



Solutions

# TEST REPORT

**Test Report No. : UL-RPT-RP-14374669-616-FCC**

**Applicant \*** : Visteon Corporation

**Model No. \*** : FPK8I5DTR2

**FCC ID \*** : NT8-FPK8I5DTR2

**Technology \*** : RFID – 125 kHz

**Test Standard(s)** : **FCC Parts 15.205,15.209(a),15.215**

For details of applied tests refer to test result summary

1. This test report shall not be reproduced in full or partial, without the written approval of UL International Germany GmbH.
2. The results in this report apply only to the sample tested.
3. The test results in this report are traceable to the national or international standards.
4. **Test Report Version 1.2 supersede Version 1.1 with immediate effect**  
Test Report No. UL-RPT-RP-14374669-616-FCC Version 1.2, Issue Date 20 April 2023 replaces  
Test Report No. UL-RPT-RP-14374669-616-FCC Version 1.1, Issue Date 28 February 2023, which is  
no longer valid.
5. Result of the tested sample: **PASS**
6. All information marked with a (\*) were provided by customer / applicant or authorized representative

Prepared by: Muhammad Faiq, Khan  
Title: Project Engineer  
Date: 20 April 2023

Approved by: Rachid, Acharkaoui  
Title: Operations Manager  
Date: 20 April 2023

This laboratory is accredited by DAkkS.  
The tests reported herein have been performed in  
accordance with its' terms of accreditation.

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## **Table of Contents**

|  |           |
|--|-----------|
| <b>1. Customer Information *</b>                             | <b>4</b>  |
| 1.1. Applicant Information                                   | 4         |
| 1.2. Manufacturer Information                                | 4         |
| <b>2. Summary of Testing</b>                                 | <b>5</b>  |
| 2.1. General Information                                     | 5         |
| Applied Standards  | 5         |
| Location   | 5         |
| Date information   | 5         |
| 2.2. Summary of Test Results                                 | 6         |
| 2.3. Methods and Procedures                                  | 6         |
| 2.4. Deviations from the Test Specification                  | 6         |
| <b>3. Equipment Under Test (EUT)</b>                         | <b>7</b>  |
| 3.1. Identification of Equipment Under Test (EUT) *          | 7         |
| 3.2. Description of EUT *                                    | 7         |
| 3.3. Modifications Incorporated in the EUT                   | 7         |
| 3.4. Additional Information Related to Testing *             | 8         |
| 3.5. Support Equipment                                       | 8         |
| A. Support Equipment (In-house)                              | 8         |
| B. Support Equipment (Manufacturer supplied)                 | 8         |
| <b>4. Operation and Monitoring of the EUT during Testing</b> | <b>9</b>  |
| 4.1. Operating Modes   | 9         |
| 4.2. Configuration and Peripherals                           | 9         |
| <b>5. Measurements, Examinations and Derived Results</b>     | <b>10</b> |
| 5.1. General Comments  | 10        |
| 5.2. Test Results  | 11        |
| 5.2.1. Transmitter 20 dB Bandwidth                           | 11        |
| 5.2.2. Transmitter Fundamental Field Strength                | 15        |
| 5.2.3. Transmitter Radiated Spurious Emissions               | 19        |
| <b>6. Measurement Uncertainty</b>                            | <b>26</b> |
| <b>7. Used equipment</b>                                     | <b>27</b> |
| <b>8. Open-Area-Test Site comparison</b>                     | <b>28</b> |
| <b>9. Report Revision History</b>                            | <b>32</b> |

## **1. Customer Information \***

### **1.1. Applicant Information**

|                                |   |
|--------------------------------|---|
| <b>Company Name:</b>           | Visteon Corporation   |
| <b>Company Address:</b>        | One Village Center Drive<br>Van Buren Township, MI, 48111 USA |
| <b>Contact Person:</b>         | Heidi Sepanik   |
| <b>Contact E-Mail Address:</b> | hdiebol@visteon.com   |
| <b>Contact Phone No.:</b>      | +1 734 710 4672   |

### **1.2. Manufacturer Information**

|                                |   |
|--------------------------------|---|
| <b>Company Name:</b>           | Visteon Corporation   |
| <b>Company Address:</b>        | One Village Center Drive<br>Van Buren Township, MI, 48111 USA |
| <b>Contact Person:</b>         | Heidi Sepanik   |
| <b>Contact E-Mail Address:</b> | hdiebol@visteon.com   |
| <b>Contact Phone No.:</b>      | +1 734 710 4672   |

## **2. Summary of Testing**

### **2.1. General Information**

#### **Applied Standards**

|                                 |   |
|---------------------------------|---|
| <b>Specification Reference:</b> | 47CFR15.205 and 47CFR15.209   |
| <b>Specification Title:</b>     | Code of Federal Regulations Volume 47 (Telecommunications):<br>Part 15 Subpart C (Intentional Radiators) - Sections 15.205 and 15.209 |
| <b>Specification Reference:</b> | 47CFR15.215   |
| <b>Specification Title:</b>     | Code of Federal Regulations Volume 47 (Telecommunications):<br>Part 15 Subpart C (Intentional Radiators) - Sections 15.215            |
| <b>Test Firm Registration:</b>  | 399704  |

#### **Location**

|                             |  |
|-----------------------------|--|
| <b>Location of Testing:</b> | UL International Germany GmbH<br>Hedelfinger Str. 61<br>70327 Stuttgart<br>Germany |
|-----------------------------|--|

#### **Date information**

|                      |                                    |
|----------------------|------------------------------------|
| <b>Order Date:</b>   | 15 January 2022                    |
| <b>EUT arrived:</b>  | 05 October 2022 & 17 January 2023  |
| <b>Test Dates:</b>   | 11 October 2022 to 20 January 2023 |
| <b>EUT returned:</b> | -/-                                |

## 2.2. Summary of Test Results

| Clause   | Measurement                                       | Complied                            | Did not comply           | Not performed            | Not applicable                      |
|--|---|-------------------------------------|--------------------------|--------------------------|-------------------------------------|
| Part 15.207  | Transmitter AC Conducted Emissions <sup>(1)</sup> | <input type="checkbox"/>            | <input type="checkbox"/> | <input type="checkbox"/> | <input checked="" type="checkbox"/> |
| Part 15.215(c)   | Transmitter 20 dB Bandwidth                       | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            |
| Part 15.209(a)   | Transmitter Fundamental Field Strength            | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            |
| Part 15.209(a)(c)  | Transmitter Radiated Emissions                    | <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            |
| <b>Decision rule:</b><br>If the decision rule is not included in the applied customer specification or testing standard, the binary statement for simple acceptance, as defined in ILAC G8: 2019 Section 4.2.1, is applied as the decision rule for a pass/ fail statement.<br><br>If the measured value is on the limit, the result is defined as a pass. In this case the risk of a false positive is 50%. For further information regarding risk assessment refer to ILAC G8: 2019. |   |                                     |                          |                          |                                     |

### Note(s):

1. Not applicable, the EUT will be powered via Car battery.

## 2.3. Methods and Procedures

|                   |  |
|-------------------|--|
| <b>Reference:</b> | ANSI C63.10-2013   |
| <b>Title:</b>     | American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices |
| <b>Reference:</b> | KDB 414788 D01 Radiated Test Site v01  |
| <b>Title:</b>     | TEST SITES FOR RADIATED EMISSION MEASUREMENTS  |

## 2.4. Deviations from the Test Specification

For the measurements contained within this test report, there were no deviations from, additions to, or exclusions from the test specification identified above.

### **3. Equipment Under Test (EUT)**

#### **3.1. Identification of Equipment Under Test (EUT) \***

|                                   |                                      |
|-----------------------------------|--------------------------------------|
| <b>Brand Name:</b>                | Visteon                              |
| <b>Model Name:</b>                | FPK8I5DTR2                           |
| <b>Test Sample Serial Number:</b> | 6WB2208260150 (Radiated Test sample) |
| <b>Sample identification:</b>     | C2 Sample, PWB26554                  |
| <b>Hardware Version Number:</b>   | HW07x / HW17x                        |
| <b>Software Version Number:</b>   | SW58xx                               |
| <b>FCC ID:</b>                    | NT8-FPK8I5DTR2                       |

|                                   |  |
|-----------------------------------|--|
| <b>Brand Name:</b>                | Visteon  |
| <b>Model Name:</b>                | FPK8I5DTR2                                       |
| <b>Test Sample Serial Number:</b> | MX7-REY28.11.22.000.10088 (Radiated Test sample) |
| <b>Sample identification:</b>     | C3 Sample, PWB26580                              |
| <b>Hardware Version Number:</b>   | HW07x / HW17x                                    |
| <b>Software Version Number:</b>   | SW58xx   |
| <b>FCC ID:</b>                    | NT8-FPK8I5DTR2                                   |

#### **3.2. Description of EUT \***

The equipment under test was an Immobilizer with Model Name: FPK8I5DTR2, supporting RFID 125 kHz technology.

#### **3.3. Modifications Incorporated in the EUT**

No modifications were applied to the EUT during testing.

**3.4. Additional Information Related to Testing \***

|                                  |                       |           |
|----------------------------------|-----------------------|-----------|
| <b>Tested Technology:</b>        | RFID                  |           |
| <b>Category of Equipment:</b>    | Transceiver           |           |
| <b>Channel Spacing:</b>          | Single channel device |           |
| <b>Transmit Frequency Range:</b> | 125 kHz               |           |
| <b>Modulation:</b>               | ASK                   |           |
| <b>Antenna Type:</b>             | Air Coil Antenna      |           |
| <b>Antenna Details:</b>          | Costal Air Coil       |           |
| <b>Power Supply Requirement:</b> | $V_{nom}$             | 13.5 V DC |

**3.5. Support Equipment**

No support equipment was used to exercise the EUT during testing:

**A. Support Equipment (In-house)**

| Item | Description                   | Brand Name | Model Name or Number | Serial Number |
|------|-------------------------------|------------|----------------------|---------------|
| 1    | Laboratory AC/DC Power Supply | Aim TTi    | CPX400S              | 507111        |

**B. Support Equipment (Manufacturer supplied)**

| Item | Description    | Brand Name | Model Name or Number | Serial Number |
|------|----------------|------------|----------------------|---------------|
| 1    | Ignition lock  | -          | -                    | -             |
| 2    | Car Key        | VW         | -                    | -             |
| 3    | Toggled button | -          | -                    | -             |



## **4. Operation and Monitoring of the EUT during Testing**

### **4.1. Operating Modes**

The EUT was tested in the following operating mode(s):

- ☒ Constantly transmitting at full power with a modulated carrier.

### **4.2. Configuration and Peripherals**

The EUT was tested in the following configuration(s):

- The customer provided test setup instructions "220914\_FPK8I5DTR2\_certification\_setups29sept2022" issued on 29 September 2022 was used to configure the EUT into respective modes.

