

ANTENNA TEST REPORT

Report ID:

REP173181a

Project number:

PRJ0079138

Type of radio equipment:

Bluetooth Device

Applicant:

SmartWave Technologies

Description of product:

Family of bait and trap-style stations

Model(s)/HVIN(s):

**Pulse Rat iQ TOTAL,
Pulse Mouse iQ TOTAL,
24/7 iQ TOTAL**

Product marketing name (PMN):

Bell iQ Total Solutions

FCC identifier:

FCC ID: 2ASYW-B01004V2

ISED certification number:

IC: 24934-B01004V2

Specifications:

- ◆ FCC 47 CFR Part 15 Subpart C, §15.247
- ◆ RSS-247, Issue 4, July 2024, Section 5

Date of issue: July 7, 2026

Tarek Elkholy, EMC/RF Engineer

Tested by

Andrey Adelberg, Senior EMC/RF Specialist

Reviewed by



Signature



Signature

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

Lab locations

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

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Table of Contents

Table of Contents	3
Section 1 Report summary	4
1.1 Test specifications	4
1.2 Test methods	4
1.3 Exclusions	4
1.4 Statement of compliance.....	4
1.5 Test report revision history.....	4
Section 2 Engineering considerations	5
2.1 Modifications incorporated in the EUT for compliance	5
2.2 Technical judgment	5
2.3 Model variant declaration	5
2.4 Deviations from laboratory tests procedures	5
Section 3 Test conditions	6
3.1 Atmospheric conditions	6
3.2 Power supply range	6
Section 4 Information provided by the applicant	7
4.1 Disclaimer	7
4.2 Applicant / Manufacturer	7
4.3 EUT information	7
4.4 Radio technical information.....	8
4.5 EUT setup details	8
Section 5 Summary of test results	10
5.1 Testing period.....	10
5.2 Sample information.....	10
5.3 Test results	10
Section 6 Test equipment.....	11
6.1 Test equipment list	11
Section 7 Testing data	12
7.1 Antenna requirement	12

Section 1 Report summary

1.1 Test specifications

FCC 47 CFR Part 15, Subpart C, Clause 15.247	Operation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz
RSS-247, Issue 4, July 2024, Section 5	Digital Transmission Systems (DTSSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices

1.2 Test methods

558074 D01 15.247 Meas Guidance v05r02 (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.
RSS-Gen, Issue 5, February 2021	General Requirements for Compliance of Radio Apparatus
ANSI C63.10-2020+Cor. 1-2023+C63.10a-2024 + Errata to C63.10a-2024	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

1.3 Exclusions

None

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.

Determining compliance is based on the results of the compliance measurement, not taking into account measurement uncertainty, in accordance with section 1.3 of ANSI C63.10 v2013.

See “Summary of test results” for full details.

1.5 Test report revision history

Table 1.5-1: Test report revision history

Revision #	Date of issue	Details of changes made to test report
REP173181a	July 7, 2026	Original report issued

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

As declared by the applicant, the EUT models differ only by the plastic enclosure housing, all contain the same radio board and with the same antenna. The model family, and the description of the variations, are as follows:

- Pulse Rat iQ TOTAL: bait station device, 9 in x 9 in x 4.5 in
- Pulse Mouse iQ TOTAL: smaller version, 6 in x 6 in x 3.75 in
- 24/7 iQ TOTAL: trap-style device, 10 in x 7 in x 2.25 in

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

Section 4 Information provided by the applicant

4.1 Disclaimer

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

Applicant name	SmartWave Technologies
Applicant address	1 Marmac Drive, Etobicoke, M9W 1E7, ON, Canada
Manufacturer name	Same as applicant
Manufacturer address	Same as applicant

4.3 EUT information

Product description	Family of bait and trap-style stations
Product marketing name (PMN):	Bell iQ Total Solutions
Model / HVIN	Pulse Rat iQ TOTAL, Pulse Mouse iQ TOTAL, 24/7 iQ TOTAL
Serial number	None
Power supply requirements	Battery: 3.6 V(DC)
Digital operational frequencies	Crystal clock 38.4 MHz
Software details	157.1
Product description and theory of operation	Family of bait and trap-style stations with BLE/LoRa RF module

4.4 Radio technical information

Category of Wideband Data Transmission equipment	☐ Frequency Hopping Spread Spectrum (FHSS) equipment ☒ Other types of Wideband Data Transmission equipment (e.g. DSSS, OFDM, etc.).
Frequency band	2400–2483.5 MHz
Frequency Min	2402 MHz
Frequency Max	2480 MHz
Channel numbers	0 – 39
RF power Max (W), Conducted	1.2 mW and (0.95 dBm)
Measured BW (kHz), 99% OBW	1018 kHz
Type of modulation	BLE (GFSK)
Transmitter spurious, dBμV/m @ 3 m	51.52 dBμV/m at 12208.4 MHz, average
Antenna information (declared)	Type: Helical / ¼-wave monopole (PCB mounted) Manufacturer: TE Connectivity Model: ANT-915-VHETH Gain: 0.9 dBi (within 900 MHz band)
Antenna information (measured)	-2.1 dBi (within 2.4 GHz band)

