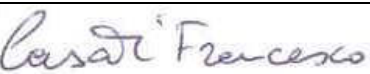


RF TEST REPORT

Test Report No:	25-4791735782-4-1-0-RAD-A
UL Project No:	4791735782
Date of issue:	2026-04-08
Total number of pages:	83
Applicant:	ASSA ABLOY Global Solutions Lodjurskatan 10 261 44 Landskrona - Sweden
Contact's person:	Robin Bengtsson (Robin.bengtsson@assaabloy.com)
Testing Laboratory:	UL International Italia S.r.l. Via delle Industrie, 6 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 Parts 15.207 & 15.209(a) & 15.247 RSS-247 Issue 4: 2025 RSS-Gen Issue 5:2021
Non-standard test method:	N/A
Scope of testing:	Wireless - New testing
TRF No.:	TRF_Accredia_FCC/ISED-FT_rev 0
Test Report Form(s) Originator:	UL International Italia S.r.l.
Master TRF	2017-07
Tested by: (name, function, signature)	Borghesi Matteo Laboratory Technician 
Approved by: (name, function, signature)	Andrea Giovanni Galbiati Laboratory Engineer 
Authorized by: (name, function, signature)	Francesco Casati Operations Leader 
General disclaimer: The test results presented in this test report relate only to the object tested, as received and not selected by UL. All technical records will be maintained by the Laboratory for minimum 10 years. This report shall not be reproduced, except in full, without the written approval of the issuing Testing Laboratory. This document contains data (of information) using color and if printed, should be printed in color to retain legibility and the information represented by the color.	
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Test Item Description:	Access Control Module
Trade Mark: (*)	ASSA ABLOY Global Solutions
Manufacturer: (*)	ASSA ABLOY Global Solutions Lodjursgatan 10 261 44 Landskrona - Sweden
Model Name: (*)	Adorn
HVIN: (*)	ADORNV1C1
PMN: (*)	Adorn
FCC ID: (*)	2BRES-ADORNV1C1
ISED Canada Certification number: (*)	34655-ADORNV1C1
Ratings: (*)	External supply: 5 – 24 V & 500 mA; Battery supply: 3 x 1.5 V AA batteries General AC/DC Power supply used: model S024DP0500300: Input: 100-240 V; ~50/60 Hz Output: 5 Vdc model PSU100: Input: 100-230 V; ~50/60 Hz Output: 24 Vdc
Testing:	
Date of receipt of test item:	2025-06-10
UL Sample Tag No.:	8344225 (Conducted sample) 8344222 (Radiated sample)
Status of sample upon receipt:	☒ New and operational ☐ Reconditioned ☐ Damaged
Date(s) of performance of tests:	2025-07-01 to 2026-04-07
Name and address of factory(ies): (*)	No information available
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: (*)

Adorn is an access control module intended to be mounted in doors, with the primary functionality of reading RFID credentials for opening the door lock. In addition to RFID, Adorn also implements a 2.4 GHz radio for BLE.

Main microcontroller (MCU)

The nRF52840 is the MCU of Adorn. It has two crystals, one 32 MHz crystal and one 32.768 kHz crystal.

Flash

Adorn has an external flash, which is used to store configuration, audit log, and time of day. The configuration and time of day are used to make access decisions for a given credential.

Detection circuit

Adorn has a pinger circuit connected to the RFID antenna. It works by sending a short pulse to the detection circuit from the MCU. From this pulse, the detection circuit generates a short current pulse through the antenna coil. This current pulse causes a damped oscillation in the antenna coil resonant circuit. A receiver RC integrator creates an envelope pulse of this oscillation. The envelope pulse is measured by the MCU. If a RFID keycard is held close to the antenna coil, the damped oscillation decays faster and the MCU detects this change.

RFID transceiver

If the MCU, by using the detection circuit, registers a detection, it will start the RFID transceiver and try to read a RFID credential. If the read operation is successful, the MCU will typically check if the credential is valid, and in that case unlock the door. The RFID transceiver is an NXP CLRC663. This transceiver contains most of the modules needed for 13.56 MHz RFID credential reading, i.e. transmitter, receiver, decoding circuit and interface to the MCU. The transceiver supports several RFID standards, ISO 14443-A, ISO 14443-B and ISO 15693. On a higher level it supports MIFARE communication and encryption. The transceiver's oscillator is controlled by a 27.12 MHz crystal.

RFID antenna

The RFID antenna is a separate PCB trace antenna, which is mounted to the main PCBA by two connectors. One of the connectors is for extra support and the other connector carries the differential RFID signal pair.

BLE radio

The 2.4 GHz radio capability of the MCU is used for BLE. The MCU is paired with a 2.4 GHz SMT MID chip antenna. In addition to the antenna, the network also includes a filter.

Service interface

Adorn has a USB-C connector as a service interface for communication by USB 2.0. The voltage, VBUS, from the USB-C service interface is supplied directly to the MCU as well as to the external supply rail. When a lock is added to a site, the service interface is used to store specific cryptographic keys to the external flash. These keys are used to ensure that credentials for accessing the door originate from the owners of the site. Audit logs can be read out using the service interface.

Motor controller

Adorn includes an H-bridge motor driver intended for operating a connected lock case.

Buzzer

Adorn includes an externally driven magnetic buzzer transducer, powered by 3.3 V. The buzzer is used to give feedback when the lock is operated,

LED

The Adorn includes a 12 channel LED driver that drives four RGB LEDs to provide visual feedback for the user. Adorn has one additional LED, typically used for debugging.

Power supply

Adorn is supplied from a 4.5 V battery pack (3 AA alkaline batteries) and/or from an external supply between 5 and 24 VDC. If both supply methods are connected, Adorn prioritizes the external supply. The external supply rail and the battery supply rail both have their own switching voltage regulator to generate a 3.3 V output. The 3.3 V outputs are fed to a multiplexer for prioritization and the 3.3 V multiplexer output

supplies the internal circuits. This 3.3 V output is also fed to a switching voltage regulator to generate a 4.1 V output on demand, for driving the RFID field, the motor, and the RGB LEDs.

Battery level monitor

Adorn has a circuit for monitoring the voltage of the connected batteries. It measures one third of the actual voltage. So, for three connected batteries, it measures the nominal battery voltage.

RS485 transceiver

Adorn has a transceiver circuit for RS485.

Lock case switches

The lock cases used with Adorn have mechanical switches for signaling events to Adorn. These switches are configured as pull-up in Adorn and pulled to ground in the lock case when the respective event occurs.

UART / I2C

Adorn has four pins that can be configured for either UART or I2C communication with an external device.

Document history

Test Report No.	Reason for change	Date of issue
25-4791735782-4-1-0-RAD-A	Original release	2026-04-08

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

Table of Contents

1	Test Item Description	7
1.1	Additional information of radio device(s)	10
2	Verdict summary section	11
3	Conformity decision rule	12
4	Formulas used	13
5	Test Setup Diagrams	14
6	Tests	17
6.1	Antenna Port Test Results	17
6.1.1	Transmitter Duty Cycle	17
6.1.2	Transmitter 99% Occupied Bandwidth	19
6.1.3	Transmitter Minimum 6 dB Bandwidth	23
6.1.4	Transmitter Maximum Peak Output Power	27
6.1.5	Transmitter Power Spectral Density	32
6.2	Radiated Test Results	36
6.2.1	Transmitter Radiated Emission < 1 GHz	36
6.2.2	Transmitter Radiated Emission > 1 GHz	52
6.2.3	Transmitter Band Edge Radiated Emission and restricted band evaluation	62
6.3	Transmitter AC Conducted Emissions	67
7	List of test equipment	80
8	Measurement instrumentation uncertainties	83

1 Test Item Description

Serial number: (*)	No information available					
Date of production: (*)	No information available					
Ports: (*)	Port name and description		Cable			
			Maximum length(m)	Attached during test	Shielded	
	AC Mains (^)	n.d	☒	☐		
	DC Mains	n.d	☒	☐		
	Signal/control port	30	☒	☐		
	Service port USB-C	1	☐	☐		
Supplementary information to the ports:	n.d. = not defined (^) AC Mains port used only for AC Transmitter AC conducted emission (representative AC/DC adaptor has been used for this scope)					
Rated power supply: (*)		Voltage and frequency	Reference poles			
			N	L1	L2	L3
	☒	AC: 100 V; 60 Hz	☒	☒	☐	☐
	☒	AC: 240 V; 60 Hz	☒	☒	☐	☐
	☒	DC: 5-24 V (external power supply)				
☒	DC: 4.5 V (Battery mode)					
Rated power: (*)	---					
Working frequencies: (*)	NFC frequency 13.56 MHz BLE frequency 2400 MHz to 2483.5 MHz Clock 32 MHz crystal; 27.12 MHz crystal; 32.768 kHz crystal Other 32 MHz QSPI; 4 MHz SPI; 100 kHz I2C					
Other parameters: (*)	No information available					
Firmware/Software version (original): (*)	No information available					
Firmware/Software version (used for testing): (*)	No information available					
Hardware version: (*)	Rev B					
Dimensions in cm (W x H x D): (*)	5.3 x 5.3 x 1.3 cm					

Number	Operating modes
1	Continuous transmission on Bluetooth LE: Channel: Bottom (Center frequency: 2402 MHz) Data rate: 1 Mbps Max Power
2	Continuous transmission on Bluetooth LE: Channel: Middle (Center frequency: 2440 MHz) Data rate: 1 Mbps Max Power
3	Continuous transmission on Bluetooth LE: Channel: Top (Center frequency: 2480 MHz) Data rate: 1 Mbps Max Power
4	Continuous transmission on Bluetooth LE: Channel: Bottom (Center frequency: 2402 MHz) Data rate: 2 Mbps Max Power
5	Continuous transmission on Bluetooth LE: Channel: Middle (Center frequency: 2440 MHz) Data rate: 2 Mbps Max Power
6	Continuous transmission on Bluetooth LE: Channel: Top (Center frequency: 2480 MHz) Data rate: 2 Mbps Max Power
7	Continuous transmission on Bluetooth LE: Channel: Bottom (Center frequency: 2402 MHz) Data rate: 125 kbps, S8 coding Max Power
8	Continuous transmission on Bluetooth LE: Channel: Middle (Center frequency: 2440 MHz) Data rate: 125 kbps, S8 coding Max Power
9	Continuous transmission on Bluetooth LE: Channel: Top (Center frequency: 2480 MHz) Data rate: 125 kbps, S8 coding Max Power
10	Continuous transmission on Bluetooth LE: Channel: Bottom (Center frequency: 2402 MHz) Data rate: 500 kbps, S2 coding Max Power
11	Continuous transmission on Bluetooth LE: Channel: Middle (Center frequency: 2440 MHz) Data rate: 500 kbps, S2 coding Max Power
12	Continuous transmission on Bluetooth LE: Channel: Top (Center frequency: 2480 MHz) Data rate: 500 kbps, S2 coding Max Power

Supplemental information to the operating mode:	<u>For radiated tests only</u> Pre-scans in the X, Y and Z axis of orientation of EUT have been performed. The worst case of orientation was recorded in the test report.		
Auxiliary equipment (AuxEq): <i>Peripheral equipment that is part of the system under test</i>	Description	Manufacturer	Type
	---	---	---
Associated equipment (AE): <i>Equipment that is not part of the system under test but needed to exercise and/or monitor the EUT</i>	Description	Manufacturer	Type
	AC/DC power supply	Siemens	PSU100C
	AC/DC power supply	---	S024DP0500300
Documents as provided by the applicant: (*)	Description	File name	Issue date
	UL CAR_EMC items for clients	UL CAR_EMC items for clients ACM84V2	---
	Test instruction	Test instruction	---
Modifications to the test item during testing:	None		

Copy of marking plate: (*)



1.1 Additional information of radio device(s)

Technology Tested:	BLE	
Type of Unit:	Chip with BLE function	
Transmit Frequency Range:	2400-2483.5 MHz	
Model of radio module:	nRF52840	
Brand of radio module:	Nordic	
Transmit Channels Tested:	Channel ID	Channel Frequency (MHz)
	Bottom	2402
	Middle	2440
	Top	2480
Gain (dBi)	3.7	

2 Verdict summary section

FCC Reference (47CFR)	ISED Canada Reference	Measurement	Accreditation	Verdict	Note
Part 15.35(c)	RSS-Gen 8.2	Transmitter Duty Cycle	Accredia	N/A	1
N/A	RSS-Gen 6.7	Transmitter 99% Occupied Bandwidth	Accredia	P	
Part 15.247(a)(2)	RSS-Gen 6.7 / RSS-247 5.2(a)	Transmitter Minimum 6 dB Bandwidth	Accredia	P	
Part 15.247(b)(3)	RSS-Gen 6.12 / RSS-247 5.4(d)	Transmitter Maximum Peak Output Power	Accredia	P	
Part 15.247(e)	RSS-247 5.2(b)	Transmitter Power Spectral Density	Accredia	P	
Part 15.247(d)	RSS-Gen 6.13 / RSS-247 5.5	Transmitter Conducted Emissions	Accredia	N/A	2
Part 15.247(d) & 15.209(a)	RSS-Gen 6.13 / RSS-247 5.5	Transmitter Band Edge Conducted Emissions	Accredia	N/A	2
Part 15.247(d) & 15.209(a)	RSS-Gen 6.13 / RSS-247 5.5	Transmitter Radiated Emissions	Accredia	P	
Part 15.247(d) & 15.209(a)	RSS-Gen 6.13 / RSS-247 5.5	Transmitter Band Edge Radiated Emissions	Accredia	P	
Part 15.207	RSS-Gen 8.8	Transmitter AC Conducted Emissions	Accredia	P	
Notes: 1. Parameter for average measurement correction in radiated emission test. 2. Radiated method applied.					

