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# **RADIO TEST REPORT**

Report ID:

REP040752

Type of assessment:

**Class II Permissive Change** 

Applicant:

EXFO Inc.

Product name:

**Communication Module** 

FCC ID:

# 2AYQH-LB1DX

Specifications:

- FCC 47 CFR Part 15 Subpart C, §15.247 ٠
- RSS-247, Issue 3, August 2023, Section 5

Date of issue: December 5, 2024

Nimish Kapoor, EMC/RF Specialist

Tested by

Andrey Adelberg, Senior EMC/RF test specialist Reviewed by

Project number:

# PRJ0048354

Model (HVIN):

1YN

ISED certification number:

# IC: 26882-LB1DX

Signature Adelberg

Signature

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ANAB File Number: AT-3195 (Ottawa/Almonte); AT-3193 (Pointe-Claire); AT-3194 (Cambridge)





#### Lab locations

| Company name         | Nemko Canada   | nc.               |   |                 |  |
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|                      | FdX: +1 013 /3/  | 9091              | FdX: +1 514 09  | 4 3328          |  |
| Test site identifier | Organization   | Ottawa            | Montreal  | Cambridge       |  |
|                      | FCC:<br>ISED:  | CA2040<br>2040A-4 | CA2041<br>2040G-5   | CA0101<br>24676 |  |
| Website              | www.nemko.co   | <u>n</u>          |   |                 |  |

#### 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 contained in this report are within Nemko Canada's ISO/IEC 17025 accreditation.

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# Section 1 Report summary

#### 1.1 Test specifications

| FCC 47 CFR Part 15, Subpart C, Clause 15.247<br>(85 FR 18149, Apr. 1, 2020) | Operation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz                                    |
|---|---|
| RSS-247, Issue 3, August 2023, Section 5                                    | Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area |
|   | Network (LE-LAN) Devices  |

### 1.2 Test methods

| 558074 D01 15.247 Meas Guidance v05r02<br>(April 2, 2019) | Guidance for compliance measurements on digital transmission system, frequency hopping spread spectrum system, and hybrid system devices operating under section 15.247 of the FCC rules. |
|---|---|
| 662911 D01 Multiple Transmitter Output                    | Emissions Testing of Transmitters with Multiple Outputs in the Same Band  |
| v02r01 (October 31, 2013)                                 |   |
| KDB 996369 D04 Module Integration Guide                   | Modular transmitter integration guide, guidance for host product manufacturers  |
| v02   |   |
| ANSI C63.10 v2013   | American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices  |
| RSS-Gen, Issue 5 April 2018 + A1:2019 +                   | General Requirements for Compliance of Radio Apparatus  |
| A2:2021   |   |

### 1.3 Exclusions

Partial testing was performed on the product with the transmitter operating to confirm that the host product meets the FCC/ISED requirements. This investigation of the final product was done by spot checking emissions from the device while operating the host as a composite system. This testing was performed with the host product configured in typical operational modes to check the spurious emissions for compliance with all the applicable rules.

### 1.4 Statement of compliance

In the configuration tested, the EUT was found compliant.

Testing was performed against all relevant requirements of the test standard except as noted in section 1.3 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.

#### 1.5 Test report revision history

#### Table 1.5-1: Test report revision history

| Report ID | Date of issue    | Details of changes made to test report |
|-----------|------------------|--|
| REP046661 | July 18, 2024    | Original report issued                 |
| REP046661 | December 5, 2024 | Updated to Issue 3 of RSS-247          |

# Section 2 Engineering considerations

# 2.1 Modifications incorporated in the EUT for compliance

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

# 2.2 Technical judgment

None

### 2.3 Model variant declaration

There were no model variants declared by the applicant.

# 2.4 Deviations from laboratory tests procedures

No deviations were made from laboratory procedures.

