LAB N° 1363 L

RF TEST REPORT

Test Report No:	**24-4791111799-3-1-1-RAD-A**
UL Project No:	4791111799
Date of issue:	2024-02-29
Total number of pages:	60
Applicant:	Pirelli Tire LLC 10 East Street 25 th Floor 10016 New York, NY, USA
Contact's person:	Camila Amaral Surcan (camila.surcan@pirelli.com)
Testing Laboratory:	UL International Italia S.r.l. Via delle Industrie, 6 (Sede A) 20061 Carugate (MI) – Italy
Testing location:	UL International Italia S.r.l. Via delle Industrie, 6 20061 Carugate (MI) – Italy
Test specification:	
Regulations:	FCC/ISED
Standards:	**FCC CFR 47 - Part 15 Subpart C** **FCC Parts 15.209(a) & 15.247** **RSS-247 Issue 3:2023** **RSS-Gen Issue 5:2021**
Non-standard test method:	N/A
Scope of testing:	Wireless - New testing
TRF No.:	TRF_FCC 15C/RSS-247_Accredia_rev 0
Test Report Form(s) Originator:	UL International Italia S.r.l.
Master TRF	2023-03
Compiled by: (name, function, signature)	Andrea Giovanni Galbiati *Laboratory Engineer*
Approved by: (name, function, signature)	Francesco Casati *Operations Leader*

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In some cases, the software in the tested sample is in a version dedicated exclusively to the test, and therefore does not represent the software installed in the final version of the product.

Test Item Description:	2.4 GHz RF Tire mount sensor (TMS)
Trade Mark: (*)	Pirelli
Manufacturer: (*)	Pirelli Tyre S.p.A Viale Piero e Alberto Pirelli, 25 20126 Milano (MI) – Italy
Model Number / HVIN: (*)	CTSN-09S
PMN: (*)	Cyber Tyre Sensor Node
Power Source: (*)	3 Vdc (Internal battery)
FCC ID:	2ANX7CTSN
IC number:	24121-CTSN
Testing:	
Date of receipt of test item:	2024-01-24 (received) 2024-02-01 (recorder into UL sample database)
UL Sample Tag No.:	6811323 (sample for radiated tests) 6811324 (sample for conducted tests)
Status of sample upon receipt:	☒ New and operational ☐ Reconditioned ☐ Damaged
Date(s) of performance of tests:	2024-01-24 to 2024-02-09
Name and address of factory(ies): (*)	Jabil Circuit Italia S.r.l. Via per Casapuzzano, 1 81025 Marcianise (CE) – Italy

General remarks:

A cross ☒ in a rectangular shape means that this option is applied.

☒ Indicates that the listed condition, standard or equipment is applicable for this report.

☐ Indicates that the listed condition, standard or equipment is not applicable for this report.

Throughout this report a ☐ comma / ☒ point is used as decimal separator.

Where not otherwise specified or communicated in writing, statements of conformity (e.g. Pass/Fail) are established according to the following decision rule:

- considering that the applied test standards take measurement uncertainty into account, acceptance limit equals the tolerance limit (simple acceptance). This leads to a maximum 50% of false accept or false reject when the measured value equals the tolerance limit. See ILAC-G8:09/2019 for further details.

General product information: (*)

the equipment under test is a an advance tyre monitoring system that utilises a proprietary 2.4 GHz RF interface

Document history

Test Report No.	Reason for change	Date of issue
24-4791111799-1-1-0-RAD-A	Original release	2024-02-12
24-4791111799-1-1-1-RAD-A	• All Photos removed from this report • Pag 1: applicant and standard section information updated • Pag 2: Logo of trademark removed and manufacturer updated • Pag 2: name of ratings section information updated • Pag 2: add HVIN, PMN, FCC ID, ID number • General product information updated • Removing from section 2 of the following sections: date of production, environment of intended use, other parameters, module/parts • Operating modes updated • Associated equipment(AE) section updated • Copy of marking plate section information removed from this report • Name of Section '2.1 Additional information of radio module' updated • Removing from section 2.1 of the following sections information: FCC ID and IC ID, Other • Updating of the following sections information in section 2.1: Technology tested, power supply requirements(s) • Adding of the 'maximun conducted output power' section information in section 2.1 • Removing from section 2.2 of the following sections information: Characteristics, supplementary note • Updating of the following sections information in section 2.2: Gain • Deleting of column 'acceditation' from Verdict summary section • Removing of Power spectral density test • Adding of test method 'KDB 558074 D01 15.247 Meas Guidance v05r02' in verdict summary section • Removing of Conformity decision rule section • Adding of restricted band evaluation • Updating of band edge test • Removing of attachment 1, 2 and 3	2924-02-29

NOTE: New test report issue cancels and replaces the previous one.

LAB N° 1363 L

1 Laboratory Accreditation

FCC Accredited Test Firm

Accreditation	MRA	Designation Number	Expiration Date
Ministero delle Sviluppo Economico- Direzione Generale Pianificazione e Gestione dello Spettro Radioelettrico Scope: • Unintentional Radiators - FCC Part 15 Subpart B • Industrial, Scientific, and Medical Equipment - FCC Part 18 • Intentional Radiators - FCC Part 15 Subpart C	US-EU	IT0010	2025-06-25

ISED Wireless Device Testing Laboratory

Company Number	CAB Identifier	Scope/Recognition Date	Expiration Date
UL INTERNATIONAL ITALIA S.R.L.	IT0008	RSS-GEN (2023-10-06) RSS-247 (2023-10-06)	RECOGNIZED UNTIL: 2025-06-16 ACCREDIA ISO/IEC 17025:2017 Expires: 2025-06-16

Table of Contents

2 Test Item Description

Serial number: (*)	No information available					
Ports: (*)	Port name and description		Cable			
			Specified length(m)	Attached during test	Shielded	
	---		---	☐	☐	
Supplementary information to the ports:	---					
Rated power supply: (*)		Voltage and frequency	Reference poles			
			N	L1	L2	L3
	☐	AC:	☐	☐	☐	☐
	☒	DC: 3 Vdc (internal battery)				
Working frequencies: (*)	Clock: 26 MHz RF: 2400-2483.5 MHz					
Firmware/Software version (original): (*)	1.0					
Firmware/Software version (used for testing): (*)	1.0					
Hardware version: (*)	1.0					
Mounting position: (*)	☐	Table top equipment				
	☐	Wall/Ceiling mounted equipment				
	☐	Floor standing equipment				
	☐	Hand-held equipment				
	☒	Other: installed in vehicle wheels, treated as table top equipment				
Dimensions in cm (W x H x D): (*)	2.5 x 1 x 2.5					

<table>
<tr><td rowspan="4">Operating modes:</td><td>No.</td><td colspan="3">Operating mode of test item</td></tr>
<tr><td>1</td><td colspan="3">Transmitter / Modulated Carrier Continuous
• Bottom channel 0 (Center frequency: ~2407 MHz)
• 1.3 Mbps rate in GFSK modulation</td></tr>
<tr><td>2</td><td colspan="3">Transmitter / Modulated Carrier Continuous
• Middle channel 15 (Center frequency: ~2441 MHz)
• 1.3 Mbps rate in GFSK modulation</td></tr>
<tr><td>3</td><td colspan="3">Transmitter / Modulated Carrier Continuous
• Top channel 31 (Center frequency: ~2477 MHz)
• 1.3 Mbps rate in GFSK modulation</td></tr>
<tr><td>Supplemental information to the operating mode:</td><td colspan="4"><u>For radiated tests only</u>
Pre-scan in the X,Y and Z axes of orientation, the worst case of orientation was recorded in the test report.</td></tr>
<tr><td rowspan="2">Auxiliary equipment (AuxEq):
Peripheral equipment that is part of the system under test</td><td>Description</td><td>Manufacturer</td><td>Type</td></tr>
<tr><td>---</td><td>---</td><td>---</td></tr>
<tr><td rowspan="4">Associated equipment (AE):
Equipment that is not part of the system under test but needed to exercise and/or monitor the EUT</td><td>Description</td><td>Manufacturer</td><td>Type</td></tr>
<tr><td>Central unit</td><td>Pirelli</td><td>VEU 027_A</td></tr>
<tr><td>Central unit</td><td>Pirelli</td><td>VRR AN#023</td></tr>
<tr><td>PC</td><td>HP</td><td>---</td></tr>
<tr><td rowspan="2">Documents as provided by the applicant: (*)</td><td>Description</td><td>File name</td><td>Issue date</td></tr>
<tr><td>---</td><td>---</td><td>---</td></tr>
<tr><td>Modifications to the test item during testing:</td><td colspan="4">None</td></tr>
</table>

