



TEST REPORT

Test Report No. : UL-RPT-RP-14421035-216-FCC

Applicant : Workaround GmbH

Model No. : MARK 3

FCC ID : 2AOJL- MARK-3

Technology : Bluetooth – Low Energy

Test Standard(s) : FCC Parts 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 1.0**
5. Result of the tested sample: **PASS**

Prepared by: Sercan Usta
Title: Project Engineer
Date: 26 August 2022

Approved by: Rachid, Acharkaoui
Title: Operations Manager
Date: 26 August 2022



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.

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1. Customer Information

1.1.Applicant Information

Company Name:	Workaround GmbH
Company Address:	Rupert-Mayer-Str. 44, 81379 Munich,Germany
Company Phone No.:	+49 89 26203500
Company E-Mail:	support@proglove.com
Contact Person:	Arif Şamil Çilgin
Contact E-Mail Address:	arif.cilgin@proglove.de
Contact Phone No.:	+4917677379345

1.2.Manufacturer Information

Company Name:	Workaround GmbH
Company Address:	Rupert-Mayer-Str. 44, 81379 Munich,Germany
Company Phone No.:	+49 89 26203500
Company E-Mail:	support@proglove.com
Contact Person:	Arif Şamil Çilgin
Contact E-Mail Address:	arif.cilgin@proglove.de
Contact Phone No.:	+4917677379345

2. Summary of Testing

2.1. General Information

Applied Standards

Specification Reference:	47CFR15.247
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications): Part 15 Subpart C (Intentional Radiators) - Section 15.247
Specification Reference:	47CFR15.209
Specification Title:	Code of Federal Regulations Volume 47 (Telecommunications): Part 15 Subpart C (Intentional Radiators) - Sections 15.209

Location

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

Date information

Order Date:	15 July 2022
EUT arrived:	22 August 2022
Test Dates:	23 August 2022
EUT returned:	-/-

2.2. Summary of Test Results

Clause	Measurement	Complied	Did not comply	Not performed	Not applicable
Part 15.207	Transmitter AC Conducted Emissions	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Part 15.247(a)(2)	Transmitter Minimum 6 dB Bandwidth ⁽²⁾	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Part 15.35(c)	Transmitter Duty Cycle ⁽¹⁾	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Part 15.247(e)	Transmitter Power Spectral Density ⁽²⁾	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Part 15.247(b)(3)	Transmitter Maximum Peak Output Power ⁽²⁾	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Part 15.247(d)/15.209(a)	Transmitter Radiated Emissions	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Part 15.247(d)/15.209(a)	Transmitter Band Edge Radiated Emissions	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Note(s):

1. The measurement was performed to assist in the calculation of the average measurements.
2. As per applicant's declaration, the EUT is a host product integrating radio module MARK 3 (FCC ID: 2AOJL-MARK3) which is identical to FCC pre-qualified radio module LEO (FCC ID: 2AOJL-LEO). Therefore, only partial testing is performed [refer to section 3.4]. For further details refer FCC pre-certified radio transmitter module's

(Model: LEO | FCC ID: 2AOJL-LEO) Report No. UL-RPT-RP-14317245-216-FCC | Issue Date: 12 July 2022 | UL International GmbH, Stuttgart.

2.3. Methods and Procedures

Reference:	ANSI C63.10-2013
Title:	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices
Reference:	FCC KDB 558074 D01 DTS Meas Guidance v05r02 April 2, 2019
Title:	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
Reference:	FCC KDB 996369 D04 Module Integration Guide v02 October 13, 2020
Title:	Modular Transmitter Integration Guide Guidance for Host Product Manufacturers

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)

Brand Name:	ProGlove
Model Name or Number:	Mark 3
Test Sample Serial Number:	M3XR B 10 000040 (Radiated Test Sample)
Hardware Version Number:	B
Software Version Number:	1
FCC ID:	2AOJL- MARK-3

Brand Name:	ProGlove
Model Name or Number:	Mark 3
Test Sample Serial Number:	M3XR B 10 000041 (Radiated Test Sample)
Hardware Version Number:	B
Firmware Version Number:	1
FCC ID:	2AOJL- MARK-3

3.2. Description of EUT

The equipment under test was a Wireless wearable bar-code reader, supporting Bluetooth Low Energy operations in 2.4 - 2.4835 GHz ISM band.

3.3. Modifications Incorporated in the EUT

No modifications were applied to the EUT during testing.

3.4. Additional Information Related to Testing

Technology Tested:	Bluetooth Low Energy (4.0 / 5.0) / Digital Transmission System				
Type of Unit:	Transceiver				
Power Supply Requirement(s):	Nominal	3.7 V DC (Internal Rechargeable Battery)			
Channel Spacing:	2 MHz				
Modulation:	GFSK				
Data Rate:	1 Mbps / 2 Mbps				
Antenna Type:	Custom Flex PCB Antenna				
Antenna Details:	2.4GHz Flex PCB antenna				
Transmit Frequency Range:	2402 MHz to 2480 MHz				
Transmit Channels Tested:	Channel ID	RF Channel	Channel Frequency (MHz)		
	Bottom	37	2402		
	Top	39	2480		

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
	-/-	-/-	-/-	-/-

B. Support Equipment (Manufacturer supplied)

Item	Description	Brand Name	Model Name or Number	Serial Number
1	Glove with button to trigger Mark	PROGLOVE	Not marked or stated	Not marked or stated

4. Operation and Monitoring of the EUT during Testing

4.1. Operating Modes

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

- Continuously transmitting modulated carrier with combination of
BT-LE Test Mode :1 Mbps | PRBS9 | Maximum Power Settings (PWR MAX)
- BT-LE Test Mode :2 Mbps | PRBS9 | Maximum Power Settings (PWR MAX)

4.2. Configuration and Peripherals

EUT Power Supply:

- The EUT was powered via 3.7V Internal battery for radiated measurements.

