

# FCC and ISED Test Report

Manufacturer: LEGO System A/S  
Model: SENSOR COLOUR NO. 3

In accordance with FCC 47 CFR Part 15C, ISED  
RSS-210 and ISED RSS-GEN  
(NFC)



Prepared for: LEGO System A/S  
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FCC ID: NPI104911

IC: 3072A-104911

## COMMERCIAL-IN-CONFIDENCE

Document 75962745-06 Issue 01

### SIGNATURE

| NAME           | JOB TITLE       | RESPONSIBLE FOR      | ISSUE DATE    |
|----------------|-----------------|----------------------|---------------|
| Steve Marshall | Senior Engineer | Authorised Signatory | 01 April 2025 |

Signatures in this approval box have checked this document in line with the requirements of TUV SUD document control rules.

### ENGINEERING STATEMENT

The measurements shown in this report were made in accordance with the procedures described on test pages. All reported testing was carried out on a sample equipment to demonstrate limited compliance with FCC 47 CFR Part 15C, ISED RSS-210 and ISED RSS-GEN. The sample tested was found to comply with the requirements defined in the applied rules.

| RESPONSIBLE FOR | NAME                | DATE          | SIGNATURE |
|-----------------|---------------------|---------------|-----------|
| Testing         | Pier-Angelo Lorusso | 01 April 2025 |           |

FCC Accreditation

492497/UK2010 Octagon House, Fareham Test Laboratory

ISED Accreditation

12669A/UK0003 Octagon House, Fareham Test Laboratory

### EXECUTIVE SUMMARY

A sample of this product was tested and found to be compliant with FCC 47 CFR Part 15C, 2023, ISED RSS-210, Issue 11 (06-2024) and ISED RSS-GEN, Issue 05 (2018-04) + A2 (2021-02) for the tests detailed in section 1.3.



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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.

| Issue | Description of Change | Date of Issue |
|-------|-----------------------|---------------|
| 1     | First Issue           | 01 April 2025 |

Table 1

## 1.2 Introduction

|                               |                                                                                                                   |
|-------------------------------|-------------------------------------------------------------------------------------------------------------------|
| Applicant                     | LEGO System A/S                                                                                                   |
| Manufacturer                  | LEGO System A/S                                                                                                   |
| Model Number(s)               | SENSOR COLOUR NO. 3                                                                                               |
| Serial Number(s)              | CS_EP2-0086 and CS_EP2-0045                                                                                       |
| Hardware Version(s)           | EP2                                                                                                               |
| Software Version(s)           | 0.3.1                                                                                                             |
| Number of Samples Tested      | 2                                                                                                                 |
| Test Specification/Issue/Date | FCC 47 CFR Part 15C, 2023,<br>ISED RSS-210, Issue 11 (06-2024)<br>ISED RSS-GEN: Issue 05 (2018-04) + A2 (2021-02) |
| Order Number                  | 7000395236                                                                                                        |
| Date                          | 15-October-2024                                                                                                   |
| Date of Receipt of EUT        | 20-January-2025                                                                                                   |
| Start of Test                 | 04-February-2025                                                                                                  |
| Finish of Test                | 27-February-2025                                                                                                  |
| Name of Engineer(s)           | Pier-Angelo Lorusso                                                                                               |
| Related Document(s)           | ANSI C63.10 (2020)                                                                                                |



### 1.3 Brief Summary of Results

A brief summary of the tests carried out in accordance with FCC 47 CFR Part 15C, ISED RSS-210 and ISED RSS-GEN is shown below.

| Section                                          | Specification Clause |         |         | Test Description                                 | Result | Comments/Base Standard                             |
|--------------------------------------------------|----------------------|---------|---------|--------------------------------------------------|--------|----------------------------------------------------|
|                                                  | Part 15C             | RSS-210 | RSS-GEN |                                                  |        |                                                    |
| Configuration and Mode: 13.56 MHz NFC - Transmit |                      |         |         |                                                  |        |                                                    |
| -                                                | 15.203               | -       | -       | Antenna Requirements                             | Pass   | The equipment under test uses an integral Antenna. |
| 2.1                                              | 15.215 (c)           | N/A     | 6.7     | 20 dB Bandwidth & 99% Occupied Bandwidth         | Pass   | ANSI C63.10 (2020)                                 |
| 2.2                                              | 15.225 (a)(b)(c)(d)  | B.6     | 6.13    | Field Strength of any Emission                   | Pass   | ANSI C63.10 (2020)                                 |
| 2.3                                              | 15.225 (e)           | B.6     | 6.11    | Frequency Tolerance Under Temperature Variations | Pass   | ANSI C63.10 (2020)                                 |

**Table 2**



## 1.4 Application Form

### Equipment Description

|                                                                                                                                                     |                                 |                                              |                                        |
|-----------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|----------------------------------------------|----------------------------------------|
| Technical Description:<br>(Please provide a brief description of the intended use of the equipment including the technologies the product supports) |                                 |                                              |                                        |
| Manufacturer:                                                                                                                                       |                                 | LEGO System A/S                              |                                        |
| Model:                                                                                                                                              |                                 | SENSOR COLOUR NO. 3                          |                                        |
| Part Number:                                                                                                                                        |                                 | SENSOR COLOUR NO. 3                          |                                        |
| Hardware Version:                                                                                                                                   |                                 | EP2                                          |                                        |
| Software Version:                                                                                                                                   |                                 | 0.3.1                                        |                                        |
| FCC ID of the product under test – <a href="#">see guidance here</a>                                                                                |                                 | NPI104911                                    |                                        |
| IC ID of the product under test – <a href="#">see guidance here</a>                                                                                 |                                 | 3072A-104911                                 |                                        |
| Device Category                                                                                                                                     | Mobile <input type="checkbox"/> | Portable <input checked="" type="checkbox"/> | Fixed <input type="checkbox"/>         |
| Equipment is fitted with an Audio Low Pass Filter                                                                                                   |                                 | Yes <input type="checkbox"/>                 | No <input checked="" type="checkbox"/> |

**Table 3**

### Intentional Radiators

| Technology                                                                                        | BLE       | RFID  |  |  |  |  |
|---------------------------------------------------------------------------------------------------|-----------|-------|--|--|--|--|
| Frequency Range (MHz to MHz)                                                                      | 2402-2480 | 13.56 |  |  |  |  |
| Conducted Declared Output Power (dBm)                                                             | 0         |       |  |  |  |  |
| Antenna Gain (dBi)                                                                                | -6.88     |       |  |  |  |  |
| Supported Bandwidth(s) (MHz) (e.g. 1 MHz, 20 MHz, 40 MHz)                                         | 1, 2MHz   | 1KHz  |  |  |  |  |
| Modulation Scheme(s) (e.g. GFSK, QPSK etc)                                                        | GFSK      | ASK   |  |  |  |  |
| ITU Emission Designator ( <a href="#">see guidance here</a> ) (not mandatory for Part 15 devices) | F1D       |       |  |  |  |  |
| Bottom Frequency (MHz)                                                                            | 2402      | 13.56 |  |  |  |  |
| Middle Frequency (MHz)                                                                            | 2442      | 13.56 |  |  |  |  |
| Top Frequency (MHz)                                                                               | 2480      | 13.56 |  |  |  |  |

**Table 4**



### Un-intentional Radiators

|                                                                                                         |        |
|---------------------------------------------------------------------------------------------------------|--------|
| Highest frequency generated or used in the device or on which the device operates or tunes              | 48 MHz |
| Lowest frequency generated or used in the device or on which the device operates or tunes               | 26 kHz |
| Class A Digital Device (Use in commercial, industrial or business environment) <input type="checkbox"/> |        |
| Class B Digital Device (Use in residential environment only) <input checked="" type="checkbox"/>        |        |

**Table 5**

### AC Power Source

|                                                                            |  |    |
|----------------------------------------------------------------------------|--|----|
| AC supply frequency:                                                       |  | Hz |
| Voltage                                                                    |  | V  |
| Max current:                                                               |  | A  |
| Single Phase <input type="checkbox"/> Three Phase <input type="checkbox"/> |  |    |

**Table 6**

### DC Power Source

|                        |  |   |
|------------------------|--|---|
| Nominal voltage:       |  | V |
| Extreme upper voltage: |  | V |
| Extreme lower voltage: |  | V |
| Max current:           |  | A |

**Table 7**

### Battery Power Source

|                                                                                                                                                                                                                   |                |                                               |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|-----------------------------------------------|
| Voltage:                                                                                                                                                                                                          | 3.85           | V                                             |
| Test Voltage                                                                                                                                                                                                      | 3.01           | V                                             |
| End-point Voltage:                                                                                                                                                                                                | 3.0            | V (Point at which the battery will terminate) |
| Alkaline <input type="checkbox"/> Leclanche <input type="checkbox"/> Lithium <input checked="" type="checkbox"/> Nickel Cadmium <input type="checkbox"/> Lead Acid* <input type="checkbox"/> *(Vehicle regulated) |                |                                               |
| Other <input type="checkbox"/>                                                                                                                                                                                    | Please detail: |                                               |

**Table 8**

### Charging

|                                           |                                                                     |
|-------------------------------------------|---------------------------------------------------------------------|
| Can the EUT transmit whilst being charged | Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> |
|-------------------------------------------|---------------------------------------------------------------------|

**Table 9**

### Temperature

|                      |    |    |
|----------------------|----|----|
| Minimum temperature: | 0  | °C |
| Maximum temperature: | 35 | °C |

**Table 10**



### Cable Loss

|                                          |                                                  |      |
|------------------------------------------|--------------------------------------------------|------|
| Adapter Cable Loss<br>(Conducted sample) | Cabel + Connector @ 2480MHz<br>0.5dB+0.5dB = 1dB | 1 dB |
|------------------------------------------|--------------------------------------------------|------|

**Table 11**

### Antenna Characteristics

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |       |             |                 |       |     |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------|-------------|-----------------|-------|-----|
| Antenna connector <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |       |             | State impedance |       | Ohm |
| Temporary antenna connector <input checked="" type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |       |             | State impedance | 50    | Ohm |
| Integral antenna <input checked="" type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Type: | PCB Antenna | Gain            | -6.88 | dBi |
| External antenna <input type="checkbox"/>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Type: |             | Gain            |       | dBi |
| <p>For external antenna only:</p> <p>Standard Antenna Jack <input type="checkbox"/> If yes, describe how user is prohibited from changing antenna (if not professional installed):</p> <p>Equipment is only ever professionally installed <input type="checkbox"/></p> <p>Non-standard Antenna Jack <input type="checkbox"/></p> <p>All part 15 applications will need to show how the antenna gain was derived either from a manufacturer data sheet or a measurement. Where the gain of the antenna is inherently accounted for as a result of the measurement, such as field strength measurements on a part 15.249 or 15.231 device, so the gain does not necessarily need to be verified. However, enough information regarding the construction of the antenna shall be provided. Such information maybe photographs, length of wire antenna etc.</p> |       |             |                 |       |     |

**Table 12**

### Ancillaries (if applicable)

|               |  |                    |  |
|---------------|--|--------------------|--|
| Manufacturer: |  | Part Number:       |  |
| Model:        |  | Country of Origin: |  |

**Table 13**

The above information was provided by the applicant.



