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Date: 27 August 2023

**I.T.L. Product Testing Ltd.
FCC/IC Radio Test Report**

for

Blue Ops Ltd.

Equipment under test:

Dry Fire System

xMAG

FCC ID: 2BCGGXM1

Tested by: _____

N. Yakobov

Approved by: _____

N. Yakobov

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I.T.L. Product Testing Ltd. This report relates only to items tested.



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This report concerns: Original Grant

Equipment type: FCC: (DTS) Digital Transmission System
IC: Spread Spectrum Digital Device (2400-2483.5)

Limits used: 47CFR15 Section 15.247
RSS 247, Issue 2, February 2017, Section 5
RSS-Gen, Issue 5, April 2018

Measurement procedure used:
KDB 558074 D01 v05r01, ANSI C63.10:2013
RSS-Gen, Issue 5, April 2018
RSS-247 Issue 3, August 2023 ,Annex A

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1. General Information

1.1 Administrative Information

Manufacturer:	Blue Ops Ltd.
Manufacturer's Address:	7 Shmuel Hanagid St., Ra'anana, Israel
Equipment Under Test (E.U.T):	Dry Fire System
Equipment name:	xMAG
Equipment Serial No.:	N/A
Date of Receipt of E.U.T:	12 July 2023
Start of Test:	26 July 2023
End of Test:	26 July 2023
Test Laboratory Location:	I.T.L Product Testing Ltd. 1 Bat Sheva St., Lod 7120101, Israel 3 Ha'oreg Street, Modi'in Maccabim Reut 7177909, Israel
Test Specifications:	FCC Part 15, Subpart C RSS 247, Issue 2, February 2017, Section 5 RSS-Gen, Issue 5, April 2018

1.2 List of Accreditations

The EMC laboratory of I.T.L. is accredited by the following bodies:

1. The American Association for Laboratory Accreditation (A2LA) (U.S.A.), Certificate No. 1152.01.
2. The Federal Communications Commission (FCC) (U.S.A.), FCC Designation No. IL1005.
3. Department of Innovation, Science and Economic Development (ISED) Canada, CAB identifier: IL1002

I.T.L. Product Testing Ltd. is accredited by the American Association for Laboratory Accreditation (A2LA) and the results shown in this test report have been determined in accordance with I.T.L.'s terms of accreditation unless stated otherwise in the report.
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1.3 Product Description

Digital dry-fire magazine packed with unique features, such as Auto Trigger Reset, Magazine Capacity Simulation, Jam Simulation, and more.

EUT (Equipment Under Test)		xMAG	
Brand		Blue Ops	
Test Model		xMAG	
Equipment Type		☒	Stand Alone
		☐	Combined/integrated
		☐	Plug-in
Intended Use		☐	Fixed (min. distance of 200 cm from human body)
		☐	Mobile (minimum distance of 200 cm from human body)
		☒	Portable (max. distance of 20 cm from human body)
Assigned frequency band/s		ISM	
Operational frequencies		2.4GHz	
Maximum rated output power		At transmitter's 50 Ω RF output connector (dBm)	5dBm
		Effective radiated power (for equipment with no RF connector)	
Antenna	☐ Unique Coupling	☐ Standard Connection	☒ Integral
	☒ Temporary RF connector	Gain (peak): 0dBm	
Operating channel bandwidth	2MHz		
Modulation type	1-Mbps GFSK (Bluetooth low energy Technology)		
Bit rate	1MBPS		
Transmitter	Max. duty cycle		
	Power source	☐ AC	Nominal rated voltage
		☐ DC	
		☒ Battery	
Receiver Class			
Extreme temperature conditions			

The above EUT information is provided by the manufacturer. For full details, refer to the manufacturer's specifications or user guide.

1.4 Test Methodology

Radiated testing was performed according to the procedures in KDB 558074 D01 v05r01, ANSI C63.10: 2013, RSS-Gen, Issue 5, April 2018.

Radiated testing was performed at an antenna to EUT distance of 3 meters.



1.5 Test Facility

Emissions tests were performed at I.T.L.'s testing facility in Modi'in, Israel.
I.T.L.'s EMC Laboratory is accredited by A2LA, certificate No. 1152.01 and its
FCC Designation Number is IL1005.

1.6 Measurement Uncertainty

Conducted Emission

Conducted Emission (CISPR 11, EN 55011, CISPR 22, EN 55022, ANSI C63.4)

0.15 – 30 MHz:

Expanded Uncertainty (95% Confidence, K=2):

± 3.44 dB

Radiated Emission

Radiated Emission (CISPR 11, EN 55011, CISPR 22, EN 55022, ANSI C63.4)
for open site:

30-1000MHz:

Expanded Uncertainty (95% Confidence, K=2):

± 4.96 dB

1 GHz to 6 GHz

Expanded Uncertainty (95% Confidence, K=2):

±5.19 dB

>6 GHz

Expanded Uncertainty (95% Confidence, K=2):

±5.51 dB



2. System Test Configuration

2.1 Justification

1. The E.U.T contains IEEE 802.15.1 a standard (BLE) transceiver.
2. The unit was evaluated while transmitting at the low channel (2404 MHz), the mid channel (2440 MHz) and the high channel (2478 MHz).
3. Final radiated emission tests were performed after exploratory emission testing that was performed in 3 orthogonal polarities to determine the “worst case” radiation and found at Y axis.

2.2 EUT Exercise Software

No special exercise software was used.

2.3 Special Accessories

No special Accessories was used.

2.4 Equipment Modifications

No modifications were necessary in order to achieve compliance.

2.5 Configuration of Tested System



Figure 1. Configuration of Tested System Radiated



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3. Test Setup Photos

See a separate file.



4. 6 dB Minimum Bandwidth

4.1 Test Specification

FCC Part 15, Subpart C, Section 247(a)(2)

RSS 247, Issue 2, Section 5.2(a)

4.2 Test Procedure

(Temperature (27°C)/ Humidity (70%RH))

The E.U.T operation mode and test set-up are as described in Section 2 of this report.

The E.U.T was tested in the chamber, and placed on a remote-controlled turntable.

The E.U.T was placed on a non-metallic table, 1.5 meters above the ground. The emissions were measured at a distance of 3 meters.

The spectrum bandwidth of the E.U.T. at the point of 6 dB below maximum peak power was measured and recorded. The RBW was set to 100 kHz.

4.3 Test Limit

Systems using digital modulation techniques may operate in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

4.4 Test Results

Protocol Type	Operation Frequency	Reading	Limit
	(MHz)	(kHz)	(kHz)
BLE	2403.73	699.0	>500.0
	2440.24	696.0	>500.0
	2478.24	738.0	>500.0

