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WIRELESS TEST REPORT – 376812-1TRFWL

Applicant:

International Road Dynamics, Inc.

Product type:

Radar speed feedback sign

Model:	FCC ID:	ISED Registration number:
TMS-SA 4	TRQ-TMSSA	6193A-TMSSA

Specifications:

- FCC 47 CFR Part 15 Subpart C, §15.245

Operation within the bands 902–928 MHz, 2435–2465 MHz, 5785–5815 MHz, 10500–10550 MHz, and 24075–24175 MHz.

- RSS-210 Issue 9, August 2016, Annex F.2

Speed Radar Meters operating in the Bands 10.5–10.55 GHz, 24.075–24.175 GHz and 33.4–36 GHz.

Date of issue: December 17, 2019

Andrey Adelberg, Senior Wireless/EMC Specialist	
Test engineer(s)	Signature
Kevin Rose, Wireless/EMC Specialist	
Reviewed by	Signature

Nemko Canada Inc., a testing laboratory, is accredited by the Standards Council of Canada. The tests included in this report are within the scope of this accreditation

Test location(s)

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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	International Road Dynamics, Inc.
Address	702-43rd Street East
City	Saskatoon
Province/State	SK
Postal/Zip code	S7K 3T9
Country	Canada

1.2 Test specifications

FCC 47 CFR Part 15, Subpart C, §15.245	Operation within the bands 902–928 MHz, 2435–2465 MHz, 5785–5815 MHz, 10500–10550 MHz, and 24075–24175 MHz.
RSS-210 Issue 9, August 2016, Annex F.2	Speed Radar Meters operating in the Bands 10.5–10.55 GHz, 24.075–24.175 GHz and 33.4–36 GHz.

1.3 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

1.4 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 1.5 below. 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 Exclusions

None

1.6 Test report revision history

Revision #	Date of issue	Details of changes made to test report
TRF	December 17, 2019	Original report issued

Section 2. Summary of test results

2.1 FCC Part 15 Subpart C, general requirements test 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 fresh batteries.

2.2 FCC Part 15 Subpart C, intentional radiators test results

Part	Test description	Verdict
§15.245(b)	Radiated emissions not in restricted bands	Pass
§15.245(b)(3)	Spurious emissions (except harmonics)	Pass
§15.215(c)	20 dB bandwidth	Pass

Notes: None

2.3 IC RSS-GEN, Issue 5, test results

Part	Test description	Verdict
7.3	Receiver radiated emission limits	Not applicable
7.4	Receiver conducted emission limits	Not applicable
6.7	Occupied bandwidth (or 99% emission bandwidth) and x dB bandwidth	Pass
6.9	Operating bands and selection of test frequencies	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.
EUT is a battery-operated device, the testing was performed using fresh batteries.

2.4 ISED RSS-210, Issue 9, test results

Section	Test description	Verdict
F.2.1	Radiated Emissions of fundamental and harmonics	Pass
F.2.1	Radiated Emissions except for harmonic	Pass
F.2.2	Frequency stability	Pass

Notes: None

Section 3. Equipment under test (EUT) details

3.1 Sample information

Receipt date	June 10, 2019
Nemko sample ID number	1

3.2 EUT information

Product type	Radar speed feedback sign
Model	TMS-SA 4
Model variant	4
Serial number	17B0248

3.3 Technical information

Applicant IC company number	6193A
IC UPN number	TMSSA
All used IC test site(s) Reg. number	2040A-4
RSS number and Issue number	RSS-210 Issue 9, Annex F.2
Frequency band	24075–27175 MHz
Frequency Min (MHz)	24116
Frequency Max (MHz)	24116
Field strength, dBµV/m @ 3 m	114.91
Measured BW (kHz) (99%)	6667
Type of modulation	CW
Emission classification (F1D, G1D, D1D)	N0N
Transmitter spurious, dBµV/m @ 3 m	64.68 @ 2nd harmonic
Power requirements	12 V_{DC} Battery operated (with solar panel charging)
Antenna information	Printed on-board antenna by AMG with 19 dBi gain.

3.4 Product description and theory of operation

Above ground and portable traffic counter using microwave antennas operating at 24 GHz. The TMS-SA 4 is a compact, self-contained and portable traffic counter. The battery, memory and sensor are contained in a single housing.
- It is installed alongside the road;
- It is discrete;
- It is not in direct contact with passing vehicles;
- The technology used makes the equipment impermeable to cold, heat, mist, surrounding pollution, variations in light, humidity, etc.

3.5 EUT exercise details

EUT was turned on and fundamental frequency was verified.

