



Solutions

# TEST REPORT

**Test Report No.: UL-RPT-RP-14067528-316-1-FCC**

**Applicant \*** : EVBox North America Inc  
**Model No. \*** : L24871NAC00  
**FCC ID \*** : Contains FCC ID: 2A3C7-WIFIG5P  
**Technology \*** : Bluetooth – Basic Rate (BR) & Enhanced Data Rate (EDR)  
**Test Standard(s)** : **FCC Parts 15.207, 15.209(a) & 15.247**

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 supersede Version 1.0 with immediate effect**  
Test Report No. UL-RPT-RP-14067528-316-1-FCC Version 1.1, Issue Date 03 April 2023 replaces  
Test Report No. UL-RPT-RP-14067528-316-1-FCC Version 1.0, Issue Date 01 September 2022, which is no longer valid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: 03 April 2023

Approved by: Rachid Acharkaoui  
Title: Operations Manager  
Date: 03 April 2023



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

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

### **1.1.Applicant Information**

<b>Company Name:</b>	EVBox North America Inc
<b>Company Address:</b>	1930 Innovation Way, Suite 200, Illinois, Libertyville, USA
<b>Contact Person:</b>	Susan Eckman
<b>Contact E-Mail Address:</b>	susan.eckman@evbox.com
<b>Contact Phone No.:</b>	+1 630 209 9060

### **1.2.Manufacturer Information**

<b>Company Name:</b>	EVBox BV
<b>Company Address:</b>	Kabelweg 47 1014 BA Amsterdam The Netherlands
<b>Contact Person:</b>	Marco Farina
<b>Contact E-Mail Address:</b>	marco.farina@evbox.com
<b>Contact Phone No.:</b>	+31620549130

## **2. Summary of Testing**

### **2.1. General Information**

#### **Applied FCC Rule Part(s)**

<b>Specification Reference:</b>	47CFR15.247
<b>Specification Title:</b>	Code of Federal Regulations Volume 47 (Telecommunications): Part 15 Subpart C (Intentional Radiators) - Section 15.247
<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 Strasse. 61, 70327 Stuttgart, GERMANY
<b>Registration Number:</b>	399704

#### **Date Information**

<b>Order Date:</b>	27 October 2022
<b>EUT Arrived:</b>	07 July 2022
<b>Test Dates:</b>	13 July 2022 to 22 July 2022
<b>EUT Returned:</b>	-/-

## 2.2. Summary of Test Results

Clause	Compliance Test Description	Complied	Did not comply	Not performed	Not applicable
15.207	Transmitter AC Conducted Emissions	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15.247(a)(1)	Transmitter Minimum 20 dB Bandwidth <sup>(2)</sup>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
15.35(c)	Transmitter Duty Cycle <sup>(1)</sup>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15.247(a)(1)	Transmitter Carrier Frequency Separation <sup>(2)</sup>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
15.247(a)(1)(iii)	Transmitter Number of Hopping Frequencies and Average Time of Occupancy <sup>(2)</sup>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
15.247(b)(1)	Transmitter Maximum Peak Output Power <sup>(2)</sup>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
15.247(d) & 15.209(a)	Transmitter Radiated Emissions	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
15.247(d) & 15.209(a)	Transmitter Band Edge Radiated Emissions	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>Decision rule:</b> 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. 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. The measurement was performed to assist the other average measurements.
2. As per applicant's declaration, the EUT is a host product integrating FCC pre-certified radio module (FCC ID: 2A3C7-WIFIG5P). Therefore, only partial testing is performed [refer to section 3.4].

## 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>	FCC KDB 558074 D01 DTS Meas Guidance v05r02 April 2, 2019
<b>Title:</b>	Guidance for compliance measurements on Digital Transmission System, Frequency Hopping Spread Spectrum System, and Hybrid System Devices Operating Under Section 15.247 of the FCC rules
<b>Title:</b>	FCC KDB 996369 D04 Module Integration Guide v02 October 13, 2020
<b>Reference:</b>	Modular Transmitter Integration Guide Guidance for Host Product Manufacturers
<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>	EVBox
<b>Model Name or Number:</b>	L24871NAC00
<b>Test Sample Serial Number:</b>	FCC / AT&T Sample 1
<b>Hardware Version Number:</b>	Com board Rev. G, US Power board Rev. F, HMI board Rev. E
<b>Firmware Version Number:</b>	Com board diagnostic image FW V5.0.1, HMI V1.1.0, Power v1.4.0, Safety 1.1.3
<b>FCC ID:</b>	Contains FCC ID: 2A3C7-WIFIG5P

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

The equipment under test was a stationary Level 2 Electric Vehicle Supply Equipment with Model Number: L24871NAC00, Contains FCC ID: 2A3C7-WIFIG5P, FCC ID: 2A3C7-HMIG5P and FCC ID: N7NHL78 supporting NFC 13.56 MHz, Bluetooth, Bluetooth LE, WLAN 2.4 GHz, WLAN 5 GHz and Cellular technologies.

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

No modifications were applied to the EUT during testing.

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

<b>Technology Tested:</b>	Bluetooth – BR/EDR		
<b>FCC Equipment Classification:</b>	Frequency hopping spread spectrum (FHSS)		
<b>Type of Unit:</b>	Transceiver		
<b>Power Supply Requirement(s):</b>	240V (V) L1-L2-PE US Splitted phase		
<b>Operating Frequency Range:</b>	2402 MHz to 2480 MHz		
<b>Channel Spacing:</b>	1 MHz		
<b>Mode(s):</b>	Basic Rate (BR)	Enhanced Data Rate (EDR)	
<b>Modulation(s):</b>	GFSK (Note 1) (Note 3)	8DPSK (Note 1) (Note 3)	
<b>Active Packet Type (s):</b>	DH1 (Note 2) (Note 3)	3DH1 (Note 2) (Note 3)	
<b>Data Rate (Mbit/s):</b>	1 (Note 1) (Note 3)	3 (Note 1) (Note 3)	
<b>Antenna Type:</b>	Printed board antenna		
<b>Antenna Details:</b>	Custom printed board antenna, not removable		
<b>Declared Antenna Gain:</b>	2402-2480 MHz < 6.1dBi		
<b>Transmit Channels Tested:</b>	<b>Channel ID</b>	<b>RF Channel</b>	<b>Frequency (MHz)</b>
	Bottom	0 (Note 1) (Note 3)	2402
	Top	78	2480
<b>Highest internally generated clock and/ or oscillator frequency:</b>	Wi-Fi ref. clock 37.4 MHz (internal to the module) Oscillator freq. of NFC module of HMI board: 27.120 MHz LTE module: 32.768 KHz, 26MHz (internal to the module) Different other oscillator clocks are included for internal functionality e.g., bus/ CPU clocks present in the circuits: 32.768 KHz, 16 MHz, 24 MHz, 25 MHz, 26 MHz		
<b>Scope of Partial Host Product Testing:</b>	FCC KDB 996369 D04 Section 3.0		
<b>Has modular transmitter been fully tested by the module grantee on the required number of channels, modulation types, and modes?</b>	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Not Known
<b>Are emissions occurring due to the intermixing of emissions with the other transmitters, digital circuitry, or due to physical properties of the host product (enclosure) checked &amp; measured?</b>	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Not Stated
<b>Frequency Range of Radiated Measurements:</b>	FCC KDB 996369 D04 section 3.2 referencing FCC Part 15.33(a)(1): intentional radiator operates below 10 GHz: to the 10 <sup>th</sup> harmonic of the highest fundamental frequency or to 40GHz, whichever is lower		
<b>Do all devices or subsystems of composite Host System or Product demonstrate compliance to their requirements and frequency of investigation following 15.33 (a) for intentional radiators</b>	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> Not Stated



(Note 1) In accordance with FCC KDB 996369 D04 Section 3.4 (b) the Host Product testing has been performed on unwanted (spurious) radiated emissions on the worst-case modulation and channel per frequency range as shown in original filing (FCC ID: 2A3C7-WIFIG5P/ FCC ID: VPYLBEE5HY1MW)

(Note 2) According to customer declaration the device only supports the above mentioned two modes (data rates) and therefore the Testing was performed only with these two modes.

(Note 3) As per applicant's declaration, the EUT is a host product integrating FCC pre-certified radio module (FCC ID: 2A3C7-WIFIG5P/ FCC ID: VPYLBEE5HY1MW). Therefore, only partial testing is performed.

### 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	-/-	-/-	-/-	-/-

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

Item	Description	Brand Name	Model Name or Number	Serial Number
1	Raspberry PI	N/A	N/A	W65
2	Ethernet Switch	D-Link	EES105E C2E	QS3P111000361
3	EVBox Certification team Windows Laptop	Dell	N/A	EVB17001260

## **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 Fixed Channel Frequency Mode (Hopping OFF) with Modulated Carrier

- Maximum Power: MAX PWR
- Test Channels: Bottom | Top
- BT-Mode & Packet Type: As required
  - BT-BR Mode : (DH1) & PRBS9
  - BT-EDR Mode : (3DH1) & PRBS9

**Note :**

According to customer declaration the device only supports the above mentioned two modes (data rates) and therefore the Testing was performed only with these two modes.

## **4.2. Configuration and Peripherals**

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

- The applicant or manufacturer supplied test setup instructions "DUT and testing - Board configuration and setting Quickguide Rev1.pdf" issued on 30/06/2022 was used to configure the EUT.

