N° 1-6736
Scope available
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CERTIFICATE #3478.01

TEST REPORT

EUT Description	**WLAN and BT, 2x2 PCIe M.2 1216 SD adapter card, LTE Coexistence**
Brand Name	**Intel® Wi-Fi 6E AX211**
Model Name	**AX211D2WL**
FCC/IC ID	**FCCID: PD9AX211D2L / IC ID: 1000M-AX211D2L**
Date of Test Start/End	**2021-07-08 / 2021-09-04**
Features	**802.11ax, Dual Band, 2x2 Wi-Fi + Bluetooth® 5.2** (see section 5)

Applicant	**Intel Mobile Communications**
Address	**100 Center Point Circle, Suite 200** **Columbia, South Carolina 29210** **USA**
Contact Person	**Steven Hackett**
Telephone/Fax/ Email	**steven.c.hackett@intel.com**

Reference Standards	**FCC CFR Title 47 Part 15 C** **FCC CFR Title 47 Part 15 E** **RSS-247 issue 2, RSS-Gen issue 5 A1** (see section 1)

Test Report identification	**210628-03.TR01**
Revision Control	**Rev. 01** **This test report revision replaces any previous test report revision** (see section 8)

The test results relate only to the samples tested.
Reference to accreditation shall be used only by full reproduction of test report

Issued by	Reviewed by
Digitally signed by Khodor RIDA Date: 2021.09.24 16:37:08 +02'00'	Olivier FARGANT cn=Olivier FARGANT, o=Intel Corporation, ou, email=olivier.fargant@intel.com, c=FR 2021.09.24 16:55:28 +02'00'
Khodor RIDA (Test Engineer Lead)	Olivier FARGANT (Technical Officer)

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425 rue de Goa – Le Cargo B6 - 06600 Antibes, France
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Table of Contents

1. Standards, reference documents and applicable test methods

FCC	1. FCC Title 47 CFR part 15 - Subpart C – §15.247 Operation within the bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz. 2019-10-01 Edition 2. FCC Title 47 CFR part 15 – Subpart E – Unlicensed National Information Infrastructure Devices. 2019-10-01 Edition 3. FCC Title 47 CFR part 15 – Subpart C – §15.209 Radiated emission limits; general requirements. 2019-10-01 Edition 4. FCC OET KDB 558074 D01 v05r02 - Guidance for compliance measurements on digital transmission system, frequency hopping spread spectrum system, and hybrid system devices operating under section 15.247 of the FCC rules. 5. FCC OET KDB 789033 D02 v02r01 General U-NII Test Procedures New Rules – Guidelines for compliance testing of Unlicensed National Information Infrastructure (U-NII) Devices (Part 15, Subpart E). 6. FCC OET KDB 662911 D01 v02r01 - Emissions Testing of Transmitters with Multiple Outputs in the Same Band. 7. ANSI C63.10-2013 American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.
ISED	1. RSS-Gen Issue 5 Amendment 1 - General Requirements for Compliance of Radio Apparatus. 2. RSS-247 Issue 2 - Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and License-Exempt Local Area Network (LE-LAN) Devices. 3. FCC OET KDB 789033 D02 v02r01 - General U-NII Test Procedures New Rules – Guidelines for compliance testing of Unlicensed National Information Infrastructure (U-NII) Devices (Part 15, Subpart E) 4. FCC OET KDB 558074 D01 v05r02 - Guidance for compliance measurements on digital transmission system, frequency hopping spread spectrum system, and hybrid system devices operating under section 15.247 of the FCC rules. 5. FCC OET KDB 662911 D01 v02r01 - Emissions Testing of Transmitters with Multiple Outputs in the Same Band. 6. ANSI C63.10-2013 American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

2. General conditions, competences and guarantees

- ✓ Tests performed under FCC standards identified in section 1 are covered by A2LA accreditation.
- ✓ Tests performed under ISED standards identified in section 1 are covered by Cofrac accreditation.
- ✓ Intel Corporation SAS Wireless RF Lab (Intel WRF Lab) is an ISO/IEC 17025:2017 laboratory accredited by the American Association for Laboratory Accreditation (A2LA) with the certificate number 3478.01.
- ✓ Intel Corporation SAS Wireless RF Lab (Intel WRF Lab) is an Accredited Test Firm recognized by the FCC, with Designation Number FR0011.
- ✓ Intel Corporation SAS Wireless RF Lab (Intel WRF Lab) is an ISO/IEC 17025:2017 testing laboratory accredited by the French Committee for Accreditation (Cofrac) with the certificate number 1-6736.
- ✓ Intel Corporation SAS Wireless RF Lab (Intel WRF Lab) is a Registered Test Site listed by ISED, with ISED #1000Y.
- ✓ Intel WRF Lab declines any responsibility with respect to the identified information provided by the customer and that may affect the validity of results.
- ✓ Intel WRF Lab only provides testing services and is committed to providing reliable, unbiased test results and interpretations.
- ✓ Intel WRF Lab is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.
- ✓ Intel WRF Lab has developed calibration and proficiency programs for its measurement equipment to ensure correlated and reliable results to its customers.
- ✓ This report is only referred to the item that has undergone the test.
- ✓ This report does not imply an approval of the product by the Certification Bodies or competent Authorities.

