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# RADIO TEST REPORT – 337515-9TRFWL

Applicant:

**BOT Home Automation Inc.**

Product name:

**Ring**

Model:

**Base Station**

FCC ID:

**2AEUPBHABS001**

IC Registration number:

**20271-BHABS001**

Specifications:

**Co-location testing**

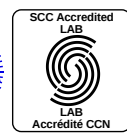
Date of issue: **October 5, 2017**

Test engineer(s): **David Duchesne, Senior EMC/Wireless Specialist**

Signature:

Reviewed by: **Andrey Adelberg, Senior Wireless/EMC Specialist**

Signature:



## Lab and test locations

|                        |                                                                |                                                                              |                                                                                  |
|------------------------|----------------------------------------------------------------|------------------------------------------------------------------------------|----------------------------------------------------------------------------------|
| Company name           | Nemko Canada Inc.                                              |                                                                              |                                                                                  |
| Facilities             | Ottawa site:<br>303 River Road, Ottawa, ON, Canada,<br>K1V 1H2 | Montreal site:<br>292 Labrosse Avenue, Pointe-Claire, QC,<br>Canada, H9R 5L8 | Almonte site:<br>1500 Peter Robinson Road, West<br>Carleton, ON, Canada, K0A 1L0 |
|                        | Tel: +1 613 737 9680                                           | Tel: +1 514 694 2684                                                         | Tel: +1 613 256-9117                                                             |
|                        | Fax: +1 613 737 9691                                           | Fax: +1 514 694 3528                                                         | Fax: +1 613 256-8848                                                             |
|                        |                                                                |                                                                              |                                                                                  |
| Test site registration | <b>Organization</b>                                            | <b>Recognition numbers and location</b>                                      |                                                                                  |
|                        | FCC                                                            | CA2040 (Ottawa); CA2041 (Montreal)                                           |                                                                                  |
|                        | ISED                                                           | CA2040A-4 (Ottawa); CA2040G-5 (Montreal); CA2040A-3 (Almonte)                |                                                                                  |
| Website                | <a href="http://www.nemko.com">www.nemko.com</a>               |                                                                              |                                                                                  |

## 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.

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## Section 1. Report summary

### 1.1 Applicant and manufacturer

|              |                                                                            |
|--------------|----------------------------------------------------------------------------|
| Company name | BOT Home Automation Inc.                                                   |
| Address      | 1523 26 <sup>th</sup> Street, Santa Monica, California United States 90404 |

### 1.2 Test specifications

|                                              |                                                                                                                                                              |
|----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|
| FCC 47 CFR Part 15, Subpart C, Clause 15.247 | Operation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–585 MHz                                                                                              |
| FCC 47 CFR Part 15, Subpart E, Clause 15.407 | Unlicensed National Information Infrastructure Devices                                                                                                       |
| FCC 47 CFR Part 15, Subpart C, Clause 15.249 | Operation within the bands 902–928 MHz, 2400–2483.5 MHz, 5725–5875 MHz, and 24.0–24.25 GHz.                                                                  |
| FCC 47 CFR Part 22, Subpart C, Clause 22.359 | Emission limitations.                                                                                                                                        |
| RSS-247, Issue 2, Feb 2017, Section 5        | Standard specifications for frequency hopping systems and digital transmission systems operating in the bands 902–928 MHz, 2400–2483.5 MHz and 5725–5850 MHz |
| RSS-247, Issue 2, Feb 2017, Section 6        | Technical requirements for licence-exempt local area network devices and digital transmission systems operating in the 5 GHz band                            |
| RSS-210 Issue 9, August 2016, Annex B.10     | Devices operating in 902–928, 2400–2483.5 and 5725–5875 MHz                                                                                                  |
| RSS-139 Issue 3, July 2015, Section 6        | Advanced Wireless Services (AWS) Equipment Operating in the Bands 1710–1780 MHz and 2110–2180 MHz                                                            |

### 1.3 Test methods

|                                                                       |                                                                                                                        |
|-----------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------|
| 789033 D02 General UNII Test Procedures New Rules v01r04 (May2, 2017) | Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices Part 15, Subpart E |
| 662911 D01 Multiple Transmitter Output v02r01 (October 31, 2013)      | Emissions Testing of Transmitters with Multiple Outputs in the Same Band                                               |
| 662911 D02 MIMO with Cross Polarized Antenna v01 (October 25, 2011)   | Emissions testing of transmitters with multiple outputs in the same band (MIMO) with Cross Polarized Antenna           |
| 558074 D01 DTS Meas Guidance v04 (April 5, 2017)                      | Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247          |
| ANSI C63.10 v2013                                                     | American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices                         |

### 1.4 Exclusions

As per Nemko quote Q102124338R1, the EUT was assessed for radiated emissions as a verification with multiple transmitters enabled at the same time to ensure compliance was maintained.

## 1.5 Statement of compliance

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In the configuration tested, the EUT was found compliant.

Testing was completed against all relevant requirements of the test standard or as per detailed in the section 1.4 Exclusions above. Results obtained indicate that the product under test complies in full with the requirements tested. The test results relate only to the items tested.

See “Summary of test results” for full details.

## 1.6 Test report revision history

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*Table 1.6-1: Test report revision history*

| Revision # | Date of issue   | Details of changes made to test report |
|------------|-----------------|----------------------------------------|
| TRF        | October 5, 2017 | Original report issued                 |

## Section 2. Summary of test results

### 2.1 Testing period

|                 |                    |
|-----------------|--------------------|
| Test start date | September 18, 2017 |
| Test end date   | September 18, 2017 |

### 2.2 FCC test results

*Table 2.2-1: Result summary*

| Part    | Section | Test description                                                  | Verdict |
|---------|---------|-------------------------------------------------------------------|---------|
| §15.247 | d       | Unwanted emissions (Radiated)                                     | Pass    |
| §15.249 | d       | Spurious emissions (except harmonics)                             | Pass    |
| §15.407 | (b)(1)  | Undesirable emission limits (Operating in the band 5.15-5.25 GHz) | Pass    |
| §22.359 | (a)     | Out of band emissions                                             | Pass    |

- Notes:
- The EUT was only assessed for the radiated emissions. No conducted measurements were performed.
  - Only emissions that were a product of multiple transmitters enabled were verified for continued compliance.

### 2.3 RSS test results

*Table 2.3-1: Result summary RSS*

| Part    | Section  | Test description                                               | Verdict |
|---------|----------|----------------------------------------------------------------|---------|
| RSS-247 | 5.5      | Unwanted emissions <sup>1</sup>                                | Pass    |
| RSS-210 | B.10 (b) | Spurious emissions (except for harmonics)                      | Pass    |
| RSS-247 | 6.2.1.2  | Unwanted emission limits (Operating in the band 5.15-5.25 GHz) | Pass    |
| RSS-139 | 6.6      | Transmitter Unwanted Emissions                                 | Pass    |

- Notes:
- The EUT was only assessed for the radiated emissions. No conducted measurements were performed.
  - Only emissions that were a product of multiple transmitters enabled were verified for continued compliance.

