

August 17, 2022

Roku, Inc.
1155 Coleman Ave
San Jose
CA 95110 USA

Dear Thien,

Enclosed is the EMC Wireless test report for compliance testing of the Roku, Inc., WiFi Remote Control as tested to the requirements of Title 47 of the CFR, , 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.

Gary Chou

Documentation Department
Eurofins Electrical and Electronic Testing NA, Inc.

Reference: WIR119780-ROKU_FCC-WLAN_2.4GHz_REV 1.0



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

FCC Test Report

Applicant name: Roku, Inc.

Product: WiFi Remote Control

Report: WIR119780-ROKU_FCC-WLAN_2.4GHz_REV 1.0

Applicant Address:

1155 Coleman Ave., San Jose, CA 95110 USA

Manufacturer Address:

1155 Coleman Ave., San Jose, CA 95110 USA

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

FCC Test Report

Applicant name: Roku, Inc.

Product: WiFi Remote Control

Standard

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

558074 D01 15.247 Meas Guidance v05r02

ANSI C63.10: 2013

Christopher Martin

Christopher Martin 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	August 17, 2022	Initial Issue.
REV 1.0	August 31, 2022	Updated Antenna Information

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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:	WiFi Remote Control	
Brand:	Roku	
Model(s) Tested:	RC-MC1F, RC-MC5F	
Series Model:	N/A	
Sample Status:	Original	
EUT Specifications:	Primary Power:	5Vdc powered by Adaptor/ 3.8Vdc powered by battery
	Voltage Frequency:	N/A
	Technology / Type of Modulations:	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
	Operating Frequency :	2.412 ~ 2.462GHz
	FCC ID:	TC2-R1049
	ISED ID:	
	Antenna Type:	Chip Antenna 2400 MHz: 0.54 dBi 2442 MHz: 2.27 dBi 2485 MHz: 1.19 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:	Christopher Martin	
Issue Date(s):	August 30, 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:

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

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 ROKU 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:

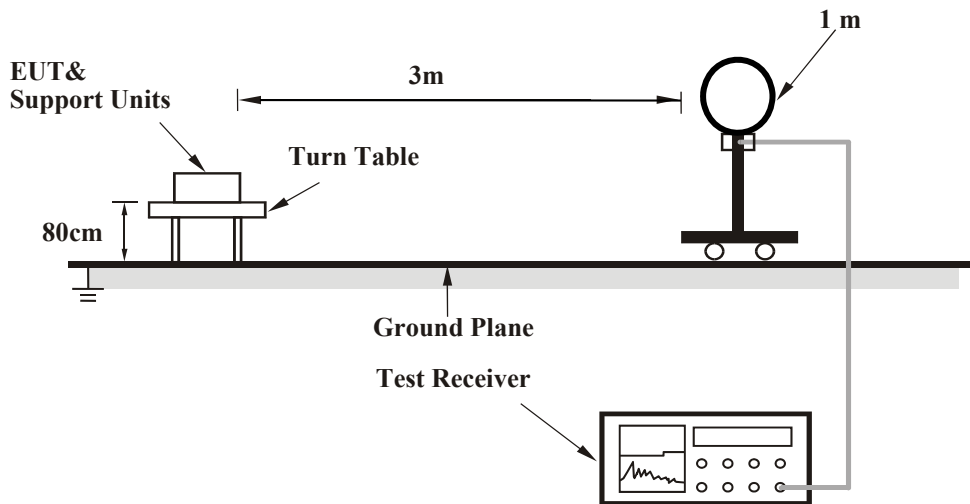
Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

Test Procedures:

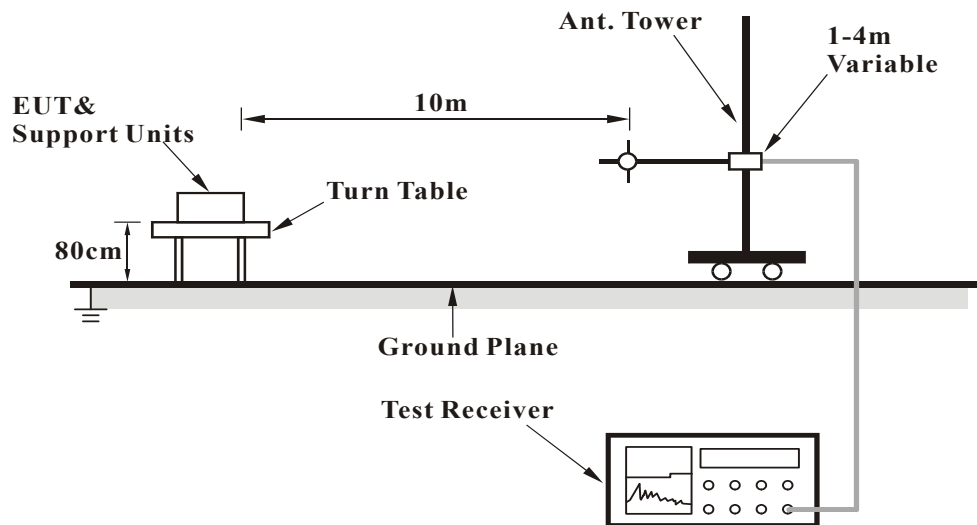
The transmitter was turned on. Measurements were performed of the low, mid and high Channels. The EUT was rotated orthogonally through all three axes. Plots shown are corrected for both antenna correction factor and distance and compared to a 3 m limit line. Only noise floor was measured above 18 GHz.

