

Report on the Testing of the Landis + Gyr Technology, Inc WFM200LG1

In accordance with:
FCC 47 CFR part 15.247
ISED RSS-247 Issue 2, February 2017

Prepared for: Landis Gyr Technology, Inc
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FCC Accreditation Designation Number US1233
FCC Test Site Registration Number 967699
Innovation, Science, and Economic Development Canada Lab Code 23932

EXECUTIVE SUMMARY

A sample of this product was tested and found to be compliant with the standards listed above.



A2LA Cert. No. 2955.09

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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.

Table 1.1-1 – Modification Record

| Issue | Description of Change | Date of Issue |
|-------|-----------------------|---------------|
| 0 | First Issue | 2/17/2022 |

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 15.247 and Innovation Science and Economic Development Canada's Radio Standards Specification RSS-247 for the tests documented herein to support Class II Permissive change by adding new antenna to Wi-Fi module WFM200S.

| | |
|----------------------------------|---|
| Applicant | Raghav Goteti |
| Manufacturer | Landis + Gyr Technoloy, Inc. |
| Applicant's Email Address | raghav.goteti@landisgyr.com |
| Module Model Number(s) | WFM200LG1 |
| Module FCC ID | R7PWFM200 |
| Module ISED Certification Number | 5294A-WFM200 |
| Hardware Version(s) | WFM200SN |
| Software Version(s) | Release 5 / EIC -6.13.12.86-jenkins-Dev_Nightly-86 |
| Number of Samples Tested | 1 |
| Test Specification/Issue/Date | US Code of Federal REgulation (CFR): Title 47, Part 15, Subpart C: Radio Frequency Devices, Intentional Radiators, 2021 ISED Canada Radio Standards Specification: RSS-247 – Digital Transmission Systems (DTSS), Frequency Hopping Systems (FHSs) and License-Exempt Local Area Network (LE-LAN) Devices, Issue 2, February 2017. |
| Order Number | 72174064 |
| Date of Receipt of EUT | 11/29/2021 |
| Start of Test | 12/2/2021 |
| Finish of Test | 12/6/2021 |



Related Document(s)

ANSI C63.10-2013: American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Device.

FCC OET 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, April 2, 2019

US Code of Federal Regulations (CFR): Title 47, Part 2, Subpart J: Equipment Authorization Procedures, 2021.

ISED 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 15.247 and ISED Canada's RSS-247 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 | ----- | 10 |
| 6 dB Bandwidth | No | Not Tested | 15.247(a)(2) | RSS-247 5.2(a) | ----- |
| 99% Bandwidth | No | Not Tested | ----- | RSS-GEN 6.7 | ----- |
| Fundamental Emission Output Power | No | Not Tested | 15.247(b)(3) | RSS-247 5.4(d) | ----- |
| Band-Edge Compliance of RF Conducted Emissions | No | Not Tested | 15.247(d) | RSS-247 5.5 | ----- |
| RF Conducted Spurious Emissions | No | Not Tested | 15.247(d) | RSS-247 5.5 | ----- |
| Radiated Spurious Emissions into Restricted Frequency Bands | Yes | Pass | 15.205, 15.209 | RSS-GEN 8.9, 8.10 | 14 |
| Power Spectral Density | No | Not Tested | 15.247(e) | RSS-247 5.2(b) | ----- |
| Power Line Conducted Emissions | Yes | Pass | 15.207 | RSS-GEN 8.8 | 11 |

1.4 Product Information

1.4.1 Technical Description

The WFM200S is an Ultra-Low Power Wi-Fi® transceiver or network co-processor (NCP) SiP (System in Package) module. It operates in the 2.4 GHz to 2.5 GHz ISM band. The very compact 6.5mm x 6.5mm WFM200S SiP module contains a high frequency crystal and shield. The WFM200S integrates a balun, T/R switch, LNA and PA for the best possible RF performance.

WFM200S supports both the 802.11 split MAC architecture and the 802.11 full MAC software architecture.

The WFM200S feeds directly into an on-board printed Inverted-F antenna located on the Revelo E360 host.

Table 1.4-1 – Wireless Module Technical Information

| Detail | Description |
|-----------------------------|--|
| Module FCC ID | R7PWFM200 |
| Module IC ID | 5294A-WFM200 |
| Transceiver Model # | WFM200LG1 |
| Operating Frequency Range | 2412 – 2462 MHz |
| Modulation Format | IEEE 802.11 b/g/n DSSS CCK, OFDM, DBPSK, DQPSK, 16-QAM and 64-QAM for MCS0 to MCS7 |
| Maximum Peak Output Power | 16 dBm |
| Antenna Type / Description: | Printed Inverted-F Antenna / 1 dBi Gain |

