

TEST REPORT

Report Number: R14956064-E11

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

Model : WD50

FCC ID : 2AJ2X-WD50

IC : 22056-WD50

EUT Description : Charger

Test Standard(s) : FCC 47 CFR PART 15 SUBPART C: 2024
ISED RSS-216 ISSUE 3: 2024
ISED RSS-GEN ISSUE 5 + A1 + A2: 2021

Date Of Issue:

2025-03-11

Prepared by:

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REVISION HISTORY

Rev.	Issue Date	Revisions	Revised By
V1	2025-01-03	Initial Issue	Charles Moody
V2	2025-03-11	Included additional RSS-216 and RSS-GEN test methods and standards	Charles Moody

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME:

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

EUT DESCRIPTION:

Charger

MODEL:

WD50

SERIAL NUMBER:

Strap: 5AMD001267, 5AMD001805
Charger: D5ZPE200050

SAMPLE RECEIVE DATE:

2024-10-22

DATE TESTED:

2024-11-08 TO 2024-12-12

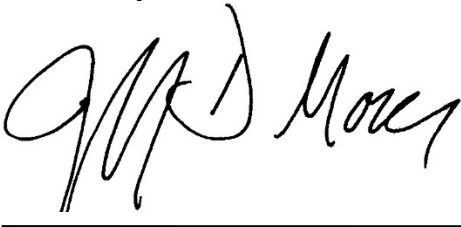
APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
FCC 47 CFR Part 15 Subpart C: 2024	Refer to Section 2
RSS-216 Issue 3: 2024	Refer to Section 2
ISED RSS-GEN Issue 5 + A1 + A2	Refer to Section 2

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.

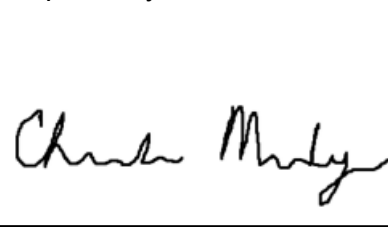
This document may not be altered or revised in any way unless done so by UL LLC and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL LLC will constitute fraud and shall nullify the document.

Approved & Released For
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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 (5.3.3.1, 5.3.3.2) RSS-GEN (8.9, 8.10)	Radiated Emissions	Compliant	None
15.215	RSS-GEN 6.7	Emissions Bandwidth	For Reporting Purposes only.	None.
15.207 (a)	RSS-216 5.3.2	AC Mains Conducted Emissions	Compliant	Note 1.
15.225(e)	RSS-216 (5.5)	Frequency Stability	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, ANSI C63.30-2021, FCC CFR 47 Part 2, and FCC CFR 47 Part 15, FCC KDB 174176 D01 v01r01, KDB 414788 D01 Radiated Test Site, RSS-GEN Issue 5 + A1 and RSS-216 Issue 3: 2024.

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.
 $\text{dBuV} + 0 \text{ dB} + 10.1 \text{ dB} + 0 \text{ dB} = 46.6 \text{ dBuV}$

6. EQUIPMENT UNDER TEST

6.1. DESCRIPTION OF EUT

The EUT is a charger that is used to charge the battery of a wearable strap and contains a WPT radio. This report covers the full emissions testing of the WPT radio.

6.2. MAXIMUM E-FIELD and H-FIELD

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

Fundamental Frequency (MHz)	Mode	E field (30m distance) FCC (dBuV/m)	H field (3m distance) IC (dBuA/m)
13.56	Config 1 – Charge Mode	14.22	1.88

6.3. SOFTWARE AND FIRMWARE

The firmware version installed in the EUT during testing was 23.19.1.0.

6.4. WORST-CASE CONFIGURATION AND MODE

For the entire radiated emissions test, the EUT was examined on the following configuration. AC power line conducted emissions were also investigated on the following configurations:

Config	Mode	Descriptions
1	Charging Mode	The Charger was attached to the load and set to charge while the load battery was <10%.
2	Dummy Load	AC Lines Only – WPT radio was terminated into a dummy load antenna.

For all radiated emissions tests, the EUT was discharged to <10%, 40-60%, and 90% battery level prior to testing, and set to continuously charge during the entirety of the test. Pretesting determined <10% battery was worst-case and this was used for all final testing. The intended included USB cable and a representative AC Adaptor were connected to the strap used for all testing to represent worst case. The AC Adaptor will not be included with the end product.

The fundamental of the EUT was investigated in three orthogonal orientations, X, Y and Z to determine the worst case orientation. It was found that Y orientation was worst case. Therefore, all testing was performed in this orientation.

6.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	Manufacturer	Model	Serial Number	FCC ID
AC Adapter	DeWalt	DXMA1310851	C42107	AC Adapter
Wearable Strap	Whoop	WS50	5AMD001309	Wearable Strap

I/O CABLES

I/O Cable List						
Cable No.	Port	# of Identical Ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	USB C	1	USB C	Shielded	<3m	Connects the battery to the AC Adapter

SETUP DIAGRAM

Please refer to R14956064-EP6 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 1)

Equip. ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
0.009-30MHz					
135144	Active Loop Antenna	ETS-Lindgren	6502	2024-10-02	2025-10-02
	30-1000 MHz				
90629	Hybrid Broadband Antenna	Sunol Sciences Corp.	JB3	2024-01-30	2026-01-30
	Gain-Loss Chains				
91974	Gain-loss string: 0.009-30MHz	Various	Various	2024-05-08	2025-05-08
91976	Gain-loss string: 25-1000MHz	Various	Various	2024-05-08	2025-05-08
	Receiver & Software				
197954	Spectrum Analyzer	Rohde & Schwarz	ESW44	2024-03-05	2025-03-05
SOFTEMI	EMI Software	UL	Version 9.5 (18 Oct 2021)		
	Additional Equipment used				
241205	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				
90410	Spectrum Analyzer	Keysight Technologies	N9030A	2024-06-14	2025-06-14
76023	Temp/Humid Chamber	Cincinnati Sub-Zero	ZPH-8-3.5-SCT/AC	2024-01-12	2025-01-12
245765	Environmental Meter	Control Company	06-662-4	2024-01-24	2026-01-24
76021	DC Regulated Power Supply	CircuitSpecialists.Com	CSI3005X5	NA	NA
SOFTEMI	Antenna Port Software	UL	Version 2024.2.23	NA	NA
	Additional Equipment Used				
-	Near Field Probe Kit	EMC Test Systems	7405	-	-

Equipment Used - Line-Conducted Emissions – Voltage (Morrisville – Conducted 1)

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
CBL087	Coax cable, RG223, N-male to BNC-male, 20-ft.	Pasternack	PE3W06143-240	2024-04-04	2025-04-04
179892	Environmental Meter	Fisher Scientific	15-077-963	2024-08-12	2025-08-12
91432	LISN, 50-ohm/50-uH, 2-conductor, 25A (For support gear only.)	Solar Electronics	8012-50-R-24-BNC	NA	NA
80391	LISN, 50-ohm/50-uH, 250uH 2-conductor, 25A	Fischer Custom Com.	FCC-LISN-50/250-25-2-01	2024-08-01	2025-08-01
70374	EMI Test Receiver 9kHz-7GHz	Rohde & Schwarz	ESCI 7	2024-07-30	2025-07-30
52859	Transient Limiter, 0.009-100MHz	Electro-Metrics	EM-7600	2024-04-04	2025-04-04
PS216	AC Power Source	Elgar	CW2501M	NA	NA
SOFTEMI	EMI Software	UL	Version 9.5 (18 Oct 2021)		
22055	DC Regulated Power Supply	Circuit Specialists	CSI3003X5	NA	NA
	Miscellaneous (if needed)				
35879	DC-18GHz 10dB Pad	Mini Circuits	BW-N10W5+	2024-04-10	2025-04-10

8. ANTENNA PORT TEST RESULTS

8.1. OCCUPIED BANDWIDTH

TEST PROCEDURE

The transmitter output is measured via a near field probe 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.

EUT SETUP

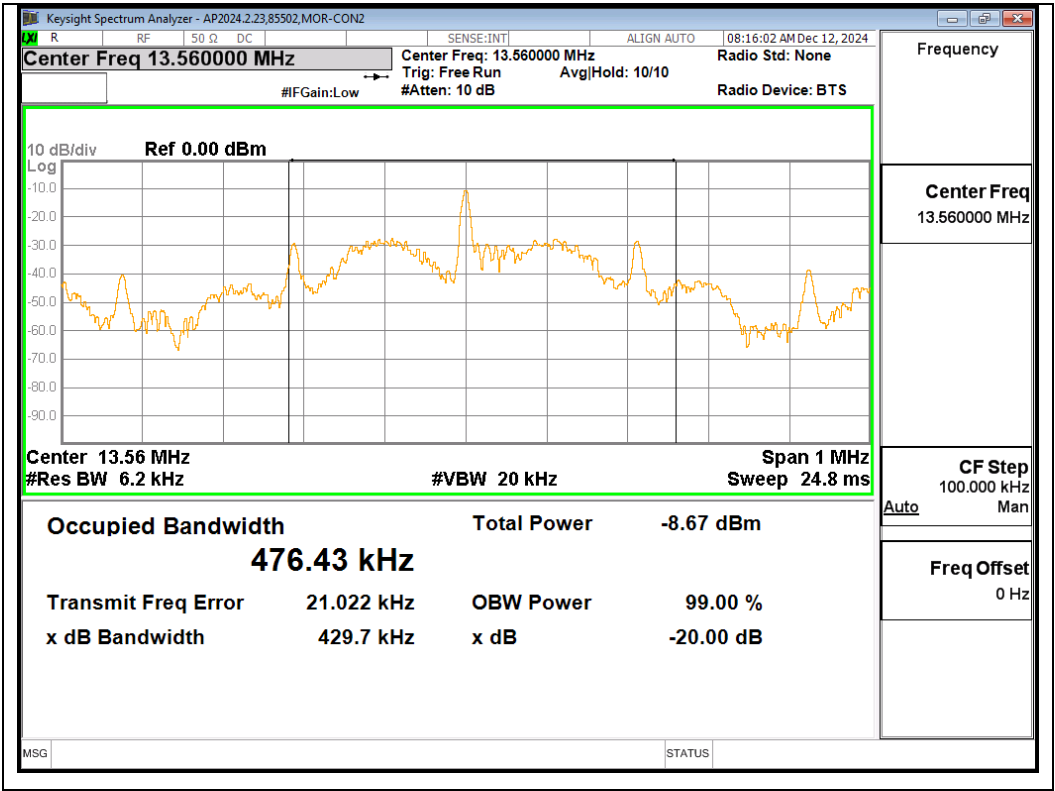
Configuration 1: Charger in charging mode with CW signal and duty cycle varied to control charge level via load modulation from watch.

Results for when the EUT was connectd to the

RESULTS

Configuration	Frequency measured	99% OBW Result	20dB BW Result
1	13.56 MHz	476.43 kHz	429.7 kHz

8.1.1. CONFIG 1



8.2. 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 the minimum to the maximum 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.

TEST PROCEDURE

ANSI C63.10-2020 Clause 6.8

RESULTS

No non-compliance noted.

