

December 20, 2022

Establishment Labs
Coyol Free Zone
Building B15 and B25
4th Street Alajuela
Costa Rica 20113

Dear Mauricio Avila Sanchez,

Enclosed is the Wireless test report for compliance testing of the Roku, Inc., Motiva Flora® Port Locator as tested to the requirements of 47 CFR FCC Part 15, Subpart C (Section 15.209), 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: WIR123500_ESTA_FCC



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FCC Test Report

Applicant name: Establishment Labs

Product: Motiva Flora ® Port Locator

Report: WIR123500_ESTA_FCC

Applicant Address:

**Coyol Free Zone, Building B15 and B25, 4th Street Alajuela
Costa Rica 20113**

Manufacturer Address:

**Coyol Free Zone, Building B15 and B25, 4th Street Alajuela
Costa Rica 20113**

Prepared By:
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FCC Test Report

Applicant name: Establishment Labs

Product: Motiva Flora ® Port Locator

Standard

**47 CFR FCC Part 15, Subpart C (Section 15.207/15.209)
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

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Release Control Record

Issue No.	Description	Date Issued
WIR123500_ESTA_FCC	Initial Release	12/20/2022

1 Summary of Test Results

47 CFR FCC Part 15, Subpart C (15.207/15.209)			
FCC IC Clause	Test Item	Result	Remarks
15.207	AC Power Conducted Emission	N/A	DC Powered, not applicable
15.215	Occupied Bandwidth	Pass	Meet the requirement of limit.
15.209	Transmitter Radiated Emission	Pass	Meet the requirement of limit.
15.203	Antenna Requirement	Pass	Meet the requirements

1.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

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%

1.2 Modification Record

There were no modifications required for compliance.

2 General Information

2.1 General Description of EUT

Product	Motiva Flora ® Port Locator
Brand	Establishment Labs
Test Model	MFPL-001
FCC ID	2A9RPMFPL001
Status of EUT	Engineering sample
Power Supply Rating	3.7 V DC (Internal Battery)
Modulation Type	ASK
Operating Frequency	135 KHz
Antenna Type	Loop Antenna
Antenna Connector	N/A

Note:

1. The above EUT information is declared by manufacturer and for more detailed features description, please refers to the manufacturer's specifications or user's manual.

2.2 Description of Test Modes

2.2.1 1 channel is provided to this EUT

Channel	Freq. (MHz)
1	0.135

2.3 Description of Support Units

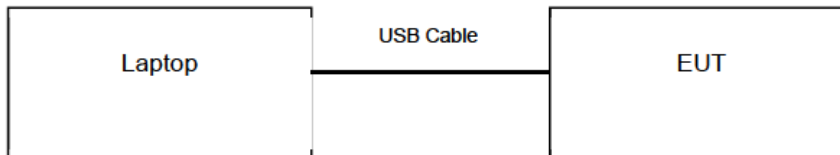
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	-	-	-	LR-16MAW	-	-
B.						

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	USB cable	1	0.8	N	0	Provided by Customer

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

2.3.1 Configuration of System under Test



2.4 General Description of Applied Standards

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 15.207)
47 CFR FCC Part 15, Subpart C (Section 15.209)
ANSI C63.10:2013

All test items have been performed and recorded as per the above standards.

3 Test Types and Results

3.1 Radiated Emission Measurement

3.1.1 Limits of Radiated Emission Measurement

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

NOTE:

- The lower limit shall apply at the transition frequencies.
- Distance extrapolation factor = $40 \log (\text{specific distance} / \text{test distance})$
Limit Line (dBuV/m) = $20 \log \text{Emission level (uV/m)} + \text{Distance extrapolation factor}$
- For frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

3.1.2 Test Instruments

Asset #	Equipment	Manufacturer	Model	Last Cal Date	Cal Due Date
1S2003	EMI Test Receiver	Keysight	N9030B	11/01/2022	11/01/2023
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
1S3983	Loop Antenna	ETS-LINDGREN	6512	10/ 14 /2021	10/ 14 /2023
1S2668	Preamplifier	Sonoma Instrument	310N	Note 1	Note 1
1S2600	Antenna	TESEQ GmbH	D-12623	05/ 11/ 2021	05/ 11/ 2023

Note 1: Verified by calibrated instrumentation at the time of testing

3.1.3 Test Procedures

For Radiated emission below 30MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. Parallel, perpendicular, and ground-parallel orientations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9 kHz at frequency below 30MHz.