3.6 EUT setup diagram

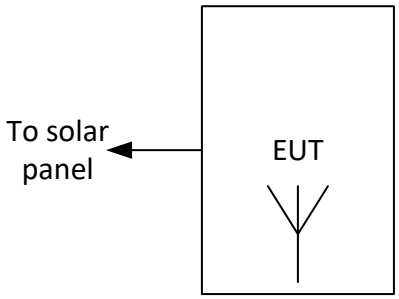


Figure 3.6-1: *Setup diagram*

Section 4. Engineering considerations

4.1 Modifications incorporated in the EUT

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

4.2 Technical judgment

None

4.3 Deviations from laboratory tests procedures

No deviations were made from laboratory procedures.

Section 5. Test conditions

5.1 Atmospheric conditions

Temperature	15–30 °C
Relative humidity	20–75 %
Air pressure	860–1060 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.

5.2 Power supply range

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

Section 6. Measurement uncertainty

6.1 Uncertainty of measurement

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

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

Table 6.1-1: *Measurement uncertainty*

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

Section 7. Test equipment

7.1 Test equipment list

Table 7.1-1: *Equipment list*

Equipment	Manufacturer	Model no.	Asset no.	Cal cycle	Next cal.
3 m EMI test chamber	TDK	SAC-3	FA002047	1 year	January 24, 2020
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	May 8, 2020
Spectrum analyzer	Rohde & Schwarz	FSU	FA001877	1 year	October 26, 2019
Horn (1–18 GHz)	ETS Lindgren	3117	FA002840	1 year	January 16, 2020
Preamp (1–18 GHz)	ETS Lindgren	124334	FA002873	1 year	November 4, 2019
Horn antenna (18–40 GHz)	EMCO	3116	FA001847	1 year	October 9, 2019
Pre-amplifier (18–26 GHz)	Narda	BBS-1826N612	FA001550	—	VOU
Pre-amplifier (26–40 GHz)	Narda	DBL-2640N610	FA001556	—	VOU
40–60 GHz Harmonic mixer	OML	WR19 M19HWD	FA002322	3 year	July 16, 2019
40–60 GHz Standard gain horn	Millitech	U SGH-19	FA002322a	—	VOU
60–90 GHz Harmonic mixer	OML	WR12 M12HWD	FA001524	3 year	July 16, 2019
60–90 GHz Standard gain horn	Millitech	U SGH-12	FA001524a	—	VOU
90–140 GHz Harmonic mixer	OML	WR08 M08HWD	FA001525	3 year	July 16, 2019
90–140 GHz Standard gain horn	Millitech	U SGH-08	FA001525a	—	VOU
Temperature chamber	Espec	EPX-4H	FA002735	1 year	September 11, 2019

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

Section 8. Testing data

8.1 FCC 15.31(e) Variation of power source

8.1.1 Definitions and limits

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

8.1.2 Test date

Start date	June 14, 2019

8.1.3 Observations, settings and special notes

None

8.1.4 Test data

EUT Power requirements:	☐ AC	☐ DC	☒ Battery
If EUT is an AC or a DC powered, was the noticeable output power variation observed?	☐ YES	☐ NO	☒ N/A
If EUT is battery operated, was the testing performed using fresh batteries?	☐ YES	☐ NO	☒ N/A
If EUT is rechargeable battery operated, was the testing performed using fully charged batteries?	☒ YES	☐ NO	☐ N/A

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

8.2.1 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 date

Start date	June 14, 2019

8.2.3 Observations, settings and special notes

EUT operates on one frequency only.

8.2.4 Test data

Table 8.2-2: *Test channels selection*

Start of Frequency range, MHz	End of Frequency range, MHz	Frequency range bandwidth, MHz	Low channel, MHz	Mid channel*, MHz	High channel, MHz
24075	24175	100	–	24116	–

Note: EUT doesn’t use channels, only one frequency

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

8.3.1 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:
The applicant for equipment certification shall provide a list of all antenna types that may be used with the transmitter, where applicable (i.e. for transmitters with detachable antenna), indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna. The test report shall demonstrate the compliance of the transmitter with the limit for maximum equivalent isotropically radiated power (e.i.r.p.) specified in the applicable RSS, when the transmitter is equipped with any antenna type, selected from this list.

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

8.3.2 Test date

Start date	June 14, 2019

8.3.3 Observations, settings and special notes

None

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

8.4 FCC 15.215(c) and RSS-Gen 6.7 and RSS-210 F2.2. Occupied (Emission) bandwidth

8.4.1 Definitions and limits

FCC
Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80 % of the permitted band in order to minimize the possibility of out-of-band operation.

