

# Report on the Testing of the

Itron, Inc.  
NIC

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

Prepared for: Itron, Inc.  
313 N Highway 11  
West Union, South Carolina 29696 USA



America

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## COMMERCIAL-IN-CONFIDENCE

Document Number: AT72186194.2P0

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| Kirby Munroe | Wireless / EMC Technical and Certification<br>Manager, NA<br>TUV SUD America Inc. | Authorized Signatory | 03/23/2023 |

Signatures in this approval box have checked this document in line with the requirements of TÜV SÜD America, Inc. document control rules.

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           | 03/23/2023    |

## 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 add an additional mode to the 900 MHz DTS radio on pre-approved module having FCC ID: SK9NIC / IC: 864G-NIC.

|                               |                                                                                                                                                                                                                                                                                                                                       |
|-------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Applicant                     | Christopher O'Steen                                                                                                                                                                                                                                                                                                                   |
| Manufacturer                  | Ittron, Inc                                                                                                                                                                                                                                                                                                                           |
| Applicant's Email Address     | <a href="mailto:Christopher.O'steen@itron.com">Christopher.O'steen@itron.com</a>                                                                                                                                                                                                                                                      |
| Model Name                    | NIC                                                                                                                                                                                                                                                                                                                                   |
| Serial Number(s)              | 11090012006                                                                                                                                                                                                                                                                                                                           |
| FCC ID                        | SK9NIC                                                                                                                                                                                                                                                                                                                                |
| ISED Certification Number     | 864G-NIC                                                                                                                                                                                                                                                                                                                              |
| Hardware Version(s)           | 576035-003 (Rev3)                                                                                                                                                                                                                                                                                                                     |
| Software Version              | 101.12.1673                                                                                                                                                                                                                                                                                                                           |
| 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, 2022<br>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                  | 72186194                                                                                                                                                                                                                                                                                                                              |
| Date of Receipt of EUT        | 2/6/2023                                                                                                                                                                                                                                                                                                                              |
| Start of Test                 | 2/6/2023                                                                                                                                                                                                                                                                                                                              |
| Finish of Test                | 2/28/2023                                                                                                                                                                                                                                                                                                                             |



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, 2022.

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, 15.204       | -----             | 10                  |
| 6 dB Bandwidth                                              | Yes                | Pass        | 15.247(a)(2)         | RSS-247 5.2(a)    | 16                  |
| 99% Bandwidth                                               | Yes                | Pass        | -----                | RSS-GEN 6.7       | 16                  |
| Average Output Power                                        | Yes                | Pass        | 15.247(b)(3)         | RSS-247 5.4(d)    | 14                  |
| Band-Edge Compliance of RF Conducted Emissions              | Yes                | Pass        | 15.247(d)            | RSS-247 5.5       | 21                  |
| RF Conducted Spurious Emissions                             | Yes                | Pass        | 15.247(d)            | RSS-247 5.5       | 23                  |
| Radiated Spurious Emissions into Restricted Frequency Bands | Yes                | Pass        | 15.205, 15.209       | RSS-GEN 8.9, 8.10 | 25                  |
| Power Spectral Density                                      | Yes                | Pass        | 15.247(e)            | RSS-247 5.2(b)    | 19                  |
| Power Line Conducted Emissions                              | Yes                | Pass        | 15.207               | RSS-GEN 8.8       | 11                  |
| Duty Cycle                                                  | No                 | -----       |                      |                   | -----               |

## 1.4 Product Information

### 1.4.1 Technical Description

The Itron HW 4.1 NIC is a network interface card which includes a 900MHz radio. The module operates on DC Voltage which is supplied by a host device.

This test report documents the compliance of the additional technical parameters identified below.

**Table 1.4-1 – General Information**

| Detail                      | Description                                              |
|-----------------------------|----------------------------------------------------------|
| FCC ID                      | SK9NIC                                                   |
| ISED Certification Number   | 864G-NIC                                                 |
| Model(s) / HVIN(s)          | NIC                                                      |
| PMN(s)                      | HW 4.1 NIC                                               |
| Operating Voltage           | 12Vdc                                                    |
| Antenna Type / Description: | *External Omnidirectional / 3 dBi (Laird, P/N: TRA9023P) |

\*Note: Only the External Omnidirectional / 3 dBi (Laird, P/N: TRA9023P) antenna is applicable to the additional modes included.

**Table 1.4-2 – Technical Parameters**

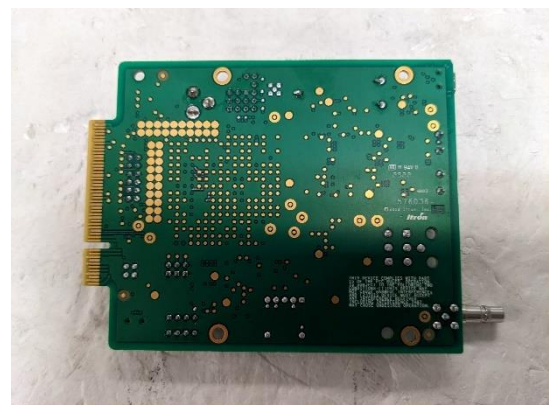
| Frequency Range (MHz) | Number of Channels | Channel Separation (kHz) | Modulation Format | Data Rates Supported (kbps) |
|-----------------------|--------------------|--------------------------|-------------------|-----------------------------|
| 902.8 – 926.8         | 31                 | 800                      | OFDM              | 1200                        |
| 903.2 – 926*          | 20                 | 1200                     | OFDM              | 2400                        |

\*Note: New modes to the original certification to be addresses in this report

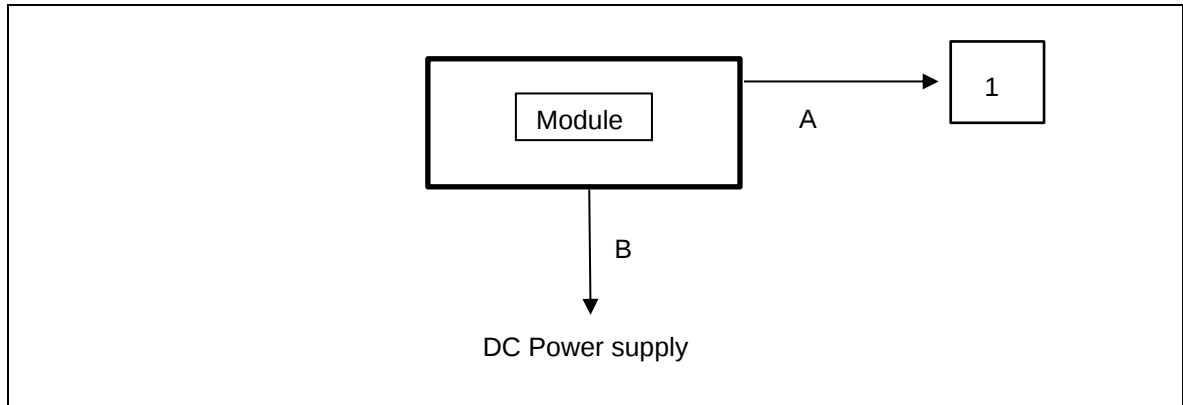
A full description and detailed product specification details are available from the manufacturer.



**Figure 1.4.1-1: Front Side of the EUT**



**Figure 1.4.1-2: Back Side of the EUT**

**Figure 1.4.1-3 –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    | DC Power Supply Cable | DC power supply                       |

**Table 1.4.1-2 – Support Equipment Descriptions**

| Item | Make/Model | Description                        |
|------|------------|------------------------------------|
| 1    | DELL       | Laptop used for configuring module |



### 1.4.2 Modes of Operation

The Itron HW 4.1 NIC is a network interface card which includes a 900MHz radio.

This test report documents the compliance of the 900 MHz Digital transmission systems mode of operation. NIC module provides the following modes of operation using DTS classification as outlined below and is an addition to the existing modes included in the original evaluation. See section 1.4.1 for additional detail.

| Mode of Operation | Frequency Range (MHz) | Number of Channels | Channel Separation (kHz) | Modulation Format | Data Rates Supported (kbps) | Classification |
|-------------------|-----------------------|--------------------|--------------------------|-------------------|-----------------------------|----------------|
| 1                 | 903.2 – 926           | 20                 | 1200                     | OFDM              | 2400                        | DTS            |

### 1.4.3 Monitoring of Performance

For radiated emissions, the EUT was evaluated in three orthogonal orientations. The worst-case orientation was X-position. See test setup photos for more information. The EUT was programmed to generate a continuously modulated signal on each channel evaluated.

