

May 31, 2022

Alveo Technologies
Wayne Okada
1000 Atlantic Ave, Suite 114
Alameda CA 94501

Dear Wayne Okada,

Enclosed is the EMC Wireless test report for compliance testing of the Alveo Technologies, Alveo be.well System as tested to the requirements of Title 47 of the CFR, Ch. 1 (10-1-06 ed.), Part 15 Subpart C for Intentional Radiators.

Thank you for using the services of Eurofins Electrical and Electronic Testing NA, Inc. If you have any questions regarding these results or if Eurofins Electrical and Electronic Testing NA, Inc. can be of further service to you, please feel free to contact me.



Documentation Department
Eurofins Electrical and Electronic Testing NA, Inc.

Reference: WIR115645-FCC-ISED-BLE



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FCC/ ISED Test Report

Applicant name: Alveo Technologies

Product: Electronic Alveo be.well System

Report: WIR115645-FCC-ISED-BLE

Applicant Address:

**1000 Atlantic Ave, Suite 114
Alameda CA 94501**

Prepared By:
Eurofins Electrical and Electronic Testing NA, Inc.
3162 Belick St.
Santa Clara CA, 95054

FCC/ ISED Test Report

Applicant name: Alveo Technologies

Product: Electronic Alveo be.well System

Standard

47 CFR FCC Part 15, Subpart C (Section 15.247)

RSS 247 Issue2, February 2017

RSS Gen Issue5, March 2019

ANSI C63.10: 2013

Alberto Saldiver

Alberto Saldiver

Test Engineer, Wireless Laboratory

Engineering Statement: The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. It is further stated that upon the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements FCC Rules under normal use and maintenance.

Gary Chou

Gary Chou

Wireless Engineering Manager, Wireless Laboratory

Report Status Sheet

Revision	Report Date	Reason for Revision
Ø	May 31, 2022	Initial Issue.

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I. Executive Summary

A. Executive Summary

47 CFR FCC Part 15, Subpart C (SECTION 15.247) RSS 247 Issue2, RSS Gen Issue5				
FCC/ IC Cluse	ISED	Test Item	Result	Remarks
15.207	RSS Gen 8.8	AC Power Conducted Emission	PASS	Meet the requirement of limit.
15.205 & 15.209 & 15.247(d)	RSS Gen 8.8	Radiated Emissions and Band Edge Measurement	PASS	Meet the requirement of limit.
15.247(a)(2)	RSS 247 5.5C	6dB bandwidth & 99% bandwidth	PASS	Meet the requirement of limit.
15.247(b)	RSS 247 5.2.1 RSS Gen 6.7	Conducted power	PASS	Meet the requirement of limit.
15.247(e)	RSS 247 5.4.4	Power Spectral Density	PASS	Meet the requirement of limit.
15.203	RSS 247 5.2.2	Antenna Requirement	PASS	PCB antenna (without connector) meet the requirement.

Note:

1. Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

II. Equipment Information

A. Overview

EUT Summary Table

Product:	Analyzer	
Brand:	ALVEO	
Model(s) Tested:	be.well Analyzer	
Series Number:	A-ANA-000002	
Filing Status:	Original	
EUT Specifications:	Primary Power:	3.7 Vdc powered by battery, 120 Vac from power adaptor
	Voltage Frequency:	N/A
	Technology / Type of Modulations:	BLUETOOTH LE: DTS
	Operating Frequency :	BLE: 2402-2480 MHz
	FCC ID:	2A6UO-AANA2
	ISED ID:	TBD
	Antenna Type:	PCB Antenna -13.8 dBi
	Antenna connector:	N/A
Analysis:	The results obtained relate only to the item(s) tested.	
Environmental Test Conditions:	Temperature: 20.3° C	
	Relative Humidity: 47.5%	
	Barometric Pressure: 860-1060 mbar	
Evaluated by:	Alberto Saldiver	
Issue Date(s):	May 31, 2022	

NOTE: The following modules can be chosen to be configured in the EUT.

	Model No.	FCC ID	Note
-	-	-	-
-	-	-	-

B. Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
B	Laptop	ACER	A315-51-533U	NXGNPAA0167300AA597600	-	-

Note: (Describe the outline of a simulator, if used for the tests, as a note under the table.)

Insert Cable Connections to/from EUT provided by test team.

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
	-	-	-	-	0	-

Note: The core(s) is(are) originally attached to the cable(s).

General Description of Applied Standards

C. References

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

- 47 CFR FCC Part 15, Subpart C (Section 15.247)
- 558074 D01 15.247 Meas Guidance v05r02
- ANSI C63.10:2013
- RSS 247 Issue2
- RSS Gen Issue5

D. Test Site

All testing was performed at Eurofins Electrical and Electronic Testing NA, Inc., 3162 Belick St. Santa Clara, CA 95054. All equipment used in making physical determinations is accurate and bears recent traceability to the National Institute of Standards and Technology.

Eurofins Electrical and Electronic Testing NA, Inc. has been accredited by the American Association for Laboratory Accreditation (A2LA) (Certificate #: 0591.02) in accordance with ISO/IEC 17025:2017.

Eurofins Electrical and Electronic Testing NA, Inc. is part of the Eurofins Electrical & Electronics (E&E) global compliance network.

E. Measurement Uncertainty

Test Method	Typical Expanded Uncertainty	K	Confidence Level
RF Frequencies	±4.52 Hz	2	95%
RF Power Conducted Emissions	±2.32 dB	2	95%
RF Power Conducted Spurious Emissions	±2.25 dB	2	95%
RF Power Radiated Emissions	±3.01 dB	2	95%

Uncertainty Calculations Summary

F. Modifications**a) Modifications to EUT**

No modifications were made to the EUT.

b) Modifications to Test Standard

No modifications were made to the test standard.

G. Disposition of EUT

The test sample including all support equipment (if any), submitted to the Electromagnetic Compatibility Lab for testing was returned to ALVEO upon completion of testing.

III. Electromagnetic Compatibility Criteria for Intentional Radiators

Radiated Emission and Bandage Measurement

Limits of Radiated Emission and Bandage Measurement:

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table. Other emissions shall be at least 20dB below the highest level of the desired power:

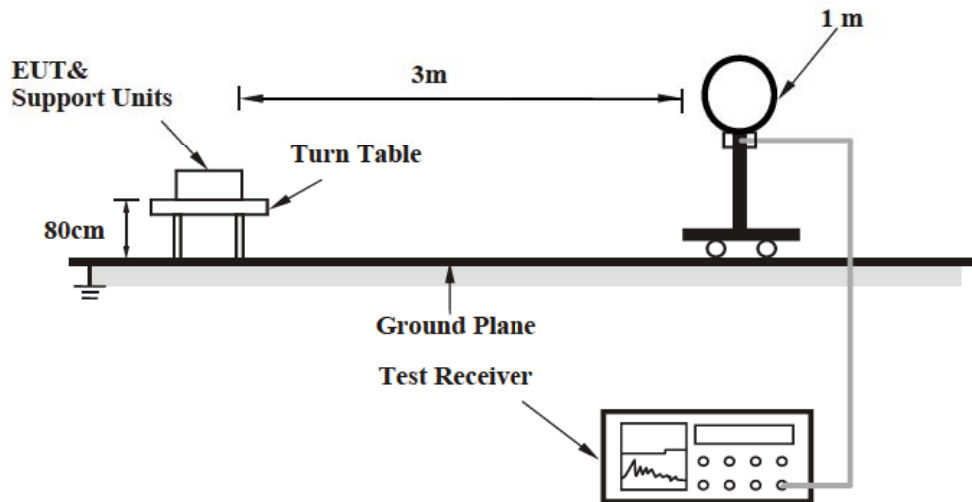
Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

Test Procedures:

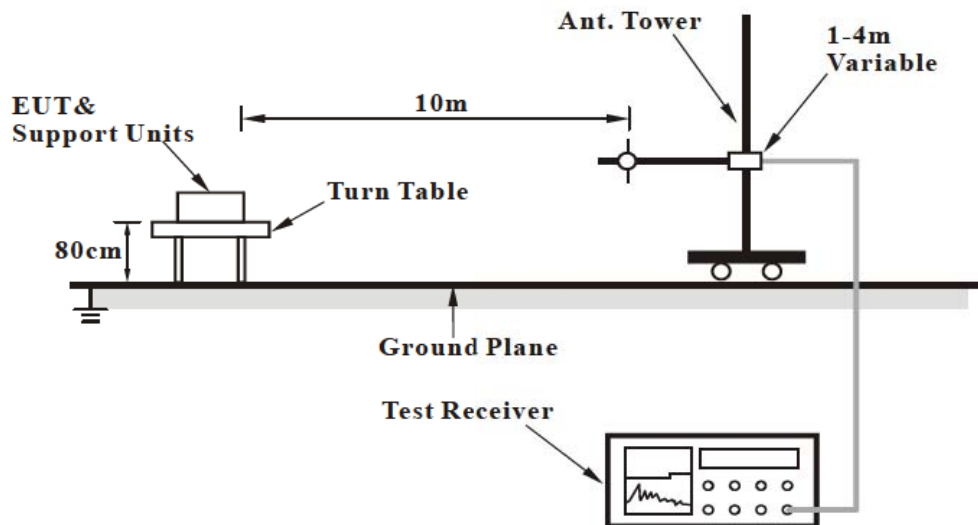
The transmitter was turned on. Measurements were performed of the low, mid and high Channels. The EUT was rotated orthogonally through all three axes. Plots shown are corrected for both antenna correction factor and distance and compared to a 3 m limit line. Only noise floor was measured above 18 GHz.

Test Setup

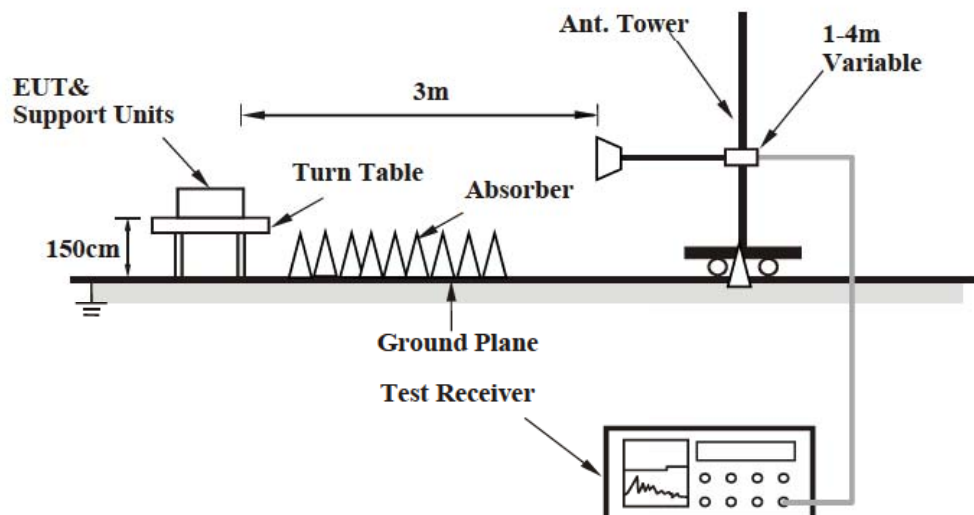
For Radiated Emission Below 30MHz



For Radiated emission 30 MHz to 1GHz



For Radiated emission 1GHz to 40GHz



Test Results: The EUT was tested is **compliant** with Radiated Spurious Emissions Requirements.