3. Environmental Conditions

✓ At the site where the measurements were performed the following limits were not exceeded during the tests:

Temperature	24.7ºC ± 1.7ºC
Humidity	44.7% ± 5.0%

4. Test samples

Sample	Control #	Description	Model	Serial #	Date of receipt	Note
#01	201218-01.S06	WiFi 6E Module	AX211D2WL	WFM18XCC18F94B42	2021-01-06	Used for 30MHz – 1GHz Spurious Emissions tests
	200102-01.S03	Extender	ADEXELEC	-	2020-01-02	
	200611-01.S06	Adaptor	PowerBy SNJ A4	-	2020-11-30	
	200602-03.S06	Absorber	MCS0	-	2020-07-03	
	180000-01.S05	Socket	Adapter 1216SD to M.2	-	2017-08-09	
	170801-01.S10	Laptop	Latitude E7470	7KNOXF2	2017-09-08	
	200921-01.S01	Wieson Antenna	-	-	2020-09-28	
	200921-01.S02	Wieson Antenna	-	-	2020-09-28	
#02	201218-01.S06	WiFi 6E Module	AX211D2WL	WFM18XCC18F94B42	2021-01-06	Used for 1GHz-9.5GHz and 18-40GHz Spurious Emissions tests
	200611-01.S07	Adaptor	PowerBy SNJ A4	-	2020-11-30	
	200602-03.S06	Absorber	MCS0	-	2020-07-03	
	180000-01.S02	Socket	Adapter 1216SD to M.2	-	2017-08-09	
	200611-03.S26	Extender	ADEXELEC		2020-07-01	
	170000-01.S01	Laptop	Lattitude E5470	DBPLMC2	2017-03-28	
	200921-01.S03	Wieson Antenna	-	-	2020-09-28	
	200921-01.S04	Wieson Antenna	-	-	2020-09-28	
#03	201218-01.S07	WiFi 6E Module	AX211D2WL	WFM:18CC18F94B6F	2021-01-06	Used for 9.5GHz-18GHz Spurious Emissions tests
	200102-01.S03	Extender	ADEXELEC	-	2020-01-02	
	200611-01.S06	Adaptor	PowerBy SNJ A4	-	2020-11-30	
	200602-03.S06	Absorber	MCS0	-	2020-07-03	
	180000-01.S05	Socket	Adapter 1216SD to M.2	-	2017-08-09	
	170801-01.S10	Laptop	Latitude E7470	7KNOXF2	2017-09-08	
	200921-01.S01	Wieson Antenna	-	-	2020-09-28	
	200921-01.S02	Wieson Antenna	-	-	2020-09-28	

5. EUT Features

The herein information is provided by the customer

Brand Name	Intel® Wi-Fi 6E AX211
Model Name	AX211D2WL
Software Version	DRTU Version: 11195_99_2100_51G
Driver Version	99.0.59.4
Prototype / Production	Production
Supported Radios	802.11b/g/n/ax 2.4GHz (2400.0 – 2483.5 MHz) 802.11a/n/ac/ax 5.2GHz (5150.0 – 5350.0 MHz) 5.6GHz (5470.0 – 5725.0 MHz) 5.8GHz (5725.0 – 5850.0 MHz) Bluetooth 5.2 2.4GHz (2400.0 – 2483.5 MHz)
Antenna Information	

Transmitter	Chain A (Main)	Chain B (Aux)
Manufacturer	Wieson	Wieson
Antenna type	Dipole	Dipole
Part number	ARY121-0009-002-H0	ARY121-0009-002-H0
Declared Antenna gain (dBi) - 2.4GHz	+3.10	+3.10
Declared Antenna gain (dBi) – 5.2 & 5.3GHz	+4.11	+4.11
Declared Antenna gain (dBi) – 5.5GHz	+5.17	+5.17
Declared Antenna gain (dBi) – 5.8 GHz	+5.17	+5.17

6. Remarks and comments

The low, mid, high channels were tested for each RF chain (A, B or A+B), bandwidth, modulation and sub- band. Only the worst case among the low, mid and high channels per sub-band has been reported in this test report

7. Test Verdicts summary

The statement of conformity to applicable standards in the table below are based on the measured values, without taking into account the measurement uncertainties.

	FCC part	RSS part	Test name	Verdict
802.11 b/g/n/ax 2.4GHz	15.247 (d) 15.209	RSS-247 Clause 5.5 RSS-Gen A1 Clause 8.9	Spurious Emission (radiated)	P
BLE	15.247 (d) 15.209	RSS-247 Clause 5.5 RSS-GEN A1 Clause 8.9	Spurious Emission (radiated)	P
BT	15.247 (d) 15.209	RSS-247 Clause 5.5 RSS-GEN A1 Clause 8.9	Spurious Emission (radiated)	P
802.11 a/n/ac/ax – U-NII-1	15.407 (b) (1) 15.209	RSS-247 Clause 6.2.1.2 RSS-GEN A1, Clause 8.9	Spurious Emission (radiated)	P
802.11 a/n/ac/ax – U-NII-2A	15.407 (b) (2) 15.209	RSS-247 Clause 6.2.2.2 RSS-GEN A1, Clause 8.9	Spurious Emission (radiated)	P
802.11 a/n/ac/ax – U-NII-2C	15.407 (b) (3) 15.209	RSS-247 Clause 6.2.3.2 RSS-GEN A1 Clause 8.9	Spurious Emission (radiated)	P
802.11 a/n/ac/ax – U-NII- 3	15.407 (b) (4) 15.209	RSS-247 Clause 6.2.4.2 RSS-GEN A1 Clause 8.9	Spurious Emission (radiated)	P

P: Pass
F: Fail
NM: Not Measured
NA: Not Applicable

8. Document Revision History

Revision #	Modified by	Revision Details
Rev. 00	N.Bui	First Issue
Rev.01	N.Bui	Additional tests were performed