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

### 3.1 Sample information

|                        |                 |
|------------------------|-----------------|
| Receipt date           | August 21, 2017 |
| Nemko sample ID number | Item # 3        |

### 3.2 EUT information

|               |                   |
|---------------|-------------------|
| Product name  | Ring              |
| Model         | Base Station      |
| Serial number | BHHB11731PG000029 |

### 3.3 Technical information

|                                      |           |
|--------------------------------------|-----------|
| Applicant IC company number          | 20271     |
| IC UPN number                        | WL18DBMOD |
| All used IC test site(s) Reg. number | 2040A-4   |

*Table 3.3-1: Antenna information*

| LTE Antenna       | Antenna type | Band 12 Peak gain, dBi      | Band 5 peak gain, dBi       | Band 4 peak gain, dBi |
|-------------------|--------------|-----------------------------|-----------------------------|-----------------------|
| Main              | Monopole     | 2.7                         | 1.5                         | 5.4                   |
| Diversity         | Monopole     | 1                           | 1.5                         | 3.9                   |
| Wi-Fi Antenna     | Antenna type | 2.4 GHz Band peak gain, dBi | 5 GHz Band peak gain, dBi   |                       |
| Wi-Fi Right       | Inverted F   | 3.3                         | 4.6                         |                       |
| Wi-Fi Left        | Inverted F   | 3.9                         | 4.6                         |                       |
| Dual band antenna | Antenna type | 900 MHz Band peak gain, dBi | 2.4 GHz Band peak gain, dBi |                       |
| Z-Wave            | Inverted F   | 1.2                         | NA                          |                       |
| Zigbee            | Inverted F   | NA                          | 5.8                         |                       |

Notes: None

### 3.4 Co-location test plan

**Table 3.4-1:** Co-Location configurations

| Radio module device                                                          | Radio parameters         |
|------------------------------------------------------------------------------|--------------------------|
| <b>Configuration 1: LTE + ZigBee + Z-Wave + SimpleLink (TI1310)</b>          |                          |
| LTE                                                                          | 1728 MHz                 |
| Zigbee                                                                       | Low Channel 11: 2405 MHz |
| Z-Wave                                                                       | High Channel 916 MHz     |
| SimpleLink (TI1310)                                                          | High Channel 927.8 MHz   |
| <b>Configuration 2: BT + ZigBee + Z-Wave + SimpleLink (TI1310)</b>           |                          |
| BT                                                                           | Low Channel 00: 2402 MHz |
| Zigbee                                                                       | Low Channel 11: 2405 MHz |
| Z-Wave                                                                       | High Channel 916 MHz     |
| SimpleLink (TI1310)                                                          | High Channel 927.8 MHz   |
| <b>Configuration 3: WiFi 2.4 GHz + ZigBee + Z-Wave + SimpleLink (TI1310)</b> |                          |
| WIFI                                                                         | Low Channel 01: 2412 MHz |
| Zigbee                                                                       | Low Channel 11: 2405 MHz |
| Z-Wave                                                                       | High Channel 916 MHz     |
| SimpleLink (TI1310)                                                          | High Channel 927.8 MHz   |
| <b>Configuration 4: WiFi 5 GHz + ZigBee + Z-Wave + SimpleLink (TI1310)</b>   |                          |
| WIFI (UNI band)                                                              | Low Channel 36: 5180 MHz |
| Zigbee                                                                       | Low Channel 11: 2405 MHz |
| Z-Wave                                                                       | High Channel 916 MHz     |
| SimpleLink (TI1310)                                                          | High Channel 927.8 MHz   |
| Notes:                                                                       | None                     |

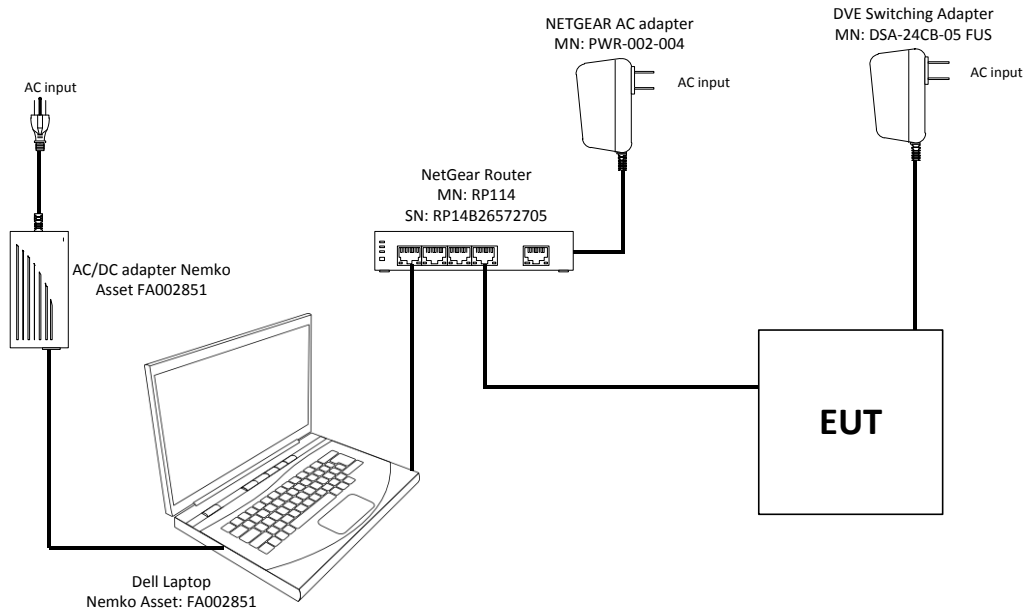
### 3.5 Product description and theory of operation

Communications Hub for Home Security Products

### 3.6 EUT exercise details

The EUT was setup in continuous transmit state.

### 3.7 EUT setup diagram



**Figure 3.7-1:** Setup diagram

## Section 4. Engineering considerations

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### 4.1 Modifications incorporated in the EUT for compliance

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

### 4.2 Technical judgment

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None

### 4.3 Deviations from laboratory tests procedures

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No deviations were made from laboratory procedures.

## Section 5. Test conditions

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### 5.1 Atmospheric conditions

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|                   |            |
|-------------------|------------|
| 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

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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  $\pm 5\%$ , for which the equipment was designed.