Test Equipment List

Calibrated test equipment utilized during testing was maintained in a current state of calibration per the requirements of ISO/IEC 17025:2017.

Asset #	Equipment	Manufacturer	Model	Last Cal Date	Cal Due Date
1S2003	EMI Test Receiver	Keysight	N9030B	10/08/2021	10/08/2022
1S2399	Turntable Controller	SUNOL SCIENCE	SC99V	Not Required	Not Required
1S2486	5 Meter Chamber Control Room	Panashield	5 Meter Control Room	Not Required	Not Required
1S2435	Horn Antenna	ETS-LINDGREN	3117	03/03/2021	03/09/2023
N/A	Preamplifier	EMC Instrument	EMC118A45SE	Note 1	Note 1
1S2668	Preamplifier	Sonoma Instrument	310N	Note 1	Note 1
1S2600	Antenna	TESEQ GmbH	D-12623	05/ 11/ 2021	05/ 11/ 2023
1S3983	Loop Antenna	ETS-LINDGREN	6512	10/ 14 /2021	10/ 14 /2023
Note 1: Verified by calibrated instrumentation at the time of testing					

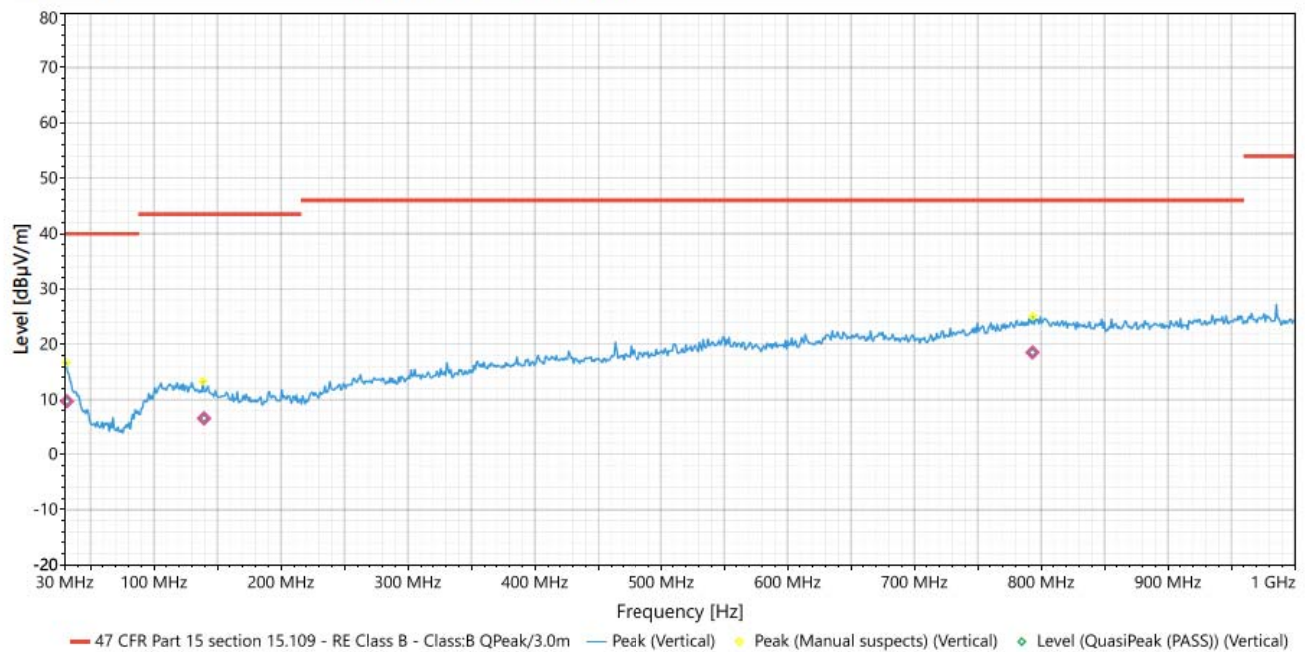
Test Engineer: Alberto Saldivar

Test Date(s): 04/28/2022

Test Data

Radiated Emissions (30 MHz~1000 MHz)

EUT Test Condition		Measurement Detail	
Input Power	5Vdc	Frequency Range	30MHz-1GHz
Environmental Conditions	25 deg. C, 70% RH	Tested By	Alberto Saldivar
Test Mode	TX MODE BLE 2440 MHz		

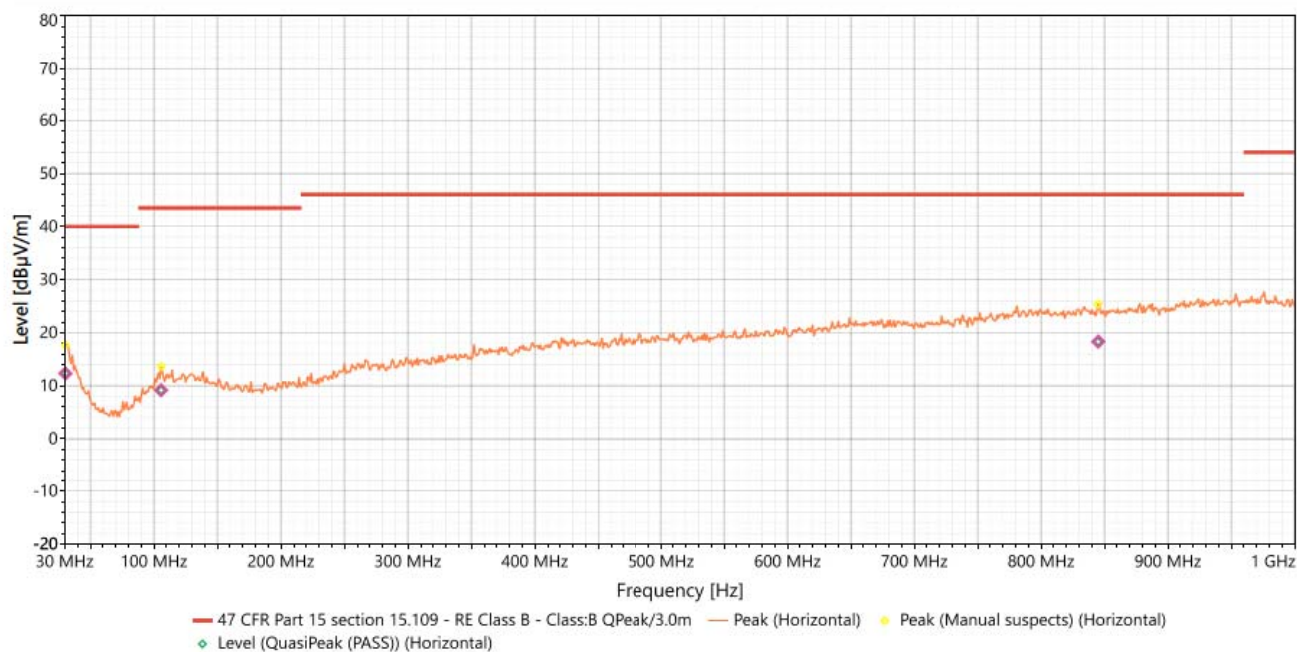


Antenna Polarity & Test Distance: Vertical at 3m									
No.	Frequency (MHz)	Polarization	Level Peak[dB(uV/m)]	Limit Peak dB(uV/m)	Margin Peak [dB]	Height (cm)	Angle (Deg)	Factor [dB(1/m)]	Pass/Fail
1	31.522	Vertical	9.731776	40	-30.2682	2.59	181	-11.52	Pass
2	139.492	Vertical	6.626065	43.5	-36.8739	3.23	101	-14.39	Pass
3	793.222	Vertical	18.54151	46	-27.4585	2.69	316	-2.5	Pass

REMARKS:

1. Level (dBuV) = Reading (dBuV) + Factor (dB(1/m)).
2. Factor (dB(1/m)) = Antenna Factor(AF) (dB(1/m)) + Cable Loss (dB) +Preamplifier
3. Margin value = Emission level – Limit value.
4. The emission levels of other frequencies were less than 20dB margin against the limit.

EUT Test Condition		Measurement Detail	
Input Power	5Vdc	Frequency Range	30MHz-1GHz
Environmental Conditions	25 deg. C, 70% RH	Tested By	Alberto Saldivar
Test Mode	TX MODE BLE 2440 MHz		



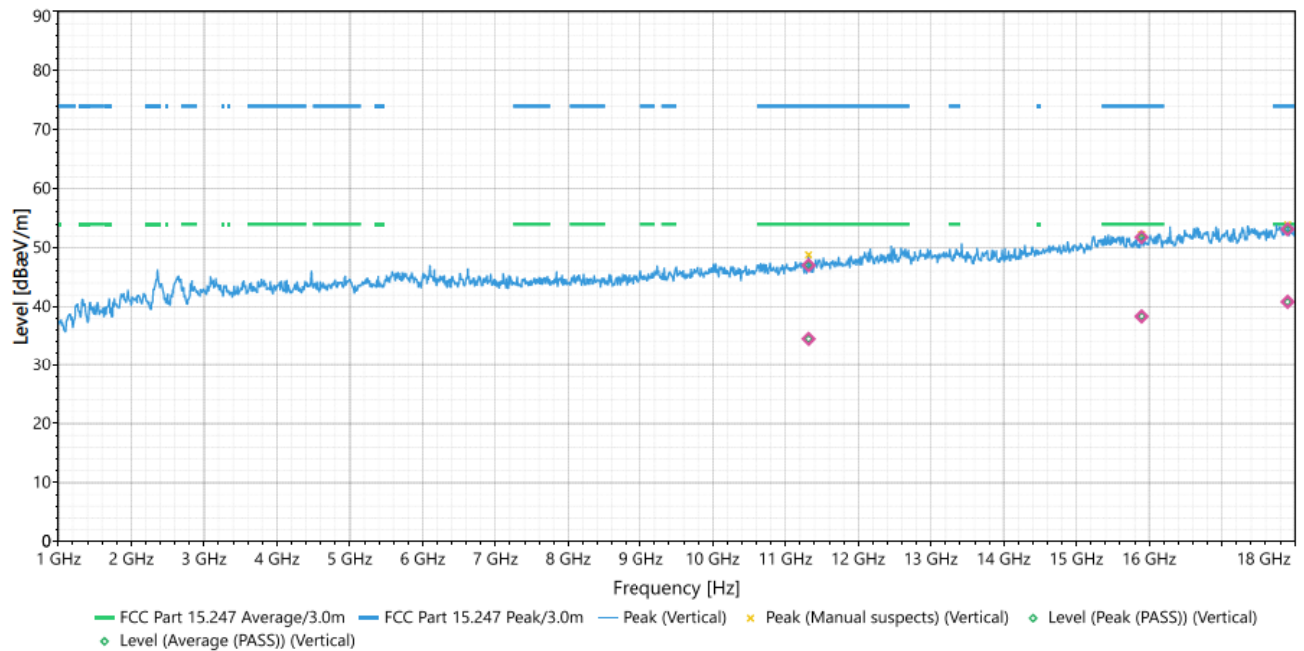
Antenna Polarity & Test Distance: Horizontal at 3m									
No.	Frequency (MHz)	Polarization	Level Peak[dB(uV/m)]	Limit Peak dB(uV/m)	Margin Peak [dB]	Height (cm)	Angle (Deg)	Factor [dB(1/m)]	Pass/Fail
1	30.336	Horizontal	12.32453	40	-27.6755	1.01	342	-8.75	Pass
2	105.672	Horizontal	9.171351	43.5	-34.3286	1.05	322	-15.11	Pass
3	844.92	Horizontal	18.33633	46	-27.6637	2.55	242	-1.85	Pass