Test Setup

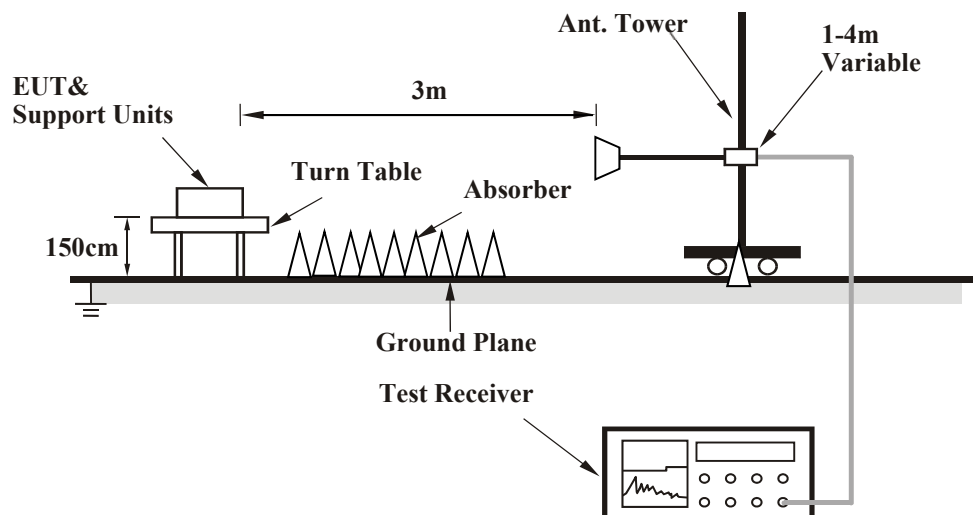
For Radiated Emission Below 30MHz



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: Christopher Martin

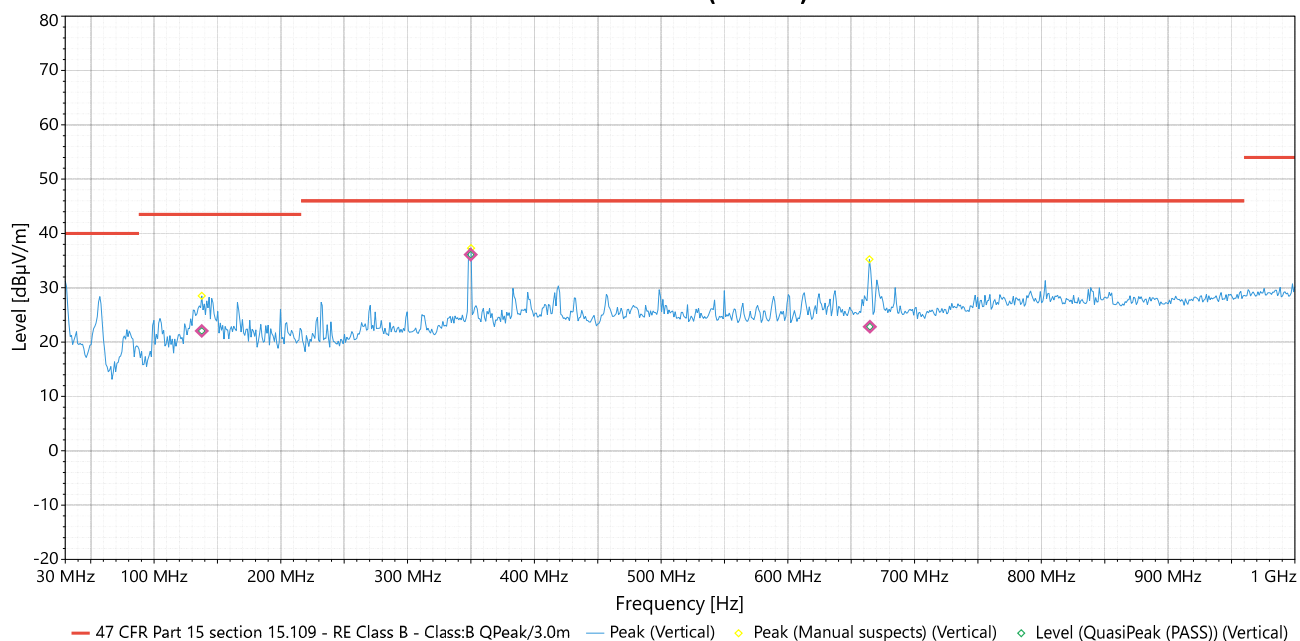
Test Date(s): 07/28/2022

Test Data

Radiated Emissions (30 MHz~1000 MHz)

EUT Test Condition		Measurement Detail	
Input Power	3.8Vdc	Frequency Range	30MHz-1GHz
Environmental Conditions	25 deg. C, 70% RH	Tested By	Alberto Saldivar
Test Mode	TX MODE 11B 2437 MHz		

#1 - 30MHz-1GHz (Vertical)



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	137.598	Vertical	22.056	43.5	-21.444	3.51	315	-14.34	Pass
2	349.836	Vertical	36.101	46	-9.899	1.65	325	-10.28	Pass
3	664.692	Vertical	22.841	46	-23.159	1.34	38	-4.91	Pass