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

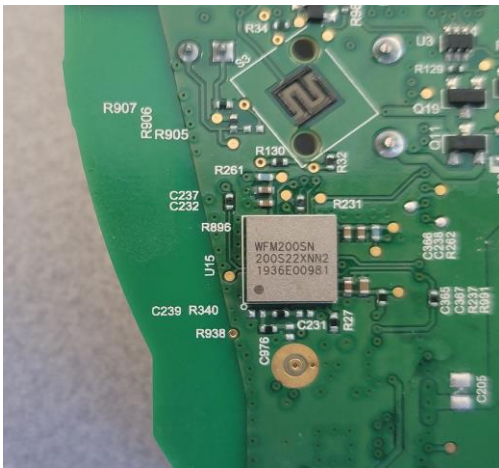


Photo 1.4.1-1 – Front view of the EUT

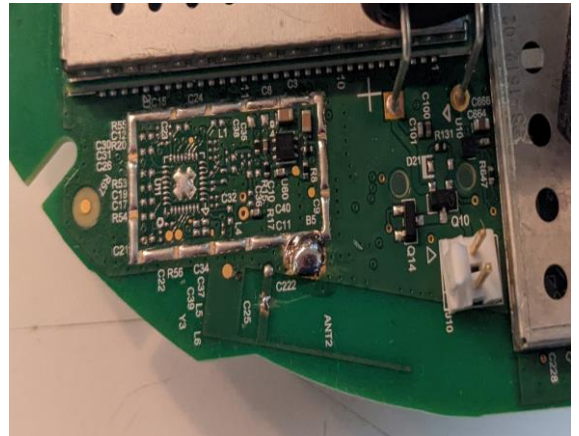


Photo 1.4.1-2 – Back view of the EUT

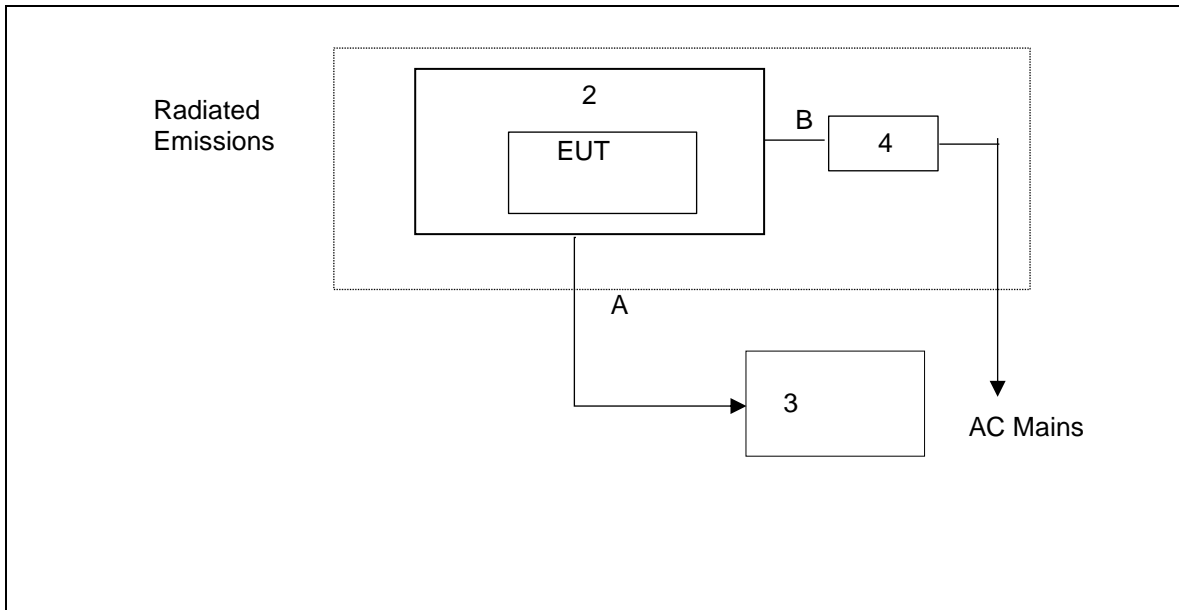


Figure 1.4.1-4 – Test Setup Block Diagram

Table 1.4.1-1 – Cable Descriptions

| Item | Cable/Port | Description |
|------|--------------------|---|
| A | USB Serial cable | Programming cable connected to laptop |
| B | Power Supply Cable | Power Supply connected to Isolation Transformer |

Table 1.4.1-2 – Support Equipment Descriptions

| Item | Make/Model | Description |
|------|------------|---|
| 2 | D013D65F | Evaluation Board (Revelo E360 Host PCB) |
| 3 | Lenovo | Laptop used for configuring wireless module – Landis + Gyr provided |
| 4 | N/A | Isolation Transformer |



1.4.2 Modes of Operation

WFM200LG1 module provides 3 modes of operation using Wi-Fi classifications as outlined below.

| Mode of Operation | Frequency Range (MHz) | Number of Channels | Data Rates / MCS | Classification |
|-------------------|-----------------------|--------------------|------------------|-------------------|
| 1 | 2412 – 2462 | 11 | 1-11 Mbps | Wi-Fi 802.11 b |
| 2 | 2412 – 2462 | 11 | 6-54 Mbps | Wi-Fi 802.11 g |
| 3 | 2412 – 2462 | 11 | MCS 0-7 | Wi-Fi 802.11 HT20 |

1.4.3 Monitoring of Performance

For radiated emissions, the EUT was evaluated in three orthogonal orientations. The worst-case orientation was Y-position. The EUT was programmed to generate a continuously modulated signal on each channel evaluated. The EUT was programmed to generate a continuously modulated signal on each channel evaluated.

Worst case mode for all parameters measured listed below:

| Test case | Tested Frequency (MHz) | Modulation Mode | Data Rate | Module or module/host combination |
|----------------------------|--|--------------------|--------------------------|-----------------------------------|
| Radiated Spurious Emission | 2412 / 2437 / 2462 2412 / 2437 / 2462 2412 / 2437 / 2462 | 11b 11g HT20 | 1 Mbps 6 Mbps MCS0 | Module |
| Conducted Emission | 2437 | 11b | 1 Mbps | Module |

Power setting during test: Mode of operation 1: 16 dBm

1.5 Deviations from the Standard

No deviations from the applicable test standard were made during testing.



1.6 EUT Modification Record

The table below details modifications made to the EUT during the test program. 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 |
|--------------------|---|------------------------|--------------------------|
| 0 | Initial State | | |

The equipment was tested as provided without any modifications.

1.7 Test Location

TÜV SÜD conducted the following tests at our Alpharetta, GA test laboratory.

| Test Name | Name of Engineer(s) | Accreditation |
|---|---------------------|---------------|
| AC Power Line Conducted Emissions | Arthur Sumner | A2LA |
| Radiated Spurious Emissions into Restricted Frequency Bands | Paul Villarreal | A2LA |

Office address:
 TÜV SÜD America
 5945 Cabot Parkway, Suite 100
 Alpharetta, GA 30005, USA



2 Test Details

2.1 Antenna Requirement

2.1.1 Specification Reference

FCC Section: 15.203, 15.204

2.1.2 Equipment Under Test and Modification State

As shown in §1.4 with modification state "0", as noted in §1.6.

2.1.3 Date of Test

12/3/2021

2.1.4 Test Method

N/A

2.1.5 Environmental Conditions

The EUT was evaluated within the temperature, humidity and pressure range of the EUT as specified by the standard. The laboratory shall have an ambient temperature range of 15°C to 35°C, relative humidity range of 30% to 60% and atmospheric pressure range of 86 kPa to 106 kPa.

| | |
|----------------------|------------|
| Ambient Temperature | 22.3 °C |
| Relative Humidity | 53.8 % |
| Atmospheric Pressure | 972.2 mbar |

2.1.6 Test Results

The EUT utilizes Printed Inverted-F Antenna with peak gain 1 dBi which is mounted on the host printed circuit board, therefore satisfying the requirements of Section 15.203.



2.2 Power Line Conducted Emissions

2.2.1 Specification Reference

FCC Section: 15.207
ISED Canada: RSS-Gen 8.8

2.2.2 Equipment Under Test and Modification State

As shown in §1.4 with modification state "0", as noted in §1.6.

2.2.3 Date of Test

12/8/2021

2.2.4 Test Method

ANSI C63.10 section 6 was the guiding documents for this evaluation. Conducted emissions were performed from 150kHz to 30MHz with the spectrum analyzer's resolution bandwidth set to 9kHz and the video bandwidth set to 30kHz. The calculation for the conducted emissions is as follows:

Corrected Reading = Analyzer Reading + LISN Loss + Cable Loss
Margin = Corrected Reading - Applicable Limit

2.2.5 Environmental Conditions

The EUT was evaluated within the temperature, humidity and pressure range of the EUT as specified by the standard. The laboratory shall have an ambient temperature range of 15°C to 35°C, relative humidity range of 30% to 60% and atmospheric pressure range of 86 kPa to 106 kPa.

