FCC and ISED Canada Testing of the

Ypsomed AG
SmartPilot YpsoMate 2.25

In accordance with FCC 47 CFR part 15.225 and ISED Canada's Radio Standards Specifications RSS-210

America

Add value.
Inspire trust.

Prepared for: Ypsomed AG
Brunnmattstrasse 6
3401 Burgdorf Switzerland

FCC ID: 2AFJO-B01
IC: 20559-B01

COMMERCIAL-IN-CONFIDENCE

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RESPONSIBLE FOR	NAME	DATE	SIGNATURE
Authorized Signatory	Dave Ernest	2025 -May-13	
Testing	Thierry Jean-Charles	2025-May-13	

Signatures in this approval box have checked this document in line with the requirements of TÜV SÜD Product Service document control rules.

FCC Accreditation Designation Number US1063 Tampa, FL Test Laboratory	Innovation, Science, and Economic Development Canada Accreditation Site Number 2087A-2 Tampa, FL Test Laboratory

EXECUTIVE SUMMARY
Samples of this product were tested and found to be in compliance with FCC 15.225. and ISED Canada's RSS-210.

A2LA Cert. No. 2955.15

TÜV SÜD America
5610 West Sligh Ave., Suite 100
Tampa, FL 33634

Phone: 813-284-2715
www.tuv-sud-america.com

Contents

1 Report Summary

1.1 Report Modification Record

Alterations and additions to this report will be issued to the holders of each copy in the form of a complete document.

Issue	Description of Change	Date of Issue
1	First Issue	2024-November-08
2	Added the ISED Certification Number	2025-May-13

1.2 Introduction

The purpose of this report is to demonstrate compliance with Part 15 Subpart C of the FCC's Code of Federal Regulations Section 15.225 and Innovation Science and Economic Development Canada's Radio Standards Specification RSS-210 for the tests documented herein.

Applicant	Ypsomed AG
Manufacturer	Ypsomed AG
Applicant's Email Address	yao.di@ypsomed.com
Model Number(s)	SmartPilot YpsoMate 2.25
Serial Number(s)	20007607, SMY MOD 43 (radiated emissions above 30 MHz), 20007564 (antenna evaluation)
FCC ID	2AFJO-B01
ISED Certification Number	20559-B01
Hardware Version(s)	Electronics: EleSer2_V1.1.0 Mechanical parts: According to manufacturing order 6253756
Software Version(s)	Standard devices: 6.4.0 Software Development Kit (YDS SDK): 6.2.2
Number of Samples Tested	2
Test Specification/Issue/Date	US Code of Federal Regulations (CFR): Title 47, Part 15, Subpart C: Radio Frequency Devices, Intentional Radiators, 2023 Innovation, Science and Economic Development Canada Radio Standards Specification: RSS-210 — Licence-Exempt Radio Apparatus: Category I Equipment, Issue 11, June 2024
Test Plan/Issue/Date	2023-June-14
Order Number	72192807
Date	2023-August-21
Date of Receipt of EUT	2024-August-26
Start of Test	2024-August-28
Finish of Test	2024-October-07
Name of Engineer(s)	Thierry Jean-Charles
Related Document(s)	ANSI C63.10-2013: American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices US Code of Federal Regulations (CFR): Title 47, Part 2, Subpart J: Equipment Authorization Procedures, 2023. Innovation, Science and Economic Development Canada Radio Standards Specification: RSS-GEN - General Requirements for Compliance of Radio Apparatus, Issue 5, Amendment 1, March 2019, Amendment 2, February 2021.

1.3 Brief Summary of Results

A brief summary of the tests carried out in accordance with FCC Part 15.225 and ISED Canada's RSS-210 is shown below.

Table 1.3-1 – Test Result Summary

Test Parameter	Test Plan (Yes/No)	Test Result	FCC 47 CFR Rule Part	ISED Canada's RSS	Test Report Page No
Antenna Requirement	Yes	Pass	15.203, 15.204	-------	11
20 dB Bandwidth	Yes	Pass	15.215(c)	-------	12
99% Bandwidth	Yes	Pass	-------	RSS-GEN 6.7	14
Field strength of Emissions within the Band 13.110-14.010 MHz	Yes	Pass	15.225(a),(b),(c)	RSS-210 Annex B.6(a)	16
Field Strength of Emissions outside of the Band 13.110-14.010 MHz	Yes	Pass	15.209, 15.225(d)	RSS-210 7.2, RSS-210 Annex B.6(a), RSS-GEN 8.9	20
Power Line Conducted Emissions	No	--------	15.207	RSS-GEN 8.8	-------
Frequency Tolerance of the Carrier Signal	Yes	Pass	15.225(e)	RSS-210 B.6(b)	25

Note: The EUT is battery powered only without any provisions for connection to the AC Mains. The EUT is exempt from the power line conducted emissions requirements.

1.4 Product Information

1.4.1 Technical Description

The EUT is a handheld Add-On dedicated for the YpsoMate auto injector. Its functions include the detection of the injection state of the YpsoMate, logging of the injection process data and interconnectivity with smartphones. For this, the YpsoMate auto injector can be coupled to the SmartPilot YpsoMate.

The device includes an NFC reader and a 2.4 GHz BLE radio. The test report documents the compliance of the NFC radio.

Technical Details

Mode of Operation:	13.56 MHz NFC
Frequency Range:	13.56 MHz
Number of Channels:	1
Channel Separation:	N/A
Data Rate:	106 kbps
Modulations:	OOK
Antenna Type/Gain:	Flexible PCB Loop Antenna / 25.727 mm x 15.535 mm
Input Power:	3.95 VDC Lithium-Ion Polymer Battery (rechargeable) 3 VDC, Lithium Manganese Dioxide Battery (primary)

A full description and detailed product specification details are available from the manufacturer.

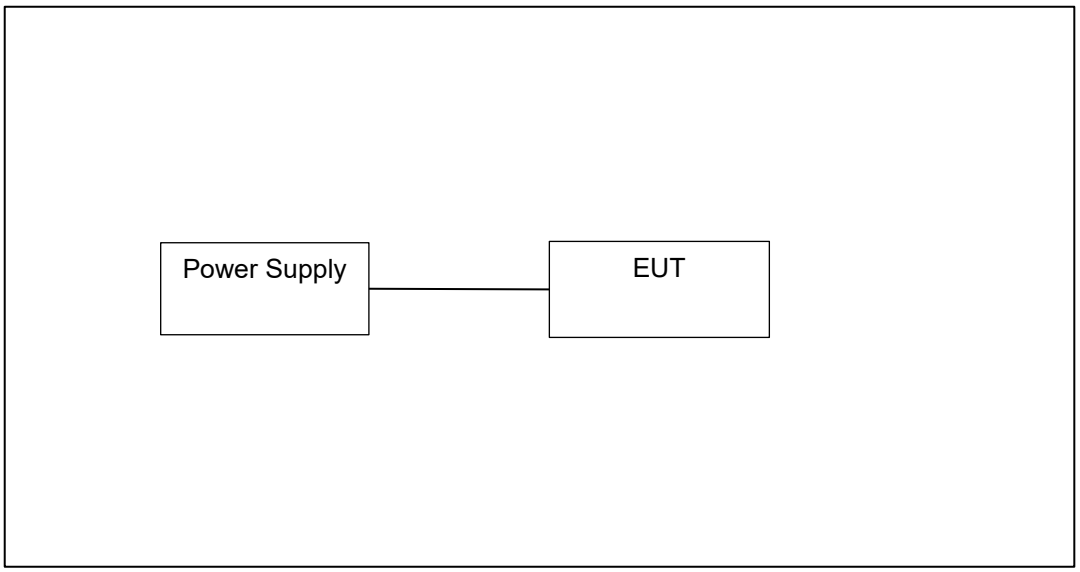

Figure 1.4.1-1 – Radiated Emissions Test Setup Diagram

Note: The EUT is a standalone battery powered device. The internal battery of the EUT is not replaceable. The EUT was configured with leads for connection to an external power supply for testing purposes.

