



# TEST REPORT

**Test Report No. : UL-RPT-RP-13697467-1016-FCC**

**Applicant** : Boxine GmbH

**Model No.** : 03-xxxx (colour coding)

**FCC ID** : 2AU47-00002

**Technology** : RFID 13.56 MHz

**Test Standard(s)** : FCC Parts 15.207, 15.209(a) & 15.225

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 1.1 supersedes Version 1.0 with immediate effect**  
Test Report No. UL-RPT-RP-13697467-1016-FCC Version 1.1, Issue Date 09 AUGUST 2021 replaces  
Test Report No. UL-RPT-RP-13697467-1016-FCC Version 1.0, Issue Date 22 JULY 2021, which is no longer valid.
5. Result of the tested sample: **PASS**

---

Prepared by: Sercan, Usta  
Title: Laboratory Engineer  
Date: 09 August 2021

---

Approved by: Ajit, Phadtare  
Title: Lead Test Engineer  
Date: 09 August 2021



Deutsche  
Akkreditierungsstelle  
D-PL-19381-02-00

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

**UL INTERNATIONAL GERMANY GMBH**

Hedelfinger Str. 61  
70327 Stuttgart, Germany  
STU.CTECHLab@ul.com

This page has been left intentionally blank.

## 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	8
3.3. Modifications Incorporated in the EUT	8
3.4. Additional Information Related to Testing	9
3.5. Support Equipment	9
A. Support Equipment (In-house)	9
B. Support Equipment (Manufacturer supplied)	9
<b>4. Operation and Monitoring of the EUT during Testing</b>	<b>10</b>
4.1. Operating Modes	10
4.2. Configuration and Peripherals	10
<b>5. Measurements, Examinations and Derived Results</b>	<b>11</b>
5.1. General Comments	11
5.2. Test Results	12
5.2.1. Transmitter AC Conducted Spurious Emissions	12
5.2.2. Transmitter 20 dB Bandwidth	18
5.2.3. Transmitter Fundamental Field Strength & Spectrum Mask	23
5.2.4. Transmitter Radiated Spurious Emissions	27
5.2.5. Transmitter Frequency Stability (Temperature & Voltage Variation)	33
<b>6. Measurement Uncertainty</b>	<b>41</b>
<b>7. Used equipment</b>	<b>42</b>
<b>8. Open-Area-Test Site comparison</b>	<b>43</b>
<b>9. Report Revision History</b>	<b>47</b>

## **1. Customer Information**

### **1.1.Applicant Information**

<b>Company Name:</b>	Boxine GmbH
<b>Company Address:</b>	Grafenberger Allee 120, 40237 Düsseldorf, GERMANY
<b>Company Phone No.:</b>	+49 211 73710100
<b>Company E-Mail:</b>	impressum@tonies.com
<b>Contact Person:</b>	Andrej Henkel
<b>Contact E-Mail Address:</b>	andrei.henkel@boxine.de
<b>Contact Phone No.:</b>	+49 211 542540-49

### **1.2.Manufacturer Information**

<b>Company Name:</b>	Boxine GmbH
<b>Company Address:</b>	Grafenberger Allee 120, 40237 Düsseldorf, GERMANY
<b>Company Phone No.:</b>	+49 211 73710100
<b>Company E-Mail:</b>	impressum@tonies.com
<b>Contact Person:</b>	Andrej Henkel
<b>Contact E-Mail Address:</b>	andrei.henkel@boxine.de
<b>Contact Phone No.:</b>	+49 211 542540-49

## **2. Summary of Testing**

### **2.1. General Information**

#### **Applied Standards**

<b>Specification Reference:</b>	47CFR15.225
<b>Specification Title:</b>	Code of Federal Regulations Volume 47 (Telecommunications): Part 15 Subpart C (Intentional Radiators) - Section 15.225
<b>Specification Reference:</b>	47CFR15.207 and 47CFR15.209
<b>Specification Title:</b>	Code of Federal Regulations Volume 47 (Telecommunications): Part 15 Subpart C (Intentional Radiators) - Sections 15.207 and 15.209

#### **Location**

<b>Location of Testing:</b>	UL International Germany GmbH Hedelfinger Str. 61 70327 Stuttgart Germany
<b>Test Firm Registration:</b>	399704

#### **Date information**

<b>Order Date:</b>	29 January 2021
<b>EUT arrived:</b>	06 April 2021 to 21 June 2021
<b>Test Dates:</b>	09 June 2021 to 23 June 2021
<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	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Part 15.215(c)	Transmitter 20 dB Bandwidth	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Part 15.225(a)(b)(c)(d)	Transmitter Fundamental Field Strength & Spectrum Mask	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Part 15.209(a)/15.225(d)	Transmitter Radiated Emissions	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Part 15.225(e)	Transmitter Frequency Stability (Temperature & Voltage Variation)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**Note(s):**

## **2.3. Methods and Procedures**

<b>Reference:</b>	ANSI C63.4-2014
<b>Title:</b>	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz.
<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>	FCC KDB 414788 D01 Radiated Test Site v01r01
<b>Title:</b>	TEST SITES FOR RADIATED EMISSION MEASUREMENTS
<b>Reference:</b>	FCC KDB 174176 D01 Line Conducted FAQ v01r01 June 3, 2015
<b>Title:</b>	AC Power-Line Conducted Emissions Frequently Asked Questions

## **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>	Toniebox Starterset
<b>Model Name or Number:</b>	03-xxxx (colour coding)
<b>Serial Number:</b>	RFID 1 (Normal Radiated Test Sample)
<b>MAC ID:</b>	90-E2-02-20-C1-9B (RFID HWRev 1.5)
<b>Hardware Version Number:</b>	1.5
<b>Software Version Number:</b>	4.0.0
<b>FCC ID:</b>	2AU47-00002

<b>Brand Name:</b>	Toniebox Starterset
<b>Model Name or Number:</b>	03-xxxx (colour coding)
<b>Serial Number:</b>	RFID 2 (Antenna Terminated with 50 Ω- Radiated Test Sample)
<b>MAC ID:</b>	90-E2-02-20-AD-8E (RFID HWRev 1.5)
<b>Hardware Version Number:</b>	1.5
<b>Software Version Number:</b>	4.0.0
<b>FCC ID:</b>	2AU47-00002

<b>Brand Name:</b>	Boxine
<b>Model Name or Number:</b>	Tonie Figure
<b>Serial Number:</b>	Not stated
<b>Hardware Version Number:</b>	Not Stated
<b>Firmware Version Number:</b>	Not Stated
<b>Additional Details:</b>	Passive RFID-13.56 MHz Key

<b>Brand Name:</b>	Tonies
<b>Model Name or Number:</b>	DYS619-090150W-2
<b>Serial Number:</b>	DYS619-090150-16917A
<b>Hardware Version Number:</b>	1.0
<b>Additional Details:</b>	AC-DC Adapter- Switching Mode Power Supply 100-240 V AC / 0.5 A / 50 Hz to 9 V DC / 1.5 A

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

The equipment under test was a Toniebox Starterset consists of the Toniebox itself, a power supply including docking station DYS 619 and Tonie Lauscher (headset). Toniebox Starterset is an Audio system for children. Tonie figures to be purchased separately are placed on the Toniebox (TB).

An RFID receiver in the Toniebox reads the product ID from the figure (passive RFID chip in the Tonie figure). Via the WLAN module in the TB, the audio content is downloaded from the Boxine-Tonie cloud to the TB's internal memory (flash drive) via the Internet and played back via the TB speaker or Headphone.

This device supports WLAN 2.4 GHz 802.11 b-, g-, n-modes, operations in 2.4 – 2.4835 GHz ISM & WLAN 5GHz a-, n-modes, operations in U-NII-1 5 GHz bands.

### **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 13.56 MHz	
<b>Category of Equipment:</b>	Transceiver	
<b>Channel Spacing:</b>	Single channel device	
<b>Transmit Frequency Range:</b>	13.56 MHz	
<b>Power supply Type 1:</b>	AC-DC Adapter- Switching Mode Power supply	
<b>Power supply Requirement(s):</b>	100-240 V AC / 0.5 A / 50 Hz to 9 V DC / 1.5 A	
<b>Power supply Type 2:</b>	Internal Rechargeable Battery via AC /DC Adapter	
<b>Power supply Requirement(s):</b>	3.6 V DC / 0.1 A	
<b>Tested Temperature Range:</b>	Minimum	-20 °C
	Maximum	+50 °C

### **3.5. Support Equipment**

The following 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	Variable DC Power Supply	Conrad Electronic	PS-2403D	N/A

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

No additional manufacturer supplied support equipment were necessary to exercise the EUT during testing.

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

### **4.1. Operating Modes**

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

- Continuous transmitting modulated carrier at maximum power in RFID-13.56 MHz test mode.

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

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

#### **EUT Power supply:**

- The EUT can be powered via either with AC/DC power adapter or rechargeable internal battery.
- The critical tests (frequency stability, 20 dB bandwidth) were performed once with AC/DC power adapter and also with fully charged internal battery.
- For AC conducted line emissions measurement the EUT was powered via AC/DC power adapter. The measurements were carried out with 120 VAC /60 Hz & 240 VAC/60 Hz.
- The frequency stability measurements
  - with respect to ambient temperature were performed with nominal supply voltages:
    - EUT powered via AC/DC power adapter: with nominal AC voltage (120 VAC /60 Hz)
    - EUT powered via rechargeable internal battery: fully charged internal battery (3.6 V DC)
  - when varying supply voltage were performed with following supply voltages:
    - EUT powered via AC/DC power adapter:
      - with nominal AC voltage (120 VAC /60 Hz)
      - 85% of the nominal supply AC voltage (102 VAC /60 Hz)
      - 115% of the nominal supply AC voltage (138 VAC /60 Hz)
    - EUT powered via variable DC power supply:
      - with nominal DC voltage (3.6 V DC): using variable DC power supply
      - 85% of the nominal supply DC voltage (3.06 V DC): using variable DC power supply
      - 115% of the nominal supply DC voltage (4.14 V DC): using variable DC power supply

#### **Test Mode Activations:**

- For RFID 13.56 MHz test mode, the Tonie Figure was placed on the EUT; which then reads the product ID from the Tonie figure & activates the RFID communication.

#### **AC Conducted Measurements:**

- In accordance with FCC KDB 174176 Q6, the EUT's RFID 13.56 MHz output port was terminated 50 Ω termination (dummy load).

#### **Radiated Measurements:**

- In accordance with ANSI C63.10 section 5.10.7, the EUT allows for the connection of external accessories, including external electrical control signals. Hence emission tests shall be performed with the EUT and accessories configured in a manner that tends to produce maximum emissions; therefore, all radiated tests were with EUT powered via AC/DC power adapter 120 VAC / 60 Hz.
- Before starting final radiated spurious emission measurements "worst case verification" with the EUT in Standing-position & Laying-position was performed by Lab.
- The EUT in Laying-position was found to be the worst case therefore this report includes relevant 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 80 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 V10.60.10 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 AC Conducted Spurious Emissions**

#### **Test Summary:**

<b>Test Engineer:</b>	Devang Chauhan	<b>Test Date:</b>	23 June 2021
<b>Test Sample Serial Number:</b>	RFID 2 (Antenna Terminated with 50 Ω- Radiated Test Sample)		
<b>Test Site Identification</b>	SR 7/8		

<b>FCC Reference:</b>	Part 15.207
<b>Test Method Used:</b>	ANSI C63.10 Section 6.2 / FCC KDB 174176 and notes below

#### **Environmental Conditions:**

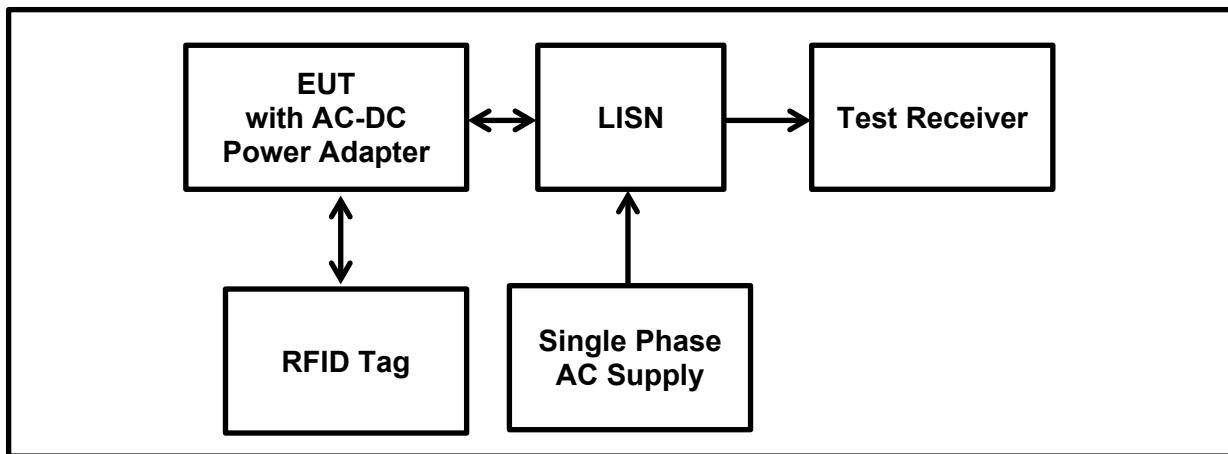
<b>Temperature (°C):</b>	23.2
<b>Relative Humidity (%):</b>	48.1