#### **EUT Power Supply:**

- The EUT was powered via DC power supply 13.5 V DC.

#### **Test Mode Activation:**

- The EUT can be configured into the test modes via a toggle button. There were three modes available, No transmission, intermittent transmission and continuous transmission.
- All the measurements are performed by setting the EUT into continuous transmission mode.

#### **Radiated Measurements:**

- All radiated measurements were carried out by using the EUT Radiated sample.
- Before starting final radiated measurements "worst case verification" with the EUT in Standing, Laying and 45° tilting position was performed.
- The EUT with its Integral antenna in laying position was found out to be the worst-case. Therefore, this report includes relevant test results
- The radiated measurements below 30 MHz were performed with the EUT positioned on the turn table and rotating 360 degrees while the loop antenna height was set to 100 cm.
- The radiated measurements above 30 MHz were performed with the EUT positioned on the turn table and rotating 360 degrees while the antenna height varies from 1 to 4 m over the measurement frequency range.
- R&S® EMC32 V11.30.00 Software was used for the Radiated spurious emission measurements.

## **5. Measurements, Examinations and Derived Results**

### **5.1. General Comments**

Measurement uncertainties are evaluated in accordance with current best practice. Our reported expanded uncertainties are based on standard uncertainties, which are multiplied by an appropriate coverage factor to provide a statistical confidence level of approximately 95%. Please refer to Section 6 *Measurement Uncertainty* for details.

In accordance with DAkkS requirements all the measurement equipment is on a calibration schedule. All equipment was within the calibration period on the date of testing.

## 5.2. Test Results

### 5.2.1. Transmitter 20 dB Bandwidth

#### Test Summary:

|                            |   |            |                                       |
|----------------------------|---|------------|---------------------------------------|
| Test Engineer:             | Muhammad Faiq Khan                                    | Test Date: | 17 October 2022 /<br>20. January 2023 |
| Test Sample Serial Number: | 6WB2208260150 (Radiated Test sample) (C2)             |            |                                       |
| Test Sample Serial Number: | MX7-REY28.11.22.000.10088 (Radiated Test sample) (C3) |            |                                       |
| Test Site Identification   | SR 9  |            |                                       |

|                   |                           |
|-------------------|---------------------------|
| FCC Reference:    | Part 15.215(c)            |
| Test Method Used: | ANSI C63.10 Section 6.9.2 |

#### Environmental Conditions:

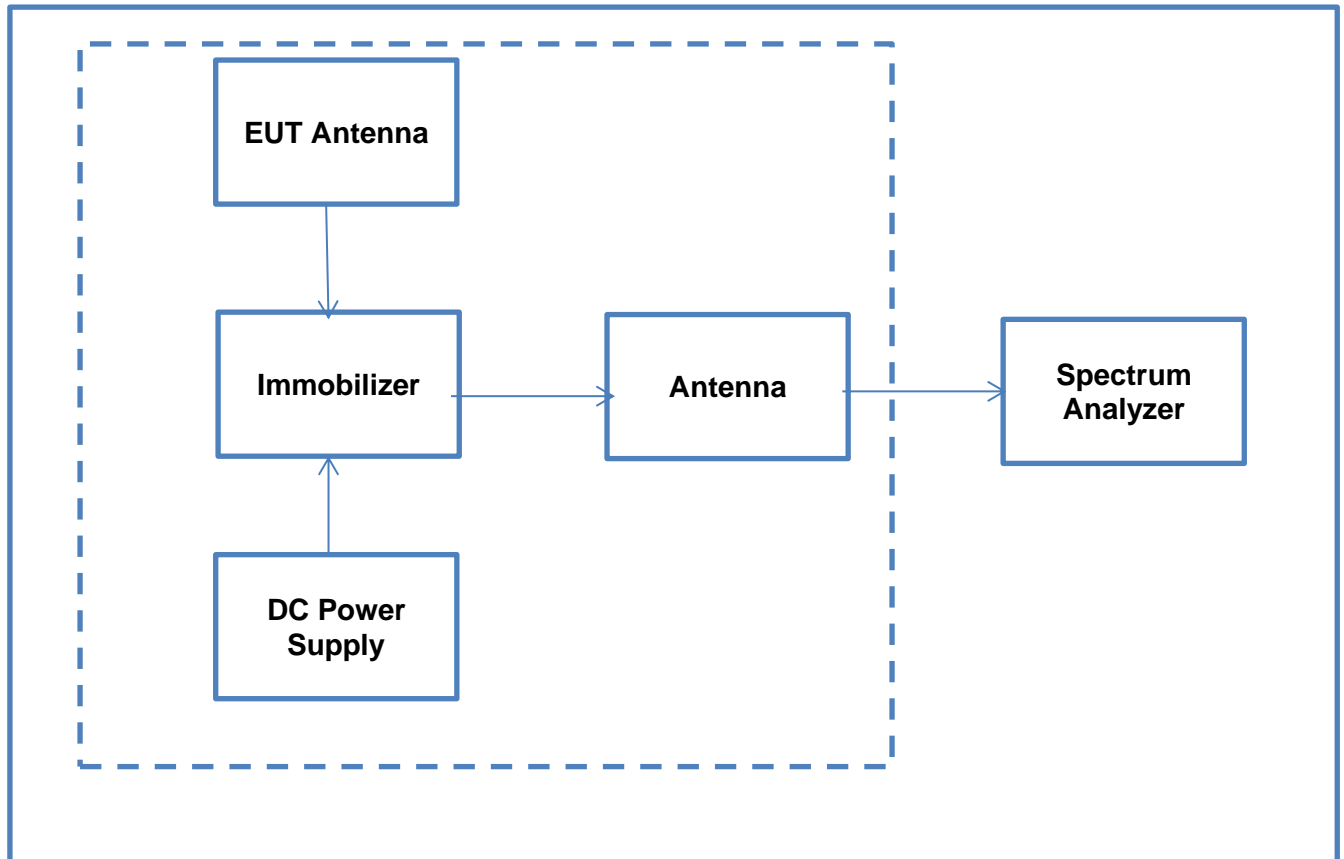
|                        |          |
|------------------------|----------|
| Temperature (°C):      | 22 to 26 |
| Relative Humidity (%): | 27 to 39 |

#### Settings of the Instrument

|            |               |
|------------|---------------|
| RBW/VBW    | 1 kHz / 3 kHz |
| Span       | 10 kHz        |
| Sweep time | Auto          |
| Detector   | Peak          |

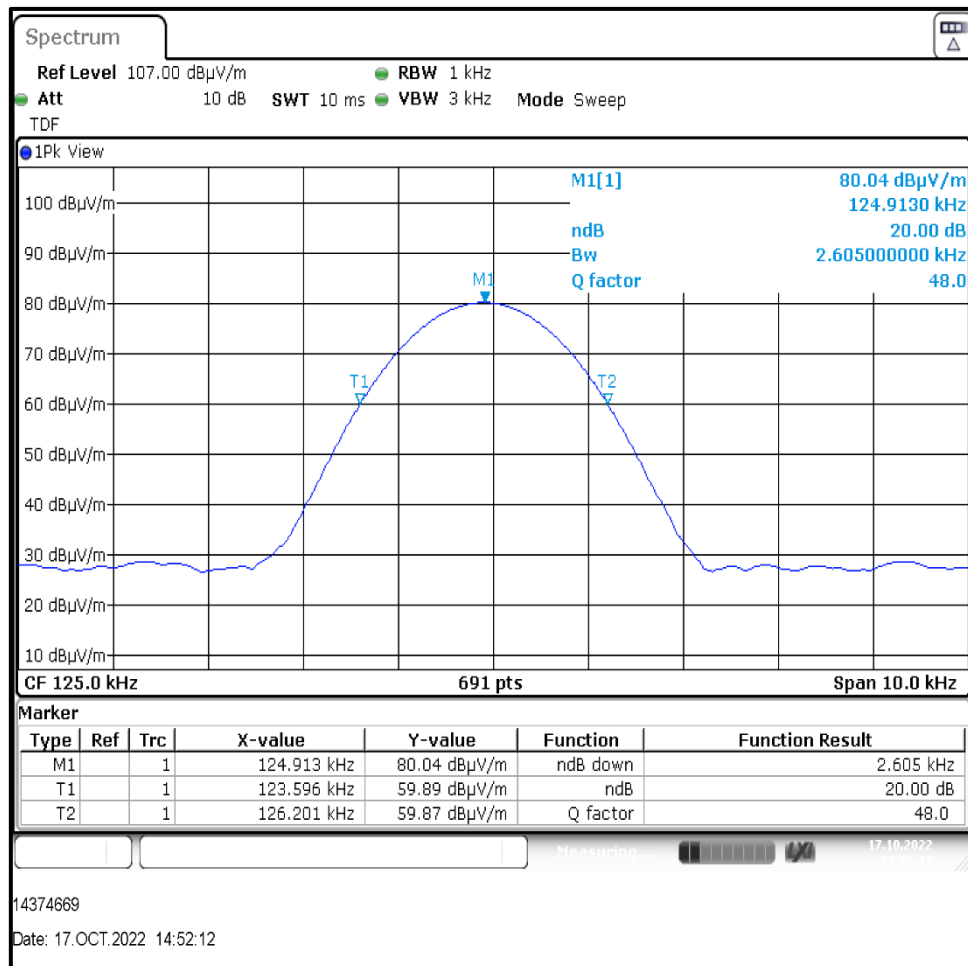
#### Note(s):

1. The measurement was performed by setting the RBW to 1kHz and the VBW to 3kHz, which defers from the procedure detailed in ANSI C63.10 6.9.2, due to the difficulty of selecting an appropriate RBW (1% to 5% of the OBW) for this technology. The span was 10 kHz and Peak detector was set on Max hold. The ndB down function of the marker was used where n is 20 dB.
2. The deviation (use of a larger RBW and VBW compared to the 20 dB BW) was agreed with the FCC via a generic KDB inquiry. Since it is difficult to perform the measurement of 20 dB bandwidth for the devices transmitting at 125 kHz as per test procedure detailed in ANSI C63.10 6.9.2.

