

TEST REPORT

Report Number. : R14956064-E7

Applicant : WHOOP, Inc.
1 Kenmore Square Ste 601
Boston, Massachusetts 02215, United States

Model : WS50

FCC ID : 2AJ2X-WS50

IC : 22056-WS50

EUT Description : Sensor Device

Test Standard(s) : FCC 47 CFR PART 15 SUBPART C: 2024
ISED RSS-210 ISSUE 11: 2024
ISED RSS-GEN ISSUE 5 + A1 + A2: 2021

Date Of Issue:
2025-02-24

Prepared by:
UL LLC
12 Laboratory Dr.
Research Triangle Park, NC 27709 U.S.A.
TEL: (919) 549-1400



Revision History

Rev.	Issue Date	Revisions	Revised By
V1	2024-07-17	Initial Issue	Charles Moody
V2	2025-02-10	Added Summary of Test Results Section 2 to Report	Charles Moody
V3	2025-02-14	Revised Table in Section 6.2	Charles Moody
V4	2025-02-24	Updated ISED RSS 210 Issue	Charles Moody

TABLE OF CONTENTS

1. ATTESTATION OF TEST RESULTS	4
2. SUMMARY OF TEST RESULTS.....	5
3. TEST METHODOLOGY	5
4. FACILITIES AND ACCREDITATION	5
5. DECISION RULES AND MEASUREMENT UNCERTAINTY	6
5.1. METROLOGICAL TRACEABILITY	6
5.2. DECISION RULES.....	6
5.3. MEASUREMENT UNCERTAINTY.....	6
5.4. SAMPLE CALCULATION	6
6. EQUIPMENT UNDER TEST	7
6.1. DESCRIPTION OF EUT	7
6.2. MAXIMUM ELECTRIC FIELD STRENGTH.....	7
6.3. SOFTWARE AND FIRMWARE.....	7
6.4. WORST-CASE CONFIGURATION AND MODE.....	7
6.5. DESCRIPTION OF TEST SETUP.....	8
7. TEST AND MEASUREMENT EQUIPMENT	9
8. OCCUPIED BANDWIDTH AND 20dB BANDWIDTH	10
9. RADIATED EMISSION TEST RESULTS.....	12
9.1. LIMITS AND PROCEDURE.....	12
9.2. FUNDAMENTAL AND SPURIOUS EMISSIONS (0.009 – 30MHz)	14
9.2.1. FUNDAMENTAL RESULTS.....	14
9.2.1.1. TAG ON	14
9.2.1.2. TAG OFF	17
9.2.2. SPURIOUS EMISSIONS RESULTS	20
9.2.2.1. TAG ON	20
9.2.2.2. TAG OFF	22
9.3. TX SPURIOUS EMISSION 30 TO 1000 MHz	24
9.3.1. Tag On.....	24
9.3.2. Tag Off.....	26
10. FREQUENCY STABILITY.....	28
10.1. Battery.....	29
11. SETUP PHOTOS	30

1. ATTESTATION OF TEST RESULTS

COMPANY NAME: WHOOP, Inc.
1 Kenmore Square St 601
Boston, Massachusetts 02215, United States

EUT DESCRIPTION: Sensor Device

MODEL: WS50

SERIAL NUMBER: 5AMD002134, 5AMD001836

SAMPLE RECEIPT DATE: 2024-06-17

DATE TESTED: 2024-06-19 TO 2024-06-21

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
FCC PART 15 SUBPART C : 2024	Complies
ISED RSS-210 Issue 11: 2024	Complies
ISED RSS-GEN Issue 5 + A1 +A2: 2021	Complies

UL LLC tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. All samples tested were in good operating condition throughout the entire test program. Measurement Uncertainties are published for informational purposes only and were not taken into account unless noted otherwise.

This document may not be altered or revised in any way unless done so by UL LLC and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL LLC will constitute fraud and shall nullify the document.

Approved & Released For
UL LLC Inc. By:

Prepared By:



Michael Antola
Staff Engineer
Consumer, Medical and IT Segment
UL LLC



Charles Moody
Engineer
Consumer, Medical and IT Segment
UL LLC

2. SUMMARY OF TEST RESULTS

FCC Clause	ISED Clause	Requirement	Result	Comment
15.209, 15.205, 15.225	RSS-216 5.3.3	Radiated Emissions	Compliant	None
15.215	RSS-GEN 6.7	Emissions Bandwidth	For Reporting Purposes only.	None.
15.207	RSS-216 5.3.2	AC Mains Conducted Emissions	NOT Performed	Eut is battery powered and charged only through WPT
15.225(e)	N/A	Frequency Tolerance	Compliant.	None

Note 1: AC Mains scans were performed while the EUT was charging a load, as well as operating as intended while terminated into a dummy load.

3. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10-2020, FCC CFR 47 Part 2, FCC CFR 47 Part 15, RSS-GEN Issue 5 + A1 + A2, and RSS-210 Issue 11.

4. FACILITIES AND ACCREDITATION

UL LLC is accredited by A2LA, Certificate Number 0751.06, for all testing performed within the scope of this report. Testing was performed at the locations noted below.

	Address	ISED CABID	ISED Company Number	FCC Registration
☐	Building: 12 Laboratory Dr RTP, NC 27709, U.S.A	US0067	2180C	825374
☒	Building: 2800 Perimeter Park Dr. Suite B Morrisville, NC 27560, U.S.A		27265	

5. DECISION RULES AND MEASUREMENT UNCERTAINTY

5.1. METROLOGICAL TRACEABILITY

All test and measuring equipment utilized to perform the tests documented in this report are calibrated on a regular basis, with a maximum time between calibrations of one year or the manufacturers' recommendation, whichever is less, and where applicable is traceable to recognized national standards.

5.2. DECISION RULES

The Decision Rule is based on Simple Acceptance in accordance with ISO Guide 98-4:2012 Clause 8.2. (Measurement uncertainty is not taken into account when stating conformity with a specified requirement.)

5.3. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

PARAMETER	UNCERTAINTY
Radio Frequency (Spectrum Analyzer)	141.2 Hz
Occupied Channel Bandwidth	1.22%
All emissions, radiated	6.01 dB
Conducted Emissions (0.150-30MHz) - LISN	3.40 dB
Temperature	0.57°C
Humidity	3.39%
DC Supply voltages	1.70%
Time	3.39%

Uncertainty figures are valid to a confidence level of 95%.

5.4. SAMPLE CALCULATION

RADIATED EMISSIONS

Where relevant, the following sample calculation is provided:

Field Strength (dBuV/m) = Measured Voltage (dBuV) + Antenna Factor (dB/m) + Cable Loss (dB) – Preamp Gain (dB)
 $36.5 \text{ dBuV} + 18.7 \text{ dB/m} + 0.6 \text{ dB} - 26.9 \text{ dB} = 28.9 \text{ dBuV/m}$

MAINS CONDUCTED EMISSIONS

Where relevant, the following sample calculation is provided:

Final Voltage (dBuV) = Measured Voltage (dBuV) + Cable Loss (dB) + Limiter Factor (dB) + LISN Insertion Loss.
 $36.5 \text{ dBuV} + 0 \text{ dB} + 10.1 \text{ dB} + 0 \text{ dB} = 46.6 \text{ dBuV}$

6. EQUIPMENT UNDER TEST

6.1. DESCRIPTION OF EUT

The EUT is a wearable sensor device that contains a BLE and NFC radio. This report covers the full emissions testing of the NFC radio.

6.2. MAXIMUM ELECTRIC FIELD STRENGTH

The transmitter has maximum peak radiated electric and magnetic field strength as follows:

Fundamental Frequency (MHz)	Mode	E field (30m distance) FCC (dBuV/m)
13.56	Worst Case Tag Configuration	1.86

6.3. SOFTWARE AND FIRMWARE

The test utility software used during testing was 50.19.0.130000256.

6.4. WORST-CASE CONFIGURATION AND MODE

The fundamental of the EUT was investigated under three orthogonal orientations X, Y and Z. The Y orientation was determined to be the worst-case orientation.

The EUT only operates as Type A with a data rate of 106 kbps.

Although these tests were performed other than open area test site, adequate comparison measurements were confirmed against 30 m open are test site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788

99% BW, 20dB BW, and frequency stability were performed in the worst-case tag configuration.

To remain compliant with Tx Spurious Emissions limit from 30-1000MHz, the power of the NFC radio had to be reduced to 80%.