### **EUT Power Supply:**

- The EUT was powered with 240V AC / 60 Hz split phase.

### **Test Mode Activation:**

- The EUT can be connected with the Test laptop via Ethernet switch and ethernet cables supplied by the customer. The cable was used only for configuration and was removed during the measurement.
- The test modes were activated by the terminal software "radio\_cert\_v12". The commands to setup the respective modes and power were defined by the customer in the setup instructions.
- NFC was also active all the time and it is not possible to de-activate it

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

- The measurements were carried out with 240 VAC/60Hz.
- The Toyo EMI Software EP5/CE Ver 4.0.1. was used for these measurements.

### **Radiated Measurements:**

- The EUT needs to use in standing position as a used case. Therefore, this report includes relevant results.
- The position of the Antenna was 90° vertical in the z-axis from the EUT.
- 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 at 100 cm.
- Radiated measurements above 30 MHz were performed with the EUT positioned on the turn table and rotating 360° while the antenna height varies from 1 to 4 m over the measurement frequency range.
- R&S® EMC32 V11.30 Software was used for the Radiated spurious emission measurements.

### **Duty Cycle Correction Details:**

- As the continuous transmission of the EUT ( $D \geq 98\%$ ) cannot be achieved and EUT was transmitting continuously at Duty Cycles of 31.31 % & 30.67 % (duty cycle variations are less than  $\pm 2\%$  at the respective data rate) for BR and EDR respectively. Therefore, Duty Cycle Correction Factor of 5.04 dB and 5.13 dB was added to all average measurements, to compute the corrected average values of the emissions that would have been measured had the test been performed at 100% Duty Cycle.

## **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:

Test Engineer:	Tobias Koch	Test Date:	22 July 2022
Test Sample Serial Number:	FCC / AT&T Sample 1		
Test Site Identification	SR 7/8		

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

#### Environmental Conditions:

Temperature (°C):	25.6
Relative Humidity (%):	48.7

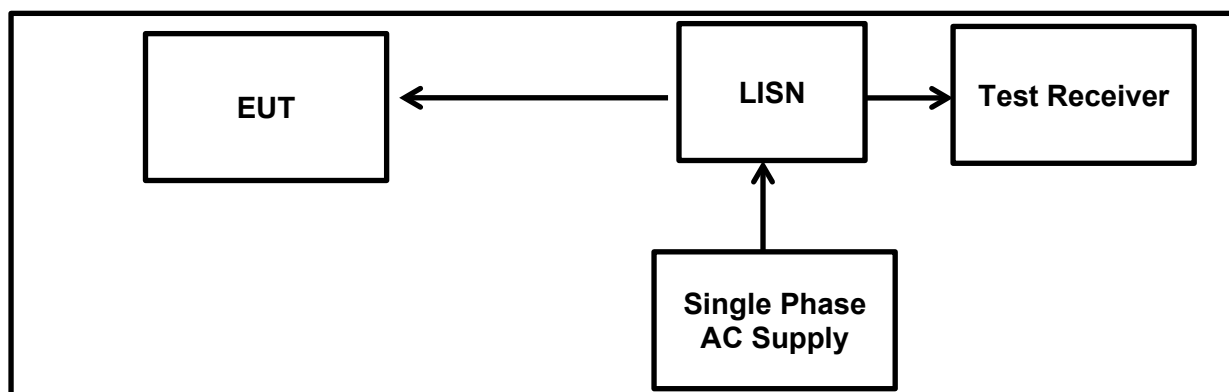
#### Settings of the Instrument

Detector	Quasi Peak/ Average
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#### Note(s):

1. The EUT was powered via AC/DC power supply which was connected with the LISN during the measurement.
2. The EUT could only be powered with 240 VAC split phase.
3. The measurement was performed with following worst-case mode.
  - BT-EDR Mode | Packet Type: 3DH1 | Hopping OFF | PRBS9 | Bottom channel | MAX PWR
4. Pre-scans were performed, and markers placed on the highest L1 and L2 measured levels. Final measurements were performed on the marker frequencies and the results entered into the tables below.
5. The final measured value, for the given emission, in the table below incorporates the cable loss.
6. 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.
7. 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.
8. Measurement software used: Toyo EMI Software; CE measurement software EP5/CE Ver 4.0.1.

#### Test Setup:



**Transmitter AC Conducted Spurious Emissions (continued)****Results: BT-EDR Mode / Packet Type: 3DH1 / Hopping OFF/ Bottom Channel / PRBS9 / MAX PWR****Results: L1 / Quasi Peak / 240 VAC 60 Hz**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.154440	L1	51.30	65.80	14.50	Complied
0.171500	L1	48.20	64.90	16.70	Complied
0.215690	L1	40.60	63.00	22.40	Complied
4.030330	L1	32.10	56.00	23.90	Complied
4.932270	L1	32.50	56.00	23.50	Complied
13.560170	L1	43.90	60.00	16.10	Complied
23.128700	L1	45.70	60.00	14.30	Complied

**Results: L1 / Average / 240 VAC 60 Hz**

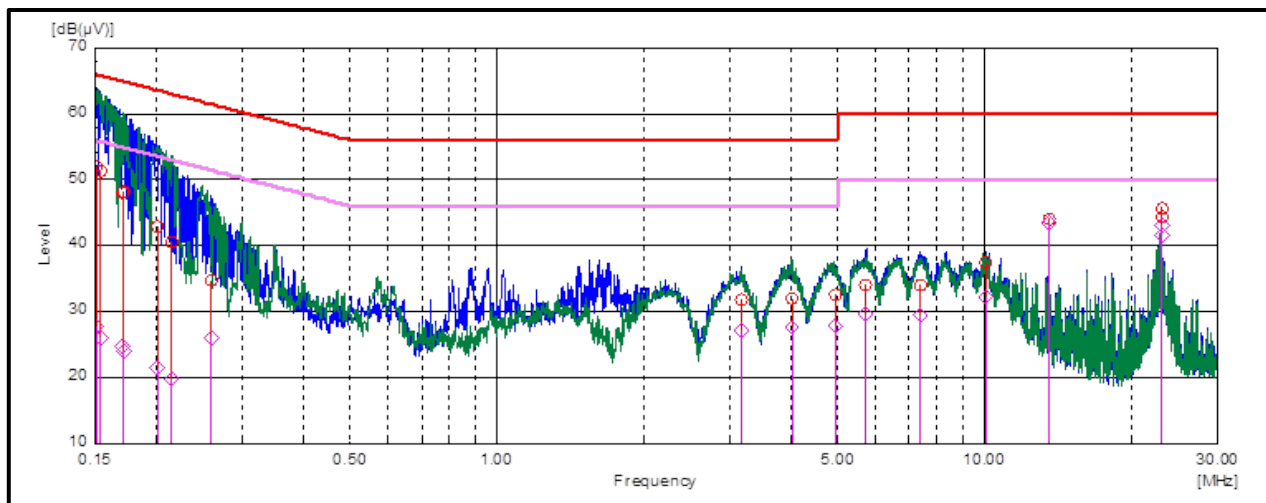
Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.154440	L1	26.10	55.80	29.70	Complied
0.171500	L1	24.00	54.90	30.90	Complied
0.215690	L1	19.80	53.00	33.20	Complied
4.030330	L1	27.70	46.00	18.30	Complied
4.932270	L1	27.90	46.00	18.10	Complied
13.560170	L1	43.50	50.00	6.50	Complied
23.128700	L1	43.00	50.00	7.00	Complied

**Results: L2 / Quasi Peak / 240 VAC 60 Hz**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.151000	L2	52.10	65.90	13.80	Complied
0.170930	L2	48.10	64.90	16.80	Complied
0.201280	L2	42.90	63.60	20.70	Complied
0.259660	L2	34.80	61.40	26.60	Complied
3.171480	L2	31.90	56.00	24.10	Complied
5.705850	L2	34.10	60.00	25.90	Complied
7.397840	L2	34.00	60.00	26.00	Complied
10.060080	L2	37.40	60.00	22.60	Complied
23.130110	L2	44.50	60.00	15.50	Complied

**Transmitter AC Conducted Spurious Emissions (continued)****Results: BT-EDR Mode / Packet Type: 3DH1 / Hopping OFF/ Bottom Channel / PRBS9 / MAX PWR****Results: L2 / Average / 240 VAC 60 Hz**

Frequency (MHz)	Line	Level (dB $\mu$ V)	Limit (dB $\mu$ V)	Margin (dB)	Result
0.151000	L2	27.80	55.90	28.10	Complied
0.170930	L2	24.60	54.90	30.30	Complied
0.201280	L2	21.50	53.60	32.10	Complied
0.259660	L2	25.90	51.40	25.50	Complied
3.171480	L2	27.10	46.00	18.90	Complied
5.705850	L2	29.60	50.00	20.40	Complied
7.397840	L2	29.50	50.00	20.50	Complied
10.060080	L2	32.10	50.00	17.90	Complied
23.130110	L2	41.50	50.00	8.50	Complied

**Result: Pass****Plot: L1 and L2 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 Duty Cycle****Test Summary:**

<b>Test Engineer:</b>	Sercan Usta	<b>Test Date:</b>	21 July 2022
<b>Test Sample Serial Number:</b>	FCC / AT&T Sample 1		
<b>Test Site Identification</b>	SR 1/2		