**Transmitter 20 dB Bandwidth (continued)****Test setup**

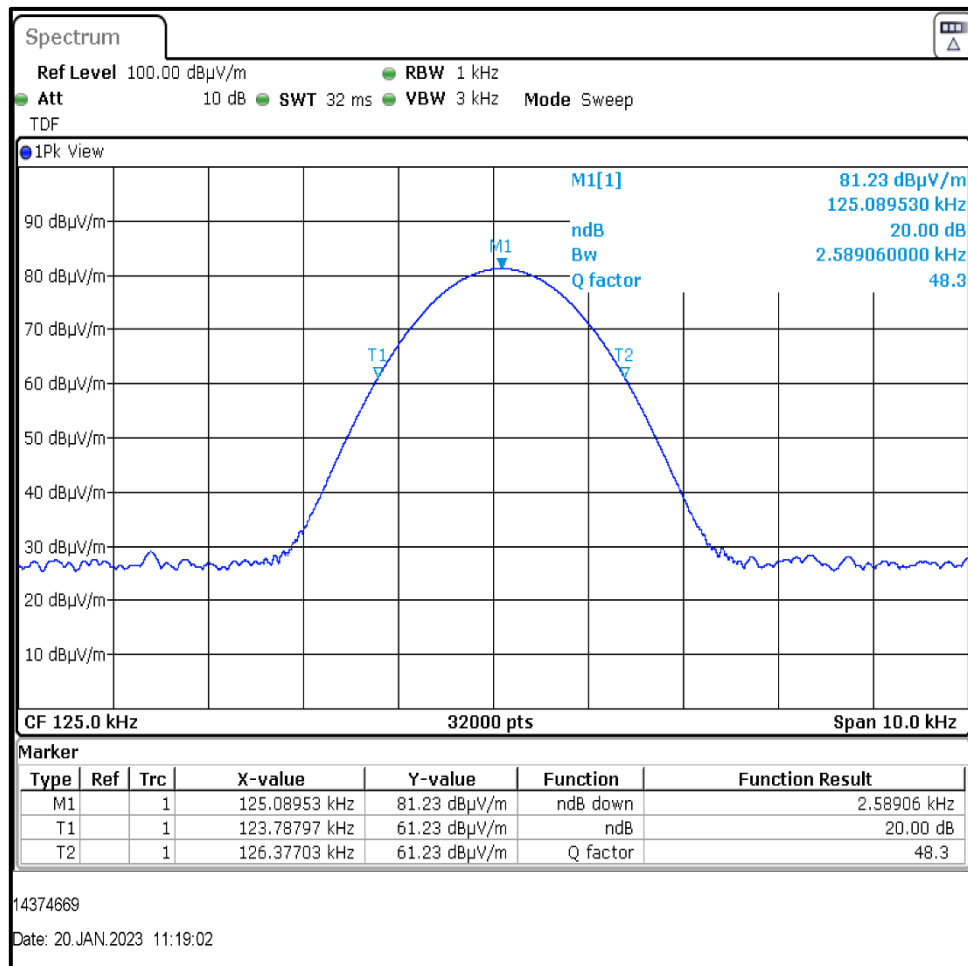
**Transmitter 20 dB Bandwidth (continued)****Results: C2 / RFID / TX / PWR MAX**

| Channel | 20 dB Bandwidth (kHz) |
|---------|-----------------------|
| 125 kHz | 2.605                 |

**C2 Single Channel****Result: Pass**

**Transmitter 20 dB Bandwidth (continued)****Results: C3 / RFID / TX / PWR MAX**

| Channel | 20 dB Bandwidth (kHz) |
|---------|-----------------------|
| 125 kHz | 2.589                 |

**C3 Single Channel****Result: Pass**

**5.2.2. Transmitter Fundamental Field Strength****Test Summary:**

|                                   |   |                   |                                       |
|-----------------------------------|---|-------------------|---------------------------------------|
| <b>Test Engineer:</b>             | Muhammad Faiq Khan                                    | <b>Test Date:</b> | 11 October 2022 to<br>17 January 2023 |
| <b>Test Sample Serial Number:</b> | 6WB2208260150 (Radiated Test sample) (C2)             |                   |                                       |
| <b>Test Sample Serial Number:</b> | MX7-REY28.11.22.000.10088 (Radiated Test sample) (C3) |                   |                                       |
| <b>Test Site Identification</b>   | SR 1/2  |                   |                                       |

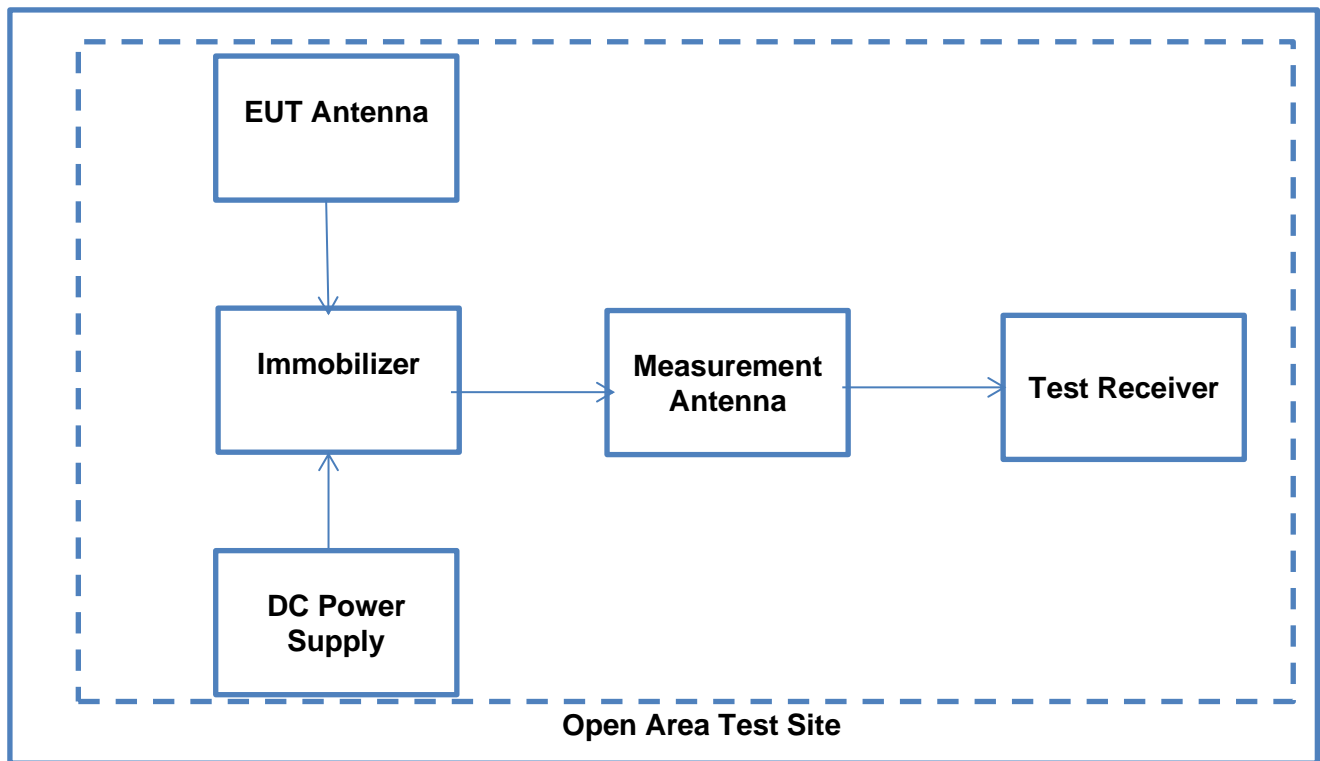
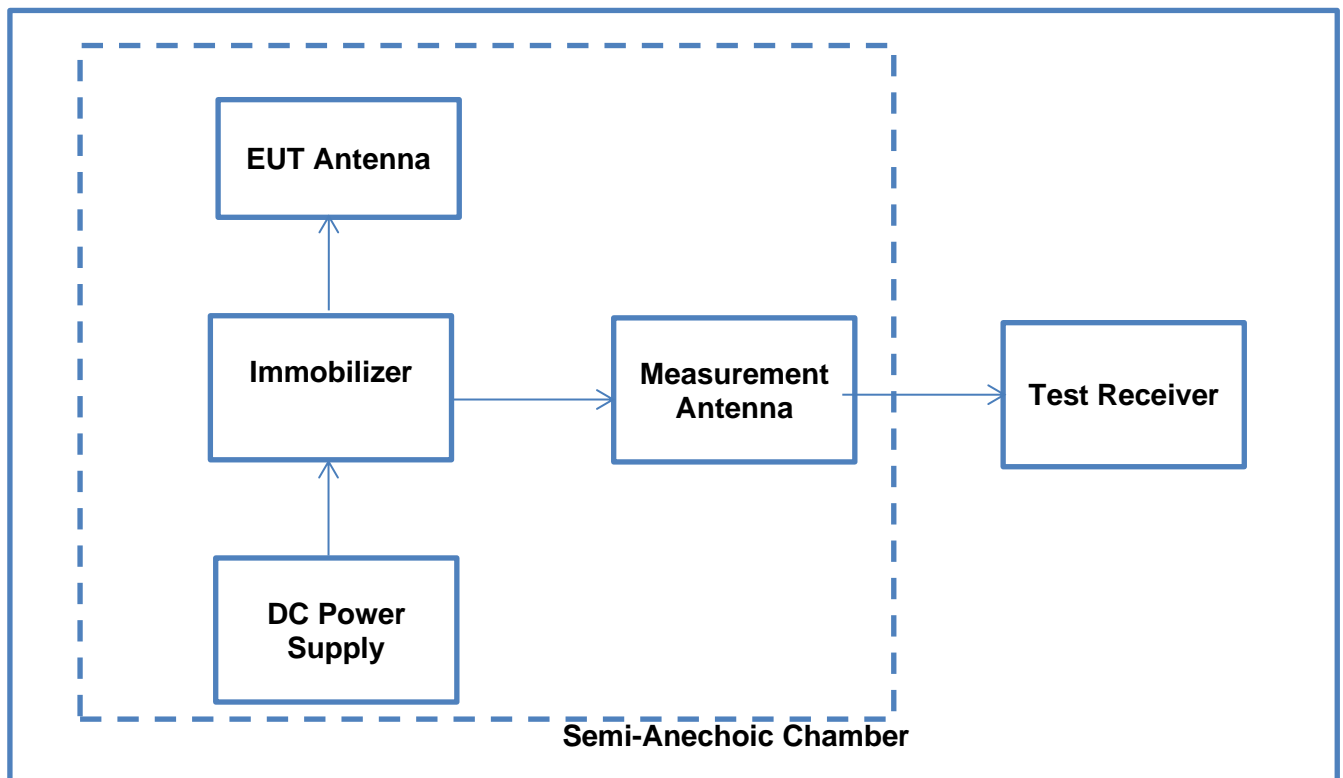
|                          |                         |
|--------------------------|-------------------------|
| <b>FCC Reference:</b>    | Part 15.209(d)          |
| <b>Test Method Used:</b> | ANSI C63.10 Section 6.4 |