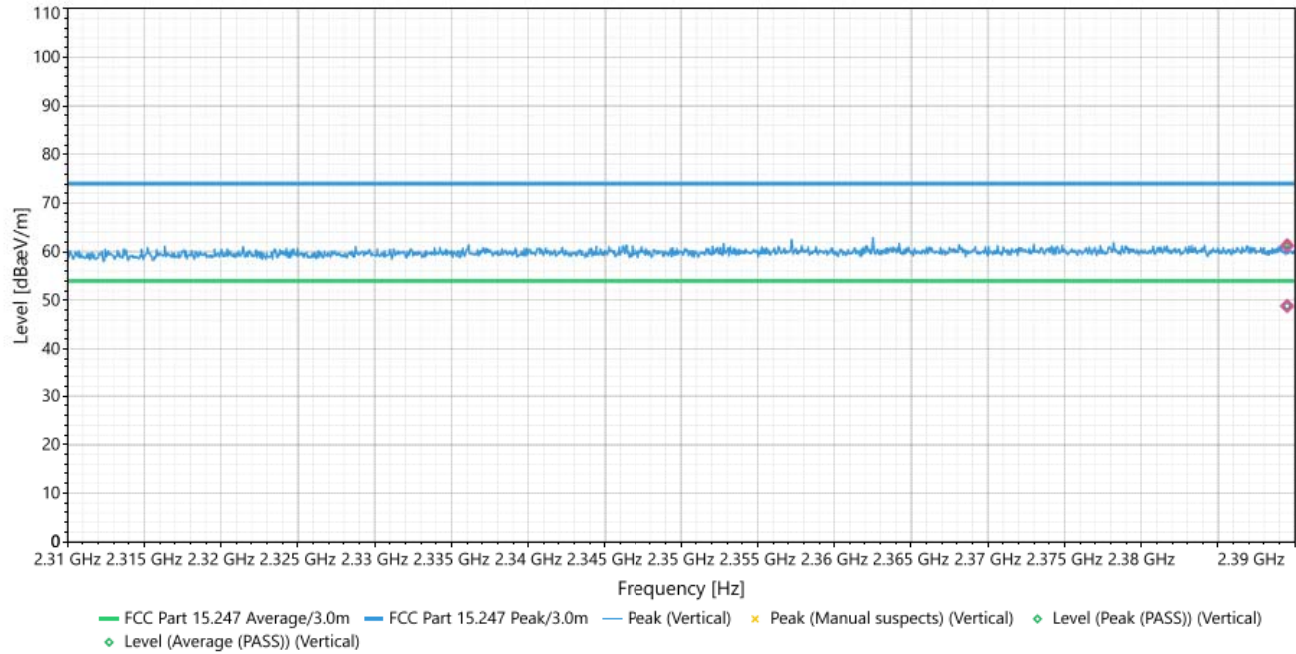
REMARKS:

1. Level (dBuV) = Reading (dBuV) + Factor (dB(1/m)).
2. Factor (dB(1/m)) = Antenna Factor(AF) (dB(1/m)) + Cable Loss (dB) +Preamplifier
3. Margin value = Emission level – Limit value.
4. The emission levels of other frequencies were less than 20dB margin against the limit.

Radiated Emissions (Above 1GHz)

EUT Test Condition		Measurement Detail	
Input Power	5Vdc	Frequency Range	1GHz-26GHz
Environmental Conditions	25 deg. C, 70% RH	Tested By	Alberto Saldivar
Test Mode	TX MODE BLE 2402 MHz		



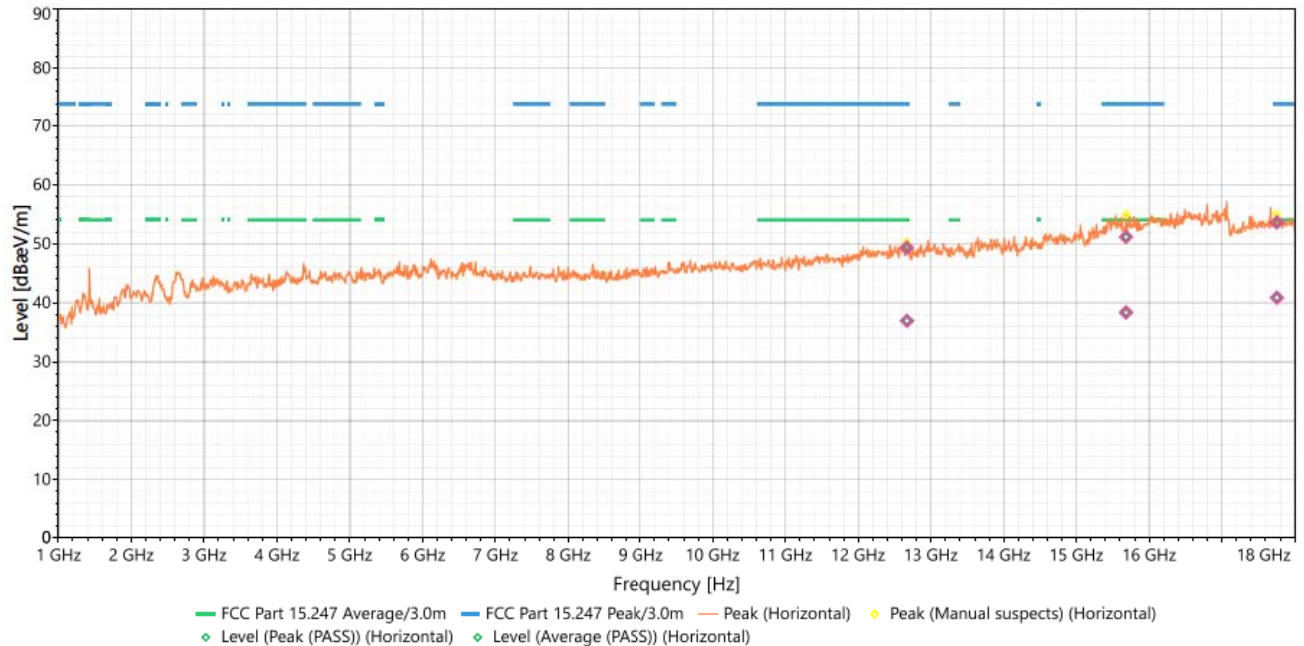


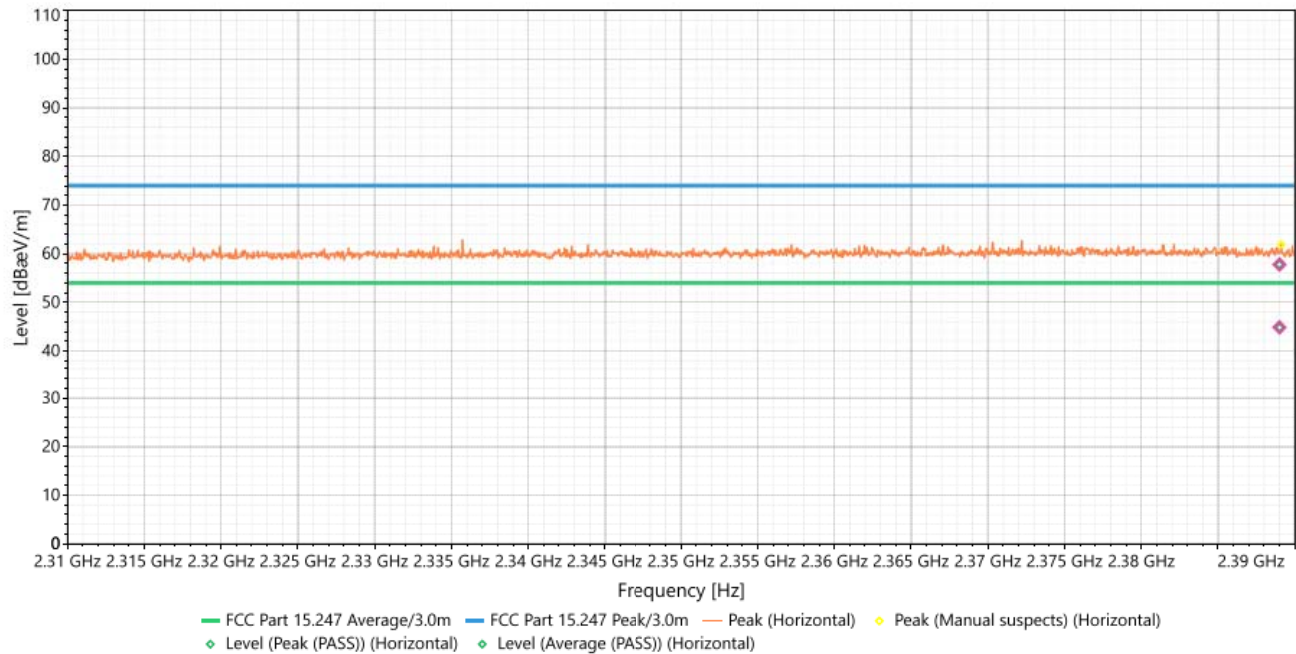
Antenna Polarity & Test Distance: Vertical at 3m									
No.	Frequency (MHz)	Polarization	Level Peak[dB(uV/m)]	Limit Peak dB(uV/m)	Margin Peak [dB]	Height (cm)	Angle (Deg)	Factor [dB(1/m)]	Pass/Fail
1	11317	Vertical	46.997	74	-27.003	3.36	167	3.39	Pass
2	11317	Vertical	34.50759	54	-19.4924	3.36	167	3.39	Pass
3	15894	Vertical	51.7552	74	-22.2448	2.81	64	4.86	Pass
4	15894	Vertical	38.32897	54	-15.671	2.81	64	4.86	Pass
5	17901	Vertical	53.11647	74	-20.8835	1.62	195	3.11	Pass
6	17901	Vertical	40.7935	54	-13.2065	1.62	195	3.11	Pass
7	2389.5	Vertical	61.2258	74	-12.7742	1.54	350	37.46	Pass
8	2389.5	Vertical	48.81258	54	-5.18742	1.54	350	37.46	Pass

REMARKS:

1. Level (dBuV) = Reading (dBuV) + Factor (dB(1/m)).
2. Factor (dB(1/m)) = Antenna Factor(AF) (dB(1/m)) + Cable Loss (dB) +Preamplifier
3. Margin value = Emission level – Limit value.
4. The emission levels of other frequencies were less than 20dB margin against the limit.

