



Choose Scandinavian trust

RADIO TEST REPORT – 452372-3TRFWL

Type of assessment:

Final product testing

Applicant:

Newtrax Technologies Inc.

Product name (type):

Proximity Ranging Sensor

Model (HVIN):

NTX-PRS-001-000

FCC identifier:

FCC ID: OQ6-PRS-001

ISED certification number:

IC: 6314B-PRS001

Specifications:

- ◆ FCC 47 CFR Part 15, Subpart C, §15.250
- ◆ RSS-210, Issue 10, Annex K, December 2019

Date of issue: **January 26, 2023**

Kevin Rose, Senior EMC/RF Specialist

Tested by

Signature

Andrey Adelberg, Senior EMC/RF Specialist

Reviewed by

Signature



Company name	Nemko Canada Inc.			
Facilities	<i>Ottawa site:</i> 303 River Road Ottawa, Ontario Canada K1V 1H2	<i>Montréal site:</i> 292 Labrosse Avenue Pointe-Claire, Québec Canada H9R 5L8	<i>Cambridge site:</i> 1-130 Saltsman Drive Cambridge, Ontario Canada N3E 0B2	<i>Almonte site:</i> 1500 Peter Robinson Road West Carleton, Ontario Canada K0A 1L0
	Tel: +1 613 737 9680	Tel: +1 514 694 2684	Tel: +1 519 650 4811	Tel: +1 613 256-9117
	Fax: +1 613 737 9691	Fax: +1 514 694 3528		Fax: +1 613 256-8848
Test site registration	Organization FCC/ISED	Recognition numbers and location FCC: CA2040; IC: 2040A-4 (Ottawa/Almonte); FCC: CA2041; IC: 2040G-5 (Montreal); CA0101 (Cambridge)		
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.

Copyright notification

Nemko Canada Inc. authorizes the applicant to reproduce this report provided it is reproduced in its entirety and for use by the company's employees only. Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties.

Nemko Canada Inc. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

© Nemko Canada Inc.

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 Deviations from laboratory tests procedures.....	5
Section 3. Test conditions.....	6
3.1 Atmospheric conditions	6
3.2 Power supply range.....	6
Section 4. Measurement uncertainty.....	7
4.1 Uncertainty of measurement	7
Section 5. Information provided by the applicant	8
5.1 Disclaimer.....	8
5.2 Applicant and manufacturer	8
5.3 EUT information	8
5.4 Technical information	9
5.5 EUT setup details.....	9
Section 6. Summary of test results.....	10
6.1 Testing location	10
6.2 Testing period	10
6.3 Sample information.....	10
6.4 FCC Part 15 Subpart C, general requirements test results.....	10
6.5 FCC Part 15 Subpart C, intentional radiators test results.....	10
6.6 ISED RSS-Gen, Issue 5, test results.....	11
6.7 ISED RSS-210, Issue 10, test results	11
Section 7. Test equipment	12
7.1 Test equipment list.....	12
Section 8. Testing data	13
8.1 FCC 15.31(e) Variation of power source	13
8.2 FCC 15.31(m) and RSS-Gen 6.9 Number of frequencies	14
8.3 FCC 15.203 and RSS-Gen, section 6.8 Antenna requirement.....	15
8.4 FCC 15.250(d)(3) and RSS-210 K.3(c) Peak emissions within 50 MHz band	16
8.5 FCC 15.250(d)(1) and RSS-210 K.3(a) Field strength of emissions above 960 MHz.....	18
8.6 FCC 15.250(d)(4) and RSS-210 K.3(d) Field strength of emissions below 960 MHz	21
8.7 FCC 15.250(a,b) and RSS-210 K.2 Emission bandwidth.....	23
8.8 FCC 15.250(d)(2) and RSS-210 K.3(b) Field strength of emissions within 1164-1240 and 1559-1610 MHz band	25
Section 9. Block diagrams of test set-ups	27
9.1 Radiated emissions set-up for frequencies below 1 GHz.....	27
9.2 Radiated emissions set-up for frequencies above 1 GHz.....	27

Section 1. Report summary

1.1 Test specifications

FCC 47 CFR Part 15, Subpart F, Clause 15.520	Operation of wideband systems within the band 5925–7250 MHz.
RSS-210, Issue 10, December 2019	Licence-Exempt Radio Apparatus: Category I Equipment. Annex K: Wideband devices operating within the band 5925–7250 MHz.

1.2 Test methods

ANSI C63.10 v2013	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices
RSS-Gen, Issue 5, March 2019	General Requirements for Compliance of Radio Apparatus

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.