## Section 6. Measurement uncertainty

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### 6.1 Uncertainty of measurement

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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.

| Test name                   | Measurement uncertainty, dB |
|-----------------------------|-----------------------------|
| Radiated spurious emissions | 3.78                        |

## Section 7. Test equipment

### 7.1 Test equipment list

**Table 7.1-1: Equipment list**

| Equipment                   | Manufacturer       | Model no.     | Asset no. | Cal cycle | Next cal.  |
|-----------------------------|--------------------|---------------|-----------|-----------|------------|
| Receiver/spectrum analyzer  | Rohde & Schwarz    | ESU 26        | FA002043  | 1 year    | Jan. 31/18 |
| 3 m EMI test chamber        | TDK                | SAC-3         | FA002047  | 1 year    | Dec. 1/17  |
| Horn with Preamp            | ETS-Lindgren       | 3117-PA       | FA002840  | 1 year    | Nov. 11/17 |
| Bilog antenna (20–3000 MHz) | Sunol              | JB3           | FA002108  | 1 year    | June 27/18 |
| 50 $\Omega$ coax cable      | Huber + Suhner     | None          | FA002830  | 1 year    | May 12/18  |
| 50 $\Omega$ coax cable      | C.C.A.             | None          | FA002555  | 1 year    | May 2/18   |
| Notch filter 2400–2483 MHz  | Microwave Circuits | 2400–2483 MHz | FA001940  | —         | VOU        |
| Notch filter 5150–5350 MHz  | Microwave Circuits | 5150–5350 MHz | FA001941  | —         | VOU        |
| High pass filter            | Microwave Circuits | H1G212G1      | FA002342  | —         | VOU        |

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

## Section 8. Testing data

### 8.1 Spurious emissions caused by co-located transmitters

#### 8.1.1 Definitions and limits

##### FCC §15.247 (d):

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

##### FCC §15.249 (d):

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

##### FCC §15.407 (b):

- (1) For transmitters operating in the 5.15–5.25 GHz band: all emissions outside of the 5.15–5.35 GHz band shall not exceed an EIRP of –27 dBm/MHz.
- (5) The emission measurements shall be performed using a minimum resolution bandwidth of 1 MHz. A lower resolution bandwidth may be employed near the band edge, when necessary, provided the measured energy is integrated to show the total power over 1 MHz.
- (6) Unwanted emissions below 1 GHz must comply with the general field strength limits set forth in § 15.209.
- (7) The provisions of § 15.205 apply to intentional radiators operating under this section.
- (8) When measuring the emission limits, the nominal carrier frequency shall be adjusted as close to the upper and lower frequency block edges as the design of the equipment permits.

##### FCC §22.359 (a)

*Out of band emissions.* The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log (P)$  dB.

##### RSS-210 Section B.10 (b):

Emissions radiated outside of the specified frequency bands, except for harmonic emissions, shall be attenuated by at least 50 dB below the level of the fundamental emissions or to the general field strength limits listed in RSS-Gen, whichever is less stringent.

##### RSS-247 Section 5.5:

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under section 5.4(d), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general field strength limits specified in RSS-Gen is not required.

##### RSS-247 Section 6.2.1.2:

For transmitters operating in the band 5150–5250 MHz, all emissions outside the band 5150–5350 MHz shall not exceed –27 dBm/MHz e.i.r.p. However, any unwanted emissions that fall into the band 5250–5350 MHz must be 26 dBc, when measured using a resolution bandwidth between 1 and 5% of the occupied bandwidth, above 5.25 GHz. Otherwise, the transmission is considered as intentional and the devices shall implement dynamic frequency selection (DFS) and transmitter power control (TPC) as per the requirements for the band 5250–5350 MHz.

##### RSS-139 Section 6.6:

- i. In the first 1.0 MHz bands immediately outside and adjacent to the equipment's smallest operating frequency block, Footnote 2 which can contain the equipment's occupied bandwidth, the emission power per any 1% of the emission bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least  $43 + 10 \log_{10} p$  (watts) dB.
- ii. After the first 1.0 MHz outside the equipment's smallest operating frequency block, which can contain the equipment's occupied bandwidth, the emission power in any 1 MHz bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least  $43 + 10 \log_{10} p$  (watts) dB.

##### IC RSS-Gen Section 8.10:

Restricted bands, identified in table 6 of RSS-Gen Section 8.10, are designated primarily for safety-of-life services (distress calling and certain aeronautical bands), certain satellite downlinks, radio astronomy and some government uses. Except where otherwise indicated, the following restrictions apply:

- a. fundamental components of modulation of licence-exempt radio apparatus shall not fall within the restricted bands of below;
- b. unwanted emissions falling into restricted bands of below shall comply with the limits specified in RSS-Gen;
- c. unwanted emissions not falling within restricted frequency bands shall either comply with the limits specified in the applicable RSS, or with those specified in RSS-Gen.

### 8.1.1 Definitions and limits, continued

**Table 8.1-1: FCC §15.209 and RSS-Gen – Radiated emission limits**

| Frequency,<br>MHz | Field strength of emissions |                                 | Measurement distance, m |
|-------------------|-----------------------------|---------------------------------|-------------------------|
|                   | $\mu\text{V/m}$             | $\text{dB}\mu\text{V/m}$        |                         |
| 0.009–0.490       | 2400/F                      | $67.6 - 20 \times \log_{10}(F)$ | 300                     |
| 0.490–1.705       | 24000/F                     | $87.6 - 20 \times \log_{10}(F)$ | 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

**Table 8.1-2: ISSED restricted frequency bands**

| MHz             | MHz                 | MHz           | GHz         |
|-----------------|---------------------|---------------|-------------|
| 0.090–0.110     | 12.51975–12.52025   | 399.9–410     | 5.35–5.46   |
| 2.1735–2.1905   | 12.57675–12.57725   | 608–614       | 7.25–7.75   |
| 3.020–3.026     | 13.36–13.41         | 960–1427      | 8.025–8.5   |
| 4.125–4.128     | 16.42–16.423        | 1435–1626.5   | 9.0–9.2     |
| 4.17725–4.17775 | 16.69475–16.69525   | 1645.5–1646.5 | 9.3–9.5     |
| 4.20725–4.20775 | 16.80425–16.80475   | 1660–1710     | 10.6–12.7   |
| 5.677–5.683     | 25.5–25.67          | 1718.8–1722.2 | 13.25–13.4  |
| 6.215–6.218     | 37.5–38.25          | 2200–2300     | 14.47–14.5  |
| 6.26775–6.26825 | 73–74.6             | 2310–2390     | 15.35–16.2  |
| 6.31175–6.31225 | 74.8–75.2           | 2655–2900     | 17.7–21.4   |
| 8.291–8.294     | 108–138             | 3260–3267     | 22.01–23.12 |
| 8.362–8.366     | 156.52475–156.52525 | 3332–3339     | 23.6–24.0   |
| 8.37625–8.38675 | 156.7–156.9         | 3345.8–3358   | 31.2–31.8   |
| 8.41425–8.41475 | 240–285             | 3500–4400     | 36.43–36.5  |
| 12.29–12.293    | 322–335.4           | 4500–5150     | Above 38.6  |

Notes: None

## 8.1.2 Definitions and limits, continued

**Table 8.1-3: 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       |                     |               |             |

Notes: None

## 8.1.3 Test summary

|               |                    |                   |          |
|---------------|--------------------|-------------------|----------|
| Verdict       | Pass               |                   |          |
| Test date     | September 18, 2017 | Temperature       | 21 °C    |
| Test engineer | David Duchesne     | Air pressure      | 995 mbar |
| Test location | Ottawa             | Relative humidity | 50 %     |

## 8.1.4 Observations, settings and special notes

- The spectrum was searched from 30 MHz to 18 GHz.
- The spectral plots have been corrected with the associated transducer factors (i.e. antenna factors, cable loss, amplifier gains, and attenuators).
- Radiated measurements were performed at a distance of 3 m