For RF conducted measurements, the EUT was connected to the test equipment with a QMA to SMA adapter. The EUT was programmed to generate a continuously modulated signal on each channel evaluated.

Software power setting during test: 20



## 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 |
|-------------------------------------------------------------|---------------------|---------------|
| Antenna Requirement                                         | Divya Adusumilli    | A2LA          |
| Power Line Conducted Emissions                              | Divya Adusumilli    | A2LA          |
| Peak Output Power                                           | Divya Adusumilli    | A2LA          |
| 6dB / 99% Bandwidth                                         | Divya Adusumilli    | A2LA          |
| Peak Power Spectral Density                                 | Divya Adusumilli    | A2LA          |
| Band-Edge Compliance of RF Conducted Emissions              | Divya Adusumilli    | A2LA          |
| RF Conducted Spurious Emissions                             | Divya Adusumilli    | A2LA          |
| Radiated Spurious Emissions into Restricted Frequency Bands | Divya Adusumilli    | A2LA          |

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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 Observation

2/13/2023

#### 2.1.4 Test Method

N/A

#### 2.1.5 Environmental Conditions

N/A

#### 2.1.6 Observation

The EUT utilizes external omnidirectional antenna with peak gain 3 dBi. Connection to the module is via female QMA connector, 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**

2/13/2023

### **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

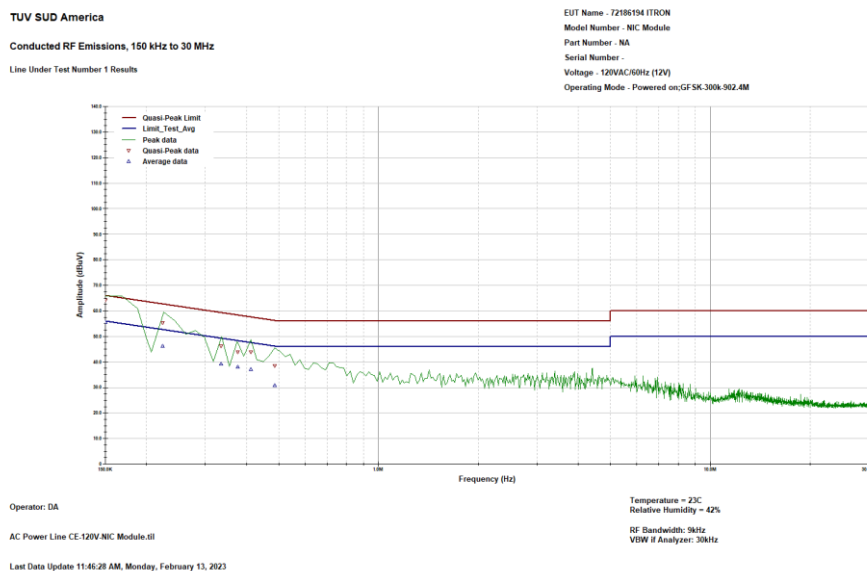


Figure 2.2.6-1: Conducted Emission Plot – Line 1

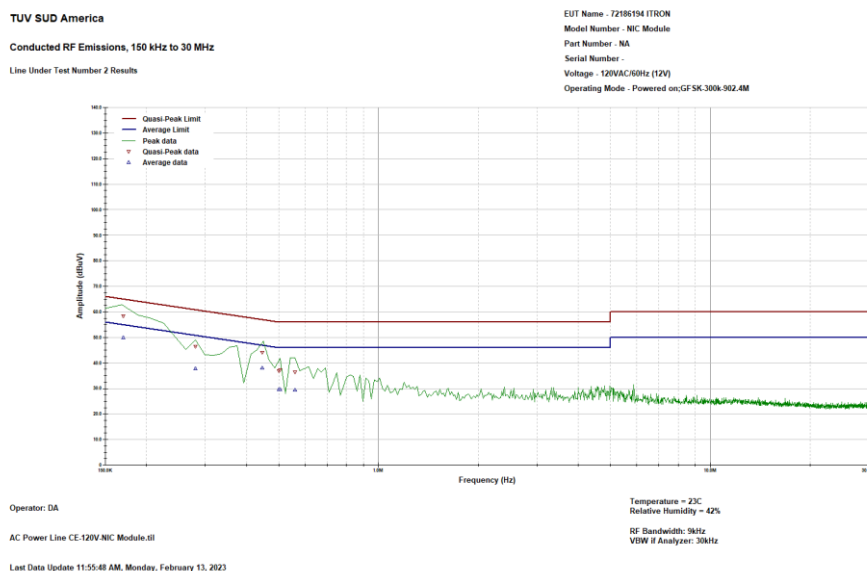


Figure 2.2.6-2: Conducted Emission Plot – Neutral

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

| Frequency | Avg Limit | Avg Level Corr | Avg Level | CF    | Avg Margin | Result |
|-----------|-----------|----------------|-----------|-------|------------|--------|
| MHz       | dBuV      | dBuV           | dBuV      | dB    | dB         |        |
| 0.15      | 56        | 55.5           | 45.8      | 9.682 | -0.5       | PASS   |
| 0.22      | 53.9      | 46.1           | 36.4      | 9.671 | -7.8       | PASS   |
| 0.34      | 50.7      | 39.3           | 29.6      | 9.658 | -11.4      | PASS   |
| 0.38      | 49.6      | 38             | 28.4      | 9.656 | -11.5      | PASS   |
| 0.41      | 48.5      | 37.1           | 27.5      | 9.654 | -11.4      | PASS   |
| 0.49      | 46.4      | 30.9           | 21.2      | 9.651 | -15.5      | PASS   |

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

| Frequency | QP Limit | QP Level Corr | QP Level | CF    | QP Margin | Result |
|-----------|----------|---------------|----------|-------|-----------|--------|
| MHz       | dBuV     | dBuV          | dBuV     | dB    | dB        |        |
| 0.15      | 66       | 64.1          | 54.4     | 9.682 | -1.9      | PASS   |
| 0.22      | 63.9     | 55.3          | 45.6     | 9.671 | -8.6      | PASS   |
| 0.34      | 60.7     | 46.2          | 36.6     | 9.658 | -14.5     | PASS   |
| 0.38      | 59.6     | 43.9          | 34.2     | 9.656 | -15.7     | PASS   |
| 0.41      | 58.5     | 43.7          | 34.1     | 9.654 | -14.7     | PASS   |
| 0.49      | 56.4     | 38.4          | 28.7     | 9.651 | -18       | PASS   |

**Table 2.2.6-3: Conducted EMI Results-Avg – Neutral**

| Frequency | Avg Limit | Avg Level Corr | Avg Level | CF    | Avg Margin | Result |
|-----------|-----------|----------------|-----------|-------|------------|--------|
| MHz       | dBuV      | dBuV           | dBuV      | dB    | dB         |        |
| 0.17      | 55.4      | 49.8           | 40.1      | 9.673 | -5.6       | PASS   |
| 0.28      | 52.3      | 37.7           | 28.1      | 9.662 | -14.5      | PASS   |
| 0.45      | 47.5      | 38.1           | 28.5      | 9.638 | -9.4       | PASS   |
| 0.5       | 46        | 29.6           | 20        | 9.63  | -16.4      | PASS   |
| 0.5       | 46        | 29.6           | 20        | 9.63  | -16.4      | PASS   |
| 0.56      | 46        | 29.5           | 19.8      | 9.634 | -16.5      | PASS   |

**Table 2.2.6-4: Conducted EMI Results-QP – Neutral**

| Frequency | QP Limit | QP Level Corr | QP Level | CF    | QP Margin | Result |
|-----------|----------|---------------|----------|-------|-----------|--------|
| MHz       | dBuV     | dBuV          | dBuV     | dB    | dB        |        |
| 0.17      | 65.4     | 58.4          | 48.8     | 9.673 | -7        | PASS   |
| 0.28      | 62.3     | 46.5          | 36.8     | 9.662 | -15.8     | PASS   |
| 0.45      | 57.5     | 44            | 34.4     | 9.638 | -13.5     | PASS   |
| 0.5       | 56       | 36.8          | 27.2     | 9.63  | -19.2     | PASS   |
| 0.5       | 56       | 37.3          | 27.6     | 9.63  | -18.7     | PASS   |
| 0.56      | 56       | 36.4          | 26.8     | 9.634 | -19.6     | PASS   |



## **2.3 Average Output Power**

### **2.3.1 Specification Reference**

FCC Sections: 15.247(b)(3)  
ISED Canada: RSS-247 5.4(d)

### **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**

02/28/2023

### **2.3.4 Test Method**

The Average conducted output power was measured in accordance with ANSI C63.10 Subclause 11.9.2.3.1 Method AVGPM (Average Power Meter). The RF output port of the EUT was directly connected to the input of an Average power meter. The resulting average value was recorded.

