N° 1-6736
Scope available
on www.cofrac.fr

# TEST REPORT

| | |
|---|---|
| EUT Description | **2x2 PCIe M.2 1216 adapter card** |
| Brand Name | **Intel®** |
| Model Name | **BE211D2W / BE211D2W M** |
| Date of Test Start/End | **2025-06-06 / 2025-07-21** |
| Features | **2x2 Wi-Fi + Bluetooth®**<br>**(see section 5)** |

| | |
|---|---|
| Applicant | **Intel Corporation SAS** |
| Address | **425 rue de Goa - Le Cargo B6 - 06600, Antibes, FRANCE** |
| Contact Person | **Irina Vicente** |
| Telephone/Fax/ Email | **Irina.vicente@intel.com** |

| | |
|---|---|
| Reference Standards | **ETSI EN 301 893 V2.2.1**<br>**(see section 1)** |

| | |
|---|---|
| Test Report identification | **250522-02.TR06** |
| Revision Control | **Rev. 00**<br>**This test report revision replaces any previous test report revision**<br>**(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

Digitally signed by Khodor RIDA
Date: 2025.07.25 14:39:09 +02'00'

Khodor RIDA
(Test Engineer Lead)

Reviewed by

Digitally signed by zayd
DN: cn=zayd, email=zayd.ouachicha@intel.com, c=US
Date: 2025.07.25 15:22:52 +02'00'

Zayd OUACHICHA
(Technical Manager)

**Intel Corporation S.A.S – WRF Lab**
**425 rue de Goa – Le Cargo B6 - 06600, Antibes, France**
**Tel. +33493001400 / Fax +33493001401**

# Table of Contents

## 1. Standards, reference documents and applicable test methods

1. ETSI EN 301 893 V2.2.1 – 5GHz RLAN; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU.

## 2. General conditions, competences and guarantees

- ✓ 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 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 | Min: 21.21°C<br>Max: 30.63°C<br>Average: 25.97°C |
| Humidity | Min: 26.15%<br>Max: 64.35%<br>Average: 48.66% |

## 4. Test samples

| Sample | Control # | Description | Model | Serial # | Date of receipt | Note |
|---|---|---|---|---|---|---|
| #01 | 250528-01.S01 | Module | BE211D2W | 289200F964C4 | 2025-05-28 | Used for conducted Test |
| | 240000-01.S03 | Extender MotherBoard | PCB00887-008_A | 2202207569 | 2024-12-12 | |
| | 210916-09.S03 | Laptop | HP HSN-I45C | 000176090Y | 2021-12-10 | |
| #02 | 250528-01.S07 | Module | BE211D2W | 289200F96596 | 2025-05-28 | Used for Radiated Spurious Emissions tests |
| | 200803-01.S01 | Extender | ADEXELEC | 139245 | 2020-08-31 | |
| | 170000-01.S57 | Adapter | BNJ C0 V3 | ASS00959-00-0C | 2025-03-24 | |
| | 200611-03.S30 | Test PC | Latitude 5401 | 6DJLK13 | 2020-08-19 | |
| | 230223-02.S48 | Triband Antenna | - | 006 | 2023-04-20 | |
| | 230526-09.S08 | Triband Antenna | - | 016 | 2023-07-06 | |
| #03 | 250528-01.S07 | Module | BE211D2W | 289200F96596 | 2025-05-28 | Used for Radiated Spurious Emissions tests |
| | 200904-01.S14 | Extender | ADEXELEC | 12 | 2023-06-22 | |
| | 170000-01.S56 | Adapter | BNJ C0 V3 | E1578726888186A | 2025-03-24 | |
| | 170000-01.S55 | Test PC | LATITUDE 5530 | 004250000000002AA521 | 2025-03-24 | |
| | 230526-09.S06 | Triband Antenna | - | 014 | 2023-07-06 | |
| | 230526-09.S05 | Triband Antenna | - | 013 | 2023-07-06 | |

## 5. EUT Features

The herein information is provided by the customer.

Intel WRF Lab declines any responsibility for the accuracy of the stated customer provided information, especially if it has any impact on the correctness of test results presented in this report.

<table>
<tr><td>Brand Name</td><td>Intel®</td></tr>
<tr><td>Model Name</td><td>BE211D2W / BE211D2W M</td></tr>
<tr><td>Software Version</td><td>DRTU.08798.99.0.99</td></tr>
<tr><td>Driver Version</td><td>99.0.99.2</td></tr>
<tr><td>Supported Radios</td><td>802.11b/g/n/ax/be 2.4GHz<br>802.11a/n/ac/ax/be 5.2GHz<br>5.3GHz<br>5.6GHz<br>5.8GHz<br>802.11ax/be 6.0GHz<br>Bluetooth 2.4GHz</td></tr>
<tr><td>Antenna Information</td><td>
<table>
<tr><th>Transmitter</th><th>Chain A(1)</th><th>Chain B(2)</th></tr>
<tr><td>Manufacturer</td><td>Intel WRF Lab</td><td>Intel WRF Lab</td></tr>
<tr><td>Antenna type</td><td>PIFA</td><td>PIFA</td></tr>
<tr><td>Part number</td><td>WRF-Tri Band-Antenna</td><td>WRF-Tri Band-Antenna</td></tr>
<tr><td>Antenna peak gain (dBi)</td><td>+5.0</td><td>+5.0</td></tr>
</table>
</td></tr>
</table>

## 6. Remarks and comments

1. At customer request, all normal condition tests were carried out at tune up power (+0.5dB) Vs device setting.

## 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.

### 7.1. 802.11a/n/ac/ax/be

| Mode | ETSI clause | Test | Verdict |
|---|---|---|---|
| 5.6GHz | 4.2.1 | Nominal Centre Frequencies | P |
| | 4.2.2 | Nominal Channel Bandwidth and Occupied Channel Bandwidth | P |
| | 4.2.3.1.1 | RF output power | P |
| | 4.2.3.1.2 | Transmit Power Control (TPC) | P |
| | 4.2.3.1.3 | Power Density | P |
| | 4.2.4.1 | Transmitter unwanted emissions outside the 5GHz RLAN bands | P |
| | 4.2.4.2 | Transmitter unwanted emissions within the 5GHz RLAN bands | P |
| | 4.2.5 | Receiver spurious emissions | P |
| | 4.2.6 | Dynamic Frequency Selection | P |
| | 4.2.7 | Adaptivity(Channel Access Mechanism) | P |
| | 4.2.8 | Receiver Blocking | P |
| | 4.2.9 | Adjacent Channel Selectivity | P |

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

## 8. Document Revision History

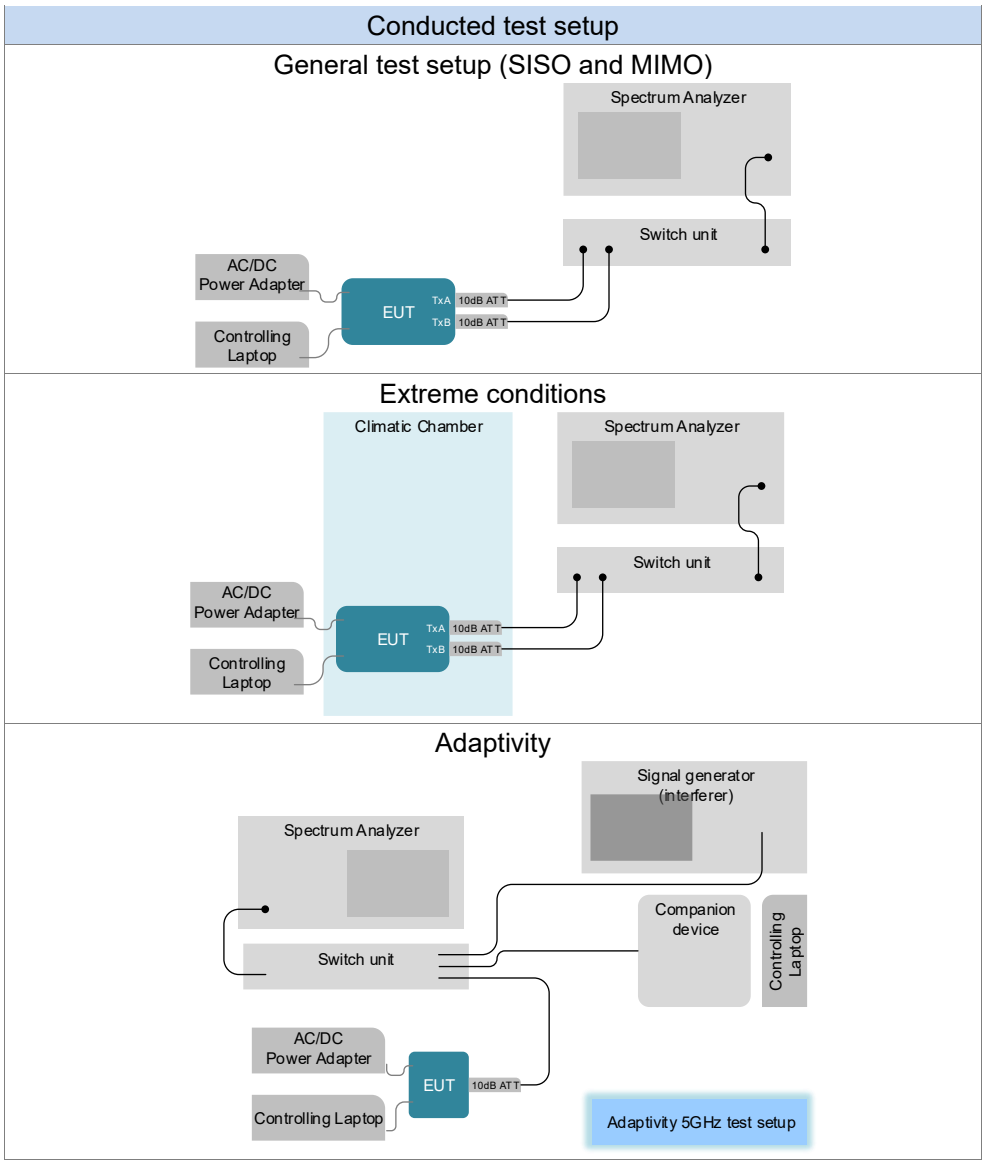
| Revision # | Modified by | Revision Details |
|---|---|---|
| Rev. 00 | T.Gamain<br>K.RIDA | First Issue |

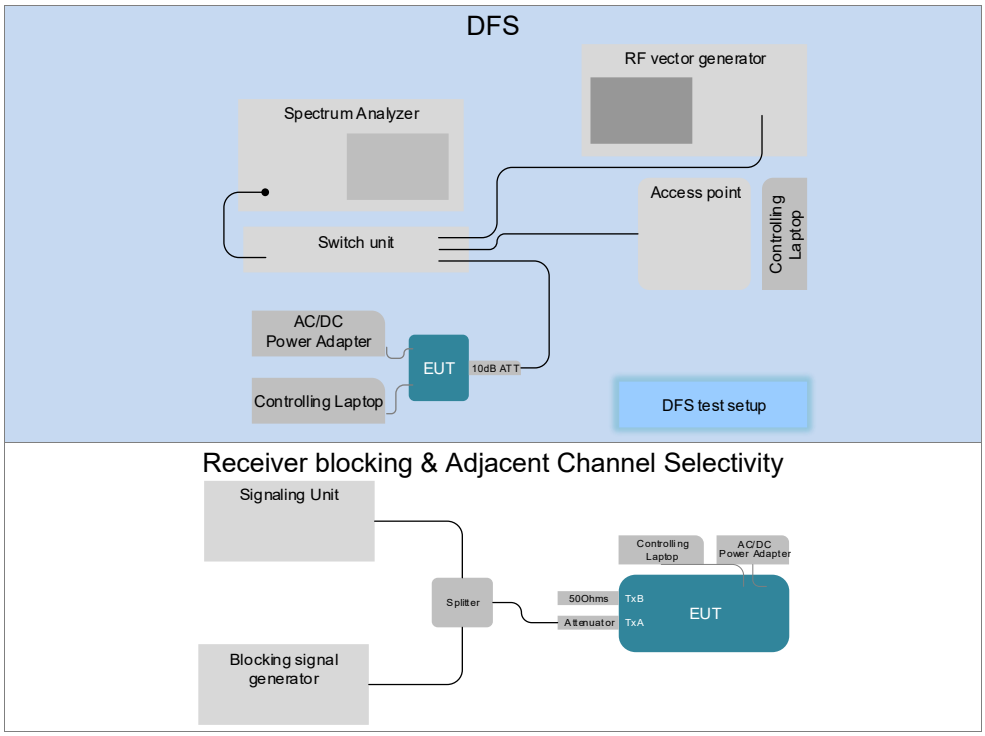
# Annex A. Test & System Description

## A.1 Measurement System

Measurements were performed using the following setups, made in accordance to the general provisions of ETSI EN 301 893 V2.2.1. Test Procedures. Rohde & Schwarz TS8997 system with the switching unit OSP120, OSP B-157 and software EMC32 were employed.

The EUT was 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.
Setups for conducted and radiated measurements are shown below.

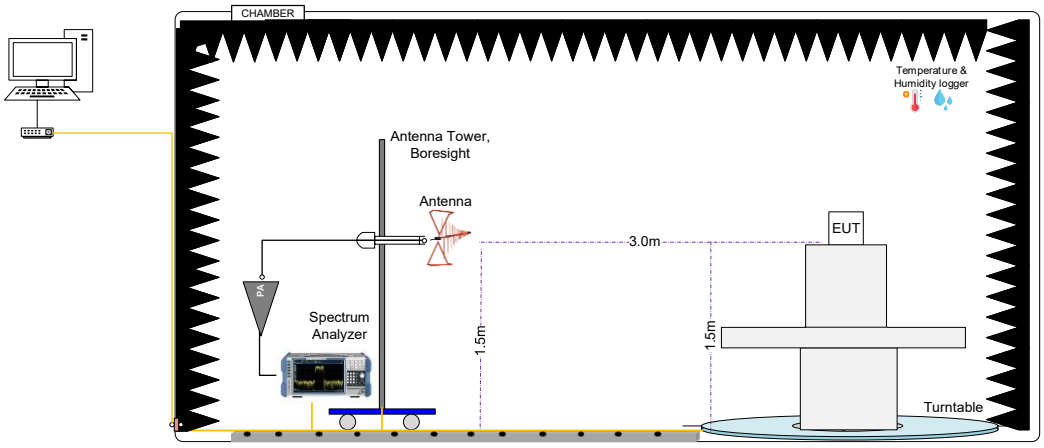



DFS
RF vector generator
Spectrum Analyzer
Access point
Controlling Laptop
Switch unit
AC/DC Power Adapter
EUT
10dB ATT
Controlling Laptop
DFS test setup

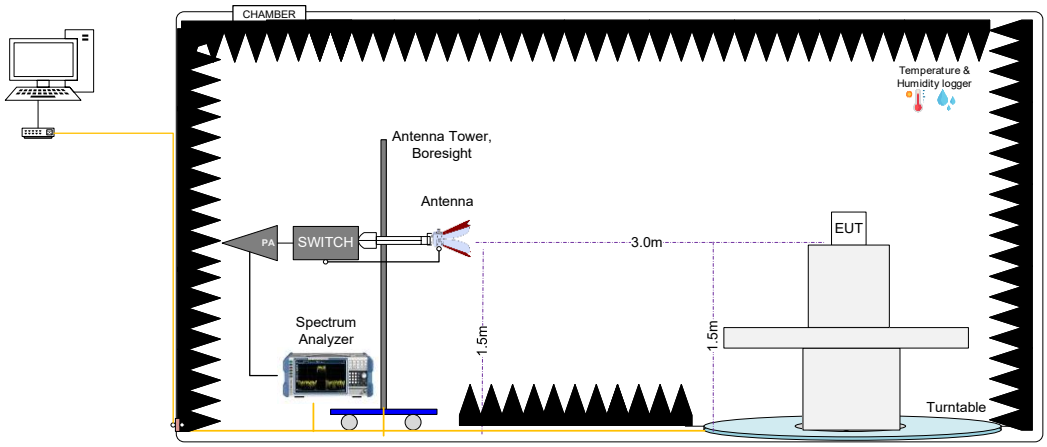

Receiver blocking & Adjacent Channel Selectivity
Signaling Unit
Controlling Laptop
AC/DC Power Adapter
Splitter
50Ohms
Attenuator
TxB
TxA
EUT
Blocking signal generator

