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# Wireless Test Report – 1R368533-5TRFWL

Applicant:

Ring LLC

Product name:

Ring

Model:

Base Station NA

FCC ID:

2AEUPBHABN002

ISED Registration number:

20271-BHABN002

Specifications:

FCC 47 CFR Part 15 Subpart E, §15.407

Unlicensed National Information Infrastructure Devises

RSS-247, Issue 2, Feb 2017, Section 6

Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices, Section 6 Technical requirements for licence-exempt local area network devices and digital transmission systems operating in the 5 GHz band

Date of issue: April 2, 2019

| | | | |
|---|---|---|---|
| Test engineer(s): | Mark Libbrecht, EMC/Wireless Specialist | Signature: | Mark Libbrecht |
| Reviewed by: | David Duchesne, Senior EMC/Wireless Specialist | Signature: | |

Lab and Test location(s)

| | | |
|---|---|---|
| Company name | Nemko Canada Inc. (Cambridge) | |
| Facility | 130 Saltsman Drive, Unit #1<br>Cambridge, ON<br>Canada, N3E 0B2<br><br>Tel: +1 519 680 4811<br><br>Test Firm Registration Number: 332406 | |
| Test site registration | **Organization** | **Designation Number** |
| | FCC/ISED | CA0101 |
| Website | www.nemko.com | |

Limits of responsibility

Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.
This test report has been completed in accordance with the requirements of ISO/IEC 17025. All results contain in this report are within Nemko Canada's ISO/IEC 17025 accreditation.

Copyright notification

# Table of contents

# **Section 1.** Report summary

## 1.1 Applicant and manufacturer

| | |
|---|---|
| Company name | Ring LLC |
| Address | 1523 26th Street, Santa Monica, CA, United States, 90404 |

## 1.2 Test specifications

| | |
|---|---|
| FCC 47 CFR Part 15, Subpart E, Clause 15.407 | Unlicensed National Information Infrastructure Devises |
| RSS-247, Issue 2, Feb. 2017 | Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices |

## 1.3 Test specifications

| | |
|---|---|
| 789033 D02 General UNII Test Procedures New Rules v02r01 (Dec. 14, 2017) | Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices Part 15, Subpart E |
| ANSI C63.10 v2013 | American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices |

## 1.4 Statement of compliance

In the configuration tested, the EUT was found non-compliant.

Testing was completed against all relevant requirements of the test standard. Results obtained indicate that the product under test does not comply in full with the requirements tested. The test results relate only to the items tested.

See “Summary of test results” for full details.

## 1.5 Exclusions

None.

## 1.6 Test report revision history

***Table 1.6-1:*** *Test report revision history*

| Revision # | Date of issue | Details of changes made to test report |
|---|---|---|
| TRF | April 1, 2019 | Original report issued |
| R1 | April 2, 2019 | Model Variant removed, Update min frequency and transmitter spurious |

# **Section 2.** Summary of test results

## 2.1 Testing period

| | |
|---|---|
| Test start date | February 1, 2019 |
| Test end date | March 29, 2019 |

## 2.2 FCC Part 15 Subpart C, general requirements test results

***Table 2.2-1:*** *FCC general requirements results*

| Part | Test description | Verdict |
|---|---|---|
| §15.207(a) | Conducted limits | Pass |
| §15.31(e) | Variation of power source | Pass |
| §15.31(m) | Number of tested frequencies | Pass |
| §15.203 | Antenna requirement | Pass |

Notes: Only test pertaining to the EUT have been included in this table.

## 2.3 FCC Part 15 Subpart E, test results

***Table 2.3-1:*** *FCC Part 15, Subpart E, results*

| Part | Test description | Verdict |
|---|---|---|
| §15.403(i) | Emission bandwidth | Pass |
| §15.407(a)(3) | Power and density limits within 5.725–5.85 GHz band | Pass |
| §15.407(b)(4) | Undesirable emission limits for 5.725–5.85 GHz band | Pass |
| §15.407(b)(6) | Conducted limits for U-NII devices using an AC power line | Pass |
| §15.407(e) | Minimum 6 dB bandwidth of U-NII devices within the 5.725-5.85 GHz band | Pass |
| §15.407(g) | Frequency stability | Pass |

Notes: Only test pertaining to the EUT have been included in this table.

## 2.4 ISED RSS-GEN, Issue 5, test results

***Table 2.4-1:*** *RSS-Gen results*

| Part | Test description | Verdict |
|---|---|---|
| 6.7 | Occupied Bandwidth | Pass |
| 6.8 | Antenna requirement | Pass |
| 6.9 | Number of tested frequencies | Pass |
| 8.8 | Power Line Conducted Emissions Limits for Licence-Exempt Radio Apparatus | Pass |
| 8.11 | Frequency stability | Pass |

Notes: Only test pertaining to the EUT have been included in this table.

## 2.5 RSS-247, Issue 2, test results

***Table 2.5-1:*** *RSS-247, Issue 2, results*

| Section | Test description | Verdict |
|---|---|---|
| 6.1[1] | Types of Modulation | Pass |
| 6.2.4.1 | Power limits for 5725–5850 MHz band | Pass |
| 6.2.4.1 | Minimum 6 dB bandwidth | Pass |
| 6.2.4.2 | Unwanted emission limits for 5725–5850 MHz band | Pass |

Notes: [1] The EUT employs digital modulations, such as: 802.11a and 802.11n
Only test pertaining to the EUT have been included in this table.

# **Section 3.** Equipment under test (EUT) details

## 3.1 Sample information

| | |
|---|---|
| Receipt date | February 1, 2019 |
| Nemko sample ID number | Item # 1 (conducted sample) and Item # 3 (radiated sample) |

## 3.2 EUT information

| | |
|---|---|
| Product name | Ring |
| Model | Base Station NA |
| Serial number | BHBN21851PG000046 (conducted), BHBN21851PG000052 (radiated) |

## 3.3 Technical information

| | |
|---|---|
| Applicant IC company number | 20271 |
| IC UPN number | 20271-BHABN002 |
| All used IC test site(s) Reg. number | 332406 |
| RSS number and Issue number | RSS-247 Issue 2, Feb 2017 |
| Frequency band | 5725–5850 MHz |
| Frequency Min (MHz) | 5745 (20 MHz), 5755 (40 MHz) |
| Frequency Max (MHz) | 5825 (20 MHz), 5795 (40 MHz) |
| RF power Min (W), | N/A |
| RF power Max (W), Conducted | 0.011 (10.3 dBm) 20 MHz, 0.016 (11.9 dBm) 40 MHz |
| Field strength, Units @ distance | N/A |
| Measured 26 dB BW (MHz) | 20.0 (20MHz), 42.1 (40 MHz) |
| Calculated BW (kHz), as per TRC-43 | N/A |
| Type of modulation | 802.11a (20 MHz), 802.11n (40 MHz) |
| Emission classification (F1D, G1D, D1D) | W7D |
| Transmitter spurious | -16.9 dBm EIRP |
| Power requirements | 5 $V_{DC}$ (via external 100-240 VAC, 50/60 Hz power adapter) |
| Antenna information | Antenna Gain is 5.6 dBi (inverted F)<br>The EUT uses a unique antenna coupling/ non-detachable antenna to the intentional radiator. |

## 3.4 Product description and theory of operation

Communications Hub for Home Security Products

## 3.5 EUT exercise details

The EUT was setup in continuous transmit state.
Channel power setting for 802.11a = 16
Channel power setting for 802.11n = 16

## 3.6 EUT setup diagram

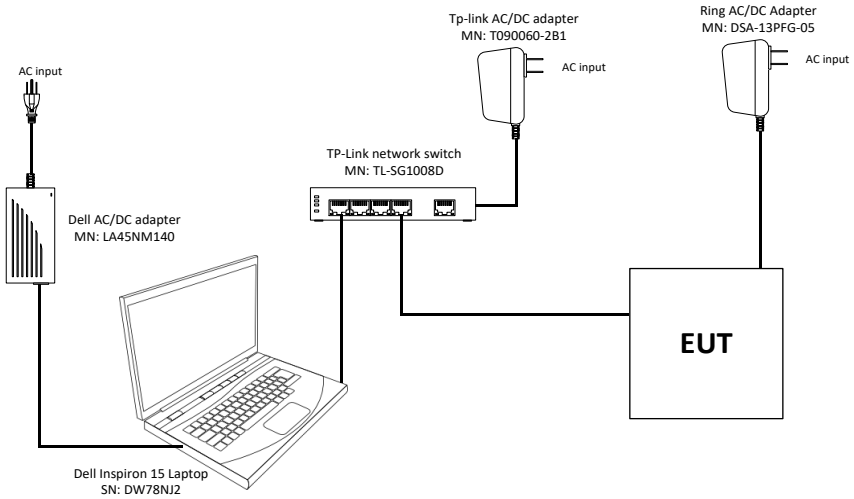



***Figure 3.6-1:*** *Setup diagram*

## 3.7 EUT sub assemblies

***Table 3.7-1:*** *EUT sub assemblies*

| Description | Brand name | Model/Part number | Serial number |
|---|---|---|---|
| AC/DC Adapter | Ring | DSA-13PFG-05 | BHAB11851DV000116 |
| Laptop | Dell | Inspiron 15 | DW78NJ2 |
| Network switch | TP-Link | TL-SG1008D | 2171682000263 |

# **Section 4.** Engineering considerations

## 4.1 Modifications incorporated in the EUT for compliance

There were no modifications performed to the EUT during this assessment.

## 4.2 Technical judgment

None

## 4.3 Deviations from laboratory tests procedures

No deviations were made from laboratory procedures.

# **Section 5.** Test conditions

## 5.1 Atmospheric conditions

| | |
|---|---|
| Temperature | 15–30 °C |
| Relative humidity | 20–75 % |
| Air pressure | 86–106 kPa |

When it is impracticable to carry out tests under these conditions, a note to this effect stating the ambient temperature and relative humidity during the tests shall be recorded and stated.

## 5.2 Power supply range

The normal test voltage for equipment to be connected to the mains shall be the nominal mains voltage. For the purpose of the present document, the nominal voltage shall be the declared voltage, or any of the declared voltages ±5 %, for which the equipment was designed.

# **Section 6.** Measurement uncertainty

## 6.1 Uncertainty of measurement

UKAS Lab 34 and TIA-603-B have been used as guidance for measurement uncertainty reasonable estimations with regards to previous experience and validation of data. Nemko Canada, Inc. follows these test methods in order to satisfy ISO/IEC 17025 requirements for estimation of uncertainty of measurement for wireless products.

Measurement uncertainty budgets for the tests are detailed below. Measurement uncertainty calculations assume a coverage factor of K = 2 with 95% certainty.