For Radiated emission above 30MHz

- a. The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. The test-receiver system was set to peak and average detects function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

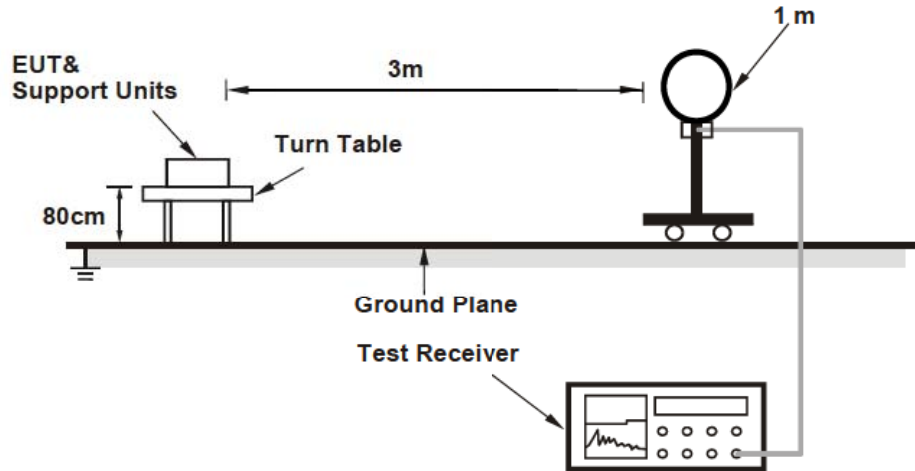
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is $\geq 1/T$ (Duty cycle < 98%) or 10Hz (Duty cycle $\geq 98\%$) for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

3.1.4 Deviation from Test Standard

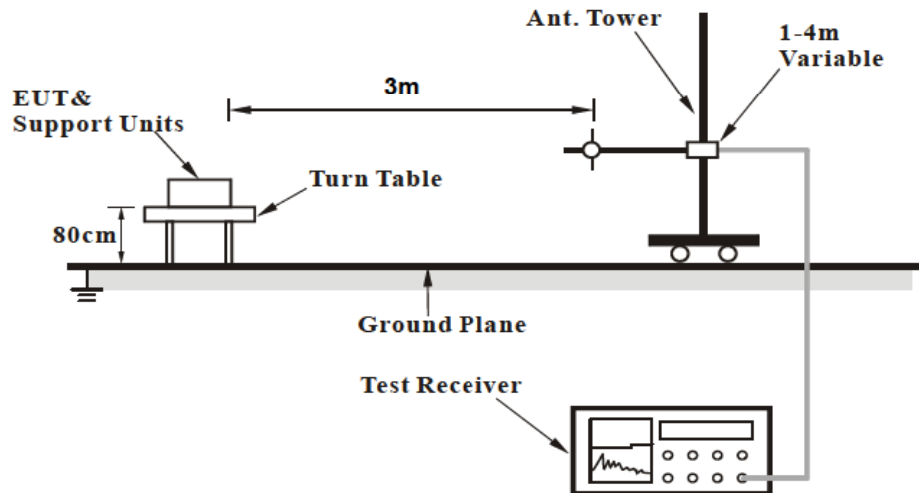
No deviation.

3.1.5 Test Setup

For Radiated emission below 30MHz



For Radiated emission 30MHz to 1GHz



3.1.6 EUT Operating Conditions

- Connected the EUT with the Notebook Computer which is placed on remote site.
- Controlling software has been activated to set the EUT on specific status.