**Environmental Conditions:**

|                               |          |
|-------------------------------|----------|
| <b>Temperature (°C):</b>      | 21 to 22 |
| <b>Relative Humidity (%):</b> | 37 to 58 |

**Note(s):**

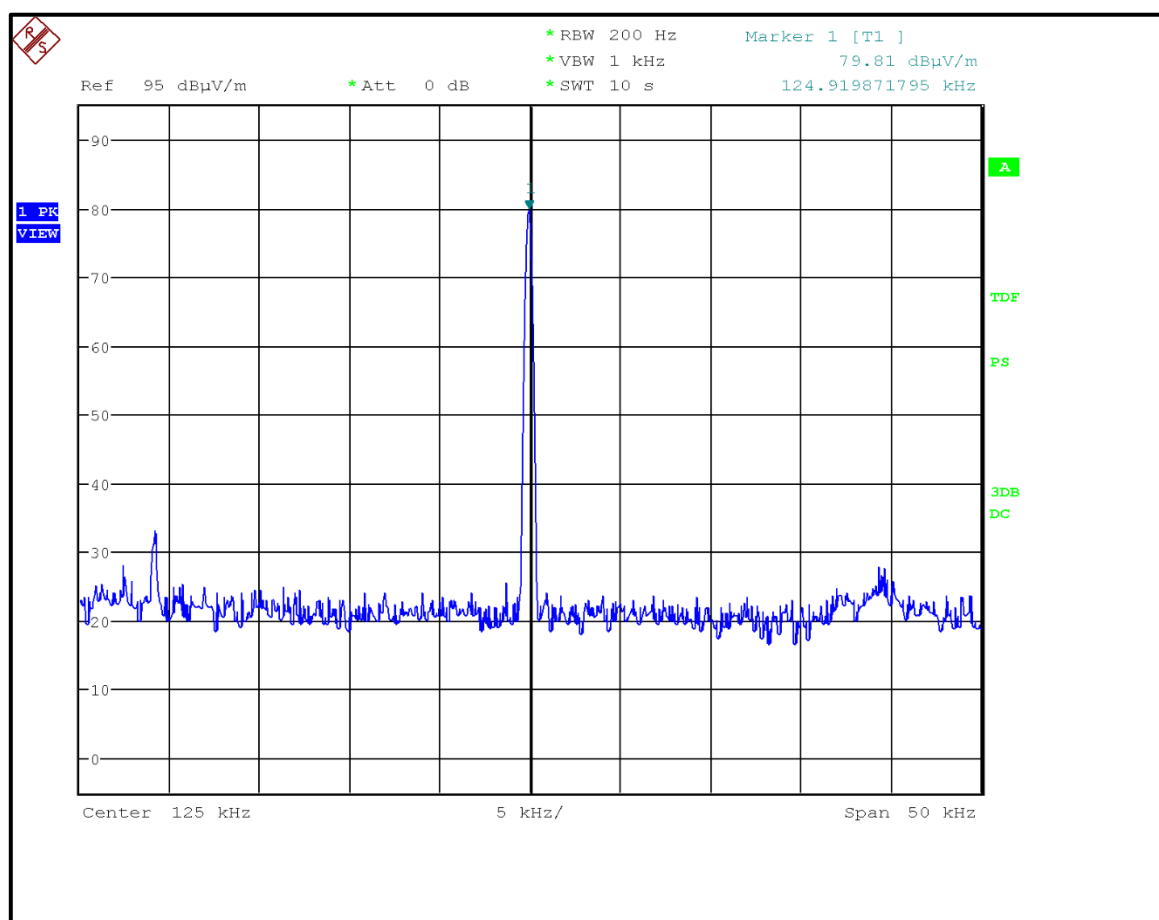
1. The limit is specified at a test distance of 300 metres. However, as specified by FCC Section 15.31 (f)(2), measurements may be performed at a closer distance and the measured level corrected to the specified measurement distance by using the square of an inverse linear distance extrapolation factor (40dB/decade).
2. In accordance with 414788 D01. Instead of an OATS a Semi Anechoic Chamber was used where evidence was shown that the behaviour is the same. A maximum deviation of 0.64 dB for 125 kHz was observed. This deviation is also taken into account to the result.
3. Pre-scan measurements were performed using a spectrum analyzer with a peak detector and measurement bandwidth of 200 Hz. The fundamental field strength was maximized by rotating the measurement antenna and EUT. The spectrum analyzer was then switched to test receiver mode and the final measurement on the maximized level was performed.
4. The measurement was performed at a measurement distance of 3 m where field strength of X dBuV/m was measured. This value was later extrapolated to a distance of 300 m by subtracting 80 dB from the result.
5. A transducer factor was used on the spectrum analyser during measurement. This factor includes correction between the fixed gain of the magnetic loop antenna and the calibration values. It also includes the value of the RF cable used to connect the antenna to the spectrum analyser which was incorporated into the annual calibration of the magnetic loop antenna.
6. Since the field strength level is below the quasi-peak limit, hence no quasi-peak detector measurement is required.

**Transmitter Fundamental Field strength test setup****Open Area Test Site****Semi Anechoic Chamber**



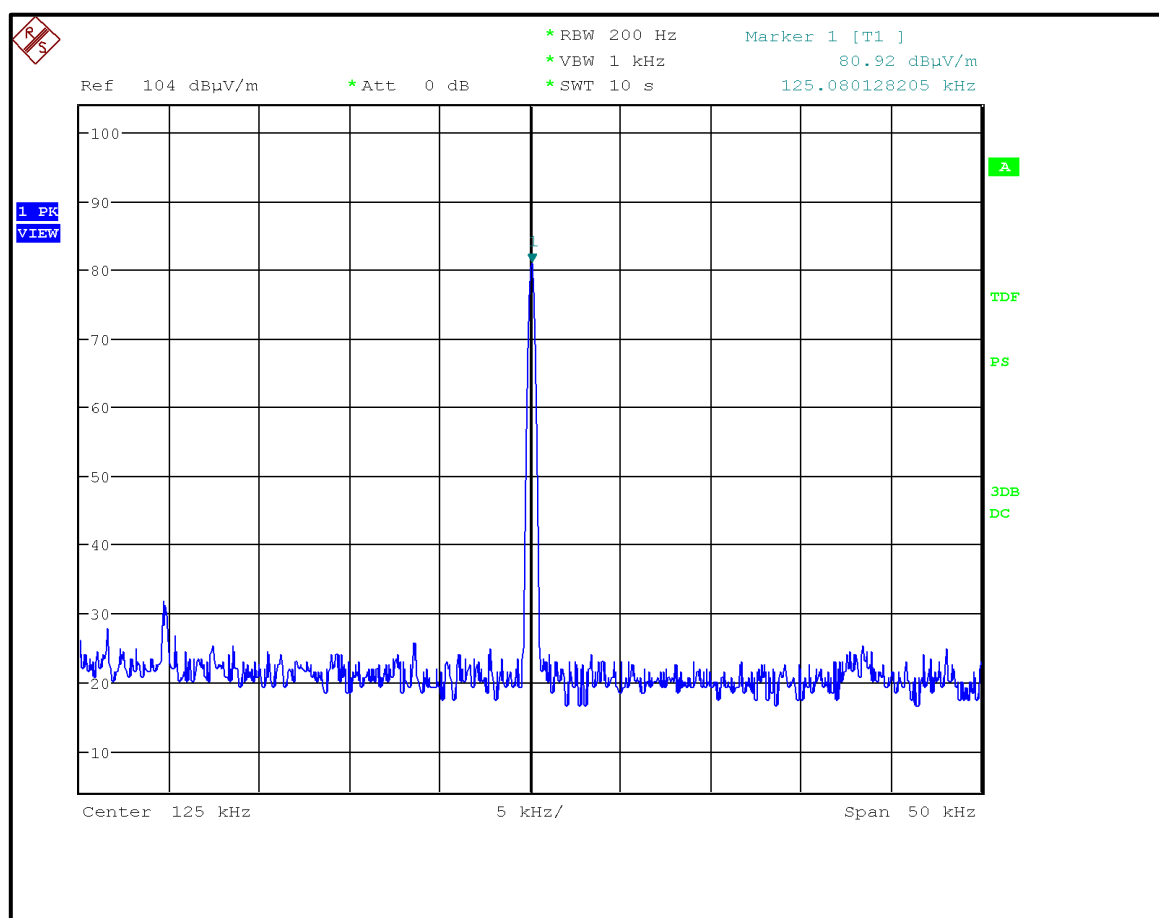
**Transmitter Fundamental Field Strength (continued)****Results: C2 / RFID / TX / PWR MAX**

| Frequency (MHz) | Measurement Antenna Polarization | Measured Level at 3 m (dB $\mu$ V/m) | Extrapolated Level at 300 m (dB $\mu$ V/m) | Deviation from OATS to SAC | Corrected Level at 300 m (dB $\mu$ V/m) with deviation added | Limit at 300 m (dB $\mu$ V/m) | Margin (dB) | Result |
|-----------------|----------------------------------|--------------------------------------|--|----------------------------|--|-------------------------------|-------------|--------|
| 124.92          | 0° to EUT                        | 79.81                                | -0.19                                      | 0.64                       | 0.45   | 25.7                          | 25.25       | Pass   |

**Result: Pass**

**Transmitter Fundamental Field Strength (continued)****Results: C3 / RFID / TX / PWR MAX**

| Frequency (MHz) | Measurement Antenna Polarization | Measured Level at 3 m (dB $\mu$ V/m) | Extrapolated Level at 300 m (dB $\mu$ V/m) | Deviation from OATS to SAC | Corrected Level at 300 m (dB $\mu$ V/m) with deviation added | Limit at 300 m (dB $\mu$ V/m) | Margin (dB) | Result |
|-----------------|----------------------------------|--------------------------------------|--|----------------------------|--|-------------------------------|-------------|--------|
| 125.08          | 0° to EUT                        | 80.92                                | 0.92                                       | 0.64                       | 1.56   | 25.66                         | 24.1        | Pass   |

**Result: Pass**

**5.2.3. Transmitter Radiated Spurious Emissions****Test Summary:**

|                                   |   |                   |                                      |
|-----------------------------------|---|-------------------|--------------------------------------|
| <b>Test Engineer:</b>             | Muhammad Faiq Khan                                    | <b>Test Date:</b> | 11 October 2022 /<br>17 January 2023 |
| <b>Test Sample Serial Number:</b> | 6WB2208260150 (Radiated Test sample) (C2)             |                   |                                      |
| <b>Test Sample Serial Number:</b> | MX7-REY28.11.22.000.10088 (Radiated Test sample) (C3) |                   |                                      |
| <b>Test Site Identification</b>   | SR 1/2  |                   |                                      |

|                          |                                       |
|--------------------------|---------------------------------------|
| <b>FCC Reference:</b>    | Parts 15.209(a)                       |
| <b>Test Method Used:</b> | ANSI C63.10 Sections 6.3, 6.4 and 6.5 |
| <b>Frequency Range:</b>  | 9 kHz to 1000 MHz                     |