Ambient Temperature 22.3 °C
Relative Humidity 53.8 %
Atmospheric Pressure 972.2 mbar

2.2.6 Test Results

Table 2.2.6-1: Conducted EMI Results-Avg – Line 1

| Frequency (MHz) | Avg Limit | Avg Level Corrected | Avg Level | Correction Fact. | Avg Margin | Result |
|-----------------|-----------|---------------------|-----------|------------------|------------|--------|
| 0.54 | 46 | 22.3 | 12.6 | 9.652 | -23.7 | PASS |
| 1.25 | 46 | 19.6 | 9.9 | 9.67 | -26.4 | PASS |
| 2.04 | 46 | 19.7 | 10 | 9.672 | -26.3 | PASS |
| 2.26 | 46 | 19.3 | 9.7 | 9.68 | -26.7 | PASS |
| 3.91 | 46 | 19.3 | 9.6 | 9.68 | -26.7 | PASS |
| 5.38 | 50 | 17.8 | 8.1 | 9.72 | -32.2 | PASS |



Table 2.2.6-2: Conducted EMI Results-QP – Line 1

| Frequency (MHz) | QP Limit | QP Level Corrected | QP Level | Correction Fact. | QP Margin | Result |
|-----------------|----------|--------------------|----------|------------------|-----------|--------|
| 0.54 | 56 | 30.8 | 21.1 | 9.652 | -25.2 | PASS |
| 1.25 | 56 | 30.3 | 20.6 | 9.67 | -25.7 | PASS |
| 2.04 | 56 | 30.3 | 20.6 | 9.672 | -25.7 | PASS |
| 2.26 | 56 | 29.9 | 20.3 | 9.68 | -26.1 | PASS |
| 3.91 | 56 | 28.7 | 19.1 | 9.68 | -27.3 | PASS |
| 5.38 | 60 | 27.7 | 18 | 9.72 | -32.3 | PASS |

Table 2.2.6-3: Conducted EMI Results-Avg – Line 2

| Frequency (MHz) | Avg Limit | Avg Level Corrected | Avg Level | Correction Fact. | Avg Margin | Result |
|-----------------|-----------|---------------------|-----------|------------------|------------|--------|
| 0.5 | 46.1 | 19.9 | 10.3 | 9.63 | -26.2 | PASS |
| 0.54 | 46 | 23.7 | 14.1 | 9.633 | -22.3 | PASS |
| 0.67 | 46 | 19.7 | 10.1 | 9.64 | -26.3 | PASS |
| 1.26 | 46 | 15.5 | 5.8 | 9.665 | -30.5 | PASS |
| 2.96 | 46 | 14.8 | 5.1 | 9.689 | -31.2 | PASS |
| 3.58 | 46 | 14.4 | 4.7 | 9.7 | -31.6 | PASS |

Table 2.2.6-4: Conducted EMI Results-QP – Line 2

| Frequency (MHz) | QP Limit | QP Level Corrected | QP Level | Correction Fact. | QP Margin | Result |
|-----------------|----------|--------------------|----------|------------------|-----------|--------|
| 0.5 | 56.1 | 27.4 | 17.7 | 9.63 | -28.7 | PASS |
| 0.54 | 56 | 32.1 | 22.4 | 9.633 | -23.9 | PASS |
| 0.67 | 56 | 27.9 | 18.3 | 9.64 | -28.1 | PASS |
| 1.26 | 56 | 20.7 | 11 | 9.665 | -35.3 | PASS |
| 2.96 | 56 | 20.4 | 10.7 | 9.689 | -35.6 | PASS |
| 3.58 | 56 | 20.1 | 10.4 | 9.7 | -35.9 | PASS |



TUV SUD America

Conducted RF Emissions, 150 kHz to 30 MHz

Line Under Test Number 1 Results

EUT Name - 72174490

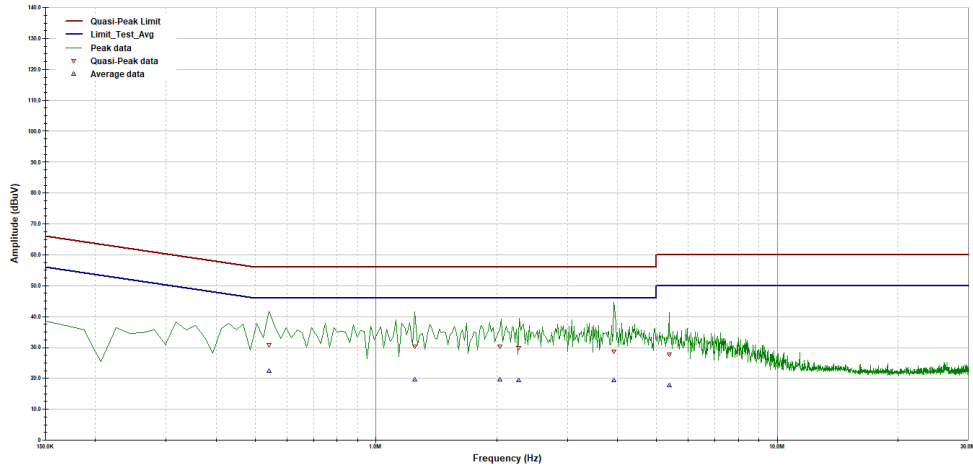
Model Number - Revelo S6 w MCM0 and Wifi

Part Number - N/A

Serial Number - N/A

Voltage - FCC/IC Class B; 120Vac/60Hz

Operating Mode - Tx Wifi radio 2437MHz



Operator: A Sumner

72179940CE02 LG Revelo S6 Wifi Radio.ii

Last Data Update 09:48:21 AM, Wednesday, December 08, 2021

Temperature = 22C
Relative Humidity = 26%

RF Bandwidth: 9kHz
VBW if Analyzer: 30kHz

Figure 1: Conducted Emission Plot – Line 1

TUV SUD America

Conducted RF Emissions, 150 kHz to 30 MHz

Line Under Test Number 2 Results

EUT Name - 72174490

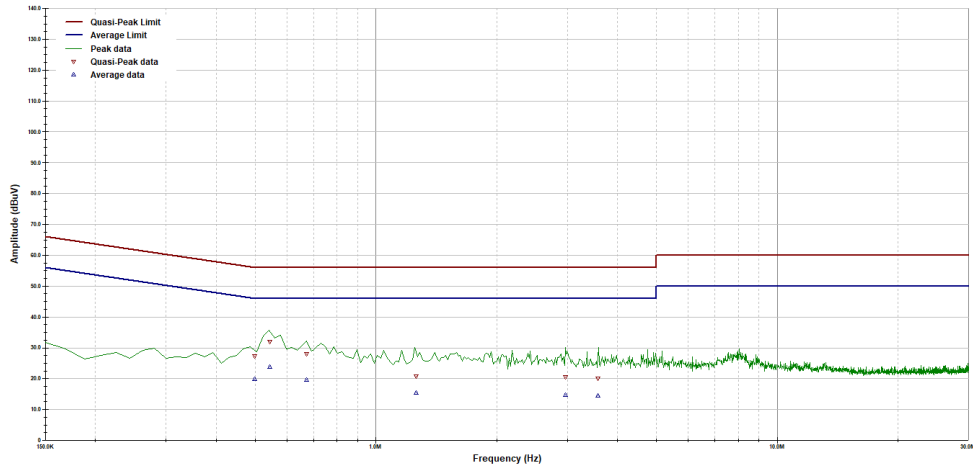
Model Number - Revelo S6 w MCM0 and Wifi

Part Number - N/A

Serial Number - N/A

Voltage - FCC/IC Class B; 120Vac/60Hz

Operating Mode - Tx Wifi radio 2437MHz



Operator: A Sumner

72179940CE02 LG Revelo S6 Wifi Radio.ii

Last Data Update 10:00:49 AM, Wednesday, December 08, 2021

Temperature = 22C
Relative Humidity = 26%

RF Bandwidth: 9kHz
VBW if Analyzer: 30kHz

Figure 2: Conducted Emission Plot – Nuetral



2.3 Radiated Spurious Emissions into Restricted Frequency Bands

2.3.1 Specification Reference

FCC Sections: 15.205, 15.209.
ISED Canada RSS – Gen 8.9/8.10

2.3.2 Equipment Under Test and Modification State

As shown in §1.4 with modification state “0”, as noted in §1.6.