#### **Settings of the Instrument**

<b>Detector</b>	Quasi Peak/ Average Peak
-----------------	--------------------------

#### **Note(s):**

1. The EUT was plugged into an AC/DC Power supply. The Power supply was connected to 120 VAC / 60 Hz single phase supply via a LISN.
2. In accordance with FCC KDB 174176 Q4, tests were performed with a 240 VAC 60 Hz single phase supply as this was within the voltage range marked on the 100-240 VAC~50/60 Hz power supply.
3. The EUT was configured on RFID 13.56 MHz : Single Channel.
4. In accordance with FCC KDB 174176 Q6, the EUT's RFID 13.56 MHz output port was terminated 50 Ω termination (dummy load).
5. Pre-scans were performed, and markers placed on the highest live and neutral measured levels. Final measurements were performed on the marker frequencies and the results entered into the tables below.
6. The final measured value, for the given emission, in the table below incorporates the cable loss.
7. All other emissions shown on the pre-scan plot were investigated. Only the highest 6 emissions have been reported in the tables below in accordance with ANSI C63.10 section 6.2.5.
8. Measurements were performed in shielded room (SR7/ 8 Asset Number 1603671). The EUT was placed at a height of 80 cm above the reference ground plane and in a distance of 40 cm from the vertical ground plane at the edge of the table.
9. Measurement software used: Toyo EMI Software; CE measurement software EP5/CE Ver 4.0.1.

**Transmitter AC Conducted Spurious Emissions (continued)****Test setup:**

**Transmitter AC Conducted Spurious Emissions (continued)****Results: Live / Quasi Peak / 120 VAC 60 Hz**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.1526	Live	43.30	65.90	22.60	Complied
0.2371	Live	33.00	62.20	29.20	Complied
0.2722	Live	34.00	61.10	27.10	Complied
1.9983	Live	17.40	56.00	38.60	Complied
3.8090	Live	14.20	56.00	41.80	Complied
13.5517	Live	12.10	60.00	47.90	Complied

**Results: Live / Average / 120 VAC 60 Hz**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.1526	Live	17.80	55.90	38.10	Complied
0.2371	Live	13.90	52.20	38.30	Complied
0.2722	Live	17.10	51.10	34.00	Complied
1.9983	Live	5.90	46.00	40.10	Complied
3.8090	Live	5.20	46.00	40.80	Complied
13.5517	Live	5.40	50.00	44.60	Complied

**Results: Neutral / Quasi Peak / 120 VAC 60 Hz**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.1517	Neutral	41.20	65.90	24.70	Complied
0.1663	Neutral	37.30	65.10	27.80	Complied
0.2567	Neutral	28.90	61.50	32.60	Complied
0.4958	Neutral	16.40	56.10	39.70	Complied
2.3182	Neutral	19.90	56.00	36.10	Complied
13.5805	Neutral	13.20	60.00	46.80	Complied

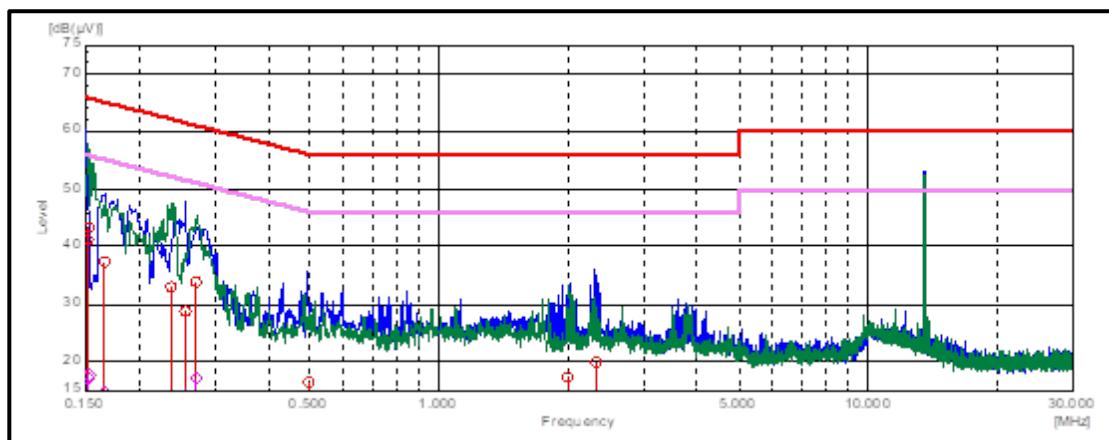
**Results: Neutral / Average / 120 VAC 60 Hz**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.1517	Neutral	17.20	55.90	38.70	Complied
0.1663	Neutral	14.70	55.10	40.40	Complied
0.2567	Neutral	14.10	51.50	37.40	Complied
0.4958	Neutral	6.60	46.10	39.50	Complied
2.3182	Neutral	5.90	46.00	40.10	Complied
13.5805	Neutral	6.10	50.00	43.90	Complied

**Result: Pass**

**Transmitter AC Conducted Spurious Emissions (continued)**

Plot: Live and Neutral Line / 120 VAC 60 Hz



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

**Transmitter AC Conducted Spurious Emissions (continued)****Results: Live / Quasi Peak / 240 VAC 60 Hz**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.1547	Live	36.40	65.70	29.30	Complied
0.2013	Live	32.50	63.60	31.10	Complied
0.2977	Live	36.10	60.30	24.20	Complied
0.7537	Live	19.70	56.00	36.30	Complied
1.5147	Live	21.70	56.00	34.30	Complied
1.9454	Live	18.80	56.00	37.20	Complied

**Results: Live / Average / 240 VAC 60 Hz**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.1547	Live	15.00	55.70	40.70	Complied
0.2013	Live	13.90	53.60	39.70	Complied
0.2977	Live	16.50	50.30	33.80	Complied
0.7537	Live	6.00	46.00	40.00	Complied
1.5147	Live	5.90	46.00	40.10	Complied
1.9454	Live	5.20	46.00	40.80	Complied

**Results: Neutral / Quasi Peak / 240 VAC 60 Hz**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.1624	Neutral	42.20	65.30	23.10	Complied
0.2959	Neutral	41.30	60.40	19.10	Complied
0.7130	Neutral	25.50	56.00	30.50	Complied
1.1908	Neutral	24.10	56.00	31.90	Complied
2.1517	Neutral	24.90	56.00	31.10	Complied
13.5614	Neutral	11.00	60.00	49.00	Complied

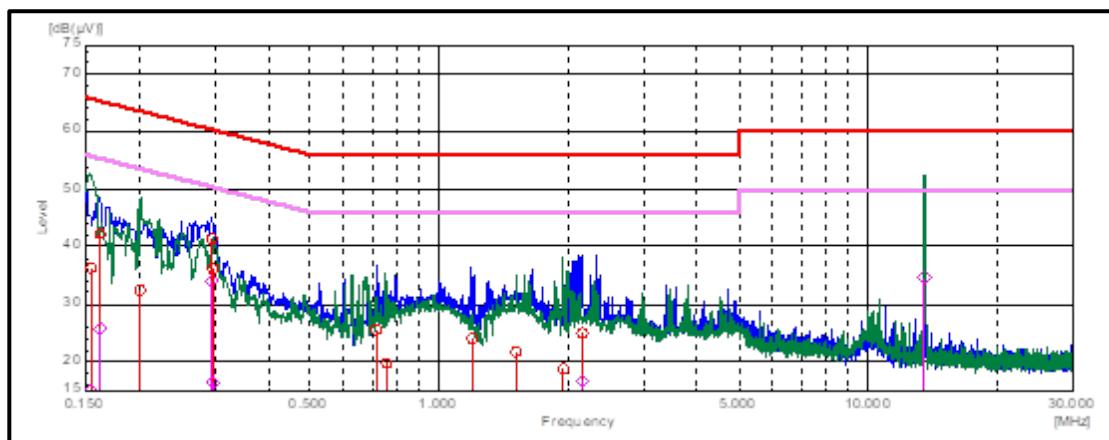
**Results: Neutral / Average / 240 VAC 60 Hz**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.1624	Neutral	25.80	55.30	29.50	Complied
0.2959	Neutral	34.20	50.40	16.20	Complied
0.7130	Neutral	13.70	46.00	32.30	Complied
1.1908	Neutral	12.60	46.00	33.40	Complied
2.1517	Neutral	16.60	46.00	29.40	Complied
13.5614	Neutral	34.70	50.00	15.30	Complied

**Result: Pass**

**Transmitter AC Conducted Spurious Emissions (continued)**

Plot: Live and Neutral Line / 240 VAC 60 Hz



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

**5.2.2. Transmitter 20 dB Bandwidth****Test Summary:**

<b>Test Engineer:</b>	Sercan Usta	<b>Test Dates:</b>	17 June 2021
<b>Test Sample Serial Number:</b>	RFID 1 (Normal Radiated Test Sample)		
<b>Test Site Identification</b>	SR 9		

<b>FCC Reference:</b>	Part 15.215(c)
<b>Test Method Used:</b>	ANSI C63.10 Section 6.9.2 deviations in accordance with notes below

**Environmental Conditions:**

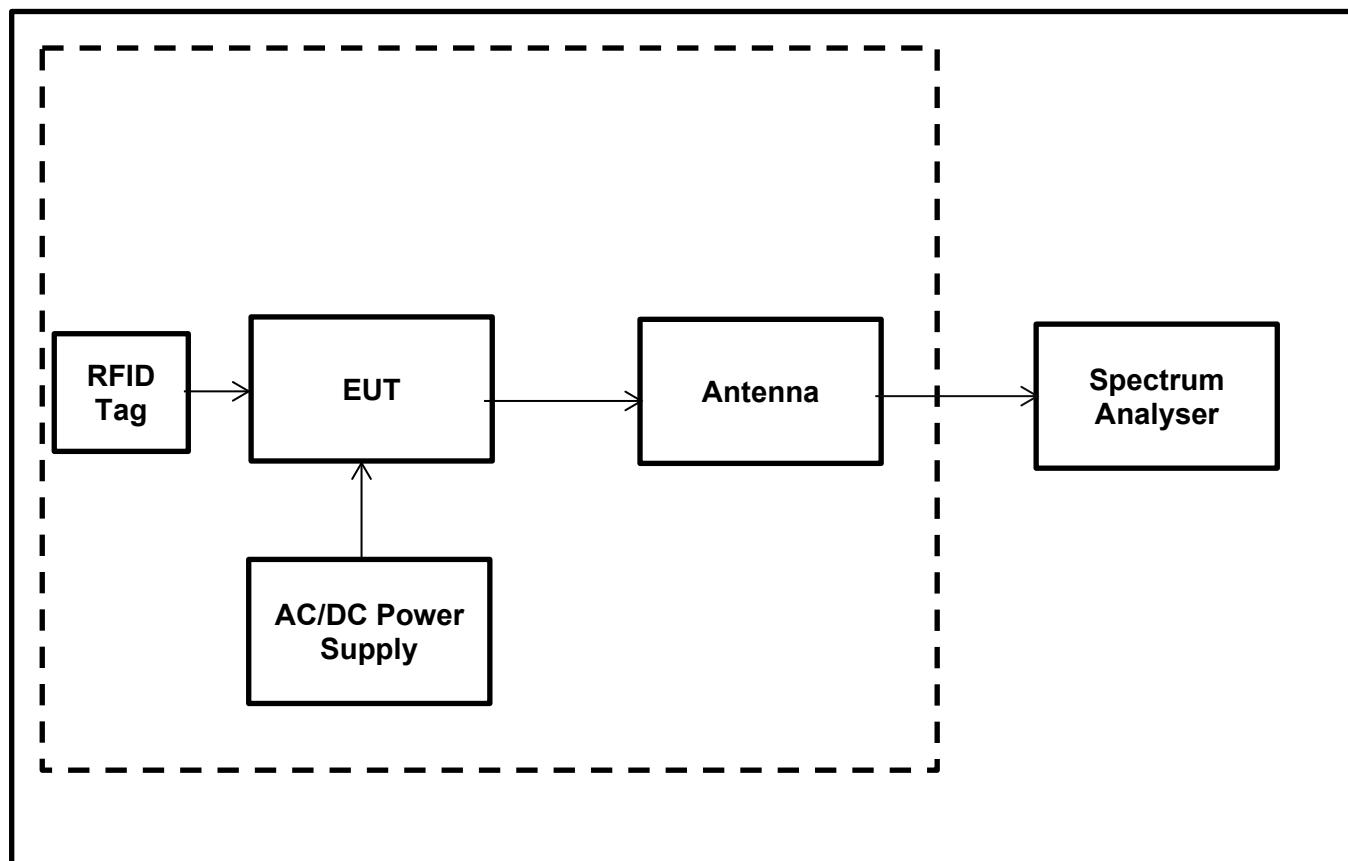
<b>Temperature (°C):</b>	25.3
<b>Relative Humidity (%):</b>	36.8