## 1.5 Product Information

### 1.5.1 Technical Description

The Equipment under test (EUT) was a LEGO System A/S, SENSOR COLOUR NO. 3, Model: SENSOR COLOUR NO. 3 incorporating Bluetooth Low Energy and NFC transmitters.

The primary function of the EUT is a Toy for use in a classroom.

## 1.6 Deviations from the Standard

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

### 1.7 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 |
|--------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|--------------------------|
| Model: SENSOR COLOUR NO. 3, Serial Number: CS_EP2-0086 |                                                                                                                                                        |                        |                          |
| 0                                                      | As supplied by the customer                                                                                                                            | Not Applicable         | Not Applicable           |
| Model: SENSOR COLOUR NO. 3, Serial Number: CS_EP2-0045 |                                                                                                                                                        |                        |                          |
| 0                                                      | As supplied by the customer                                                                                                                            | Not Applicable         | Not Applicable           |
| 1                                                      | Customer modified bottom enclosure to allow DC cable connection to the battery terminals for Extreme Voltages testing. Pier inserted the modification. | Pier-Angelo Lorusso    | 27 February 2025         |

**Table 14**

## 1.8 Test Location

TÜV SÜD conducted the following tests at our Octagon House Test Laboratory.

| Test Name                                        | Name of Engineer(s) | Accreditation |
|--------------------------------------------------|---------------------|---------------|
| Configuration and Mode: 13.56 MHz NFC - Transmit |                     |               |
| 20 dB Bandwidth & 99% Occupied Bandwidth         | Pier-Angelo Lorusso | UKAS          |
| Field Strength of any Emission                   | Pier-Angelo Lorusso | UKAS          |
| Frequency Tolerance Under Temperature Variations | Pier-Angelo Lorusso | UKAS          |

**Table 15**

Office Address:

TÜV SÜD  
Octagon House  
Concorde Way  
Fareham  
Hampshire  
PO15 5RL  
United Kingdom

## 2 Test Details

### 2.1 20 dB Bandwidth & 99% Occupied Bandwidth

#### 2.1.1 Specification Reference

FCC 47 CFR Part 15C, Clause 15.215 (c),  
ISED RSS-210 Clause N/A  
ISED RSS-GEN, Clause 6.7

#### 2.1.2 Equipment Under Test and Modification State

SENSOR COLOUR NO. 3, S/N: CS\_EP2-0086 - Modification State 0

#### 2.1.3 Date of Test

06-February-2025

#### 2.1.4 Test Method

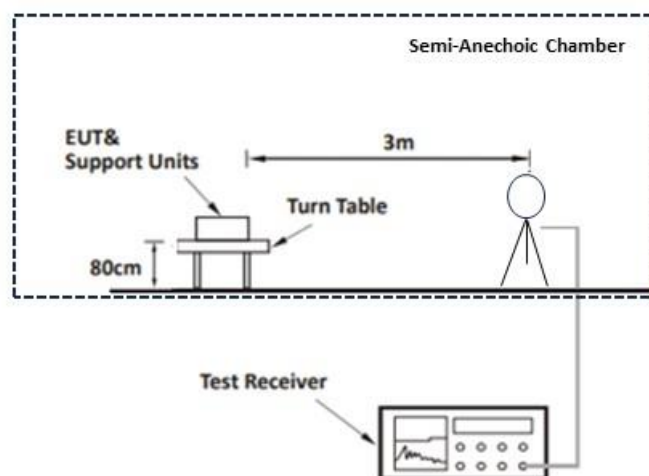
The test was performed in accordance with ANSI C63.10, clause 6.9.2 and 6.9.3.

DUT was powered by internal 3.85 V DC Lithium Battery.

The DUT was configured as per customer setting 13.56 MHz, Continuous Wave. (Setting 31).

#### 2.1.5 Test Setup Diagram

For Radiated emissions 9kHz to 30MHz



#### 2.1.6 Environmental Conditions

|                     |         |
|---------------------|---------|
| Ambient Temperature | 20.2 °C |
| Relative Humidity   | 33.8 %  |



2.1.7 Test Results

13.56 MHz NFC - Transmit

| Frequency (MHz) | 20 dB Bandwidth (Hz) | 99% Occupied Bandwidth (Hz) | F <sub>LOWER</sub> (MHz) | F <sub>UPPER</sub> (MHz) |
|-----------------|----------------------|-----------------------------|--------------------------|--------------------------|
| 13.56           | 76.92                | 63.78661                    | 13.56011                 | 13.56018                 |

Table 16

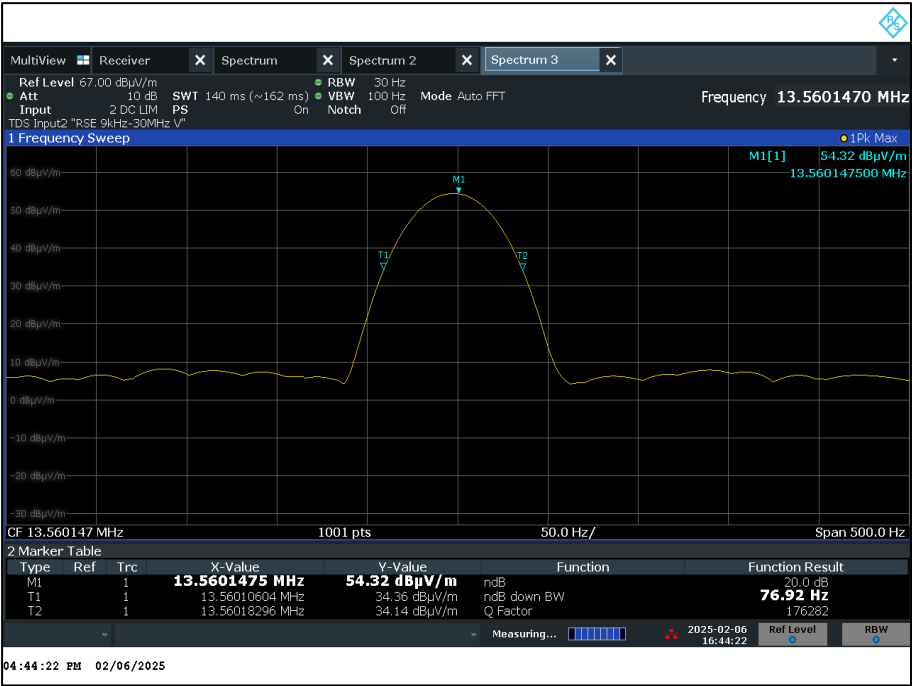


Figure 1 - 20 dB Bandwidth

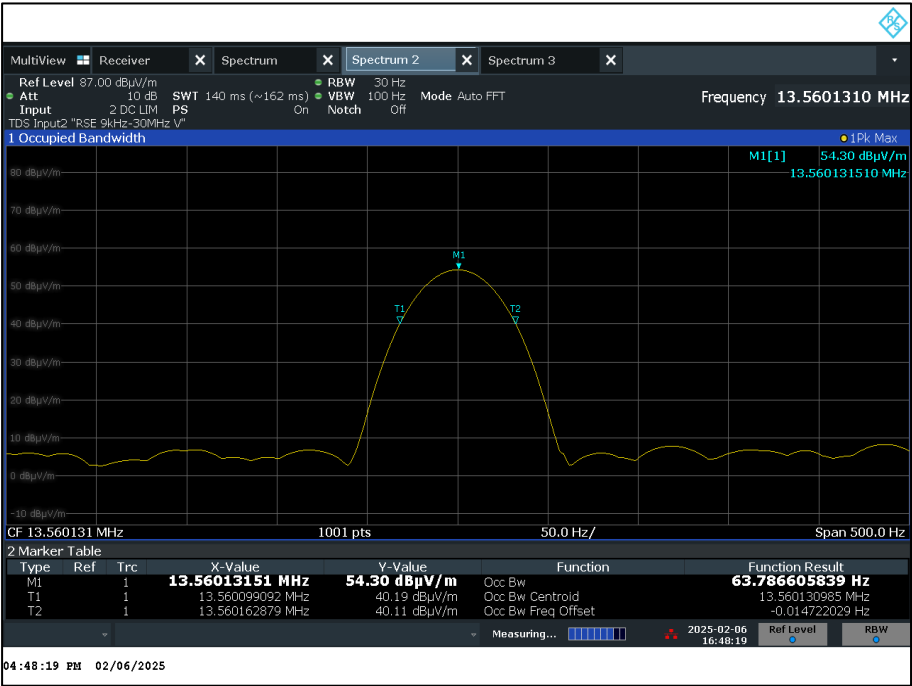


Figure 2 - 99% Occupied Bandwidth

2.1.8 Specification Limits

FCC 47 CFR Part 15C, Limit Clause 15.215 (c)

The 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

ISED RSS 210 and ISED RSS GEN, Limit Clause

None specified.



## 2.1.9 Test Location and Test Equipment Used

This test was carried out in RF Chamber 11.

| Instrument                      | Manufacturer    | Type No              | TE No | Calibration Period (months) | Calibration Expires |
|---------------------------------|-----------------|----------------------|-------|-----------------------------|---------------------|
| HygroPalm                       | Rotronic        | HygroPalm 0          | 3484  | 12                          | 13-Sep-2025         |
| 3m Semi-Anechoic Chamber        | Rainford        | RF Chamber 11        | 5136  | 36                          | 14-Nov-2027         |
| Mast and Turntable Controller   | Maturo          | Maturo NCD           | 5159  | -                           | TU                  |
| Turntable                       | Maturo          | TT 15WF              | 5160  | -                           | TU                  |
| Test Receiver                   | Rohde & Schwarz | ESW44                | 5382  | 12                          | 09-Sep-2025         |
| Cable (SMA to SMA, 2 m)         | Junkosha        | MWX221-02000AMSAMS/A | 5518  | 12                          | 18-Apr-2025         |
| Antenna (Loop, 9 kHz to 30 MHz) | Teseq           | HLA 6121             | 5616  | 24                          | 16-Aug-2026         |
| Cable (N to N 8m)               | Junkosha        | MWX221-08000NMSNMS/B | 6330  | 6                           | 17-Feb-2025         |

**Table 17**

TU - Traceability Unscheduled



## **2.2 Field Strength of any Emission**

### **2.2.1 Specification Reference**

FCC 47 CFR Part 15C, Clause 15.225 (a)(b)(c)(d)  
ISED RSS-210, Clause B.6  
ISED RSS-GEN, Clause 6.13

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

SENSOR COLOUR NO. 3, S/N: CS\_EP2-0086 - Modification State 0  
SENSOR COLOUR NO. 3, S/N: CS\_EP2-0045 - Modification State 0

### **2.2.3 Date of Test**

04-February-2025 to 07-February-2025

### **2.2.4 Test Method**

The test was performed in accordance with ANSI C63.10, clause 6.3, 6.4 and 6.5.