4.5 EUT setup details

4.5.1 Radio exercise details

Operating conditions	The EUT was powered up and was connected to laptop loaded with (Silicon labs Bluetooth NCP Commander) software via USB-UART connection, using the SW the EUT was forced into continuous transmission at any of the available channels at 1 Mbps (LE 1M PHY) at power level of 2 dBm. The EUT is battery powered, DC power supply was used during the test to maintain consistent power supply to the EUT throughout the whole test.
Transmitter state	Continuous transmission

4.5.2 EUT setup configuration

Table 4.5-1: Radio module board interface ports

Description	Qty.
DC power input	1
SMA female RF interface (conducted sample)	1
UART control port	1

Table 4.5-2: Support equipment

Description	Brand name	Model, Part number, Serial number, Revision level
Laptop	Dell	MN: Latitude E6420, DPN: VVF52 A01, SN: 28MCCS1

Table 4.5-3: Inter-connection cables

Cable description	From	To	Length (m)
UART-USB power cable	Laptop	EUT	0.9
DC power cable	DC power supply	EUT	0.9

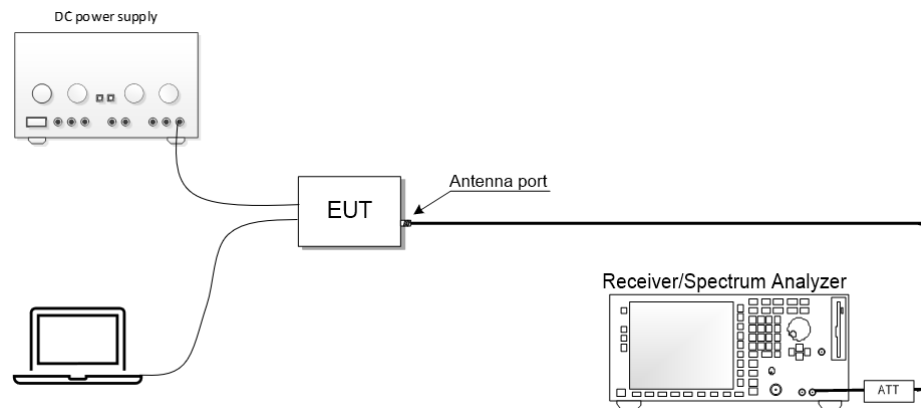


Figure 4.5-1: Antenna port testing block diagram

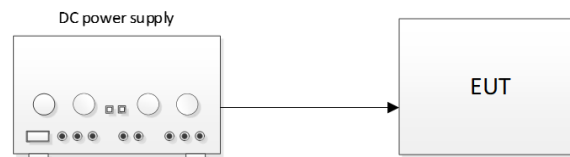


Figure 4.5-2: Antenna port testing block diagram

Section 5 Summary of test results

5.1 Testing period

Test start date	September 29, 2025	Test end date	June 3, 2026
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5.2 Sample information

Receipt date	September 29, 2025	Nemko sample ID number(s)	PRJ00791380001, PRJ00791380002, PRJ00980670001, PRJ00980670002, PRJ00980670003
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5.3 Test results

Table 5.3-1: FCC and ISED requirements results

Test description	Acceptance
Antenna characterization test	Accepted

Section 6 Test equipment

6.1 Test equipment list

Table 6.1-1: Equipment list

Equipment	Manufacturer	Model no.	Asset no.	Cal cycle	Next cal.
Receiver/spectrum analyzer	Rohde & Schwarz	ESR26	FA002969	1 year	August 28, 2026
3 m EMI test chamber	TDK	SAC-3	FA003012	1 year	October 31, 2026
Vector signal generator	Rohde & Schwarz	SMW200A	FA002970	1 year	March 26, 2026
Antenna mast	SUNAR	TLT2	FA003007	—	NCR
Horn antenna (1–18 GHz)	EMCO	3115	FA000649	1 year	April 23, 2027
Preamp (1–18 GHz)	ETS Lindgren	124334	FA002956	1 year	April 10, 2027
Spectrum analyzer	Rohde & Schwarz	FSW43	FA002971	1 year	November 24, 2026
50 Ω SMA coax cable	Huber + Suhner	None	FA003056	1 year	Aug 6, 2026
50 Ω coax cable	Huber + Suhner	None	FA003402	1 year	Aug 6, 2026
50 Ω coax cable	Huber + Suhner	None	FA003047	1 year	Aug 6, 2026

Note: NCR - no calibration required

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
Radio/EMC test software	Rohde & Schwarz	EMC32, Software for EMC Measurements, Version 10.60.00

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

Measurement	Measurement uncertainty, $\pm$ dB
Radiated spurious emissions (1 GHz to 6 GHz)	4.74
RF Output power measurement using Spectrum Analyzer	1.46
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 Antenna requirement

7.1.1 References, 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.

FCC §15.247:

- (b) The maximum peak conducted output power of the intentional radiator shall not exceed the following:
- (4) The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

RSS-Gen, Clause 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.