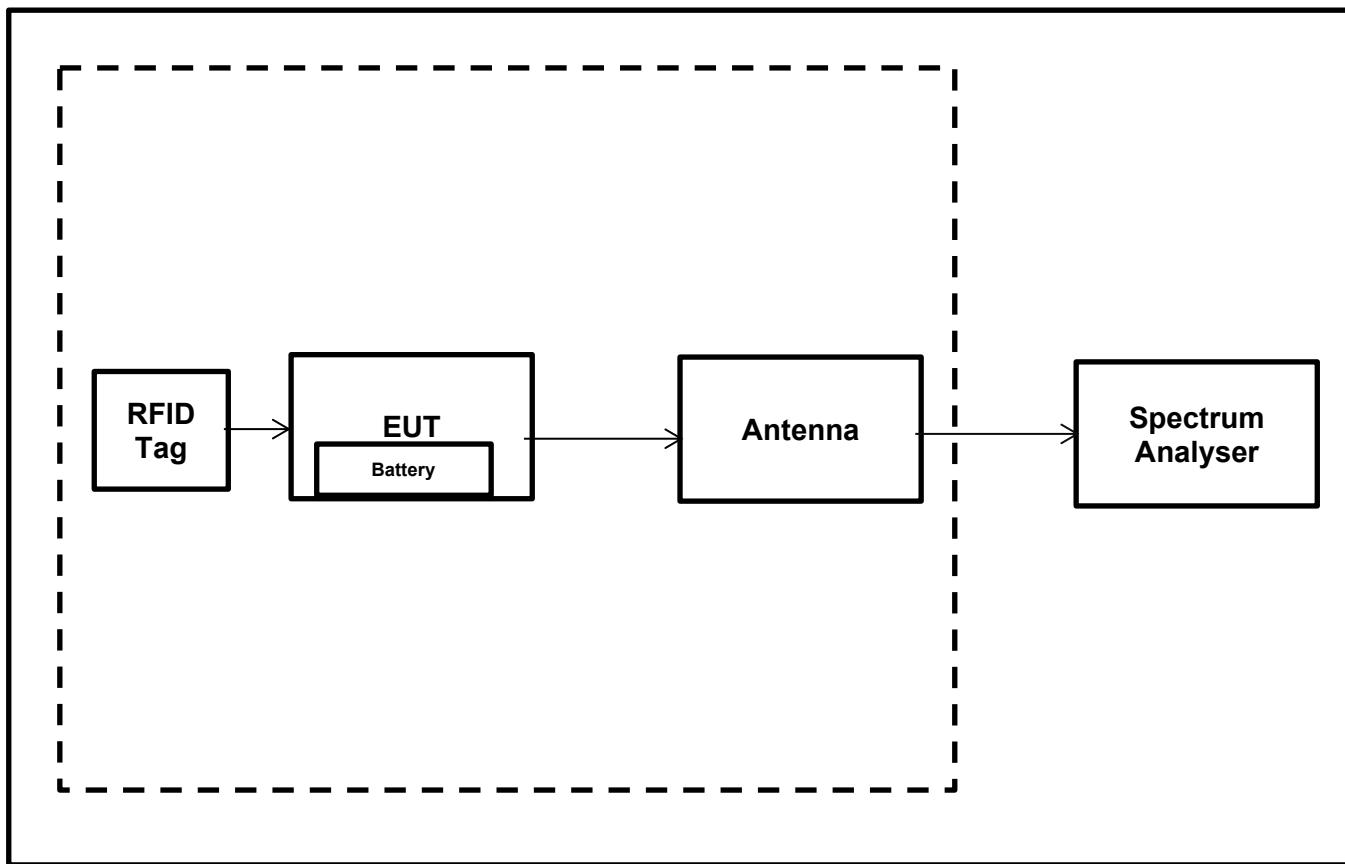
**Settings of the Instrument:**

<b>RBW/VBW:</b>	200 kHz / 1 MHz
<b>Span:</b>	4 MHz
<b>Sweep Time:</b>	Auto
<b>Detector:</b>	MaxPeak

**Notes:**

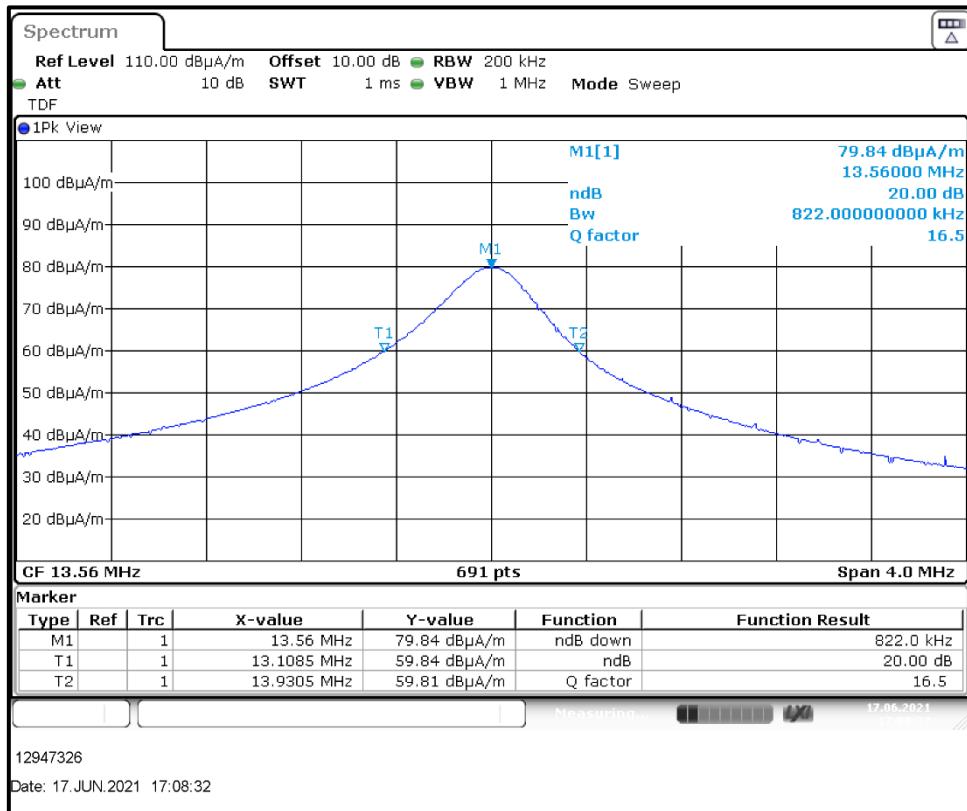
1. Following reasonable deviations to test method ANSI C63.10 Section 6.9.2 were made:
  - o Larger value of RBW (>1% to 5% of the OBW) than those mentioned in ANSI C63.10 Section 6.9.2 (shall be in the range of 1% to 5%)
2. The plot uses a RBW > 5% of the measured OBW but as this plot clearly shows the 20 dB bandwidth remains within the 13.110-14.010 MHz band allocated under 15.215 and the device also complies with the 15.215 "mask". Therefore, additional measurements were not made.
3. The n dB down function of the spectrum analyzer was set to 20 dB.
4. The emission shown on 20 dB Bandwidth plots show the EUT's RFID 13.56 MHz fundamental for the tested channel.
5. As EUT can be operated either with AC/DC power adapter or charged internal battery; measurements were performed once with AC/DC power adapter and also with fully charged internal battery.

**Transmitter 20 dB Bandwidth (Continued)****Test Setup (AC-DC Power Supply):**

**Transmitter 20 dB Bandwidth (continued)****Test Setup (Internal Battery Powered):**

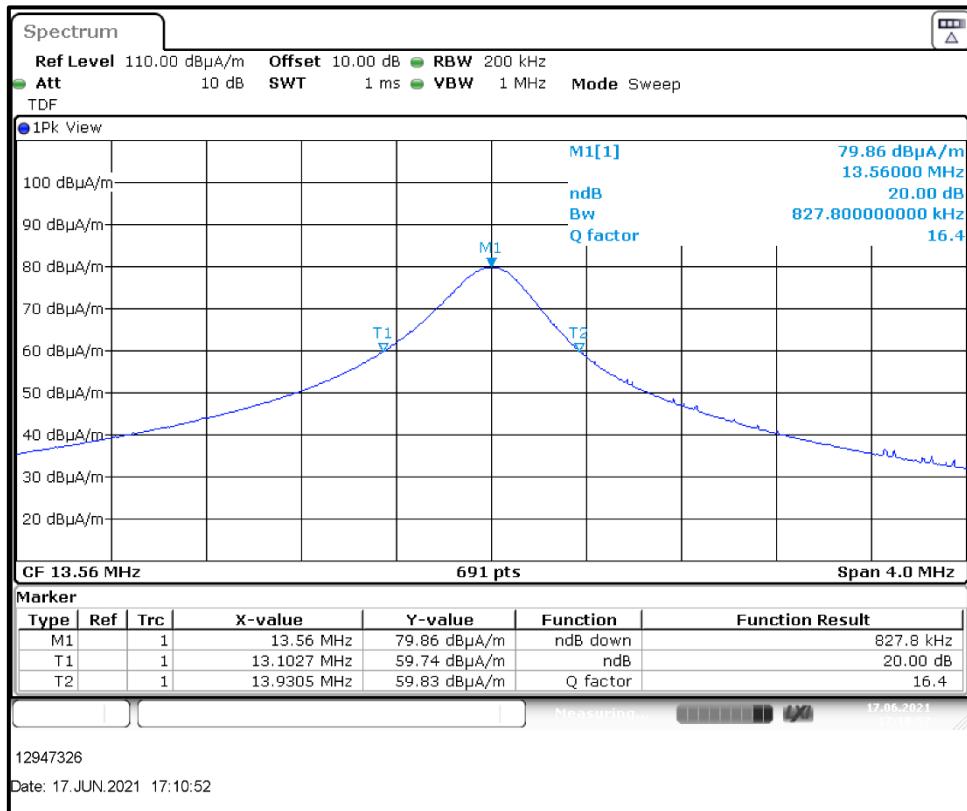
**Transmitter 20 dB Bandwidth (continued)****Results: AC-DC Power Supply / RFID 13.56 MHz**

RFID Channel	20 dB Bandwidth (kHz)
13.56 MHz	822.00

**RFID 13.56 MHz****Result: Pass**

**Transmitter 20 dB Bandwidth (continued)****Results: Fully Charged Internal Battery / RFID 13.56 MHz**

RFID Channel	20 dB Bandwidth (kHz)
13.56 MHz	827.80

**RFID 13.56 MHz****Result: Pass**

**5.2.3. Transmitter Fundamental Field Strength & Spectrum Mask****Test Summary:**

<b>Test Engineer:</b>	Sercan Usta	<b>Test Date:</b>	09 June 2021
<b>Test Sample Serial Number:</b>	RFID 1 (Normal Radiated Test Sample)		
<b>Test Site Identification</b>	SR 1/2		

<b>FCC Reference:</b>	Part 15.225(a)(b)(c)(d)
<b>Test Method Used:</b>	ANSI C63.10 Section 6.4