<b>FCC Reference:</b>	Part 15.35(c)
<b>Test Method Used:</b>	FCC KDB 558074 Section 9.b) referencing ANSI C63.10 Section 7.5

**Environmental Conditions:**

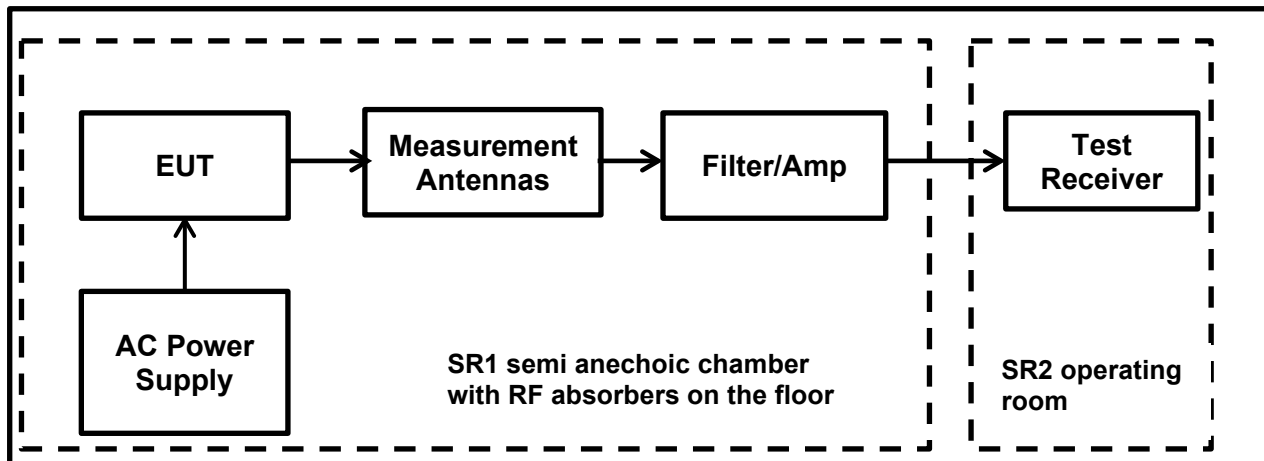
<b>Temperature (°C):</b>	24.7
<b>Relative Humidity (%):</b>	45.6

**Note:**

- The transmitter duty cycle was measured using a spectrum analyser in the time domain and calculated by using the following calculation:

$$\text{Duty Cycle (\%)} = 100 \times [\text{On Time (T}_{\text{ON}})] / [\text{Period(T}_{\text{ON}} + \text{T}_{\text{OFF}}) \text{ or } 100\text{ms whichever is the lesser}]$$

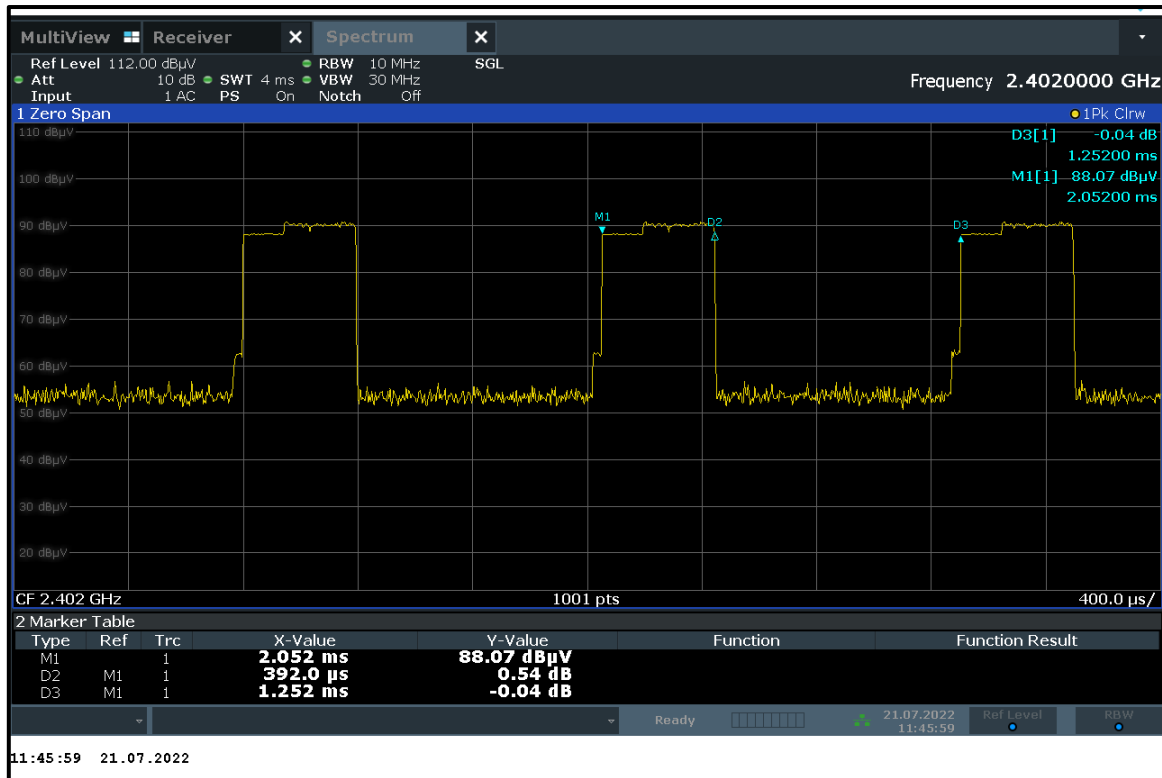
$$\text{Duty Cycle Correction Factor} = 10 \log 1 / [\text{On Time (T}_{\text{ON}})] / [\text{Period(T}_{\text{ON}} + \text{T}_{\text{OFF}}) \text{ or } 100\text{ms whichever is the lesser}]$$

**Test Setup:**



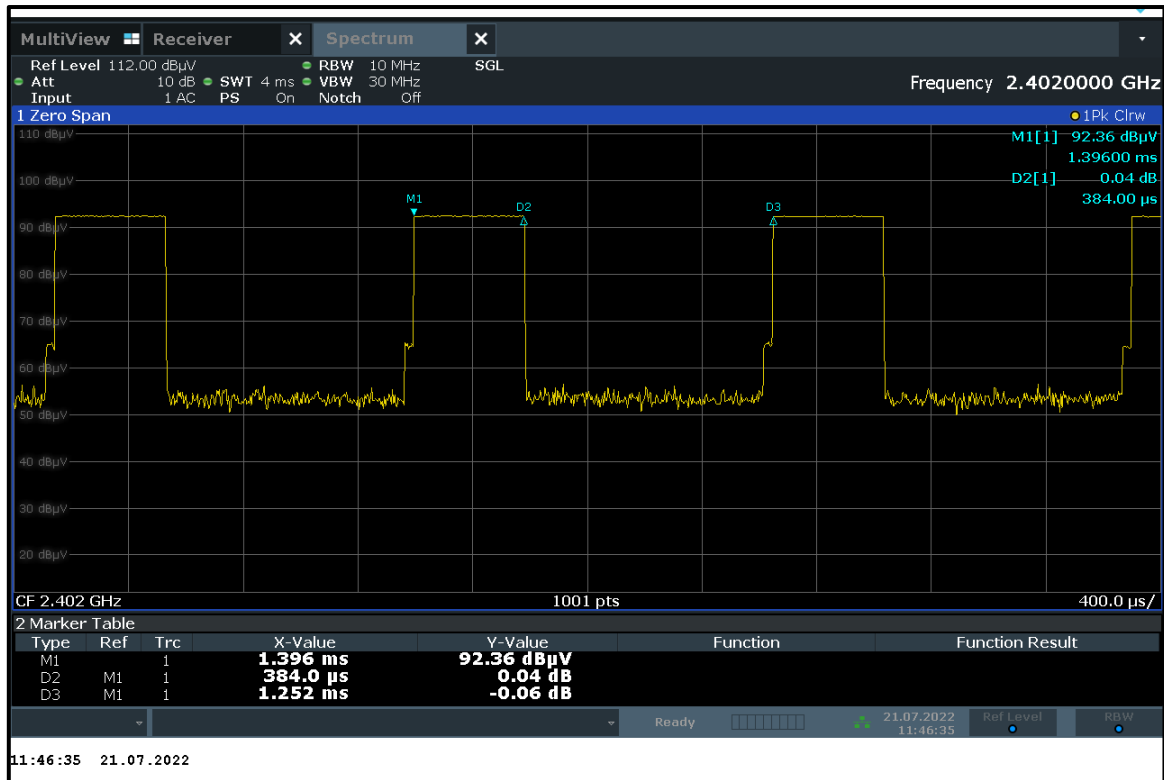
**Transmitter Duty Cycle (continued)****Results: BT-BR Mode / Packet Type: DH1 / Hopping OFF/ Bottom Channel / MAX PWR**

Pulse On Time (T <sub>ON</sub> ) (ms)	Pulse Period (T <sub>ON</sub> + T <sub>OFF</sub> ) (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)
0.392	1.252	31.31	5.04



**Transmitter Duty Cycle (continued)****Results: BT-EDR Mode / Packet Type: 3DH1 / Hopping OFF/ Bottom Channel / MAX PWR**

