TEST REPORT

Report Number: R14204340-E3

Applicant	:	Stryker Instruments 1941 Stryker Way Portage, MI, 49002, U.S.A
Model	:	System 9
FCC ID	:	Q9R-9110120550
IC	:	4919A-9110120550
EUT Description	:	Sterile Battery Charger
Test Standard(s)	:	FCC 47 CFR PART 15 SUBPART C:2022 ISED RSS-210 ISSUE 10 + A1 Annex B:2020 ISED RSS-GEN ISSUE 5 + A2: 2021

Date Of Issue:
2022-06-02

Prepared by:
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ACCREDITED
CERT #0751.06

REVISION HISTORY

Ver.	Issue Date	Revisions	Revised By
1	2022-06-02	Initial Issue	Brian Kiewra

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME:	Stryker Instruments 1941 Stryker Way Portage, MI 49002, USA
EUT DESCRIPTION:	Sterile Batery Charger
MODEL:	System 9
SERIAL NUMBER:	AB2212200669, AB2212200639
SAMPLE RECEIPT DATE:	2022-05-16
DATE TESTED:	2022-05-16 to 2022-05-25

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
FCC PART 15 SUBPART C : 2022	Compliant
ISED RSS-210 Issue 10 + A1, Annex B: 2020	Compliant
ISED RSS-GEN Issue 5 + A2:2021	Compliant

This report contains data provided by the applicant which can impact the validity of results. UL LLC is only responsible for the validity of results after the integration of the data provided by the customer.

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 By:

Michael Antola
Staff Engineer
Consumer Technology Division
UL LLC

Prepared By:

Brian Kiewra
Project Engineer
Consumer Technology Division
UL LLC

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10-2013, KDB 174176, FCC CFR 47 Part 2, FCC CFR 47 Part 15: 2021, RSS-GEN Issue 5 + A2:2021, and RSS-210 Issue 10 Annex B: 2019.

3. FACILITIES AND ACCREDITATION

UL LLC is accredited by A2LA, certification # 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	

4. DECISION RULES AND MEASUREMENT UNCERTAINTY

4.1. 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.

4.2. 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.)

4.3. 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%.

4.4. 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 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 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 dBuV + 0 dB +10.1 dB+ 0 dB = 46.6 dBuV

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5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a sterile battery charge with NFC and WPT. This test report covers NFC testing.

5.2. MAXIMUM OUTPUT POWER

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

Fundamental Frequency (MHz)	E-field (30m distance) (dBuV/m)
13.56	19.41

5.3. SOFTWARE AND FIRMWARE

The test utility software for configuring the charger is the Sterile Charger PC Tool Suite, Version 5.0.10. Transmitter firmware version is 6.0.1.

5.4. WORST-CASE CONFIGURATION AND MODE

The EUT operates in only one orientation in the field; therefore all final radiated emissions were performed with the EUT in its intended orientation.

For final radiated emissions, the EUT was investigated with all 6 charging bays active since this was determined to be the worst-case configuration.

Frequency Tolerance performed with tag as worst-case.

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.

5.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
Wi-Fi /Router	NETGEAR	AC1750	59BF127WA35B6	PY316200342
Fiberoptic Ethernet Transceivers	Pontus for Ethernet	N/A	4682203210	N/A
Laptop	HP	14-DK1xxx	5CG016B4XM	N/A
Laptop	HP	11-ah112dx	5CD8294MZY	N/A
Router	Netgear	R6400v2	59BE0B74A5D4D	PY316200342

I/O CABLES

I/O Cable List						
Cable No.	**Port**	**# of Identical Ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	1	1	Hardwired	Mains	1m	Connects to AC mains
2	2	1	Ethernet	Cat6A	1m	Connect to laptop for test configuration.

SETUP DIAGRAM

Refer to exhibit R14204340-EP3 for setup diagram.

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6. TEST AND MEASUREMENT EQUIPMENT

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

Test Equipment Used - Line-Conducted Emissions – Voltage (RTP-CDE)

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
85496	EMI Test Receiver 9kHz-3.6GHz	Rohde & Schwarz	ESR3	2021-08-17	2022-08-17
CBL004	Coaxial cable, 20 ft., BNC -male to BNC-male	UL	RG-223	2021-08-02	2022-08-02
HI0093	Temp/Humid/Pressure Meter	Extech	SD700	2021-08-11	2022-08-11
SOFTEMI	EMI Software	UL	Version 9.5	NA	NA
206212	Transient Limiter, 0.009 to 100 MHz	Electro-Metrics	EM 7600	2021-08-02	2022-08-02
LISN001	LISN, 50-ohm/50-uH, 250uH, 2-conductor, 25A	Fischer Custom Com.	FCC-LISN-50/250-25-2-01	2021-08-16	2022-08-16

Test Equipment Used - Wireless Conducted Measurement Equipment

Equipment ID	Description	Manufacturer/Brand	Model Number	Last Cal.	Next Cal.
SA0026	Spectrum Analyzer	Keysight Technologies	N9030A	2021-07-26	2022-07-26
HI0090	Environmental Meter	Fisher Scientific	15-077-963	2021-07-12	2022-07-12
SOFTEMI	Antenna Port Software	UL	Version 2022.5.4	NA	NA
207726	Temp/Humid Chamber	Thermotron	SM-32-8200	2022-01-25	2023-01-25
MM0167	True RMS Multimeter	Keysight Technologies	U1232A	2021-08-17	2023-08-17
PS215	AC Power Source	Elgar	CW2501M (s/n 1523A02397)	NA	NA
MM0165	Multimeter	Agilent	U1232A	2021-08-18	2022-08-18

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Test Equipment Used - Radiated Disturbance Emissions Test Equipment (Morrisville – Chamber 2)

Equipment ID	Description	Manufacturer/Brand	Model Number	Last Cal.	Next Cal.
0.009-30MHz					
AT0079	Active Loop Antenna	ETS-Lindgren	6502	2021-08-19	2022-08-19
30-1000 MHz					
AT0073	Hybrid Broadband Antenna	Sunol Sciences Corp.	JB3	2021-08-30	2022-08-30
Gain-Loss Chains					
C2-SAC01	Gain-loss string: 0.009-30MHz	Various	Various	2021-07-09	2022-07-09
C2-SAC02	Gain-loss string: 25-1000MHz	Various	Various	2021-07-09	2022-07-09
Receiver & Software					
197955	Spectrum Analyzer	Rohde & Schwarz	ESW44	2022-03-08	2023-03-08
SOFTEMI	EMI Software	UL	Version 9.5 (18 Oct 2021)		
Additional Equipment used					
PS216	AC Power Source	Elgar	CW2501M (s/n 1045A04231)	NA	NA
H10093	Temp/Humid/Pressure Meter	Extech	SD700	2021-08-11	2022-08-11

7. OCCUPIED BANDWIDTH AND 20dB BANDWIDTH

LIMITS

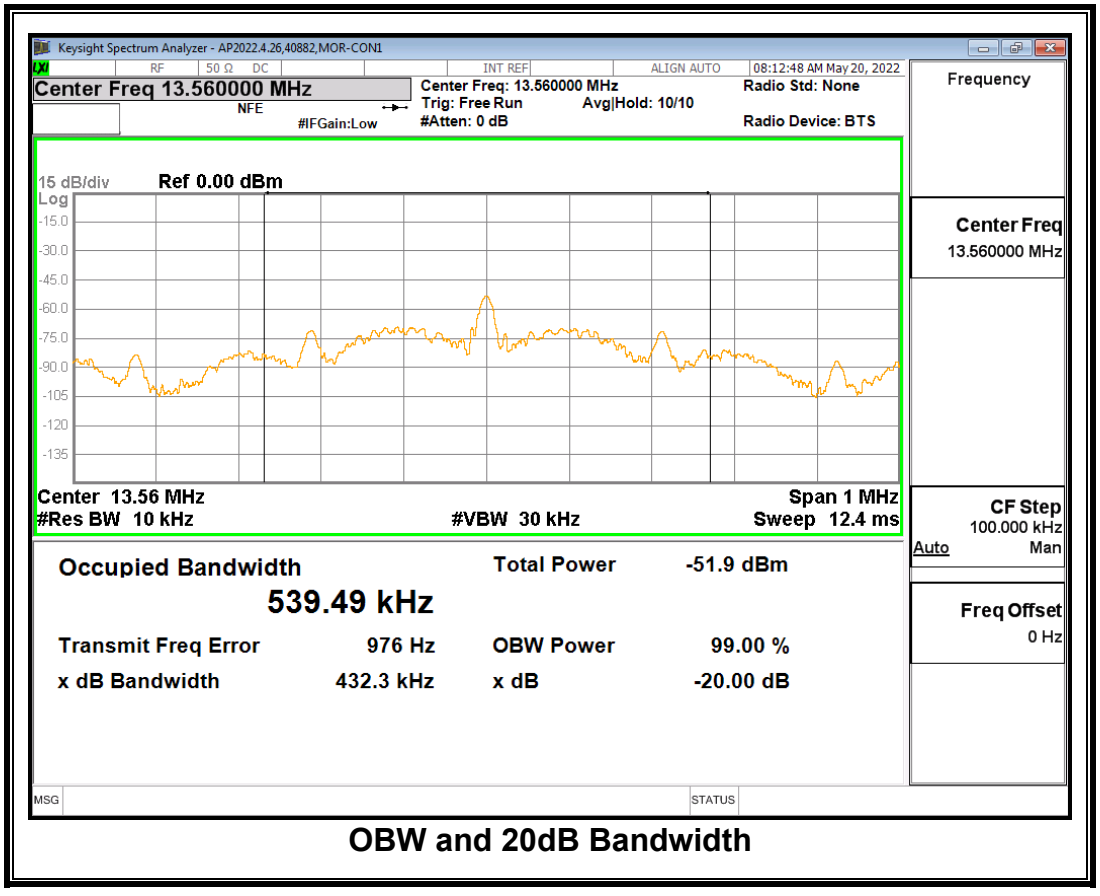
§15.215 (c)
Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in 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 and x dB bandwidth functions are utilized.