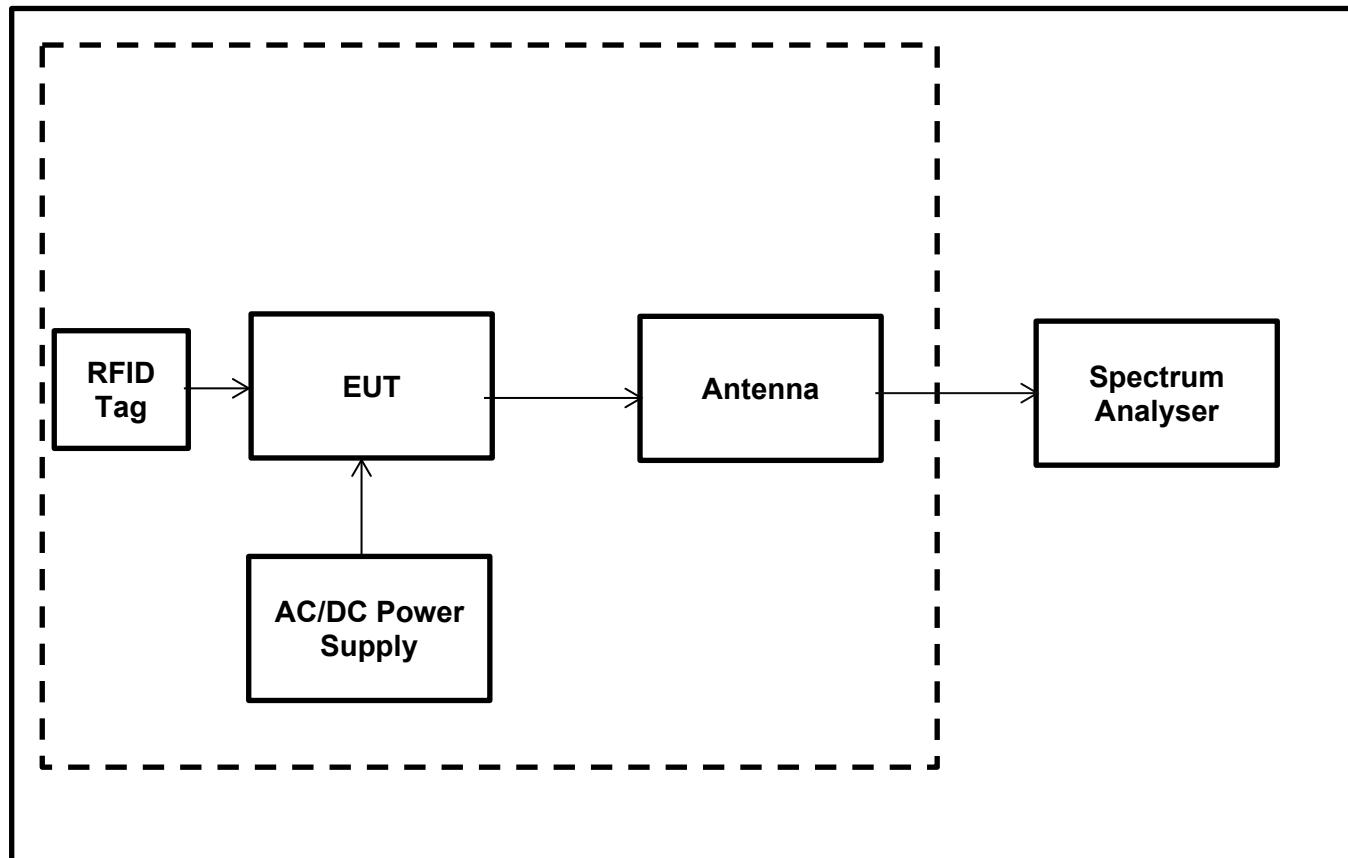
**Environmental Conditions:**

<b>Temperature (°C):</b>	21.5
<b>Relative Humidity (%):</b>	35.7

**Note(s):**

1. The limit is specified at a test distance of 30 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 (40 dB/decade).
2. In accordance with FCC KDB 414788 D01 Radiated Test Site v01 an alternative Test Site was used. Instead of an OATS a Semi Anechoic Chamber was used where evidence was shown that the behaviour is the same. A maximum deviation of 1.38 dB for 13.56 MHz could be determined. This deviation is also taken into account to the result.
3. Therefore, applicable limits were extrapolated from 30 m to 3 m using a distance extrapolation factor of 40 dB/decade. The transducer factor on the measuring instrument was used to extrapolate the measured values from 30 m to 3 m using a distance extrapolation factor of 40 dB/decade.
4. Pre-scan measurements were performed using a spectrum analyser with a peak detector and measurement bandwidth of 10 kHz. The fundamental field strength was maximized by rotating the measurement antenna and EUT. The spectrum analyser was then switched to test receiver mode and the final measurement on the maximized level was performed.
5. Compliance with the spectrum mask is shown by final measurements performed in a semi-anechoic chamber. For the field strength measurements in a semi-anechoic chamber, a transducer factor on the measuring instrument was used to extrapolate the results at 3 m to a distance of 30 m. A distance extrapolation factor of 40 dB was used.
6. 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.
7. For the emissions appearing within the 13.110-14.010 MHz band, compliance with the spectrum mask is shown in accordance with FCC Part 15.225(a)(b)(c)(d) limits.
8. The emissions shown at frequencies approximately at 13.56 MHz on the plot represent EUT's fundamental field strength for RFID 13.56 MHz.
9. For the emissions appearing outside of the 13.110-14.010 MHz band, compliance with the spectrum mask is shown in accordance with FCC Part 15.225(d) referencing FCC Part 15.209 general radiated emission limits.

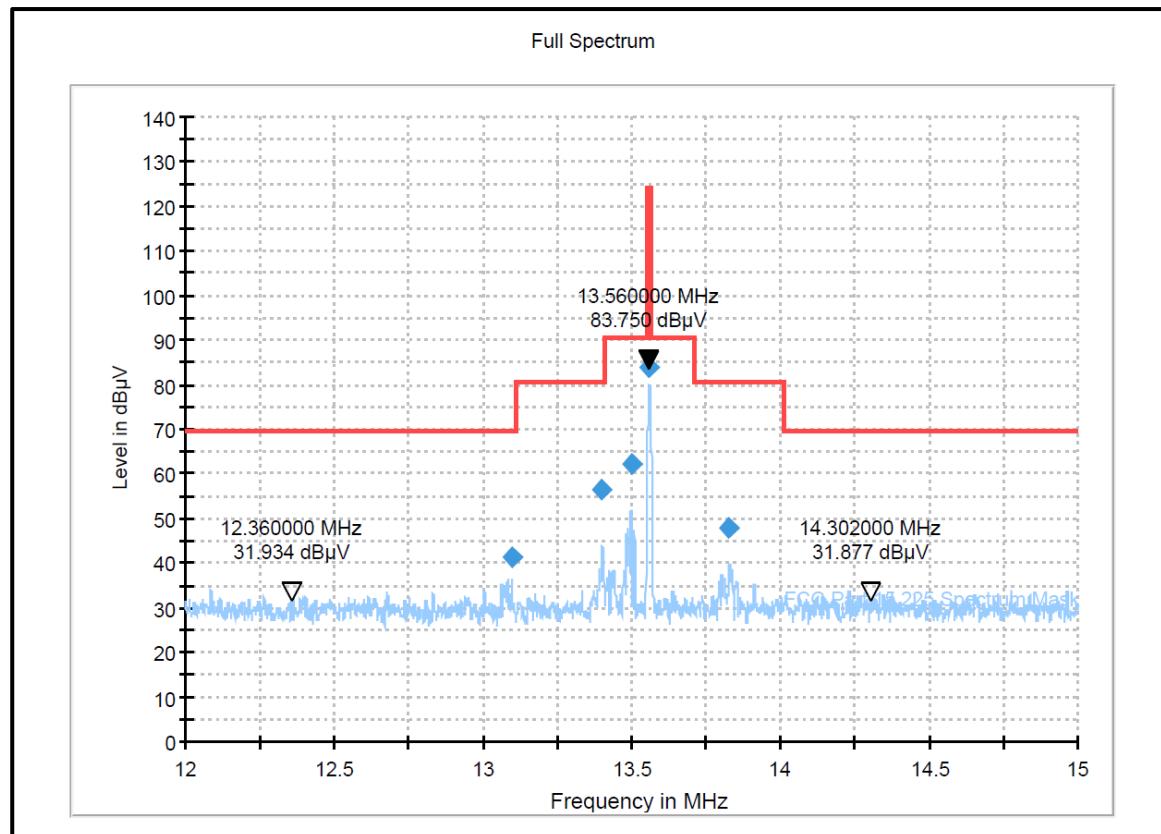
**Transmitter Fundamental Field Strength & Spectrum Mask (continued)**  
**Test Setup (AC-DC Power Supply):**



**Transmitter Fundamental Field Strength(continued)****Results: AC-DC Power supply / RFID 13.56 MHz**

Frequency Band (MHz)	Emission Frequency (MHz)	Loop Antenna Orientation	MaxPeak Emission Level at 3 m (dB $\mu$ V/m) Note 3	Deviation from OATS to SAC) (dB)	Deviation Corrected Level at 3 m (dB $\mu$ V/m)	Limit at 3 m (dB $\mu$ V/m) Note 3	Margin (dB)	Result
12.000 to 13.110	13.098	0° to EUT	41.39	0.48	41.87	70.00	28.13	Complied
13.110 to 13.410	13.400	0° to EUT	56.30	1.25	57.55	81.00	23.45	Complied
13.410 to 13.553	13.497	0° to EUT	62.15	1.38	63.53	91.0	27.47	Complied
13.553 to 13.567	13.560	0° to EUT	83.75	1.38	85.13	124.00	38.87	Complied
13.567 to 13.710	All emissions were found to be below system noise floor							Complied
13.710 to 14.010	13.827	0° to EUT	47.75	1.07	48.82	81.0	32.18	Complied
14.010 to 15.000	All emissions were found to be below system noise floor							Complied

**Result: Pass**



**RFID 13.56 MHz / Fundamental Field Strength & Spectrum Mask at 3 m**

### 5.2.4. Transmitter Radiated Spurious Emissions

#### Test Summary:

<b>Test Engineer:</b>	Sercan Usta	<b>Test Date:</b>	09 June 2021
<b>Test Sample Serial Number:</b>	RFID 1 (Normal Radiated Test Sample)		
<b>Test Site Identification</b>	SR 1/2		

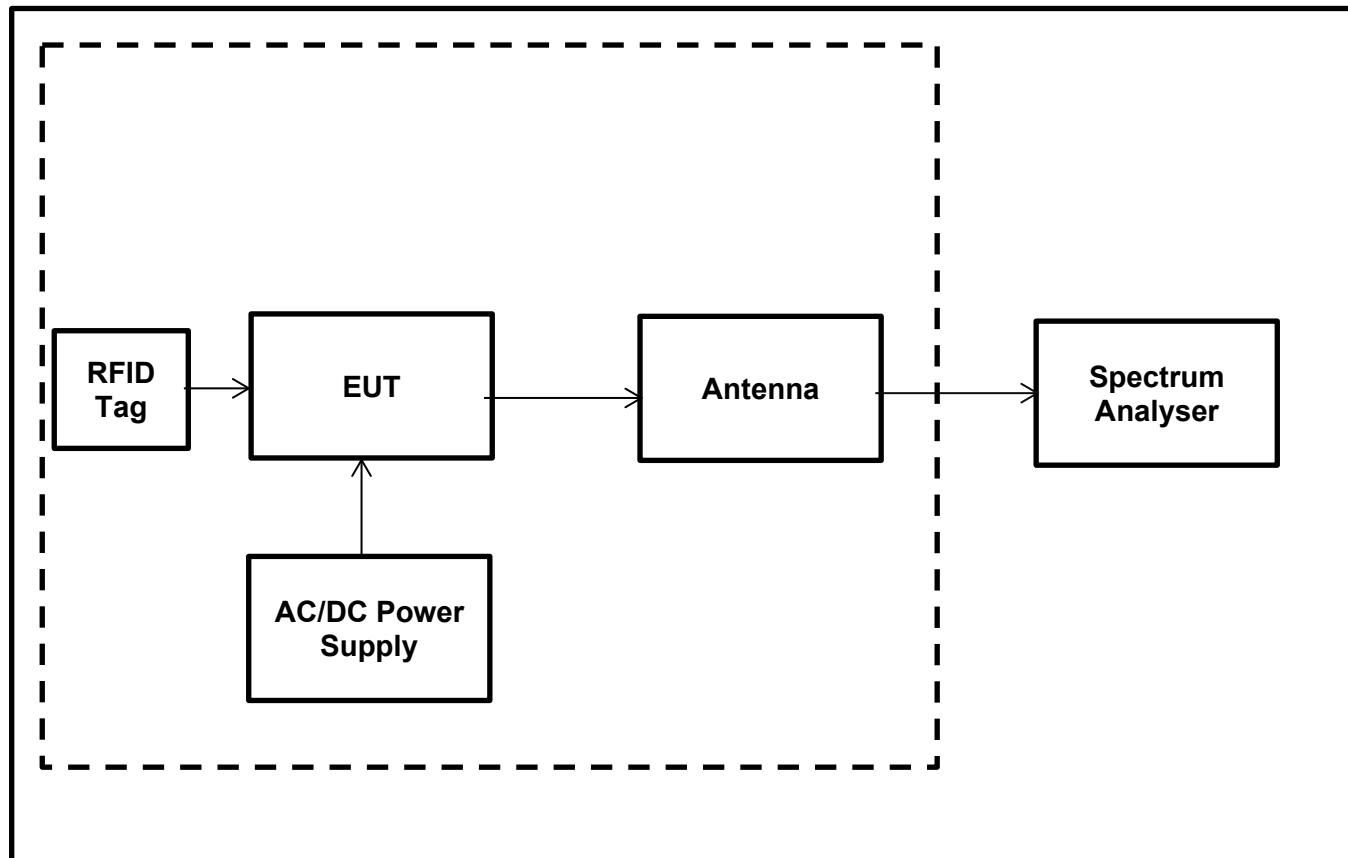
<b>FCC Reference:</b>	Parts 15.225(d) & 15.209(a)
<b>Test Method Used:</b>	ANSI C63.10:2013 Sections 6.3 and 6.4
<b>Frequency Range:</b>	9 kHz to 30 MHz