***Table 6.1-1:*** *Measurement uncertainty*

| Test name | Measurement uncertainty, dB |
|---|---|
| All antenna port measurements | 0.55 |
| Conducted spurious emissions | 1.13 |
| Radiated spurious emissions | 3.78 |
| AC power line conducted emissions | 3.55 |

# **Section 7.** Test equipment

## 7.1 Test equipment list

***Table 7.1-1:*** *Equipment list*

| Equipment | Manufacturer | Model no. | Serial no. | Asset no. | Cal./Ver. cycle | Next cal./ver. |
|---|---|---|---|---|---|---|
| 3 m EMI test chamber | TDK | SAC-3 | | FA003012 | 1 year | Aug. 22/19 |
| Flush mount turntable | SUNAR | FM2022 | | FA003006 | — | NCR |
| Controller | SUNAR | SC110V | 050118-1 | FA002976 | — | NCR |
| Antenna mast | SUNAR | TLT2 | 042418-5 | FA003007 | — | NCR |
| Receiver/spectrum analyzer | Rohde & Schwarz | ESR26 | 101367 | FA002969 | 1 year | June 1/19 |
| Spectrum analyzer | Rohde & Schwarz | FSW43 | 104437 | FA002971 | 1 year | June 1/19 |
| Horn antenna (1–18 GHz) | ETS-Lindgren | 3117 | 00052793 | FA002911 | 1 year | Aug. 16/19 |
| Preamp (1–18 GHz) | ETS-Lindgren | 124334 | 00224880 | FA002956 | 1 year | Sept 18/19 |
| Bilog antenna (30–2000 MHz) | SUNAR | JB1 | A053018-2 | FA003010 | 1 year | Sept. 6/19 |
| 50 Ω coax cable | Huber + Suhner | None | 457630 | FA003047 | 1 year | Nov 12/19 |
| 50 Ω coax cable | Huber + Suhner | None | 457624 | FA003044 | 1 year | Nov 12/19 |
| Two-line v-network | Rohde & Schwarz | ENV216 | 101376 | FA002964 | 1 year | Mar. 27/19 |
| 50 Ω coax cable | Rohde & Schwarz | None | | FA003074 | 1 year | Dec. 21/19 |
| AC Power source | Chroma | 61605 | 616050002253 | FA003034 | — | VOU |
| Filter 5.725 – 5.85 GHz | Microwave Circuits | N0257881 | 499783 | FA003029 | 1 year | Oct. 1/19 |
| Horn antenna (18-40 GHz) | ETS-Lindgren | 3116B | 00122305 | FA002948 | 1 year | Apr. 18/19 |

Note: NCR - no calibration required, VOU - verify on use

# **Section 8.** Testing data

## 8.1 FCC 15.31(e) Variation of power source

### 8.1.1 Definitions and limits

**FCC §15.31:**

(e) For intentional radiators, measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage. For battery operated equipment, the equipment tests shall be performed using a new battery.

### 8.1.2 Test date

| | |
|---|---|
| Start date | February 14, 2019 |

### 8.1.3 Observations, settings and special notes

The testing was performed as per ANSI C63.10 Section 5.13.

a) Where the device is intended to be powered from an external power adapter, the voltage variations shall be applied to the input of the adapter provided with the device at the time of sale. If the device is not marketed or sold with a specific adapter, then a typical power adapter shall be used.
b) For devices where operating at a supply voltage deviating ±15% from the nominal rated value may cause damages or loss of intended function, test to minimum and maximum allowable voltage per manufacturer's specification and document in the report.
c) For devices with wide range of rated supply voltage, test at 15% below the lowest and 15% above the highest declared nominal rated supply voltage.
d) For devices obtaining power from an input/output (I/O) port (USB, firewire, etc.), a test jig is necessary to apply voltage variation to the device from a support power supply, while maintaining the functionalities of the device.

For battery-operated equipment, the equipment tests shall be performed using a variable power supply.

### 8.1.4 Test data

The EUT AC Input supply voltage was varied between 85% and 115% of the nominal rated supply voltage. No change to transmitter performance was observed.

## 8.2 FCC 15.31(m) and RSS-Gen 6.9 Number of frequencies

### 8.2.1 Definitions and limits

**FCC §15.31:**

(m) Measurements on intentional radiators or receivers, other than TV broadcast receivers, shall be performed and, if required, reported for each band in which the device can be operated with the device operating at the number of frequencies in each band specified in the following table:

**RSS-Gen Section 6.9:**

Except where otherwise specified, measurements shall be performed for each frequency band of operation for which the radio apparatus is to be certified, with the device operating at the frequencies in each band of operation shown in table below. The frequencies selected for measurements shall be reported in the test report.

***Table 8.2-1:*** *Frequency Range of Operation*

| Frequency range over which the device operates (in each band) | Number of test frequencies required | Location of measurement frequency inside the operating frequency range |
|---|---|---|
| 1 MHz or less | 1 | Center (middle of the band) |
| 1–10 MHz | 2 | 1 near high end, 1 near low end |
| Greater than 10 MHz | 3 | 1 near high end, 1 near center and 1 near low end |

Notes: "near" means as close as possible to or at the centre / low end / high end of the frequency range over which the device operates.

### 8.2.2 Test date

| | |
|---|---|
| Start date | February 14, 2019 |

### 8.2.3 Observations, settings and special notes

Per ANSI C63.10 Subclause 5.6.2.1:

The number of channels tested can be reduced by measuring the center channel bandwidth first and then applying the following relaxations as appropriate:

a) For each operating mode, if the measured channel bandwidth on the middle channel is at least 150% of the minimum permitted bandwidth, then it is not necessary to measure the bandwidth on the high and low channels.
b) For multiple-input multiple-output (MIMO) systems, if the measured channel bandwidth on testing the middle channel exceeds the minimum permitted bandwidth by more than 50% on one transmit chain, then it is not necessary to repeat testing on the other chains.
c) If the measured channel bandwidth on the middle channel is less than 50% of the maximum permitted bandwidth, then it is not necessary to measure the bandwidth on the high and low channels.

Per ANSI C63.10 Subclause 5.6.2.2:

For devices with multiple operating modes, measurements on the middle channel can be used to determine the worst-case mode(s). The worst-case modes are as follows:

a) Band edge requirements—Measurements on the mode with the widest bandwidth can be used to cover the same channel (center frequency) on modes with narrower bandwidth that have the same or lower output power for each modulation family (e.g., OFDM and direct sequence spread spectrum).
b) Spurious emissions—Measure the mode with the highest output power and the mode with the highest output power spectral density for each modulation family (e.g., OFDM and direct sequence spread spectrum).
c) In-band PSD—Measurements on the mode with the narrowest bandwidth can be used to cover all modes within the same modulation family of an equal or lower output power provided the result is less than 50% of the limit.

### 8.2.4 Test data

***Table 8.2-2:*** *Test channels selection 20 MHz channels*

| Start of Frequency range, MHz | End of Frequency range, MHz | Frequency range bandwidth, MHz | Low channel, MHz | Mid channel, MHz | High channel, MHz |
|---|---|---|---|---|---|
| 5725 | 5850 | 125 | 5745 | 5785 | 5825 |

***Table 8.2-3:*** *Test channels selection 40 MHz channels*

| Start of Frequency range, MHz | End of Frequency range, MHz | Frequency range bandwidth, MHz | Low channel, MHz | High channel, MHz |
|---|---|---|---|---|
| 5725 | 5850 | 125 | 5755 | 5795 |

## 8.3 FCC 15.203 and RSS-Gen 6.8 Antenna requirement

### 8.3.1 Definitions and limits

**FCC §15.203:**

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

**RSS-Gen Section 6.8:**

The applicant for equipment certification shall provide a list of all antenna types that may be used with the transmitter, where applicable (i.e. for transmitters with detachable antenna), indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna. The test report shall demonstrate the compliance of the transmitter with the limit for maximum equivalent isotropically radiated power (e.i.r.p.) specified in the applicable RSS, when the transmitter is equipped with any antenna type, selected from this list.

For expediting the testing, measurements may be performed using only the antenna with highest gain of each combination of transmitter and antenna type, with the transmitter output power set at the maximum level. However, the transmitter shall comply with the applicable requirements under all operational conditions and when in combination with any type of antenna from the list provided in the test report.

### 8.3.2 Test date

| | |
|---|---|
| Start date | February 14, 2019 |

### 8.3.3 Observations, settings and special notes

None

### 8.3.4 Test data

- The EUT has an internal integrated antenna, non-detachable.
- The EUT will not be professionally installed

## 8.4 FCC 15.207(a) and RSS-Gen 8.8 AC power line conducted emissions limits

### 8.4.1 Definitions and limits

**FCC §15.207:**

a) Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 µH/50 Ω line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

ANSI: C63.10 subclause 6.2
If the EUT normally receives power from another device that in turn connects to the public utility ac power lines, measurements shall be made on that device with the EUT in operation to demonstrate that the device continues to comply with the appropriate limits while providing the EUT with power. If the EUT is
operated only from internal or dedicated batteries, with no provisions for connection to the public utility ac power lines (600 VAC or less) to operate the EUT (such as an adapter), then ac power-line conducted measurements are not required.
For direct current (dc) powered devices where the ac power adapter is not supplied with the device, an “off-the-shelf” unmodified ac power adapter shall be used. If the device is supposed to be installed in a host (e.g., the device is a module or PC card), then it is tested in a typical compliant host.

**RSS-GEN Section 8.8:**

A radio apparatus that is designed to be connected to the public utility (AC) power line shall ensure that the radio frequency voltage, which is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz, shall not exceed the limits in table below.

Unless the requirements applicable to a given device state otherwise, for any radio apparatus equipped to operate from the public utility AC power supply either directly or indirectly (such as with a battery charger), the radio frequency voltage of emissions conducted back onto the AC power lines in the frequency range of 0.15 MHz to 30 MHz shall not exceed the limits shown in table below. The more stringent limit applies at the frequency range boundaries.

***Table 8.4-1:*** *AC power line conducted emissions limit*

| Frequency of emission, MHz | Conducted limit, dBµV | |
|---|---|---|
| | Quasi-peak | Average** |
| 0.15–0.5 | 66 to 56* | 56 to 46* |
| 0.5–5 | 56 | 46 |
| 5–30 | 60 | 50 |

Notes: * - The level decreases linearly with the logarithm of the frequency.
** - A linear average detector is required.

### 8.4.2 Test date

| | |
|---|---|
| Start date | February 14, 2019 |

### 8.4.3 Observations, settings and special notes

| | |
|---|---|
| Port under test – Coupling device | AC Input – Artificial Mains Network (AMN) |
| EUT power input during test | 5 $V_{DC}$ (Powered via external power adapter @ 120 $V_{AC}$ 60 Hz) |
| EUT setup configuration | Table top |
| Measurement details | – A preview measurement was generated with the receiver in continuous scan mode. Emissions detected within 10 dB or above the limit were re-measured with the appropriate detector against the correlating limit and recorded as the final measurement. No conducted emissions were overserved within 10 dB of limit.<br>– The spectral plots have been corrected with transducer factors. |

Receiver settings:

| | |
|---|---|
| Resolution bandwidth | 9 kHz |
| Video bandwidth | 30 kHz |
| Detector mode | Peak and Average (Preview measurement), Quasi-peak and CAverage (Final measurement) |
| Trace mode | Max Hold |
| Measurement time | – 100 ms (Peak and Average preview measurement)<br>– 100 ms (Quasi-peak final measurement)<br>– 160 ms (CAverage final measurement) |