EUT Test Condition		Measurement Detail	
Input Power	5Vdc	Frequency Range	1GHz-26GHz
Environmental Conditions	25 deg. C, 70% RH	Tested By	Alberto Saldivar
Test Mode	TX MODE BLE 2402 MHz		



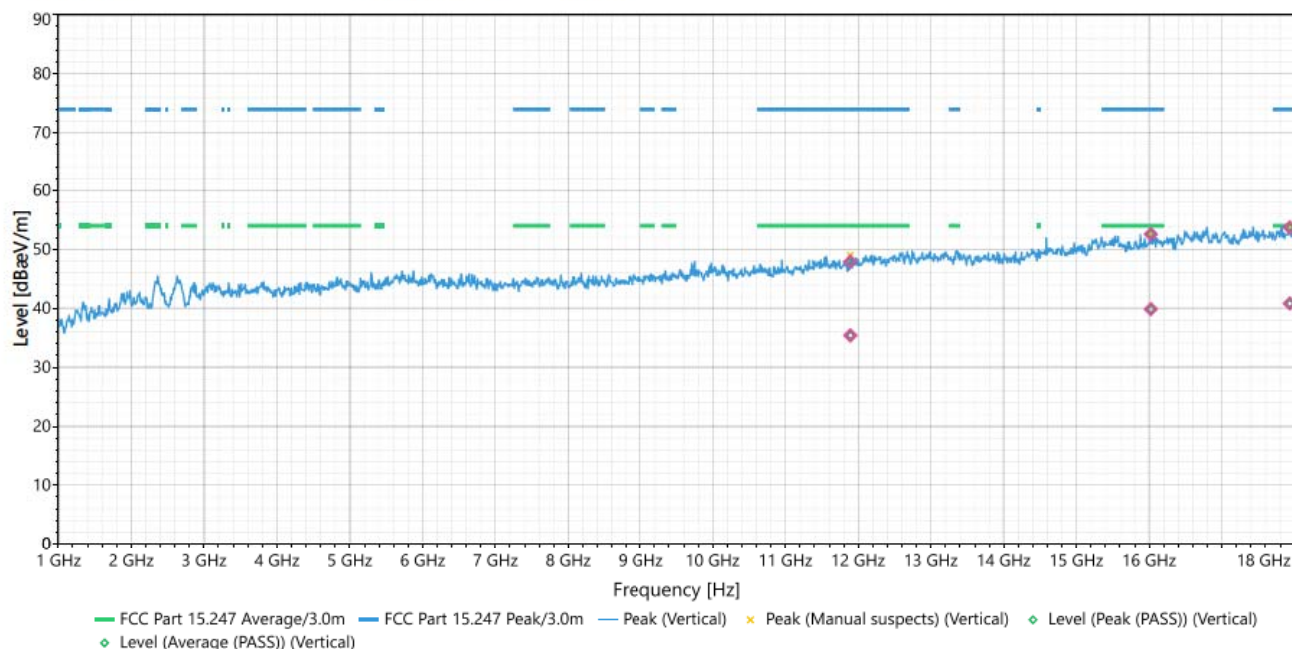


Antenna Polarity & Test Distance: Horizontal at 3m									
No.	Frequency (MHz)	Polarization	Level Peak[dB(μV/m)]	Limit Peak dB(μV/m)	Margin Peak [dB]	Height (cm)	Angle (Deg)	Factor [dB(1/m)]	Pass/Fail
1	12669	Horizontal	49.324	74	-24.676	2.45	125	4.29	Pass
2	12669	Horizontal	36.9261	54	-17.0739	2.45	125	4.29	Pass
3	15680	Horizontal	51.14092	74	-22.8591	1	335	4.79	Pass
4	15680	Horizontal	38.36434	54	-15.6357	1	335	4.79	Pass
5	17754	Horizontal	53.60973	74	-20.3903	1.71	27	3.33	Pass
6	17754	Horizontal	40.84572	54	-13.1543	1.71	27	3.33	Pass
7	2389	Horizontal	57.76964	74	-16.2304	2.42	17	37.51	Pass
8	2389	Horizontal	44.83005	54	-9.16995	2.42	17	37.51	Pass

REMARKS:

1. Level (dBuV) = Reading (dBuV) + Factor (dB(1/m)).
2. Factor (dB(1/m)) = Antenna Factor(AF) (dB(1/m)) + Cable Loss (dB) +Preamplifier
3. Margin value = Emission level – Limit value.
4. The emission levels of other frequencies were less than 20dB margin against the limit.

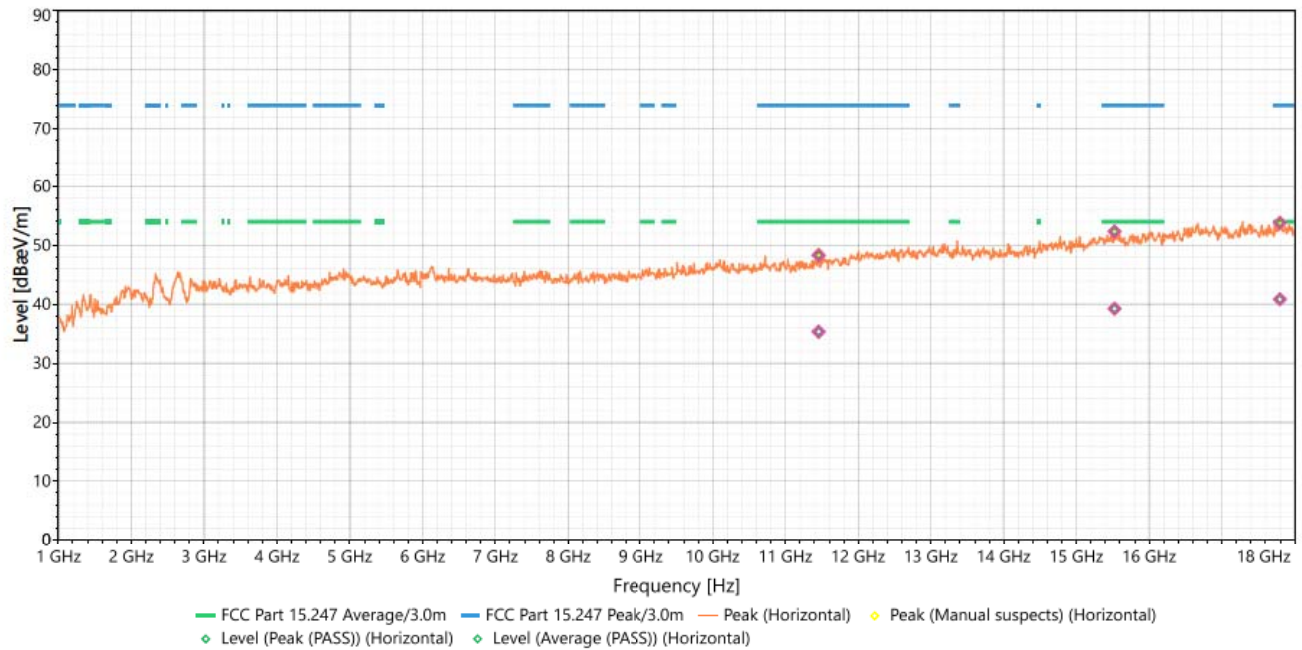
EUT Test Condition		Measurement Detail	
Input Power	5Vdc	Frequency Range	1GHz-26GHz
Environmental Conditions	25 deg. C, 70% RH	Tested By	Alberto Saldivar
Test Mode	TX MODE BLE 2440 MHz		



Antenna Polarity & Test Distance: Vertical at 3m									
No.	Frequency (MHz)	Polarization	Level Peak [dB(uV/m)]	Limit Peak dB(uV/m)	Margin Peak [dB]	Height (cm)	Angle (Deg)	Factor [dB(1/m)]	Pass/Fail
1	11892	Vertical	47.90535	74	-26.0947	1.59	175	3.85	Pass
2	11892	Vertical	35.39092	54	-18.6091	1.59	175	3.85	Pass
3	16021	Vertical	52.56252	74	-21.4375	1.63	310	5.11	Pass
4	16021	Vertical	39.85721	54	-14.1428	1.63	310	5.11	Pass
5	17932	Vertical	53.68904	74	-20.311	3.33	11	3.04	Pass
6	17932	Vertical	40.82416	54	-13.1758	3.33	11	3.04	Pass

1. Level (dBuV) = Reading (dBuV) + Factor (dB(1/m)).
2. Factor (dB(1/m)) = Antenna Factor(AF) (dB(1/m)) + Cable Loss (dB) +Preamplifier
3. Margin value = Emission level – Limit value.
4. The emission levels of other frequencies were less than 20dB margin against the limit.

EUT Test Condition		Measurement Detail	
Input Power	5Vdc	Frequency Range	1GHz-26GHz
Environmental Conditions	25 deg. C, 70% RH	Tested By	Alberto Saldivar
Test Mode	TX MODE BLE 2440 MHz		