## Radiated test setup

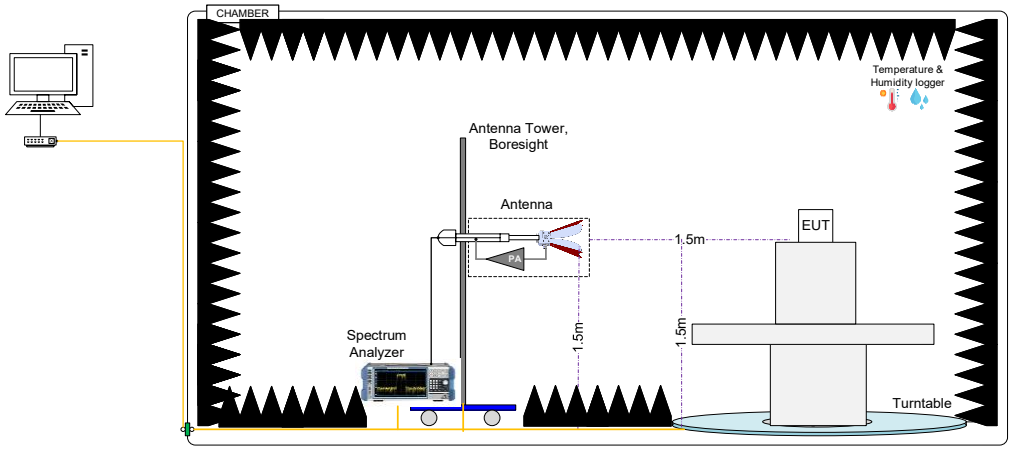
### Radiated Setup 30 MHz - 1 GHz (Transmitter tests)



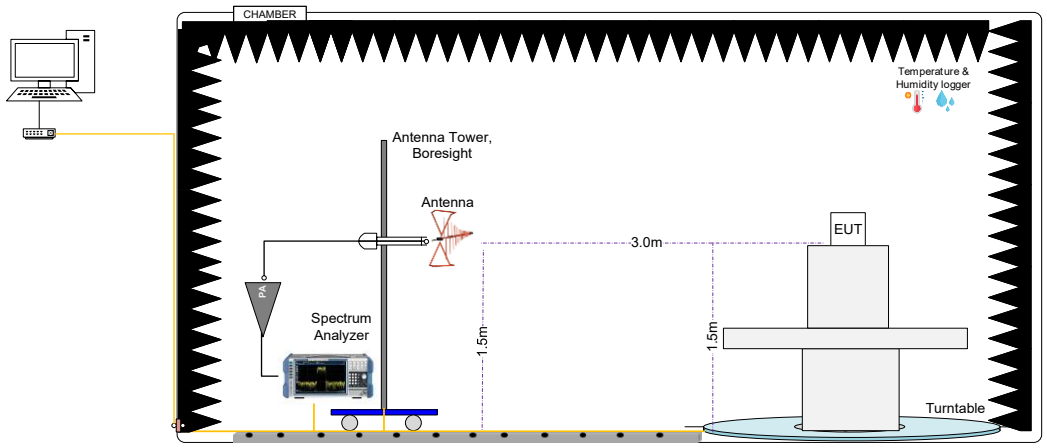

### Radiated Setup 1 GHz – 11 GHz (Transmitter tests)



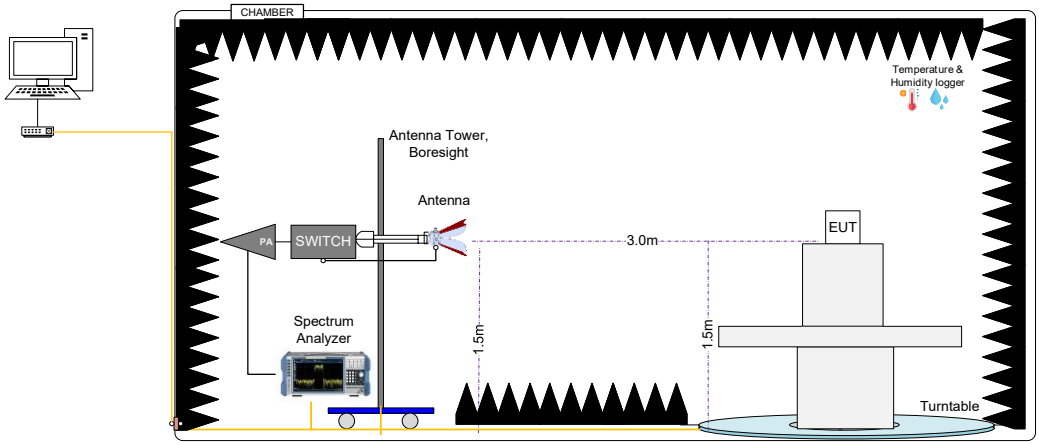

### Radiated Setup 11 GHz - 26 GHz (Transmitter tests)



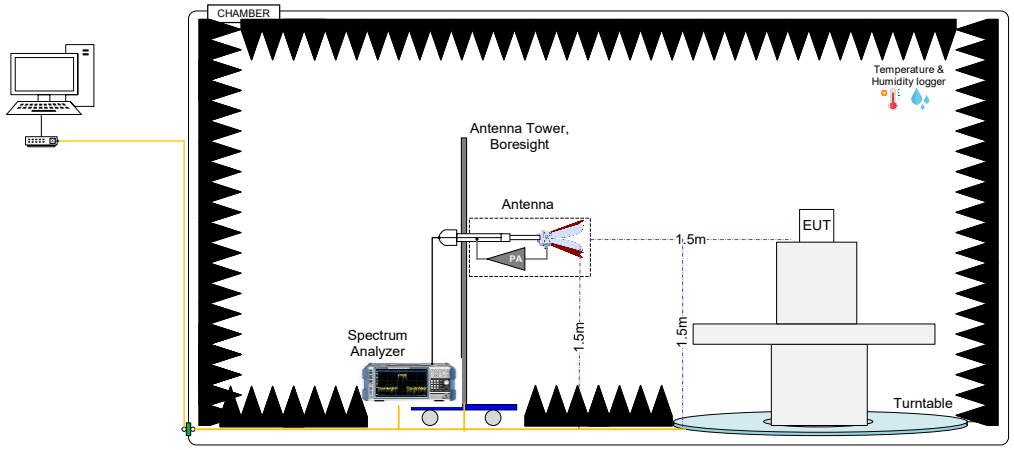

### Radiated Setup 30 MHz – 1 GHz (Receiver tests)




Radiated Setup 1 GHz - 11 GHz (Receiver tests)



Radiated Setup 11 GHz - 26 GHz (Receiver tests)



## A.2 Test Equipment List

| ID# | Device | Type/Model | Serial # | Manufacturer | Cal. Date | Cal. Due Date |
|---|---|---|---|---|---|---|
| 017-015 | Switch unit | OSP 120 | 101172 | Rohde & Schwarz | 2024-05-22 | 2026-05-22 |
| 481-000 | Access point 802.11n | AIR-CAP3502E-A-K9 | FTX1438S6P4 | Cisco | N/A | N/A |
| 017-003 | DC Power supply | E3640A | MY40006885 | Agilent | N/A | N/A |
| 133-000 | Oscilloscope | RTE1052 | 101135 | Rohde & Schwarz | 2024-03-04 | 2026-03-04 |
| 299-000 | Multimeter | 34401A | US360546853146A00597 | HPAgilent | 2024-03-14 | 2026-03-14 |
| 311-000 | Climatic chamber | SLT34/40 | 56746020930010 | Secasi | 2023-12-20 | 2025-12-20 |
| 017-038 | Spectrum analyzer | FSVA3013 | 102344 | Rohde & Schwarz | 2024-05-29 | 2026-05-29 |
| 017-000 | Measurement Software | WMS32 V11.40 | 200226 | Rohde & Schwarz | N/A | N/A |
| 412-000 | Measurement Software | DRTU Power Finder V2 | N/A | WRF Lab | N/A | N/A |
| 094-004 | Temp & Humidity Logger | RMS-HCD-S | 24050483 | Rotronic | 2024-09-02 | 2026-09-02 |
| 237-000 | 10dB directional coupler | MC2047-10 | 01-062 | Fairview | 2025-02-24 | 2026-02-24 |
| 017-005 | RF Cable 0.5m | PE3CA1039 | - | Pasternack | 2025-02-24 | 2026-02-24 |
| 017-006 | RF Cable 1.2m | PE3C0666 | - | Pasternack | 2025-02-24 | 2026-02-24 |
| 017-007 | Cable SMA Male to ML51-P | HRMP-ML51LP | DTR178-100RS | Hirose | 2025-02-24 | 2026-02-24 |
| 017-008 | Cable SMA Male to ML51-P | HRMP-ML51LP | DTR178-100RS | Hirose | 2025-02-24 | 2026-02-24 |
| 281-000 | Thermometer | t3000FC | 46320036 | Fluke | 2024-04-17 | 2026-04-17 |
| 053-000 | Thermometer | t3000FC | 46320032 | Fluke | 2023-12-13 | 2025-12-13 |
| 017-011 | RF Cable 2m | 0900670672000PJ | 1936949 | Radiall | 2025-02-24 | 2026-02-24 |
| 017-012 | RF Cable 2m | 0900670672000PJ | 1936947 | Radiall | 2025-02-24 | 2026-02-24 |
| 017-019 | 10dB attenuator | - | - | Pasternack | 2025-02-24 | 2026-02-24 |
| 017-020 | 10dB attenuator | - | - | Pasternack | 2025-02-24 | 2026-02-24 |
| 008-025 | Power Sensor | NRP-Z57 | 101280 | Rohde & Schwarz | 2024-05-22 | 2026-05-22 |

N/A: Not Applicable

Conducted setup #02 (Adaptivity)

| ID# | Device | Type/Model | Serial # | Manufacturer | Cal. Date | Cal. Due Date |
|---|---|---|---|---|---|---|
| 221-000 | Switch unit | OSP 120 | 101396 | Rohde & Schwarz | 2023-09-15 | 2025-09-15 |
| 122-000 | Climatic chamber | LHU-113 | 1012-00-5753 | ESPEC | 2024-09-30 | 2026-09-30 |
| 017-039 | Spectrum analyzer | FSVA3013 | 102345 | Rohde & Schwarz | 2024-05-29 | 2026-05-29 |
| 017-031 | Measurement Software | WMS32 V11.40 | 101512 | Rohde & Schwarz | N/A | N/A |
| 094-004 | Temp & Humidity Logger | RMS-HCD-S | 24050483 | Rotronic | 2024-09-02 | 2026-09-02 |
| 234-000 | RF Cable 0.5m | PE3CA1039-50 | - | Pasternack | 2025-02-24 | 2026-02-24 |
| 017-007 | Cable SMA Male to ML51-P | HRMP-ML51LP | DTR178-100RS | Hirose | 2025-02-24 | 2026-02-24 |
| 017-008 | Cable SMA Male to ML51-P | HRMP-ML51LP | DTR178-100RS | Hirose | 2025-02-24 | 2026-02-24 |
| 017-032 | RF Cable 2m | NA500-18-SS-2 | N/A | HESA | 2025-02-24 | 2026-02-24 |
| 017-033 | RF Cable 2m | NA500-18-SS-2 | N/A | HESA | 2025-02-24 | 2026-02-24 |
| 017-034 | 6dB attenuator | BW-S6W2+ | N/A | Mini-Circuits | 2025-02-24 | 2026-02-24 |
| 017-035 | 6dB attenuator | BW-S6W2+ | N/A | Mini-Circuits | 2025-02-24 | 2026-02-24 |
| 053-000 | Thermometer | t3000FC | 46320032 | Fluke | 2023-12-13 | 2025-12-13 |
| 281-000 | Thermometer | t3000FC | 46320036 | Fluke | 2024-04-17 | 2026-04-17 |
| 481-000 | Access point 802.11n | AIR-CAP3502E-A-K9 | FTX1438S6P4 | Cisco | N/A | N/A |
| 017-006 | RF Cable 1.2m | PE3C0666 | - | Pasternack | 2025-02-24 | 2026-02-24 |

Receiver blocking Setup

| ID# | Device | Type/Model | Serial # | Manufacturer | Cal. Date | Cal. Due Date |
|---|---|---|---|---|---|---|
| 125-000 | Communication tester | CMW500 | 129337 | Rohde & Schwarz | 2025-05-28 | 2027-05-28 |
| 098-000 | Signal generator | SMW200A | 103732 | Rohde & Schwarz | 2023-07-26 | 2025-07-26 |
| 018-005 | SMA-SMA 45cm RF Cable | FMC020285-18 | - | Fairview Microwave | 2025-02-21 | 2026-02-21 |
| 094-004 | Temp & Humidity Logger | RMS-HCD-S | 24050483 | Rotronic | 2024-09-02 | 2026-09-02 |
| 018-000 | 2 Way SMA Power Divider | PE2084 | - | Pasternack | 2025-02-21 | 2026-02-21 |
| 016-003 | SMA-SMA 45cm RF Cable | FMC0202085-18 | - | Fairview Microwave | 2025-02-21 | 2026-02-21 |
| 018-006 | SMA-SMA 45cm RF Cable | FMC0202085-18 | - | Fairview Microwave | 2025-02-21 | 2026-02-21 |

N/A: Not Applicable

Radiated Setup #1

| ID# | Device | Type/Model | Serial # | Manufacturer | Cal. Date | Cal. Due Date |
|---|---|---|---|---|---|---|
| 006-000 | Anechoic Chamber | FACT3 | 5720 | ETS-Lindgren | 2024-01-17 | 2026-01-17 |
| 006-001 | Turn Table | ETS | - | ETS-Lindgren | N/A | N/A |
| 094-002 | Temp & Humidity Logger | RMS-HCD-S | 24050486 | Rotronic | 2024-09-02 | 2026-09-02 |
| 006-011 | Boresight antenna mast | BAM 4.0-P | P/278/2890.01 | Maturo | N/A | N/A |
| 006-002 | Switch & Positioning systems | EMCenter | 00159757 | ETS-Lindgren | N/A | N/A |
| 147-000 | Spectrum analyzer | FSW43 | 101847 | Rohde & Schwarz | 2025-03-07 | 2027-03-07 |
| 006-008 | Measurement SW, v11.3 | EMC32 | 100623 | Rohde & Schwarz | N/A | N/A |
| 301-000 | Amplifier 9kHz-1300MHz | 8447F | 3113A07440 | HP | 2025-02-11 | 2026-02-11 |
| 006-067 | Low Pass Filter 1.6GHz | LPM17671 | G002 | Micro-Tronics | 2025-02-11 | 2026-02-11 |
| 007-034 | Broadband RF Power Amplifier 0.5-40.0GHz | DEPA0540-43 | 2024A02 | Diamond Engineering | 2025-02-11 | 2026-02-11 |
| 189-000 | Double Horn Ridged antenna 10GHz-40GHz | 3116C | 227716 | ETS-Lindgren | 2024-05-29 | 2026-05-29 |
| 057-000 | Double ridged horn antenna (1GHz to 18GHz) | ETS-Lindgren-3117 | 167062 | ETS-Lindgren | 2024-07-23 | 2026-07-23 |
| 006-061 | Bi-Log Periodic antenna | CBL6143A | 61382 | Teseq | 2024-11-13 | 2026-11-13 |
| 006-068 | RF Switch DC-40GHz | LPM17671 | G002 | Mini-Circuits | 2025-02-11 | 2026-02-11 |
| 261-000 | RF Amplifier Used for 1 GHz-11GHz | ETS-Lindgren-3117-PA | 00157993 | ETS-Lindgren | 2025-02-11 | 2026-02-11 |
| 009-007 | Filter HPF 11GHz | Mini-Circuits-ZHSS-k11G+ | 84931831830 | Mini-Circuits | 2025-02-11 | 2026-02-11 |
| 006-051 | RF Cable 1.0m | CBL-1.5M-SMSM+ | 202879 | Mini-Circuits | 2025-03-12 | 2026-03-12 |
| 006-066 | Cable 7m – 25MHz to 40GHz | R286304174 | 20.46.370 | Radiall | 2025-02-10 | 2026-02-10 |
| 006-063 | Cable 30cm – 1GHz to 40GHz | PE371-12 | - | Pasternack | 2025-02-10 | 2026-02-10 |
| 006-064 | Cable 30cm – 1GHz to 40GHz | PE371-12 | - | Pasternack | 2025-02-10 | 2026-02-10 |
| 006-065 | Cable 60cm – 25MHz to 1GHz | PE300-24 | - | Pasternack | 2025-02-10 | 2026-02-10 |