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
TRF	January 26, 2023	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 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. Measurement uncertainty

4.1 Uncertainty of measurement

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

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

Table 4.1-1: Measurement uncertainty calculations for Radio

Test name	Measurement uncertainty, \pm dB
All antenna port measurements	0.55
Occupied bandwidth	4.45
Conducted spurious emissions	1.13
Radiated spurious emissions	3.78
AC power line conducted emissions	3.55

Section 5. Information provided by the applicant

5.1 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.

5.2 Applicant and manufacturer

Applicant name	Newtrax Technologies Inc.
Applicant address	620, rue Saint-Jacques, Suite 600, H3C 1C7, Montreal, Quebec, Canada
Manufacturer name	Same as applicant
Manufacturer address	Same as applicant

5.3 EUT information

Product	Proximity Ranging Sensor
Model	NTX-PRS-001-000
Serial number	A521-136F
Part number	10-00114-00
Power supply requirements	Car battery: typical 12 V _{DC}
Product description and theory of operation	Newtrax RF Ranging Sensor for Proximity Detection enables additional proximity detection features when used with the Newtrax Vehicle Device (NVD), including filtering of detections too far away, classification of detection in green/yellow/red levels of criticality, and relative positioning of people, vehicles, and fixed hazards to determine if they are front/back/left/right of vehicle.

5.4 Technical information

Frequency band	5925–7250 MHz
Frequency (MHz)	6495
Channel numbers	Single channel
Field Strength of fundamental (dB μ V/m @ 3 m)	88.18
Measured BW (MHz), 99% OBW	671.3
Measured BW (MHz), 10 dB BW	470.3
Type of modulation	Gaussian Frequency Shift Keying (GFSK)
Emission classification	671MF1D
Transmitter spurious, dB μ V/m @ 3 m	36.61 (average)
Antenna information	Newtrax PCB antenna, 3.3 dBi gain

5.5 EUT setup details

5.5.1 Radio exercise details

Operating conditions	Firmware version: V1.1.0 EUT was configured for CSS and UWB which were exercised simultaneously. Support PRS was ranging with EUT.
Transmitter state	Transmitter set into continuous mode.

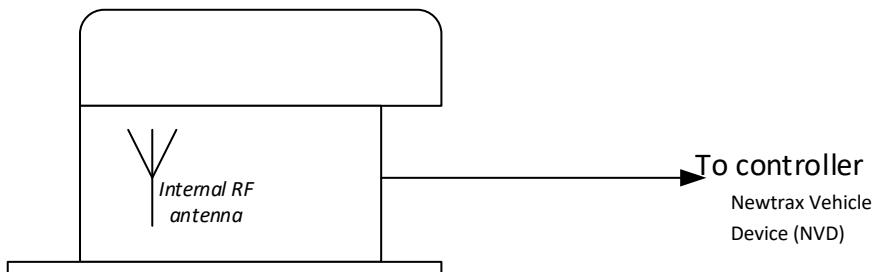


Figure 5.5-1: Setup block diagram

Section 6. Summary of test results

6.1 Testing location

Test location (s)	Ottawa
-------------------	--------

6.2 Testing period

Test start date	November 17, 2021	Test end date	November 17, 2021
-----------------	-------------------	---------------	-------------------

6.3 Sample information

Receipt date	November 9, 2021	Nemko sample ID number(s)	1
--------------	------------------	---------------------------	---

6.4 FCC Part 15 Subpart C, general requirements test results

Table 6.4-1: FCC general requirements results

Part	Test description	Verdict
§15.207(a)	Conducted limits	Not applicable
§15.31(e)	Variation of power source	Pass
§15.31(m)	Number of tested frequencies	Pass
§15.203	Antenna requirement	Pass

Notes: EUT is a battery-operated device, the testing was performed using fully charged batteries.

6.5 FCC Part 15 Subpart C, intentional radiators test results

Table 6.5-1: FCC 15.250 requirements results

Part	Test description	Verdict
§15.250(d)(1)	Field strength of emissions above 960 MHz	Pass
§15.250(a,b)	Emission bandwidth	Pass
§15.250(d)(2)	Field Strength of emissions within 1164-1240 and 1559-1610 MHz	Pass
§15.250(d)(3)	Peak Emissions within 50 MHz band	Pass
§15.250(d)(4)	Field strength of emissions at or below 960 MHz	Pass

6.6 ISED RSS-Gen, Issue 5, test results

Table 6.6-1: RSS-Gen results

Part	Test description	Verdict
7.3	Receiver radiated emission limits	Not applicable
7.4	Receiver conducted emission limits	Not applicable
6.9	Operating bands and selection of test frequencies	Pass
6.7	Occupied bandwidth (or 99% emission bandwidth)	Pass
8.8	AC power-line conducted emissions limits	Not applicable

Notes: ¹ According to sections 5.2 and 5.3 of RSS-Gen, Issue 5 the EUT does not have a stand-alone receiver neither scanner receiver, therefore exempt from receiver requirements.