## 8.4.4 Test data

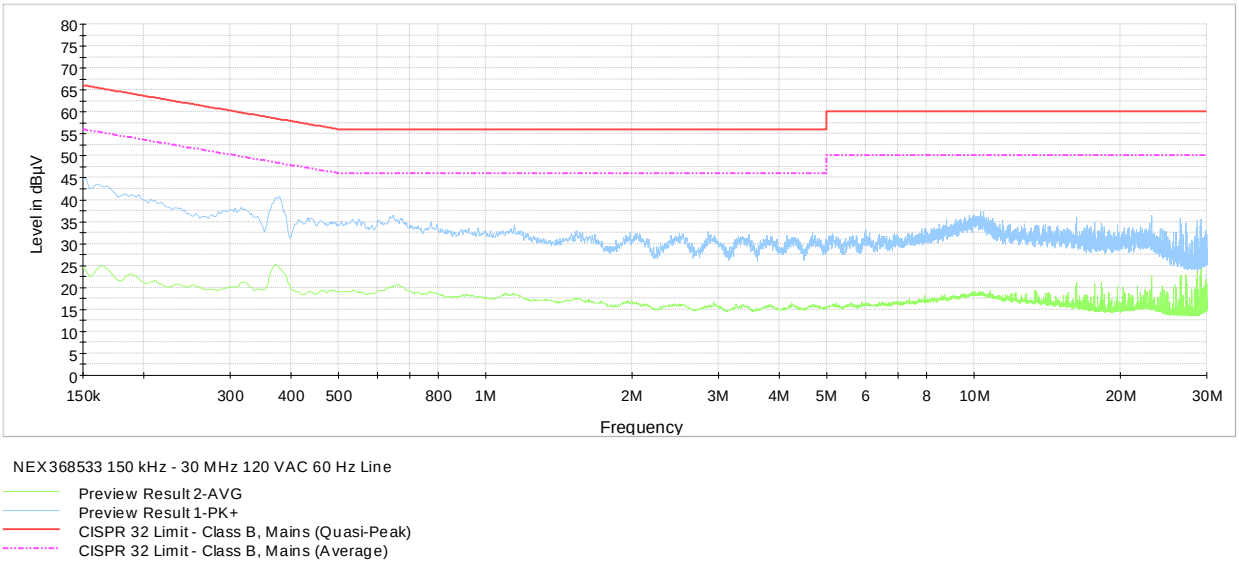



***Figure 8.4-1:*** *AC power line conducted emissions – spectral plot on phase line*

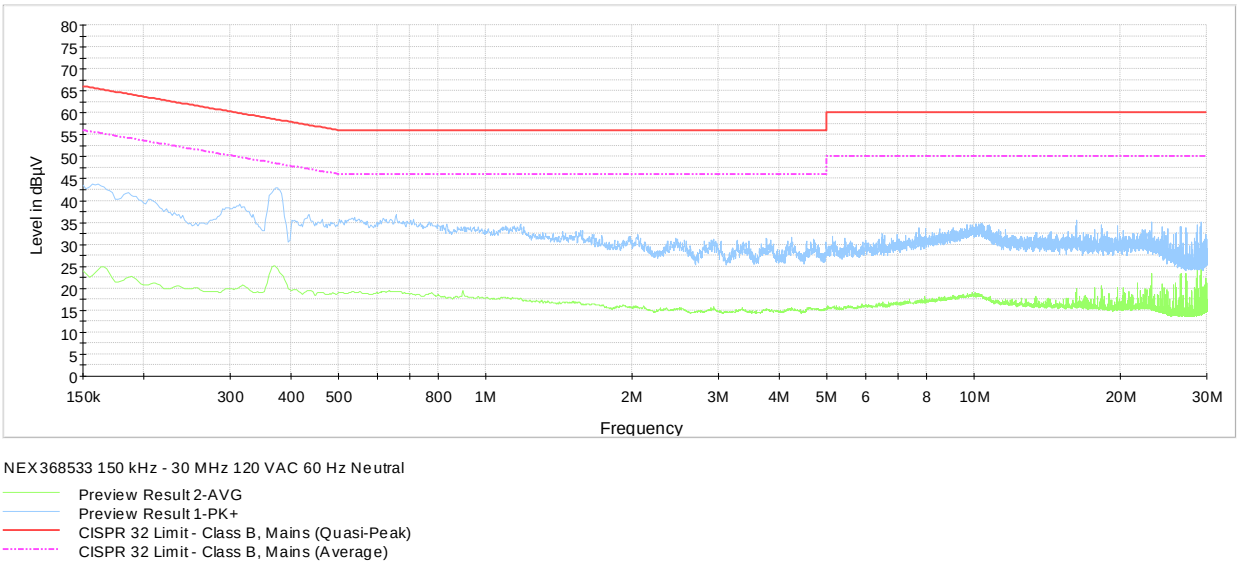



***Figure 8.4-2:*** *AC power line conducted emissions – spectral plot on neutral line*

## 8.5 FCC 15.407(e) and RSS-247 6.2.4.1, Minimum 6 dB bandwidth

### 8.5.1 Definitions and limits

**FCC:**
15.407 (8)(e) Within the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

**ISED:**
**RSS 247 6.2.4.1**
For equipment operating in the band 5725-5850 MHz, the minimum 6 dB bandwidth shall be at least 500 kHz

### 8.5.2 Test date

| | |
|---|---|
| Start date | March 14, 2019 |

### 8.5.3 Observations, settings and special notes

The test was performed as per KDB 789033, section C (2).

Spectrum analyser settings:

| | |
|---|---|
| Resolution bandwidth | 100 kHz |
| Video bandwidth | ≥3 × RBW |
| Frequency span | 30 MHz for 20 MHz channel; 70 MHz for 40 MHz channel |
| Detector mode | Peak |
| Trace mode | Max Hold |

## 8.5.4 Test data

***Table 8.5-1:*** *6 dB bandwidth results*

| Modulation | Frequency, MHz | 6 dB bandwidth, MHz | Minimum limit, MHz | Margin, MHz |
|---|---|---|---|---|
| 802.11a | 5745 | 16.7 | 0.50 | 16.2 |
| | 5785 | 16.7 | 0.50 | 16.2 |
| | 5825 | 16.7 | 0.50 | 16.2 |
| 802.11n | 5755 | 36.4 | 0.50 | 35.9 |
| | 5795 | 36.5 | 0.50 | 36.0 |

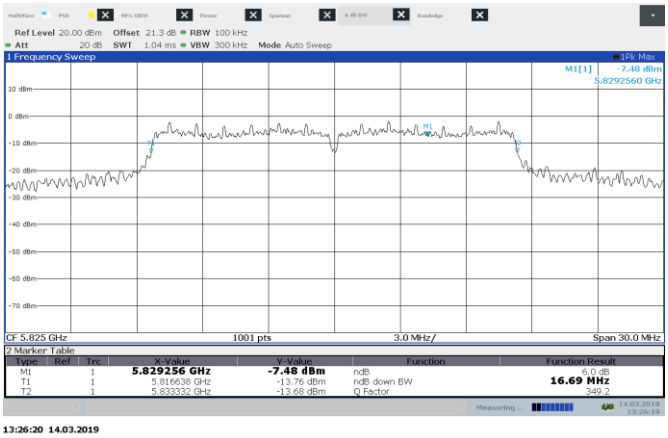



***Figure 8.5-1:*** *6 dB bandwidth on 802.11a, sample plot*

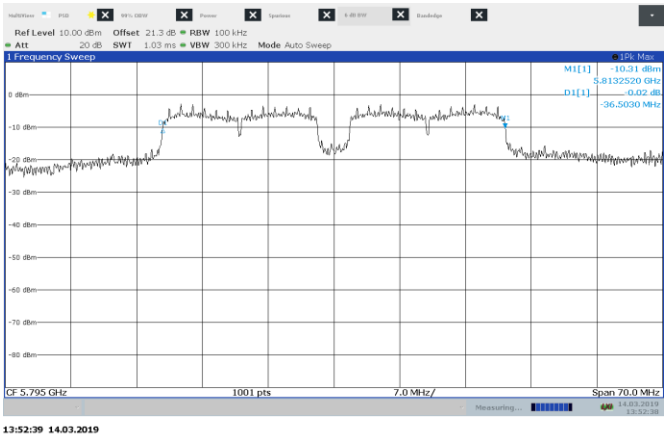



***Figure 8.5-2:*** *6 dB bandwidth on 802.11n, sample plot*

## 8.6 FCC 15.403(i) Emission bandwidth

### 8.6.1 Definitions and limits

For purposes of this subpart the emission bandwidth shall be determined by measuring the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, that are 26 dB down relative to the maximum level of the modulated carrier. Determination of the emissions bandwidth is based on the use of measurement instrumentation employing a peak detector function with an instrument resolution bandwidth approximately equal to 1.0 percent of the emission bandwidth of the device under measurement.

### 8.6.2 Test date

| | |
|---|---|
| Start date | March 12, 2019 |

### 8.6.3 Observations, settings and special notes

The test was performed as per KDB 789033, section C (1)

Spectrum analyser settings:

| | |
|---|---|
| Resolution bandwidth | approximately 1% of the emission bandwidth |
| Video bandwidth | > RBW |
| Detector mode | Peak |
| Trace mode | Max Hold |

## 8.6.4 Test data

***Table 8.6-1:*** *26 dB bandwidth results*

| Modulation | Frequency, MHz | 26 dB bandwidth, MHz |
|---|---|---|
| 802.11a | 5745 | 19.7 |
| | 5785 | 20.0 |
| | 5825 | 19.9 |
| 802.11n | 5755 | 42.1 |
| | 5795 | 41.8 |

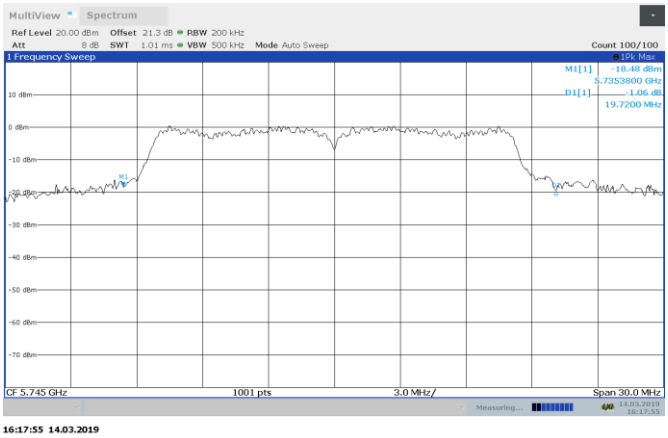



***Figure 8.6-1:*** *26 dB bandwidth on 802.11a, sample plot*

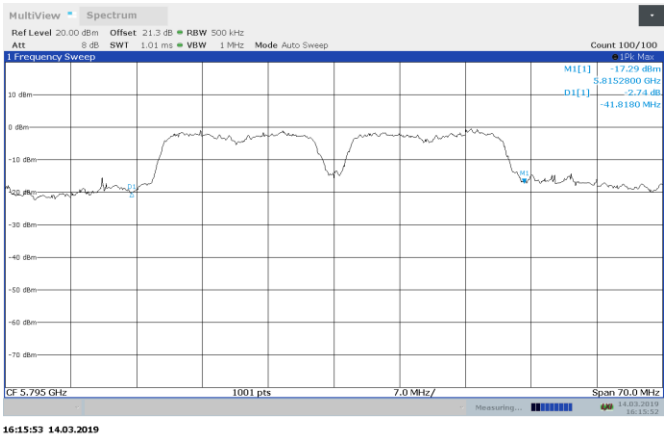



***Figure 8.6-2:*** *26 dB bandwidth on 802.11n, sample plot*

## 8.7 RSS-Gen 6.7 Occupied bandwidth

### 8.7.1 Definitions and limits

The emission bandwidth (×dB) is defined as the frequency range between two points, one above and one below the carrier frequency, at which the spectral density of the emission is attenuated × dB below the maximum in-band spectral density of the modulated signal. Spectral density (power per unit bandwidth) is to be measured with a detector of resolution bandwidth in the range of 1% to 5% of the anticipated emission bandwidth, and a video bandwidth at least 3× the resolution bandwidth.

When the occupied bandwidth limit is not stated in the applicable RSS or reference measurement method, the transmitted signal bandwidth shall be reported as the 99% emission bandwidth, as calculated or measured.