Table 1.4.1-1 – Cable Descriptions

Cable/Port	Description
Power leads	10 m, EUT to DC Power Supply

Table 1.4.1-2 – Support Equipment Descriptions

Make/Model	Description
Lambda / LA-200	Regulated DC Power Supply, SN: LA2-AA20-45 0470

Declaration of Build Status

EQUIPMENT DESCRIPTION	
Model Name/Number	SmartPilot YpsoMate 2.25
Part Number	700020624
Standard Devices	Device with the following serial number: • 20007334 • 20007460 • 20007564 • 20007627 • 20007634 • 20007647 • 20007735 • 20007757 • 20007771 • 20007934
Hardware Version	Standard devices: • Electronics: EleSer2_V1.1.0 • Mechanical parts: According to manufacturing order 6253756
Software Version	Standard devices: 6.4.0 Software Development Kit (YDS SDK): 6.2.2
Special Builds	Device with ID starting with SMY mod. (SMY mod 20 – SMY mod 40, SMY mod 43, SMY mod 44) The devices are used in electrical safety test, Immunity testing, unintentional emission, ESD testing, conducted RF emission, radiated emission, wireless co-existance tests The detailed build status is documented in 10373174 DTP SubSys EMC. And 10419700 TR TüV Sample Modifications beyong DTP.
FCC ID (if applicable)	N/A
ISED ID (if applicable)	N/A
Technical Description (Please provide a brief description of the intended use of the equipment)	The SmartPilot YpsoMate 2.25 (in short: SmartPilot) is an optional, battery operated, single-patient reusable device. The SmartPilot is designed to be used together with a compatible YpsoMate Autoinjector. The SmartPilot records device data, injection data and injection states. The SmartPilot also provides visual and acoustic guidance feedback to the user during the injection. The SmartPilot is not intended to ensure the biologic/drug quantity nor serve as a dose counter. It is also not intended to ensure the biologic/drug information from the SmartLabel.

UN-INTENTIONAL RADIATOR	
Highest frequency generated or used in the device or on which the device operates or tunes	2.4835 GHz (BLE)
Lowest frequency generated or used in the device or on which the device operates or tunes	800 kHz (inductive sensor)
Class A Digital Device (Use in commercial, industrial or business environment) ☒ Class B Digital Device (Use in residential environment only) ☒	

Power Source			
AC	Single Phase	Three Phase	Nominal Voltage
	☐	☐	N/A, no external AC power source
External DC	Nominal Voltage		Maximum Current
	N/A, no external DC power source		N/A, no external DC power source
Battery	Nominal Voltage		Battery Operating End Point Voltage
	Primary battery: 3.00 V Rechargeable battery: 3.95 V		Primary battery: 2.60 V Rechargeable battery: 3.40 V

EXTREME CONDITIONS					
Maximum temperature	+35	°C	Minimum temperature	+5	°C

Ancillaries
Please list all ancillaries which will be used with the device.
• iPhone with the YDS SMS Testing App installed (Equipment Number: 417554) • iPhone with the NFC Trigger App installed (According to 10400525 NFC Trigger App) • Laptop (Equipment Number: 421207) with Commander App (Equipment Number: 417726) • YpsoMate 2.25 mL filled with water (Material Number: 700026295) • YpsoMate 2.25 mL filled with NaCl solution (According to 10400249 Final Assembly YM with NaCl)

I hereby declare that the information supplied is correct and complete.

Name: DI, Yao

Position held: System Verification Manager Date: 05.11.2024

1.4.2 Modes of Operation

The EUT was evaluated for the 13.56 MHz NFC reader in continuous transmission mode. The reader was pre-configured to be on upon power up. The TX output power was not configurable during testing.

1.4.3 Monitoring of Performance

The EUT was evaluated to the requirements of FCC Section 15.225 and ISED Canada RSS-210 Annex B.6. For the radiated emissions evaluation, preliminary measurements were performed for the EUT in 3 orthogonal orientations. Where applicable, the final measurements were performed using the orientation leading to the highest emissions with respect to the limits.

1.4.4 Performance Criteria

The EUT was evaluated for the following performance criteria.

Table 1.4.4-1 – Performance Criteria

Parameter	Requirement
Antenna Requirement	FCC: Section 15.203. 15.204
20 dB Bandwidth	FCC: Section 15.215(c)
99% Bandwidth	ISED Canada: RSS-GEN 6.7
Radiated Field Strength of Emissions within the 13.110-14.010 MHz Band	FCC: Section 15.225 (a),(b),(c); ISED Canada: RSS-210 Annex B.6 (a)
Radiated Field Strength of Emissions outside of the 13.110-14.010 MHz Band	FCC: Section 15.209, 15.225; ISED Canada: RSS-210 7.2, RSS-210 Annex B.6 (a), RSS-GEN 8.9
Frequency Tolerance of the Carrier Signal	FCC: Section 15.225(e); ISED Canada: RSS-210 B.6 (b)

1.5 Deviations from the Standard

The evaluation was performed without any deviations from the test standards.

1.6 EUT Modification Record

The table below details modifications made to the EUT during the test programme. The modifications incorporated during each test are recorded on the appropriate test pages.

Modification State	Description of Modification still fitted to EUT	Modification Fitted By	Date Modification Fitted
None	N/A	N/A	N/A

The equipment was tested as provided without any modifications for compliance. External power leads were implemented to ensure continuous operation for the duration of the evaluation.

1.7 Test Location

TÜV SÜD Product Service conducted the following tests at our Tampa FL Test Laboratory.

Test Name	Name of Engineer(s)	Accreditation
DC Powered, Operating		
Antenna Requirement	Thierry Jean-Charles	A2LA
20 dB Bandwidth	Thierry Jean-Charles	A2LA
99% Bandwidth	Thierry Jean-Charles	A2LA
Radiated Field Strength of Emissions within the 13.110-14.010 MHz Band	Thierry Jean-Charles	A2LA
Radiated Field Strength of Emissions outside of the 13.110-14.010 MHz Band	Thierry Jean-Charles	A2LA
Frequency Tolerance of Carrier Signal	Thierry Jean-Charles	A2LA

Office Address:

TÜV SÜD America, Inc.
5610 W. Sligh Ave, Suite 100
Tampa, FL 33634
USA

2 Test Details

2.1 Antenna Requirements

2.1.1 Specification Reference

FCC: Section 15.203, 15.204

2.1.2 Equipment Under Test and Modification State

SN: 20007564

2.1.3 Date of Test

2024-October-02

2.1.4 Test Method

N/A

2.1.5 Environmental Conditions

Ambient Temperature	N/A
Relative Humidity	N/A
Atmospheric Pressure	N/A

2.1.6 Test Results

Limit Clause FCC Sections: 15.203, 15,204

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 EUT uses an internal flexible PCB loop antenna with an FPC connector (Panasonic model AYF530835). The antenna is connector is unique and therefore meets the requirements of FCC Section 15.203.

2.1.7 Test Location and Test Equipment Used

This test was carried out in TÜV SÜD America, Inc., 5610 W. Sligh Ave, Suite 100, Tampa, FL 33634, USA.

As this was a visual inspection, no test equipment was used.

2.2 20 dB Bandwidth

2.2.1 Specification Reference

FCC: Section 15.215(c)

2.2.2 Equipment Under Test and Modification State

SN: 20007607

2.2.3 Date of Test

2024-September-12

2.2.4 Test Method

The 20 dB bandwidth was measured in accordance with ANSI C63.10 Subclause 6.9.2. The spectrum analyzer span was set between two times and five times the OBW. The RBW of the spectrum analyzer was set to 1% to 5% if the OBW. The VBW was approximately three times RBW. A peak detector was used for the measurements.

2.2.5 Environmental Conditions

Ambient Temperature	23.3°C
Relative Humidity	46.2 %
Atmospheric Pressure	1009.6 mbar

2.2.6 Test Results

DC Powered, Operating

Limit Clause FCC Part 15.215

The intentional radiator must be designed to ensure that the 20 dB bandwidth of the emission is contained within the frequency band designated in the rule section under which the equipment is operated.