### **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 as per sections 1.4.2 / 1.4.3.

**Test Results:** Pass

See data below for detailed results.



Table 2.3.6-1: RF Output Power

| Frequency [MHz] | Average Output Power (dBm) | E.I.R.P (dBm) | Data Rate (kbps) | Modulation Format |
|-----------------|----------------------------|---------------|------------------|-------------------|
| 903.2           | 17.18                      | 20.18         | 2400             | OFDM              |
| 914             | 18.72                      | 21.72         | 2400             | OFDM              |
| 926             | 17.98                      | 20.98         | 2400             | OFDM              |



## **2.4 6dB / 99% Bandwidth**

### **2.4.1 Specification Reference**

FCC Sections: 15.247(a)(2)  
ISED Canada: RSS-247 5.2(a), RSS-GEN 6.7

### **2.4.2 Equipment Under Test and Modification State**

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

### **2.4.3 Date of Test**

02/06/2023

### **2.4.4 Test Method**

The 6dB bandwidth was measured in accordance with the ANSI C63.10 Section 11.8. The Resolution Bandwidth (RBW) of the spectrum analyzer was set to 100 kHz. The Video Bandwidth (VBW) was set to  $\geq 3$  times the RBW. The trace was set to max hold with a peak detector active. The marker-delta function of the spectrum analyzer was utilized to determine the 6 dB bandwidth of the emission.

The occupied bandwidth measurement function of the spectrum analyzer was used to measure the 99% bandwidth. The span of the analyzer was set to capture all products of the modulation process, including the emission sidebands. The resolution bandwidth was set to 1% to 5% of the occupied bandwidth. The video bandwidth was set to 3 times the resolution bandwidth. A peak detector was used.

### **2.4.5 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 |

### **2.4.6 Test Results**

**Test Summary:** EUT was set to transmit mode.

**Test Results:** Pass

See data below for detailed results.



Table 2.4.6-1: 6dB / 99% Bandwidth

| Frequency [MHz] | 6dB Bandwidth (MHz) | 99% Bandwidth (MHz) | Data Rate (kbps) | Modulation Format |
|-----------------|---------------------|---------------------|------------------|-------------------|
| 903.2           | 1.130               | 1.127               | 2400             | OFDM              |
| 914             | 1.127               | 1.122               | 2400             | OFDM              |
| 926             | 1.113               | 1.121               | 2400             | OFDM              |

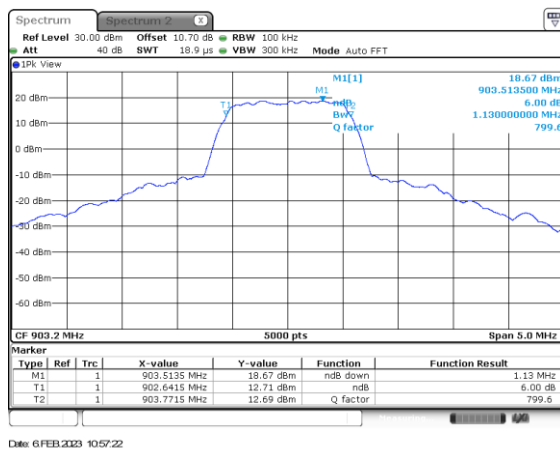


Figure 2.4.6-1: Mode 1 – 6 dB BW – LCH

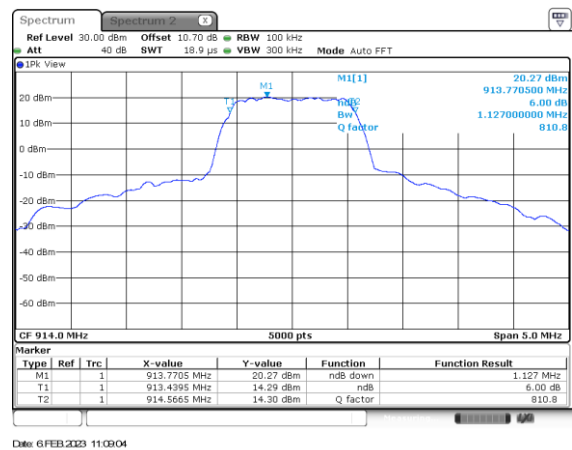


Figure 2.4.6-2: Mode 1– 6 dB BW – MCH

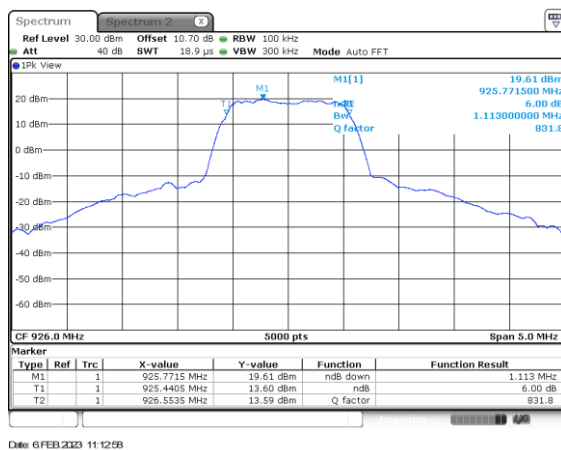


Figure 2.4.6-3: Mode 1 – 6 dB BW – HCH

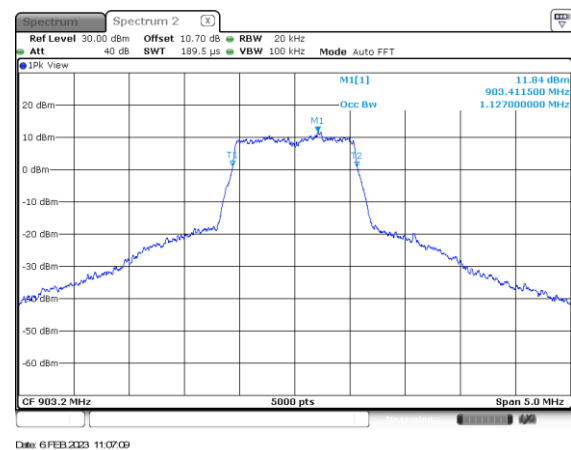


Figure 2.4.6-4: Mode 1 – 99% OBW – LCH

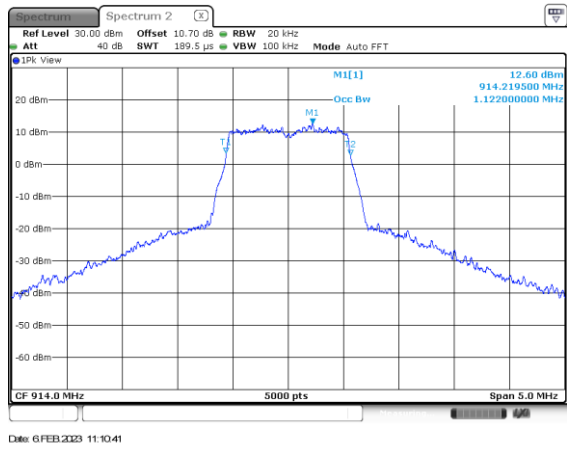


Figure 2.4.6-5: Mode 1 – 99% OBW – MCH

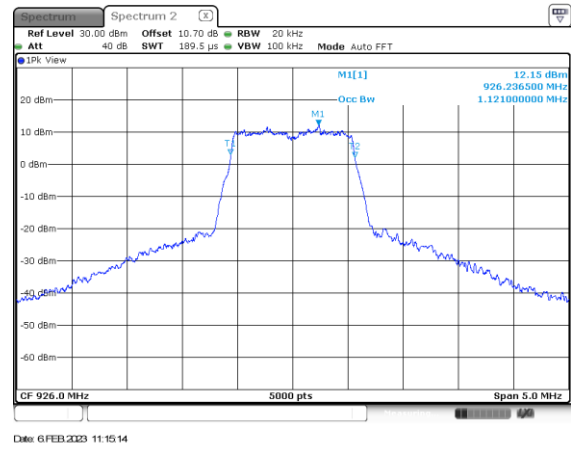


Figure 2.4.6-6: Mode 1 – 99% OBW – HCH



## **2.5 Maximum Power Spectral Density in the Fundamental Emission**

### **2.5.1 Specification Reference**

FCC Sections: 15.247(e)  
ISED Canada: RSS-247 5.2(b)