# Section 3 Test conditions

### 3.1 Atmospheric conditions

| Temperature       | 15 °C – 35 °C                           |  |
|-------------------|---|--|
| Relative humidity | 20 % – 75 %                             |  |
| Air pressure      | 86 kPa (860 mbar) – 106 kPa (1060 mbar) |  |

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.

# 3.2 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 4 Information provided by the applicant

#### 4.1 Disclaimer

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This section contains information provided by the applicant and has been utilized to support the test plan. Inaccurate information provided by the applicant can affect the validity of the results contained within this test report. Nemko accepts no responsibility for the information contained within this section and the impact it may have on the test plan and resulting measurements.

### 4.2 Applicant/Manufacturer

| Name    | EXFO Inc  |  |
|---------|---|--|
| Address | 400 Godin Avenue Quebec City, QC, Canada, G1M 2K2 |  |

### 4.3 EUT information

| Product                        | Communication Module   |
|--------------------------------|--|
| Model number (HVIN)            | 1YN  |
| Host model number (HMN)        | AXS-1xx Series   |
| Part number                    | LBEE5KL1YN-814   |
| Power supply requirements      | 3.6 V <sub>DC</sub> VBAT and 3.3 V <sub>DC</sub> VDDIO   |
| Product description and theory | The EUT is a small and high-performance module based on Infineon CYW4343W combo chipset to support Wi-Fi and |
| of operation                   | BLE.   |

### 4.4 Radio technical information

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| Category of Wideband Data | □ Frequency Hopping Spread Spectrum (FHSS) equipment                         |  |
|---------------------------|--|--|
| Transmission equipment    | Other types of Wideband Data Transmission equipment (e.g. DSSS, OFDM, etc.). |  |
| Frequency band            | 2400–2483.5 MHz  |  |
| Frequency Min (MHz)       | 2402 for BLE   |  |
|                           | 2412 for Wi-Fi   |  |
| Frequency Max (MHz)       | 2480 for BLE   |  |
|                           | 2462 for Wi-Fi   |  |
| Type of modulation        | BLE: GFSK  |  |
|                           | Wi-Fi: DSSS (CCK, DQPSK, DBPSK), OFDM (QPSK, BPSK, 16-QAM, 64-QAM)           |  |
| Antenna                   | Manufacturer: Pulse, Type: Chip antenna, Gain: 2.2 dBi, Part number: W3006   |  |

# 4.5 EUT setup details

#### 4.5.1 Radio exercise details

| Operating conditions | The following scripts are used to control.<br>Wi-Fi: "./Murata_IFX_RF_Test_Tool.py"<br>BLE: "./cyw_ble-test.sh"   |  |
|----------------------|---|--|
| Transmitter state    | <ol> <li>Transmitter set in to continuous mode.</li> <li>Bluetooth Low Energy (BLE) mode: Middle Channel (2442 MHz)</li> <li>Wi-Fi mode: Low Channel (2412 MHz) with 1 Mbps Data Rate, packet interval: 30, packet length: 1024 and 20 MHz bandwidth with 17 dBm output power.</li> </ol> |  |

# 4.5.2 EUT setup configuration

| Table | 4.5-1: | Sunnort | equipment  |
|-------|--------|---------|------------|
| rubic | 4.5 1. | Support | cquipinent |

| Description         | Brand name | Model, Part number, Serial number, Revision level |
|---------------------|------------|---|
| USB Hub             | Anker      | MN: A8352, SN: AELS2C0A39401569                   |
| OTDR                | EXFO       | MN/PN: AXS-120, Sn: 1776744                       |
| Keyboard            | Cherry     | MN: ML4100, SN: C 009101 W29                      |
| Mouse               | Lenovo     | MN: M-UAE119, SN: LZ034AC0R1K                     |
| AC/DC power adapter | W&T        | MN: W&T-PD2020B-CK                                |

| Cable description | From     | То         | Length (m) |
|-------------------|----------|------------|------------|
| USB (Type C)      | EUT      | USB Hub    | 0.3        |
| USB               | Keyboard | USB Hub    | 1.0        |
| USB               | USB Hub  | AC adapter | 1.5        |