2.3.3 Date of Test

12/8/2021 to 12/14/2021

2.3.4 Test Method

Radiated emissions tests were made over the frequency range of 9 kHz to 26 GHz, 10 times the highest fundamental frequency of 2.4 GHz. Each emission found to be in a restricted band as defined by section 15.205, including any emission at the operational band-edge, was compared to the radiated emission limits as defined in Section 15.209.

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 150 kHz, quasi-peak measurements were made using a resolution bandwidth RBW of 300 Hz and a video bandwidth VBW of 1 kHz and frequencies between 150 kHz and 30MHz, quasi-peak measurements were made using a resolution bandwidth RBW of 10 kHz and a video bandwidth VBW of 30 kHz. For frequencies between 30 MHz and 1000 MHz, quasi-peak measurements were made using a resolution bandwidth RBW of 100 kHz and a video bandwidth VBW of 300 kHz. For frequencies above 1000 MHz, peak and average measurements were made with RBW of 1 MHz and VBW of 3 MHz.

2.3.5 Environmental Conditions

The EUT was evaluated within the temperature, humidity and pressure range of the EUT as specified by the standard. The laboratory shall have an ambient temperature range of 15°C to 35°C, relative humidity range of 30% to 60% and atmospheric pressure range of 86 kPa to 106 kPa.

| | |
|----------------------|------------|
| Ambient Temperature | 22.3 °C |
| Relative Humidity | 53.8 % |
| Atmospheric Pressure | 972.2 mbar |



2.3.6 Test Results

Test Summary: EUT was set to transmit mode.

Test Results: Pass

See data below for detailed results.

Table 2.3.6-1: Radiated Spurious Emissions Tabulated Data – b mode

| Frequency (MHz) | Level (dBuV) | | Antenna Polarity (H/V) | Correction Factors (dB) | Corrected Level (dBuV/m) | | Limit (dBuV/m) | | Margin (dB) | | Note |
|-----------------|--------------|---------|------------------------|-------------------------|--------------------------|---------|----------------|---------|-------------|---------|------|
| | pk | Qpk/Avg | | | pk | Qpk/Avg | pk | Qpk/Avg | pk | Qpk/Avg | |
| LCH | | | | | | | | | | | |
| 2390 | 51.10 | 37.80 | H | 0.08 | 51.18 | 37.88 | 74.0 | 54.0 | 22.8 | 16.1 | 1 |
| 2390 | 50.20 | 37.30 | V | 0.08 | 50.28 | 37.38 | 74.0 | 54.0 | 23.7 | 16.6 | 1 |
| 4824 | 46.70 | 33.20 | H | 3.13 | 49.83 | 36.33 | 74.0 | 54.0 | 24.2 | 17.7 | |
| 4824 | 46.60 | 34.10 | V | 3.13 | 49.73 | 37.23 | 74.0 | 54.0 | 24.3 | 16.8 | |
| MCH | | | | | | | | | | | |
| 7312.1 | 46.20 | 33.10 | H | 7.92 | 54.12 | 41.02 | 74.0 | 54.0 | 19.9 | 13.0 | |
| 7311 | 47.30 | 35.40 | V | 7.92 | 55.22 | 43.32 | 74.0 | 54.0 | 18.8 | 10.7 | |
| HCH | | | | | | | | | | | |
| 2483.5 | 53.30 | 42.60 | H | 0.36 | 53.66 | 42.96 | 74.0 | 54.0 | 20.3 | 11.0 | 2 |
| 2483.5 | 54.10 | 43.60 | V | 0.36 | 54.46 | 43.96 | 74.0 | 54.0 | 19.5 | 10.0 | 2 |
| 4924 | 46.10 | 33.50 | H | 3.20 | 49.30 | 36.70 | 74.0 | 54.0 | 24.7 | 17.3 | |
| 4924 | 47.00 | 33.90 | V | 3.20 | 50.20 | 37.10 | 74.0 | 54.0 | 23.8 | 16.9 | |
| 7386 | 46.60 | 33.00 | H | 8.02 | 54.62 | 41.02 | 74.0 | 54.0 | 19.4 | 13.0 | |
| 7386 | 48.00 | 34.70 | V | 8.02 | 56.02 | 42.72 | 74.0 | 54.0 | 18.0 | 11.3 | |

Note 1: Lower BE

Note 2: Upper BE

Table 2.3.6-2: Radiated Spurious Emissions Tabulated Data – g mode

| Frequency (MHz) | Level (dBuV) | | Antenna Polarity (H/V) | Correction Factors (dB) | Corrected Level (dBuV/m) | | Limit (dBuV/m) | | Margin (dB) | | Note |
|--|--------------|---------|------------------------|-------------------------|--------------------------|---------|----------------|---------|-------------|---------|------|
| | pk | Qpk/Avg | | | pk | Qpk/Avg | pk | Qpk/Avg | pk | Qpk/Avg | |
| LCH | | | | | | | | | | | |
| 2390 | 63.90 | 43.30 | H | 0.08 | 63.98 | 43.38 | 74.0 | 54.0 | 10.0 | 10.6 | 1 |
| 2390 | 64.10 | 43.50 | V | 0.08 | 64.18 | 43.58 | 74.0 | 54.0 | 9.8 | 10.4 | 1 |
| MCH | | | | | | | | | | | |
| No radiated spurious emission detected within 20dB of the limit. | | | | | | | | | | | |
| HCH | | | | | | | | | | | |
| 2483.5 | 53.30 | 42.60 | H | 0.36 | 53.66 | 42.96 | 74.0 | 54.0 | 20.3 | 11.0 | 2 |
| 2483.5 | 54.10 | 43.60 | V | 0.36 | 54.46 | 43.96 | 74.0 | 54.0 | 19.5 | 10.0 | 2 |

Note 1: Lower BE

Note 2: Upper BE



Table 2.3.6-3: Radiated Spurious Emissions Tabulated Data – n20 mode

| Frequency (MHz) | Level (dBuV) | | Antenna Polarity (H/V) | Correction Factors (dB) | Corrected Level (dBuV/m) | | Limit (dBuV/m) | | Margin (dB) | | Note |
|--|--------------|---------|------------------------|-------------------------|--------------------------|---------|----------------|---------|-------------|---------|------|
| | pk | Qpk/Avg | | | pk | Qpk/Avg | pk | Qpk/Avg | pk | Qpk/Avg | |
| LCH | | | | | | | | | | | |
| 2390 | 64.70 | 43.90 | H | 0.08 | 64.78 | 43.98 | 74.0 | 54.0 | 9.2 | 10.0 | 1 |
| 2390 | 66.60 | 45.40 | V | 0.08 | 66.68 | 45.48 | 74.0 | 54.0 | 7.3 | 8.5 | 1 |
| MCH | | | | | | | | | | | |
| No radiated spurious emission detected within 20dB of the limit. | | | | | | | | | | | |
| HCH | | | | | | | | | | | |
| 2483.5 | 66.50 | 45.10 | H | 0.36 | 66.86 | 45.46 | 74.0 | 54.0 | 7.1 | 8.5 | 2 |
| 2483.5 | 67.50 | 46.50 | V | 0.36 | 67.86 | 46.86 | 74.0 | 54.0 | 6.1 | 7.1 | 2 |