8.2.1. CONFIG 1

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)
5.00	50	13.5598512	2.537	13.5598454	2.963	13.5598412	3.272	13.5598358	3.675	± 100
5.00	40	13.5598675	1.333	13.5598472	2.830	13.5598416	3.247	13.5598430	3.146	± 100
5.00	30	13.5599128	-2.002	13.5598803	0.396	13.5598678	1.310	13.5598572	2.097	± 100
5.00	20	13.5598856	0.000	13.5598683	1.274	13.5598555	2.223	13.5598449	3.004	± 100
5.00	10	13.5599275	-3.091	13.5599228	-2.741	13.5599196	-2.510	13.5599168	-2.303	± 100
5.00	0	13.5599330	-3.496	13.5599340	-3.567	13.5599272	-3.070	13.5599235	-2.791	± 100
5.00	-10	13.5599281	-3.136	13.5599378	-3.845	13.5599365	-3.752	13.5599345	-3.608	± 100
5.00	-20	13.5599334	-3.524	13.5599383	-3.887	13.5599382	-3.877	13.5599371	-3.796	± 100
4.75	20	13.5598443	3.048	13.5598416	3.243	13.5598389	3.447	13.5598367	3.608	± 100
5.5	20	13.5598599	1.898	13.5598481	2.764	13.5598429	3.152	13.5598381	3.508	± 100

Tested by: 85502

Test date: 2024-12-11

Low and High voltage was declared by the client to be 4.75 VDC and 5.5 VDC respectively.

9. RADIATED EMISSION TEST RESULTS

9.1. LIMITS AND PROCEDURE

LIMIT

FCC §15.209 (a), 15.225(a)-(d)

Frequency (MHz)	FCC 15.209 Field Strength (microvolts/meter)	FCC 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 to 216	150	3
216 to 960	200	3
Above 960 MHz	500	3
Frequency (MHz)	FCC 15.225 Field Strength (microvolts/meter)	FCC Measurement Distance (m)
13.110-13.410	106	30
13.410-13.553	334	30
13.553-13.567	15848	30
13.567-13.710	334	30
13.710-14.010	106	30
Note:15.225 Limits outside of the 13.110 to 14.010 are shared with 15.209		

ICES-001 Section 6.2, IC RSS-216 6.2.2, and IC RSS-GEN Sections 8.9 and 8.10.

Table 2: Magnetic field strength radiated emission limits for induction cooking appliances

Frequency range (MHz)	Quasi-peak, at 3 m distance (dBμA/m)
0.009 – 0.07	69
0.07 – 0.15	69 to 39 *
0.15 – 30	39 to 7 *
* The limit level in dBμA/m decreases linearly with the logarithm of frequency.	

Table 4: Electric field strength radiated emission limits for induction cooking appliances

Frequency range (MHz)	OATS or SAC * 10 m measurement distance Quasi-peak (dBμV/m)	OATS or SAC * 3 m measurement distance Quasi-peak (dBμV/m)	FAR * 3 m measurement distance Quasi-peak (dBμV/m)
30 – 230	30	40	42 to 35**
230 – 1000	37	47	42
Note: The more stringent limit applies at the transition frequency. * OATS = open-area test site, SAC = semi-anechoic chamber, FAR = fully-anechoic room (see CSA CISPR 11:19). ** The limit level in dBμV/m decreases linearly with the logarithm of frequency.			

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane for measurement below 1GHz. The antenna to EUT distance is 3 meters. The EUT is configured in accordance with ANSI C63.10. The EUT is set to transmit in a continuous mode.

Resolution bandwidth is set to 100 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements in the 30-1000MHz range, 9kHz for peak and/or quasi-peak detection measurements in the 0.15-30MHz range and 200Hz for peak and/or quasi-peak detection measurements in the 9-150kHz range. Peak detection is used unless otherwise noted as quasi-peak.

The frequency range of interest is monitored at a fixed antenna height and EUT azimuth. The EUT is rotated through 360 degrees to maximize emissions received. The antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Measurements are made with the antenna polarized in both the vertical and the horizontal positions.

3D antenna use - For below 30MHz testing, investigation was done on three antenna orientations (parallel, perpendicular, and ground-parallel).

Based on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field.

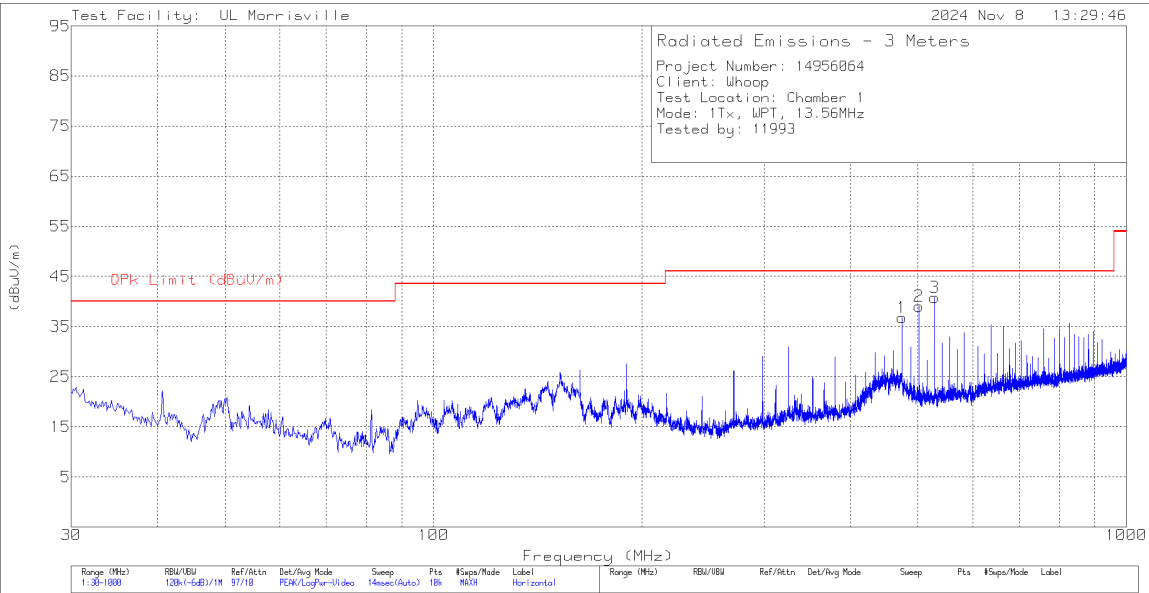
KDB 414788 Open Field Site (OFS) and Chamber Correlation Justification

OFS and chamber correlation testing had been performed and chamber measured test result is the worst-case test result.

RESULTS

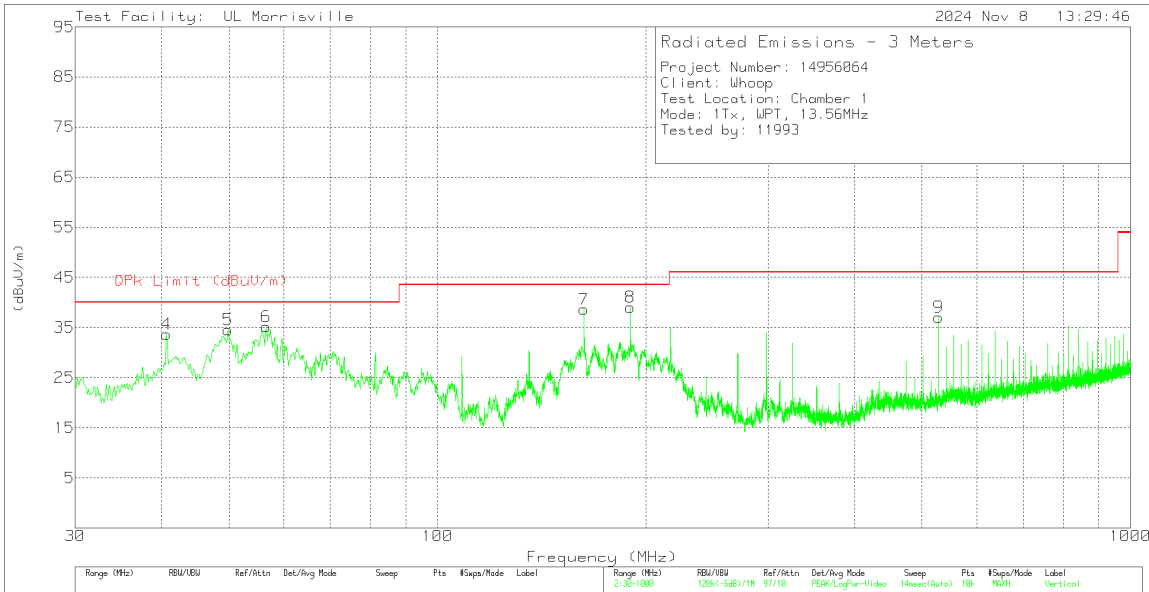
9.2. FCC TX SPURIOUS EMISSION 30 TO 1000 MHz

9.2.1. CONFIG 1



Rev 9.5 18 Oct 2021

HORIZONTAL



Rev 9.5 18 Oct 2021

VERTICAL

RADIATED EMISSIONS

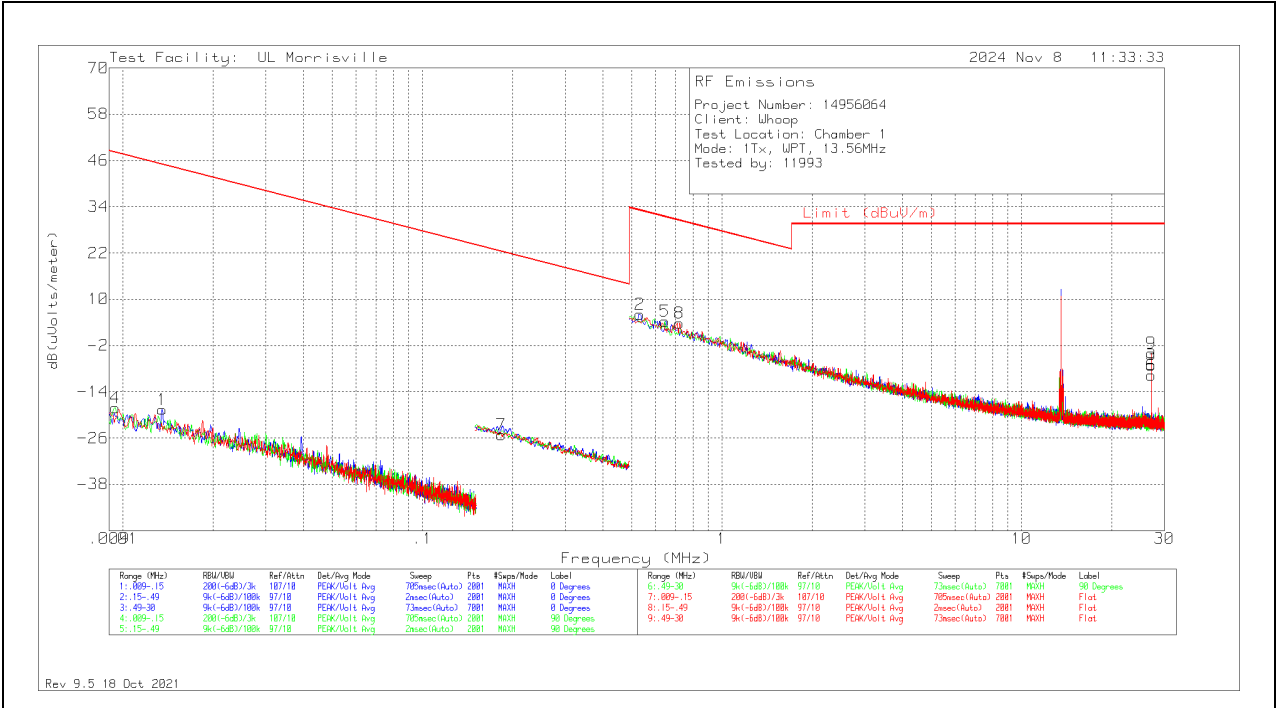
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	90629 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	40.67	46.02	Pk	19.3	-31.6	33.72	40	-6.28	0-360	100	V
5	50.0351	47.46	Qp	14	-31.4	30.06	40	-9.94	319	125	V
6	57.4411	48.07	Qp	13.7	-31.3	30.47	40	-9.53	270	105	V
7	162.7195	49.61	Qp	18.5	-30.1	38.01	43.52	-5.51	242	100	V
8	189.8459	50.5	Qp	17.9	-30	38.4	43.52	-5.12	254	104	V
1	474.648	41.54	Pk	23.9	-28.6	36.84	46.02	-9.18	0-360	100	H
2	501.711	43.31	Pk	24	-28.3	39.01	46.02	-7.01	0-360	100	H
3	528.8331	44.25	Qp	24.1	-28.1	40.25	46.02	-5.77	13	100	H
9	528.871	41.1	Pk	24.1	-28.1	37.1	46.02	-8.92	0-360	100	V