Radiated Setup #2

| ID# | Device | Type/Model | Serial # | Manufacturer | Cal. Date | Cal. Due Date |
|---|---|---|---|---|---|---|
| 007-000 | Anechoic chamber | RFD-FA-100 | 5996 | ETS Lindgren | 2024-01-18 | 2026-01-18 |
| 138-000 | Spectrum Analyzer | FSV40** | 101556 | Rohde & Schwarz | 2024-02-27 | 2026-02-27 |
| 137-000 | Spectrum Analyzer | FSW67* | 103266 | Rohde & Schwarz | 2025-02-11 | 2027-02-11 |
| 007-007 | Double Ridge Horn Antenna (1- 18GHz) | 3117 | 00152266 | ETS Lindgren | 2024-03-26 | 2026-03-26 |
| 059-000 | Double-ridged horn antenna + PA (1 GHz to 18 GHz) | 3117-PA | 201542 | ETS-Lindgren | 2023-09-26 | 2025-09-26 |
| 026-008 | Low noise amplifier 1-18GHz | LA1018N3209 | J10100000407 | A-INFO | 2025-02-19 | 2026-02-19 |
| 007-004 | Switch & Positioner | EMCenter | 00162359 | ETS Lindgren | N/A | N/A |
| 007-006 | EMControl & EMSwitch | EMCenter | 00151232 | ETS Lindgren | N/A | N/A |
| 007-036 | SMA-SMA 6.5m Cable | 140-8500-11-51-001 | 001 | Atem | 2025-03-12 | 2026-03-12 |
| 007-005 | Measurement SW, v11.30.00 | EMC32 | 100401 | Rohde & Schwarz | N/A | N/A |
| 007-001 | Styrofoam Column, 151mm | - | - | - | N/A | N/A |
| 007-002 | Turntable | - | - | ETS Lindgren | N/A | N/A |
| 007-003 | Antenna Tower | 2171B-3.0M | 00150123 | ETS Lindgren | N/A | N/A |
| 007-015 | N-SMA 1.5m Cable | - | - | Spirent | 2025-02-19 | 2026-02-19 |
| 007-018 | SMA-SMA 1.2m Cable | 0500990991200KE | - | Radiall | 2025-02-19 | 2026-02-19 |
| 007-022 | N-SMA 1.5m Cable | 0501050991500GX | 19.23.493 | Radiall | 2025-02-10 | 2026-02-10 |
| 094-001 | Temp & Humidity Logger | RMS-HCD-S | 24050487 | Rotronic | 2024-09-02 | 2026-09-02 |

Shared Radiated Equipment

| ID# | Device | Type/Model | Serial # | Manufacturer | Cal. Date | Cal. Due Date |
|---|---|---|---|---|---|---|
| 412-000 | DRTU Power finder V2.1 | - | - | Intel | NA | NA |
| 139-000 | Power Sensor | NRP-Z81 | 104383 | Rohde & Schwarz | 2025-05-20 | 2027-05-20 |
| 140-000 | Power Sensor | NRP-Z81 | 104382 | Rohde & Schwarz | 2024-04-04 | 2026-04-04 |

## 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 | Limit | Unit |
|---|---|---|---|
| Frequency Stability | ±6.18 | ±10 | ppm |
| RF Output Power, conducted | ±0.99 | ±1.5 | dB |
| Power Spectral Density, conducted | ±0.99 | ±1.5 | dB |
| Unwanted Emission, conducted | ±1.53 | ±3 | dB |
| Radiated test < 1GHz | ±4.03 | ±6 | dB |
| Radiated test 1GHz - 26 GHz | ±4.68 | ±6 | dB |
| Temperature | ±0.23 | ±2 | ºC |
| Humidity | ±1.99 | ±5 | % |
| Time | ±0.01 | ±10 | % |

# Annex B. Test Results

The herein test results were performed by:

| Test case measurement | Test Personnel |
|---|---|
| Carrier frequencies | Thomas Gamain |
| Occupied channel bandwidth | Thomas Gamain |
| RF output power at the highest power | Thomas Gamain |
| RF output power at the lowest power of the TPC | Thomas Gamain |
| Power density | Thomas Gamain |
| Transmitter unwanted emissions within the 5GHz RLAN bands | Thomas Gamain |
| Transmitter unwanted emissions outside the 5GHz RLAN bands | K. RIDA |
| Receiver spurious emissions | K. RIDA |
| Dynamic Frequency Selection | Thomas Gamain |
| Adaptivity(Channel Access Mechanism) | Thomas Gamain |
| Receiver Blocking | Thomas Gamain |
| Adjacent Channel Selectivity | Thomas Gamain |

## B.1 Test Conditions

| ETSI clause | Conditions | ETSI EN 301 893 V2.2.1.Annex H |
|---|---|---|
| 5.1.1<br><br>5.4.1, item n). | Tests defined in the present document shall be carried out at representative points within the boundary limits of the operational environmental profile defined by its intended use (see clause 5.4.1, item n)).<br><br>Where technical performance varies subject to environmental conditions, tests shall be carried out under a sufficient variety of environmental conditions (within the boundary limits of the operational environmental profile defined by its intended use) to give confidence of compliance for the affected technical requirements.<br><br>For each test defined in the present document, the environmental condition(s) at which the test has to be performed is specified in the clause on test conditions for that particular test.<br><br>The operating temperature range that applies to the intended use of the equipment, if different from -20 °C to +55 °C. | **"Information provided by the customer"** |

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

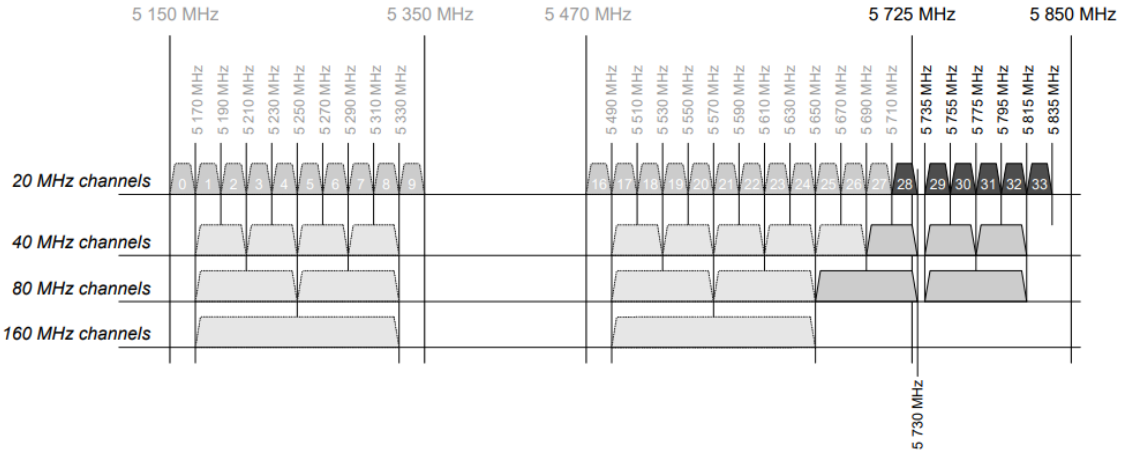
For 802.11n20, 802.11ax/be20 (20 MHz channel bandwidth), 802.11n40, 802.11ax/be40 (40MHz channel bandwidth), 802.11ac80, 802.11ax/be80 (80MHz channel bandwidth) and 802.11ac160, 802.11ax/be160 (160 MHz channel bandwidth) modes the EUT can transmit at both CHAIN A and CHAIN B RF outputs individually, and also simultaneously.

The following data rates were selected based on preliminary testing that identified those rates as the worst cases for output power and spurious levels at the band edges:

| Transmission | Mode | Bandwidth (MHz) | Worst Case Data Rate |
|---|---|---|---|
| SISO | 802.11a | 20 | 6Mbps |
| | 802.11n | 20 | HT0 |
| | | 40 | HT0 |
| | 802.11ac | 80 | VHT0 |
| | | 160 | VHT0 |
| | 802.11ax/be | 20 | MCS0 |
| | | 40 | MCS0 |
| | | 80 | MCS0 |
| | | 160 | MCS0 |
| MIMO | 802.11n | 20/40 | HT8 |
| | 802.11ac | 80/160 | VHT0 |
| | 802.11ax/be | 20/40/80/160 | MCS0 |

## B.2 Carrier frequencies

**Test limits**

| ETSI clause | Limits |
|---|---|
| 4.2.1.3 | The nominal centre frequencies (fc) for channels whose nominal channel bandwidth falls partly or completely within sub-band 1, sub-band 2 or sub-band 3 shall be defined by equation (1).<br><br>fc = 5 160 MHz + (g × 20 MHz) ± fc_offset, with g integer and 0 ≤ g ≤ 9 or 16 ≤ g ≤ 28 (1)<br><br>Operation on the channel with g = 28 is only permitted where operation in sub-band 4 by RLAN devices is allowed by national frequency usage conditions.<br><br>  <br><br>**Figure 3**<br><br>An offset (fc_offset) is permitted for each nominal centre frequency. The offset may be different for each nominal centre frequency, but it shall not be greater than 200 kHz. Where an offset is applied, the nominal centre frequencies used by the equipment shall be noted in the test report (see clause 5.4.1, item a)).<br><br>The nominal centre frequency for any given channel shall be maintained within the range of fc ± 0,002 %. |

**Test conditions**

| ETSI clause | Conditions |
|---|---|
| 5.4.2.1 | These measurements shall be performed under both normal and extreme test conditions<br><br>The UUT shall be configured to operate at a normal RF Output Power level. In addition, the UUT shall be configured to operate on a single channel. |

**Test procedure**

The conducted setups shown in section *Test & System Description* were used to measure the center frequency accordingly to the test procedure described in ETSI EN 301 893 V2.2.1.. The antenna terminal of the EUT is connected to the OSP120 through an attenuator and a cable, the spectrum analyzer is connected to the receiver port on the OSP. System connection cable loss is compensated by the EMC32 software on measured parameters.

For MIMO transmission modes, measurements are taken from chain A on the EUT.

**Results tables**

| Centre Frequencies | | | Normal condition Ambient Temperature +23ºC | | Extreme condition High Temperature +50ºC | | Extreme condition Low Temperature -10ºC | |
|---|---|---|---|---|---|---|---|---|
| #Ch | Freq [MHz] | Chain | Centre frequency [MHz] | Deviation [ppm] | Centre frequency [MHz] | Deviation [ppm] | Centre frequency [MHz] | Deviation [ppm] |
| 140 | 5700 | A | 5699.9100 | 1.579 | 5700.0030 | 0.526 | 5700.0290 | 5.088 |
| | | B | 5699.9880 | 2.105 | 5700.0030 | 0.526 | 5700.0250 | 5.386 |
| 122 | 5610 | A | 5609.9880 | 2.139 | 5610.0080 | 1.426 | 5610.0240 | 4.278 |
| | | B | 5609.9880 | 2.139 | 5610.0080 | 1.426 | 5610.0360 | 6.417 |

## B.3 Occupied Channel Bandwidth

**Test limits**

| ETSI clause | Limits |
|---|---|
| 4.2.2.2 | The Nominal Channel Bandwidth for a single Operating Channel shall be 20 MHz.<br><br>Alternatively, equipment may implement a lower Nominal Channel Bandwidth with a minimum of 5 MHz, providing it still conforms to the limits defined for nominal centre frequencies (20 MHz raster).<br><br>For channels whose nominal channel bandwidth falls partly or completely within sub-band 2 or sub-band 3, the occupied bandwidth shall not be less than 80 % of the nominal channel bandwidth. In case of smart antenna systems (devices with multiple transmit chains) each of the transmit chains shall meet this requirement.<br>The Occupied Channel Bandwidth might change with time/payload.<br><br>During a Channel Occupancy Time (COT), equipment may operate temporarily with an Occupied Channel Bandwidth of less than 80 % of its Nominal Channel Bandwidth with a minimum of 2 MHz. |

**Test conditions**

| ETSI clause | Conditions |
|---|---|
| 5.4.3.1 | These measurements shall be performed only under normal operating conditions (see clause 5.1.2).<br><br>The measurements shall be performed using normal operation of the equipment with the test signal applied (see clause 5.3.1.1).<br><br>The UUT shall be configured to operate at a typical RF power output level used for normal operation.<br><br>For equipment capable of multi-channel operation (see clause 4.2.7.3.1.3 or clause 4.2.7.3.2.3) using adjacent channels, the equipment shall be configured to have transmissions in all the channels. These transmissions may be considered as one signal with a total bandwidth of n times the nominal channel bandwidth of an individual channel where n is the number of adjacent channels.<br><br>In case of conducted measurements on smart antenna systems (devices with multiple transmit chains) measurements need only to be performed on one of the active transmit chains (antenna outputs). |

**Test procedure**

The conducted setups shown in section *Test & System Description* were used to measure the occupied channel bandwidth accordingly to the test procedure described in ETSI EN 301 893 V2.2.1.. The antenna terminal of the EUT is connected to the OSP120 through an attenuator and a cable, the spectrum analyzer is connected to the receiver port on the OSP. System connection cable loss is compensated by the EMC32 software on measured parameters.

For MIMO transmission mode measurements are taken from chain A on the EUT.