### 8.1.3 Observations, settings and special notes

---

Spectrum analyser settings for radiated measurements within restricted bands below 1 GHz:

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

Spectrum analyser settings for peak radiated measurements within restricted bands above 1 GHz:

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

Spectrum analyser settings for average radiated measurements within restricted bands above 1 GHz:

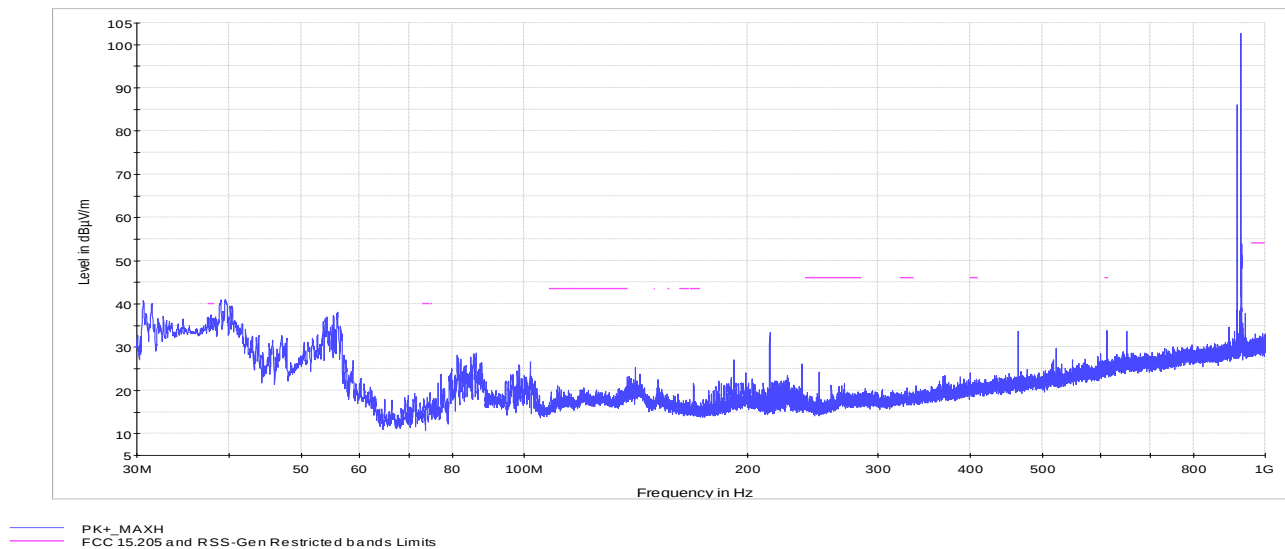
|                       |                      |
|-----------------------|----------------------|
| Resolution bandwidth: | 1 MHz                |
| Video bandwidth:      | 3 MHz                |
| Detector mode:        | RMS                  |
| Trace mode:           | Average (100 Traces) |

#### For WIFI

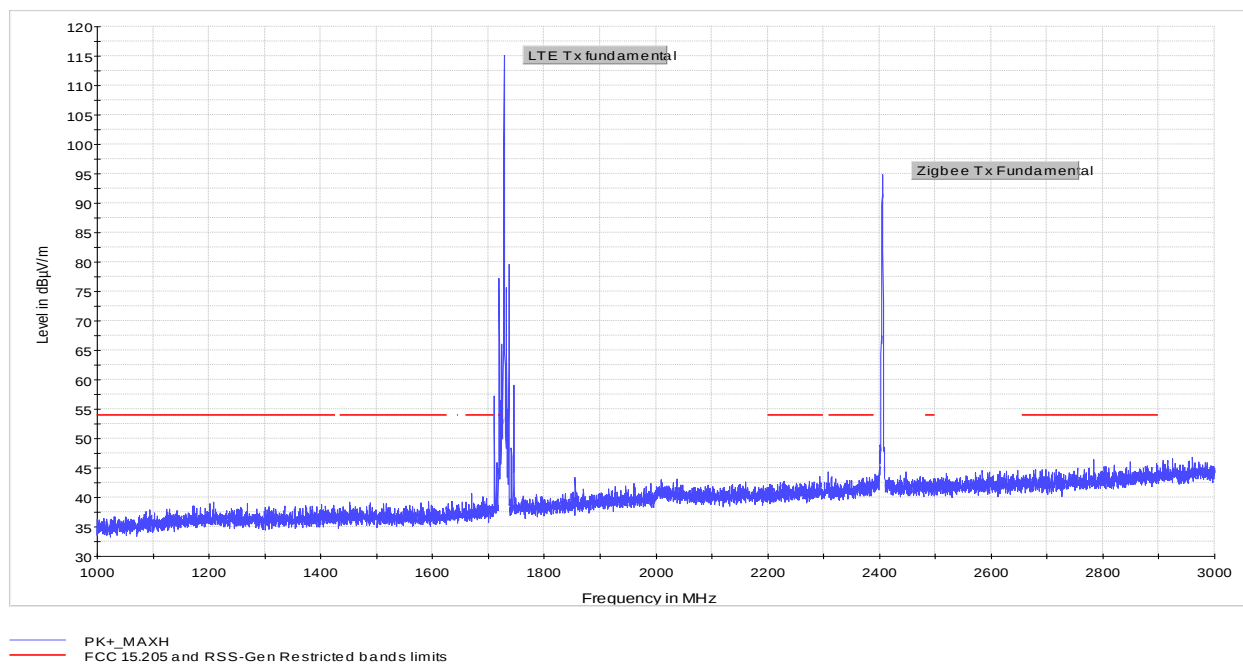
Spectrum analyser settings for average radiated measurements at bands edge:

|                       |                                                                                                                      |
|-----------------------|----------------------------------------------------------------------------------------------------------------------|
| Resolution bandwidth: | 100 kHz                                                                                                              |
| Video bandwidth:      | 300 kHz                                                                                                              |
| Detector mode:        | RMS                                                                                                                  |
| Trace mode:           | Average (100 Traces)                                                                                                 |
| Span:                 | 2 MHz (Instrument set to center frequency of the emission to be measured (within 2 MHz of the authorized band edge). |