RESULTS

Frequency (MHz)	99% Bandwidth (kHz)	20dB Bandwidth (kHz)
13.56	539.49	432.3



OBW and 20dB Bandwidth

8. RADIATED EMISSION TEST RESULTS

8.1. 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 filed strength from uV/m to dBuV/m is:
Limit (dBuV/m) = 20 log limit (uV/m)

Note: The limits in CFR 47, Part 15, Subpart C, paragraph 15.209(a), are identical to those in RSS-Gen section 8.9, Table 6, since the measurements are performed in terms of magnetic field strength and converted to electric field strength levels (as report in the table) using free space impedance of 377 Ohms. For example, the measurement at frequency X kHz resulted in a level of Y dBuV/m, which is equivalent to Y-51.5 = Z dBuA/m, which has the same margin, W dB to the corresponding RSS-Gen Table 6 limit as it has to 15.209(a) limit.

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.

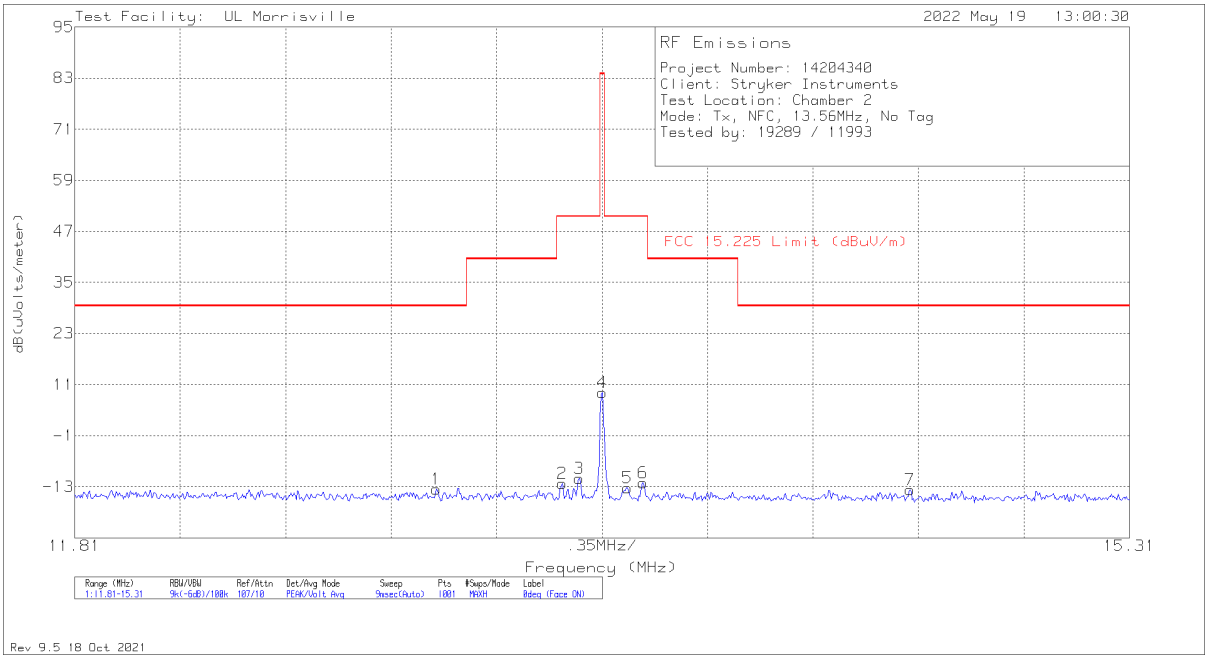
TEST PROCEDURE

ANSI C63.10, 2013

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.

8.2. FUNDAMENTAL EMISSIONS – NO TAG

ANTENNA LOOP FACE ON



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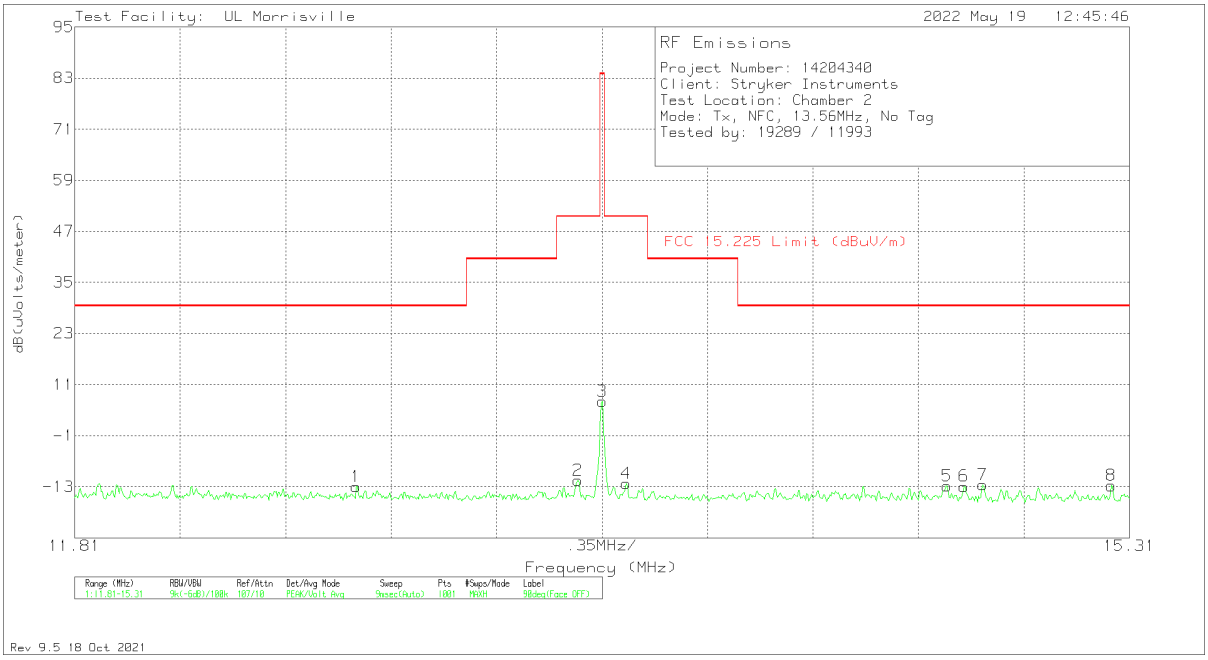
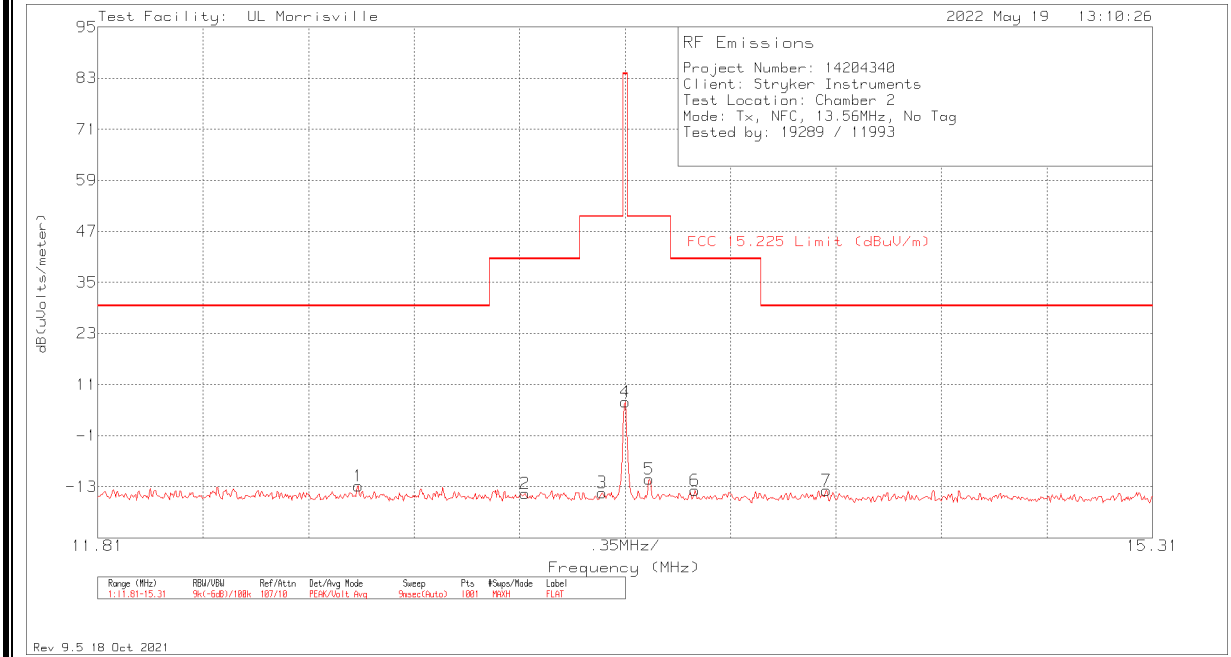


