dB/m]	Pol. (H/V)	Azimuth [deg]	Height [cm]	Position #
437.500	32.0	46.0	14.0	9.3	22.7	H	246.2	1.7	1 - 3
562.480	40.0	46.0	6.0	14.6	25.4	V	202.0	1.3	1 - 3
687.490	35.4	46.0	10.6	8.3	27.1	H	52.0	1.3	1 - 3
812.500	36.7	46.0	9.3	7.6	29.1	H	69.1	1.1	1 - 3
832.630	30.9	46.0	15.1	1.6	29.3	V	39.1	1.3	1 - 3
841.390	27.8	46.0	18.2	-1.6	29.4	V	193.4	1.5	1 - 3

(operation mode 65):

Frequency [MHz]	Result (QP) [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Readings [dBμV]	Correction [dB/m]	Pol. (H/V)	Azimuth [deg]	Height [cm]	Position #
375.010	24.7	46.0	21.3	3.5	21.3	H	186.4	1.0	1 - 3
437.500	32.1	46.0	13.9	9.3	22.7	H	246.2	1.7	1 - 3
562.480	40.1	46.0	5.9	14.7	25.4	V	202.0	1.3	1 - 3
687.490	34.9	46.0	11.1	7.8	27.1	H	52.0	1.3	1 - 3
812.500	36.4	46.0	9.7	7.2	29.1	H	73.6	1.0	1 - 3
841.480	21.4	46.0	24.6	-8.0	29.4	V	171.4	1.0	1 - 3

Test result: Passed

Test equipment (please refer to chapter 6 for details)

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5.9.3.5 Test results (above 1 GHz) Operation Modes– full retest MiMo FCC

Ambient temperature:	22 – 24°C
Relative humidity:	39 - 59%

Date	12.06 – 14.07.2023
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 (68.3 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)

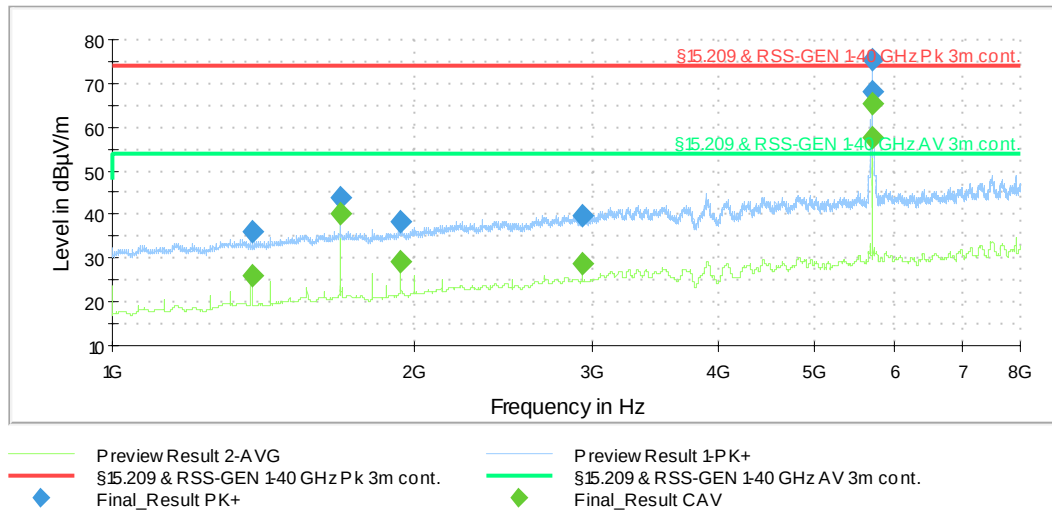
Margin [dB] = Limit [dBμV/m] – Max Peak | Average [dBμV/m]

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.

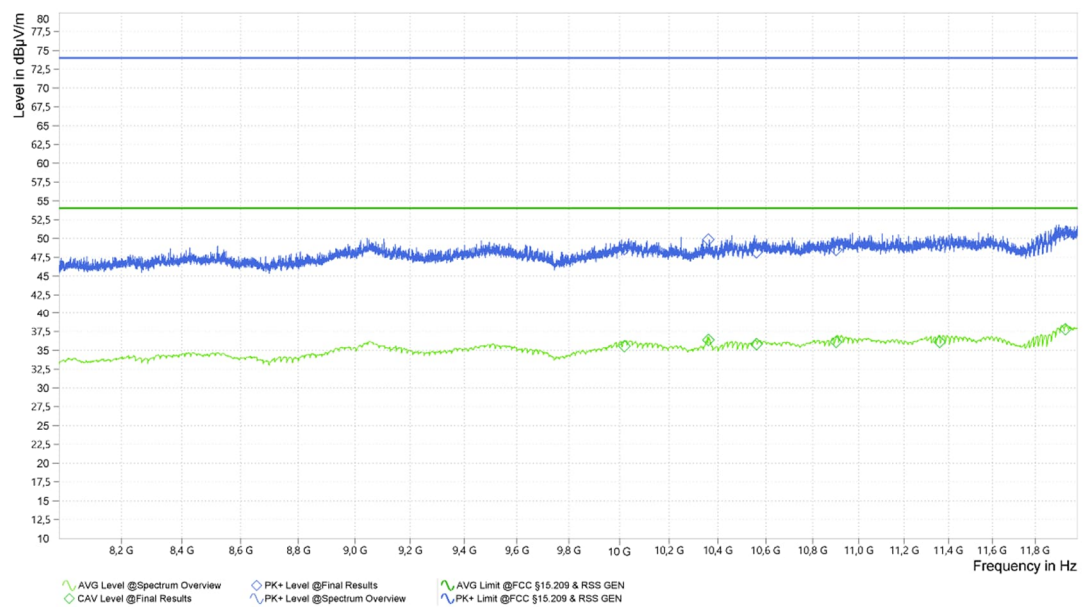
The top measured curve represents the peak measurement. The measured points marked with "◇" are frequency points for the final peak detector measurement. These values are indicated in the following table. The bottom measured curve represents the average measurement. The measured points marked with "◇"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

Worst case plots:

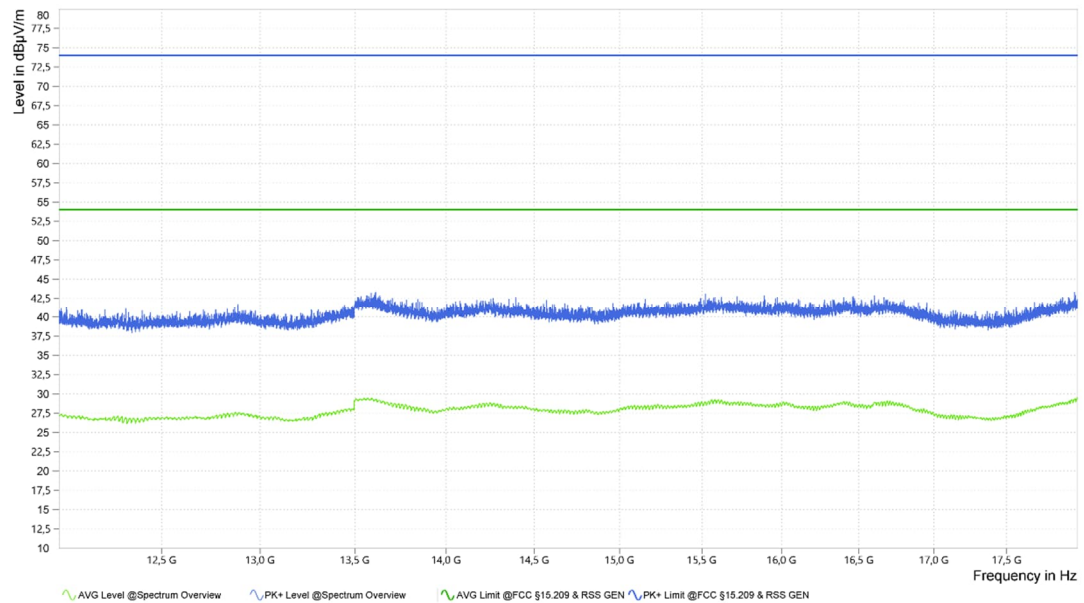
Spurious emissions from 1 GHz to 8 GHz (operation mode 9):



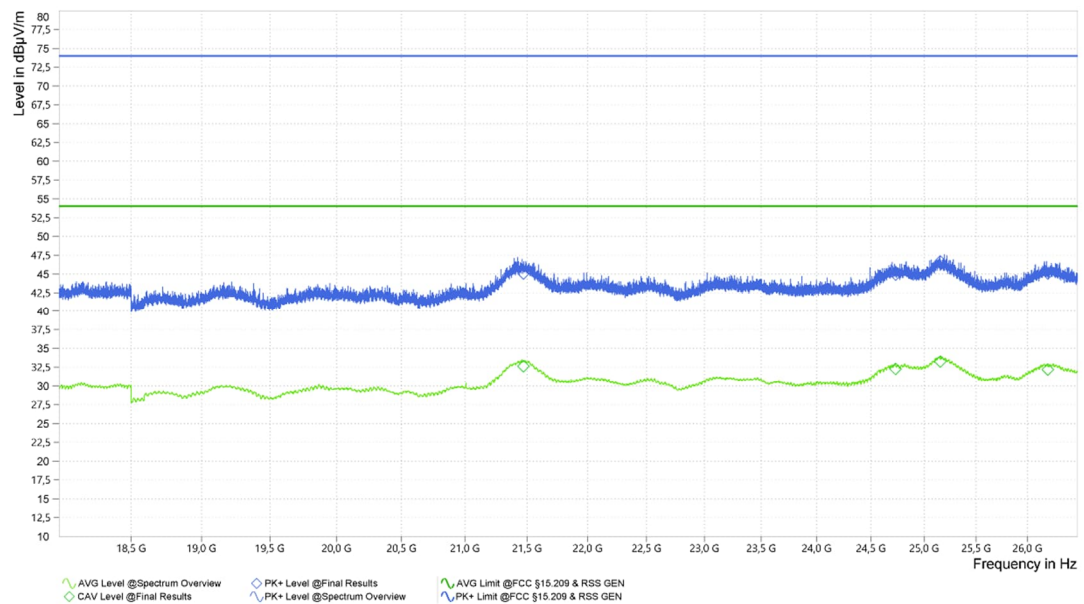
Spurious emissions from 8 GHz to 12 GHz (operation mode 1):



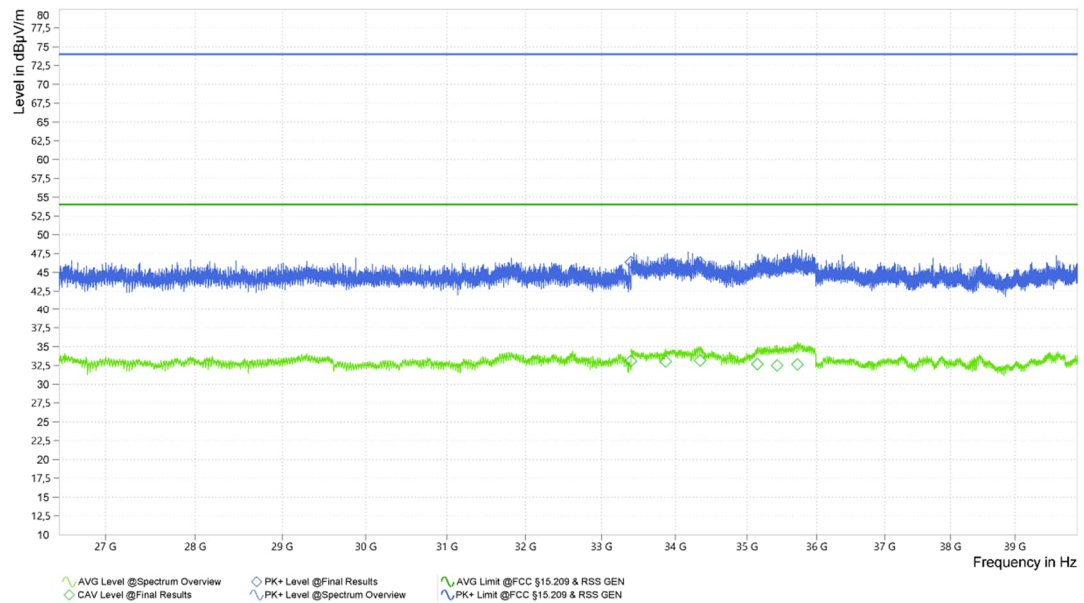
Spurious emissions from 12 GHz to 18 GHz (operation mode 1):