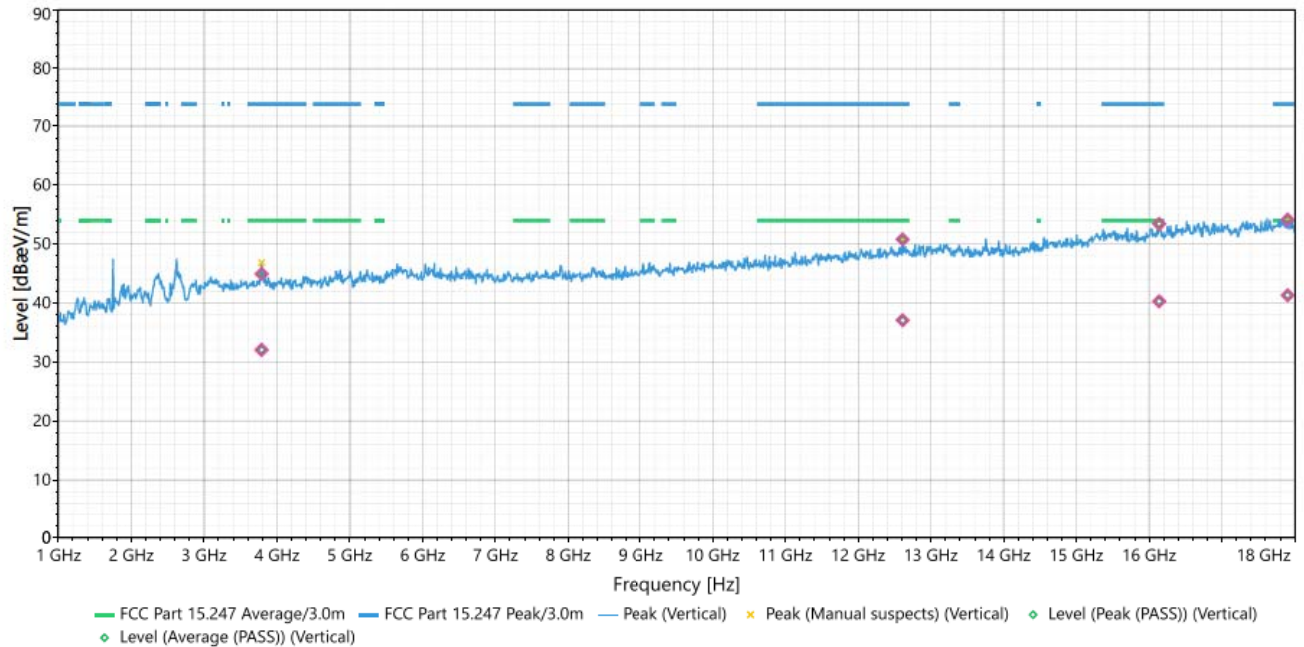


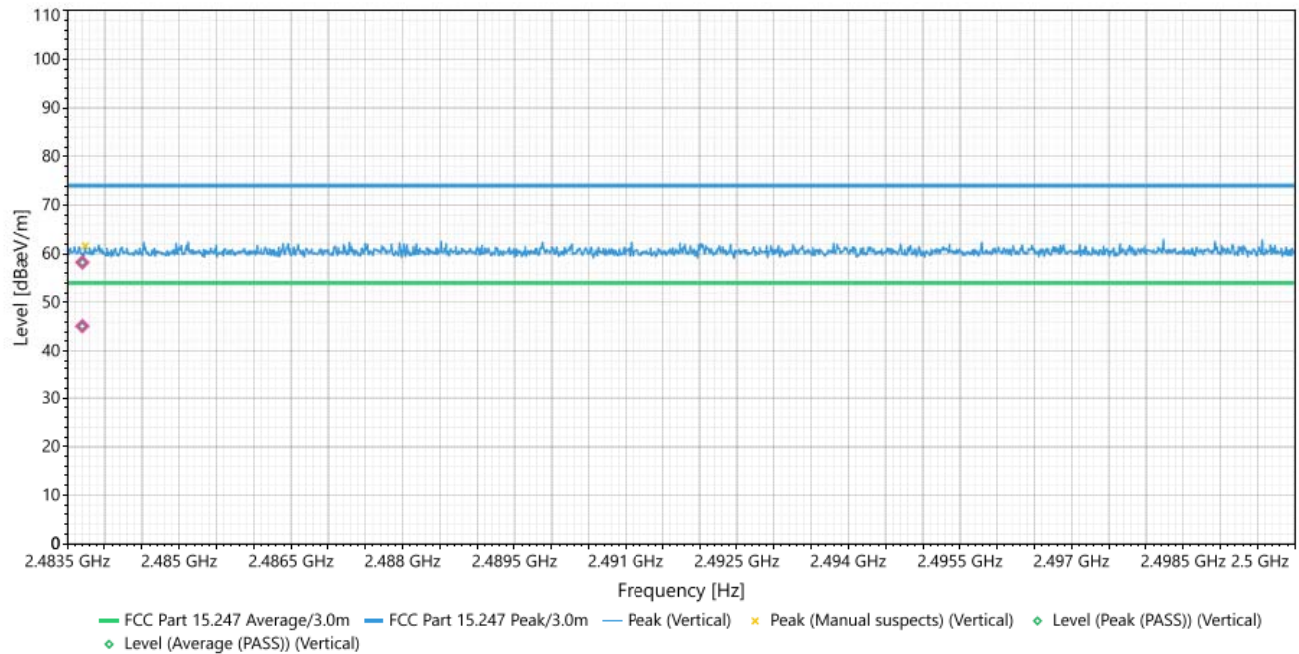
Antenna Polarity & Test Distance: Horizontal at 3m									
No.	Frequency (MHz)	Polarization	Level Peak [dB(uV/m)]	Limit Peak dB(uV/m)	Margin Peak [dB]	Height (cm)	Angle (Deg)	Factor [dB(1/m)]	Pass/Fail
1	11455	Horizontal	48.31152	74	-25.6885	1.18	105	3.63	Pass
2	11455	Horizontal	35.34559	54	-18.6544	1.18	105	3.63	Pass
3	15523	Horizontal	52.32847	74	-21.6715	2.85	1	4.99	Pass
4	15523	Horizontal	39.26156	54	-14.7384	2.85	1	4.99	Pass
5	17796	Horizontal	53.81632	74	-20.1837	3.11	3	3.28	Pass
6	17796	Horizontal	40.84318	54	-13.1568	3.11	3	3.28	Pass

REMARKS:

1. Level (dBuV) = Reading (dBuV) + Factor (dB(1/m)).
2. Factor (dB(1/m)) = Antenna Factor(AF) (dB(1/m)) + Cable Loss (dB) +Preamplifier
3. Margin value = Emission level – Limit value.
4. The emission levels of other frequencies were less than 20dB margin against the limit.

EUT Test Condition		Measurement Detail	
Input Power	5Vdc	Frequency Range	1GHz-26GHz
Environmental Conditions	25 deg. C, 70% RH	Tested By	Alberto Saldivar
Test Mode	TX MODE BLE 2480 MHz		

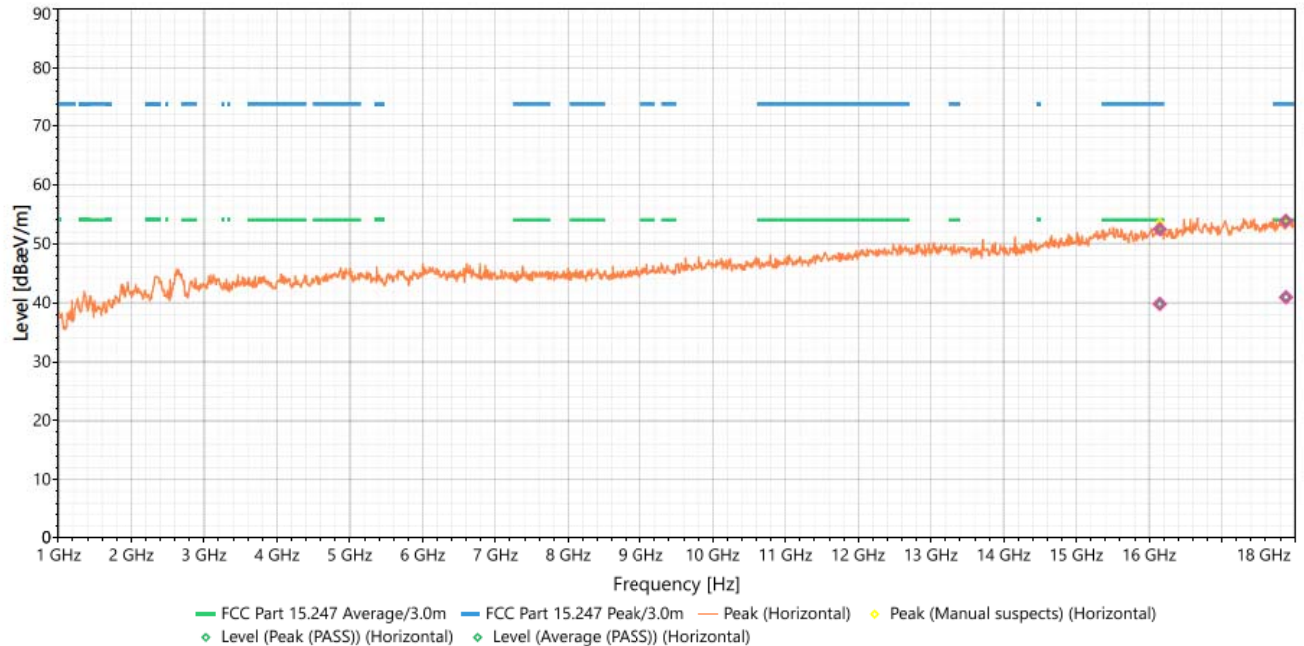


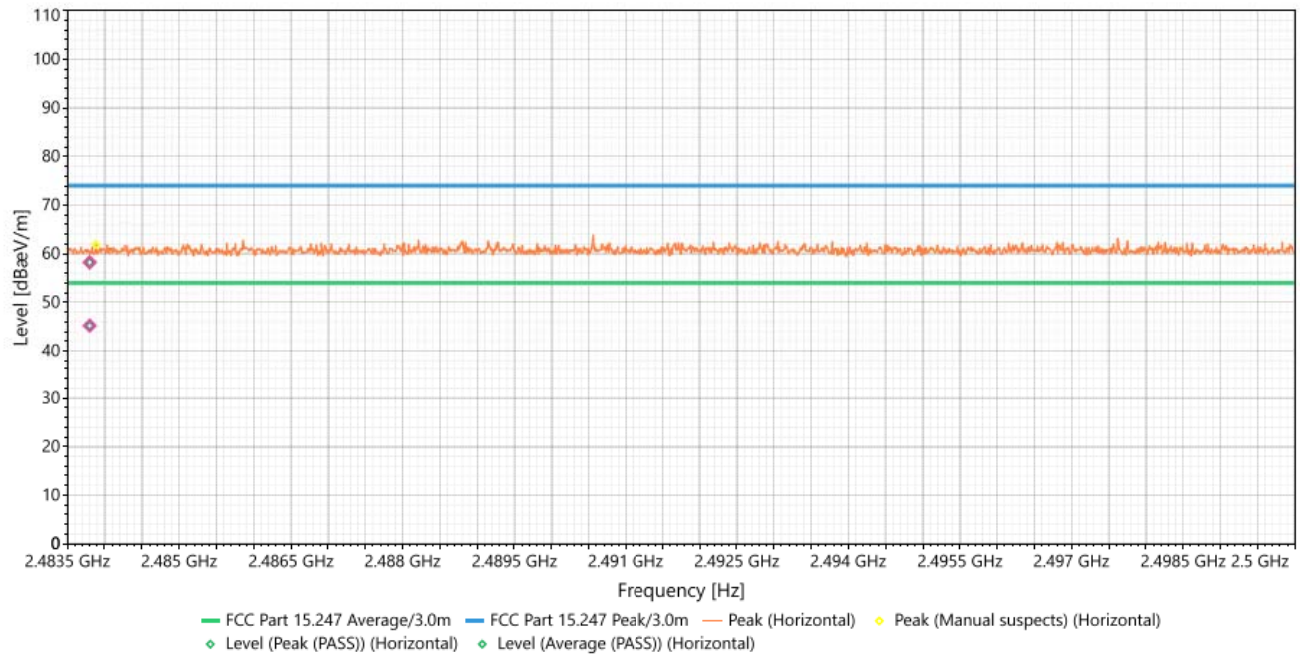


Antenna Polarity & Test Distance: Vertical at 3m									
No.	Frequency (MHz)	Polarization	Level Peak[dB(uV/m)]	Limit Peak dB(uV/m)	Margin Peak [dB]	Height (cm)	Angle (Deg)	Factor [dB(1/m)]	Pass/Fail
1	3791.4	Vertical	44.93358	74	-29.0664	1.69	119	1.44	Pass
2	3791.4	Vertical	32.05667	54	-21.9433	1.69	119	1.44	Pass
3	12611	Vertical	50.7838	74	-23.2162	1.64	108	4.19	Pass
4	12611	Vertical	37.07858	54	-16.9214	1.64	108	4.19	Pass
5	16135	Vertical	53.41261	74	-20.5874	3.29	169	5.2	Pass
6	16135	Vertical	40.28147	54	-13.7185	3.29	169	5.2	Pass
7	17901	Vertical	54.1595	74	-19.8405	2.15	330	3.11	Pass
8	17901	Vertical	41.30587	54	-12.6941	2.15	330	3.11	Pass
9	2483.7	Vertical	58.18568	74	-15.8143	1.3	357	37.84	Pass
10	2483.7	Vertical	45.07534	54	-8.92466	1.3	357	37.84	Pass