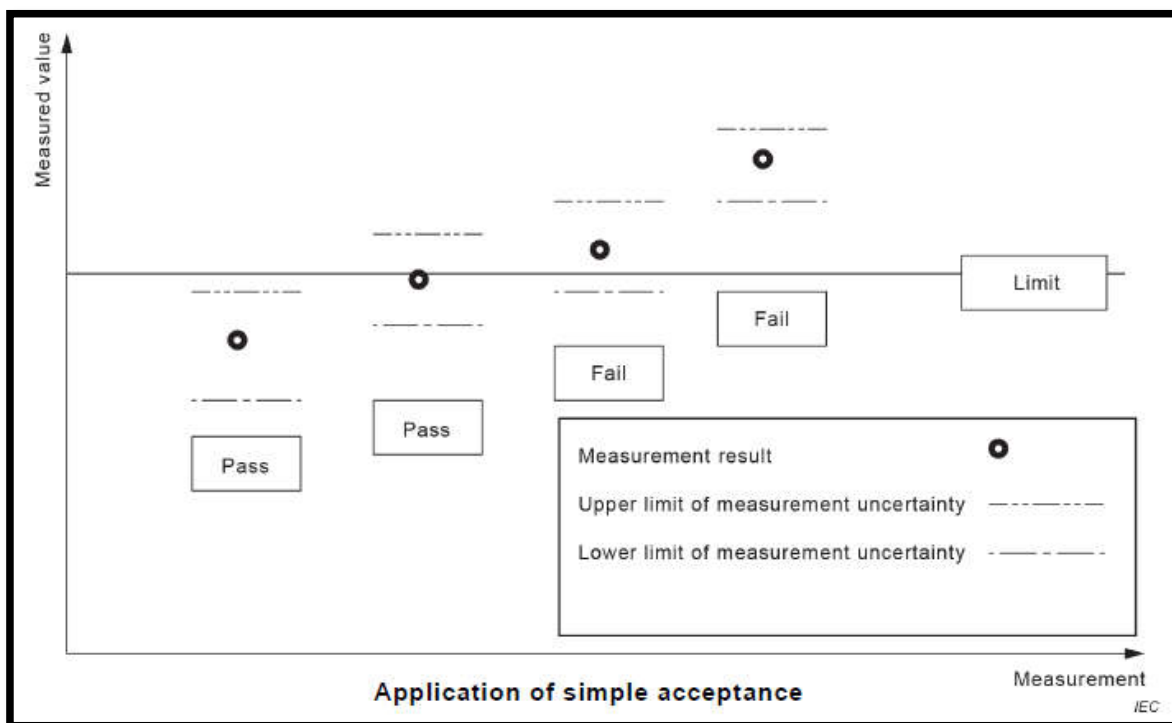
Methods and Procedures
ANSI C63.10-2020 + Cor. 1-2023 for FCC
ANSI C63.10-2020+Cor. 1-2023+C63.10a-2024 + Errata to C63.10a-2024 for ISED
KDB 558074 D01 15.247 Meas Guidance v05r02
GUIDANCE FOR COMPLIANCE MEASUREMENTS ON DIGITAL TRANSMISSION SYSTEM, FREQUENCY HOPPING SPREAD SPECTRUM SYSTEM, AND HYBRID SYSTEM DEVICES OPERATING UNDER SECTION 15.247 OF THE FCC RULES
FCC KDB 414788 D01 Radiated Test Site v01r01
TEST SITES FOR RADIATED EMISSION MEASUREMENTS
KDB 174176 D01 Line Conducted FAQ v01r02 August 7, 2025

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)

3 Conformity decision rule

Determining compliance shall be based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.



4 Formulas used

Disturbance voltage

$$V \text{ (dB}\mu\text{V)} = V \text{ receiver (dB}\mu\text{V)} + \text{Correction (dB)}$$

where:

$$\text{Correction (dB)} = \text{VDF LISN (dB)} + \text{insertion loss cable (dB)}$$

Magnetic field

$$H \text{ (dB}\mu\text{A/m)} = V \text{ receiver (dB}\mu\text{V)} + \text{Correction (dB)}$$

where:

$$\text{Correction (dB)} = \text{Magnetic antenna factor (dB}/\Omega\text{m)} + \text{insertion loss cables (dB)}$$

Electric field

$$E \text{ (dB}\mu\text{V/m)} = V \text{ receiver (dB}\mu\text{V)} + \text{Correction (dB)}$$

where:

$$\text{Correction (dB)} = \text{Electric antenna factor (dB/m)} - \text{Gain external preamplifier (dB)} + \text{insertion loss external filter (dB)} + \text{insertion loss cables (dB)}$$

Note: external preamplifier and external filter are optional and, if used, are indicated in the list of test equipment

Margin

$$\text{Margin (dB)} = \text{Measure} - \text{Limit}$$

Radiated emission measurement conversion for a different measuring distance

$$40 \text{ dB/decade (f} \leq 30 \text{ MHz); } 20 \text{ dB/decade (f} \geq 30 \text{ MHz)}$$

Linear to logarithmic conversion

$$\text{Log} = 20 * \log(\text{Lin}) \text{ for voltage and current; } \text{Log} = 10 * \log(\text{Lin}) \text{ for power}$$

Conducted Radio Measurements

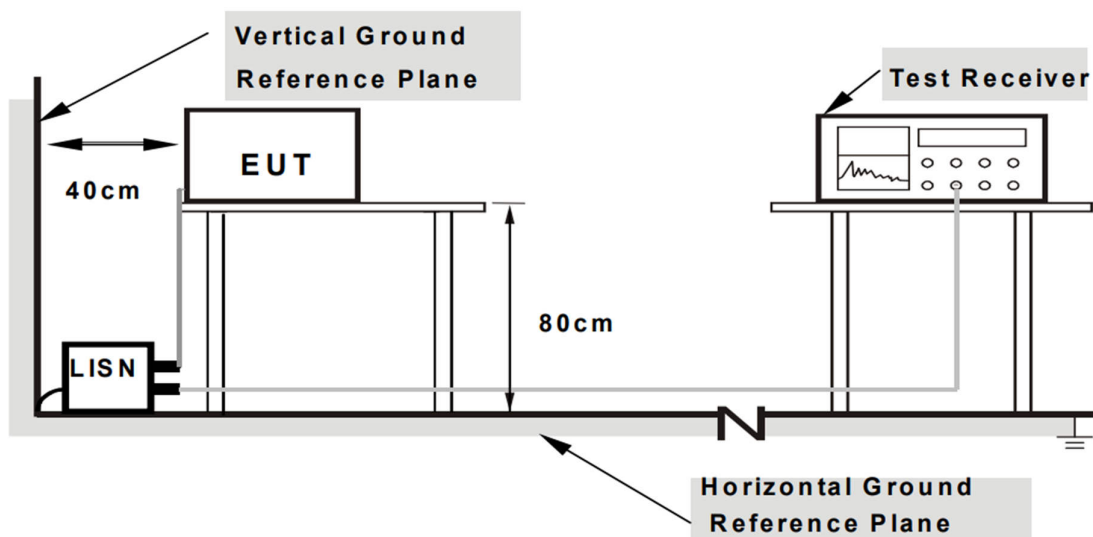
$$P_{\text{out_EUT}} = P_{\text{read_Amplifier}} \text{ (dBm)} + \text{Cable Losses (dB)} + \text{Attenuator (dB)}$$

5 Test Setup Diagrams

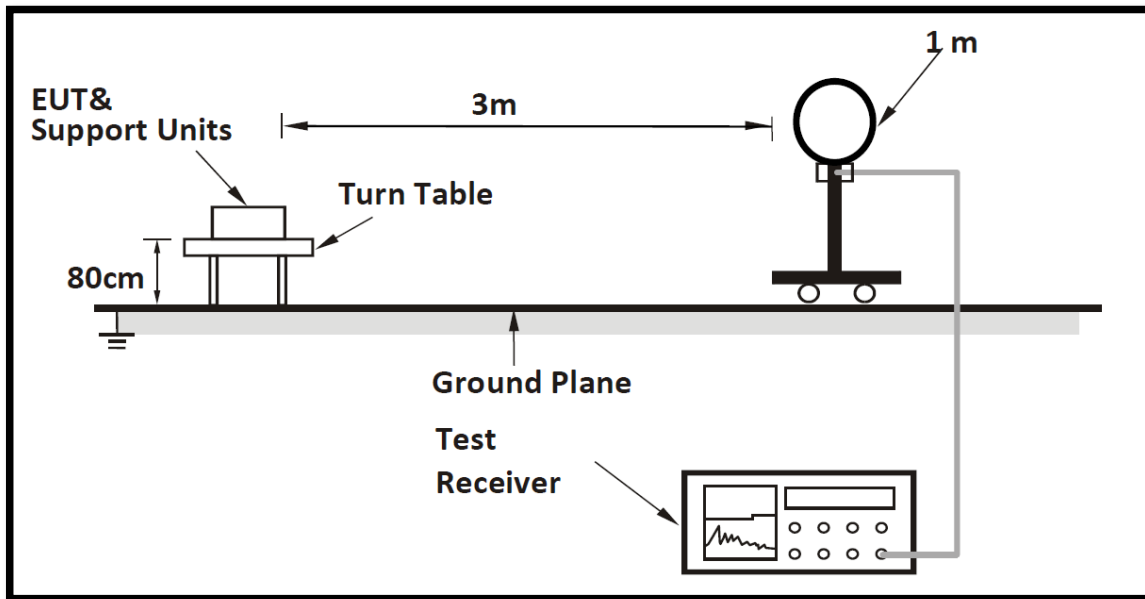
Conducted tests on antenna port:



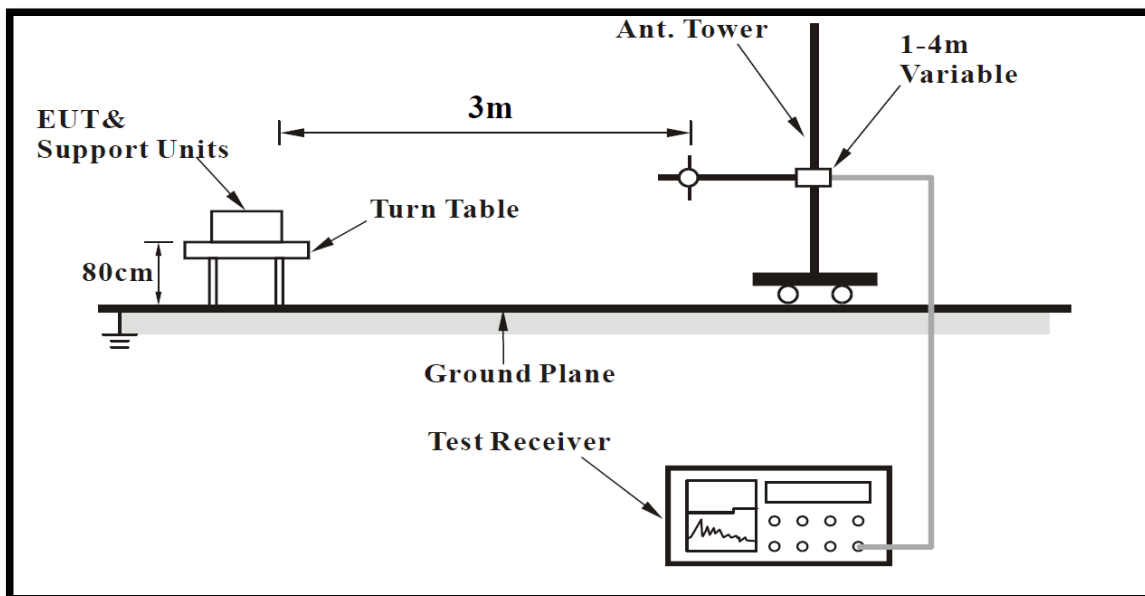
AC Conducted emission:



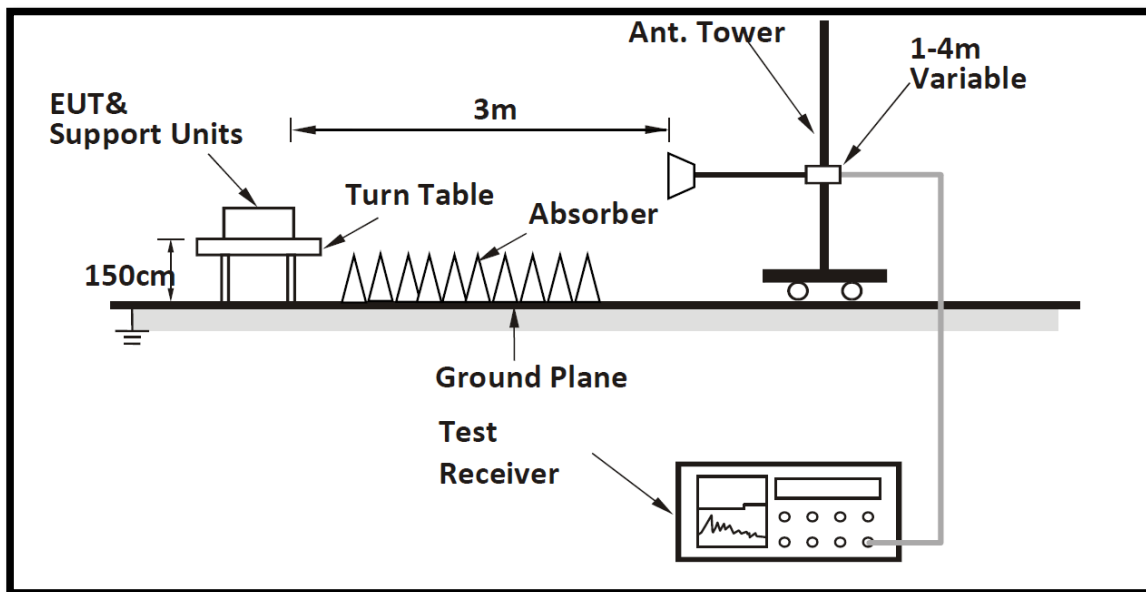
Radiated emission from 9kHz to 30 MHz



Radiated emission from 30 MHz to 1 GHz



Radiated emission from 1 GHz to 26 GHz



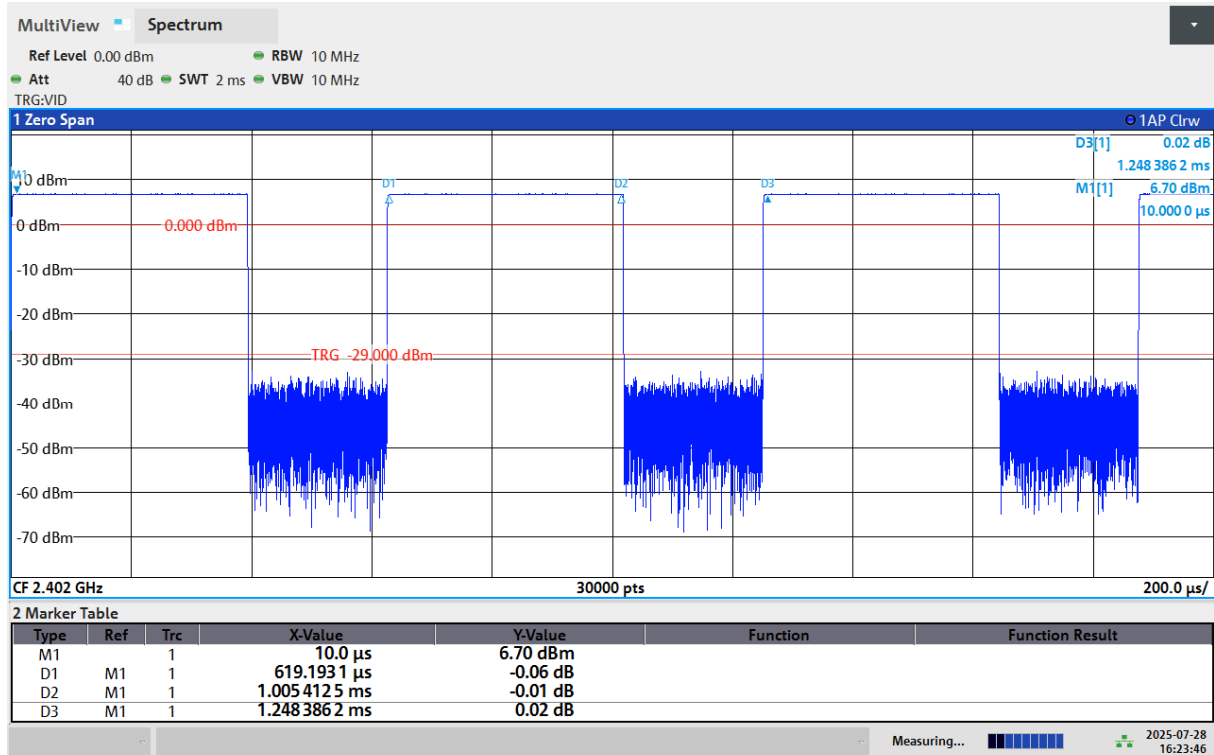
6 Tests

6.1 Antenna Port Test Results

6.1.1 Transmitter Duty Cycle

Tested by:	Matteo Borghesi
Test date:	2025-07-28
Test location (stand):	EMC Laboratory
Ambient temperature:	23 °C
Relative humidity:	61 %
Atmospheric pressure:	988 mbar
FCC Reference:	Part 15.35 (c)
ISED Reference:	RSS-Gen 8.2
Test Method Used	FCC KDB 558074 Section 6 referencing ANSI C63.10 Section 11.6
Used mains voltage/frequency:	5 Vdc (worst case)
Test item:	8344225
Supplementary information:	In order to assist with the determination of the average level of spurious emissions field strength , measurements were made of duty cycle to determine the transmission duration and the silent period time of the transmitter. The transmitter duty cycle was measured using a spectrum/signal analyser in the time domain and calculated by using the following calculation: $DC (\%) = \left(\frac{\sum T_{ON}}{\text{Period or 100 ms whichever is the lesser}} \right) \times 100$ $DC (dB) = 10 \times \log \left(\frac{\text{Period or 100 ms whichever is the lesser}}{\sum T_{ON}} \right)$

Results:



04:23:47 PM 07/28/2025

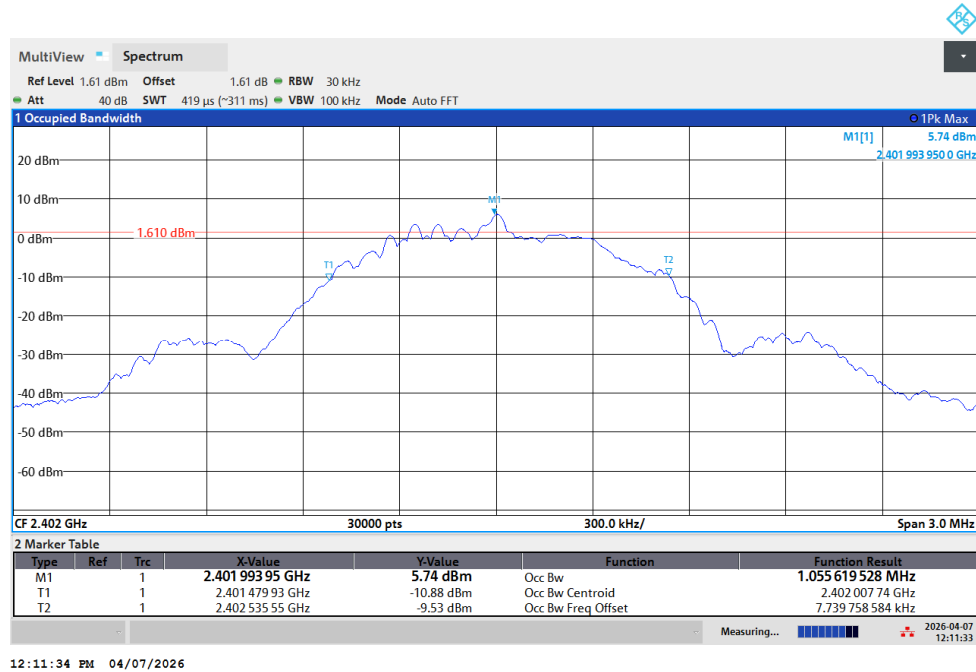
Operation Mode: 1

Pulse Duration (μ s)	Period (μ s)	Duty Cycle (%)	DC Correction Factor (dB)
386	619	62.4	2.05

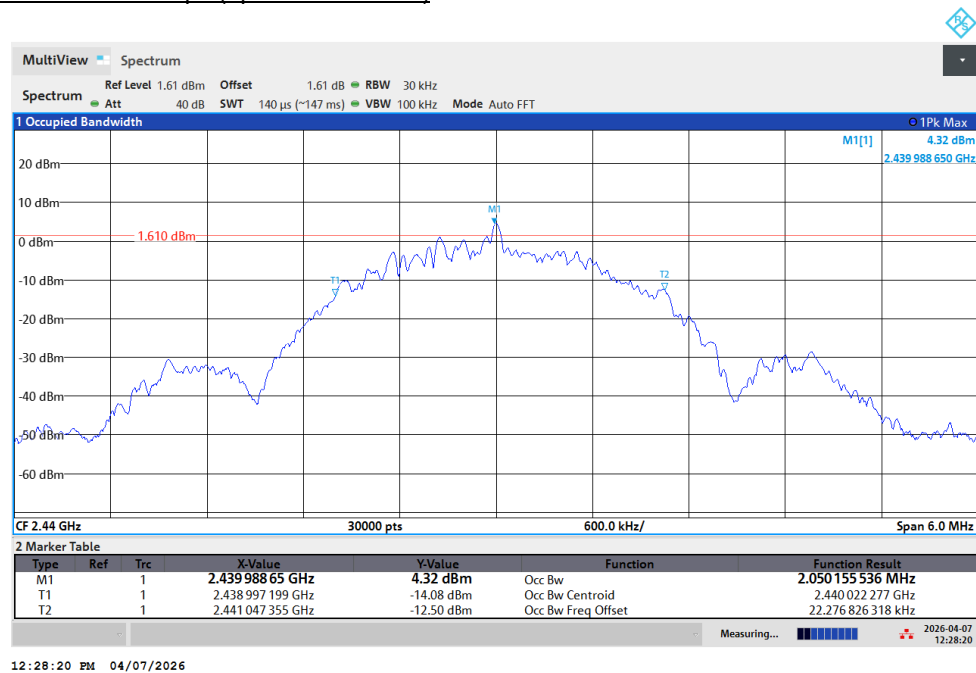
6.1.2 Transmitter 99% Occupied Bandwidth

Tested by:	Matteo Borghesi
Test date:	2026-04-07
Test location (stand):	EMC Laboratory
Ambient temperature:	23 °C
Relative humidity:	61 %
Atmospheric pressure:	988 mbar
FCC Reference:	N/A
ISED Reference:	RSS-Gen 6.7
Test Method Used	RSS-Gen 6.7 and Notes below
Used mains voltage/frequency:	5 Vdc (worst case)
Test item:	8344225
Supplementary information:	The 99% emission bandwidth was measured using the signal analyser occupied bandwidth function. The resolution bandwidth was set in the range of 1% to 5% of the occupied bandwidth and the video bandwidth set to 3 times the resolution bandwidth. The span was set to capture all products of the modulation process including emission skirts.