Table 2.2.6-1 – 20 dB Bandwidth Test Results

Frequency (MHz)	20 dB Bandwidth (Hz)
13.56	12.46

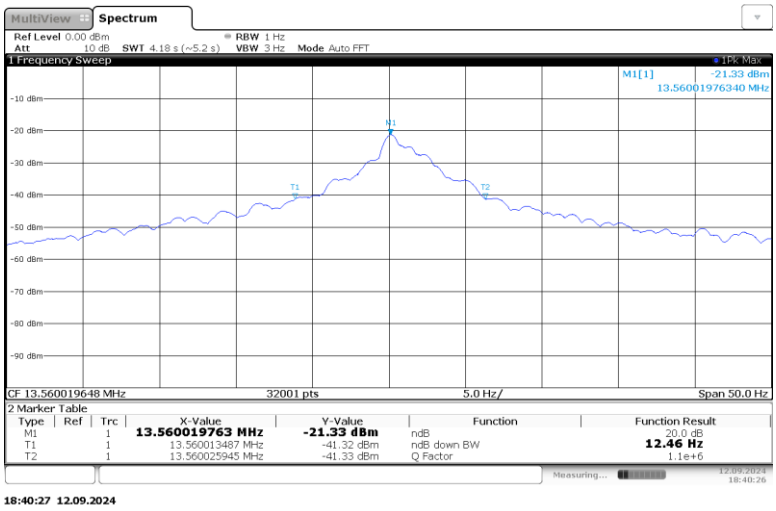

Figure 2.2.6-1 – 20 dB Bandwidth Test Results

2.2.7 Test Location and Test Equipment Used

This test was carried out in TÜV SÜD America, Inc., 5610 W. Sligh Ave, Suite 100, Tampa, FL 33634, USA.

Instrument	Manufacturer	Type No	TE No	Software / Firmware Revision	Calibration Period (months)	Calibration Due
PCB Loop Antenna	FAU EMI R&D Lab	EMI-LOOP	BEMC02141	N/A	N/A	NCR
Signal & Spectrum Analyzer	Rohde & Schwarz	FSW43	DEMC3085	2.90 SP1	12	03-Jun-2025
DC Power Supply	Xantrex	HPD-60-5	TAME01064	N/A	N/A	NCR
Flexible Test Cable	Mini-Circuits	ULC-8FT-SMSM+	TEMC00267	N/A	12	08-Mar-2025
SMA Fixed Attenuator Kit	Mini Circuits	K2-BW2+	TEMC00272	N/A	12	06-Apr-2025

TU - Traceability Unscheduled
O/P MON - Output Monitored with Calibrated Equipment
N/A - Not Applicable
NCR – No Calibration Required

2.3 99% Bandwidth

2.3.1 Specification Reference

ISED Canada: RSS-GEN 6.7

2.3.2 Equipment Under Test and Modification State

SN: 20007607

2.3.3 Date of Test

2024-September-12

2.3.4 Test Method

The 99% occupied bandwidth was measured with the spectrum analyzer span set to fully display the emission. The RBW was set to 1% to 5% of the approximated bandwidth. The occupied 99% bandwidth was measured by using 99% bandwidth equipment function of the spectrum analyzer using a peak detector.

2.3.5 Environmental Conditions

Ambient Temperature	23.4°C
Relative Humidity	46.5 %
Atmospheric Pressure	1009.8 mbar

2.3.6 Test Results

DC Powered, Operating

Limit Clause ISED RSS-GEN 6.6

Table 2.3.6-1 – 99% dB Bandwidth Test Results

Frequency (MHz)	99% Bandwidth (Hz)
13.56	780.586

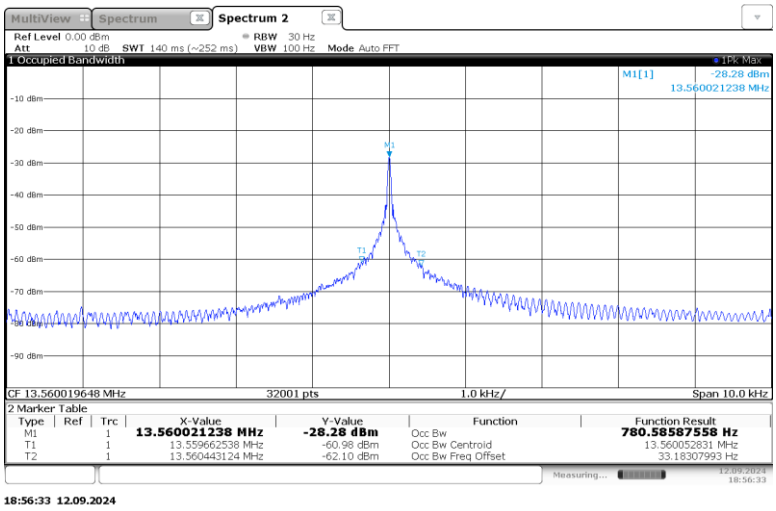

Figure 2.3.6-1 – 99% Bandwidth Test Results

2.3.7 Test Location and Test Equipment Used

This test was carried out in TÜV SÜD America, Inc., 5610 W. Sligh Ave, Suite 100, Tampa, FL 33634, USA.

Instrument	Manufacturer	Type No	TE No	Software / Firmware Revision	Calibration Period (months)	Calibration Due
PCB Loop Antenna	FAU EMI R&D Lab	EMI-LOOP	BEMC02141	N/A	N/A	NCR
Signal & Spectrum Analyzer	Rohde & Schwarz	FSW43	DEMC3085	2.90 SP1	12	03-Jun-2025
DC Power Supply	Xantrex	HPD-60-5	TAME01064	N/A	N/A	NCR
Flexible Test Cable	Mini-Circuits	ULC-8FT-SMSM+	TEMC00267	N/A	12	08-Mar-2025
SMA Fixed Attenuator Kit	Mini Circuits	K2-BW2+	TEMC00272	N/A	12	06-Apr-2025

TU - Traceability Unscheduled
O/P MON - Output Monitored with Calibrated Equipment
N/A - Not Applicable
NCR – No Calibration Required

2.4 Radiated Field Strength of Emissions within the 13.110-14.010 MHz Band

2.4.1 Specification Reference

FCC Sections: 15.225(a),(b),(c);
ISED Canada: RSS-210 Annex B.6(a)

2.4.2 Equipment Under Test and Modification State

SN: 20007607

2.4.3 Date of Test

2024-August-28 to 2024-August-30

2.4.4 Test Method

Radiated emissions tests were made over the frequency range of 13.110 to 14.010 MHz. The receive antenna height was set to 1 m and the EUT was rotated through 360 degrees. The measurements were performed for 3 orthogonal orientations of the receive antenna. The resolution bandwidth was set to 9 kHz and a Quasi-Peak detector was used. Where applicable, the worst results are reported.

2.4.5 Environmental Conditions

Ambient Temperature	23.3 °C
Relative Humidity	47.7 %
Atmospheric Pressure	1017.1 mbar

2.4.6 Test Results

DC Powered, Operating

Limit Clause FCC Sections 15.225 (a),(b),(c), ISED Canada: RSS-210 Annex B.6 (a)

Frequency (MHz)	Field Strength (microvolts/meter)	Field Strength (dBuV/m)	Measurement Distance (meters)
13.110 – 13.410	106	40.5	30
13.410 – 13.553	334	50.5	30
13.553 – 13.567	15,848	84	30
13.567 – 13.710	334	50.5	30
13.710 – 14.010	106*	40.5	30

Radiated measurements were performed at a distance closer than 30 m as required, according to Part 15.209. Therefore, a correction factor was applied to account for propagation loss at the specified distance. The propagation loss was determined by using the square of an inverse linear distance extrapolation factor (40dB/decade) according to 15.31. A sample calculation of the distance correction factor is shown below for limits expressed at a 30m measurement distance.

Distance correction factor (30m Specified Test Distance) = 40*Log (Test Distance/30)
= 40*Log (3/30)
= - 40 dB

Table 2.4.6-1 – Radiated Field Strength of Emissions within the 13.110-14.010 band

Frequency (MHz)	QuasiPeak (dBµV/m)	Pol	Azimuth (deg)	Corr. (dB/m)	Limit (dBµV/m)	Margin (dB)
13.401	21.1	V	0	11.1	80.5	59.4
13.553	37.7	V	0	11.1	90.5	52.8
13.56	52.2	V	0	11.1	124	71.8
13.567	38.1	V	0	11.1	90.5	52.4
13.719	21.6	V	0	11.1	80.5	58.9

Notes:

- The measurements were performed at ta test distance of 3m. The limits are corrected using a distance correction factor of 40 dB per decade as described above.
- The results are reported for the worst case receive loop antenna orientation.