Annex A. Test & System Description

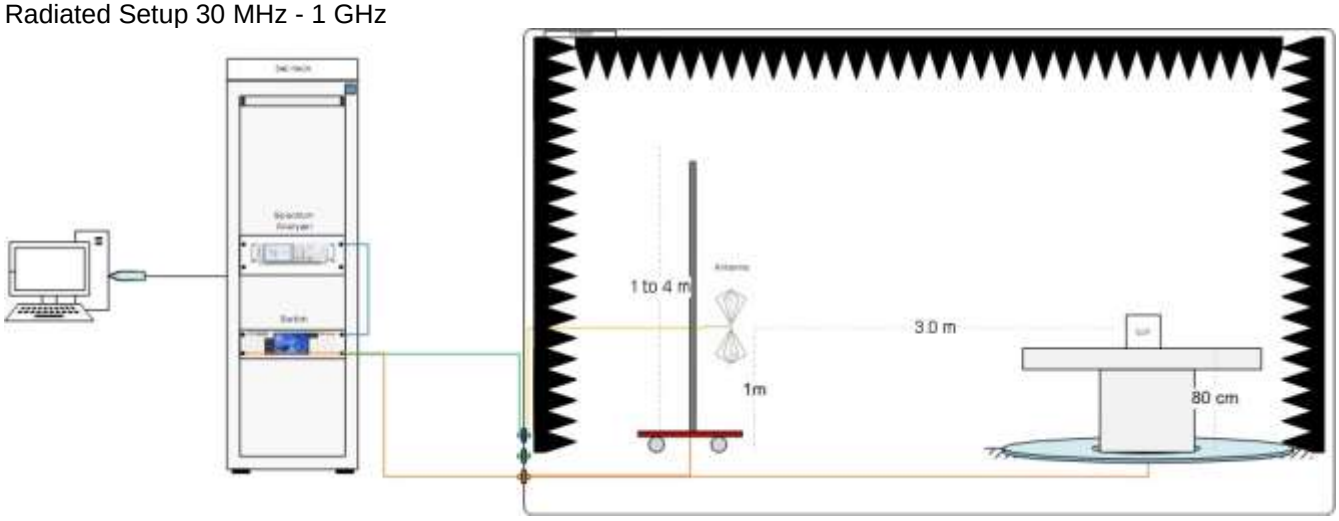
A.1 Measurement System

Measurements were performed using the following setups, made in accordance to the general provisions of ANSI C63.10-2013 Test Procedures.

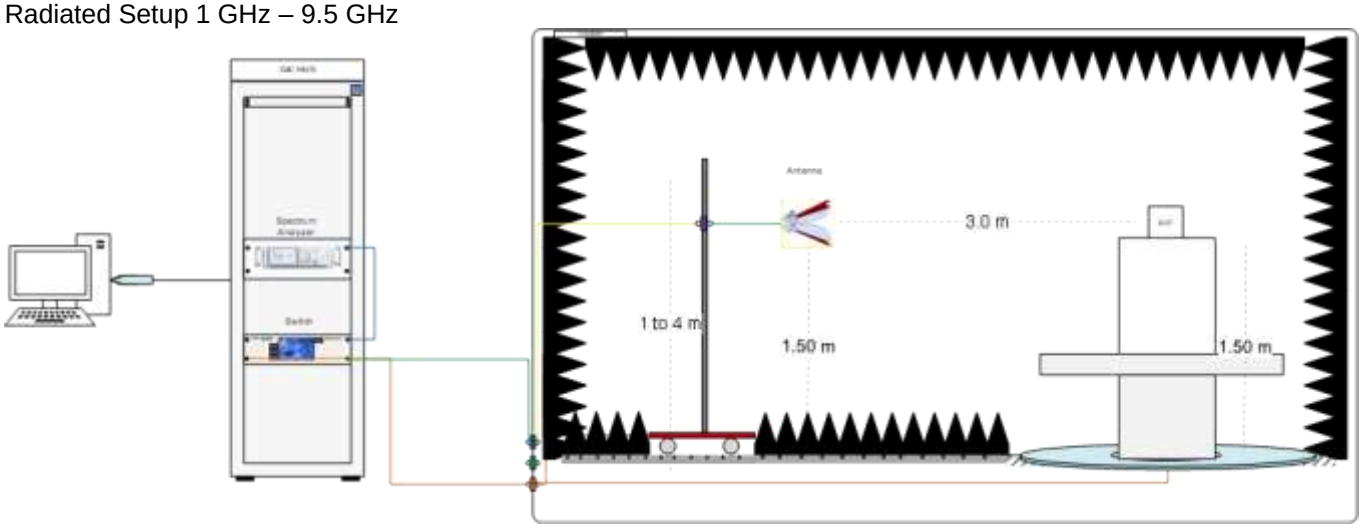
The DUT is installed in a test fixture and this test fixture is connected to a laptop computer and AC/DC power adapter. The laptop computer was used to configure the EUT to continuously transmit at a specified output power using all different modes and modulation schemes, using the Intel proprietary tool DRTU.