### 8.7.2 Test date

| | |
|---|---|
| Start date | March 12, 2019 |

### 8.7.3 Observations, settings and special notes

The test was performed as per KDB 789033, section D

Spectrum analyser settings:

| | |
|---|---|
| Resolution bandwidth: | 1 – 5 % of OBW |
| Video bandwidth: | ≥3 × RBW |
| Detector mode: | Peak |
| Trace mode: | Max Hold |

## 8.7.4 Test data

***Table 8.7-1: 99 %** bandwidth results*

| Modulation | Frequency, MHz | 99 % occupied bandwidth, MHz |
|---|---|---|
| 802.11a | 5745 | 20.9 |
| | 5785 | 21.8 |
| | 5825 | 20.5 |
| 802.11n | 5755 | 51.4 |
| | 5795 | 36.2 |

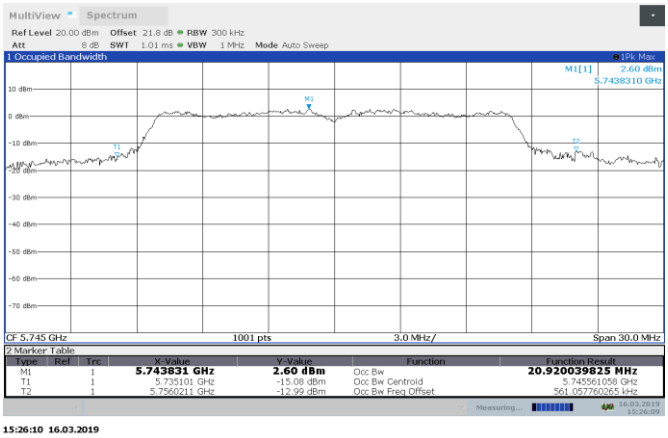



***Figure 8.7-1:** 99 % bandwidth on 802.11a, sample plot*

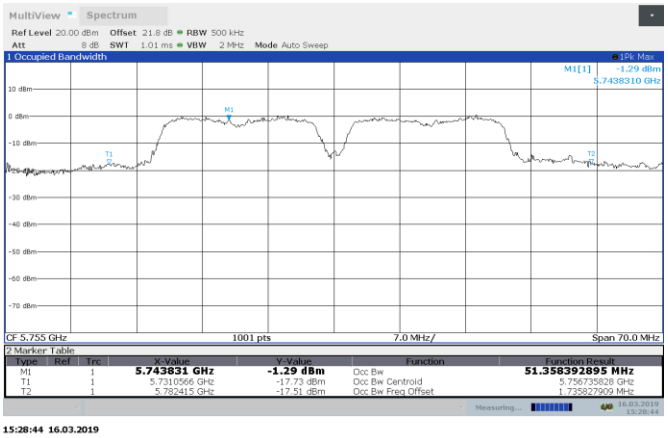



***Figure 8.7-2:** 99 % bandwidth on 802.11n, sample plot*

## 8.8 FCC 15.407(a)(3) and RSS-247 6.2.4 (1) 5.725–5.85 GHz band output power and spectral density limits

### 8.8.1 Definitions and limits

**FCC:**
For the band 5.725–5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. In addition, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

**IC:**
The maximum conducted output power shall not exceed 1 W. The power spectral density shall not exceed 30 dBm in any 500 kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications and multiple collocated transmitters transmitting the same information.

### 8.8.2 Test date

| | |
|---|---|
| Start date | March 14, 2019 |

### 8.8.3 Observations, settings and special notes

EUT set to transmit continuously with duty cycle ≥ 98%.
KDB 789033 section E.2(b) method SA-1 referenced for power measurements
KDB 789033 section F.5 referenced for PSD measurements with reduced RBW, integrated over 500 kHz

Spectrum analyser settings for PSD:

| | |
|---|---|
| Resolution bandwidth: | 100 kHz |
| Video bandwidth: | ≥3 × RBW |
| Detector mode: | RMS |
| Trace mode: | Average |
| Trace counts: | 100 |
| Power Integration BW | 500 kHz |

Spectrum analyser settings for Output Power:

| | |
|---|---|
| Resolution bandwidth: | 1 MHz |
| Video bandwidth: | ≥3 × RBW |
| Detector mode: | RMS |
| Trace mode: | Average |
| Trace counts: | 100 |
| Power Integration BW | EBW |

## 8.8.4 Test data

***Table 8.8-1:*** *Output power measurements results*

| Modulation | Frequency, MHz | Conducted output power, dBm | Power limit, dBm | Margin, dB |
|---|---|---|---|---|
| 802.11a | 5745 | 10.3 | 30.0 | 19.7 |
| | 5785 | 9.5 | 30.0 | 20.5 |
| | 5825 | 8.8 | 30.0 | 21.2 |
| 802.11n | 5755 | 11.9 | 30.0 | 18.1 |
| | 5795 | 11.2 | 30.0 | 18.8 |

***Table 8.8-2:*** *PSD measurements results*

| Modulation | Frequency, MHz | PPSD, dBm/500 kHz | PPSD limit, dBm/500 kHz | Margin, dB |
|---|---|---|---|---|
| 802.11a | 5745 | -4.7 | 30.0 | 34.7 |
| | 5785 | -3.8 | 30.0 | 33.8 |
| | 5825 | -2.6 | 30.0 | 32.6 |
| 802.11n | 5755 | -6.1 | 30.0 | 36.1 |
| | 5795 | -3.6 | 30.0 | 33.6 |

## 8.8.4 Test data, continued

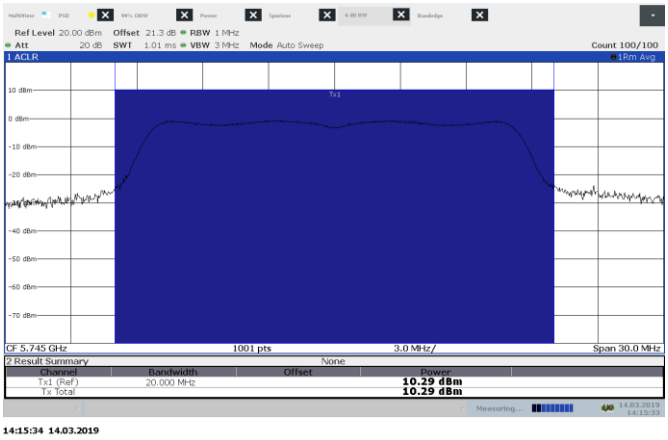



***Figure 8.8-1:*** *Sample plot for Power on 802.11a*

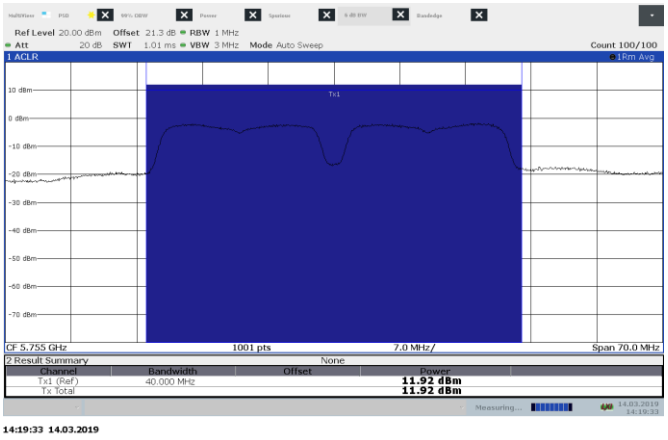



***Figure 8.8-2:*** *Sample plot for Power on 802.11n*

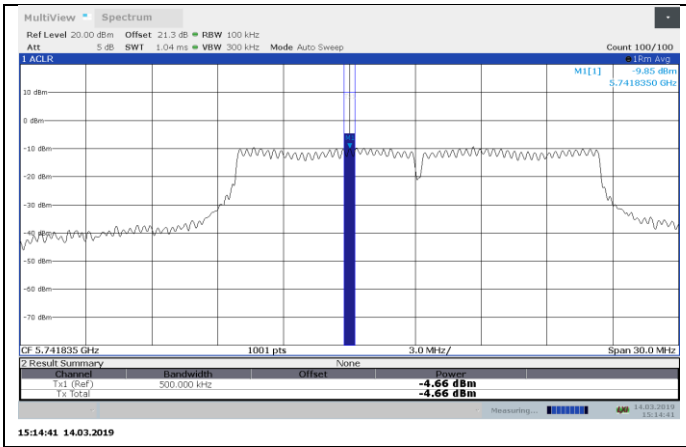



***Figure 8.8-3:*** *Sample plot for PPSD on 802.11a*

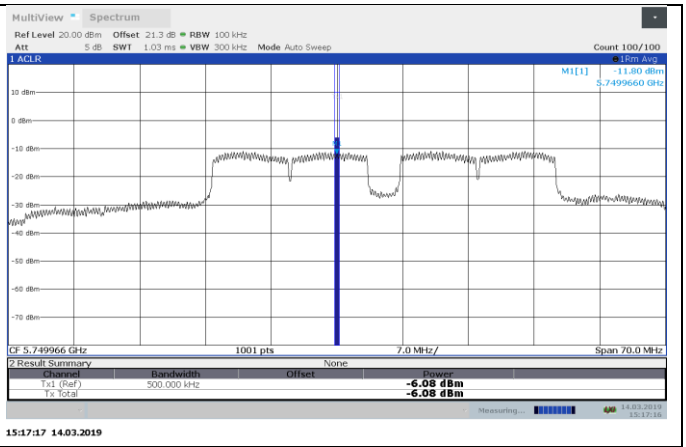



***Figure 8.8-4:*** *Sample plot for PPSD on 802.11n*

## 8.9 FCC 15.407(b) and RSS-247 6.2.4.2 Undesirable (unwanted) emissions

### 8.9.1 Definitions and limits

**FCC:**
**15.407 (4) For transmitters operating in the 5.725-5.85 GHz band:**
(i) 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.

**RSS-247 6.2.4.2**

Devices operating in the band 5725-5850 MHz shall have e.i.r.p. of unwanted emissions comply with the following:
a. 27 dBm/MHz at frequencies from the band edges decreasing linearly to 15.6 Bm/MHz at 5 MHz above or below the band edges;
b.15.6 dBm/MHz at 5 MHz above or below the band edges decreasing linearly to 10 dBm/MHz at 25 MHz above or below the band edges;
c.10 dBm/MHz at 25 MHz above or below the band edges decreasing linearly to -27 dBm/MHz at 75 MHz above or below the band edges; and
d.-27 dBm/MHz at frequencies more than 75 MHz above or below the bandedges

***Table 8.9-1:*** *FCC §15.209 and RSS-Gen – Radiated emission limits*

| Frequency, MHz | Field strength of emissions µV/m | Field strength of emissions dBµV/m | Measurement distance, m |
|---|---|---|---|
| 0.009–0.490 | 2400/F *(F in kHz)* | $67.6 - 20 \times \log_{10}$(F) *(F in kHz)* | 300 |
| 0.490–1.705 | 24000/F *(F in kHz)* | $87.6 - 20 \times \log_{10}$(F) *(F in kHz)* | 30 |
| 1.705–30.0 | 30 | 29.5 | 30 |
| 30–88 | 100 | 40.0 | 3 |
| 88–216 | 150 | 43.5 | 3 |
| 216–960 | 200 | 46.0 | 3 |
| above 960 | 500 | 54.0 | 3 |

Notes: In the emission table above, the tighter limit applies at the band edges.
For frequencies above 1 GHz the limit on peak RF emissions is 20 dB above the maximum permitted average emission limit applicable to the equipment under test

## 8.9.1 Definitions and limits, continued

***Table 8.9-2:*** *ISED restricted frequency bands*

| MHz | MHz | MHz | GHz |
|---|---|---|---|
| 0.090–0.110 | 12.57675–12.57725 | 399.9–410 | 7.25–7.75 |
| 0.495–0.505 | 13.36–13.41 | 608–614 | 8.025–8.5 |
| 2.1735–2.1905 | 16.42–16.423 | 960–1427 | 9.0–9.2 |
| 3.020–3.026 | 16.69475–16.69525 | 1435–1626.5 | 9.3–9.5 |
| 4.125–4.128 | 16.80425–16.80475 | 1645.5–1646.5 | 10.6–12.7 |
| 4.17725–4.17775 | 25.5–25.67 | 1660–1710 | 13.25–13.4 |
| 4.20725–4.20775 | 37.5–38.25 | 1718.8–1722.2 | 14.47–14.5 |
| 5.677–5.683 | 73–74.6 | 2200–2300 | 15.35–16.2 |
| 6.215–6.218 | 74.8–75.2 | 2310–2390 | 17.7–21.4 |
| 6.26775–6.26825 | 108–138 | 2483.5–2500 | 22.01–23.12 |
| 6.31175–6.31225 | 149.9–150.05 | 2655–2900 | 23.6–24.0 |
| 8.291–8.294 | 156.52475–156.52525 | 3260–3267 | 31.2–31.8 |
| 8.362–8.366 | 156.7–156.9 | 3332–3339 | 36.43–36.5 |
| 8.37625–8.38675 | 162.0125–167.17 | 3345.8–3358 | |
| 8.41425–8.41475 | 167.72–173.2 | 3500–4400 | Above 38.6 |
| 12.29–12.293 | 240–285 | 4500–5150 | |
| 12.51975–12.52025 | 322–335.4 | 5350–5460 | |

Note: Certain frequency bands listed in Table 8.9-2 and above 38.6 GHz are designated for licence-exempt applications. These frequency bands and the requirements that apply to related devices are set out in the 200 and 300 series of RSSs.