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



Spurious emissions from 26.5 GHz to 40 GHz (operation mode 1):



5.9.3.5.1 Result tables

Operation mode 1:

Frequency [MHz]	PK+ [dBμV/m]	AV [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Pol	Azimuth [deg]	Elevation [deg]	Corr. [dB/m]
5150.000	---	28.9	54.0	25.1	H	224	120	-1.5
5150.000	49.9	---	68.3	18.4	H	224	120	-1.5
5180.000	---	45.2	54.0	8.8	H	237	120	-1.5
5180.000	56.7	---	68.3	11.6	H	237	120	-1.5

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]
10019.500	48.6	68.3	19.7	35.6	54.0	18.4	20.3	V	150.0	229.1
10360.250	49.9	68.3	18.5	36.4	54.0	17.6	19.6	H	90.0	210.0
10560.000	48.2	68.3	20.1	35.8	54.0	18.2	20.2	V	90.0	354.1
10901.250	48.5	68.3	19.8	36.1	54.0	17.9	21.6	V	150.0	372.5
11359.750	49.1	68.3	19.2	36.1	54.0	17.9	21.7	V	120.0	223.4
11942.500	50.7	68.3	17.6	37.8	54.0	16.2	23.2	H	150.0	2.6
21472.250	45.1	68.3	23.2	32.6	54.0	21.4	11.4	V	120.0	338.3
24731.250	44.9	68.3	23.4	32.3	54.0	21.7	11.2	H	120.0	62.2
25154.500	46.7	68.3	21.6	33.2	54.0	20.8	11.5	H	30.0	30.8
26202.750	45.1	68.3	23.2	32.2	54.0	21.8	11.8	V	120.0	236.8
33393.250	46.4	68.3	21.9	33.1	54.0	20.9	19.8	V	150.0	329.6
33865.750	46.0	68.3	22.3	33.0	54.0	21.0	20.1	V	30.0	25.6
34339.750	46.3	68.3	22.0	33.2	54.0	20.9	19.8	H	90.0	148.0
35144.000	45.7	68.3	22.6	32.7	54.0	21.3	20.1	V	150.0	117.6
35428.500	45.2	68.3	23.1	32.5	54.0	21.5	20.2	V	150.0	170.8
35716.750	45.7	68.3	22.6	32.6	54.0	21.4	20.3	V	0.0	20.2

Operation mode 2:

Frequency [MHz]	PK+ [dBμV/m]	AV [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Pol	Azimuth [deg]	Elevation [deg]	Corr. [dB/m]
5150.000	46.9	---	68.3	21.4	V	186	0	-1.5
5150.000	---	29.1	54.0	24.9	V	186	0	-1.5
5200.000	43.6	---	68.3	24.7	V	97	0	-1.6
5200.000	---	31.0	54.0	23.0	V	97	0	-1.6

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]
10021.750	48.2	68.3	20.1	35.6	54.0	18.4	20.3	V	90.0	123.1
10401.500	49.5	68.3	18.8	36.5	54.0	17.5	19.6	H	90.0	56.6
10921.250	48.7	68.3	19.6	36.3	54.0	17.7	21.7	V	120.0	179.1
11358.500	48.9	68.3	19.4	36.0	54.0	18.0	21.7	V	90.0	83.6
11576.750	48.8	68.3	19.5	36.3	54.0	17.7	21.5	V	90.0	37.3
11941.750	50.7	68.3	17.6	37.9	54.0	16.2	23.2	H	90.0	244.7
21483.250	44.8	68.3	23.5	32.5	54.0	21.5	11.5	V	150.0	342.9
24729.000	45.9	68.3	22.5	32.2	54.0	21.8	11.2	V	150.0	81.6
25124.250	46.1	68.3	22.2	33.1	54.0	20.9	11.6	H	60.0	315.2
26183.500	44.7	68.3	23.7	32.2	54.0	21.8	11.8	V	150.0	15.2
33394.750	45.4	68.3	22.9	33.0	54.0	21.0	19.8	H	30.0	105.8
33925.750	46.3	68.3	22.0	33.0	54.0	21.0	20.1	V	120.0	137.7
34319.000	45.6	68.3	22.8	33.0	54.0	21.0	19.8	H	120.0	59.6
35147.750	45.5	68.3	22.8	32.6	54.0	21.4	20.2	H	120.0	251.7
35508.500	45.1	68.3	23.2	32.8	54.0	21.2	20.3	V	60.0	81.6
35942.750	45.9	68.3	22.4	32.6	54.0	21.4	20.0	H	120.0	271.6

Operation mode 3:

Frequency [MHz]	PK+ [dBμV/m]	AV [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Pol	Azimuth [deg]	Elevation [deg]	Corr. [dB/m]
5150.000	---	27.9	54.0	26.1	V	60	0	-1.5
5150.000	40.4	---	68.3	27.9	V	60	0	-1.5
5220.000	55.8	---	68.3	12.5	V	185	0	-1.6
5220.000	---	29.6	54.0	24.4	V	185	0	-1.6
5240.000	44.3	---	68.3	24.0	V	11	0	-0.9
5240.000	---	32.2	54.0	21.8	V	11	0	-0.9

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]
10026.000	49.0	68.3	19.3	35.6	54.0	18.5	20.3	V	150.0	124.0
10480.000	50.2	68.3	18.1	37.1	54.0	17.0	20.0	H	90.0	208.4
10921.750	48.9	68.3	19.4	36.2	54.0	17.8	21.7	V	120.0	298.2
11378.500	49.0	68.3	19.3	36.2	54.0	17.8	21.7	V	120.0	41.5
11594.500	48.9	68.3	19.4	36.3	54.0	17.7	21.5	V	150.0	188.0
11944.250	50.4	68.3	17.9	37.9	54.0	16.2	23.2	V	90.0	92.5
21481.750	45.2	68.3	23.1	32.5	54.0	21.5	11.5	H	90.0	259.8
24729.750	45.1	68.3	23.2	32.2	54.0	21.8	11.2	V	90.0	77.7
25150.750	45.9	68.3	22.4	33.2	54.0	20.8	11.5	V	120.0	43.8
26219.250	44.9	68.3	23.4	32.1	54.0	21.9	11.8	V	120.0	29.0
33393.500	46.0	68.3	22.3	33.0	54.0	21.0	19.8	H	60.0	273.7
33971.500	45.5	68.3	22.8	33.0	54.0	21.0	20.1	H	60.0	291.0
34321.250	45.5	68.3	22.8	33.1	54.0	20.9	19.8	V	120.0	369.7
35155.000	45.3	68.3	23.0	32.7	54.0	21.3	20.2	H	120.0	317.7
35606.750	45.0	68.3	23.3	32.7	54.0	21.3	20.4	V	120.0	293.8
35940.500	45.7	68.3	22.6	33.0	54.0	21.0	20.0	V	60.0	379.2

Operation mode 4:

Frequency [MHz]	PK+ [dBµV/m]	AV [dBµV/m]	Limit [dBµV/m]	Margin [dB]	Pol	Azimuth [deg]	Elevation [deg]	Corr. [dB/m]
5150.000	41.7	---	68.3	26.6	V	213	0	-1.5
5150.000	---	28.6	54.0	25.4	V	213	0	-1.5
5260.000	59.0	---	68.3	9.3	H	186	0	-0.9
5260.000	---	47.9	54.0	6.1	H	186	0	-0.9
5350.000	---	29.4	54.0	24.6	V	315	0	-0.4
5350.000	41.8	---	68.3	26.5	V	315	0	-0.4

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]
9060.000	49.1	68.3	19.3	35.6	54.0	18.4	19.3	V	120.0	114.6
10519.250	49.7	68.3	18.6	36.7	54.0	17.3	20.1	H	90.0	209.9
10907.250	48.3	68.3	20.0	36.3	54.0	17.7	21.6	H	90.0	110.4
11377.500	48.3	68.3	20.0	36.1	54.0	17.9	21.7	V	30.0	309.5
11581.250	48.9	68.3	19.4	36.3	54.0	17.7	21.5	H	120.0	203.4
11942.750	50.9	68.3	17.5	37.8	54.0	16.2	23.2	V	120.0	179.7
21488.500	45.5	68.3	22.8	32.5	54.0	21.6	11.5	V	90.0	-4.1
24727.000	45.5	68.3	22.8	32.2	54.0	21.8	11.2	H	150.0	258.7
25134.250	45.7	68.3	22.7	33.1	54.0	20.9	11.6	H	30.0	319.8
26199.000	45.4	68.3	22.9	32.1	54.0	21.9	11.8	H	60.0	180.5
33425.750	45.7	68.3	22.6	33.1	54.0	20.9	19.8	H	150.0	201.0
33961.500	46.0	68.3	22.3	32.8	54.0	21.2	20.1	H	120.0	36.1
34350.750	46.0	68.3	22.4	33.1	54.0	20.9	19.8	V	120.0	57.6
35143.500	45.2	68.3	23.1	32.5	54.0	21.6	20.1	H	90.0	211.6
35571.000	45.6	68.3	22.7	32.7	54.0	21.3	20.4	H	120.0	61.6
35938.000	45.7	68.3	22.6	32.8	54.0	21.2	20.0	H	0.0	13.7

Operation mode 5:

Frequency [MHz]	PK+ [dBμV/m]	AV [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Pol	Azimuth [deg]	Elevation [deg]	Corr. [dB/m]
5150.000	41.7	---	68.3	26.6	V	213	0	-1.5
5150.000	---	28.6	54.0	25.4	V	213	0	-1.5
5260.000	59.0	---	68.3	9.3	H	186	0	-0.9
5260.000	---	47.9	54.0	6.1	H	186	0	-0.9
5350.000	---	29.4	54.0	24.6	V	315	0	-0.4
5350.000	41.8	---	68.3	26.5	V	315	0	-0.4

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]
9055.750	48.1	68.3	20.2	35.5	54.0	18.5	19.3	V	90.0	106.8
10597.750	49.8	68.3	18.5	36.5	54.0	17.5	20.4	H	90.0	226.2
10919.500	49.4	68.3	18.9	36.2	54.0	17.8	21.7	V	150.0	288.4
11388.500	48.8	68.3	19.5	36.2	54.0	17.8	21.7	V	120.0	377.5
11599.250	49.6	68.3	18.7	36.2	54.0	17.8	21.4	H	90.0	131.6
11942.250	50.0	68.3	18.4	37.8	54.0	16.2	23.2	H	120.0	296.3
21473.250	45.1	68.3	23.2	32.6	54.0	21.4	11.4	V	150.0	226.2
24710.750	44.8	68.3	23.5	32.3	54.0	21.8	11.3	V	150.0	236.8
25156.250	46.1	68.3	22.2	33.2	54.0	20.8	11.5	H	150.0	353.4
26252.000	45.5	68.3	22.8	32.1	54.0	21.9	12.0	H	0.0	350.6
29653.250	46.0	68.3	22.3	32.9	54.0	21.1	18.1	H	60.0	203.8
33394.750	45.2	68.3	23.1	32.3	54.0	21.7	19.8	H	0.0	115.6
33959.250	45.7	68.3	22.6	33.0	54.0	21.0	20.1	H	30.0	11.7
34311.750	45.7	68.3	22.6	32.9	54.0	21.1	19.8	V	90.0	63.7
35147.000	44.6	68.3	23.7	32.0	54.0	22.1	20.2	V	150.0	181.6
35974.000	44.2	68.3	24.2	31.4	54.0	22.6	19.9	H	0.0	38.1

Operation mode 6:

Frequency [MHz]	PK+ [dBμV/m]	AV [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Pol	Azimuth [deg]	Elevation [deg]	Corr. [dB/m]
5150.000	---	29.8	54.0	24.2	V	1	0	-1.5
5150.000	42.1	---	68.3	26.2	V	1	0	-1.5
5320.000	59.7	---	68.3	8.6	H	170	30	-0.7
5320.000	---	47.9	54.0	6.1	H	170	30	-0.7
5350.000	54.6	---	68.3	13.7	V	186	0	-0.4
5350.000	---	33.5	54.0	20.5	V	186	0	-0.4