### **2.5.2 Equipment Under Test and Modification State**

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

### **2.5.3 Date of Test**

02/28/2023

### **2.5.4 Test Method**

The power spectral density was measured in accordance with the ANSI 63.10 Subclause 11.10.3 Method AVGPS-1. The RF output of the equipment under test was directly connected to the input of the spectrum analyzer applying suitable attenuation. The Resolution Bandwidth (RBW) of the spectrum analyzer was set to 3 kHz. The Video Bandwidth (VBW) was set to 10 kHz. Span was set to 1.5 times the OBW. The RMS average detector is used, with the trace averaging mode set to 100 traces. The marker is placed on the highest peak of the resulting trace.

### **2.5.5 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 |

### **2.5.6 Test Results**

**Test Summary:** EUT was set to transmit mode as per sections 1.4.2 / 1.4.3.

**Test Results:** Pass

See data below for detailed results.

Table 2.5.6-1: RF Power Spectral Density

| Frequency [MHz] | Average PSD (dBm) | Data rate (Kbps) | Modulation Format |
|-----------------|-------------------|------------------|-------------------|
| 903.2           | -4.52             | 2400             | OFDM              |
| 914             | -2.73             | 2400             | OFDM              |
| 926             | -3.72             | 2400             | OFDM              |

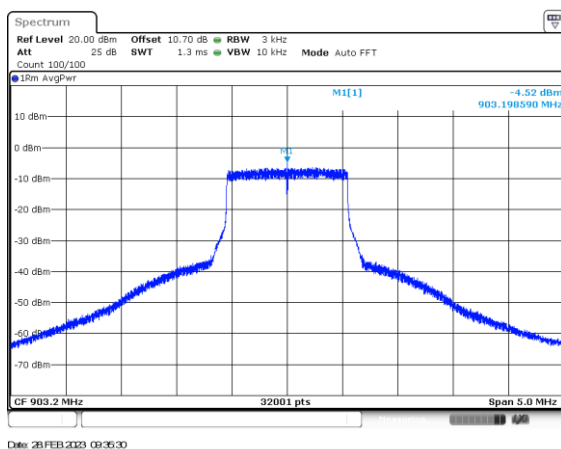


Figure 2.5.6-1: Mode 1 – PSD – LCH

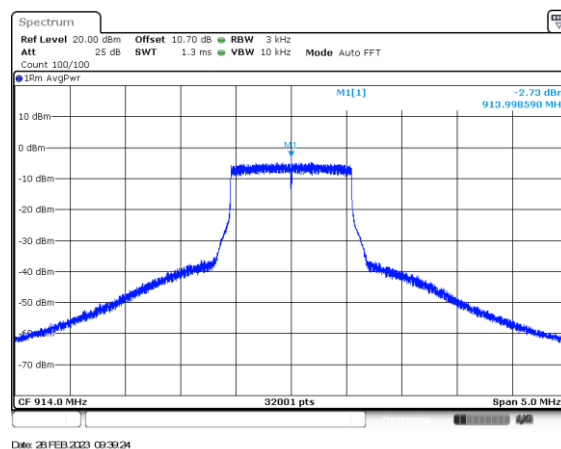


Figure 2.5.6-2: Mode 1 – PSD – MCH

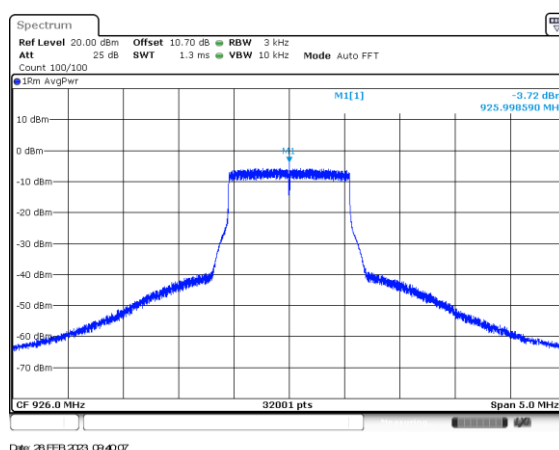


Figure 2.5.6-3: Mode 1 – PSD – HCH



## **2.6 Band-Edge Compliance of RF Conducted Emissions**

### **2.6.1 Specification Reference**

FCC Sections: 15.247(d)  
ISED Canada: RSS-247 5.5

### **2.6.2 Equipment Under Test and Modification State**

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

### **2.6.3 Date of Test**

02/06/2023

### **2.6.4 Test Method**

The RF output port of the EUT was directly connected to the input of the spectrum analyzer with suitable attenuation. The EUT was investigated at the lowest and highest channel available to determine band-edge compliance. For each measurement, the spectrum analyzer’s RBW was set to 100kHz and the VBW was set to 300kHz.

If maximum conducted (average) output power was used to determine compliance, then the peak power in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 30 dB relative to the maximum in-band peak PSD level in 100 kHz (i.e., 30 dBc).

### **2.6.5 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.

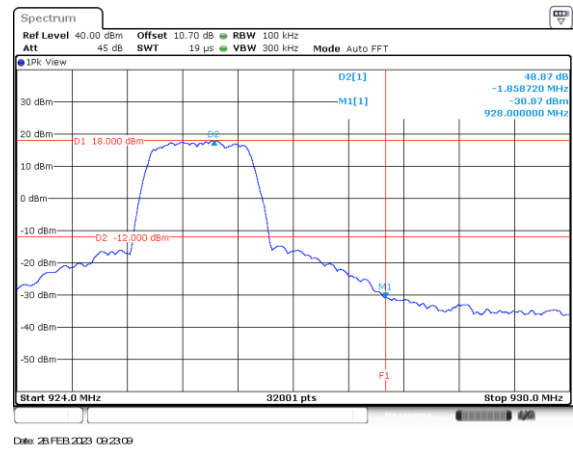
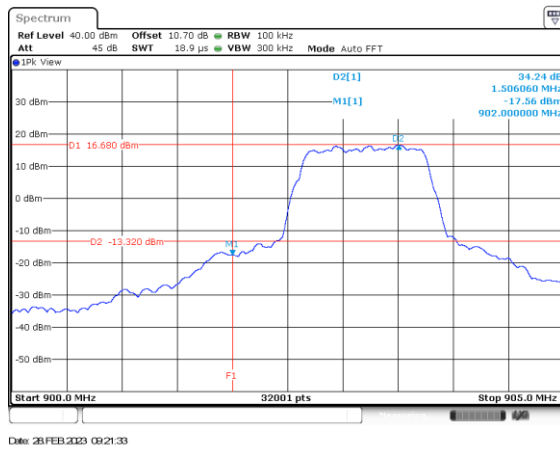
|                      |            |
|----------------------|------------|
| Ambient Temperature  | 22.3 °C    |
| Relative Humidity    | 53.8 %     |
| Atmospheric Pressure | 972.2 mbar |

### **2.6.6 Test Results**

**Test Summary:** EUT was set to transmit mode as per sections 1.4.2 / 1.4.3.

**Test Results:** Pass

See data below for detailed results.





## **2.7 RF Conducted Spurious Emissions**

### **2.7.1 Specification Reference**

FCC Sections: 15.247(d)  
ISED Canada: RSS-247 5.5

### **2.7.2 Equipment Under Test and Modification State**

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

### **2.7.3 Date of Test**

02/06/2023

### **2.7.4 Test Method**

The RF output port of the EUT was directly connected to the input of the spectrum analyzer. The EUT was investigated for conducted spurious emissions from 30MHz to 10 GHz, 10 times the highest fundamental frequency. Measurements were made at the low, center, and high channels of the EUT. For each measurement, the spectrum analyzer's RBW was set to 100kHz. A peak detector function was used with the trace set to max hold.