***Table 8.9-3:*** *FCC restricted frequency bands*

| MHz | MHz | MHz | GHz |
|---|---|---|---|
| 0.090–0.110 | 16.42–16.423 | 399.9–410 | 4.5–5.15 |
| 0.495–0.505 | 16.69475–16.69525 | 608–614 | 5.35–5.46 |
| 2.1735–2.1905 | 16.80425–16.80475 | 960–1240 | 7.25–7.75 |
| 4.125–4.128 | 25.5–25.67 | 1300–1427 | 8.025–8.5 |
| 4.17725–4.17775 | 37.5–38.25 | 1435–1626.5 | 9.0–9.2 |
| 4.20725–4.20775 | 73–74.6 | 1645.5–1646.5 | 9.3–9.5 |
| 6.215–6.218 | 74.8–75.2 | 1660–1710 | 10.6–12.7 |
| 6.26775–6.26825 | 108–121.94 | 1718.8–1722.2 | 13.25–13.4 |
| 6.31175–6.31225 | 123–138 | 2200–2300 | 14.47–14.5 |
| 8.291–8.294 | 149.9–150.05 | 2310–2390 | 15.35–16.2 |
| 8.362–8.366 | 156.52475–156.52525 | 2483.5–2500 | 17.7–21.4 |
| 8.37625–8.38675 | 156.7–156.9 | 2690–2900 | 22.01–23.12 |
| 8.41425–8.41475 | 162.0125–167.17 | 3260–3267 | 23.6–24.0 |
| 12.29–12.293 | 167.72–173.2 | 3332–3339 | 31.2–31.8 |
| 12.51975–12.52025 | 240–285 | 3345.8–3358 | 36.43–36.5 |
| 12.57675–12.57725 | 322–335.4 | 3600–4400 | Above 38.6 |
| 13.36–13.41 | | | |

## 8.9.2 Test date

| | |
|---|---|
| Start date | February 14, 2019 |

### 8.9.3 Observations, settings and special notes

- The spectrum was searched from 30 MHz to 40 GHz.
  EUT was set to transmit with 100 % duty cycle.
- Radiated measurements 30 MHz – 18 GHz were performed at a distance of 3 m.
- Radiated measurements 18 - 25 GHz were performed at a distance of 30 cm.
- Radiated measurements 25 – 40 GHz were performed at a distance of 3 cm.
- No transmitter related radiated emissions were detected below 1 GHz. Emissions detected within restricted bands that were close to the limit were found to be digital emissions.
- Conducted spurious EIRP emission limit line calculated as follows: -27 dBm EIRP – Antenna Gain (5.6 dBi) = -32.6 dBm
- For radiated band edge Kdb 789033 section 3(d)(ii) integration method was used.

Spectrum analyzer settings for measurements below 1 GHz:

| | |
|---|---|
| Detector mode | Peak or Quasi-Peak |
| Resolution bandwidth | 100 kHz or 120 kHz |
| Video bandwidth | 300 kHz |
| Trace mode | Max Hold |

Spectrum analyser for peak measurements above 1 GHz:

| | |
|---|---|
| Resolution bandwidth: | 1 MHz |
| Video bandwidth: | 3 MHz |
| Detector mode: | Peak |
| Trace mode: | Max Hold |

Spectrum analyser for average measurements above 1 GHz:

| | |
|---|---|
| Resolution bandwidth: | 1 MHz |
| Video bandwidth: | 3 MHz |
| Detector mode: | RMS |
| Trace mode: | Power average |
| Number of averaging traces: | 100 |

Spectrum analyser for band edge measurements above 1 GHz:

| | |
|---|---|
| Resolution bandwidth: | 1MHz |
| Video bandwidth: | 3MHz |
| Detector mode: | RMS |
| Trace mode: | Average |