Pulse On Time (T <sub>ON</sub> ) (ms)	Pulse Period (T <sub>ON</sub> + T <sub>OFF</sub> ) (ms)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)
0.384	1.252	30.67	5.13



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

<b>Test Engineer:</b>	Sercan Usta	<b>Test Date:</b>	13 July 2022
<b>Test Sample Serial Number:</b>	FCC / AT&T Sample 1		
<b>Test Site Identification</b>	SR 1/2		

<b>FCC Reference:</b>	Parts 15.247(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:**

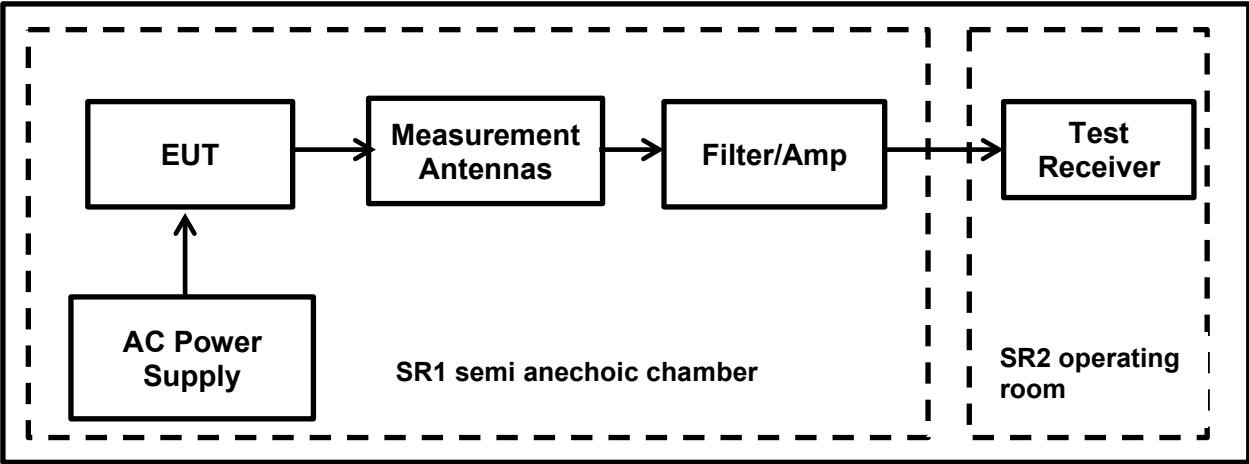
<b>Temperature (°C):</b>	22.5
<b>Relative Humidity (%):</b>	46.6

**Notes:**

- In accordance with FCC KDB 414788 D01 Radiated Test Site & ANSI C63.10 clause 5.2 an alternative test site that can demonstrate equivalence to a open area test site may be used. Therefore, the measurement was performed in a Semi Anechoic Chamber. (The OATS / SAC comparison data is available upon request).
- The limits are specified at a test distances of 30 and 300 meters. However, as specified in FCC Section 15.31 (f)(2) & ANSI C63.10 clause 6.4.3, measurements may be performed at a closer distance and the measured level extrapolated to the specified measurement distance using the method described in clauses 6.4.4, specifically sub-clause 6.4.4.1 which specifies that the measured level shall be extrapolated to the specified distance by conservatively presuming that the field strength decays at 40 dB/decade.  
Therefore, measurements were performed at a measurement distance of 3 m.
- Therefore, the limit values are extrapolated to a measurement distance of 3 m.
  - 9 kHz- 490 kHz: limits extrapolated from 300 m to 3 m by 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.
- 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 center of the chamber turntable. The measurement loop antenna height was 100 cm.
- In accordance with FCC KDB 996369 D04 Section 3.4 (b) the Host Product testing has been performed on unwanted (spurious) radiated emissions on the worst-case modulation and channel per frequency range as shown in original filing (FCC ID: 2A3C7-WIFIG5P / FCC ID: VPYLBEE5HY1MW).
- The radiated emissions measurements were performed with the EUT set to the following worst-case mode.
  - BT-EDR Mode | Packet Type: 3DH1 | Hopping OFF | Bottom channel | PRBS9 | MAX PWR
- The final measured value, for the given emission, in the table below incorporates the calibrated antenna factor and cable loss.
- All other emissions shown on the pre-scan plot were investigated and found to be below the measurement system noise floor.
- 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: 1 kHz /VBW: 3 kHz
  - Frequency range: 150 kHz – 30 MHz: RBW: 10 kHz /VBW: 30 kHz
  - Detector: Max-Peak detector
  - Trace Mode: Max Hold

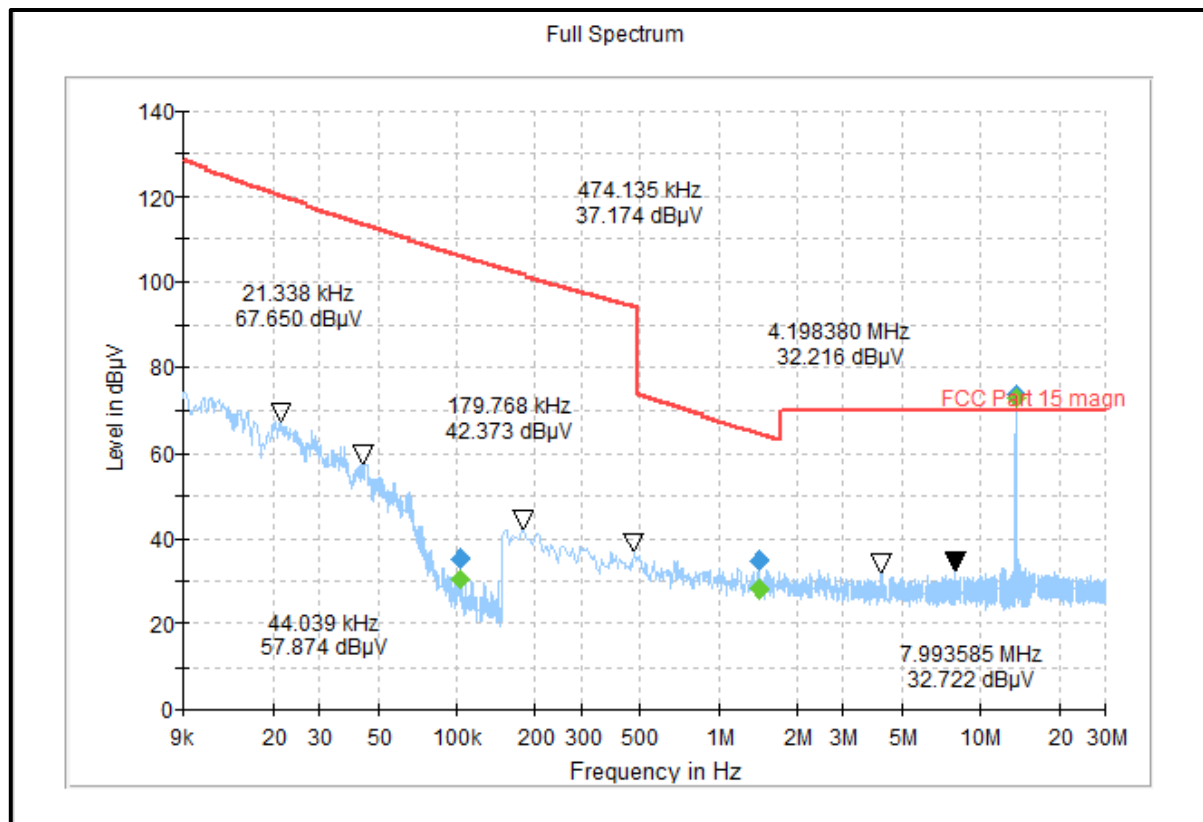
**Transmitter Radiated Emissions (continued)**

**Test Setup:**



**Transmitter Radiated Emissions (continued)****Results: BT-EDR Mode / Packet Type: 3DH1 / Hopping OFF/ Bottom Channel / PRBS9 /MAX PWR**

Frequency (MHz)	Loop Antenna Orientation	MaxPeak Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
0.104034	90° to the EUT	35.20	105.97	70.77	Complied
1.423388	0° to the EUT	35.05	64.43	29.38	Complied

**Plot: 9 kHz – 30 MHz:****BT-EDR Mode / Packet Type: 3DH1 / Hopping OFF/ Bottom Channel / MAX PWR**

Note: Emission at 13.56 MHz is from NFC and we cannot de-activate it during the measurement

**Result: Pass**

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

<b>Test Engineer:</b>	Sercan Usta	<b>Test Date:</b>	12 July 2022
<b>Test Sample Serial Number:</b>	FCC / AT&T Sample 1		
<b>Test Site Identification</b>	SR 1/2		