Figure 2 6 dB Minimum Bandwidth

JUDGEMENT: PASS

For additional information see *Figure 3 to Error! Reference source not found..*

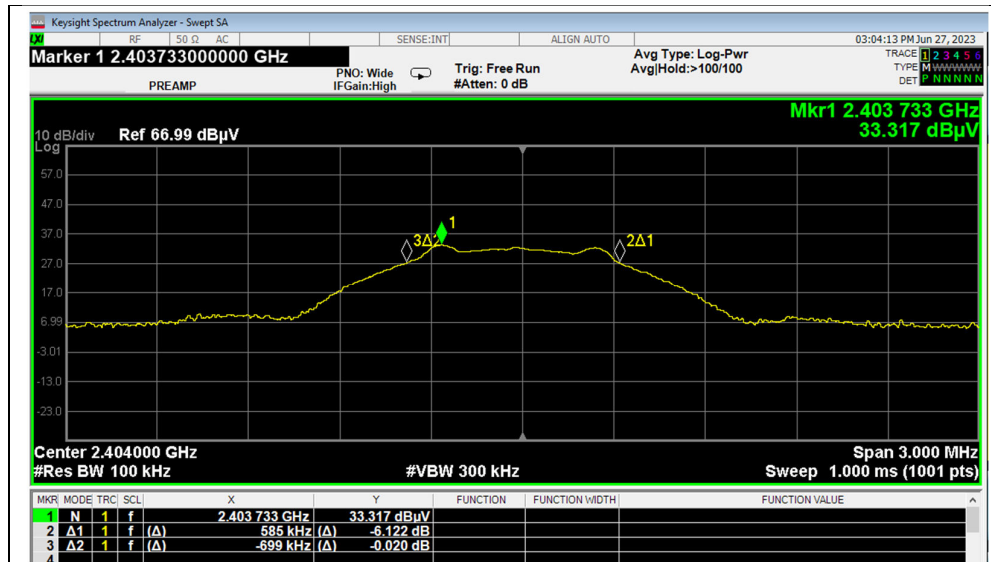


Figure 3. 2404.0 MHz

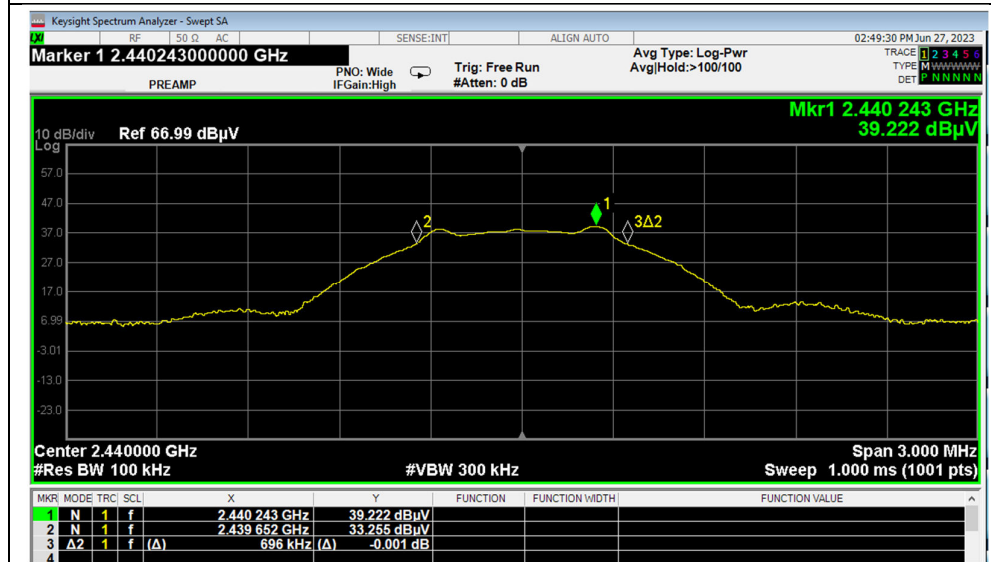
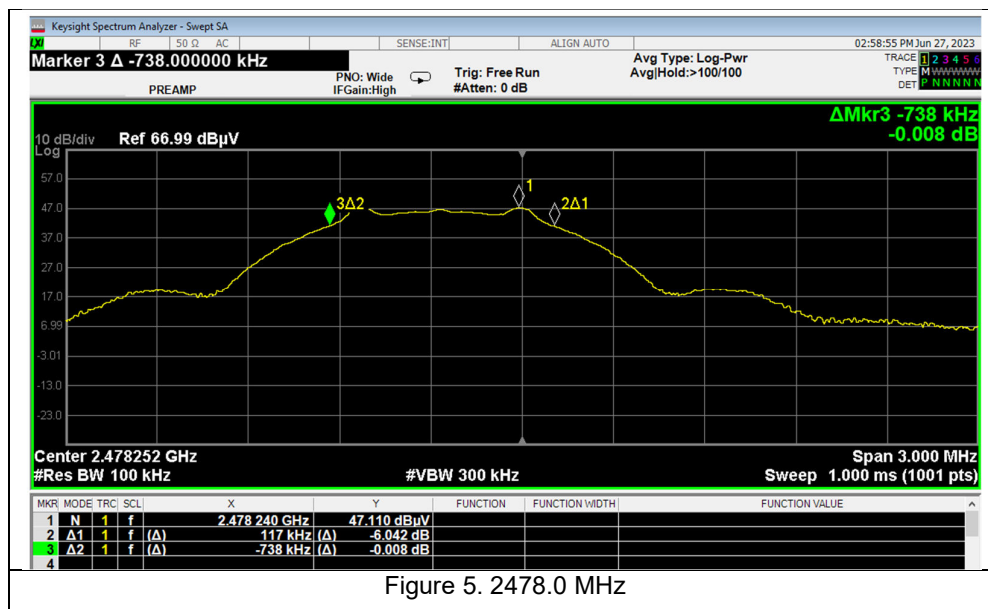


Figure 4. 2440.0 MHz



4.5 Test Equipment Used; 6dB Bandwidth

I.T.L. #	Instrument	Manufacturer	Model	Serial No.	Last Cal.	Next Cal.
1366	Horn Antenna	EMCO	3115	9702-511	May 25, 2021	May 25, 2024
1778	Cable for KA Band Antenna	OSR Electronics (Serge)	37297C KPS	1503-590 (05032006)	May 16, 2022	Sep 15, 2023
2163	Signal analyzer	Keysight	EXA signal analyzer N9010A	my51170071	February 13, 2022	February 13, 2024
2210	Semi Anechoic Chamber	Frankonia Group	SAC-3	-	May 23, 2023	May 23, 2024

Figure 6 Test Equipment Used



5. Maximum Conducted Output Power

5.1 Test Specification

FCC, Part 15, Subpart C, Section 247(b)(3)

RSS 247, Issue 2, Section 5.4(d)

5.2 Test Procedure

(Temperature (27°C)/ Humidity (70%RH))

The E.U.T operation mode and test set-up are as described in Section 2 of this report.

The E.U.T was tested in the chamber, and placed on a remote-controlled turntable.

The E.U.T was placed on a non-metallic table, 1.5 meters above the ground. The readings were maximized by the turntable azimuth between 0-360°, and the antenna polarization.

The emissions were measured at a distance of 3 meters.

Radiated output power levels were measured at selected operation frequencies and the results were converted to power level according to the formula as shown below:

$$P = \frac{(E_{V/m} \times d)^2}{(30 \times G)} \quad [\text{W}]$$

E: Field Strength (V/m)

d: Distance from transmitter (m)

G: Antenna gain

P: Peak power (W)

5.3 Test Limit

The maximum peak conducted output power of the intentional radiator for systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt.



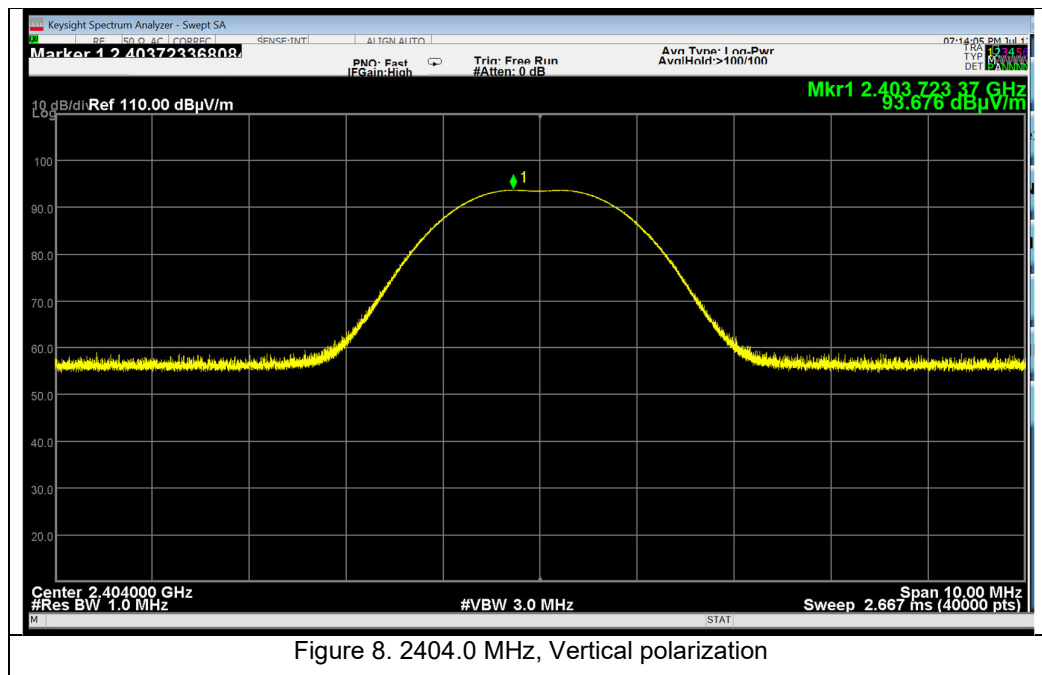
5.4 Test Results

Protocol Type	Operation Frequency	Pol.	Field Strength	EIRP	Ant. Gain	Power	Power	Limit	Margin
	(MHz)	(V/H)	(dBuV/m)	(dBm)	(dBi)	(dBm)	(mW)	(mW)	(mW)
BLE	2402.0	V	93.7	1.5-	0.0	-1.5	0.7	1000.0	-999.3
		H	85.1	10.1-	0.0	-10.1	0.1	1000.0	-999.9
	2440.0	V	93.8	1.4-	0.0	-1.4	0.7	1000.0	-999.3
		H	84.6	10.6-	0.0	-10.6	0.1	1000.0	-999.9
	2480.0	V	92.3	2.9-	0.0	-2.9	0.5	1000.0	-999.5
		H	84.9	10.3-	0.0	-10.3	0.1	1000.0	-999.9

Figure 7 Maximum Peak Power Output

JUDGEMENT: PASS

For additional information see Figure 8 to Figure 13.