#### 8.1.4 Test data



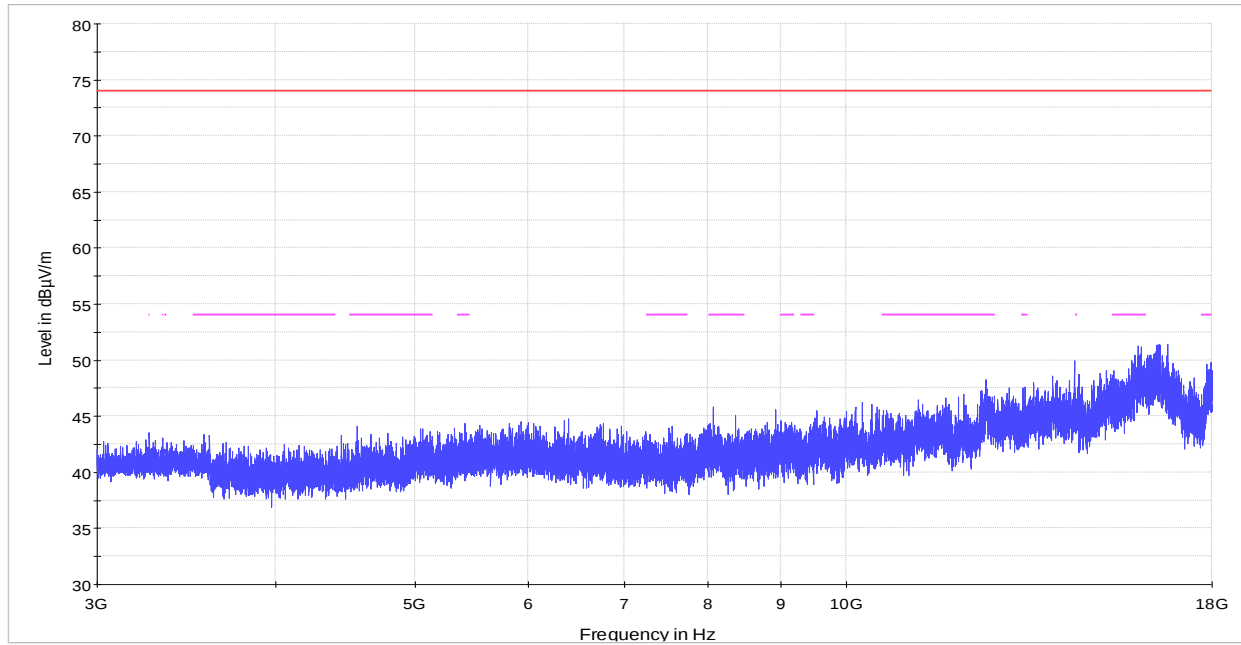
**Figure 8.1-1:** Radiated spurious emissions products from co-located transmitters, Configuration 1



The spectral plot is a summation of a vertical and horizontal scan. The spectral scan has been corrected with the associated transducer factors (i.e. antenna factors, cable loss, amplifier gains, and attenuators).

**Figure 8.1-2:** Radiated spurious emissions products from co-located transmitters within 1–3 GHz, Configuration 1

#### 8.1.4 Test data, continued



— PK+ \_MAXH  
— FCC Part 15 and ICES- Class B 3m Peak Limit  
- - - FCC 15.205 and RSS-Gen Restricted bands limits

The spectral plot is a summation of a vertical and horizontal scan. The spectral scan has been corrected with the associated transducer factors (i.e. antenna factors, cable loss, amplifier gains, and attenuators).

**Figure 8.1-3:** Radiated spurious emissions products from co-located transmitters within 3–18 GHz, Configuration 1

#### 8.1.4 Test data, continued

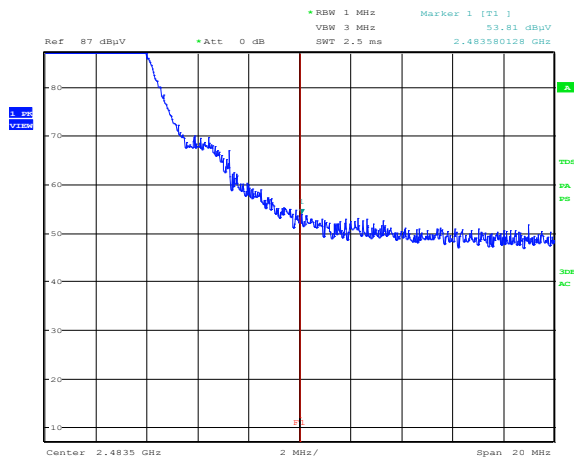


Figure 8.1-4: Upper band edge, Configuration 2 (BLE High Channel and Zigbee High Channel) Peak detector

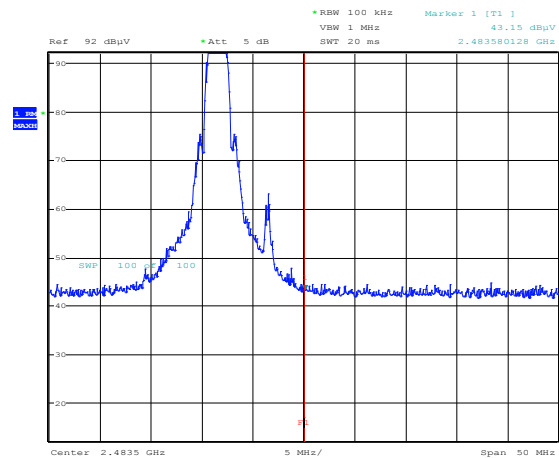


Figure 8.1-5: Lower band edge, Configuration 2 (BLE Low Channel and Zigbee Low Channel) Avg. detector