2.1 Additional information relating to the radio parameters (*)

Technology Tested:	Propietary 2.4 GHz	
Type of Radio Device:	Transceiver	
Power Supply Requirement(s):	Nominal	3V DC battery
Modulations:	GFSK	
Data Rates:	1.3 Mbps	
Transmit Frequency Range:	2407.124992 MHz to 2476.834816 MHz	
Channel Spacing:	2.248704 MHz	
Maximum Conducted Output Power:	-9.25 dBm	

2.2 Additional information of antennas used (*)

Model:	2450AT18D0100E-AEC
Manufacturer:	Johanson Technology
Mounting:	☒ Integral ☐ Dedicated
Type:	SMD Antenna
Gain:	-6 dBi max

3 Verdict summary section

Standard clause		Description	Verdict	Note
FCC	ISED			
15.203	---	Antenna requirements	N/A	1
15.207	RSS-Gen 8.8	AC power-line conducted emissions	N/A	2
15.209 15.247(d)	RSS-Gen 6.13 RSS-Gen 8.9 RSS-Gen 8.10	Transmitter unwanted emissions	P	
15.35	RSS-Gen 8.2	Transmitter Duty Cycle	N/A	3
15.247(a)(1)	RSS-Gen 6.7 RSS-247 5.1(a)	20 dB emission bandwidth	N/A	4
15.247(a)(1)	RSS-247 5.1(b)	Channel separation test	N/A	4
15.247(a)(1)	RSS-247 5.1(d)	Time of occupancy (dwell time)	N/A	4
15.247(a)(1)	RSS-247 5.1(d)	Quantity of hopping channels	N/A	4
15.247(a)(2)	RSS-Gen 6.7 RSS-247 5.2(a)	6 dB emission bandwidth	P	
---	RSS-Gen 6.7	99% emission bandwidth	P	
15.247(b)	RSS-Gen 6.12 RSS-247 5.4(d)	Maximum peak conducted output power	P	5
15.247(b)	RSS-Gen 6.12 RSS-247 5.4(d)	Transmitter maximum (average) output power	N/P	6
15.247(c)	RSS-247 5.4(f)	Operation with directional antenna gains greater than 6 dBi	N/A	7
15.247(d)	RSS-247 5.5	100 kHz bandwidth of frequency band edge	P	
15.247(e)	RSS-247 5.2(b)	Power spectral density	N/P	8

Test method:
ANSI C63.10-2013
reference to KDB 558074 D01 15.247 Meas Guidance v05r02

Notes:

1. The EUT uses a permanently attached antenna.
2. Conducted limits are not required for devices which only employ battery power for operation and which do not operate from the AC power lines or contain provisions for operation while connected to the AC power lines.
3. Applicable when the field strength or envelope power is not constant or it is in pulses.
4. Applicable to frequency hopping intentional radiators only.
5. §15.247(b)(3) applied.
6. Maximum peak conducted output power measured.
7. The EUT doesn't use directional antenna with gain greater than 6 dBi.
8. Maximum output power is less than the PSD limit of 8 dBm/3 kHz

Possible test case verdicts:
Test case not performed: N/P
Test case does not apply to test object: N/A
Test object does meet requirement: Pass (P)
Test object does not meet requirement: Fail (F)

4 Formulas used

☐ Disturbance voltage
V (dBµV) = V receiver (dBµV) + Correction (dB)
where:
Correction (dB) = I.L. transducer (dB) + I.L. cable (dB)

☒ Magnetic field
H (dBµA/m) = V receiver (dBµV) + Correction (dB)
where:
Correction (dB) = Magnetic antenna factor (dB/Ωm) + I.L. cables (dB)

☒ Electric field
E (dBµV/m) = V receiver (dBµV) + Correction (dB)
where:
Correction (dB) = Electric antenna factor (dB/m) – Gain external preamplifier (dB) + I.L. external filter (dB) + I.L. cables (dB)
Note: external preamplifier and external filter are optional and, if used, are indicated in the list of test equipment

☐ Radiated power (substitution method)
Radiated power (dBm) = V receiver (dBµV) + Correction (dB)
where:
Correction (dB) = Chamber attenuation (dB) + Gain of calibration transmitting antenna (dBi) – Gain external preamplifier (dB) + I.L. external filter (dB)
Note: external preamplifier and external filter are optional and, if used, are indicated in the list of test equipment

☐ E (dBµV/m) = EIRP (dBm) – 20 log D + 104.8; where D is the measurement distance in meters

☐ EIRP (dBm) = E (dBµV/m) + 20 log D − 104.8; where D is the measurement distance in meters

☐ ERP = EIRP – 2.15 (dB); where ERP and EIRP are expressed in consistent units

☐ EIRP = ERP + 2.15 (dB); ERP and EIRP are expressed in consistent units

☒ Margin
Margin (dB) = Measure – Limit

☐ Radiated emission limit conversion for a different measuring distance
40 dB/decade (f<30 MHz); 20 dB/decade (f≥30 MHz)

☐ Correction of radiated field from 5 m to 3 m
+8.87 dB (f<30 MHz); +4.44 dB (f≥30 MHz)

☒ Linear to logarithmic conversion
Log = 20*log(Lin) for voltage and current; Log = 10*log(Lin) for power

☒ Conducted Radio Measurements
P_{out_EUT} = $P_{read\_Amplifier}$ (dBm) + Cable Losses (dB) + Attenuator (dB)

☐ Duty Cycle
☐ Duty Cycle (%) = 100 X [On Time (TON)] / [Period(TON+ TOFF)
☐ Duty Cycle Correction Factor= 10 log 1 / [On Time (TON)] / [Period(TON+ TOFF)]
☐ $P_{out\_AVGcorr}$= P_{out_AVG} + Duty Cycle Correction Factor

☐ Average time of occupancy:
Average time of occupancy = Emission Width x Number of Hops in the Period
Period = 0.4 s x Number of hopping channels employed