If maximum conducted (average) output power was used to determine compliance, then the peak power in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 30 dB relative to the maximum in-band peak PSD level in 100 kHz (i.e., 30 dBc).

### **2.7.5 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 |

### **2.7.6 Test Results**

**Test Summary:** EUT was set to transmit mode as per sections 1.4.2 / 1.4.3.

**Test Results:** Pass

See data below for detailed results.

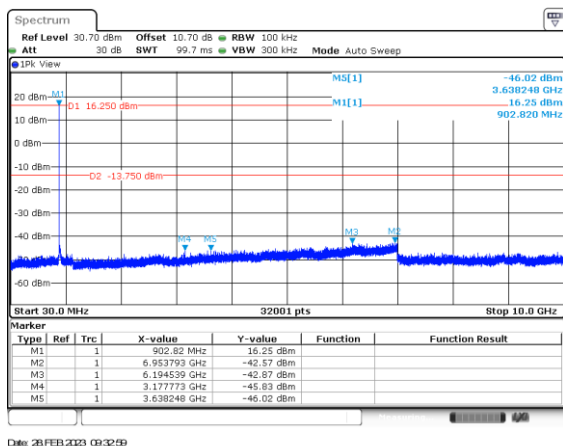


Figure 2.7.6-1:30MHz – 10GHz – LCH – Mode 1

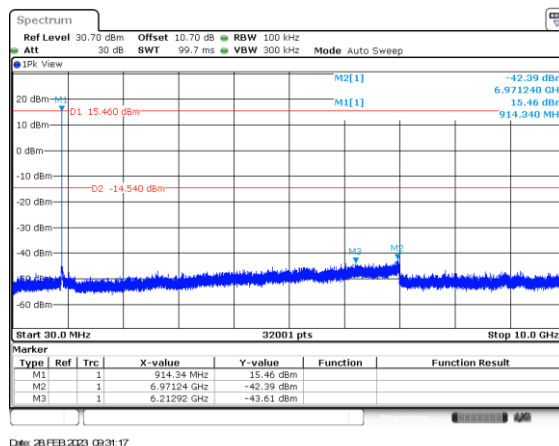


Figure 2.7.6-2:30MHz – 10GHz – MCH – Mode 1

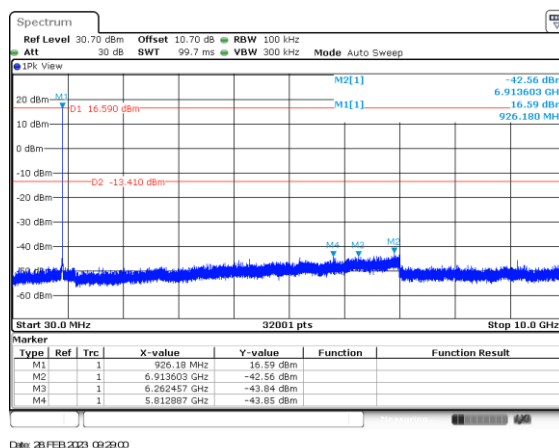


Figure 2.7.6-3:30MHz – 10GHz – HCH – Mode 1



## **2.8 Radiated Spurious Emissions into Restricted Frequency Bands**

### **2.8.1 Specification Reference**

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

### **2.8.2 Equipment Under Test and Modification State**

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

### **2.8.3 Date of Test**

02/07/2023 to 02/09/2023

### **2.8.4 Test Method**

Radiated emissions tests were made over the frequency range of 9 kHz to 10 GHz, 10 times the highest fundamental frequency of 900 MHz. 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.

### **2.8.5 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 |



## 2.8.6 Test Results

**Test Summary:** EUT was set to transmit mode as per sections 1.4.2 / 1.4.3.

**Test Results:** Pass

See data below for detailed results.

**Table 2.8.6-1: Radiated Spurious Emissions Tabulated Data**

| Frequency              | Peak Value | QP/Avg Value | Peak Limit | QP/Avg Limit | Peak Margin | QP/Avg Margin | Polarity | Peak Limit Results | QP/Avg Limit Results |
|------------------------|------------|--------------|------------|--------------|-------------|---------------|----------|--------------------|----------------------|
| MHz                    | dBμV/m     | dBμV/m       | dBμV/m     | dBμV/m       | dB          | dB            | H/V      | Pass/Fail          | Pass/Fail            |
| <b>LCH – 903.2 MHz</b> |            |              |            |              |             |               |          |                    |                      |
| 118.243                | -----      | 36.021       | -----      | 43.5         | -----       | -7.48         | H        | -----              | PASS                 |
| 133.109                | -----      | 32.25        | -----      | 43.5         | -----       | -11.25        | H        | -----              | PASS                 |
| 162.644                | -----      | 34.294       | -----      | 43.5         | -----       | -9.21         | H        | -----              | PASS                 |
| 118.267                | -----      | 39.541       | -----      | 43.5         | -----       | -3.96         | V        | -----              | PASS                 |
| 133.109                | -----      | 39.193       | -----      | 43.5         | -----       | -4.31         | V        | -----              | PASS                 |
| 162.621                | -----      | 41.357       | -----      | 43.5         | -----       | -2.14         | V        | -----              | PASS                 |
| 2709.8                 | 46.164     | 31.134       | 74         | 54           | -27.84      | -22.87        | H        | PASS               | PASS                 |
| 3612.575               | 47.014     | 32.8         | 74         | 54           | -26.99      | -21.2         | H        | PASS               | PASS                 |
| 2709.825               | 45.482     | 31.469       | 74         | 54           | -28.52      | -22.53        | V        | PASS               | PASS                 |
| 3612.875               | 48.072     | 33.061       | 74         | 54           | -25.93      | -20.94        | V        | PASS               | PASS                 |
| <b>MCH – 914 MHz</b>   |            |              |            |              |             |               |          |                    |                      |
| 118.418                | -----      | 35.674       | -----      | 43.5         | -----       | -7.83         | H        | -----              | PASS                 |
| 133.114                | -----      | 30.915       | -----      | 43.5         | -----       | -12.59        | H        | -----              | PASS                 |
| 162.699                | -----      | 34.258       | -----      | 43.5         | -----       | -9.24         | H        | -----              | PASS                 |
| 118.37                 | -----      | 38.722       | -----      | 43.5         | -----       | -4.78         | V        | -----              | PASS                 |
| 133.114                | -----      | 39.168       | -----      | 43.5         | -----       | -4.33         | V        | -----              | PASS                 |
| 162.746                | -----      | 41.574       | -----      | 43.5         | -----       | -1.93         | V        | -----              | PASS                 |
| 162.524                | -----      | 28.664       | -----      | 43.5         | -----       | -14.84        | V        | -----              | PASS                 |
| 2741.75                | 45.555     | 31.133       | 74         | 54           | -28.45      | -22.87        | H        | PASS               | PASS                 |
| 3655.975               | 48.421     | 33.357       | 74         | 54           | -25.58      | -20.64        | H        | PASS               | PASS                 |
| 2742.175               | 46.696     | 31.348       | 74         | 54           | -27.3       | -22.65        | V        | PASS               | PASS                 |
| 3655.8                 | 48.28      | 32.904       | 74         | 54           | -25.72      | -21.1         | V        | PASS               | PASS                 |
| <b>HCH – 926 MHz</b>   |            |              |            |              |             |               |          |                    |                      |
| 118.389                | -----      | 33.963       | -----      | 43.5         | -----       | -9.54         | H        | -----              | PASS                 |
| 133.234                | -----      | 30.794       | -----      | 43.5         | -----       | -12.71        | H        | -----              | PASS                 |
| 162.815                | -----      | 36.011       | -----      | 43.5         | -----       | -7.49         | H        | -----              | PASS                 |
| 118.442                | -----      | 38.467       | -----      | 43.5         | -----       | -5.03         | V        | -----              | PASS                 |
| 133.161                | -----      | 40.184       | -----      | 43.5         | -----       | -3.32         | V        | -----              | PASS                 |



|          |        |        |       |      |        |        |   |       |      |
|----------|--------|--------|-------|------|--------|--------|---|-------|------|
| 162.72   | -----  | 41.327 | ----- | 43.5 | -----  | -2.17  | V | ----- | PASS |
| 2778.2   | 45.99  | 30.975 | 74    | 54   | -28.01 | -23.03 | H | PASS  | PASS |
| 3704.025 | 47.066 | 32.885 | 74    | 54   | -26.93 | -21.12 | H | PASS  | PASS |
| 2777.875 | 46.232 | 31.136 | 74    | 54   | -27.77 | -22.86 | V | PASS  | PASS |
| 3703.975 | 47.55  | 32.861 | 74    | 54   | -26.45 | -21.14 | V | PASS  | PASS |