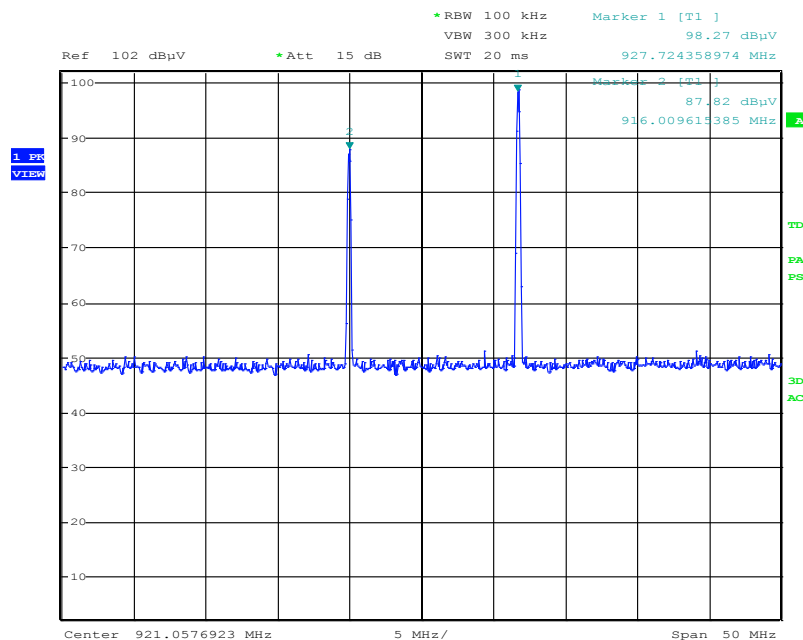
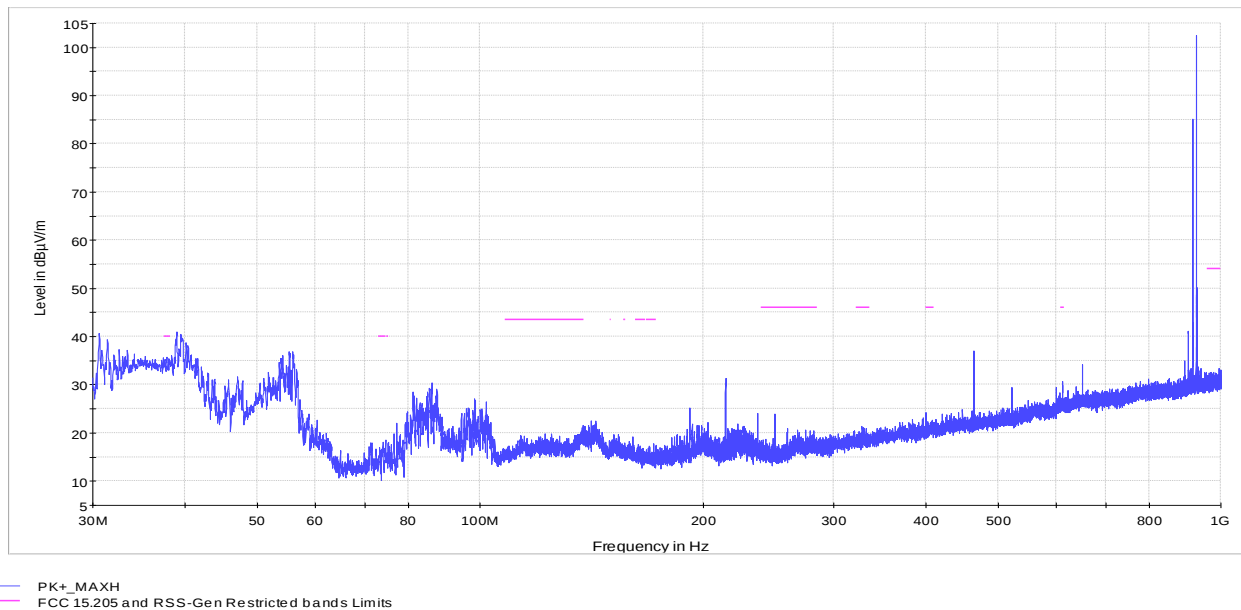
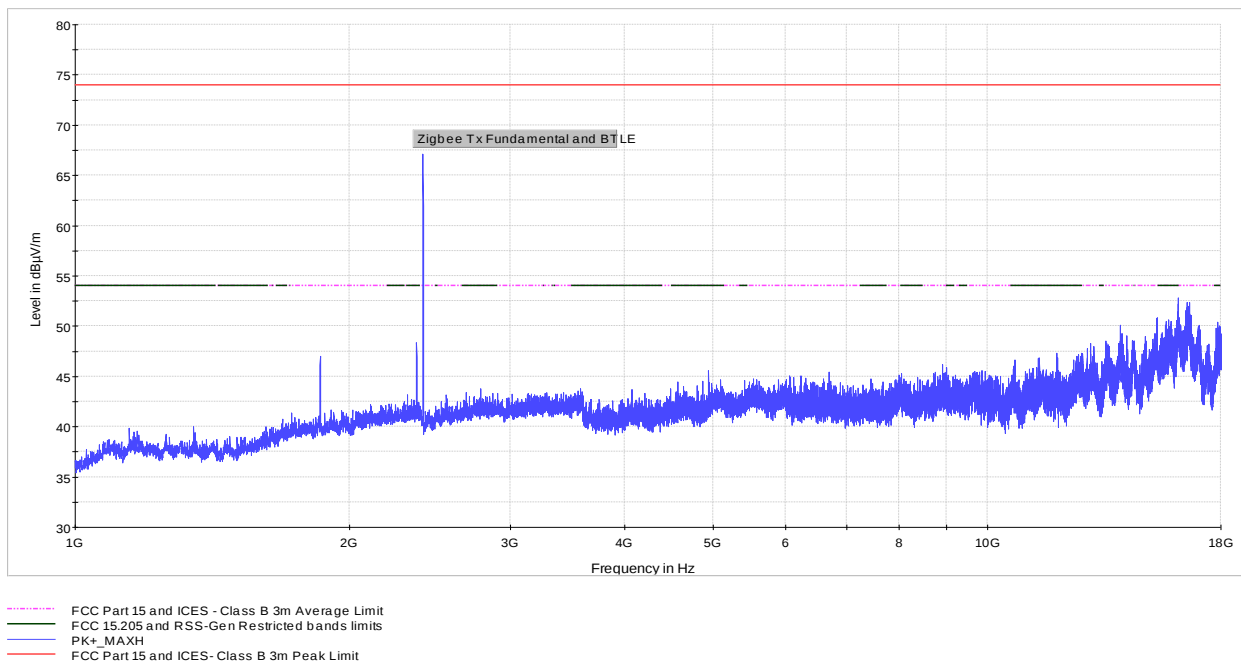