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]
9054.000	48.9	68.3	19.4	35.6	54.0	18.4	19.3	V	150.0	180.6
10635.750	49.7	68.3	18.6	36.1	54.0	17.9	20.4	H	60.0	119.2
10904.500	48.7	68.3	19.6	36.2	54.0	17.8	21.6	V	0.0	15.9
11378.000	49.0	68.3	19.3	36.1	54.0	17.9	21.7	V	90.0	256.7
11594.500	49.4	68.3	19.0	36.2	54.0	17.8	21.5	H	90.0	377.0
11942.750	50.5	68.3	17.8	37.8	54.0	16.2	23.2	V	60.0	251.9
21462.500	45.2	68.3	23.1	32.6	54.0	21.4	11.4	V	120.0	379.2
24709.500	45.1	68.3	23.2	32.2	54.0	21.8	11.3	V	60.0	59.0
25182.500	46.4	68.3	22.0	33.0	54.0	21.0	11.5	H	60.0	22.1
26199.250	44.4	68.3	23.9	32.1	54.0	21.9	11.8	V	30.0	153.9
33394.500	46.3	68.3	22.0	33.0	54.0	21.1	19.8	V	30.0	161.7
33960.000	45.8	68.3	22.5	32.9	54.0	21.1	20.1	V	90.0	292.4
34323.500	45.7	68.3	22.6	33.1	54.0	21.0	19.8	V	0.0	187.7
35176.000	45.0	68.3	23.3	32.5	54.0	21.5	20.1	V	150.0	155.7
35391.250	45.5	68.3	22.8	32.2	54.0	21.8	20.2	V	0.0	37.7
35938.750	45.1	68.3	23.2	32.8	54.0	21.2	20.0	V	30.0	263.8

Operation mode 7:

Frequency [MHz]	PK+ [dBμV/m]	AV [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Pol	Azimuth [deg]	Elevation [deg]	Corr. [dB/m]
5470.000	50.6	---	68.3	17.7	V	162	0	-0.4
5470.000	---	30.3	54.0	23.7	V	162	0	-0.4
5485.250	61.9	---	68.3	6.4	V	161	0	-0.4
5485.250	---	32.4	54.0	21.6	V	161	0	-0.4
5500.000	44.1	---	68.3	24.2	V	150	0	-0.4
5500.000	---	32.0	54.0	22.0	V	150	0	-0.4
5725.000	40.3	---	68.3	28.0	V	111	0	0.1
5725.000	---	28.3	54.0	25.7	V	111	0	0.1

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]
9058.250	48.2	68.3	20.1	35.6	54.0	18.4	19.3	H	90.0	167.0
10555.000	47.9	68.3	20.5	35.8	54.0	18.2	20.2	V	150.0	247.2
10921.750	49.1	68.3	19.2	36.3	54.0	17.7	21.7	V	90.0	290.2
11375.000	48.7	68.3	19.7	36.3	54.0	17.8	21.7	V	90.0	162.2
11590.250	48.9	68.3	19.4	36.3	54.0	17.7	21.5	V	90.0	363.8
11927.250	50.4	68.3	17.9	37.7	54.0	16.3	22.9	H	150.0	135.5
21480.250	44.9	68.3	23.4	32.5	54.0	21.5	11.5	H	150.0	56.2
24726.750	45.1	68.3	23.2	32.3	54.0	21.8	11.3	H	90.0	29.0
25148.500	46.2	68.3	22.1	33.2	54.0	20.8	11.5	H	120.0	352.7
26199.250	44.7	68.3	23.6	32.1	54.0	21.9	11.8	H	60.0	300.8
33396.250	46.1	68.3	22.2	32.9	54.0	21.1	19.8	V	30.0	29.6
33958.250	45.1	68.3	23.2	32.7	54.0	21.3	20.1	H	90.0	96.1

Operation mode 8:

Frequency [MHz]	PK+ [dBμV/m]	AV [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Pol	Azimuth [deg]	Elevation [deg]	Corr. [dB/m]
1000.000	32.0	---	68.3	36.3	H	31	150	-17.8
1000.000	---	23.3	68.3	45.0	H	31	150	-17.8
1375.000	35.5	---	68.3	32.8	V	10	30	-15.1
1375.000	---	26.0	54.0	28.0	V	10	30	-15.1
1687.500	44.5	---	68.3	23.8	H	324	0	-13.0
1687.500	---	40.4	54.0	13.6	H	324	0	-13.0
1937.500	37.9	---	68.3	30.4	H	348	120	-12.0
1937.500	---	29.6	54.0	24.4	H	348	120	-12.0
2937.500	39.9	---	68.3	28.4	H	330	0	-8.2
2937.500	---	28.7	54.0	25.3	H	330	0	-8.2
5572.250	---	53.1	54.0	0.9	V	255	150	0.0
5572.250	63.4	---	68.3	4.9	V	255	150	0.0
5587.750	63.1	---	68.3	5.2	H	151	60	-0.1
5587.750	---	53.0	54.0	1.0	H	151	60	-0.1

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]
9058.250	48.2	68.3	20.1	35.6	54.0	18.4	19.3	H	90.0	167.0
10555.000	47.9	68.3	20.5	35.8	54.0	18.2	20.2	V	150.0	247.2
10921.750	49.1	68.3	19.2	36.3	54.0	17.7	21.7	V	90.0	290.2
11375.000	48.7	68.3	19.7	36.3	54.0	17.8	21.7	V	90.0	162.2
11590.250	48.9	68.3	19.4	36.3	54.0	17.7	21.5	V	90.0	363.8
11927.250	50.4	68.3	17.9	37.7	54.0	16.3	22.9	H	150.0	135.5
21480.250	44.9	68.3	23.4	32.5	54.0	21.5	11.5	H	150.0	56.2
24726.750	45.1	68.3	23.2	32.3	54.0	21.8	11.3	H	90.0	29.0
25148.500	46.2	68.3	22.1	33.2	54.0	20.8	11.5	H	120.0	352.7
26199.250	44.7	68.3	23.6	32.1	54.0	21.9	11.8	H	60.0	300.8
33396.250	46.1	68.3	22.2	32.9	54.0	21.1	19.8	V	30.0	29.6
33958.250	45.1	68.3	23.2	32.7	54.0	21.3	20.1	H	90.0	96.1

Operation mode 9:

Frequency [MHz]	PK+ [dBμV/m]	AV [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Pol	Azimuth [deg]	Elevation [deg]	Corr. [dB/m]
1375.000	---	26.1	54.0	27.9	V	19	0	-15.1
1375.000	35.9	---	68.3	32.4	V	19	0	-15.1
1687.500	43.9	---	68.3	24.4	H	304	120	-13.0
1687.500	---	40.0	54.0	14.0	H	304	120	-13.0
1937.500	38.2	---	68.3	30.1	H	353	150	-12.0
1937.500	---	29.4	54.0	24.6	H	353	150	-12.0
2937.500	39.6	---	68.3	28.7	H	332	150	-8.2
2937.500	---	28.8	54.0	25.2	H	332	150	-8.2
5692.750	---	57.6	Fund.	-	H	173	120	0.2
5692.750	68.0	---	68.3	0.3	H	173	120	0.2
5707.750	75.3	---	Fund.	-	H	174	120	0.0
5707.750	---	65.4	Fund.	-	H	174	120	0.0

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]
9051.500	48.0	68.3	20.3	35.6	54.0	18.4	19.3	V	0.0	226.8
10028.750	48.3	68.3	20.1	35.7	54.0	18.4	20.3	V	30.0	183.4
10918.000	49.1	68.3	19.2	36.3	54.0	17.7	21.7	V	60.0	163.5
11373.500	49.5	68.3	18.8	36.1	54.0	17.9	21.7	H	150.0	112.4
11596.750	49.1	68.3	19.2	36.3	54.0	17.7	21.5	V	90.0	348.5
11927.750	50.2	68.3	18.1	37.7	54.0	16.3	22.9	H	90.0	248.1
21469.750	44.9	68.3	23.4	32.5	54.0	21.5	11.4	H	120.0	2.7
24732.000	45.0	68.3	23.3	32.2	54.0	21.8	11.2	V	120.0	66.3
25152.500	46.2	68.3	22.1	33.2	54.0	20.8	11.5	V	0.0	103.8
26195.000	44.8	68.3	23.5	32.1	54.0	21.9	11.8	V	30.0	312.6
33393.000	45.9	68.3	22.4	32.9	54.0	21.1	19.8	H	30.0	327.6
33941.500	46.2	68.3	22.2	32.9	54.0	21.2	20.1	V	60.0	147.6

Test result: Passed

5.9.3.6 Test results (above 1 GHz) Operation Modes– full retest MiMo ISED only

Ambient temperature:	22 - 24°C
Relative humidity:	39 - 58%

Date	13.06 – 12.07.2023
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 (68.3 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)

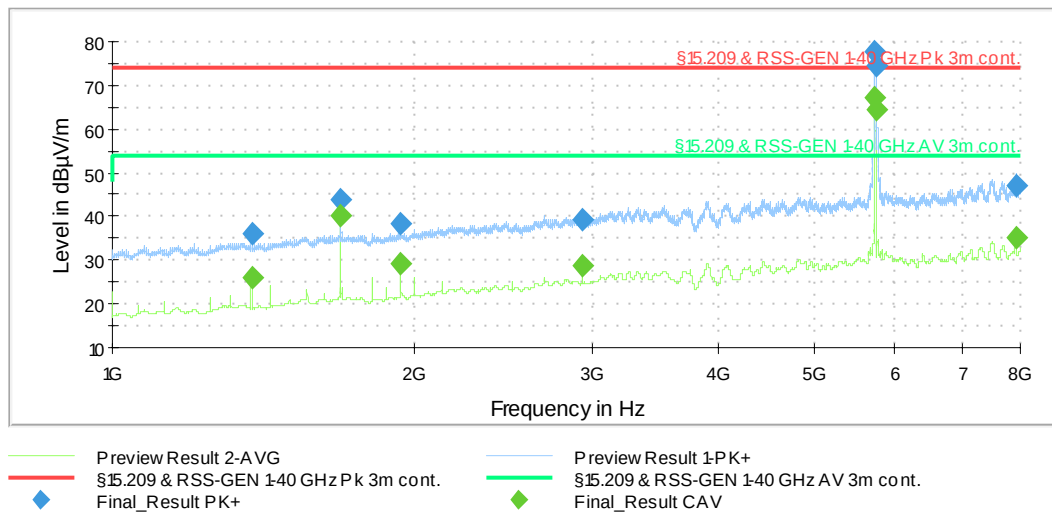
Margin [dB] = Limit [dBμV/m] – Max Peak | Average [dBμV/m]

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.

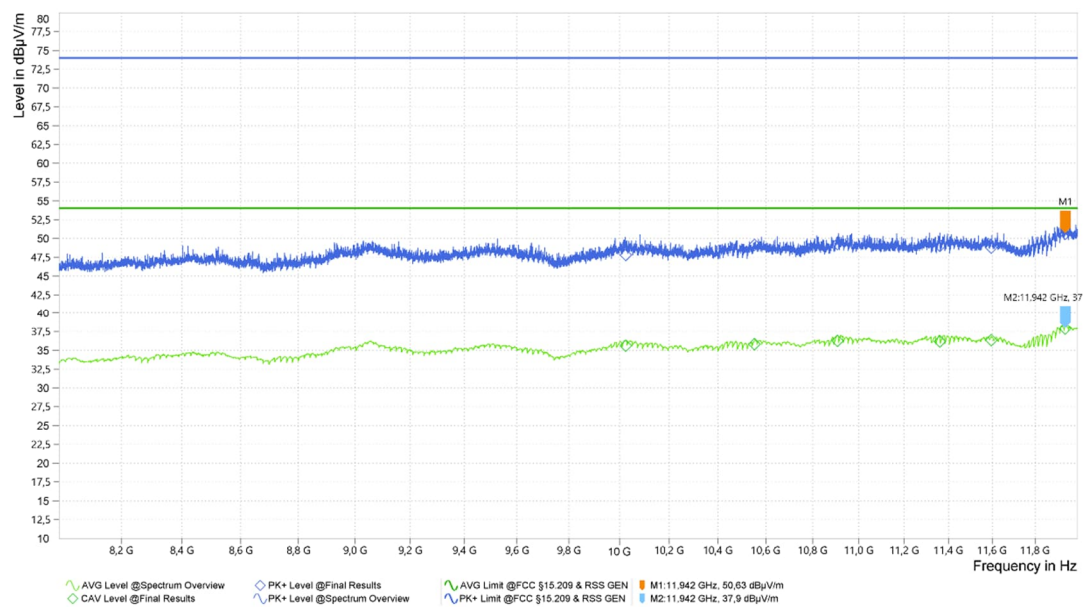
The top measured curve represents the peak measurement. The measured points marked with "◇" are frequency points for the final peak detector measurement. These values are indicated in the following table. The bottom measured curve represents the average measurement. The measured points marked with "◇"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

Worst case plots:

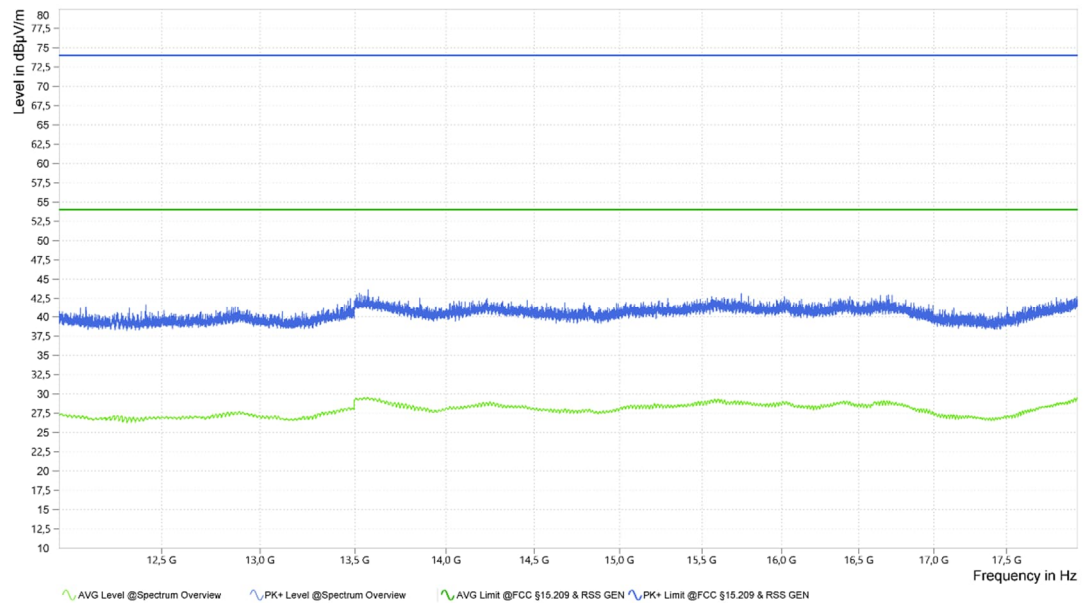
Spurious emissions from 1 GHz to 8 GHz (operation mode 10):



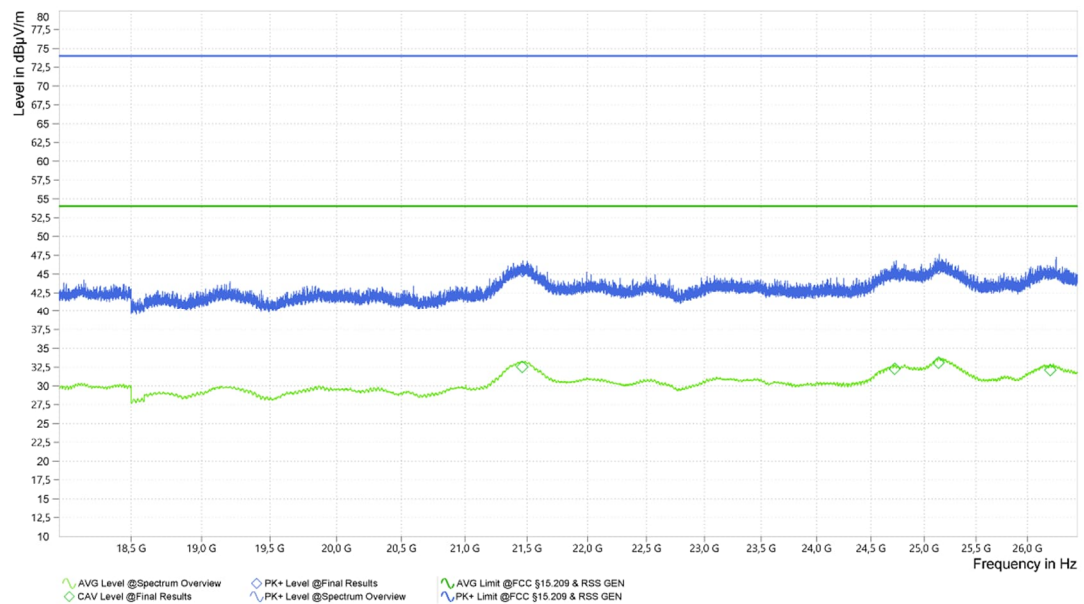
Spurious emissions from 8 GHz to 12 GHz (operation mode 12):



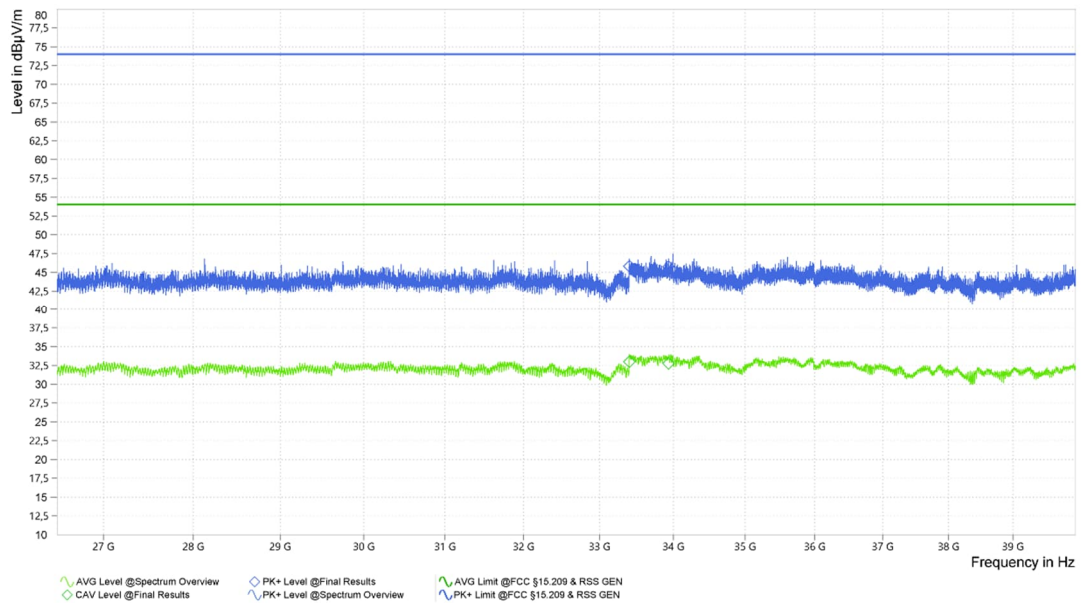
Spurious emissions from 12 GHz to 18 GHz (operation mode 12):



Spurious emissions from 18 GHz to 26.5 GHz (operation mode 11):



Spurious emissions from 26.5 GHz to 40 GHz (operation mode 10):



5.9.3.6.1 Result tables

Operation mode 10:

Frequency [MHz]	PK+ [dBμV/m]	AV [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Pol	Azimuth [deg]	Elevation [deg]	Corr. [dB/m]
1375.000	36.2	---	68.3	32.1	V	12	150	-15.1
1375.000	---	25.9	54.0	28.1	V	12	150	-15.1
1687.500	43.9	---	68.3	24.4	H	312	150	-13.0
1687.500	---	40.1	54.0	13.9	H	312	150	-13.0
1937.500	38.2	---	68.3	30.1	V	326	120	-12.0
1937.500	---	29.4	54.0	24.6	V	326	120	-12.0
2937.500	---	28.6	54.0	25.4	H	327	90	-8.2
2937.500	39.3	---	68.3	29.0	H	327	90	-8.2
5737.250	---	67.4	Fund.	-	H	137	60	0.3
5737.250	77.7	---	Fund.	-	H	137	60	0.3
5747.750	74.6	---	Fund.	-	H	137	60	0.5
5747.750	---	64.3	Fund.	-	H	137	60	0.5
7925.500	---	35.0	54.0	19.0	H	64	90	5.4
7925.500	47.0	---	68.3	21.3	H	64	90	5.4

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]
9049.000	48.2	68.3	20.1	35.6	54.0	18.4	19.3	H	150.0	40.9
10039.000	47.5	68.3	20.8	35.6	54.0	18.4	20.3	V	150.0	251.0
10907.500	49.0	68.3	19.3	36.2	54.0	17.8	21.6	H	150.0	181.3
11359.750	48.7	68.3	19.6	36.1	54.0	17.9	21.7	H	30.0	4.7
11583.250	48.9	68.3	19.4	36.4	54.0	17.6	21.5	V	120.0	143.4
11926.750	50.8	68.3	17.5	37.7	54.0	16.3	22.9	H	150.0	101.6
21465.750	45.8	68.3	22.5	32.6	54.0	21.4	11.4	H	120.0	1.6
24718.000	44.9	68.3	23.4	32.2	54.0	21.8	11.3	H	120.0	4.2
25142.250	46.3	68.3	22.1	33.2	54.0	20.8	11.5	H	60.0	6.6
26204.000	44.9	68.3	23.4	32.1	54.0	21.9	11.8	V	60.0	377.7
33399.750	45.8	68.3	22.5	33.0	54.0	21.0	19.8	H	60.0	-6.2
33931.000	45.7	68.3	22.6	32.8	54.0	21.2	20.1	H	60.0	269.6

Operation mode 11:

Frequency [MHz]	PK+ [dBμV/m]	AV [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Pol	Azimuth [deg]	Elevation [deg]	Corr. [dB/m]
1375.000	35.0	---	68.3	33.3	V	15	30	-15.1
1375.000	---	25.6	54.0	28.4	V	15	30	-15.1
1687.500	43.7	---	68.3	24.6	H	295	0	-13.0
1687.500	---	39.7	54.0	14.3	H	295	0	-13.0
1812.500	---	27.8	54.0	26.2	V	356	30	-13.0
1812.500	37.4	---	68.3	30.9	V	356	30	-13.0
1937.500	38.0	---	68.3	30.3	V	330	150	-12.0
1937.500	---	28.7	54.0	25.3	V	330	150	-12.0
2937.500	39.1	---	68.3	29.2	H	330	120	-8.2
2937.500	---	29.0	54.0	25.0	H	330	120	-8.2
5788.500	79.4	---	Fund.	-	H	101	90	0.7
5788.500	---	68.2	Fund.	-	H	101	90	0.7
5792.500	---	72.9	Fund.	-	H	101	90	0.7
5792.500	82.7	---	Fund.	-	H	101	90	0.7
7925.750	47.2	---	68.3	21.1	H	324	150	5.4
7925.750	---	35.0	54.0	19.0	H	324	150	5.4

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]
9050.250	48.6	68.3	19.7	35.7	54.0	18.3	19.3	V	60.0	107.3
10027.500	48.3	68.3	20.0	35.7	54.0	18.3	20.3	H	30.0	282.4
10909.000	48.8	68.3	19.5	36.3	54.0	17.7	21.6	H	120.0	280.3
11356.750	49.1	68.3	19.2	36.0	54.0	18.0	21.7	V	0.0	286.2
11578.000	49.8	68.3	18.5	36.4	54.0	17.6	21.5	V	0.0	22.7
11926.250	50.8	68.3	17.5	37.8	54.0	16.2	22.9	H	30.0	98.9
21461.500	45.4	68.3	22.9	32.5	54.0	21.5	11.4	V	150.0	213.9
24722.500	45.0	68.3	23.3	32.3	54.0	21.7	11.3	V	30.0	114.8
25139.000	45.7	68.3	22.6	33.1	54.0	20.9	11.5	V	60.0	130.2
26227.250	45.1	68.3	23.2	32.1	54.0	21.9	11.9	H	150.0	295.8
33399.500	46.0	68.3	22.3	33.1	54.0	20.9	19.8	V	60.0	213.7
35691.000	45.6	68.3	22.7	32.5	54.0	21.5	20.3	V	60.0	271.6

Operation mode 12:

Frequency [MHz]	PK+ [dBμV/m]	AV [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Pol	Azimuth [deg]	Elevation [deg]	Corr. [dB/m]
1375.000	34.8	---	68.3	33.5	V	15	120	-15.1
1375.000	---	25.0	54.0	29.0	V	15	120	-15.1
1437.500	33.3	---	68.3	35.0	V	33	60	-14.8
1437.500	---	22.2	54.0	31.8	V	33	60	-14.8
1687.500	---	39.8	54.0	14.2	H	295	150	-13.0
1687.500	43.7	---	68.3	24.6	H	295	150	-13.0
1812.500	36.5	---	68.3	31.8	V	0	0	-13.0
1812.500	---	25.9	54.0	28.1	V	0	0	-13.0
1937.500	37.7	---	68.3	30.6	V	325	0	-12.0
1937.500	---	28.3	54.0	25.7	V	325	0	-12.0
2937.500	40.0	---	68.3	28.3	H	328	60	-8.2
2937.500	---	29.0	54.0	25.0	H	328	60	-8.2
5827.500	---	70.9	Fund.	-	H	126	60	0.9
5827.500	81.2	---	Fund.	-	H	126	60	0.9
5832.500	81.7	---	Fund.	-	H	127	60	1.0
5832.500	---	72.1	Fund.	-	H	127	60	1.0