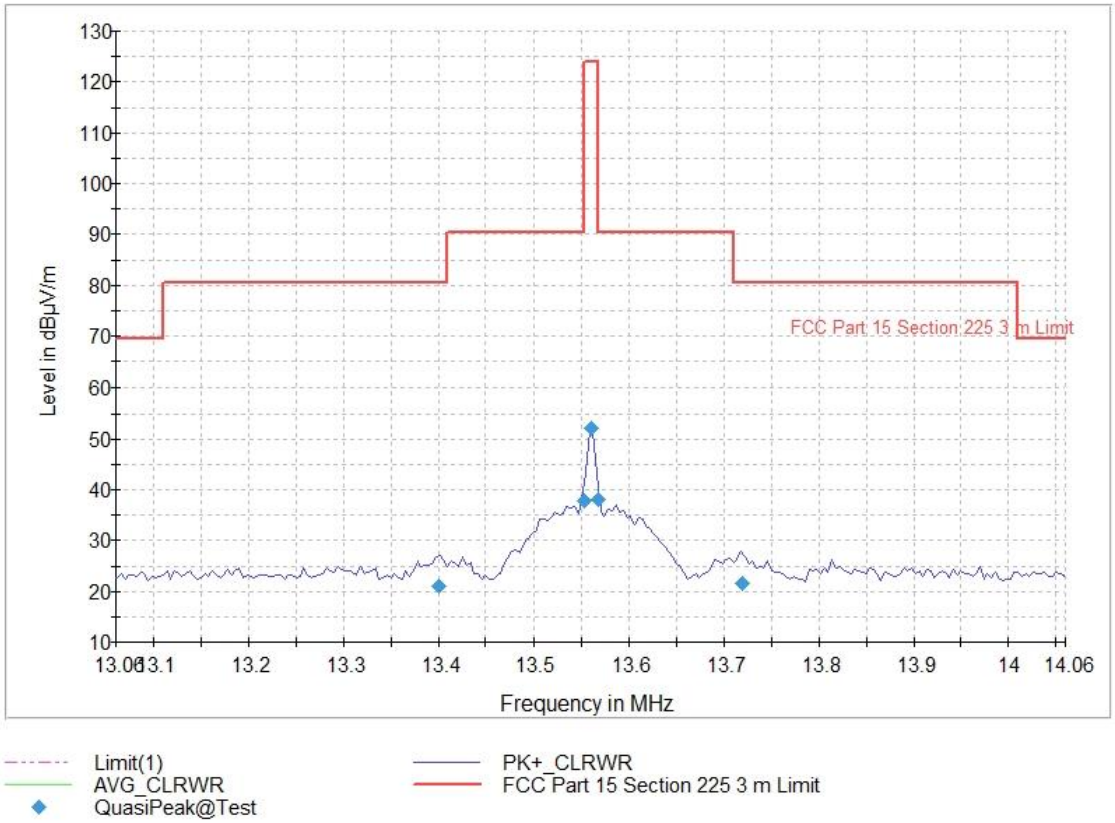

Figure 2.4.6-1 – Radiated Field Strength of Emissions within the 13.110-14.010 MHz band

2.4.7 Sample Calculations

$R_C = R_U + CF_T$

Where:

CF_T	=	Total Correction Factor (AF+CA+AG)-DC (Average Measurements Only)
R_U	=	Uncorrected Reading
R_C	=	Corrected Level
AF	=	Antenna Factor
CA	=	Cable Attenuation
AG	=	Amplifier Gain
DC	=	Duty Cycle Correction Factor

Example Calculation: Quasi-Peak
Corrected Level: 10 + 11.1 = 21.1 dBµV/m
Margin: 80.5 dBµV/m – 21.1 dBµV/m = 59.4 dB

2.4.8 Test Location and Test Equipment Used

This test was carried out in TÜV SÜD America, Inc., 5610 W. Sligh Ave, Suite 100, Tampa, FL 33634, USA.

Instrument	Manufacturer	Type No	TE No	Software / Firmware Revision	Calibration Period (months)	Calibration Due
Active Loop Antenna	EMCO	6502	BEMC00078	N/A	24	06-Sep-2025
100Hz-26.5GHz EMC analyzer/HYZ	Hewlett Packard	E7405A	BEMC00523	A.14.06	12	25-Jun-2025
Tile Automation Software	ETS Lindgren	TILE4! - Version 4.2.A	BEMC02095	4.2A	N/A	NCR
EMC Chamber	Panashield	N/A	TEMC00031	N/A	24	19-Oct-2025
Test Software	Rohde & Schwarz	EMC32	TEMC00184	10.60.00	N/A	NCR
R & S ESW EMI Test Receiver	Rohde & Schwarz	ESW	TEMC00232	2.00 SP1	12	04-Jun-2025
DC to 18 GHz Cable	SSI Technologies	2801-03-03-360/WN	TEMC00293	N/A	12	05-Apr-2025

TU - Traceability Unscheduled
O/P MON - Output Monitored with Calibrated Equipment
N/A - Not Applicable
NCR – No Calibration Required

2.5 Radiated Field Strength of Emissions outside of the 13.110-14.010 MHz Band

2.5.1 Specification Reference

FCC Sections: 15.225(d), 15.209;
ISED Canada: RSS-210 7.2, RSS-210 Annex B.6(a), RSS-GEN 8.9

2.5.2 Equipment Under Test and Modification State

SN: 20007607

2.5.3 Date of Test

2024-August-29 to 2024-October-07

2.5.4 Test Method

Radiated emissions tests were made over the frequency range of 9 kHz to 1 GHz, 10 times the highest fundamental frequency. Each emission was compared to the radiated emission limits as defined in Section 15.209.

For measurements below 30 MHz, the receive antenna height was set to 1 m and the EUT was rotated through 360 degrees. The resolution bandwidth was set to 200 Hz below 150 kHz and to 9 kHz above 150 kHz. The measurements were performed for 3 orthogonal orientations of the receive antenna. Where applicable, the worst results are reported.

The EUT was rotated through 360° and the receive antenna height was varied from 1m to 4m so that the maximum radiated emissions level would be detected. For frequencies below 1000 MHz, quasi-peak measurements were made using a resolution bandwidth RBW of 120 kHz and a video bandwidth VBW of 300 kHz. For frequencies above 1000 MHz, peak measurements are made with RBW of 1 MHz and VBW of 3 MHz. Average measurements are performed in the linear scale using VBW of 30 Hz.

2.5.5 Duty Cycle Correction

The EUT was configured to transmit at maximum 100.00% duty cycle during the evaluation. No Duty Cycle Correction were used during the measurements for the corrected average results.

2.5.6 Environmental Conditions

Ambient Temperature	23.8 °C
Relative Humidity	46.2 %
Atmospheric Pressure	1014.3 mbar

2.5.7 Test Results

DC Powered, Operating

Limit Clause FCC Sections 15.209, 15.225(d), ISED Canada: RSS-210 7.2, RSS-GEN 8.9

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009-0.490	2400/F(kHz)	300
0.4090-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100**	3
88-216	150**	3
216-960	200**	3
Above 960	500	3

Radiated measurements were performed at a distance closer than 300 meters and 30m as required, according to Part 15.209. Therefore, a correction factor was applied to account for propagation loss at the specified distance. The propagation loss was determined by using the square of an inverse linear distance extrapolation factor (40dB/decade) according to 15.31. A sample calculation of the distance correction factor is shown below for limits expressed at a 300m measurement distance and a 30m measurement distance.