ANTENNA LOOP FLAT

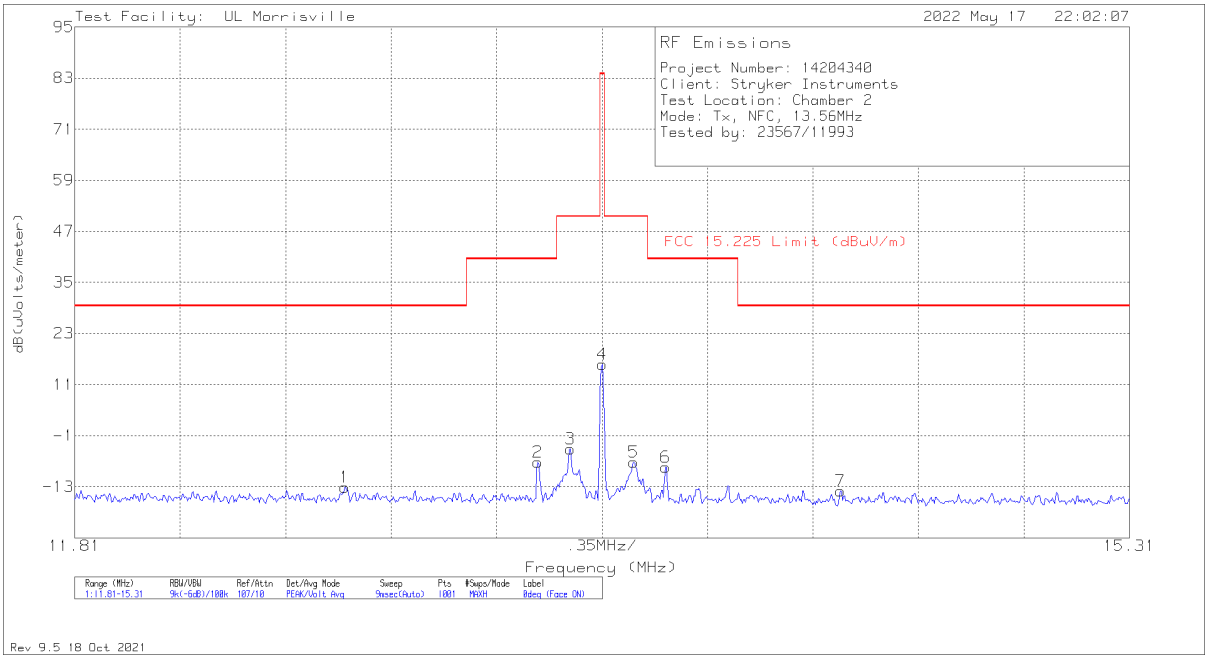


Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0079 (dB/m)	Cbl (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uVolts/meter)	FCC 15.225 Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Loop Angle
1	13.0105	15.53	Pk	10.2	.7	-40	-13.57	29.5	-43.07	305	100	0 degs
2	13.427	16.9	Pk	10.2	.7	-40	-12.2	50.5	-62.7	305	100	0 degs
3	13.483	18	Pk	10.2	.7	-40	-11.1	50.5	-61.6	305	100	0 degs
4	13.56	38.24	Pk	10.2	.7	-40	9.14	84	-74.86	305	100	0 degs
5	13.644	15.84	Pk	10.2	.7	-40	-13.26	50.5	-63.76	305	100	0 degs
6	13.6965	17.02	Pk	10.2	.7	-40	-12.08	50.5	-62.58	305	100	0 degs
7	14.582	15.39	Pk	10.1	.8	-40	-13.71	29.5	-43.21	305	100	0 degs
1	12.7445	15.99	Pk	10.3	.7	-40	-13.01	29.5	-42.51	243	100	90 degs
2	13.4795	17.53	Pk	10.2	.7	-40	-11.57	50.5	-62.07	243	100	90 degs
3	13.56	36.14	Pk	10.2	.7	-40	7.04	84	-76.96	243	100	90 degs
4	13.6405	16.81	Pk	10.2	.7	-40	-12.29	50.5	-62.79	243	100	90 degs
5	14.7045	16.31	Pk	10	.8	-40	-12.89	29.5	-42.39	243	100	90 degs
6	14.7605	16.29	Pk	10	.8	-40	-12.91	29.5	-42.41	243	100	90 degs
7	14.8235	16.63	Pk	10	.8	-40	-12.57	29.5	-42.07	243	100	90 degs
8	15.2505	16.44	Pk	10	.8	-40	-12.76	29.5	-42.26	243	100	90 degs
1	12.6745	16.15	Pk	10.3	.7	-40	-12.85	29.5	-42.35	307	100	Flat
2	13.2275	14.55	Pk	10.2	.7	-40	-14.55	40.5	-55.05	307	100	Flat
3	13.483	14.71	Pk	10.2	.7	-40	-14.39	50.5	-64.89	307	100	Flat
4	13.56	35.98	Pk	10.2	.7	-40	6.88	84	-77.12	307	100	Flat
5	13.6405	17.84	Pk	10.2	.7	-40	-11.26	50.5	-61.76	307	100	Flat
6	13.791	15.38	Pk	10.1	.7	-40	-13.82	40.5	-54.32	307	100	Flat
7	14.2285	15.26	Pk	10.1	.8	-40	-13.84	29.5	-43.34	307	100	Flat

Pk - Peak detector

8.3. FUNDAMENTAL EMISSIONS – TAG

ANTENNA LOOP FACE ON



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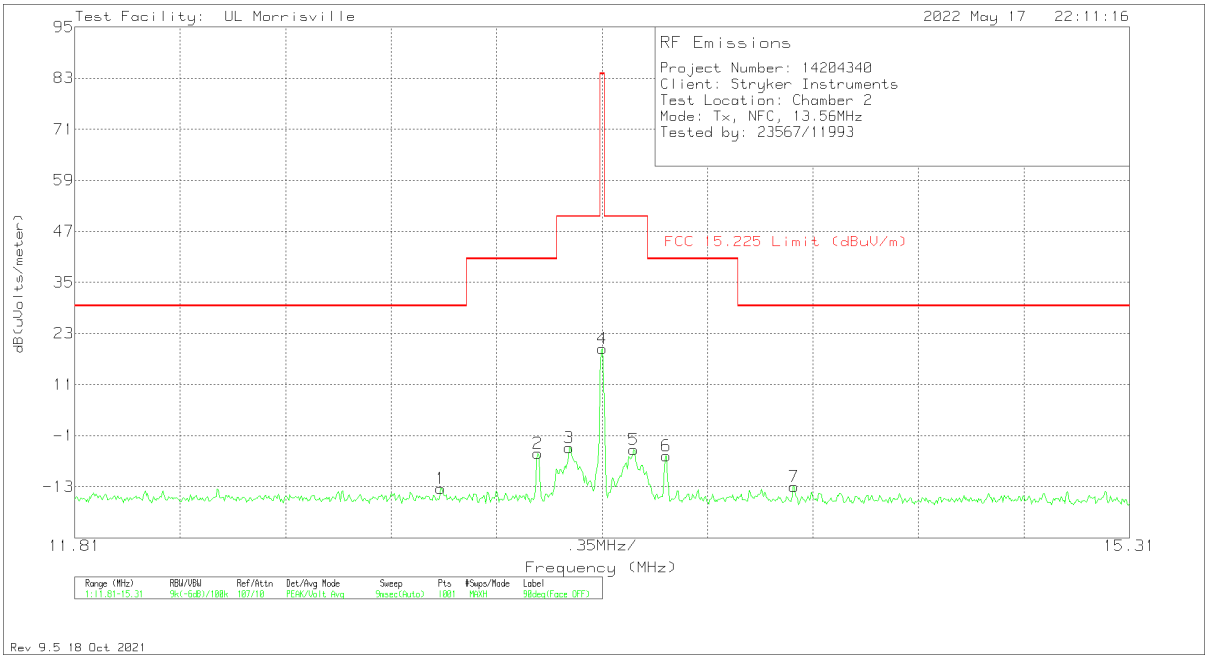
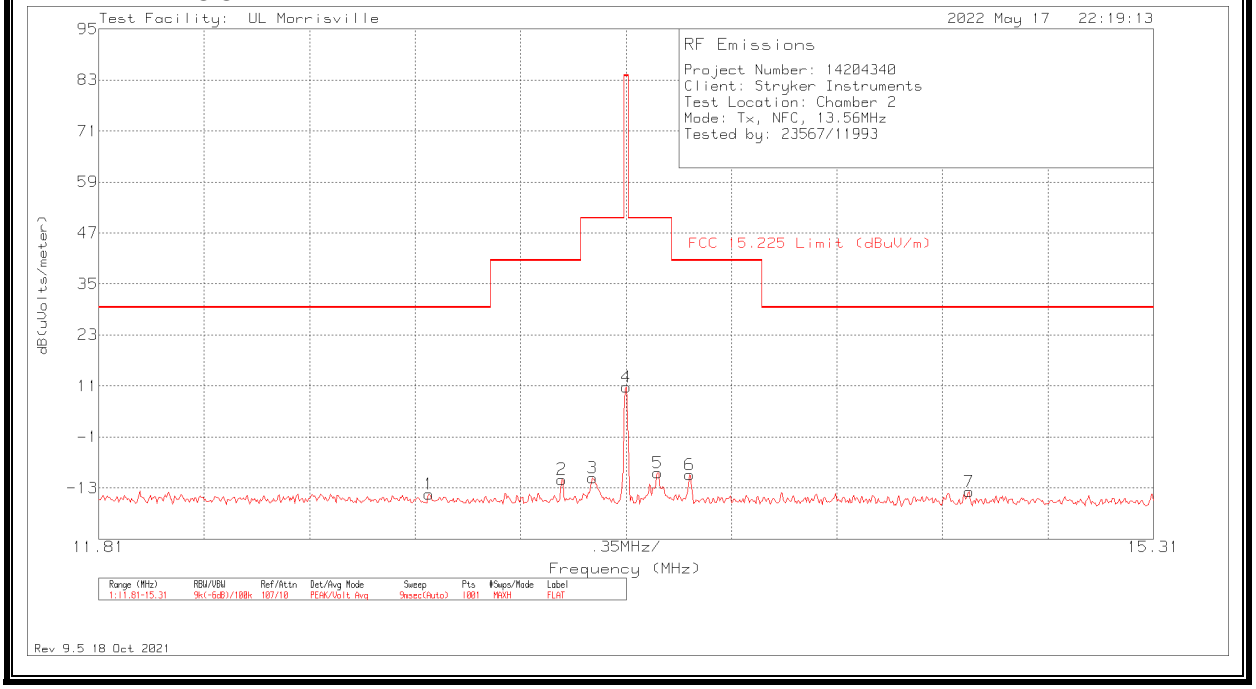