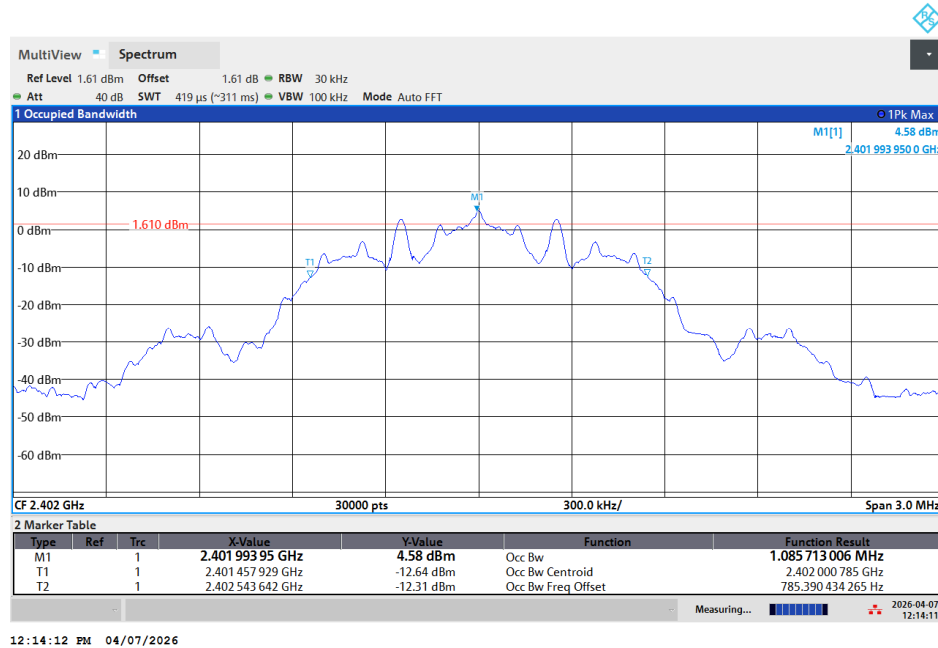
Worst case data rate 1 Mbps (operation mode 1)



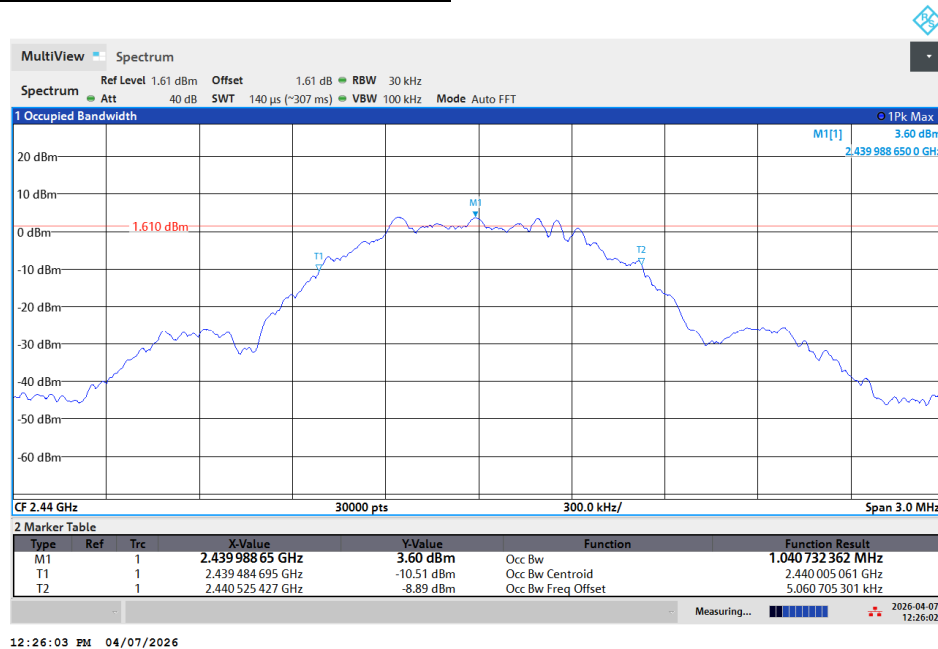
Worst case data rate 2 Mbps (operation mode 5)



Worst case data rate coded S8 (operation mode 7)



Worst case data rate coded S2 (operation mode 11)



Operation mode: 1,2,3

Channel	99% Occupied Bandwidth (kHz)
Bottom	1055
Middle	1055
Top	1054

Operation mode: 4,5,6

Channel	99% Occupied Bandwidth (kHz)
Bottom	2044
Middle	2050
Top	2045

Operation mode: 7,8,9

Channel	99% Occupied Bandwidth (kHz)
Bottom	1086
Middle	1079
Top	1079

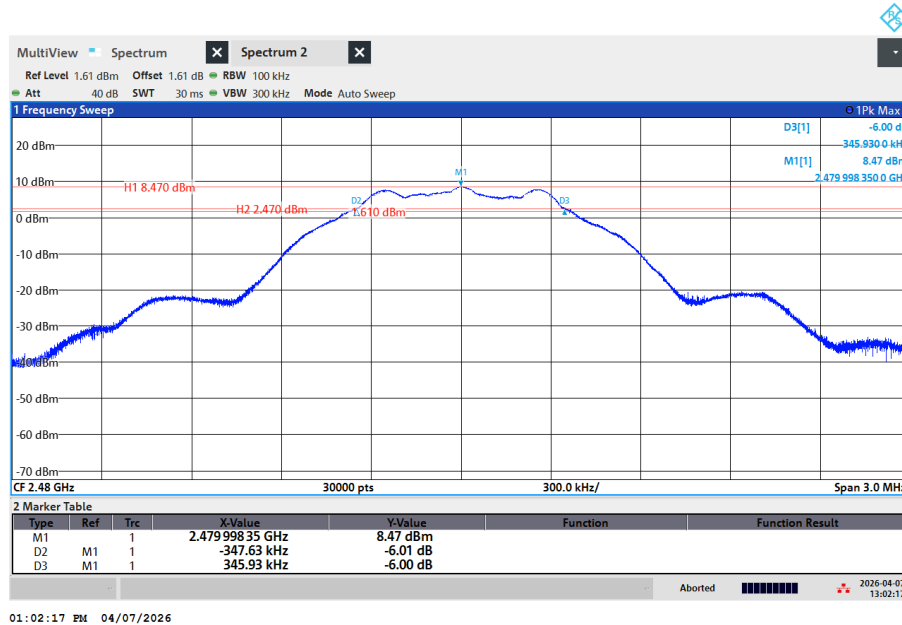
Operation mode: 10.11.12

Channel	99% Occupied Bandwidth (kHz)
Bottom	1040
Middle	1041
Top	1037

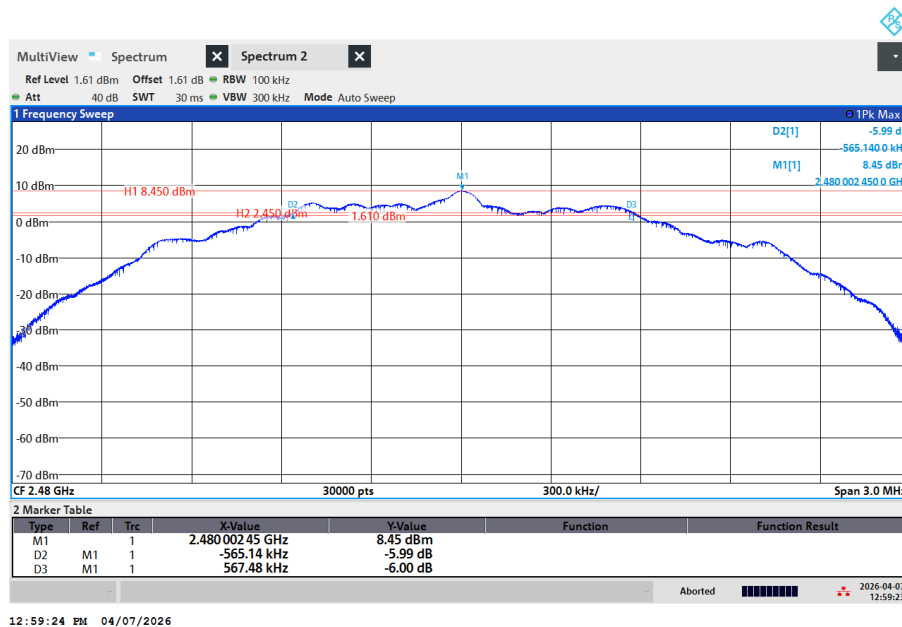
6.1.3 Transmitter Minimum 6 dB Bandwidth

Tested by:	Matteo Borghesi
Test date:	2026-04-07
Test location (stand):	EMC Laboratory
Ambient temperature:	23 °C
Relative humidity:	61 %
Atmospheric pressure:	988 mbar
FCC Reference:	Part 15.247(a)(2)
ISED Canada Reference:	RSS-Gen 6.7 / RSS-247 5.2(a)
Test Method Used	FCC KDB 558074 Section 8.2 referencing ANSI C63.10 Section 11.8.1
Used mains voltage/frequency:	5 Vdc (worst case)
Test item:	8344225
Supplementary information:	According to ANSI C63.10-2020, RBW must be set in the range of 1% to 5% of the occupied bandwidth but can not be less than 100 kHz. VBW was set 3 times the RBW.

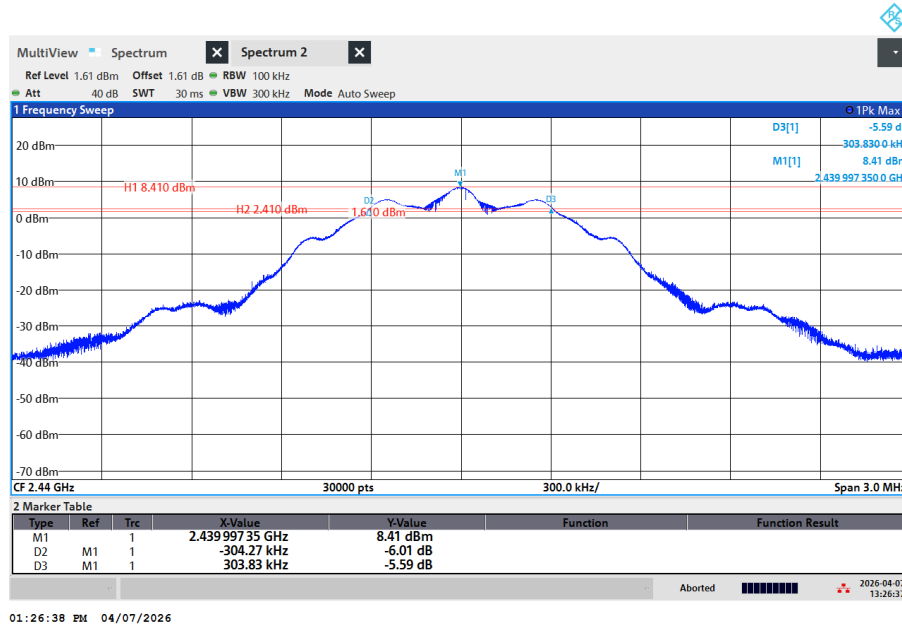
Worst case data rate 1 Mbps (operation mode 3)



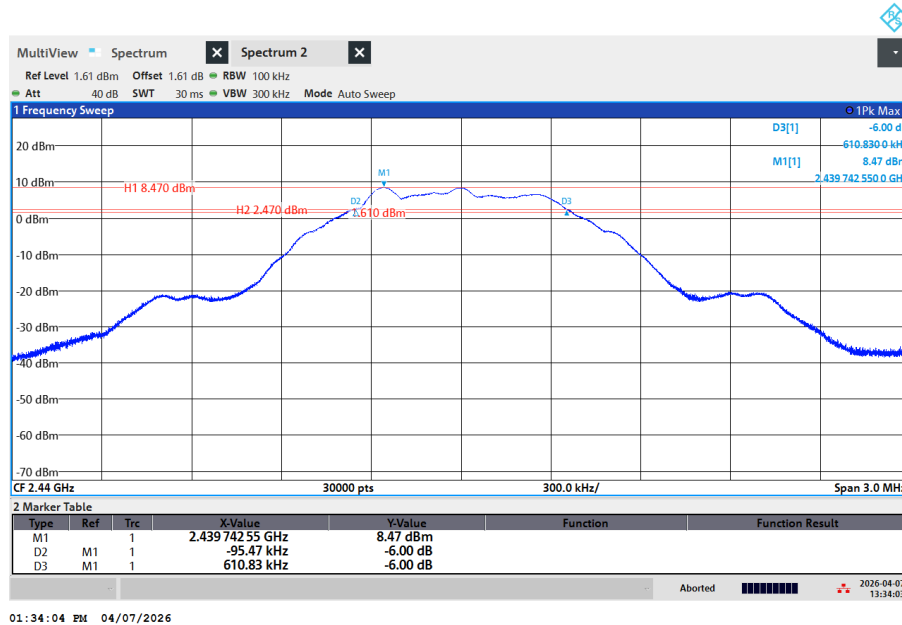
Worst case data rate 2 Mbps (operation mode 6)



Worst case data rate coded S8(operation mode 8)



Worst case data rate coded S2 (operation mode 11)



Operation mode: 1,2,3

Channel	6 dB Bandwidth (kHz)	Limit (kHz)	Result
Bottom	721.49	≥ 500	Pass
Middle	714.54	≥ 500	Pass
Top	693.56	≥ 500	Pass

Operation mode: 4,5,6

Channel	6 dB Bandwidth (kHz)	Limit (kHz)	Result
Bottom	1135.9	≥ 500	Pass
Middle	1139.8	≥ 500	Pass
Top	1132.62	≥ 500	Pass

Operation mode: 7,8,9

Channel	6 dB Bandwidth (kHz)	Limit (kHz)	Result
Bottom	616.09	≥ 500	Pass
Middle	608.1	≥ 500	Pass
Top	614.92	≥ 500	Pass