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]
10025.250	47.8	68.3	20.5	35.6	54.0	18.4	20.3	V	120.0	245.6
10552.000	49.1	68.3	19.2	35.8	54.0	18.2	20.2	V	90.0	325.1
10906.750	49.3	68.3	19.0	36.3	54.0	17.7	21.6	V	150.0	17.1
11360.500	49.0	68.3	19.3	36.2	54.0	17.8	21.7	V	120.0	283.0
11595.500	48.8	68.3	19.5	36.3	54.0	17.7	21.5	V	90.0	338.9
11942.000	50.6	68.3	17.7	37.9	54.0	16.1	23.2	V	150.0	200.2
21485.250	46.7	68.3	21.6	32.5	54.0	21.5	11.5	H	60.0	84.7
24760.250	44.9	68.3	23.4	32.0	54.0	22.0	11.2	H	90.0	48.0
25146.000	46.1	68.3	22.2	33.1	54.0	20.9	11.5	V	150.0	5.7
26196.000	45.3	68.3	23.1	32.1	54.0	21.9	11.8	H	150.0	216.9

Test result: Passed

5.9.3.7 Test results (above 1 GHz) Operation Modes– full retest MiMo FCC & ISSED

Ambient temperature:	22 - 24°C
Relative humidity:	39 - 58%

Date	13.06 – 12.07.2023
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 (68.3 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)

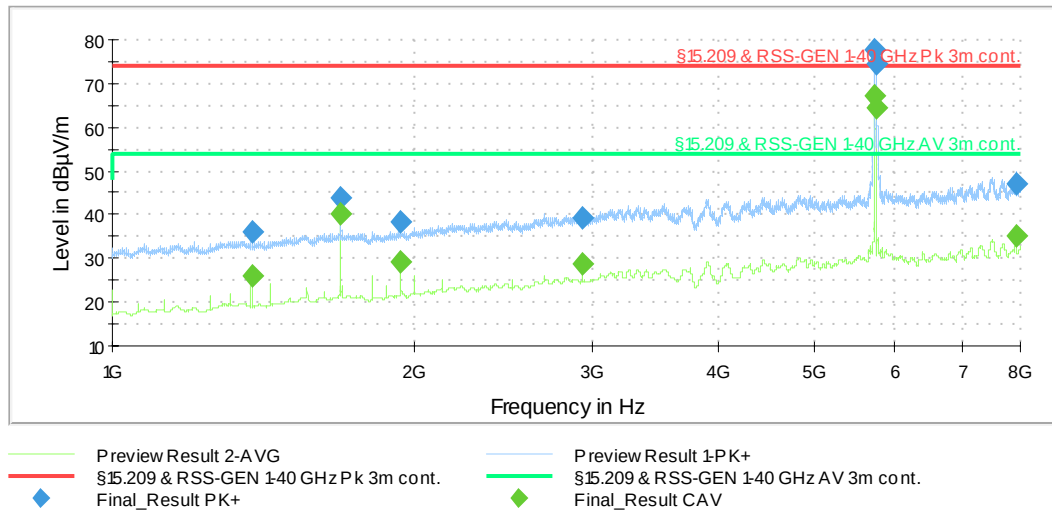
Margin [dB] = Limit [dBμV/m] – Max Peak | Average [dBμV/m]

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.

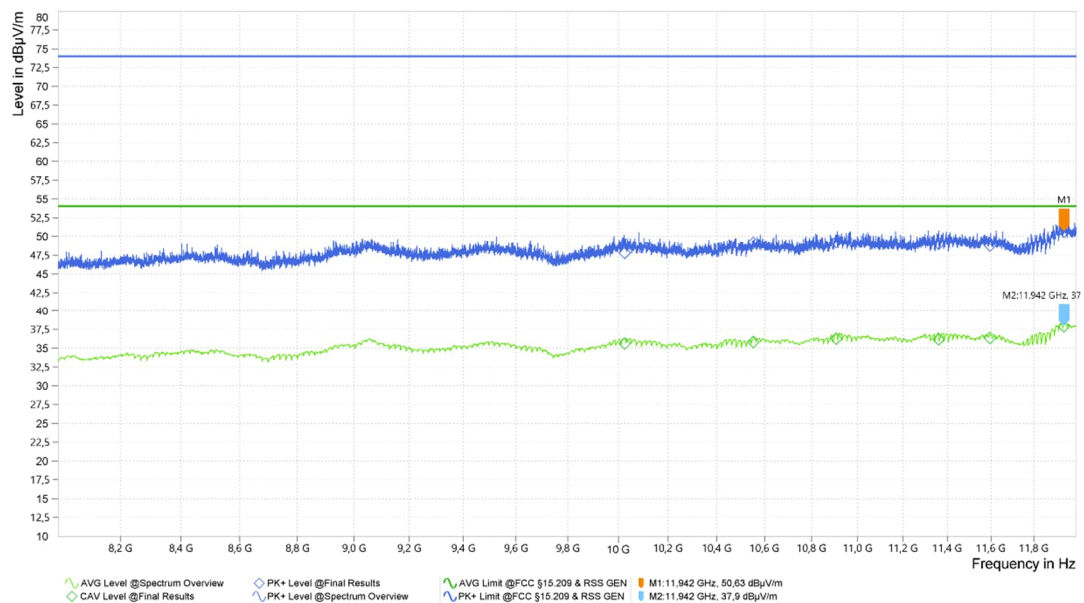
The top measured curve represents the peak measurement. The measured points marked with "◇" are frequency points for the final peak detector measurement. These values are indicated in the following table. The bottom measured curve represents the average measurement. The measured points marked with "◇"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

Worst case plots:

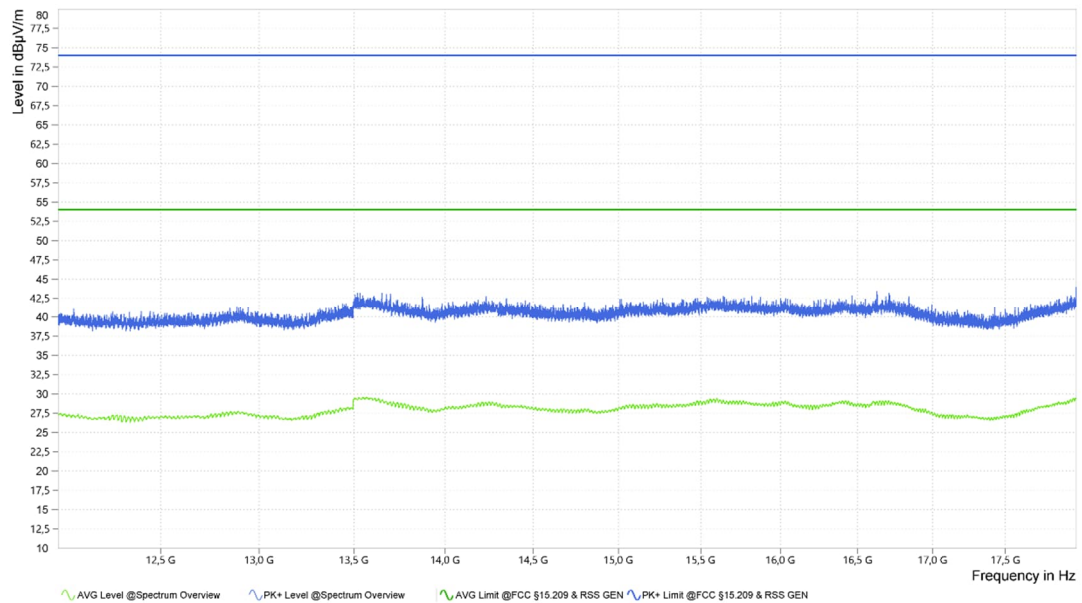
Spurious emissions from 1 GHz to 8 GHz (operation mode 13):



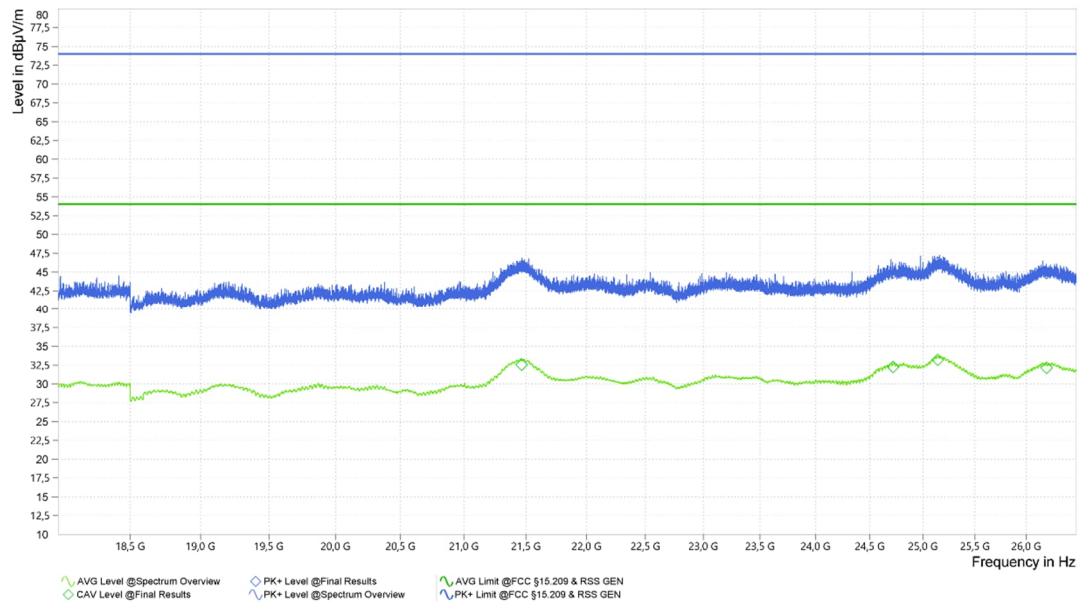
Spurious emissions from 8 GHz to 12 GHz (operation mode 15):



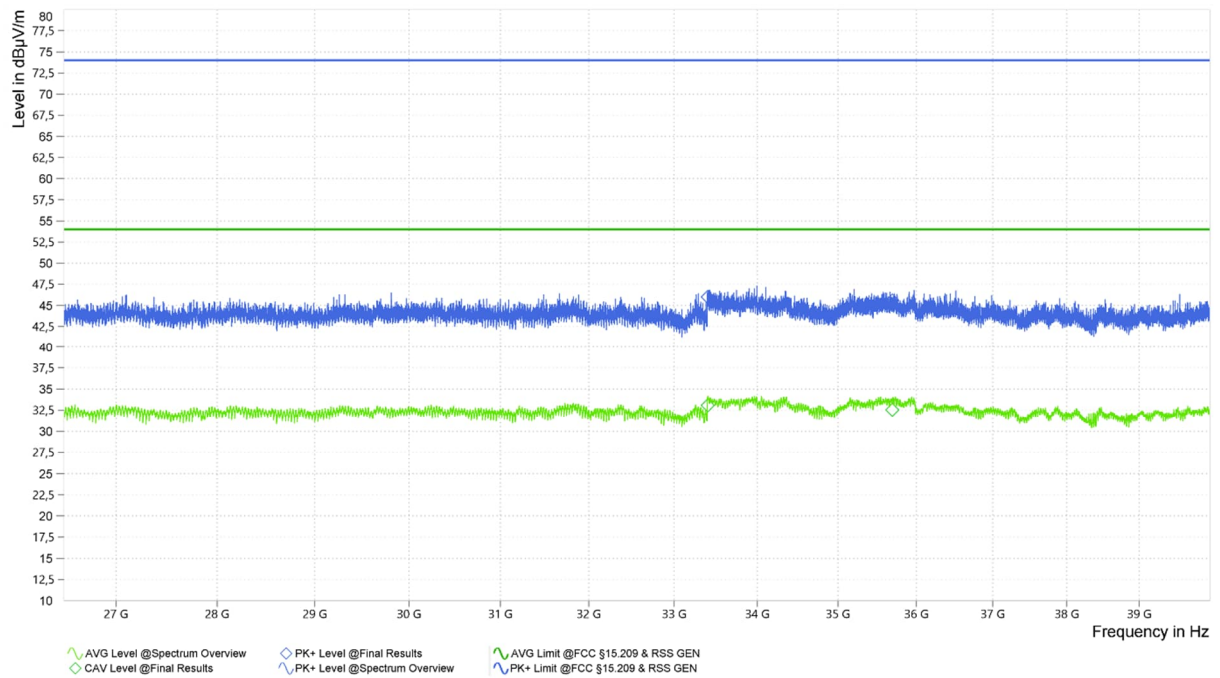
Spurious emissions from 12 GHz to 18 GHz (operation mode 14):