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Radiated Emissions, Under 1GHz

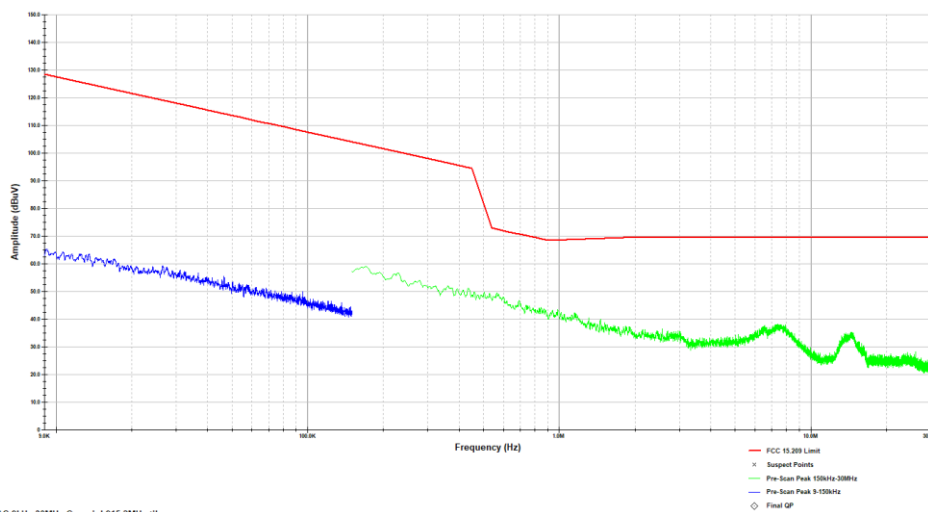
HV Graph

Company - 72186194 Iron

Model - Dual Mesh PMR NIC

Config - 915.2MHz-GFSK-300kbps

Operator - Divya



**Figure 1: Reference Plot for Radiated Spurious Emissions – 9 kHz – 30 MHz – Co-Axial**

Note: Emissions above the noise floor are ambient not associated with the EUT.

TUV EMC Lab

Radiated Emissions, Under 1GHz

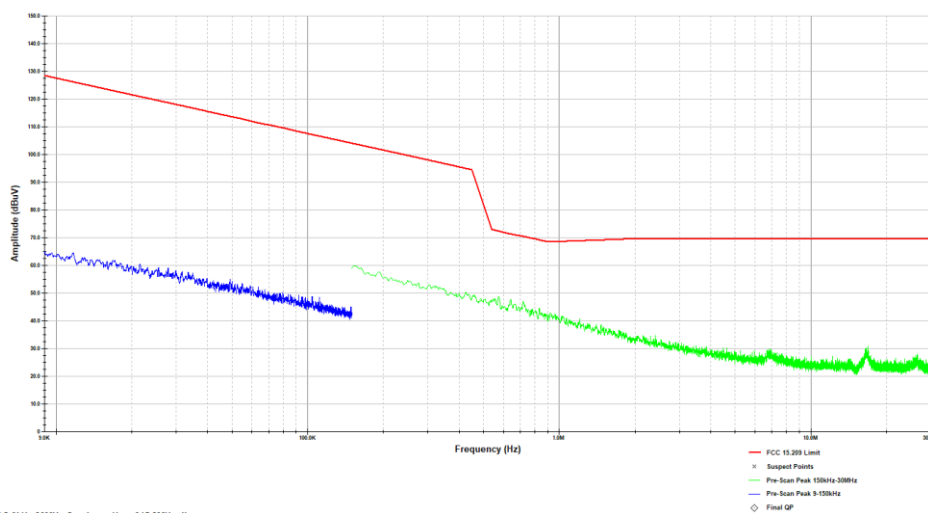
HV Graph

Company - 72186194 Iron

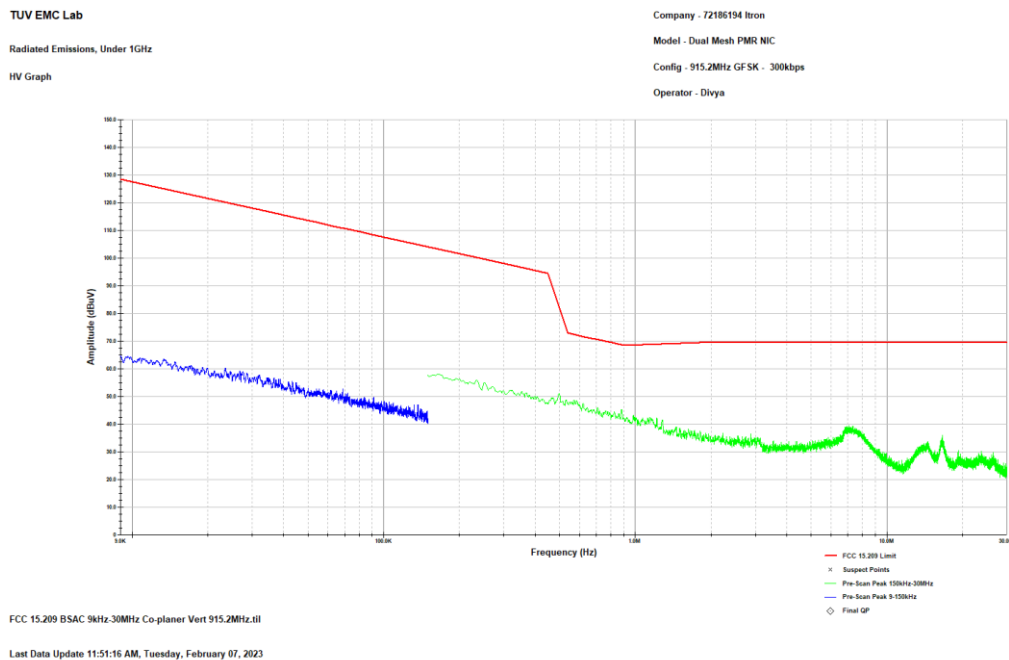
Model - Dual Mesh PMR NIC

Config - 915.2MHz-GFSK-300kbps

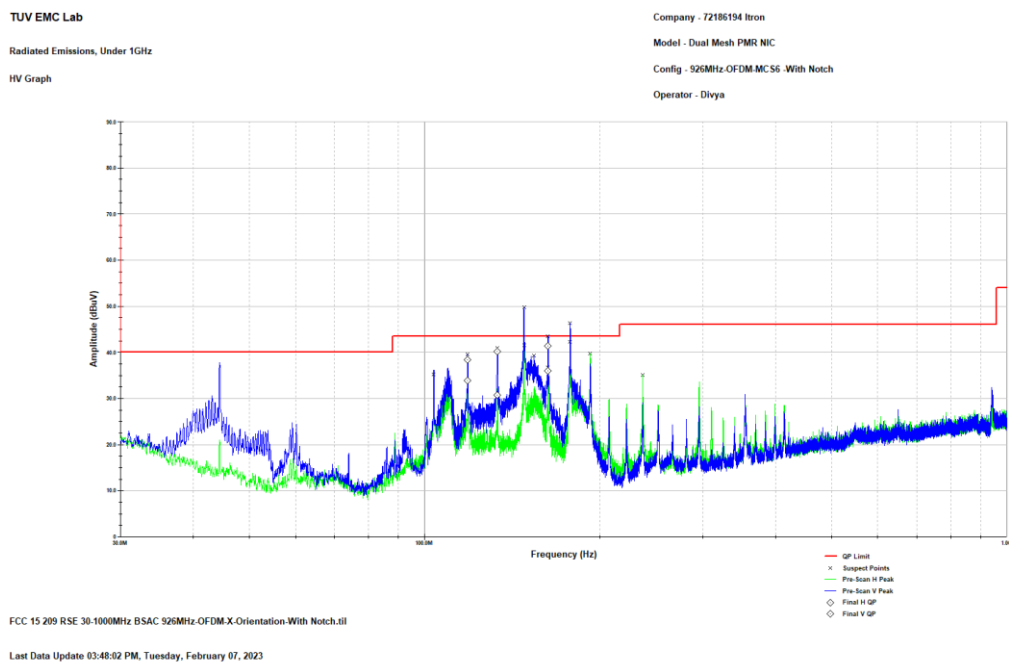
Operator - Divya



**Figure 2: Reference Plot for Radiated Spurious Emissions – 9 kHz – 30 MHz – Co-Planar Horizontal**



**Figure 3: Reference plot for Radiated Spurious Emissions – 9 kHz – 30 MHz – Co-Planar Vertical**  
 Note: Emissions above the noise floor are ambient not associated with the EUT.