Radiated test setup

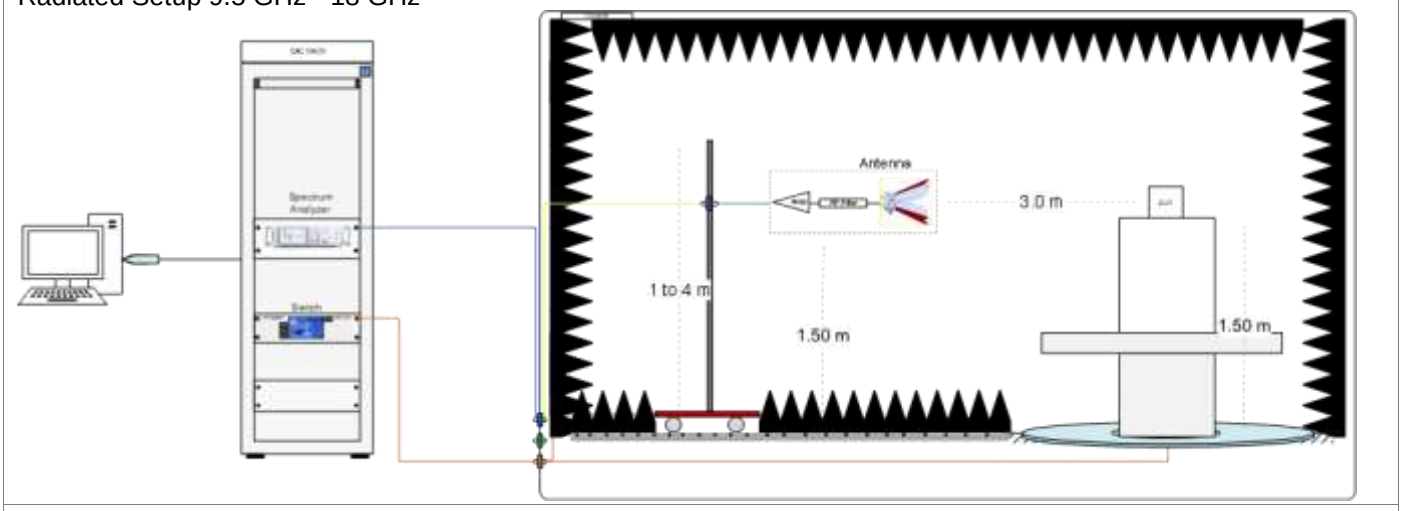
Radiated Setup 30 MHz - 1 GHz



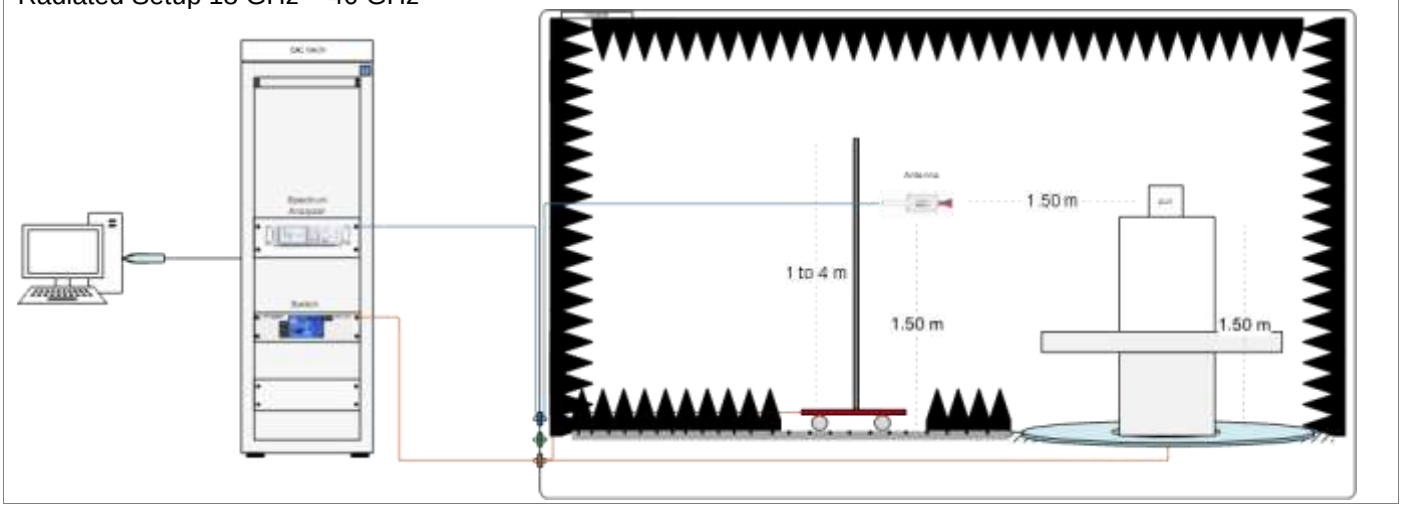
Radiated Setup 1 GHz – 9.5 GHz



Radiated Setup 9.5 GHz - 18 GHz



Radiated Setup 18 GHz – 40 GHz



Sample Calculation

The spurious received voltage V(dBµV) in the spectrum Analyzer is converted to Electric field strength using the transducer factor F corresponding to the Rx path Loss:

F (dB/m)= Rx Antenna Factor (dB/m) + Cable losses (dB) – Amplifiers Gain (dBi)
E (dBµV/m) = V(dBµV) + F (dB/m)

For field strength measurements made at other than the distance at which the applicable limit is specified, the field strength of the emission at the distance specified by the limit is deduced as follows:

$$E_{SpecLimit} = E_{Meas} + 20*\log(D_{Meas}/D_{SpecLimit})$$

where

$E_{SpecLimit}$ is the field strength of the emission at the distance specified by the limit, in dBµV/m
E_{Meas} is the field strength of the emission at the measurement distance, in dBµV/m
D_{Meas} is the measurement distance, in m
$D_{SpecLimit}$ is the distance specified by the limit, in m