**Results tables**

| Mode | Rate | #Ch | Freq [MHz] | Chain | Measured 99% BW [MHz] |
|---|---|---|---|---|---|
| 802.11a | 6Mbps | 140 | 5700 | A | 16.54 |
| | | | | B | 16.54 |
| 802.11n20 | HT0 | | | A | 17.74 |
| | | | | B | 17.74 |
| | HT8 | | | A+B | 17.74 |
| 802.11n40 | HT0 | 134 | 5670 | A | 36.35 |
| | | | | B | 36.35 |
| | HT8 | | | A+B | 36.35 |
| 802.11ac80 | VHT0 | 122 | 5610 | A | 75.95 |
| | | | | B | 75.95 |
| | VHT0 | | | A+B | 75.95 |
| 802.11ac160 | VHT0 | 114 | 5570 | A | 155.15 |
| | | | | B | 155.15 |
| | VHT0 | | | A+B | 155.15 |
| 802.11ax/be20 | MCS0 | 140 | 5700 | A | 18.95 |
| | | | | B | 18.95 |
| | MCS0 | | | A+B | 18.95 |
| 802.11ax/be40 | MCS0 | 134 | 5670 | A | 37.75 |
| | | | | B | 37.75 |
| | MCS0 | | | A+B | 37.75 |
| 802.11ax/be80 | MCS0 | 122 | 5610 | A | 77.35 |
| | | | | B | 77.35 |
| | MCS0 | | | A+B | 77.34 |
| 802.11ax/be160 | MCS0 | 114 | 5570 | A | 156.55 |
| | | | | B | 156.55 |
| | MCS0 | | | A+B | 156.55 |

## B.4 RF Output Power at the highest power

**Test limits**

<table>
<tr><th>ETSI clause</th><th>Limits</th></tr>
<tr><td>4.2.3.2.2</td><td>The maximum RF output power PH,sb and the PSD in sub-band sb shall not exceed the limits given in table 2 for that sub-band. If the device uses TPC, PH,sb is the RF output power in sub-band sb at the highest power level of the TPC range in sub-band sb. In case of multiple (adjacent or non-adjacent) channels, the limits for the maximum RF output power and the PSD apply per sub-band.<br>NOTE: According to ECC/DEC/(04)08 [i.6] as well as Commission Implementing Decision (EU) 2022/179 [i.7] amended by Commission Implementing Decision (EU) 2022/2307 [i.8], for certain installations, the RF output power limit and the PSD limit might be lower than given in table 2.<br><br>Table 2: RF output power and PSD limits
<table>
<tr><th rowspan="2">Sub-band</th><th colspan="2">RF output power limit (dBm)</th><th colspan="2">PSD limit (dBm/MHz)</th></tr>
<tr><th>With TPC</th><th>Without TPC</th><th>With TPC</th><th>Without TPC</th></tr>
<tr><td>Sub-band 1</td><td>23</td><td>23</td><td>10</td><td>10</td></tr>
<tr><td>Sub-band 2</td><td>23</td><td>20</td><td>10</td><td>7</td></tr>
<tr><td>Sub-band 3 (see note 2)</td><td>30 (see note 1)</td><td>27 (see note 1)</td><td>17 (see note 1)</td><td>14 (see note 1)</td></tr>
<tr><td colspan="5">NOTE 1: Secondary devices without radar detection operating in sub-band 3 shall conform to the limits for sub-band 2.<br>NOTE 2: National frequency usage conditions may allow devices to operate in sub-band 3 on a channel with a nominal channel bandwidth that extends into sub-band 4.<br>NOTE 3: If TPC is used, the RF output power in sub-band sb at the lowest power level of the TPC range in sub-band sb (PL,sb) shall be at least 6 dB less than the applicable RF output power limit with TPC.</td></tr>
</table>
</td></tr>
</table>

**Test conditions**

| ETSI clause | Conditions |
|---|---|
| 5.4.4.2.1.1.1 | These measurements shall be performed under both normal and extreme test conditions (see clause 5.1.2 and clause 5.1.3). The UUT shall be configured to operate at:<br>• the highest transmitter output power level of the TPC range; or<br>• the maximum transmitter output power level in case the equipment has no TPC feature. |

**Test procedure**

The conducted setups shown in section *Test & System Description* were used to measure the RF output power at the highest power. The antenna terminal of the EUT is connected to the OSP120 through an attenuator and a cable. System connection cable loss is compensated by the EMC32 software on the measured parameters.

Antenna gain is taken into account and added by the software to the measurements. The EIRP power (dBm) is calculated by adding the declared maximum antenna gain to the measured conducted power.

According to the test procedure described in ETSI EN 301 893 V2.2.1., the measurement for MIMO modes is done synchronously on all transmit ports, the power of the individual samples is sum for all ports and then the reported power is the highest calculated RMS power for the active bursts.

**Results tables**

| RF Output Power | | | | | | Normal condition Ambient Temperature +23ºC | | Extreme condition High Temperature +50ºC | | Extreme condition Low Temperature -10ºC | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Mode | Meas Duty Cycle % | Rate | #Ch | Freq [MHz] | Chain | Measured Conducted [dBm] | EIRP [dBm] | Measured Conducted [dBm] | EIRP [dBm] | Measured Conducted [dBm] | EIRP [dBm] |
| 802.11a | 97.9 | 6Mbps | 100 | 5500 | A | 16.7 | 21.7 | 15.6 | 20.6 | 16.0 | 21.0 |
| | | | | | B | 16.6 | 21.6 | 16.3 | 21.3 | 17.0 | 22.0 |
| | | | 140 | 5700 | A | 16.6 | 21.6 | 15.9 | 20.9 | 16.2 | 21.2 |
| | | | | | B | 17.2 | 22.2 | 16.6 | 21.6 | 17.1 | 22.1 |
| 802.11n20 | 98.9 | HT0 | 100 | 5500 | A | 17.0 | 22.0 | 15.9 | 20.9 | 16.2 | 21.2 |
| | | | | | B | 17.0 | 22.0 | 16.6 | 21.6 | 17.1 | 22.1 |
| | | | 140 | 5700 | A | 16.8 | 21.8 | 16.1 | 21.1 | 16.4 | 21.4 |
| | | | | | B | 17.0 | 22.0 | 16.9 | 21.9 | 17.3 | 22.3 |
| | 98.9 | HT8 | 100 | 5500 | A+B | 17.0 | 22.0 | 16.2 | 21.2 | 16.6 | 21.6 |
| | | | 140 | 5700 | A+B | 17.2 | 22.2 | 16.4 | 21.4 | 16.8 | 21.8 |
| 802.11n40 | 98.9 | HT0 | 102 | 5510 | A | 17.8 | 22.8 | 16.7 | 21.7 | 16.9 | 21.9 |
| | | | | | B | 17.7 | 22.7 | 17.3 | 22.3 | 17.8 | 22.8 |
| | | | 134 | 5570 | A | 17.9 | 22.9 | 16.8 | 21.8 | 16.9 | 21.9 |
| | | | | | B | 17.9 | 22.9 | 17.5 | 22.5 | 17.9 | 22.9 |
| | 98.9 | HT8 | 102 | 5510 | A+B | 17.7 | 22.7 | 16.8 | 21.8 | 17.2 | 22.2 |
| | | | 134 | 5570 | A+B | 17.8 | 22.8 | 17.0 | 22.0 | 17.3 | 22.3 |
| 802.11ac80 | 98.9 | VHT0 | 106 | 5530 | A | 17.8 | 22.8 | 16.6 | 21.6 | 16.9 | 21.9 |
| | | | | | B | 17.8 | 22.8 | 17.3 | 22.3 | 17.8 | 22.8 |
| | | | 122 | 5610 | A | 17.9 | 22.9 | 16.6 | 21.6 | 16.8 | 21.8 |
| | | | | | B | 17.7 | 22.7 | 17.3 | 22.3 | 17.7 | 22.7 |
| | 98.9 | VHT0 | 106 | 5530 | A+B | 17.8 | 22.8 | 16.9 | 21.9 | 17.3 | 22.3 |
| | | | 122 | 5610 | A+B | 17.6 | 22.6 | 16.9 | 21.9 | 17.2 | 22.2 |
| 802.11ac160 | 98.9 | VHT0 | 114 | 5570 | A | 17.6 | 22.6 | 16.4 | 21.4 | 16.6 | 21.6 |
| | | | | | B | 17.8 | 22.8 | 17.1 | 22.1 | 17.9 | 22.9 |
| | 98.9 | VHT0 | | | A+B | 17.9 | 22.9 | 16.7 | 21.7 | 17.1 | 22.1 |
| 802.11ax/be20 | 98.8 | MCS0 | 100 | 5500 | A | 17.5 | 22.5 | 16.4 | 21.4 | 16.6 | 21.6 |
| | | | | | B | 17.3 | 22.3 | 17.1 | 22.1 | 17.6 | 22.6 |
| | | | 140 | 5700 | A | 17.2 | 22.2 | 16.7 | 21.7 | 16.8 | 21.8 |
| | | | | | B | 17.4 | 22.4 | 17.3 | 22.3 | 17.7 | 22.7 |
| | 98.9 | MCS0 | 100 | 5500 | A+B | 17.5 | 22.5 | 17.1 | 22.1 | 17.6 | 22.6 |
| | | | 140 | 5700 | A+B | 17.4 | 22.4 | 17.3 | 22.3 | 17.7 | 22.7 |
| 802.11ax/be40 | 98.9 | MCS0 | 102 | 5510 | A | 17.7 | 22.7 | 16.6 | 21.6 | 16.8 | 21.8 |
| | | | | | B | 17.6 | 22.6 | 17.2 | 22.2 | 17.7 | 22.7 |
| | | | 134 | 5570 | A | 17.8 | 22.8 | 16.6 | 21.6 | 16.8 | 21.8 |
| | | | | | B | 17.8 | 22.8 | 17.4 | 22.4 | 17.8 | 22.8 |
| | 98.9 | MCS0 | 102 | 5510 | A+B | 17.6 | 22.6 | 17.2 | 22.2 | 17.7 | 22.7 |
| | | | 134 | 5570 | A+B | 17.7 | 22.7 | 17.4 | 22.4 | 17.8 | 22.8 |
| 802.11ax/be80 | 98.9 | MCS0 | 106 | 5530 | A | 17.8 | 22.8 | 16.6 | 21.6 | 16.8 | 21.8 |
| | | | | | B | 17.7 | 22.7 | 17.2 | 22.2 | 17.7 | 22.7 |
| | | | 122 | 5610 | A | 17.8 | 22.8 | 16.5 | 21.5 | 16.8 | 21.8 |
| | | | | | B | 17.8 | 22.8 | 17.2 | 22.2 | 17.7 | 22.7 |
| | 98.9 | MCS0 | 106 | 5530 | A+B | 17.9 | 22.9 | 17.2 | 22.2 | 17.7 | 22.7 |
| | | | 122 | 5610 | A+B | 17.8 | 22.8 | 17.2 | 22.2 | 17.6 | 22.6 |
| 802.11ax/be160 | 98.9 | MCS0 | 114 | 5570 | A | 17.7 | 22.7 | 16.4 | 21.4 | 16.6 | 21.6 |
| | | | | | B | 17.8 | 22.8 | 17.1 | 22.1 | 17.5 | 22.5 |
| | 98.9 | MCS0 | | | A+B | 17.7 | 22.7 | 17.1 | 22.1 | 17.6 | 22.6 |

## B.5 RF Output Power at the lowest level of the TPC range

**Test limits**

<table>
<tr><th>ETSI clause</th><th>Limits</th></tr>
<tr><td>4.2.3.1.2</td><td>Transmit Power Control (TPC) is a mechanism to ensure a mitigation factor of at least 3 dB on the aggregate power from a large number of devices, which implies a TPC range of at least 6 dB. The RF output power limit and the PSD limit might depend on whether an RLAN device operates with or without TPC.<br><br>Table 2: RF output power and PSD limits
<table>
<tr><th rowspan="2">Sub-band</th><th colspan="2">RF output power limit (dBm)</th><th colspan="2">PSD limit (dBm/MHz)</th></tr>
<tr><th>With TPC</th><th>Without TPC</th><th>With TPC</th><th>Without TPC</th></tr>
<tr><td>Sub-band 1</td><td>23</td><td>23</td><td>10</td><td>10</td></tr>
<tr><td>Sub-band 2</td><td>23</td><td>20</td><td>10</td><td>7</td></tr>
<tr><td>Sub-band 3 (see note 2)</td><td>30 (see note 1)</td><td>27 (see note 1)</td><td>17 (see note 1)</td><td>14 (see note 1)</td></tr>
<tr><td colspan="5">NOTE 1: Secondary devices without radar detection operating in sub-band 3 shall conform to the limits for sub-band 2.<br>NOTE 2: National frequency usage conditions may allow devices to operate in sub-band 3 on a channel with a nominal channel bandwidth that extends into sub-band 4.<br>NOTE 3: If TPC is used, the RF output power in sub-band sb at the lowest power level of the TPC range in sub-band sb (PL,sb) shall be at least 6 dB less than the applicable RF output power limit with TPC.</td></tr>
</table>
</td></tr>
</table>

**Test conditions**

| ETSI clause | Conditions |
|---|---|
| 5.4.4.2.1.2.1 | This test is only required for equipment with a TPC feature.<br><br>These measurements shall be performed under both normal and extreme test conditions (see clause 5.1.2 and clause 5.1.3).<br><br>The UUT shall be configured to operate at the lowest transmitter output power level of the TPC range |

**Test procedure**

The conducted setups shown in section *Test & System Description* were used to measure the RF output power at the lowest level of the TPC. The antenna terminal of the EUT is connected to the OSP120 through an attenuator and a cable. System connection cable loss is compensated by the EMC32 software on the measured parameters.

Antenna gain is taken into account and added by the software to the measurements. The EIRP power (dBm) is calculated by adding the declared maximum antenna gain to the measured conducted power.

According to the test procedure described in ETSI EN 301 893 V2.2.1., the measurement for MIMO modes is done synchronously on all transmit ports, the power of the individual samples is sum for all ports and then the reported power is the highest calculated RMS power for the active bursts.