6.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
Laptop	Dell	Latitude 7320	FPC60F3	-
Laptop	Dell	P112F	N/A	N/A

I/O CABLES

I/O Cable List						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length (m)	Remarks
None						

SETUP DIAGRAM

Please refer to R14956064-EP2 for setup diagrams

7. TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

Test Equipment Used - Radiated Disturbance Emissions Test Equipment (Morrisville – Chamber 4)

Equip. ID	Description	Manufacturer/Brand	Model Number	Last Cal.	Next Cal.
	0.009-30MHz				
135144	Active Loop Antenna	ETS-Lindgren	6502	2024-01-24	2025-01-24
	30-1000 MHz				
90628	Hybrid Broadband Antenna	Sunol Sciences Corp.	JB3	2024-01-02	2026-01-02
	Gain-Loss Chains				
207638	Gain-loss string: 0.009-30MHz	Various	Various	2024-05-22	2025-05-22
207639	Gain-loss string: 25-1000MHz	Various	Various	2024-05-22	2025-05-22
	Receiver & Software				
197955	Spectrum Analyzer	Rohde & Schwarz	ESW44	2024-04-16	2025-04-16
SOFTEMI	EMI Software	UL	Version 9.5 (18 Oct 2021)		
	Additional Equipment used				
241204	Environmental Meter	Fisher Scientific	15-077-963	2023-09-05	2025-09-05

Test Equipment Used - Wireless Conducted Measurement Equipment

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
	Common Equipment				
	Conducted Room 2				
90416	Spectrum Analyzer	Keysight Technologies	N9030A	2023-06-09	2024-06-30
76023	Temp/Humid Chamber	Cincinnati Sub-Zero	ZPH-8-3.5-SCT/AC	2024-01-12	2025-01-12
238710	Environmental Meter	Fisher Scientific	15-077-963	2023-06-27	2024-06-27
76021	DC Regulated Power Supply	CircuitSpecialists.Com	CSI3005X5	NA	NA
SOFTEMI	Antenna Port Software	UL	Version 2022.8.16	NA	NA
	Additional Equipment used				
-	Near Field Probe Kit	EMC Test Systems	7405	-	-

8. OCCUPIED BANDWIDTH AND 20dB BANDWIDTH

LIMITS

None; for reporting purposes only.

RSS-Gen Issue 5+A1+A2: 2021 Section 6.7

20dB Bandwidth: §15.215 (c) Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

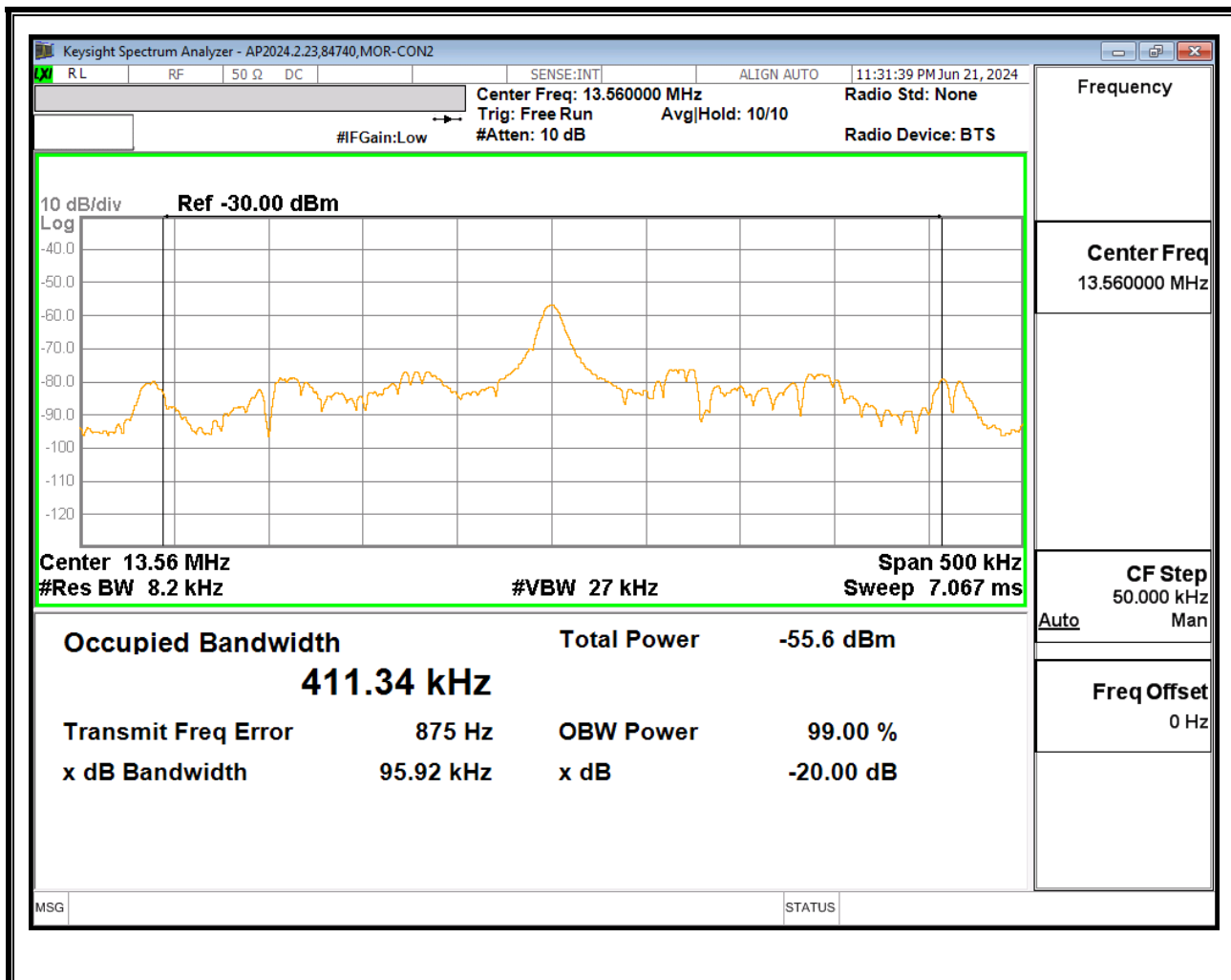
TEST PROCEDURE

The transmitter output is connected to the spectrum analyzer. The RBW is set to 1-5% of the OBW. The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

RESULTS

99% and 20dB BW

Frequency (MHz)	99% Bandwidth (KHz)	20dB Bandwidth (KHz)
13.56	411.34	95.92



9. RADIATED EMISSION TEST RESULTS

9.1. LIMITS AND PROCEDURE

LIMIT

§15.225

IC RSS-210, Annex B.6

IC RSS-GEN, Section 8.9 (Transmitter)

(a) The field strength of any emissions within the band 13.553–13.567 MHz shall not exceed 15,848 microvolts/ meter at 30 meters.

(b) Within the bands 13.410–13.553 MHz and 13.567–13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.

(c) Within the bands 13.110–13.410 MHz and 13.710–14.010 MHz the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.

(d) The field strength of any emissions appearing outside of the 13.110– 14.010 MHz and shall not exceed the general radiated emission limits in § 15.209 as follows:

§15.209 (a) Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Limits for radiated disturbance of an intentional radiator		
Frequency range (MHz)	Limits (µV/m)	Measurement Distance (m)
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

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g. §§ 15.231 and 15.241.

§15.209 (b) In the emission table above, the tighter limit applies at the band edges.

Formula for converting the field strength from µV/m to dBµV/m is:

Limit (dBµV/m) = 20 log limit (µV/m)

In addition:

§15.209 (d) The emission limits shown 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 emissions limits in these three bands are based on measurements employing an average detector.

§15.209 (d) The provisions in §§ 15.225, measuring emissions at distances other than the distances specified in the above table, determining the frequency range over which radiated emissions are to be measured, and limiting peak emissions apply to all devices operated under this part.

TEST PROCEDURE

ANSI C63.10, 2020

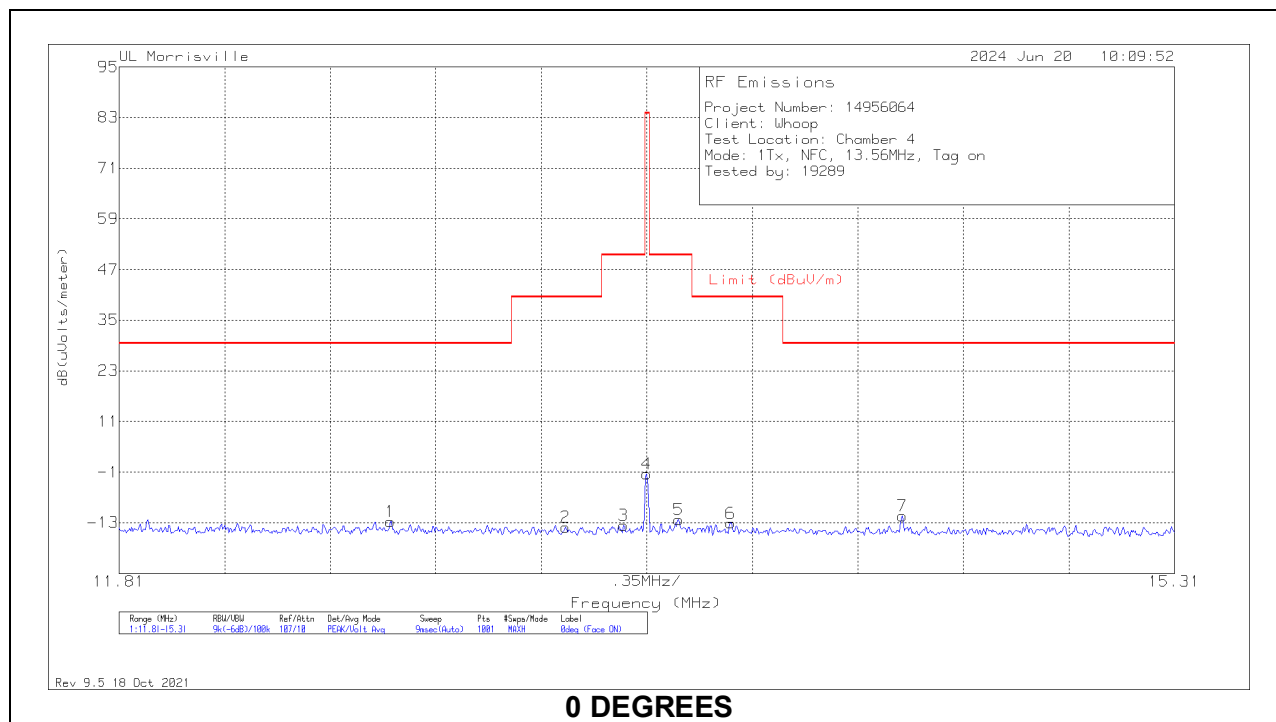
The EUT is an intentional radiator that incorporates a digital device, the highest fundamental frequency generated or used in the device is 13.56 MHz; therefore, the frequency range was investigated from 0.15 MHz to the 10th harmonic of the highest fundamental frequency, or 1000 MHz, whichever is greater.