A.2 Test Equipment List

Radiated Setup #1

ID#	Device	Type/Model	Serial #	Manufacturer	Cal. Date	Cal. Due Date
006-000	Anechoic Chamber	FACT3	5720	ETS-Lindgren	2020-07-06	2022-01-07
006-001	Turn Table	ETS	-	ETS-Lindgren	N/A	N/A
006-002	Switch & Positioning systems	EMC Center	00159757	ETS-Lindgren	N/A	N/A
006-008	Measurement SW	EMC32, v10.40.10	100623	Rohde & Schwarz	N/A	N/A
006-011	Boresight antenna mast	BAM 4.0-P	P/278/2890.01	Maturo	N/A	N/A
006-019	Biconical antenna 30 MHz – 1 GHz	UBAA9115 + BBVU9135 + DGA9552N	0286 + CH 9044	Schwarzbeck	2019-11-22	2021-11-22
147-000	Spectrum analyzer	FSW43	101847	Rohde & Schwarz	2020-11-02	2022-11-02
*006-020	Horn antenna 3117	3117	00157734	ETS-Lindgren	2021-08-05	2023-08-05
057-000	Horn Antenna 3117 + Amplifier + HPF9.5	3117	00167062+00169546	ETS-Lindgren	2020-06-15	2022-06-15
*007-008	Double Horn Ridged antenna	3116C-PA	00169308bis + 00196308	ETS-Lindgren	2021-08-05	2023-08-05
006-039	Cable 2.5m - 30MHz to 18GHz	0500990992500KE	19.23.395	Radiall	2021-02-24	2022-02-12
006-030	Cable 1.2m – 18 to 40 GHz	UFA147A-0-0480-200200	MFR 64639223720-003	Micro-coax	2021-02-15	2022-02-12
006-034	Cable 1m - 1GHz to 18GHz	UFA147A	-	Utilflex	2021-02-19	2022-02-12
006-036	Cable 1m – 30 MHz - 18GHz	UFB311A-0-0590-50U50U	MFR 64639 223230-001	Micro-coax	2021-02-24	2022-02-12
006-052	RF Cable 7.5m	0501051057000GX	19.35.850	Radiall	2021-02-24	2022-02-12
006-038	Cable 7m - 18GHz to 40GHz	R286304009	-	Radiall	2021-02-15	2022-02-12
006-051	RF Cable 1.0m	CBL-1.5M-SMSM+	202879	Mini-Circuits	2021-02-24	2022-02-12
365-000	Temperature & Humidity logger	RA12E-TH1-RAS	00-80-A3-E1-6E-55	Avtech	2021-03-08	2023-03-08
140-000	Power Sensor	NRP-Z81	104382	Rohde & Schwarz	2020-04-08	2022-04-08

N/A: Not Applicable
*Items not used during out of calibration period

Radiated Setup #2

ID#	Device	Type/Model	Serial #	Manufacturer	Cal. Date	Cal. Due Date
007-000	Anechoic chamber	RFD-FA-100	5996	ETS Lindgren	2020-07-06	2022-07-06
007-002	Turntable	-	-	ETS Lindgren	N/A	N/A
007-003	Antenna Tower	2171B-3.0M	00150123	ETS Lindgren	N/A	N/A
007-006	Switch & Positioner	EMCenter	00151232	ETS Lindgren	N/A	N/A
007-005	Measurement SW	EMC32, V11.20.00	100401	Rohde & Schwarz	N/A	N/A
127-000	Spectrum Analyzer	FSV40	101358	Rohde & Schwarz	2021-01-15	2023-01-15
*007-007	Double Ridge Horn (1- 18GHz)	3117	00152266	ETS Lindgren	2020-03-18	2022-03-18
057-000	Horn Antenna 3117 + Amplifier + HPF9.5	3117	00167062+00169546	ETS-Lindgren	2020-06-15	2022-06-15
*007-008	Double Horn Ridged antenna	3116C-PA	00169308bis + 00196308	ETS-Lindgren	2021-08-05	2023-08-05
*007-022	RF Cable 1-18GHz, 1.5m	0501050991200GX	19.23.493	Radiall	2021-08-12	2022-02-12
*007-020	RF Cable 1-18GHz, 1.2 m	2301761761200PJ	12.22.1104	Radiall	2021-08-12	2022-02-12
*007-011	RF Cable 1-18GHz - 6.5m	140-8500-11-51	001	Spectrum	2021-08-12	2022-02-12
*007-015	RF Cable 1GHz-18GHz 1.5m	-	-	Spirent	2021-08-12	2022-02-12
*007-014	RF Cable 18-40 GHz 6m	R286304009	1747364	Radiall	2021-08-12	2022-02-12
*007-023	RF Cable 1m DC-40GHz	PE360-100CM	-	Pasternack	2021-08-12	2022-02-12
*007-018	RF Cable 1-9.5GHz 1.2m	0500990991200KE	-	Radiall	2021-08-12	2022-02-12
145-000	Temp & Humidity Logger	RA12E-TH1-RAS	RA12-B89BE3	Avtech	2020-01-22	2022-01-22

N/A: Not Applicable
*Items not used during out of calibration period

Shared Radiated Equipment

ID#	Device	Type/Model	Serial #	Manufacturer	Cal. Date	Cal. Due Date
0616	Power Sensor	NRP-Z81	104385	Rohde & Schwarz	2020-04-08	2022-04-08
0617	Power Sensor	NRP-Z81	104386	Rohde & Schwarz	2020-04-08	2022-04-08
0618	Power Sensor	NRP-Z81	104382	Rohde & Schwarz	2020-04-08	2022-04-08

A.3 Measurement Uncertainty Evaluation

The system uncertainty evaluation is shown in the table below with a coverage factor of k = 2 to indicate a 95% level of confidence:

Measurement type	Uncertainty	Unit
Radiated tests <1GHz	±5.99	dB
Radiated tests 1GHz – 40 GHz	±5.85	dB

Annex B. Test Results

B.1 Test Conditions

For 802.11b, g and a modes the EUT can transmit at both CHAIN A and CHAIN B RF outputs individually, but not simultaneously.

For 802.11n20 & 802.11ax20 (20 MHz channel bandwidth), 802.11n40 & 802.11ax40 (40MHz channel bandwidth), 802.11ac80 & 802.11ax80 (80MHz channel bandwidth) and 802.11ac160 & 802.11ax160 (160MHz channel bandwidth) modes the EUT can transmit at both CHAIN A and CHAIN B RF outputs individually, and also simultaneously.