**Environmental Conditions:**

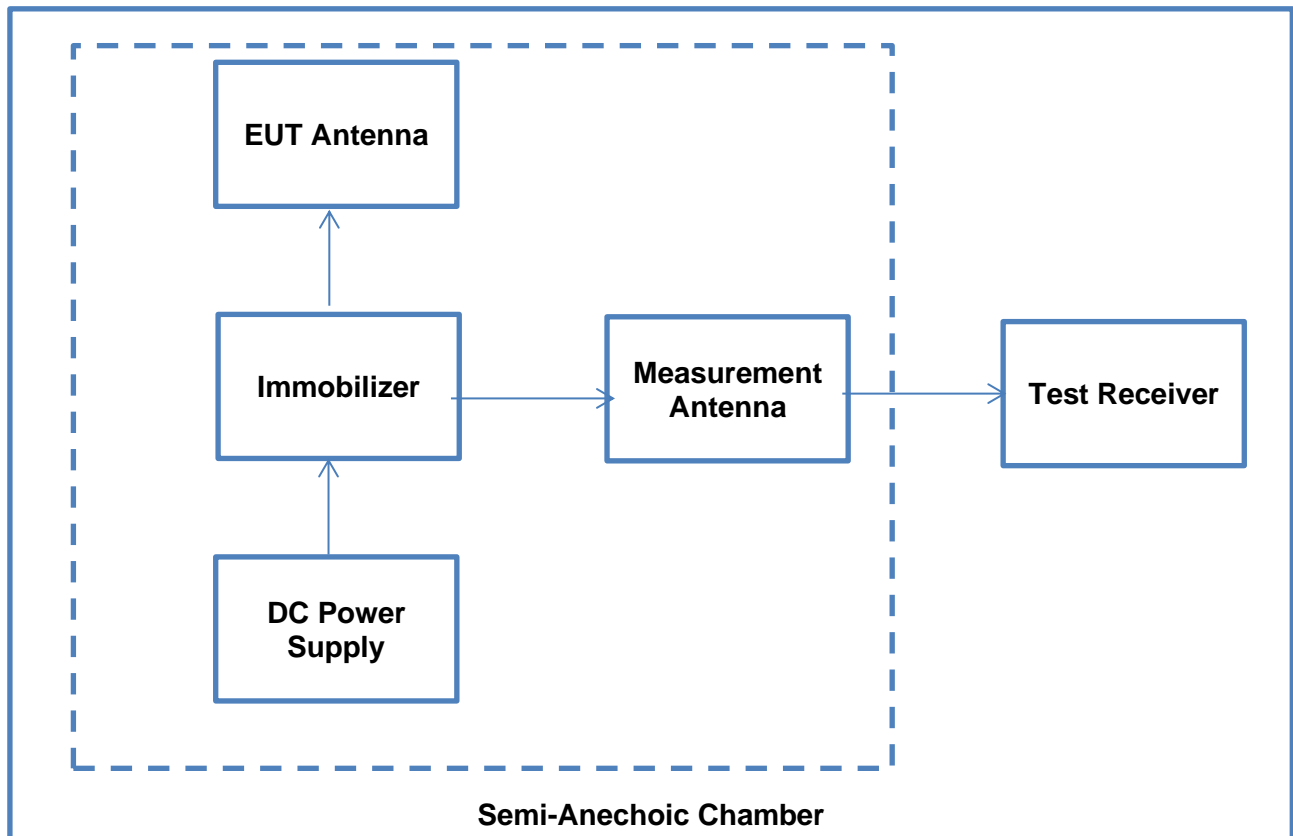
|                               |        |
|-------------------------------|--------|
| <b>Temperature (°C):</b>      | 21     |
| <b>Relative Humidity (%):</b> | 58, 37 |

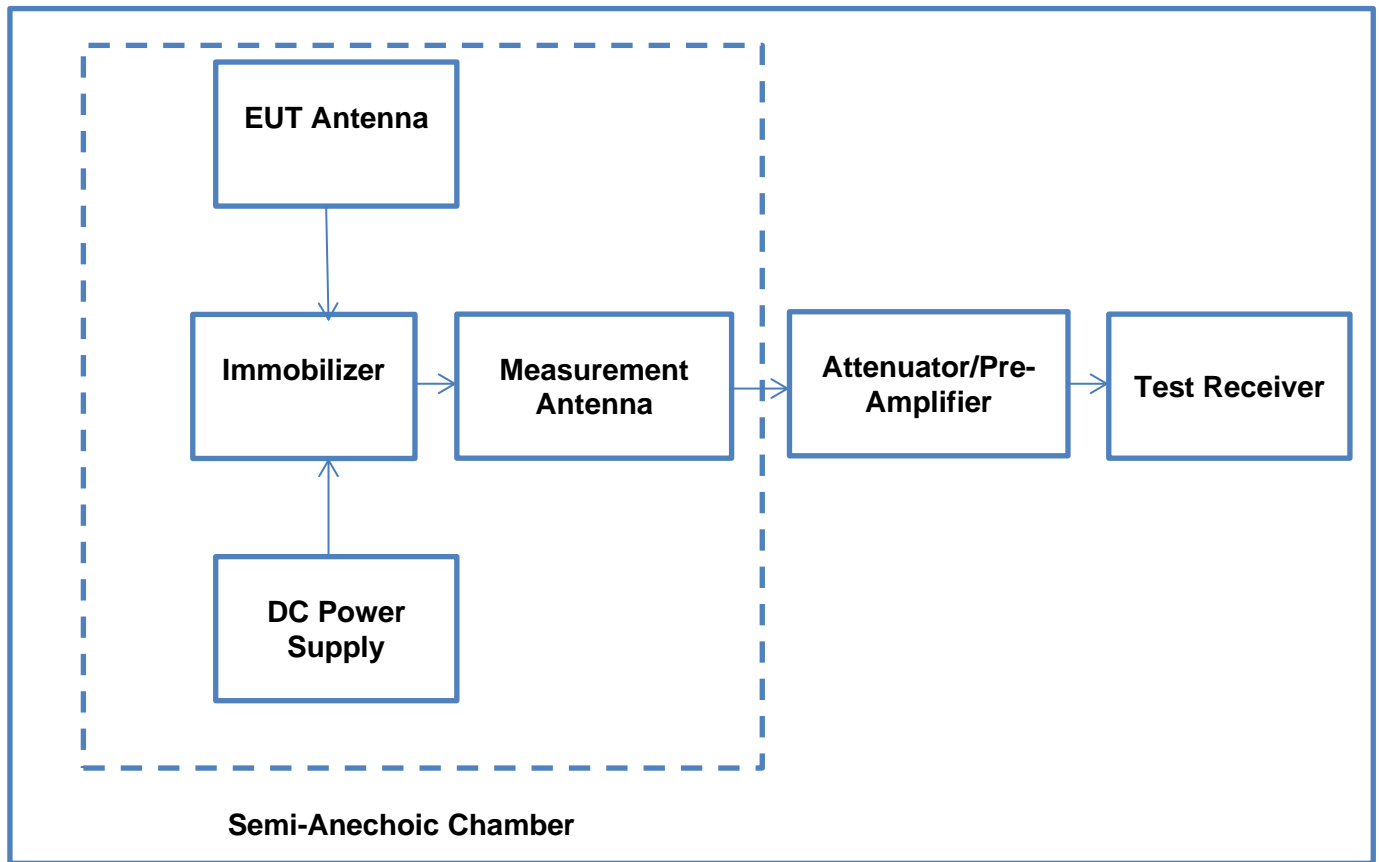
**Settings of the Instrument**

| Frequency Range | RBW     | VBW     | Detector      |
|-----------------|---------|---------|---------------|
| 9 kHz-150 kHz   | 300 Hz  | 1 kHz   | Peak Detector |
| 150 kHz-30 MHz  | 10 kHz  | 30 kHz  | Peak Detector |
| 30 MHz-1 GHz    | 100 kHz | 300 kHz | Peak Detector |

**Note(s):**

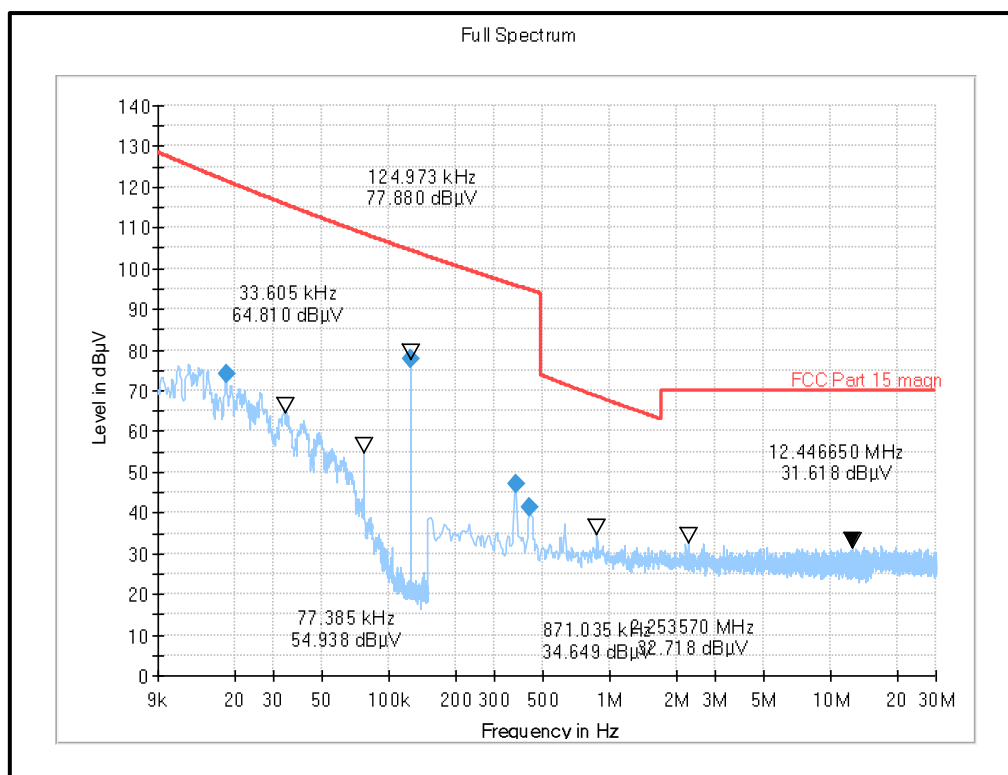
- In accordance with FCC KDB 414788, an alternative test site may be used for the measurement. Therefore, the result from the semi-anechoic chamber tests is shown in this section of the test report.
- The emissions from 9 kHz to 1 GHz were recorded. Markers were placed on the peaks of the pre-scan plots and the worst-case emissions were noted.
- All other emissions were greater than 20 dB below the applicable limit, below the noise floor of the measurement system or ambient.
- Measurements were performed in a semi-anechoic chamber at a distance of 3 metres. The EUT was placed at a height of 80 cm above the reference ground plane in the centre of the chamber turntable. Between 30 MHz and 1 GHz, maximum emission levels were determined by height searching the measurement antenna over the range 1 metre to 4 metres.
- A transducer factor was used on the spectrum analyser during open field tests. This factor includes correction between the fixed gain of the magnetic loop antenna and the calibration values. It also includes the value of the RF cable used to connect the antenna to the spectrum analyser which was incorporated into the annual calibration of the magnetic loop antenna.
- The emission shown at approximately 125 kHz is the fundamental emission. The worst-case emissions were presented in the result table.
- Since the field strength level is below the quasi-peak limit, hence no quasi-peak detector measurement is required.
- The measurement was performed at a measurement distance of 3 m where field strength of X dBuV/m was measured.
  - 9 kHz- 490 kHz: measured level extrapolated to a distance of 300 m by subtracting 80 dB from the result.
  - 490kHz-1705 kHz: measured level extrapolated to a distance of 30 m by subtracting 40 dB from the result.