Test Mode Activation:

- The customer supplied a document containing the setup instructions "LEO& MARK 3 Certification Helper (rev-A).pdf", 17.05.2022
- The EUTs were configured into required Bluetooth LE TX test modes using the QR codes which were supplied by the customer.
- For the modulated test mode activation TXRAND and PRBS9 options were selected.
- The transmitter power was configured to maximum value & was not accessible during the tests.

Radiated Measurements:

- The EUT radiated samples with fully charged internal battery were used for radiated spurious emission & radiated band edge measurements.
- 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 100 cm.
- The radiated measurements above 30 MHz were performed with the EUT positioned on the turn table and rotating 360 degrees while the antenna height varies from 1 to 4 m over the measurement frequency range.
- R&S® EMC32 V11.30.00 Software was used for the Radiated spurious emission measurements.

Duty Cycle:

- As the EUT continuous transmission of the EUT ($D \geq 98\%$) cannot be achieved and EUT was transmitting continuously with a constant Duty Cycle of 66.48 % & 34.34 % (duty cycle variations are less than $\pm 2\%$) in 1 Mbps and 2 Mbps data rates. Therefore, a Duty Cycle Correction Factor of 1.77dB & 4.64 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 Duty Cycle

Test Summary:

Test Engineer:	Sercan Usta	Test Date:	23 August 2022
Test Sample Serial Number:	M3XR B 10 000041 (Radiated Test Sample)		
Test Site Identification	SR 9		

FCC Reference:	Part 15.35(c)
Test Method Used:	FCC KDB 558074 Section 6.0 referencing ANSI C63.10 Section 11.6

Environmental Conditions:

Temperature (°C):	23.8
Relative Humidity (%):	45.8

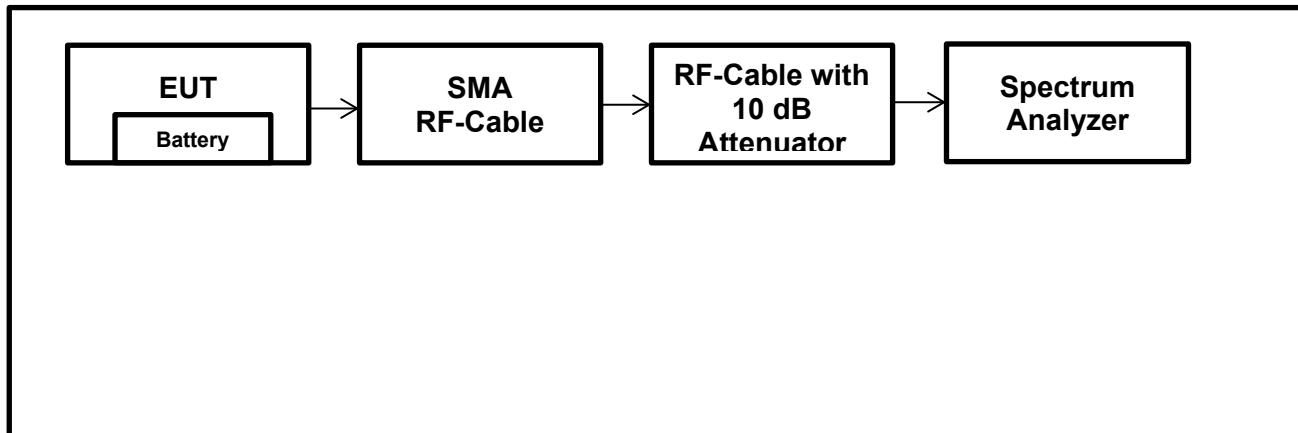
Note:

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

Duty Cycle (%) = 100 X [On Time (T_{ON})] / [Period(T_{ON}+ T_{OFF}) or 100ms whichever is the lesser]

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

Test Setup:



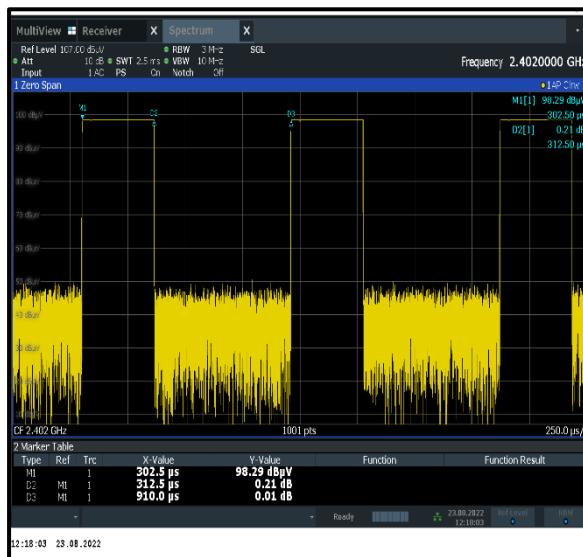
Transmitter Duty Cycle (continued)**Results: BT-LE Mode / TXRAND / PRBS9 / 1 Mbps / PWR MAX**

Pulse On Time (T _{ON}) (μ s)	Pulse Period (T _{ON} + T _{OFF}) (μ s)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)
605.0	910.0	66.48	1.77



Transmitter Duty Cycle (continued)**Results: BT-LE Mode / TXRAND / PRBS9 / 2 Mbps / PWR MAX**

Pulse On Time (T_{ON}) (μ s)	Pulse Period ($T_{ON} + T_{OFF}$) (μ s)	Duty Cycle (%)	Duty Cycle Correction Factor (dB)
312.5	910.0	34.34	4.64



5.2.2. Transmitter Radiated Emissions

Test Summary:

Test Engineer:	Sercan Usta	Test Date:	23 August 2022
Test Sample Serial Number:	M3XR B 10 000041 (Radiated Test Sample)		
Test Site Identification	SR 1/2		