Pk - Peak detector

Qp - Quasi-Peak detector

9.3. FCC TX FUNDAMENTAL & SPURIOUS EMISSIONS FROM 9 kHz TO 30 MHz

9.3.1. CONFIG 1 – E FIELD

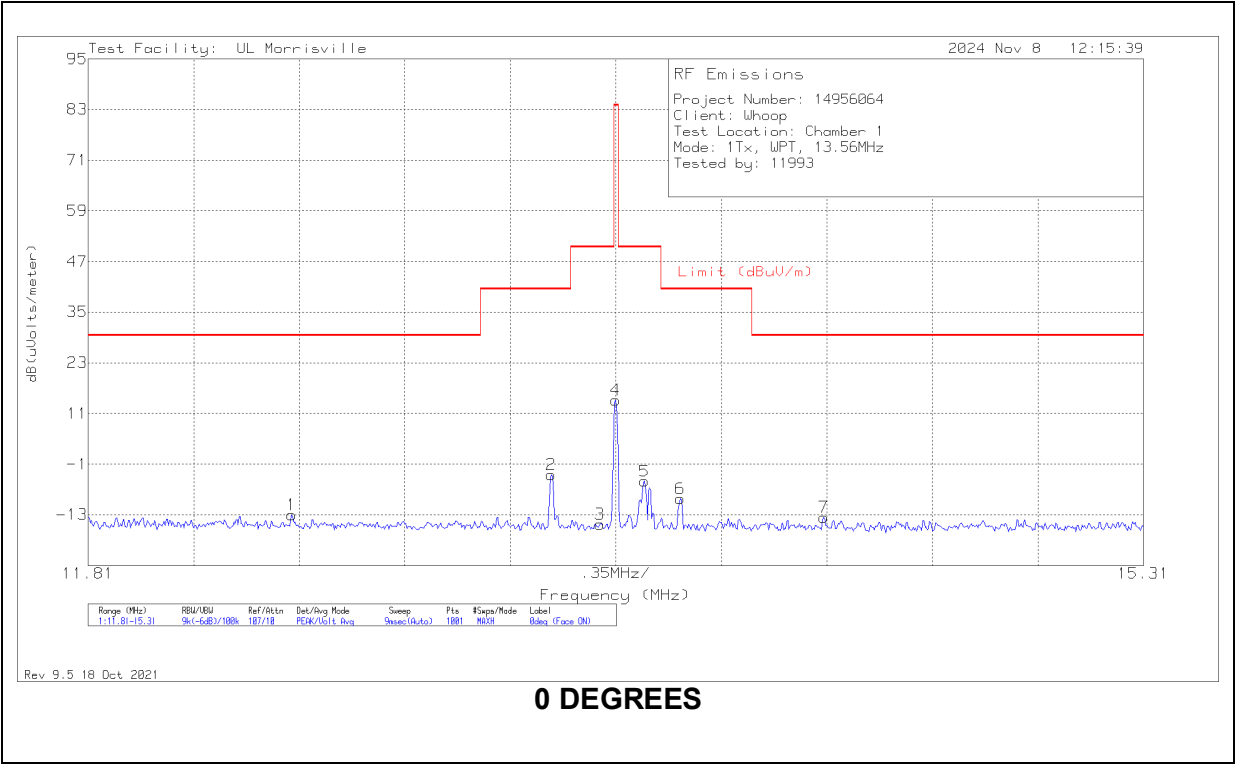


DATA

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	135144 (dB/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	.00943	43	Pk	18.7	.1	-80	-18.2	48.12	68.12	-66.32	0-360	90 degs
1	.01354	44.62	Pk	16.7	.1	-80	-18.58	44.97	64.97	-63.55	0-360	0 degs
7	.18349	43.78	Pk	11	.1	-80	-25.12	22.33	42.33	-47.45	0-360	Flat
2	.53216	35.01	Pk	11	.1	-40	6.11	33.08	-	-26.97	0-360	0 degs
5	.64599	33.2	Pk	11	.1	-40	4.3	31.4	-	-27.1	0-360	90 degs
8	.72188	32.76	Pk	11	.1	-40	3.86	30.43	-	-26.57	0-360	Flat
3	27.12247	24.49	Pk	7.7	.8	-40	-7.01	29.54	-	-36.55	0-360	0 degs
6	27.12247	21.77	Pk	7.7	.8	-40	-9.73	29.54	-	-39.27	0-360	90 degs
9	27.12247	27.56	Pk	7.7	.8	-40	-3.94	29.54	-	-33.48	0-360	Flat

Pk - Peak detector

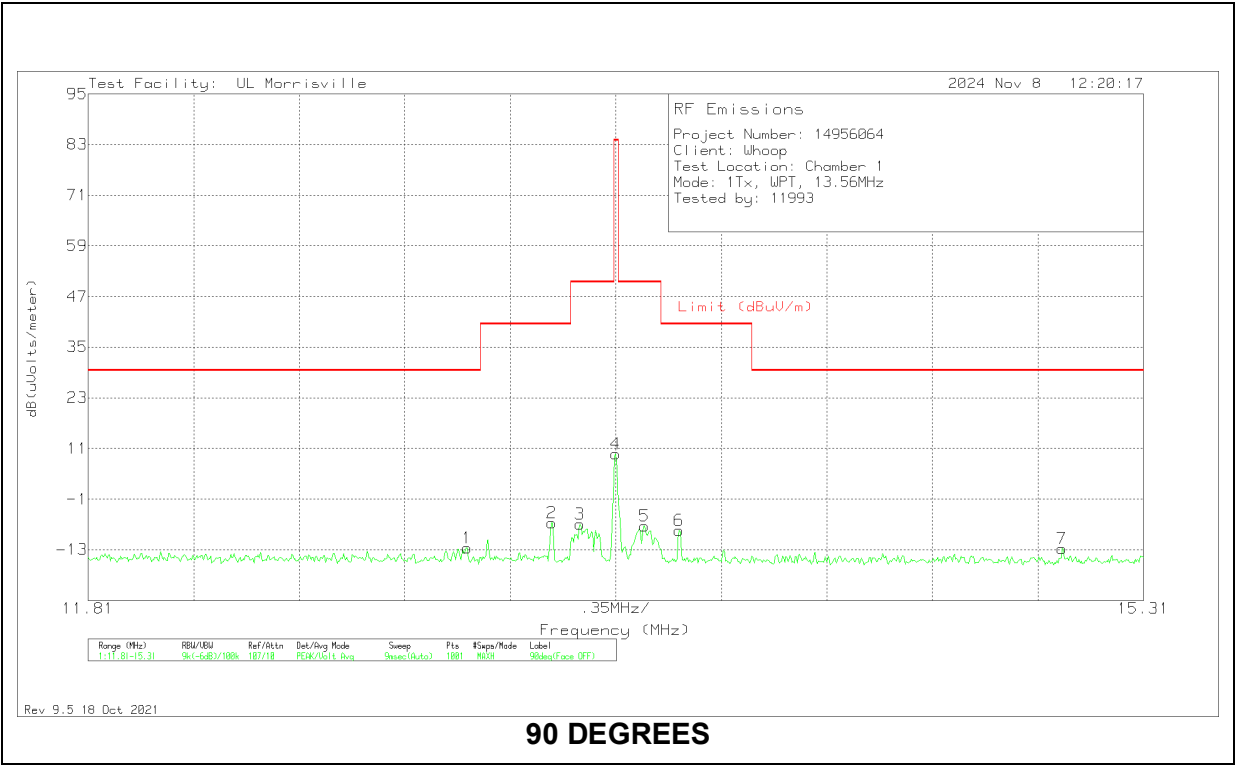
9.3.2. CONFIG 1 – Tx Mask



DATA – 0 Degrees

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	135144 (dB/m)	Gain/Loss (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uVolts/meter)	Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Loop Angle
1	12.4855	16.56	Pk	9.9	.5	-40	-13.04	29.5	-42.54	209	0 degs
2	13.3465	26.16	Pk	9.8	.6	-40	-3.44	40.5	-43.94	209	0 degs
3	13.5075	14.39	Pk	9.8	.6	-40	-15.21	50.5	-65.71	209	0 degs
4	13.56	43.82	Pk	9.8	.6	-40	14.22	84	-69.78	209	0 degs
5	13.6545	24.54	Pk	9.8	.6	-40	-5.06	50.5	-55.56	209	0 degs
6	13.7735	20.49	Pk	9.7	.6	-40	-9.21	40.5	-49.71	209	0 degs
7	14.2495	16.12	Pk	9.7	.6	-40	-13.58	29.5	-43.08	209	0 degs