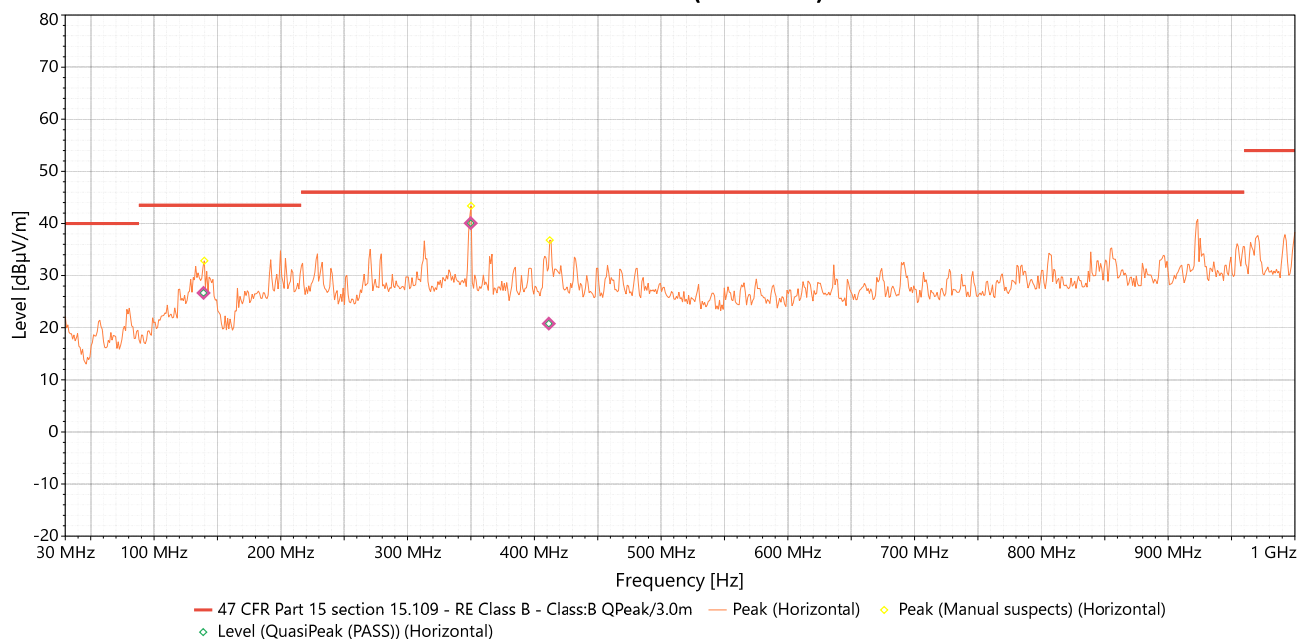
REMARKS:

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	3.8Vdc	Frequency Range	30MHz-1GHz
Environmental Conditions	25 deg. C, 70% RH	Tested By	Alberto Saldivar
Test Mode	TX MODE 11B 2437 MHz		

#2 - 30MHz-1GHz (Horizontal)



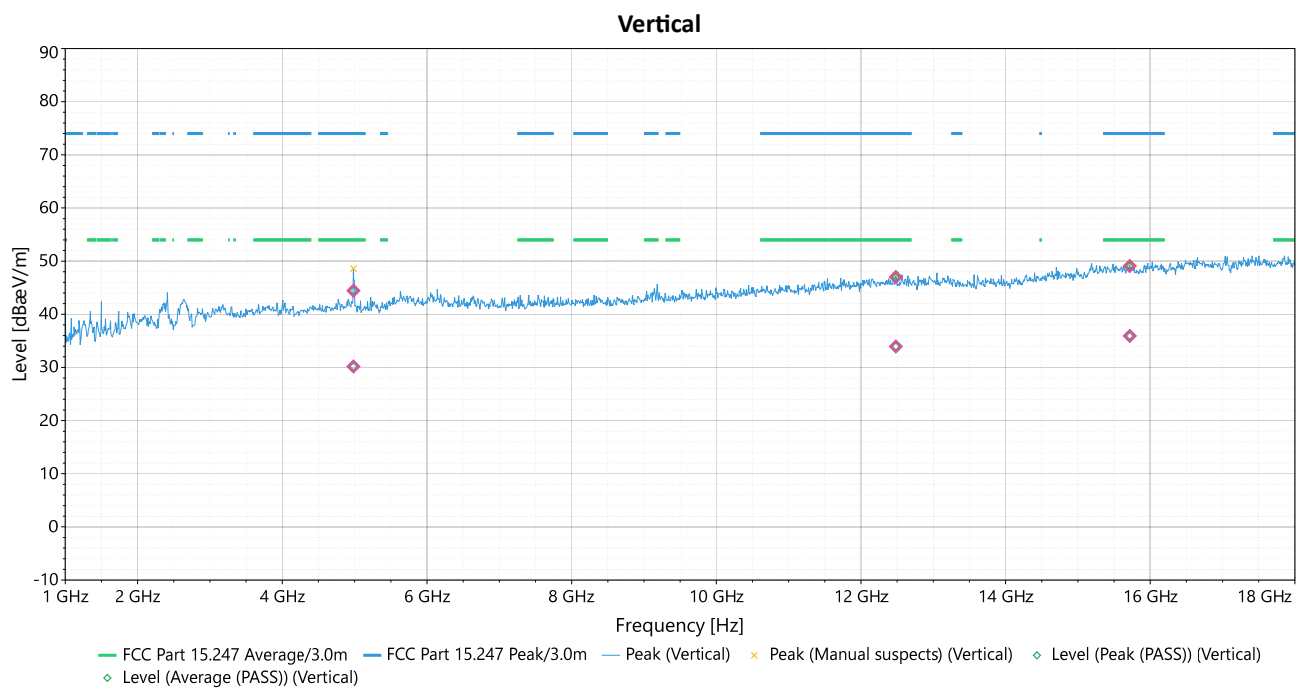
Antenna Polarity & Test Distance: Horizontal at 3m									
No.	Frequency (MHz)	Polarization	Level Peak[dB(uV/m)]	Limit Peak dB(uV/m)	Margin Peak [dB]	Height (cm)	Angle (Deg)	Factor [dB(1/m)]	Pass/Fail
1	139.034	Horizontal	26.678	43.5	-16.822	2.22	215	-14.8	Pass
2	349.848	Horizontal	40.063	46	-5.937	1	279	-9.88	Pass
3	411.448	Horizontal	20.779	46	-25.221	1.15	339	-7.98	Pass