Distance correction factor (300m Specified Test Distance) = 40*Log (Test Distance/300)
= 40*Log (3/300)
= - 80 dB

Distance correction factor (30m Specified Test Distance) = 40*Log (Test Distance/30)
= 40*Log (3/30)
= - 40 dB

Table 2.5.7-1 – Transmitter Radiated Spurious Emissions below 30 MHz – Quasi-Peak

Frequency (MHz)	QuasiPeak (dBµV/m)	Pol	Azimuth (deg)	Corr. (dB/m)	Limit (dBµV/m)	Margin (dB)
9.04	26.4	V	180	10.8	69.5	43.2
12.3275	33.1	V	163	11.1	69.5	36.4
14.793	32.7	V	167	11.1	69.5	36.8

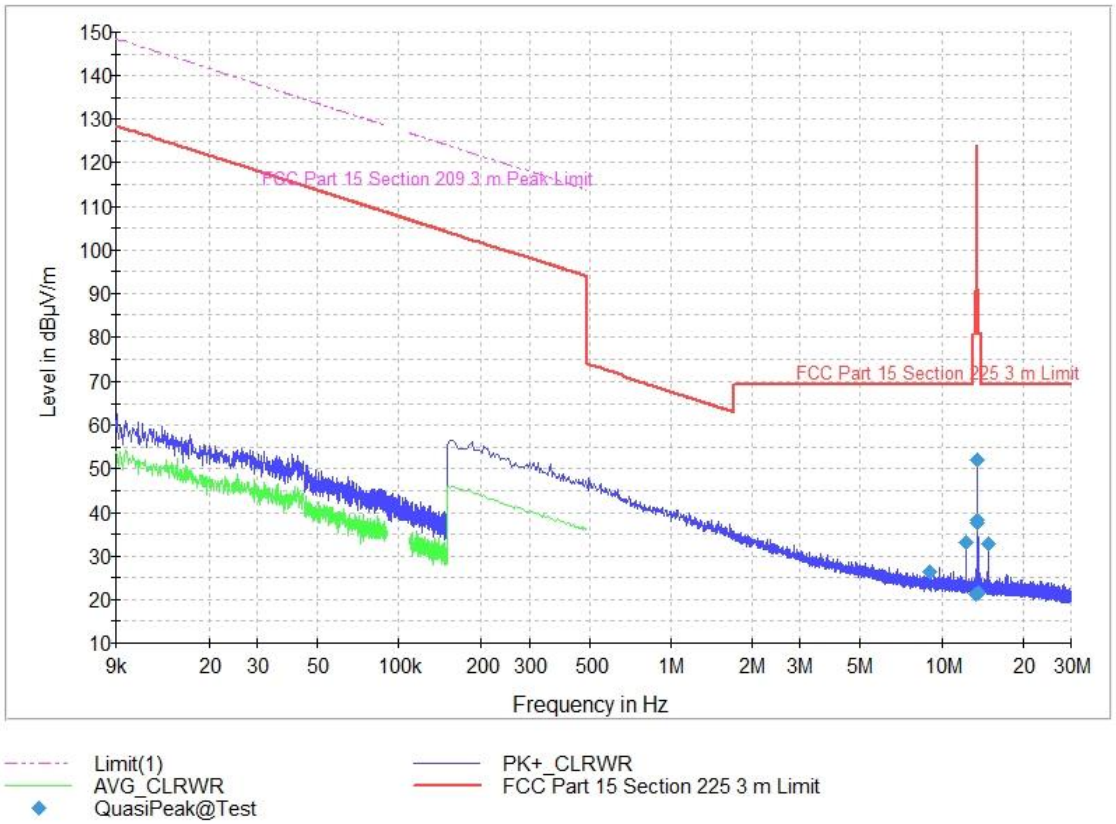

Figure 2.5.7-1 – Transmitter Radiated Spurious Emissions below 30 MHz

Note: The emissions within the 13.110-14.010 MHz band are documented in Section 2.4 of the document.

Table 2.5.7-2 – Transmitter Radiated Spurious Emissions above 30 MHz

Frequency (MHz)	QuasiPeak (dBµV/m)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)	Limit (dBµV/m)	Margin (dB)
30.3	19.09	329	H	90	25.6	40	20.91
257.64	33.12	108	H	20	20.7	46	12.88
284.76	32.2	110	H	15	20.3	46	13.8
311.88	31.82	109	H	24	20.9	46	14.18
339	30.76	112	H	27	21.4	46	15.24
379.68	29.79	104	H	21	22.6	46	16.21
406.8	29.32	103	H	34	23.6	46	16.68
641.34	19.76	403	H	225	27.4	46	26.24
674.67	19.15	350	V	226	26.9	46	26.85
941.61	22.71	198	V	255	29.2	46	23.29
953.58	22.68	350	V	90	29.4	46	23.32

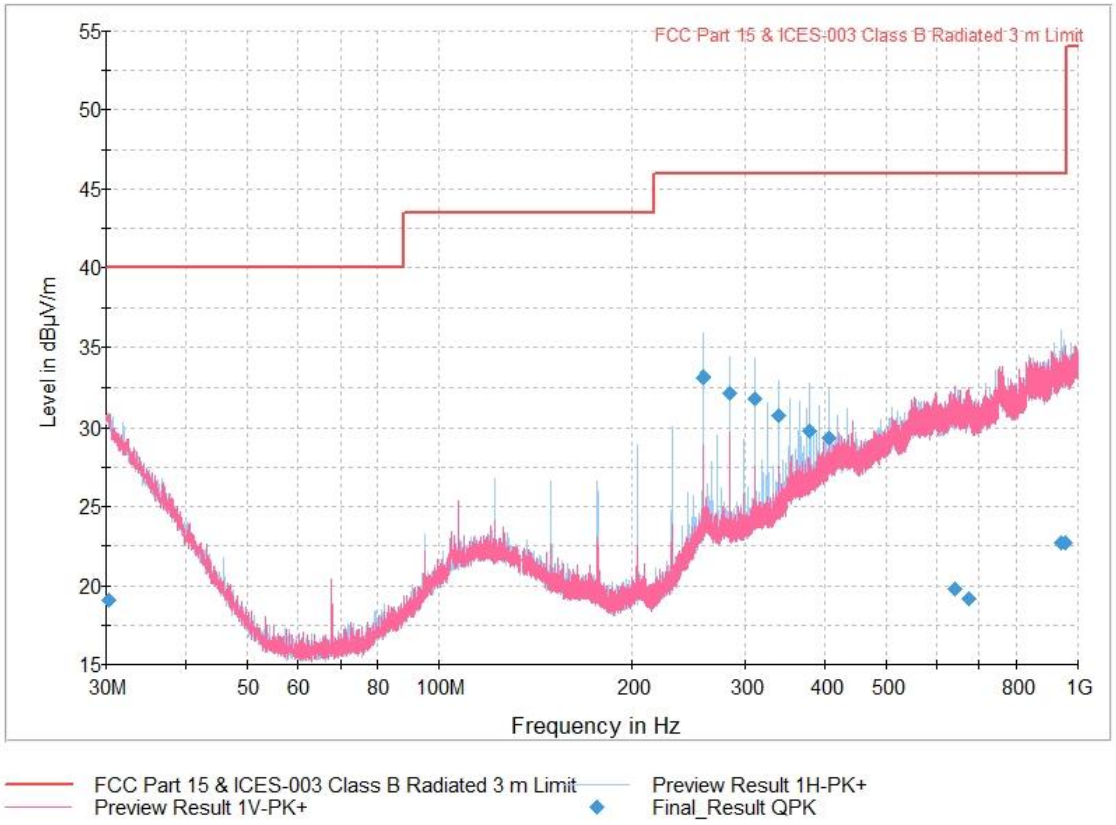

Figure 2.5.7-2 – Transmitter Radiated Spurious Emissions above 30 MHz

2.5.8 Sample Calculations

$R_C = R_U + CF_T$

Where:
CF_T = Total Correction Factor (AF+CA+AG)-DC (Average Measurements Only)
R_U = Uncorrected Reading
R_C = Corrected Level
AF = Antenna Factor
CA = Cable Attenuation
AG = Amplifier Gain
DC = Duty Cycle Correction Factor

Example Calculation:Quasi-Peak
Corrected Level: 8.77 + 22.5 = 31.27 dBµV/m
Margin: 40 dBµV/m – 31.27 dBµV/m = 8.73 dB

2.5.9 Test Location and Test Equipment Used

This test was carried out in TÜV SÜD America, Inc., 5610 W. Sligh Ave, Suite 100, Tampa, FL 33634, USA.