**Transmitter Radiated Spurious Emission test setup (Measurement below 30 MHz)****Test Setup:**

**Transmitter Radiated Spurious Emission test setup (Measurement above 30 MHz)****Test Setup:**

**Transmitter Radiated Spurious Emissions (continued)****Results: C2 / RFID / TX / PWR MAX**

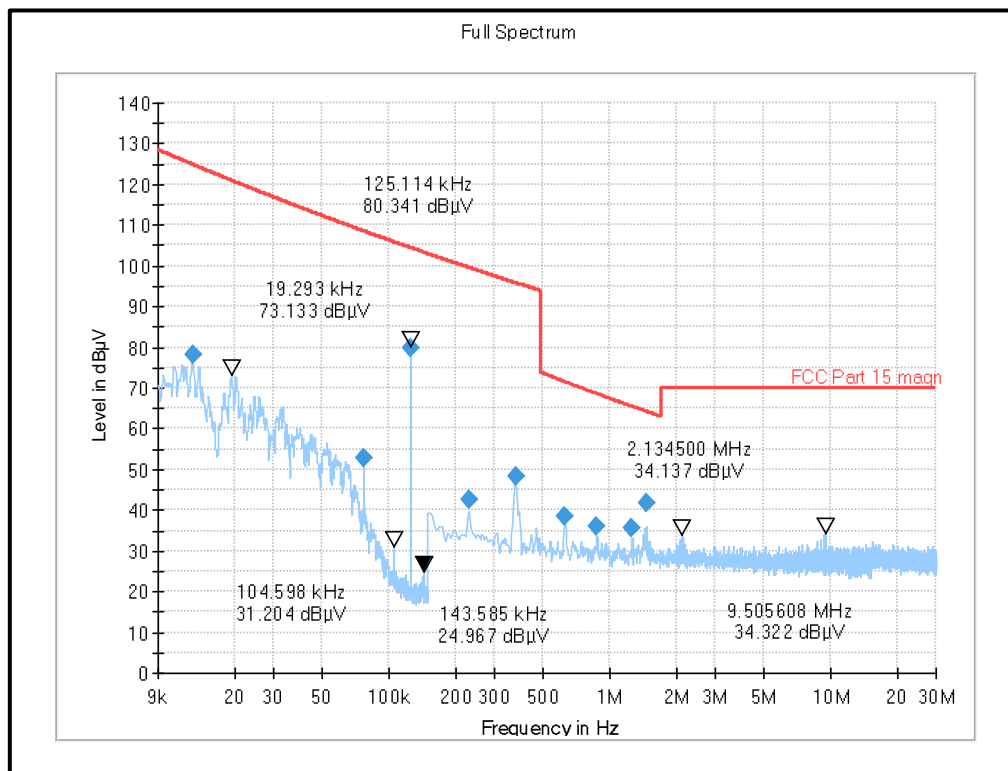
| Frequency (MHz) | Antenna Polarization | Extrapolated Levels (dB $\mu$ V/m) | Limit (dB $\mu$ V/m) | Margin (dB) | Result   |
|-----------------|----------------------|------------------------------------|----------------------|-------------|----------|
| 0.018306        | Vertical             | 74.25                              | 121.51               | 47.26       | Complied |
| 0.124973        | Horizontal           | 77.88                              | 104.46               | 26.58       | Complied |
| 0.374910        | Horizontal           | 46.91                              | 95.80                | 48.89       | Complied |
| 0.434445        | Vertical             | 41.24                              | 94.69                | 53.45       | Complied |

**Result: Pass****Plot: Radiated Spurious Emissions (9kHz-30 MHz) @ 3m**

Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying table.

**Transmitter Radiated Spurious Emissions (continued)****Results: C3 / RFID / TX / PWR MAX**

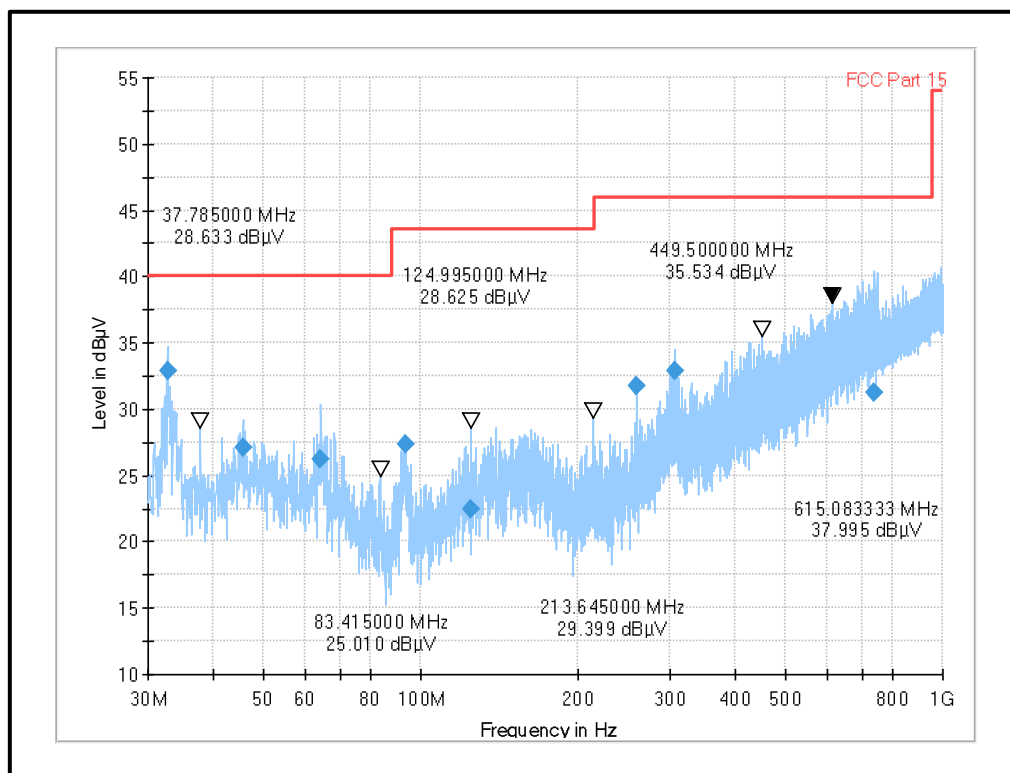
| Frequency (MHz) | Antenna Polarization | Extrapolated Levels (dB $\mu$ V/m) | Limit (dB $\mu$ V/m) | Margin (dB) | Result   |
|-----------------|----------------------|------------------------------------|----------------------|-------------|----------|
| 0.012878        | Vertical             | 78.20                              | 124.93               | 46.73       | Complied |
| 0.077456        | Horizontal           | 52.93                              | 108.47               | 55.54       | Complied |
| 0.125114        | Horizontal           | 79.88                              | 104.45               | 24.57       | Complied |
| 0.229380        | Horizontal           | 42.63                              | 99.58                | 56.95       | Complied |
| 0.374910        | Horizontal           | 48.44                              | 95.80                | 47.36       | Complied |
| 0.622973        | Horizontal           | 38.45                              | 71.58                | 33.13       | Complied |
| 0.874343        | Horizontal           | 35.84                              | 68.56                | 32.72       | Complied |
| 1.264628        | Vertical             | 35.60                              | 65.41                | 29.81       | Complied |
| 1.469693        | Vertical             | 41.91                              | 64.17                | 22.26       | Complied |

**Result: Pass****Plot: Radiated Spurious Emissions (9kHz-30 MHz) @ 3m**

Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying table.

**Transmitter Radiated Spurious Emissions (continued)****Results: C2 / RFID / TX / PWR MAX**

| Frequency (MHz) | Antenna Polarization | Extrapolated Levels (dB $\mu$ V/m) | Limit (dB $\mu$ V/m) | Margin (dB) | Result   |
|-----------------|----------------------|------------------------------------|----------------------|-------------|----------|
| 32.700000       | Vertical             | 32.93                              | 40.00                | 7.07        | Complied |
| 45.615000       | Vertical             | 27.08                              | 40.00                | 12.92       | Complied |
| 64.200000       | Vertical             | 26.27                              | 40.00                | 13.73       | Complied |
| 93.630000       | Vertical             | 27.35                              | 43.50                | 16.15       | Complied |
| 124.995000      | Vertical             | 22.50                              | 43.50                | 21.00       | Complied |
| 258.240000      | Horizontal           | 31.77                              | 46.00                | 14.23       | Complied |
| 306.233333      | Horizontal           | 32.88                              | 46.00                | 13.12       | Complied |
| 736.458333      | Vertical             | 31.23                              | 46.00                | 14.77       | Complied |