Figure 8.1-6: Configuration 2 (Z-Wave and TI Chip) Peak detector

#### 8.1.4 Test data, continued

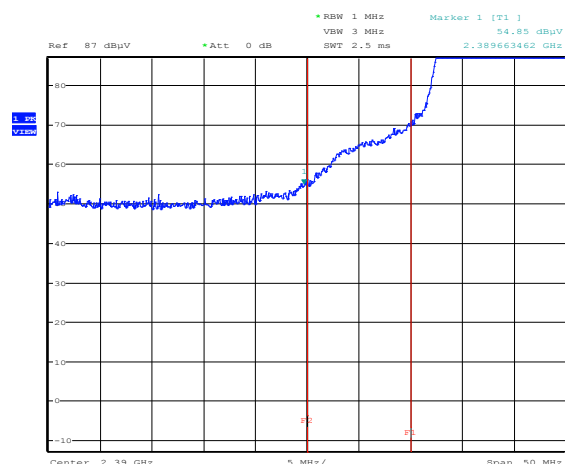


**Figure 8.1-7:** Radiated spurious emissions products from co-located transmitters below 1 GHz, Configuration 2

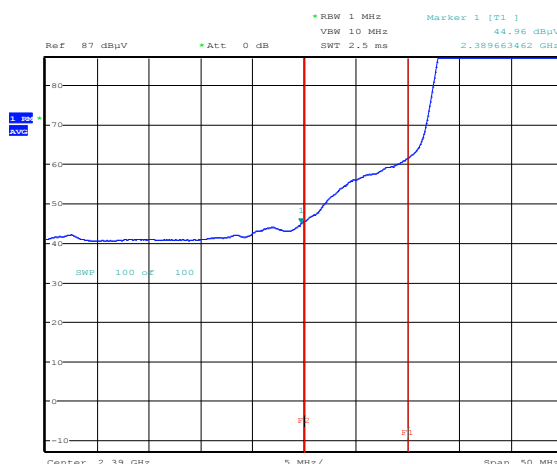


**Figure 8.1-8:** Radiated spurious emissions products from co-located transmitters within 1–18 GHz, Configuration 2

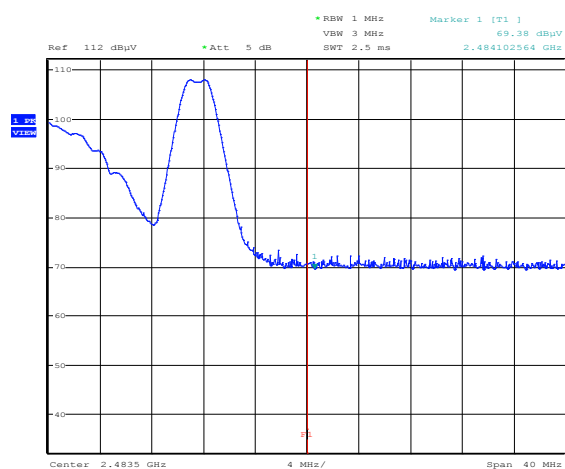
## 8.1.4 Test data, continued



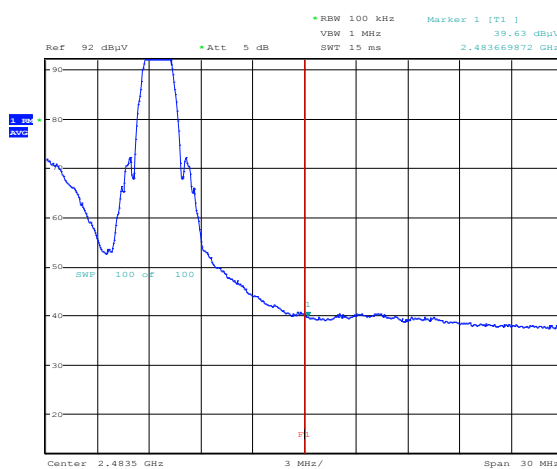
**Figure 8.1-9:** Upper band edge, Configuration 2 (WIFI Low Channel and Zigbee Low Channel) Peak detector