**Figure 4: Reference plot for Radiated Spurious Emissions – 30 MHz – 1 GHz**  
 Note: Emissions within restricted bands only were evaluated.



TUV EMC Lab

Company - Ikon 72186194

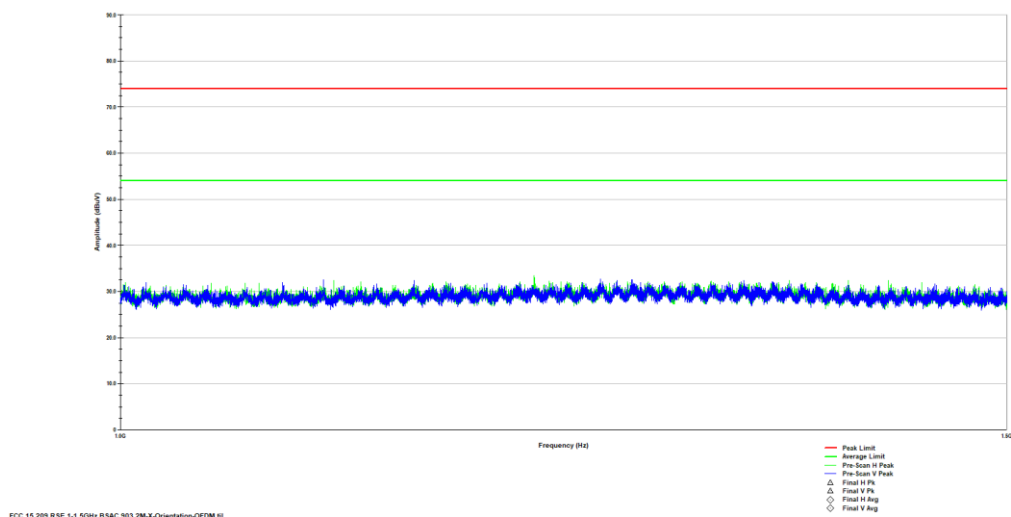
Radiated Emissions, Above 1GHz

Model - Dual Mesh PMR NIC

HV Graph

Config - 903.2M-CFDM-MC56-2.4Mbps

Operator - Olvya



**Figure 5: Reference plot for Radiated Spurious Emissions – 1 GHz – 1.5 GHz**

TUV EMC Lab

Company - Ikon 72186194

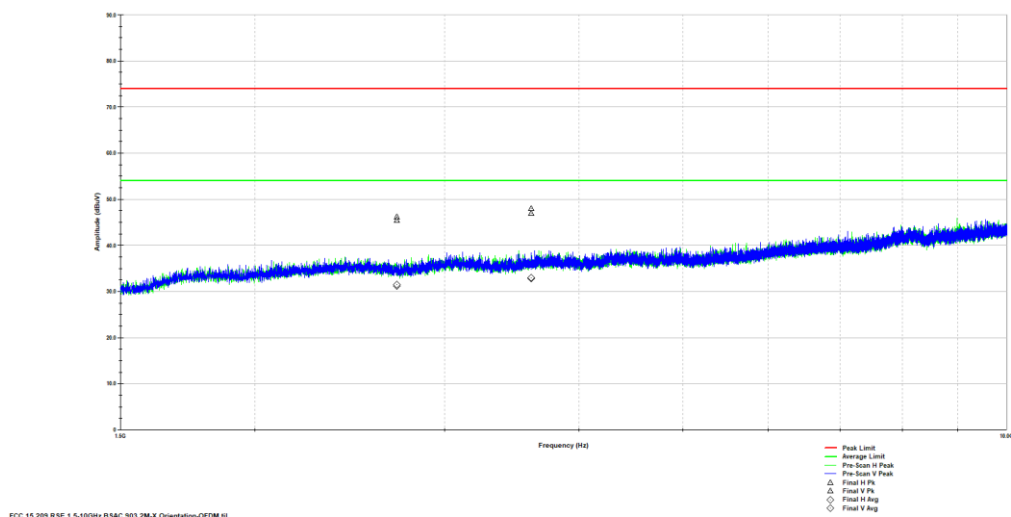
Radiated Emissions, Above 1GHz

Model - Dual Mesh PMR NIC

HV Graph

Config - 903.2MHz-CFDM-MC56-2.4Mbps

Operator - Olvya



**Figure 6: Reference plot for Radiated Spurious Emissions – 1.5 GHz – 10 GHz**



## 2.9 Test Equipment Used

**Table 2.9-1 –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     | 06/08/2021            | 06/08/2023           |
| 853      | Teseq                    | CBL6112D      | BiLog Antenna                     | 51616         | 7/15/2021             | 7/15/2023            |
| 884      | ETS Lindgren (EMCO)      | 3117          | DOUBLE-RIDGED GUIDE ANTENNA       | 240106        | 5/6/2021              | 5/6/2023             |
| 889      | Com Power                | PAM 103       | Pre-amplifier                     | 18020215      | 9/27/2022             | 9/27/2023            |
| 338      | Hewlett Packard          | 8449B         | High Frequency Pre-Amp            | 3008A01111    | 6/22/2021             | 6/22/2023            |
| 882      | Rohde & Schwarz          | ESW44         | ESW44 EMI TEST RECEIVER           | 101961        | 7/14/2022             | 7/14/2023            |
| 22       | Teledyne Storm Microwave | 90-195-456    | BSAC Cable                        | N/A           | 10/7/2022             | 10/7/2023            |
| 20       | Teledyne Storm Microwave | R-90-195-036  | BSAC Cable                        | N/A           | 7/12/2022             | 7/12/2023            |
| 21       | Teledyne Storm Microwave | R-90-195-072  | BSAC Cable                        | N/A           | 7/12/2022             | 7/12/2023            |
| 337      | Microwave Circuits       | H1G513G1      | Microwave filter                  | 282706        | 5/31/2022             | 5/31/2023            |
| 827      | Rohde & Schwarz          | RF Cable set  | TS8997 Rack cable set             | N/A           | 12/21/2022            | 12/21/2023           |
| 622      | Rohde & Schwarz          | FSV40 (v3.40) | FSV Signal Analyzer 10Hz to 40GHz | 101338        | 10/05/2022            | 10/05/2023           |
| 267      | Hewlett Packard          | N1911A        | Power Meter                       | MY45100129    | 7/27/2021             | 7/27/2023            |
| 872      | HP                       | E7402A        | EMI Receiver                      | US40240258    | 6/21/2022             | 6/21/2023            |
| 871      | ACS                      | n/a           | Conducted EMI Cable               | 871           | 4/1/2022              | 4/1/2023             |
| 3010     | Rohde & Schwarz          | ENV216        | Two-Line V-Network                | 3010          | 6/22/2022             | 6/22/2023            |