## 8.9.4 Test data

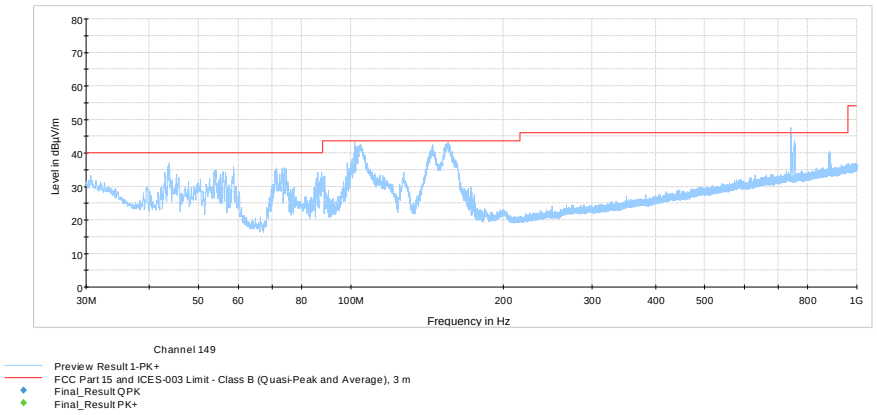



***Figure 8.9-1:*** *Radiated spurious emissions 30 MHz – 1 GHz low channel, 802.11a*

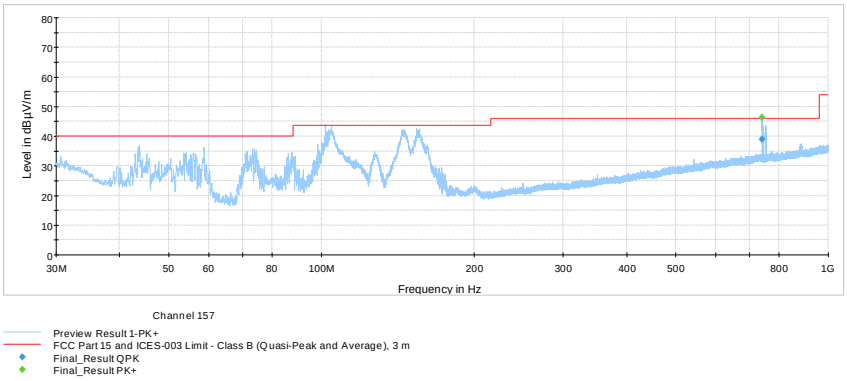



***Figure 8.9-2:*** *Radiated spurious emissions 30 MHz – 1 GHz mid channel, 802.11a*

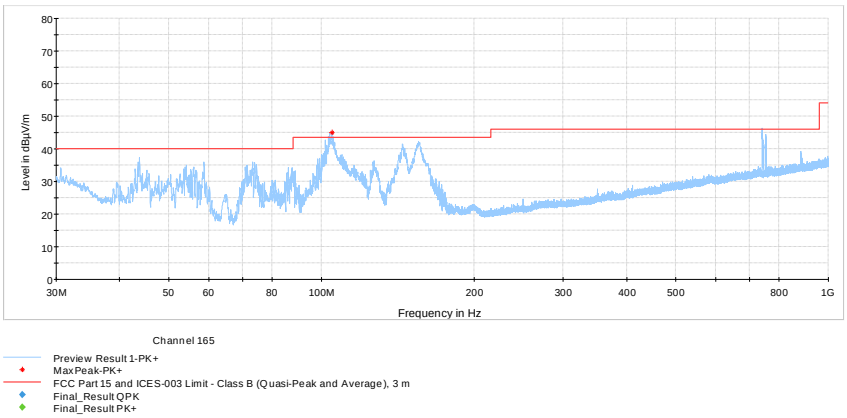



***Figure 8.9-3:*** *Radiated spurious emissions 30 MHz – 1 GHz high channel, 802.11a*

## 8.9.4 Test data, continued

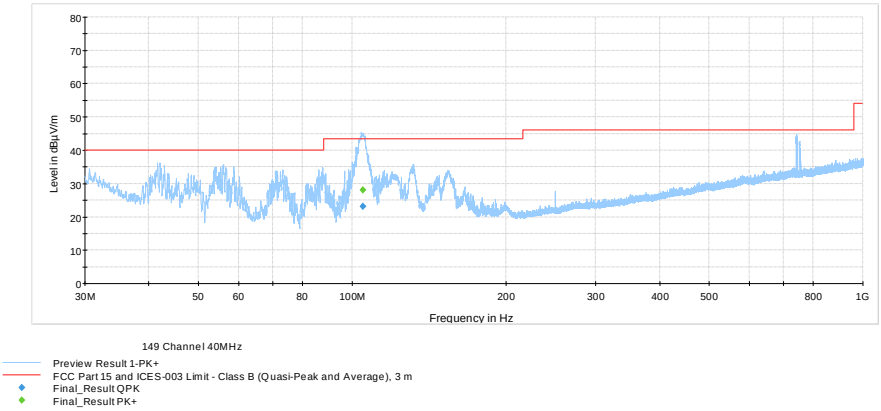



***Figure 8.9-4:*** *Radiated spurious emissions 30 MHz – 1 GHz low channel, 802.11n*

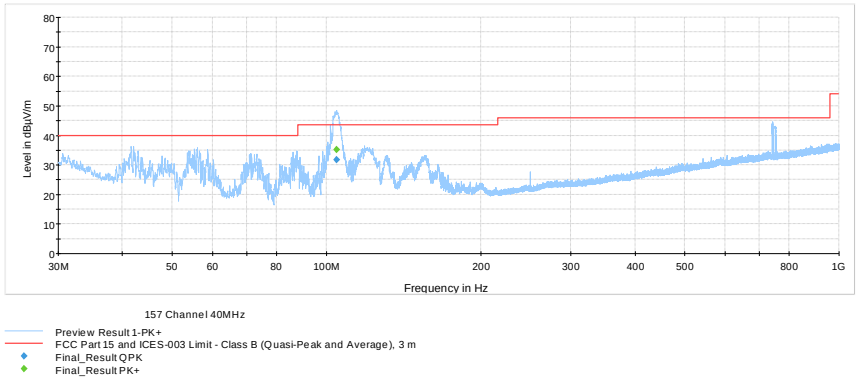



***Figure 8.9-5:*** *Radiated spurious emissions 30 MHz – 1 GHz high channel, 802.11n*

## 8.9.4 Test data, continued

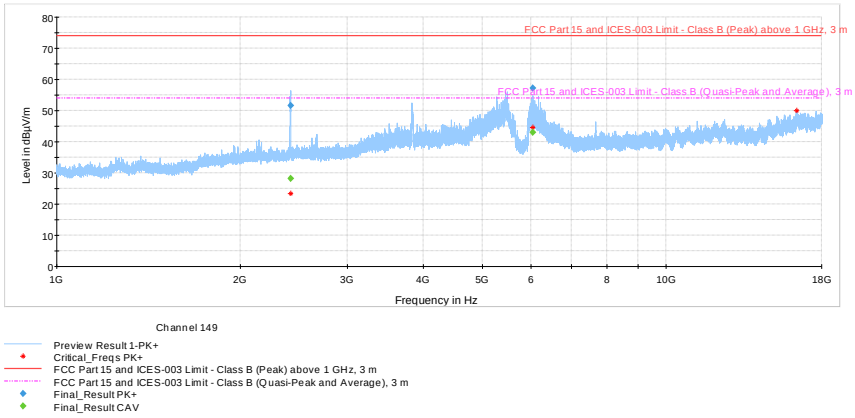



***Figure 8.9-6:*** *Radiated spurious emissions 1 - 18 GHz low channel, 802.11a*

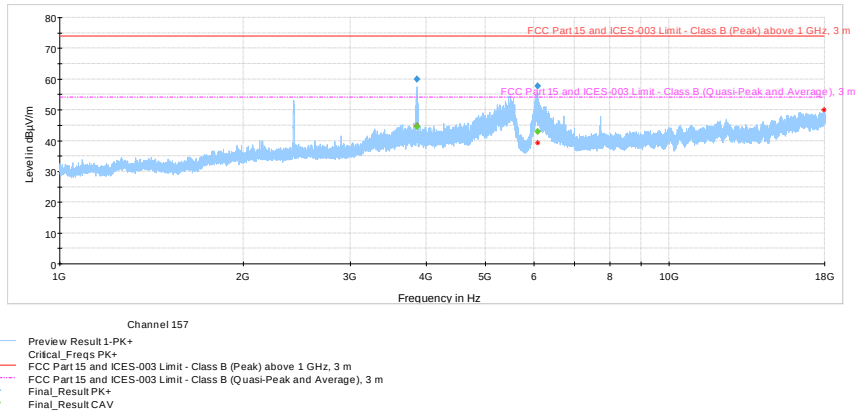



***Figure 8.9-7:*** *Radiated spurious emissions 1 - 18 GHz mid channel, 802.11a*

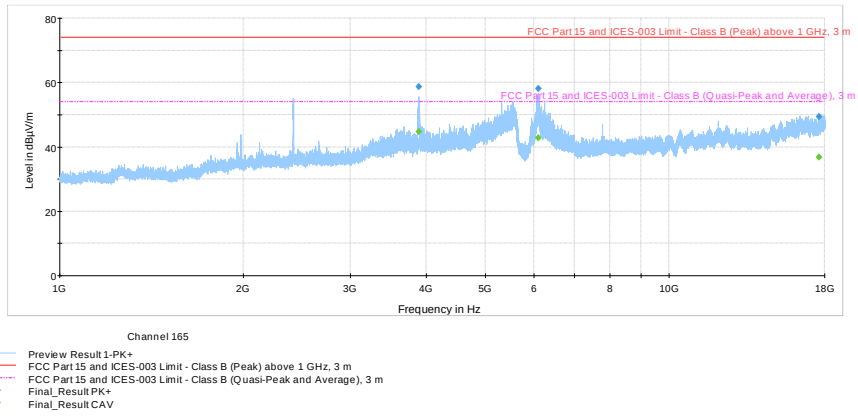



***Figure 8.9-8:*** *Radiated spurious emissions 1 - 18 GHz high channel, 802.11a*

## 8.9.4 Test data, continued

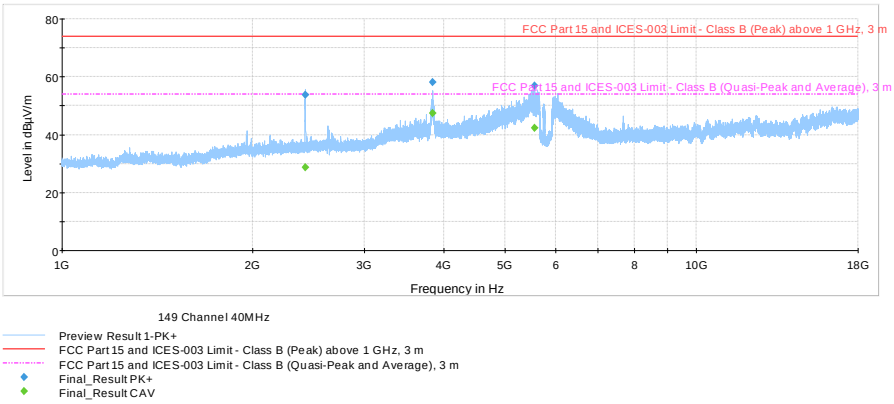



***Figure 8.9-9:*** *Radiated spurious emissions 1 - 18 GHz low channel, 802.11n*

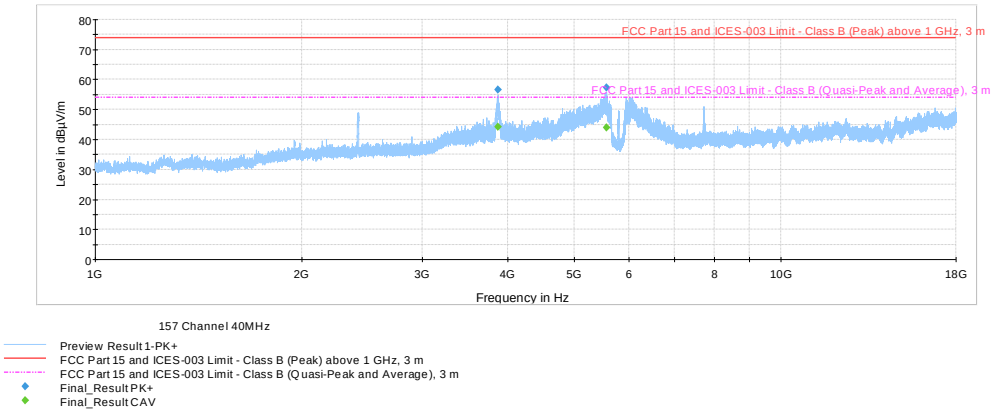



***Figure 8.9-10:*** *Radiated spurious emissions 1 - 18 GHz high channel, 802.11n*

## 8.9.4 Test data, continued

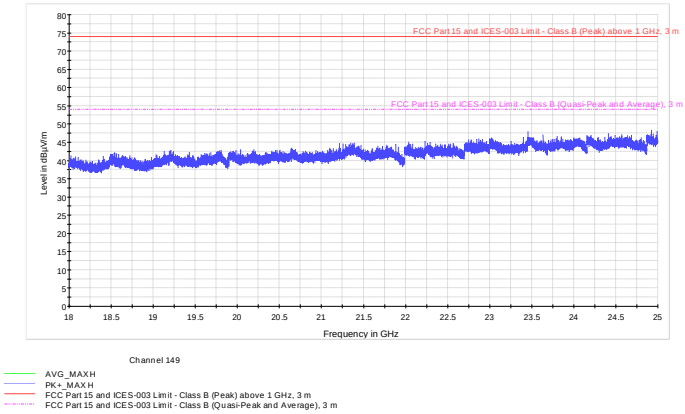



***Figure 8.9-11:*** *Radiated spurious emissions 18 - 25 GHz low channel, 802.11a*

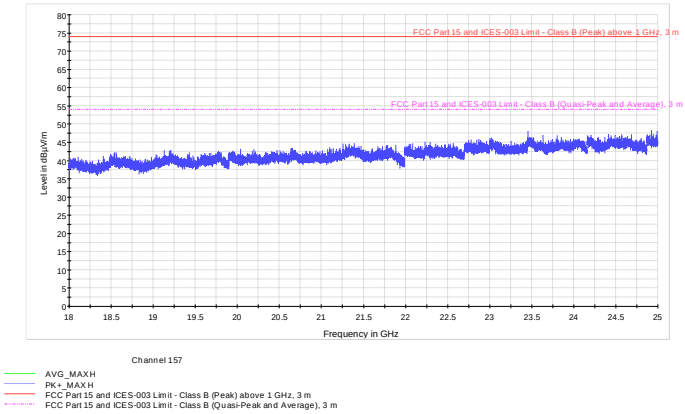



***Figure 8.9-12:*** *Radiated spurious emissions 18 - 25 GHz mid channel, 802.11a*

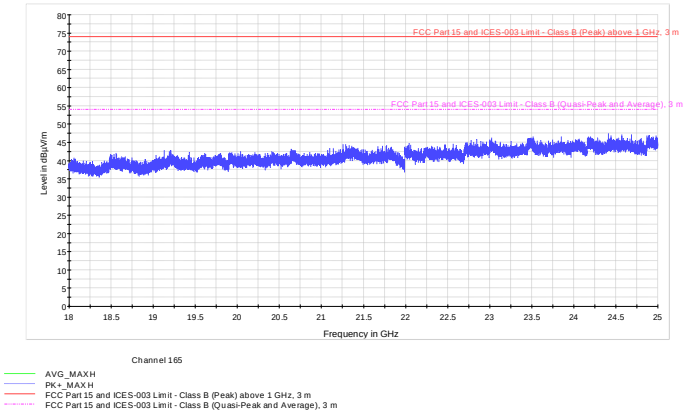



***Figure 8.9-13:*** *Radiated spurious emissions 18 - 25 GHz high channel, 802.11a*

## 8.9.4 Test data, continued

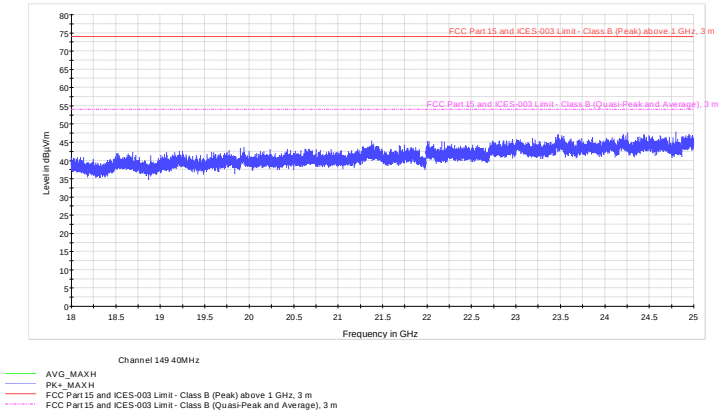



***Figure 8.9-14:*** *Radiated spurious emissions 18 - 25 GHz low channel, 802.11n*

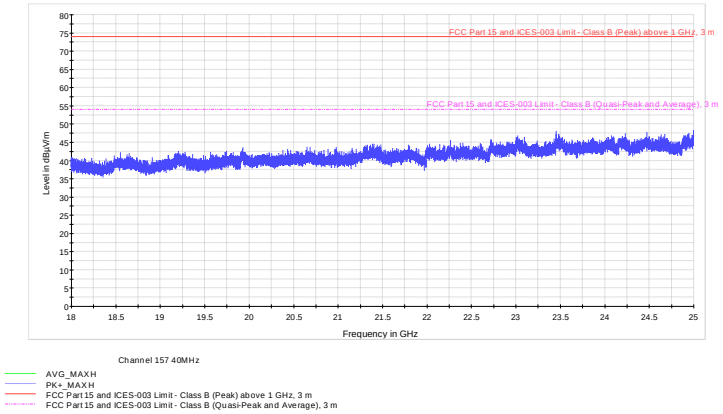



***Figure 8.9-15:*** *Radiated spurious emissions 18 - 25 GHz high channel, 802.11n*

## 8.9.4 Test data, continued

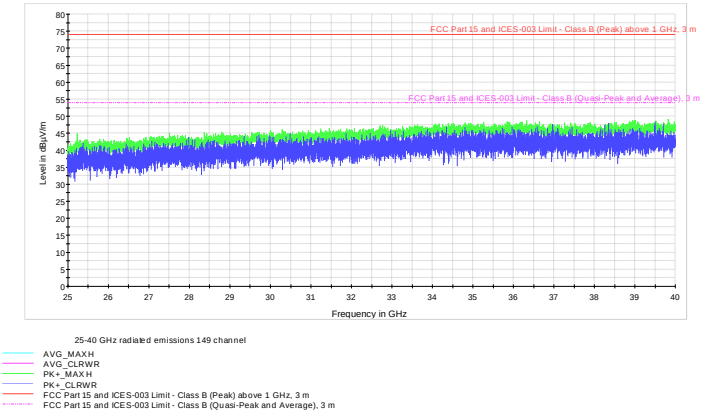