5 Tests

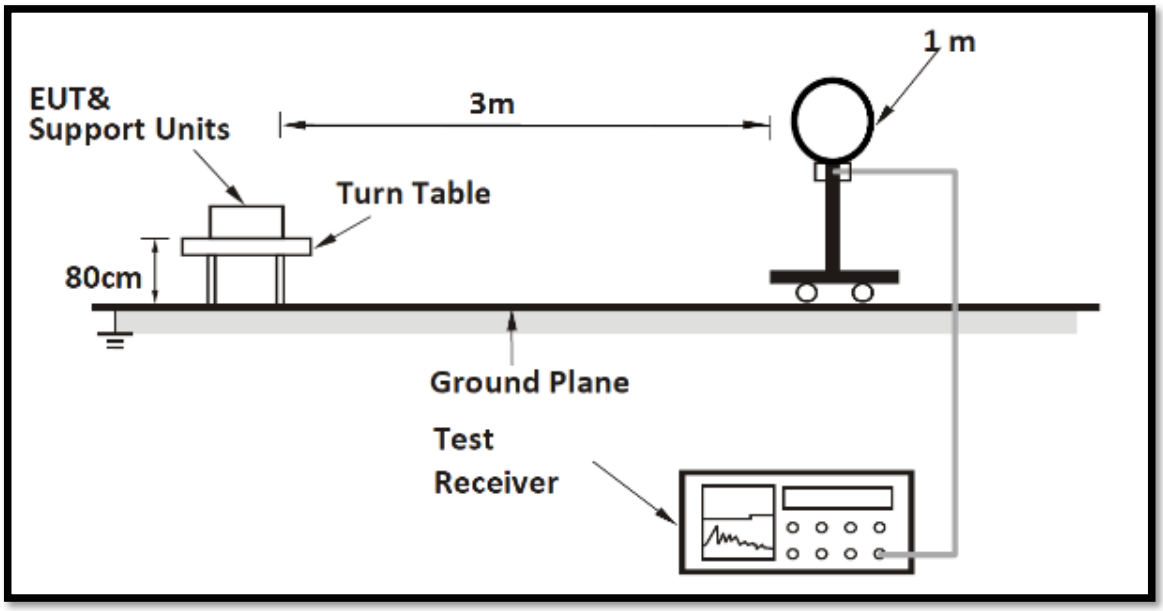
5.1 Transmitter unwanted emissions

Tested by:	Andrea Giovanni Galbiati	
Test date:	2024-01-26 to 2024-02-09	
Test location (stand):	Area 8: SAC 3-1.2 (RF emission)	
Ambient temperature:	22 °C to 24 °C	
Relative humidity:	45 % to 45 %	
Atmospheric pressure:	998 mbar to 1001 mbar	
FCC requirements (clauses):	15.209(a), 15.247(d)	
ISED requirements (clauses):	RSS-Gen 6.13, RSS-Gen 8.9, RSS-Gen 8.10	
ANSI C63.10 test method (clause):	6.3, 6.4, 6.5, 6.6	
EUT Test set-up:	☒	Table-top equipment EUT on nonconducting support of 80 cm height above the floor for measurements at or below 1 GHz
	☒	Table-top equipment EUT on nonconducting support of 1.5 m height above the floor for measurements above 1 GHz
	☐	Floor-standing equipment EUT on nonconducting support of 10 cm height above the floor
	☐	Floor-standing equipment If possible, the antenna(s) of the EUT is located at a height of 1.5 m above the floor, and the intentional radiator circuitry is located within the system at a height of at least 0.8 m above the floor.
	☐	Use of LISN on the floor for measurements between 30 MHz and 1000 MHz (optional)
	☐	Other:
Supplementary test set-up description:	---	
Test facility:	☒	Range: 9 kHz to 30 MHz OATS or SAC using active loop antenna (distance: 3 m; height: 1 m from the loop center)
	☒	Range: 30 MHz to 1 GHz OATS or SAC using hybrid (bicon/log) antenna (distance: 3 m; height: 1 m to 4 m)
	☒	Range: 1 GHz to 26 GHz FSOATS using double-ridged guide horn antenna (distance: 3 m; height: 1 m to 4 m)
	☐	Range: 26 GHz to 40 GHz FSOATS using double-ridged guide horn antenna (distance: 1 m; height: 1 m to 4 m)
Used mains voltage/frequency:	3 Vdc (fully charged battery)	
Supplementary information:	For ISED only The limits in CFR 47, Part 15, Subpart C, paragraph 15.209 (a), are identical to those in RSS-Gen Section 8.9, Table 6, since the measurements are performed in terms of magnetic field strength and converted to electric field strength levels (as reported in the table) using the free space impedance of 377Ω. For example, the measurement frequency X kHz resulted in a level of Y dBµV/m, which is equivalent to Y - 51.5 = Z dBµA/m,	

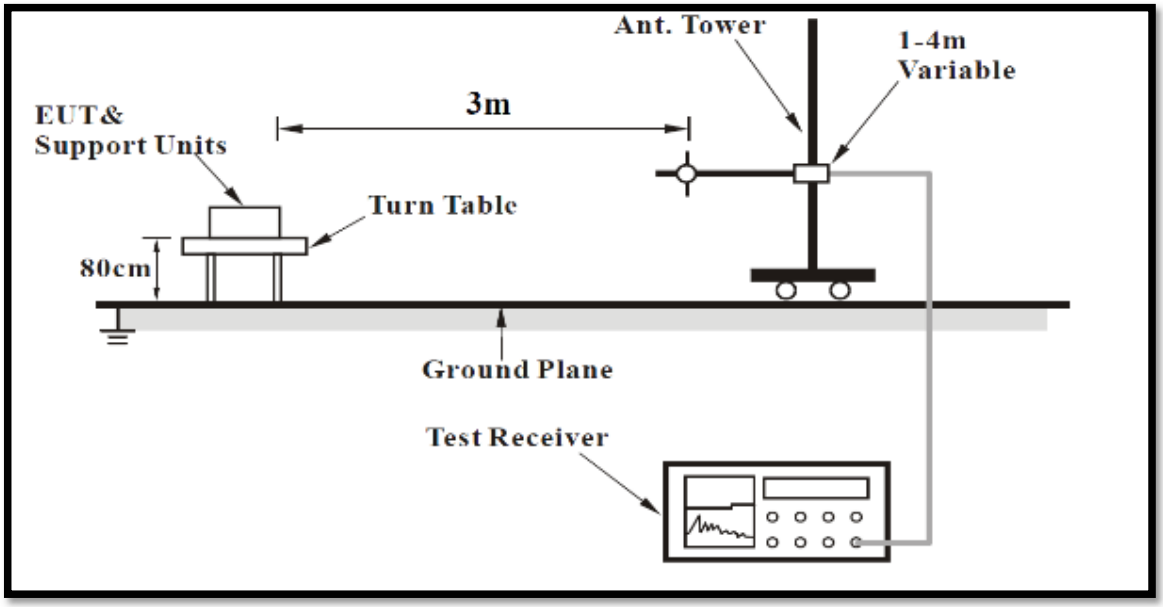
	which has the same margin, W dB, to the corresponding RSS-Gen Table 6 limit as it has to the 15.209(a) limit.

Block diagram of the test setup:

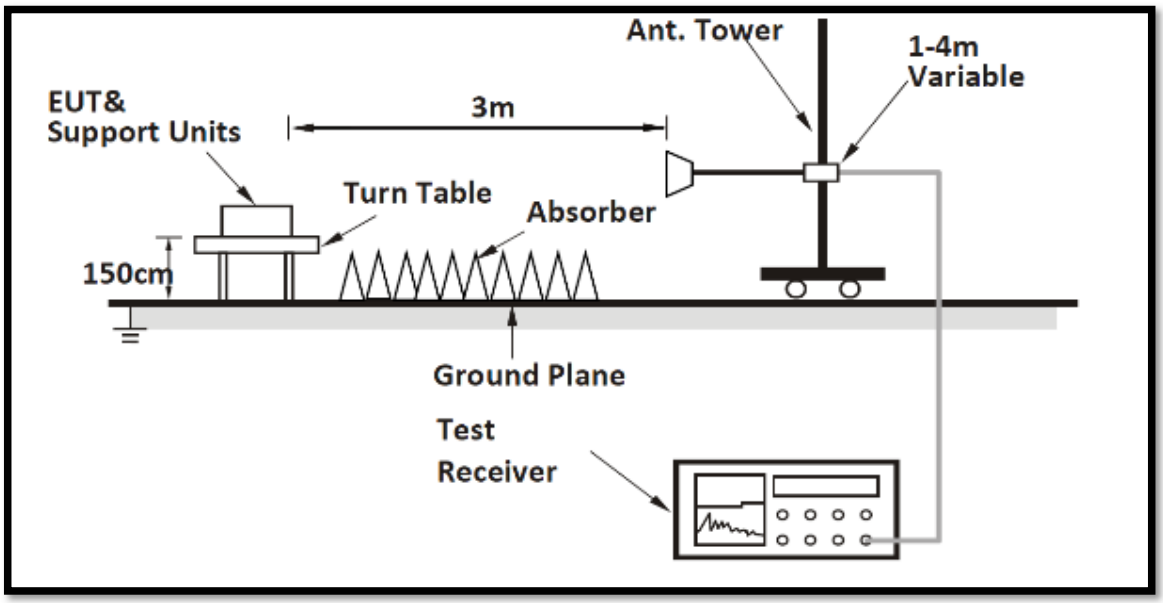
9 kHz to 30 MHz



30 MHz to 1 GHz



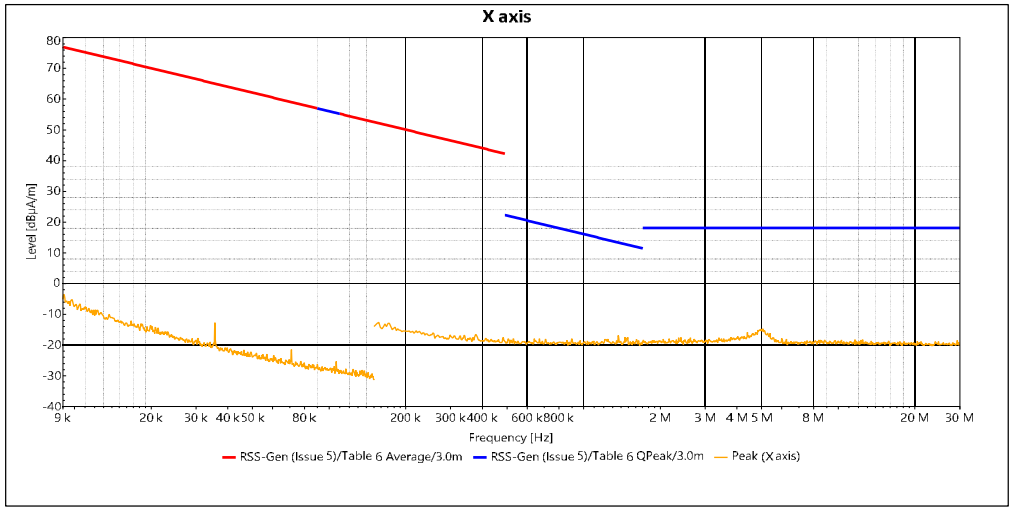
1 GHz to 26 GHz



Results

Frequency range / Antenna axis:	9 kHz to 30 MHz / X		
Supply condition:	3 Vdc (fully charged battery)		
Operating mode:	1		
Test result:	Pass	**Tested on:**	2024-02-09

Start Frequency: 9 kHz; Stop Frequency: 150 kHz; Step: 50 Hz; Sweep Time: 500 ms/Step; RF Attenuation: Auto; 10 dB min attenuation: OFF; RBW: 200 Hz; Preamplifier: OFF; Preselector: ON
Start Frequency: 150 kHz; Stop Frequency: 30 MHz; Step: 2.25 kHz; Sweep Time: 500 ms/Step; RF Attenuation: Auto; 10 dB min attenuation: OFF; RBW: 9 kHz; Preamplifier: OFF; Preselector: ON



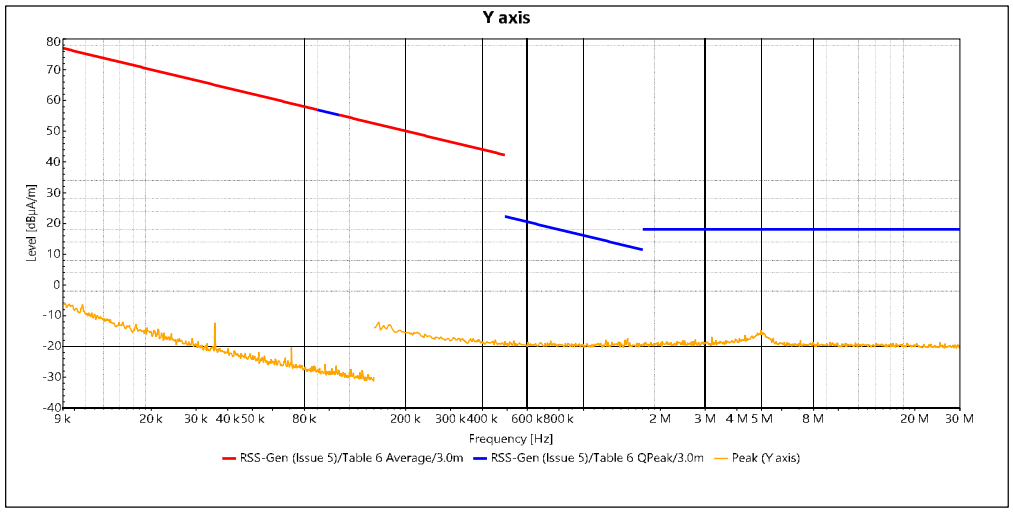
Final measurement

☒ The emissions are below the measurement system noise floor or 20 dB or more below the limit

☐ The measurement results of highest emissions relative to the limit for each detector type are shown below:

Frequency range / Antenna axis:	9 kHz to 30 MHz / Y		
Supply condition:	3 Vdc (fully charged battery)		
Operating mode:	1		
Test result:	Pass	**Tested on:**	2024-02-09

Start Frequency: 9 kHz; Stop Frequency: 150 kHz; Step: 50 Hz; Sweep Time: 500 ms/Step; RF Attenuation: Auto; 10 dB min attenuation: OFF; RBW: 200 Hz; Preamplifier: OFF; Preselector: ON
Start Frequency: 150 kHz; Stop Frequency: 30 MHz; Step: 2.25 kHz; Sweep Time: 500 ms/Step; RF Attenuation: Auto; 10 dB min attenuation: OFF; RBW: 9 kHz; Preamplifier: OFF; Preselector: ON



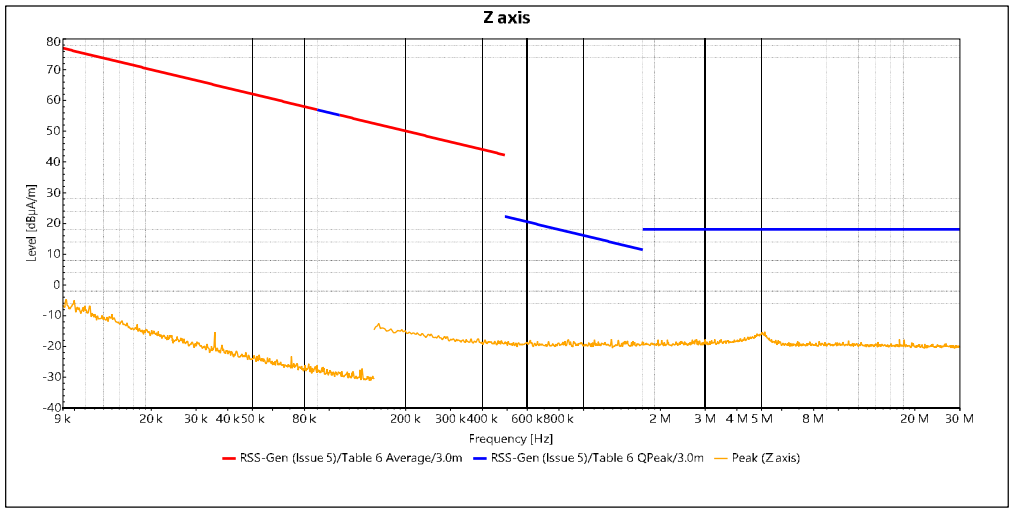
Final measurement

☒ The emissions are below the measurement system noise floor or 20 dB or more below the limit

☐ The measurement results of highest emissions relative to the limit for each detector type are shown below:

Frequency range / Antenna axis:	9 kHz to 30 MHz / Z		
Supply condition:	3 Vdc (fully charged battery)		
Operating mode:	1		
Test result:	Pass	**Tested on:**	2024-02-09

Start Frequency: 9 kHz; Stop Frequency: 150 kHz; Step: 50 Hz; Sweep Time: 500 ms/Step; RF Attenuation: Auto; 10 dB min attenuation: OFF; RBW: 200 Hz; Preamplifier: OFF; Preselector: ON
Start Frequency: 150 kHz; Stop Frequency: 30 MHz; Step: 2.25 kHz; Sweep Time: 500 ms/Step; RF Attenuation: Auto; 10 dB min attenuation: OFF; RBW: 9 kHz; Preamplifier: OFF; Preselector: ON



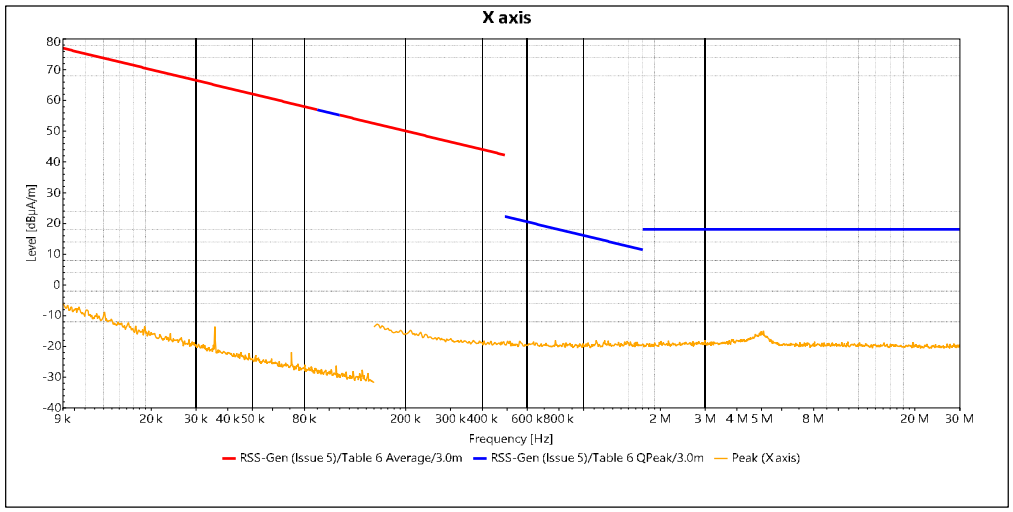
Final measurement

☒ The emissions are below the measurement system noise floor or 20 dB or more below the limit