Note 1: Lower BE
 Note 2: Upper BE

Sample Calculation:

$$R_c = R_u + CF_T$$

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: Peak – b mode

Corrected Level: 51.10 + 0.08 = 51.18dBμV/m
 Margin: 74dBμV/m – 51.18dBμV/m = 22.8dB

Example Calculation: Average – b mode

Corrected Level: 37.80 + 0.08 - 0 = 37.88dBμV
 Margin: 54dBμV – 37.88dBμV = 16.1dB

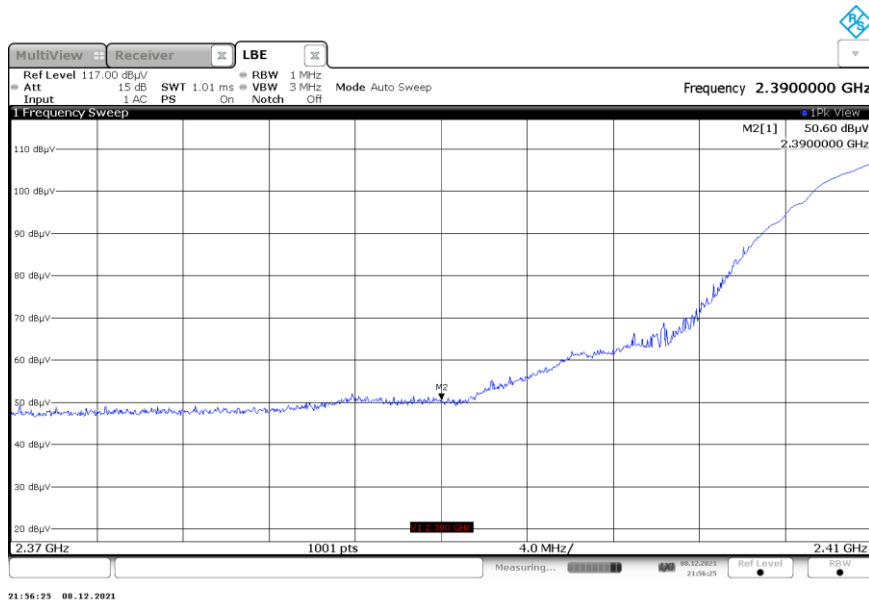


Figure 1: Reference plot Radiated Lower Band-edge – LCH – b mode

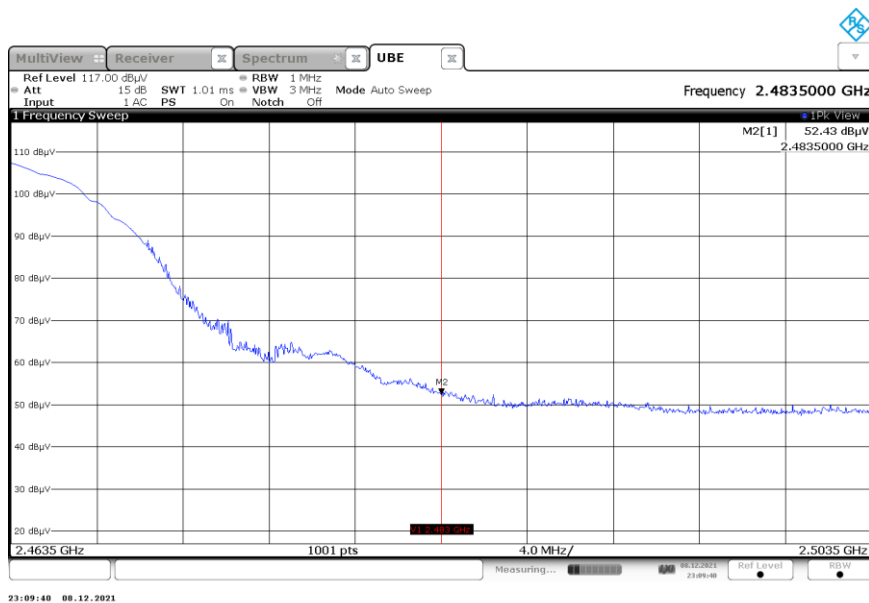


Figure 2: Reference plot Radiated Upper Band-edge – HCH – b mode

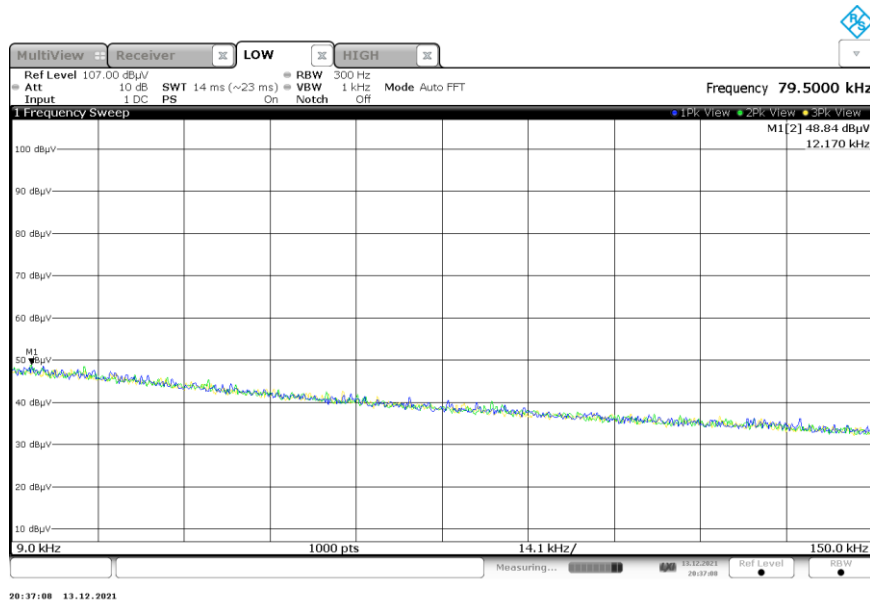


Figure 3: Reference plot for Radiated Spurious Emissions – 9 kHz – 150 kHz – b mode

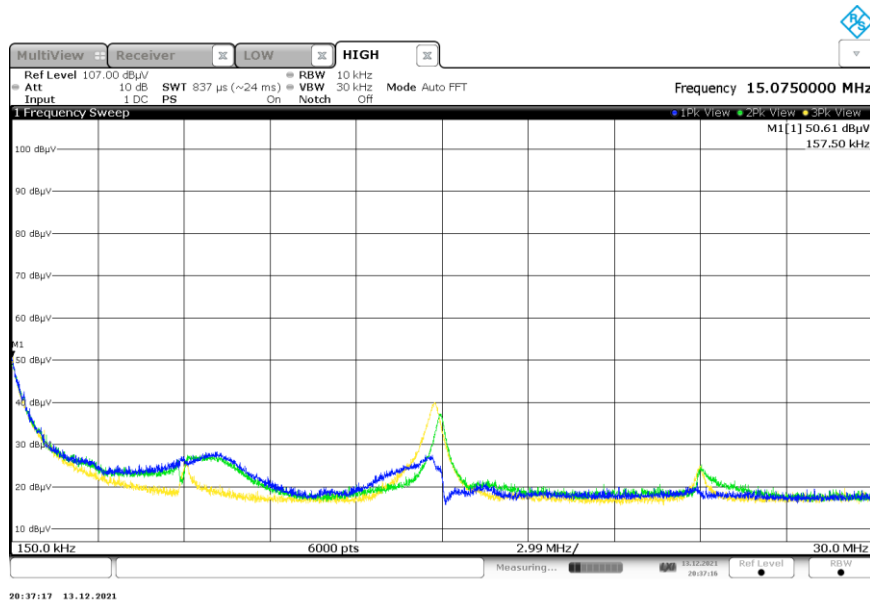


Figure 4: Reference plot for Radiated Spurious Emissions– 150 kHz – 30MHz – b mode
 Note: Emissions above the noise floor are ambient not associated with the EUT.