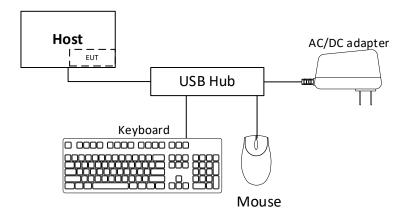


Figure 4.5-1: Block diagram

# Section 5 Summary of test results

# 5.1 Testing period

| Test start date       | June 13, 2024 | Test end date             | June 17, 2024  |
|-----------------------|---------------|---------------------------|----------------|
| 5.2 Sample informatio | n             |                           |                |
| Receipt date          | June 10, 2024 | Nemko sample ID number(s) | PRJ00483540006 |
|                       |               |                           |                |

# 5.3 FCC Part 15, Test results

requirements.

Table 5.3-1: FCC requirements results

| Part       | Test description   | Verdict |
|------------|--------------------|---------|
| §15.207(a) | Conducted limits   | Pass    |
| §15.247(d) | Spurious emissions | Pass    |
| Notes:     | None               |         |

# 5.4 ISED RSS-Gen/ ISED RSS-247, Test results

#### Table 5.4-1: RSS-Gen/ ISED RSS-247 requirements results

| Part              | Test description                         | Verdict        |
|-------------------|--|----------------|
| ISED RSS-Gen, 7.3 | Receiver radiated emission limits        | Not applicable |
| ISED RSS-Gen, 8.8 | AC power-line conducted emissions limits | Pass           |
| ISED RSS-247, 5.5 | Unwanted emissions                       | Pass           |

# Section 6 Test equipment

#### Test equipment list 6.1

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| Table 6.1-1: Equipment list     |                    |                 |           |           |                   |
|---------------------------------|--------------------|-----------------|-----------|-----------|-------------------|
| Equipment                       | Manufacturer       | Model no.       | Asset no. | Cal cycle | Next cal.         |
| 3 m EMI test chamber            | TDK                | SAC-3           | FA002047  | 1 year    | January 18, 2025  |
| Flush mount turntable           | Sunol              | FM2022          | FA002082  | _         | NCR               |
| Controller                      | Sunol              | SC104V          | FA002060  | —         | NCR               |
| Antenna mast                    | Sunol              | TLT2            | FA002061  | _         | NCR               |
| 61505 AC/DC programmable source | Chroma             | 61509           | FA003036  | —         | NCR               |
| Receiver/spectrum analyzer      | Rohde & Schwarz    | ESU 40          | FA002071  | 1 year    | March 7, 2025     |
| Horn (1–18 GHz)                 | ETS Lindgren       | 3117            | FA002840  | 1 year    | March 8, 2025     |
| 2.4 GHz band Notch Filter       | Microwave Circuits | N0324413        | FA003306  | 1 year    | March 12, 2025    |
| Preamp (1–18 GHz)               | ETS Lindgren       | 124334          | FA002877  | 1 year    | November 24, 2024 |
| Bilog antenna (20–3000 MHz)     | Sunol              | JB3             | FA002108  | 1 year    | March 27, 2025    |
| 50 Ω coax cable                 | Carlisle           | WHU18-1818-072  | FA002391  | 1 year    | October 17, 2024  |
| 50 Ω coax cable                 | Huber+Suhner       | 104B11NX2/11000 | FA003441  | 1 year    | October 17, 2024  |
| LISN                            | Rohde & Schwarz    | ENV216          | FA002515  | 1 year    | February 1, 2025  |
| 50 Ω coax cable                 | Huber + Suhner     | None            | FA001652  | 1 year    | April 4, 2025     |

All equipment related to the contribution of measurement has been included in this list. Such items include, but are not limited to, cables, attenuators, directional couplers, and pre-amps.