6.7 ISED RSS-210, Issue 10, test results

Table 6.7-1: RSS-210 results

Section	Test description	Verdict
K.2	Bandwidth	Pass
K.3.a	Limits of radiated emissions above 960 MHz	Pass
K.3.b	Field Strength of emissions within 1164-1240 and 1559-1610 MHz	Pass
K.3.c	Peak Emission within 50 MHz band	Pass
K.3.d	Limits of radiated emissions below 960 MHz	Pass

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.
3 m EMI test chamber	TDK	SAC-3	FA002047	1 year	March 26, 2022
Flush mount turntable	Sunol	FM2022	FA002082	—	NCR
Controller	Sunol	SC104V	FA002060	—	NCR
Antenna mast	Sunol	TLT2	FA002061	—	NCR
Receiver/spectrum analyzer	Rohde & Schwarz	ESU 26	FA002043	1 year	November 6, 2021
Preamp (1–18 GHz)	ETS Lindgren	124334	FA002877	1 year	October 13, 2021
Bilog antenna (20–3000 MHz)	Sunol	JB3	FA002108	1 year	February 2, 2022
Horn antenna (1–18 GHz)	EMCO	3115	FA000825	1 year	October 13, 2021
Horn antenna (18–40 GHz)	EMCO	3116	FA001847	1 year	May 7, 2021
Pre-amplifier (18–26 GHz)	Narda	BBS-1826N612	FA001550	—	VOU
Spectrum analyzer	Rohde & Schwarz	FSU	FA001877	1 year	April 31, 2021
Pre-amplifier (26–40 GHz)	Narda	DBL-2640N610	FA001556	—	VOU
50 Ω coax cable	C.C.A.	None	FA002556	1 year	March 24, 2022

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



Section 8. Testing data

8.1 FCC 15.31(e) Variation of power source

8.1.1 References, definitions and limits

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

8.1.2 Test summary

Verdict	Pass
Tested by	Kevin Rose

8.1.3 Observations, settings and special notes

None

8.1.4 Test data

EUT Power requirements:

AC DC Battery
 YES NO N/A
 YES NO N/A
 YES NO N/A

If EUT is an AC or a DC powered, was the noticeable output power variation observed?

If EUT is battery operated, was the testing performed using fresh batteries?

If EUT is rechargeable battery operated, was the testing performed using fully charged batteries?

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

8.2.1 References, definitions and limits

FCC:

Measurements on intentional radiators or receivers shall be performed and, if required, reported for each band in which the device can be operated with the device operating at the number of frequencies in each band specified in the following table.

ISED:

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

Table 8.2-1: Frequency Range of Operation

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

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

8.2.2 Test summary

Verdict	Pass	Test date	November 17, 2021
Tested by	Kevin Rose		

8.2.3 Observations, settings and special notes

8.2.4 Test data

Table 8.2-2: Frequency range bandwidth

Start of Frequency range, MHz	End of Frequency range, MHz	Frequency range bandwidth, MHz
5925	7250	1325

EUT is only using single 500-MHz channel at 6.5 GHz

8.3 FCC 15.203 and RSS-Gen, section 6.8 Antenna requirement

8.3.1 References, definitions and limits

FCC:

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.

ISED:**RSS-Gen**

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

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

8.3.2 Test summary

Verdict	Pass
Tested by	Kevin Rose

Test date

April 29, 2021

8.3.3 Observations, settings and special notes

The antenna is located inside the EUT and is not end user accessible.

8.3.4 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 8.3-1: Antenna information

Antenna type	Manufacturer	Model number	Maximum gain	Connector type
Patch	Pulse	W3229	6.5 dBi	SMA

8.4 FCC 15.250(d)(3) and RSS-210 K.3(c) Peak emissions within 50 MHz band

8.4.1 References, definitions and limits

FCC:

There is a limit on the peak level of the emissions contained within a 50 MHz bandwidth centered on the frequency at which the highest radiated emission occurs and this 50 MHz bandwidth must be contained within the 5925-7250 MHz band. The peak EIRP limit is $20 \log (RBW/50)$ dBm where RBW is the resolution bandwidth in megahertz that is employed by the measurement instrument. RBW shall not be lower than 1 MHz or greater than 50 MHz. The video bandwidth of the measurement instrument shall not be less than RBW. If RBW is greater than 3 MHz, the application for certification filed with the Commission shall contain a detailed description of the test procedure, calibration of the test setup, and the instrumentation employed in the testing.