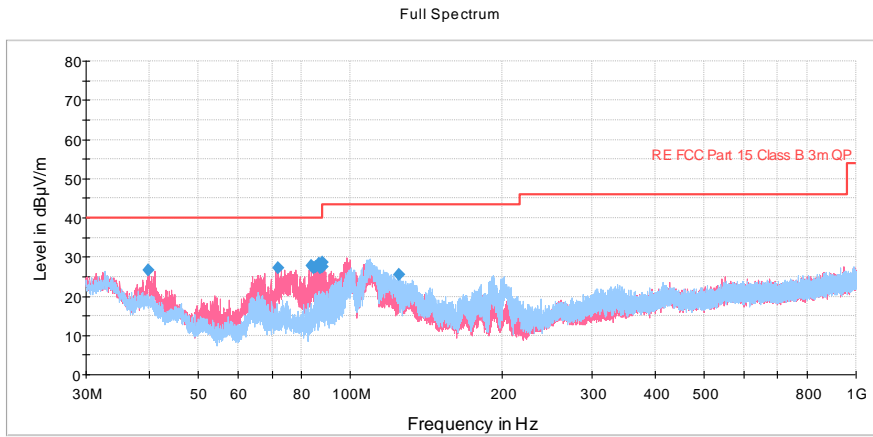


Figure 5: Reference plot for Radiated Spurious Emissions – 30 MHz – 1 GHz – b mode
Note: Emissions above the noise floor do not falls within restricted bands.

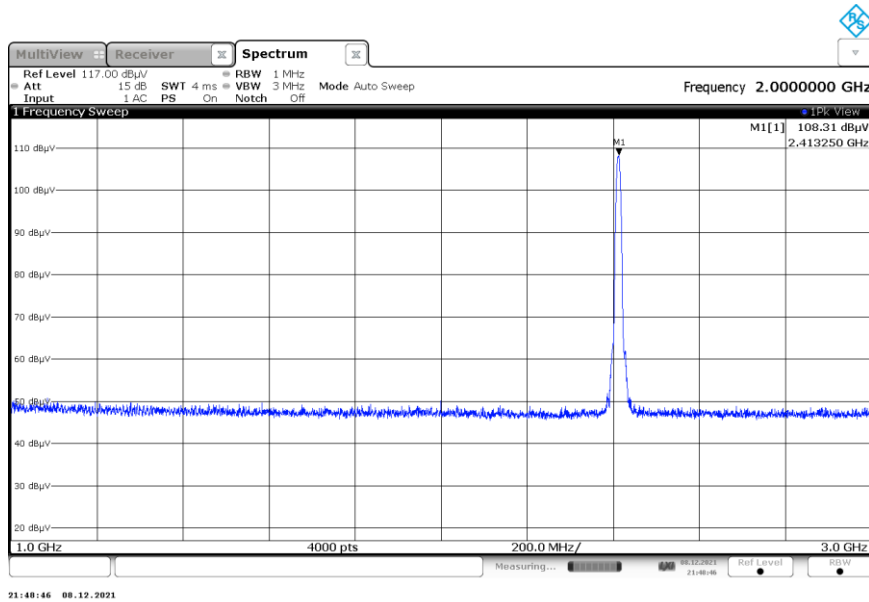


Figure 6: Reference plot for Radiated Spurious Emissions – 1 GHz – 3 GHz – b mode

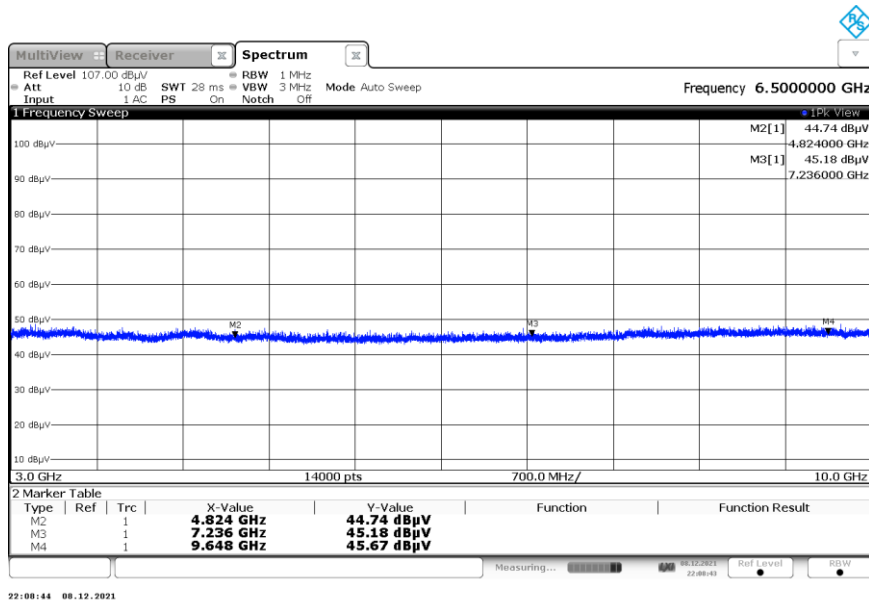


Figure 7: Reference plot for Radiated Spurious Emissions – 3 GHz – 10 GHz – b mode

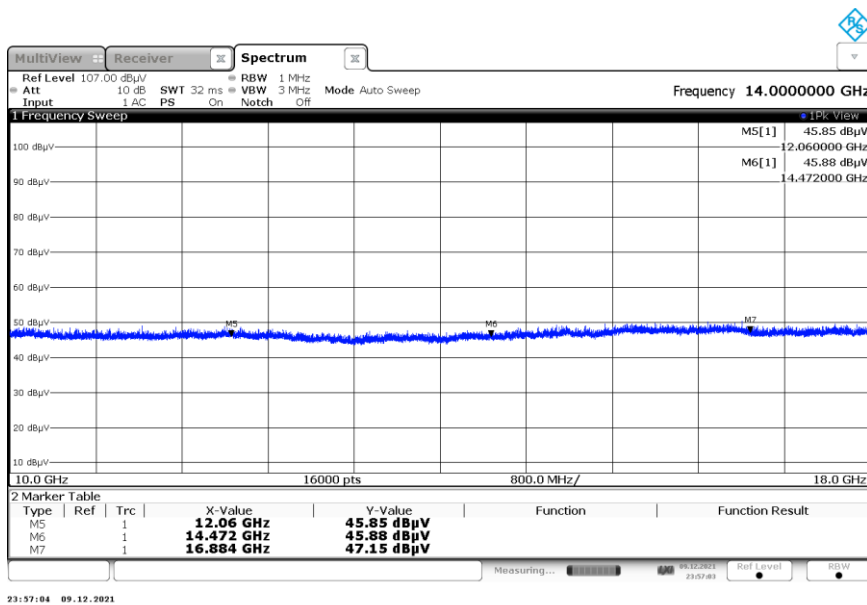


Figure 8: Reference plot for Radiated Spurious Emissions – 10 GHz – 18 GHz – b mode