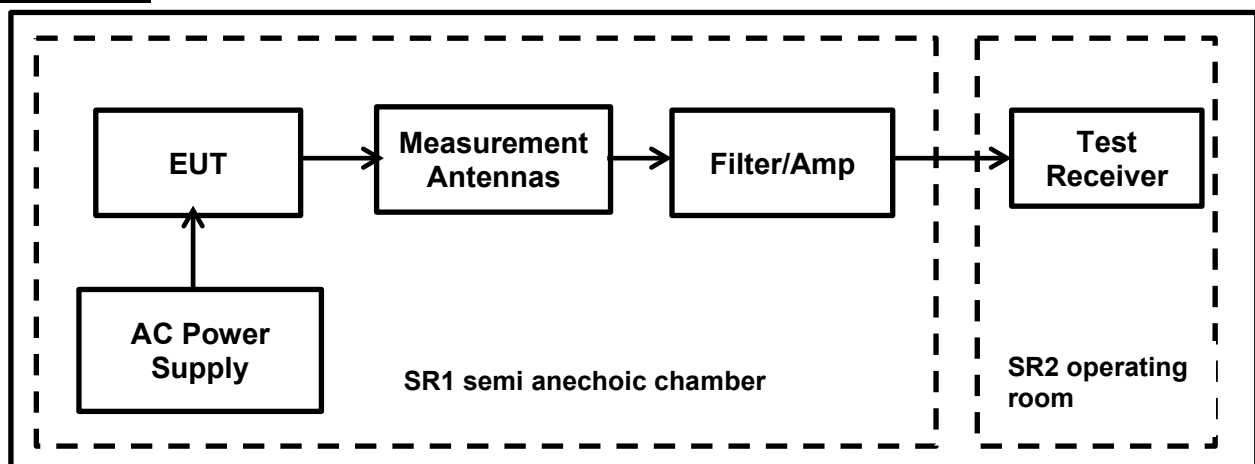
<b>FCC Reference:</b>	Parts 15.247(d) & 15.209(a)
<b>Test Method Used:</b>	ANSI C63.10:2013 Sections 6.3 and 6.5
<b>Frequency Range</b>	30 MHz to 1000 MHz

**Environmental Conditions:**

<b>Temperature (°C):</b>	22.8
<b>Relative Humidity (%):</b>	46.9

**Note(s):**

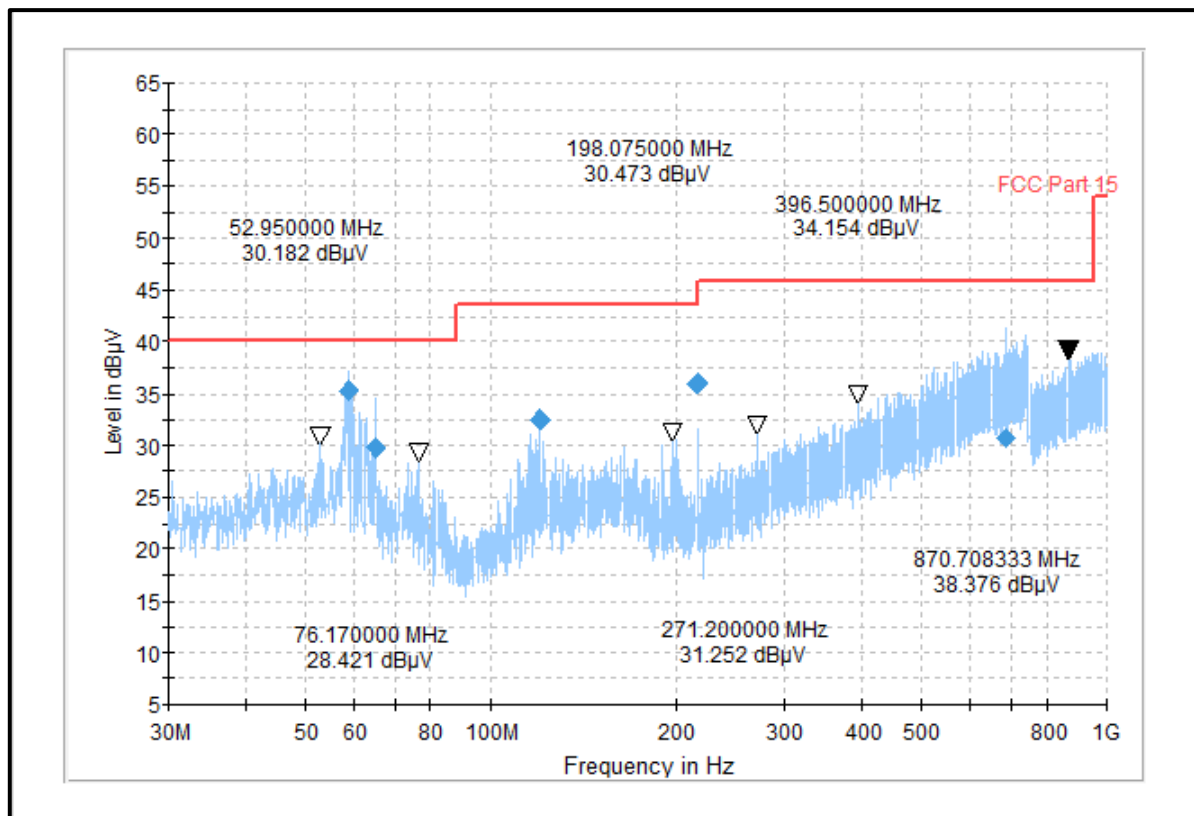
- Measurements below 1 GHz were performed in a semi-anechoic chamber (Asset Number K0001) at a distance of 3 meters. The EUT was placed at a height of 80 cm above the reference ground plane in the center of the chamber turntable. Maximum emission levels were determined by height searching the measurement antenna over the range 1 meter to 4 meters.
- 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.
- In accordance with FCC KDB 996369 D04 Section 3.4 (b) the Host Product testing has been performed on unwanted (spurious) radiated emissions on the worst-case modulation and channel per frequency range as shown in original filing (FCC ID: 2A3C7-WIFIG5P / FCC ID: VPYLBEE5HY1MW).
- The radiated emissions measurements were performed with the EUT set to the following worst-case mode.
  - BT-EDR Mode | Packet Type: 3DH1 | Hopping OFF | Bottom channel | MAX PWR
- The final measured value, for the given emission, in the table below incorporates the calibrated antenna factor and cable loss.
- All other emissions shown on the pre-scan plot were investigated and found to be below the measurement system noise floor.

**Test Setup:**

**Transmitter Radiated Emissions (continued)****Results: BT-EDR Mode / Packet Type: 3DH1 / Hopping OFF/ Bottom Channel / MAX PWR**

Frequency (MHz)	Antenna Polarization	MaxPeak Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
58.71	Vertical	35.23	40.00	4.77	Complied
64.92	Vertical	29.82	40.00	10.18	Complied
120.54	Vertical	32.49	43.50	11.01	Complied
216.98	Vertical	36.03	46.00	9.97	Complied
686.00	Horizontal	30.66	46.00	15.34	Complied

**Plot: 30 MHz – 1 GHz:**  
**BT-EDR Mode / Packet Type: 3DH1 / Hopping OFF/ Bottom Channel / MAX PWR**

**Result: Pass**

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

<b>Test Engineer:</b>	Sercan Usta	<b>Test Date:</b>	15 July 2022
<b>Test Sample Serial Number:</b>	FCC / AT&T Sample 1		
<b>Test Site Identification</b>	SR 1/2		

<b>FCC Reference:</b>	Parts 15.247(d) & 15.209(a)
<b>Test Method Used:</b>	ANSI C63.10:2013 Sections 6.3 and 6.5
<b>Frequency Range</b>	1 GHz to 25 GHz