RSS-GEN
The occupied bandwidth or the "99% emission bandwidth" is defined as the frequency range between two points, one above and the other below the carrier frequency, within which 99% of the total transmitted power of the fundamental transmitted emission is contained. The occupied bandwidth shall be reported for all equipment in addition to the specified bandwidth required in the applicable RSSs.

RSS-210 F.2.2
The frequency stability shall be sufficient to ensure that the 40 dB bandwidth stays within the operating frequency band when tested at the temperature and supply voltage variations specified the frequency stability measurement in RSS-Gen.

8.4.2 Test summary

Test date	June 14, 2019

8.4.3 Observations, settings and special notes

Spectrum analyzer settings:

Detector mode	Peak
Resolution bandwidth	≥1 % of OBW
Video bandwidth	RBW × 3
Trace mode	Max Hold

8.4.4 Test data

Table 8.4-1: *Lower 20 dBc frequency cross result*

Fundamental frequency, GHz	Lower 20 dBc frequency cross, GHz	Lower limit, GHz	Margin, MHz
24.1157	24.1148	24.075	39.8

Table 8.4-2: *Upper 20 dBc frequency cross result*

Fundamental frequency, GHz	Upper 20 dBc frequency cross, GHz	Upper limit, GHz	Margin, MHz
24.1157	24.1164	24.175	58.6

Table 8.4-3: *Lower 40 dBc frequency cross result*

Fundamental frequency, GHz	Lower 40 dBc frequency cross, GHz	Lower limit, GHz	Margin, MHz
24.1153	24.1049	24.075	29.9

Table 8.4-4: *Upper 40 dBc frequency cross result*

Fundamental frequency, GHz	Upper 40 dBc frequency cross, GHz	Upper limit, GHz	Margin, MHz
24.1153	24.1313	24.175	43.7

Table 8.4-5: *99% occupied bandwidth results*

Frequency, MHz	99% occupied bandwidth, MHz
24.1157	6.667

Note: there is no 99% occupied bandwidth limit in the standard's requirements, the measurement results provided for information purposes only.