#### Environmental Conditions:

<b>Temperature (°C):</b>	21.5
<b>Relative Humidity (%):</b>	35.7

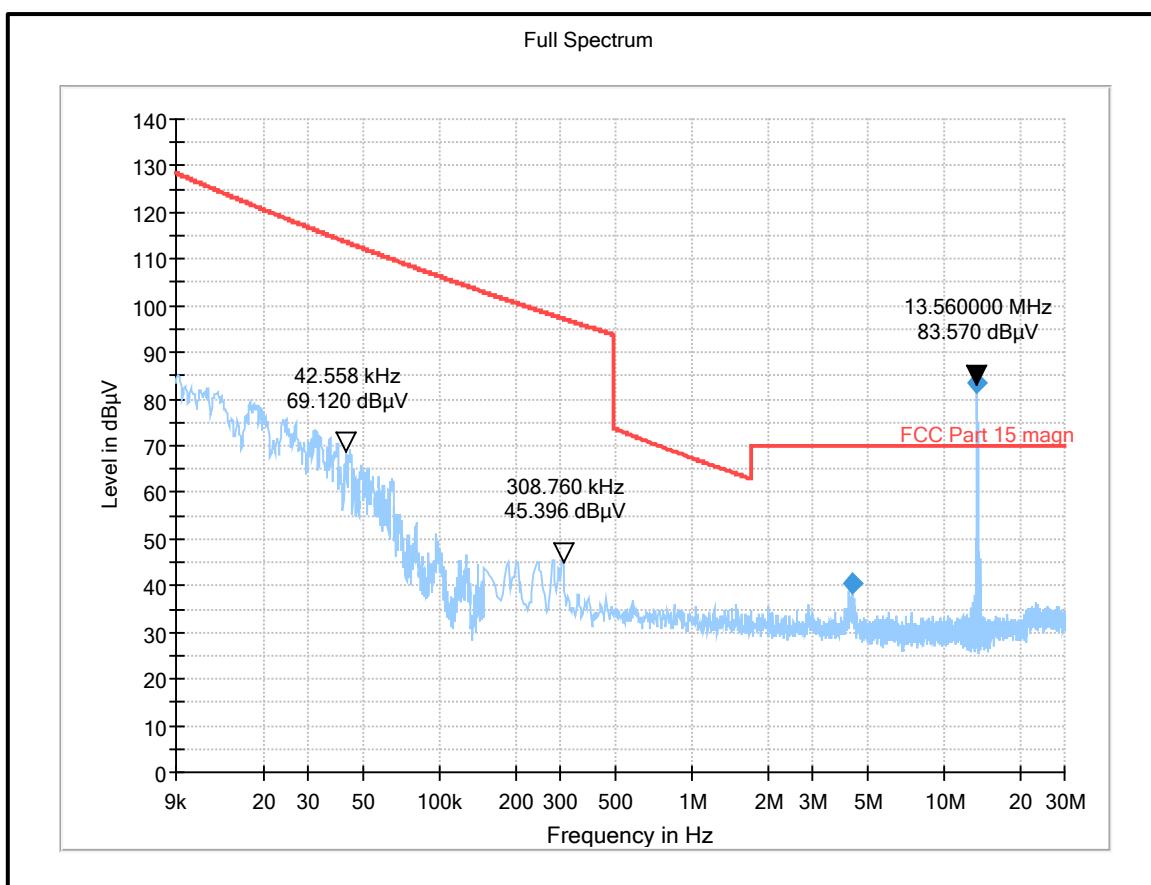
#### Note(s):

1. In accordance with FCC KDB 414788, an alternative test site may be used for the measurement below 30 MHz (The OATS / SAC comparison data is available upon request). Therefore the result from the semi-anechoic chamber tests is shown in this section of the test report.
2. The limits are specified at a test distance of 30 m & 300 m. 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.
3. Therefore, the limit values are extrapolated to a measurement distance of 3 m where field strength of X dB $\mu$ V/m was measured.
  - 9 kHz- 490 kHz: limits extrapolated from 300 m to 3 m adding 80 dB at 40 dB /decade.
  - 490 kHz-1705 kHz: limits extrapolated from 30 m to 3 m by adding 40 dB at 40 dB /decade.
4. Measurements below 30 MHz were performed in a semi-anechoic chamber SR1/ 2 (Asset Number 1603665) at a distance of 3 m. The EUT was placed at a height of 80 cm above the reference ground plane in the centre of the chamber turntable. The measurement loop antenna height was 1 m.
5. Pre-scans were performed and markers placed on the highest measured levels. The test receiver was set to:
  - Frequency range: 9 kHz-150 kHz : RBW: 300 Hz /VBW: 1 kHz
  - Frequency range: 150 kHz – 30 MHz: RBW: 10 kHz /VBW: 30 kHz
  - Detector: Max-Peak detector
  - Trace Mode: Max Hold
6. Final measurements were performed on the marker frequencies and the results entered into the table below. The final measured value, for the given emission, in the table below incorporates the calibrated antenna factor and cable loss.
7. All other emissions shown on the pre-scan plots were investigated and found to be measurement system noise floor.
8. The emissions shown at frequencies approximately 13.56 MHz on the 9 kHz to 30 MHz plots are the EUT's RFID 13.56 MHz fundamental for the tested channel.

**Transmitter Radiated Spurious Emission (continued)****Test Setup (AC-DC Power Supply):**

**Transmitter Radiated Emissions (continued)****Results: AC-DC Power supply / RFID 13.56 MHz**

Frequency (MHz)	Antenna Position	MaxPeak Emission Level at 3 m (dB $\mu$ V/m) Note 3	Deviation from OATS to SAC) (dB)	Deviation Corrected Level at 3 m (dB $\mu$ V/m)	Limit (dB $\mu$ V/m) Note 3	Margin (dB)	Result
4.310	90° to EUT	40.69	-0.87	39.82	70.00	30.18	Complied

**Result: Pass**

**Transmitter Radiated Emissions (continued)****Test Summary:**

<b>Test Engineer:</b>	Sercan Usta	<b>Test Date:</b>	09 June 2021
<b>Test Sample Serial Number:</b>	RFID 1 (Normal Radiated Test Sample)		
<b>Test Site Identification</b>	SR 1/2		

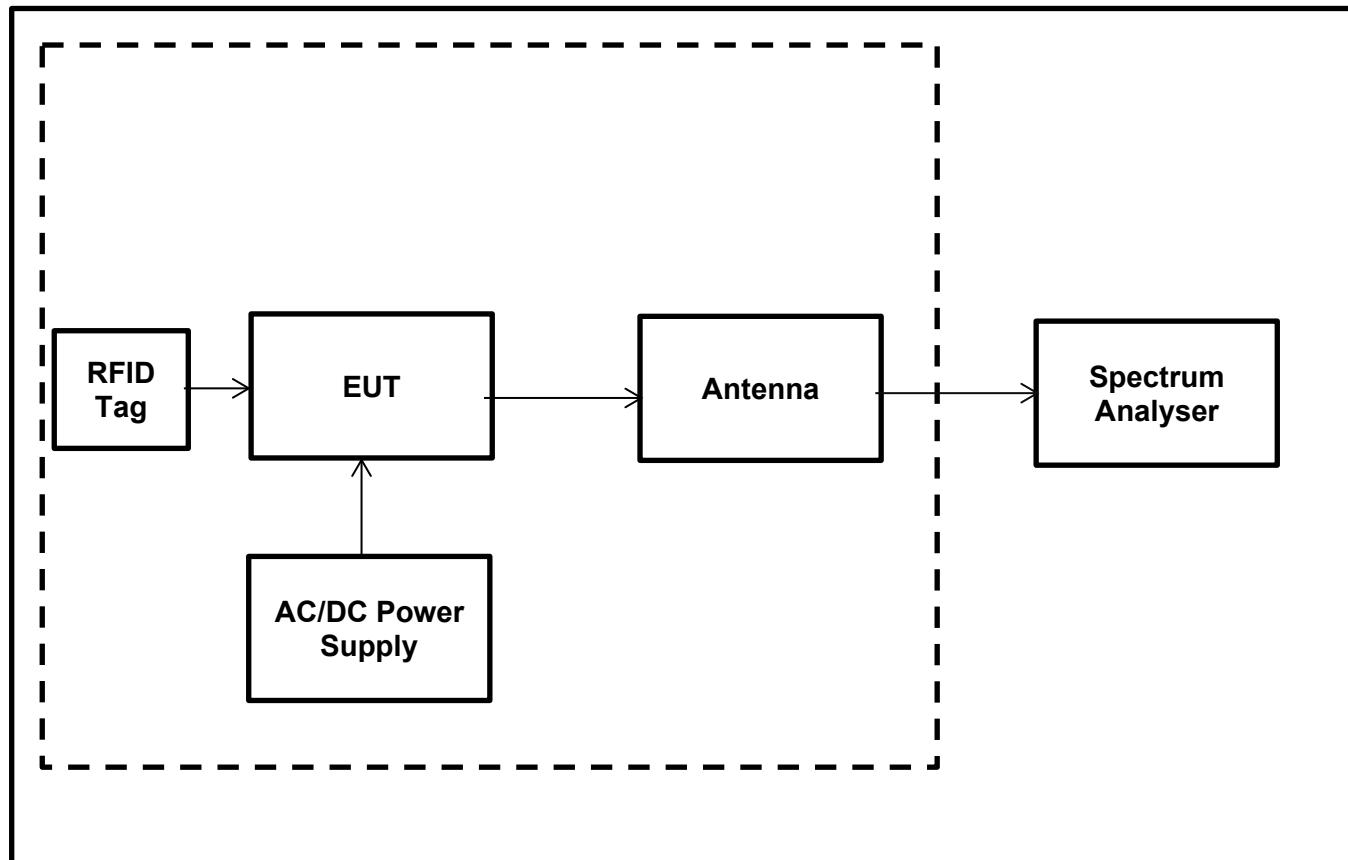
<b>FCC Reference:</b>	Parts 15.225(d) & 15.209(a)
<b>Test Method Used:</b>	ANSI C63.10:2013 Sections 6.3 and 6.5
<b>Frequency Range:</b>	30 MHz to 1000 MHz