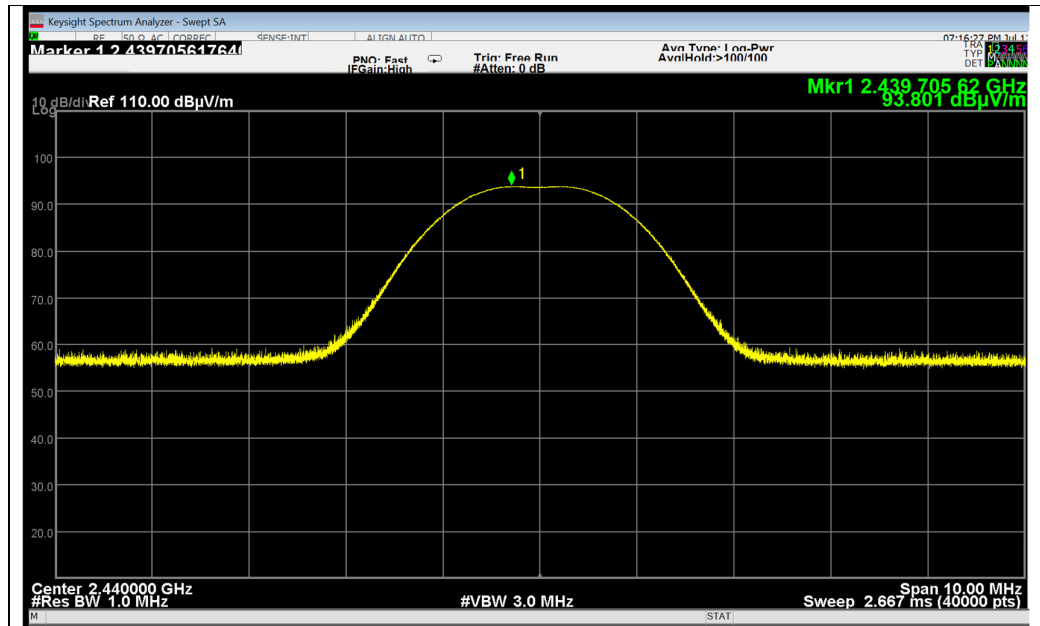


Figure 9. 2440.0 MHz, Vertical polarization

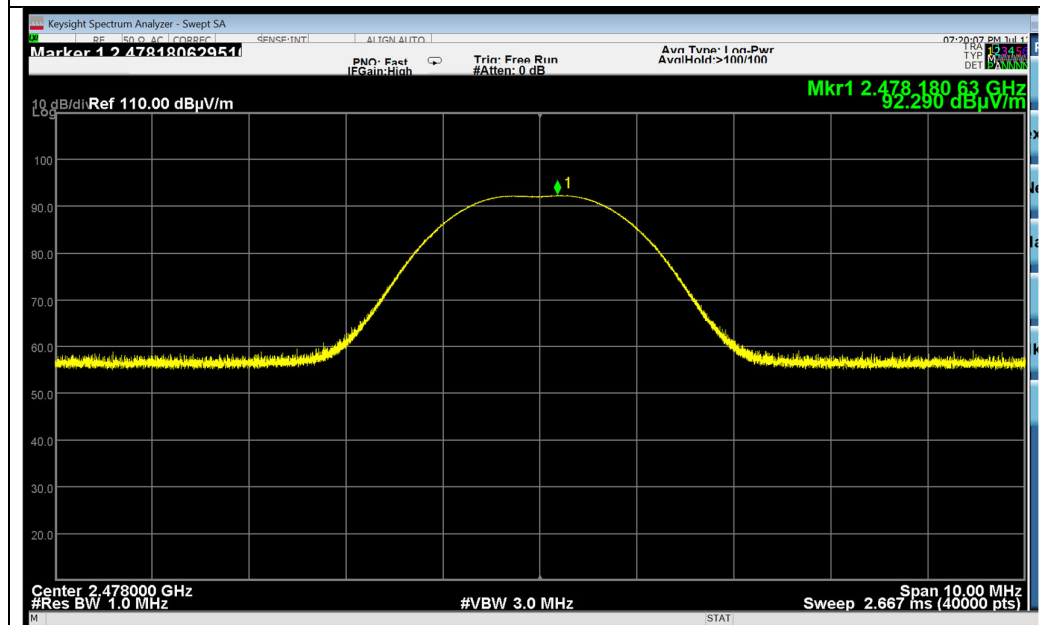


Figure 10. 2478.0 MHz, Vertical polarization

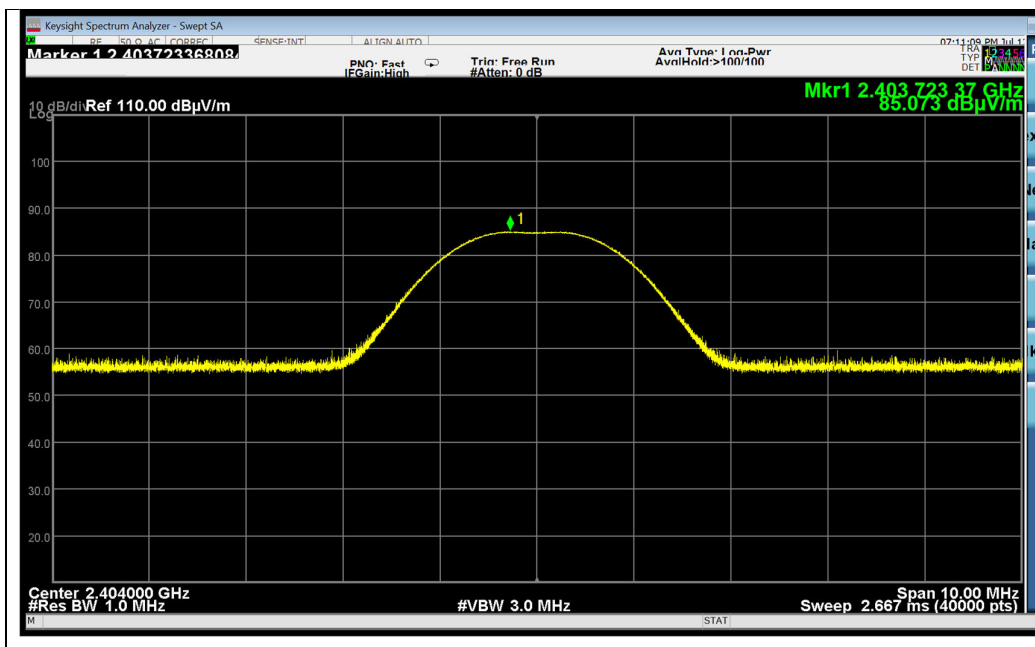


Figure 11. 2404.0 MHz, Horizontal polarization

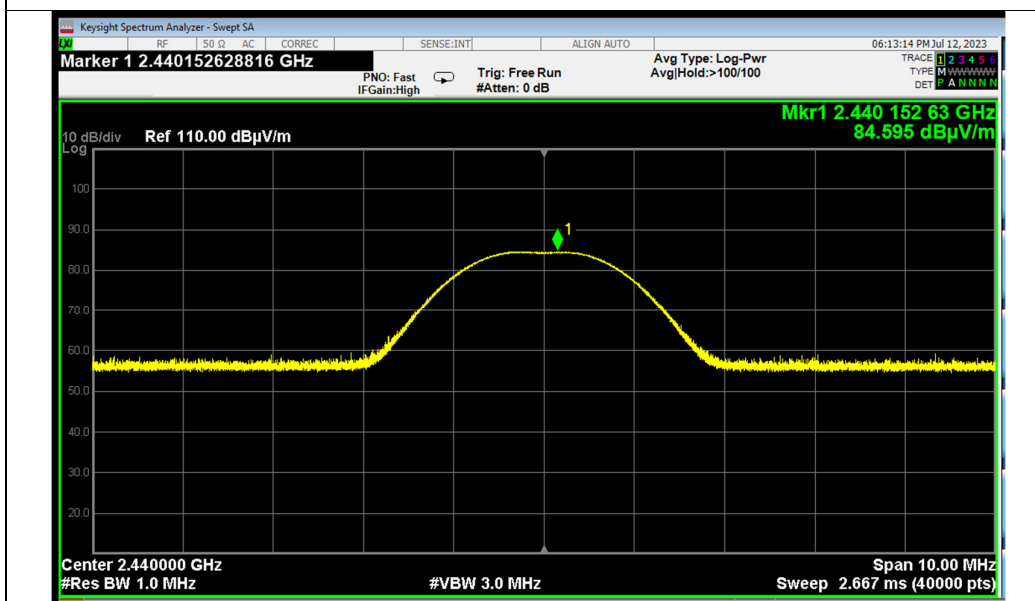
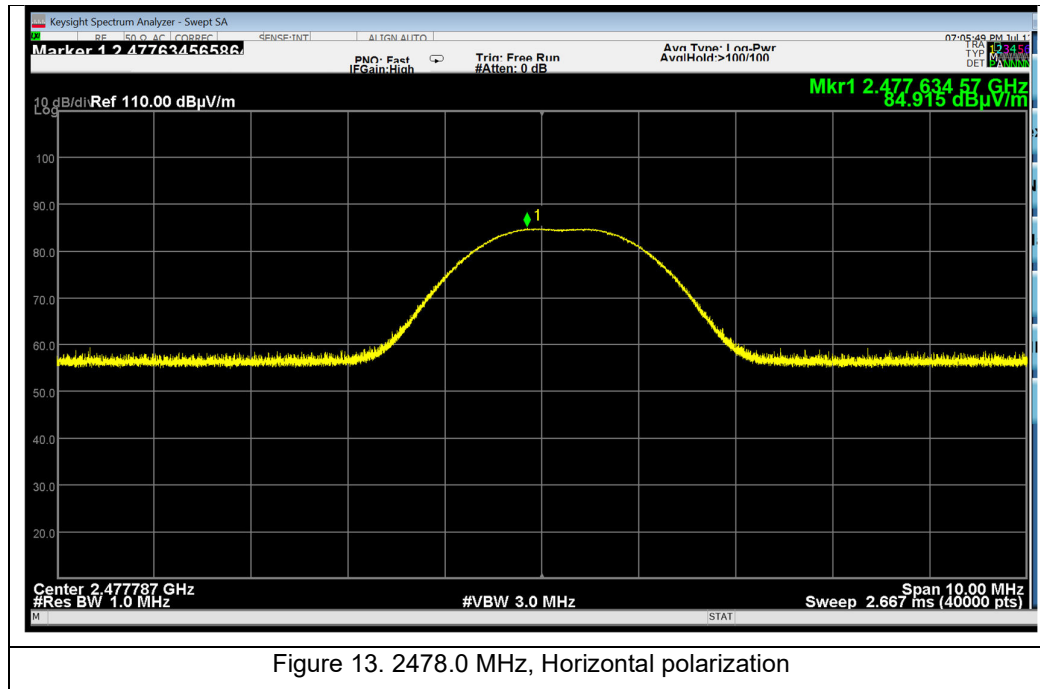


Figure 12. 2440.0 MHz, Horizontal polarization



5.5 Test Equipment Used; Maximum Peak Power Output

I.T.L. #	Instrument	Manufacturer	Model	Serial No.	Last Cal.	Next Cal.
1366	Horn Antenna	EMCO	3115	9702-511	May 25, 2021	May 25, 2024
1778	Cable for KA Band Antenna	OSR Electronics (Serge)	37297C KPS	1503-590 (05032006)	May 16, 2022	Sep 15, 2023
2163	Signal analyzer	Keysight	EXA signal analyzer N9010A	my51170071	February 13, 2022	February 13, 2024
2210	Semi Anechoic Chamber	Frankonia Group	SAC-3	-	May 23, 2023	May 23, 2024

Figure 14 Test Equipment Used



6. Band Edge Spectrum

6.1 Test Specification

FCC, Part 15, Subpart C, Section 247(d)