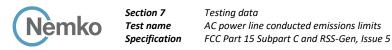
#### Table 6.1-2: Automation software details

| Test description                        | Manufacturer of Software | Details  |
|---|--------------------------|--|
| Radiated emissions as of April 4, 2023  | Rohde & Schwarz          | EMC32, Software for EMC Measurements, Version 11.20.00 |
| Conducted emissions as of April 4, 2023 | Rohde & Schwarz          | EMC32, Software for EMC Measurements, Version 11.20.00 |

### Table 6.1-3: Measurement uncertainty calculations based on equipment list

| Measurement  | Measurement uncertainty, ±dB |
|--|------------------------------|
| AC power line conducted emissions  | 3.42                         |
| Radiated spurious emissions (30 MHz to 1 GHz)  | 4.16                         |
| Radiated spurious emissions (1 GHz to 6 GHz)   | 4.67                         |
| Radiated spurious emissions (6 GHz to 18 GHz)4.95  |                              |
| Notes: UKAS Lab 34, TIA-603 and ETSI TR 100 028-1&2 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 calculations assume a coverage factor of K = 2 with 95% certainty.



# Section 7 Testing data

#### 7.1 AC power line conducted emissions limits

#### 7.1.1 References, 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, Clause 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, Clause 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 7.1-1: Conducted emissions limit

| Conducted en | missions limit, dBμV          |
|--------------|-------------------------------|
| Quasi-peak   | Average**                     |
| 66 to 56*    | 56 to 46*                     |
| 56           | 46                            |
| 60           | 50                            |
|              | Quasi-peak<br>66 to 56*<br>56 |

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

#### 7.1.2 Test summary

| Verdict       | Pass          |                   |           |
|---------------|---------------|-------------------|-----------|
| Test date     | June 17, 2024 | Temperature       | 23 °C     |
| Tested by     | Nimish Kapoor | Air pressure      | 1015 mbar |
| Test location | Ottawa        | Relative humidity | 58 %      |



Testing data AC power line conducted emissions limits FCC Part 15 Subpart C and RSS-Gen, Issue 5

# 7.1.3 Observations, settings and special notes

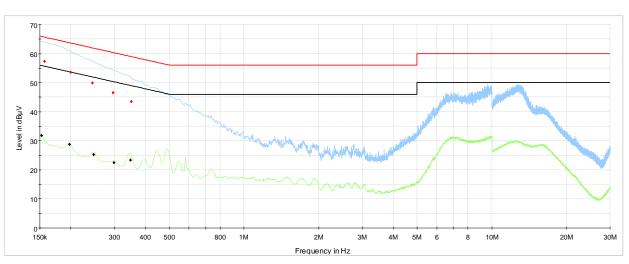
| Port under test – Coupling device | AC Input of AC/DC Adapter – Artificial Mains Network (AMN)   |
|-----------------------------------|--|
| EUT power input during test       | 120 V <sub>AC</sub> , 60 Hz;   |
|                                   | 5 V <sub>DC</sub> USB Powered  |
| EUT setup configuration           | 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.   |
| Additional notes:                 | <ul> <li>The EUT was set up as tabletop configuration per ANSI C63.10-2013 measurement procedure.</li> </ul>           |
|                                   | - The spectral scan has been corrected with transducer factors (i.e. cable loss, LISN factors, and attenuators) for    |
|                                   | determination of compliance. Correction factor (dB) = LISN factor IL (dB) + cable loss (dB) + attenuator (dB)          |
|                                   | - Emissions that were continuously present for a minimum of 1 second and occurred more than once for every 15          |
|                                   | seconds observation period were considered valid emissions. The maximum value of valid emissions has been              |
|                                   | recorded.  |
|                                   | - Tabular data was provided for emissions that were within 6 dB of the limit. If no tabular data was provided, no      |
|                                   | emissions were observed within 6 dB of the limit.  |

| Receiver settings:   |   |
|----------------------|---|
| Resolution bandwidth | 9 kHz   |
| Video bandwidth      | 30 kHz  |
| Detector mode        | Peak and Average (Preview), Quasi-peak and CAverage (Final) |
| Trace mode           | Max Hold  |
| Measurement time     | 100 ms (Preview), 160 ms (Final)                            |