ISED:

In a 50 MHz bandwidth contained within the band 5925-7250 MHz and centred on the frequency at which the highest radiated emission level occurs, the peak e.i.r.p. level of the emissions in this 50 MHz bandwidth shall not exceed $20 \log (RBW/50)$ dBm, where "RBW" is the resolution bandwidth in MHz that is employed by the measurement instrument. The RBW shall not be lower than 1 MHz or greater than 50 MHz. The video bandwidth of the measurement instrument shall not be less than the RBW. If the RBW is greater than 3 MHz, the application for certification shall contain a detailed description of the test procedure, calibration of the test set-up, and the instrumentation employed during testing.

8.4.2 Test summary

Verdict	Pass
Tested by	Kevin Rose

8.4.3 Observations, settings and special notes

Receiver settings for preview measurements:

Resolution bandwidth	50 MHz
Video bandwidth	50 MHz
Detector mode	Peak
Trace mode	Max Hold

8.4.4 Test data

Table 8.4-1: Peak emissions within 50 MHz band results

Peak result, dB μ V/m/50 MHz	Limit, dB μ V/m/50 MHz	Margin, dB
88.18	95.23	7.05

Note: 0 dBm EIRP is equivalent to 95.23 dB μ V/m at 3 m.

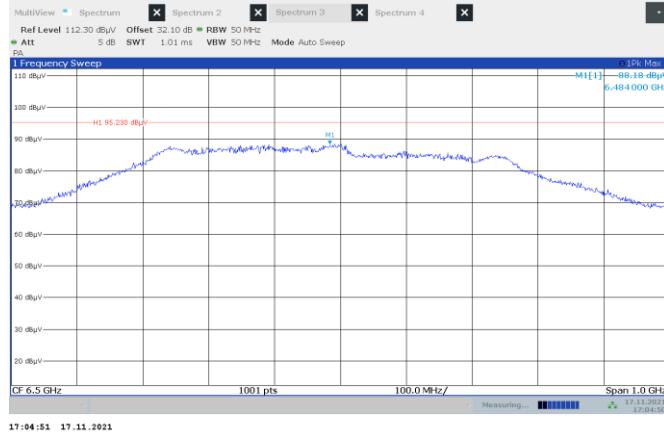


Figure 8.4-1: Field strength of the fundamental

8.5 FCC 15.250(d)(1) and RSS-210 K.3(a) Field strength of emissions above 960 MHz

8.5.1 References, definitions and limits

FCC:

Emissions from a transmitter operating under this section shall not exceed the following equivalent isotropically radiated power (EIRP) density levels. The radiated emissions above 960 MHz from a device operating under the provisions of this section shall not exceed the RMS average limits (in the table below) based on measurements using a 1 MHz resolution bandwidth.

FCC 15.209:

Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table.

ISED:

Transmitter radiated emissions shall comply with the following e.i.r.p. limits.

The e.i.r.p. of radiated emissions above 960 MHz shall not exceed the limits in table below, and the transmitter power shall be measured using root-mean-square (RMS) average detector and a 1 MHz resolution bandwidth.

Table 8.5-1: Radiated emissions for wideband devices operating in the band 5925-7250 MHz

Spurious emission frequency (MHz)	Average EIRP, dBm/MHz	RMS Average EIRP, dB μ V/m/MHz
960–1610	-75.3	19.93
1610–1990	-63.3	31.93
1990–3100	-61.3	33.93
3100–5925	-51.3	43.93
5925–7250	-41.3	53.93
7250–10600	-51.3	43.93
10600–40000	-61.3	33.93