3.1.7 Test Results

Radiated Emissions (9 kHz~30 MHz)

EUT Test Condition		Measurement Detail	
Frequency	135KHz	Frequency Range	9 kHz~30 MHz
Input Power	3.7 V DC (Internal Battery)		
Environmental Conditions	25 deg. C, 70% RH	Tested By	Christopher Martin

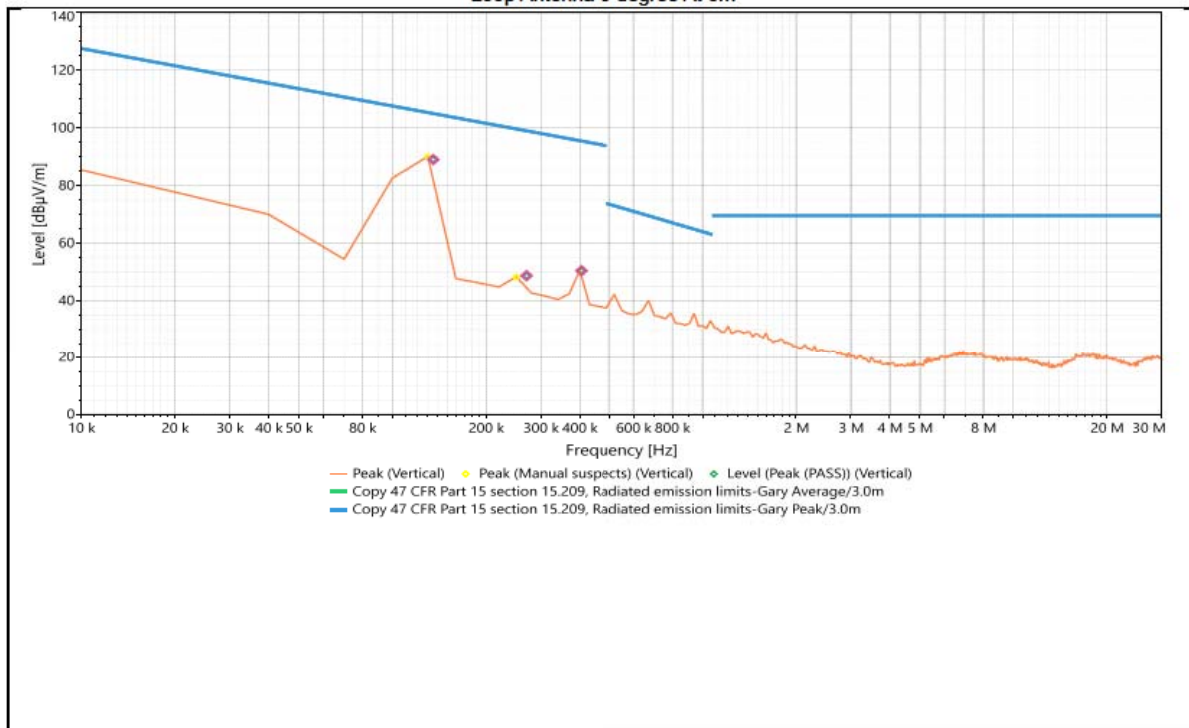
Antenna Polarity & Test Distance: Loop Antenna 0/90 worst degree At 3m											
No.	Frequency (MHz)	Level PK [dB(uV/m)]	LevelAV dB(uV/m)	LimitPK dB(uV/m)	LimitAV dB(uV/m)	Margin PK [dB]	Margin AV [dB]	Height (cm)	Angle (Deg)	Factor [dB(1/m)]	Pass/Fail
1	0.135	88.01	83.32	105.332	85.332	-17.322	-2.012	1	360	32.93	Pass
2	0.26972	48.667	46.22	98.665	78.665	-49.998	-32.445	1	22	26.77	Pass
3	0.40527	50.403	48.31	95.566	75.566	-45.163	-27.256	1	0	23.51	Pass

Antenna Polarity & Test Distance: 0/90 worst degree 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)]	Pass/Fail
1	3.85473	Vertical	4.472	69.54	-65.068	1	304	6.49	Pass