1. Level (dBuV) = Reading (dBuV) + Factor (dB(1/m)).
2. Factor (dB(1/m)) = Antenna Factor(AF) (dB(1/m)) + Cable Loss (dB) +Preamplifier
3. Margin value = Emission level – Limit value.
4. The emission levels of other frequencies were less than 20dB margin against the limit.

EUT Test Condition		Measurement Detail	
Input Power	5Vdc	Frequency Range	1GHz-26GHz
Environmental Conditions	25 deg. C, 70% RH	Tested By	Alberto Saldivar
Test Mode	TX MODE BLE 2480 MHz		





Antenna Polarity & Test Distance: Horizontal at 3m									
No.	Frequency (MHz)	Polarization	Level Peak[dB(uV/m)]	Limit Peak dB(uV/m)	Margin Peak [dB]	Height (cm)	Angle (Deg)	Factor [dB(1/m)]	Pass/Fail
1	16144	Horizontal	52.46682	74	-21.5332	1.06	7	5.32	Pass
2	16144	Horizontal	39.78174	54	-14.2183	1.06	7	5.32	Pass
3	17879	Horizontal	53.87609	74	-20.1239	2.59	358	3.15	Pass
4	17879	Horizontal	40.91639	54	-13.0836	2.59	358	3.15	Pass
5	2483.8	Horizontal	58.20308	74	-15.7969	1.42	284	37.96	Pass
6	2483.8	Horizontal	45.18443	54	-8.81557	1.42	284	37.96	Pass

REMARKS:

1. Level (dBuV) = Reading (dBuV) + Factor (dB(1/m)).
2. Factor (dB(1/m)) = Antenna Factor(AF) (dB(1/m)) + Cable Loss (dB) +Preamplifier
3. Margin value = Emission level – Limit value.
4. The emission levels of other frequencies were less than 20dB margin against the limit.

Conducted Emission Measurement**Limits of Conducted Emission Measurement :**

The following standards specified below are covered in the scope of this section of the test report:

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15 - 0.5	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30.0	60	50

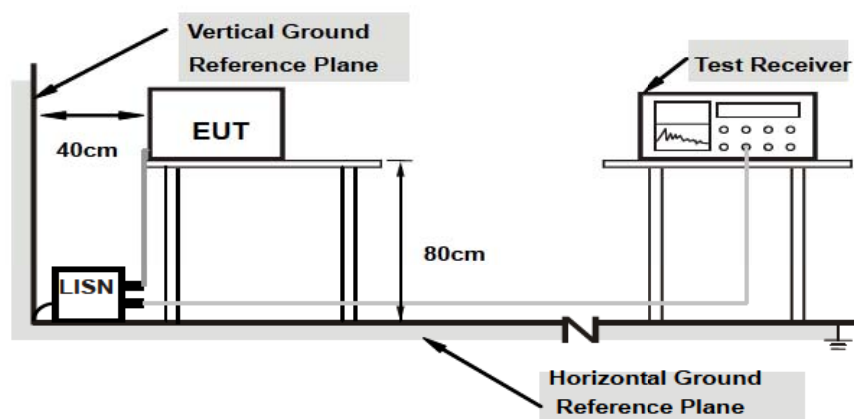
Note: 1. The lower limit shall apply at the transition frequencies.

2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

Conducted Emissions - Test Procedure

- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- c. The frequency ranges from 150 kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

Conducted Emissions - Test Setup



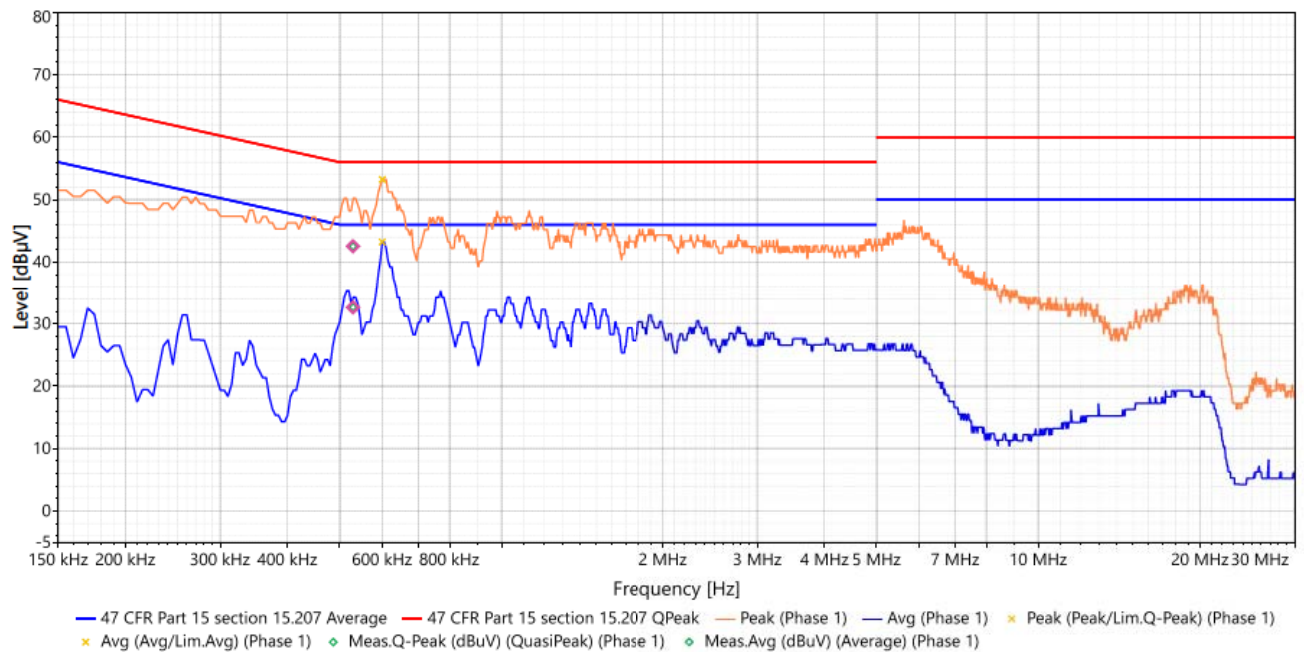
Note: 1.Support units were connected to second LISN.

For the actual test configuration, please refer to the attached file (Test Setup Photo)

Test Results:

Phase		Line (L)			Detector Function		Quasi-Peak / Average		
No	Freq.	Level (QP)	Limit (QP)	Margin	Level (Average)	Limit (Average)	Margin	Correction	Pass /Fail
	[MHz]	(dBuV)	(dBuV)	(dB)	(dBuV)	(dBuV)	(dB)	(dB)	
1	0.53	42.52	56.00	-13.48	-	-	-	0.23	Pass
2	0.53	-	-	-	32.63	46.00	-13.37	0.23	Pass

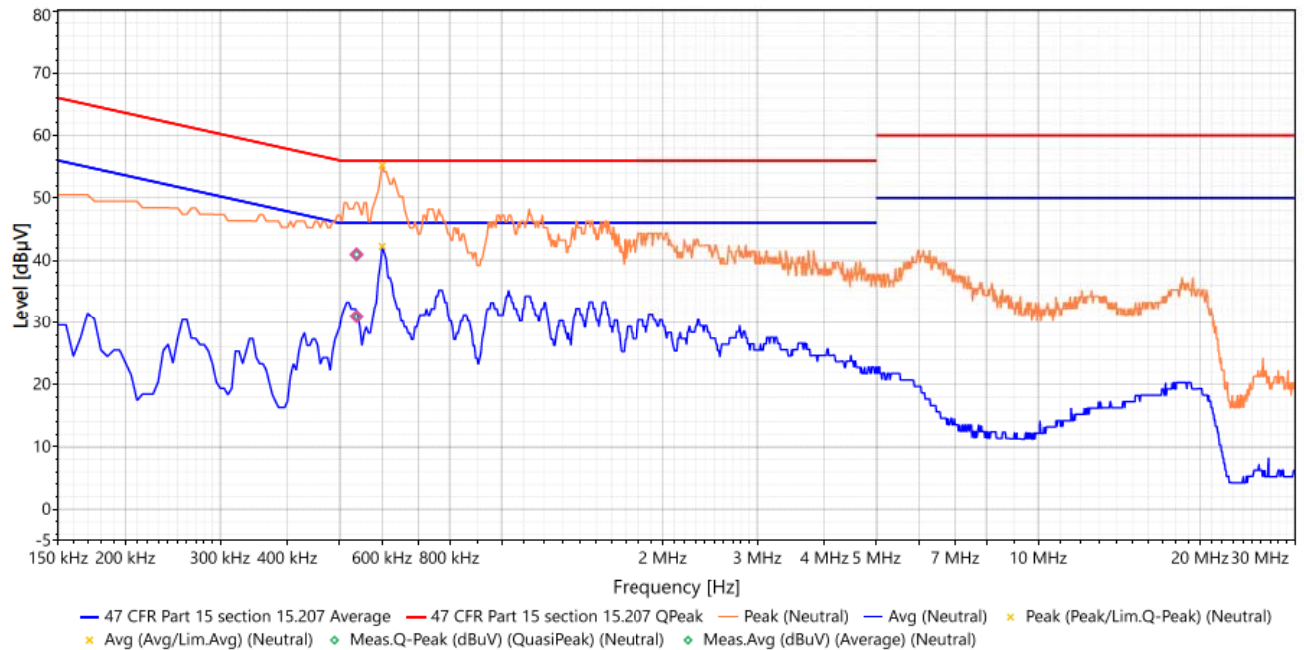
Test Plot:



Phase	Neutral (N)	Detector Function	Quasi-Peak / Average
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No	Freq. [MHz]	Level (QP) (dBuV)	Limit (QP) (dBuV)	Margin (dB)	Level (Average) (dBuV)	Limit (Average) (dBuV)	Margin (dB)	Correction (dB)	Pass /Fail
1	0.54	40.94	56.00	-15.06	-	-	-	0.23	Pass
2	0.54	-	-	-	30.93	46.00	-15.07	0.23	Pass

Test Plot:



Test Equipment

Calibrated test equipment utilized during testing was maintained in a current state of calibration per the requirements of ISO/IEC 17025:2017.