ANTENNA LOOP FLAT



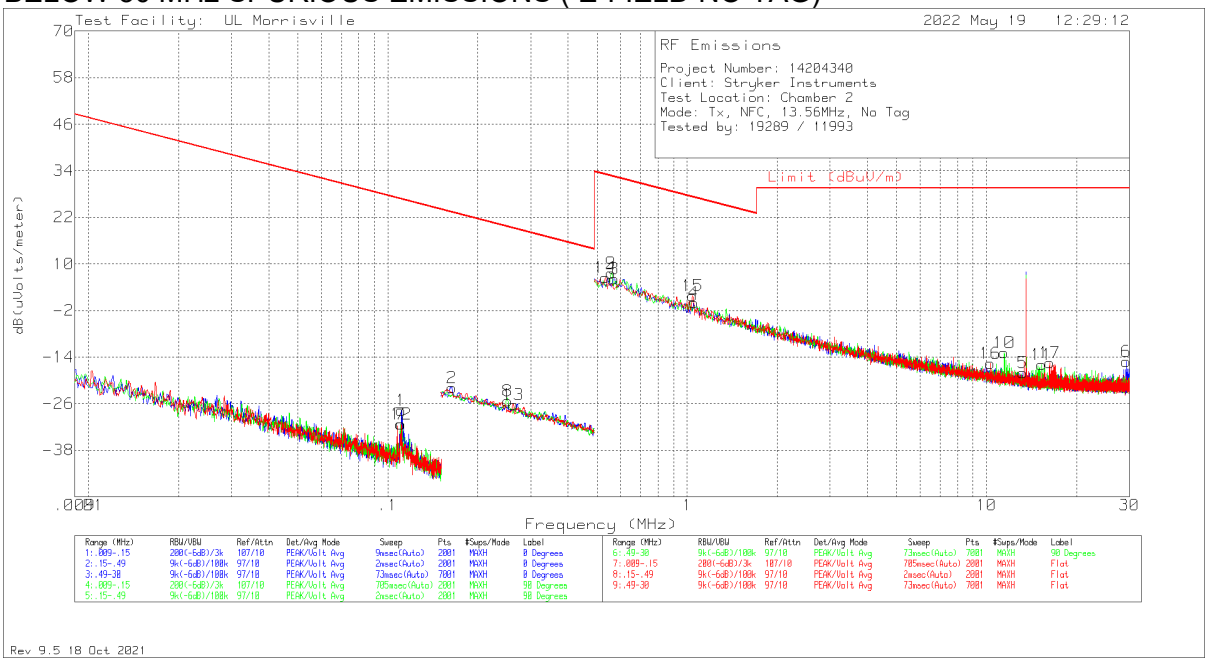
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0079 (dB/m)	Cbl (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uVolts/meter)	FCC 15.225 Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Loop Angle
1	12.706	15.8	Pk	10.3	.7	-40	-13.2	29.5	-42.7	204	100	0 degs
2	13.3465	21.82	Pk	10.2	.7	-40	-7.28	40.5	-47.78	204	100	0 degs
3	13.455	24.95	Pk	10.2	.7	-40	-4.15	50.5	-54.65	204	100	0 degs
4	13.56	44.83	Pk	10.2	.7	-40	15.73	84	-68.27	204	100	0 degs
5	13.665	21.87	Pk	10.2	.7	-40	-7.23	50.5	-57.73	204	100	0 degs
6	13.77	20.85	Pk	10.1	.7	-40	-8.35	40.5	-48.85	204	100	0 degs
7	14.351	15.02	Pk	10.1	.8	-40	-14.08	29.5	-43.58	204	100	0 degs
1	13.0245	15.71	Pk	10.2	.7	-40	-13.39	29.5	-42.89	4	100	90 degs
2	13.3465	23.9	Pk	10.2	.7	-40	-5.2	40.5	-45.7	4	100	90 degs
3	13.4515	25.24	Pk	10.2	.7	-40	-3.86	50.5	-54.36	4	100	90 degs
4	13.56	48.51	Pk	10.2	.7	-40	19.41	84	-64.59	4	100	90 degs
5	13.665	24.87	Pk	10.2	.7	-40	-4.23	50.5	-54.73	4	100	90 degs
6	13.7735	23.44	Pk	10.1	.7	-40	-5.76	40.5	-46.26	4	100	90 degs
7	14.197	16.17	Pk	10.1	.7	-40	-13.03	29.5	-42.53	4	100	90 degs
1	12.9055	14.58	Pk	10.3	.7	-40	-14.42	29.5	-43.92	139	100	Flat
2	13.3465	18.1	Pk	10.2	.7	-40	-11	40.5	-51.5	139	100	Flat
3	13.448	18.43	Pk	10.2	.7	-40	-10.67	50.5	-61.17	139	100	Flat
4	13.56	39.87	Pk	10.2	.7	-40	10.77	84	-73.23	139	100	Flat
5	13.665	19.7	Pk	10.2	.7	-40	-9.4	50.5	-59.9	139	100	Flat
6	13.77	19.25	Pk	10.1	.7	-40	-9.95	40.5	-50.45	139	100	Flat
7	14.6975	15.27	Pk	10	.8	-40	-13.93	29.5	-43.43	139	100	Flat

Pk - Peak detector

8.4. TX SPURIOUS EMISSION BELOW 30 MHz – NO TAG

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).

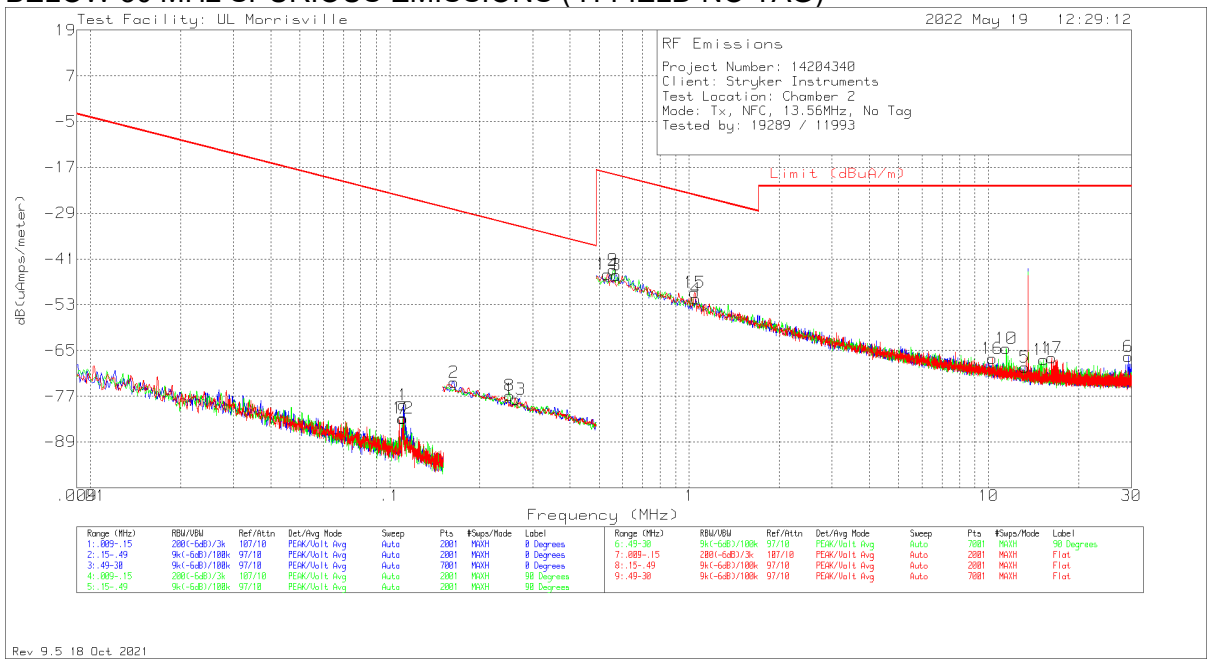
BELOW 30 MHz SPURIOUS EMISSIONS (E-FIELD NO TAG)



Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0079 (dB/m)	Cbl (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
1	.11103	40.74	Pk	11.4	.1	-80	-27.76	26.7	46.7	-54.46	0-360	0 degs
2	.1636	46.82	Pk	11.2	.1	-80	-21.88	23.33	43.33	-45.21	0-360	0 degs
3	.5701	34.82	Pk	11.2	.2	-40	6.22	32.48	-	-26.26	0-360	0 degs
4	1.05073	28.5	Pk	11.3	.2	-40	0	27.17	-	-27.17	0-360	0 degs
5	13.23918	11.12	Pk	10.2	.7	-40	-17.98	29.54	-	-47.52	0-360	0 degs
6	29.2389	15.88	Pk	7.9	1.1	-40	-15.12	29.54	-	-44.66	0-360	0 degs
7	.1101	37.15	Pk	11.4	.1	-80	-31.35	26.77	46.77	-58.12	0-360	90 degs
8	.252	43.39	Pk	11.2	.1	-80	-25.31	19.58	39.58	-44.89	0-360	90 degs
9	.55746	36.19	Pk	11.2	.2	-40	7.59	32.68	-	-25.09	0-360	90 degs
10	11.46425	15.97	Pk	10.4	.7	-40	-12.93	29.54	-	-42.47	0-360	90 degs
11	15.25022	13.23	Pk	10	.8	-40	-15.97	29.54	-	-45.51	0-360	90 degs
12	.11096	37.27	Pk	11.4	.1	-80	-31.23	26.7	46.7	-57.93	0-360	Flat
13	.26288	42.42	Pk	11.2	.1	-80	-26.28	19.21	39.21	-45.49	0-360	Flat
14	.53216	35.2	Pk	11.2	.1	-40	6.5	33.08	-	-26.58	0-360	Flat
15	1.0423	30.25	Pk	11.3	.2	-40	1.75	27.24	-	-25.49	0-360	Flat
16	10.29642	13.15	Pk	10.6	.6	-40	-15.65	29.54	-	-45.19	0-360	Flat
17	16.22833	13.86	Pk	9.9	.8	-40	-15.44	29.54	-	-44.98	0-360	Flat

Pk - Peak detector

BELOW 30 MHz SPURIOUS EMISSIONS (H-FIELD NO TAG)



Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0079 (dB/m)	Cbl (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uAmps/meter)	QP/AV Limit (dBuA/m)	PK Limit (dBuA/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Loop Angle
1	.11103	40.74	Pk	-40.1	.1	-80	-79.26	-24.8	-4.8	-54.46	0-360	401	0 degs
2	.1636	46.82	Pk	-40.3	.1	-80	-73.38	-28.17	-8.17	-45.21	0-360	401	0 degs
3	.5701	34.82	Pk	-40.3	.2	-40	-45.28	-19.02	-	-26.26	0-360	401	0 degs
4	1.05073	28.5	Pk	-40.2	.2	-40	-51.5	-24.33	-	-27.17	0-360	401	0 degs
5	13.23918	11.12	Pk	-41.3	.7	-40	-69.48	-21.96	-	-47.52	0-360	401	0 degs
6	29.2389	15.88	Pk	-43.6	1.1	-40	-66.62	-21.96	-	-44.66	0-360	401	0 degs
7	.1101	37.15	Pk	-40.1	.1	-80	-82.85	-24.73	-4.73	-58.12	0-360	401	90 degs
8	.252	43.39	Pk	-40.3	.1	-80	-76.81	-31.92	-11.92	-44.89	0-360	401	90 degs
9	.55746	36.19	Pk	-40.3	.2	-40	-43.91	-18.82	-	-25.09	0-360	401	90 degs
10	11.46425	15.97	Pk	-41.1	.7	-40	-64.43	-21.96	-	-42.47	0-360	401	90 degs
11	15.25022	13.23	Pk	-41.5	.8	-40	-67.47	-21.96	-	-45.51	0-360	401	90 degs
12	.11096	37.27	Pk	-40.1	.1	-80	-82.73	-24.8	-4.8	-57.93	0-360	401	Flat
13	.26288	42.42	Pk	-40.3	.1	-80	-77.78	-32.29	-12.29	-45.49	0-360	401	Flat
14	.53216	35.2	Pk	-40.3	.1	-40	-45	-18.42	-	-26.58	0-360	401	Flat
15	1.0423	30.25	Pk	-40.2	.2	-40	-49.75	-24.26	-	-25.49	0-360	401	Flat
16	10.29642	13.15	Pk	-40.9	.6	-40	-67.15	-21.96	-	-45.19	0-360	401	Flat
17	16.22833	13.86	Pk	-41.6	.8	-40	-66.94	-21.96	-	-44.98	0-360	401	Flat

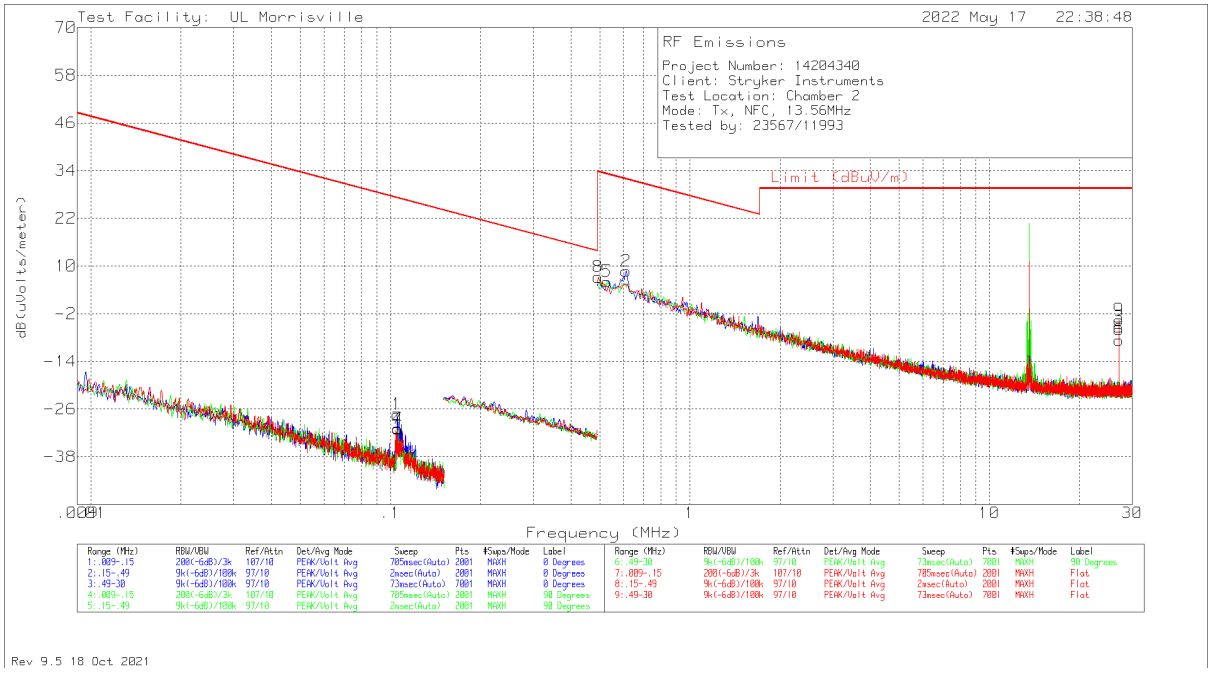
Pk - Peak detector

UL LLC
12 Laboratory Dr., RTP, NC 27709; USA TEL:(919) 549-1400

8.5. TX SPURIOUS EMISSION BELOW 30 MHz – TAG

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).