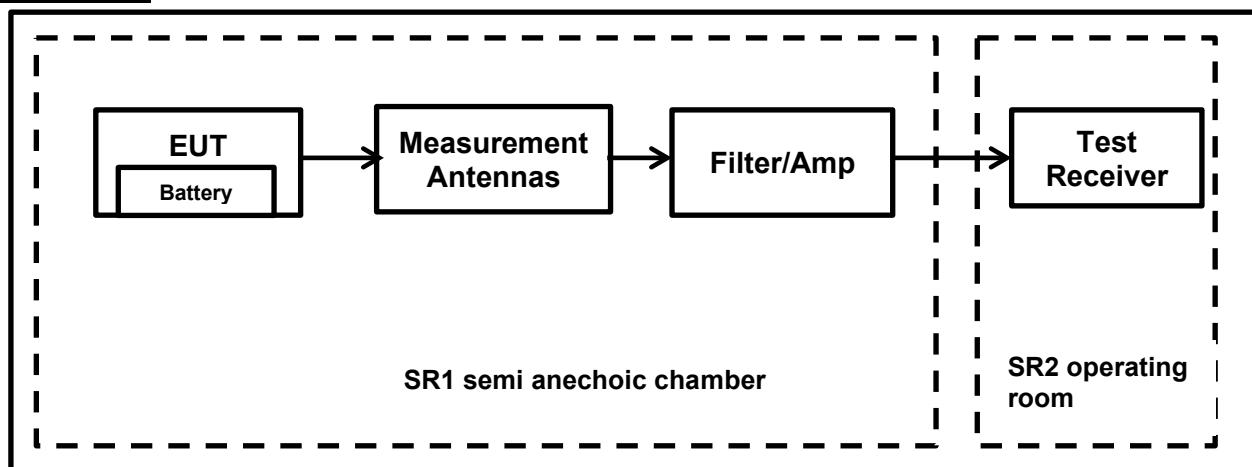
FCC Reference:	Parts 15.247(d) & 15.209(a)
Test Method Used:	FCC KDB 558074 Sections 8.5 & 8.6 referencing ANSI C63.10 Sections 11.11 and 11.12 ANSI C63.10:2013 Sections 6.3 and 6.4
Frequency Range	9 kHz to 30 MHz

Environmental Conditions:

Temperature (°C):	23.8
Relative Humidity (%):	45.8

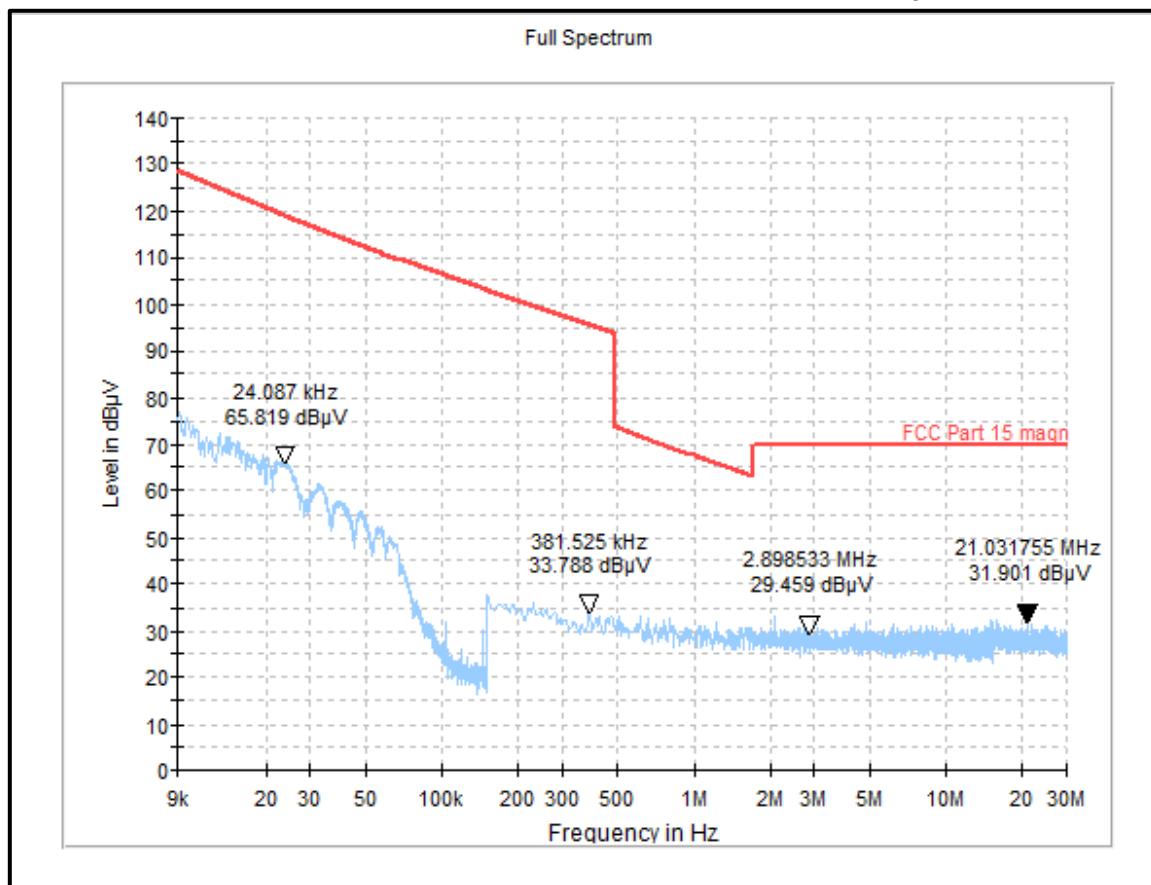
Notes:

1. 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).
2. The limits are specified at a test distances of 30 and 300 metres. 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.
3. 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.
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 100 cm.
5. The measurement was performed only with 2 Mbps data rate on bottom channel as it was found out to be the worst-case.
6. All other emissions shown on the pre-scans were investigated and found to be > 20 dB below the applicable limits.
7. 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-LE Mode / TXRAND / PRBS9 / PWR MAX / 2 Mbps / Bottom Channel**

Frequency (MHz)	Loop Antenna Orientation	MaxPeak Level (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Result
No critical spurious emissions were detected					

Plot: 9 kHz – 30 MHz: BT-LE Mode / TXRAND / PRBS9 / PWR MAX / 2 Mbps / Bottom Channel**Result: Pass**

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

Test Engineer:	Sercan Usta	Test Date:	23 August 2022
Test Sample Serial Number:	M3XR B 10 000041 (Radiated Test Sample)		
Test Site Identification	SR 1/2		

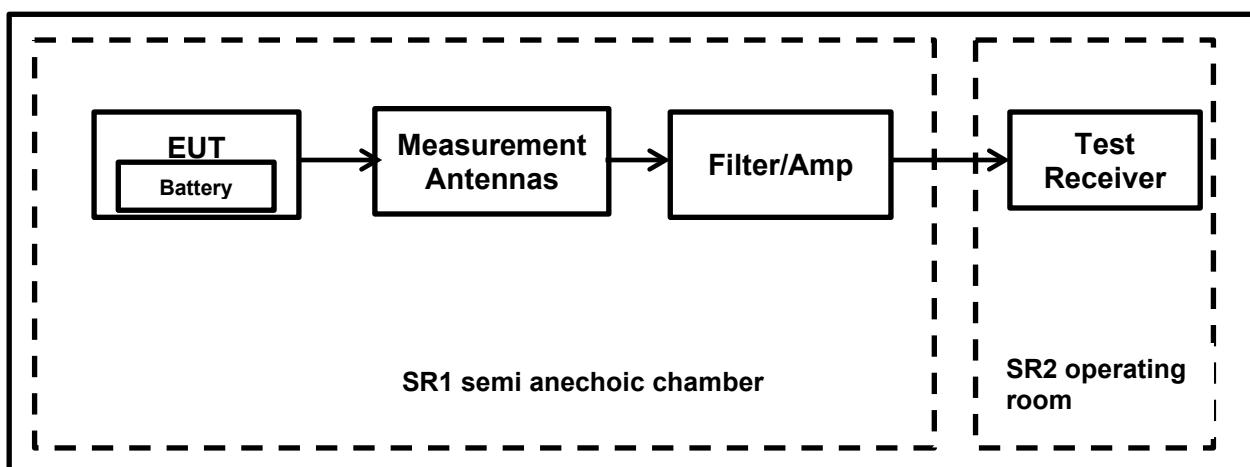
FCC Reference:	Parts 15.247(d) & 15.209(a)
Test Method Used:	FCC KDB 558074 Sections 8.5 & 8.6 referencing ANSI C63.10 Sections 11.11 and 11.12 ANSI C63.10:2013 Sections 6.3 and 6.5
Frequency Range	30 MHz to 1000 MHz

Environmental Conditions:

Temperature (°C):	23.8
Relative Humidity (%):	45.8

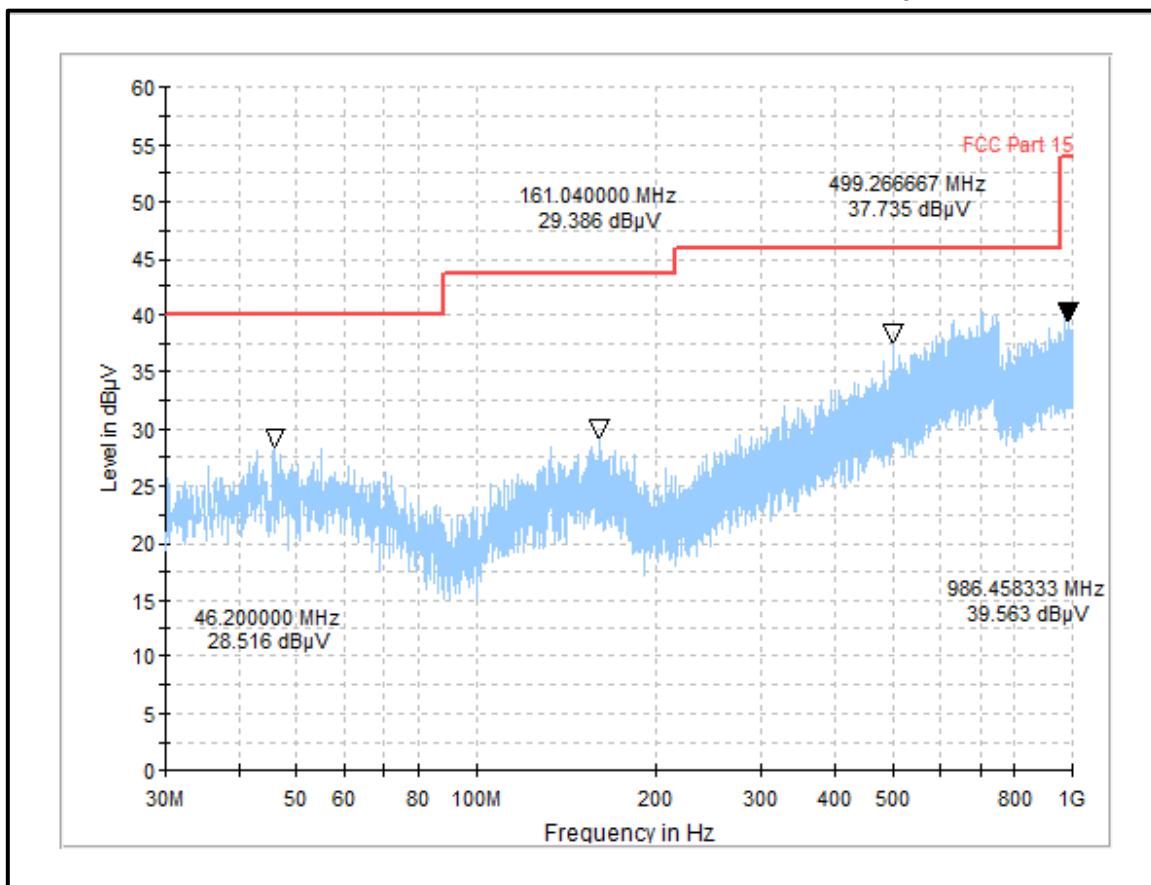
Notes:

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. The measurement was performed only with 2 Mbps data rate on bottom channel as it was found out to be the worst-case.
3. 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.
4. All emissions shown on the pre-scan plots were investigated and found to be below system noise floor.

Test Setup:

Transmitter Radiated Emissions (continued)**Results: BT-LE Mode / TXRAND / PRBS9 / PWR MAX / 2 Mbps / Bottom Channel**

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

Plot: 30 MHz-1 GHz: BT-LE Mode / TXRAND / PRBS9 / PWR MAX / 2 Mbps / Bottom Channel**Result: Pass**

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

Test Engineer:	Sercan Usta	Test Date:	23 August 2022
Test Sample Serial Number:	M3XR B 10 000041 (Radiated Test Sample)		
Test Site Identification	SR 1/2		

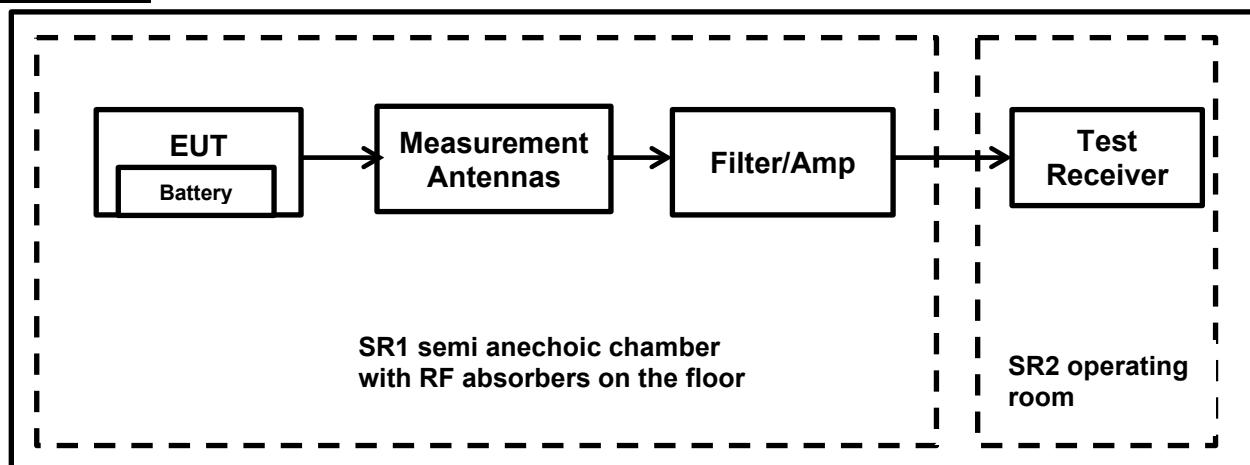
FCC Reference:	Parts 15.247(d) & 15.209(a)
Test Method Used:	FCC KDB 558074 Sections 8.5 & 8.6 referencing ANSI C63.10 Sections 11.11 and 11.12 ANSI C63.10:2013 Sections 6.3 and 6.6
Frequency Range	1 GHz to 25 GHz

Environmental Conditions:

Temperature (°C):	21.6
Relative Humidity (%):	55.9

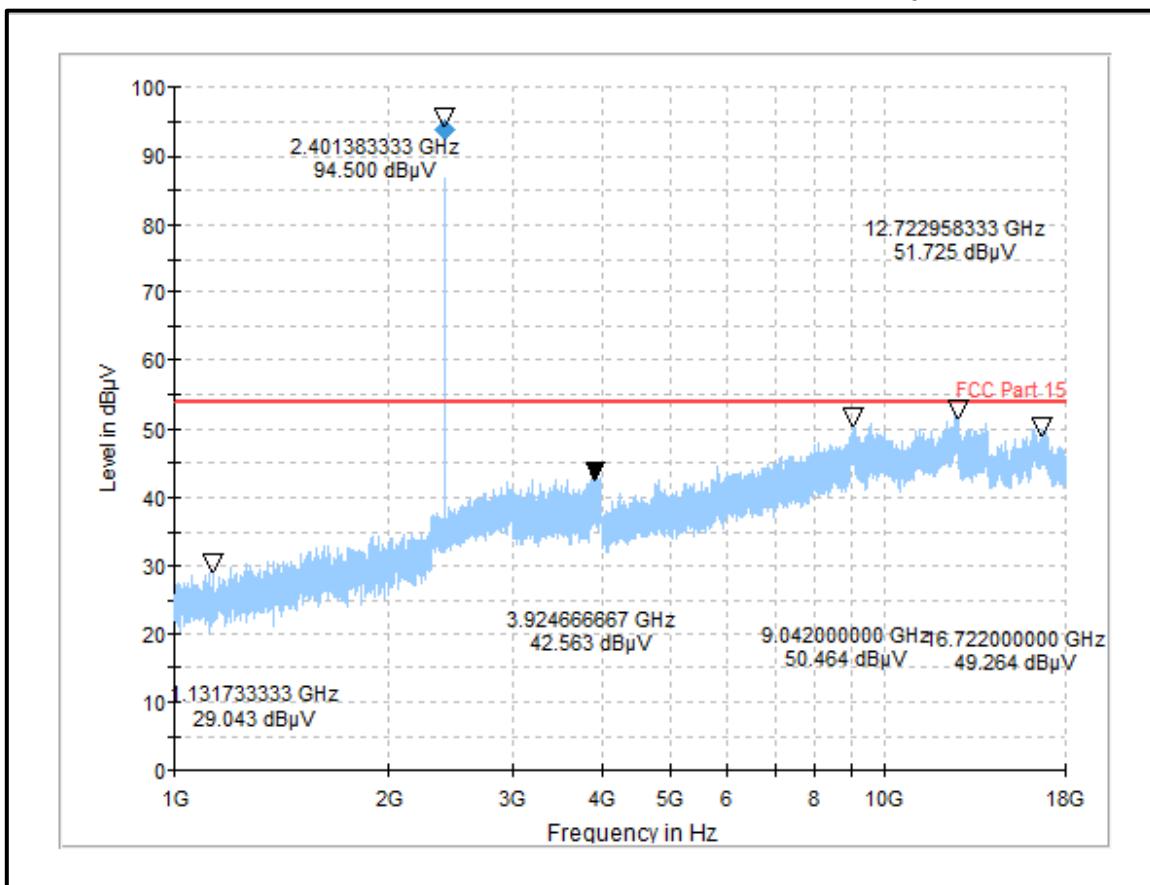
Note(s):