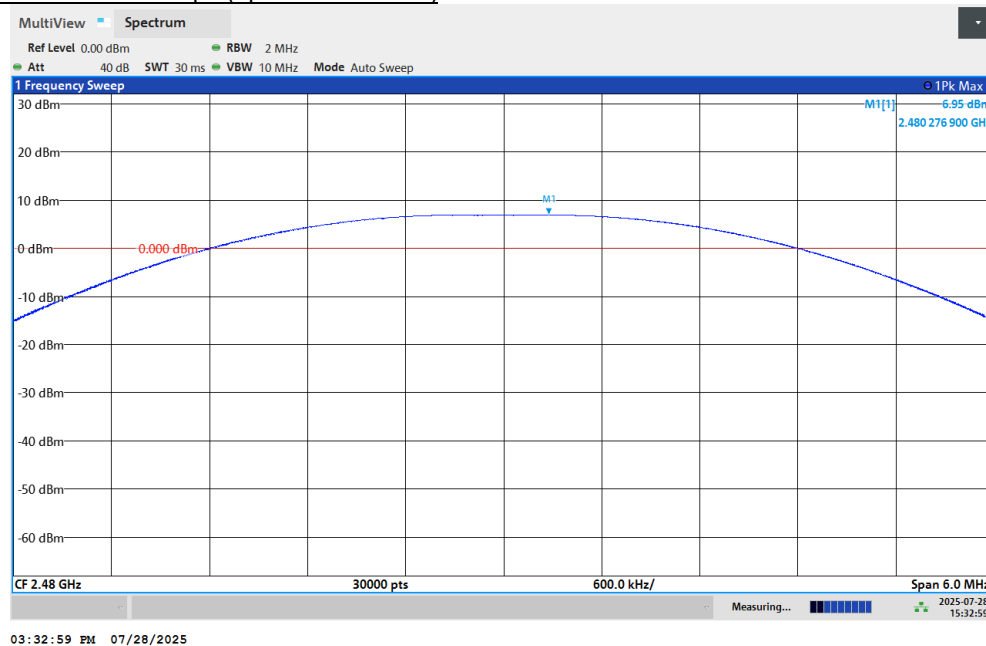
Operation mode: 10,11,12

Channel	6 dB Bandwidth (kHz)	Limit (kHz)	Result
Bottom	721.09	≥ 500	Pass
Middle	706.3	≥ 500	Pass
Top	717.71	≥ 500	Pass

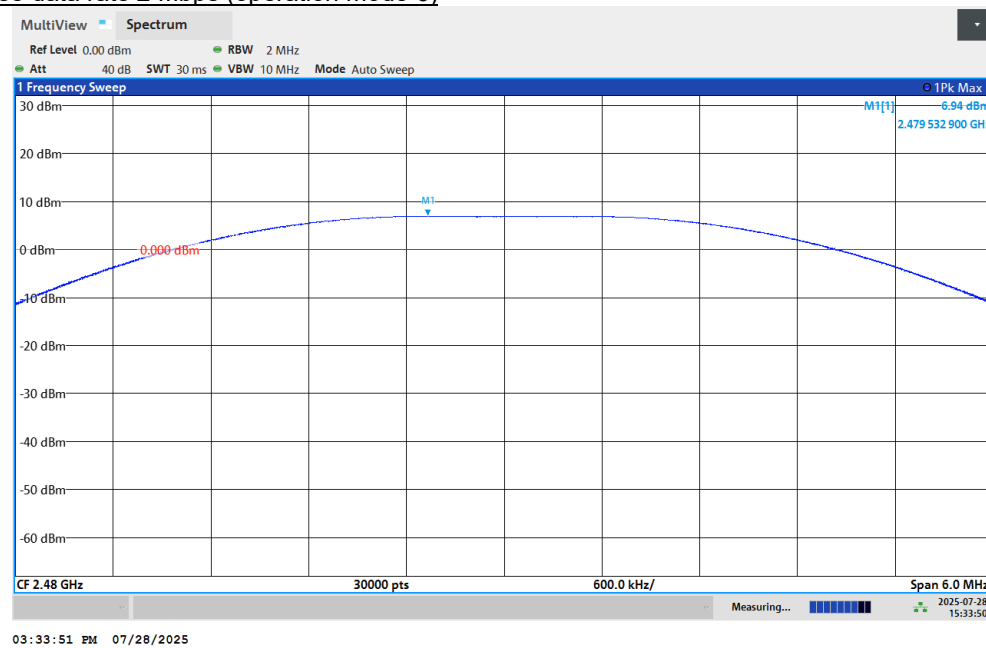
6.1.4 Transmitter Maximum Peak Output Power

Tested by:	Matteo Borghesi
Test date:	2025-07-28
Test location (stand):	EMC Laboratory
Ambient temperature:	23 °C
Relative humidity:	61 %
Atmospheric pressure:	988 mbar
FCC Reference:	Part 15.247(b)(3)
ISED Canada Reference:	RSS-Gen 6.12 / RSS-247 5.4(d)
Test Method Used	FCC KDB 558074 Section 8.3.1.1 referencing ANSI C63.10 Section 11.9.1.1 and Notes below
Used mains voltage/frequency:	5 Vdc (worst case)
Test item:	8344225
Supplementary information:	- Instrument's band/channel power measurement function with the band limits set equal to the DTS bandwidth edges was used. - The conducted power was added to the declared antenna gain to obtain the EIRP. - A correction of 1.61 dB was added to compensate losses of RF cables.

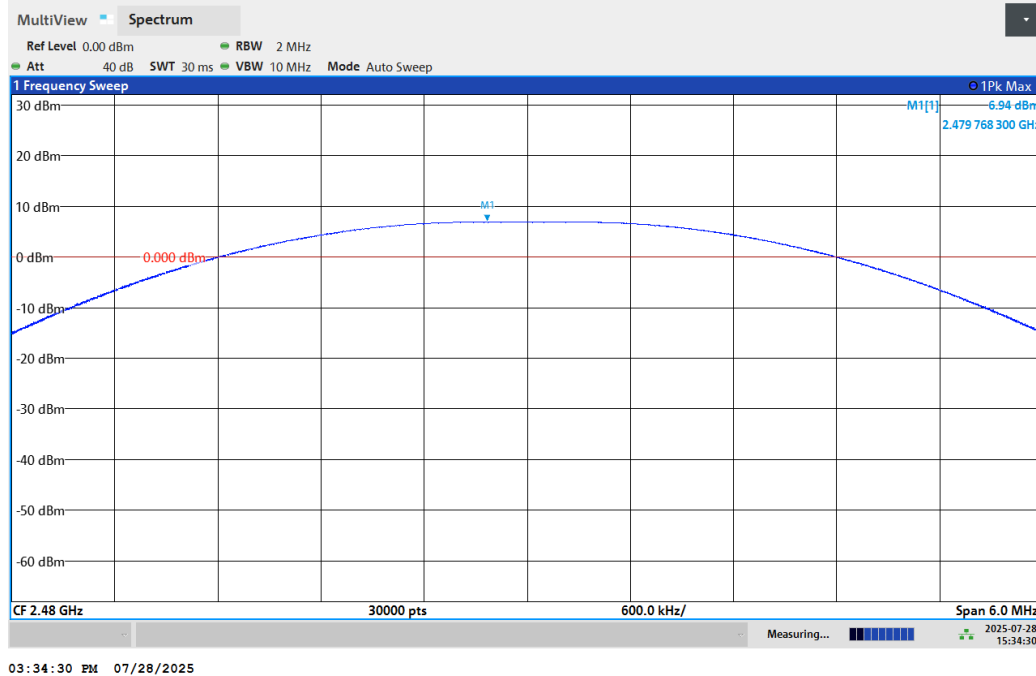
Worst case data rate 1 Mbps (operation mode 3)



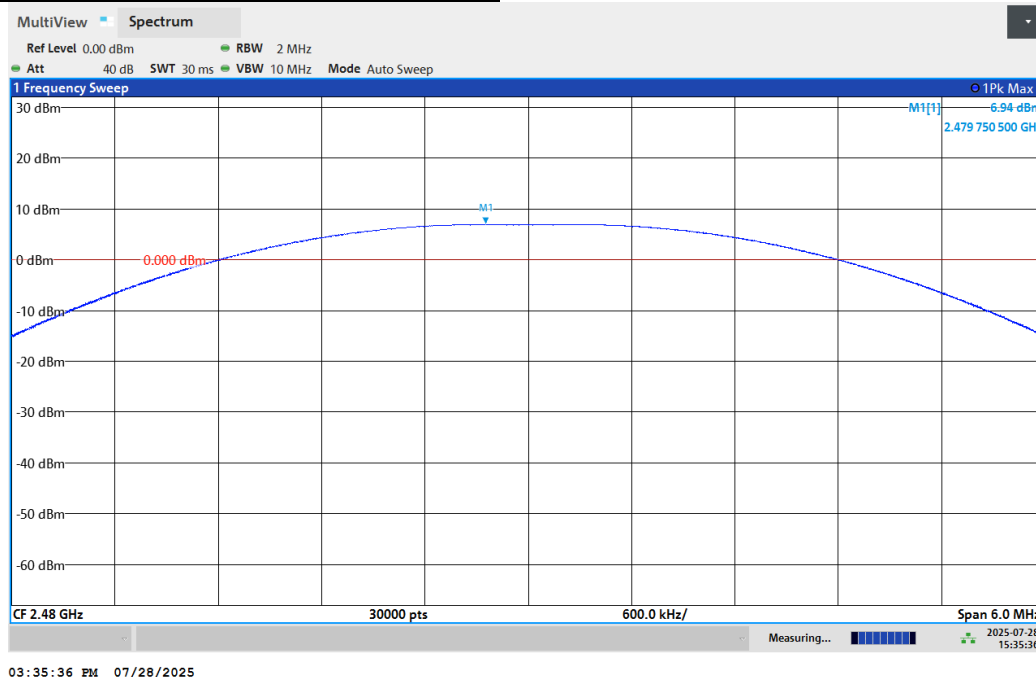
Worst case data rate 2 Mbps (operation mode 6)



Worst case data rate coded S8 (operation mode 9)



Worst case data rate coded S2 (operation mode 12)



Operation mode: 1,2,3

Channel	Conducted Peak Power (dBm)	Conducted Peak Power with Offset (dBm)	Conducted Peak Power Limit (dBm)	Margin (dB)	Result
Bottom	6.73	8.34	30.0	-21.66	Pass
Middle	6.87	8.48	30.0	-21.52	Pass
Top	6.95	8.56	30.0	-21.44	Pass

Channel	Conducted Peak Power with offset (dBm)	Declared Antenna Gain (dBi)	EIRP (dBm)	De Facto EIRP Limit (dBm)	Margin (dB)	Result
Bottom	8.34	3.7	12.04	36.0	-23.96	Pass
Middle	8.48	3.7	12.18	36.0	-23.82	Pass
Top	8.56	3.7	12.26	36.0	-23.74	Pass

Operation mode: 4,5,6

Channel	Conducted Peak Power (dBm)	Conducted Peak Power with Offset (dBm)	Conducted Peak Power Limit (dBm)	Margin (dB)	Result
Bottom	6.74	8.35	30.0	-21.65	Pass
Middle	6.87	8.48	30.0	-21.52	Pass
Top	6.94	8.55	30.0	-21.45	Pass

Channel	Conducted Peak Power with Offset (dBm)	Declared Antenna Gain (dBi)	EIRP (dBm)	De Facto EIRP Limit (dBm)	Margin (dB)	Result
Bottom	8.35	3.7	12.05	36.0	-23.95	Pass
Middle	8.48	3.7	12.18	36.0	-23.82	Pass
Top	8.55	3.7	12.25	36.0	-23.75	Pass

Operation mode: 7,8,9

hannel	Conducted Peak Power (dBm)	Conducted Peak Power with Offset (dBm)	Conducted Peak Power Limit (dBm)	Margin (dB)	Result
Bottom	6.73	8.34	30.0	-21.66	Pass
Middle	6.87	8.48	30.0	-21.52	Pass
Top	6.94	8.55	30.0	-21.45	Pass

Channel	Conducted Peak Power with offset (dBm)	Declared Antenna Gain (dBi)	EIRP (dBm)	De Facto EIRP Limit (dBm)	Margin (dB)	Result
Bottom	8.34	3.7	12.04	36.0	-23.96	Pass
Middle	8.48	3.7	12.18	36.0	-23.82	Pass
Top	8.55	3.7	12.25	36.0	-23.75	Pass

Operation mode: 10,11,12

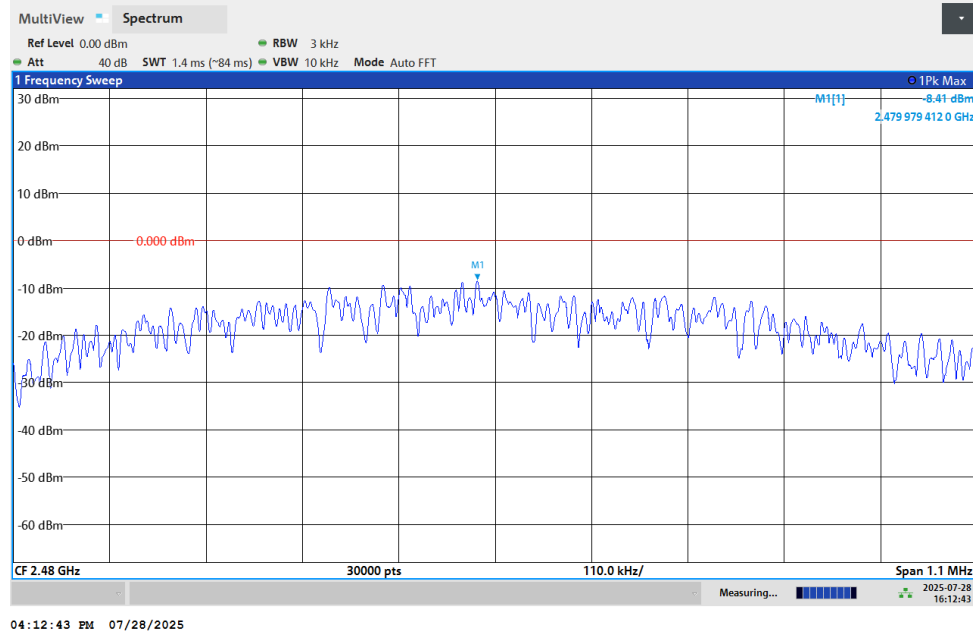
Channel	Conducted Peak Power (dBm)	Conducted Peak Power with Offset (dBm)	Conducted Peak Power Limit (dBm)	Margin (dB)	Result
Bottom	6.73	8.34	30.0	-21.66	Pass
Middle	6.87	8.48	30.0	-21.52	Pass
Top	6.94	8.55	30.0	-21.45	Pass