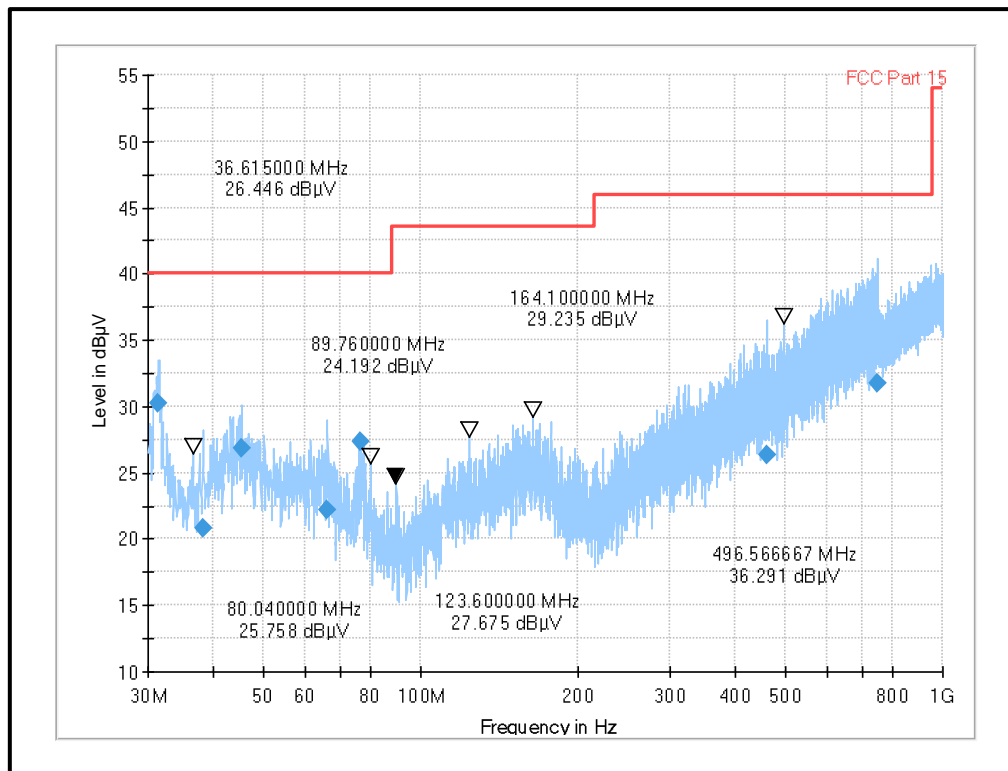
**Result: Pass****Plot: Radiated Spurious Emissions (30 MHz-1 GHz) @ 3m**

Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying table.



**Transmitter Radiated Spurious Emissions (continued)****Results: C3 / RFID / TX / PWR MAX**

| Frequency (MHz) | Antenna Polarization | Extrapolated Levels (dB $\mu$ V/m) | Limit (dB $\mu$ V/m) | Margin (dB) | Result   |
|-----------------|----------------------|------------------------------------|----------------------|-------------|----------|
| 31.440000       | Vertical             | 30.28                              | 40.00                | 9.72        | Complied |
| 38.325000       | Vertical             | 20.77                              | 40.00                | 19.23       | Complied |
| 45.300000       | Vertical             | 26.83                              | 40.00                | 13.17       | Complied |
| 66.270000       | Vertical             | 22.16                              | 40.00                | 17.84       | Complied |
| 76.530000       | Vertical             | 27.35                              | 40.00                | 12.65       | Complied |
| 460.966667      | Horizontal           | 26.30                              | 46.00                | 19.70       | Complied |
| 747.833333      | Horizontal           | 31.71                              | 46.00                | 14.29       | Complied |

**Result: Pass****Plot: Radiated Spurious Emissions (30 MHz-1 GHz) @ 3m**

Note: These plots are pre-scans and for indication purposes only. For final measurements, see accompanying table.

## 6. Measurement Uncertainty

The expression of uncertainty of a measurement result allows realistic comparison of results with reference values and limits given in specifications and standards.

The uncertainty of the result may need to be taken into account when interpreting the measurement results.

The reported expanded uncertainties below are based on a standard uncertainty multiplied by an appropriate coverage factor such that a confidence level of approximately 95% is maintained. For the purposes of this document “approximately” is interpreted as meaning “effectively” or “for most practical purposes”.

| Measurement Type                       | Confidence Level (%) | Calculated Uncertainty |
|--|----------------------|------------------------|
| 20 dB Bandwidth                        | 95%                  | ±0.87 %                |
| Transmitter Fundamental Field Strength | 95%                  | ±3.10 dB               |
| Radiated Spurious Emissions            | 95%                  | ±3.10 dB               |

The methods used to calculate the above uncertainties are in line with those recommended within the various measurement specifications. Where measurement specifications do not include guidelines for the evaluation of measurement uncertainty the published guidance of the appropriate accreditation body is followed.

## 7. Used equipment

### Test site: SR 1/2

| ID      | Manufacturer                        | Type                            | Model      | Serial            | Calibration Date | Cal. Cycle (months) |
|---------|-------------------------------------|---------------------------------|------------|-------------------|------------------|---------------------|
| 1       | Rohde & Schwarz                     | Antenna, Loop                   | HFH2-Z2    | 831247/012        | 10/07/2020       | 36                  |
| 460     | Deisel                              | Turntable                       | DT 4250 S  | n/a               | n/a              | n/a                 |
| 452     | Schwarzbeck                         | Antenna, Trilog Broadband       | VULB 9168  | 9168-240          | 02/09/2020       | 36                  |
| 587     | Maturo                              | antenna mast, tilting           | TAM 4.0-E  | 011/7180311       | n/a              | n/a                 |
| 588     | Maturo                              | Controller                      | NCD        | 029/7180311       | n/a              | n/a                 |
| 591     | Rohde & Schwarz                     | Receiver                        | ESU 40     | 100244/040        | 13/07/2022       | 12                  |
| 669     | Rohde & Schwarz                     | EMI Test Receiver               | ESW 44     | 103087            | 03/02/2022       | 18                  |
| 608     | Rohde & Schwarz                     | Switch Matrix                   | OSP 120    | 101227            | lab verification | n/a                 |
| 628     | Maturo                              | Antenna mast                    | CAM 4.0-P  | 224/19590716      | n/a              | n/a                 |
| 629     | Maturo                              | Kippeinrichtung                 | KE 2.5-R-M | MAT002            | n/a              | n/a                 |
| -/-     | Testo                               | Thermo-Hygrometer               | 608-H1     | 01                | lab verification | n/a                 |
| 1603665 | Siemens<br>Matsushita<br>Components | semi-anechoic chamber<br>SR1/ 2 | -/-        | B83117-A1421-T161 | n/a              | n/a                 |

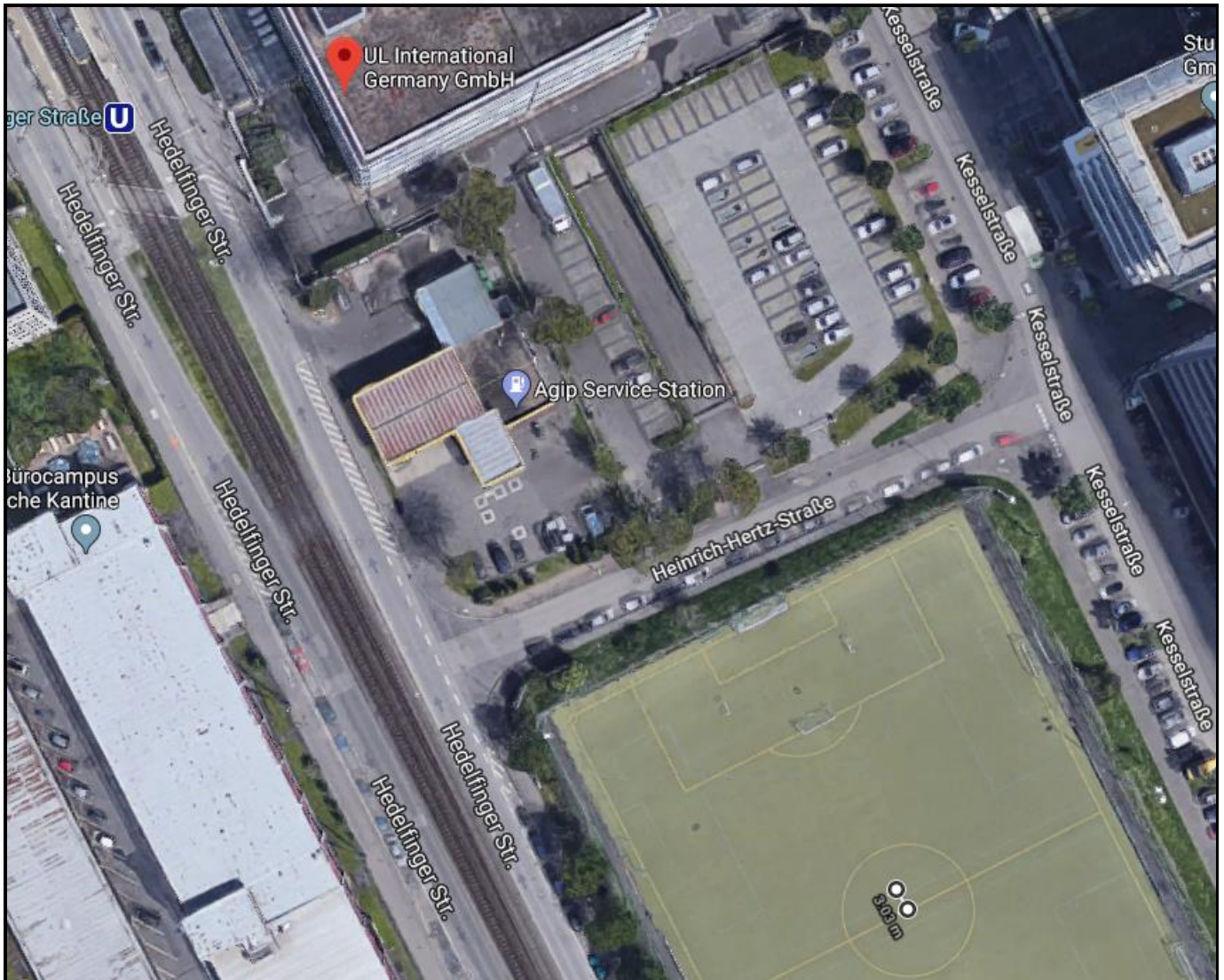
### Test site: SR 9

| ID  | Manufacturer           | Type                               | Model                  | Serial             | Calibration Date                                  | Cal. Cycle (months) |
|-----|------------------------|------------------------------------|------------------------|--------------------|---|---------------------|
| 625 | Schwarzbeck            | Antenna, H-field                   | HFSL 7101              | 109                | lab verification<br>only relative<br>measurements | n/a                 |
| 637 | Rohde & Schwarz        | Spectrum Analyser                  | FSV40                  | 101587             | 15/07/2022  | 12                  |
| -/- | Testo                  | Thermo-Hygrometer                  | 608-H1                 | 07                 | lab verification                                  | n/a                 |
| 645 | Weiss<br>Umwelttechnik | Climatic Chamber                   | LabEvent<br>T/110/70/3 | 5822619794<br>0010 | lab verification                                  | n/a                 |
| 327 | SPS                    | AC/DC power distribution<br>system | PAS 5000               | A2464 00/1<br>0200 | lab verification                                  | n/a                 |