**Figure 8.1-10:** Lower band edge, Configuration 2 (WIFI Low Channel and Zigbee Low Channel) Avg. detector

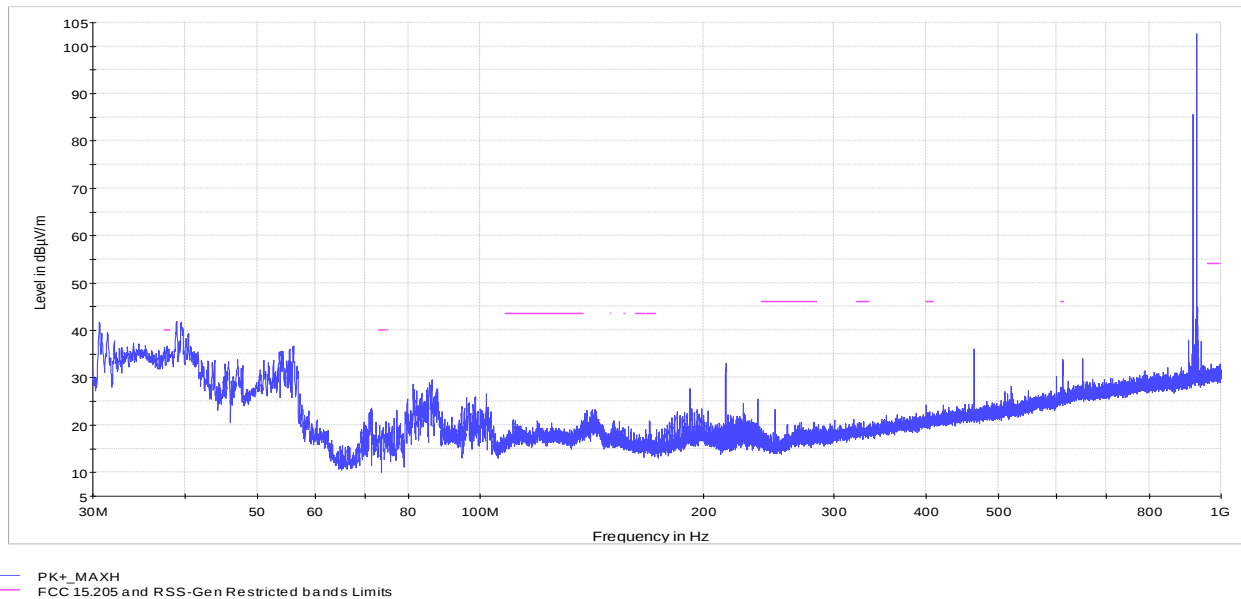


**Figure 8.1-11:** Upper band edge, Configuration 2 (WIFI High Channel and Zigbee High Channel) Peak detector

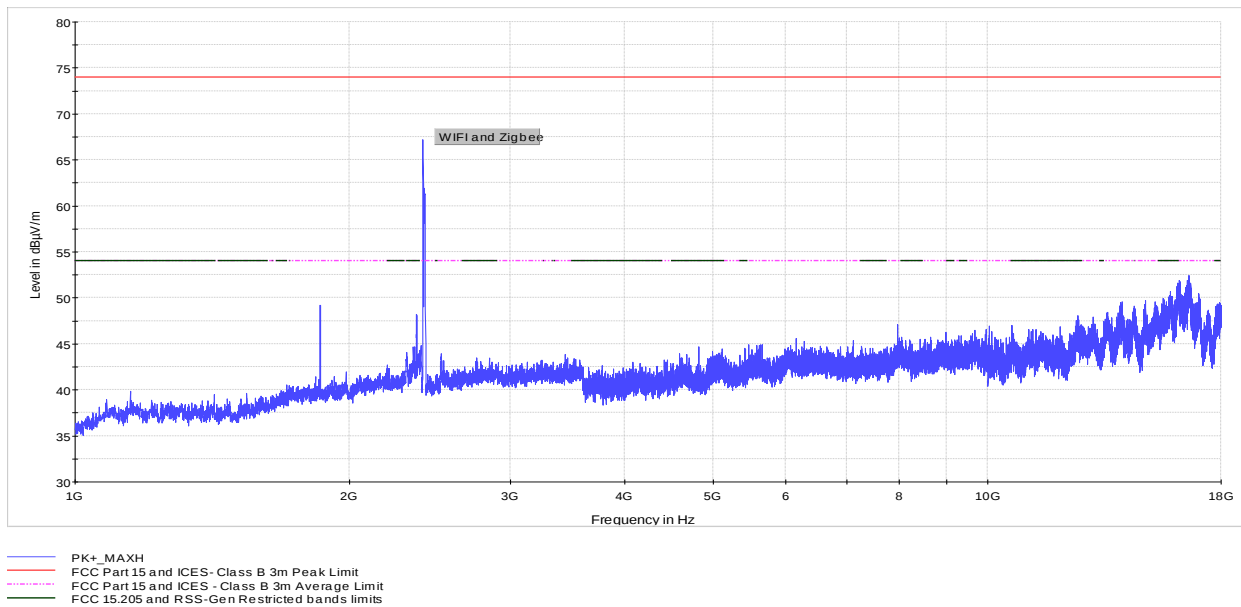


**Figure 8.1-12:** Lower band edge, Configuration 2 (WIFI high Channel and Zigbee High Channel) Avg. detector

#### 8.1.4 Test data, continued

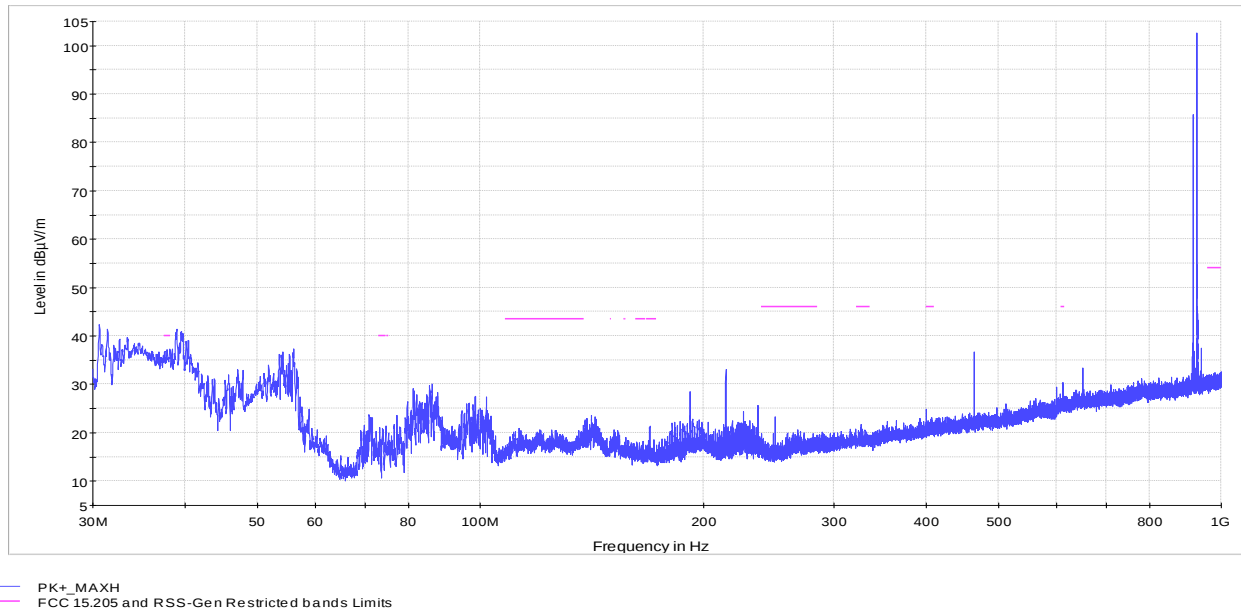


**Figure 8.1-13:** Radiated spurious emissions products from co-located transmitters below 1 GHz, Configuration 3

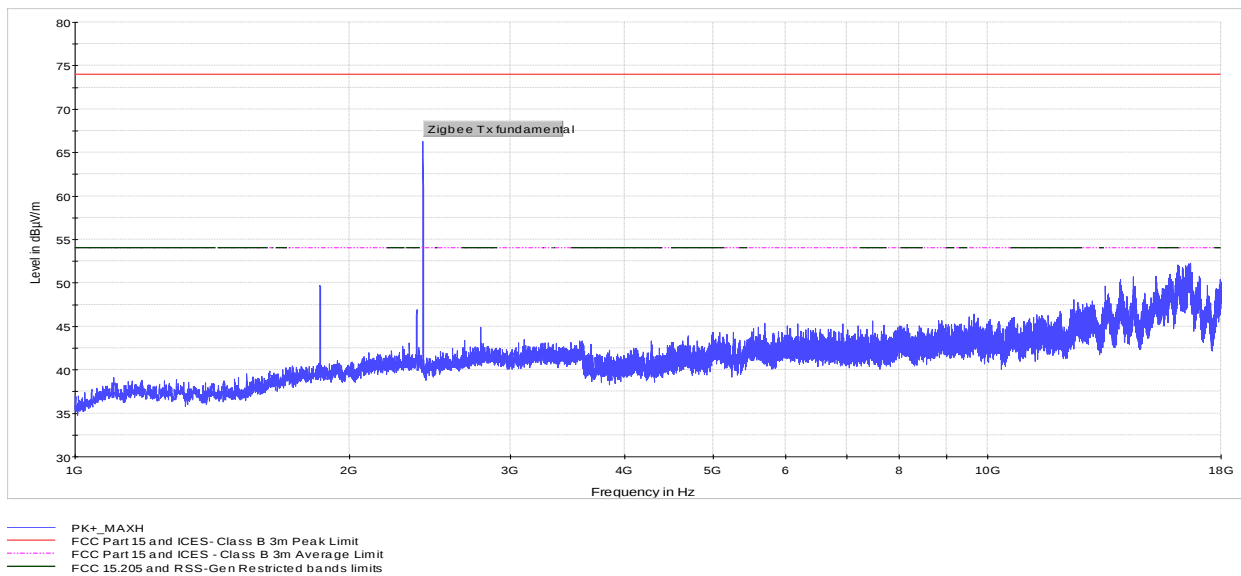


**Figure 8.1-14:** Radiated spurious emissions products from co-located transmitters within 1–18 GHz, Configuration 3

#### 8.1.4 Test data, continued



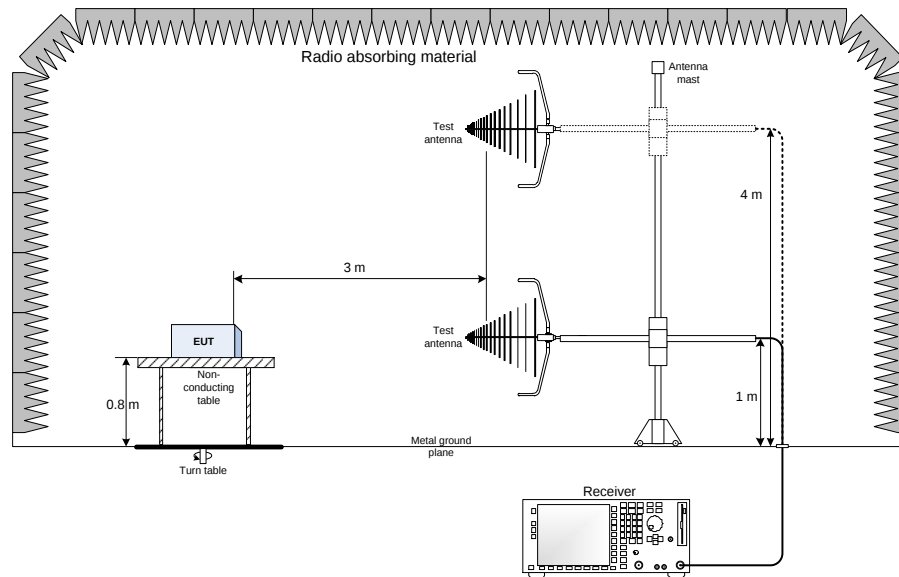
**Figure 8.1-15:** Radiated spurious emissions products from co-located transmitters below 1 GHz, Configuration 4



**Figure 8.1-16:** Radiated spurious emissions products from co-located transmitters within 1–18 GHz, Configuration 4

## 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