**Results tables**

| TPC RF Output Power | | | | | | Normal condition Ambient Temperature +23ºC | | Extreme condition High Temperature +50ºC | | Extreme condition Low Temperature -10ºC | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Mode | Meas Duty Cycle % | Rate | #Ch | Freq [MHz] | Chain | Measured Conducted [dBm] | EIRP [dBm] | Measured Conducted [dBm] | EIRP [dBm] | Measured Conducted [dBm] | EIRP [dBm] |
| 802.11a | 97.9 | 6Mbps | 100 | 5500 | A | 11.9 | 16.9 | 10.7 | 15.7 | 11.0 | 16.0 |
| | | | | | B | 11.8 | 16.8 | 11.4 | 16.4 | 11.9 | 16.9 |
| | | | 140 | 5700 | A | 11.9 | 16.9 | 11.0 | 16.0 | 11.2 | 16.2 |
| | | | | | B | 11.9 | 16.9 | 11.7 | 16.7 | 11.9 | 16.9 |
| 802.11n20 | 98.9 | HT0 | 100 | 5500 | A | 11.9 | 16.9 | 10.8 | 15.8 | 11.1 | 16.1 |
| | | | | | B | 11.8 | 16.8 | 10.5 | 15.5 | 11.9 | 16.9 |
| | | | 140 | 5700 | A | 11.9 | 16.9 | 10.9 | 15.9 | 11.2 | 16.2 |
| | | | | | B | 11.9 | 16.9 | 11.7 | 16.7 | 11.9 | 16.9 |
| | 98.9 | HT8 | 100 | 5500 | A+B | 11.6 | 16.6 | 10.8 | 15.8 | 11.2 | 16.2 |
| | | | 140 | 5700 | A+B | 11.8 | 16.8 | 11.0 | 16.0 | 11.3 | 16.3 |
| 802.11n40 | 98.9 | HT0 | 102 | 5510 | A | 11.9 | 16.9 | 10.9 | 15.9 | 11.0 | 16.0 |
| | | | | | B | 11.8 | 16.8 | 11.4 | 16.4 | 11.9 | 16.9 |
| | | | 134 | 5670 | A | 11.9 | 16.9 | 10.9 | 15.9 | 11.1 | 16.1 |
| | | | | | B | 11.3 | 16.3 | 11.6 | 16.6 | 11.9 | 16.9 |
| | 98.9 | HT8 | 102 | 5510 | A+B | 11.5 | 16.5 | 10.7 | 15.7 | 11.1 | 16.1 |
| | | | 134 | 5670 | A+B | 11.5 | 16.5 | 10.7 | 15.7 | 11.0 | 16.0 |
| 802.11ac80 | 98.9 | VHT0 | 106 | 5530 | A | 11.8 | 16.8 | 10.7 | 15.7 | 10.9 | 15.9 |
| | | | | | B | 11.9 | 16.9 | 11.4 | 16.4 | 11.9 | 16.9 |
| | | | 122 | 5610 | A | 11.9 | 16.9 | 10.7 | 15.7 | 10.9 | 15.9 |
| | | | | | B | 11.7 | 16.7 | 11.4 | 16.4 | 11.8 | 16.8 |
| | 98.9 | VHT0 | 106 | 5530 | A+B | 11.7 | 16.7 | 10.8 | 15.8 | 11.1 | 16.1 |
| | | | 122 | 5610 | A+B | 11.4 | 16.4 | 10.7 | 15.7 | 11.0 | 16.0 |
| 802.11ac160 | 98.9 | VHT0 | 114 | 5570 | A | 11.7 | 16.7 | 10.5 | 15.5 | 10.7 | 15.7 |
| | | | | | B | 11.7 | 16.7 | 11.2 | 16.2 | 11.9 | 16.9 |
| | 98.9 | VHT0 | | | A+B | 11.3 | 16.3 | 10.6 | 15.6 | 10.9 | 15.9 |
| 802.11ax/be20 | 98.8 | MCS0 | 100 | 5500 | A | 11.7 | 16.7 | 10.7 | 15.7 | 10.9 | 15.9 |
| | | | | | B | 11.7 | 16.7 | 11.4 | 16.4 | 11.8 | 16.8 |
| | | | 140 | 5700 | A | 11.9 | 16.9 | 11.0 | 16.0 | 11.1 | 16.1 |
| | | | | | B | 11.9 | 16.9 | 11.7 | 16.7 | 11.9 | 16.9 |
| | 98.9 | MCS0 | 100 | 5500 | A+B | 11.5 | 16.5 | 11.4 | 16.4 | 11.9 | 16.9 |
| | | | 140 | 5700 | A+B | 11.7 | 16.7 | 11.7 | 16.7 | 11.9 | 16.9 |
| 802.11ax/be40 | 98.9 | MCS0 | 102 | 5510 | A | 11.8 | 16.8 | 10.7 | 15.7 | 10.9 | 15.9 |
| | | | | | B | 11.7 | 16.7 | 11.3 | 16.3 | 11.8 | 16.8 |
| | | | 134 | 5670 | A | 11.8 | 16.8 | 10.7 | 15.7 | 10.9 | 15.9 |
| | | | | | B | 11.9 | 16.9 | 11.5 | 16.5 | 11.9 | 16.9 |
| | 98.9 | MCS0 | 102 | 5510 | A+B | 11.4 | 16.4 | 11.3 | 16.3 | 11.8 | 16.8 |
| | | | 134 | 5670 | A+B | 11.5 | 16.5 | 11.5 | 16.5 | 11.9 | 16.9 |
| 802.11ax/be80 | 98.9 | MCS0 | 106 | 5530 | A | 11.8 | 16.8 | 10.7 | 15.7 | 10.9 | 15.9 |
| | | | | | B | 11.8 | 16.8 | 11.3 | 16.3 | 11.8 | 16.8 |
| | | | 122 | 5610 | A | 11.9 | 16.9 | 10.6 | 15.6 | 10.8 | 15.8 |
| | | | | | B | 11.6 | 16.6 | 11.3 | 16.3 | 11.7 | 16.7 |
| | 98.9 | MCS0 | 106 | 5530 | A+B | 11.4 | 16.4 | 11.3 | 16.3 | 11.8 | 16.8 |
| | | | 122 | 5610 | A+B | 11.3 | 16.3 | 11.3 | 16.3 | 11.7 | 16.7 |
| 802.11ax/be160 | 98.9 | MCS0 | 114 | 5570 | A | 11.7 | 16.7 | 10.5 | 15.5 | 10.6 | 15.6 |
| | | | | | B | 11.6 | 16.6 | 11.2 | 16.2 | 11.7 | 16.7 |
| | 98.9 | MCS0 | | | A+B | 11.3 | 16.3 | 11.2 | 16.2 | 11.7 | 16.7 |

## B.6 Power Density

**Test limits**

<table>
<tr><th>ETSI clause</th><th>Limits</th></tr>
<tr><td>4.2.3.2.2</td><td>
The maximum RF output power PH,sb and the PSD in sub-band sb shall not exceed the limits given in table 2 for that sub-band. If the device uses TPC, PH,sb is the RF output power in sub-band sb at the highest power level of the TPC range in sub-band sb. In case of multiple (adjacent or non-adjacent) channels, the limits for the maximum RF output power and the PSD apply per sub-band.<br>
NOTE: According to ECC/DEC/(04)08 [i.6] as well as Commission Implementing Decision (EU) 2022/179 [i.7] amended by Commission Implementing Decision (EU) 2022/2307 [i.8], for certain installations, the RF output power limit and the PSD limit might be lower than given in table 2.<br><br>
Table 2: RF output power and PSD limits
<table>
<tr><th rowspan="2">Sub-band</th><th colspan="2">RF output power limit (dBm)</th><th colspan="2">PSD limit (dBm/MHz)</th></tr>
<tr><th>With TPC</th><th>Without TPC</th><th>With TPC</th><th>Without TPC</th></tr>
<tr><td>Sub-band 1</td><td>23</td><td>23</td><td>10</td><td>10</td></tr>
<tr><td>Sub-band 2</td><td>23</td><td>20</td><td>10</td><td>7</td></tr>
<tr><td>Sub-band 3 (see note 2)</td><td>30 (see note 1)</td><td>27 (see note 1)</td><td>17 (see note 1)</td><td>14 (see note 1)</td></tr>
<tr><td colspan="5">NOTE 1: Secondary devices without radar detection operating in sub-band 3 shall conform to the limits for sub-band 2.<br>NOTE 2: National frequency usage conditions may allow devices to operate in sub-band 3 on a channel with a nominal channel bandwidth that extends into sub-band 4.<br>NOTE 3: If TPC is used, the RF output power in sub-band sb at the lowest power level of the TPC range in sub-band sb (PL,sb) shall be at least 6 dB less than the applicable RF output power limit with TPC.</td></tr>
</table>
</td></tr>
</table>

**Test conditions**

| ETSI clause | Conditions |
|---|---|
| 5.4.4.2.1.3.1 | These measurements shall only be performed at normal test conditions (see clause 5.1.2). The UUT shall be configured to operate at the lowest nominal channel bandwidth with:<br>• the highest transmitter output power level of its TPC range; or<br>• the maximum transmitter output power level in case the equipment has no TPC feature. |

**Test procedure**

The conducted setups shown in section *Test & System Description* were used to measure the power spectral density (PSD). The antenna terminal of the EUT is connected to the OSP120 through an attenuator and a cable, the spectrum analyzer is connected to the receiver port on the OSP. System connection cable loss is compensated by the EMC32 software to measure all parameters.

Antenna gain is taken into account and added by the software to the measurements. The EIRP power (dBm) is calculated by adding the declared maximum antenna gain to the measured conducted power.

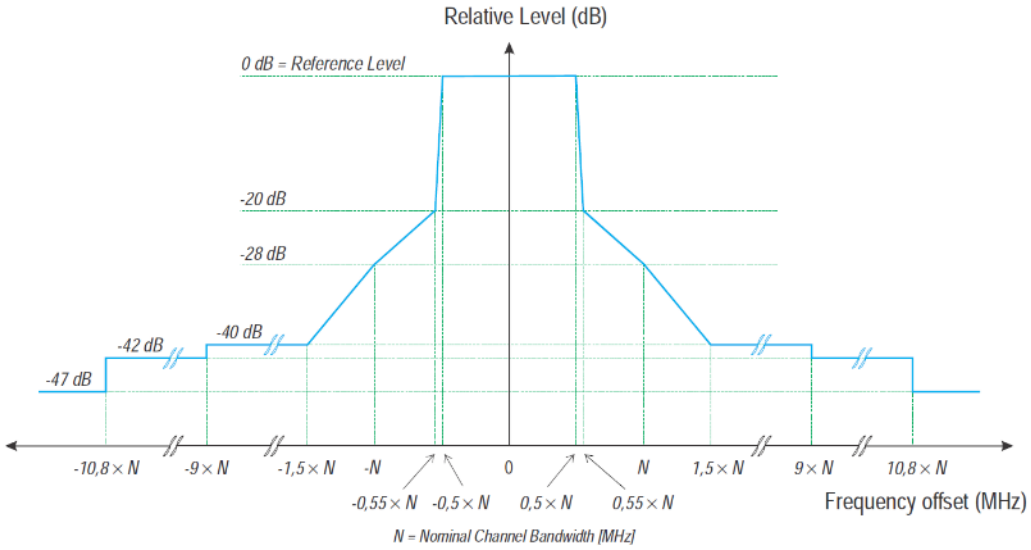
According to the test procedure described in ETSI EN 301 893 V2.2.1. the measurement for MIMO modes is done separately on each transmit ports and the power of the individual samples per frequency is sum for all ports. Finally, the software takes the highest PSD among all the 1MHz calculated segments.

**Results tables**

| Mode | Meas. Duty Cycle % | Rate | Ch Number | Frequency [MHz] | Chain | EIRP PSD [dBm/MHz] |
|---|---|---|---|---|---|---|
| 802.11a | 97.9 | 6Mbps | 100 | 5500 | A | 9.86 |
| | | | | | B | 9.85 |
| | | | 140 | 5700 | A | 9.97 |
| | | | | | B | 9.98 |
| 802.11n20 | 98.9 | HT0 | 100 | 5500 | A | 9.85 |
| | | | | | B | 9.99 |
| | | | 140 | 5700 | A | 9.80 |
| | | | | | B | 9.90 |
| | 98.9 | HT8 | 100 | 5500 | A+B | 9.89 |
| | | | 140 | 5700 | A+B | 9.90 |
| 802.11ax/be20 | 98.8 | MCS0 | 100 | 5500 | A | 9.89 |
| | | | | | B | 9.86 |
| | | | 140 | 5700 | A | 9.92 |
| | | | | | B | 9.84 |
| | 98.9 | MCS0 | 100 | 5500 | A+B | 9.99 |
| | | | 140 | 5700 | A+B | 9.89 |

## B.7 Transmitter unwanted emissions within the 5GHz RLAN bands

**Test limits**

| ETSI clause | Limits |
|---|---|
| 4.2.4.2.2 | The mean PSD of the transmitter unwanted emissions within the transmitter's operating bands shall not exceed the limits of the mask provided in figure 1 or an absolute level of -30 dBm/MHz, whichever is greater. The limits in figure 1 are relative to the maximum PSD transmitted by the RLAN device when measured with a reference bandwidth of 1 MHz.<br><br>The mask is only applicable within the band(s) of operation. Beyond the band edges, the requirements for transmitter unwanted emissions outside the transmitter's operating bands (see clause 4.2.4.1) apply.<br><br>In case of smart antenna systems (devices with multiple transmit chains) each of the transmit chains shall meet the limits for transmitter unwanted emissions within the transmitter's operating bands.<br><br>**Figure 1. Transmit spectral power mask**<br>  <br> |

**Test conditions**

| ETSI clause | Conditions |
|---|---|
| 5.4.6.1 | These measurements shall be performed only under normal test conditions (see clause 5.1.2).<br><br>The equipment shall be configured to operate under conditions aligned with its intended use so that unwanted emissions within the transmitter's operating bands are maximized.<br><br>For UUT without an integral antenna and for a UUT with an integral antenna but with one or more temporary antenna connectors, conducted measurements should be performed. Alternatively, if UUT has one or more integral antennas, but no temporary antenna connector(s), radiated measurements may be used.<br><br>In case of conducted measurements on smart antenna systems (devices with multiple transmit chains) operating in a mode with more than one transmit chain being active simultaneously, measurements shall only be performed on one of the transmit chains (antenna outputs). |

**Test procedure**

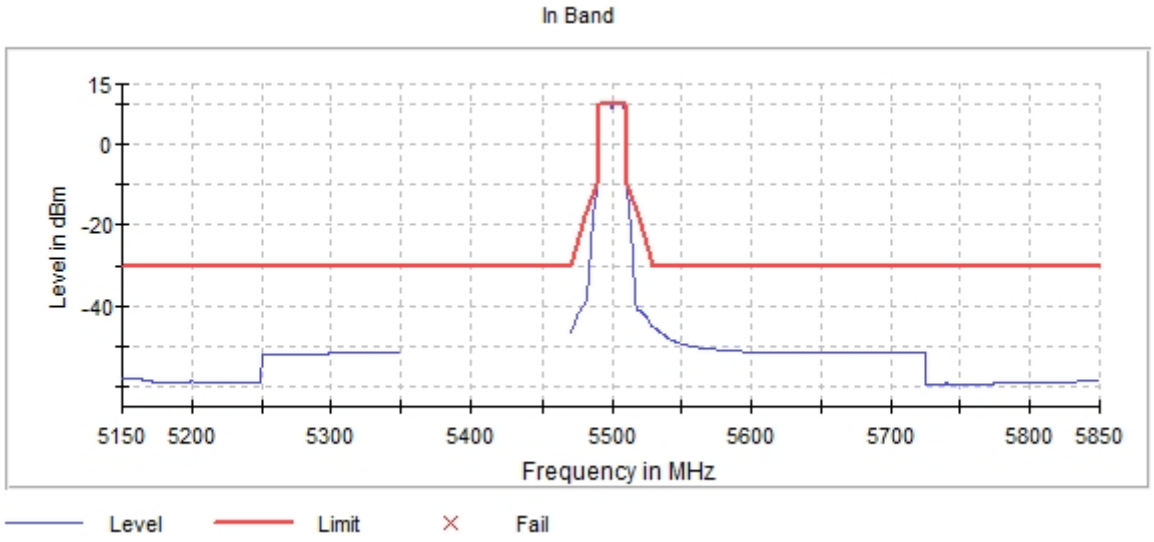
The conducted setups shown in section *Test & System Description* were used to measure the unwanted emissions within the 5GHz RLAN bands (Band Edge). The antenna terminal of the EUT is connected to the OSP120 through an attenuator and a cable, the spectrum analyzer is connected to the receiver port on the OSP. System connection cable loss is compensated by the EMC32 software on measured parameters.

Antenna gain is taken into account and added by the software to the measurements. The EIRP power (dBm) is calculated by adding the declared maximum antenna gain to the measured conducted power. EMC32 provides the mask and the frequency limits based in the measured channel bandwidth. For MIMO transmission mode, measurements are taken from chain A on the EUT.