8.5.2 Test summary

Verdict	Pass	Test date	November 17, 2021
Tested by	Kevin Rose		

8.5.3 Observations, settings and special notes

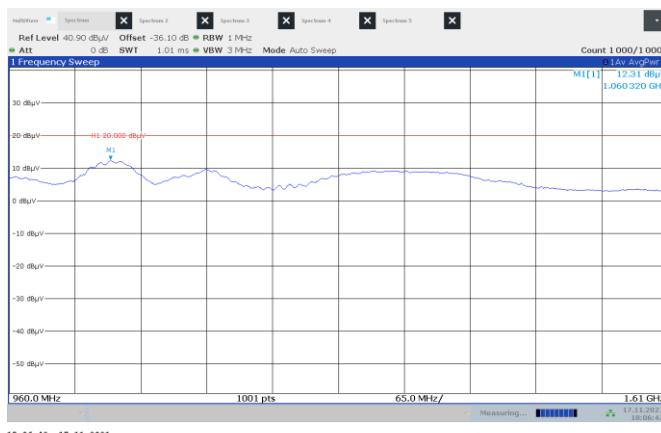
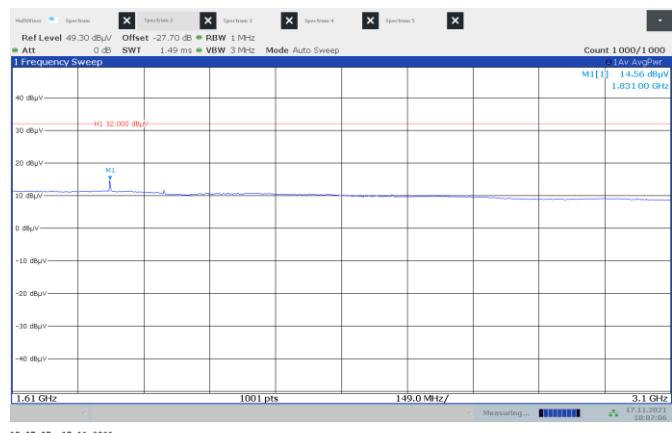
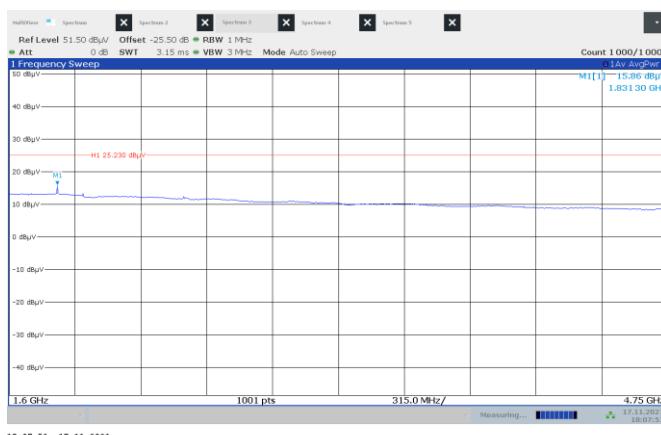
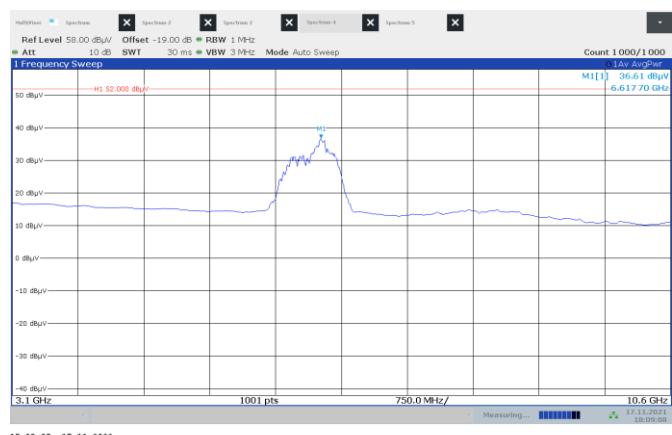
The spectrum was searched from 960 MHz to 40 GHz

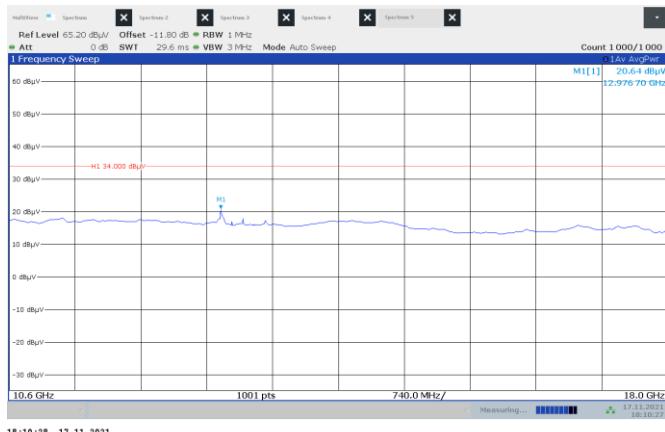
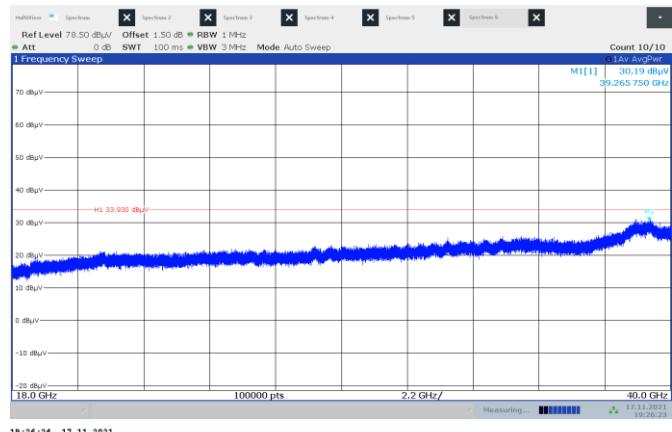
Radiated measurements were performed at a distance of 30 cm.