Instrument	Manufacturer	Type No	TE No	Software / Firmware Revision	Calibration Period (months)	Calibration Due
Active Loop Antenna	EMCO	6502	BEMC00078	N/A	24	06-Sep-2025
100Hz-26.5GHz EMC analyzer/HYZ	Hewlett Packard	E7405A	BEMC00523	A.14.06	12	10-Jan-2025
Tile Automation Software	ETS Lindgren	TILE4! - Version 4.2.A	BEMC02095	4.2A	N/A	NCR
BI LOG PERIODIC, ANTENNA	Schaffner	CBL6112B	TEMC00005	N/A	24	07-Nov-2025
EMC Chamber	Panashield	N/A	TEMC00031	N/A	24	19-Oct-2025
Test Software	Rohde & Schwarz	EMC32	TEMC00184	10.60.00	N/A	NCR
R & S ESW EMI Test Receiver	Rohde & Schwarz	ESW	TEMC00232	2.00 SP1	12	04-Jun-2025
DC to 18 GHz Cable	SSI Technologies	2801-03-03-360/WN	TEMC00293	N/A	12	05-Apr-2025

TU - Traceability Unscheduled
O/P MON - Output Monitored with Calibrated Equipment
N/A - Not Applicable
NCR – No Calibration Required

2.6 Frequency Tolerance of Carrier Signal

2.6.1 Specification Reference

FCC Section 15.225(e);
ISED Canada RSS-210 Annex B.6(b)

2.6.2 Equipment Under Test and Modification State

Serial Number: 20007607

2.6.3 Date of Test

2024-September-12 to 2024-September-13

2.6.4 Test Method

Frequency stability measurements with respect to ambient temperature and when varying voltage were performed in accordance with ANSI C63.10 section 6.8 and ISED Canada RSS-GEN 6.11. The measurements were performed using a spectrum analyzer. Sufficient stabilization period was used at each temperature prior to each measurement.

2.6.5 Environmental Conditions

Ambient Temperature	23.3 °C
Relative Humidity	46.6 %
Atmospheric Pressure	1009 mbar

2.6.6 Test Results

Limit Clause FCC Sections 15.225(e),ISED Canada: RSS-210 B.6 (b)

	Carrier Frequency Tolerance Limits	
Temperature Range	FCC 15.225 (e)	RSS-210 B6 (b)
-20 C to +50C	0.01%	100 ppm

Frequency Stability

Frequency (MHz): 13.560055
Deviation Limit (%): 0.01
Deviation Limit (PPM): 100.00
Nominal Voltage (VDC): 3.95

Temperature	Frequency	Frequency Error		Voltage	Voltage
C	MHz	(%)	PPM	(%)	(VDC)
-20 C	**13.560109**	**0.00040**	**4.01916**	100%	3.95
-10 C	**13.560110**	**0.00040**	**4.04866**	100%	3.95
0 C	**13.560132**	**0.00057**	**5.68582**	100%	3.95
10 C	**13.560118**	**0.00046**	**4.64600**	100%	3.95
20 C	**13.560055**	**0.00000**	**0.00000**	100%	3.95
30 C	**13.560026**	**-0.00021**	**-2.10914**	100%	3.95
40 C	**13.560026**	**-0.00021**	**-2.13863**	100%	3.95
50 C	**13.560021**	**-0.00024**	**-2.44837**	100%	3.95
20 C	**13.560028**	**-0.00019**	**-1.93215**	endpoint	3.40

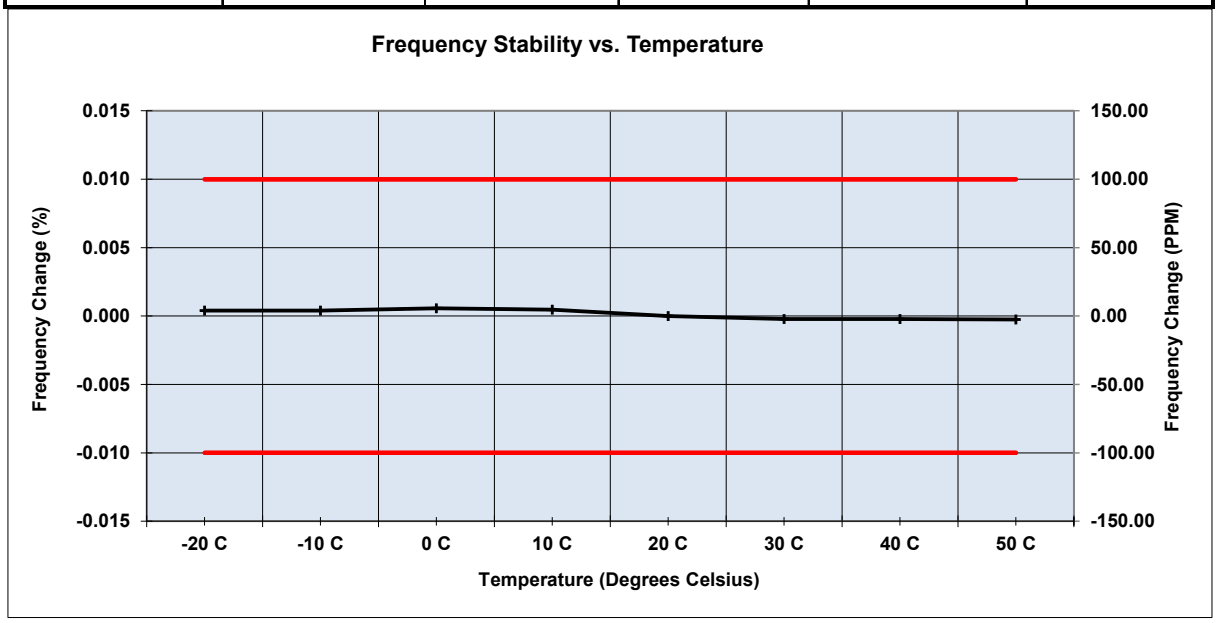

Figure 2.6.6-1 – Frequency Tolerance of Carrier Signal Result

2.6.7 Test Location and Test Equipment Used

This test was carried out in TÜV SÜD America, Inc., 5610 W. Sligh Ave, Suite 100, Tampa, FL 33634, USA.

Instrument	Manufacturer	Type No	TE No	Software / Firmware Revision	Calibration Period (months)	Calibration Due
Digital Thermometer	Omega Engineering, Inc.	MDSS41-TC	BEMC00002	N/A	24	19-Sep-2025
Digital MultiMeter	Fluke	115	BEMC02108	N/A	12	25-Jan-2025
PCB Loop Antenna	FAU EMI R&D Lab	EMI-LOOP	BEMC02141	N/A	N/A	NCR
Signal & Spectrum Analyzer	Rohde & Schwarz	FSW43	DEMC3085	2.90 SP1	12	03-Jun-2025
DC Power Supply 0-60V/0-35A	Hewlett Packard	6674A	DEMC780	N/A	N/A	NCR
Temperature Test Chamber	Sun Electronic Systems, Inc.	EC127	TEMC00242	5.10	N/A	NCR
Flexible Test Cable	Mini-Circuits	ULC-8FT-SMSM+	TEMC00267	N/A	12	08-Mar-2025
SMA Fixed Attenuator Kit	Mini Circuits	K2-BW2+	TEMC00272	N/A	12	06-Apr-2025

TU - Traceability Unscheduled
O/P MON - Output Monitored with Calibrated Equipment
N/A - Not Applicable
NCR – No Calibration Required

3 Test Equipment Information

3.1 General Test Equipment Used

Instrument	Manufacturer	Type No	TE No	Software / Firmware Revision	Calibration Period (months)	Calibration Due
Digital Thermometer	Omega Engineering, Inc.	MDSS41-TC	BEMC00002	N/A	24	19-Sep-2025
Active Loop Antenna	EMCO	6502	BEMC00078	N/A	24	6-Sep-2025
100Hz-26.5GHz EMC analyzer/HYZ	Hewlett Packard	E7405A	BEMC00523	A.14.06	12	25-Jun-2025
Tile Automation Software	ETS Lindgren	TILE4! - Version 4.2.A	BEMC02095	4.2A	N/A	NCR
Digital MultiMeter	Fluke	115	BEMC02108	N/A	12	25-Jan-2025
PCB Loop Antenna	FAU EMI R&D Lab	EMI-LOOP	BEMC02141	N/A	N/A	NCR
Signal & Spectrum Analyzer	Rohde & Schwarz	FSW43	DEMC3085	2.90 SP1	12	3-Jun-2025
DC Power Supply 0-60V/0-35A	Hewlett Packard	6674A	DEMC780	N/A	N/A	NCR
DC Power Supply	Xantrex	HPD-60-5	TAME01064	N/A	N/A	NCR
BI LOG PERIODIC, ANTENNA	Schaffner	CBL6112B	TEMC00005	N/A	24	7-Nov-2025
EMC Chamber	Panashield	N/A	TEMC00031	N/A	24	19-Oct-2025
Test Software	Rohde & Schwarz	EMC32	TEMC00184	10.60.00	N/A	NCR
R & S ESW EMI Test Receiver	Rohde & Schwarz	ESW	TEMC00232	2.00 SP1	12	4-Jun-2025
Temperature Test Chamber	Sun Electronic Systems, Inc.	EC127	TEMC00242	5.1	N/A	NCR
Flexible Test Cable	Mini-Circuits	ULC-8FT-SMSM+	TEMC00267	N/A	12	8-Mar-2025
SMA Fixed Attenuator Kit	Mini Circuits	K2-BW2+	TEMC00272	N/A	12	6-Apr-2025
DC to 18 GHz Cable	SSI Technologies	2801-03-03-360/WN	TEMC00293	N/A	12	5-Apr-2025