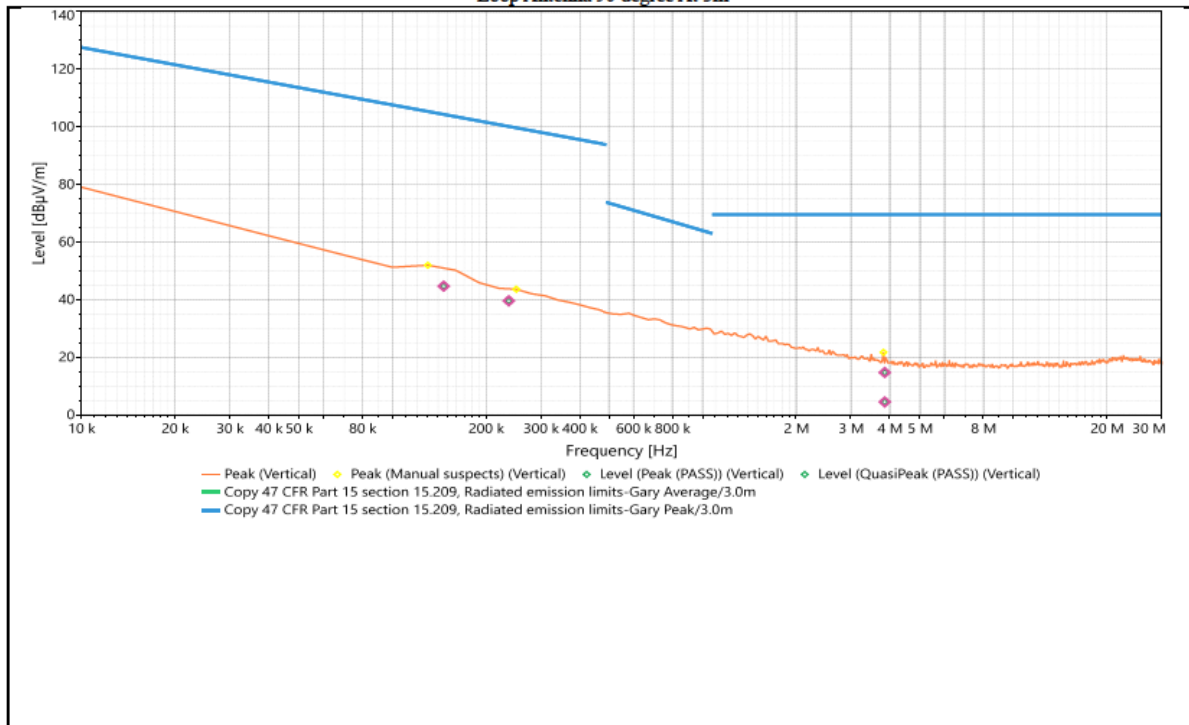
REMARKS:

1. Level (dBuV) = Reading (dBuV) + Factor (dB(1/m)).
2. Factor (dB(1/m)) = Antenna Factor(AF) (dB(1/m)) + Cable Loss (dB)
3. Margin value = Emission level – Limit value.
4. The emission levels of other frequencies were less than 20dB margin against the limit.
5. The emission limits for the ranges 9-90 kHz and 110-490 kHz are based on measurements employing a linear average detector.

Loop Antenna 0 degree At 3m



Loop Antenna 90 degree At 3m



Radiated Emissions (30 MHz~1000 MHz)

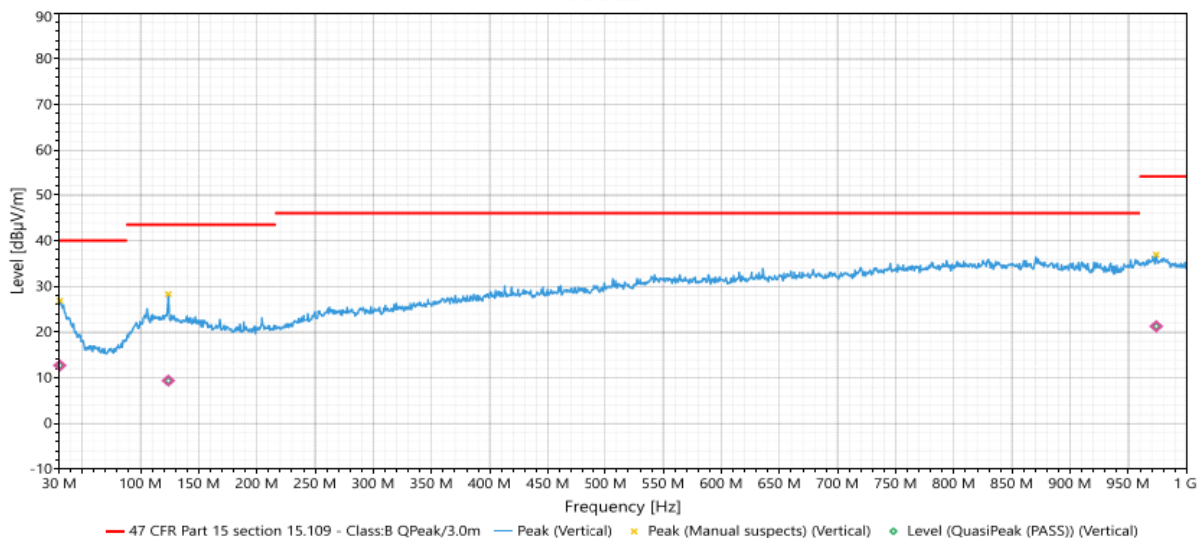
Frequency Range	30-1000 MHz		
Input Power	3.7 V DC (Internal Battery)	Environmental Conditions	20 °C, 45% RH
Tested by	Christopher Martin	Test Date	11/10/2022