REMARKS:

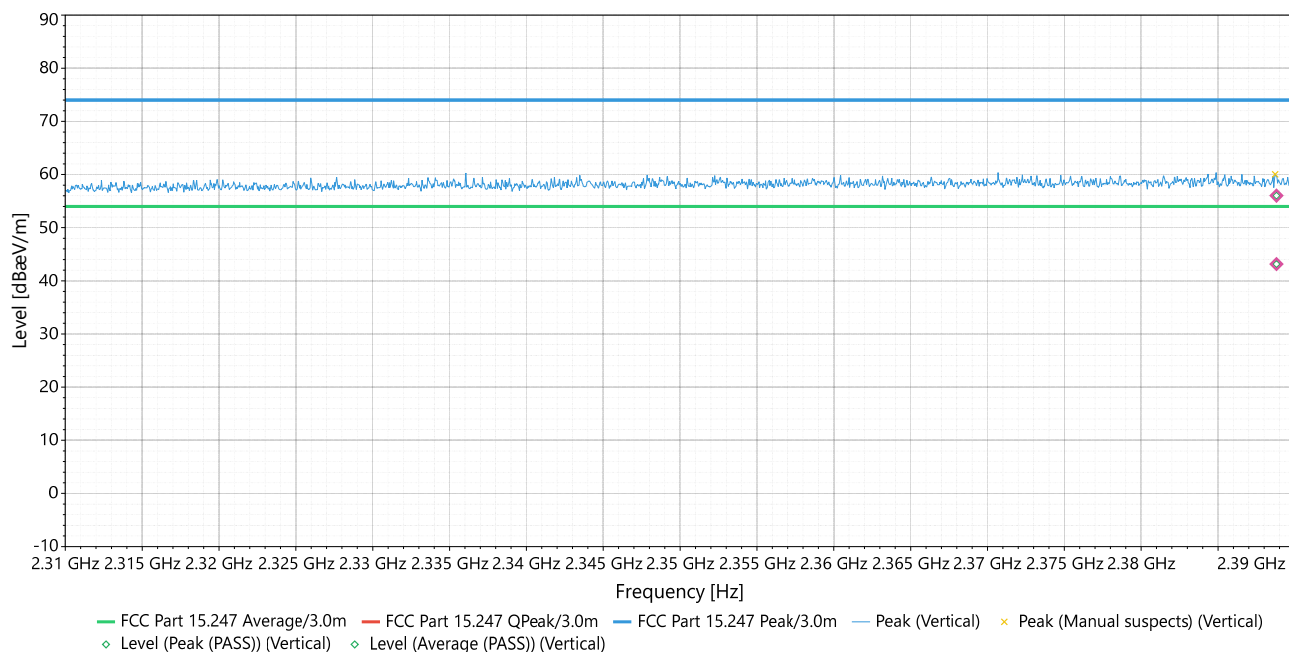
1. Level (dBuV) = Reading (dBuV) + Factor (dB(1/m)).
2. Factor (dB(1/m)) = Antenna Factor(AF) (dB(1/m)) + Cable Loss (dB) +Preamplifier
3. Margin value = Emission level – Limit value.
4. The emission levels of other frequencies were less than 20dB margin against the limit.

Radiated Emissions (Above 1GHz)

EUT Test Condition		Measurement Detail	
Input Power	3.8Vdc	Frequency Range	1GHz-26GHz
Environmental Conditions	25 deg. C, 70% RH	Tested By	Alberto Saldivar
Test Mode	TX MODE B 2412 MHz		