TU - Traceability Unscheduled
O/P MON - Output Monitored with Calibrated Equipment
N/A - Not Applicable
NCR – No Calibration Required

4 Diagram of Test Set-ups

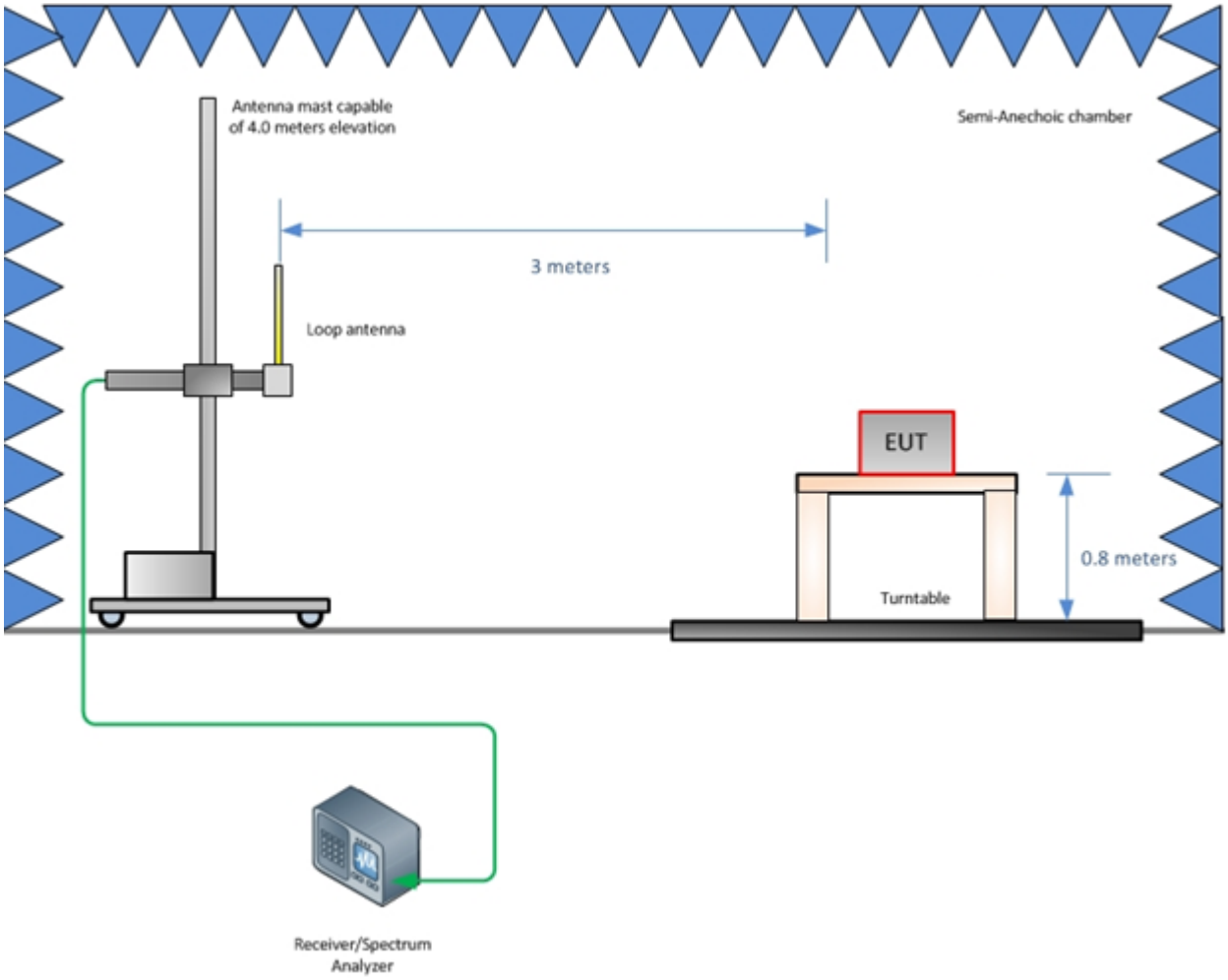

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Figure 4-1 - Radiated Emissions Test Setup up to 30 MHz