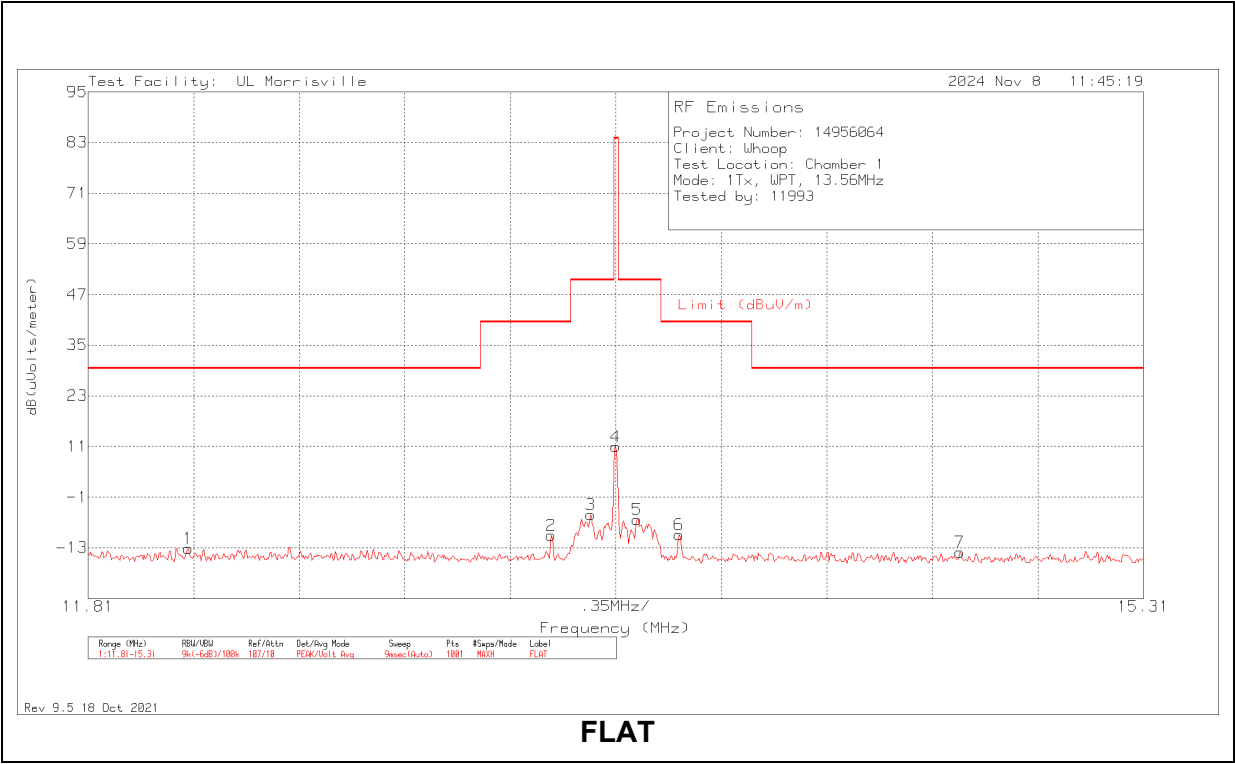
Pk - Peak detector



DATA – 90 Degrees

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	135144 (dB/m)	Gain/Loss (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uVolts/meter)	Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Loop Angle
1	13.0665	17.02	Pk	9.8	.6	-40	-12.58	29.5	-42.08	121	100	90 degs
2	13.34825	22.97	Pk	9.8	.6	-40	-6.63	40.5	-47.13	121	100	90 degs
3	13.441	22.72	Pk	9.8	.6	-40	-6.88	50.5	-57.38	121	100	90 degs
4	13.56	39.38	Pk	9.8	.6	-40	9.78	84	-74.22	121	100	90 degs
5	13.6545	22.27	Pk	9.8	.6	-40	-7.33	50.5	-57.83	121	100	90 degs
6	13.77	21.33	Pk	9.7	.6	-40	-8.37	40.5	-48.87	121	100	90 degs
7	15.0405	17.13	Pk	9.6	.6	-40	-12.67	29.5	-42.17	121	100	90 degs

Pk - Peak detector



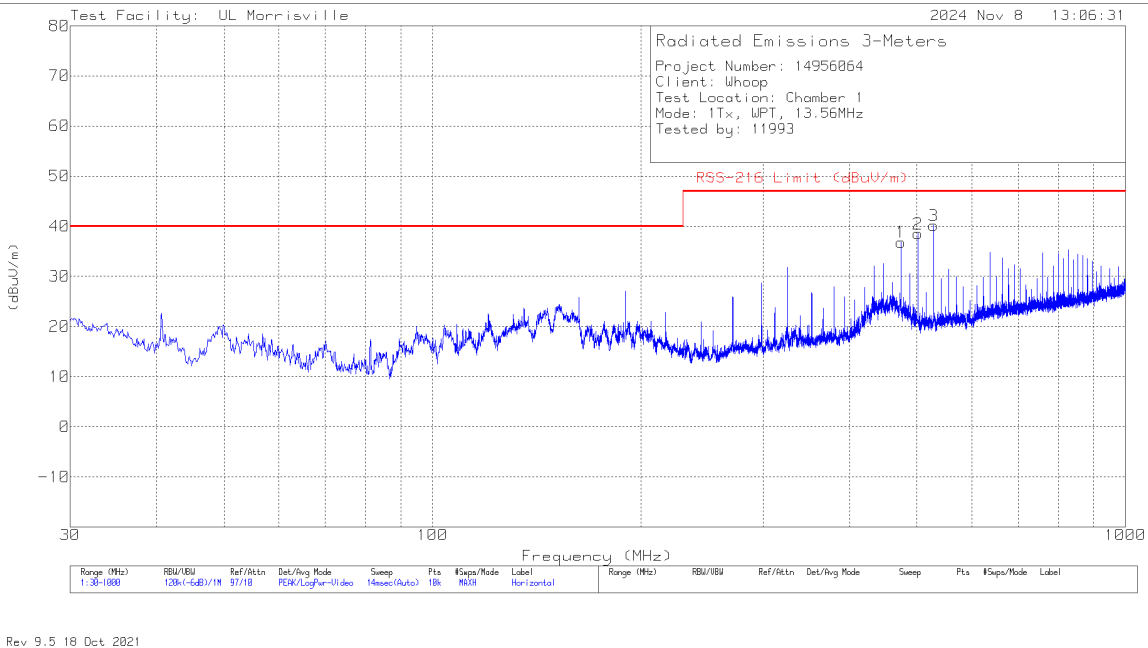
DATA – Flat

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	135144 (dB/m)	Gain/Loss (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uVolts/meter)	Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Loop Angle
1	12.1425	16.5	Pk	9.9	.5	-40	-13.1	29.5	-42.6	4	Flat
2	13.3465	19.5	Pk	9.8	.6	-40	-10.1	40.5	-50.6	4	Flat
3	13.476	24.42	Pk	9.8	.6	-40	-5.18	50.5	-55.68	4	Flat
4	13.56	40.58	Pk	9.8	.6	-40	10.98	84	-73.02	4	Flat
5	13.63	23.33	Pk	9.8	.6	-40	-6.27	50.5	-56.77	4	Flat
6	13.77	19.81	Pk	9.7	.6	-40	-9.89	40.5	-50.39	4	Flat
7	14.701	15.79	Pk	9.6	.6	-40	-14.01	29.5	-43.51	4	Flat

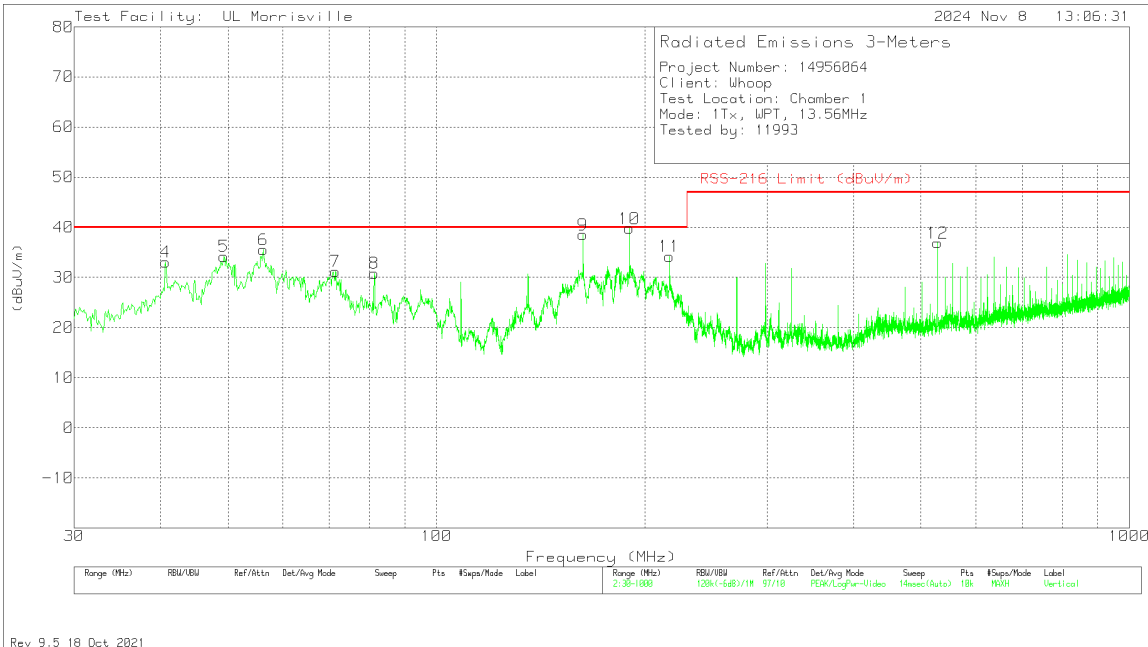
Pk - Peak detector

9.4. IC / RSS-216 TX SPURIOUS EMISSION 30 TO 1000 MHz

9.4.1. CONFIG 1



HORIZONTAL



VERTICAL

RADIATED EMISSIONS

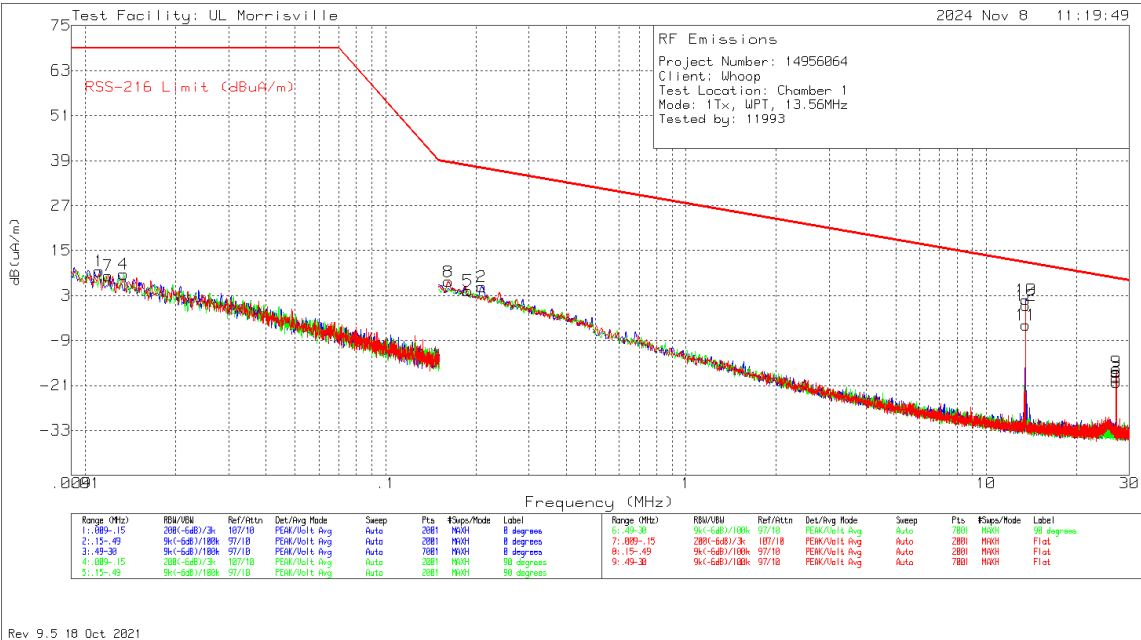
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	90629 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	RSS-216 Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	40.67	45.35	Pk	19.3	-31.6	33.05	40	-6.95	0-360	100	V
5	49.4138	48.04	Qp	14.2	-31.3	30.94	40	-9.06	288	102	V
6	56.3291	48.81	Qp	13.6	-31.3	31.11	40	-8.89	266	100	V
7	71.516	47.86	Pk	14.5	-31.2	31.16	40	-8.84	0-360	100	V
8	81.313	48.17	Pk	13.8	-31.2	30.77	40	-9.23	0-360	100	V
9	162.7224	49.34	Qp	18.5	-30.1	37.74	40	-2.26	3	100	V
10	189.833	50.66	Qp	17.8	-30	38.46	40	-1.54	247	101	V
11	216.9487	46.29	Qp	16.8	-30	33.09	40	-6.91	78	105	V
1	474.648	41.54	Pk	23.9	-28.6	36.84	47	-10.16	0-360	100	H
2	501.711	42.81	Pk	24	-28.3	38.51	47	-8.49	0-360	100	H
3	528.871	44.14	Pk	24.1	-28.1	40.14	47	-6.86	0-360	100	H
12	528.871	40.88	Pk	24.1	-28.1	36.88	47	-10.12	0-360	100	V