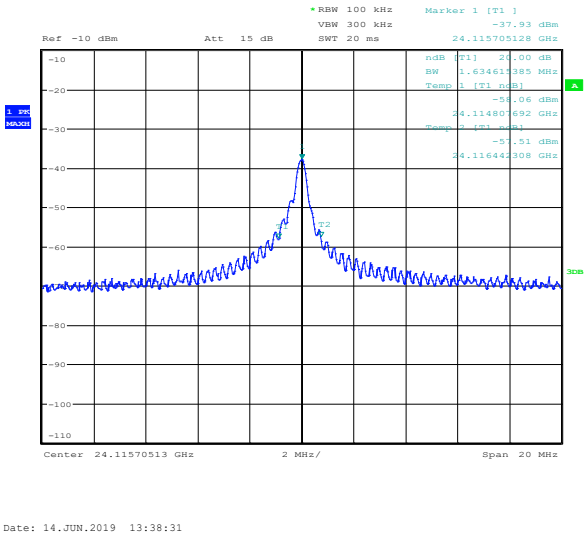


Figure 8.4-1: *20 dB bandwidth*

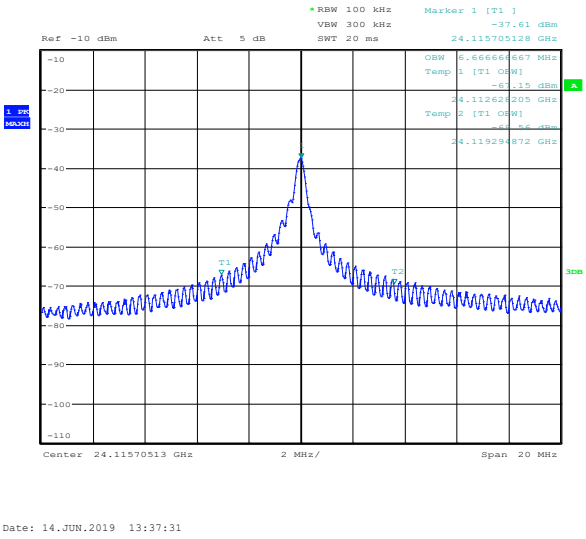


Figure 8.4-2: *99% dB bandwidth*

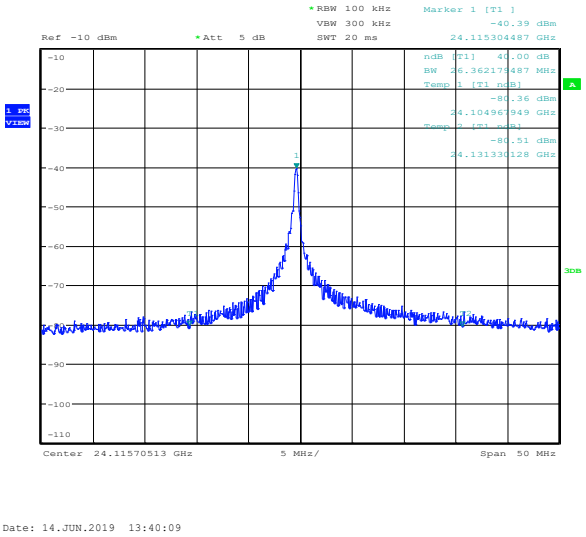


Figure 8.4-3: *40 dB bandwidth*

8.5 FCC 15.245(b) and RSS 210 Annex F.2.1 Field strength of fundamental and harmonics outside restricted bands

8.5.1 Definitions and limits

FCC:
The field strength of emissions from intentional radiators shall comply with the following FCC table. Field strength limits are specified at a distance of 3 meters.
ISED:
The field strength of fundamental and harmonic emissions, measured at 3 m, shall not exceed the following ISED table.

Table 8.5-1: *FCC field strength limits*

Fundamental frequencies, MHz	Field strength of fundamental		Field strength of harmonics	
	mV/m	dBµV/m	mV/m	dBµV/m
902–928	500	114	1.6	64
2435–2465	500	114	1.6	64
5785–5815	500	114	1.6	64
10500–10550	2500	128	25.0	88
24075–24175	2500	128	25.0	88

Note: The emission limits shown above are based on measurement instrumentation employing an average detector. The provisions in §15.35 for limiting peak emissions apply.
Regardless of the limits shown in the above table, harmonic emissions in the restricted bands below 17.7 GHz, as specified in §15.205, shall not exceed the field strength limits shown in §15.209. Harmonic emissions in the restricted bands at and above 17.7 GHz shall not exceed the following field strength limits:

(i) For the second and third harmonics of field disturbance sensors operating in the 24075–24175 MHz band and for other field disturbance sensors designed for use only within a building or to open building doors, 25.0 mV/m.

(ii) For all other field disturbance sensors, 7.5 mV/m.

Table 8.5-2: *ISED field strength limits*

Fundamental frequencies, MHz	Average field strength of fundamental		Average field strength of harmonics	
	mV/m	dBµV/m	mV/m	dBµV/m
10500–10550	2500	128	25	88
24075–24175	2500	128	25	88
33400–36000	2500	128	80	98

Harmonic emissions falling into restricted bands listed in RSS-Gen and which are below 17.7 GHz shall meet the general filed strength limits specified in RSS-Gen.
Harmonic emissions falling into restricted bands listed in RSS-Gen and which are at and above 17.7 GHz shall not exceed the following strength limits measured at a distance of 3 m

25 mV/m for the second and third harmonic emissions of devices operating in the band 24.075–24.175 GHz and for the second harmonic emission of devices operating in the band 33.4–36.0 GHz;
7.5 mV/m for all other devices.

8.5.2 Test summary

Test date	June 14, 2019

8.5.3 Observations, settings and special notes

As per FCC §15.33 (2) If the intentional radiator operates at or above 10 GHz and below 30 GHz: to the fifth harmonic of the highest fundamental frequency or to 100 GHz, whichever is lower. Therefore the spectrum was searched from 30 MHz to 100 GHz
Radiated measurements were performed at a distance of 3 m for frequencies up to 18 GHz, 1 m within 18–40 GHz, and 0.1 m above 40 GHz. All distance corrections were included in the correction factors settings.

Spectrum analyzer settings for peak measurements at the frequencies above 1000 MHz:

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

8.5.4 Test data

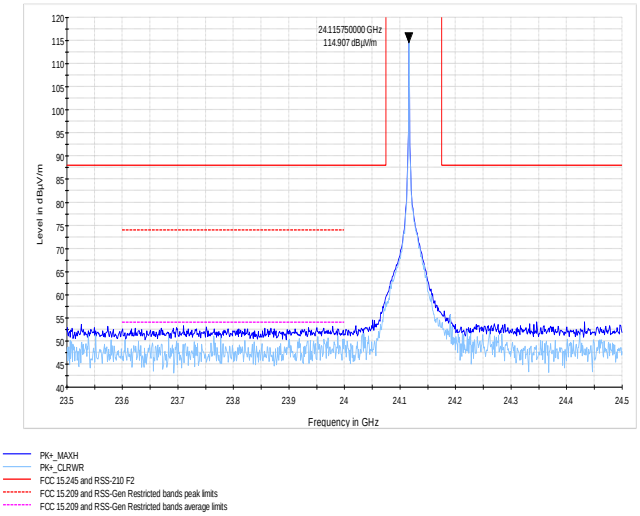


Figure 8.5-1: *Field strength of fundamental*

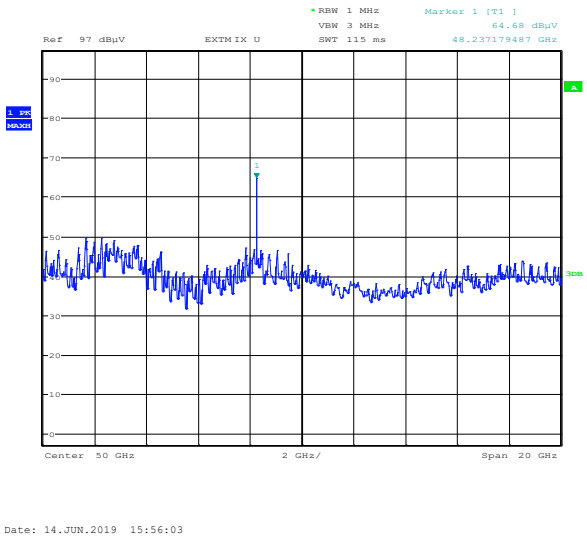


Figure 8.5-2: *Field strength spurious emission at 2nd harmonic*

Table 8.5-3: *Field strength measurement results*

Frequency, GHz	Field strength (peak), dBµV/m	Average limit, dBµV/m	Margin, dB
24.116	114.91	128.00	13.09
48.237	64.68	88.00	23.32

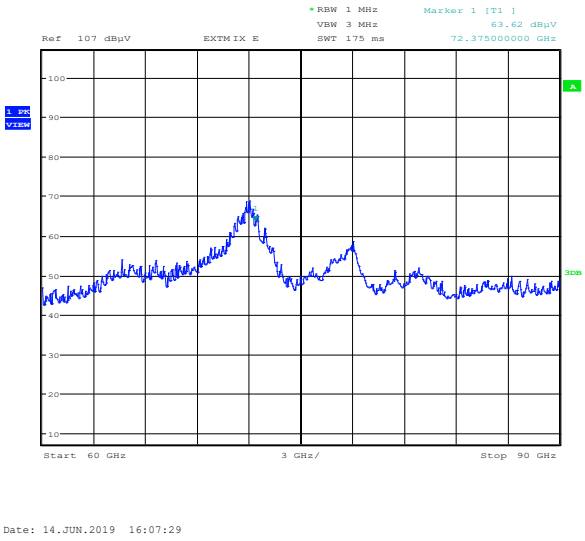


Figure 8.5-3: *Field strength spurious emission at 3rd harmonic*

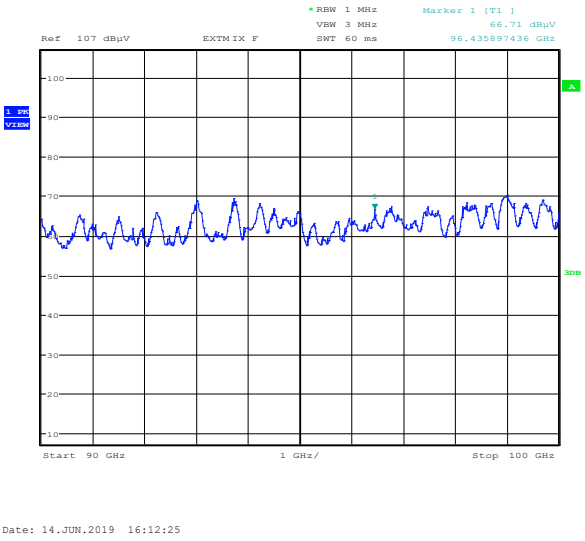


Figure 8.5-4: *Field strength spurious emission at 4th harmonic*

Note: all measurement results indicated in the plots above were taken with a peak detector, which is more stringent measurement, and still comply with average limit.

8.6 FCC 15.245(b)(3) and RSS-210 Annex F.2.1 Spurious emissions (except for harmonics)

8.6.1 Definitions and limits

FCC
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.

ISED
Emissions radiated outside of this specified operating 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 specified in RSS-Gen, whichever is less stringent.