☐ The measurement results of highest emissions relative to the limit for each detector type are shown below:

Frequency range / Antenna axis:	9 kHz to 30 MHz / X		
Supply condition:	3 Vdc (fully charged battery)		
Operating mode:	2		
Test result:	Pass	**Tested on:**	2024-02-09

Start Frequency: 9 kHz; Stop Frequency: 150 kHz; Step: 50 Hz; Sweep Time: 500 ms/Step; RF Attenuation: Auto; 10 dB min attenuation: OFF; RBW: 200 Hz; Preamplifier: OFF; Preselector: ON
Start Frequency: 150 kHz; Stop Frequency: 30 MHz; Step: 2.25 kHz; Sweep Time: 500 ms/Step; RF Attenuation: Auto; 10 dB min attenuation: OFF; RBW: 9 kHz; Preamplifier: OFF; Preselector: ON



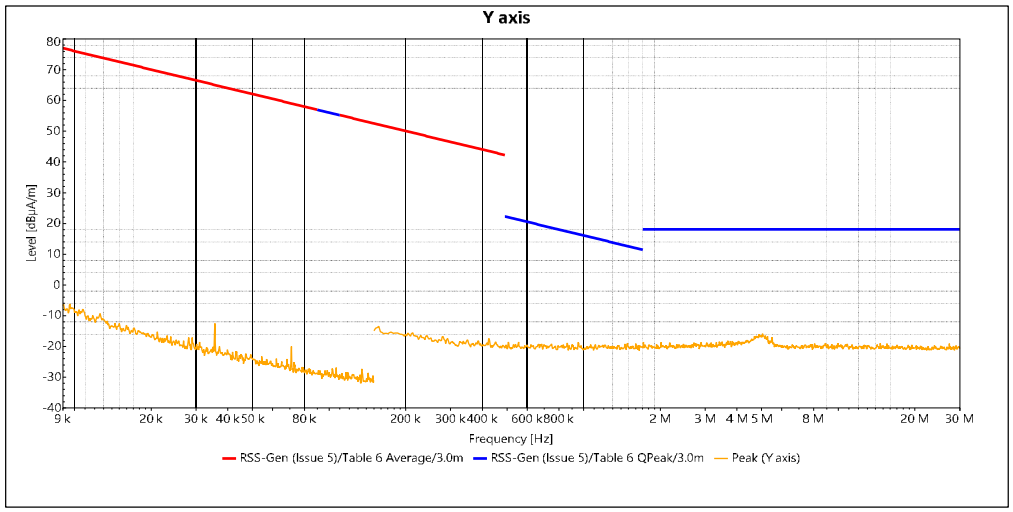
Final measurement

☒ The emissions are below the measurement system noise floor or 20 dB or more below the limit

☐ The measurement results of highest emissions relative to the limit for each detector type are shown below:

Frequency range / Antenna axis:	9 kHz to 30 MHz / Y		
Supply condition:	3 Vdc (fully charged battery)		
Operating mode:	2		
Test result:	Pass	**Tested on:**	2024-02-09

Start Frequency: 9 kHz; Stop Frequency: 150 kHz; Step: 50 Hz; Sweep Time: 500 ms/Step; RF Attenuation: Auto; 10 dB min attenuation: OFF; RBW: 200 Hz; Preamplifier: OFF; Preselector: ON
Start Frequency: 150 kHz; Stop Frequency: 30 MHz; Step: 2.25 kHz; Sweep Time: 500 ms/Step; RF Attenuation: Auto; 10 dB min attenuation: OFF; RBW: 9 kHz; Preamplifier: OFF; Preselector: ON



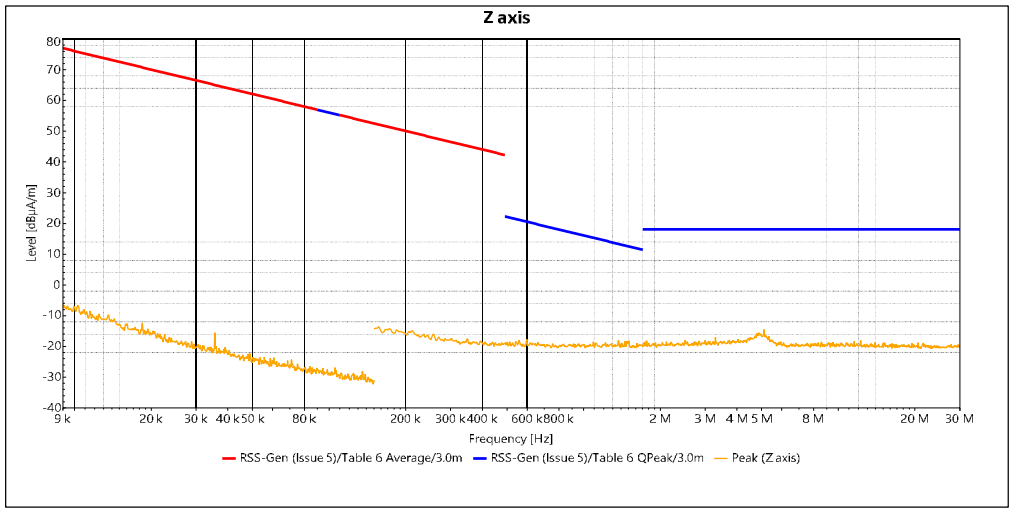
Final measurement

☒ The emissions are below the measurement system noise floor or 20 dB or more below the limit

☐ The measurement results of highest emissions relative to the limit for each detector type are shown below:

Frequency range / Antenna axis:	9 kHz to 30 MHz / Z		
Supply condition:	3 Vdc (fully charged battery)		
Operating mode:	2		
Test result:	Pass	**Tested on:**	2024-02-09

Start Frequency: 9 kHz; Stop Frequency: 150 kHz; Step: 50 Hz; Sweep Time: 500 ms/Step; RF Attenuation: Auto; 10 dB min attenuation: OFF; RBW: 200 Hz; Preamplifier: OFF; Preselector: ON
Start Frequency: 150 kHz; Stop Frequency: 30 MHz; Step: 2.25 kHz; Sweep Time: 500 ms/Step; RF Attenuation: Auto; 10 dB min attenuation: OFF; RBW: 9 kHz; Preamplifier: OFF; Preselector: ON



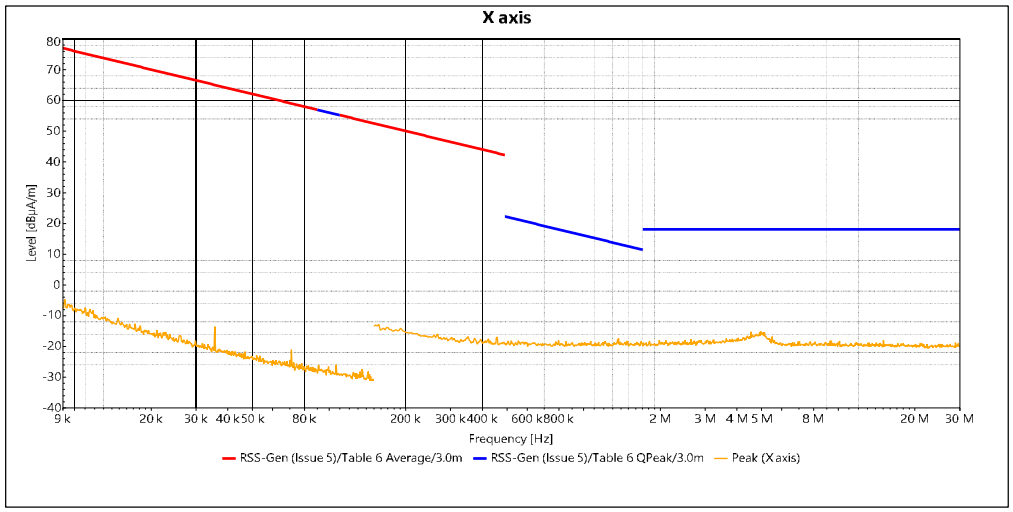
Final measurement

☒ The emissions are below the measurement system noise floor or 20 dB or more below the limit