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 centre 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 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 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.
3. The measurement from 1GHz to 18 GHz was performed only with 2 Mbps data rate as it was found out to be the worst-case.
4. 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.
5. 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.
6. For frequency range between 18 GHz and 25 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.
7. 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 channel.
8. For frequency range between 1 GHz and 18 GHz No critical spurious emissions were detected.
9. The measurement above 18 GHz was performed only with 2 Mbps data rate on bottom channel as it was found out to be the worst-case.
10. For frequency range between 18 GHz and 25 GHz, no critical emissions were found.

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

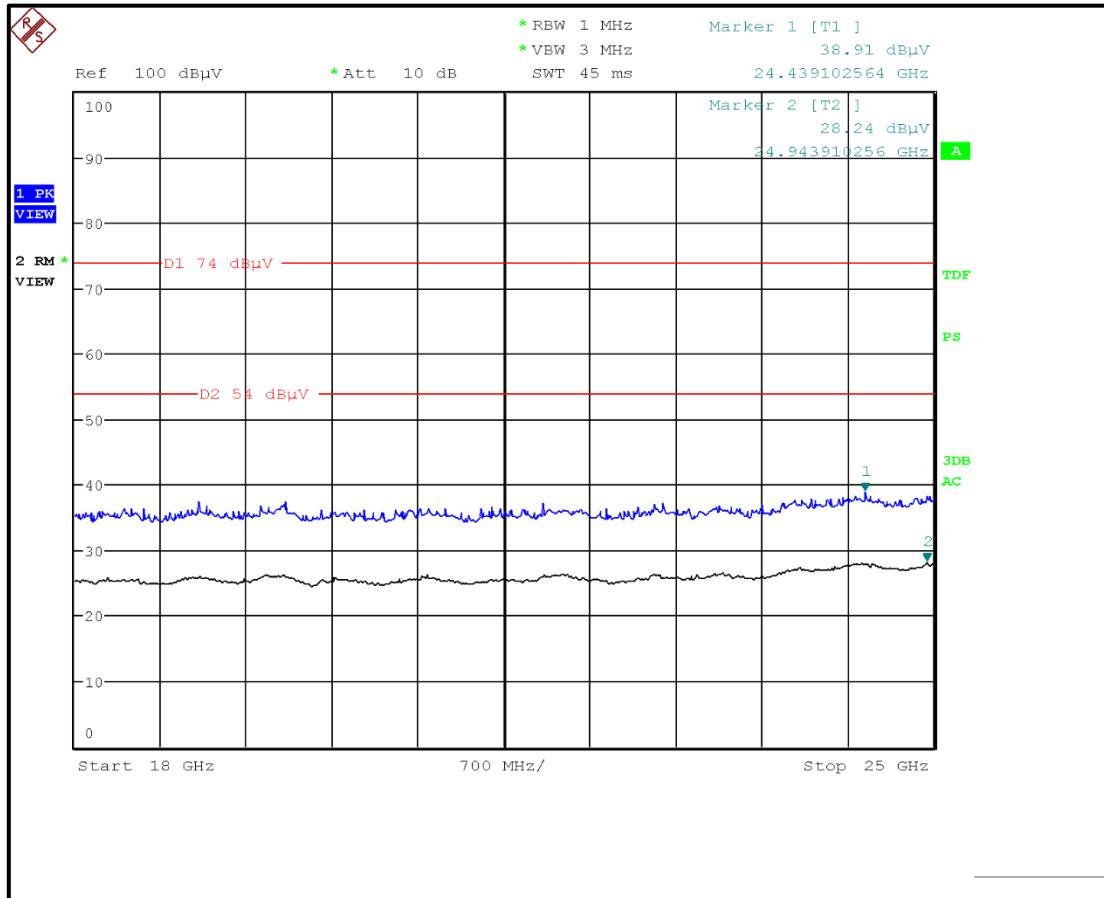
Transmitter Radiated Emissions (continued)**Results: BT-LE Mode / TXRAND / PRBS9 / PWR MAX / 2 Mbps / Bottom Channel**

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

Plot: 1 GHz – 18 GHz: BT-LE Mode / TXRAND / PRBS9 / PWR MAX / 2 Mbps / Bottom Channel**Result: Pass**