Table 8.6-1: *15.209 and RSS-Gen emissions field strength limits*

Frequency, MHz	Field strength of emissions		Measurement distance, m
	µV/m	dBµV/m	
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 8.6-2: *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	Above 38.6
8.41425–8.41475	167.72–173.2	3500–4400	
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 8.6-3: *FCC restricted frequency bands*

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

8.6.2 Test summary

Test date	June 18, 2019

8.6.3 Observations, settings and special notes

The spectrum was searched from 30 MHz to 100 GHz. No spurious emissions were detected above 40 GHz, except for the second harmonic, which is covered in the previous section.
Radiated measurements up to 18 GHz were performed at a distance of 3 m, from 18 GHz and up to 40 GHz at 1 m, and from 40 GHz and up to 100 GHz at 0.1 m. All distance correction factors were included in the offsets of the plots. Correction factors were calculated using following formula: $20 \times \text{Log}_{10}$ (3 m / measurement distance).

Spectrum analyzer settings for frequencies below 1000 MHz:

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

Spectrum analyzer settings for peak measurements at the frequencies above 1000 MHz:

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

8.6.4 Test data

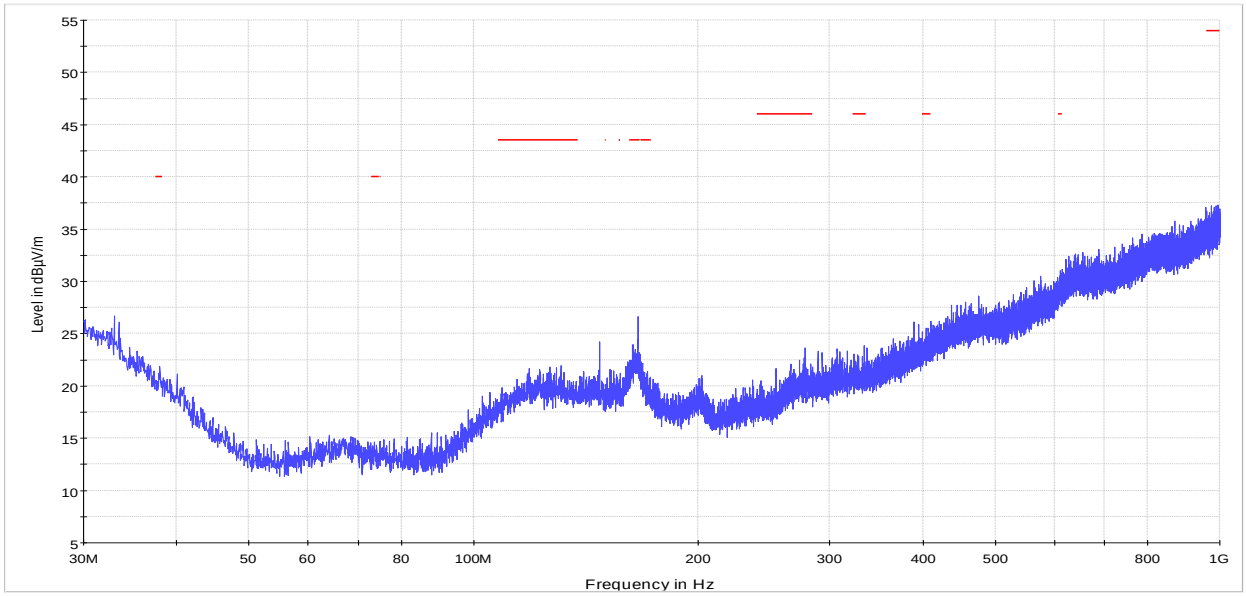


Figure 8.6-1: *Field strength of spurious emissions below 1000 MHz*

Note: all measurement results indicated in the plot were taken with a peak detector, which is more stringent measurement, and still comply with quasi-peak limit.