☐ The measurement results of highest emissions relative to the limit for each detector type are shown below:

Frequency range / Antenna axis:	9 kHz to 30 MHz / X		
Supply condition:	3 Vdc (fully charged battery)		
Operating mode:	3		
Test result:	Pass	**Tested on:**	2024-02-09

Start Frequency: 9 kHz; Stop Frequency: 150 kHz; Step: 50 Hz; Sweep Time: 500 ms/Step; RF Attenuation: Auto; 10 dB min attenuation: OFF; RBW: 200 Hz; Preamplifier: OFF; Preselector: ON
Start Frequency: 150 kHz; Stop Frequency: 30 MHz; Step: 2.25 kHz; Sweep Time: 500 ms/Step; RF Attenuation: Auto; 10 dB min attenuation: OFF; RBW: 9 kHz; Preamplifier: OFF; Preselector: ON



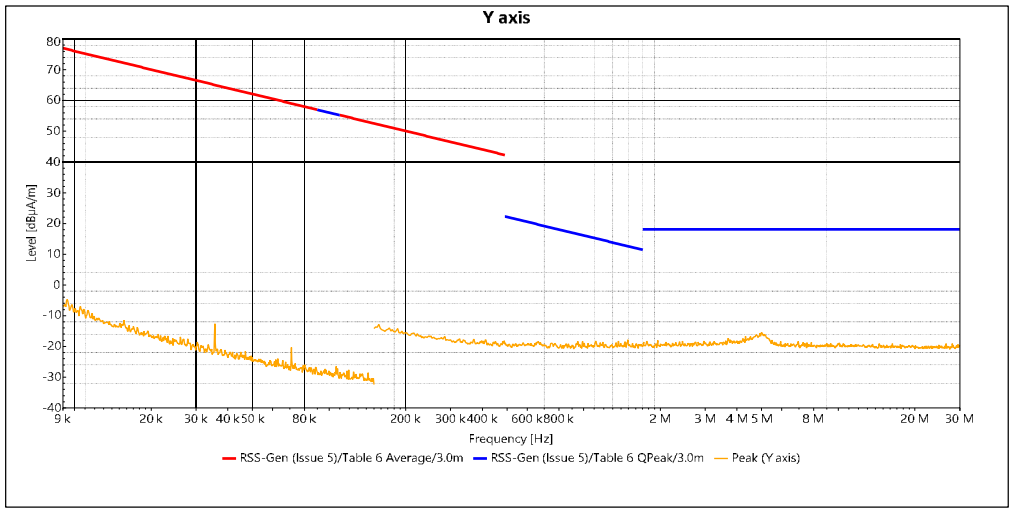
Final measurement

☒ The emissions are below the measurement system noise floor or 20 dB or more below the limit

☐ The measurement results of highest emissions relative to the limit for each detector type are shown below:

Frequency range / Antenna axis:	9 kHz to 30 MHz / Y		
Supply condition:	3 Vdc (fully charged battery)		
Operating mode:	3		
Test result:	Pass	**Tested on:**	2024-02-09

Start Frequency: 9 kHz; Stop Frequency: 150 kHz; Step: 50 Hz; Sweep Time: 500 ms/Step; RF Attenuation: Auto; 10 dB min attenuation: OFF; RBW: 200 Hz; Preamplifier: OFF; Preselector: ON
Start Frequency: 150 kHz; Stop Frequency: 30 MHz; Step: 2.25 kHz; Sweep Time: 500 ms/Step; RF Attenuation: Auto; 10 dB min attenuation: OFF; RBW: 9 kHz; Preamplifier: OFF; Preselector: ON



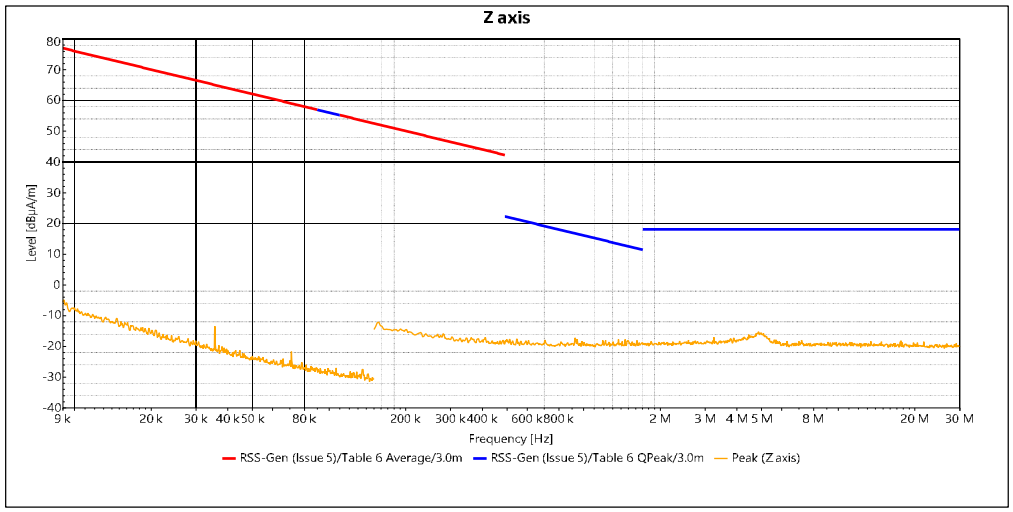
Final measurement

☒ The emissions are below the measurement system noise floor or 20 dB or more below the limit

☐ The measurement results of highest emissions relative to the limit for each detector type are shown below:

Frequency range / Antenna axis:	9 kHz to 30 MHz / Z		
Supply condition:	3 Vdc (fully charged battery)		
Operating mode:	3		
Test result:	Pass	**Tested on:**	2024-02-09

Start Frequency: 9 kHz; Stop Frequency: 150 kHz; Step: 50 Hz; Sweep Time: 500 ms/Step; RF Attenuation: Auto; 10 dB min attenuation: OFF; RBW: 200 Hz; Preamplifier: OFF; Preselector: ON
Start Frequency: 150 kHz; Stop Frequency: 30 MHz; Step: 2.25 kHz; Sweep Time: 500 ms/Step; RF Attenuation: Auto; 10 dB min attenuation: OFF; RBW: 9 kHz; Preamplifier: OFF; Preselector: ON