**Environmental Conditions:**

<b>Temperature (°C):</b>	22.8
<b>Relative Humidity (%):</b>	46.9

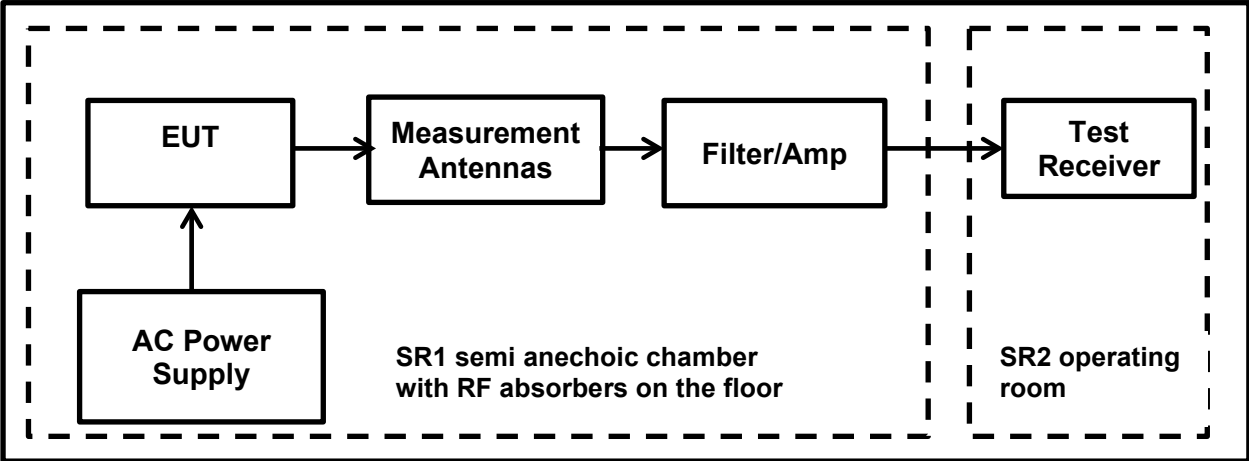
**Note(s):**

1. Pre-scans above 1 GHz were performed in a semi-anechoic chamber SR1/ 2 (Asset Number 1603665) with RF absorbers on the floor at a distance of 3 m. The EUT was placed at a height of 1.5 m above the test chamber floor in the center of the chamber turntable. All measurement antennas were placed at a fixed height of 1.5 m above the test chamber floor, in line with the EUT. Final measurements above 1 GHz were performed in a semi-anechoic chamber SR1/ 2 (Asset Number 1603665) with absorber on the floor at a distance of 3 m. The EUT was placed at a height of 1.5 m above the reference ground plane in the center of the chamber turntable. Maximum emission levels were determined by height searching the measurement antenna over the range 1 m to 4 m.
2. The emissions shown at frequencies approximately 2.4 GHz to 2.4835 GHz on the 1 GHz to 18 GHz plots are the EUT fundamental for the tested channels.
3. Pre-scans were performed, and a marker placed on the highest measured level of the appropriate plot. The test receiver resolution bandwidth was set to 1 MHz and video bandwidth 3 MHz. The sweep time was set to auto.
4. In accordance with FCC KDB 996369 D04 Section 3.4 (b) the Host Product testing has been performed on unwanted (spurious) radiated emissions on the worst-case modulation and channel per frequency range as shown in original filing (FCC ID: 2A3C7-WIFIG5P / FCC ID: VPYLBEE5HY1MW).
5. The radiated emissions measurements from 1 GHz to 25 GHz were performed with the following worst-case mode.
  - BT-EDR Mode | Packet Type: 3DH1 | Hopping OFF | Bottom channel | MAX PWR
6. For frequency range 1 GHz to 18 GHz, all other emissions shown on the pre-scan plots were investigated and found to be below system noise floor.
7. In accordance with ANSI C63.10-2013 Section 5.3.3 & 6.5.3 measurements above 18 GHz were performed at closer distance (1 m); because at specified measurement distance (3m) for compliance the instrumentation noise floor was typically close to the radiated emission limit.
8. For frequency range between 18 GHz and 26.5 GHz, no critical emissions were found. All emissions shown on the pre-scans were investigated and found to be below the noise floor of the measurement system.



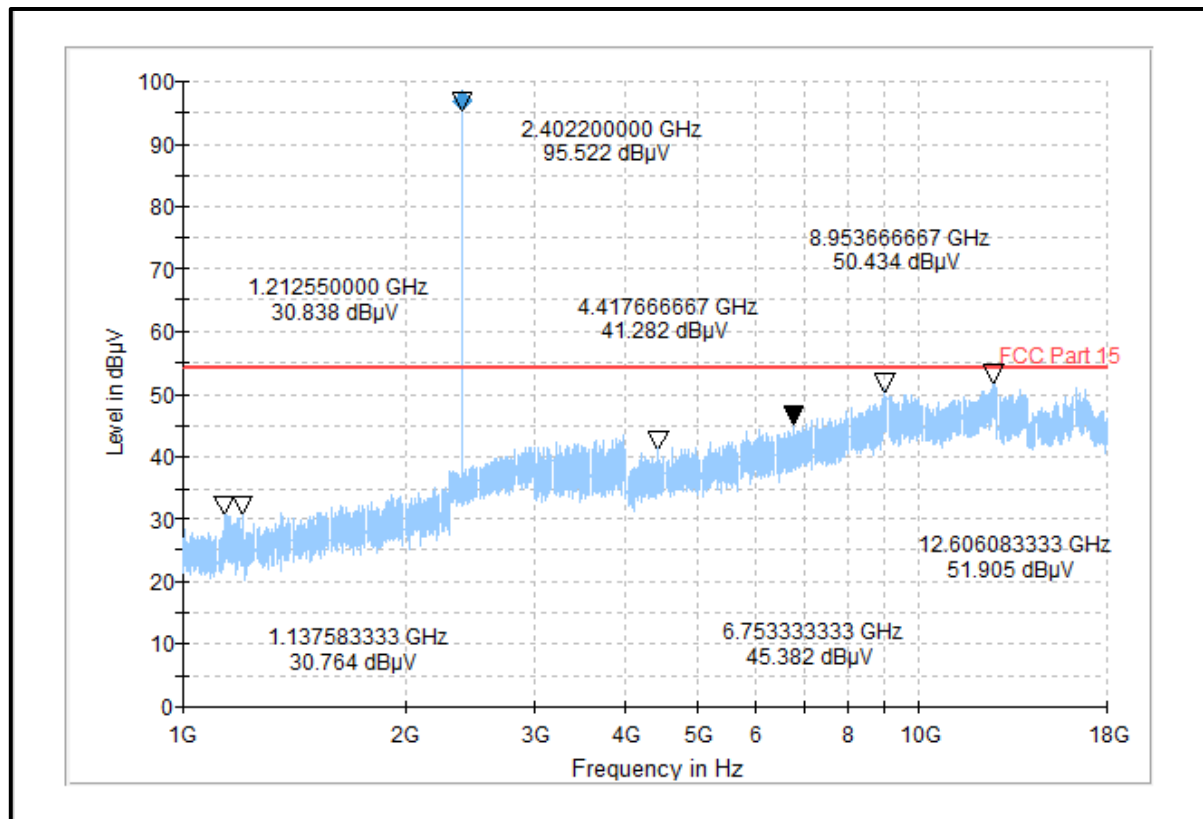
**Transmitter Radiated Emissions (continued)**

**Test Setup:**



**Transmitter Radiated Emissions (continued)****Results: BT-EDR Mode / Packet Type: 3DH1 / Hopping OFF/ Bottom Channel / PRBS9 / MAX PWR**

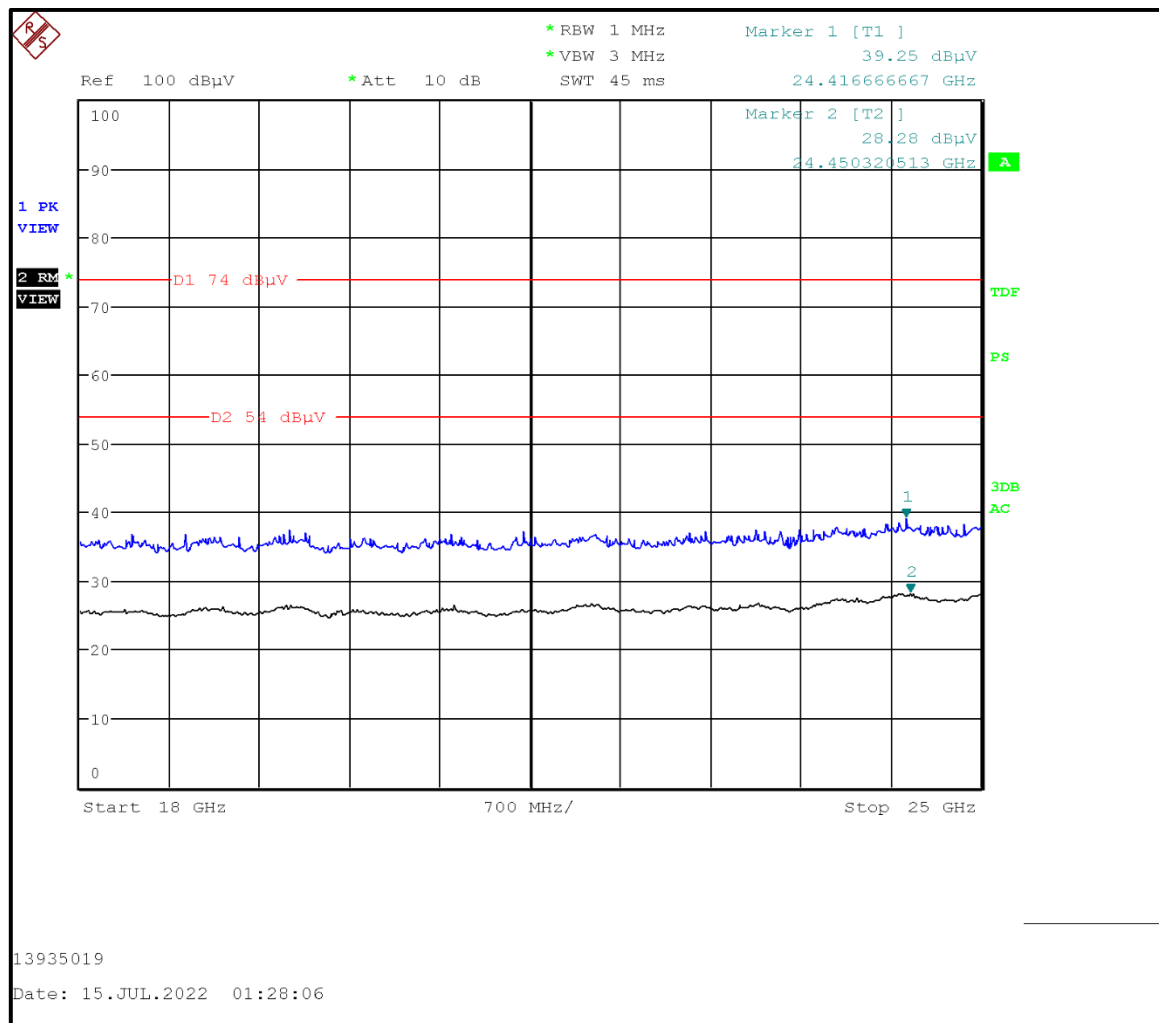
Frequency (MHz)	Antenna Polarization	MaxPeak Level (dB $\mu$ V/m)	Limit (dB $\mu$ V/m)	Margin (dB)	Result
No critical spurious emissions were detected					