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	30.73	Vertical	12.693	40	-27.307	3.39	68	-9.13	Pass
2	123.95	Vertical	9.382	40	-30.618	2.53	123	-12.27	Pass
3	974.05	Vertical	21.274	47	-25.726	2.91	206	1.2	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)
3. Margin = Limit value(dBuV/m) - Level (dBuV/m)

Vertical

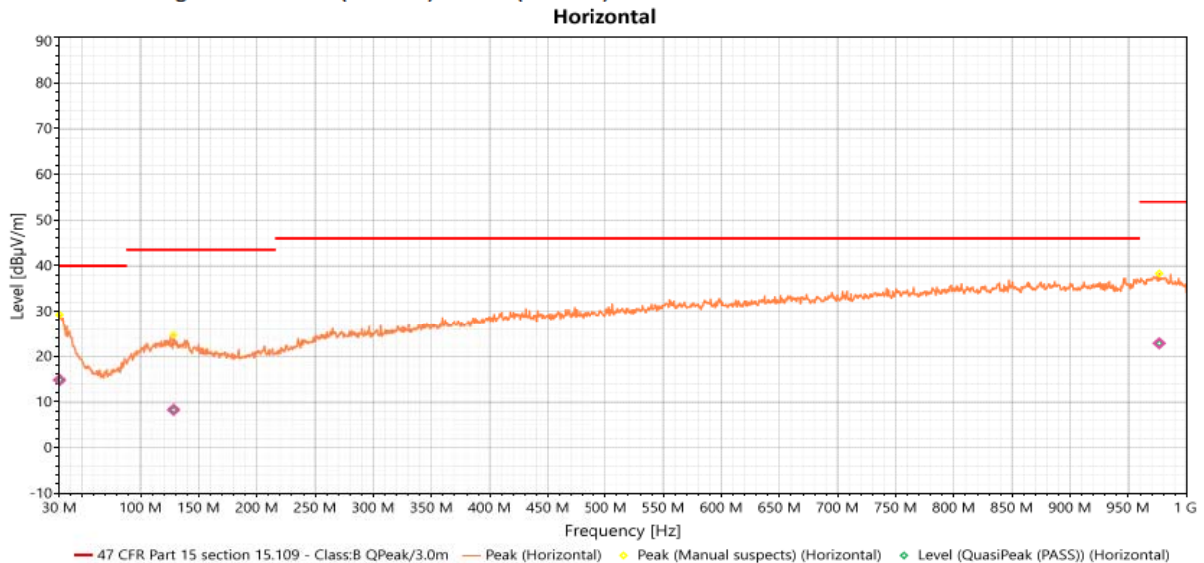


Frequency Range	30-1000 MHz		
Input Power	3.7 V DC (Internal Battery)	Environmental Conditions	20 °C, 45% RH
Tested by	Christopher Martin	Test Date	11/10/2022

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	30.488	Horizontal	14.823	40	-25.177	3.33	119	-6.8	Pass
2	128.45	Horizontal	8.29	43.5	-28.21	1.96	137	-12.95	Pass
3	976.61	Horizontal	22.825	54	-17.175	2.76	5	2.78	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)
3. Margin = Limit value(dBuV/m) - Level (dBuV/m)