The following data rates were selected based on preliminary testing that identified those rates as the worst cases for the spurious level:

Transmission	Mode	Bandwidth (MHz)	Worst Case Data Rate
SISO	802.11b	20	1Mbps
	802.11g, a	20	6Mbps
	802.11n	20	HT0
		40	HT0
	802.11ac	80	VHT0
		160	VHT0
	802.11ax	20	HE0
		40	HE0
		80	HE0
		160	HE0
MIMO	802.11n	20/40	HT8
	802.11ac	80/160	VHT0
	802.11ax	20/40/80/160	HE0

B.2 Radiated spurious emission

The herein test results were performed by:

Test case measurement	Test Personnel
Radiated spurious emissions	A. Lounes, N.Bui

B.2.1 802.11 b/g/n/ax 2.4GHz

Standard references

<table>
<tr><th>FCC part</th><th>RSS part</th><th>Limits</th></tr>
<tr><td>15.247 (d)
15.209</td><td>RSS-247
Clause 5.5
RSS-Gen A1
Clause 8.9</td><td>Radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a):

<table>
<tr><th>Freq Range (MHz)</th><th>Field Strength (µV/m)</th><th>Field Strength (dBµV/m)</th><th>Meas. Distance (m)</th></tr>
<tr><td>30-88</td><td>100</td><td>40</td><td>3</td></tr>
<tr><td>88-216</td><td>150</td><td>43.5</td><td>3</td></tr>
<tr><td>216-960</td><td>200</td><td>46</td><td>3</td></tr>
<tr><td>Above 960</td><td>500</td><td>54</td><td>3</td></tr>
</table>

The emission limits shown in the above table are based on measurements employing CISPR quasi-peak detector except for the frequency bands 9-90 kHz. 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.
For average radiated emission measurements above 1000 MHz. there is also a limit specified when measuring with peak detector function corresponding to 20 dB above the indicated values in the table.</td></tr>
</table>

Test procedure

The radiated setups shown in section A.1 were used to measure the radiated spurious emissions.
Depending on the frequency range and bands being tested, different antennas and filters were used.
The final measurement is done by varying the antenna height from 1 to 4 meters, the EUT azimuth over 360º and for both Vertical and Horizontal polarizations.

Test Results

Radiated spurious - 30 MHz – 1 GHz

Radiated Spurious – All modes

Frequency	QuasiPeak	Limit	Margin	Polar
MHz	dBµV/m	dBµV/m	dBµV/m	---
166.4	40.3	43.5	3.2	H

Note 1: The spurious signals detected do not depend on either the operating channel or the modulation mode.

1 GHz – 26.5 GHz, 802.11n20, HT0, Chain A+B

Radiated Spurious – CH11

Frequency	MaxPeak	Average	Limit	Margin	Polar
6906.6	58.1	---	74.0	15.9	V
6987.2	---	47.1	54.0	6.9	V
17813.0	---	41.8	54.0	12.2	V
17832.8	53.3	---	74.0	20.7	V
25908.8	---	38.1	54.0	16.0	V
25919.6	49.2	---	74.0	24.8	V

B.2.2 BLE

Standards references

FCC part	RSS part	Limits
15.247 (d) 15.209	RSS-247 Clause 5.5 RSS-Gen A1 Clause 8.9	Radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a): Freq Range (MHz) / Field Strength (µV/m) / Field Strength (dBµV/m) / Meas. Distance (m) 30-88 / 100 / 40 / 3 88-216 / 150 / 43.5 / 3 216-960 / 200 / 46 / 3 Above 960 / 500 / 54 / 3 The emission limits shown in the above table are based on measurements employing CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector. For average radiated emission measurements above 1000 MHz, there is also a limit specified when measuring with peak detector function, corresponding to 20 dB above the indicated values in the table.

Test procedure

The radiated setups shown in section A.1 were used to measure the radiated spurious emissions.
Depending on the frequency range and bands being tested, different antennas and filters were used.
The final measurement is done by varying the antenna height from 1 to 4 meters, the EUT azimuth over 360º and for both Vertical and Horizontal polarizations.

Test Results

Radiated spurious - 30 MHz – 1 GHz

Radiated Spurious – All modes

Frequency	QuasiPeak	Limit	Margin	Polar
50.4	33.1	40.0	6.9	V

Note 1: The spurious signals detected do not depend on either the operating channel or the modulation mode.

1 GHz – 26.5 GHz, BLE

Radiated Spurious – CH39

Frequency	MaxPeak	Average	Limit	Margin	Polar
MHz	dBµV/m	dBµV/m	dBµV/m	dB	---
6909.0	---	43.5	54.0	10.5	H
6955.0	56.7	---	74.0	17.3	H
17811.0	---	41.7	54.0	12.3	V
17815.0	55.0	---	74.0	19.0	H
25925.5	---	36.9	54.0	17.1	V
25938.5	49.7	---	74.0	24.3	V

B.2.3 BT

Standard references

FCC part	RSS part	Limits
15.247 (d) 15.209 (a)	RSS-247 Clause 5.5 RSS GEN A1 Clause 8.9	Radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a): Freq Range (MHz) / Field Strength (µV/m) / Field Strength (dBµV/m) / Meas. Distance (m) 30-88 / 100 / 40 / 3 88-216 / 150 / 43.5 / 3 216-960 / 200 / 46 / 3 Above 960 / 500 / 54 / 3 The emission limits shown in the above table are based on measurements employing CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector. For average radiated emission measurements above 1000 MHz, there is also a limit specified when measuring with peak detector function, corresponding to 20 dB above the indicated values in the table.