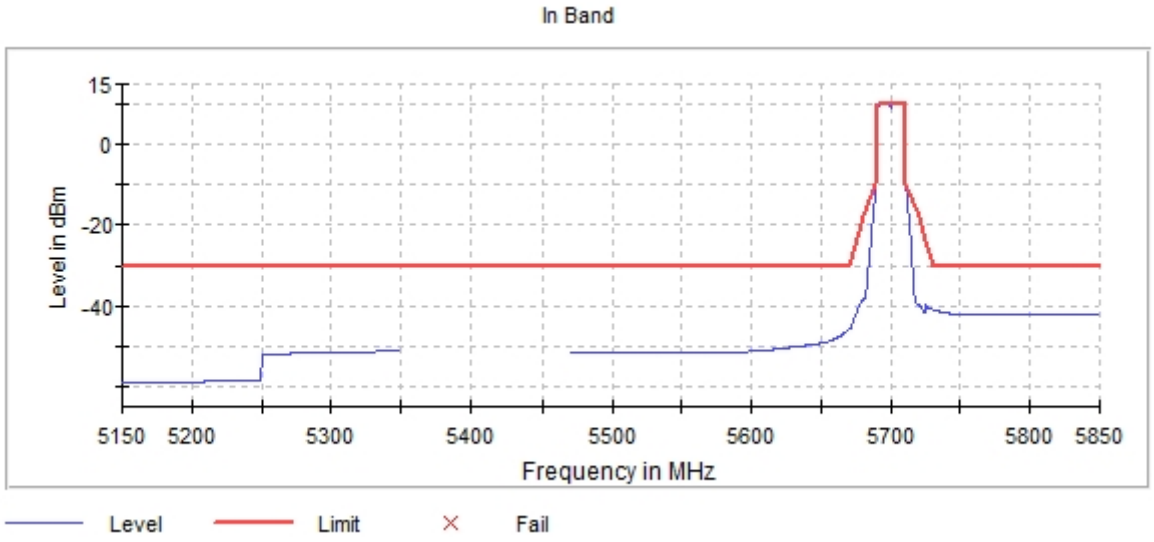
**Results Screenshot**

## 802.11ax/be20 (SISO), MCS0 – Chain A

Channel 100

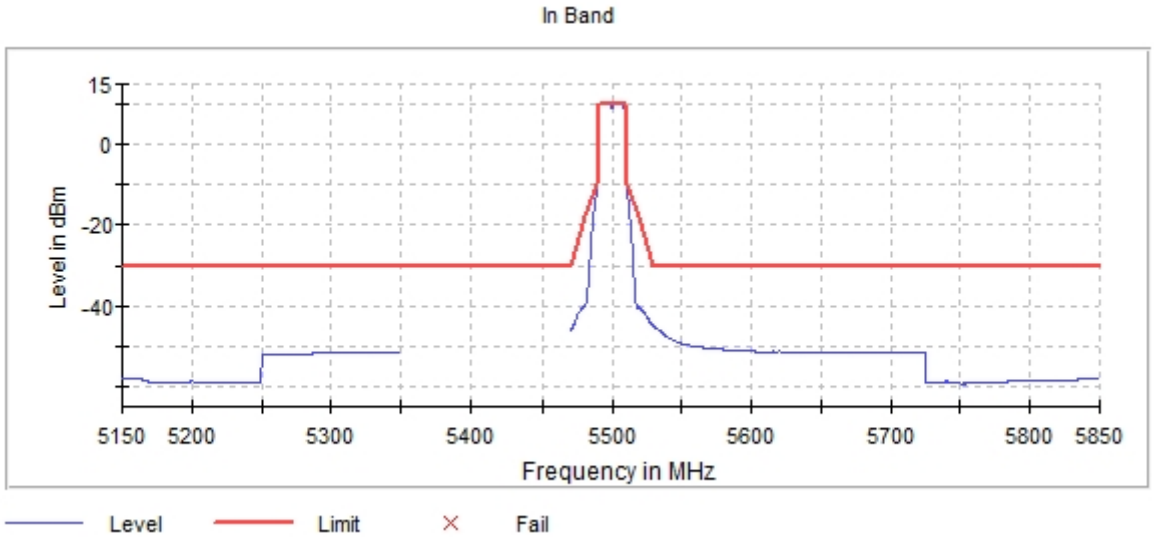



Channel 140

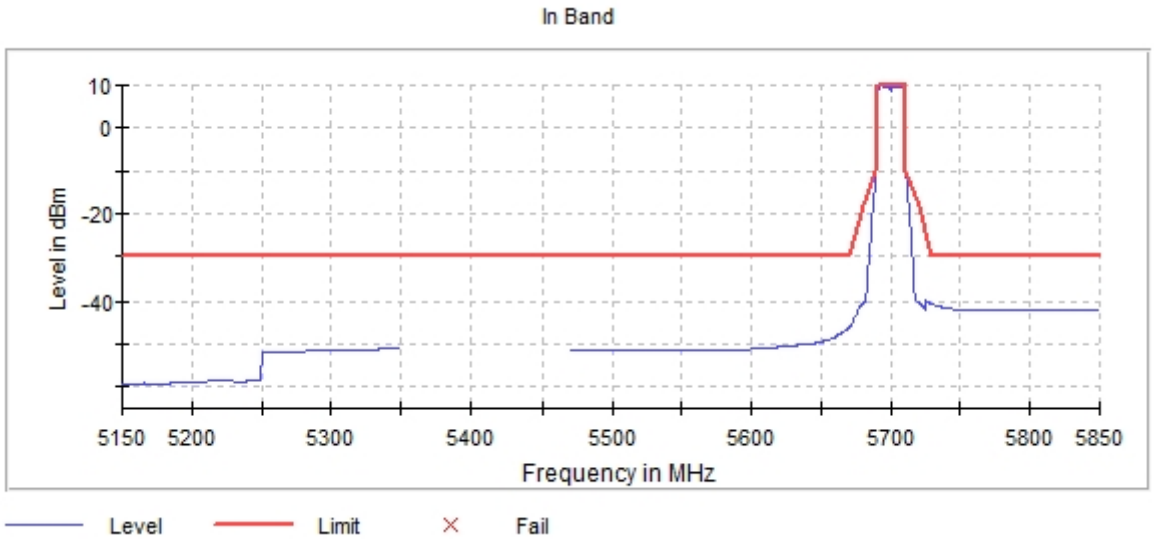


# 802.11ax/be20 (SISO), MCS0 – Chain B

## Channel 100

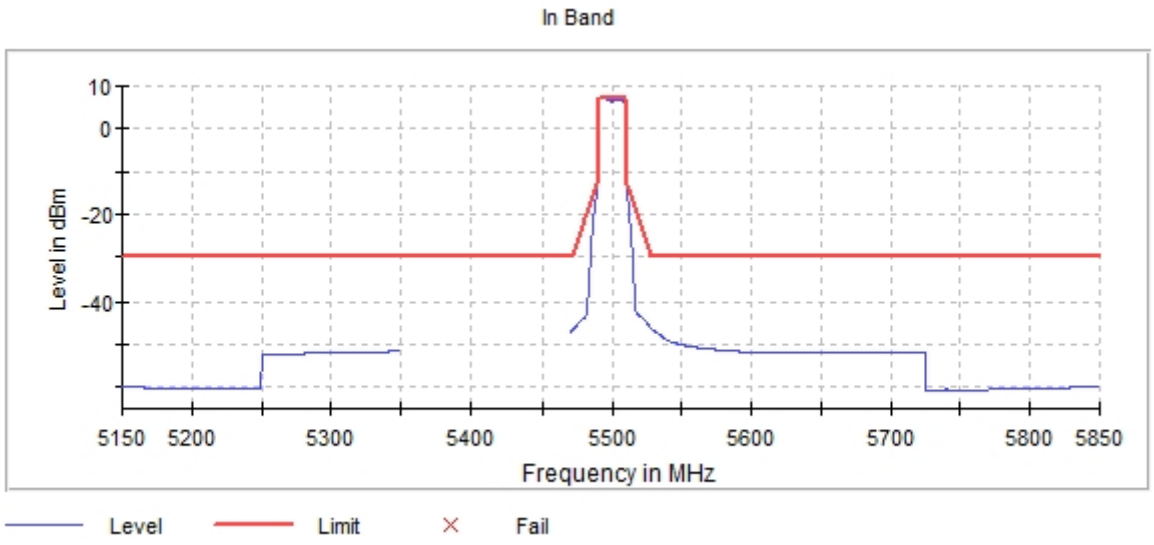



## Channel 140

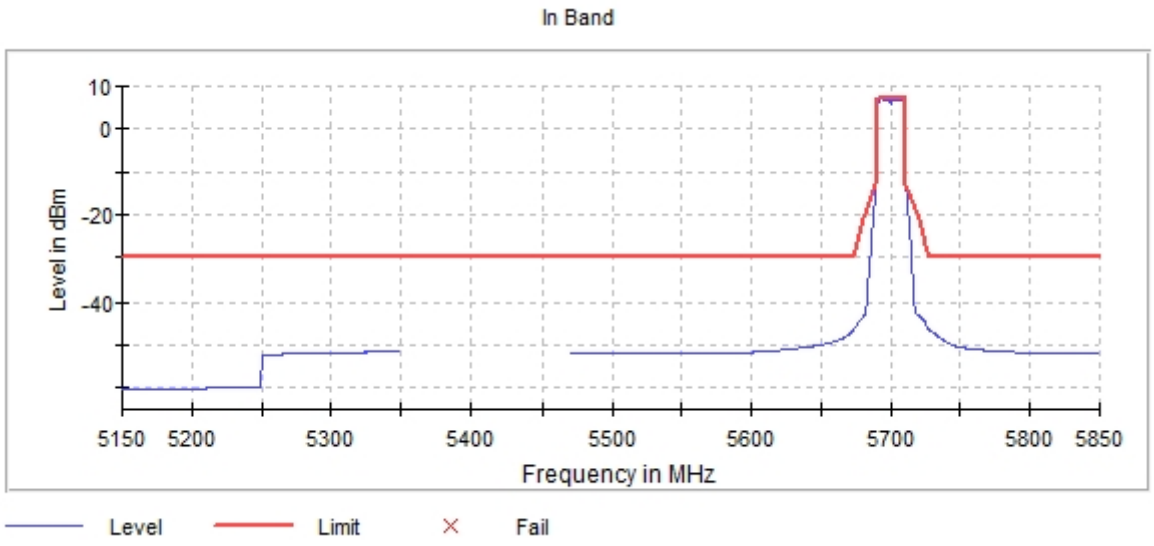


# 802.11ax/be20 (MIMO), MCS0

## Channel 100




## Channel 140



## B.8 Transmitter unwanted emissions outside the 5GHz RLAN bands

**Standard references**

<table>
<tr><th>ETSI clause</th><th>Limits</th></tr>
<tr><td>4.2.4.1.2</td><td>The level of transmitter unwanted emissions outside the 5 GHz RLAN bands shall not exceed the limits given in table 3.<br><br>Table 3. Transmitter unwanted emission limits outside the 5GHz RLAN bands
<table>
<tr><th>Frequency range</th><th>Maximum power</th><th>Bandwidth</th></tr>
<tr><td>30 MHz to 87.5 MHz</td><td>-36 dBm</td><td>100 kHz</td></tr>
<tr><td>87.5 MHz to 118 MHz</td><td>-54 dBm</td><td>100 kHz</td></tr>
<tr><td>118 MHz to 174 MHz</td><td>-36 dBm</td><td>100 kHz</td></tr>
<tr><td>174 MHz to 230 MHz</td><td>-54 dBm</td><td>100 kHz</td></tr>
<tr><td>230 MHz to 470 MHz</td><td>-36 dBm</td><td>100 kHz</td></tr>
<tr><td>470 MHz to 694 MHz</td><td>-54 dBm</td><td>100 kHz</td></tr>
<tr><td>694 MHz to 1 GHz</td><td>-36 dBm</td><td>100 kHz</td></tr>
<tr><td>1 GHz to 26 GHz</td><td>-30 dBm</td><td>1 MHz</td></tr>
</table></td></tr>
</table>

**Test conditions**

| ETSI clause | Conditions |
|---|---|
| 5.4.5.1 | The conformance requirements in clause 4.2.4.1 shall be verified only under normal operating conditions, and when operating on those channels defined in clause 5.3.2.<br><br>The equipment shall be configured to operate under its worst case situation with respect to unwanted emissions outside the 5 GHz RLAN bands.<br><br>If possible, the UUT shall be set to continuous transmit (duty cycle = 1) for the duration of this test.<br><br>If continuous transmit is not possible, the UUT should be configured to operate at its maximum duty cycle.<br><br>The level of transmitter unwanted emissions shall be measured as, either:<br>a) their power in a specified load (conducted emissions) and their radiated power (e.r.p. or e.i.r.p as given in clause 4.2.4.1.2) when radiated by the cabinet or structure of the equipment (cabinet radiation); or<br>b) their radiated power (e.r.p. or e.i.r.p as given in clause 4.2.4.1.2) when radiated by cabinet and antenna. |

**Test procedure**

The radiated setups (transmitter) shown in section *Test & System Description* were used to measure the transmission spurious emissions. Depending of the frequency range and bands being tested, different antennas and filters were used; in consequence different setups are employed.

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

According to ETSI EN 301 893, the device under test shall be configured to operate under its worst-case condition. In order to determine the worst case, a comprehensive evaluation was performed by varying all available bandwidths and operational modes. The results indicated that the narrowest bandwidth (20 MHz) represents the worst case, as it resulted in the lowest margins to the applicable spurious emission limits.

Radiated spurious emissions were measured on one channel for each transmission mode.

For the 20 MHz bandwidth, only the operational modes identified as worst-case were retained and reported in this test report.

**Test Results**

## 30 MHz – 1 GHz, Tx spurious emissions

### Radiated Spurious – All modes

| Frequency | Level | Detector | Limit (e.i.r.p) | Margin | Polar |
|---|---|---|---|---|---|
| MHz | dBm | --- | dBm | dB | --- |
| 425 | -74.8 | RMS | -33.9 | 40.9 | H |

## Tx Spurious Emissions – 1 GHz to 26 GHz

### Tx Spurious Emissions – 802.11a (SISO), Chain A, CH120

| Frequency | Level | Detector | Limit | Margin | Polar |
|---|---|---|---|---|---|
| MHz | dBm | --- | dBm | dB | --- |
| 4666.5 | -46.2 | RMS | -30.0 | 16.2 | H |
| 10586.0 | -45.7 | RMS | -30.0 | 15.7 | H |
| 11196.2 | -54.3 | RMS | -30.0 | 24.3 | V |
| 22398.9 | -53.8 | RMS | -30.0 | 23.8 | V |

### Tx Spurious Emissions – 802.11n20 (SISO), Chain B, CH120

| Frequency | Level | Detector | Limit | Margin | Polar |
|---|---|---|---|---|---|
| MHz | dBm | --- | dBm | dB | --- |
| 10648.0 | -47.0 | RMS | -30.0 | 17.0 | H |

| | | | | | |
|---|---|---|---|---|---|
| 11195.8 | -59.4 | RMS | -30.0 | 29.4 | H |
| 22399.4 | -51.2 | RMS | -30.0 | 21.2 | V |

**Tx Spurious Emissions – 802.11ax/be20 (MIMO), Chain A+B, CH120**

| Frequency | Level | Detector | Limit | Margin | Polar |
|---|---|---|---|---|---|
| MHz | dBm | --- | dBm | dB | --- |
| 2212.7 | -60.0 | RMS | -30.0 | 30.0 | H |
| 11182.2 | -57.2 | RMS | -30.0 | 27.2 | V |
| 22364.6 | -53.3 | RMS | -30.0 | 23.3 | V |

## B.9 Receiver spurious emissions

**Test limits**

<table>
<tr><th>ETSI clause</th><th>Limits</th></tr>
<tr><td>4.2.5.2</td><td>The spurious emissions of the receiver shall not exceed the limits given in table 4.<br><br>Table 4: Spurious emissions limits for receivers
<table>
<tr><th>Frequency range</th><th>Maximum power</th><th>Bandwidth</th></tr>
<tr><td>30 MHz to 1GHz</td><td>-57 dBm</td><td>100 kHz</td></tr>
<tr><td>1GHz to 26 GHz</td><td>-47 dBm</td><td>1 MHz</td></tr>
</table></td></tr>
</table>

**Test conditions**

| ETSI clause | Conditions |
|---|---|
| 5.4.7.1 | The conformance requirements in clause 4.2.5 shall be verified only under normal operating conditions, and when operating on those channels defined in clause 5.3.2.<br><br>For equipment having different operating modes (see clause 5.3.3.2) the measurements described in the present clause may not need to be repeated for all the operating modes.<br><br>The level of transmitter unwanted emissions shall be measured as, either:<br>• their power in a specified load (conducted emissions) and their radiated power (e.r.p. or e.i.r.p as given in clause 4.2.5.2) when radiated by the cabinet or structure of the equipment (cabinet radiation); or<br>• their radiated power (e.r.p. or e.i.r.p as given in clause 4.2.5.2) when radiated by cabinet and antenna.<br><br>The test method in clause 5.4.7.2 below assumes, that for the duration of the test, the UUT is configured into a continuous receive mode, or is operated in a mode where no transmissions occur. |

**Test procedure**

The radiated setups (receiver) shown in section *Test & System Description* were used to measure the receiver spurious emissions. Depending of the frequency range and bands being tested, different antennas and filters were used, in consequence different setups are employed.

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

The radiated spurious emissions were measured for all bandwidths on one channel of each transmission mode. The worst-case configuration was reported.