Vertical

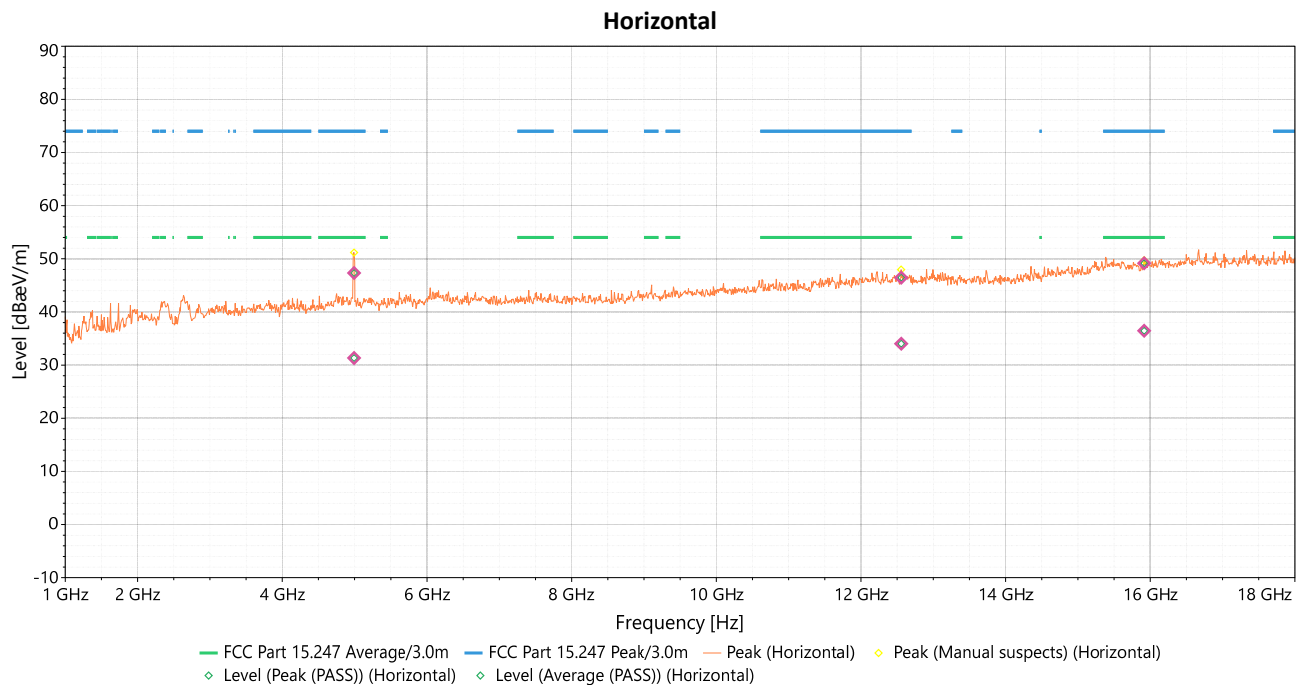


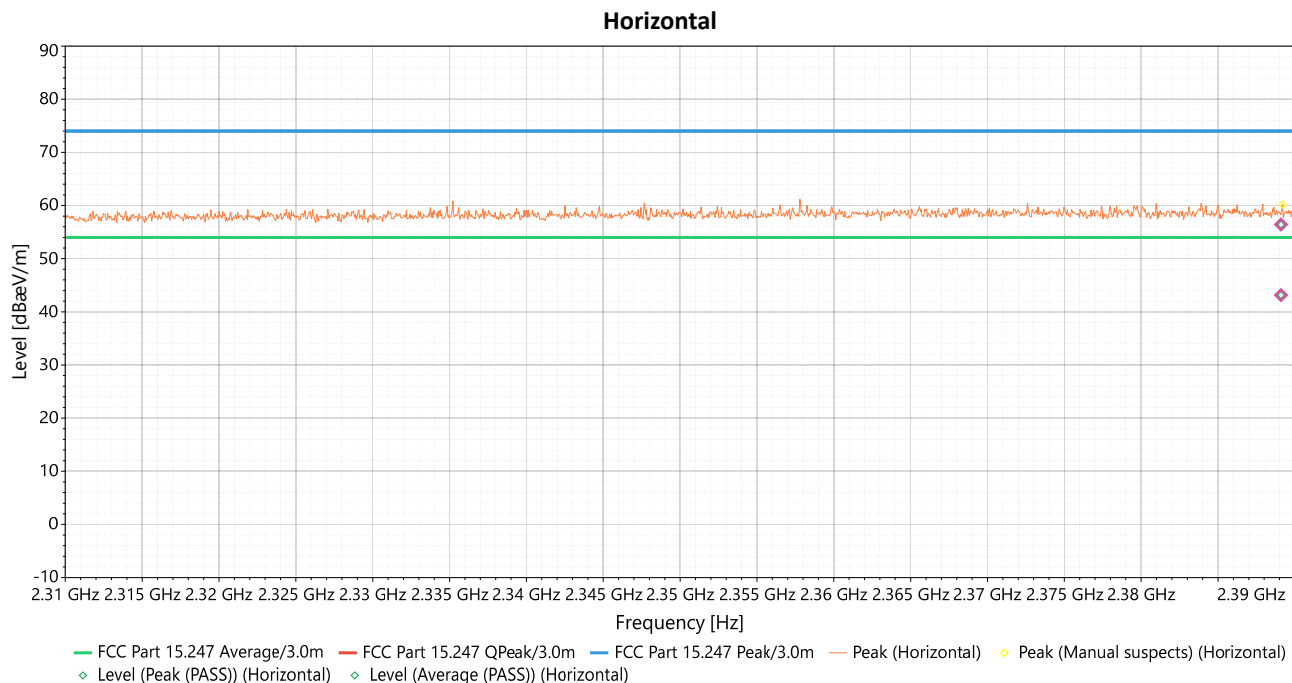
Antenna Polarity & Test Distance: Vertical at 3m									
No.	Frequency (MHz)	Polarization	Level Peak[dB(uV/m)]	Limit Peak dB(uV/m)	Margin Peak [dB]	Height (m)	Angle (Deg)	Factor [dB(1/m)]	Measure Type/ Result
1	4983.1	Vertical	44.437	74	-29.563	2.54	209	0.76	Peak (PASS)
2	4983.1	Vertical	30.174	54	-23.826	2.54	209	0.76	Average (PASS)
3	12483	Vertical	47.01	74	-26.99	1.36	99	3.83	Peak (PASS)
4	12483	Vertical	33.933	54	-20.067	1.36	99	3.83	Average (PASS)
5	15717	Vertical	49.089	74	-24.911	1.98	319	4.24	Peak (PASS)
6	15717	Vertical	35.931	54	-18.069	1.98	319	4.24	Average (PASS)
7	2388.8	Vertical	56.016	74	-17.984	2.09	43	35.82	Peak (PASS)
8	2388.8	Vertical	43.15	54	-10.85	2.09	43	35.82	Average (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	3.8Vdc	Frequency Range	1GHz-26GHz
Environmental Conditions	25 deg. C, 70% RH	Tested By	Alberto Saldivar
Test Mode	TX MODE B 2412 MHz		