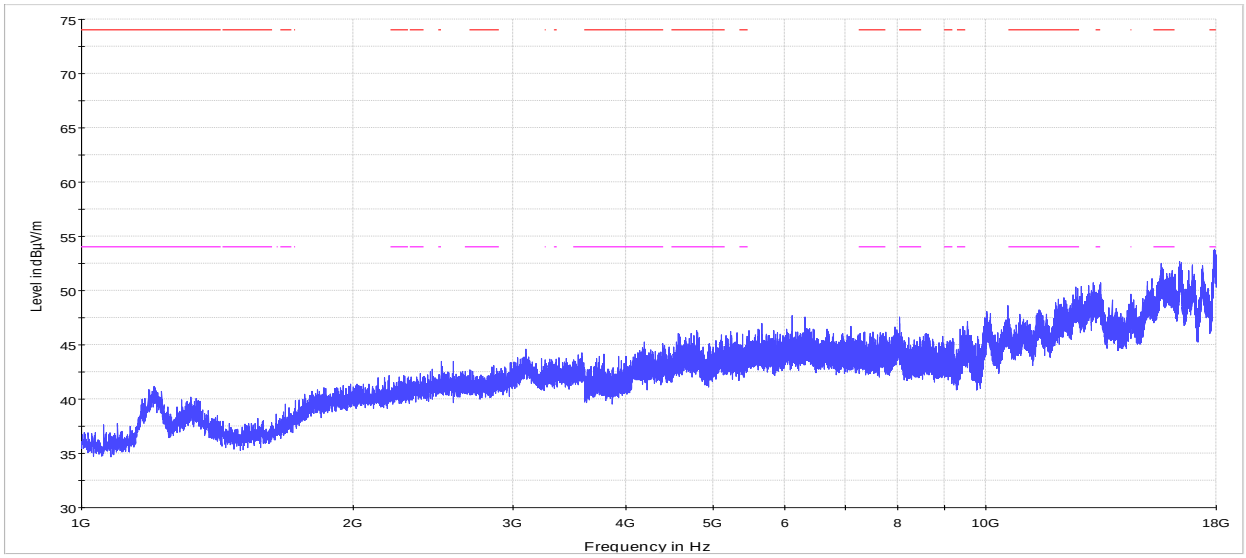


Figure 8.6-2: *Field strength of spurious emissions within 1–18 GHz*

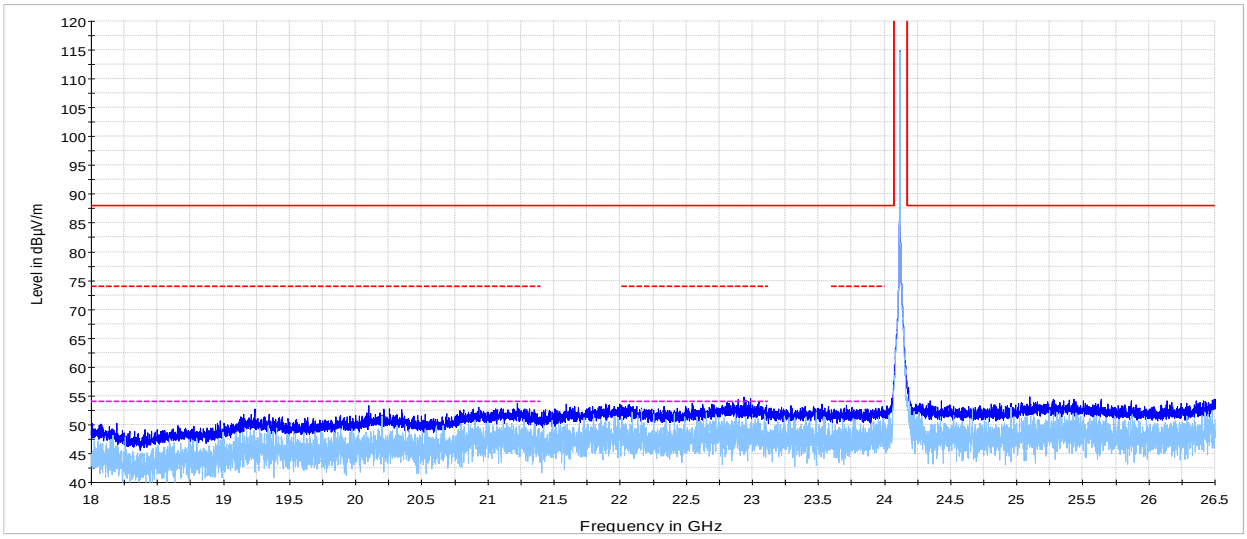


Figure 8.6-3: *Field strength of spurious emissions within18–26.5 GHz*

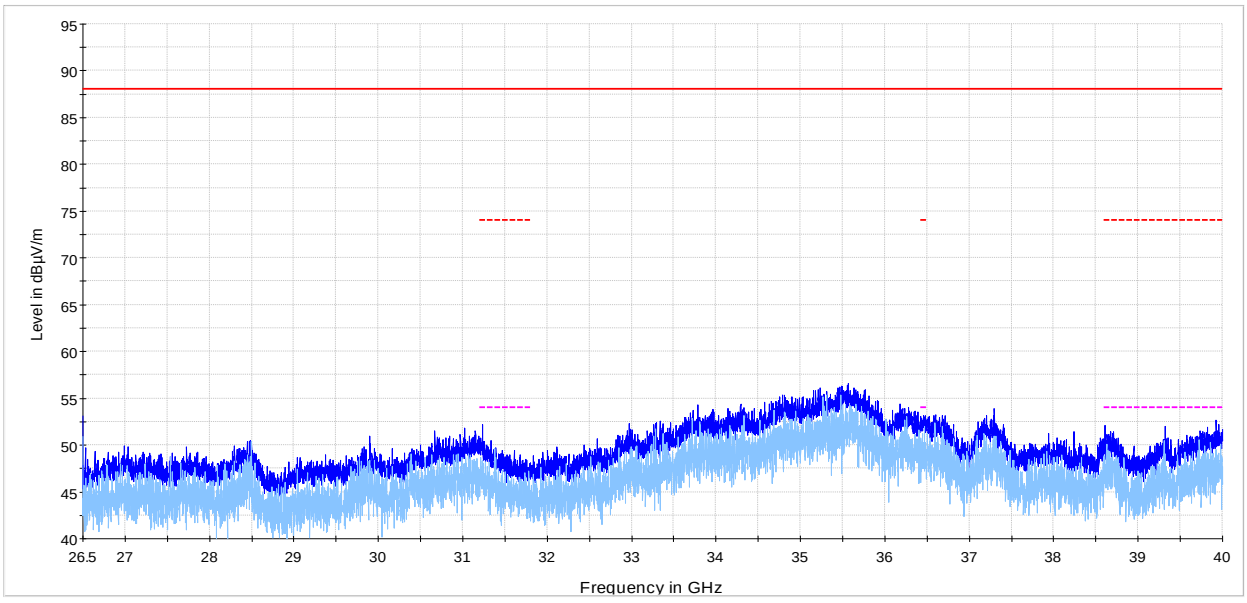


Figure 8.6-4: *Field strength of spurious emissions within26.5–40 GHz*

The spectrum was scanned up to 100 GHz. No spurious emissions were detected above 40 GHz, except for the second harmonic, which is covered in the previous section.

8.7 RSS 210 Annex F.2.2 Frequency stability

8.7.1 Definitions and limits

The frequency stability shall be sufficient to ensure that the 40 dB bandwidth stays within the operating frequency band when tested at the temperature and supply voltage variations specified the frequency stability measurement in RSS-Gen.