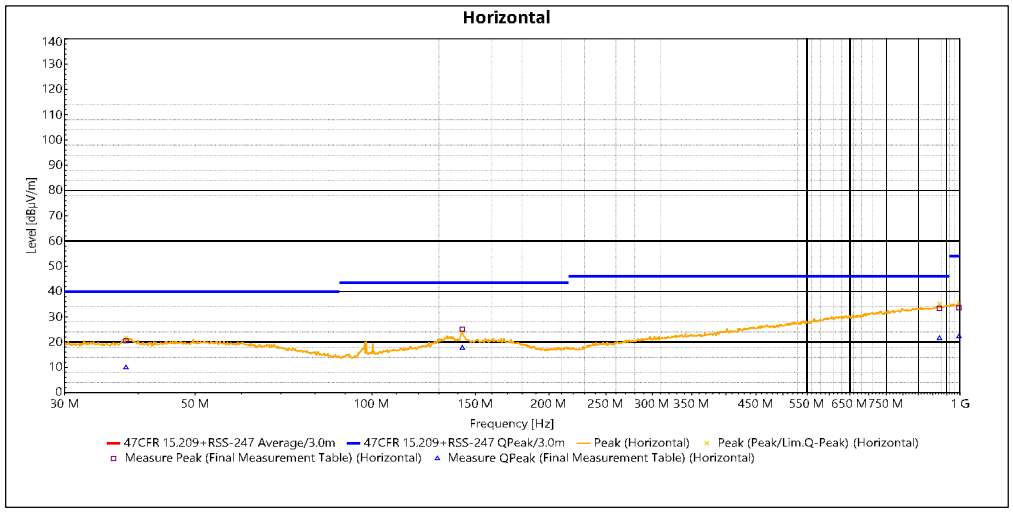
Final measurement

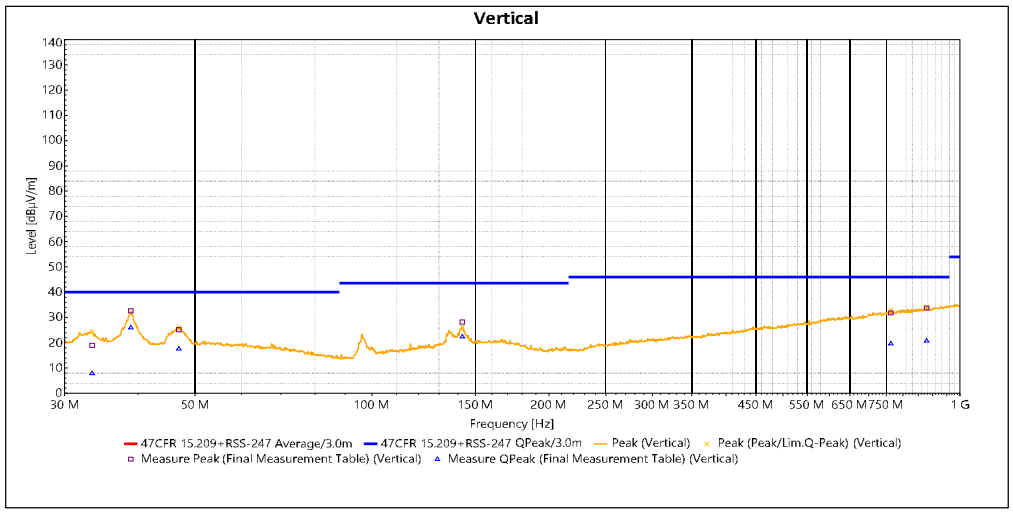
☒ The emissions are below the measurement system noise floor or 20 dB or more below the limit

☐ The measurement results of highest emissions relative to the limit for each detector type are shown below:

Operating mode ..... :	1
Frequency range / Polarization:	30 MHz to 1 GHz / Both
Used mains voltage/frequency ... :	3 Vdc (fully charged battery)
Verdict..... :	Pass

Start Frequency: 30 MHz; Stop Frequency: 1 GHz; Step: 30 kHz; Sweep Time: 20 ms/Step; RF Attenuation: Auto; RBW: 120 kHz; VBW: Auto; Preamplifier: ON; Preselector: ON





Final measurement

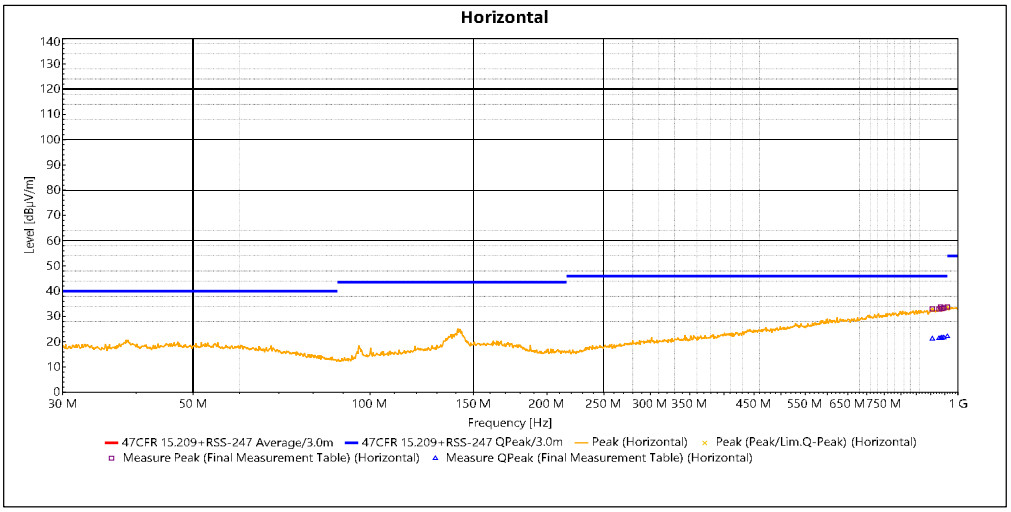
☐ The emissions are below the measurement system noise floor or 20 dB or more below the limit

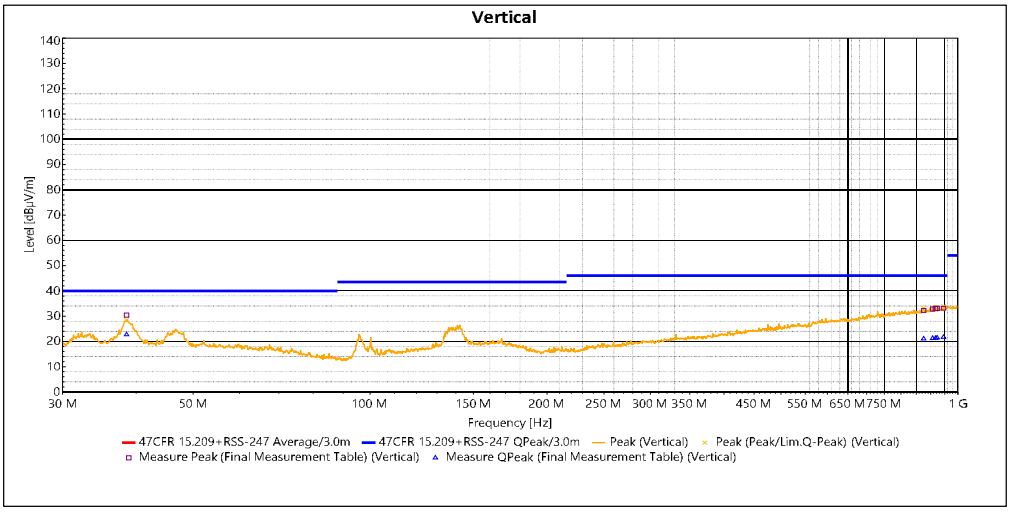
☒ The measurement results of highest emissions relative to the limit for each detector type are shown below:

Frequency	SR #	Measure Peak (dBµV/m)	Measure QPeak (dBµV/m)	Limit QPeak (dBµV/m)	Margin QPeak (dB)	Max height (m)	Max angle (°)	Polarization	RBW (Hz)	Meas.Time (s)	Comments	Correction (dB)
38.16 MHz	1	20.506	9.92	40	-30.08	3.927	137.1	Horizontal	120 k	5	Pass	19.021
142.41 MHz	1	25.053	17.704	43.52	-25.816	1.304	112.4	Horizontal	120 k	5	Pass	19.433
923.79 MHz	1	33.289	21.497	46.02	-24.523	3.414	221.9	Horizontal	120 k	5	Pass	31.613
997.11 MHz	1	33.529	22.252	53.98	-31.728	3.269	123	Horizontal	120 k	5	Pass	32.127
33.42 MHz	2	18.959	7.848	40	-32.152	3.573	333.5	Vertical	120 k	5	Pass	18.451
38.85 MHz	2	32.587	25.985	40	-14.015	1.062	83.5	Vertical	120 k	5	Pass	19.111
46.89 MHz	2	25.106	17.583	40	-22.417	1.342	87	Vertical	120 k	5	Pass	19.996
142.38 MHz	2	28.147	22.381	43.52	-21.139	2.26	1.1	Vertical	120 k	5	Pass	19.43
763.38 MHz	2	31.815	19.55	46.02	-26.47	3.939	80.6	Vertical	120 k	5	Pass	30.027
877.77 MHz	2	33.714	20.75	46.02	-25.27	1.226	4	Vertical	120 k	5	Pass	30.79

Operating mode ..... :	2
Frequency range / Polarization:	30 MHz to 1 GHz / Both
Used mains voltage/frequency ... :	3 Vdc (fully charged battery)
Verdict..... :	Pass