Spurious emissions from 18 GHz to 26.5 GHz (operation mode 13):



Spurious emissions from 26.5 GHz to 40 GHz (operation mode 14):



5.9.3.7.1 Result tables

Operation mode 13:

Frequency [MHz]	PK+ [dBμV/m]	AV [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Pol	Azimuth [deg]	Elevation [deg]	Corr. [dB/m]
1375.000	36.2	---	68.3	32.1	V	12	150	-15.1
1375.000	---	25.9	54.0	28.1	V	12	150	-15.1
1687.500	43.9	---	68.3	24.4	H	312	150	-13.0
1687.500	---	40.1	54.0	13.9	H	312	150	-13.0
1937.500	38.2	---	68.3	30.1	V	326	120	-12.0
1937.500	---	29.4	54.0	24.6	V	326	120	-12.0
2937.500	---	28.6	54.0	25.4	H	327	90	-8.2
2937.500	39.3	---	68.3	29.0	H	327	90	-8.2
5737.250	---	67.4	Fund.	-	H	137	60	0.3
5737.250	77.7	---	Fund.	-	H	137	60	0.3
5747.750	74.6	---	Fund.	-	H	137	60	0.5
5747.750	---	64.3	Fund.	-	H	137	60	0.5
7925.500	---	35.0	54.0	19.0	H	64	90	5.4
7925.500	47.0	---	68.3	21.3	H	64	90	5.4

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]
9049.000	48.2	68.3	20.1	35.6	54.0	18.4	19.3	H	150.0	40.9
10039.000	47.5	68.3	20.8	35.6	54.0	18.4	20.3	V	150.0	251.0
10907.500	49.0	68.3	19.3	36.2	54.0	17.8	21.6	H	150.0	181.3
11359.750	48.7	68.3	19.6	36.1	54.0	17.9	21.7	H	30.0	4.7
11583.250	48.9	68.3	19.4	36.4	54.0	17.6	21.5	V	120.0	143.4
11926.750	50.8	68.3	17.5	37.7	54.0	16.3	22.9	H	150.0	101.6
21465.750	45.8	68.3	22.5	32.6	54.0	21.4	11.4	H	120.0	1.6
24718.000	44.9	68.3	23.4	32.2	54.0	21.8	11.3	H	120.0	4.2
25142.250	46.3	68.3	22.1	33.2	54.0	20.8	11.5	H	60.0	6.6
26204.000	44.9	68.3	23.4	32.1	54.0	21.9	11.8	V	60.0	377.7
33399.750	45.8	68.3	22.5	33.0	54.0	21.0	19.8	H	60.0	-6.2
33931.000	45.7	68.3	22.6	32.8	54.0	21.2	20.1	H	60.0	269.6

Operation mode 14:

Frequency [MHz]	PK+ [dBμV/m]	AV [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Pol	Azimuth [deg]	Elevation [deg]	Corr. [dB/m]
1375.000	35.0	---	68.3	33.3	V	15	30	-15.1
1375.000	---	25.6	54.0	28.4	V	15	30	-15.1
1687.500	43.7	---	68.3	24.6	H	295	0	-13.0
1687.500	---	39.7	54.0	14.3	H	295	0	-13.0
1812.500	---	27.8	54.0	26.2	V	356	30	-13.0
1812.500	37.4	---	68.3	30.9	V	356	30	-13.0
1937.500	38.0	---	68.3	30.3	V	330	150	-12.0
1937.500	---	28.7	54.0	25.3	V	330	150	-12.0
2937.500	39.1	---	68.3	29.2	H	330	120	-8.2
2937.500	---	29.0	54.0	25.0	H	330	120	-8.2
5788.500	79.4	---	Fund.	-	H	101	90	0.7
5788.500	---	68.2	Fund.	-	H	101	90	0.7
5792.500	---	72.9	Fund.	-	H	101	90	0.7
5792.500	82.7	---	Fund.	-	H	101	90	0.7
7925.750	47.2	---	68.3	21.1	H	324	150	5.4
7925.750	---	35.0	54.0	19.0	H	324	150	5.4

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]
9050.250	48.6	68.3	19.7	35.7	54.0	18.3	19.3	V	60.0	107.3
10027.500	48.3	68.3	20.0	35.7	54.0	18.3	20.3	H	30.0	282.4
10909.000	48.8	68.3	19.5	36.3	54.0	17.7	21.6	H	120.0	280.3
11356.750	49.1	68.3	19.2	36.0	54.0	18.0	21.7	V	0.0	286.2
11578.000	49.8	68.3	18.5	36.4	54.0	17.6	21.5	V	0.0	22.7
11926.250	50.8	68.3	17.5	37.8	54.0	16.2	22.9	H	30.0	98.9
21461.500	45.4	68.3	22.9	32.5	54.0	21.5	11.4	V	150.0	213.9
24722.500	45.0	68.3	23.3	32.3	54.0	21.7	11.3	V	30.0	114.8
25139.000	45.7	68.3	22.6	33.1	54.0	20.9	11.5	V	60.0	130.2
26227.250	45.1	68.3	23.2	32.1	54.0	21.9	11.9	H	150.0	295.8
33399.500	46.0	68.3	22.3	33.1	54.0	20.9	19.8	V	60.0	213.7
35691.000	45.6	68.3	22.7	32.5	54.0	21.5	20.3	V	60.0	271.6

Operation mode 15:

Frequency [MHz]	PK+ [dBμV/m]	AV [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Pol	Azimuth [deg]	Elevation [deg]	Corr. [dB/m]
1375.000	34.8	---	68.3	33.5	V	15	120	-15.1
1375.000	---	25.0	54.0	29.0	V	15	120	-15.1
1437.500	33.3	---	68.3	35.0	V	33	60	-14.8
1437.500	---	22.2	54.0	31.8	V	33	60	-14.8
1687.500	---	39.8	54.0	14.2	H	295	150	-13.0
1687.500	43.7	---	68.3	24.6	H	295	150	-13.0
1812.500	36.5	---	68.3	31.8	V	0	0	-13.0
1812.500	---	25.9	54.0	28.1	V	0	0	-13.0
1937.500	37.7	---	68.3	30.6	V	325	0	-12.0
1937.500	---	28.3	54.0	25.7	V	325	0	-12.0
2937.500	40.0	---	68.3	28.3	H	328	60	-8.2
2937.500	---	29.0	54.0	25.0	H	328	60	-8.2
5827.500	---	70.9	Fund.	-	H	126	60	0.9
5827.500	81.2	---	Fund.	-	H	126	60	0.9
5832.500	81.7	---	Fund.	-	H	127	60	1.0
5832.500	---	72.1	Fund.	-	H	127	60	1.0

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]
10025.250	47.8	68.3	20.5	35.6	54.0	18.4	20.3	V	120.0	245.6
10552.000	49.1	68.3	19.2	35.8	54.0	18.2	20.2	V	90.0	325.1
10906.750	49.3	68.3	19.0	36.3	54.0	17.7	21.6	V	150.0	17.1
11360.500	49.0	68.3	19.3	36.2	54.0	17.8	21.7	V	120.0	283.0
11595.500	48.8	68.3	19.5	36.3	54.0	17.7	21.5	V	90.0	338.9
11942.000	50.6	68.3	17.7	37.9	54.0	16.1	23.2	V	150.0	200.2
21485.250	46.7	68.3	21.6	32.5	54.0	21.5	11.5	H	60.0	84.7
24760.250	44.9	68.3	23.4	32.0	54.0	22.0	11.2	H	90.0	48.0
25146.000	46.1	68.3	22.2	33.1	54.0	20.9	11.5	V	150.0	5.7
26196.000	45.3	68.3	23.1	32.1	54.0	21.9	11.8	H	150.0	216.9

Test result: Passed

5.9.3.8 Test results (above 1 GHz) Operation Modes - Retest worst case Spurious emission + band-edge from original report (FCC+ISED)

Ambient temperature:	22 - 23°C
Relative humidity:	39 - 66%

Date	14.06 – 11.07.2023
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 (68.3 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)

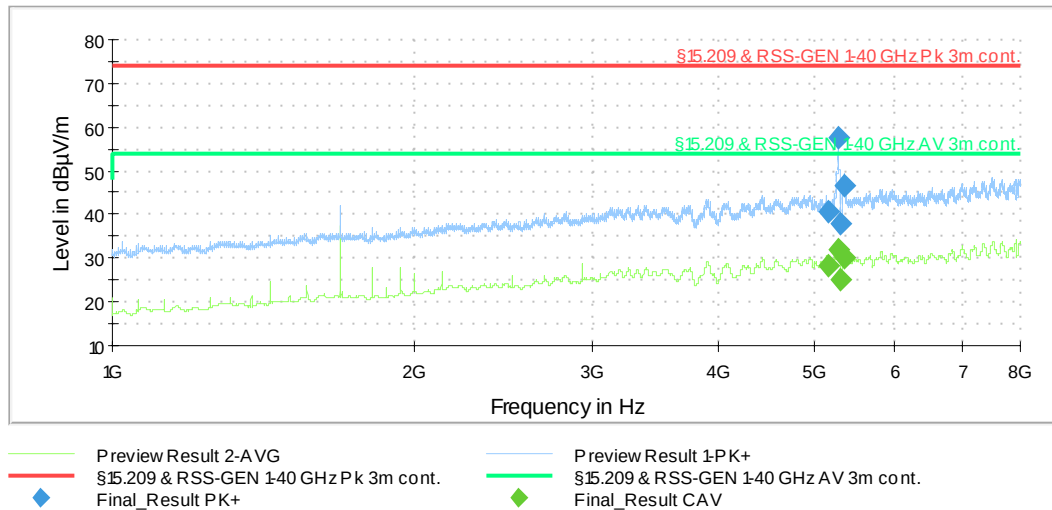
Margin [dB] = Limit [dBμV/m] – Max Peak | Average [dBμV/m]

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.

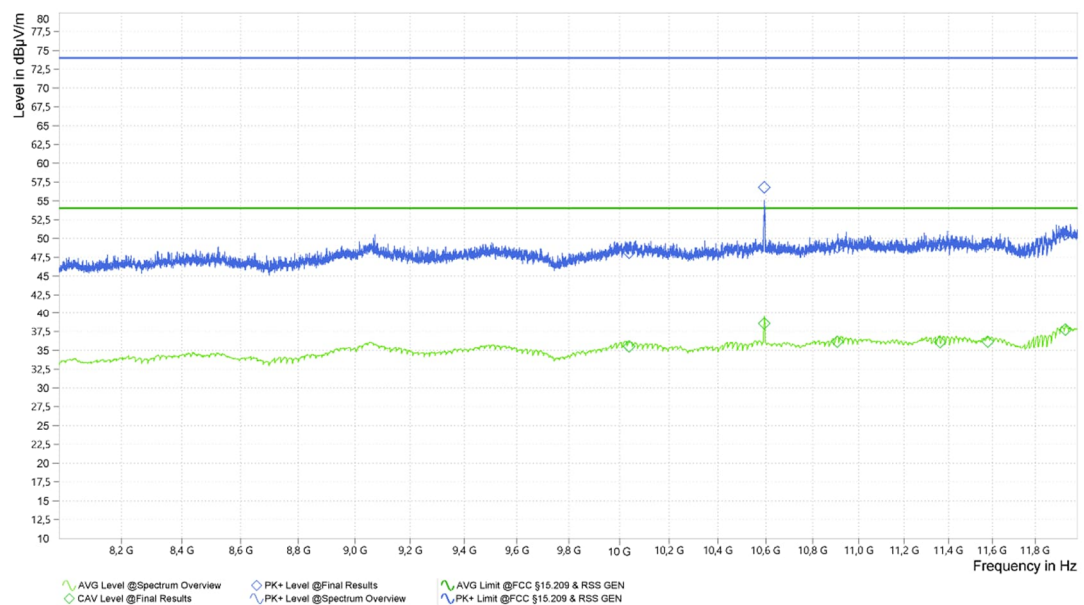
The top measured curve represents the peak measurement. The measured points marked with "◇" are frequency points for the final peak detector measurement. These values are indicated in the following table. The bottom measured curve represents the average measurement. The measured points marked with "◇"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