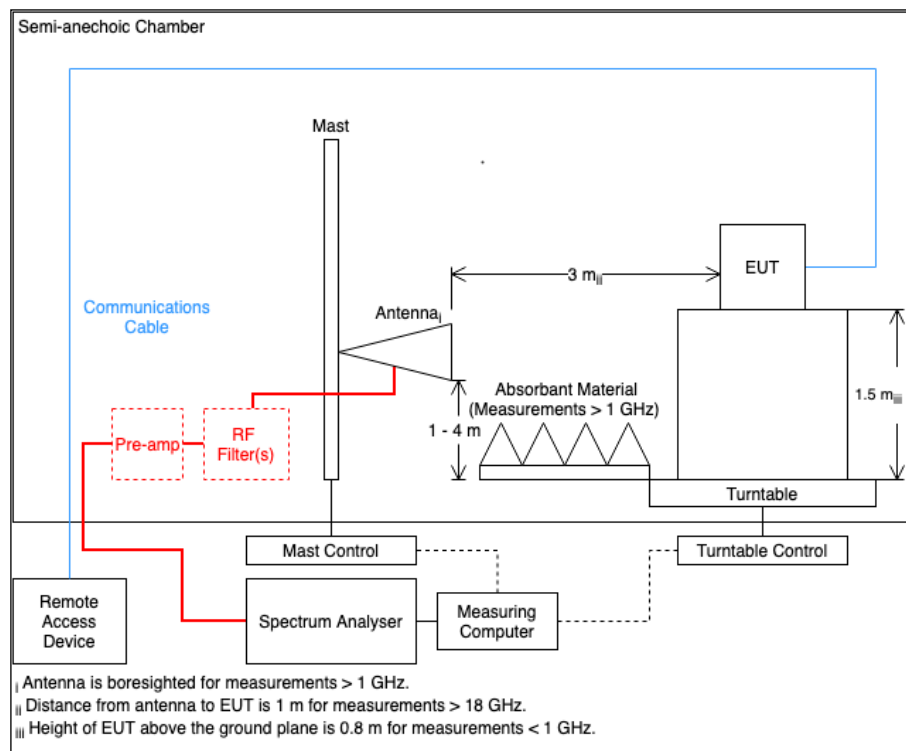
DUT was powered by internal 3.85 V DC Lithium Battery.

The DUT was configured as per customer setting 13.56 MHz, Continuous Wave. (Setting 31).

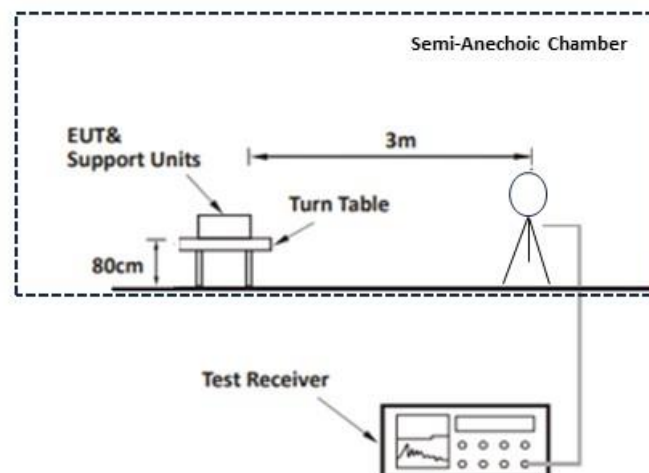
Pre-scan measurements were made at a distance of 3 m as shown by the plots below using a peak detector.

Final emission measurements were then made using a Quasi-Peak detector and recorded in the tables below. The limit lines shown on the plot were extrapolated from either 300 m or 30 m to the measurement distance of 3 m in accordance with ANSI C63.10 Clause 6.4.4.2.

## 2.2.5 Test Setup Diagram



For Radiated emissions 9kHz to 30MHz



## 2.2.6 Environmental Conditions

|                     |                |
|---------------------|----------------|
| Ambient Temperature | 19.5 - 20.2 °C |
| Relative Humidity   | 33.8 - 44.3 %  |



2.2.7 Test Results

13.56 MHz NFC - Transmit, Carrier Results

| Frequency (MHz) | Quasi-Peak Level (dBμV/m) at 3m | Quasi-Peak Level (dBμV/m) at 30m | Quasi-Peak Level (μV/m) at 3m | Quasi-Peak Level (μV/m) at 30m |
|-----------------|---------------------------------|----------------------------------|-------------------------------|--------------------------------|
| 13.56           | 55.28                           | 35.28                            | 580.76                        | 58.076                         |

Table 18 - Fundamental Field Strength

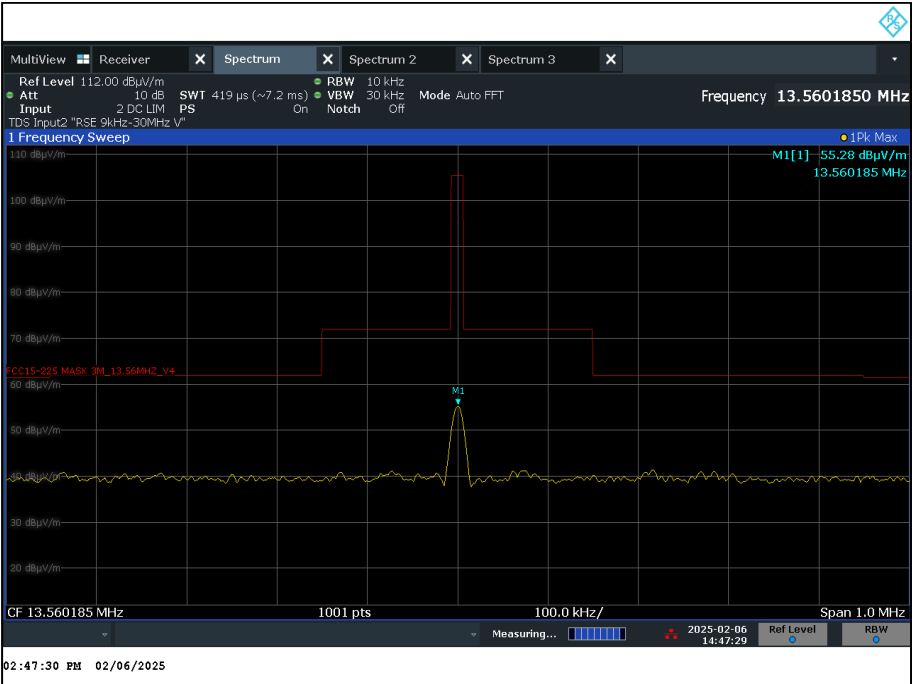


Figure 3 - Plot of the Fundamental - 13.56 MHz



| Frequency MHz | Quasi-Peak Level (dBµV/m) at 3 m | Quasi-Peak Level (dBµV/m) at 30 m | Quasi-Peak Level (µV/m) at 3 m | Quasi-Peak Level (µV/m) at 30 m |
|---------------|----------------------------------|-----------------------------------|--------------------------------|---------------------------------|
| *             |                                  |                                   |                                |                                 |

Table 19 - NFC Transmit Emissions Results - 9 kHz to 30 MHz

No emissions were detected within 10 dB of the limit.