Note: Functionally tested equipment is verified using calibrated instrumentation at the time of testing.

Test Name: CE Voltage – AC Power Port			Test Date(s): 04/28/2022		
MET Asset #	Equipment	Manufacturer	Model	Last Cal Date	Cal Due Date
1S2481	10 Meter Chamber (NSA)	ETS Lingren	DKE 8X8 DBL	Not Required	Not Required
1U0337	LISN	Com-Power	LI-215A	10/07/2021	10/07/2022
1U0304	EMI Receiver	Narda	PMM 9010	04/26/2021	04/26/2022
Note: Functionally tested equipment is verified using calibrated instrumentation at the time of testing.					

Table 1. Conducted Emissions, Test Equipment

Test Engineer: Alberto Saldivar

Test Date(s): 04/28/2022

6dB Bandwidth Measurement & 99% Bandwidth Measurement

Limits of Conducted Emission Measurement :

The minimum of 6dB Bandwidth Measurement is 0.5 MHz.

Test Procedure

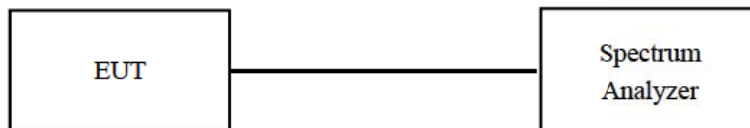
99% Bandwidth Measurement

Refer to ANSI C63.10 section 6.9.3

-6dB Bandwidth Measurement

- Set resolution bandwidth (RBW) = 100kHz
- Set the video bandwidth (VBW) $\geq 3 \times$ RBW, Detector = Peak.
- Trace mode = max hold.
- Sweep = auto couple.
- Measure the maximum width of the emission that is constrained by the frequencies associated with the two amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission

Conducted Emissions - Test Setup



For the actual test configuration, please refer to the attached file (Test Setup Photo)

Test Equipment

Calibrated test equipment utilized during testing was maintained in a current state of calibration per the requirements of ISO/IEC 17025:2017.

Note: Functionally tested equipment is verified using calibrated instrumentation at the time of testing.

Test Name: 6dB Bandwidth Measurement & 99% Bandwidth Measurement			Test Date(s): 04//26/2022		
MET Asset #	Equipment	Manufacturer	Model	Last Cal Date	Cal Due Date
1S2003	EMI Test Receiver	Keysight	N9030B	10/08/2021	10/08/2022
Note: Functionally tested equipment is verified using calibrated instrumentation at the time of testing.					

Test Result:

DATA RATE 2MBPS

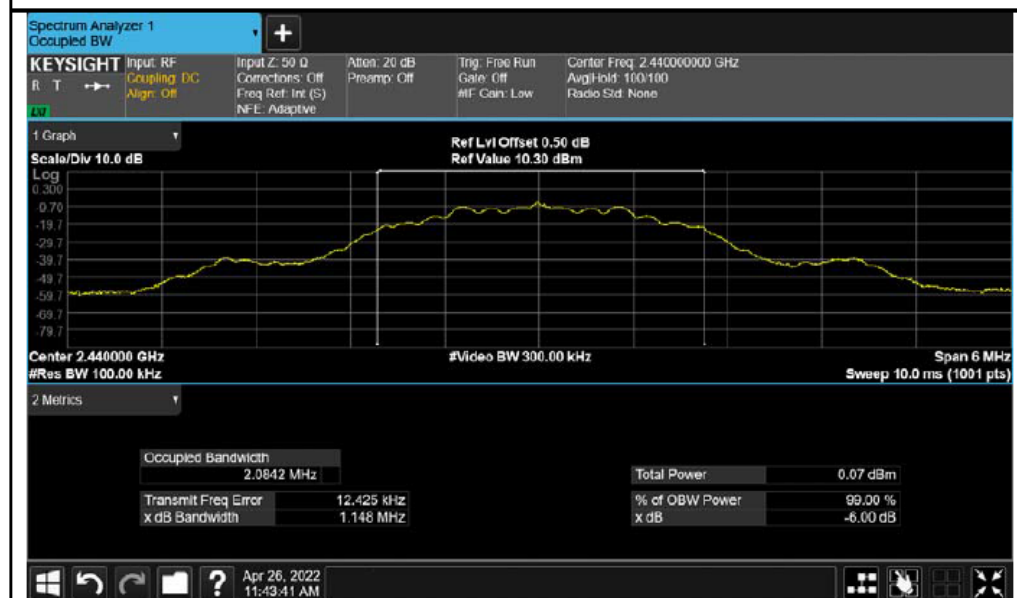
Channel	Frequency (MHz)	6dB Bandwidth (MHz)	99% Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
37	2402	1.142	2.08	0.5	PASS
17	2440	1.148	2.0842	0.5	PASS
39	2480	1.142	2.0851	0.5	PASS

Test Plots:

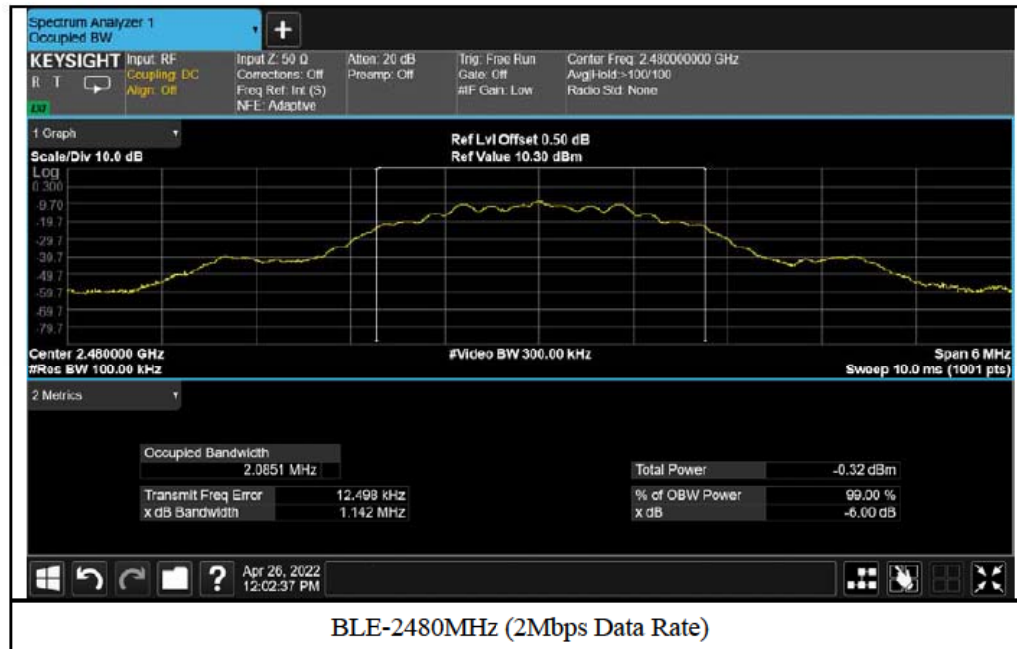
99% Occupied Bandwidth:



BLE-2402MHz (2Mbps Data Rate)



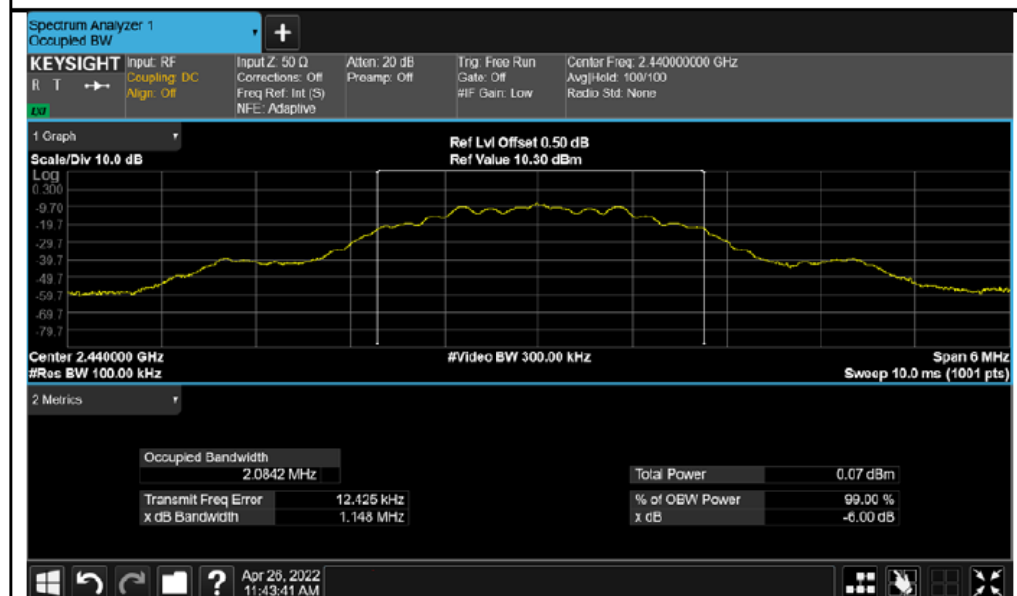
BLE-2440MHz (2Mbps Data Rate)



6 dB Occupied Bandwidth:



BLE-2402MHz (2Mbps Data Rate)



BLE-2440MHz (2Mbps Data Rate)



Conducted Output Power Measurement

Limits of Output Power Measurement :

FCC 15.247

For systems using digital modulation in the 2400–2483.5 MHz bands: 1 Watt (30dBm)

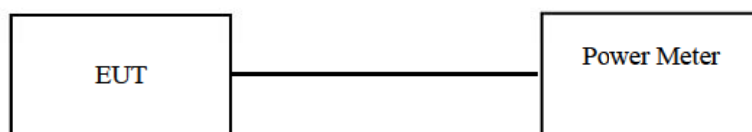
RSS 247

E.I.R.P for systems using digital modulation in the 2400–2483.5 MHz bands: 4 Watt (36.02dBm)

Test Procedure

A power meter sensor was used on the output port of the EUT. A power meter was used to read the response of the power sensor. Record the power level.

Test Setup



For the actual test configuration, please refer to the attached file (Test Setup Photo)

Test Equipment

Calibrated test equipment utilized during testing was maintained in a current state of calibration per the requirements of ISO/IEC 17025:2017.