Field Strength (dB μ V/m) = Measured raw value (dB μ V/m) + Path loses (dB) + Distance Correction Factor (-20 dB)

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

Resolution bandwidth	1 MHz
Video bandwidth	3 MHz
Detector mode	RMS
Trace mode	Max Hold

8.5.4 Test data

Figure 8.5-1: Spurious Emissions within 960–1610 MHz

Figure 8.5-2: Spurious Emissions within 1610–3100 MHz

Figure 8.5-3: Spurious Emissions within 1600–4750 MHz

Figure 8.5-4: Spurious Emissions within 3100–10600 MHz

Test data, continued

Figure 8.5-5: Spurious Emissions within 10.6–18 GHz

Figure 8.5-6: Spurious Emissions within 18–40 GHz

8.6 FCC 15.250(d)(4) and RSS-210 K.3(d) Field strength of emissions below 960 MHz

8.6.1 References, definitions and limits

FCC:

Radiated emissions at or below 960 MHz shall not exceed the emission levels in FCC 15.209.

FCC 15.209:

Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table.

ISED:

Radiated emissions at or below 960 MHz shall not exceed the emission levels in RSS-Gen.

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.

Table 8.6-3: FCC §15.209 and RSS-Gen – Radiated emission limits

Frequency, MHz	Field strength of emissions µV/m	Field strength of emissions dBµV/m	Measurement distance, m
30–88	100	40.0	3
88–216	150	43.5	3
216–960	200	46.0	3

Notes: In the emission table above, the tighter limit applies at the band edges.

Table 8.6-4: 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 this table and above 38.6 GHz are designated for licence-exempt applications. These frequency bands and the requirements that apply to related devices are set out in the 200 and 300 series of RSSs.

Table 8.6-5: FCC restricted frequency bands

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

8.6.2 Test summary

Verdict	Pass		
Tested by	Kevin Rose	Test date	November 17, 2021

8.6.3 Observations, settings and special notes

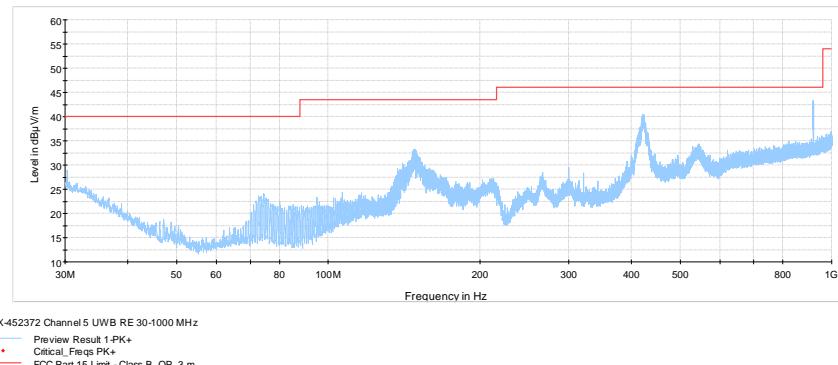
The spectrum was searched from 30 MHz to 960 MHz

Radiated measurements were performed at a distance of 3 m.

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

Resolution bandwidth	100 kHz
Video bandwidth	300 kHz
Detector mode	Peak (preview), Quasi-peak (final measurement, if any)
Trace mode	Max Hold

8.6.4 Test data


Figure 8.6-1: Spurious Emissions below 960 MHz

8.7 FCC 15.250(a,b) and RSS-210 K.2 Emission bandwidth

8.7.1 References, definitions and limits

FCC:

The -10 dB bandwidth of a device operating under the provisions of this section must be contained within the 5925-7250 MHz band under all conditions of operation including the effects from stepped frequency, frequency hopping or other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage.