RESULTS

9.2. FUNDAMENTAL AND SPURIOUS EMISSIONS (0.009 – 30MHz)

9.2.1. FUNDAMENTAL RESULTS

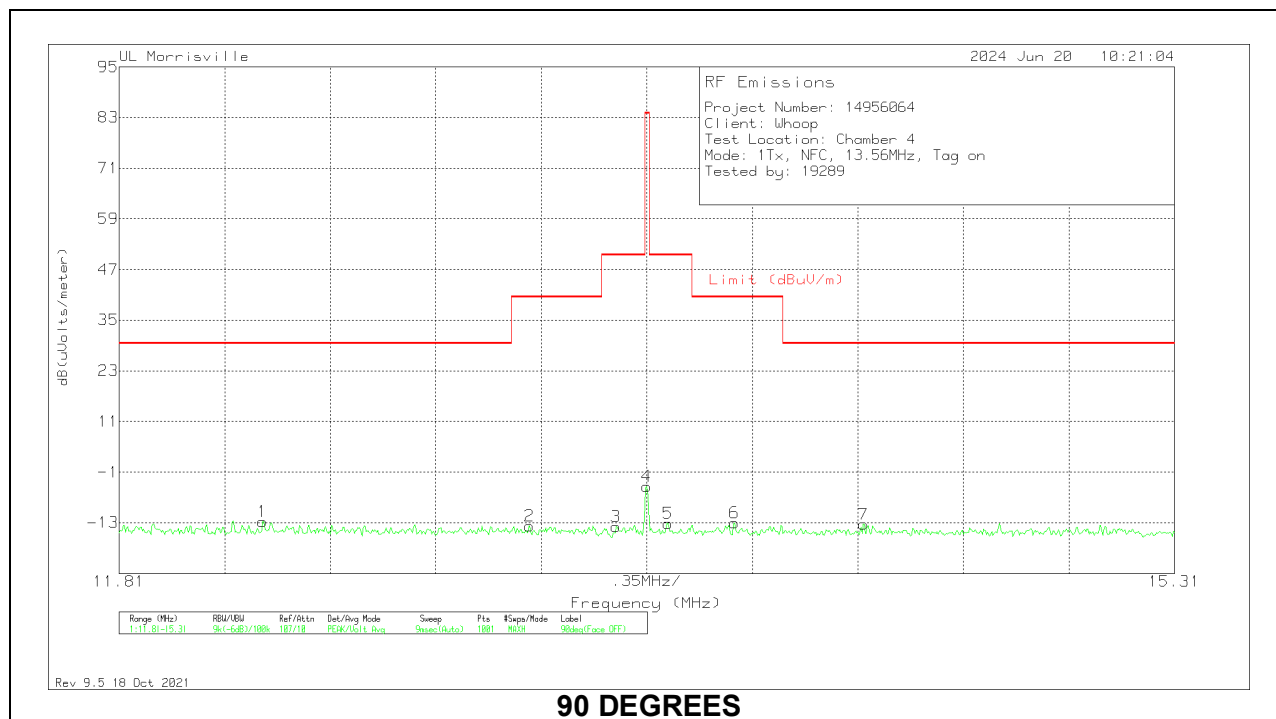
9.2.1.1. TAG ON



DATA – 0 Degrees

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	135144 (dBuV/m)	Gain/Loss (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uVolts/meter)	Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Loop Angle
1	12.7095	15.99	Pk	10.8	.5	-40	-12.71	29.5	-42.21	358	0 degs
2	13.2905	14.81	Pk	10.7	.5	-40	-13.99	40.5	-54.49	358	0 degs
3	13.483	15.25	Pk	10.7	.5	-40	-13.55	50.5	-64.05	358	0 degs
4	13.56	27.39	Pk	10.7	.5	-40	-1.41	84	-85.41	358	0 degs
5	13.665	16.58	Pk	10.7	.5	-40	-12.22	50.5	-62.72	358	0 degs
6	13.83825	15.71	Pk	10.7	.5	-40	-13.09	40.5	-53.59	358	0 degs
7	14.407	17.47	Pk	10.7	.5	-40	-11.33	29.5	-40.83	358	0 degs

Pk - Peak detector

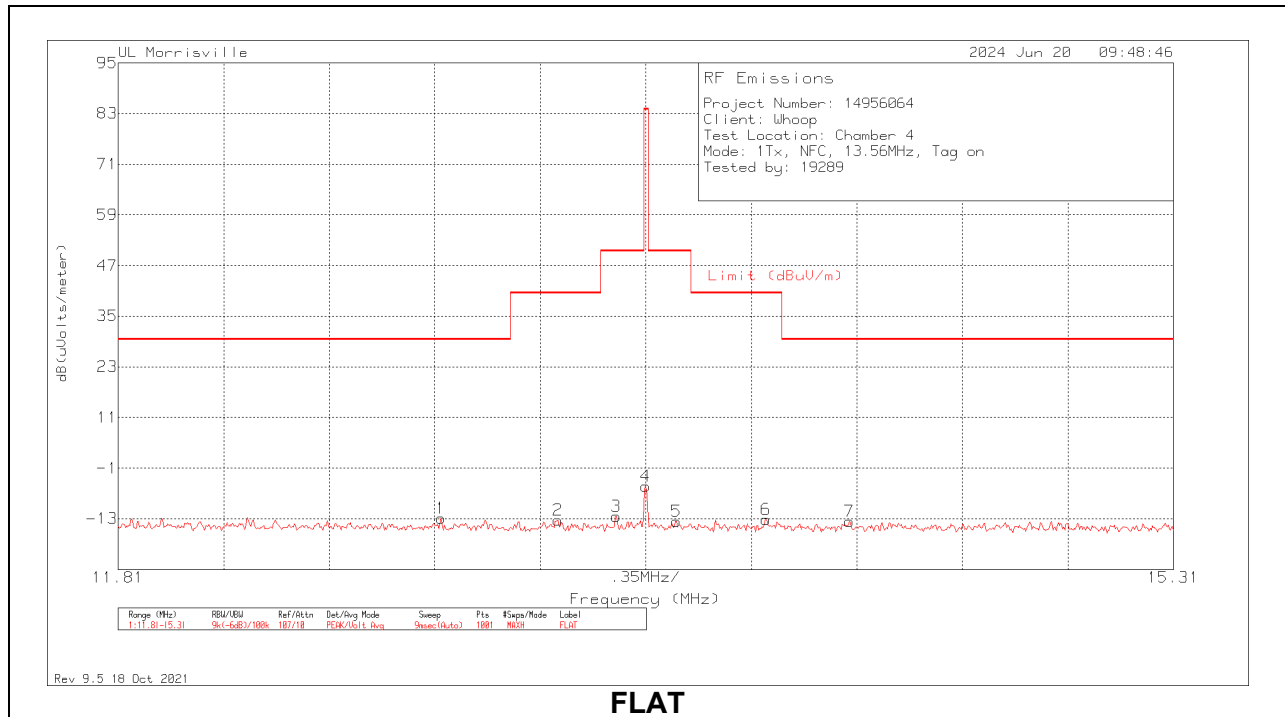


90 DEGREES

DATA – 90 Degrees

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	135144 (dBuV/m)	Gain/Loss (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uVolts/meter)	Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Loop Angle
1	12.286	16.04	Pk	10.8	.5	-40	-12.66	29.5	-42.16	301	90 degs
2	13.1715	15	Pk	10.7	.5	-40	-13.8	40.5	-54.3	301	90 degs
3	13.4585	14.93	Pk	10.7	.5	-40	-13.87	50.5	-64.37	301	90 degs
4	13.56	24.45	Pk	10.7	.5	-40	-4.35	84	-88.35	301	90 degs
5	13.63	15.59	Pk	10.7	.5	-40	-13.21	50.5	-63.71	301	90 degs
6	13.8505	15.8	Pk	10.7	.5	-40	-13	40.5	-53.5	301	90 degs
7	14.27925	15.43	Pk	10.7	.5	-40	-13.37	29.5	-42.87	301	90 degs