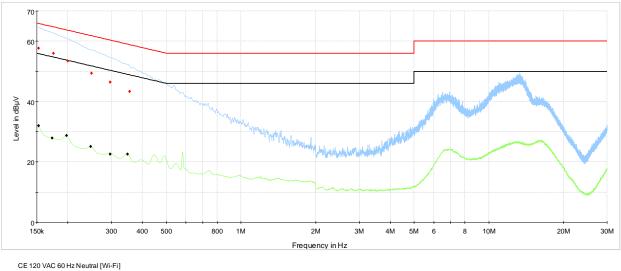
Testing data AC power line conducted emissions limits FCC Part 15 Subpart C and RSS-Gen, Issue 5

#### 7.1.4 Test data



CE 120 VAC 60 Hz Phase [Wi-Fi] Preview Result 2-AVG Preview Result 1-PK+ FCC 15.207 Limit Line, Mains (QP) FCC 15.207 Limit Line, Mains (Avg) Final\_Result QPK Final\_Result CAV

Figure 7.1-1: Conducted emissions on phase line [Wi-FI]



Preview Result 2-AVG Preview Result 1-PK+ FCC 15.207 Limit Line, Mains (QP) FCC 15.207 Limit Line, Mains (Avg) Final\_Result QPK

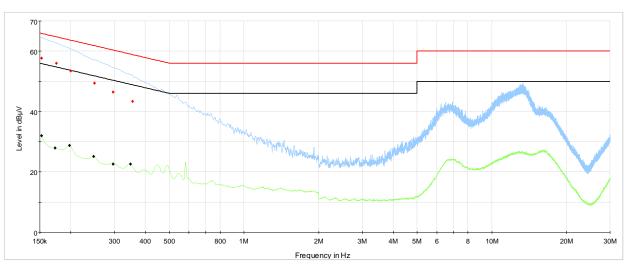
- Final\_Result CAV

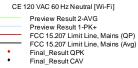
Figure 7.1-2: Conducted emissions on neutral line [Wi-FI]



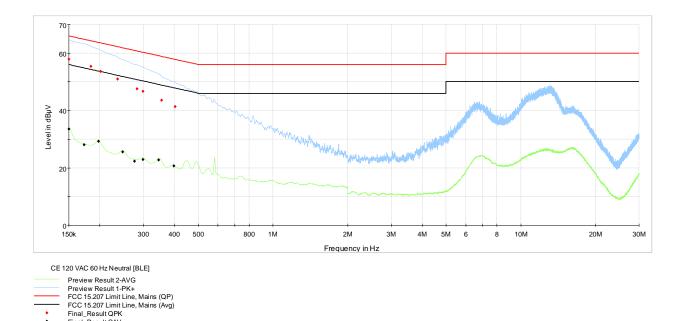
Testing data AC power line conducted emissions limits FCC Part 15 Subpart C and RSS-Gen, Issue 5

Test data, continued











Final\_Result CAV



Testing data AC power line conducted emissions limits FCC Part 15 Subpart C and RSS-Gen, Issue 5

# 7.1.5 Setup photos



Figure 7.1-5: Conducted emissions – from AC mains power ports setup photo

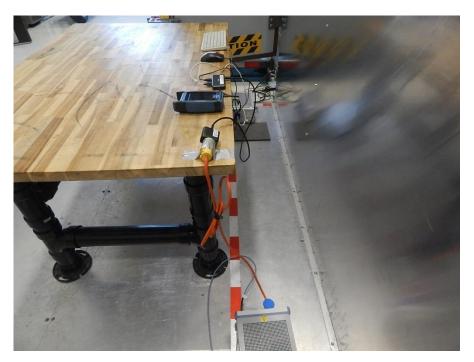


Figure 7.1-6: Conducted emissions – from AC mains power ports setup photo



Testing data Spurious (out-of-band) unwanted emissions FCC Part 15 Subpart C and RSS-247, Issue 3