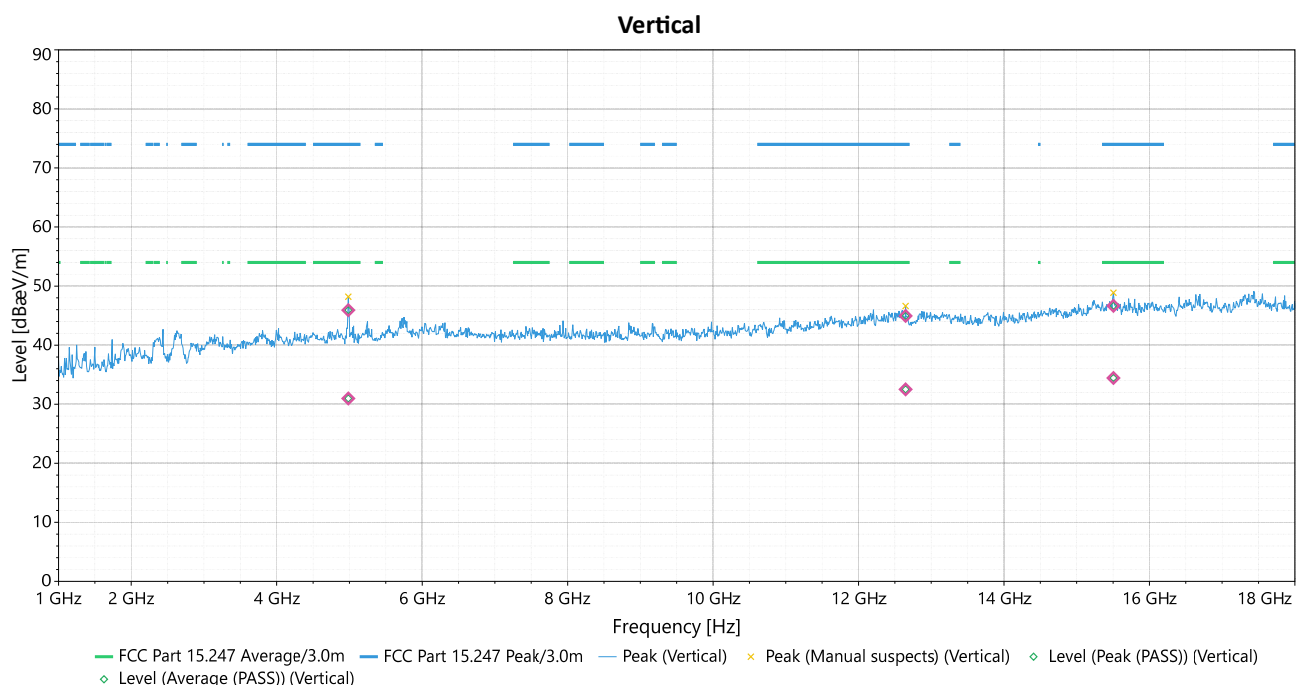


Antenna Polarity & Test Distance: Horizontal at 3m									
No.	Frequency (MHz)	Polarization	Level Peak[dB(uV/m)]	Limit Peak dB(uV/m)	Margin Peak [dB]	Height (m)	Angle (Deg)	Factor [dB(1/m)]	Measure Type/ Result
1	4991.6	Horizontal	47.337	74	-26.663	2.18	242	1.32	Peak (PASS)
2	4991.6	Horizontal	31.331	54	-22.669	2.18	242	1.32	Average (PASS)
3	12557	Horizontal	46.454	74	-27.546	3.05	115	3.92	Peak (PASS)
4	12557	Horizontal	34.031	54	-19.969	3.05	115	3.92	Average (PASS)
5	15916	Horizontal	49.177	74	-24.823	1.91	355	4.63	Peak (PASS)
6	15916	Horizontal	36.453	54	-17.547	1.91	355	4.63	Average (PASS)
7	2389.1	Horizontal	56.418	74	-17.582	1.95	348	35.86	Peak (PASS)
8	2389.1	Horizontal	43.153	54	-10.847	1.95	348	35.86	Average (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.