Pk - Peak detector

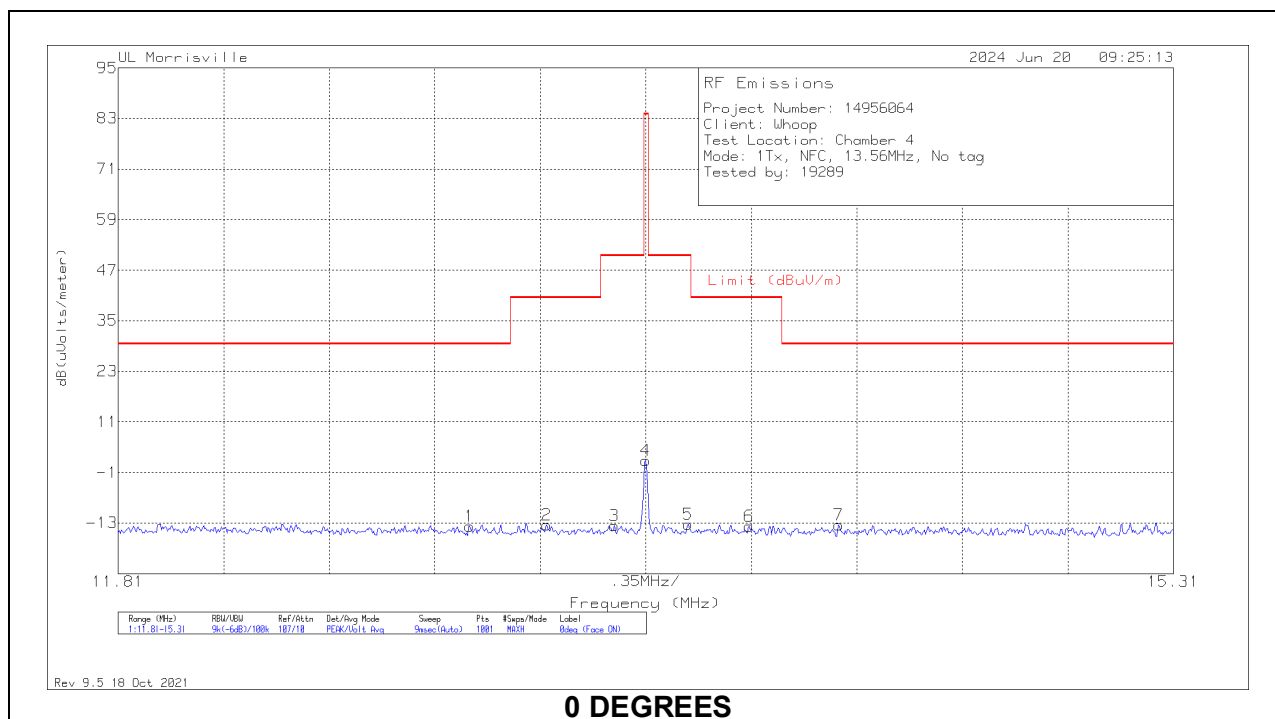


DATA – FLAT

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	135144 (dBuV/m)	Gain/Loss (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uVolts/meter)	Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Loop Angle
1	12.881	15.79	Pk	10.8	.5	-40	-12.91	29.5	-42.41	20	Flat
2	13.2695	15.5	Pk	10.7	.5	-40	-13.3	40.5	-53.8	20	Flat
3	13.462	16.35	Pk	10.7	.5	-40	-12.45	50.5	-62.95	20	Flat
4	13.56	23.48	Pk	10.7	.5	-40	-5.32	84	-89.32	20	Flat
5	13.6615	15.22	Pk	10.7	.5	-40	-13.58	50.5	-64.08	20	Flat
6	13.959	15.7	Pk	10.7	.5	-40	-13.1	40.5	-53.6	20	Flat
7	14.2355	15.16	Pk	10.7	.5	-40	-13.64	29.5	-43.14	20	Flat

Pk - Peak detector

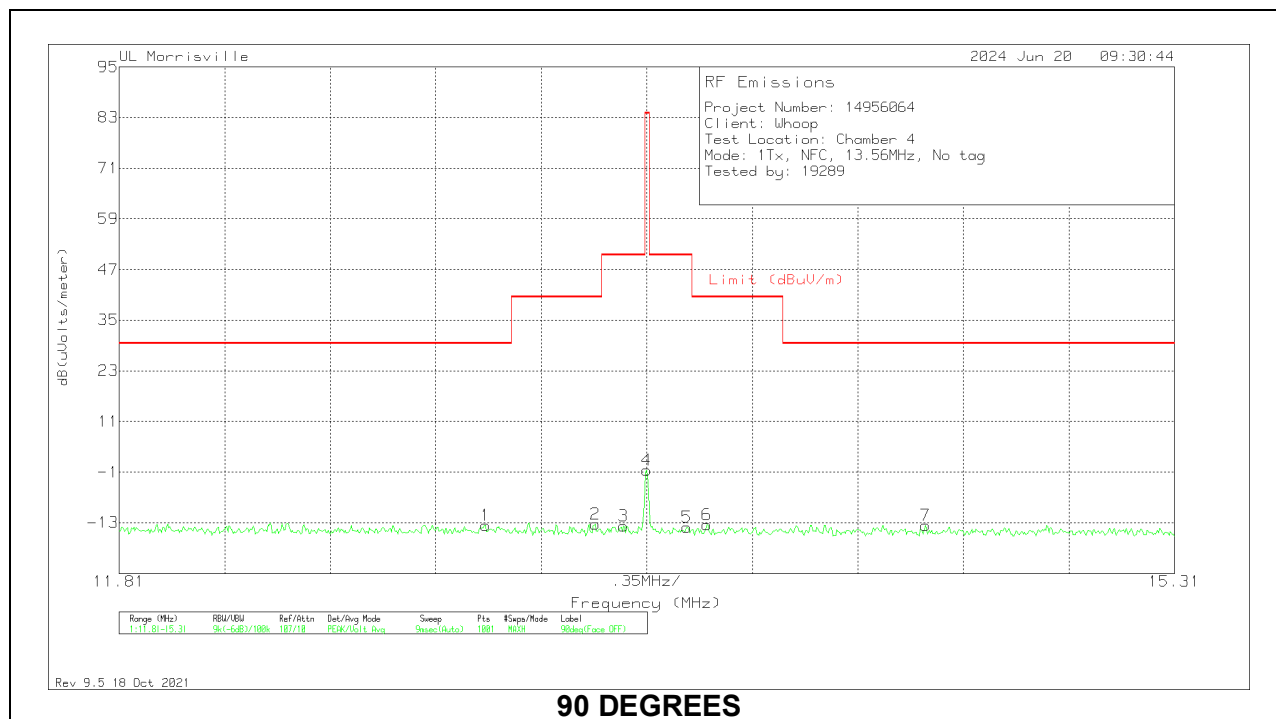
9.2.1.2. TAG OFF



DATA – 0 Degrees

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	135144 (dBuV/m)	Gain/Loss (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uVolts/meter)	Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Loop Angle
1	12.9755	15.03	Pk	10.7	.5	-40	-13.77	29.5	-43.27	334	0 degs
2	13.231	15.3	Pk	10.7	.5	-40	-13.5	40.5	-54	334	0 degs
3	13.455	15.17	Pk	10.7	.5	-40	-13.63	50.5	-64.13	334	0 degs
4	13.56	30.66	Pk	10.7	.5	-40	1.86	84	-82.14	334	0 degs
5	13.7	15.52	Pk	10.7	.5	-40	-13.28	50.5	-63.78	334	0 degs
6	13.903	15.07	Pk	10.7	.5	-40	-13.73	40.5	-54.23	334	0 degs
7	14.2005	15.36	Pk	10.7	.5	-40	-13.44	29.5	-42.94	334	0 degs