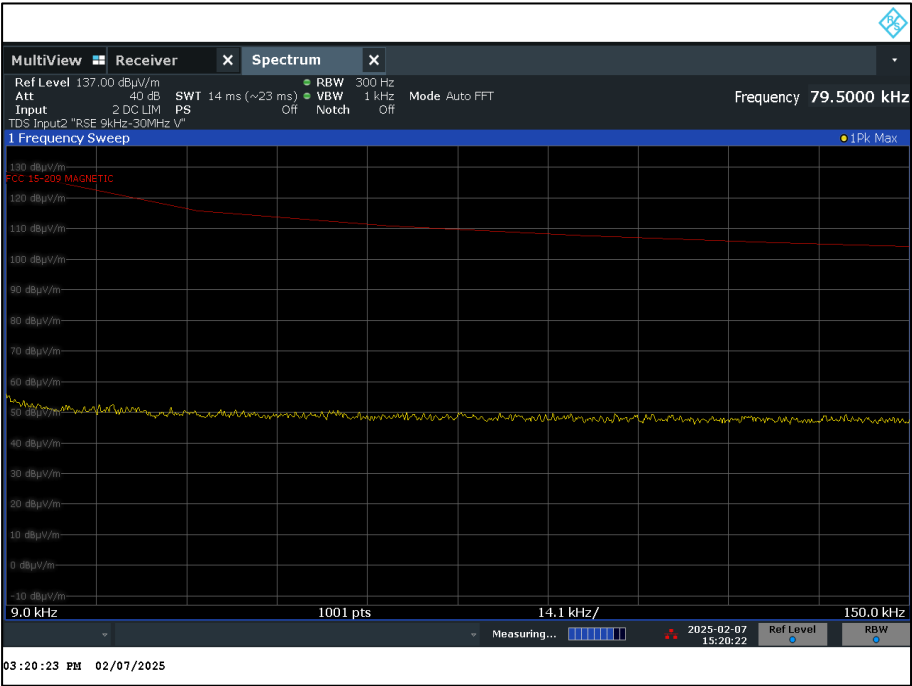


Figure 4 - NFC Transmit - 9 kHz to 150 kHz - X Orientation Front on

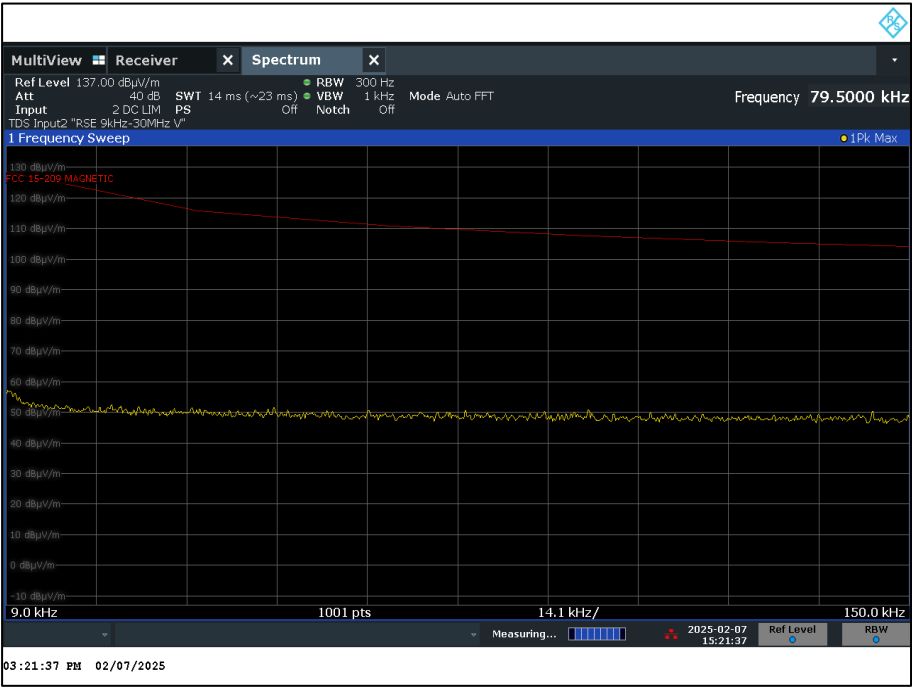


Figure 5 - NFC Transmit - 9 kHz to 150 kHz - X Orientation Side on

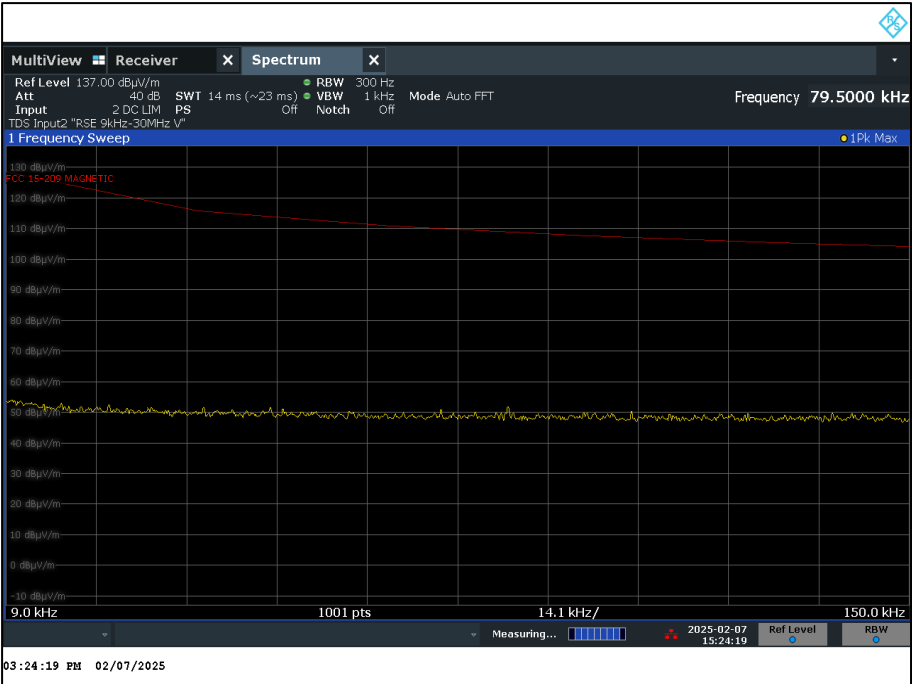


Figure 6 - NFC Transmit - 9 kHz to 150 kHz - Y Orientation Front on

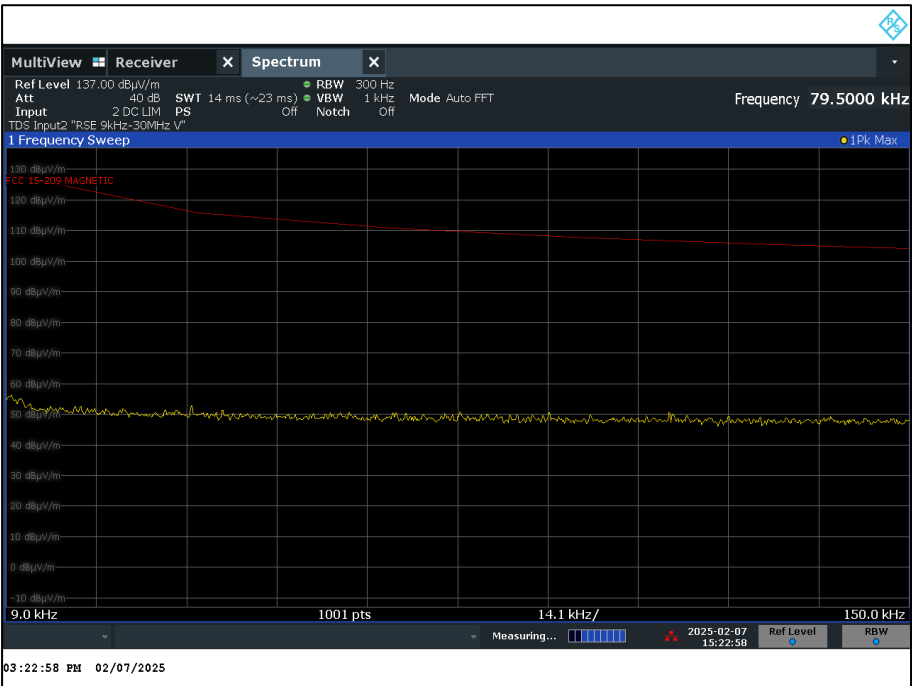


Figure 7 - NFC Transmit - 9 kHz to 150 kHz - Y Orientation Side on

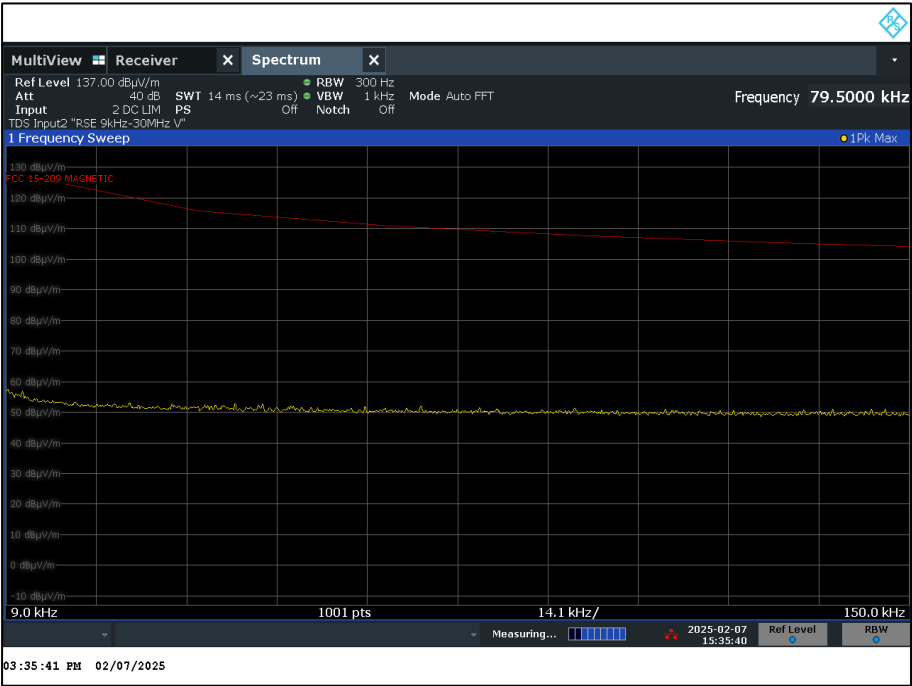


Figure 8 - NFC Transmit - 9 kHz to 150 kHz - Z Orientation Front on

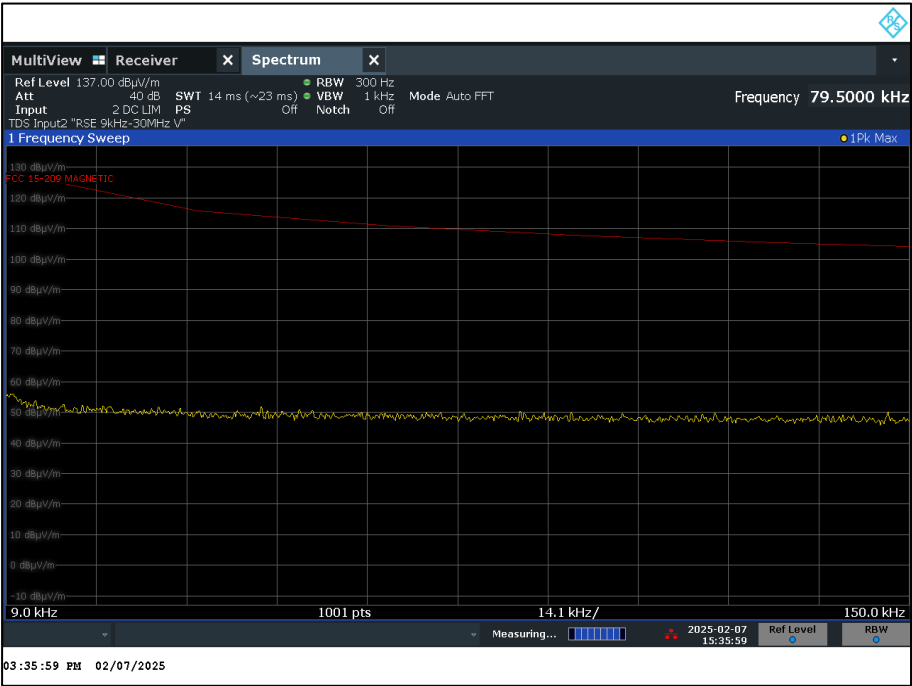


Figure 9 - NFC Transmit - 9 kHz to 150 kHz - Z Orientation Side on

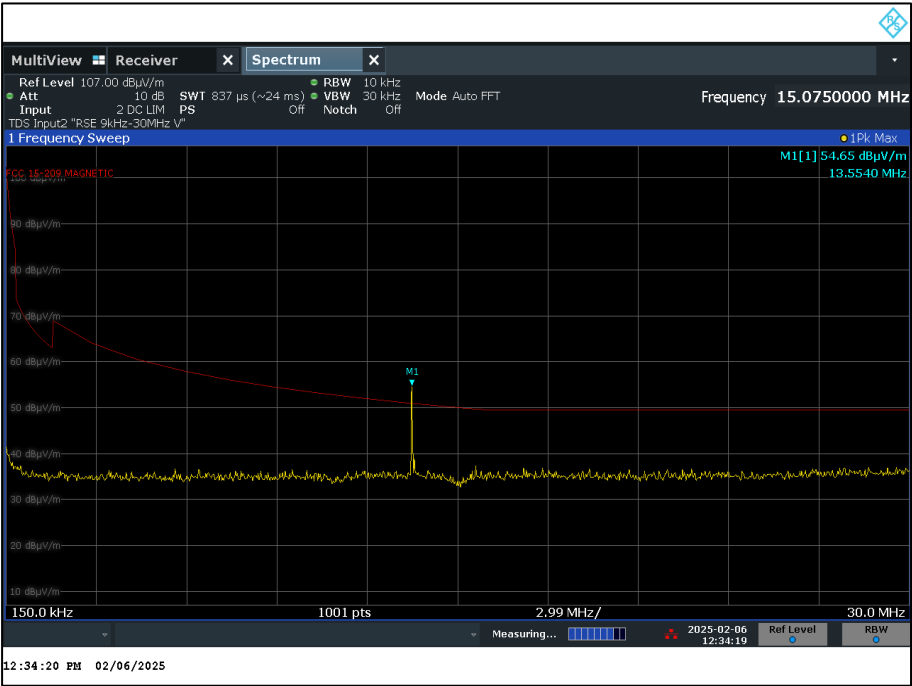


Figure 10 - NFC Transmit - 150 kHz to 30 MHz - X Orientation Front on

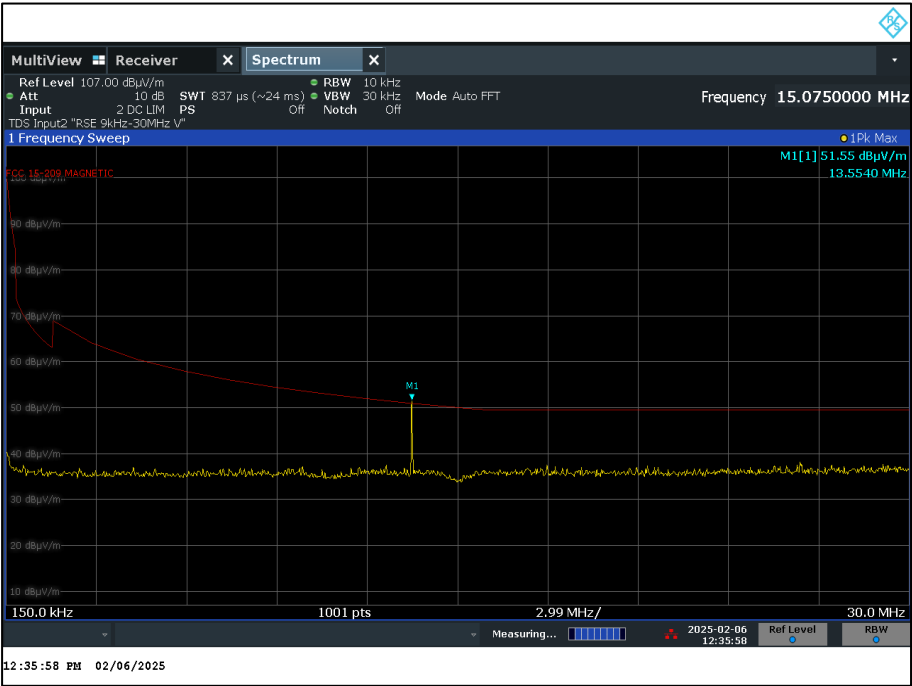


Figure 11 - NFC Transmit - 150 kHz to 30 MHz - X Orientation Side on

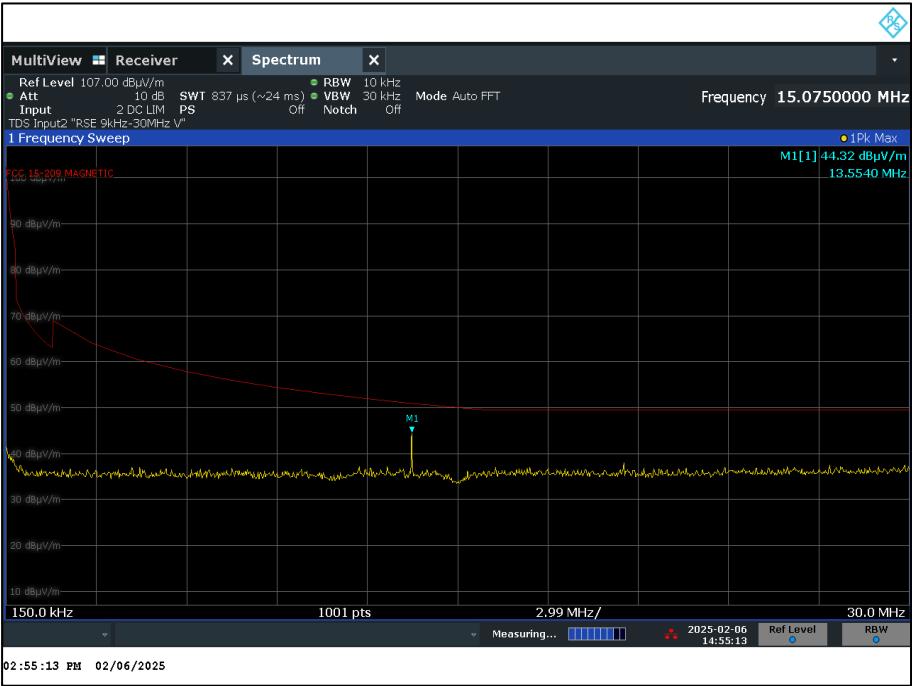