***Figure 8.9-16:*** *Radiated spurious emissions 25 - 40 GHz low channel, 802.11a*

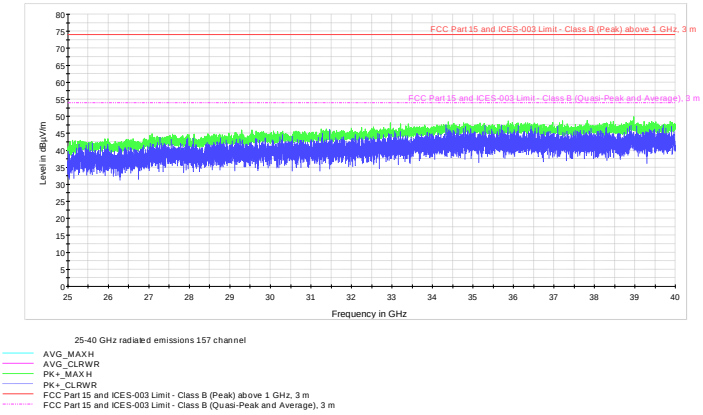



***Figure 8.9-17:*** *Radiated spurious emissions 25 - 40 GHz mid channel, 802.11a*

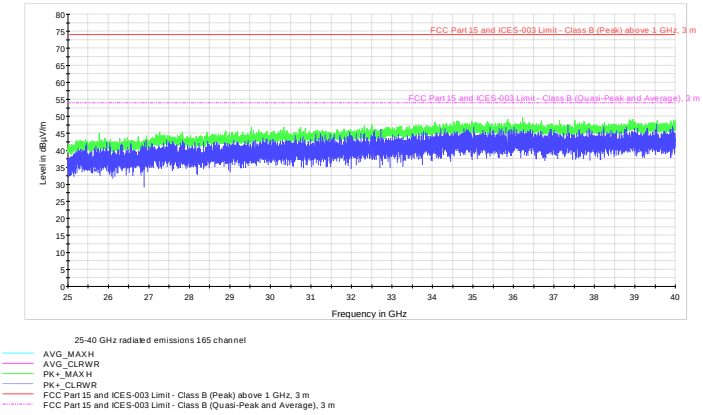



***Figure 8.9-18:*** *Radiated spurious emissions 25 - 40 GHz high channel, 802.11a*

## 8.9.4 Test data, continued

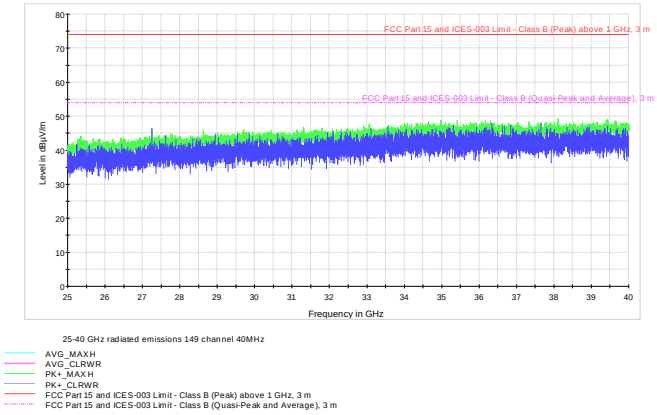



***Figure 8.9-19:*** *Radiated spurious emissions 25 - 40 GHz low channel, 802.11n*

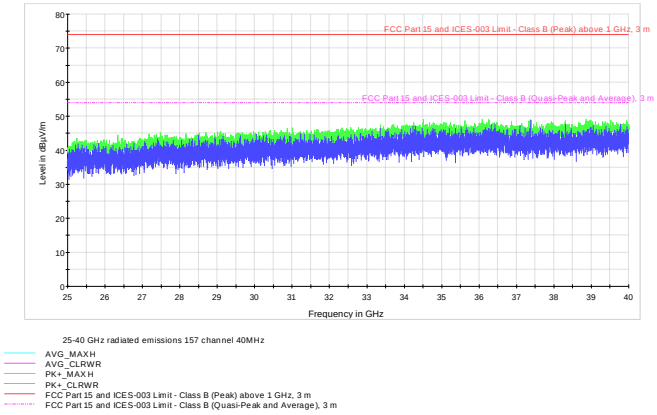



***Figure 8.9-20:*** *Radiated spurious emissions 25 - 40 GHz high channel, 802.11n*

## 8.9.4 Test data, continued

***Table 8.9-4:*** *Conducted lower band edge emissions measurement results*

| Modulation | Frequency, MHz | PSD dBm/MHz | Antenna Gain | PSD dBm/MHz EIRP | limit, dBm/MHz EIRP | Margin, dB |
|---|---|---|---|---|---|---|
| 802.11a | 5725 | -34.3 | 5.6 | -28.7 | 27.0 | 55.7 |
| 802.11a | 5720 | -37.6 | 5.6 | -32.0 | 15.6 | 16.4 |
| 802.11a | 5700 | -46.6 | 5.6 | -41.0 | 10.0 | 31.0 |
| 802.11a | 5650 | -55.7 | 5.6 | -50.1 | -27.0 | 23.1 |
| 802.11n | 5725 | -22.5 | 5.6 | -16.9 | 27.0 | 43.9 |
| 802.11n | 5720 | -22.5 | 5.6 | -16.9 | 15.6 | 32.5 |
| 802.11n | 5700 | -30.2 | 5.6 | -24.6 | 10.0 | 34.6 |
| 802.11n | 5650 | -36.6 | 5.6 | -31.0 | -27.0 | 4.0 |

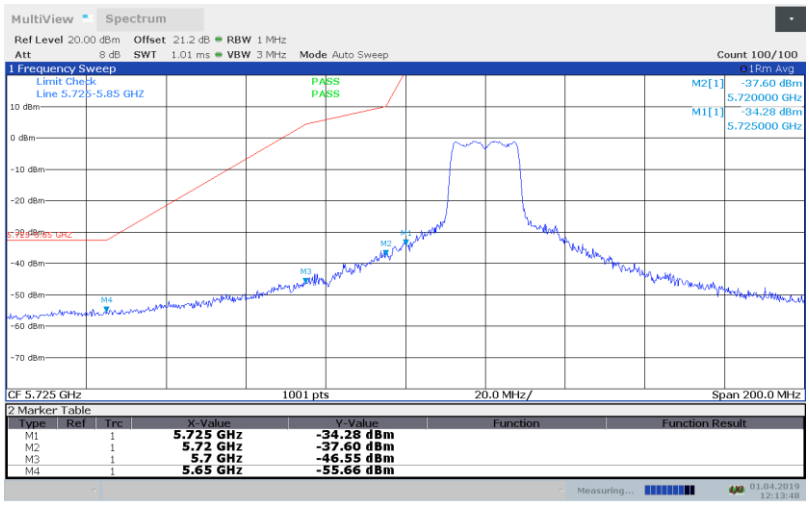



***Figure 8.9-21:*** *Conducted emissions at lower band edge measurement, 802.11a*


***Figure 8.9-22:*** *Conducted emissions at lower band edge measurement, 802.11n*

## 8.9.1 Test data, continued

***Table 8.9-5:*** *Conducted upper band edge emissions measurement results*

| Modulation | Frequency, MHz | PSD dBm/MHz | Antenna Gain | PSD dBm/MHz EIRP | limit, dBm/MHz EIRP | Margin, dB |
|---|---|---|---|---|---|---|
| 802.11a | 5850 | -35.9 | 5.6 | -30.3 | 27.0 | 57.3 |
| 802.11a | 5855 | -39.5 | 5.6 | -33.9 | 15.6 | 49.5 |
| 802.11a | 5875 | -46.9 | 5.6 | -41.3 | 10.0 | 51.3 |
| 802.11a | 5925 | -55.3 | 5.6 | -49.7 | -27.0 | 22.7 |
| 802.11n | 5850 | -26.8 | 5.6 | -21.2 | 27.0 | 48.2 |
| 802.11n | 5855 | -28.3 | 5.6 | -22.7 | 15.6 | 38.3 |
| 802.11n | 5875 | -30.5 | 5.6 | -24.9 | 10.0 | 34.9 |
| 802.11n | 5925 | -37.6 | 5.6 | -32.0 | -27.0 | 5.0 |