Channel	Conducted Peak Power with offset (dBm)	Declared Antenna Gain (dBi)	EIRP (dBm)	De Facto EIRP Limit (dBm)	Margin (dB)	Result
Bottom	8.34	3.7	12.04	36.0	-23.96	Pass
Middle	8.48	3.7	12.18	36.0	-23.82	Pass
Top	8.55	3.7	12.25	36.0	-23.75	Pass

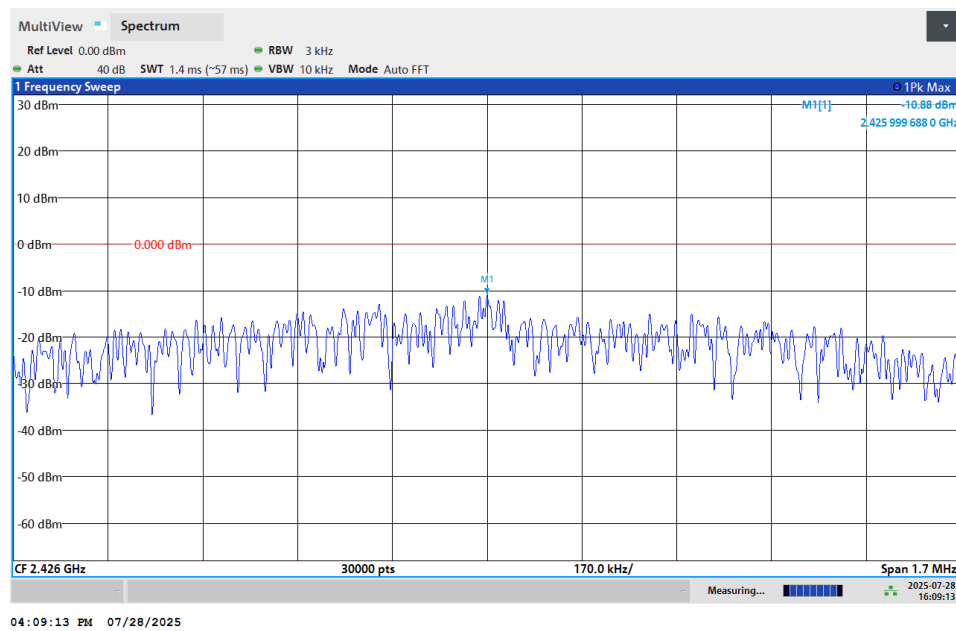
6.1.5 Transmitter Power Spectral Density

Tested by:	Matteo Borghesi
Test date:	2025-07-28
Test location (stand):	EMC Laboratory
Ambient temperature:	23 °C
Relative humidity:	61 %
Atmospheric pressure:	988 mbar
FCC Reference:	Part 15.247(e)
ISED Canada Reference:	RSS-247 5.2(b)
Test Method Used	FCC KDB 558074 Section 8.4 referencing ANSI C63.10 Section 11.10.2
Used mains voltage/frequency:	5 Vdc (worst case)
Test item:	8344225
Supplementary information:	The signal analyser was connected to the RF port on the EUT using suitable attenuation and RF cable. An RF level offset of 1.61 dB was entered on the signal analyser to compensate for the loss of the attenuator and RF cable.

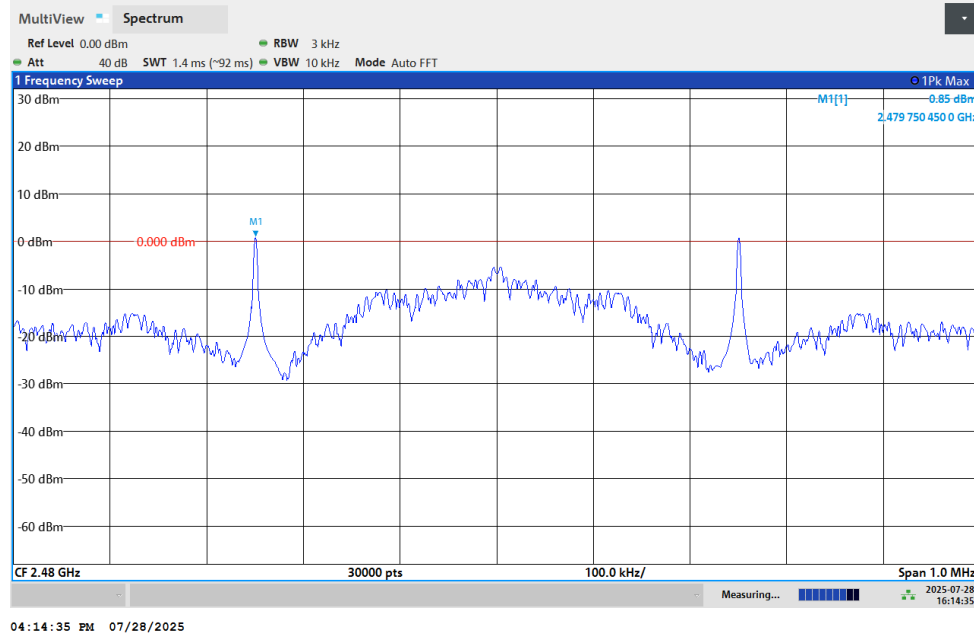
Worst case data rate 1 Mbps (operation mode 3)



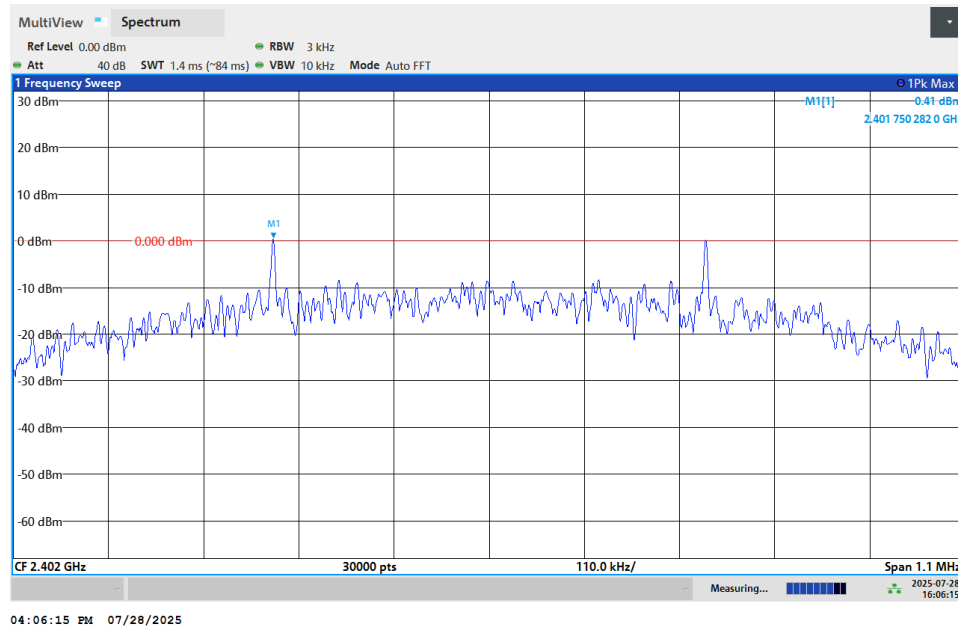
Worst case data rate 2 Mbps (operation mode 5)



Worst case data rate coded S8 (operation mode 9)



Worst case data rate coded S2 (operation mode 10)



Operation mode: 1,2,3

Channel	Output Power (dBm)	Output Power with Offset (dBm)	Limit (dBm / 3 kHz)	Margin (dB)	Result
Bottom	-8.74	-7.13	8.0	-15.13	Pass
Middle	-8.45	-6.84	8.0	-14.84	Pass
Top	-8.41	-6.8	8.0	-14.8	Pass

Operation mode: 4,5,6

Channel	Output Power (dBm)	Output Power with Offset (dBm)	Limit (dBm / 3 kHz)	Margin (dB)	Result
Bottom	-11.34	-9.73	8.0	-17.73	Pass
Middle	-10.88	-9.27	8.0	-17.27	Pass
Top	-10.94	-9.33	8.0	-17.33	Pass

Operation mode: 7,8,9

Channel	Output Power (dBm)	Output Power with Offset (dBm)	Limit (dBm / 3 kHz)	Margin (dB)	Result
Bottom	0.63	2.24	8.0	-5.76	Pass
Middle	0.78	2.39	8.0	-5.61	Pass
Top	0.85	2.46	8.0	-5.54	Pass

Operation mode: 10,11,12

Channel	Output Power (dBm)	Output Power with Offset (dBm)	Limit (dBm / 3 kHz)	Margin (dB)	Result
Bottom	0.41	2.02	8.0	-5.98	Pass
Middle	0.35	1.96	8.0	-6.04	Pass
Top	-0.25	1.36	8.0	-6.64	Pass

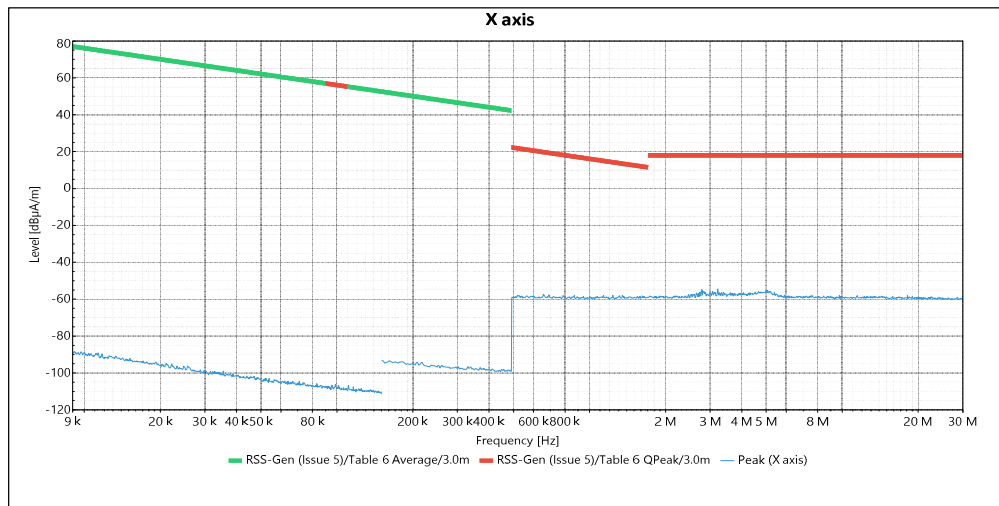
6.2 Radiated Test Results

6.2.1 Transmitter Radiated Emission < 1 GHz

Tested by:	Matteo Borghesi
Test date:	2025-07-01
Test location (stand):	Area 8: SAC 3-1.2 (RF emission)
Ambient temperature:	23 °C
Relative humidity:	55 %
Atmospheric pressure:	1001 mbar
FCC Reference:	Parts 15.247(d) & 15.209(a)
ISED Canada Reference:	RSS-Gen 6.13 & 8.9 / RSS-247 5.5
Test Method Used	ANSI C63.10 Sections 6.3, 6.4 and 6.5
Frequency Range	9 kHz to 1000 MHz
Used mains voltage/frequency:	5 Vdc (worst case)
Test item:	834422
Supplementary information:	<u>For 9kHz-30MHz frequency range only</u> - In accordance with FCC KDB 414788, an alternative test site may be used for the measurement below 30 MHz (the OATS / SAC comparison data is available upon request). Therefore the result from the semi-anechoic chamber tests is shown in this section of the test report. - The limits are specified at a test distance of 30 m & 300 m. However, as specified by FCC Section 15.31(f)(2), measurements may be performed at a closer distance and the measured level corrected to the specified measurement distance by using the square of an inverse linear distance extrapolation factor. - Therefore the measurement values are extrapolated to a measurement distance of 3 m where field strength of X dBμV/m was measured. ➤ 9-490 kHz: from 300 m to 3 m subtracting 80 dB at 40 dB/decade. ➤ 490-1705 kHz: from 30 m to 3 m subtracting 40 dB at 40 dB/decade. 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 a 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 Test performed in the following worst case: - Worst case of data rate resulting from Transmitter Maximum Peak Output Power has been used for this test - Worst condition orientation of EUT: Horizontal orientation