### 7.2 Spurious (out-of-band) unwanted emissions

#### 7.2.1 References, 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)).

#### RSS-247, Clause 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-Gen:**

- 8.9 Except where otherwise indicated in the applicable RSS, radiated emissions shall comply with the field strength limits shown in table below.
- 8.10 Restricted frequency bands are designated primarily for safety-of-life services (distress calling and certain aeronautical activities), certain satellite downlinks, radio astronomy and some government uses. The following conditions related to the restricted frequency bands apply:
  - a The transmit frequency, including fundamental components of modulation, of licence-exempt radio apparatus shall not fall within the restricted frequency bands.
  - b Unwanted emissions that fall into restricted frequency bands listed in table 7 shall comply with the limits specified in table below.
  - c Unwanted emissions that do not fall within the restricted frequency bands shall comply either with the limits specified in the applicable RSS or with those specified in table below.

|                | Field strength of emissions |                                   |                         |  |  |
|----------------|-----------------------------|-----------------------------------|-------------------------|--|--|
| Frequency, MHz | μV/m                        | dBµV/m                            | Measurement distance, m |  |  |
| 0.009–0.490    | 2400/F                      | 67.6 – 20 × log10(F)              | 300                     |  |  |
| 0.490-1.705    | 24000/F                     | 87.6 – 20 × log <sub>10</sub> (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                       |  |  |

#### Table 7.2-1: FCC §15.209 and RSS-Gen – Radiated emission limits

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.



Testing data Spurious (out-of-band) unwanted emissions FCC Part 15 Subpart C and RSS-247, Issue 3

### References, definitions and limits, continued

#### Table 7.2-2: 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 7.2-2 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 7.2-3: 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       |                     |               |             |



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### 7.2.2 Test summary

| Verdict       | Pass               |                   |           |
|---------------|--------------------|-------------------|-----------|
| Test date     | June 13, 2024      | Temperature       | 24 °C     |
| Tested by     | Sarveshkumar Patel | Air pressure      | 1009 mbar |
| Test location | Ottawa             | Relative humidity | 56 %      |

#### 7.2.3 Observations, settings and special notes

- Only radiated spurious emissions within restricted bands were evaluated.
- As part of the current assessment, the test range of 9 kHz to 5<sup>th</sup> harmonic has been fully considered and compared to the actual frequencies utilized within the EUT. Since the EUT contains a transmitter in the GHz range, the EUT has been deemed compliant without formal testing in the 9 kHz to 30 MHz test range, therefore formal test results (tabular data and/or plots) are not provided within this test report.
- EUT was set to transmit with 100 % duty cycle..
- Radiated measurements were performed at a distance of 3 m.
- DTS emissions in restricted frequency bands test was performed as per KDB 558074, section 8.6 with reference to ANSI C63.10 subclause 11.12.
- DTS band-edge emission measurements test was performed as per KDB 558074, section 8.7 with reference to ANSI C63.10 subclause 11.13.

#### Spectrum analyser settings (Measurements within restricted bands)

| Resolution bandwidth: | Measurements below 1 GHz: 100 kHz Peak or 120 kHz Q-Peak, Measurements above 1 GHz: 1 MHz |
|-----------------------|---|
| Video bandwidth:      | Measurements below 1 GHz: 300 kHz, Measurements above 1 GHz: 3 MHz                        |
| Detector mode:        | Peak or Q-Peak  |
| Trace mode:           | Max Hold  |