The -10 dB bandwidth of the fundamental emission shall be at least 50 MHz. For transmitters that employ frequency hopping, stepped frequency or similar modulation types, measurement of the -10 dB minimum bandwidth specified in this paragraph shall be made with the frequency hop or step function disabled and with the transmitter operating continuously at a fundamental frequency following the provisions of § 15.31(m).

ISED:

Following are the requirements for bandwidth measurements:

- a. The 10 dB bandwidth of the device shall be within the band 5925-7250 MHz under all conditions of operation, including the effects from stepped frequency, frequency hopping or other modulation techniques that may be employed, as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage.
- b. The 10 dB bandwidth of the device shall be at least 50 MHz and less than 500 MHz. For transmitters that employ frequency hopping, stepped frequency or similar modulation types, measurement of the 10 dB bandwidth specified in this paragraph shall be made with the frequency hop or step function disabled, and with the transmitter operating continuously at a frequency chosen in accordance with the provisions of RSS-Gen for determining measurement frequencies.

8.7.2 Test summary

Verdict	Pass		
Tested by	Kevin Rose	Test date	November 17, 2021

8.7.3 Observations, settings and special notes

Spectrum analyser settings:

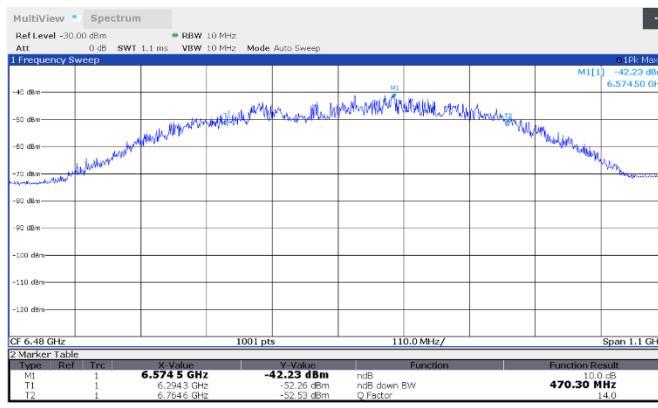
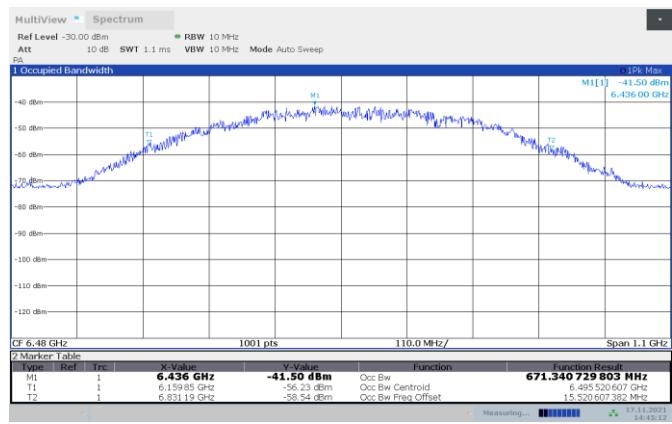
Resolution bandwidth	≥ 1 % of emission bandwidth
Video bandwidth	$\geq 3 \times$ RBW
Frequency span	Wider than emission bandwidth
Detector mode	Peak

8.7.4 Test data
Table 8.7-1: 10 dB bandwidth measurement result

10 dB bandwidth, MHz	Limit, MHz	Margin, MHz
470.3	500.0	29.7

Table 8.7-2: Bandwidth within frequency band measurement result

Lower 10 dBc cross point, MHz	Start of Frequency range, MHz	Start of Frequency range margin, MHz	Upper 10 dBc cross point, MHz	End of Frequency range, MHz	End of Frequency range margin, MHz
6294.3	5925.0	369.3	6764.6	7250.0	485.4


Figure 8.7-1: -10 dB bandwidth

Figure 8.7-2: 99 % occupied bandwidth

8.8 FCC 15.250(d)(2) and RSS-210 K.3(b) Field strength of emissions within 1164-1240 and 1559-1610 MHz band

8.8.1 References, definitions and limits

FCC:

In addition to the radiated emission limits specified in the table in paragraph (d)(1) of this section, transmitters operating under the provisions of this section shall not exceed the following RMS average limits when measured using a resolution bandwidth of no less than 1 kHz.

ISED:

In addition to the radiated emission limits above 960 MHz, the transmitter's e.i.r.p. shall not exceed the RMS average limits specified in table below when measured using a resolution bandwidth of no less than 1 kHz.