Pk - Peak detector

Qp - Quasi-Peak detector

9.5. RSS-216 FUNDAMENTAL & SPURIOUS EMISSIONS FROM 9 kHz TO 30 MHz

9.5.1. CONFIG 1



DATA

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	135144 (dBs/m)	Gain/Loss (dB)	Corrected Reading dB(uA/m)	RSS-216 Limit (dBuA/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Loop Angle
1	.01113	43.36	Pk	-33.9	.1	9.56	69	-59.44	0-360	400	0 degs
7	.01191	42.43	Pk	-34.2	.1	8.33	69	-60.67	0-360	400	Flat
4	.0134	43.44	Pk	-34.8	.1	8.74	69	-60.26	0-360	400	90 degs
8	.16173	47.1	Pk	-40.5	.1	6.7	38.55	-31.85	0-360	400	Flat
5	.18791	44.62	Pk	-40.5	.1	4.22	37.64	-33.42	0-360	400	90 degs
2	.20908	45.86	Pk	-40.6	.1	5.36	36.99	-31.63	0-360	400	0 degs
10	13.5596	43.08	Pk	-41.8	.6	1.88	11.8	-9.92	0-360	400	0 degs
11	13.5596	36.34	Pk	-41.8	.6	-4.86	11.8	-16.66	0-360	400	90 degs
12	13.5596	41.57	Pk	-41.8	.6	.37	11.8	-11.43	0-360	400	Flat
3	27.12247	23.97	Pk	-43.8	.8	-19.03	7.61	-26.64	0-360	400	0 degs
6	27.12247	22.83	Pk	-43.8	.8	-20.17	7.61	-27.78	0-360	400	90 degs
9	27.12247	25.65	Pk	-43.8	.8	-17.35	7.61	-24.96	0-360	400	Flat

Pk - Peak detector

10. AC MAINS LINE CONDUCTED EMISSIONS

LIMITS

FCC §15.207 (a)

Frequency of Emission (MHz)	Conducted Limit (dB μ V)	
	Quasi-peak	Average
0.15-0.5	66 to 56 *	56 to 46 *
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

RSS-Gen 8.8; RSS-216 6.2.2.1

Frequency of Emission (MHz)	Conducted Limit (dB μ A)	
	Quasi-peak	Average
0.009-0.05	110	-
0.05-0.15	90 to 80 *	-
0.15-0.5	66 to 56 *	56 to 46 *
0.5-5	56	46
5-30	60	50

TEST PROCEDURE

The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.10.

The receiver is set to a resolution bandwidth of 9 kHz for above 150kHz and 200Hz for below 150kHz. Peak detection is used unless otherwise noted as quasi-peak or average.

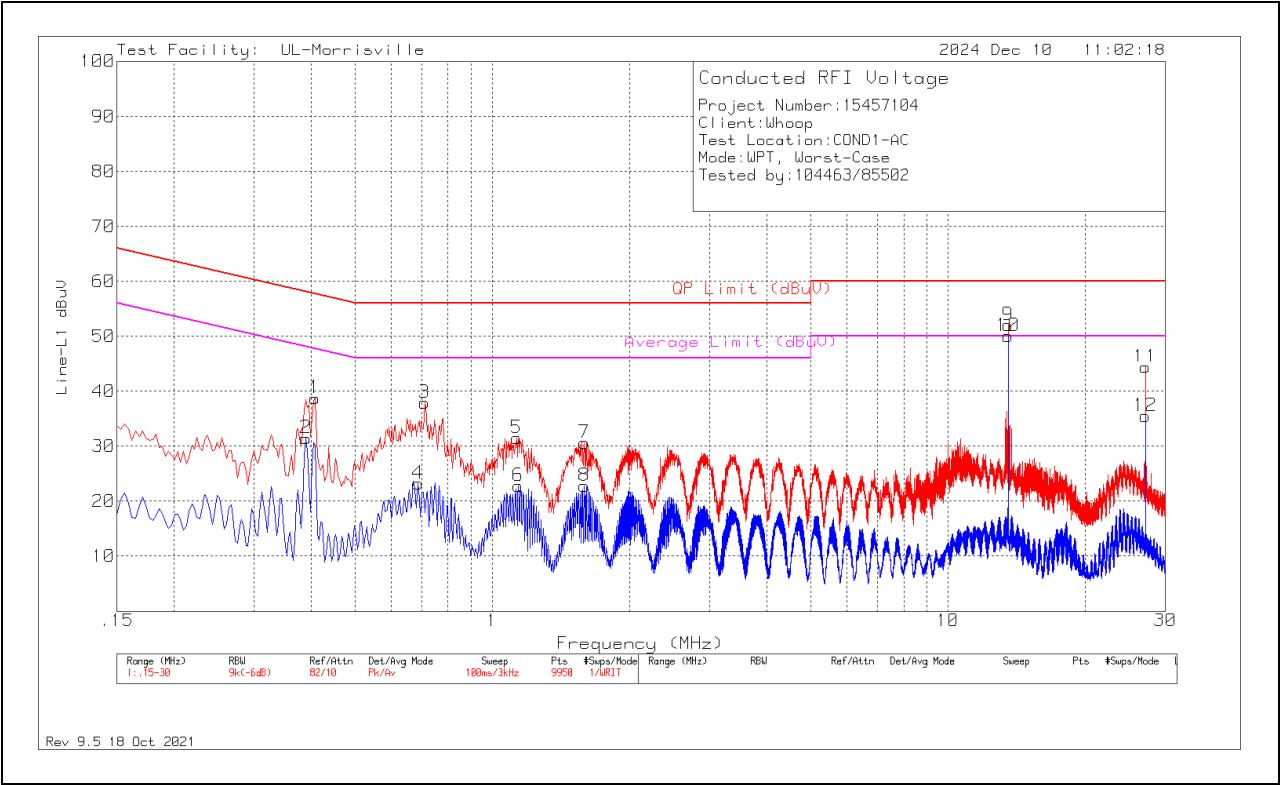
Line conducted data is recorded for both lines.

RESULTS

10.1. FCC 15.207 AC MAINS LINE CONDUCTED

10.1.1. CONFIG 1

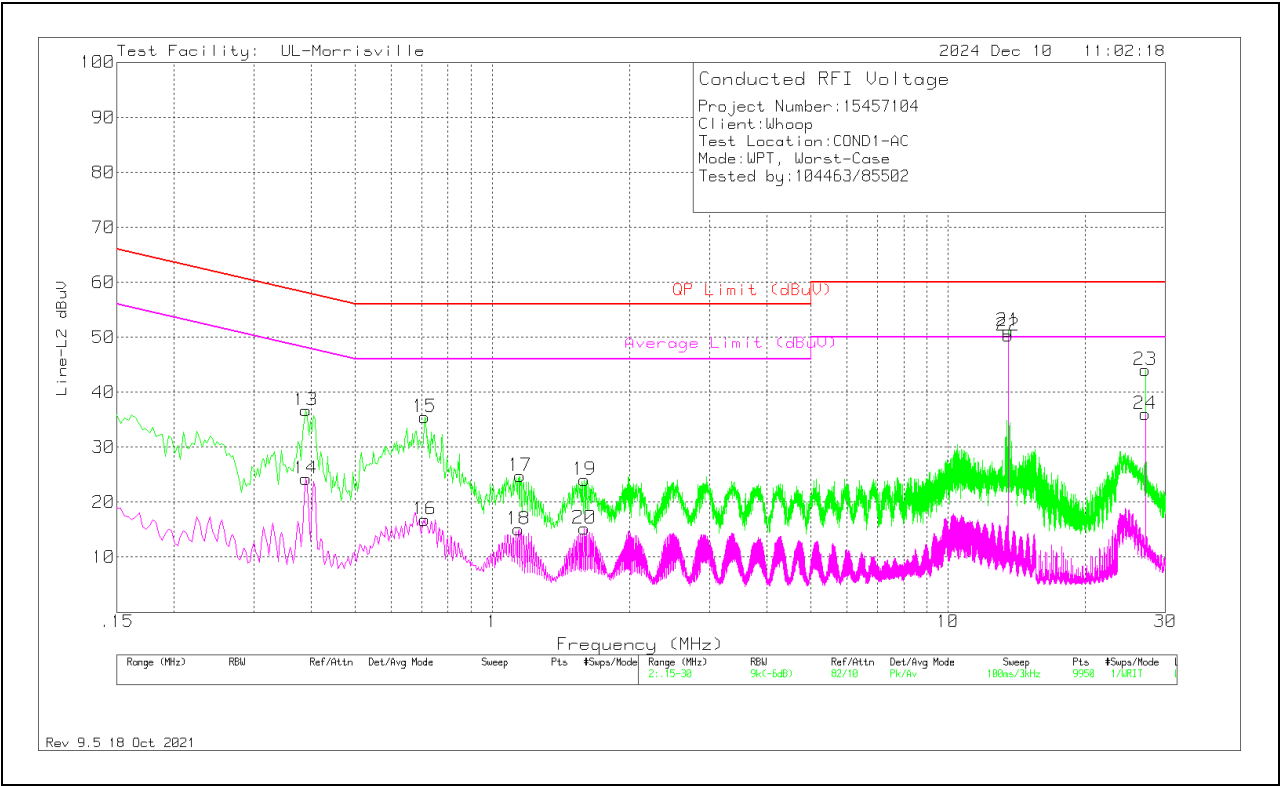
LINE 1 RESULTS



Range 1: Line-L1 .15 - 30MHz										
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VDF (dB)	Cbl/Limiter (dB)	Corrected Reading dBuV	QP Limit (dBuV)	Margin (dB)	Average Limit (dBuV)	Margin (dB)
2	.39	21.53	Av	.1	9.8	31.43	-	-	48.06	-16.63
1	.408	28.81	Pk	.1	9.8	38.71	57.69	-18.98	-	-
4	.687	13.37	Av	0	9.8	23.17	-	-	46	-22.83
3	.711	28.07	Pk	0	9.8	37.87	56	-18.13	-	-
5	1.131	21.66	Pk	0	9.8	31.46	56	-24.54	-	-
6	1.14	13	Av	0	9.8	22.8	-	-	46	-23.2
7	1.593	20.84	Pk	0	9.8	30.64	56	-25.36	-	-
8	1.593	12.97	Av	0	9.8	22.77	-	-	46	-23.23
*9	13.56	41.9	Pk	.1	10	52	60	-8	-	-
*10	13.56	39.97	Av	.1	10	50.07	-	-	50	.07
11	27.12	33.8	Pk	.4	10.2	44.4	60	-15.6	-	-
12	27.12	24.93	Av	.4	10.2	35.53	-	-	50	-14.47

Pk - Peak detector
Av - Average detection
*Note: Fundamental Frequency
NOTE 2: Order number in plot is improperly labeled and should be labeled as 14956064.