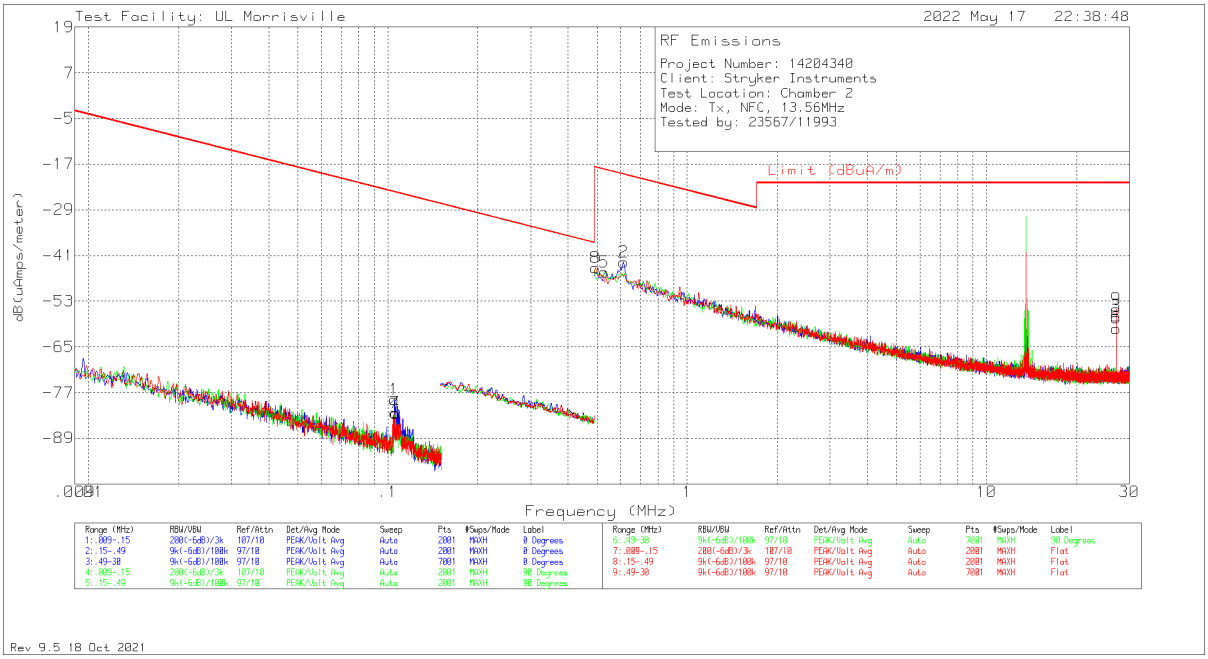
BELOW 30 MHz SPURIOUS EMISSIONS (E-FIELD)



Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0079 (dB/m)	Cbl (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uVolts/meter)	QP/AV Limit (dBuV/m)	PK Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Loop Angle
1	.10528	41.19	Pk	11.4	.1	-80	-27.31	27.16	47.16	-54.47	0-360	401	0 degs
2	.61226	37.32	Pk	11.2	.2	-40	8.72	31.87	-	-23.15	0-360	401	0 degs
3	27.12247	25.24	Pk	8.3	1.1	-40	-5.36	29.54	-	-34.9	0-360	401	0 degs
4	.10592	37.51	Pk	11.4	.1	-80	-30.99	27.11	47.11	-58.1	0-360	401	90 degs
5	.52794	34.79	Pk	11.2	.1	-40	6.09	33.15	-	-27.06	0-360	401	90 degs
6	27.12247	21.99	Pk	8.3	1.1	-40	-8.61	29.54	-	-38.15	0-360	401	90 degs
7	.10563	37.66	Pk	11.4	.1	-80	-30.84	27.13	47.13	-57.97	0-360	401	Flat
8	.49422	35.93	Pk	11.2	.1	-40	7.23	33.73	-	-26.5	0-360	401	Flat
9	27.12247	27.01	Pk	8.3	1.1	-40	-3.59	29.54	-	-33.13	0-360	401	Flat

Pk - Peak detector

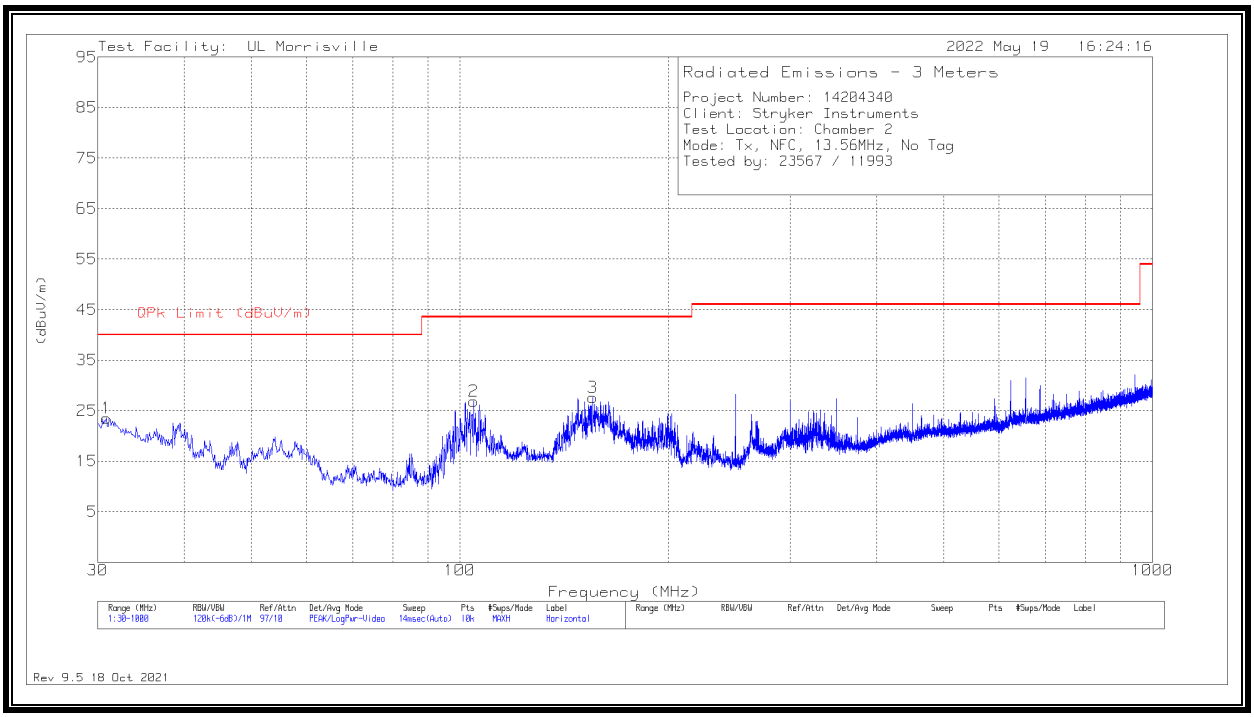
BELOW 30 MHz SPURIOUS EMISSIONS (H-FIELD)

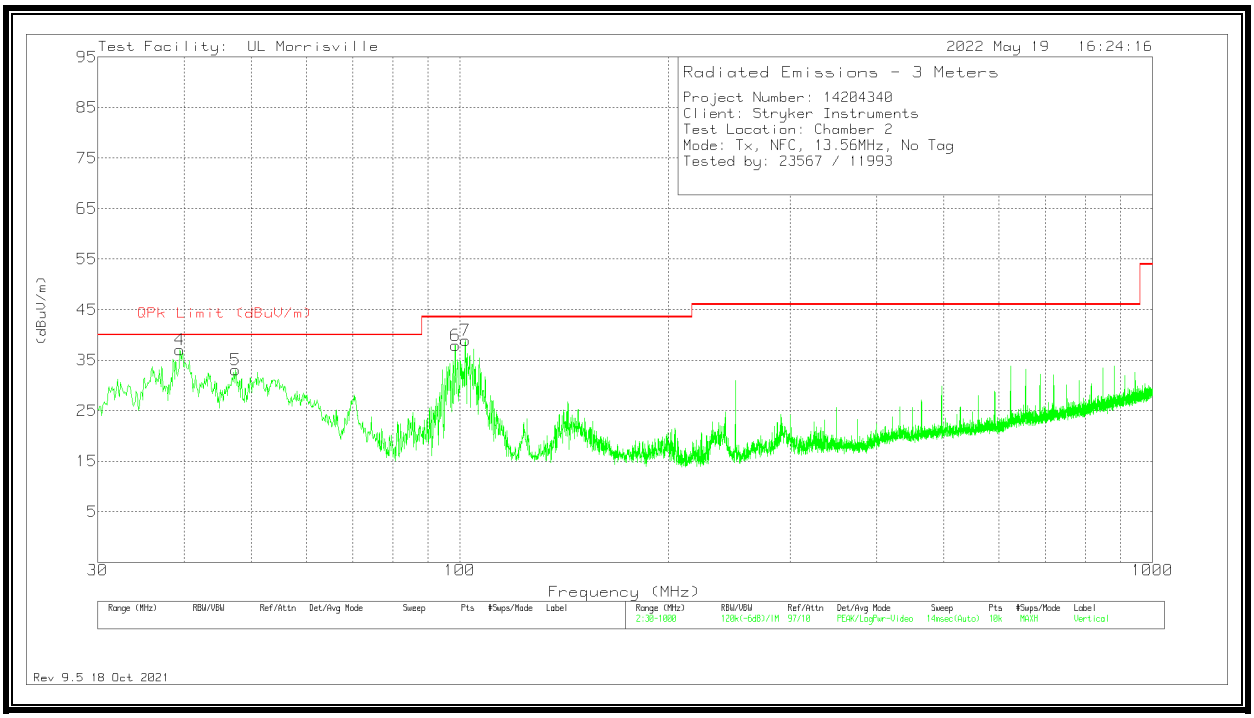


Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0079 (dB/m)	Cbl (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uAmps/meter)	QP/AV Limit (dBuA/m)	PK Limit (dBuA/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Loop Angle
1	.10528	41.19	Pk	-40.1	.1	-80	-78.81	-24.34	-4.34	-54.47	0-360	401	0 degs
2	.61226	37.32	Pk	-40.3	.2	-40	-42.78	-19.63	-	-23.15	0-360	401	0 degs
3	27.12247	25.24	Pk	-43.2	1.1	-40	-56.86	-21.96	-	-34.9	0-360	401	0 degs
4	.10592	37.51	Pk	-40.1	.1	-80	-82.49	-24.39	-4.39	-58.1	0-360	401	90 degs
5	.52794	34.79	Pk	-40.3	.1	-40	-45.41	-18.35	-	-27.06	0-360	401	90 degs
6	27.12247	21.99	Pk	-43.2	1.1	-40	-60.11	-21.96	-	-38.15	0-360	401	90 degs
7	.10563	37.66	Pk	-40.1	.1	-80	-82.34	-24.37	-4.37	-57.97	0-360	401	Flat
8	.49422	35.93	Pk	-40.3	.1	-40	-44.27	-17.77	-	-26.5	0-360	401	Flat
9	27.12247	27.01	Pk	-43.2	1.1	-40	-55.09	-21.96	-	-33.13	0-360	401	Flat