3.2 Occupied Bandwidth

3.2.1 Test Instruments

Asset #	Equipment	Manufacturer	Model	Last Cal Date	Cal Due Date
1S2003	EMI Test Receiver	Keysight	N9030B	11/01/2022	11/01/2023
1S3983	Loop Antenna	ETS-LINDGREN	6512	10/ 14 /2021	10/ 14 /2023

Note 1: Verified by calibrated instrumentation at the time of testing

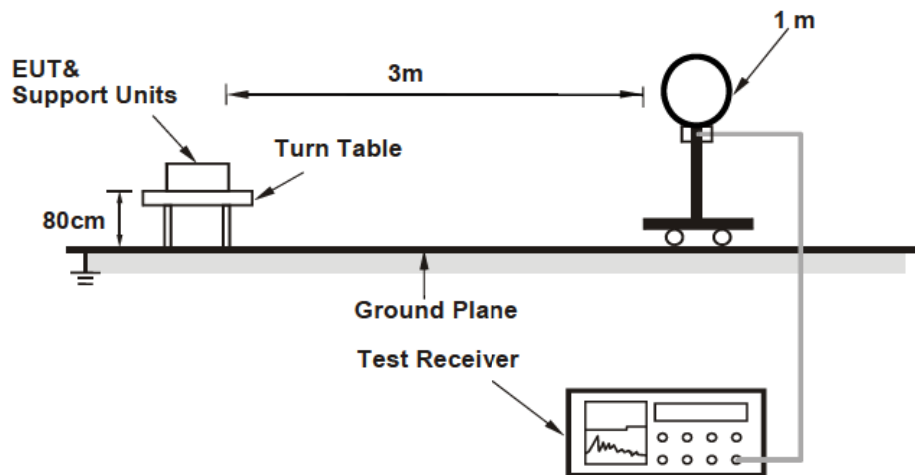
3.2.2 Test Procedures

Refer to ANSI C63.10 Section 6.9.3

Note:

Because the measured signal is CW adjusting the RBW per C63.10 would not be practical since measured bandwidth will always follow the RBW and the result will be approximately twice the RBW.

3.2.3 Test Setup



3.2.4 EUT Operating Conditions

a.Connected the EUT with the Notebook Computer which is placed on remote site.

3.2.5 Test Results

Frequency (KHz)	99% Bandwidth (KHz)	Limit (KHz)	Pass / Fail
135	2.151	/	PASS

Test Plots:



135KHz

3.3 Conducted Emission Measurement

3.3.1 Limits of Conducted Emission Measurement

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.

3.3.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Date Of Calibration	Due Date Of Calibration
-	-	-	-	-

3.3.3 Test Procedures

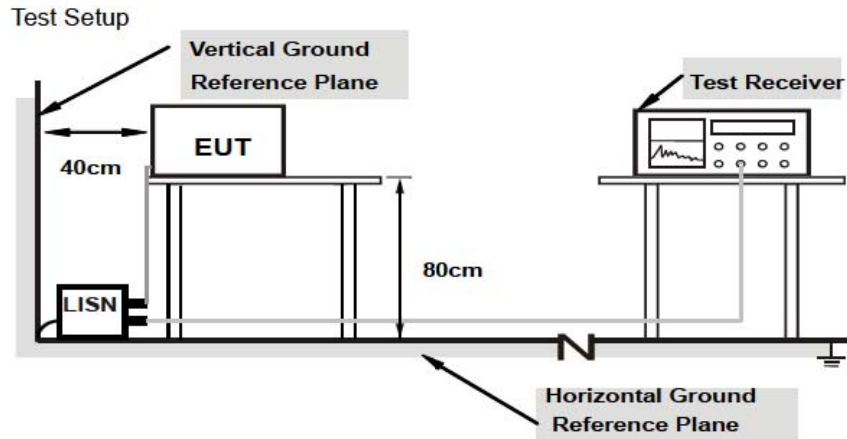
- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling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

NOTE: The resolution bandwidth and video bandwidth of test receiver is 9 kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15MHz-30MHz.

3.3.4 Deviation from Test Standard

No deviation.

3.3.5



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

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

3.3.6 EUT Operating Conditions

Same as 4.1.6.

3.3.7 Test Results

N/A

4 Pictures of Test Arrangements

Please see setup photo file.

--- END ---