#### 7.2.4 Test data

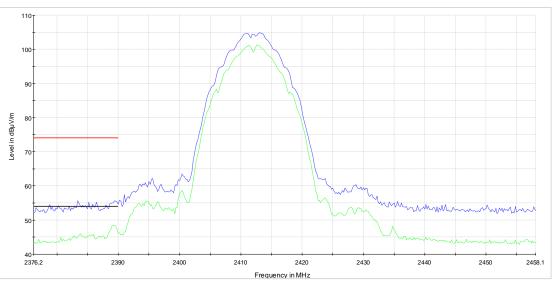
#### Table 7.2-4: Radiated unwanted emissions results

| Frequency (MHz) | Quasi-Peak field strength <sup>1 and 3</sup> (dBµV/m) | Quasi-Peak limit (dBµV/m) | Quasi-Peak margin (dB) | Correction factor <sup>2</sup> (dB) |
|-----------------|---|---------------------------|------------------------|-------------------------------------|
| Wi-Fi           |   |                           |                        |                                     |
| 111.8680        | 37.7  | 43.5                      | 5.8                    | 17.8                                |
| 114.1960        | 38.8  | 43.5                      | 4.7                    | 18.1                                |
| 127.0485        | 38.5  | 43.5                      | 5.0                    | 18.6                                |
| BLE             |   |                           |                        |                                     |
| 114.2930        | 38.9  | 43.5                      | 4.6                    | 18.1                                |
| 125.5450        | 39.4  | 43.5                      | 4.1                    | 18.7                                |
| 131.1225        | 37.4  | 43.5                      | 6.1                    | 18.6                                |



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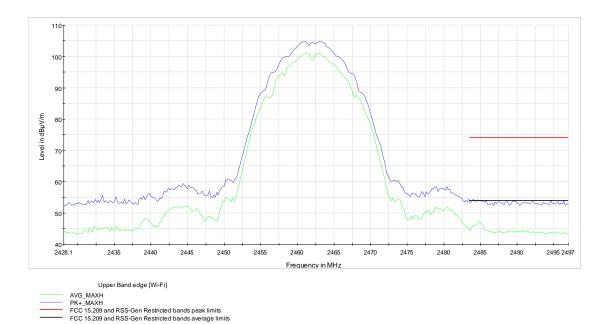
### Test data, continued

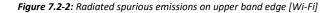


Lower Band edge [Wi-Fi]

AVG\_MAXH PK+\_MAXH FCC 15.209 and RSS-Gen Restricted bands peak limits FCC 15.209 and RSS-Gen Restricted bands average limits

Figure 7.2-1: Radiated spurious emissions on lower band edge [Wi-Fi]

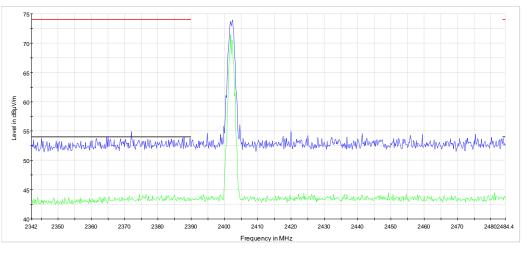






Testing data Spurious (out-of-band) unwanted emissions FCC Part 15 Subpart C and RSS-247, Issue 3

### Test data, continued



Lower Band edge (BLE) AVG\_MAXH PK+\_MAXH FCC 15.209 and RSS-Gen Restricted bands peak limits FCC 15.209 and RSS-Gen Restricted bands average limits

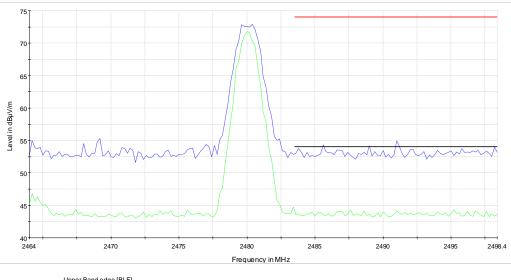
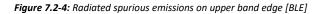


Figure 7.2-3: Radiated spurious emissions on lower band edge [BLE]