**Plot: 1 GHz – 18 GHz:****BT-EDR Mode / Packet Type: 3DH1 / Hopping OFF/ Bottom Channel / MAX PWR****Result: Pass**

**Transmitter Radiated Emissions (continued)****Results: BT-EDR Mode / Packet Type: 3DH1 / Hopping OFF/ Bottom Channel / PRBS9 / MAX PWR**

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

**Plot: 18 GHz – 26.5 GHz:**  
**BT-EDR Mode / Packet Type: 3DH1 / Hopping OFF/ Bottom Channel / MAX PWR**

**Result: Pass**

**5.2.4. Transmitter Band Edge Radiated Emissions****Test Summary:**

<b>Test Engineer:</b>	Sercan Usta	<b>Test Date:</b>	18 & 21 July 2022
<b>Test Sample Serial Number:</b>	FCC / AT&T Sample 1		
<b>Test Site Identification</b>	SR 1/2		

<b>FCC Reference:</b>	Parts 15.247(d), 15.209(a) & 15.205(a)
<b>Test Method Used:</b>	FCC KDB 558074 Section 9
	ANSI C63.10:2013 Section 7.8.6 referencing Section 6.10
	Emissions in Authorized-band / non-restricted frequency bands: ANSI C63.10:2013 Section 6.10.4
	Emissions in restricted frequency bands: ANSI C63.10:2013 Section 6.10.5

**Environmental Conditions:**

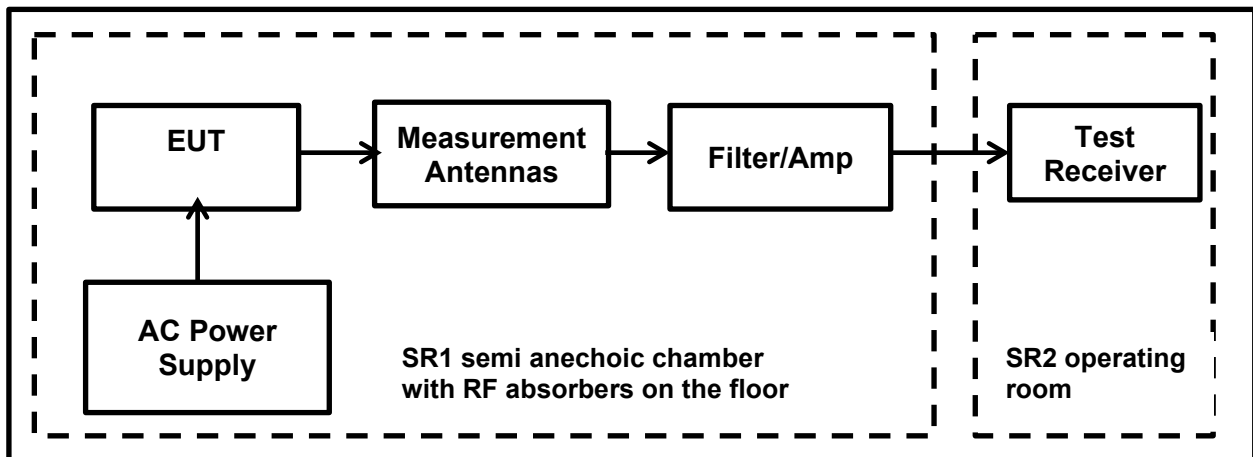
<b>Temperature (°C):</b>	24.7
<b>Relative Humidity (%):</b>	45.6

**Note(s):**

1. The measurements were in a semi-anechoic chamber SR1/ 2 (Asset Number 1603665) with RF absorbers on the floor at a distance of 3 m. The EUT was placed at a height of 1.5 m above the test chamber floor in the center of the chamber turntable. Maximum emission levels were determined by height searching the measurement antenna over the range 1 m to 4 m
2. As the lower band edge falls within a non-restricted band, measurements were performed in accordance with ANSI C63.10:2013 Section 6.10.4. As the maximum peak conducted output power was previously measured, in accordance with FCC Part 15.247(d) lower band edge measurement was performed with a peak detector and the -20 dBc limit applied.
3. As the lower band edge falls within a non-restricted band, only peak measurements are required. 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. The test receiver was left to sweep for a sufficient length of time in order to maximize the carrier level and out-of-band emissions. A marker and corresponding reference level line were placed on the peak of the carrier. Marker frequencies and levels were recorded.
4. The restricted band peak measurements were performed in accordance with ANSI C63.10:2013 Section 6.10.5
5. As the upper band edge falls within a restricted band both peak and average measurements were recorded by placing a marker at the edge of the band. For peak measurements the test receiver resolution bandwidth was set to 1 MHz and the video bandwidth 3 MHz A peak detector was used, sweep time was set to auto and trace mode was Max Hold. For average measurements the test receiver resolution bandwidth was set to 1 MHz and the video bandwidth 3 MHz and Average detector was used, the trace mode was Max hold. A marker was placed on the band edge spot frequencies and a second marker placed on the highest emission level in the adjacent restricted band of operation (where a higher-level emission was present). Marker frequencies and levels were recorded.

**Transmitter Band Edge Radiated Emissions (continued)****Note(s):**

6. There is a restricted band 10 MHz below the lower band edge. The test receiver was set up as follows: the RBW set to 1 MHz, the VBW set to 3 MHz, with the sweep time set to auto couple. Peak and average measurements were performed with their respective detectors. Markers were placed on the highest point on each trace.
7. The final measured value, for the given emission, in the table below incorporates the calibrated antenna factor and cable loss.
8. The final radiated emissions measurements were performed with the EUT set to the following worst-case mode with highest output power and on the mode with the widest bandwidth.
  - BT-BR Mode | Packet Type: DH1 | Hopping OFF | MAX PWR
  - BT-EDR Mode | Packet Type: 3DH1 | Hopping OFF | MAX PWR
9. As the continuous transmission of the EUT ( $D \geq 98\%$ ) cannot be achieved and EUT was transmitting continuously at Duty Cycles of 31.31 % & 30.67 % (duty cycle variations are less than  $\pm 2\%$  at the respective data rate) for BR and EDR respectively. Therefore, Duty Cycle Correction Factor of 5.04 dB and 5.13 dB was added to all average measurements, to compute the corrected average values of the emissions that would have been measured had the test been performed at 100% Duty Cycle.

**Test Setup:**

**Transmitter Band Edge Radiated Emissions (continued)****Results: BT-BR Mode / Packet Type: DH1 / Hopping OFF/ Bottom Channel / PRBS9 / MAX PWR****Results: Lower Band Edge / Peak**

Frequency (MHz)	Peak Level (dB $\mu$ V/m)	-20 dBc Limit (dB $\mu$ V/m)	Margin (dB)	Result
2399.90	39.00	77.20	38.20	Complied
2400.00	38.98	77.20	38.22	Complied

**Results: 2310 to 2390 MHz Restricted Band / Peak**

Frequency (MHz)	Peak Level (dB $\mu$ V/m)	Peak Limit (dB $\mu$ V/m)	Margin (dB)	Result
2332.34	41.15	74.00	22.85	Complied

**Results: 2310 to 2390 MHz Restricted Band / Average**

Frequency (MHz)	Average Level (dB $\mu$ V/m)	Duty Cycle Correction Factor (dB)	Corrected Average Level (dB $\mu$ V/m)	Average Limit (dB $\mu$ V/m)	Margin (dB)	Result
2331.94	38.16	5.04	43.20	54.00	10.80	Complied

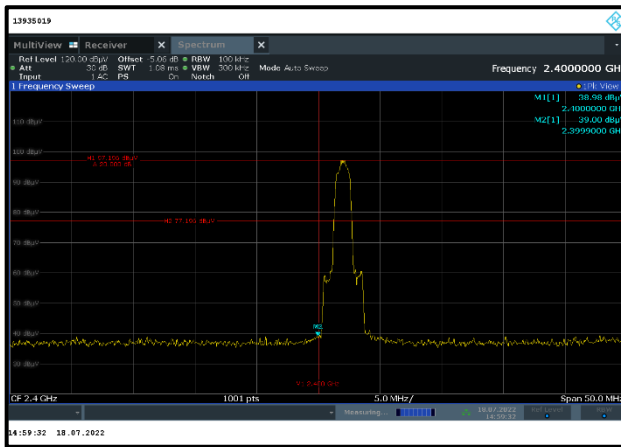
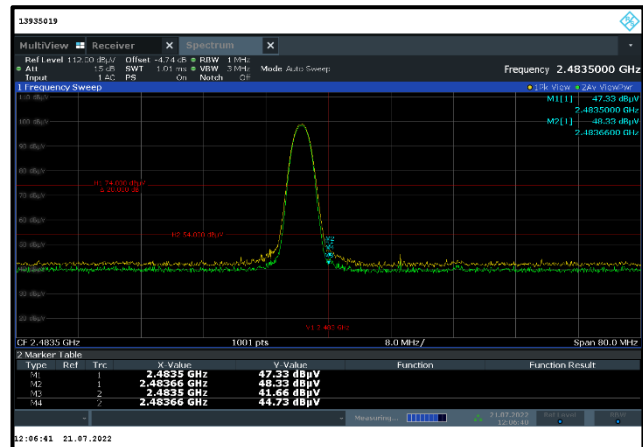
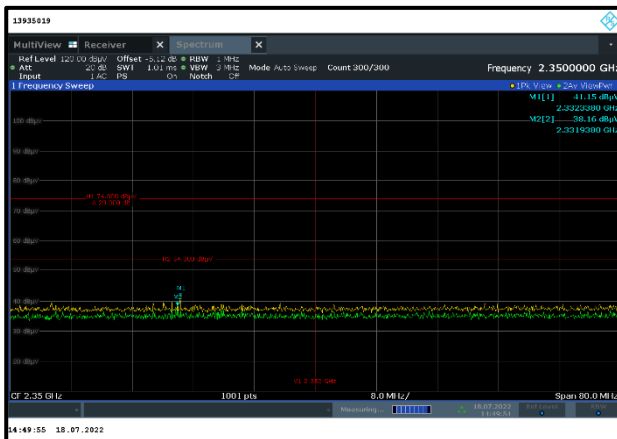
**Results: Upper Band Edge / Peak**