## 8. Open-Area-Test Site comparison

GPS coordinates

48.765746, 9.250684



## Test Setup

The following listed equipment was used for the measurement:

| Manufacturer     | Type               | Model   | Frequency Range |
|------------------|--------------------|---------|-----------------|
| Rohde & Schwarz  | Receiver, EMI Test | SML03   | 9 kHz – 30 MHz  |
| Rohde & Schwarz  | Receiver, EMI Test | ESIB7   | 20 Hz – 7 GHz   |
| Rohde & Schwarz  | Antenna, Loop      | HFH2-Z2 | 1 kHz – 30 MHz  |
| ETS LINDGREN     | Antenna, Loop      | 6512    | 1 kHz – 30 MHz  |
| Huber and Suhner | RF Cable           | -       | -               |
| Elspec           | BNC Cable          | -       | -               |

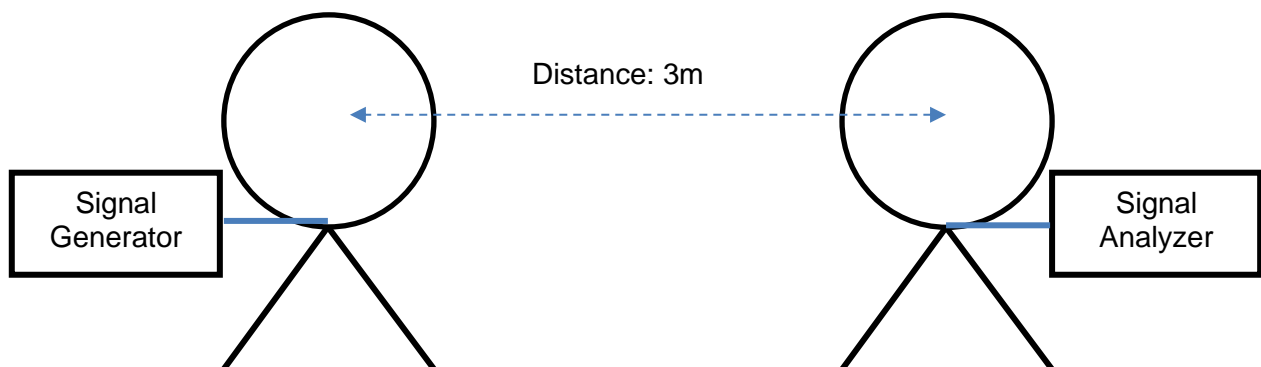
The transmit signal to the ETS Lindgren loop antenna is supplied by the SML signal generator.

The distance of the transmit and receive Antenna was 3m. No other distances can be achieved in SR1 so 10m and 30m distances are not possible. Due to this no comparison is possible.

The Results are valid for equipment which is not larger as the loop antenna which represents in the comparison the EUT.

If an EUT is bigger measurements on an OATS are needed.

The measurement was performed on the lowest frequency 9 kHz and was increased by 10 kHz Steps up to 100 kHz. Then the step size was 100 kHz up to 1000 kHz. From 1 MHz up to the last frequency of 30 MHz the step size was 1 MHz. The HFH2-Z2 loop antenna placed at 80 cm height was used as the receive antenna. The intercepted RF signal from this antenna was measured with the ESIB7 Test Receiver and the values were recorded accordingly.



**Numeric values**

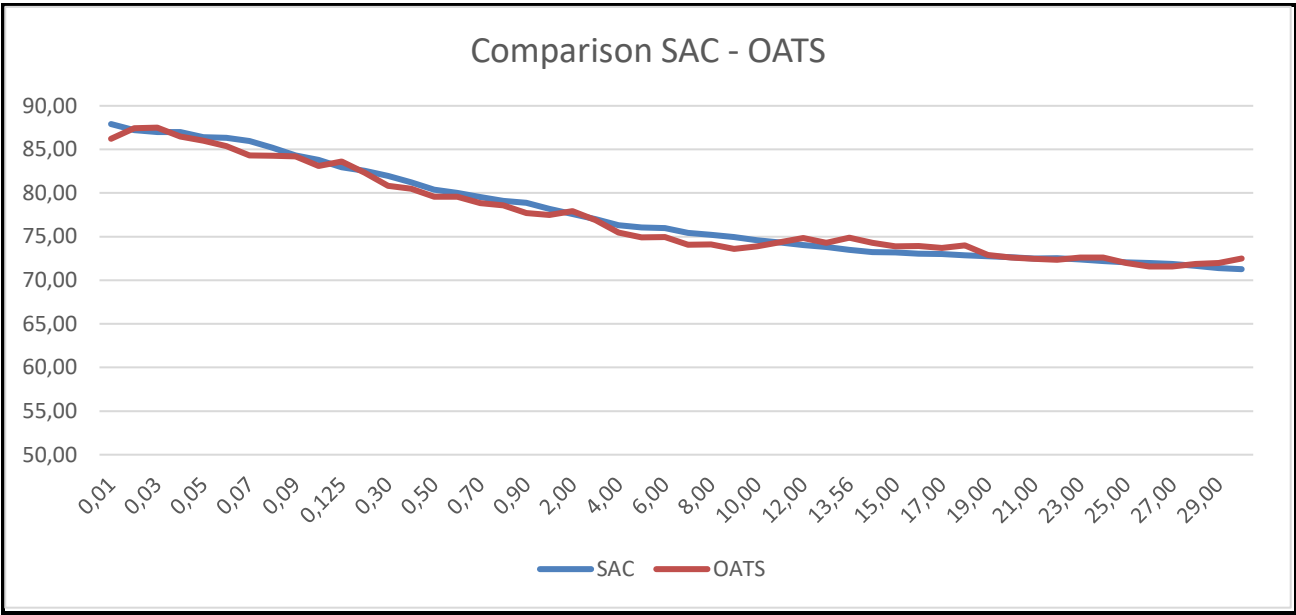
| Frequency (MHz)            | 0.01  | 0.02  | 0.03  | 0.04  | 0.05  | 0.06  | 0.07  | 0.08  | 0.09  | 0.10  | 0.125 | 0.20  |
|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| SR1 Measured power (dBμV)  | 87.91 | 87.22 | 87.01 | 86.98 | 86.40 | 86.32 | 85.98 | 85.20 | 84.30 | 83.80 | 82.96 | 82.55 |
| OATS Measured power (dBμV) | 86.22 | 87.42 | 87.50 | 86.49 | 86.01 | 85.39 | 84.32 | 84.29 | 84.20 | 83.10 | 83.60 | 82.32 |
| Delta (dB)                 | -1.69 | 0.20  | 0.49  | -0.49 | -0.39 | -0.93 | -1.66 | -0.91 | -0.10 | -0.70 | 0.64  | -0.23 |

| Frequency (MHz)            | 0.30  | 0.40  | 0.50  | 0.60  | 0.70  | 0.80  | 0.90  | 1.00  | 2.00  | 3.00  | 4.00  | 5.00  |
|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| SR1 Measured power (dBμV)  | 81.98 | 81.23 | 80.39 | 80.00 | 79.53 | 79.10 | 78.87 | 78.20 | 77.60 | 77.01 | 76.32 | 76.04 |
| OATS Measured power (dBμV) | 80.84 | 80.49 | 79.58 | 79.58 | 78.85 | 78.59 | 77.69 | 77.50 | 77.91 | 76.90 | 75.45 | 74.90 |
| Delta (dB)                 | -1.14 | -0.74 | -0.81 | -0.42 | -0.68 | -0.51 | -1.18 | -0.70 | 0.31  | -0.11 | -0.87 | -1.14 |

| Frequency (MHz)            | 6.00  | 7.00  | 8.00  | 9.00  | 10.00 | 11.00 | 12.00 | 13.00 | 13.56 | 14.00 | 15.00 | 16.00 |
|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| SR1 Measured power (dBμV)  | 75.98 | 75.43 | 75.20 | 74.97 | 74.59 | 74.32 | 74.05 | 73.83 | 73.50 | 73.22 | 73.20 | 73.05 |
| OATS Measured power (dBμV) | 74.94 | 74.09 | 74.11 | 73.58 | 73.87 | 74.38 | 74.84 | 74.31 | 74.88 | 74.29 | 73.90 | 73.93 |
| Delta (dB)                 | -1.04 | -1.34 | -1.09 | -1.39 | -0.72 | 0.06  | 0.79  | 0.48  | 1.38  | 1.07  | 0.70  | 0.88  |

| Frequency (MHz)            | 17.00 | 18.00 | 19.00 | 20.00 | 21.00 | 22.00 | 23.00 | 24.00 | 25.00 | 26.00 | 27.00 | 28.00 | 29.00 | 30.00 |
|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| SR1 Measured power (dBμV)  | 73.00 | 72.86 | 72.74 | 72.64 | 72.50 | 72.52 | 72.39 | 72.20 | 72.04 | 71.97 | 71.86 | 71.64 | 71.41 | 71.27 |
| OATS Measured power (dBμV) | 73.70 | 73.98 | 72.90 | 72.60 | 72.45 | 72.34 | 72.59 | 72.59 | 71.97 | 71.59 | 71.58 | 71.88 | 71.98 | 72.49 |
| Delta (dB)                 | 0.70  | 1.12  | 0.16  | -0.04 | -0.05 | -0.18 | 0.20  | 0.39  | -0.07 | -0.38 | -0.28 | 0.24  | 0.57  | 1.22  |

Graph



Conclusion: Maximum difference is 1.69 dB @ 9 kHz

## 9. Report Revision History

| Version Number   | Revision Details  |               |   |
|--|-------------------|---------------|---|
|  | Page No(s)        | Clause        | Details                                       |
| 1.0  | 31                | -             | Initial Version                               |
| 1.1  | <b>Page No(s)</b> | <b>Clause</b> | <b>Details</b>                                |
|  | 7                 | 3.1           | Updated the EUT identification numbers.       |
|  | 8                 | 3.4           | Table updated (Removed the Temperature range) |
|  | 11                | 5.2.1         | Notes updated                                 |
| <b>Test Report Version 1.2 supersede Version 1.1 with immediate effect</b>                                     |                   |               |   |
| Test Report No. UL-RPT-RP-14374669-616-FCC Version 1.2, Issue Date 20 April 2023 replaces                      |                   |               |   |
| Test Report No. UL-RPT-RP-14374669-616-FCC Version 1.1, Issue Date 28 February 2023, which is no longer valid. |                   |               |   |
| 1.2  | <b>Page No(s)</b> | <b>Clause</b> | <b>Details</b>                                |
|  | 8                 | 3.4           | Table updated (Removed the Antenna Gain info) |

END OF REPORT