Pk - Peak detector

8.6. TX SPURIOUS EMISSION 30 TO 1000 MHz – NO TAG

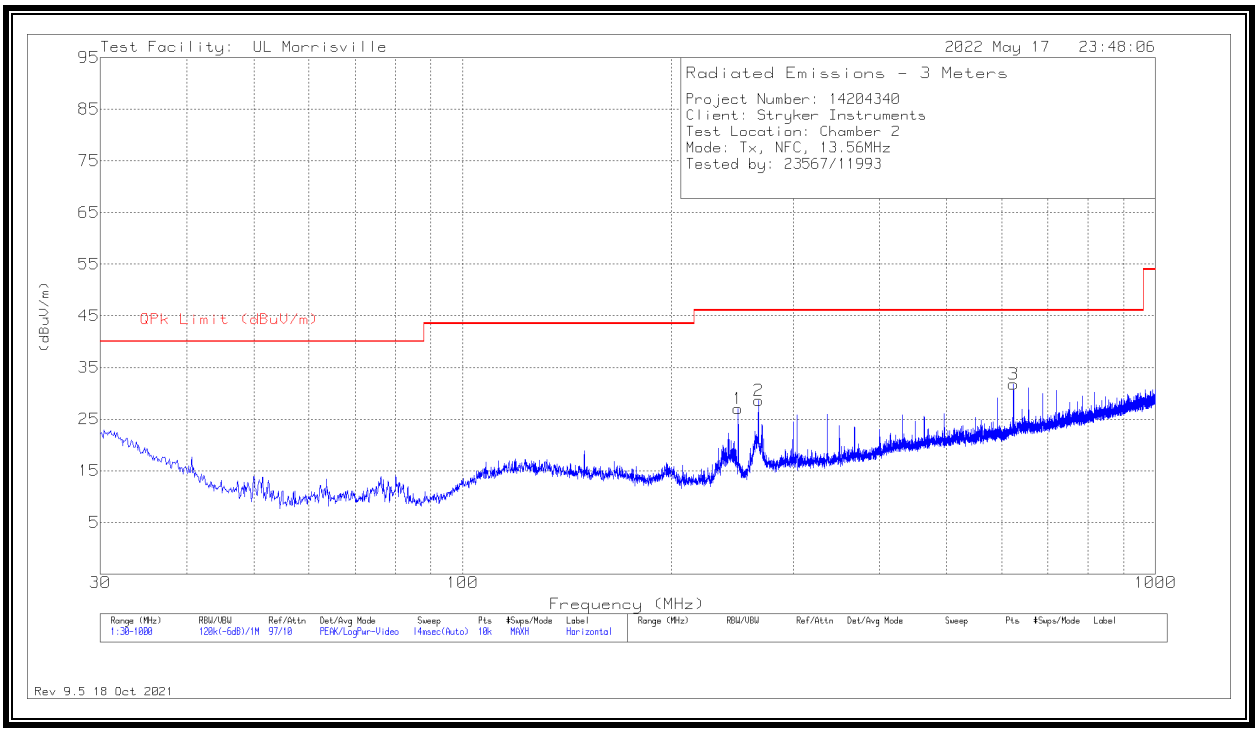


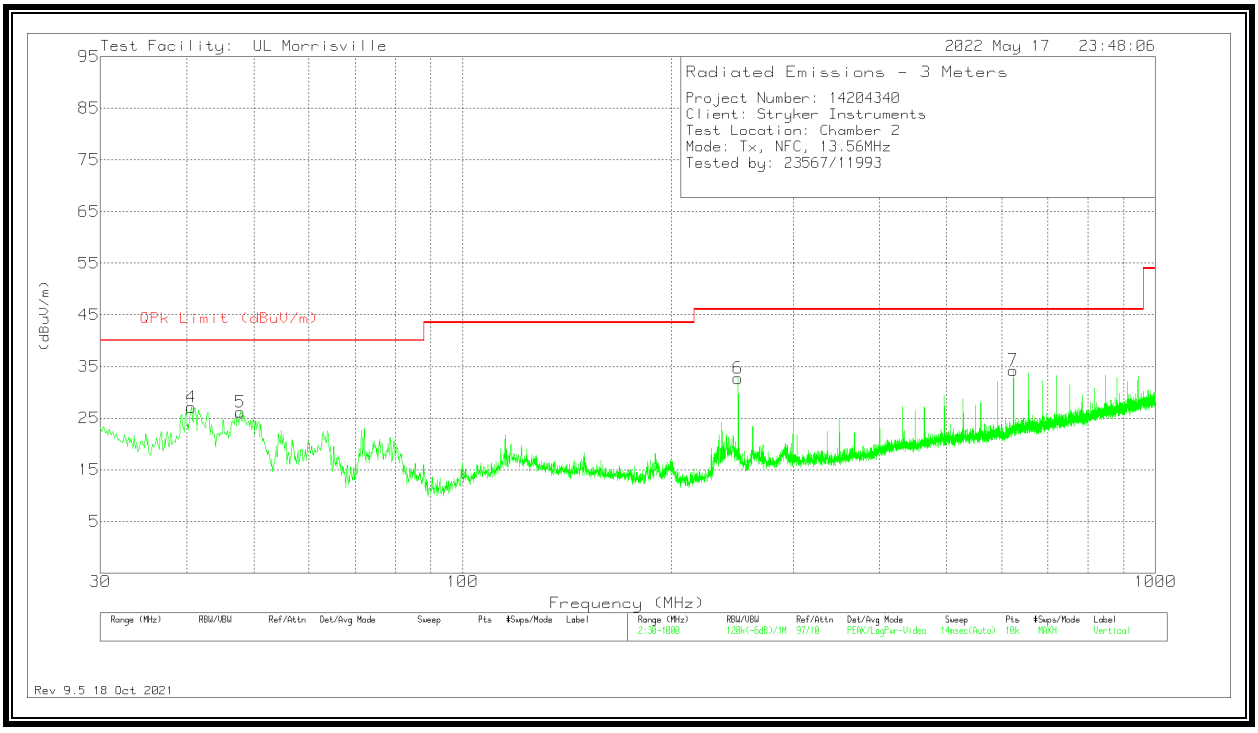


Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0073 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	30.873	28.69	Pk	26.3	-31.5	23.49	40	-16.51	0-360	101	H
4	39.233	44.56	Qp	20.3	-31.4	33.46	40	-6.54	342	103	V
5	47.46	49.09	Pk	15	-31	33.09	40	-6.91	0-360	101	V
6	98.4398	50.38	Qp	15.9	-30.4	35.88	43.52	-7.64	51	113	V
7	101.8828	50.94	Qp	17	-30.5	37.44	43.52	-6.08	36	113	V
2	104.69	39.63	Pk	17.7	-30.5	26.83	43.52	-16.69	0-360	299	H
3	155.615	39.09	Pk	18.5	-30	27.59	43.52	-15.93	0-360	199	H

Pk - Peak detector
Qp - Quasi-Peak detector

8.7. TX SPURIOUS EMISSION 30 TO 1000 MHz – TAG





Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0073 (dB/m)	Amp/Cbl (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
4	40.573	39.09	Pk	19.3	-31.3	27.09	40	-12.91	0-360	101	V
5	47.751	42.46	Pk	14.8	-31.1	26.16	40	-13.84	0-360	101	V
1	249.996	38.49	Pk	17.6	-29.1	26.99	46.02	-19.03	0-360	101	H
6	249.996	44.2	Pk	17.6	-29.1	32.7	46.02	-13.32	0-360	101	V
2	267.456	38.5	Pk	19.1	-29	28.6	46.02	-17.42	0-360	101	H
7	624.028	35.83	Pk	25.5	-27.1	34.23	46.02	-11.79	0-360	199	V
3	624.125	33.47	Pk	25.5	-27.2	31.77	46.02	-14.25	0-360	199	H

Pk - Peak detector
Qp - Quasi-Peak detector

9. FREQUENCY STABILITY

LIMIT

§15.225 (e) The frequency tolerance of the carrier signal shall be maintained within ±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 ±0.01% (±100 ppm).

TEST PROCEDURE

ANSI C63.10-2013 Clause 6.8

RESULTS

No non-compliance noted.