LINE 2 RESULTS

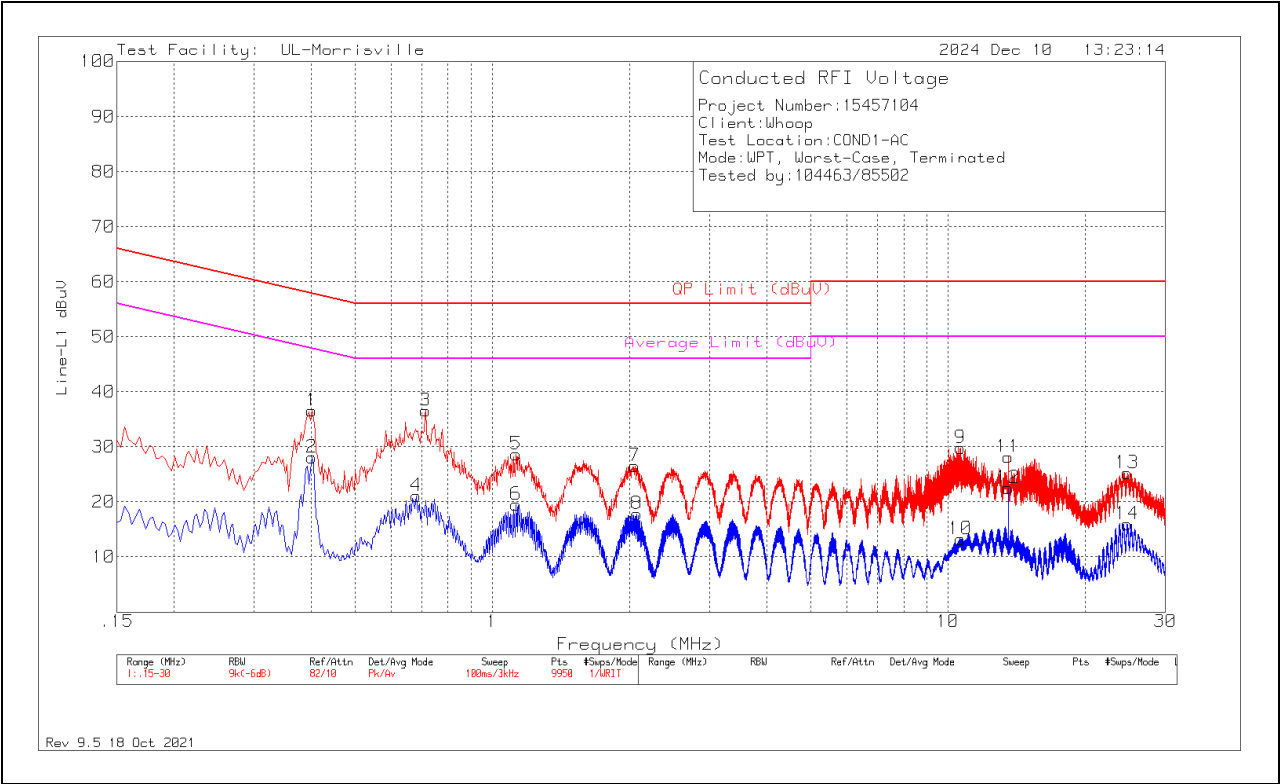


Range 2: Line-L2 .15 - 30MHz										
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VDF (dB)	Cbl/Limiter (dB)	Corrected Reading dBuV	QP Limit (dBuV)	Margin (dB)	Average Limit (dBuV)	Margin (dB)
13	.39	26.79	Pk	.1	9.8	36.69	58.06	-21.37	-	-
14	.39	14.37	Av	.1	9.8	24.27	-	-	48.06	-23.79
15	.711	25.67	Pk	0	9.8	35.47	56	-20.53	-	-
16	.711	7.05	Av	0	9.8	16.85	-	-	46	-29.15
18	1.143	5.24	Av	0	9.8	15.04	-	-	46	-30.96
17	1.152	15.03	Pk	0	9.8	24.83	56	-31.17	-	-
19	1.593	14.3	Pk	0	9.8	24.1	56	-31.9	-	-
20	1.593	5.47	Av	0	9.8	15.27	-	-	46	-30.73
*21	13.56	41.02	Pk	.1	10	51.12	60	-8.88	-	-
*22	13.56	40.24	Av	.1	10	50.34	-	-	50	.34
23	27.12	33.43	Pk	.4	10.2	44.03	60	-15.97	-	-
24	27.12	25.41	Av	.4	10.2	36.01	-	-	50	-13.99

Pk - Peak detector
Av - Average detection
*Note: Fundamental Frequency
NOTE 2: Order number in plot is improperly labeled and should be labeled as 14956064.

10.1.2. CONFIG 2

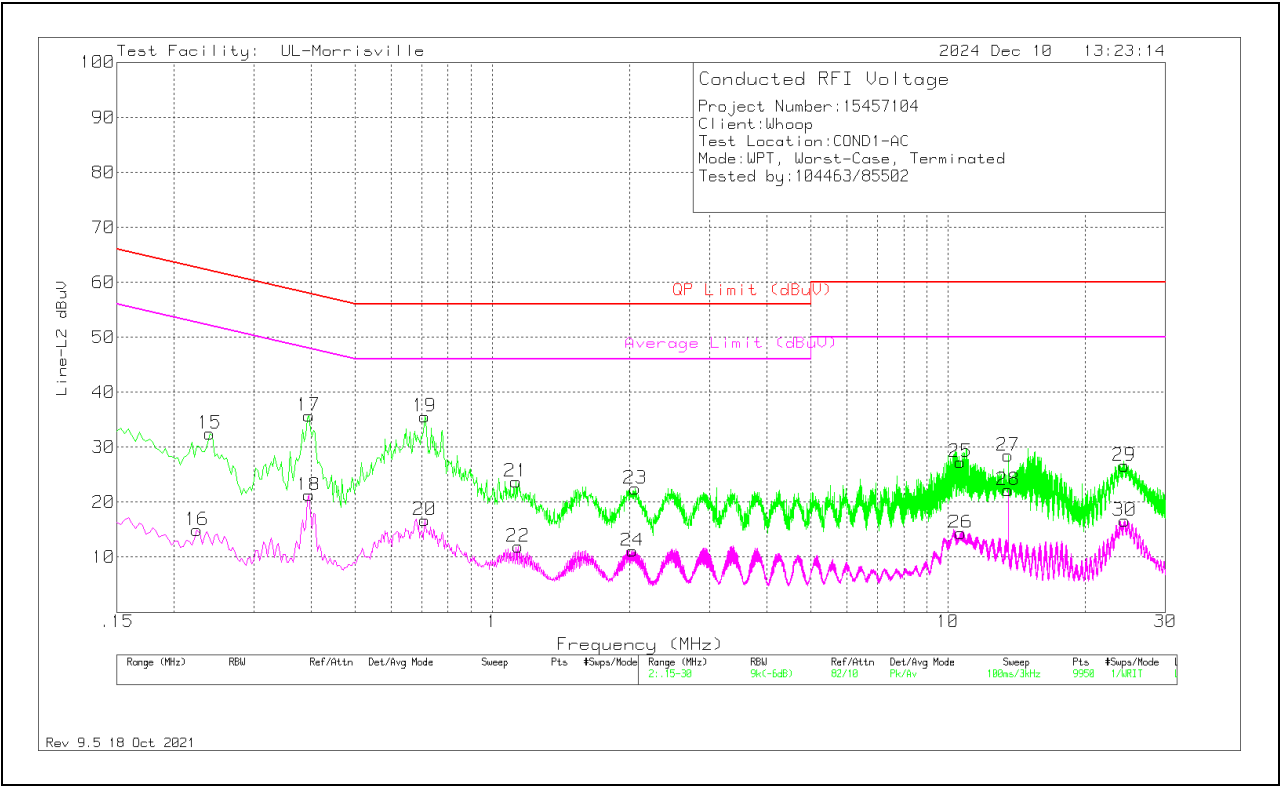
LINE 1 RESULTS



Range 1: Line-L1 .15 - 30MHz										
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VDF (dB)	Cbl/Limiter (dB)	Corrected Reading dBuV	QP Limit (dBuV)	Margin (dB)	Average Limit (dBuV)	Margin (dB)
1	.402	26.66	Pk	.1	9.8	36.56	57.81	-21.25	-	-
2	.402	18.19	Av	.1	9.8	28.09	-	-	47.81	-19.72
4	.681	11.27	Av	0	9.8	21.07	-	-	46	-24.93
3	.714	26.76	Pk	0	9.8	36.56	56	-19.44	-	-
5	1.128	18.83	Pk	0	9.8	28.63	56	-27.37	-	-
6	1.128	9.72	Av	0	9.8	19.52	-	-	46	-26.48
7	2.055	16.72	Pk	0	9.8	26.52	56	-29.48	-	-
8	2.076	7.95	Av	0	9.8	17.75	-	-	46	-28.25
9	10.653	19.65	Pk	.1	10	29.75	60	-30.25	-	-
10	10.659	3.12	Av	.1	10	13.22	-	-	50	-36.78
11	13.56	18.03	Pk	.1	10	28.13	60	-31.87	-	-
12	13.56	12.35	Av	.1	10	22.45	-	-	50	-27.55
13	24.756	14.58	Pk	.4	10.2	25.18	60	-34.82	-	-
14	24.768	5.36	Av	.4	10.2	15.96	-	-	50	-34.04

Pk - Peak detector
Av - Average detection
NOTE: Order number in plot is improperly labeled and should be labeled as 14956064.