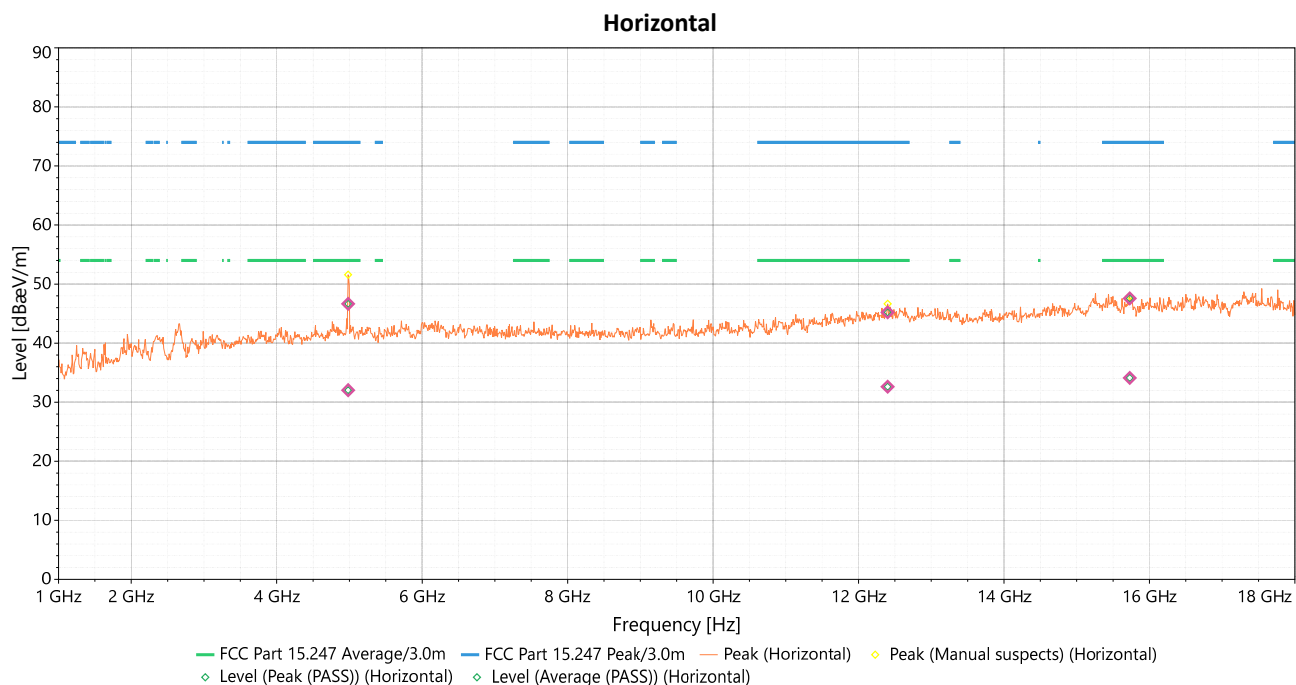
EUT Test Condition		Measurement Detail	
Input Power	3.8Vdc	Frequency Range	1GHz-26GHz
Environmental Conditions	25 deg. C, 70% RH	Tested By	Alberto Saldivar
Test Mode	TX MODE 11 B 2437 MHz		



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 (m)	Angle (Deg)	Factor [dB(1/m)]	Measure Type/ Result
1	4984.8	Vertical	45.918	74	-28.082	1.26	205	0.76	Peak (PASS)
2	4984.8	Vertical	30.957	54	-23.043	1.26	205	0.76	Average (PASS)
3	12648	Vertical	44.957	74	-29.043	1.92	240	3.83	Peak (PASS)
4	12648	Vertical	32.516	54	-21.484	1.92	240	3.83	Average (PASS)
5	15506	Vertical	46.647	74	-27.353	2.72	97	4.36	Peak (PASS)
6	15506	Vertical	34.451	54	-19.549	2.72	97	4.36	Average (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	3.8Vdc	Frequency Range	1GHz-26GHz
Environmental Conditions	25 deg. C, 70% RH	Tested By	Alberto Saldivar
Test Mode	TX MODE 11B 2437 MHz		