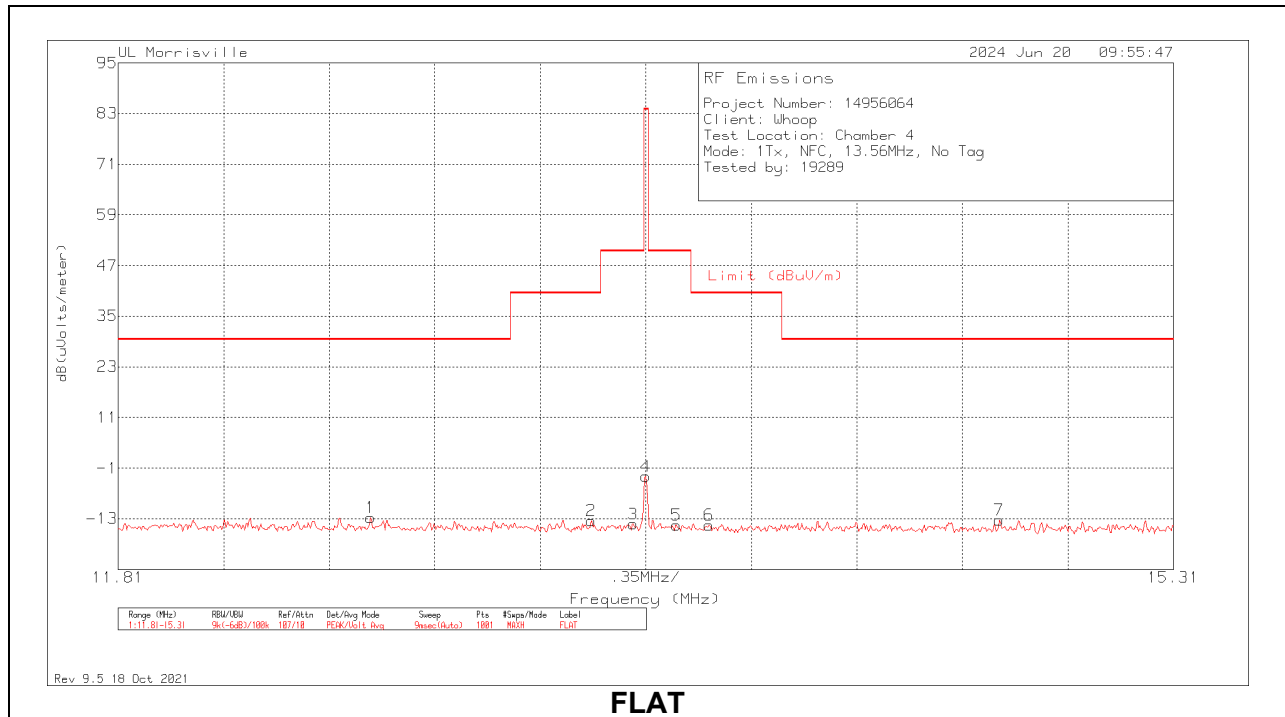
Pk - Peak detector



DATA – 90 Degrees

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	135144 (dBuV/m)	Gain/Loss (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uVolts/meter)	Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Loop Angle
1	13.0245	15.2	Pk	10.7	.5	-40	-13.6	29.5	-43.1	242	90 degs
2	13.3885	15.47	Pk	10.7	.5	-40	-13.33	40.5	-53.83	242	90 degs
3	13.483	15.05	Pk	10.7	.5	-40	-13.75	50.5	-64.25	242	90 degs
4	13.56	28.27	Pk	10.7	.5	-40	-.53	84	-84.53	242	90 degs
5	13.693	14.69	Pk	10.7	.5	-40	-14.11	50.5	-64.61	242	90 degs
6	13.7595	15.29	Pk	10.7	.5	-40	-13.51	40.5	-54.01	242	90 degs
7	14.484	15.18	Pk	10.7	.5	-40	-13.62	29.5	-43.12	242	90 degs

Pk - Peak detector



DATA – FLAT

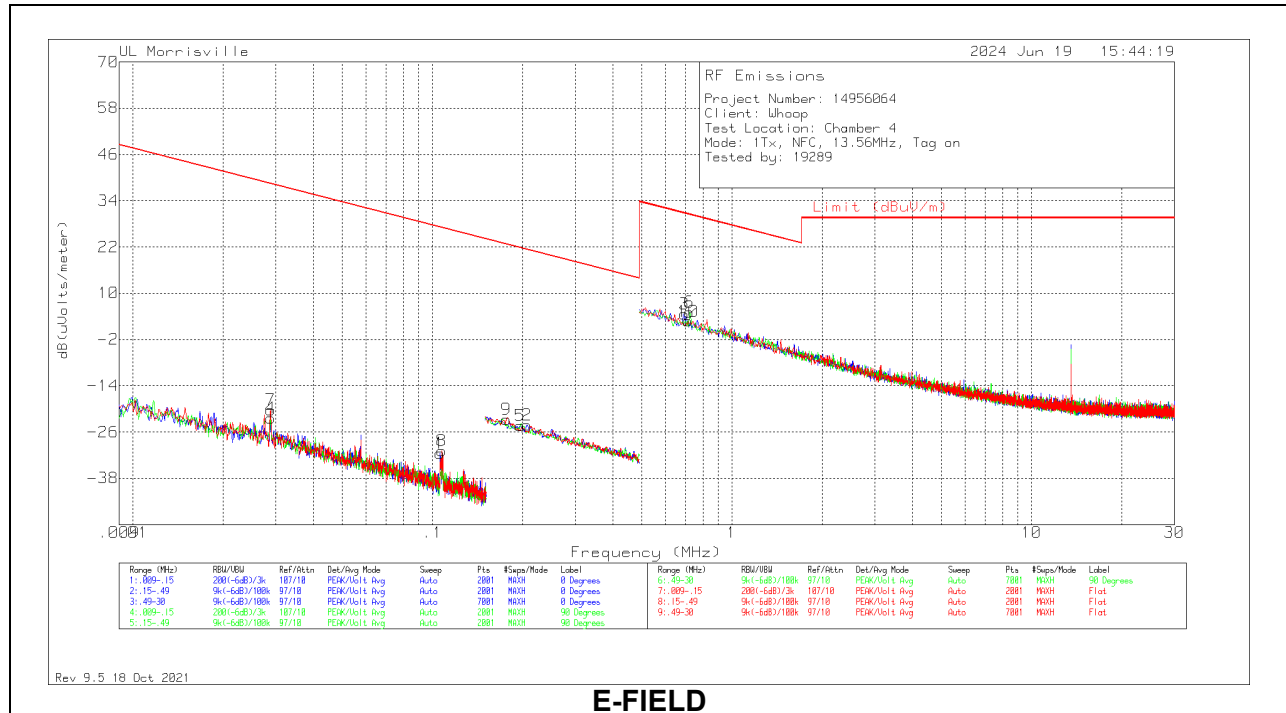
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	135144 (dBuV/m)	Gain/Loss (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uVolts/meter)	Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Loop Angle
1	12.6465	16.04	Pk	10.8	.5	-40	-12.66	29.5	-42.16	349	Flat
2	13.378	15.39	Pk	10.7	.5	-40	-13.41	40.5	-53.91	349	Flat
3	13.518	14.53	Pk	10.7	.5	-40	-14.27	50.5	-64.77	349	Flat
4	13.56	25.82	Pk	10.7	.5	-40	-2.98	84	-86.98	349	Flat
5	13.6615	14.33	Pk	10.7	.5	-40	-14.47	50.5	-64.97	349	Flat
6	13.77	14.31	Pk	10.7	.5	-40	-14.49	40.5	-54.99	349	Flat
7	14.7325	15.49	Pk	10.7	.5	-40	-13.31	29.5	-42.81	349	Flat

Pk - Peak detector

9.2.2. SPURIOUS EMISSIONS RESULTS

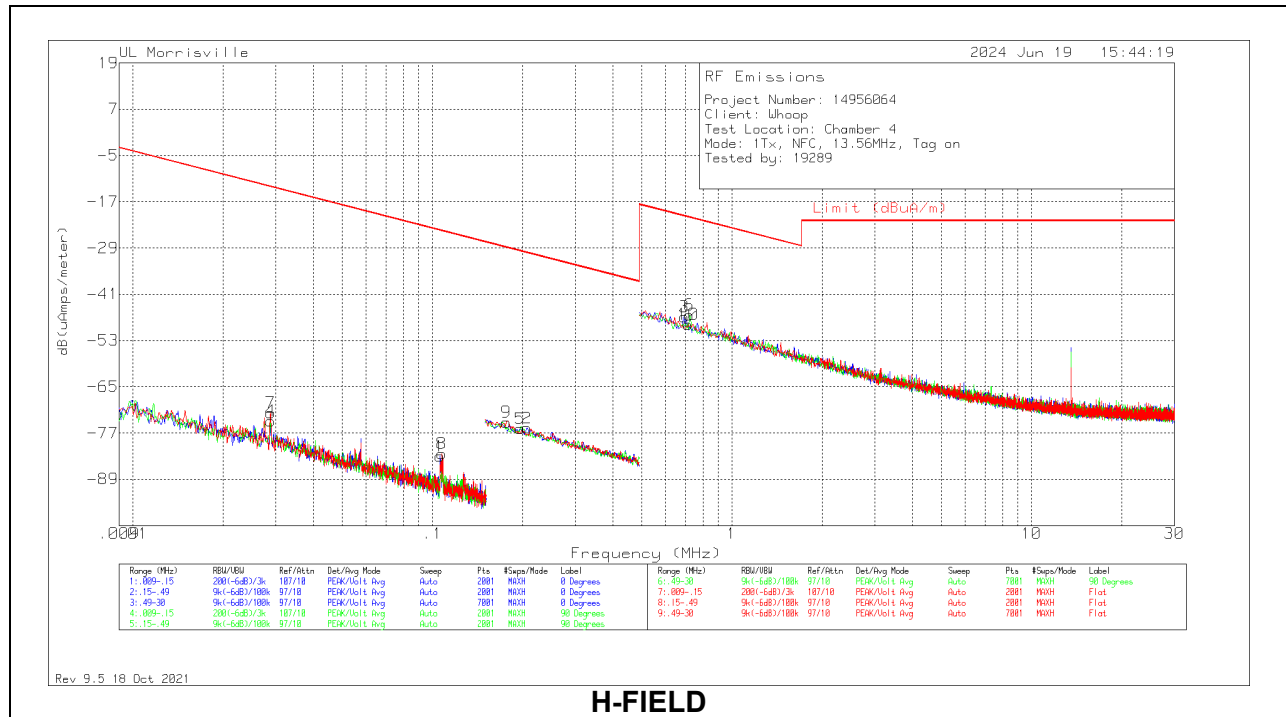
9.2.2.1. TAG ON

Note: All measurements were made at a test distance of 3 m. The measured data was extrapolated from the test distance (3m) to the specification distance (300 m from 9-490 kHz and 30 m from 490 kHz – 30 MHz) to clearly show the relative levels of fundamental and spurious emissions and demonstrate compliance with the requirement that the level of any spurious emissions be below the level of the intentionally transmitted signal. The extrapolation factor for the limits were 40*Log (test distance / specification distance).



Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	135144 (dBuV/m)	Gain/Loss (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uVolts/meter)	QP/AV Limit (dBuV/m)	PK Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Loop Angle
4	.02881	43.94	Pk	13.6	.1	-80	-22.36	38.41	58.41	-60.77	0-360	90 degs
7	.02881	45.98	Pk	13.6	.1	-80	-20.32	38.41	58.41	-58.73	0-360	Flat
1	.10606	37.24	Pk	11.1	.1	-80	-31.56	27.09	-	-58.65	0-360	0 degs
8	.10741	37.98	Pk	11.1	.1	-80	-30.82	26.98	-	-57.8	0-360	Flat
9	.17652	46.04	Pk	11.1	.1	-80	-22.76	22.67	42.67	-45.43	0-360	Flat
5	.19624	44.4	Pk	11.1	.1	-80	-24.4	21.75	41.75	-46.15	0-360	90 degs
2	.2067	44.56	Pk	11.1	.1	-80	-24.24	21.3	41.3	-45.54	0-360	0 degs
3	.69237	33.16	Pk	11.2	.2	-40	4.56	30.8	-	-26.24	0-360	0 degs
10	.71345	31.34	Pk	11.2	.2	-40	2.74	30.54	-	-27.8	0-360	Flat
6	.72188	33.69	Pk	11.2	.2	-40	5.09	30.43	-	-25.34	0-360	90 degs

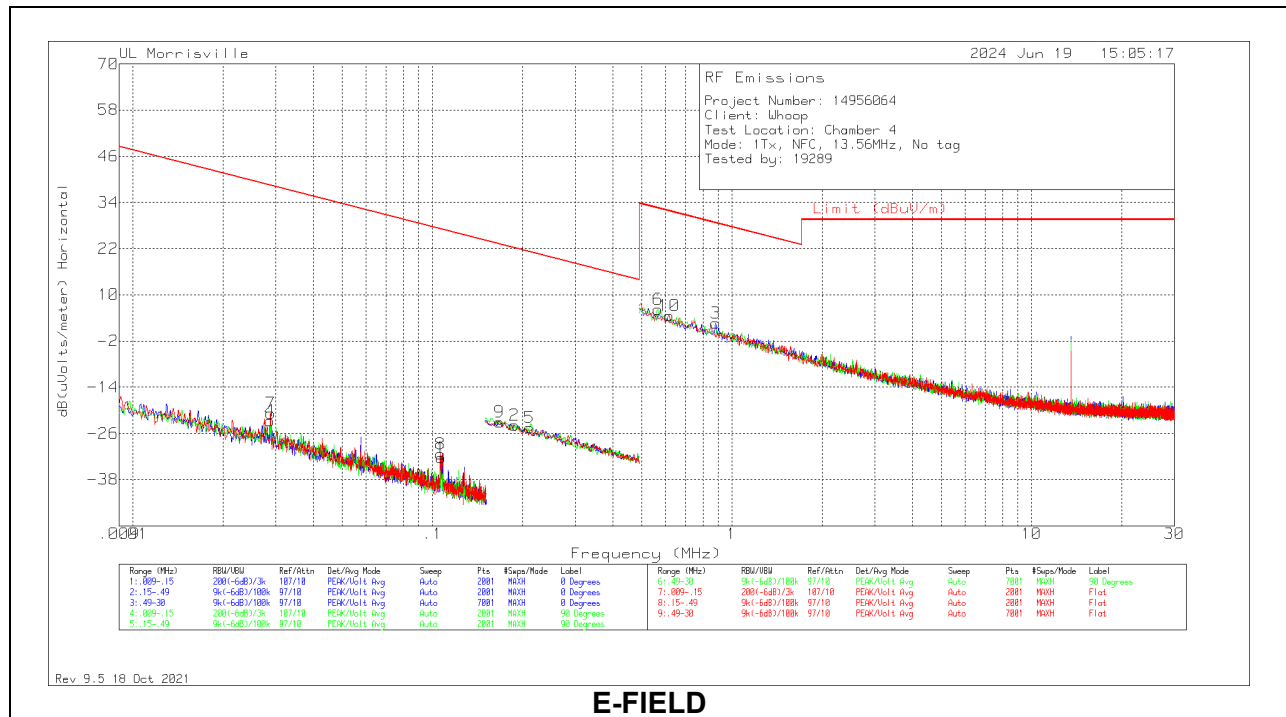
Pk - Peak detector



Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	135144 (dBuV/m)	Gain/Loss (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uAmps/meter)	QP/AV Limit (dBuA/m)	PK Limit (dBuA/m)	Margin (dB)	Azimuth (Degs)	Loop Angle
4	.02881	43.94	Pk	-37.9	.1	-80	-73.86	-13.09	6.91	-60.77	0-360	90 degs
7	.02881	45.98	Pk	-37.9	.1	-80	-71.82	-13.09	6.91	-58.73	0-360	Flat
1	.10606	37.24	Pk	-40.4	.1	-80	-83.06	-24.41	-	-58.65	0-360	0 degs
8	.10741	37.98	Pk	-40.4	.1	-80	-82.32	-24.52	-	-57.8	0-360	Flat
9	.17652	46.04	Pk	-40.4	.1	-80	-74.26	-28.83	-8.83	-45.43	0-360	Flat
5	.19624	44.4	Pk	-40.4	.1	-80	-75.9	-29.75	-9.75	-46.15	0-360	90 degs
2	.2067	44.56	Pk	-40.4	.1	-80	-75.74	-30.2	-10.2	-45.54	0-360	0 degs
3	.69237	33.16	Pk	-40.3	.2	-40	-46.94	-20.7	-	-26.24	0-360	0 degs
10	.71345	31.34	Pk	-40.3	.2	-40	-48.76	-20.96	-	-27.8	0-360	Flat
6	.72188	33.69	Pk	-40.3	.2	-40	-46.41	-21.07	-	-25.34	0-360	90 degs