RSS 247, Issue 2, Section 5.5

6.2 Test Procedure

(Temperature (27°C)/ Humidity (70%RH))

The E.U.T operation mode and test set-up are as described in Section 2 of this report.

The E.U.T was tested in the chamber, and placed on a remote-controlled turntable.

The E.U.T was placed on a non-metallic table, 1.5 meters above the ground. The readings were maximized by the turntable azimuth between 0-360°, and the antenna polarization. The emissions were measured at a distance of 3 meters.

The RBW was set to 100 kHz.

6.3 Test Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

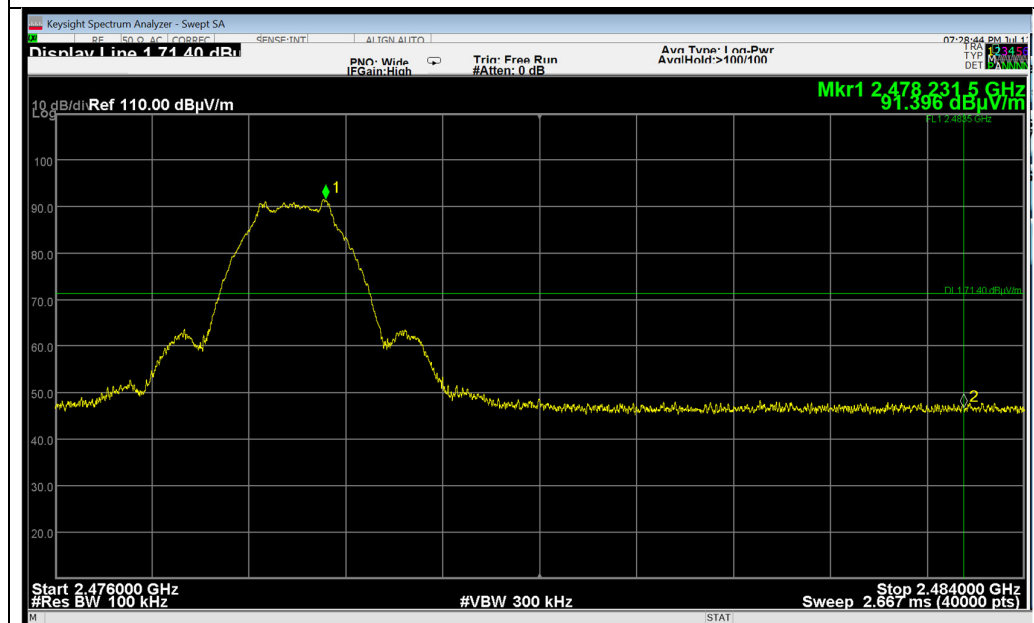
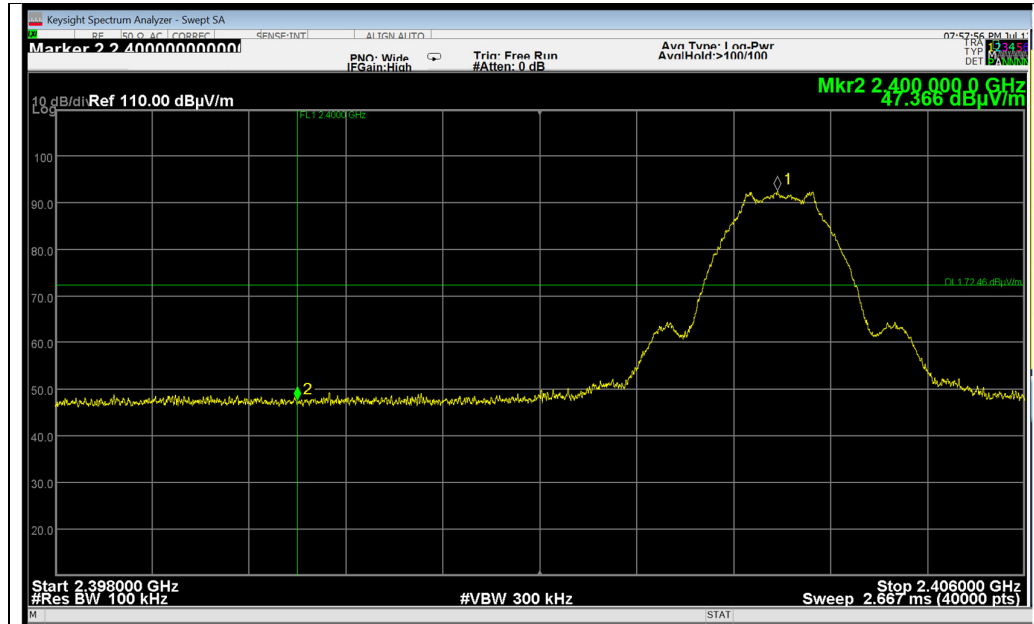
6.4 Test Results

Protocol Type	Operation Frequency	Band Edge Frequency	Spectrum Level	Limit	Margin
	(MHz)	(MHz)	(dBuV/m)	(dBuV/m)	(dB)
BLE	2404.0	2400.0	46.8	71.4	-24.6
	2478.0	2483.5	47.4	72.5	-25.1

Figure 15 Band Edge Spectrum

JUDGEMENT: PASS

For additional information see Figure 16 to Figure 17 .