Figure 12 - NFC Transmit - 150 kHz to 30 MHz - Y Orientation Front on

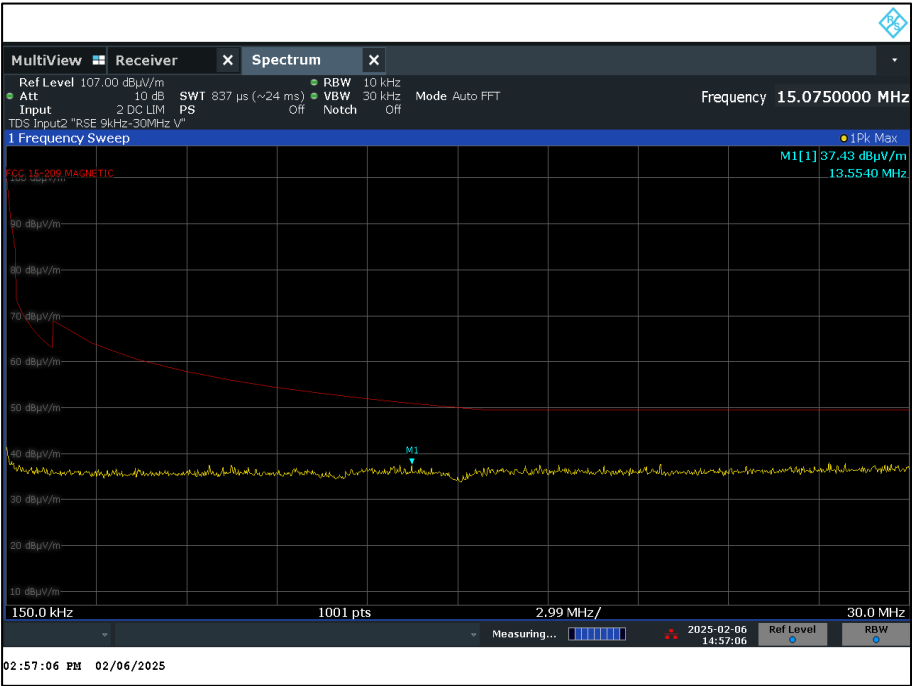


Figure 13 - NFC Transmit - 150 kHz to 30 MHz - Y Orientation Side on

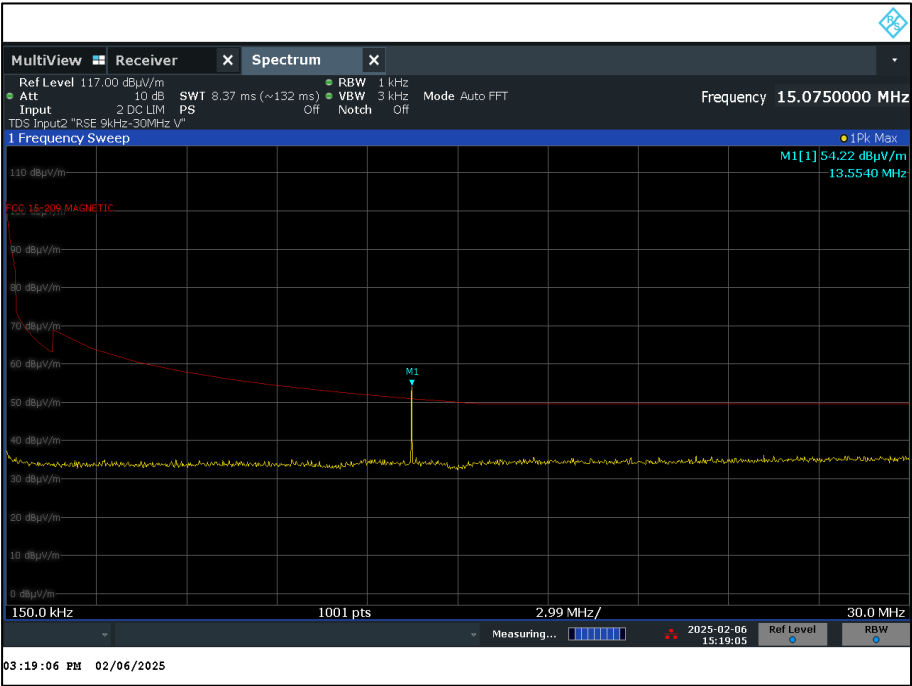


Figure 14 - NFC Transmit - 150 kHz to 30 MHz - Z Orientation Front on

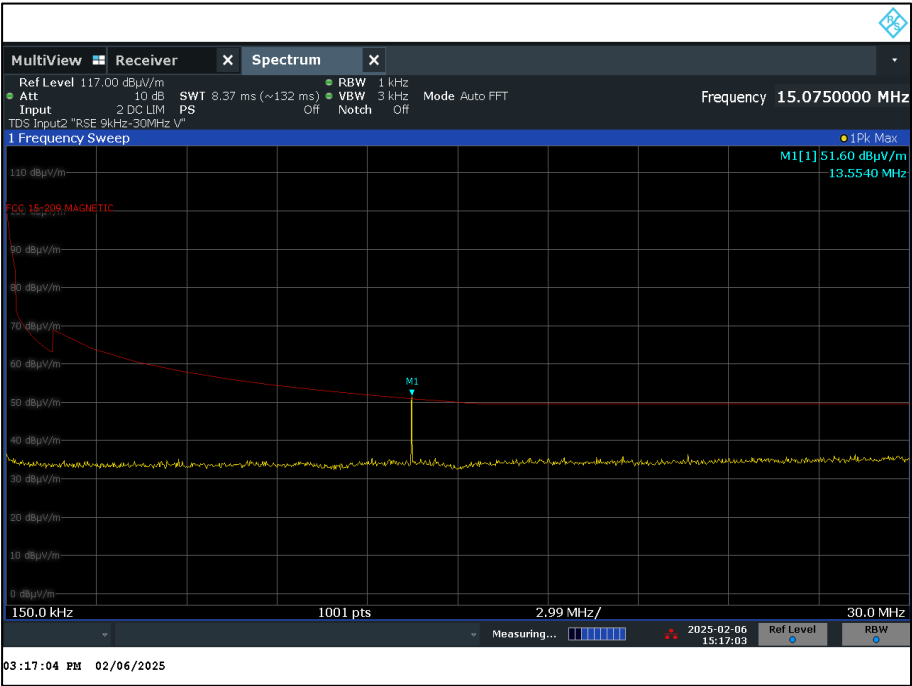


Figure 15 - NFC Transmit - 150 kHz to 30 MHz - Z Orientation Side on



| Frequency (MHz) | Level (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Detector | Angle (°) | Height (cm) | Polarisation |
|-----------------|----------------|----------------|-------------|----------|-----------|-------------|--------------|
| *               |                |                |             |          |           |             |              |

Table 20 - NFC Transmit - X Plane, Emissions Results – 30 MHz to 1 GHz

No emissions were detected within 10 dB of the limit.

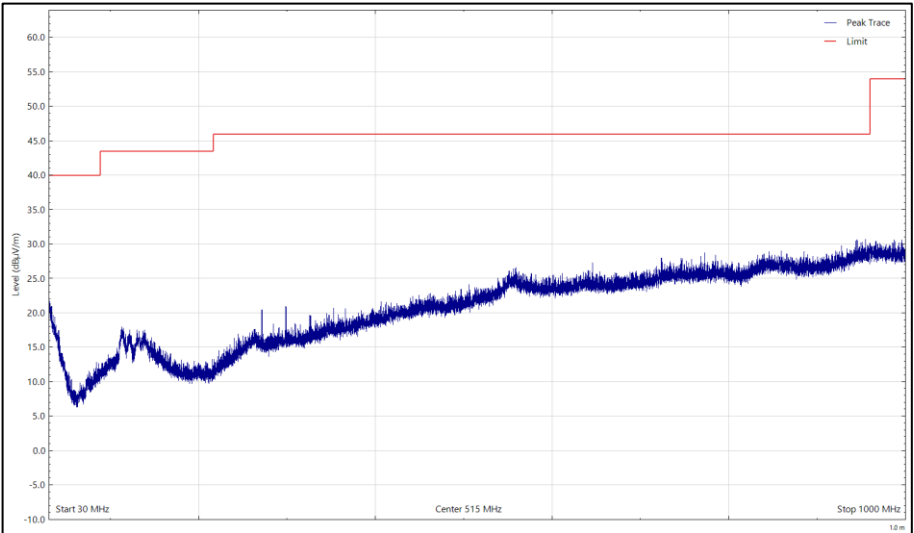