Transmitter Radiated Emissions (continued)**Results: BT-LE Mode / TXRAND / PRBS9 / PWR MAX / 2 Mbps / Bottom Channel**

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

Plot: 18 GHz – 25 GHz: BT-LE Mode / TXRAND / PRBS9 / PWR MAX / 2 Mbps / Bottom Channel**Result: Pass**

5.2.3. Transmitter Band Edge Radiated Emissions

Test Summary:

Test Engineer:	Sercan Usta	Test Date:	23 August 2022
Test Sample Serial Number:	M3XR B 10 000041 (Radiated Test Sample)		
Test Site Identification	SR 1/2		

FCC Reference:	Parts 15.247(d) & 15.209(a)
Test Method Used:	DTS emissions in non-restricted frequency bands: FCC KDB 558074 Section 8.5 referencing ANSI C63.10:2013 Sections 11.11
	DTS emissions in restricted frequency bands: FCC KDB 558074 Section 8.6 referencing ANSI C63.10:2013 Sections 11.12
	ANSI C63.10:2013 Sections 6.10.4, 6.10.5

Environmental Conditions:

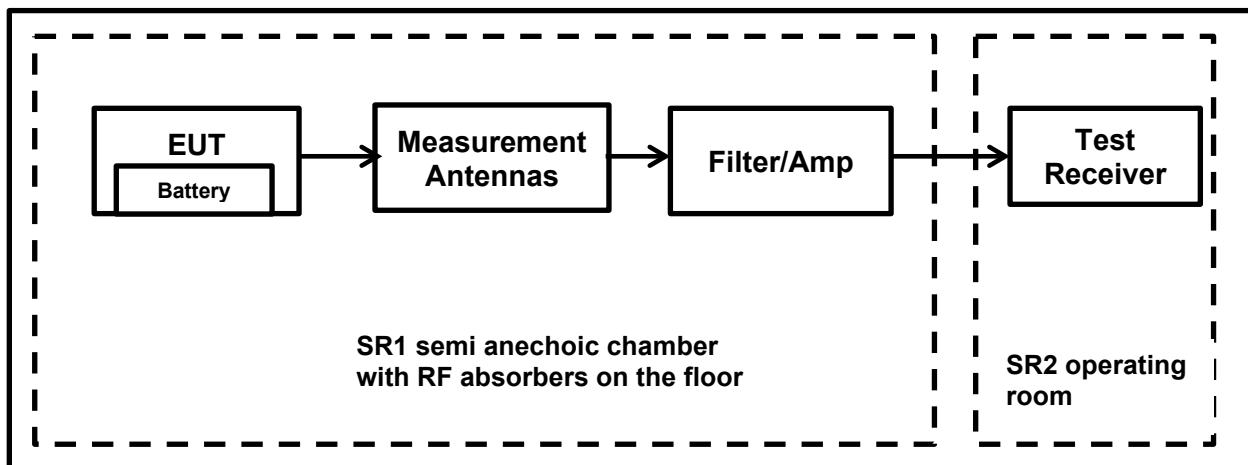
Temperature (°C):	23.8
Relative Humidity (%):	45.8

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 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. As the lower band edge falls within a non-restricted band, measurements were performed in accordance with FCC KDB 558074 Section 8.5 referencing ANSI C63.10 Section 11.11. As the maximum peak conducted output power was previously measured, in accordance with ANSI C63.10 Section 11.11.1(a) 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 maximise 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. 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. A RMS detector in power averaging mode was used. The test receiver was set to sweep for a 300 sweep counts in order to maximise the carrier level and out-of-band emissions. 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.
5. The restricted band peak measurements were performed in accordance with ANSI C63.10 Section 11.12.2.4.

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 (300 sweeps) 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. **As the EUT continuous transmission of the EUT ($D \geq 98\%$) cannot be achieved and EUT was transmitting continuously with a constant Duty Cycle of 66.48 % & 34.34 % (duty cycle variations are less than $\pm 2\%$) in 1 Mbps and 2 Mbps data rates. Therefore, a Duty Cycle Correction Factor of 1.77dB & 4.64 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-LE Mode / TXRAND / PRBS9 / 1 Mbps / PWR MAX****Results: Lower Band Edge / Peak**

Frequency (MHz)	Peak Level (dB μ V/m)	-20 dBc Limit (dB μ V/m)	Margin (dB)	Result
2399.90	40.04	73.89	33.85	Complied
2400.00	38.24	73.89	35.65	Complied

Results: 2310 to 2390 MHz Restricted Band / Peak

Frequency (MHz)	Peak Level (dB μ V/m)	Peak Limit (dB μ V/m)	Margin (dB)	Result
2353.28	44.75	74.0	29.25	Complied

Results: 2310 to 2390 MHz Restricted Band / Average

Frequency (MHz)	Average Level (dB μ V/m)	Duty Cycle Correction Factor (dB)	Corrected Avarage Level (dB μ V/m)	Average Limit (dB μ V/m)	Margin (dB)	Result
2384.53	32.84	1.77	34.61**	54.0	19.39	Complied

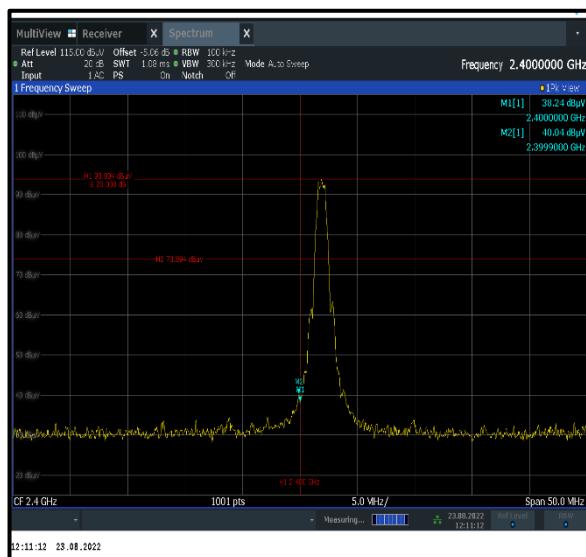
Results: Upper Band Edge / Peak

Frequency (MHz)	Peak Level (dB μ V/m)	Peak Limit (dB μ V/m)	Margin (dB)	Result
2483.50	44.27	74.0	29.73	Complied
2489.73	45.12	74.0	28.88	Complied