6.5 Test Equipment Used; Band Edge

I.T.L. #	Instrument	Manufacturer	Model	Serial No.	Last Cal.	Next Cal.
1366	Horn Antenna	EMCO	3115	9702-511	May 25, 2021	May 25, 2024
1778	Cable for KA Band Antenna	OSR Electronics (Serge)	37297C KPS	1503-590 (05032006)	May 16, 2022	Sep 15, 2023
2163	Signal analyzer	Keysight	EXA signal analyzer N9010A	my51170071	February 13, 2022	February 13, 2024
2210	Semi Anechoic Chamber	Frankonia Group	SAC-3	-	May 23, 2023	May 23, 2024

Figure 18 Test Equipment Used



7. Transmitted Power Density

7.1 Test Specification

FCC, Part 15, Subpart C, Section 247(e)

RSS 247, Issue 2, Section 5.2(b)

7.2 Test Procedure

(Temperature (27°C)/ Humidity (70%RH))

The E.U.T operation mode and test set-up are as described in Section 2 of this report.

The E.U.T was tested in the chamber, and placed on a remote-controlled turntable.

The E.U.T was placed on a non-metallic table, 1.5 meters above the ground.

The readings were maximized by the turntable azimuth between 0-360°, and the antenna polarization.

The emissions were measured at a distance of 3 meters.

The spectrum analyzer was set to 3 kHz RBW and VBW to 10 kHz.

Radiated output power levels were measured at selected operation frequencies and the results were converted to power level according to the formula as shown below:

$$P = \frac{(E_{V/m} \times d)^2}{(30 \times G)} \text{ [W]}$$

E - Field Strength (V/m)

d – Distance from transmitter (m)

G – Antenna gain

P – Peak power (W)

7.3 Test Limit

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.



7.4 Test Results

Protocol Type	Operation Frequency	Polarity	Reading Spectrum Analyzer	Reading Spectrum Analyzer	Limit	Margin
	(MHz)	(V/H)	(dBμV/m)	(dBm)	(dBm)	(dB)
BLE	2404.0	V	82.3	-12.9	8.0	-20.9
		H	73.0	-22.2	8.0	-30.2
	2440.0	V	82.5	-12.7	8.0	-20.7
		H	73.8	-21.4	8.0	-29.4
	2478.0	V	81.1	-14.1	8.0	-22.1
		H	72.2	-23.0	8.0	-31.0

Figure 19 Test Results

JUDGEMENT: PASS by ___dB

For additional information see Figure 20 to Figure 25.