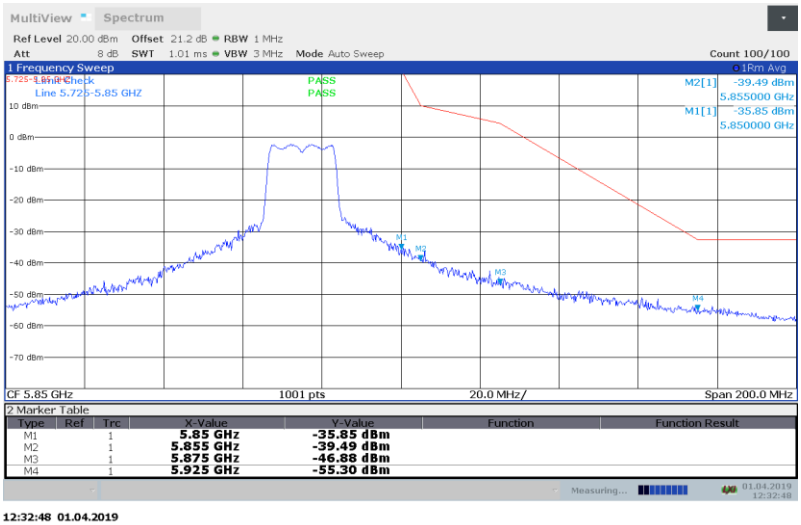



***Figure 8.9-23:*** *Conducted emissions at upper band edge measurement, 802.11a*

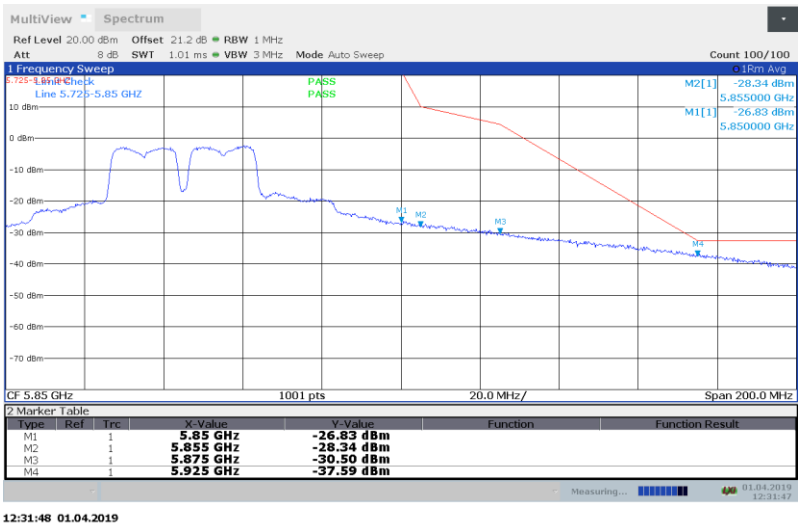



***Figure 8.9-24:*** *Conducted emissions at upper band edge measurement, 802.11n*

## 8.9.4 Test data, continued

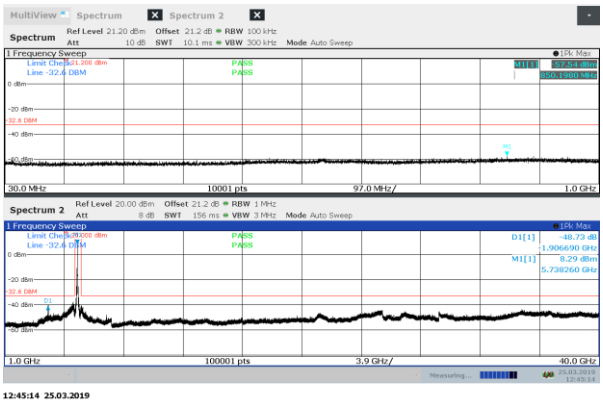



***Figure 8.9-25:*** *Conducted spurious emissions 30 MHz – 40 GHz low channel, 802.11a*

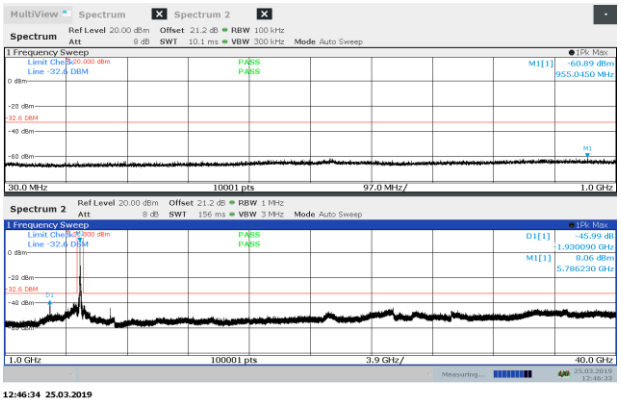



***Figure 8.9-26:*** *Conducted spurious emissions 30 MHz – 40 GHz mid channel, 802.11a*

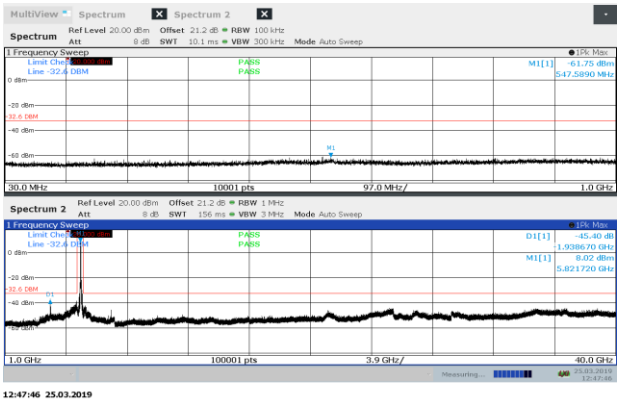



***Figure 8.9-27:*** *Conducted spurious emissions 30 MHz – 40 GHz high channel, 802.11a*

## 8.9.4 Test data, continued

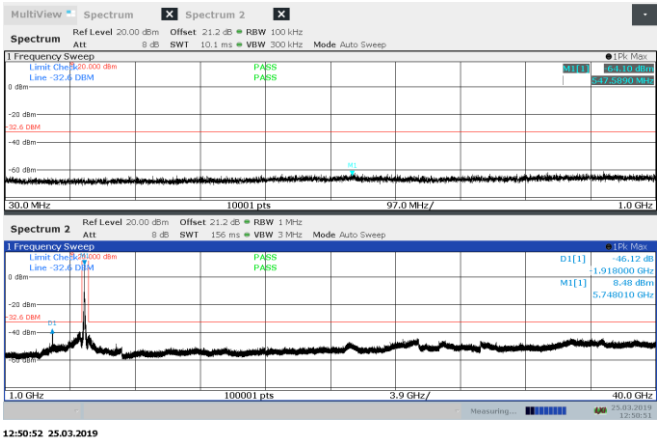



***Figure 8.9-28:*** *Conducted spurious emissions 30 MHz – 40 GHz low channel, 802.11n*

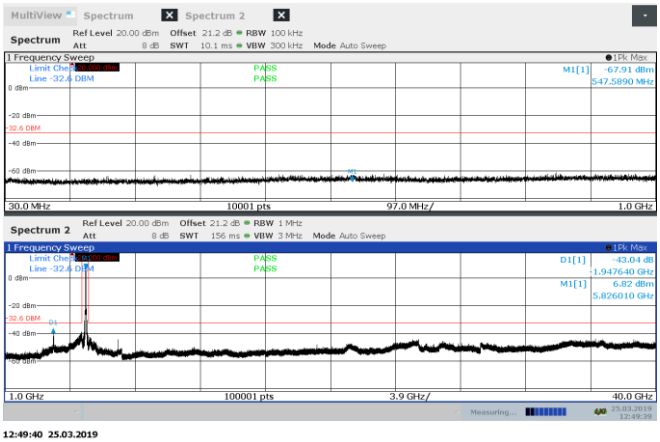



***Figure 8.9-29:*** *Conducted spurious emissions 30 MHz – 40 GHz high channel, 802.11n*

## 8.10 FCC 15.407(g) and RSS-Gen 8.11 Frequency stability

### 8.10.1 Definitions and limits

Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

### 8.10.2 Test date

| | |
|---|---|
| Start date | February 20, 2019 |

### 8.10.3 Observations, settings and special notes

Spectrum analyser settings:

| | |
|---|---|
| Resolution bandwidth: | 100 kHz |
| Video bandwidth: | 300 kHz |
| Detector mode: | Peak |
| Trace mode: | Max Hold |

## 8.10.4 Test data

***Table 8.10-1:*** *Frequency drift measurement*

| Test conditions | Frequency, Hz | Drift, Hz |
|---|---|---|
| +50 °C, Nominal | 5784983125 | -22500 |
| +40 °C, Nominal | 5784979375 | -26250 |
| +30 °C, Nominal | 5785001875 | -3750 |
| +20 °C, +15 % | 5785013125 | 7500 |
| +20 °C, Nominal | 5785005625 | ***Reference*** |
| +20 °C, −15 % | 5784994375 | -11250 |
| +10 °C, Nominal | 5785028125 | 22500 |
| 0 °C, Nominal | 5785031875 | 26250 |
| −10 °C, Nominal | 5785035625 | 30000 |
| −20 °C, Nominal | 5785005625 | 0 |
| −30 °C, Nominal | 5784986875 | -18750 |

***Table 8.10-2:*** *Lower band edge drift calculation*

| Modulation | 26 dBc lower cross point, GHz | Max Negative drift, Hz | Drifted upper cross point, GHz | Band edge, GHz | Margin, MHz |
|---|---|---|---|---|---|
| 802.11a | 5.7354 | -26250 | 5.7354 | 5.725 | 10.4 |
| 802.11n | 5.7341 | -26250 | 5.7341 | 5.725 | 9.1 |

Notes: Drifted upper cross point = −26 dBc upper cross point + max positive drift.

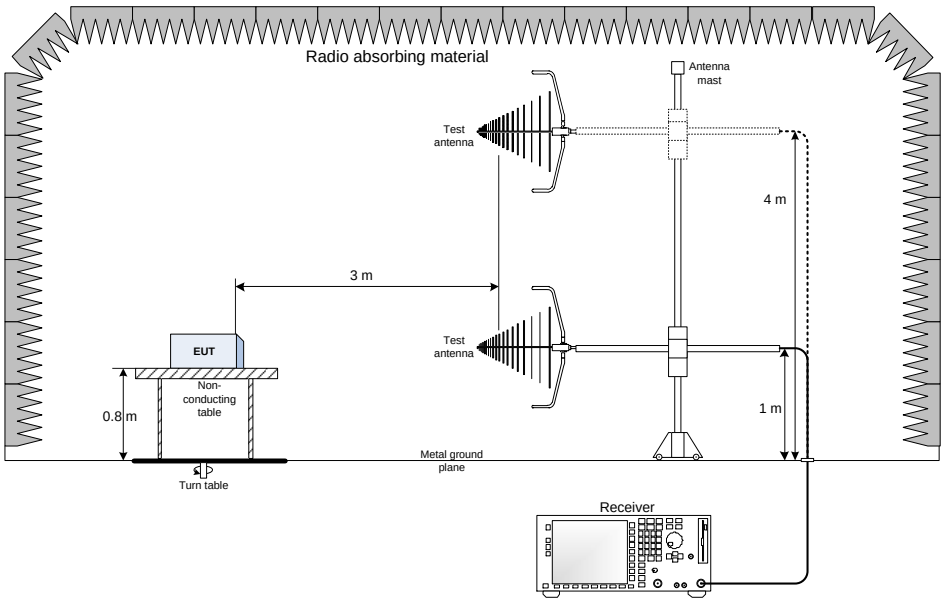
***Table 8.10-3:*** *Upper band edge drift calculation*

| Modulation | 26 dBc upper cross point, GHz | Max positive drift, Hz | Drifted upper cross point, GHz | Band edge, GHz | Margin, MHz |
|---|---|---|---|---|---|
| 802.11a | 5.83495 | 30000 | 5.83498 | 5.85 | 15.0 |
| 802.11n | 5.81528 | 30000 | 5.81531 | 5.85 | 34.7 |

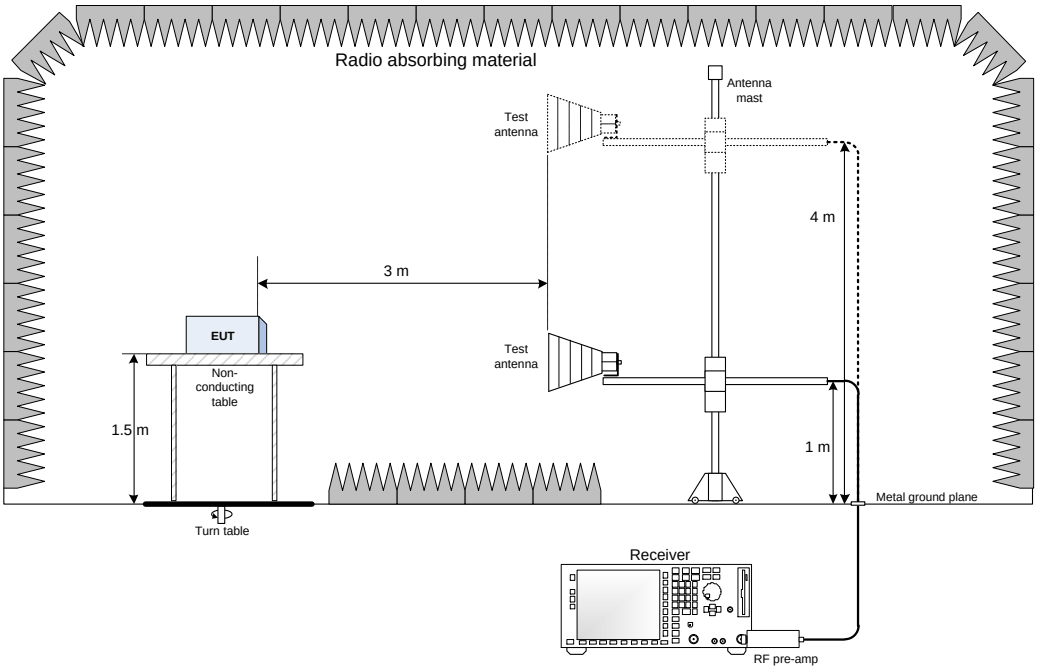
Notes: Drifted upper cross point = −26 dBc upper cross point + max positive drift.

# **Section 9.** Block diagrams of test set-ups

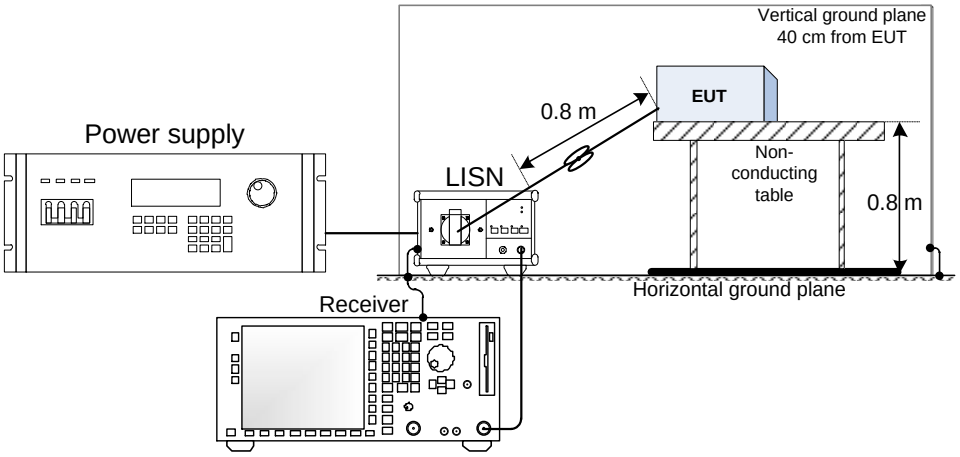
## 9.1 Radiated emissions set-up for frequencies below 1 GHz




## 9.2 Radiated emissions set-up for frequencies above 1 GHz



## 9.3 Conducted emissions set-up




## 9.4 Antenna port set-up