LINE 2 RESULTS



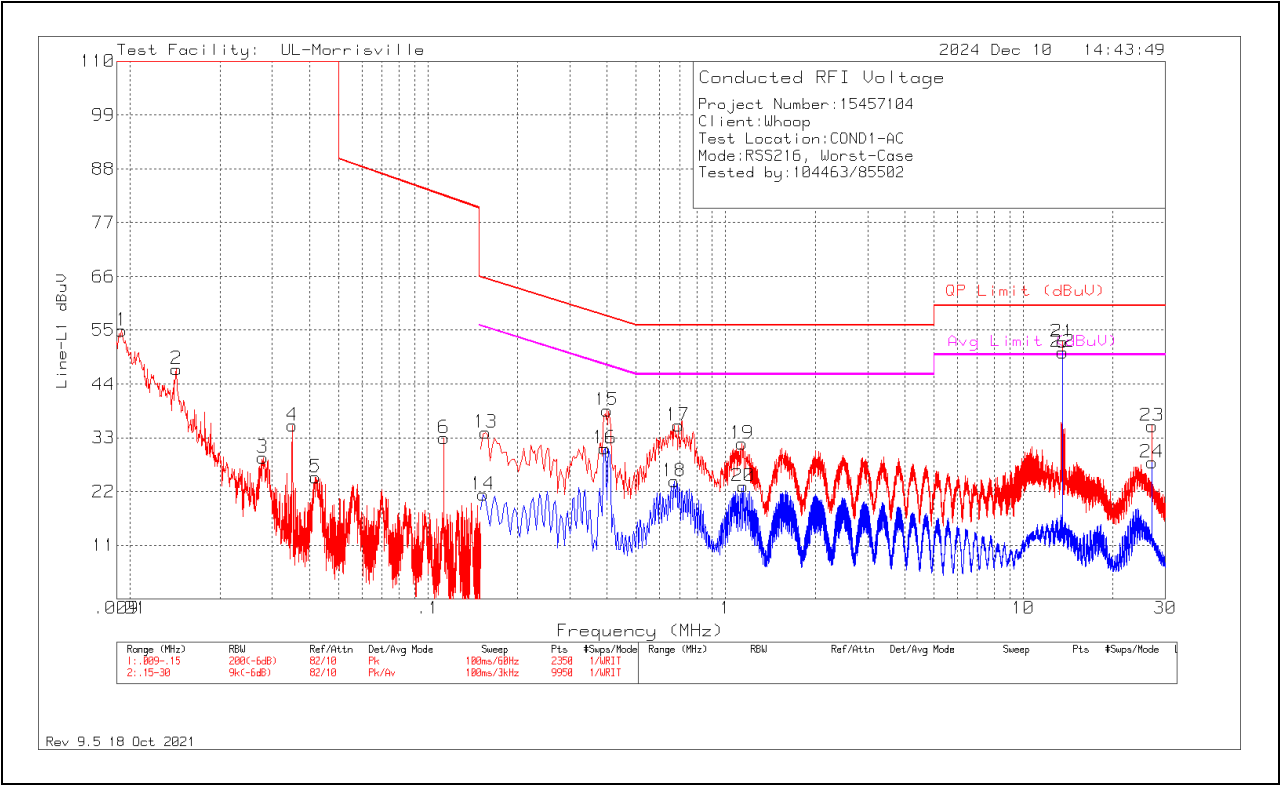
Range 2: Line-L2 .15 - 30MHz										
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VDF (dB)	Cbl/Limiter (dB)	Corrected Reading dBuV	QP Limit (dBuV)	Margin (dB)	Average Limit (dBuV)	Margin (dB)
16	.225	5.02	Av	.1	9.8	14.92	-	-	52.63	-37.71
15	.24	22.63	Pk	.1	9.8	32.53	62.1	-29.57	-	-
17	.396	25.81	Pk	.1	9.8	35.71	57.94	-22.23	-	-
18	.396	11.38	Av	.1	9.8	21.28	-	-	47.94	-26.66
19	.711	25.77	Pk	0	9.8	35.57	56	-20.43	-	-
20	.711	6.93	Av	0	9.8	16.73	-	-	46	-29.27
21	1.128	13.93	Pk	0	9.8	23.73	56	-32.27	-	-
22	1.14	2.11	Av	0	9.8	11.91	-	-	46	-34.09
24	2.031	1.36	Av	0	9.8	11.16	-	-	46	-34.84
23	2.061	12.67	Pk	0	9.8	22.47	56	-33.53	-	-
25	10.65	17.19	Pk	.1	10	27.29	60	-32.71	-	-
26	10.68	4.32	Av	.1	10	14.42	-	-	50	-35.58
27	13.56	18.39	Pk	.1	10	28.49	60	-31.51	-	-
28	13.56	12.1	Av	.1	10	22.2	-	-	50	-27.8
29	24.39	16.14	Pk	.3	10.2	26.64	60	-33.36	-	-
30	24.417	6.12	Av	.3	10.2	16.62	-	-	50	-33.38

Pk - Peak detector
Av - Average detection
NOTE: Order number in plot is improperly labeled and should be labeled as 14956064.

10.2. RSS-216 AC MAINS LINE CONDUCTED

10.2.1. CONFIG 1

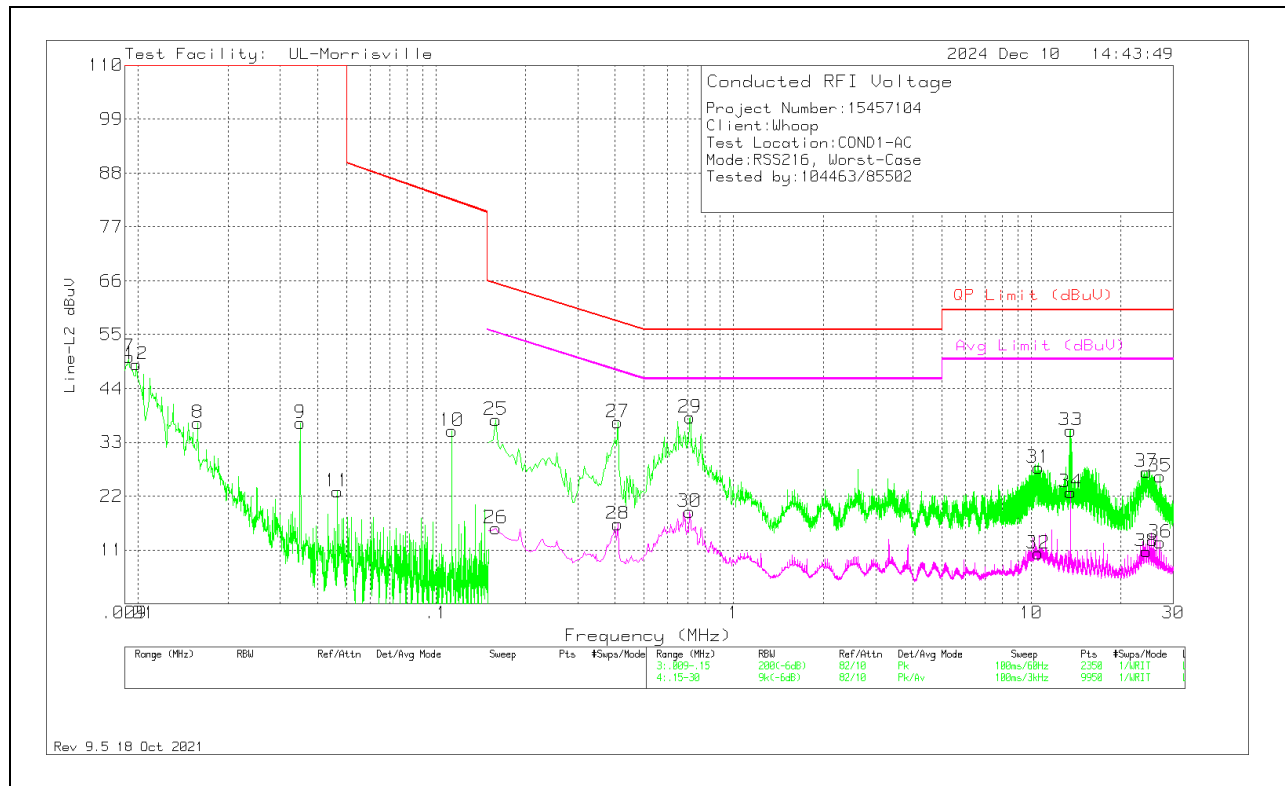
LINE 1 RESULTS



Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VDF (dB)	Cbl/Limiter (dB)	LISN VDF (dB)	Corrected Reading dBuV	QP Limit (dBuV)	Margin (dB)	Avg Limit (dBuV)	Margin (dB)
1	.00936	34.45	Pk	5	10.5	5	54.95	110	-55.05	-	-
2	.01428	31	Pk	2.8	10.4	2.8	47	110	-63	-	-
3	.0279	16.77	Pk	1	10.2	1	28.97	110	-81.03	-	-
4	.03498	24.31	Pk	.6	10	.6	35.51	110	-74.49	-	-
5	.04194	14	Pk	.5	9.9	.5	24.9	110	-85.1	-	-
6	.11304	22.98	Pk	.1	9.8	.1	32.98	82.51	-49.53	-	-
14	.153	11.33	Av	.1	9.8	.1	21.33	-	-	55.75	-34.42
13	.156	24.11	Pk	.1	9.8	.1	34.11	65.59	-31.48	-	-
16	.393	20.98	Av	0	9.8	0	30.78	-	-	47.98	-17.2
15	.399	28.82	Pk	0	9.8	0	38.62	57.86	-19.24	-	-
18	.672	14.27	Av	0	9.8	0	24.07	-	-	46	-21.93
17	.693	25.65	Pk	0	9.8	0	35.45	56	-20.55	-	-
19	1.134	22.01	Pk	0	9.8	0	31.81	56	-24.19	-	-
20	1.146	13.26	Av	0	9.8	0	23.06	-	-	46	-22.94
*21	13.56	42.39	Pk	.1	10	.1	52.59	60	-7.41	-	-
*22	13.56	40.3	Av	.1	10	.1	50.5	-	-	50	.5
23	27.117	24.81	Pk	.2	10.2	.2	35.41	60	-24.59	-	-
24	27.12	17.36	Av	.2	10.2	.2	27.96	-	-	50	-22.04

Pk - Peak detector
Av - Average detection
*Note: Fundamental Frequency
NOTE 2: Order number in plot is improperly labeled and should be labeled as 14956064.

LINE 2 RESULTS



Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VDF (dB)	Cbl/Limiter (dB)	LISN VDF (dB)	Corrected Reading dBuV	QP Limit (dBuV)	Margin (dB)	Avg Limit (dBuV)	Margin (dB)
7	.0093	30	Pk	5	10.5	5	50.5	110	-59.5	-	-
12	.00984	29.01	Pk	4.7	10.5	4.7	48.91	110	-61.09	-	-
8	.01584	21.7	Pk	2.4	10.4	2.4	36.9	110	-73.1	-	-
9	.03498	25.73	Pk	.6	10	.6	36.93	110	-73.07	-	-
11	.04662	12.32	Pk	.4	9.8	.4	22.92	110	-87.08	-	-
10	.11304	25.39	Pk	.1	9.8	.1	35.39	82.51	-47.12	-	-
25	.159	27.54	Pk	.1	9.8	.1	37.54	65.44	-27.9	-	-
26	.159	5.5	Av	.1	9.8	.1	15.5	-	-	55.44	-39.94
27	.408	27.3	Pk	0	9.8	0	37.1	57.67	-20.57	-	-
28	.408	6.51	Av	0	9.8	0	16.31	-	-	47.67	-31.36
30	.711	9.05	Av	0	9.8	0	18.85	-	-	46	-27.15
29	.714	28.28	Pk	0	9.8	0	38.08	56	-17.92	-	-
32	10.554	.06	Av	.1	10	.1	10.26	-	-	50	-39.74
31	10.566	17.63	Pk	.1	10	.1	27.83	60	-32.17	-	-
*33	13.56	25.21	Pk	.1	10	.1	35.41	60	-24.59	-	-
*34	13.563	12.56	Av	.1	10	.1	22.76	-	-	50	-27.24
37	24.384	16.33	Pk	.2	10.2	.2	26.93	60	-33.07	-	-
38	24.384	.11	Av	.2	10.2	.2	10.71	-	-	50	-39.29
35	27.126	15.44	Pk	.2	10.2	.2	26.04	60	-33.96	-	-
36	27.126	1.94	Av	.2	10.2	.2	12.54	-	-	50	-37.46