Test procedure

The radiated setups shown in section A.1 were used to measure the radiated spurious emissions.
Depending on the frequency range and bands being tested, different antennas and filters were used.
The final measurement is done by varying the antenna height from 1 m to 4 m, the EUT azimuth over 360º and for both Vertical and Horizontal polarizations.

Test Results

Radiated spurious - 30 MHz – 1 GHz

Radiated Spurious – All modes

Frequency	QuasiPeak	Limit	Margin	Polar
MHz	dBµV/m	dBµV/m	dBµV/m	---
50.0	18.4	40.0	21.6	V

Note 1: The spurious signals detected do not depend on either the operating channel or the modulation mode.

1 GHz – 26 GHz, BR – GFSK

Radiated Spurious – CH39 DH5

Frequency	MaxPeak	Average	Limit	Margin	Polar
MHz	dBµV/m	dBµV/m	dBµV/m	dB	---
7323.0	---	50.5	54.0	3.5	V
7382.0	56.4	---	74.0	17.6	V
17810.0	---	41.8	54.0	12.2	V
17816.5	54.8	---	74.0	19.2	H
25928.0	49.7	---	74.0	24.3	V
25945.5	---	36.9	54.0	17.1	V

B.2.4 802.11 a/g/n/ax U-NII-1

Standard references

<table>
<tr><th>FCC part</th><th>Limits</th></tr>
<tr><td>15.407 (b) (1)</td><td>For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.</td></tr>
<tr><td>15.209</td><td>Radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a):
<table>
<tr><th>Freq Range (MHz)</th><th>Field Strength (µV/m)</th><th>Field Strength (dBµV/m)</th><th>Meas. Distance (m)</th></tr>
<tr><td>0.009-0.490</td><td>2400/f(kHz)</td><td>-</td><td>300</td></tr>
<tr><td>0.490-1.705</td><td>24000/f(kHz)</td><td>-</td><td>300</td></tr>
<tr><td>1.705-30.0</td><td>30</td><td>-</td><td>30</td></tr>
<tr><td>30-88</td><td>100</td><td>40</td><td>3</td></tr>
<tr><td>88-216</td><td>150</td><td>43.5</td><td>3</td></tr>
<tr><td>216-960</td><td>200</td><td>46</td><td>3</td></tr>
<tr><td>Above 960</td><td>500</td><td>54</td><td>3</td></tr>
</table>
The emission limits shown in the above table are based on measurements employing CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.
For average radiated emission measurements above 1000 MHz, there is also a limit specified when measuring with peak detector function, corresponding to 20 dB above the indicated values in the table.</td></tr>
</table>

Test procedure

The radiated setup shown in section A.1 was used to measure the radiated spurious emissions.
Depending of the frequency range and bands being tested, different antennas and filters were used.
The final measurement is done by varying the antenna height, the EUT azimuth over 360º and for both Vertical and Horizontal polarizations.

Test Results

Radiated spurious - 30 MHz – 1 GHz

Radiated Spurious – All modes

Frequency	QuasiPeak	Limit	Margin	Polar
MHz	dBµV/m	dBµV/m	dBµV/m	---
50.0	18.4	40.0	21.6	V

Note 1: The spurious signals detected do not depend on either the operating channel or the modulation mode.

1 GHz – 40 GHz, 802.11ax20, HE0, Chain A+B

Radiated Spurious – CH40

Frequency	MaxPeak	Average	Limit	Margin	Polar
MHz	dBµV/m	dBµV/m	dBµV/m	dB	---
9316.6	---	46.5	54.0	7.5	H
9344.9	56.9	---	74.0	17.1	H
10383.1	53.0	---	68.2	15.3	V
15574.7	---	49.4	54.0	4.7	V
15575.6	56.5	---	74.0	17.5	V
20764.9	50.3	---	74.0	23.7	V
20766.3	---	40.8	54.0	13.2	V

B.2.5 802.11 a/g/n/ax U-NII-2A

Standard references

<table>
<tr><th>FCC part</th><th>Limits</th></tr>
<tr><td>15.407 (a) (2)</td><td>For transmitters operating in the 5.25-5.35 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.</td></tr>
<tr><td>15.209</td><td>Radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a):
<table>
<tr><th>Freq Range (MHz)</th><th>Field Strength (µV/m)</th><th>Field Strength (dBµV/m)</th><th>Meas. Distance (m)</th></tr>
<tr><td>30-88</td><td>100</td><td>40</td><td>3</td></tr>
<tr><td>88-216</td><td>150</td><td>43.5</td><td>3</td></tr>
<tr><td>216-960</td><td>200</td><td>46</td><td>3</td></tr>
<tr><td>Above 960</td><td>500</td><td>54</td><td>3</td></tr>
</table>
The emission limits shown in the above table are based on measurements employing CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.
For average radiated emission measurements above 1000 MHz, there is also a limit specified when measuring with peak detector function, corresponding to 20 dB above the indicated values in the table.</td></tr>
</table>

Test procedure

The radiated setups shown in section A.1 were used to measure the radiated spurious emissions.
Depending of the frequency range and bands being tested, different antennas and filters were used.
The final measurement is done by varying the antenna height, the EUT azimuth over 360º and for both Vertical and Horizontal polarizations.

Test Results

Radiated spurious - 30 MHz – 1 GHz

Radiated Spurious – All modes

Frequency	QuasiPeak	Limit	Margin	Polar
MHz	dBµV/m	dBµV/m	dBµV/m	---
49.9	34.3	40.0	5.7	V
166.4	18.7	43.5	24.8	H

Note 1: The spurious signals detected do not depend on either the operating channel or the modulation mode.