Start Frequency: 30 MHz; Stop Frequency: 1 GHz; Step: 30 kHz; Sweep Time: 20 ms/Step; RF Attenuation: Auto; RBW: 120 kHz; VBW: Auto; Preamplifier: ON; Preselector: ON





Final measurement

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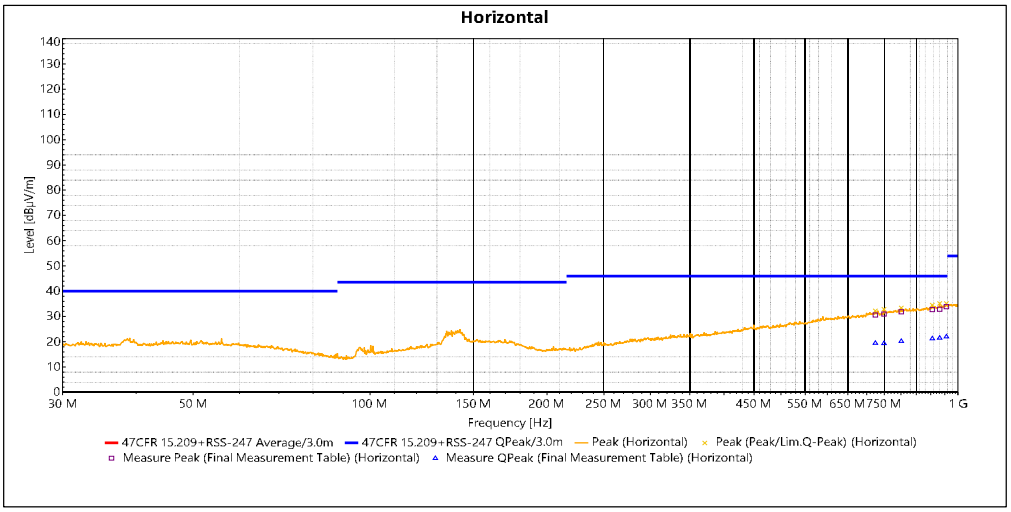
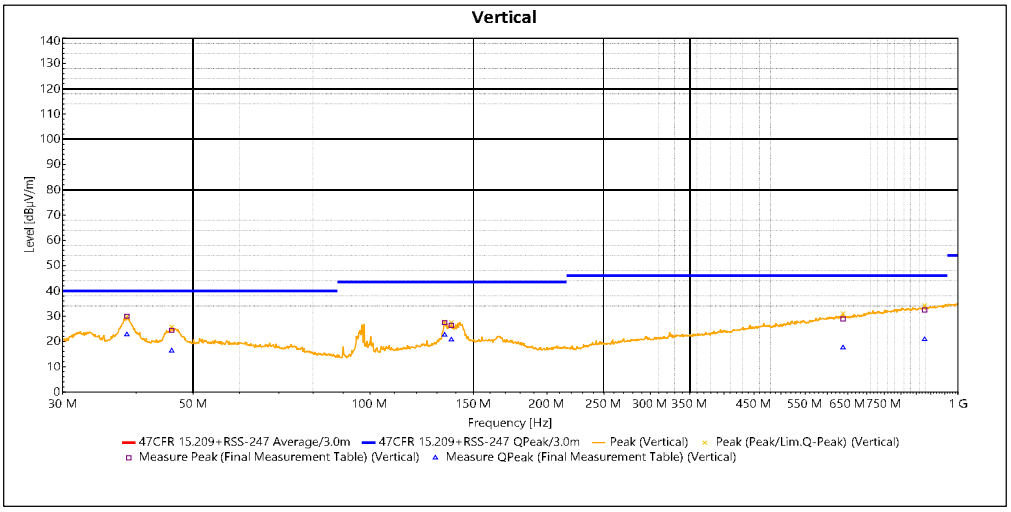
☒ The measurement results of highest emissions relative to the limit for each detector type are shown below:

Frequency	SR #	Measure Peak (dBµV/m)	Measure QPeak (dBµV/m)	Limit QPeak (dBµV/m)	Margin QPeak (dB)	Max height (m)	Max angle (°)	Polarization	RBW (Hz)	Meas.Time (s)	Comments	Correction (dB)
905.52 MHz	1	32.977	21.182	46.02	-24.838	1.308	336.2	Horizontal	120 k	5	Pass	31.505
929.01 MHz	1	33.014	21.417	46.02	-24.603	3.615	354.9	Horizontal	120 k	5	Pass	31.693
935.46 MHz	1	33.758	21.417	46.02	-24.603	1.778	27.5	Horizontal	120 k	5	Pass	31.795
940.32 MHz	1	33.122	21.557	46.02	-24.463	2.695	20.9	Horizontal	120 k	5	Pass	31.877
946.71 MHz	1	33.42	21.601	46.02	-24.419	3.39	348.9	Horizontal	120 k	5	Pass	31.928
959.85 MHz	1	33.793	22.072	46.02	-23.948	3.519	356.9	Horizontal	120 k	5	Pass	32.145
38.52 MHz	2	30.419	22.649	40	-17.351	1.027	15.2	Vertical	120 k	5	Pass	19.068
874.8 MHz	2	32.236	21.037	46.02	-24.983	3.54	355.6	Vertical	120 k	5	Pass	30.772
905.91 MHz	2	32.784	21.241	46.02	-24.779	3.844	354.2	Vertical	120 k	5	Pass	31.515
916.17 MHz	2	33.023	21.336	46.02	-24.684	3.614	1.8	Vertical	120 k	5	Pass	31.602
922.14 MHz	2	33.023	21.425	46.02	-24.595	3.9	18.9	Vertical	120 k	5	Pass	31.627
945.24 MHz	2	33.132	21.674	46.02	-24.346	1.329	0.2	Vertical	120 k	5	Pass	31.915

Operating mode ..... :	3
Frequency range / Polarization:	30 MHz to 1 GHz / Both
Used mains voltage/frequency ... :	3 Vdc (fully charged battery)
Verdict..... :	Pass

Start Frequency: 30 MHz; Stop Frequency: 1 GHz; Step: 30 kHz; Sweep Time: 20 ms/Step; RF Attenuation: Auto; RBW: 120 kHz; VBW: Auto; Preamplifier: ON; Preselector: ON





Final measurement

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☒ The measurement results of highest emissions relative to the limit for each detector type are shown below:

Frequency	SR #	Measure Peak (dBµV/m)	Measure QPeak (dBµV/m)	Limit QPeak (dBµV/m)	Margin QPeak (dB)	Max height (m)	Max angle (°)	Polarization	RBW (Hz)	Meas.Time (s)	Comments	Correction (dB)
724.38 MHz	1	30.557	19.417	46.02	-26.603	2.721	302.7	Horizontal	120 k	5	Pass	29.065
748.8 MHz	1	31.004	19.361	46.02	-26.659	1.974	261.6	Horizontal	120 k	5	Pass	29.732
801.54 MHz	1	31.862	20.198	46.02	-25.822	3.059	351.2	Horizontal	120 k	5	Pass	30.293
905.19 MHz	1	32.749	21.242	46.02	-24.778	1.769	227.9	Horizontal	120 k	5	Pass	31.496
931.11 MHz	1	32.884	21.481	46.02	-24.539	2.912	247.1	Horizontal	120 k	5	Pass	31.721
956.97 MHz	1	33.904	22.001	46.02	-24.019	1.298	294.9	Horizontal	120 k	5	Pass	32.098
38.58 MHz	2	29.964	22.743	40	-17.257	1.168	65.2	Vertical	120 k	5	Pass	19.076
45.96 MHz	2	24.387	16.295	40	-23.705	1.127	231.8	Vertical	120 k	5	Pass	19.853
133.89 MHz	2	27.43	22.588	43.52	-20.932	1.506	194	Vertical	120 k	5	Pass	18.925
137.58 MHz	2	26.314	20.68	43.52	-22.84	1.358	196.5	Vertical	120 k	5	Pass	19.139
638.16 MHz	2	28.877	17.447	46.02	-28.573	3.801	265.3	Vertical	120 k	5	Pass	28.082
878.19 MHz	2	32.458	20.756	46.02	-25.264	2.866	95.1	Vertical	120 k	5	Pass	30.796