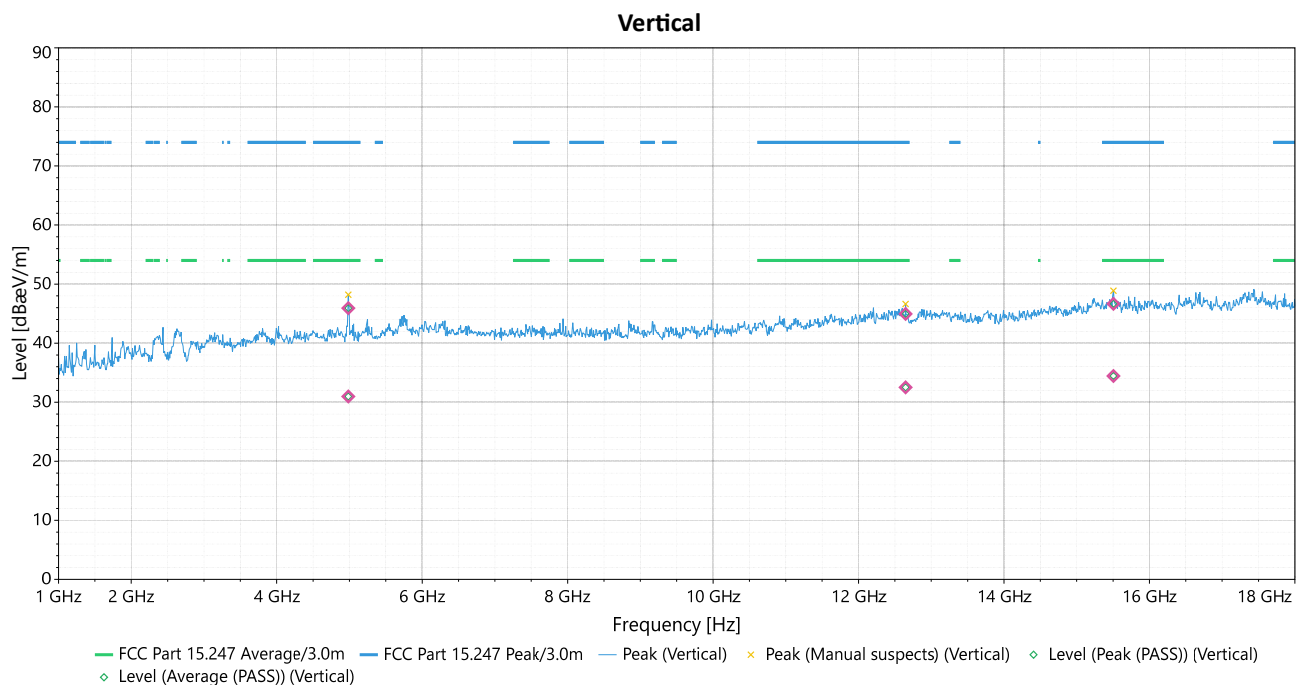


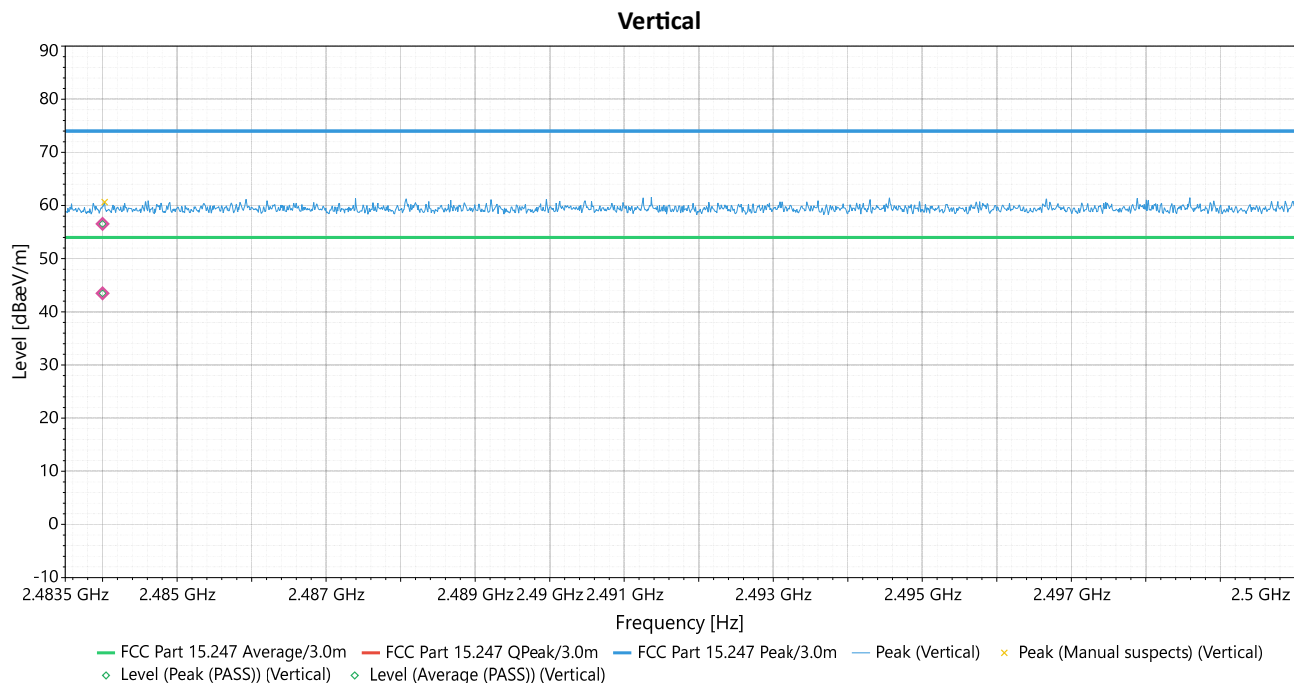
Antenna Polarity & Test Distance: Horizontal at 3m									
No.	Frequency (MHz)	Polarization	Level Peak[dB(uV/m)]	Limit Peak dB(uV/m)	Margin Peak [dB]	Height (cm)	Angle (Deg)	Factor [dB(1/m)]	Measure Type/ Result
1	4981.4	Horizontal	46.648	74	-27.352	1.8	271	1.33	Peak (PASS)
2	4981.4	Horizontal	32.04	54	-21.96	1.8	271	1.33	Average (PASS)
3	12400	Horizontal	45.229	74	-28.771	1.67	313	3.9	Peak (PASS)
4	12400	Horizontal	32.619	54	-21.381	1.67	313	3.9	Average (PASS)
5	15729	Horizontal	47.584	74	-26.416	2.99	258	4.35	Peak (PASS)
6	15729	Horizontal	34.12	54	-19.88	2.99	258	4.35	Average (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	3.8Vdc	Frequency Range	1GHz-26GHz
Environmental Conditions	25 deg. C, 70% RH	Tested By	Alberto Saldivar
Test Mode	TX MODE 11B 2462 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 (m)	Angle (Deg)	Factor [dB(1/m)]	Measure Type/ Result
1	4989.9	Vertical	46.891	74	-27.109	2.7	210	0.76	Peak (PASS)
2	4989.9	Vertical	29.981	54	-24.019	2.7	210	0.76	Average (PASS)
3	15472	Vertical	49.856	74	-24.144	1.28	210	4.35	Peak (PASS)
4	15472	Vertical	36.724	54	-17.276	1.28	210	4.35	Average (PASS)
5	2484	Vertical	56.538	74	-17.462	1.61	329	36.21	Peak (PASS)
6	2484	Vertical	43.473	54	-10.527	1.61	329	36.21	Average (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	3.8Vdc	Frequency Range	1GHz-26GHz
Environmental Conditions	25 deg. C, 70% RH	Tested By	Alberto Saldivar
Test Mode	TX MODE 11B 2462 MHz		