Table 8.8-1: Additional e.i.r.p. limits for wideband devices operating in the band 5925-7250 MHz

Fundamental frequency (MHz)		EIRP in RBW no less than 1 kHz (dB μ V/m)
1164-1240	-85.3	9.93
1559-1610	-85.3	9.93

8.8.2 Test summary

Verdict	Pass		
Tested by	Kevin Rose	Test date	November 17, 2021

8.8.3 Observations, settings and special notes

Spectrum analyser settings:

Resolution bandwidth	1 kHz
Video bandwidth	3 kHz
Detector mode	Peak
Trace Mode	Max Hold

8.8.4 Test data

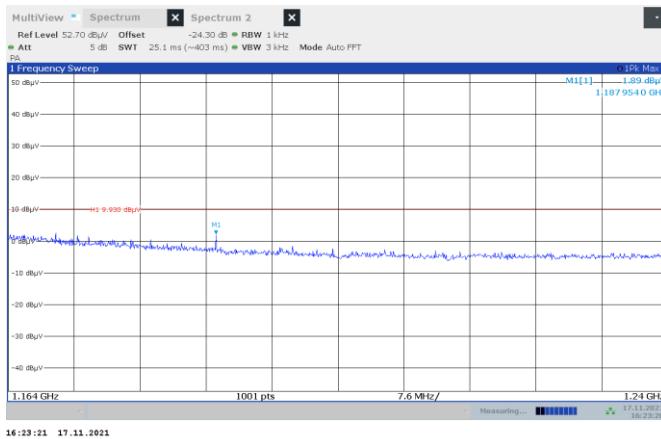


Figure 8.8-1: Spurious Emissions within 1164–1240 MHz

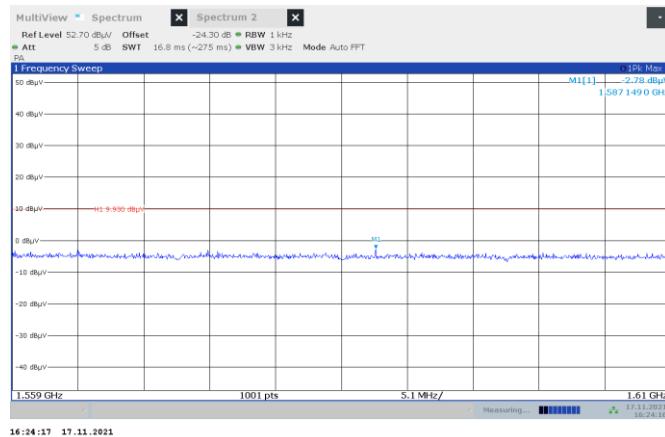
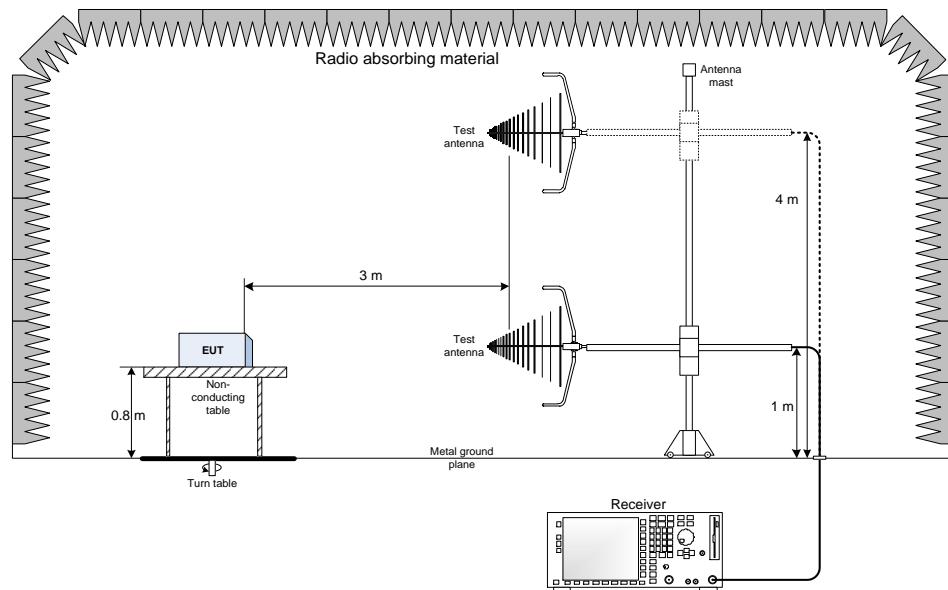


Figure 8.8-2: Spurious Emissions within 1559–1610 MHz

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