Pk - Peak detector

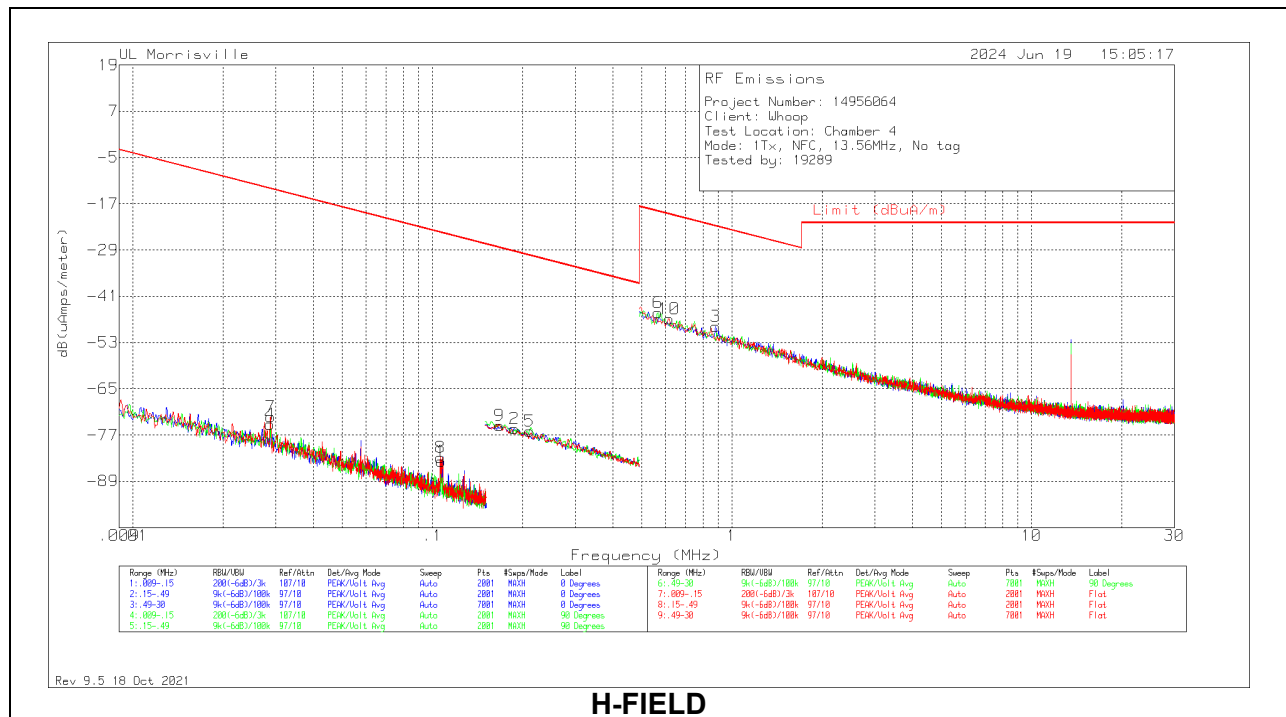
9.2.2.2. TAG OFF



E-FIELD

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	135144 (dBuV/m)	Gain/Loss (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uVolts/meter)	QP/AV Limit (dBuV/m)	PK Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Loop Angle
4	.02874	43.64	Pk	13.6	.1	-80	-22.66	38.44	58.44	-61.1	0-360	90 degs
7	.02881	45.53	Pk	13.6	.1	-80	-20.77	38.41	58.41	-59.18	0-360	Flat
8	.10663	37.41	Pk	11.1	.1	-80	-31.39	27.05	-	-58.44	0-360	Flat
1	.10698	36.55	Pk	11.1	.1	-80	-32.25	27.02	-	-59.27	0-360	0 degs
9	.16768	45.74	Pk	11.1	.1	-80	-23.06	23.11	43.11	-46.17	0-360	Flat
2	.18749	44.96	Pk	11.1	.1	-80	-23.84	22.14	42.14	-45.98	0-360	0 degs
5	.21069	44.35	Pk	11.1	.1	-80	-24.45	21.13	41.13	-45.58	0-360	90 degs
6	.56589	35.09	Pk	11.1	.1	-40	6.29	32.55	-	-26.26	0-360	90 degs
10	.61648	33.34	Pk	11.2	.1	-40	4.64	31.81	-	-27.17	0-360	Flat
3	.88209	31.36	Pk	11.1	.2	-40	2.66	28.69	-	-26.03	0-360	0 degs

Pk - Peak detector



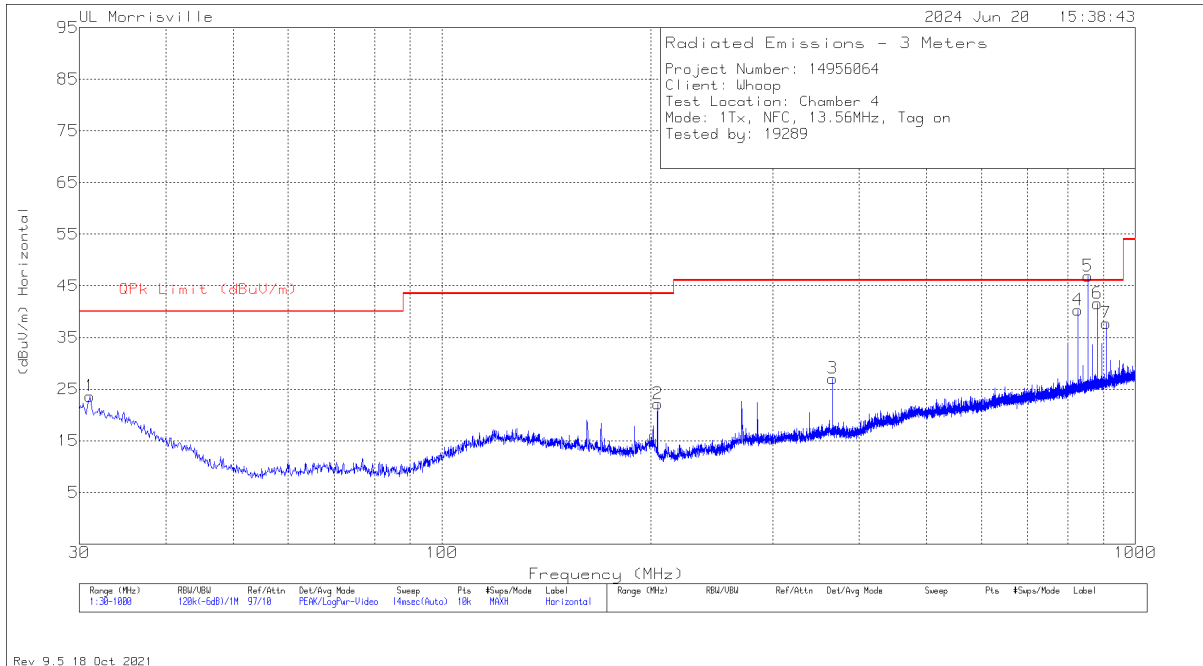
H-FIELD

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	135144 (dBuV/m)	Gain/Loss (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uAmps/meter)	QP/AV Limit (dBuA/m)	PK Limit (dBuA/m)	Margin (dB)	Azimuth (Degs)	Loop Angle
4	.02874	43.64	Pk	-37.9	.1	-80	-74.16	-13.06	6.94	-61.1	0-360	90 degs
7	.02881	45.53	Pk	-37.9	.1	-80	-72.27	-13.09	6.91	-59.18	0-360	Flat
8	.10663	37.41	Pk	-40.4	.1	-80	-82.89	-24.45	-	-58.44	0-360	Flat
1	.10698	36.55	Pk	-40.4	.1	-80	-83.75	-24.48	-	-59.27	0-360	0 degs
9	.16768	45.74	Pk	-40.4	.1	-80	-74.56	-28.39	-8.39	-46.17	0-360	Flat
2	.18749	44.96	Pk	-40.4	.1	-80	-75.34	-29.36	-9.36	-45.98	0-360	0 degs
5	.21069	44.35	Pk	-40.4	.1	-80	-75.95	-30.37	-	-45.58	0-360	90 degs
6	.56589	35.09	Pk	-40.4	.1	-40	-45.21	-18.95	-	-26.26	0-360	90 degs
10	.61648	33.34	Pk	-40.3	.1	-40	-46.86	-19.69	-	-27.17	0-360	Flat
3	.88209	31.36	Pk	-40.4	.2	-40	-48.84	-22.81	-	-26.03	0-360	0 degs