**Environmental Conditions:**

<b>Temperature (°C):</b>	21.5
<b>Relative Humidity (%):</b>	35.7

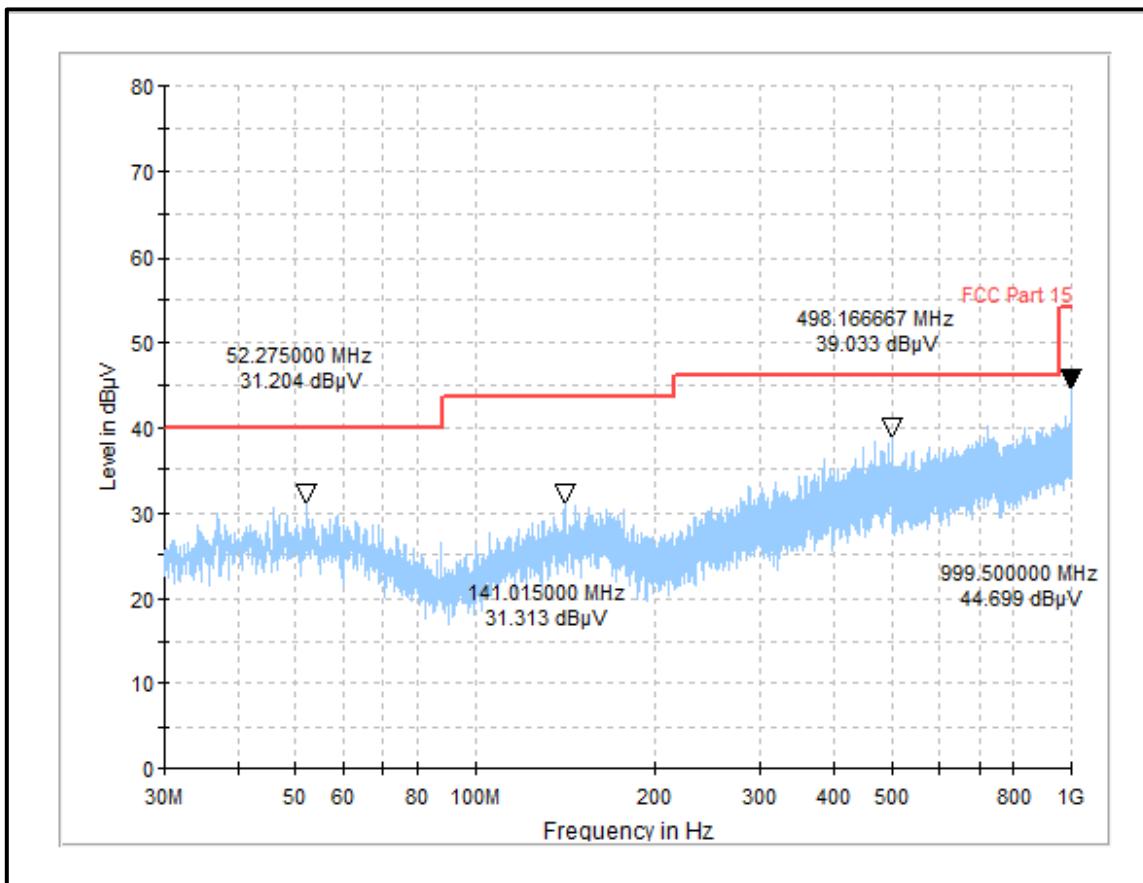
**Note(s):**

1. Measurements below 1 GHz were performed in a semi-anechoic chamber SR1/ 2 (Asset Number 1603665) at a distance of 3 m. The EUT was placed at a height of 80 cm above the reference ground plane in the centre of the chamber turntable. Maximum emission levels were determined by height searching the measurement antenna over the range 1 m to 4 m.
2. Pre-scans were performed and markers placed on the highest measured levels. The test receiver resolution bandwidth was set to 100 kHz and video bandwidth 300 kHz. A peak detector was used, sweep time was set to auto and trace mode was Max Hold.
3. All emissions shown on the pre-scan plots were investigated and found to be below the measurement system noise floor.

**Transmitter Radiated Spurious Emission (continued)****Test Setup (AC-DC Power Supply):**

**Transmitter Radiated Emissions (continued)****Results: AC-DC Power supply / RFID 13.56 MHz**

Frequency (MHz)	Antenna Polarization	MaxPeak Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
No critical spurious emissions were found					

**Result: Pass**

**5.2.5. Transmitter Frequency Stability (Temperature & Voltage Variation)****Test Summary:**

<b>Test Engineer:</b>	Sercan Usta	<b>Test Date:</b>	16 June 2021 & 17 June 2021
<b>Test Sample Serial Number:</b>	RFID 1 (Normal Radiated Test Sample)		
<b>Test Site Identification</b>	SR 9		

<b>FCC Reference:</b>	Part 15.225(e)
<b>Test Method Used:</b>	ANSI C63.10 Sections 6.8.1 and 6.8.2

**Environmental Conditions:**

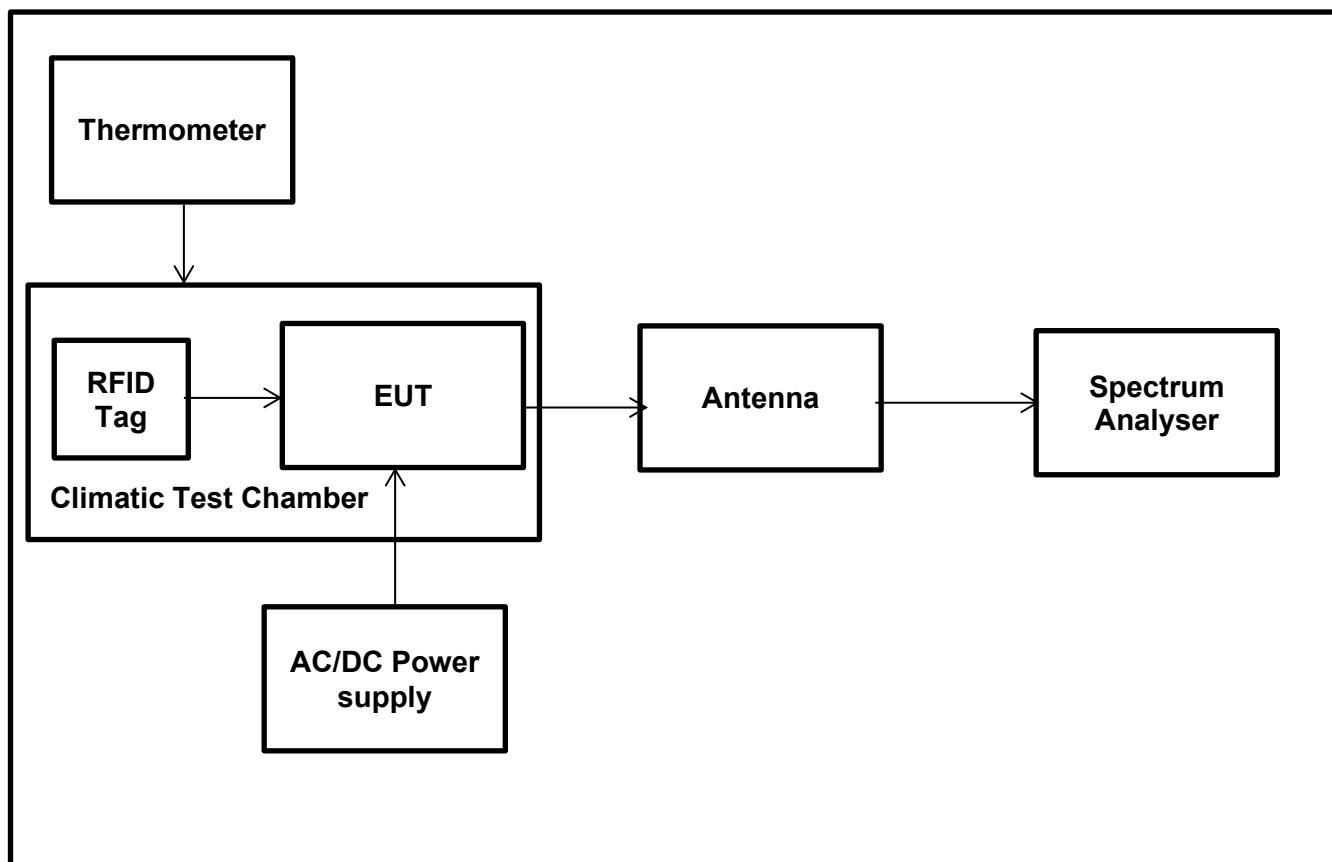
<b>Ambient Temperature (°C):</b>	23.4 to 28.9
<b>Ambient Relative Humidity (%):</b>	32.3 to 36.5