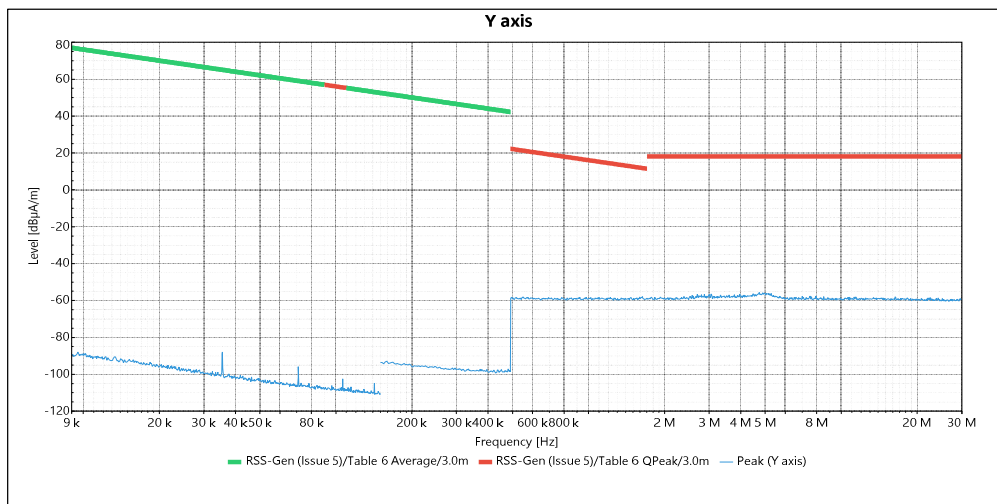
Results:

Operating mode	1
Axis	X axis
Verdict.....	Pass
Instrument settings	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



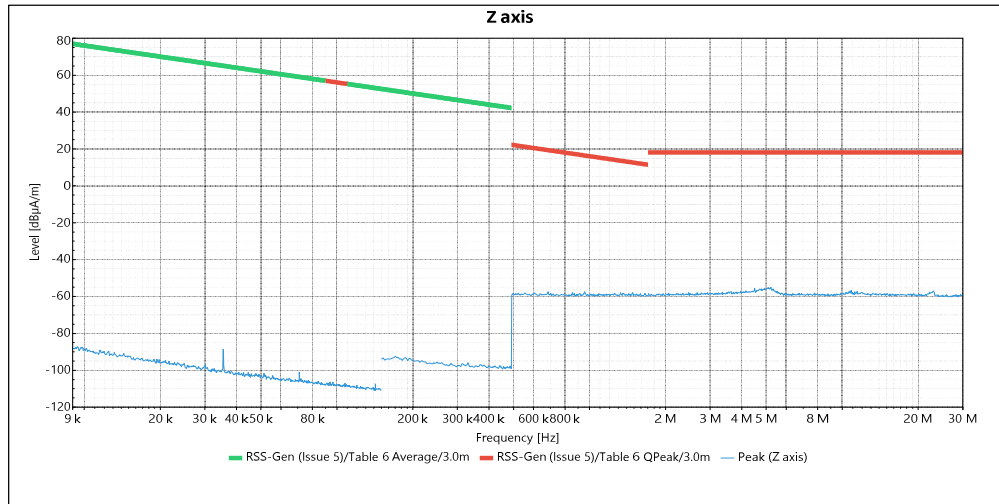
- ☒ The emissions are below the measurement system noise floor or 20 dB or more below the limit
- ☐ Final measurements for emissions that are above -20 dB from the applicable limits are shown below (at least 6 worst frequencies):

Operating mode	1
Axis	Y axis
Verdict	Pass
Instrument settings	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



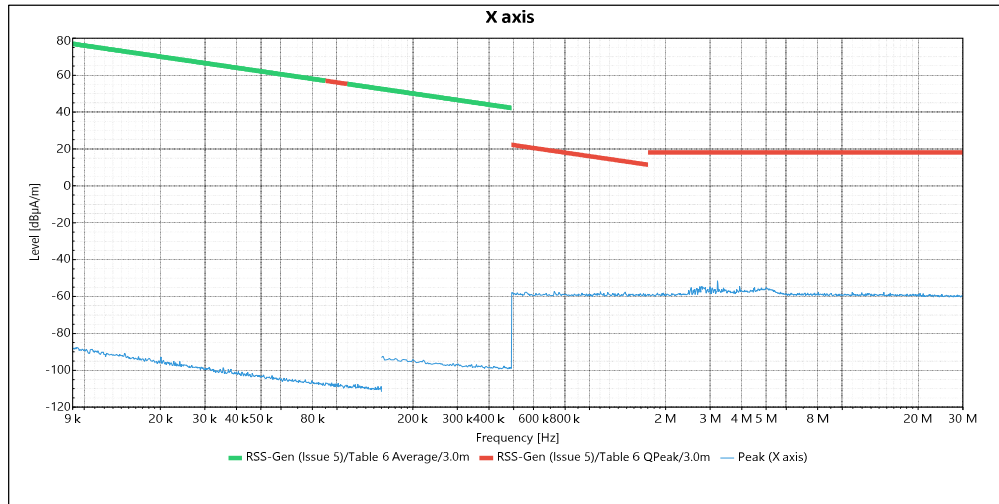
- ☒ The emissions are below the measurement system noise floor or 20 dB or more below the limit
- ☐ Final measurements for emissions that are above -20 dB from the applicable limits are shown below (at least 6 worst frequencies):

perating mode.....	1
Axis	Z axis
Verdict.....	Pass
Instrument settings	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



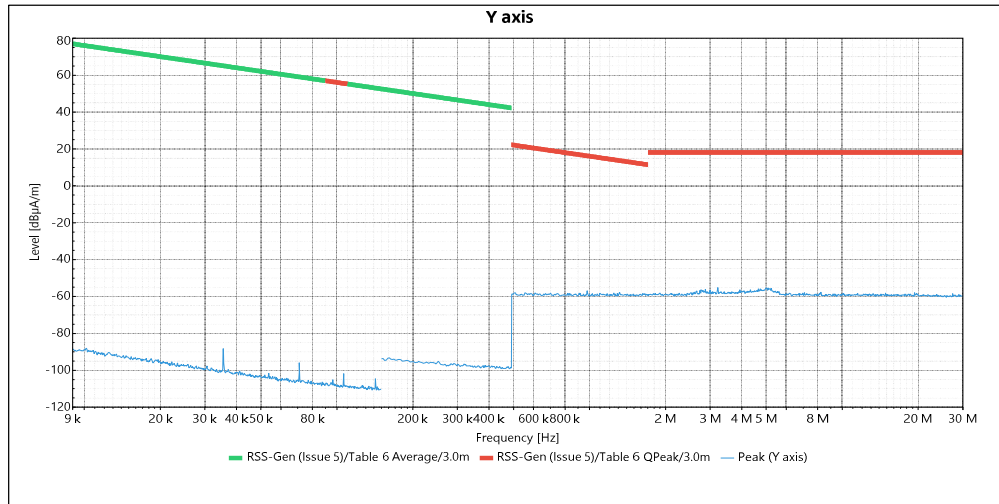
- ☒ The emissions are below the measurement system noise floor or 20 dB or more below the limit
- ☐ Final measurements for emissions that are above -20 dB from the applicable limits are shown below (at least 6 worst frequencies):

Operating mode	2
Axis	X axis
Verdict	Pass
Instrument settings	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



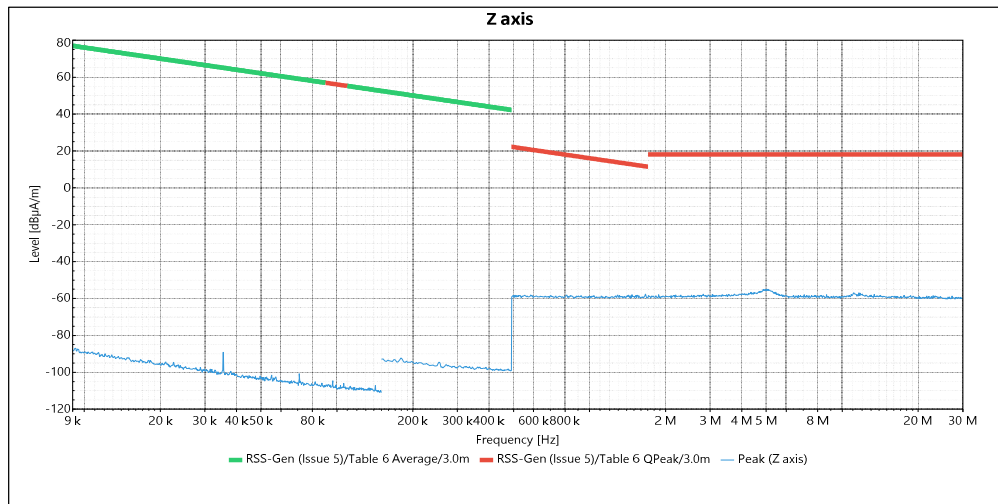
- ☒ The emissions are below the measurement system noise floor or 20 dB or more below the limit
- ☐ Final measurements for emissions that are above -20 dB from the applicable limits are shown below (at least 6 worst frequencies):

Operating mode	2
Axis	Y axis
Verdict	Pass
Instrument settings	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



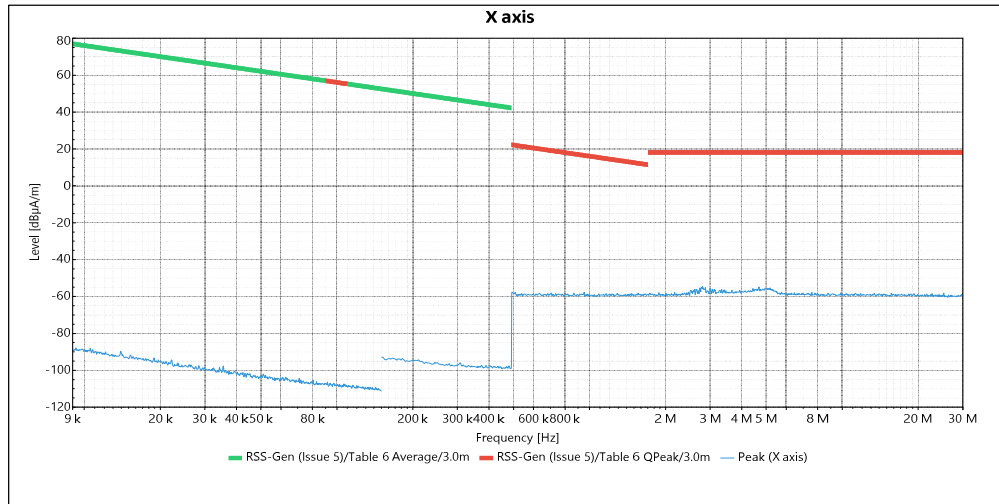
- ☒ The emissions are below the measurement system noise floor or 20 dB or more below the limit
- ☐ Final measurements for emissions that are above -20 dB from the applicable limits are shown below (at least 6 worst frequencies):

Operating mode	2
Axis	Z axis
Verdict	Pass
Instrument settings	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



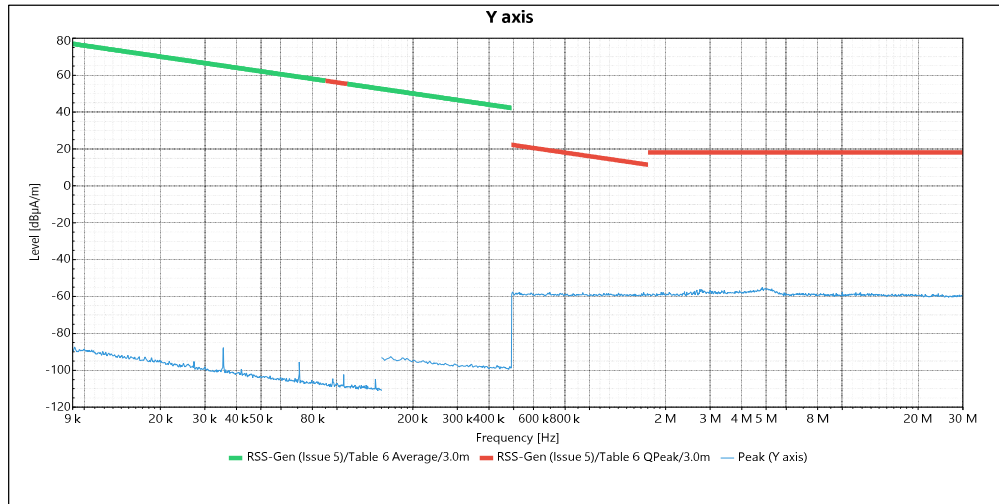
- ☒ The emissions are below the measurement system noise floor or 20 dB or more below the limit
- ☐ Final measurements for emissions that are above -20 dB from the applicable limits are shown below (at least 6 worst frequencies):

Operating mode	3
Axis	X axis
Verdict	Pass
Instrument settings	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