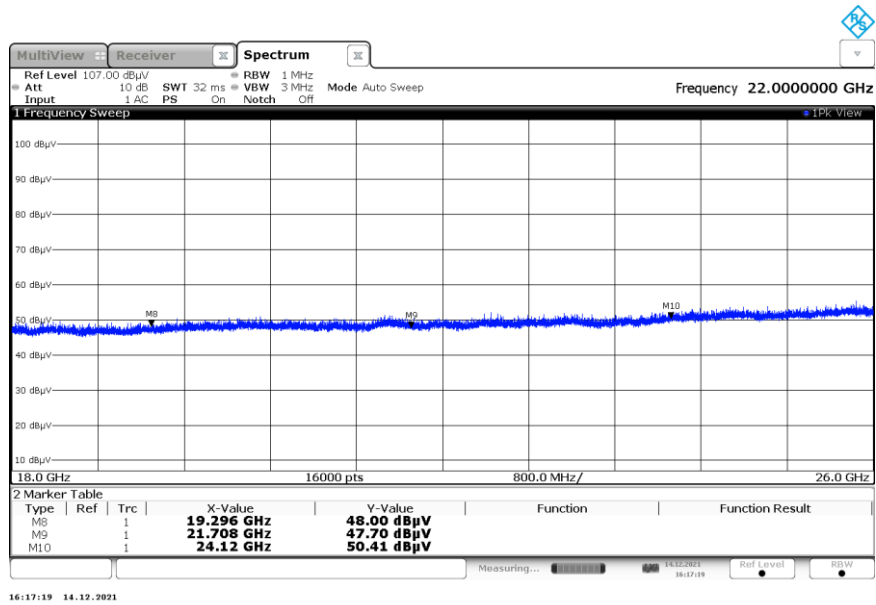


Figure 9: Reference plot for Radiated Spurious Emissions – 18 GHz – 26 GHz – b mode



2.4 Test Equipment Used

Table 2.4-1 –Equipment List

| Asset ID | Manufacturer | Model | Equipment Type | Serial Number | Last Calibration Date | Calibration Due Date |
|----------|----------------------------|---------------|---|---------------|-----------------------|----------------------|
| 628 | EMCO | 6502 | Active Loop Antenna 10kHz-30MHz | 9407-2877 | 6/8/2021 | 6/8/2023 |
| 338 | Hewlett Packard | 8449B | High Frequency Pre-Amp | 3008A01111 | 6/22/2021 | 6/22/2023 |
| DEMC3161 | Ametek CTS Germany GmbH | CBL 6112D | Bilog Antenna; Attenuator | 51323 | 3/19/2021 | 3/19/2023 |
| 884 | ETS Lindgren | 3117 | Horn Antenna | 00240106 | 5/6/2021 | 5/6/2022 |
| 213 | TEC | PA 102 | Amplifier | 44927 | 7/30/2021 | 7/30/2022 |
| 432 | Microwave Circuits | H3G020G4 | Highpass Filter | 264066 | 6/9/2021 | 6/9/2022 |
| 882 | Rohde & Schwarz | ESW44 | Test Receiver | 111961 | 6/24/2021 | 6/24/2022 |
| 836 | ETS Lindgren | SAC Cable Set | SAC Cable Set includes 620, 837, 838 | N/A | 5/11/2021 | 5/11/2022 |
| 872 | Agilent | E7402A | EMC Spectrum Analyzer | US40240258 | 6/22/2021 | 6/22/2022 |
| 871 | Belden | RF Cable | RF Cable (CE Cable) | 871 | 4/2/2021 | 4/2/2022 |
| 861 | Com-Power | LI-1100C | Line Impedance Stabilization Network | 20180038 | 2/26/2021 | 2/26/2022 |
| 862 | Com-Power | LI01100C | Line Impedance Stabilization Network | 20180039 | 2/26/2021 | 2/26/2022 |
| 144 | Omega | RH411 | Temp / Humidity Meter | H0103373 | 12/16/2020 | 12/16/2022 |