Frequency (MHz)	Peak Level (dB $\mu$ V/m)	Peak Limit (dB $\mu$ V/m)	Margin (dB)	Result
2483.50	47.33	74.00	26.67	Complied
2483.66	48.33	74.00	25.67	Complied

**Results: Upper Band Edge / Average**

Frequency (MHz)	Average Level (dB $\mu$ V/m)	Duty Cycle Correction Factor (dB)	Corrected Average Level (dB $\mu$ V/m)	Average Limit (dB $\mu$ V/m)	Margin (dB)	Result
2483.50	41.66	5.04	46.70	54.00	7.30	Complied
2484.66	44.73	5.04	49.77	54.00	4.23	Complied

**Result: Pass**

**Transmitter Band Edge Radiated Emissions (continued)****Results: BT-BR Mode / Packet Type: DH1 / Hopping OFF/ Bottom Channel / PRBS9 / MAX PWR****Lower Band Edge Peak Measurement****Upper Band Edge Peak & Average Measurement****2310 MHz to 2390 MHz Restricted Band****Result: Pass**

**Transmitter Band Edge Radiated Emissions (continued)****Results: BT-EDR Mode / Packet Type: 3DH1 / Hopping OFF/ Bottom Channel / PRBS9 / MAX PWR****Results: Lower Band Edge / Peak**

Frequency (MHz)	Peak Level (dB $\mu$ V/m)	-20 dBc Limit (dB $\mu$ V/m)	Margin (dB)	Result
2399.90	39.00	77.19	38.19	Complied
2400.00	38.98	77.19	38.21	Complied

**Results: 2310 to 2390 MHz Restricted Band / Peak**

Frequency (MHz)	Peak Level (dB $\mu$ V/m)	Peak Limit (dB $\mu$ V/m)	Margin (dB)	Result
2351.28	39.85	74.00	34.15	Complied

**Results: 2310 to 2390 MHz Restricted Band / Average**

Frequency (MHz)	Average Level (dB $\mu$ V/m)	Duty Cycle Correction Factor (dB)	Corrected Average Level (dB $\mu$ V/m)	Average Limit (dB $\mu$ V/m)	Margin (dB)	Result
2326.42	37.45	5.13	42.58	54.00	11.42	Complied

**Results: Upper Band Edge / Peak**

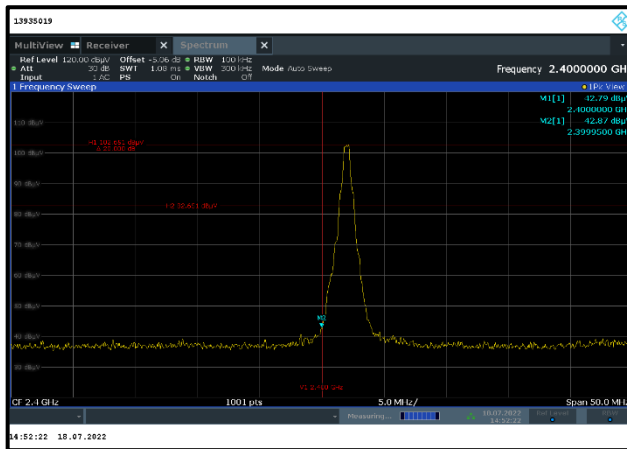
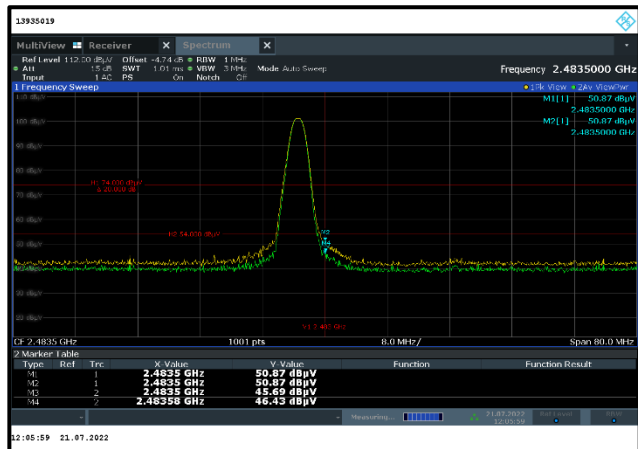
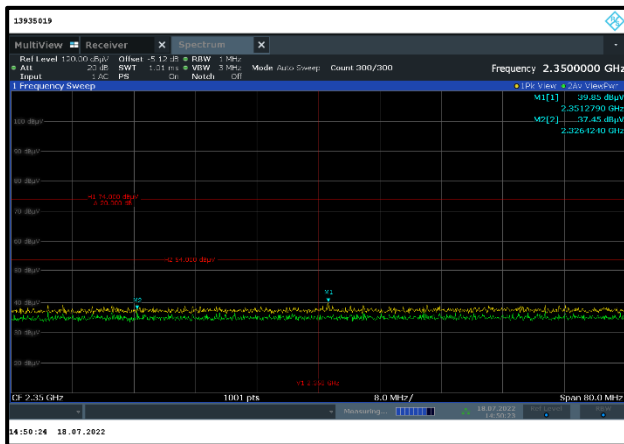
Frequency (MHz)	Peak Level (dB $\mu$ V/m)	Peak Limit (dB $\mu$ V/m)	Margin (dB)	Result
2483.50	50.87	74.00	23.13	Complied
2483.50	50.87	74.00	23.13	Complied

**Results: Upper Band Edge / Average**

Frequency (MHz)	Average Level (dB $\mu$ V/m)	Duty Cycle Correction Factor (dB)	Corrected Average Level (dB $\mu$ V/m)	Average Limit (dB $\mu$ V/m)	Margin (dB)	Result
2483.50	45.69	5.13	50.82	54.00	3.18	Complied
2583.58	46.43	5.13	51.56	54.00	2.44	Complied

**Result:** **Pass**



**Transmitter Band Edge Radiated Emissions (continued)****Results: BT-EDR Mode / Packet Type: 3DH1 / Hopping OFF/ Bottom Channel / PRBS9 / MAX PWR****Lower Band Edge Peak Measurement****Upper Band Edge Peak & Average Measurement****2310 MHz to 2390 MHz Restricted Band****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
Transmitter Duty Cycle	95%	±3.4%
Radiated Spurious Emissions	95%	±3.10 dB
Band Edge Radiated 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
377	BONN Elektronik	Amplifier, Low Noise Pre	BLMA 0118-1A	025294B	13/07/2022	12
423	Bonn Elektronik	Amplifier, Low Noise Pre	BLMA 1840-1A	55929	13/07/2022	12
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
495	Rohde & Schwarz	Antenna, log. - periodical	HL050	100296	06/08/2021	24
496	Rohde & Schwarz	Antenna, log. - periodical	HL050	100297	22/08/2022	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	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
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	ESH3-Z5	831767/013	11/07/2022	12
28	Rohde & Schwarz	Passive Probe	ESH2-Z3	none	12/07/2022	36
349	Rohde & Schwarz	Receiver, EMI Test	ESIB7	836697/009	12/07/2022	12
351	Rohde & Schwarz	network, Artificial Mains	ESH3-Z5	862770/018	11/07/2022	12
564	Teseq	Impedance stabilisation network (ISN)	ISN T800	26076	14/07/2021	24
616	Rohde & Schwarz	ISN	ENY81-CA6	101656	07/07/2020	36
-/-	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

## 8. Report Revision History

Version Number	Revision Details		
	Page No(s)	Clause	Details
1.0	36	-	Initial Version
<b>Test Report Version 1.1 supersede Version 1.0 with immediate effect</b> Test Report No. UL-RPT-RP-14067528-316-1-FCC Version 1.1, Issue Date 03 April 2023 replaces Test Report No. UL-RPT-RP-14067528-316-1-FCC Version 1.0, Issue Date 01 September 2022, which is no longer valid.			
1.1	as below	as below	Current Version
	-	-	Report template updated
	1	-	Model no. and FCC ID updated
	4	1.2	Applicant and Manufacturer info updated
	6	2.2	Notes updated
	7	3.1	Identification of EUT updated
	7	3.2	Description of EUT updated
	9	3.4	Notes updated
	9	3.5	Support equipment table updated
	10	4.1	Notes updated
	13 & 14	5.2.1	Tables updated
	19	-	Notes updated
	22	-	Notes updated
	24	-	Notes updated
	35	7	Used equipment list updated

--- END OF REPORT ---