Pk - Peak detector

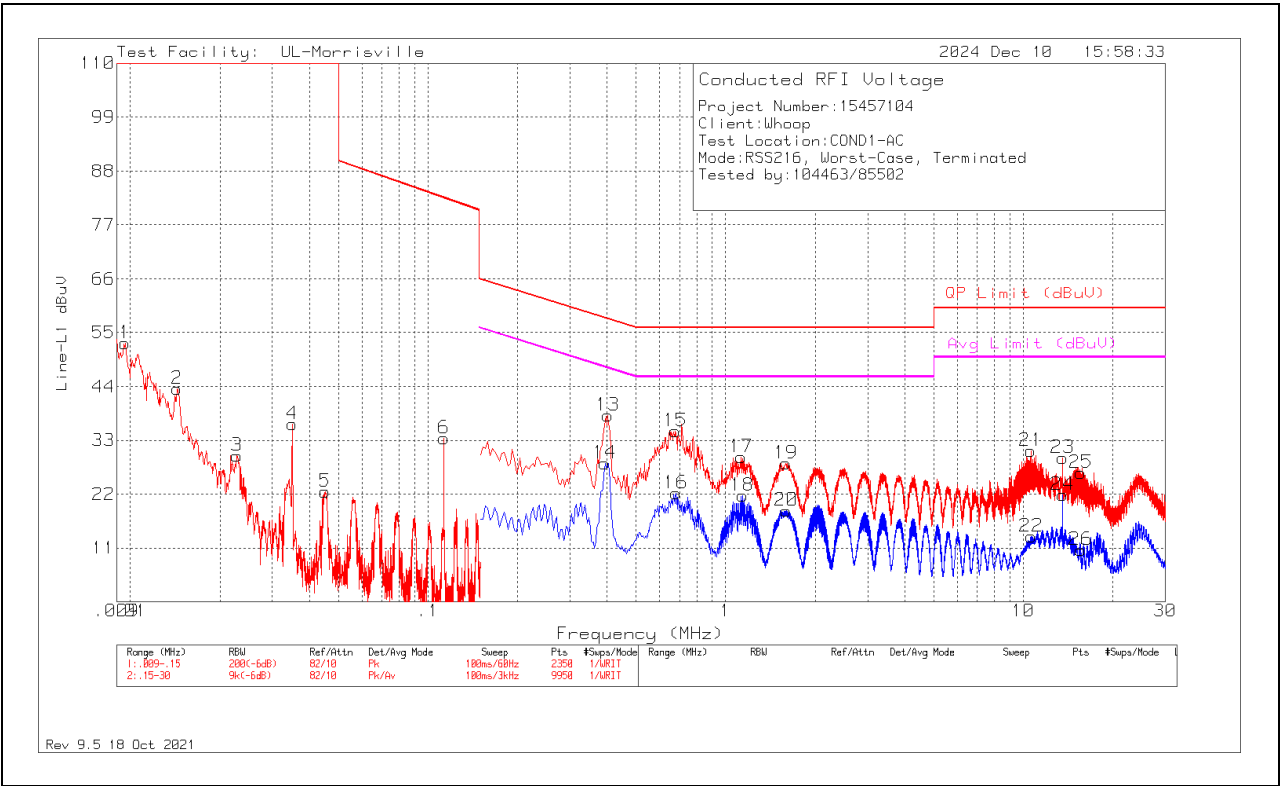
Av - Average detection

*Note: Fundamental Frequency

NOTE 2: Order number in plot is improperly labeled and should be labeled as 14956064.

10.2.2. CONFIG 2

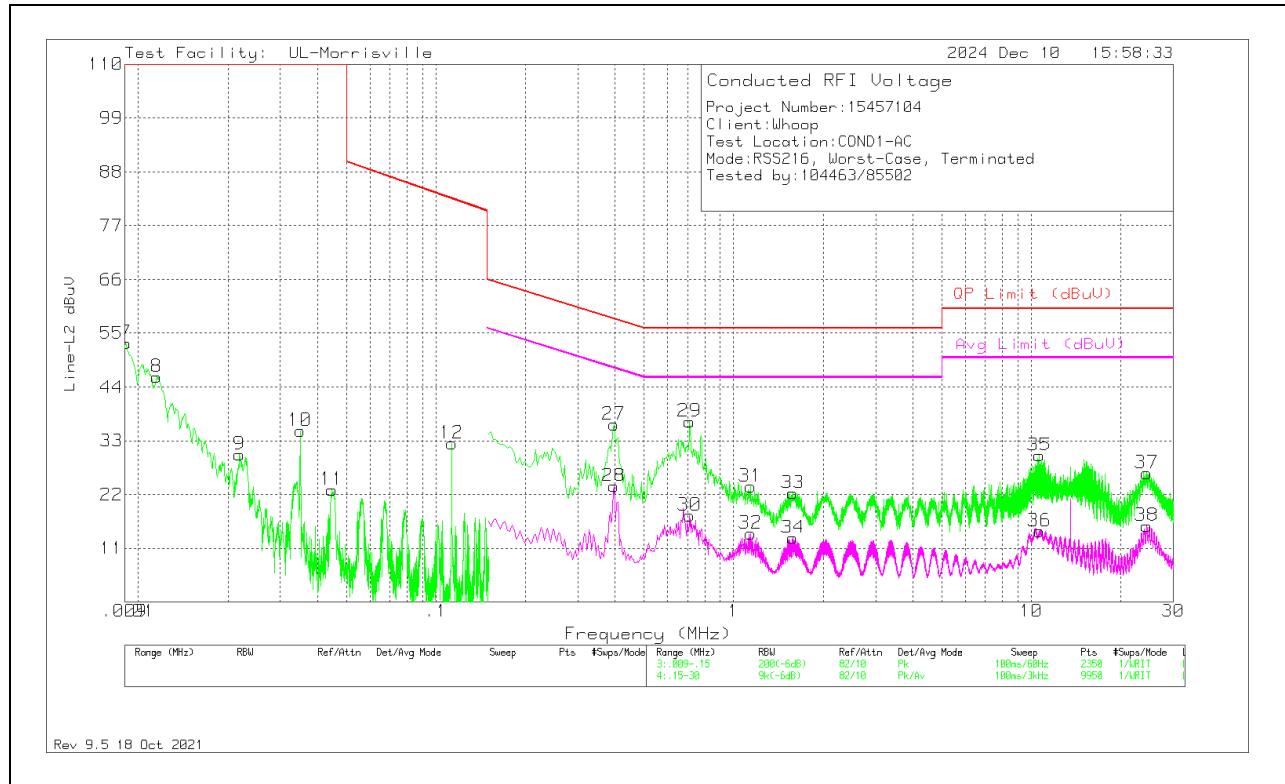
LINE 1 RESULTS



Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VDF (dB)	Cbl/Limiter (dB)	LISN VDF (dB)	Corrected Reading dBuV	QP Limit (dBuV)	Margin (dB)	Avg Limit (dBuV)	Margin (dB)
1	.0096	32.73	Pk	4.8	10.5	4.8	52.83	110	-57.17	-	-
2	.01434	27.5	Pk	2.8	10.4	2.8	43.5	110	-66.5	-	-
3	.0228	17.02	Pk	1.3	10.2	1.3	29.82	110	-80.18	-	-
4	.03498	25.1	Pk	.6	10	.6	36.3	110	-73.7	-	-
5	.04512	11.9	Pk	.4	9.8	.4	22.5	110	-87.5	-	-
6	.11304	23.38	Pk	.1	9.8	.1	33.38	82.51	-49.13	-	-
14	.393	18.54	Av	0	9.8	0	28.34	-	-	47.98	-19.64
13	.402	28.28	Pk	0	9.8	0	38.08	57.8	-19.72	-	-
15	.678	25.11	Pk	0	9.8	0	34.91	56	-21.09	-	-
16	.681	12.35	Av	0	9.8	0	22.15	-	-	46	-23.85
17	1.128	19.72	Pk	0	9.8	0	29.52	56	-26.48	-	-
18	1.14	11.94	Av	0	9.8	0	21.74	-	-	46	-24.26
19	1.593	18.47	Pk	0	9.8	0	28.27	56	-27.73	-	-
20	1.599	8.78	Av	0	9.8	0	18.58	-	-	46	-27.42
21	10.608	20.69	Pk	.1	10	.1	30.89	60	-29.11	-	-
22	10.632	3.15	Av	.1	10	.1	13.35	-	-	50	-36.65
23	13.56	19.24	Pk	.1	10	.1	29.44	60	-30.56	-	-
24	13.56	11.64	Av	.1	10	.1	21.84	-	-	50	-28.16
26	15.591	.26	Av	.1	10.1	.1	10.56	-	-	50	-39.44
25	15.615	16.04	Pk	.1	10.1	.1	26.34	60	-33.66	-	-

Pk - Peak detector
Av - Average detection
NOTE: Order number in plot is improperly labeled and should be labeled as 14956064.

LINE 2 RESULTS



Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN VDF (dB)	Cbl/Limiter (dB)	LISN VDF (dB)	Corrected Reading dBuV	QP Limit (dBuV)	Margin (dB)	Avg Limit (dBuV)	Margin (dB)
7	.00906	32.04	Pk	5.2	10.5	5.2	52.94	110	-57.06	-	-
8	.01152	28.03	Pk	3.8	10.4	3.8	46.03	110	-63.97	-	-
9	.02184	17.05	Pk	1.4	10.3	1.4	30.15	110	-79.85	-	-
10	.03498	23.83	Pk	.6	10	.6	35.03	110	-74.97	-	-
11	.0447	12.22	Pk	.4	9.9	.4	22.92	110	-87.08	-	-
12	.11298	22.49	Pk	.1	9.8	.1	32.49	82.51	-50.02	-	-
27	.396	26.52	Pk	0	9.8	0	36.32	57.92	-21.6	-	-
28	.396	13.91	Av	0	9.8	0	23.71	-	-	47.92	-24.21
29	.711	27.09	Pk	0	9.8	0	36.89	56	-19.11	-	-
30	.711	7.89	Av	0	9.8	0	17.69	-	-	46	-28.31
31	1.14	13.8	Pk	0	9.8	0	23.6	56	-32.4	-	-
32	1.14	4.25	Av	0	9.8	0	14.05	-	-	46	-31.95
33	1.581	12.47	Pk	0	9.8	0	22.27	56	-33.73	-	-
34	1.581	3.32	Av	0	9.8	0	13.12	-	-	46	-32.88
35	10.641	19.76	Pk	.1	10	.1	29.96	60	-30.04	-	-
36	10.668	4.29	Av	.1	10	.1	14.49	-	-	50	-35.51
38	24.426	4.94	Av	.2	10.2	.2	15.54	-	-	50	-34.46
37	24.447	15.76	Pk	.2	10.2	.2	26.36	60	-33.64	-	-

Pk - Peak detector

Av - Average detection

NOTE: Order number in plot is improperly labeled and should be labeled as 14956064.

11. SETUP PHOTOS

Please refer to R14956064-EP6 for setup photos

END OF TEST REPORT