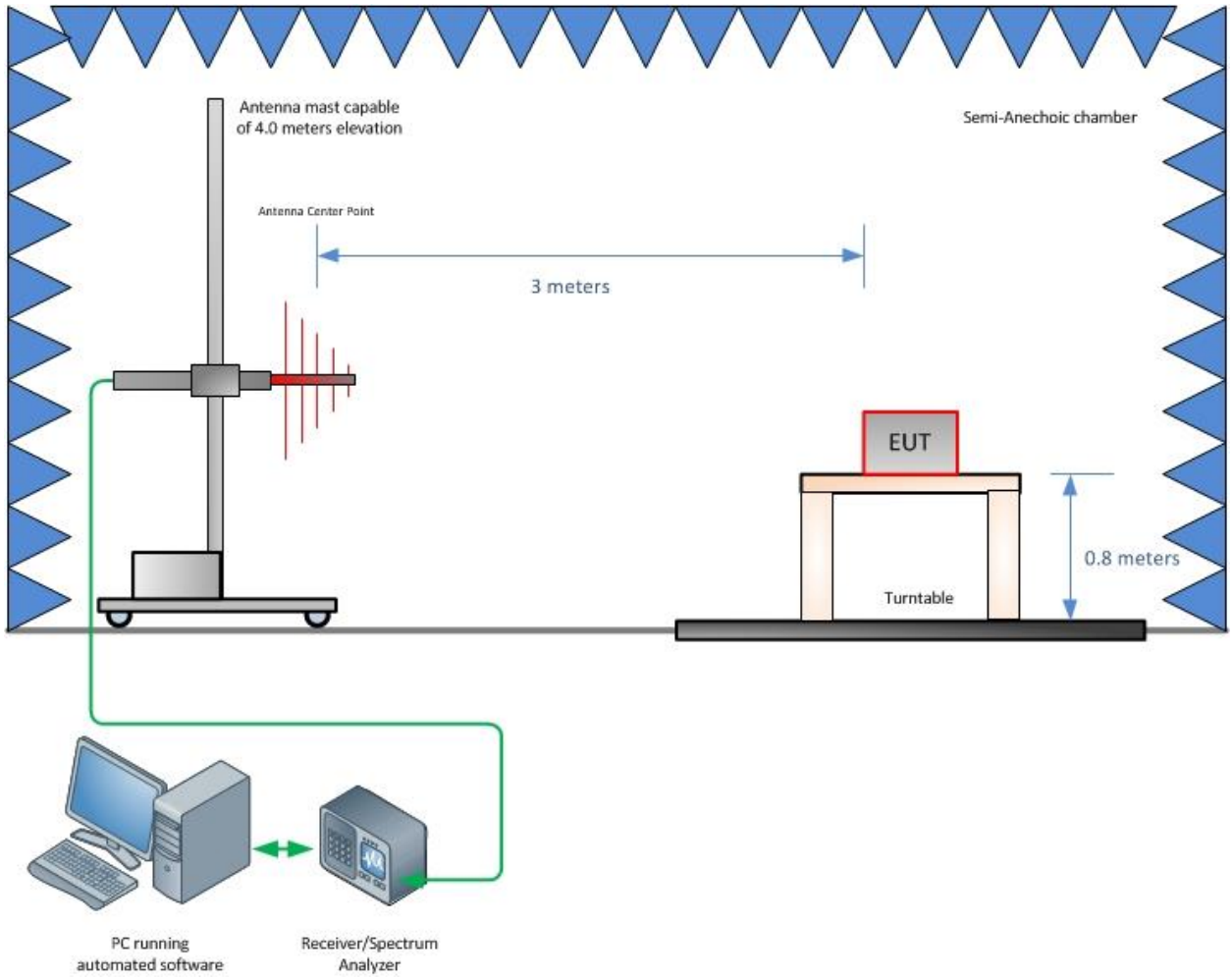

Figure 4-2 - Radiated Emissions Test Setup up to 1 GHz

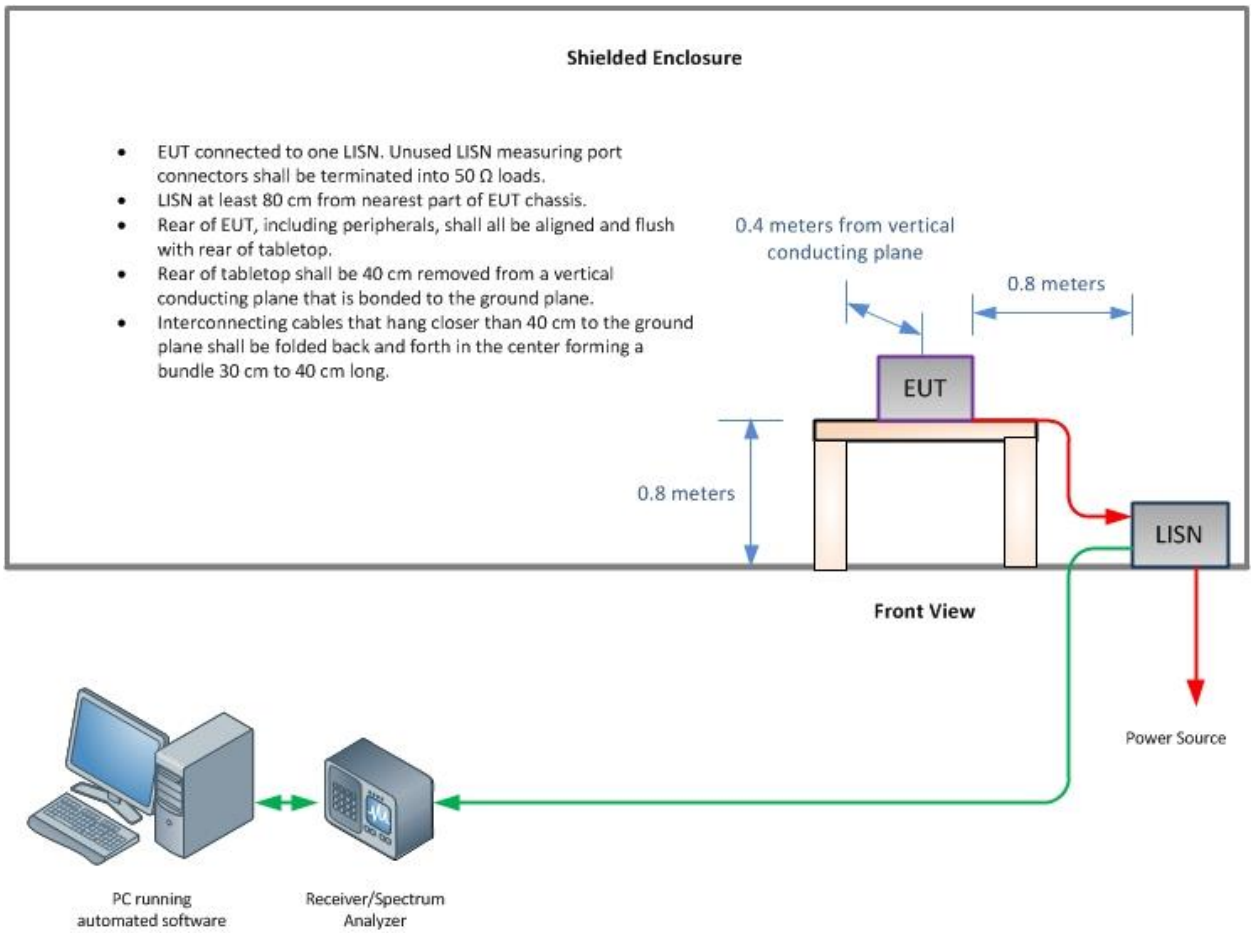

Figure 4-3 - Conducted Emissions Test Setup

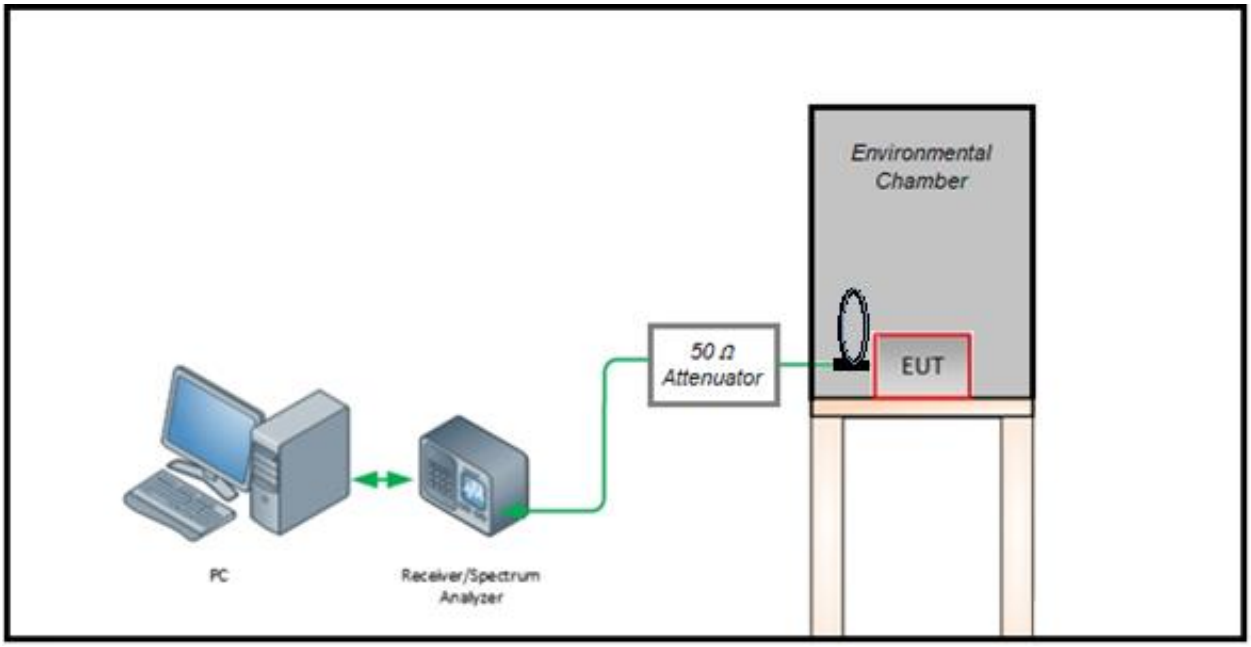

Figure 4-4 – Frequency Stability Test Setup

5 Measurement Uncertainty

For a 95% confidence level, the measurement uncertainties for defined systems are:

Table 5-1 - Values of U_{cispr} and U_{Lab}

Measurement	U_{cispr}	U_{Lab}
Conducted disturbance (mains port) (9 kHz – 150 kHz) (150 kHz – 30 MHz)	 3.8 dB 3.4 dB	 3.71 dB 3.31 dB
Conducted disturbance (telecom port) (150 kHz – 30 MHz 55 dB LCL) (150 kHz – 30 MHz 65 dB LCL) (150 kHz – 30 MHz 75 dB LCL)	 5.0 dB 5.0 dB 5.0 dB	 4.11 dB 4.50 dB 4.94 dB
Radiated disturbance (electric field strength on an open area test site or alternative test site) (30 MHz – 1 000 MHz) (1 – 6 GHz) (6-18 GHz)	 6.3 dB 5.2 dB 5.5 dB	 5.94 dB 5.07 dB 5.07 dB

Notes:

U_{cispr} resembles a value of measurement uncertainty for a specific test, which was determined by considering uncertainties associated with the quantities listed in CISPR 16-4-2:2011.

6 Accreditation, Disclaimers and Copyright

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