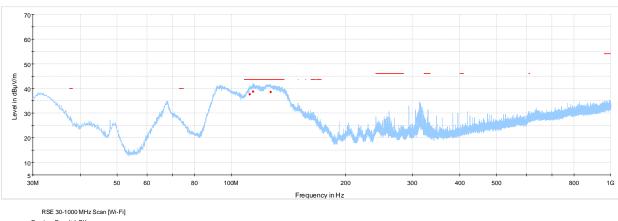
Upper Band edge [BLE] AVG\_MAXH PK+\_MAXH FCC 15.209 and RSS-Gen Restricted bands peak limits FCC 15.209 and RSS-Gen Restricted bands average limits



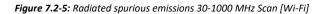


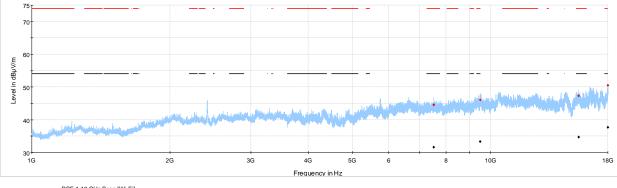
Testing data Spurious (out-of-band) unwanted emissions FCC Part 15 Subpart C and RSS-247, Issue 3

### Test data, continued



Preview Result 1-PK+ FCC 15.209 and RSS-Gen Restricted bands QP limit Final\_Result QPK





Preview Result 1-PK+ FC 15208 and RSS-Gen Restricted bands peak limits FC 15208 and RSS-Gen Restricted bands average limits Final\_Result PK+ Final\_Result CAV RSE 1-18 GHz Scan [Wi-Fi]

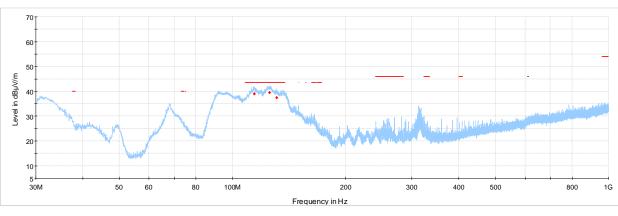


Figure 7.2-6: Radiated spurious emissions 1-18 GHz Scan [Wi-Fi]



Testing data Spurious (out-of-band) unwanted emissions FCC Part 15 Subpart C and RSS-247, Issue 3

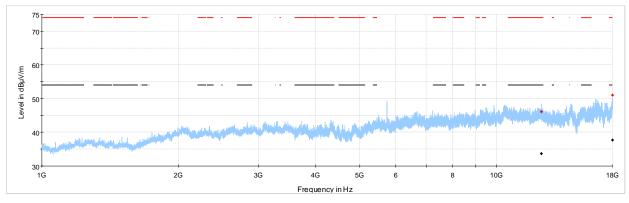
### Test data, continued



RSE 30-1000 MHz Scan [BLE]

Preview Result 1-PK+ FCC 15.209 and RSS-Gen Restricted bands QP limit Final\_Result QPK

#### Figure 7.2-7: Radiated spurious emissions 30-1000 MHz Scan [BLE]



RSE 1-18 GHz Scan [BLE]

Preview Result 1-PK+ FCC 15.209 and RSS-Gen Restricted bands peak limits FCC 15.209 and RSS-Gen Restricted bands average limits Final\_Result PK+ Final\_Result PK+

.

Figure 7.2-8: Radiated spurious emissions 1-18 GHz Scan [BLE]



Testing data Spurious (out-of-band) unwanted emissions FCC Part 15 Subpart C and RSS-247, Issue 3

# 7.2.5 Setup photos



Figure 7.2-9: Radiated spurious emissions – below 1 GHz



Figure 7.2-10: Radiated spurious emissions – above 1 GHz



# Section 8 Host photos

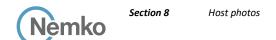
# 8.1 External photos of the host



Figure 8.1-1: Front view photo



Figure 8.1-2: Rear view photo



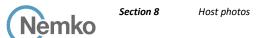
### External photos, continued



### Figure 8.1-3: Side view photo



Figure 8.1-4: Side view photo



External photos, continued



Figure 8.1-5: Top view photo



Figure 8.1-6: Bottom view photo

End of the test report