Figure 16 - NFC Transmit - X Plane, 13.56MHz, 30 MHz to 1 GHz, Horizontal (Peak)

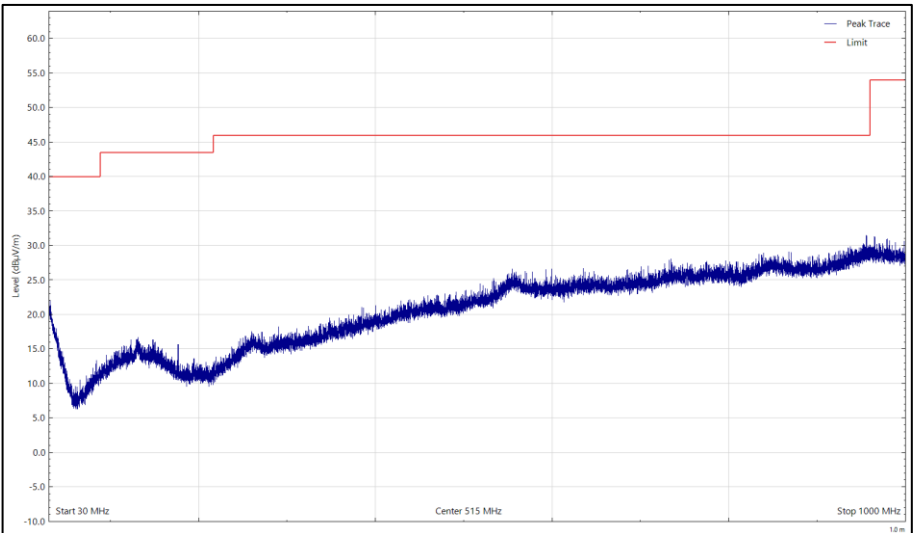


Figure 17 - NFC Transmit - X Plane, 13.56MHz, 30 MHz to 1 GHz, Vertical (Peak)



| Frequency (MHz) | Level (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Detector | Angle (°) | Height (cm) | Polarisation |
|-----------------|----------------|----------------|-------------|----------|-----------|-------------|--------------|
| *               |                |                |             |          |           |             |              |

Table 21 - NFC Transmit - Y Plane, Emissions Results – 30 MHz to 1 GHz

No emissions were detected within 10 dB of the limit.

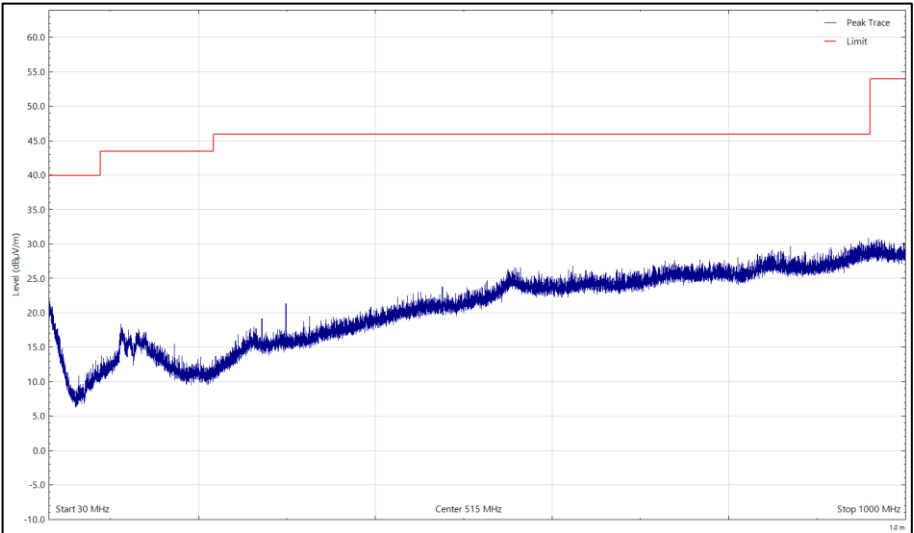


Figure 18 - NFC Transmit - Y Plane, 13.56MHz, 30 MHz to 1 GHz, Horizontal (Peak)

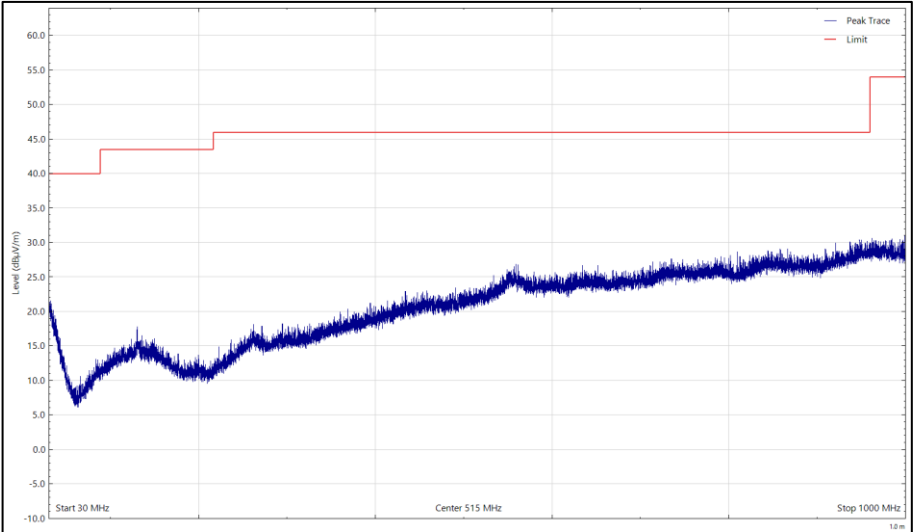
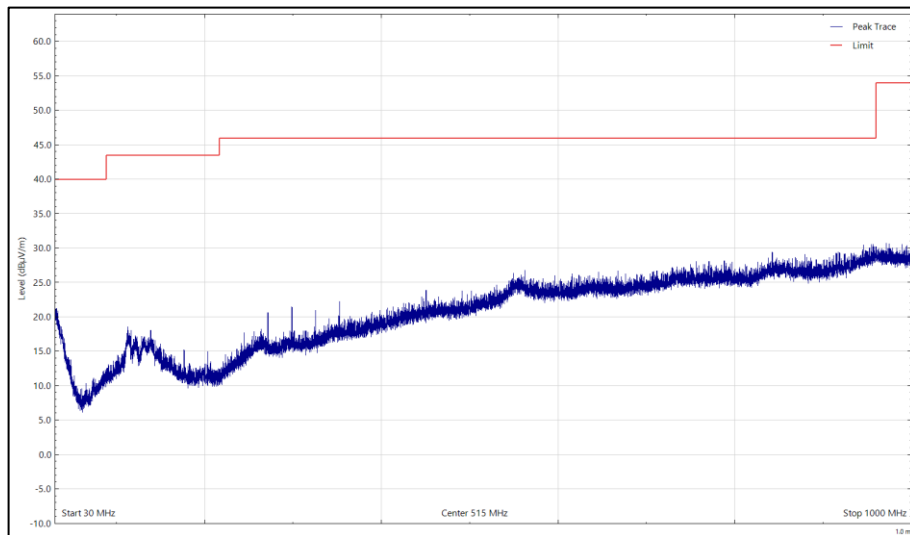