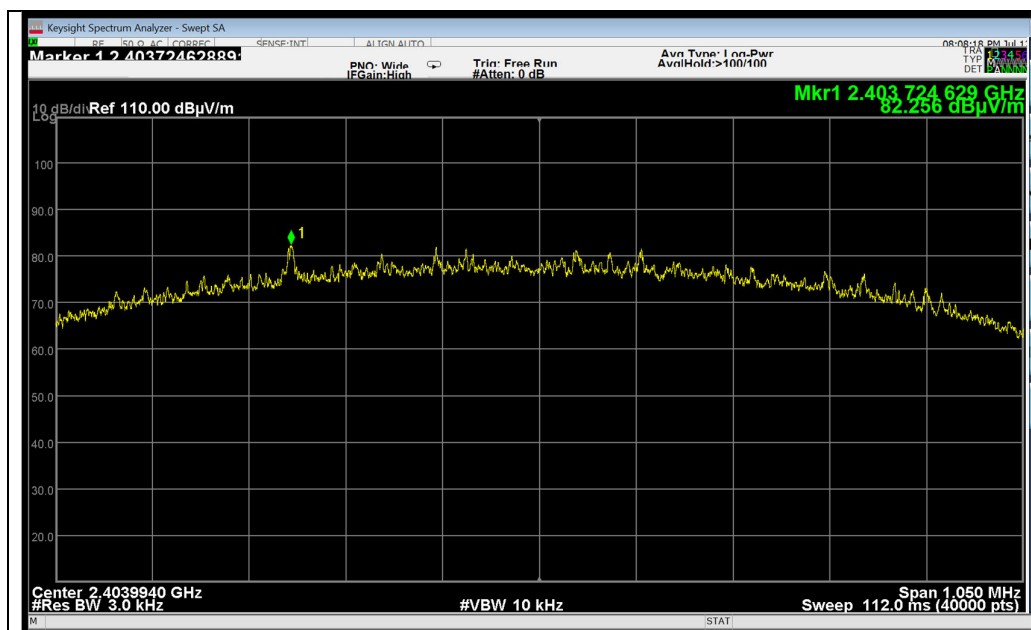


Figure 20. 2404.0 MHz, Vertical polarization

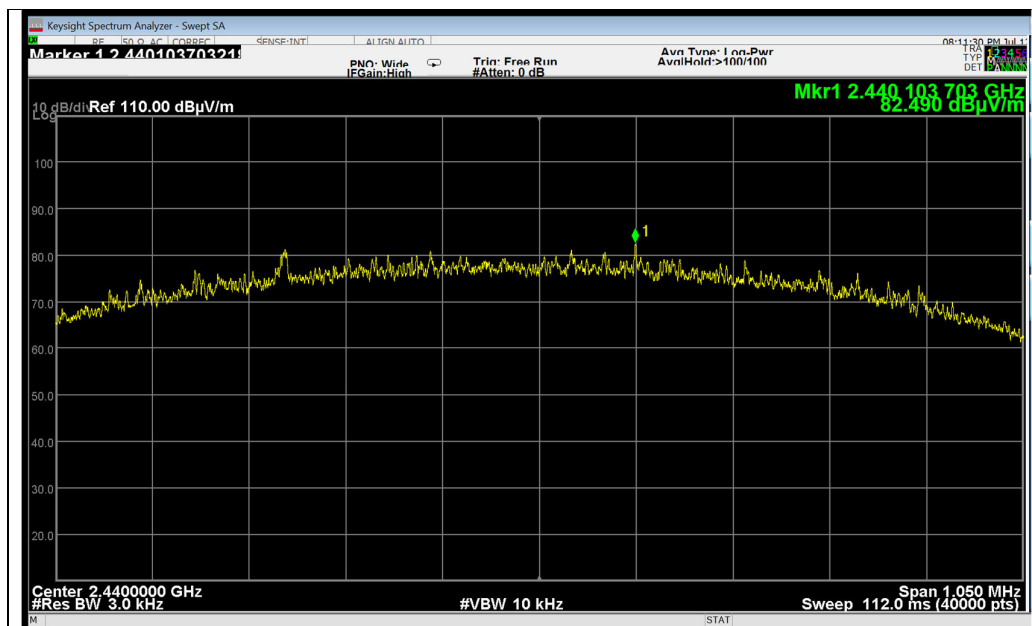


Figure 21. 2440.0 MHz, Vertical polarization

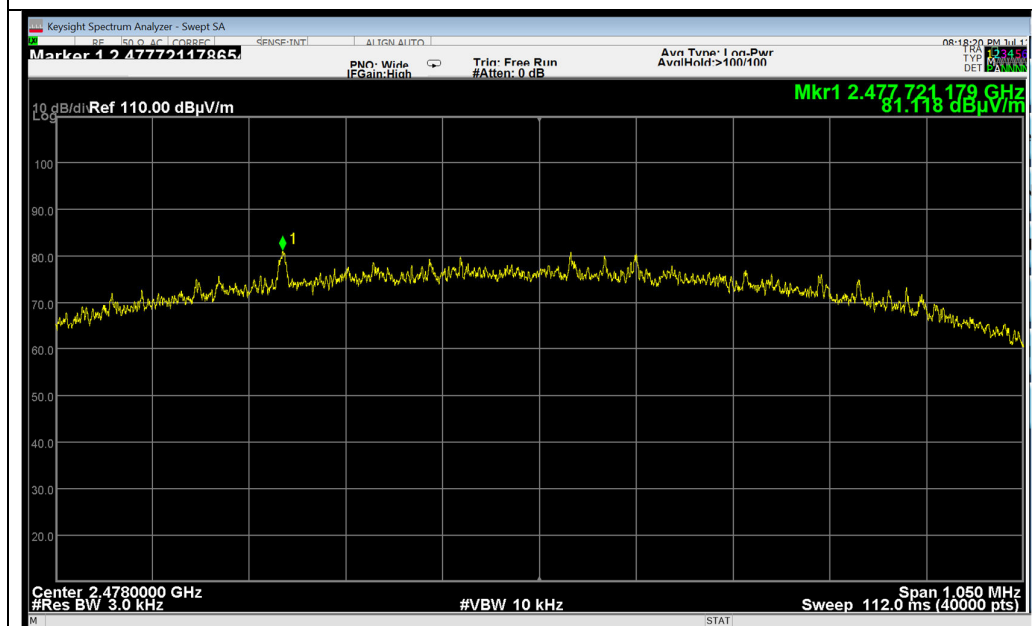


Figure 22. 2478.0 MHz, Vertical polarization

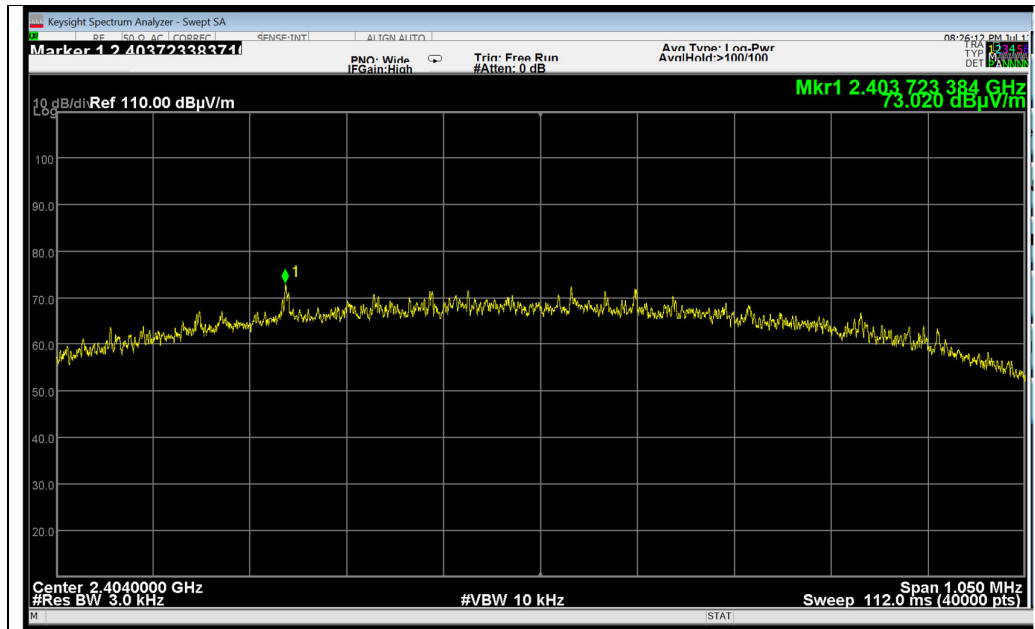


Figure 23. 2404.0 MHz, Horizontal polarization

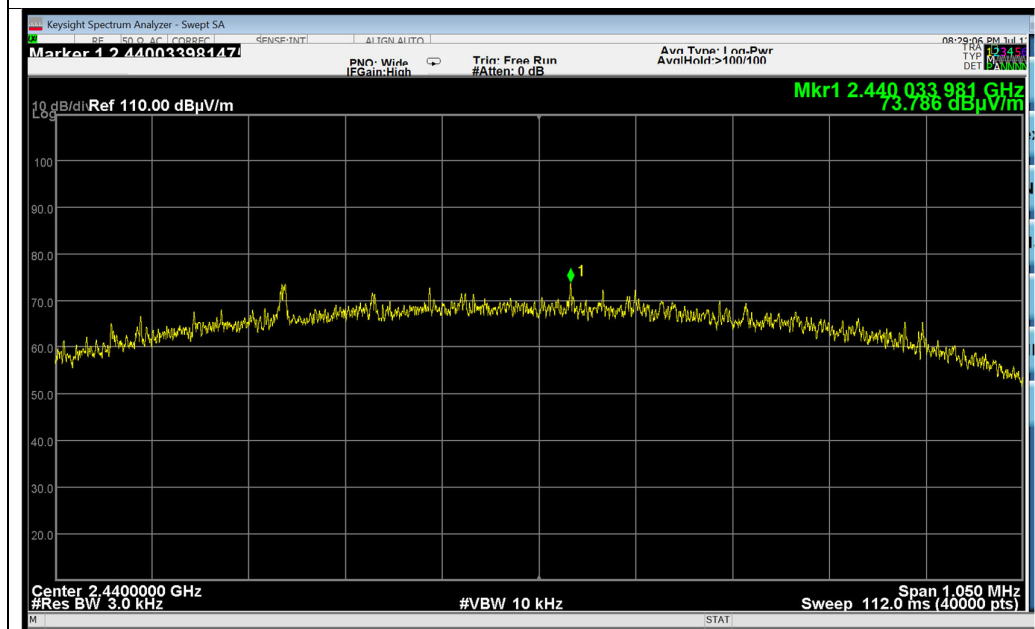


Figure 24. 2440.0 MHz, Horizontal polarization

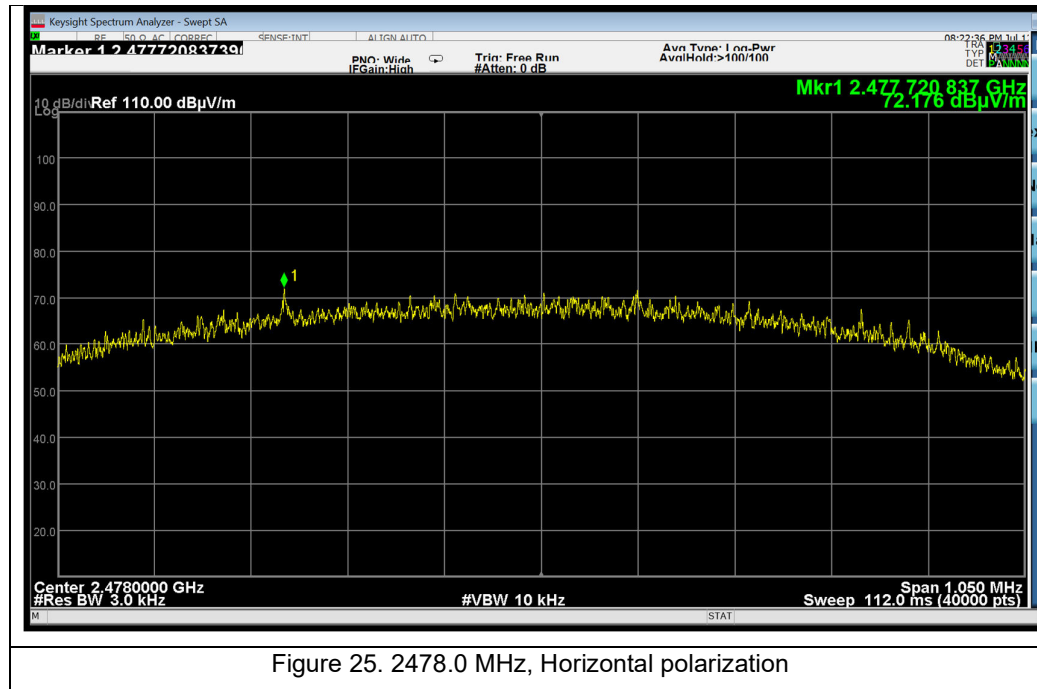


Figure 25. 2478.0 MHz, Horizontal polarization

7.5 Test Equipment Used; Transmitted Power Density

I.T.L. #	Instrument	Manufacturer	Model	Serial No.	Last Cal.	Next Cal.
1366	Horn Antenna	EMCO	3115	9702-511	May 25, 2021	May 25, 2024
1778	Cable for KA Band Antenna	OSR Electronics (Serge)	37297C KPS	1503-590 (05032006)	May 16, 2022	Sep 15, 2023
2163	Signal analyzer	Keysight	EXA signal analyzer N9010A	my51170071	February 13, 2022	February 13, 2024
2210	Semi Anechoic Chamber	Frankonia Group	SAC-3	-	May 23, 2023	May 23, 2024

Figure 26 Test Equipment Use



8. Emissions in Non-Restricted Frequency Bands

8.1 Test Specification

FCC, Part 15, Subpart C, Section 247(d)

RSS 247, Issue 2, Section 5.5

8.2 Test Procedure

(Temperature (27°C)/ Humidity (70%RH))

The E.U.T. operation mode and test set-up are as described in Section 2 of this report.