N/A – Not Applicable

NCR – No Calibration Required

3 Diagram of Test Set-ups

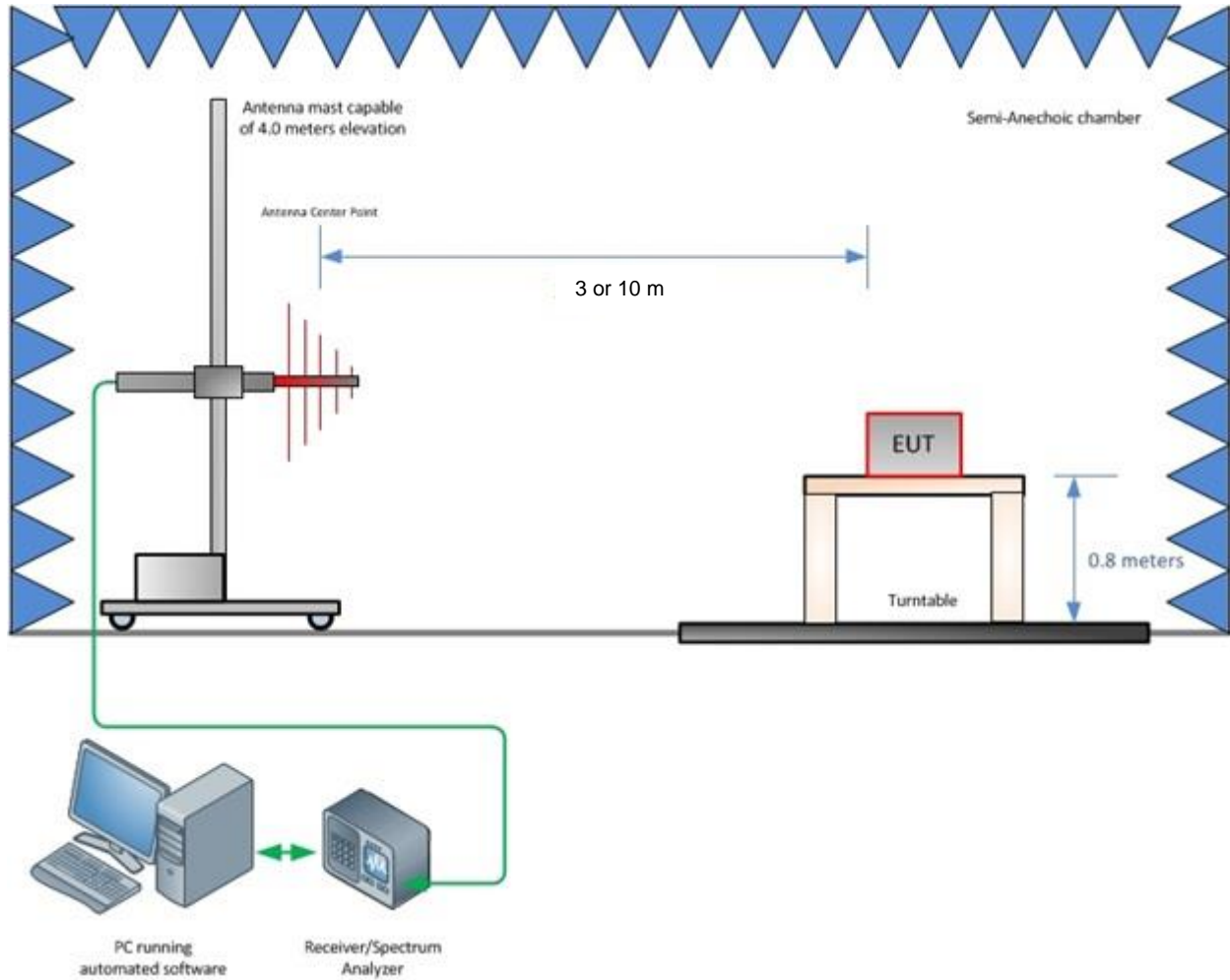


Figure 3-1 – Radiated Emissions Test Setup up to 1 GHz

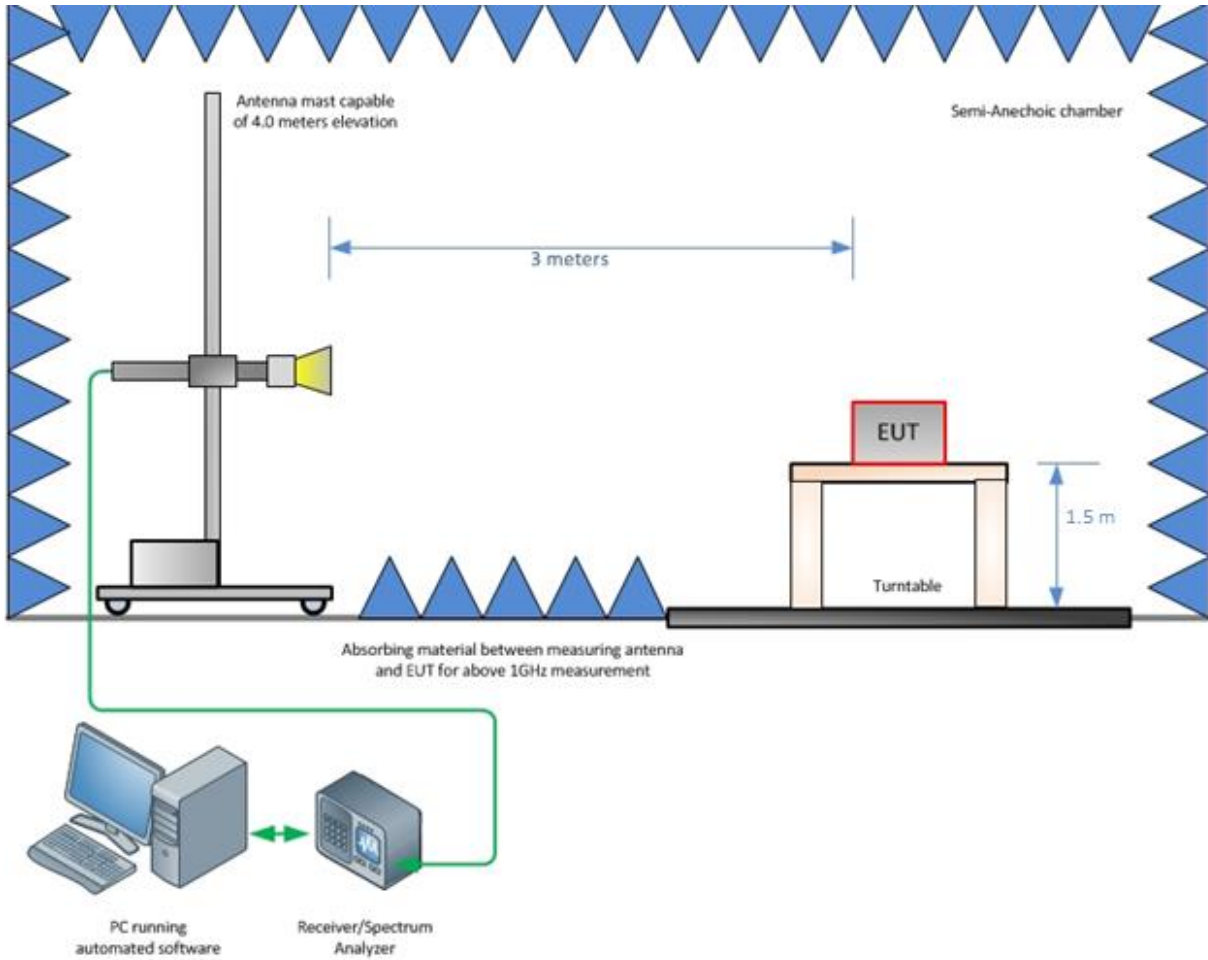


Figure 3-2 – Radiated Emissions Test Setup above 1 GHz

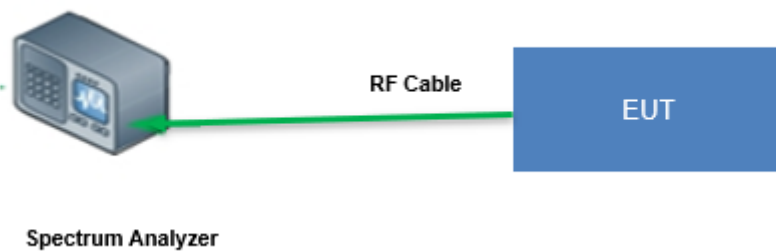


Figure 3-3 – Conducted Test Setup: Antenna Port measurement



4 Accreditation, Disclaimers and Copyright

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STATEMENT OF MEASUREMENT UNCERTAINTY – Emissions

The expanded laboratory measurement uncertainty figures (U_{Lab}) provided below correspond to an expansion factor (coverage factor) $k = 1.96$ which provide confidence levels of 95%.

Table 4-1: Estimation of Measurement Uncertainty

| Parameter | U_{lab} |
|---|------------------------------------|
| Occupied Channel Bandwidth | $\pm 0.009 \%$ |
| RF Conducted Output Power | $\pm 0.349 \text{ dB}$ |
| Power Spectral Density | $\pm 0.372 \text{ dB}$ |
| Antenna Port Conducted Emissions | $\pm 1.264 \text{ dB}$ |
| Radiated Emissions $\leq 1 \text{ GHz}$ | $\pm 5.814 \text{ dB}$ |
| Radiated Emissions $> 1 \text{ GHz}$ | $\pm 4.318 \text{ dB}$ |
| Temperature | $\pm 0.860 \text{ }^\circ\text{C}$ |
| Radio Frequency | $\pm 2.832 \times 10^{-8}$ |
| AC Power Line Conducted Emissions | $\pm 3.360 \text{ dB}$ |

TEST EQUIPMENT

All measurement instrumentation is traceable to the National Institute of Standards and Technology and is calibrated to meet test method standard requirements and/or manufacturer's specifications.