Results: Upper Band Edge / Average

Frequency (MHz)	Average Level (dB μ V/m)	Duty Cycle Correction Factor (dB)	Corrected Avarage Level (dB μ V/m)	Average Limit (dB μ V/m)	Margin (dB)	Result
2483.50	34.21	1.77	35.98**	54.0	18.02	Complied
2487.90	34.24	1.77	36.01**	54.0	17.99	Complied

Result: Pass

Transmitter Band Edge Radiated Emissions (continued)**Results: BT-LE Mode / TXRAND / PRBS9 / 1 Mbps / PWR MAX****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-LE Mode / TXRAND / PRBS9 / 2 Mbps / PWR MAX****Results: Lower Band Edge / Peak**

Frequency (MHz)	Peak Level (dB μ V/m)	-20 dBc Limit (dB μ V/m)	Margin (dB)	Result
2399.90	60.44	73.70	13.26	Complied
2400.00	58.18	73.70	15.52	Complied

Results: 2310 to 2390 MHz Restricted Band / Peak

Frequency (MHz)	Peak Level (dB μ V/m)	Peak Limit (dB μ V/m)	Margin (dB)	Result
2324.66	44.72	74.0	29.28	Complied

Results: 2310 to 2390 MHz Restricted Band / Average

Frequency (MHz)	Average Level (dB μ V/m)	Duty Cycle Correction Factor (dB)	Corrected Avarage Level (dB μ V/m)	Average Limit (dB μ V/m)	Margin (dB)	Result
2389.40	32.91	4.64	37.55**	54.0	16.45	Complied

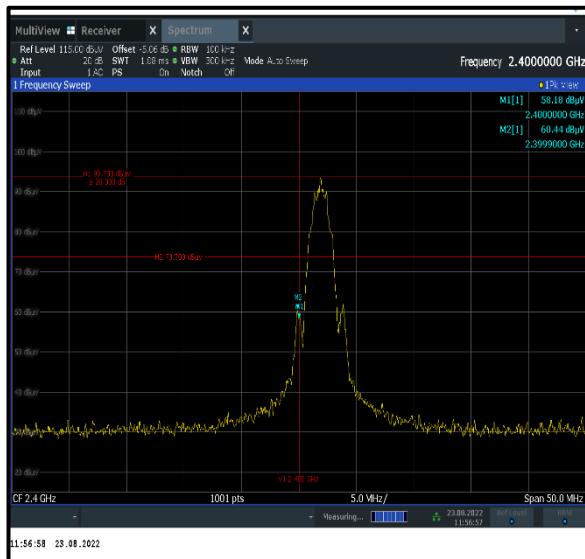
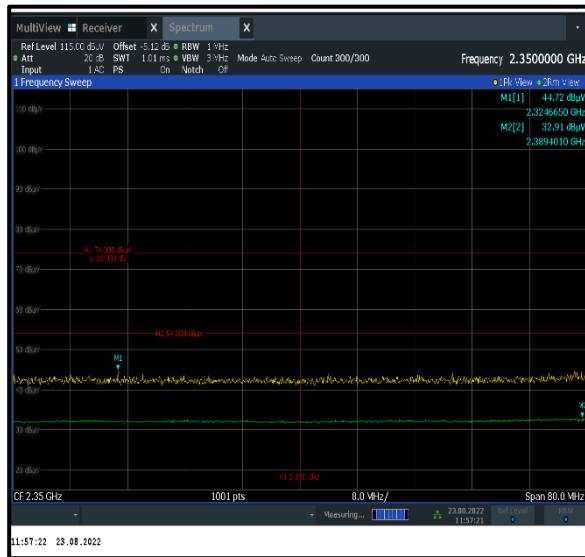
Results: Upper Band Edge / Peak

Frequency (MHz)	Peak Level (dB μ V/m)	Peak Limit (dB μ V/m)	Margin (dB)	Result
2483.50	51.19	74.0	22.81	Complied
2483.58	51.97	74.0	22.03	Complied

Results: Upper Band Edge / Average

Frequency (MHz)	Average Level (dB μ V/m)	Duty Cycle Correction Factor (dB)	Corrected Avarage Level (dB μ V/m)	Average Limit (dB μ V/m)	Margin (dB)	Result
2483.50	37.76	4.64	42.40**	54.0	11.60	Complied
2483.58	37.64	4.64	42.28**	54.0	11.72	Complied

Result: Pass

Transmitter Band Edge Radiated Emissions (continued)**Results: BT-LE Mode / TXRAND / PRBS9 / 2 Mbps / PWR MAX****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
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	24
496	Rohde & Schwarz	Antenna, log. - periodical	HL050	100297	05/08/2020	36
607	Schwarzbeck	Antenna broadband horn antenna	BBHA 9170	9170-561	15/10/2019	36
587	Maturo	antenna mast, tilting	TAM 4.0-E	011/7180311	n/a	n/a
588	Maturo	Controller	NCD	029/7180311	n/a	n/a
591	Rohde & Schwarz	Receiver	ESU 40	100244/040	13/07/2022	12
669	Rohde & Schwarz	EMI Test Receiver	ESW 44	103087	03/02/2022	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

8. Report Revision History

Version Number	Revision Details		
	Page No(s)	Clause	Details
1.0	32	-	Initial Version

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