Note: Functionally tested equipment is verified using calibrated instrumentation at the time of testing.

Test Name: Conducted Output Power Measurement			Test Date(s): 04/26/2022		
Asset #	Equipment	Manufacturer	Model	Last Cal Date	Cal Due Date
N/A	Power Meter	ROHDE & SCHWARZ	NRQ6	05/05/2021	05/05/2022

Test Result:

FCC

Data Rate: 2Mbps(Peak Power)

Channel	Frequency (MHz)	Conducted Power (dBm)	Limit (dBm)	Pass/Fail
37	2402	-4.48	30	Pass
17	2440	-4.82	30	Pass
39	2480	-5.13	30	Pass

Data Rate: 2Mbps (Time-Average Power)

Channel	Frequency (MHz)	Conducted Power (dBm)
37	2402	-7.22
17	2440	-7.63
39	2480	-7.92

ISED:

Channel	Frequency (MHz)	Conducted Power (dBm)	Limit (dBm)	EIRP (dBm)	Limit (dBm)	Pass/Fail
37	2402	-7.22	30	-21.02	36.02	Pass
17	2440	-7.63	30	-21.43	36.02	Pass
39	2480	-7.92	30	-21.72	36.02	Pass

Power Spectral Density Measurement

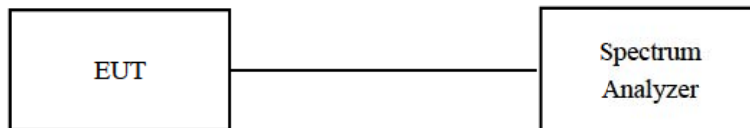
Limits of Power Spectral Measurement :

The Maximum of Power Spectral Density Measurement is 8dBm in any 3 kHz.

Test Procedure

A power meter sensor was used on the output port of the EUT. A power meter was used to read the response of the power sensor. Record the power level.

Test Setup



For the actual test configuration, please refer to the attached file (Test Setup Photo)

Test Equipment

Calibrated test equipment utilized during testing was maintained in a current state of calibration per the requirements of ISO/IEC 17025:2017.

Note: Functionally tested equipment is verified using calibrated instrumentation at the time of testing.

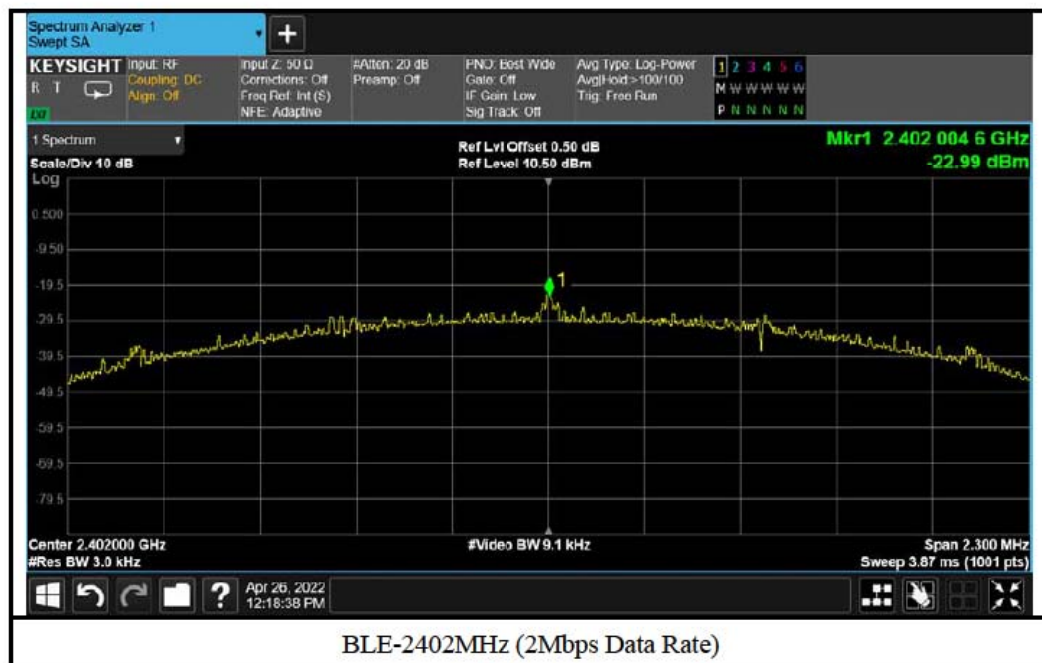
Test Name: Power Spectral Density Measurement			Test Date(s): 04/26/2022		
MET Asset #	Equipment	Manufacturer	Model	Last Cal Date	Cal Due Date
1S2003	EMI Test Receiver	Keysight	N9030B	10/08/2021	10/08/2022
Note: Functionally tested equipment is verified using calibrated instrumentation at the time of testing.					

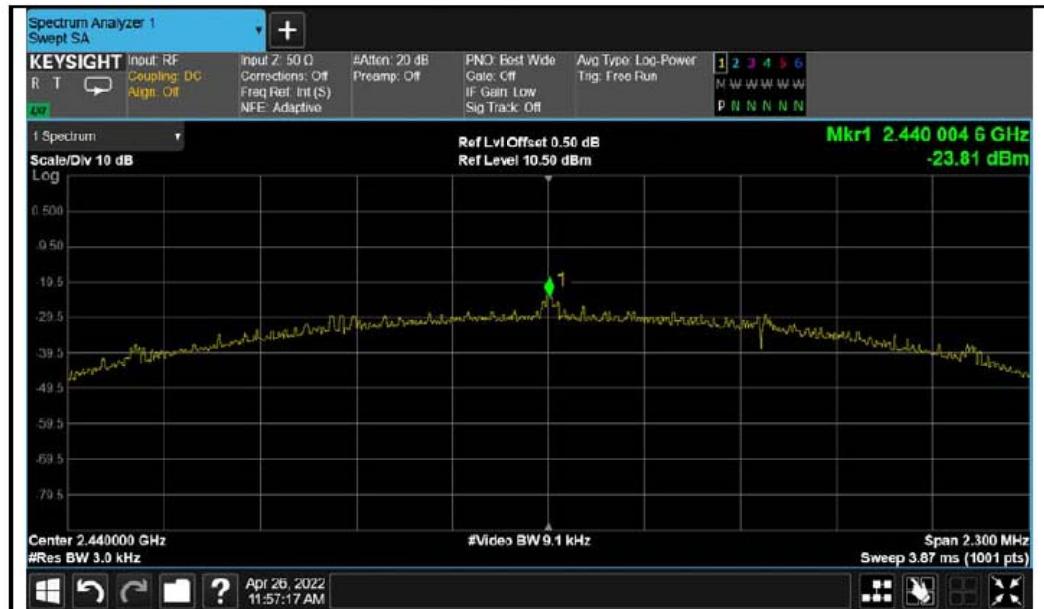
Test Result:

Data Rate: 2Mbps

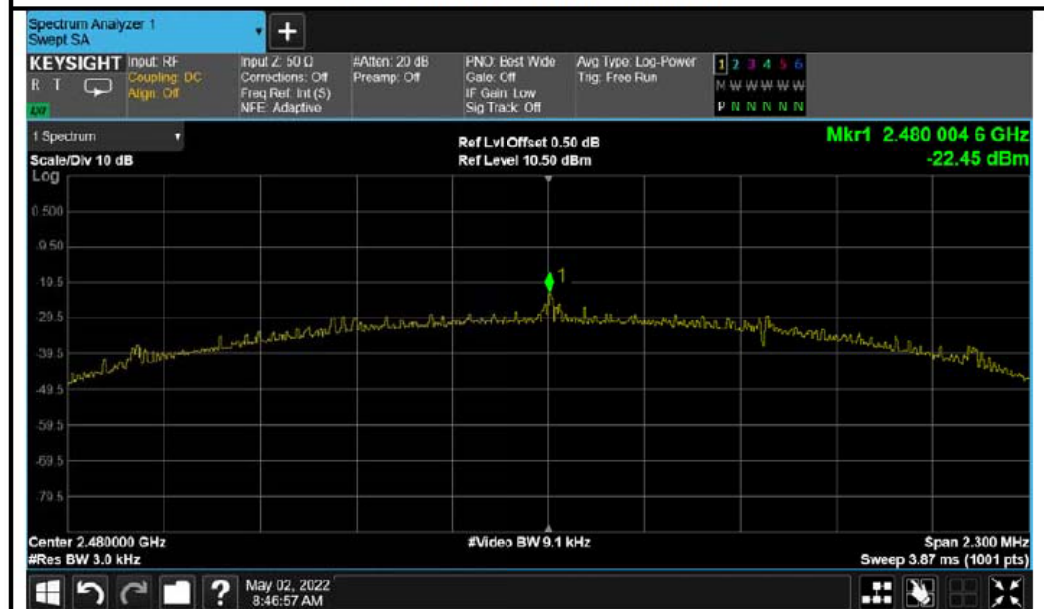
Channel	Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)	Pass/Fail
37	2402	-22.99	8	Pass
17	2440	-23.81	8	Pass
39	2480	-22.45	8	Pass

Test Plots:





BLE-2440MHz (2Mbps Data Rate)



BLE-2480MHz (2Mbps Data Rate)

Conducted Out of Band Emission Measurement

Limits of Conducted Out of Band Emission Measurement:

Below 20dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth)

Test Procedure

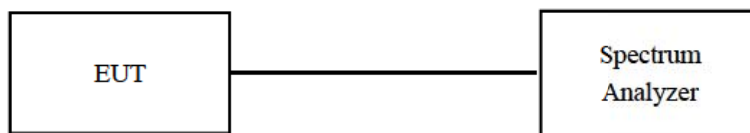
MEASUREMENT PROCEDURE REF

1. Set the RBW = 100 kHz.
2. Set the VBW $\geq$ 300 kHz.
3. Detector = peak.
4. Sweep time = auto couple.
5. Trace mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.

MEASUREMENT PROCEDURE OOBE

1. Set RBW = 100 kHz.
2. Set VBW $\geq$ 300 kHz.
3. Detector = peak.
4. Sweep = auto couple.
5. Trace Mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum amplitude level.

Test Setup



For the actual test configuration, please refer to the attached file (Test Setup Photo)

Test Equipment

Calibrated test equipment utilized during testing was maintained in a current state of calibration per the requirements of ISO/IEC 17025:2017.

Note: Functionally tested equipment is verified using calibrated instrumentation at the time of testing.

Test Name: Conducted Out of Band Emission Measurement			Test Date(s): 04/26/2022		
MET Asset #	Equipment	Manufacturer	Model	Last Cal Date	Cal Due Date
1S2003	EMI Test Receiver	Keysight	N9030B	10/08/2021	10/08/2022
Note: Functionally tested equipment is verified using calibrated instrumentation at the time of testing.					

Test Result:

Data Rate: 2Mbps



IV. Pictures of test Arrangements

Please see setup photo file

END OF REPORT