Worst case plots:

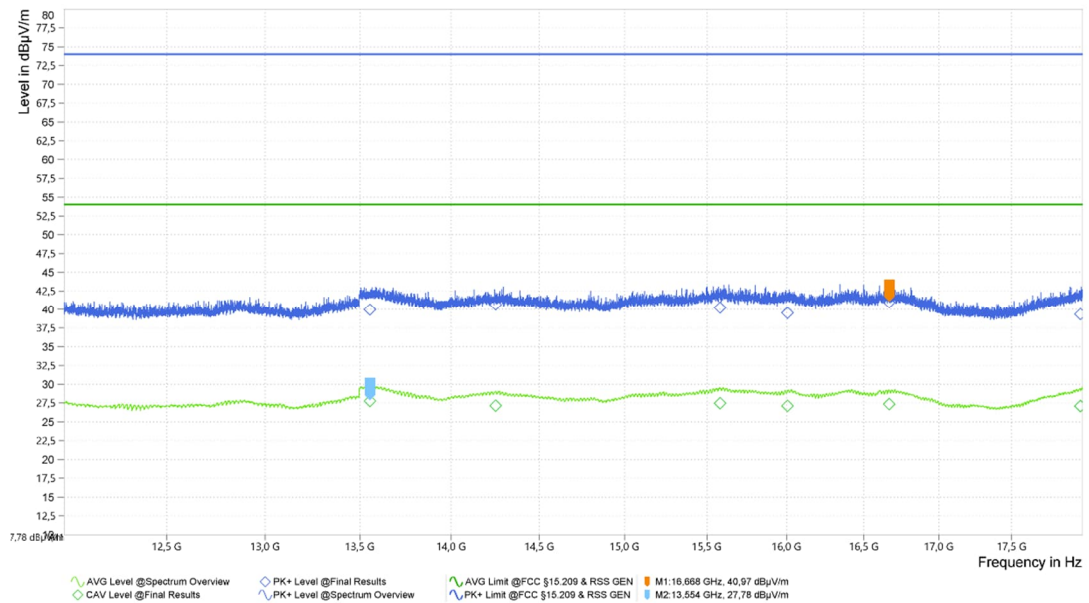
Spurious emissions from 1 GHz to 8 GHz (operation mode 63):



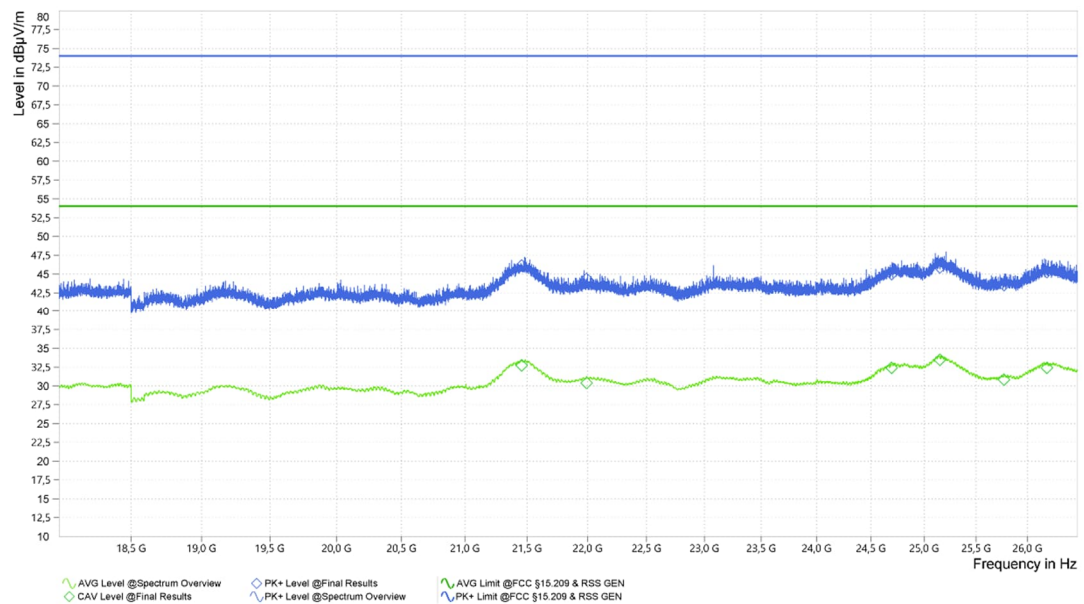
Spurious emissions from 8 GHz to 12 GHz (operation mode 63):



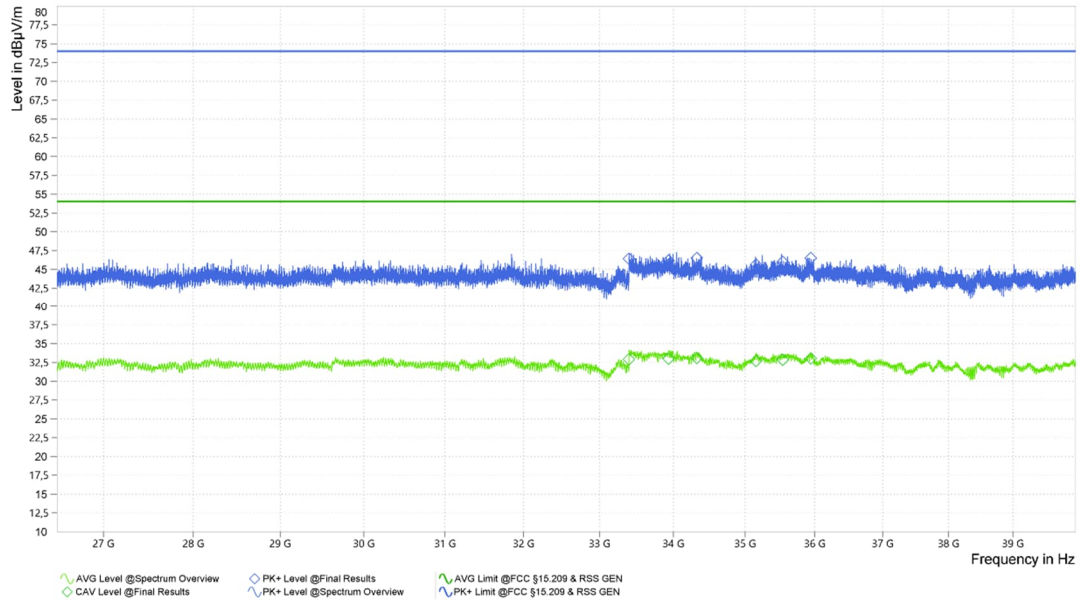
Spurious emissions from 12 GHz to 18 GHz (operation mode 63):



Spurious emissions from 18 GHz to 26.5 GHz (operation mode 64):



Spurious emissions from 26.5 GHz to 40 GHz (operation mode 62):



5.9.3.8.1 Result tables

Operation mode 62:

Frequency [MHz]	PK+ [dBμV/m]	AV [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Pol	Azimuth [deg]	Elevation [deg]	Corr. [dB/m]
5150.000	---	28.5	54.0	25.5	H	228	90	-1.5
5150.000	41.1	---	68.3	27.2	H	228	90	-1.5
5220.250	---	28.6	54.0	25.4	H	164	120	-1.6
5220.250	50.4	---	68.3	17.9	H	164	120	-1.6
5240.000	---	32.1	54.0	21.9	V	-3	0	-0.9
5240.000	44.1	---	68.3	24.2	V	-3	0	-0.9
5350.000	42.1	---	68.3	26.2	H	133	90	-0.4
5350.000	---	29.4	54.0	24.6	H	133	90	-0.4

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]
10021.000	48.0	68.3	20.3	35.5	54.0	18.5	20.3	H	120.0	43.8
10478.750	49.0	68.3	19.3	36.1	54.0	17.9	20.0	V	150.0	205.3
10909.250	48.9	68.3	19.4	36.1	54.0	17.9	21.6	V	150.0	200.7
11361.500	48.8	68.3	19.5	36.0	54.0	18.0	21.7	H	60.0	372.4
11593.000	49.2	68.3	19.1	36.2	54.0	17.9	21.5	V	90.0	126.0
11927.250	50.2	68.3	18.1	37.7	54.0	16.3	22.9	V	150.0	90.6
13500.750	40.4	68.3	27.9	27.7	54.0	26.4	6.9	H	30.0	186.6
14226.500	39.1	68.3	29.2	26.8	54.0	27.2	7.8	H	0.0	209.2
15580.000	40.3	68.3	28.0	27.3	54.0	26.7	8.9	V	90.0	52.4
16008.750	40.2	68.3	28.1	27.0	54.0	27.0	8.5	H	120.0	284.0
16392.750	39.8	68.3	28.5	26.8	54.0	27.3	7.1	H	150.0	360.3
17981.750	39.9	68.3	28.4	26.9	54.0	27.1	10.2	H	30.0	225.7
21474.250	45.2	68.3	23.1	32.7	54.0	21.3	11.5	V	120.0	189.1
22025.000	43.6	68.3	24.7	30.4	54.0	23.6	11.4	H	90.0	246.8
23081.000	43.4	68.3	24.9	30.5	54.0	23.5	11.7	V	90.0	161.3
24724.000	45.1	68.3	23.2	32.5	54.0	21.5	11.3	H	150.0	145.3
25147.750	45.8	68.3	22.5	33.4	54.0	20.6	11.5	H	150.0	14.2
26215.250	45.1	68.3	23.2	32.3	54.0	21.7	11.8	H	120.0	73.0
33394.000	46.4	68.3	21.9	32.9	54.0	21.1	19.8	H	60.0	350.8
33931.250	46.2	68.3	22.1	33.0	54.0	21.0	20.1	H	0.0	363.7
34321.750	46.5	68.3	21.8	33.1	54.0	20.9	19.8	V	150.0	112.4
35153.750	45.6	68.3	22.7	32.7	54.0	21.3	20.2	V	60.0	293.8
35536.000	46.0	68.3	22.3	32.8	54.0	21.2	20.4	V	90.0	45.8
35939.250	46.5	68.3	21.8	33.0	54.0	21.0	20.0	H	120.0	161.7

Operation mode 63:

Frequency [MHz]	PK+ [dBμV/m]	AV [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Pol	Azimuth [deg]	Elevation [deg]	Corr. [dB/m]
5150.000	40.6	---	68.3	27.7	V	313	150	-1.5
5150.000	---	28.4	54.0	25.6	V	313	150	-1.5
5280.750	---	31.8	54.0	22.2	V	186	0	-0.8
5280.750	57.7	---	68.3	10.6	V	186	0	-0.8
5300.000	---	25.2	54.0	28.8	H	19	0	-0.6
5300.000	38.1	---	68.3	30.2	H	19	0	-0.6
5350.000	46.7	---	68.3	21.6	V	165	0	-0.4
5350.000	---	30.1	54.0	23.9	V	165	0	-0.4

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]
10038.500	48.1	68.3	20.2	35.5	54.0	18.5	20.3	H	120.0	354.4
10593.000	56.8	68.3	11.5	38.6	54.0	15.4	20.3	H	90.0	53.5
10905.750	48.8	68.3	19.5	36.1	54.0	17.9	21.6	H	150.0	47.8
11361.500	49.1	68.3	19.2	36.1	54.0	17.9	21.7	H	90.0	184.0
11578.750	49.3	68.3	19.1	36.2	54.0	17.8	21.5	V	120.0	354.5
11943.000	50.6	68.3	17.7	37.7	54.0	16.3	23.2	H	150.0	219.5
13554.000	40.0	68.3	28.3	27.8	54.0	26.2	6.9	V	150.0	43.1
14250.000	40.6	68.3	27.7	27.2	54.0	26.9	7.9	H	120.0	220.9
15582.000	40.2	68.3	28.1	27.5	54.0	26.5	8.9	H	150.0	289.1
16006.250	39.5	68.3	28.8	27.1	54.0	26.9	8.5	H	30.0	193.0
16667.500	41.0	68.3	27.3	27.4	54.0	26.6	6.9	V	150.0	310.1
17985.000	39.4	68.3	29.0	27.1	54.0	26.9	10.2	V	0.0	344.8
21470.250	45.0	68.3	23.3	32.7	54.0	21.3	11.4	H	150.0	59.7
22030.750	43.0	68.3	25.3	30.3	54.0	23.7	11.4	V	60.0	374.1
23111.750	43.2	68.3	25.1	30.6	54.0	23.4	11.8	H	150.0	154.1
24707.750	45.3	68.3	23.0	32.4	54.0	21.6	11.3	V	120.0	229.1
25144.750	46.0	68.3	22.3	33.4	54.0	20.6	11.5	H	90.0	168.2
26211.250	45.6	68.3	22.7	32.2	54.0	21.8	11.8	V	120.0	225.1
33399.750	45.8	68.3	22.5	33.1	54.0	20.9	19.8	V	90.0	75.8
33963.000	45.4	68.3	22.9	32.9	54.0	21.1	20.1	V	90.0	119.6
34320.750	45.6	68.3	22.8	33.0	54.0	21.0	19.8	H	30.0	173.8
35151.000	46.2	68.3	22.1	32.6	54.0	21.4	20.2	H	90.0	219.7
35510.500	45.3	68.3	23.0	32.9	54.0	21.2	20.3	H	90.0	375.8
35936.750	45.6	68.3	22.7	32.9	54.0	21.1	20.0	H	0.0	281.7