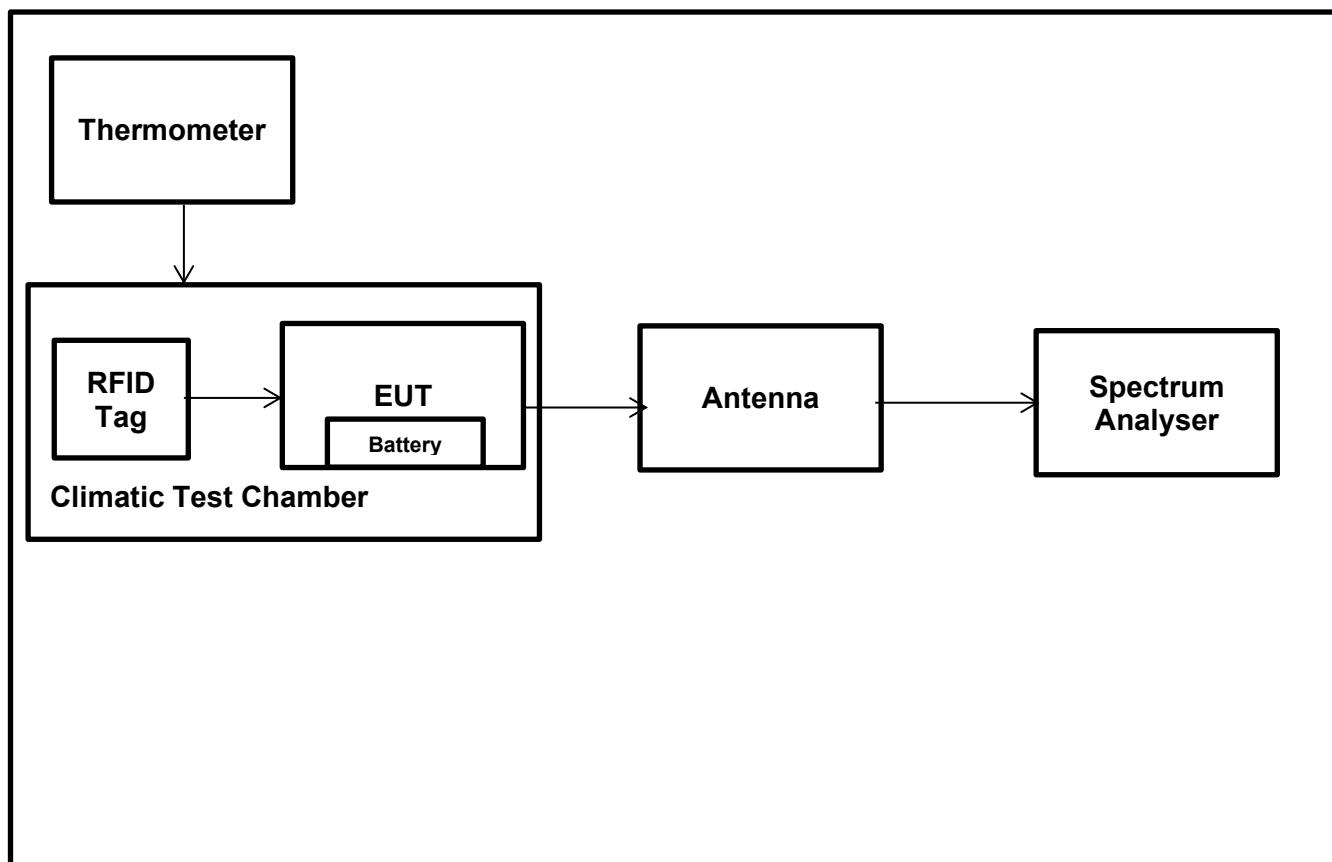
**Settings of the Instrument**

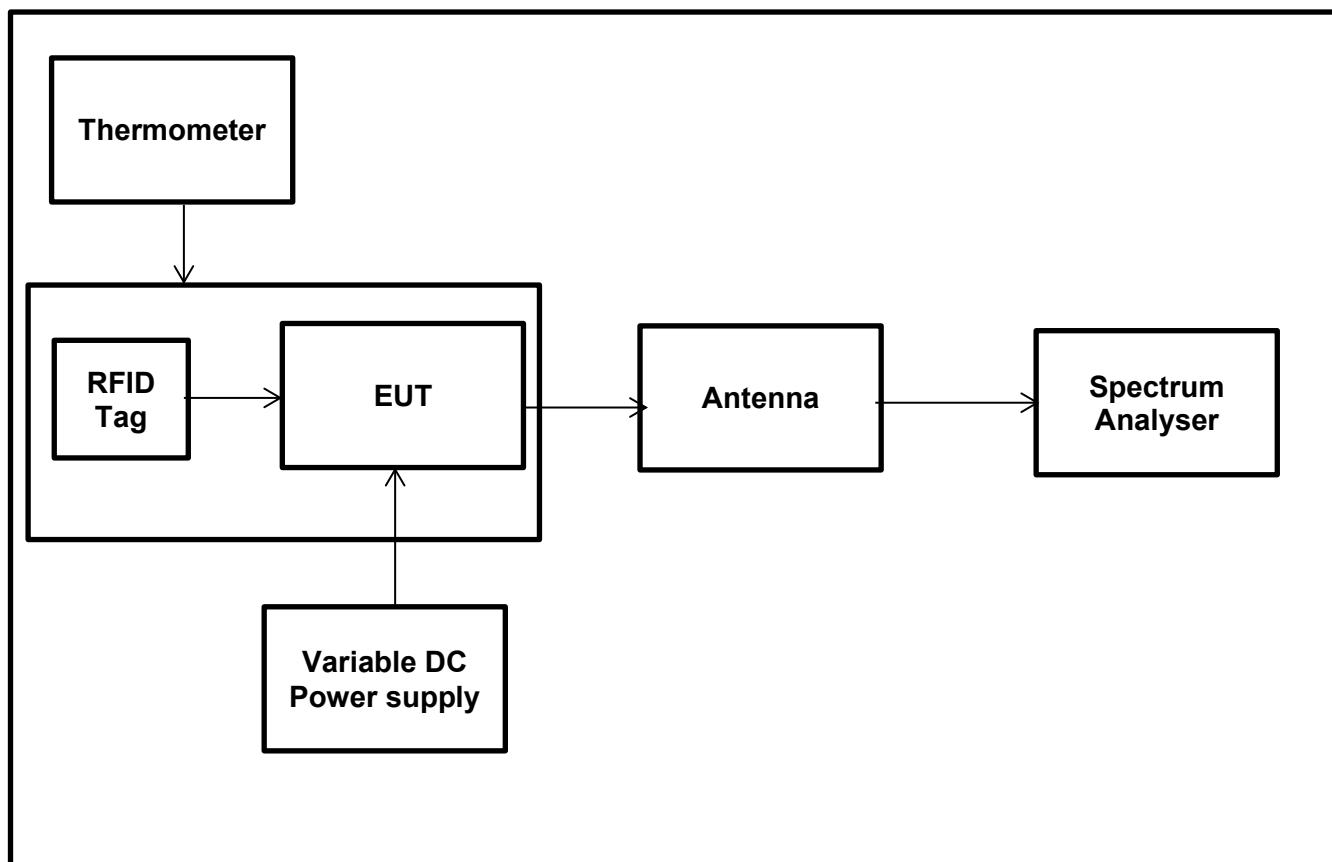
<b>RBW/VBW</b>	30 Hz/30 kHz
<b>Span</b>	4 kHz
<b>Sweep Time</b>	Auto
<b>Sweep Mode</b>	Single Sweep
<b>Detector</b>	Peak
<b>Marker Function</b>	Signal Count

**Note(s):**

1. The EUT was kept inside the environmental/climatic test chamber. The tests were performed with extreme temperature & extreme voltage variations.
2. The temperature variations were monitored throughout the tests using a calibrated digital thermometer. The voltage variations were monitored throughout the tests using a calibrated digital multimeter.
3. For accurate measurement of frequency deviations, Signal Count / frequency counter function was activated on the spectrum analyser.
4. The applicant's declared operating frequency 13.560 MHz was used as reference frequency.
5. The difference between operating /reference frequency & measured frequency was reported as a frequency error.
6. The frequency tolerance of the carrier signal shall be maintained within  $\pm 0.01\%$  or 100 ppm of the operating frequency
7. As EUT can be operated either with AC/DC power adapter or charged internal battery. The frequency stability measurements
  - o with respect to ambient temperature were performed with nominal supply voltages:
    - EUT powered via AC/DC power adapter: with nominal AC voltage (120 VAC /60 Hz)
    - EUT powered via rechargeable internal battery: fully charged internal battery (3.6 V DC)
  - o when varying supply voltage were performed with following supply voltages:
    - EUT powered via AC/DC power adapter:
      - with nominal AC voltage (120 VAC /60 Hz)
      - 85% of the nominal supply AC voltage (102 VAC /60 Hz)
      - 115% of the nominal supply AC voltage (138 VAC /60 Hz)
    - EUT powered via variable DC power supply:
      - with nominal DC voltage (3.6 V DC) : using variable DC power supply
      - 85% of the nominal supply DC voltage (3.06 V DC): using variable DC power supply
      - 115% of the nominal supply DC voltage (4.14 V DC): using variable DC power supply

**Transmitter Frequency Stability (Temperature & Voltage Variation) (continued)****Test Setup (AC-DC Power Supply):**

**Transmitter Frequency Stability (Temperature Variation) (continued)****Test Setup (Internal Battery Powered):**

**Transmitter Frequency Stability (DC Voltage Variation) (continued)****Test Setup (DC Power Supply):**

**Transmitter Frequency Stability (Temperature & Voltage Variation) (continued)****Results: AC-DC Power supply / RFID 13.56 MHz / Temperature Variations**

Extreme Temperature (°C)	Time after EUT Power-up	Measured Frequency (MHz)	Frequency Error		Frequency Error Limits		Result
			%	ppm	%	ppm	
-20	at 0 minutes	13.560012502	0.000092	0.92	± 0.01	± 100	Complied
	at 2 minutes	13.560010628	0.000078	0.78	± 0.01	± 100	Complied
	at 5 minutes	13.560010887	0.000080	0.80	± 0.01	± 100	Complied
	at 10 minutes	13.560035640	0.000263	2.63	± 0.01	± 100	Complied
-10	at 0 minutes	13.559972369	-0.000204	-2.04	± 0.01	± 100	Complied
	at 2 minutes	13.559975847	-0.000178	-1.78	± 0.01	± 100	Complied
	at 5 minutes	13.559984052	-0.000118	-1.18	± 0.01	± 100	Complied
	at 10 minutes	13.560001388	0.000010	0.10	± 0.01	± 100	Complied
0	at 0 minutes	13.560004417	0.000033	0.33	± 0.01	± 100	Complied
	at 2 minutes	13.560040296	0.000297	2.97	± 0.01	± 100	Complied
	at 5 minutes	13.560005420	0.000040	0.40	± 0.01	± 100	Complied
	at 10 minutes	13.559970645	-0.000216	-2.16	± 0.01	± 100	Complied
+10	at 0 minutes	13.560003175	0.000023	0.23	± 0.01	± 100	Complied
	at 2 minutes	13.560004301	0.000032	0.32	± 0.01	± 100	Complied
	at 5 minutes	13.560003461	0.000026	0.26	± 0.01	± 100	Complied
	at 10 minutes	13.560030350	0.000224	2.24	± 0.01	± 100	Complied
+20	at 0 minutes	13.560002520	0.000019	0.19	± 0.01	± 100	Complied
	at 2 minutes	13.560005588	0.000041	0.41	± 0.01	± 100	Complied
	at 5 minutes	13.560023208	0.000171	1.71	± 0.01	± 100	Complied
	at 10 minutes	13.560003398	0.000025	0.25	± 0.01	± 100	Complied
+30	at 0 minutes	13.559990175	-0.000072	-0.72	± 0.01	± 100	Complied
	at 2 minutes	13.559987440	-0.000093	-0.93	± 0.01	± 100	Complied
	at 5 minutes	13.559983264	-0.000123	-1.23	± 0.01	± 100	Complied
	at 10 minutes	13.559983117	-0.000125	-1.25	± 0.01	± 100	Complied
+40	at 0 minutes	13.559999425	-0.000004	-0.04	± 0.01	± 100	Complied
	at 2 minutes	13.559983910	-0.000119	-1.19	± 0.01	± 100	Complied
	at 5 minutes	13.559977583	-0.000165	-1.65	± 0.01	± 100	Complied
	at 10 minutes	13.559996836	-0.000023	-0.23	± 0.01	± 100	Complied
+50	at 0 minutes	13.560001761	0.000013	0.13	± 0.01	± 100	Complied
	at 2 minutes	13.560003717	0.000027	0.27	± 0.01	± 100	Complied
	at 5 minutes	13.560006010	0.000044	0.44	± 0.01	± 100	Complied
	at 10 minutes	13.559999512	-0.000004	-0.04	± 0.01	± 100	Complied

**Result: Pass**

**Transmitter Frequency Stability (Temperature & Voltage Variation) (continued)****Results: AC-DC Power supply / RFID 13.56 MHz / Voltage Variations**

Extreme Voltage Conditions	Extreme Primary Supply AC Voltage (V)	Measured Frequency (MHz)	Frequency Error		Frequency Error Limits		Result
			%	ppm	%	ppm	
85 % of Rated Voltage	102	13.560023430	0.000173	1.73	± 0.01	± 100	Complied
Rated Voltage	120	13.560027906	0.000206	2.06	± 0.01	± 100	Complied
115 % of Rated Voltage	138	13.560024110	0.000178	1.78	± 0.01	± 100	Complied

**Result: Pass**

**Transmitter Frequency Stability (Temperature & Voltage Variation) (continued)****Results: Fully Charged Internal Battery / RFID 13.56 MHz / Temperature Variations**

Extreme Temperature (°C)	Time after EUT Power-up	Measured Frequency (MHz)	Frequency Error		Frequency Error Limits		Result
			%	ppm	%	ppm	
-20	at 0 minutes	13.560034401	0.000254	2.54	± 0.01	± 100	Complied
	at 2 minutes	13.560034929	0.000258	2.58	± 0.01	± 100	Complied
	at 5 minutes	13.560057839	0.000427	4.27	± 0.01	± 100	Complied
	at 10 minutes	13.560063538	0.000469	4.69	± 0.01	± 100	Complied
-10	at 0 minutes	13.560080881	0.000596	5.96	± 0.01	± 100	Complied
	at 2 minutes	13.560081239	0.000599	5.99	± 0.01	± 100	Complied
	at 5 minutes	13.560085429	0.000630	6.30	± 0.01	± 100	Complied
	at 10 minutes	13.560091860	0.000677	6.77	± 0.01	± 100	Complied
0	at 0 minutes	13.560132967	0.000981	9.81	± 0.01	± 100	Complied
	at 2 minutes	13.560128739	0.000949	9.49	± 0.01	± 100	Complied
	at 5 minutes	13.560128204	0.000945	9.45	± 0.01	± 100	Complied
	at 10 minutes	13.560126833	0.000935	9.35	± 0.01	± 100	Complied
+10	at 0 minutes	13.560126833	0.000935	9.35	± 0.01	± 100	Complied
	at 2 minutes	13.560019490	0.000144	1.44	± 0.01	± 100	Complied
	at 5 minutes	13.560129000	0.000951	9.51	± 0.01	± 100	Complied
	at 10 minutes	13.560122208	0.000901	9.01	± 0.01	± 100	Complied
+20	at 0 minutes	13.560109939	0.000811	8.11	± 0.01	± 100	Complied
	at 2 minutes	13.560110993	0.000819	8.19	± 0.01	± 100	Complied
	at 5 minutes	13.560104303	0.000769	7.69	± 0.01	± 100	Complied
	at 10 minutes	13.560097711	0.000721	7.21	± 0.01	± 100	Complied
+30	at 0 minutes	13.560086931	0.000641	6.41	± 0.01	± 100	Complied
	at 2 minutes	13.560089018	0.000656	6.56	± 0.01	± 100	Complied
	at 5 minutes	13.560075715	0.000558	5.58	± 0.01	± 100	Complied
	at 10 minutes	13.560073337	0.000541	5.41	± 0.01	± 100	Complied
+40	at 0 minutes	13.560066876	0.000493	4.93	± 0.01	± 100	Complied
	at 2 minutes	13.560023303	0.000172	1.72	± 0.01	± 100	Complied
	at 5 minutes	13.560023794	0.000175	1.75	± 0.01	± 100	Complied
	at 10 minutes	13.560023092	0.000170	1.70	± 0.01	± 100	Complied
+50	at 0 minutes	13.560005801	0.000043	0.43	± 0.01	± 100	Complied
	at 2 minutes	13.559998617	-0.000010	-0.10	± 0.01	± 100	Complied
	at 5 minutes	13.559998838	-0.000009	-0.09	± 0.01	± 100	Complied
	at 10 minutes	13.559994158	-0.000043	-0.43	± 0.01	± 100	Complied

**Result: Pass**

**Transmitter Frequency Stability (Temperature & Voltage Variation) (continued)****Results: DC Power Supply / RFID 13.56 MHz / Voltage Variations**