For measurements between 0.009MHz-30MHz:

The E.U.T was tested inside the shielded room and placed on a non-metallic table, 0.8 meters above the ground. The emissions were measured at a distance of 3 meters. The readings were maximized by the turntable azimuth between 0-360°, and the antenna polarization.

The frequency range 0.009MHz-30MHz was scanned.

For measurements between 30MHz-1GHz:

The E.U.T was placed on a non-metallic table, 0.8 meters above the ground. The emissions were measured at a distance of 3 meters. The readings were maximized by adjusting the antenna height between 1-4 meters, the turntable azimuth between 0-360°, and the antenna polarization. The frequency range 30.0MHz - 1.0GHz was scanned and the list of the highest emissions was verified and updated accordingly.

For measurements between 1GHz-25GHz:

The E.U.T was tested inside the shielded room and placed on a non-metallic table, 1.5 meters above the ground. The emissions were measured at a distance of 3 meters. The readings were maximized by the turntable azimuth between 0-360°, and the antenna polarization.

The frequency range 1.0GHz -25.0GHz was scanned.

RBW was set to 100 kHz, detector set to max peak and trace to “max hold”.

8.3 Test Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power.

8.4 Test Results

JUDGEMENT: PASS

All detected emissions were greater than 20dBc below the fundamental level.

The EUT met the requirements of the F.C.C. Part 15, Subpart C, Section 247(d) specification.



8.5 Test Instrumentation Used; Emission in non- Restricted Frequency Bands

I.T.L. #	Instrument	Manufacturer	Model	Serial No.	Last Cal.	Next Cal.
1037	Low Noise Amplifier 16-30 GHz	Sophia Wireless	LNA28-B	232	May 16, 2022	Sep 15 2023
1075	Active Loop Antenna	EMCO	6502	2950	July 5, 2022	Sep 15 2023
1353	Horn Antenna	ARA	SWH-28	1007	November 2, 2021	November 2, 2024
1366	Horn Antenna	EMCO	3115	9702-511	May 25, 2021	May 25, 2024
1699	Low Loss cable	Huber Suhner	Sucofelex	27502/4PEA	May 16, 2022	May 16, 2023
1778	Cable for KA Band Antenna	OSR Electronics (Serge)	37297C KPS	1503-590 (05032006)	May 16, 2022	Sep 15 2023
1783	20 cm Cable for KA Band Antenna	Rhophase Microwave	01536 263440 (A1673)	A1673	May 16, 2022	Sep 15 2023
1998	Band pass filter (9GHz to 18GHz)	OSR	-	-	May 16, 2022	Sep 15 2023
2163	Signal analyzer	Keysight	EXA signal analyzer N9010A	my51170071	February 13, 2022	February 13, 2024
2199	Trilog broadband antenna 30 MHz - 7 GHz	Schwarzbeck	VULB 9162	585	September 12, 2022	September 12, 2024
2210	Semi Anechoic Chamber	Frankonia Group	SAC-3	-	May 23, 2023	May 23, 2024

Figure 27 Test Equipment Used

8.6 Field Strength Calculation

The field strength is calculated directly by the EMI Receiver software, and a "Correction Factors", using the following equation:

$$FS = RA + AF + CF - PA^*$$

FS: Field Strength [dBμv/m]



RA: Receiver Amplitude [dB μ V]

AF: Receiving Antenna Correction Factor [dB/m]

CF: Cable Attenuation Factor [dB]

PA: Low Noise Amplifier (Pre-amplifier) Amplification

* External pre-amplifiers are used only in few set-ups

Example: FS = 30.7 dB μ V (RA) + 14.0 dB (AF) + 0.9 dB (CF) – 20 dB (PA) = 25.6 dB μ V



9. Emissions in Restricted Frequency Bands

9.1 Test Specification

FCC Part 15, Subpart C, Sections 15.209, 15.205, 15.247(d)

RSS 247, Issue 2, Section 3.3

RSS-Gen, Issue 5, Section 8.10

9.2 Test Procedure

(Temperature (27°C)/ Humidity (70%RH))

The E.U.T. operation mode and test set-up are as described in Section 2 of this report.

For measurements between 0.009-30MHz:

The E.U.T was tested inside the shielded room and placed on a non-metallic table, 0.8 meters above the ground. The emissions were measured at a distance of 3 meters. The readings were maximized by the turntable azimuth between 0-360°, and the antenna polarization.

The frequency range 0.009MHz-30MHz was scanned.

For measurements between 30-1000MHz:

The E.U.T was placed on a non-metallic table, 0.8 meters above the ground. The emissions were measured at a distance of 3 meters. The readings were maximized by adjusting the antenna height between 1-4 meters, the turntable azimuth between 0-360°, and the antenna polarization. The frequency range 30MHz -1000MHz was scanned and the list of the highest emissions was verified and updated accordingly.

For measurements between 1GHz-25GHz:

The E.U.T was tested inside the shielded room and placed on a non-metallic table, 1.5 meters above the ground. The emissions were measured at a distance of 3 meters. The readings were maximized by the turntable azimuth between 0-360°, and the antenna polarization.

The frequency range 1GHz -25GHz was scanned.

Tests done for all “worst case”, each protocol type. The highest radiation describes in the tables below.

The levels of the emissions within the frequency ranges of the restricted bands (Section 15.205 of FCC Part 15) were compared to the limits of the table in Section 15.209 (a), General Requirements.



9.3 FCC Test Limits

Radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement distance (meters)	Field Strength* (dBμV/m)	Field Strength* (dBμV/m)@3m
0.009-0.490	2400/F(kHz)	300	48.5-13.8	128.5-73.8
0.490-1.705	24000/F(kHz)	30	33.8-23.0	73.8-63.0
1.705-30.0	30	30	29.5	69.5
30-88	100	3	40.0	40.0
88-216	150	3	43.5	43.5
216-960	200	3	46.0	46.0
Above 960	500	3	54.0	54.0

*The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector. For average radiated emission measurements above 1000 MHz, there is also a limit corresponding to 20 dB above the indicated values in the table is specified when measuring with peak detector function.

Figure 28 Table of Limits

9.4 ISED Test Limits

Table 5 – General field strength limits at frequencies above 30 MHz	
Frequency (MHz)	Field strength (μV/m at 3 m)
30 – 88	100
88 – 216	150
216 – 960	200
Above 960	500

Table 6 – General field strength limits at frequencies below 30 MHz		
Frequency	Magnetic field strength (H-Field) (μA/m)	Measurement distance (m)
9 - 490 kHz ^{Note 1}	6.37/F (F in kHz)	300
490 - 1705 kHz	63.7/F (F in kHz)	30
1.705 - 30 MHz	0.08	30

Note 1: The emission limits for the ranges 9-90 kHz and 110-490 kHz are based on measurements employing a linear average detector.

9.5 Test Results

JUDGEMENT: PASS

The details of the highest emissions are given in Figure 29.