Figure 19 - NFC Transmit - Y Plane, 13.56MHz, 30 MHz to 1 GHz, Vertical (Peak)

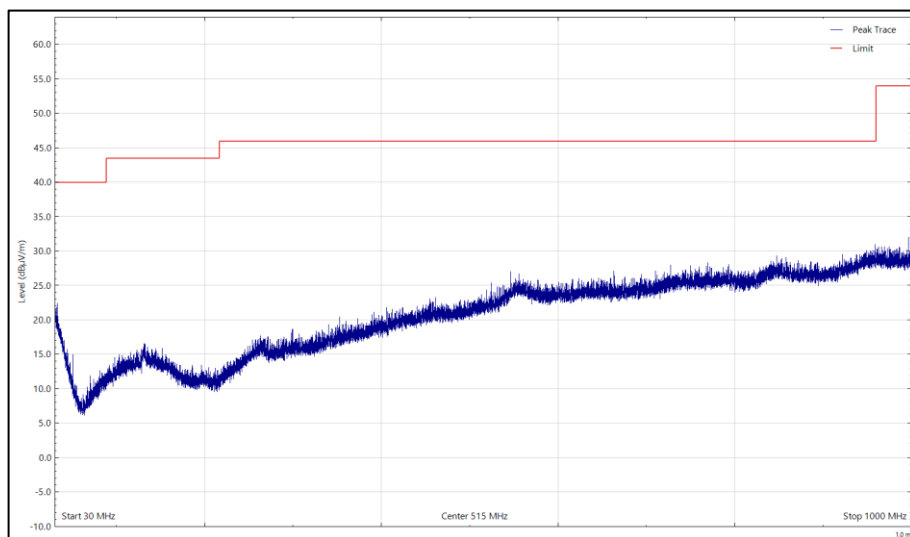
| Frequency (MHz) | Level (dB $\mu$ V/m) | Limit (dB $\mu$ V/m) | Margin (dB) | Detector | Angle (°) | Height (cm) | Polarisation |
|-----------------|----------------------|----------------------|-------------|----------|-----------|-------------|--------------|
| *               |                      |                      |             |          |           |             |              |

**Table 22 - NFC Transmit - Z Plane, Emissions Results – 30 MHz to 1 GHz**

No emissions were detected within 10 dB of the limit.



**Figure 20 - NFC Transmit - Z Plane, 13.56MHz, 30 MHz to 1 GHz, Horizontal (Peak)**



**Figure 21 - NFC Transmit - Z Plane, 13.56MHz, 30 MHz to 1 GHz, Vertical (Peak)**



## 2.2.8 Specification Limits

### FCC 47 CFR Part 15, Limit Clause 15.225 (a)(b)(c)(d)

(a) The field strength of any emissions within the band 13.553–13.567 MHz shall not exceed 15,848 microvolts/meter at 30 m.

(b) Within the bands 13.410–13.553 MHz and 13.567–13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 m.

(c) Within the bands 13.110–13.410 MHz and 13.710–14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 m.

(d) The field strength of any emissions appearing outside of the 13.110–14.010 MHz band shall not exceed the general radiated emission limits in § 15.209.

### FCC 47 CFR Part 15, Limit Clause 15.209

| Frequency (MHz) | Field Strength ( $\mu\text{V/m}$ ) | Measurement Distance (m) |
|-----------------|------------------------------------|--------------------------|
| 0.009 to 0.490  | 2400/F (kHz)                       | 300                      |
| 0.490 to 1.705  | 24000/F (kHz)                      | 30                       |
| 1.705 to 30     | 30                                 | 30                       |
| 30 to 88        | 100**                              | 3                        |
| 88 to 216       | 150**                              | 3                        |
| 216 to 960      | 200**                              | 3                        |
| Above 960       | 500                                | 5                        |

**Table 23 - FCC Radiated Emission Limit**

### ISED RSS-210, Limit Clause B.6

The field strength of any emission shall not exceed the following limits:

(a) 15.848 mV/m (84 dB $\mu\text{V/m}$ ) at 30 m, within the band 13.553 – 13.567 MHz.

(b) 334  $\mu\text{V/m}$  (50.5 dB $\mu\text{V/m}$ ) at 30 m, withing the bands 13.410 – 13.553 MHz and 13.567 – 13.710 MHz.

(c) 106  $\mu\text{V/m}$  (40.5 dB $\mu\text{V/m}$ ) at 30 m, within the bands 13.110 – 13.410 MHz and 13.710 – 14.010 MHz.

(d) RSS-GEN general field strength limits for frequencies outside the band 13.110 – 14.010 MHz.

### ISED RSS-GEN, Limit Clause

| Frequency          | Electric Field Strength ( $\mu\text{V/m}$ ) | Magnetic Field Strength (H-Field) ( $\mu\text{A/m}$ ) | Measurement Distance (m) |
|--------------------|---------------------------------------------|-------------------------------------------------------|--------------------------|
| 9 - 490 kHz        | 2,400/F (F in kHz)                          | 2,400/377F (F in kHz)                                 | 300                      |
| 490 - 1,705 kHz    | 24,000/F (F in kHz)                         | 24,000/377F (F in kHz)                                | 30                       |
| 1,705 kHz - 30 MHz | 30                                          | N/A                                                   | 30                       |

**Table 24 - ISED Radiated Emission Limit - Less than 30 MHz**



| Frequency (MHz) | Field Strength ( $\mu\text{V/m}$ at 3 m) |
|-----------------|------------------------------------------|
| 30 - 88         | 100                                      |
| 88 - 216        | 150                                      |
| 216 - 960       | 200                                      |
| > 960           | 500                                      |

**Table 25 - ISED Radiated Emission Limit - 30 MHz to 1 GHz**

### 2.2.9 Test Location and Test Equipment Used

This test was carried out in RF Chamber 11.

| Instrument                        | Manufacturer    | Type No              | TE No | Calibration Period (months) | Calibration Expires |
|-----------------------------------|-----------------|----------------------|-------|-----------------------------|---------------------|
| HygroPalm                         | Rotronic        | HygroPalm 0          | 3484  | 12                          | 13-Sep-2025         |
| Emissions Software                | TUV SUD         | EmX V3.4.2           | 5125  | -                           | Software            |
| 3m Semi-Anechoic Chamber          | Rainford        | RF Chamber 11        | 5136  | 36                          | 14-Nov-2027         |
| Mast                              | Maturo          | TAM 4.0-P            | 5158  | -                           | TU                  |
| Mast and Turntable Controller     | Maturo          | Maturo NCD           | 5159  | -                           | TU                  |
| Turntable                         | Maturo          | TT 15WF              | 5160  | -                           | TU                  |
| Test Receiver                     | Rohde & Schwarz | ESW44                | 5382  | 12                          | 09-Sep-2025         |
| Cable (SMA to SMA, 2 m)           | Junkosha        | MWX221-02000AMSAMS/A | 5518  | 12                          | 18-Apr-2025         |
| Antenna (Bi-Log, 30 MHz to 1 GHz) | Teseq           | CBL6111D             | 5615  | 24                          | 15-Mar-2025         |
| Antenna (Loop, 9 kHz to 30 MHz)   | Teseq           | HLA 6121             | 5616  | 24                          | 16-Aug-2026         |
| Cable (N to N 8m)                 | Junkosha        | MWX221-08000NMSNMS/B | 6330  | 6                           | 17-Feb-2025         |

**Table 26**

TU - Traceability Unscheduled

## 2.3 Frequency Tolerance Under Temperature Variations

### 2.3.1 Specification Reference

FCC 47 CFR Part 15C, Clause 15.225 (e),  
ISED RSS-210 Clause B.6  
ISED RSS-GEN, Clause 6.11

### 2.3.2 Equipment Under Test and Modification State

SENSOR COLOUR NO. 3, S/N: CS\_EP2-0045 - Modification State 0  
SENSOR COLOUR NO. 3, S/N: CS\_EP2-0045 - Modification State 1

### 2.3.3 Date of Test

21-February-2025 to 27 February 2025

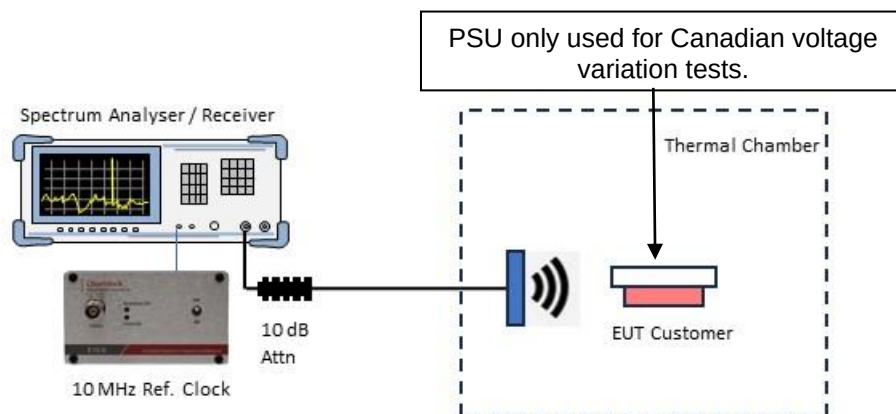
### 2.3.4 Test Method

The test was performed in accordance with ANSI C63.10, clause 6.8 and RSS-GEN Clause 6.11.

DUT (Mod 0) was powered by internal 3.85 V DC Lithium Battery and the DUT (Mod 1) with variable DC Power supply of 3.01 VDC and 3.85 VDC for extreme voltage variations for Canadian standards.

The DUT was configured as per customer setting 13.56 MHz, Continuous Wave. (Setting 31).