**Test Results Rx**

# Rx Spurious Emissions – 30 MHz to 26 GHz

## Rx Spurious Emissions – 802.11ac160 (MIMO), Chain A+B, CH114

| Frequency | Level | Detector | Limit | Margin | Polar |
|---|---|---|---|---|---|
| MHz | dBm | --- | dBm | dB | --- |
| 424.7 | -67.4 | RMS | -54.9 | 12.5 | H |
| 10749.5 | -58.2 | RMS | -47.0 | 11.2 | V |

## B.10 Dynamic Frequency Selection

**Test limits**

<table>
<tr><th>ETSI clause</th><th>Limits</th></tr>
<tr><td>4.2.6.2.1</td><td>The table below lists the DFS related technical requirements and their applicability for every operational mode. If the RLAN device is capable of operating in more than one operational mode then every operating mode shall be assessed separately.
<table>
<tr><th>Requirement</th><th>Slave without radar detection</th></tr>
<tr><td>Channel Availability Check</td><td>Not required</td></tr>
<tr><td>Off-Channel CAC (see note 1)</td><td>Not required</td></tr>
<tr><td>In-Service Monitoring</td><td>Not required</td></tr>
<tr><td>Channel Shutdown</td><td>✓</td></tr>
<tr><td>Non-Occupancy Period</td><td>Not required</td></tr>
<tr><td>Uniform Spreading</td><td>Not required</td></tr>
</table></td></tr>
<tr><td>4.2.6.2.5<br><br>Annex D</td><td>Channel Shutdown<br>The Channel Move Time shall not exceed the limit defined in table D.1.<br>The Channel Closing Transmission Time shall not exceed the limit defined in table D.1.
Table D.1. DFS requirement values
<table>
<tr><th>Parameter</th><th>Value</th></tr>
<tr><td>Channel Move Time</td><td>10 s</td></tr>
<tr><td>Channel Closing Transmission Time</td><td>1s</td></tr>
</table></td></tr>
</table>

**Test conditions**

| ETSI clause | Conditions |
|---|---|
| 5.4.8.1.1 | These measurements shall be performed only under normal test conditions (see clause 5.1.2).<br>The channels and the channel bandwidths to be used for testing are defined in clause 5.3.2.<br>The UUT is capable of transmitting a test transmission sequence as described in clause 5.3.1.2. The UUT shall be configured to operate at its maximum *Channel Occupancy Time* without the use of any pauses in between transmissions. |

**Test procedure**

The DFS setup shown in section *Test & System Description* was used to measure the Dynamic Frequency Selection (DFS). The DUT (slave device) is connected to the access point through an attenuator and a power splitter. A laptop is connected to the access point (master device) through an Ethernet connection and it receives the broadcasted data from the DUT.

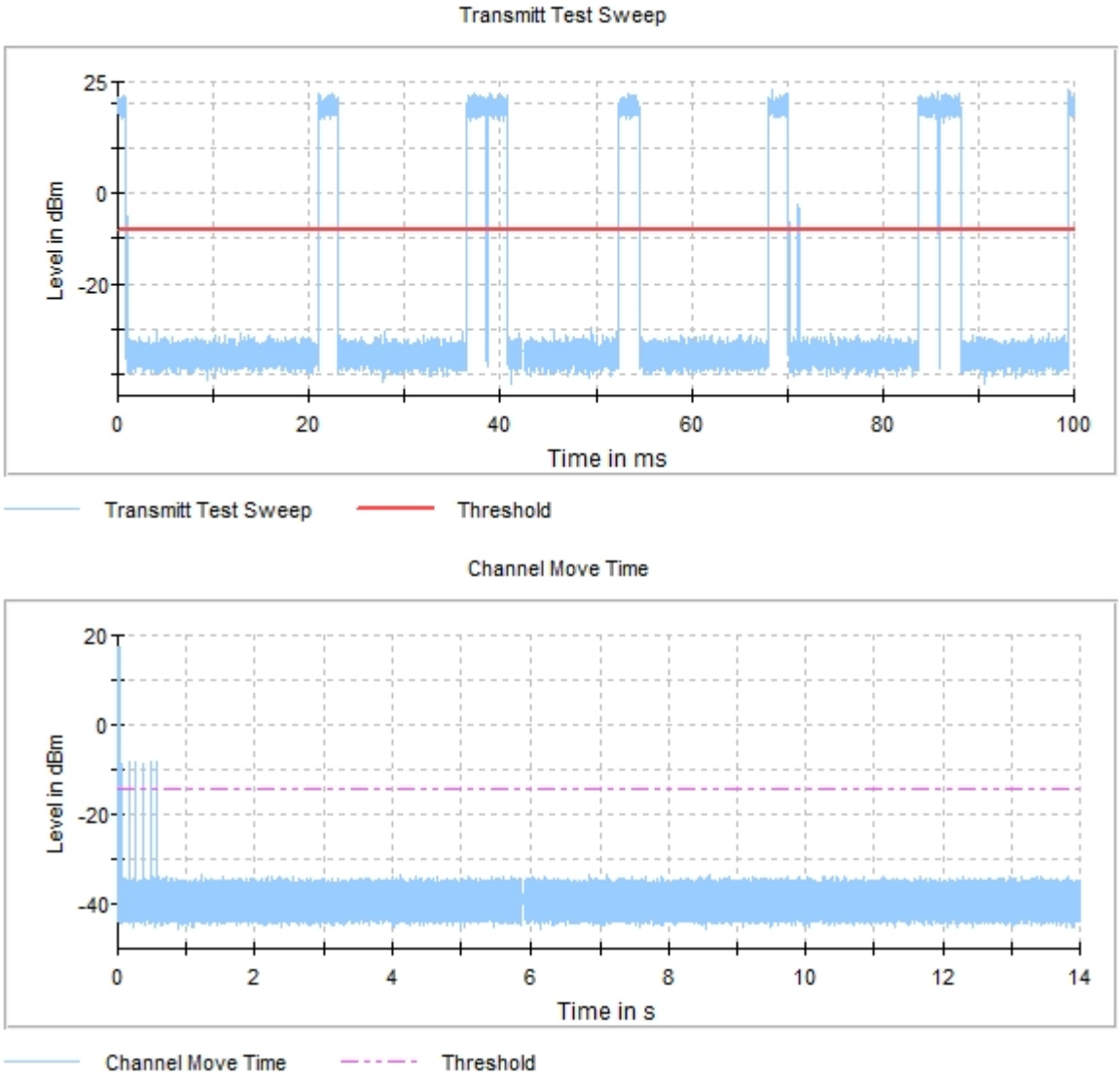
For the DFS measurement, the vector signal generator (VSG) send the reference DFS test signal to the access point. Then the access point should detected the radar, the DUT (slave) should stop its transmission on the current channel whenever instructed by the master device. All signals – master, slave, radar – are captured by the spectrum analyzer.

**Results tables**

Tested Channel: 104, Frequency: 5520 MHz

| Test item | Results | Limit |
|---|---|---|
| Transmit Test Duty Cycle | 16.51 % | - |
| Channel Closing Transmission Time | 1.68 ms | 1 second |
| Channel Move Time | 0.80 ms | 10 seconds |

**Results Screenshot**




Channel Move Time < 10s. Test PASS
Channel Closing Transmission Time (*Aggregate Time*) = 1.68 ms. Test PASS
Channel Move Time (*Channel Closing Time*) = 0.80 ms. Test PASS

## B.11 Adaptivity (Channel Access Mechanism)

**Test limits**

| ETSI clause | Limits |
|---|---|
| 4.2.7.3.2 | *Load Based Equipment.*<br>Load based Equipment shall implement a Listen Before Talk (LBT) based Channel Access Mechanism to detect the presence of other RLAN transmissions on an Operating Channel. |
| 4.2.7.3.2.5 | *ED Threshold Level.*<br>An operating channel is an occupied channel as long as transmissions in that channel are present at a power level greater than the Energy Detection Threshold (EDT). The power level is determined by integrating the received power over the channel and then normalized to per MHz power. The received power shall be determined at the interface between the equipment and the antenna assembly. If no transmissions are present at a power level greater than the EDT, the operating channel is an unoccupied channel. Equipment may consist of one or more devices.<br>The EDT is proportional to the equipment's maximum configured RF output power and shall be:<br>• -75 dBm/MHz for Pmax ≤ 18 dBm<br>• -80 dBm/MHz + (23 dBm - Pmax) for 18 dBm < Pmax < 23 dBm (3)<br>• -80 dBm/MHz for Pmax ≥ 23 dBm |
| 4.2.7.3.3.3 | *Short control signalling transmissions:*<br>• within an observation period of 50 ms, the number of Short Control Signalling Transmissions by the equipment shall be equal to or less than 50; and<br>• the total duration of the equipment's Control Signalling Transmissions shall be less than 2 500 µs within said observation period. |

**Test conditions**

| ETSI clause | Conditions |
|---|---|
| 5.4.9.1 | These measurements shall only be performed at normal test conditions (see clause 5.1.2).<br><br>The device shall be configured to operate at its maximum output power level.<br><br>NOTE: Capabilities of the equipment that are relevant for the test method in the present clause have been noted in the test report per clause 5.4.1. |

**Test procedure**

| ETSI clause | Conducted measurements, verification of reaction to the interference signal. |
|---|---|
| 5.4.9.2.2 | It shall be verified that:<br>• The UUT stops transmissions on the current operating channel.<br>• Apart from Short Control Signaling Transmissions there shall be no subsequent transmissions while the interfering signal is present.<br>• The Short Control Signalling Transmissions shall comply with the limits defined in clause 4.2.7.3.3. |

The adaptivity setup shown in section *Test & System Description* was used to verify the adaptivity of the UUT.

The UUT connects to a companion device with the maximum possible payload.

The spectrum analyzer monitors the transmissions in response to three different interference signals.

These interferers are three 100% duty cycle noise signal: one Gaussian noise signal, one OFDM signal and one LTE type signal. These signals are injected on the current operating channel of the UUT

The power levels for the signals at the input of the receiver are as follows:

- Companion device= -50dBm/MHz
- Interference signal = ***TL - Margin*** = -81dBm/MHz
  ***TL*** = -80 dBm/MHz, limit of the ED Threshold Level assuming 0dBi antenna gain
  ***Margin*** = Additionnal margin requested by the applicant (1dB)

**Test Results**

According to ETSI EN 301 893 V2.2.1., table 10 of section 5.3.2, one channel out of the declared channels has been tested.
See report 250522-02.TR04 for the test results.

**Compliance**

PASS

## B.12 Receiver Blocking

**Test limits**

<table>
<tr><th>ETSI clause</th><th>Limits</th></tr>
<tr><td>4.2.8.3<br><br>4.2.8.4</td><td>For equipment that supports a PER or FER test to be performed, the minimum performance criterion shall be a PER or FER less than or equal to 10 %.<br><br>While maintaining the minimum performance criteria as defined in clause 4.2.8.3, the blocking levels at specified frequency offsets shall be equal to or greater than the limits defined in table 9.
Table 9: Receiver Blocking parameters
<table>
<tr><th rowspan="2">Wanted signal mean power from companion device (dBm)</th><th rowspan="2">Blocking signal frequency (MHz)</th><th colspan="2">Blocking signal power (dBm) (see note 2)</th><th rowspan="2">Type of blocking signal</th></tr>
<tr><th>Master or Slave signal with radar detection (see table D.2, note 2)</th><th>Slave without radar detection (see table D.2, note 2)</th></tr>
<tr><td>Pmin + 6 dB</td><td>5 100</td><td>-53</td><td>-59</td><td>Continuous Wave</td></tr>
<tr><td>Pmin + 6 dB</td><td>4 900<br>5 000<br>5 975</td><td>-47</td><td>-53</td><td>Continuous Wave</td></tr>
<tr><td colspan="5">NOTE: $P_{min}$ is the minimum level of the wanted signal (in dBm) required to meet the minimum performance criteria as defined clause 4.2.8.3 in the absence of any blocking signal.</td></tr>
</table>
</td></tr>
</table>

**Test conditions**

<table>
<tr><th>ETSI clause</th><th>Conditions</th></tr>
<tr><td>5.4.10.1</td><td>These measurements shall only be performed at normal test conditions (see clause 5.1.2).<br><br>The UUT shall operate in its normal operational mode.<br><br>For devices which can change their operating frequency automatically (adaptive channel allocation), this function shall be disabled.<br><br>If the equipment can be configured to operate with different nominal channel bandwidths and different data rates, then the combination of the smallest channel bandwidth and the lowest data rate for this channel bandwidth which still allows the equipment to operate as intended shall be used. This mode of operation shall be aligned with the performance criteria defined in clause 4.2.8.3 and shall be described in the test report.<br><br>It shall be verified that these performance criteria are achieved during the blocking test.</td></tr>
</table>

**Test procedure**

The receiver blocking setup shown in section *Test & System Description* was used to measure receiver blocking signal. The signaling Unit is a CMW500.

The packet error rate (PER) is measured with the CMW500. The blocking signal is emulated by the Signal generator SMB100A. According to the applicant declaration, the device is considered as a slave device.

**Test results**

Configuration tested: 802.11a, Chain A, Channel 100, 6Mbps

- **Minimum performance result without interferer**

| Wanted signal mean power from companion device: Pmin [dBm] | PER [%] |
|---|---|
| -96.00 | 9.35 |

- **Minimum performance results with interferer**

Wanted signal mean power from companion device:

✓ Pmin [dBm] + 6dB = -90.00dBm

| Blocking signal Frequency [MHz] | Blocking signal Power [dBm] | PER [%] | Verdict |
|---|---|---|---|
| 5100 | -59 | 1.05 | Pass |
| 4900 | -53 | 0.55 | Pass |
| 5000 | -53 | 0.85 | Pass |
| 5975 | -53 | 0.55 | Pass |

## B.13 Adjacent Channel Selectivity

**Test limits**

<table>
<tr><th>ETSI clause</th><th>Limits</th></tr>
<tr><td>4.2.9.4</td><td>
The limits defined in this clause apply when the equipment receives the wanted signal on a single channel and the occupied bandwidth of the interfering signal falls completely within a channel adjacent to this channel. Both channels have a nominal channel bandwidth as defined in clause 4.2.2.<br><br>
While maintaining the minimum performance criteria as defined in clause 4.2.9.3, the adjacent channel interferer level shall be equal to or greater than the limit given in table 9 corresponding to a frequency offset within the range specified in table 9.<br><br>
Table 9: Adjacent channel selectivity parameters
<table>
<tr><th>Wanted signal mean power from companion device (dBm)</th><th>Interferer signal frequency offset range (MHz)</th><th>Interferer signal power (dBm) (see note 2 and note 3)</th><th>Type of interferer signal</th></tr>
<tr><td>$P_{min}$ + 10 dB</td><td>20<br>(see note 4)</td><td>$P_{min}$ + 26 dB</td><td>Same as the wanted signal with an equivalent nominal bandwidth</td></tr>
<tr><td colspan="4">NOTE 1: $P_{min}$ is the minimum level of the wanted signal (in dBm) required to meet the minimum performance criteria as defined clause 4.3.9.3 in the absence of any interfering signal.<br>NOTE 3: The level specified for the interferer signal applies at the lowest data rate</td></tr>
</table>
</td></tr>
</table>

**Test conditions**

| ETSI clause | Conditions |
|---|---|
| 5.4.11.1 | These measurements shall only be performed at normal test conditions (see clause 5.1.2).<br>For devices which can change their operating frequency automatically (adaptive channel allocation), this function shall be disabled.<br>The UUT shall operate in its normal operational mode, except that it shall be configured to operate with a nominal channel bandwidth of 20 MHz and at the lowest data rate for this channel bandwidth.<br>It shall be verified that the performance criteria as defined in clause 4.2.9.3 are achieved during the adjacent channel selectivity test. |

**Test procedure**

The receiver blocking setup shown in section ***Error! Reference source not found.*** was used to measure receiver a djacent channel selectivity. The signaling Unit is the CMW500.