**N/A – Not Applicable**

**NCR – No Calibration Required**

### 3 Diagram of Test Set-ups

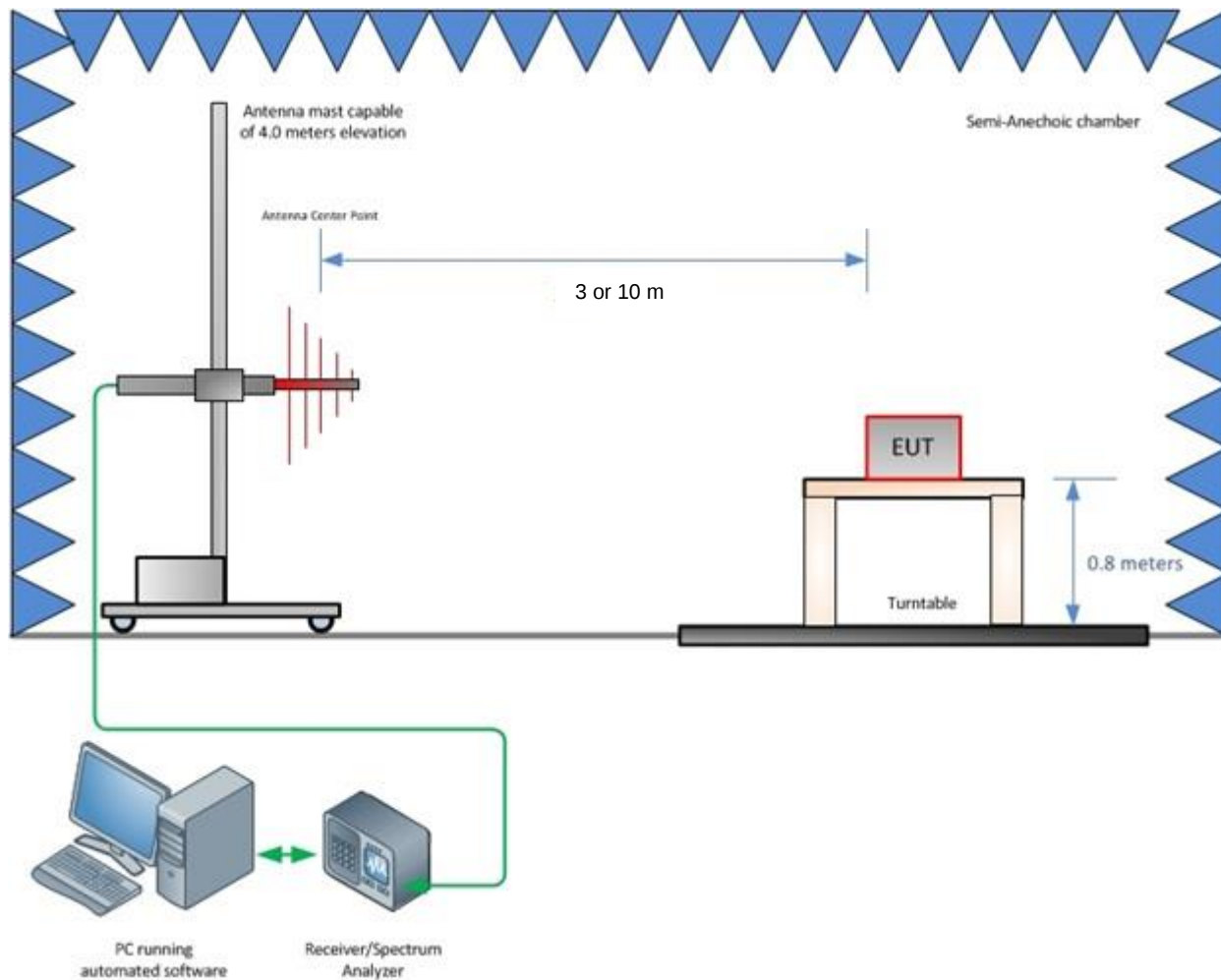


Figure 3-1 – Radiated Emissions Test Setup up to 1 GHz

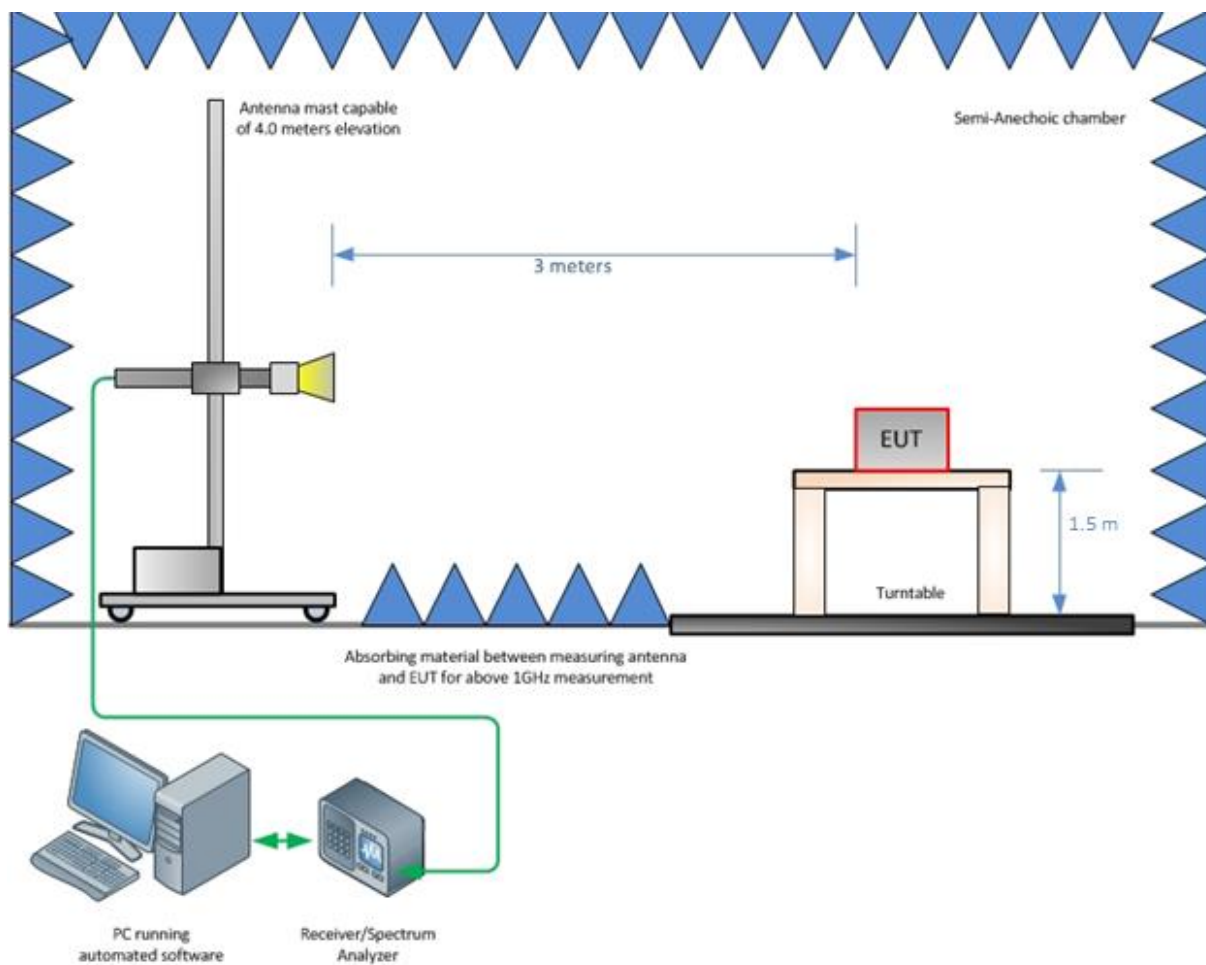


Figure 3-2 – Radiated Emissions Test Setup above 1 GHz

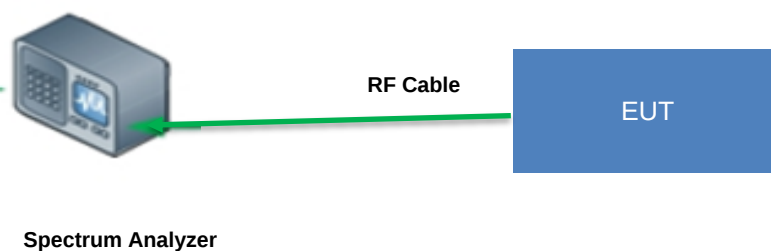


Figure 3-3 – Conducted Test Setup: Antenna Port measurement



## 4 Accreditation, Disclaimers and Copyright

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### STATEMENT OF MEASUREMENT UNCERTAINTY

The expanded laboratory measurement uncertainty figures ( $U_{\text{Lab}}$ ) 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                               | $U_{\text{lab}}$                     |
|-----------------------------------------|--------------------------------------|
| 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.