Operation mode 64:

Frequency [MHz]	PK+ [dBμV/m]	AV [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Pol	Azimuth [deg]	Elevation [deg]	Corr. [dB/m]
1562.500	---	23.7	54.0	30.3	H	160	0	-13.8
1562.500	34.5	---	68.3	33.8	H	160	0	-13.8
1687.500	41.6	---	68.3	26.7	V	308	30	-13.0
1687.500	---	36.6	54.0	17.4	V	308	30	-13.0
1812.500	---	30.0	54.0	24.0	H	306	60	-13.0
1812.500	38.1	---	68.3	30.2	H	306	60	-13.0
1937.500	---	26.9	54.0	27.1	H	349	150	-12.0
1937.500	37.7	---	68.3	30.6	H	349	150	-12.0
2000.000	37.2	---	68.3	31.1	V	55	120	-11.8
2000.000	---	26.9	54.0	27.1	V	55	120	-11.8
2937.500	38.6	---	68.3	29.7	H	332	0	-8.2
2937.500	---	27.2	54.0	26.8	H	332	0	-8.2
5656.250	44.3	---	68.3	24.0	H	135	120	0.2
5656.250	---	29.7	54.0	24.3	H	135	120	0.2

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]
10041.250	48.3	68.3	20.0	35.5	54.0	18.5	20.3	H	90.0	157.0
10453.750	48.0	68.3	20.4	35.3	54.0	18.7	19.9	V	150.0	328.1
10552.250	48.3	68.3	20.1	35.7	54.0	18.3	20.2	V	120.0	250.4
10904.250	48.9	68.3	19.4	36.1	54.0	17.9	21.6	V	90.0	350.6
11374.250	48.3	68.3	20.0	36.0	54.0	18.0	21.7	V	90.0	305.9
11928.000	50.8	68.3	17.5	37.7	54.0	16.3	22.9	V	90.0	192.6
13574.250	40.3	68.3	28.1	27.6	54.0	26.4	7.0	V	60.0	12.8
14244.000	39.7	68.3	28.6	27.1	54.0	26.9	7.9	V	150.0	191.4
15601.000	40.2	68.3	28.1	27.4	54.0	26.6	8.9	H	120.0	323.1
16406.000	39.5	68.3	28.8	26.7	54.0	27.3	7.1	V	90.0	287.7
16676.500	41.0	68.3	27.3	27.4	54.0	26.6	6.9	H	150.0	277.1
17980.250	39.8	68.3	28.5	27.0	54.0	27.0	10.2	V	60.0	276.3
21457.750	46.2	68.3	22.2	32.7	54.0	21.3	11.4	H	30.0	147.8
21993.000	44.4	68.3	23.9	30.4	54.0	23.6	11.4	H	150.0	309.5
24694.500	45.0	68.3	23.3	32.4	54.0	21.6	11.2	V	30.0	269.6
25150.250	45.9	68.3	22.4	33.5	54.0	20.5	11.5	H	150.0	62.8
25770.750	43.5	68.3	24.8	30.8	54.0	23.2	11.7	V	120.0	106.1
26195.750	45.2	68.3	23.1	32.4	54.0	21.6	11.8	V	0.0	92.7
33395.750	45.7	68.3	22.6	33.0	54.0	21.0	19.8	H	120.0	67.7
33710.000	45.8	68.3	22.5	33.0	54.0	21.0	20.0	H	150.0	53.8
34356.750	45.7	68.3	22.6	33.0	54.0	21.0	19.8	V	150.0	350.2
35158.250	46.2	68.3	22.1	32.6	54.0	21.4	20.2	H	120.0	249.7

Operation mode 65:

Frequency [MHz]	PK+ [dB μ V/m]	AV [dB μ V/m]	Limit [dB μ V/m]	Margin [dB]	Pol	Azimuth [deg]	Elevation [deg]	Corr. [dB/m]
1687.500	41.1	---	68.3	27.2	H	313	30	-13.0
1687.500	---	35.3	54.0	18.7	H	313	30	-13.0
1812.500	---	29.0	54.0	25.0	V	9	30	-13.0
1812.500	38.2	---	68.3	30.1	V	9	30	-13.0
1937.500	---	28.2	54.0	25.8	V	330	0	-12.0
1937.500	37.7	---	68.3	30.6	V	330	0	-12.0
2937.500	---	28.4	54.0	25.6	H	344	60	-8.2
2937.500	39.7	---	68.3	28.6	H	344	60	-8.2
5821.500	89.9	---	Fund.	-	V	131	30	0.9
5821.500	---	75.5	Fund.	-	V	131	30	0.9
5823.250	---	73.1	Fund.	-	H	143	120	0.9
5823.250	86.2	---	Fund.	-	H	143	120	0.9
5832.750	---	45.3	Fund.	-	H	144	120	1.0
5832.750	80.7	---	Fund.	-	H	144	120	1.0
7916.750	---	34.7	54.0	19.3	V	240	120	5.2
7916.750	46.4	---	68.3	21.9	V	240	120	5.2

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]
9053.250	48.8	68.3	19.5	35.7	54.0	18.3	19.3	H	150.0	277.4
10026.250	48.2	68.3	20.1	35.6	54.0	18.4	20.3	H	30.0	152.4
10904.500	49.7	68.3	18.7	36.3	54.0	17.7	21.6	V	150.0	148.6
11356.000	49.5	68.3	18.8	36.2	54.0	17.8	21.7	V	120.0	173.5
11602.000	49.1	68.3	19.2	36.4	54.0	17.6	21.4	V	0.0	272.8
11925.500	50.4	68.3	17.9	37.9	54.0	16.1	22.8	V	0.0	343.1
13499.000	38.8	68.3	29.5	26.2	54.0	27.8	6.9	H	150.0	56.5
14253.750	39.8	68.3	28.5	27.0	54.0	27.0	7.9	V	150.0	-5.0
15595.000	39.8	68.3	28.6	27.3	54.0	26.7	8.9	H	150.0	172.3
16393.250	39.3	68.3	29.0	26.7	54.0	27.3	7.1	V	120.0	343.7
16682.500	40.0	68.3	28.4	27.3	54.0	26.8	6.9	H	90.0	6.8
17977.250	39.4	68.3	28.9	27.0	54.0	27.0	10.1	H	120.0	281.8
21466.250	46.0	68.3	22.3	32.7	54.0	21.3	11.4	H	120.0	11.9
23079.000	44.4	68.3	23.9	30.4	54.0	23.6	11.7	H	90.0	311.4
24698.500	45.3	68.3	23.0	32.4	54.0	21.6	11.2	V	30.0	85.8
25140.500	46.2	68.3	22.1	33.4	54.0	20.6	11.5	V	60.0	166.3
25774.500	43.6	68.3	24.7	30.8	54.0	23.2	11.7	H	150.0	90.6
26157.250	45.0	68.3	23.3	32.4	54.0	21.6	11.9	V	90.0	188.6
33393.750	45.6	68.3	22.7	32.9	54.0	21.1	19.8	V	150.0	345.8
34010.500	45.2	68.3	23.1	32.6	54.0	21.4	20.0	V	60.0	67.7
34349.250	46.0	68.3	22.3	33.0	54.0	21.0	19.8	H	30.0	253.7
35155.750	44.9	68.3	23.4	32.6	54.0	21.4	20.2	V	150.0	140.8
35576.250	45.4	68.3	22.9	32.6	54.0	21.4	20.4	H	30.0	-9.0
35935.250	45.9	68.3	22.4	32.8	54.0	21.2	20.0	H	30.0	289.2

Test result: Passed

Test equipment (please refer to chapter 6 for details)

3 - 9, 12 – 18, 22 - 35

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	11.2023
2	Loop antenna	HFH2-Z2	Rohde & Schwarz	832609/014	480059	22.02.2022	02.2024
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	12.2023
10	Ultralog Antenna	HL562E	Rohde & Schwarz	101079	482978	18.03.2021	03.2024
11	Attenuator 6dB	WA-2	Weinschel Corp	BG0931	483499	Calibration not necessary	
12	Standard Gain Horn 20 dB, 12 GHz-18 GHz	18240-20	Flann	267220	483025	Calibration not necessary	
13	Standard Gain Horn 20 dB, 18 GHz -26 GHz	20240-20	Flann	266399	483026	Calibration not necessary	
14	Low Noise Amplifier 12 GHz – 12 GHz	LNA-30-12001800-13-10P	Narda Miteq	2173737	483430	18.02.2022	02.2024
15	Low Noise Amplifier 18 GHz - 26.5 GHz	LNA-30-18002650-20-10P	Narda Miteq	2110911	482969	18.02.2022	02.2024
16	Low Noise Amplifier 100 MHz - 18 GHz	LNA-30-00101800-25-10P	Narda Miteq	2110917	482967	18.02.2022	02.2024
17	Log.Per Antenna 850 MHz - 26 GHz	HL050	Rohde&Schwarz	100908	482977	22.09.2022	09.2025
18	Highpass Filter	WHK2.8/18G-10SS	Wainwright Instruments GmbH	1	480867	Calibration not necessary	
19	Power Meter	NRVD	Rohde & Schwarz	833697/030	480589	19.06.2023 30.04.2022	06.2024 04.2023
20	Power probe thermal	NRV-Z51	Rohde & Schwarz	825948/004	480247	21.06.2023 18.02.2022	06.2024 02.2022
21	Power probe thermal	NRV-Z51	Rohde & Schwarz	825948/003	480248	21.06.2023 15.02.2022	06.2024 02.2022
22	RF cable	SF 102	Huber+Suhner	510211/2	483032	Calibration not necessary	
23	Fully anechoic chamber M20	B83117-E2439-T232	Albatross Projects	103	480303	Calibration not necessary	
24	Turntable	DS420 HE	Deisel	420/620/00	480315	Calibration not necessary	
25	Antenna support	AS620P	Deisel	620/375	480325	Calibration not necessary	

No.	Test equipment	Type	Manufacturer	Serial No.	PM. No.	Cal. Date	Cal Due
26	Multiple Control Unit	MCU	Maturo	MCU/043/971107	480832	Calibration not necessary	
27	Positioners	TDF 1.5- 10Kg	Maturo	15920215	482034	Calibration not necessary	
28	EMI Receiver / Spectrum Analyser	ESW44	Rohde & Schwarz	101635	482467	22.02.2022	02.2024
29	RF cable	SF106B/11N/11N/450 0.0	Huber & Suhner	500218/6B	482415	Calibration not necessary	
30	Testsoftware M20	EMC32 V10.6.2	Rohde & Schwarz	-	483261	Calibration not necessary	
31	Highpass filter	WHKX8.0/18G-8SS	Wainwright	4	480856	Calibration not necessary	
32	Preamplifier 100 MHz - 16 GHz	AFS6-00101600-23-10P-6-R	Narda MITEQ	2011215	482333	17.02.2022	02.2024
33	Log.Per Antenna 850 MHz - 26 GHz	HL050	Rohde&Schwarz	100977	483511	05.03.2021	03.2024
34	Low Noise Amplifier 26 MHz - 40 GHz	LNA-30-26004000-27-10P	Narda-Miteq	2110293	482970	18.02.2022	02.2024
35	Standard Gain Horn 20 dB, 26 GHz - 40 GHz	22240-20	Flann	266405	483027	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 27.03.2023
Fully anechoic chamber M20	480303	1 -18 GHz	SVSWR	CISPR 16-1-4 Amd. 1	17.08.2022	16.08.2024

* 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	19.10.2023	Initial Test Report
-	-	
-	-	-

9 List of Annexes

Annex A Test Setup Photos

18 pages