### 2.3.5 Test Setup Diagram



### 2.3.6 Environmental Conditions

|                     |               |
|---------------------|---------------|
| Ambient Temperature | 19.4 – 20.6°C |
| Relative Humidity   | 49.8 - 53.9 % |



### 2.3.7 Test Results

#### 13.56 MHz NFC - Transmit

| Temperature | Voltage  | Measured Frequency (MHz) | Frequency Deviation (%) | Frequency Error (ppm) |
|-------------|----------|--------------------------|-------------------------|-----------------------|
| -20.0 °C    | 3.85 VDC | 13.5602326               | 0.0017153               | 17.1533923            |
| -10.0 °C    | 3.85 VDC | 13.5602188               | 0.0016136               | 16.1356932            |
| 0.0 °C      | 3.85 VDC | 13.5601969               | 0.0014521               | 14.5206490            |
| +10.0 °C    | 3.85 VDC | 13.5601695               | 0.0012501               | 12.5007375            |
| +20.0 °C    | 3.85 VDC | 13.5601247               | 0.0009196               | 9.1961652             |
| +30.0 °C    | 3.85 VDC | 13.5601147               | 0.0008459               | 8.4587021             |
| +40.0 °C    | 3.85 VDC | 13.5601141               | 0.0008415               | 8.4151917             |
| +50.0 °C    | 3.85 VDC | 13.5601220               | 0.0008997               | 8.9970502             |

**Table 27 - Frequency Tolerance Under Temperature Variation**

| Temperature | Voltage     | Measured Frequency (MHz) | Frequency Deviation (%) | Frequency Error (ppm) |
|-------------|-------------|--------------------------|-------------------------|-----------------------|
| +20.0 °C    | 3.01 V DC   | 13.5609337               | 0.0068857               | 68.8569322            |
| +20.0 °C    | 3.85 V DC * | 13.5601626               | 0.0011989               | 11.9889381            |

**Table 28 - Frequency Tolerance Under Voltage Variation**

\* Note: Upper end point and Nominal Voltage are the same (3.85 V DC)

### 2.3.8 Specification Limits

#### FCC 47 CFR Part 15, Limit Clause 15.225 (e)

The frequency tolerance of the carrier signal shall be maintained within  $\pm 0.01$  % of the operating frequency.

#### ISED RSS-210, Limit Clause B.6

Carrier frequency stability shall be maintained to  $\pm 0.01\%$  ( $\pm 100$  ppm)



### 2.3.9 Test Location and Test Equipment Used

This test was carried out in RF Chamber 11.

| Instrument               | Manufacturer     | Type No              | TE No | Calibration Period (months) | Calibration Expires |
|--------------------------|------------------|----------------------|-------|-----------------------------|---------------------|
| Climatic Chamber         | Votsch           | VT4002               | 161   | -                           | O/P Mon             |
| Dual Power Supply Unit   | Hewlett Packard  | 6253A                | 292   | -                           | O/P Mon             |
| DLP_RFID-ANT             | DLP Designs Inc. | Review 1.2 2008      | -     | -                           | TU                  |
| Thermocouple Thermometer | Fluke            | 51                   | 3173  | 12                          | 31-May-2025         |
| HygroPalm                | Rotronic         | HygroPalm 0          | 3484  | 12                          | 13-Sep-2025         |
| True RMS Multimeter      | Fluke            | 179                  | 4006  | 12                          | 22-Mar-2025         |
| 1 MHz / 10 MHz reference | Quartzlock       | E10-X                | 4973  | 12                          | 03-Sep-2025         |
| 3m Semi-Anechoic Chamber | Rainford         | RF Chamber 11        | 5136  | 36                          | 14-Nov-2027         |
| Test Receiver            | Rohde & Schwarz  | ESW44                | 5382  | 12                          | 09-Sep-2025         |
| Cable (SMA to SMA, 2 m)  | Junkosha         | MWX221-02000AMSAMS/A | 5518  | 12                          | 18-Apr-2025         |

**Table 29**

TU – Traceability Unscheduled

O/P Mon – Output Monitored using calibrated equipment

### 3 Photographs

#### 3.1 Test Setup Photographs

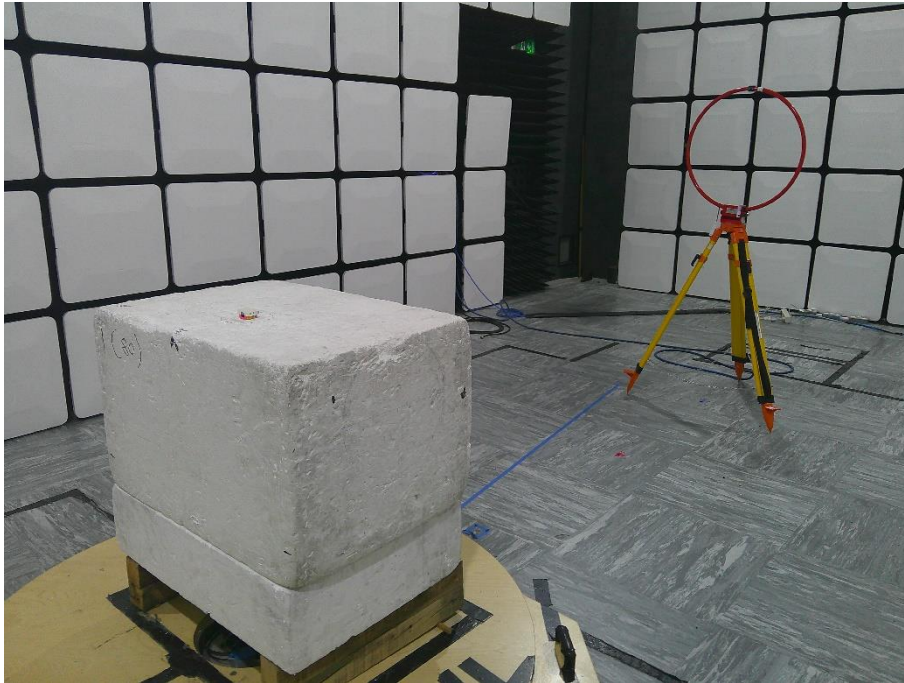
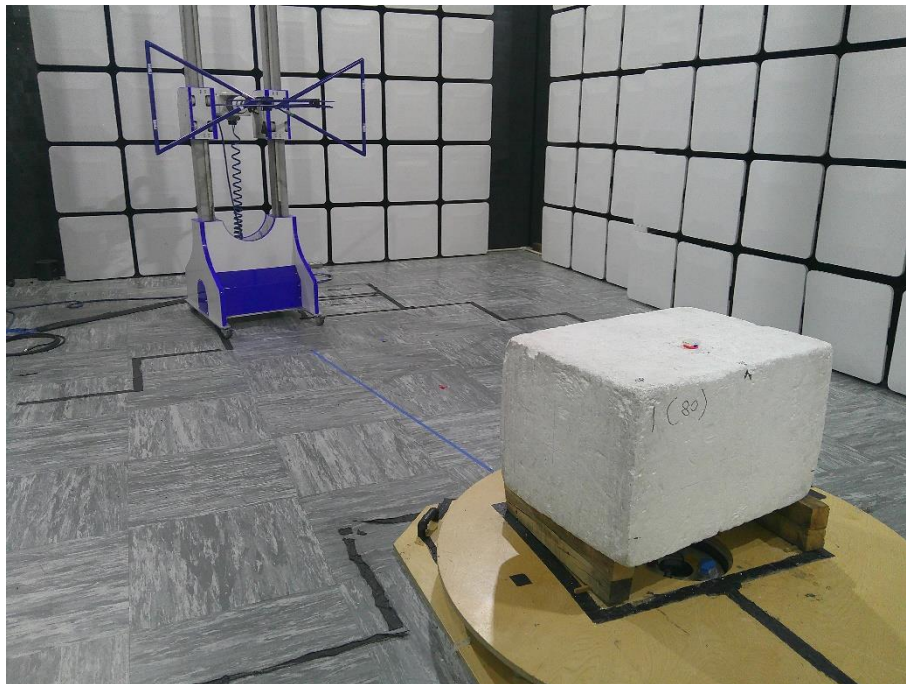


Figure 22 – Below 30GHz Front on



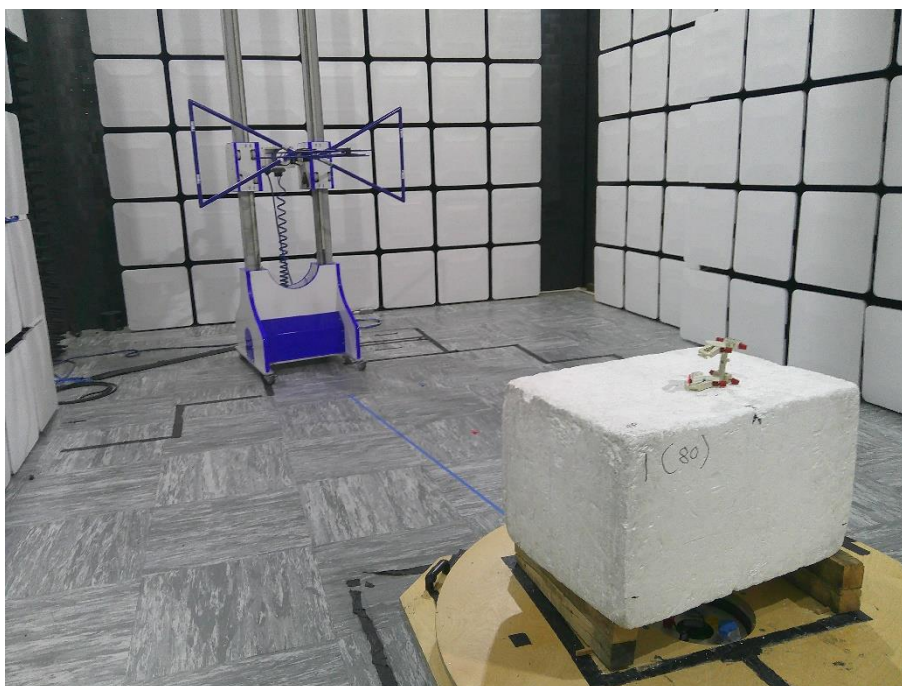
Figure 23 – Below 30GHz Side on



**Figure 24 – 30 MHz to 1 GHz X Plane**



**Figure 25 – 30 MHz to 1 GHz Y Plane**



**Figure 26 – 30 MHz to 1 GHz Z Plane**



## 4 Measurement Uncertainty

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

| Test Name                                        | Measurement Uncertainty                                        |
|--------------------------------------------------|----------------------------------------------------------------|
| 20 dB Bandwidth & 99% Occupied Bandwidth         | $\pm 9.89$ Hz.                                                 |
| Field Strength of any Emission                   | 9 kHz to 30 MHz: $\pm 3.4$ dB<br>30 MHz to 1 GHz: $\pm 5.2$ dB |
| Frequency Tolerance Under Temperature Variations | $\pm 6.54$ Hz                                                  |

**Table 30**

### Measurement Uncertainty Decision Rule – Accuracy Method

Determination of conformity with the specification limits is based on the decision rule according to IEC Guide 115:2021, Clause 4.4.3 (Procedure 2). The measurement results are directly compared with the test limit to determine conformance with the requirements of the standard.

Risk: The uncertainty of measurement about the measured result is negligible with regard to the final pass/fail decision. The measurement result can be directly compared with the test limit to determine conformance with the requirement (compare IEC Guide 115). The level of risk to falsely accept and falsely reject items is further described in ILAC-G8.