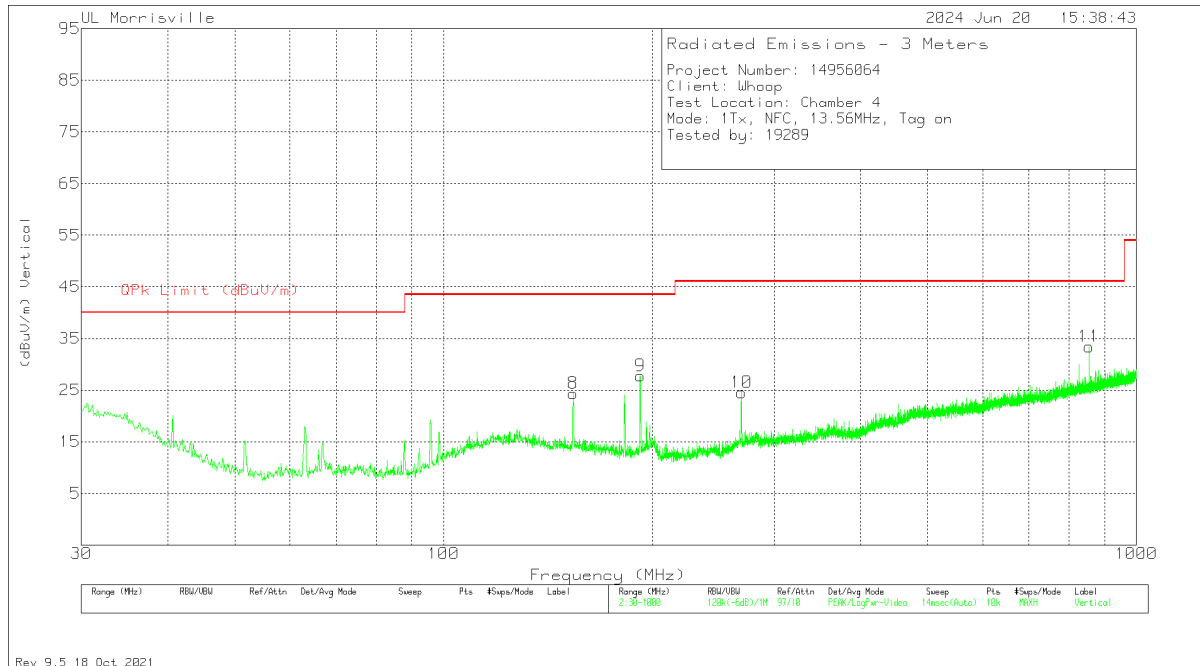
Pk - Peak detector

9.3. TX SPURIOUS EMISSION 30 TO 1000 MHz

9.3.1. Tag On



HORIZONTAL



VERTICAL

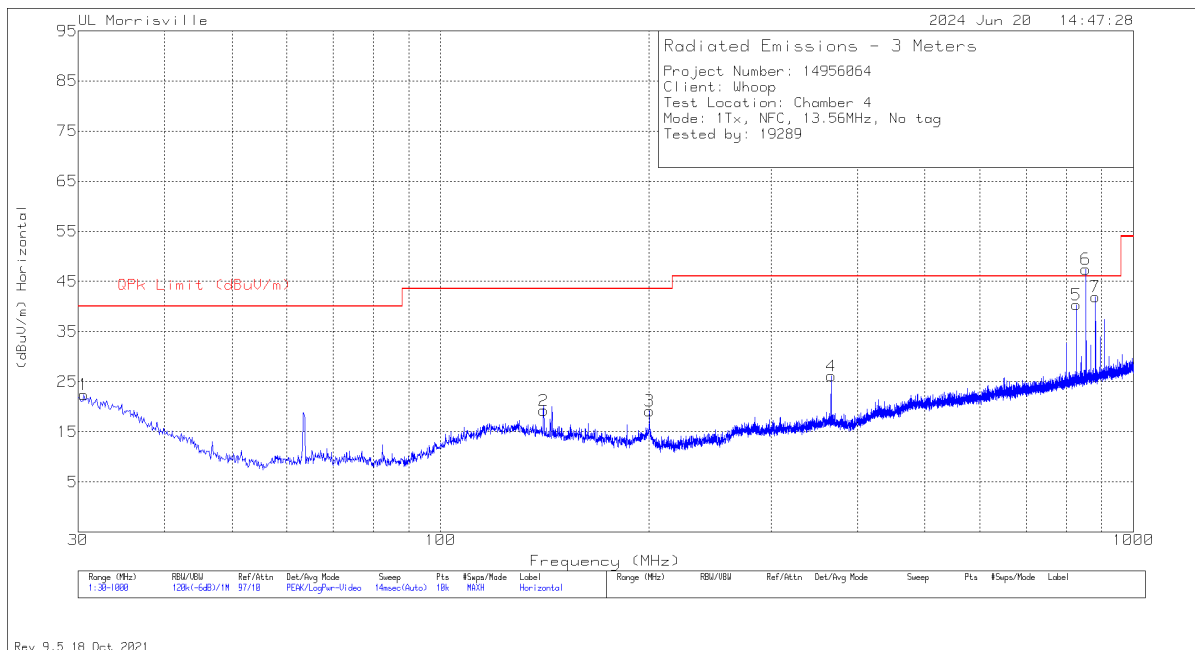
RADIATED EMISSIONS

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	90628 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	31.067	29.66	Pk	26.1	-32.1	23.66	40	-16.34	0-360	200	H
8	153.869	36.88	Pk	18.6	-31.1	24.38	43.52	-19.14	0-360	100	V
9	192.281	40.97	Pk	17.6	-30.8	27.77	43.52	-15.75	0-360	100	V
2	204.794	35.96	Pk	17	-30.8	22.16	43.52	-21.36	0-360	200	H
10	269.202	35.64	Pk	19.3	-30.4	24.54	46.02	-21.48	0-360	100	V
3	366.105	36.08	Pk	21	-30	27.08	46.02	-18.94	0-360	100	H
4	827.15179	37.35	Qp	27.7	-28	37.05	46.02	-8.97	34	105	H
5	854.271	44.66	Qp	27.8	-27.8	44.66	46.02	-1.36	97	102	H
11	854.306	33.42	Pk	27.8	-27.8	33.42	46.02	-12.6	0-360	100	V
6	881.39263	38.23	Qp	28	-27.6	38.63	46.02	-7.39	89	168	H
7	908.529	36.6	Pk	28.3	-27.1	37.8	46.02	-8.22	0-360	100	H

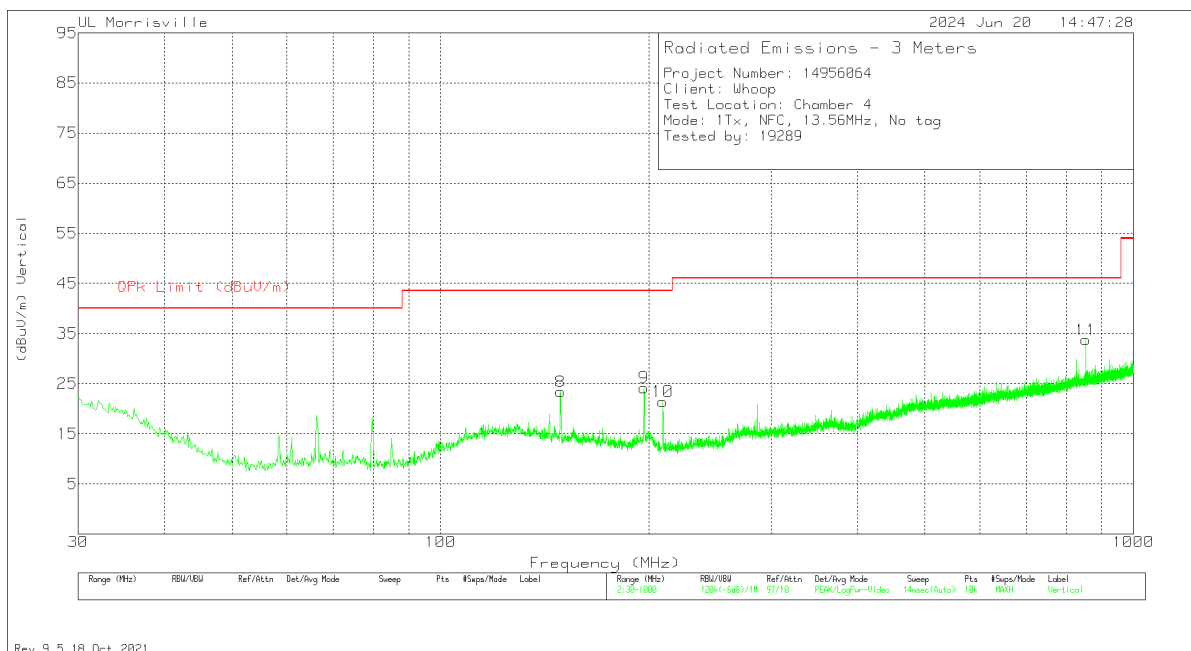
Pk - Peak detector

Qp - Quasi-Peak detector

9.3.2. Tag Off



HORIZONTAL



VERTICAL

RADIATED EMISSIONS

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	90628 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	30.582	28.01	Pk	26.5	-32.1	22.41	40	-17.59	0-360	100	H
2	140.968	31.22	Pk	19.1	-31.1	19.22	43.52	-24.3	0-360	100	H
8	148.922	35.65	Pk	18.7	-31	23.35	43.52	-20.17	0-360	100	V
9	196.743	36.59	Pk	18.4	-30.8	24.19	43.52	-19.33	0-360	100	V
3	200.332	31.13	Pk	18.8	-30.8	19.13	43.52	-24.39	0-360	100	H
10	209.353	35.51	Pk	16.5	-30.6	21.41	43.52	-22.11	0-360	100	V
4	366.105	35.1	Pk	21	-30	26.1	46.02	-19.92	0-360	100	H
5	827.15223	35.82	Qp	27.7	-28	35.52	46.02	-10.5	218	189	H
6	854.27514	44.3	Qp	27.8	-27.8	44.3	46.02	-1.72	244	106	H
11	854.306	33.74	Pk	27.8	-27.8	33.74	46.02	-12.28	0-360	100	V
7	881.39111	37.1	Qp	28	-27.6	37.5	46.02	-8.52	297	164	H

Pk - Peak detector

Qp - Quasi-Peak detector

10. FREQUENCY STABILITY

LIMIT

§15.225 (e) The frequency tolerance of the carrier signal shall be maintained within $\pm 0.01\%$ of the operating frequency, over a temperature variation of -20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For battery operated equipment, the equipment tests shall be performed using a new battery.

IC RSS-210, Annex B.6

Carrier frequency stability shall be maintained to $\pm 0.01\%$ (± 100 ppm).

TEST PROCEDURE

ANSI C63.10-2020 Clause 6.8

RESULTS

No non-compliance noted.

10.1. Battery

Reference Frequency: EUT Channel 13.56 MHz @ 20°C Limit: ± 100 ppm = 1.356 kHz										
Power Supply	Envir. Temp	Frequency Deviation Measured with Time Elapse								
(Vdc)	(°C)	Startup (MHz)	Delta (ppm)	@ 2 mins (MHz)	Delta (ppm)	@ 5 mins (MHz)	Delta (ppm)	@ 10 mins (MHz)	Delta (ppm)	Limit (ppm)
4.50	50	13.5597726	3.048	13.5597649	3.612	13.5597643	3.656	13.5597643	3.657	± 100
4.50	40	13.5597866	2.014	13.5597776	2.680	13.5597759	2.802	13.5597754	2.843	± 100
4.50	30	13.5598012	0.935	13.5597947	1.417	13.5597955	1.357	13.5597969	1.256	± 100
4.50	20	13.5598139	0.000	13.5598086	0.392	13.5598082	0.419	13.5598079	0.442	± 100
4.50	10	13.5598532	-2.895	13.5598495	-2.623	13.5598529	-2.875	13.5598567	-3.154	± 100
4.50	0	13.5598753	-4.525	13.5598744	-4.463	13.5598763	-4.604	13.5598781	-4.735	± 100
4.50	-10	13.5598830	-5.093	13.5598833	-5.114	13.5598830	-5.092	13.5598825	-5.055	± 100
4.50	-20	13.5598812	-4.960	13.5598831	-5.101	13.5598783	-4.748	13.5598665	-3.880	± 100
3.00	20	13.5598468	-2.427	13.5598523	-2.828	13.5598424	-2.104	13.5598410	-1.999	± 100

Tested by: 84740
Test date: 2024-06-21

11. SETUP PHOTOS

Please refer to R14956064-EP2 for setup photos

END OF TEST REPORT