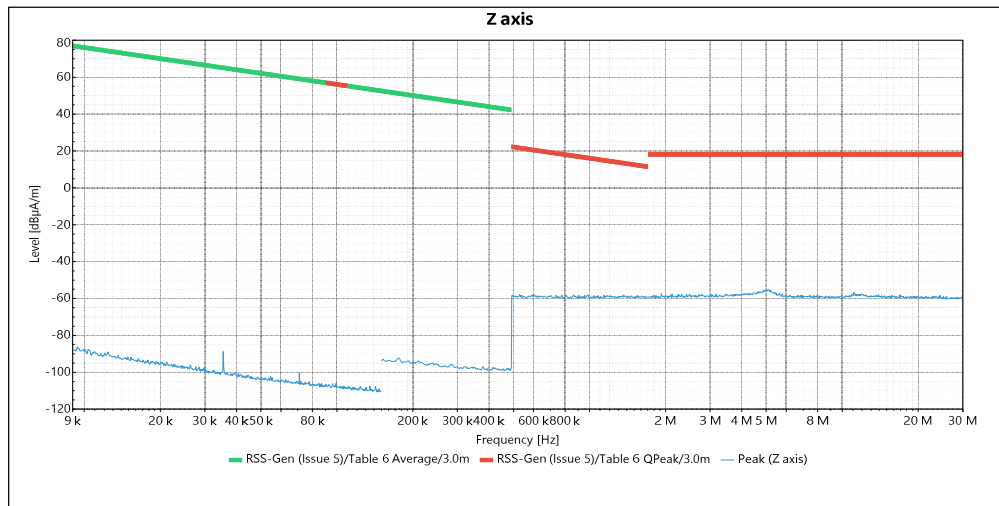
- ☒ The emissions are below the measurement system noise floor or 20 dB or more below the limit
- ☐ Final measurements for emissions that are above -20 dB from the applicable limits are shown below (at least 6 worst frequencies):

Operating mode	3
Axis	Y axis
Verdict	Pass
Instrument settings	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



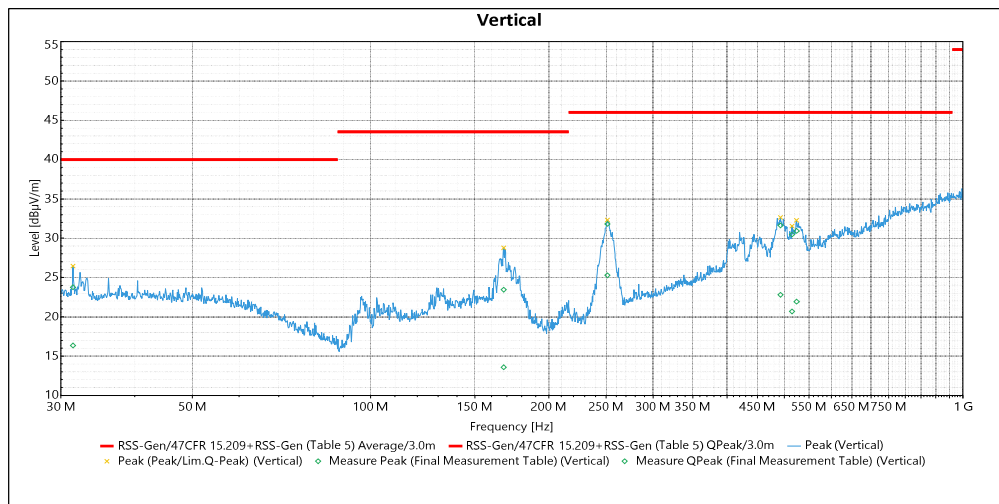
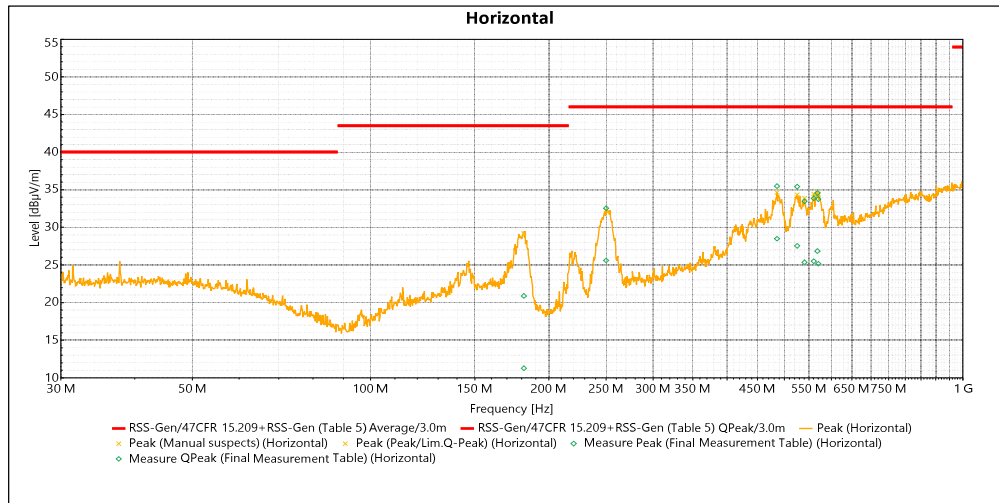
- ☒ The emissions are below the measurement system noise floor or 20 dB or more below the limit
- ☐ Final measurements for emissions that are above -20 dB from the applicable limits are shown below (at least 6 worst frequencies):

Operating mode	3
Axis	Z
Verdict	Pass
Instrument settings	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



- ☒ The emissions are below the measurement system noise floor or 20 dB or more below the limit
- ☐ Final measurements for emissions that are above -20 dB from the applicable limits are shown below (at least 6 worst frequencies):

Operating mode.....	1
Verdict.....	Pass
Instrument settings	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

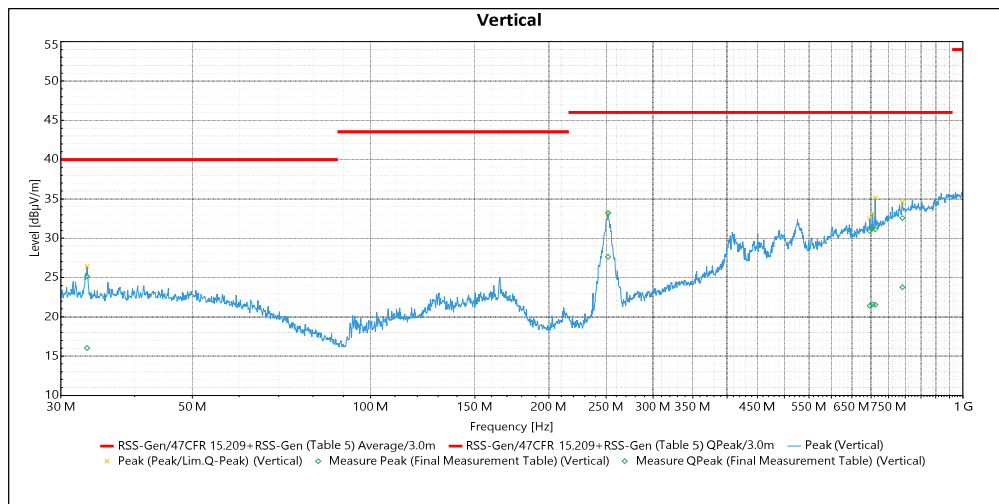
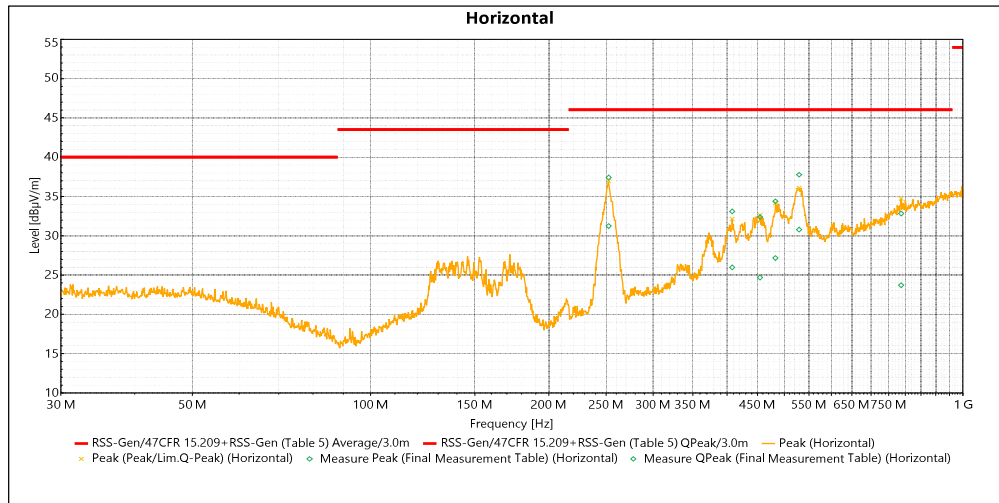


- ☐ The emissions are below the measurement system noise floor or 20 dB or more below the limit
- ☒ Final measurements for emissions that are above -20 dB from the applicable limits are shown below (at least 6 worst frequencies):

Final Measurement Table

Frequency	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)
181.53 MHz	20.88	11.27	43.52	-32.25	1.52	226.4	Horizontal	120 k	5	Pass	18.5
250.02 MHz	32.55	25.6	46.02	-20.42	1.03	153.1	Horizontal	120 k	5	Pass	18.74
485.67 MHz	35.49	28.49	46.02	-17.53	1.66	123.6	Horizontal	120 k	5	Pass	25.06
525.3 MHz	35.41	27.54	46.02	-18.48	1.38	355.3	Horizontal	120 k	5	Pass	26.21
540.24 MHz	33.47	25.35	46.02	-20.67	1.42	357.5	Horizontal	120 k	5	Pass	26.29
560.16 MHz	33.86	25.49	46.02	-20.53	1.66	240.7	Horizontal	120 k	5	Pass	26.45
568.41 MHz	34.56	26.85	46.02	-19.17	1.48	234.9	Horizontal	120 k	5	Pass	26.68
569.97 MHz	33.76	25.17	46.02	-20.85	1.41	246.2	Horizontal	120 k	5	Pass	26.73
31.44 MHz	23.75	16.35	40	-23.65	1.03	297.9	Vertical	120 k	5	Pass	18.44
167.91 MHz	23.45	13.58	43.52	-29.94	1.75	54	Vertical	120 k	5	Pass	20.05
251.25 MHz	31.81	25.27	46.02	-20.75	1.03	62.9	Vertical	120 k	5	Pass	18.78
492.39 MHz	31.63	22.8	46.02	-23.22	1.05	182.2	Vertical	120 k	5	Pass	25.13
515.04 MHz	30.46	20.68	46.02	-25.34	1.14	189	Vertical	120 k	5	Pass	25.84
524.22 MHz	30.92	21.93	46.02	-24.09	1.17	175.8	Vertical	120 k	5	Pass	26.2

Operating mode.....	2
Verdict.....	Pass
Instrument settings	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



- ☐ The emissions are below the measurement system noise floor or 20 dB or more below the limit
- ☒ Final measurements for emissions that are above -20 dB from the applicable limits are shown below (at least 6 worst frequencies):

Final Measurement Table

Frequency	Measure Peak (dBuV/m)	Measure QPeak (dBuV/m)	Limit QPeak (dBuV/m)	Margin QPeak (dB)	Max height (m)	Max angle (°)	Polarization	RBW (Hz)	Meas.Time (s)	Comments	Correction (dB)
252.33 MHz	37.42	31.25	46.02	-14.77	1.08	137	Horizontal	120 k	5	Pass	18.82
408.06 MHz	33.11	25.98	46.02	-20.04	2.01	55.3	Horizontal	120 k	5	Pass	23.43
454.59 MHz	32.4	24.7	46.02	-21.32	1.62	92.8	Horizontal	120 k	5	Pass	24.6
482.7 MHz	34.39	27.17	46.02	-18.85	1.49	78.2	Horizontal	120 k	5	Pass	25.03
529.29 MHz	37.77	30.79	46.02	-15.23	1.52	15.5	Horizontal	120 k	5	Pass	26.21
786.93 MHz	32.84	23.71	46.02	-22.31	2.59	113	Horizontal	120 k	5	Pass	30.54
33.21 MHz	25.13	16.02	40	-23.98	1.6	132.7	Vertical	120 k	5	Pass	18.55
251.76 MHz	33.24	27.62	46.02	-18.4	1.05	86.8	Vertical	120 k	5	Pass	18.8
696.39 MHz	30.91	21.4	46.02	-24.62	3.05	169.4	Vertical	120 k	5	Pass	29.05
704.25 MHz	31.3	21.59	46.02	-24.43	1.7	214.7	Vertical	120 k	5	Pass	29.4
711.63 MHz	31.15	21.53	46.02	-24.49	2.69	216.2	Vertical	120 k	5	Pass	29.32
791.19 MHz	32.57	23.75	46.02	-22.27	3.3	10.8	Vertical	120 k	5	Pass	30.57

Operating mode.....	3
Verdict.....	Pass
Instrument settings	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