Radiated Emission

E.U.T Description Dry Fire System
Type xMAG
Serial Number: N/A

Specifications: FCC, Part 15, Subpart C, Sections 15.209, 15.205, 15.247(d)
RSS 247, Issue 2, Section 3.3; RSS-Gen, Issue 5, Section 8.10

Antenna Polarization: Horizontal/
Vertical

Frequency Range: 9kHz to 25.0 GHz

Protocol Type: BLE

Detector: Peak, Average

Operation Frequency	Freq.	Pol	Peak Reading	Peak Limit	Peak Margin	Average Reading	Average Limit	Average Margin
(MHz)	(MHz)	(H/V)	(dBμV/m)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
2404.0	2390.0	V	46.0	74.0	-28.0	-	54.0	-
	2390.0	H	44.5	74.0	-29.5	-	54.0	-
	4808.0	V	48.6	74.0	-25.4	-	54.0	-
	4808.0	H	45.6	74.0	-28.4	-	54.0	-
2440.0	4880.0	V	47.6	74.0	-26.5	-	54.0	-
	4880.0	H	50.6	74.0	-23.4	-	54.0	-
2478.0	4956.0	V	48.5	74.0	-25.5	-	54.0	-
	4956.0	H	48.5	74.0	-25.5	-	54.0	-
	2483.5	V	43.0	74.0	-31.0	-	54.0	-
	2483.5	H	43.6	74.0	-30.4	-	54.0	-

Figure 29. Radiated Emission Results

Margin refers to the test results obtained minus specified requirement; thus a positive number indicates failure, and a negative result indicates that the product passes the test.

“Peak Amp” includes correction factor.

* “Correction Factor” = Antenna Factor + Cable Loss- Low Noise Amplifier Gain



9.6 Test Instrumentation Used, Emissions in Restricted Frequency Bands

I.T.L. #	Instrument	Manufacturer	Model	Serial No.	Last Cal.	Next Cal.
1037	Low Noise Amplifier 16-30 GHz	Sophia Wireless	LNA28-B	232	May 16, 2022	Sep 15 2023
1075	Active Loop Antenna	EMCO	6502	2950	July 5, 2022	Sep 15 2023
1353	Horn Antenna	ARA	SWH-28	1007	November 2, 2021	November 2, 2024
1366	Horn Antenna	EMCO	3115	9702-511	May 25, 2021	May 25, 2024
1699	Low Loss cable	Huber Suhner	Sucofelex	27502/4PEA	May 16, 2022	May 16, 2023
1778	Cable for KA Band Antenna	OSR Electronics (Serge)	37297C KPS	1503-590 (05032006)	May 16, 2022	Sep 15 2023
1783	20 cm Cable for KA Band Antenna	Rhophase Microwave	01536 263440 (A1673)	A1673	May 16, 2022	Sep 15 2023
1998	Band pass filter (9GHz to 18GHz)	OSR	-	-	May 16, 2022	Sep 15 2023
2163	Signal analyzer	Keysight	EXA signal analyzer N9010A	my51170071	February 13, 2022	February 13, 2024
2199	Trilog broadband antenna 30 MHz - 7 GHz	Schwarzbeck	VULB 9162	585	September 12, 2022	September 12, 2024
2210	Semi Anechoic Chamber	Frankonia Group	SAC-3	-	May 23, 2023	May 23, 2024

Figure 30 Test Equipment Used



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10. R.F Exposure/Safety

See a separate file.



11. Appendix A - Correction Factors

ITL # 1075: Active Loop Antenna						
Frequency (MHz)	MAF (dBs/m)	AF (dB/m)		Frequency (MHz)	MAF (dBs/m)	AF (dB/m)
0.01	-33.1	18.4		2.0	-40.0	11.5
0.02	-37.2	14.3		3.0	-40.0	11.5
0.03	-38.2	13.3		4.0	-40.1	11.4
0.05	-39.8	11.7		5.0	-40.2	11.3
0.1	-40.1	11.4		6.0	-40.4	11.1
0.2	-40.3	11.2		7.0	-40.4	11.1
0.3	-40.3	11.2		8.0	-40.4	11.1
0.5	-40.3	11.2		9.0	-40.5	11.0
0.7	-40.3	11.2		10.0	-40.5	11.0
1.0	-40.1	11.4		20.0	-41.5	10.0

ITL # 1349: Log Periodic Antenna			
Frequency (MHz)	AF (dB/m)	Frequency (MHz)	AF (dB/m)
200.0	11.58	600.0	18.66
250.0	12.04	700.0	20.87
300.0	14.76	800.0	21.15
400.0	15.55	900.0	22.32
500.0	17.85	1000.0	24.22

ITL # 1352: Horn Antenna			
Frequency (MHz)	AF (dB/m)	Frequency (MHz)	AF (dB/m)
0.75	25	9.5	38
1.0	23.5	10.0	38.5
1.5	26.0	10.5	38.5
2.0	29.0	11.0	38.5
2.5	27.5	11.5	38.5
3.0	30.0	12.0	38.0
3.5	31.5	12.5	38.5
4.0	32.5	13.0	40.0
4.5	32.5	13.5	41.0
5.0	33.0	14.0	40.0
5.5	35.0	14.5	39.0
6.0	36.5	15.0	38.0
6.5	36.5	15.5	37.5
7.0	37.5	16.0	37.5
7.5	37.5	16.5	39.0
8.0	37.5	17.0	40.0



8.5	38.0	17.5	42.0
9.0	37.5	18.0	42.5

ITL # 1353: Horn Antenna (@ 3m distance)¹

Frequency (MHz)	Measured antenna factor (dB/m)	Frequency (MHz)	Measured antenna factor (dB/m)
18000.0	32.4	22500.0	33.0
18500.0	32.0	23000.0	33.1
19000.0	32.3	23500.0	33.8
19500.0	32.4	24000.0	33.5
20000.0	32.3	24500.0	33.5
20500.0	32.8	25000.0	33.8
21000.0	32.8	25500.0	33.9
21500.0	32.7	26000.0	34.2
22000.0	33.1	26500.0	34.7

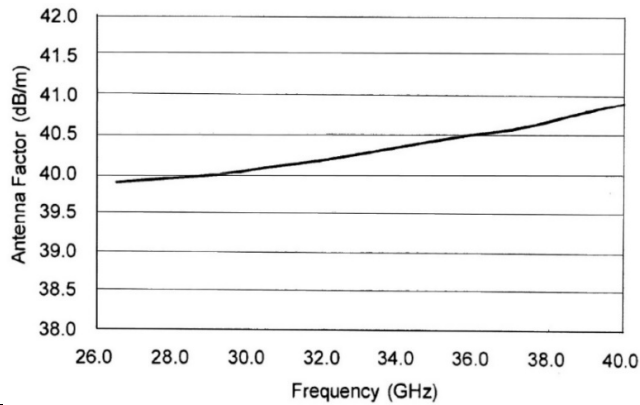
ITL #1840: Anechoic Chamber RF Cable

Frequency (MHz)	Cable Loss (dB)	Frequency (MHz)	Cable Loss (dB)
1000.0	-1.4	10000.0	-6.0
1500.0	-1.7	10500.0	-6.2
2000.0	-2.0	11000.0	-6.2
2500.0	-2.3	11500.0	-6.0
3000.0	-2.6	12000.0	-6.0
3500.0	-2.8	12500.0	-6.1
4000.0	-3.1	13000.0	-6.3
4500.0	-3.3	13500.0	-6.5
5000.0	-3.6	14000.0	-6.7
5500.0	-3.7	14500.0	-7.0
6000.0	-4.0	15000.0	-7.3
6500.0	-4.4	15500.0	-7.5
7000.0	-4.7	16000.0	-7.6
7500.0	-4.8	16500.0	-8.0
8000.0	-5.0	17000.0	-8.0
8500.0	-5.1	17500.0	-8.1
9000.0	-5.6	18000.0	-8.2
9500.0	-5.8		

¹ The antenna factor shall be added to the receiver reading in dBμV to obtain field strength in dBμV/m



ITL # 1777: 26.5-40 GHz Horn Antenna



ITL # 2199 Trilog Broadband Antenna 30 MHz - 1 GHz + RF cables

Frequency (MHz)	Measured antenna factor (dB/m)	Frequency (MHz)	Measured antenna factor (dB/m)
30.00	14.30	80.00	11.10
40.00	16.20	90.00	13.40
50.00	17.40	100.00	15.20
60.00	16.30	150.00	11.40
70.00	13.00	200.00	14.10
80.00	11.10	300.00	16.10
90.00	13.40	400.00	18.10
100.00	15.20	500.00	19.50
150.00	11.40	600.00	21.10
30.00	14.30	700.00	22.50
40.00	16.20	800.00	23.50
50.00	17.40	900.00	24.70
60.00	16.30	1000.00	25.50
70.00	13.00		

End of Test Report