Extreme Voltage Conditions	Extreme Primary Supply DC Voltage (V)	Measured Frequency (MHz)	Frequency Error		Frequency Error Limits		Result
			%	ppm	%	ppm	
85 % of Rated Voltage	3.06	13.560029408	-0.000217	-2.17	± 0.01	± 100	Complied
Rated Voltage	3.60	13.560029408	-0.000217	-2.17	± 0.01	± 100	Complied
115 % of Rated Voltage	4.14	13.560040637	-0.000300	-3.00	± 0.01	± 100	Complied

**Result: Pass**

## **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
AC Conducted Spurious Emissions	95%	±2.49 dB
20 dB Bandwidth	95%	±0.87 %
Fundamental Field Strength	95%	±3.10 dB
Radiated Spurious Emissions	95%	±3.10 dB
Frequency Stability	95%	±92 Hz

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	Deisl	Turntable	DT 4250 S	n/a	n/a	n/a
452	Schwarzbeck	Antenna, Trilog Broadband	VULB 9168	9168-240	02/09/2020	24
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	07/07/2020	12
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
328	SPS	AC/DC power distribution system	PAS 5000	A2464 00/2 0200	lab verification	n/a
1603665	Siemens Matsushita Components	semi-anechoic chamber SR1/ 2	-/-	B83117-A1421-T161	n/a	n/a

### Test site: SR 7/8

ID	Manufacturer	Type	Model	Serial	Calibration Date	Cal. Cycle (months)
23	Rohde & Schwarz	Artificial Mains Network	ESH3-Z5	831767/013	07/07/2020	12
28	Rohde & Schwarz	Passive Probe	ESH2-Z3	none	11/07/2020	12
349	Rohde & Schwarz	Receiver, EMI Test	ESIB7	836697/009	09/07/2020	12
351	Rohde & Schwarz	network, Artificial Mains	ESH3-Z5	862770/018	07/07/2020	12
564	Teseq	Impedance stabilisation network (ISN)	ISN T800	26076	07/07/2020	24
-/-	Testo	Thermo-Hygrometer	608-H1	08	lab verification	n/a
327	SPS	AC/DC power distribution system	PAS 5000	A2464 00/1 0200	lab verification	n/a

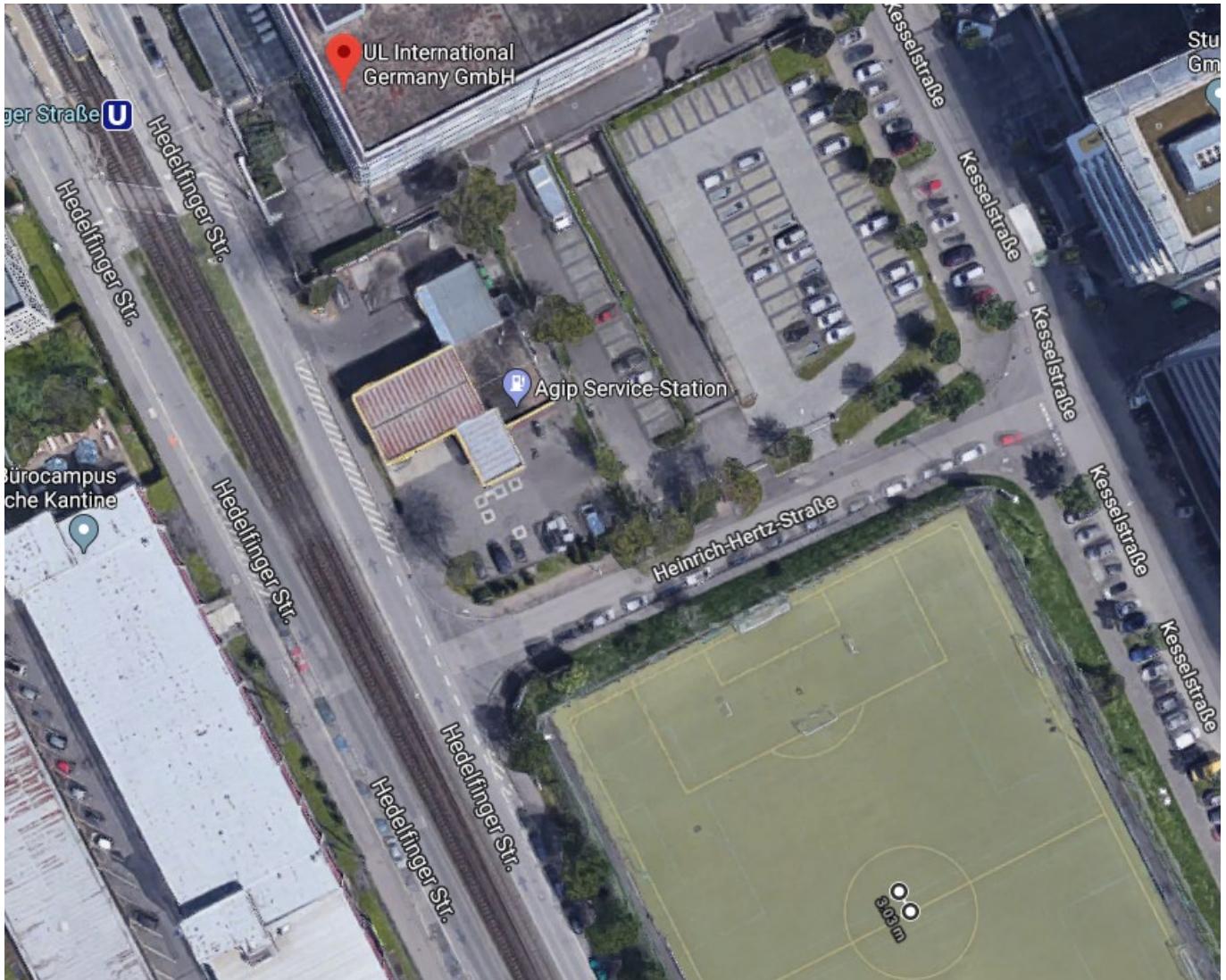
### Test site: SR 9

ID	Manufacturer	Type	Model	Serial	Calibration Date	Cal. Cycle (months)
625	Schwarzbeck	Antenna, H-field	HFSL 7101	109	lab verification only relative measurements	n/a
637	Rohde & Schwarz	Spectrum Analyser	FSV40	101587	08/07/2020	12
-/-	Testo	Thermo-Hygrometer	608-H1	07	lab verification	n/a
645	Weiss Umwelttechnik	Climatic Chamber	LabEvent T/110/70/3	5822619794 0010	lab verification	n/a
194	Hewlett Packard	Digital Multimeter	34401A	US36020807	08/07/2020	12
327	SPS	AC/DC power distribution system	PAS 5000	A2464 00/1 0200	lab verification	n/a

## 8. Open-Area-Test Site comparison

### GPS coordinates

Latitude: 48.765746, Longitude: 9.250684



### Open-Area-Test Site comparison (continued)

The following listed equipment was used for the measurement:

Manufacturer	Type	Model	Frequency Range
Rohde & Schwarz	Signal generator	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+SUHNER	RF Cable	-/-	-/-
Elspec	BNC Cable	-/-	-/-

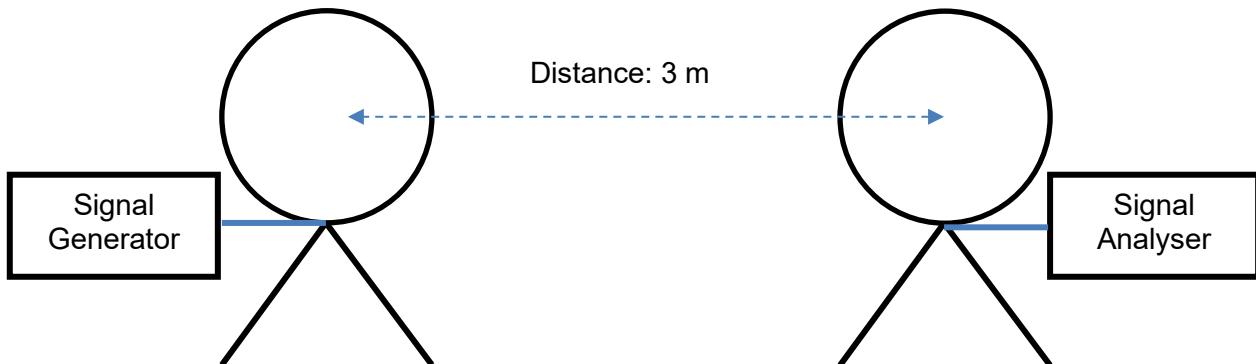
The transmit signal to the ETS Lindgren loop antenna is supplied by the SML signal generator.

The distance of the transmit and receive antenna was 3 m. No other distances can be achieved in SR1 so 10 m and 30 m 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.



**Open-Area-Test Site comparison (continued)**

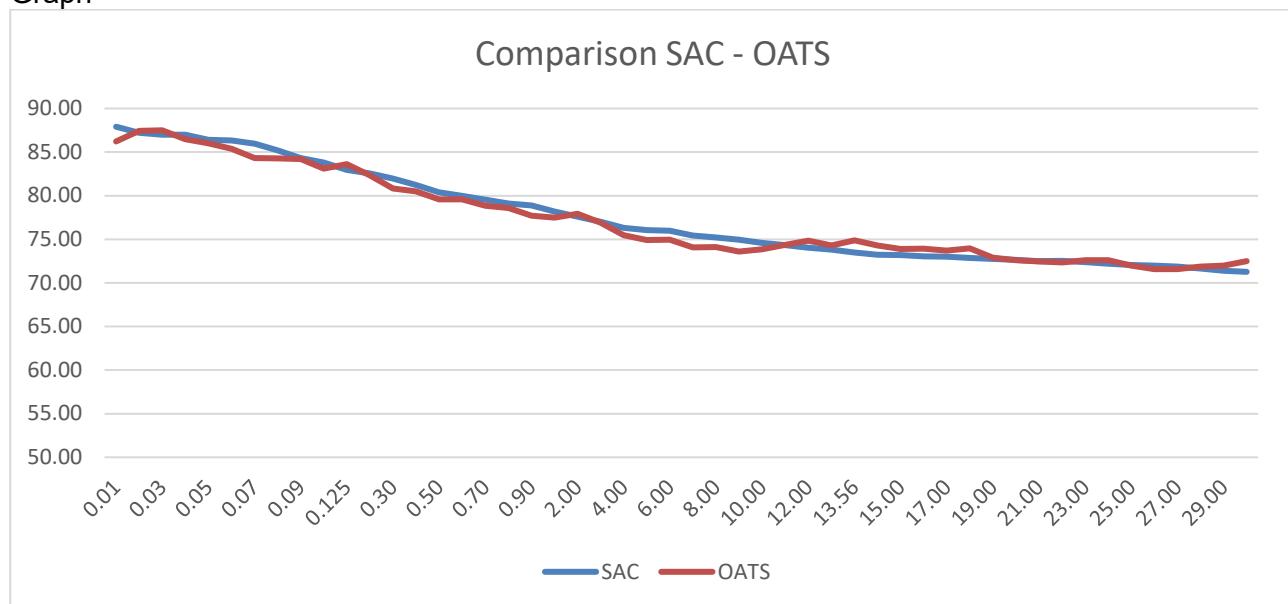
Numeric values:

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 (dB $\mu$ V)	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 (dB $\mu$ V)	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 (dB $\mu$ V)	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 (dB $\mu$ V)	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 (dB $\mu$ V)	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 (dB $\mu$ V)	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 (dB $\mu$ V)	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 (dB $\mu$ V)	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

**Open-Area-Test Site comparison (continued)****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	-	-	Initial Version
<b>Test Report Version 1.1 supersedes Version 1.0 with immediate effect</b>			
Test Report No. UL-RPT-RP-13697467-1016-FCC Version 1.1, Issue Date 09 AUGUST 2021 replaces			
Test Report No. UL-RPT-RP-13697467-1016-FCC Version 1.0, Issue Date 22 JULY 2021, which is no longer valid.			
1.1	as below	as below	Current Version
	9	3.5	Section 3.5 A: updated to include reference to Variable DC Power Supply
	9	3.5	Section 3.5 B: updated to include note that no support equipment were necessary
	10	4.2	EUT Power supply: reference to frequency stability voltage variations was added
	33	5.2.5	Note 7: reference to frequency stability voltage variations was added
	35	5.2.5	Test Setup (Internal Battery Powered): Block Diagram title changed to Temperature Variation
	36	5.2.5	Test Setup (DC Power Supply): Block Diagram for DC Voltage Variation was added
	40	5.2.5	Test Result table title updated to include reference to DC Power Supply
	42	7.0	Test site: SR 9: Equipment No. 194 calibration date corrected to 08/07/2020