The packet error rate (PER) is measured with the CMW500. The blocking signal is emulated by the Signal generator SMW200A.

## Configuration tested: 802.11a20, Chain A, Channel 140 (5700MHz) , 6Mbps

- **Minimum performance result without interferer**

| Wanted signal mean power from companion device: Pmin [dBm] | PER [%] |
|---|---|
| -95.50 | 6.05 |

- **Minimum performance results with interferer (frequency offset 20MHz)**

Wanted signal mean power from companion device:

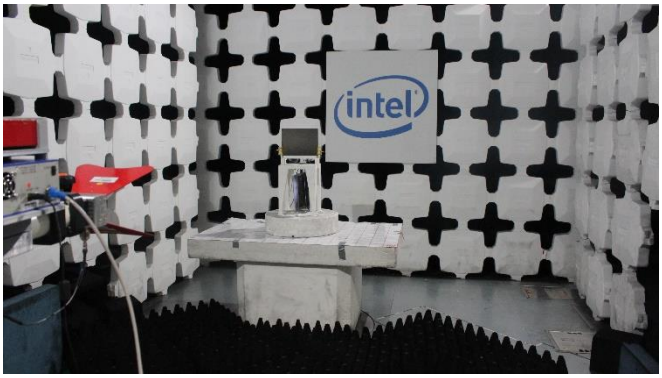
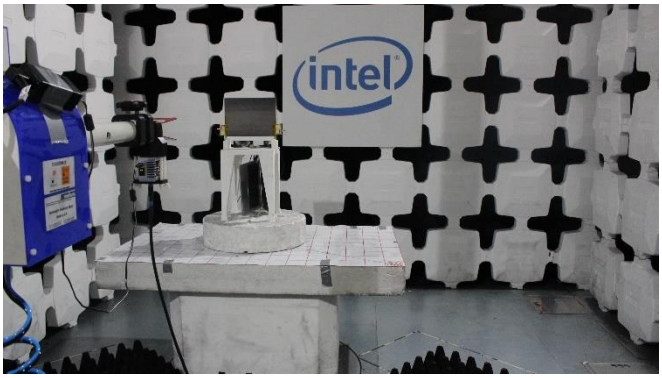
✓ Pmin [dBm] + 10dB = -85.50

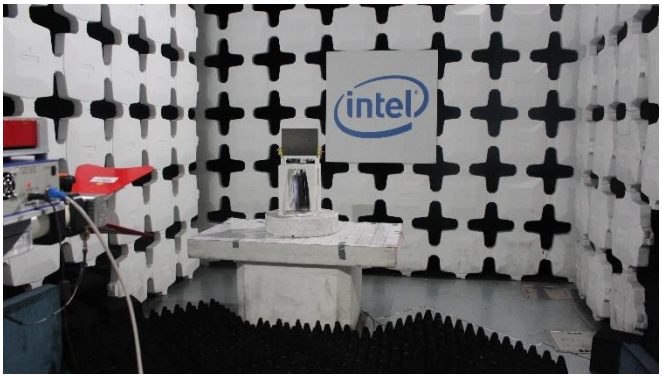
✓ Initial Interferer Signal power: Pmin [dBm] + 26dB = -69.50

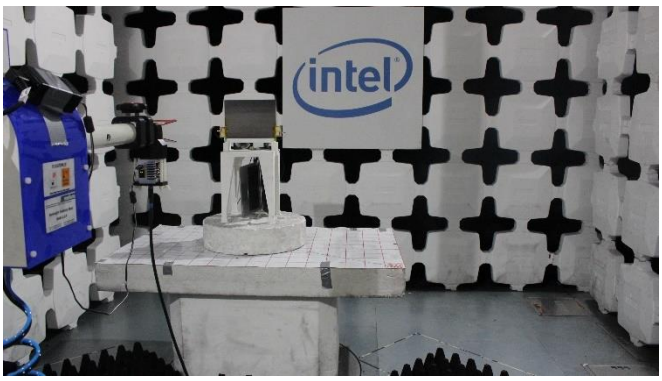
| Blocking signal Frequency ( MHz ) | Interferer signal frenquency (MHz) | Minimum Blocking signal power (dBm) | PER (%) | Maximum Blocking signal power (dBm) | PER (%) | Verdict |
|---|---|---|---|---|---|---|
| 5700 | 5480 | -69.50 | 0.00 | -37.00 | 1.05 | Pass |
| | 5520 | -69.50 | 0.00 | -38.00 | 9.90 | Pass |

# Annex C. Photographs

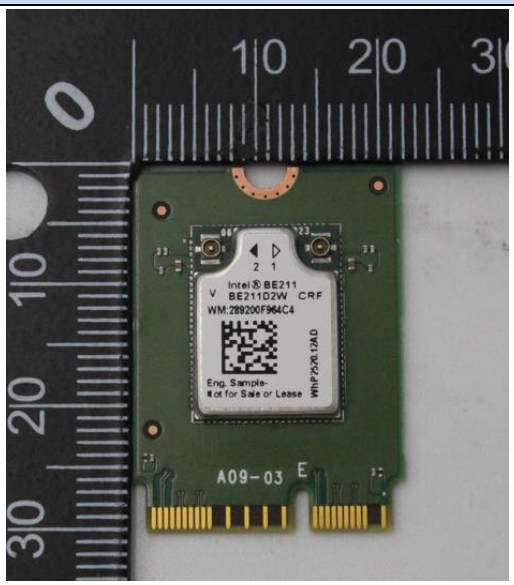
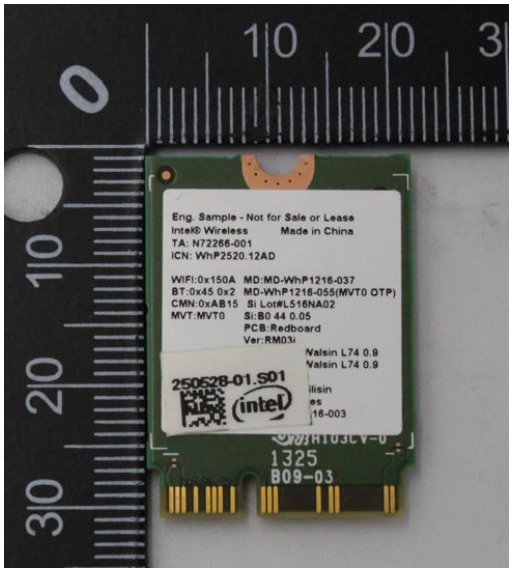
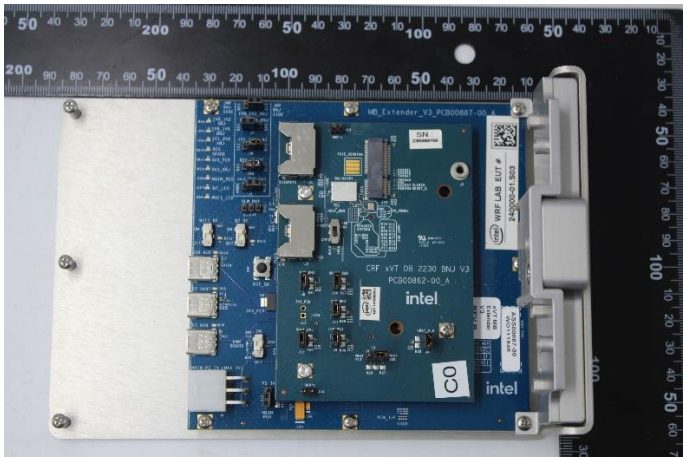
## C.1 Test Setup

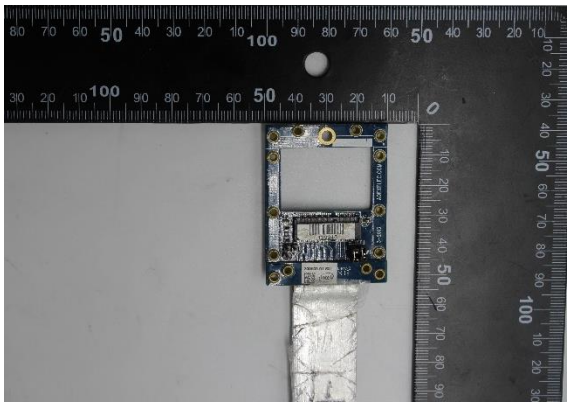
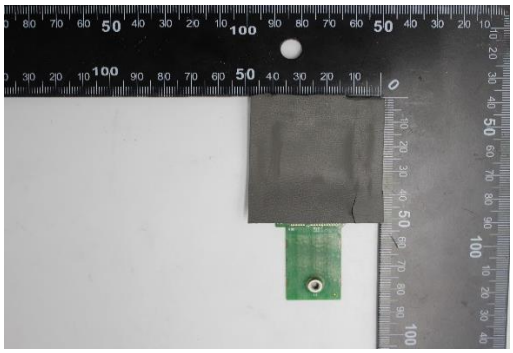
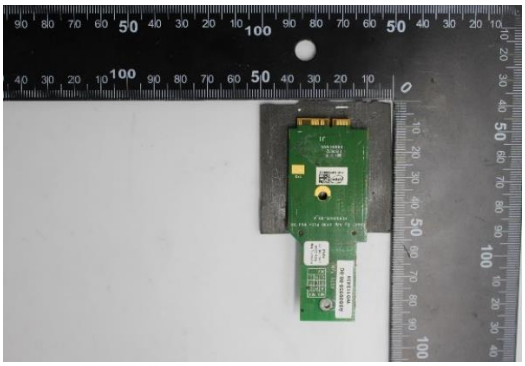
| Radiated Setup<br>30 MHz – 1 GHz (Transmitter tests) | Radiated Setup<br>1 GHz – 11 GHz (Transmitter tests) |
|---|---|
|  |  |
| Radiated Setup<br>11 GHz – 26 GHz (Transmitter tests) | |
|  | |

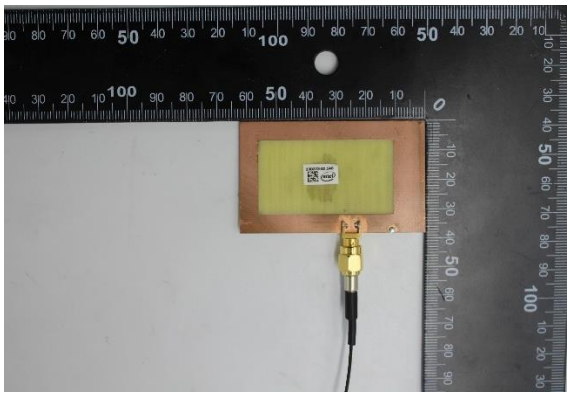
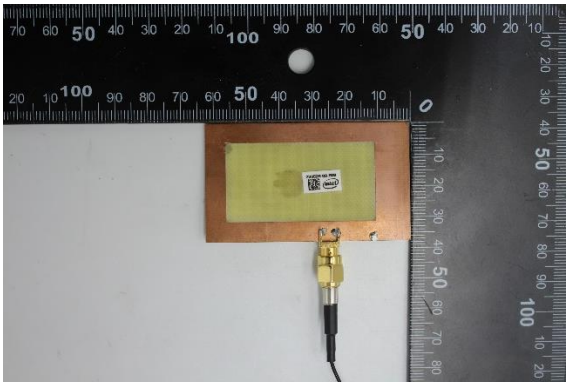
| Radiated Setup<br>30 MHz – 1 GHz (Receiver tests) | Radiated Setup<br>1 GHz – 11 GHz (Receiver tests) |
|---|---|
|  |  |

| Radiated Setup<br>11 GHz – 26 GHz (Receiver tests) |
|---|
|  |

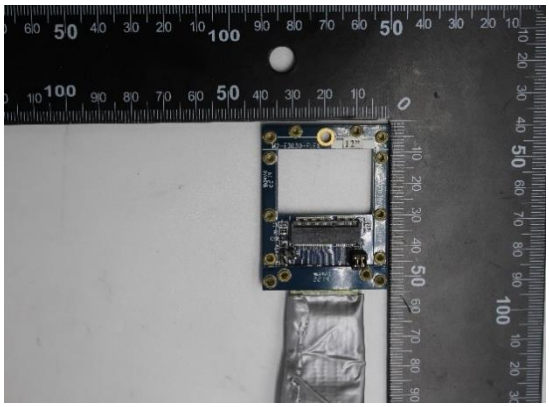
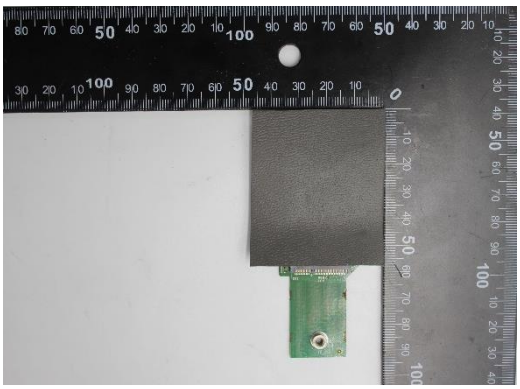
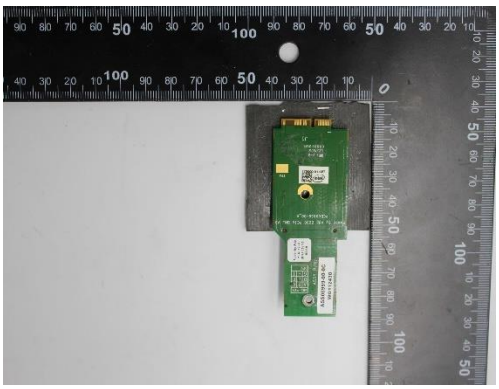
## C.2 Test Sample

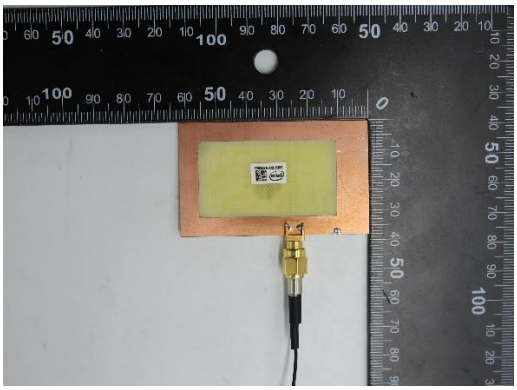
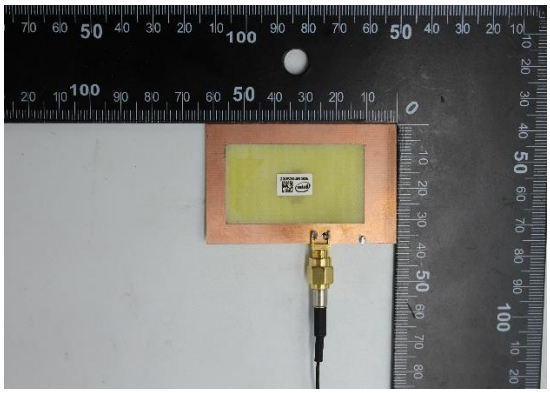
| Sample #01 | |
|---|---|
| Module Front | Module Back |
|  |  |
| Extender board | Laptop |
|  |  |

| Sample #02 | |
|---|---|
| Module Front | Module Back |
|  |  |
| Extender board | Laptop |
|  |  |
| Adaptor Front | Adaptor Back |
|  |  |

| PIFA antenna (Main) | PIFA antenna (Aux) |
| --- | --- |
|  |  |

| Sample #03 |
|---|

| Module Front | Module Back |
|---|---|
|  |  |
| **Extender board** | **Laptop** |
|  |  |
| **Adaptor Front** | **Adaptor Back** |
|  |  |

| PIFA antenna (Main) | PIFA antenna (Aux) |
| --- | --- |
|  |  |

## End of the report

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