8.7.2 Test summary

Test date	June 14, 2019

8.7.3 Observations, settings and special notes

None

8.7.4 Test data

Table 8.7-1: *Frequency drift results*

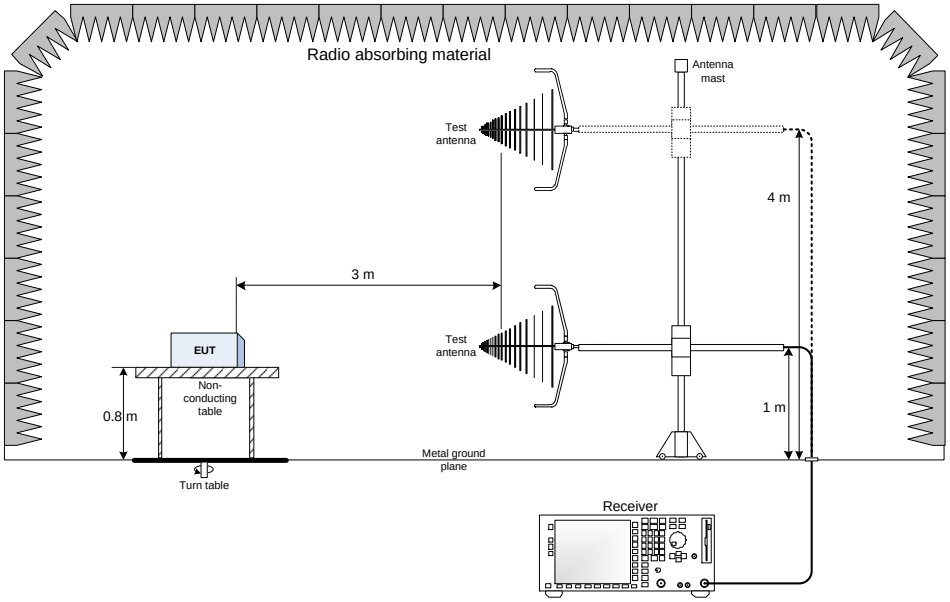
Conditions	Frequency, GHz	Frequency drift, MHz
Temperature: +70 °C Voltage: Nominal	24.11637019	0.625
Temperature: +20 °C Voltage: Nominal + 15%	24.11560497	-0.140
Temperature: +20 °C Voltage: Nominal	24.11574519	*Reference*
Temperature: +20 °C Voltage: Nominal – 15%	24.11557692	-0.168
Temperature: −30 °C Voltage: Nominal	24.11317308	-2.572

Table 8.7-2: *Frequency stability results*

–40 dBc, GHz	Max drift, MHz	Drifted frequency, GHz	Limit, GHz	Margin, MHz
24.1049	-2.575	24.102325	24.075	27.325
24.1313	0.625	24.131925	24.175	43.075

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