1 GHz – 40 GHz, 802.11ax40, HE0, Chain A+B

Radiated Spurious – CH62

Frequency	MaxPeak	Average	Limit	Margin	Polar
MHz	dBµV/m	dBµV/m	dBµV/m	dB	---
9361.0	---	46.4	54.0	7.6	H
9366.7	57.0	---	74.0	17.0	H
10625.8	54.7	---	74.0	19.3	V
10626.3	---	45.1	54.0	8.9	V
15938.8	54.6	---	74.0	19.4	V
15940.6	---	46.4	54.0	7.6	V
21251.7	50.6	---	74.0	23.4	V
21252.7	---	40.5	54.0	13.5	H
31879.8	---	43.2	68.2	25.0	H
31882.2	52.4	---	68.2	15.8	H

B.2.6 802.11 a/g/n/ax U-NII-2C

Standard references

<table>
<tr><th>FCC part</th><th>RSS clause</th><th>Limits</th></tr>
<tr><td>15.407 (b) (3)</td><td>RSS-247 Clause 6.2.3 (2)</td><td>For transmitters operating in the 5.47–5.725 GHz band: all emissions outside of the 5.47–5.725 GHz band shall not exceed an EIRP of -27 dBm/MHz.</td></tr>
<tr><td>15.209</td><td>RSS-GEN A1, Clause 8.9</td><td>Radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a):
<table>
<tr><th>Freq Range (MHz)</th><th>Field Strength (µV/m)</th><th>Field Strength (dBµV/m)</th><th>Meas. Distance (m)</th></tr>
<tr><td>30-88</td><td>100</td><td>40</td><td>3</td></tr>
<tr><td>88-216</td><td>150</td><td>43.5</td><td>3</td></tr>
<tr><td>216-960</td><td>200</td><td>46</td><td>3</td></tr>
<tr><td>Above 960</td><td>500</td><td>54</td><td>3</td></tr>
</table>
The emission limits shown in the above table are based on measurements employing CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.
For average radiated emission measurements above 1000 MHz, there is also a limit specified when measuring with peak detector function, corresponding to 20 dB above the indicated values in the table.</td></tr>
</table>

Test procedure

The radiated setups shown in section A.1 were used to measure the radiated spurious emissions.
Depending on the frequency range and bands being tested, different antennas and filters were used.
The final measurement is done by varying the antenna height from 1 m to 4 m, the EUT azimuth over 360º and for both Vertical and Horizontal polarizations.

Test Results

Radiated spurious - 30 MHz – 1 GHz

Radiated Spurious – All modes

Frequency	QuasiPeak	Limit	Margin	Polar
MHz	dBµV/m	dBµV/m	dBµV/m	---
40.0	29.7	40.0	10.3	V
50.0	16.2	40.0	23.8	V

Note 1: The spurious signals detected do not depend on either the operating channel or the modulation mode.

1 GHz – 40 GHz, 802.11ax80, HE0, Chain A+B

Radiated Spurious – CH138

Frequency	MaxPeak	Average	Limit	Margin	Polar
MHz	dBµV/m	dBµV/m	dBµV/m	dB	---
9353.2	---	46.5	54.0	7.5	H
9355.8	56.6	---	74.0	17.4	V
1388.4	58.9	---	74.0	15.1	V
11388.9	---	51.1	54.0	2.9	V
22778.4	---	42.7	54.0	11.3	H
22779.4	52.6	---	74.0	21.5	H

B.2.7 802.11 a/g/n/ax U-NII-3

Standard references

<table>
<tr><th>FCC part</th><th>RSS clause</th><th>Limits</th></tr>
<tr><td>15.407 (b) (4)</td><td>RSS-247 Clause 6.2.4.2</td><td>For transmitters operating in the 5.725-5.85 GHz band: All emissions shall be limited to a level of −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.</td></tr>
<tr><td>15.209</td><td>RSS-GEN A1, Clause 8.9</td><td>Radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a):
<table>
<tr><th>Freq Range (MHz)</th><th>Field Strength (µV/m)</th><th>Field Strength (dBµV/m)</th><th>Meas. Distance (m)</th></tr>
<tr><td>30-88</td><td>100</td><td>40</td><td>3</td></tr>
<tr><td>88-216</td><td>150</td><td>43.5</td><td>3</td></tr>
<tr><td>216-960</td><td>200</td><td>46</td><td>3</td></tr>
<tr><td>Above 960</td><td>500</td><td>54</td><td>3</td></tr>
</table>
The emission limits shown in the above table are based on measurements employing CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.
For average radiated emission measurements above 1000 MHz, there is also a limit specified when measuring with peak detector function, corresponding to 20 dB above the indicated values in the table.</td></tr>
</table>

Test procedure

The radiated setups shown in section A.1 were used to measure the radiated spurious emissions.

Depending on the frequency range and bands being tested, different antennas and filters were used.

The final measurement is done by varying the antenna height from 1 m to 4 m, the EUT azimuth over 360º and for both Vertical and Horizontal polarizations.

Test Results

Radiated spurious - 30 MHz – 1 GHz

Radiated Spurious – All modes

Frequency	QuasiPeak	Limit	Margin	Polar
MHz	dBµV/m	dBµV/m	dBµV/m	---
50.0	17.4	40.0	22.6	V

Note 1: The spurious signals detected do not depend on either the operating channel or the modulation mode.

1 GHz – 40 GHz, 802.11ax80, HE0, Chain A+B

Radiated Spurious – CH155

Frequency	MaxPeak	Average	Limit	Margin	Polar
MHz	dBµV/m	dBµV/m	dBµV/m	dB	---
9361.9	---	46.4	54.0	7.7	H
9413.3	57.0	---	74.0	17.0	H
11558.4	---	53.6	54.0	0.4	V
11559.4	61.9	---	74.0	12.1	V
23117.9	51.9	---	74.0	22.1	H
23117.9	---	42.3	54.0	11.7	H