7.1.2 Test summary

Verdict	Pass		
Test date	September 29, 2025	Temperature	23 °C
Tested by	Tarek Elkholy	Air pressure	990 mbar
Test location	Cambridge	Relative humidity	48 %

7.1.3 Observations, settings and special notes

The antenna datasheet provides gain information only for operation within the 902–930 MHz band and does not specify antenna gain at 2.4 GHz. To evaluate antenna performance within the 2.4 GHz BLE operating band, the measured conducted output power of the fundamental frequency was compared with the measured equivalent isotropically radiated power (EIRP) obtained during compliance testing. The maximum conducted output power was measured as 0.95 dBm (refer to figure 7.5-1), while the corresponding radiated output power (Field Strength) was measured around 94.1 dBμV/m at 3 m (equivalent to –1.13 dBm EIRP, refer to figure 7.5-2). Based on these measurements, the effective antenna gain is calculated to be approximately –2.1 dBi. Therefore, the declared antenna gain of 0.9 dBi represents a conservative value and bounds the measured antenna performance.

7.1.4 Test data

Must the EUT be professionally installed? ☐ YES ☒ NO
 Does the EUT have detachable antenna(s)? ☐ YES ☒ NO
 If detachable, is the antenna connector(s) non-standard? ☐ YES ☐ NO ☒ N/A

Table 7.1-1: Antenna information

Antenna type	Manufacturer	Model number	Maximum measured gain	Maximum declared gain	Connector type
Helical Antenna	TE Connectivity	ANT-915-VHETH	-2.1 dBi	0.9 dBi	Soldered to the PCB

Table 7.1-2: Antenna gain measurement results

Frequency	Field Strength at 3 m, dBμV/m	Calculated EIRP, dBm	Conducted peak output power, dBm	Calculated antenna gain, dBi
2402	94.09	-1.13	0.95	-2.1

Calculated antenna gain = Calculated EIRP – conducted peak output power

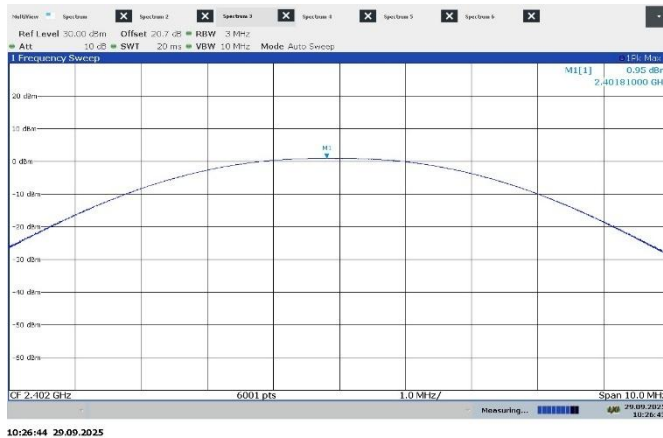


Figure 7.1-1: Output power (conducted)

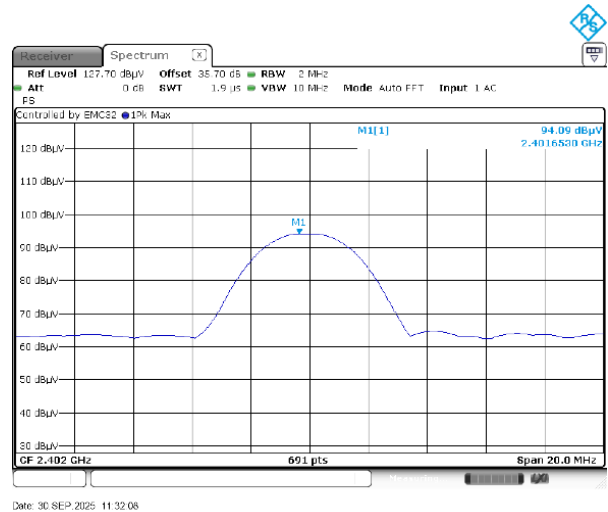


Figure 7.1-2: EIRP radiated

Conclusion:

- The measured antenna gain at 2.4 GHz is **-2.1 dBi**, which is lower than the declared 0.9 dBi.
- Therefore, **0.9 dBi is conservative** and bounds the actual antenna performance.

The antenna performance at 2.4 GHz was not directly specified in the datasheet, requiring derivation from test data. Using measured conducted and radiated results, the effective antenna gain is -2.1 dBi. The declared gain of 0.9 dBi is conservative and safely bounds real performance. Radiated and conducted plots confirm:

Proper RF behavior
 Compliance with FCC Part 15.247 and RSS-247 requirements

End of the test report