Reference Frequency: EUT Channel 13.56 MHz @ 20ºC Limit: ± 100 ppm = 1.356 kHz										
Power Supply	Envir. Temp	Frequency Deviation Measureed with Time Elapse								
(Vdc)	(ºC)	Startup (MHz)	Delta (ppm)	@ 2 mins (MHz)	Delta (ppm)	@ 5 mins (MHz)	Delta (ppm)	@ 10 mins (MHz)	Delta (ppm)	Limit (ppm)
110.00	50	13.5599348	5.226	13.5599366	5.097	13.5599351	5.205	13.5599311	5.499	± 100
110.00	40	13.5599448	4.492	13.5599407	4.794	13.5599397	4.869	13.5599420	4.696	± 100
110.00	30	13.5659969	-441.833	13.5599652	2.984	13.5599657	2.951	13.5599622	3.208	± 100
110.00	***20***	***13.5600057***	***0.000***	***13.5600030***	***0.197***	***13.5600011***	***0.340***	***13.5600007***	***0.365***	***± 100***
110.00	10	13.5600348	-2.147	13.5600338	-2.069	13.5600326	-1.982	13.5600393	-2.479	± 100
110.00	0	13.5600476	-3.094	13.5600526	-3.458	13.5600492	-3.207	13.5600551	-3.645	± 100
110.00	-10	13.5600556	-3.678	13.5600522	-3.430	13.5600559	-3.705	13.5600559	-3.705	± 100
110.00	-20	13.5600196	-1.023	13.5600277	-1.620	13.5600270	-1.568	13.5600372	-2.323	± 100
93.50	20	13.5599295	5.616	13.5599319	5.445	13.5599370	5.065	13.5599349	5.218	± 100
126.5	20	13.5599364	5.112	13.5599380	4.989	13.5599375	5.028	13.5599388	4.931	± 100

Tested by: 40882
Test date: 2022-05-20

10. AC MAINS LINE CONDUCTED EMISSIONS

LIMITS

§15.207
IC RSS-GEN, Section 8.8

(a) Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50μH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the band edges.

Frequency range	Limits (dBμV)	
(MHz)	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50
Notes: 1. The lower limit shall apply at the transition frequencies 2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.		

TEST PROCEDURE

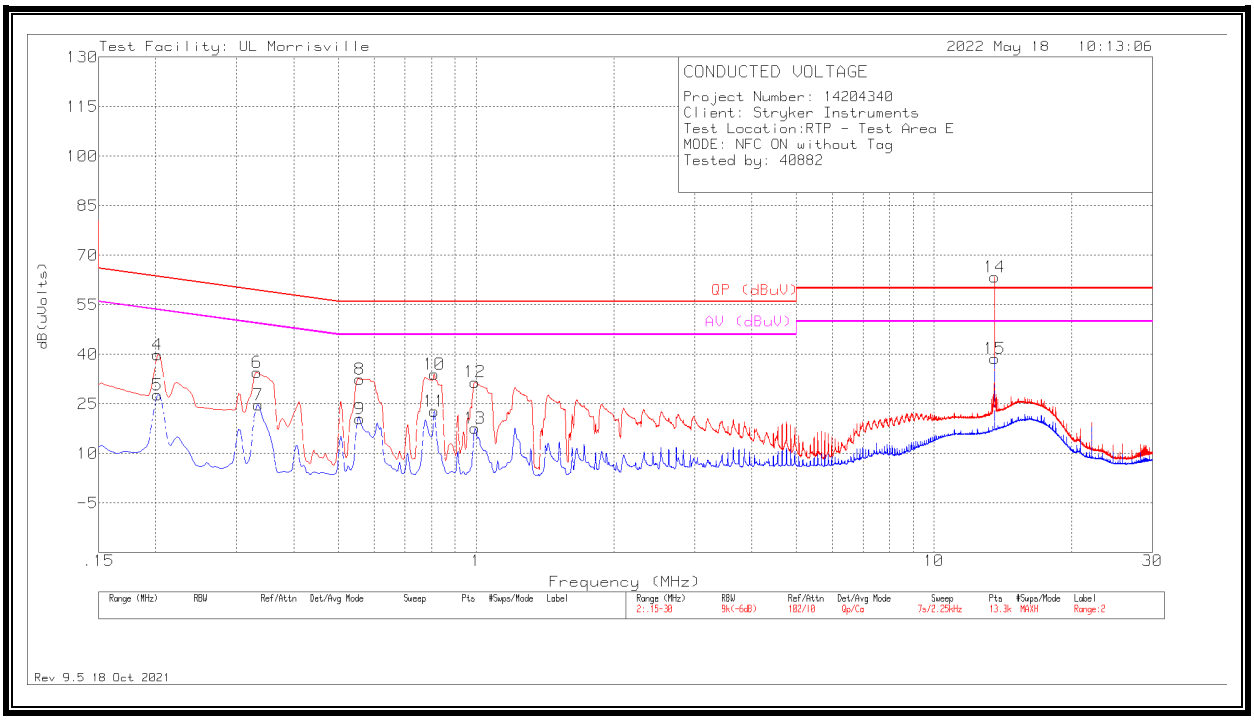
The EUT is placed on a non-conducting table 40 cm from the vertical ground plane and 80 cm above the horizontal ground plane. The EUT is configured in accordance with ANSI C63.10.

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

Line conducted data is recorded for both lines.

10.1. NFC – NO TAG

LINE 1 RESULTS

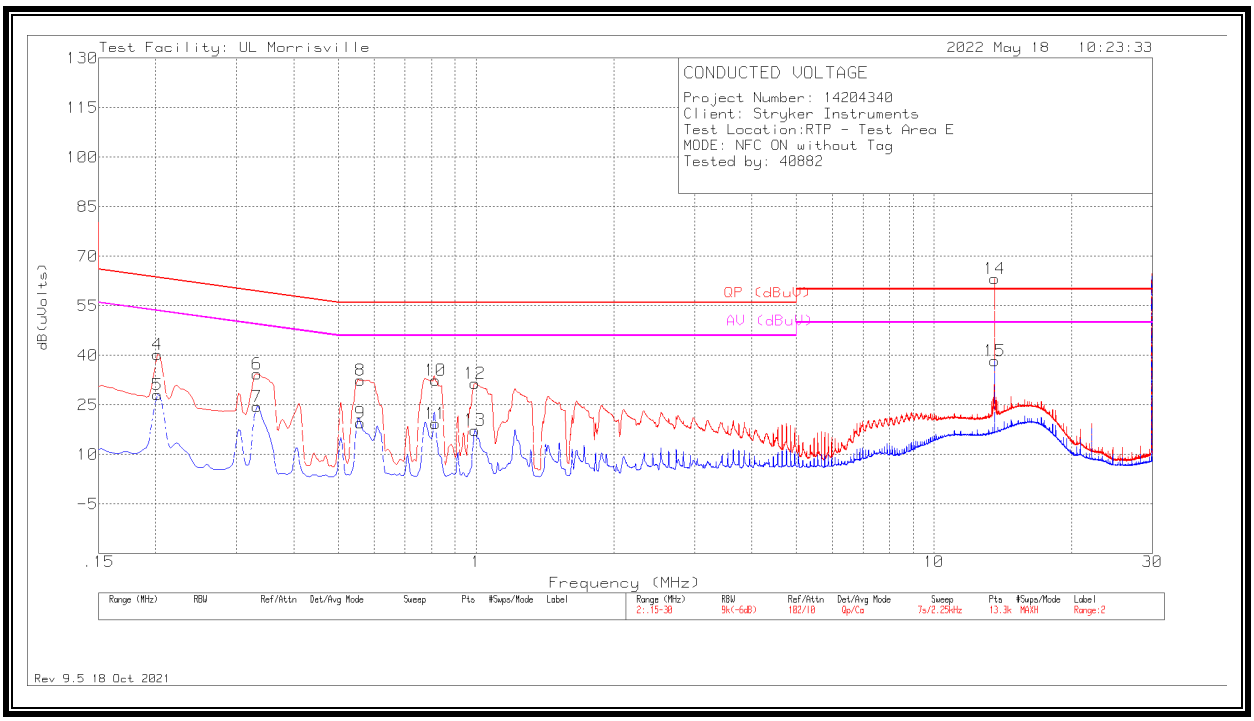


Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN001 (dB)	CBL004_206212 (dB)	Corrected Reading dB(uVolts)	QP (dBuV)	Margin (dB)	AV (dBuV)	Margin (dB)
4	.20175	30.03	Qp	.1	9.8	39.93	63.54	-23.61	-	-
5	.20175	17.89	Ca	.1	9.8	27.79	-	-	53.54	-25.75
6	.33225	24.7	Qp	.1	9.8	34.6	59.39	-24.79	-	-
7	.3345	14.74	Ca	.1	9.8	24.64	-	-	49.34	-24.7
8	.55725	22.61	Qp	.1	9.8	32.51	56	-23.49	-	-
9	.55725	10.62	Ca	.1	9.8	20.52	-	-	46	-25.48
10	.8115	24.04	Qp	.1	9.8	33.94	56	-22.06	-	-
11	.8115	12.9	Ca	.1	9.8	22.8	-	-	46	-23.2
12	.996	21.72	Qp	.1	9.8	31.62	56	-24.38	-	-
13	.996	7.75	Ca	.1	9.8	17.65	-	-	46	-28.35
14	13.56	53.18	Qp	.1	10.1	63.38	**60**	**3.38**	-	-
15	13.56	28.46	Ca	.1	10.1	38.66	-	-	50	-11.34

Qp – Quasi-peak detection
Ca – CISPR Average detection

Note: 13.56MHz is a fundamental frequency of the EUT. Data under the following section 10.3 indicate that when the antenna terminal is terminated the fundamental amplitude is lowered below the limit line.

LINE 2 RESULT



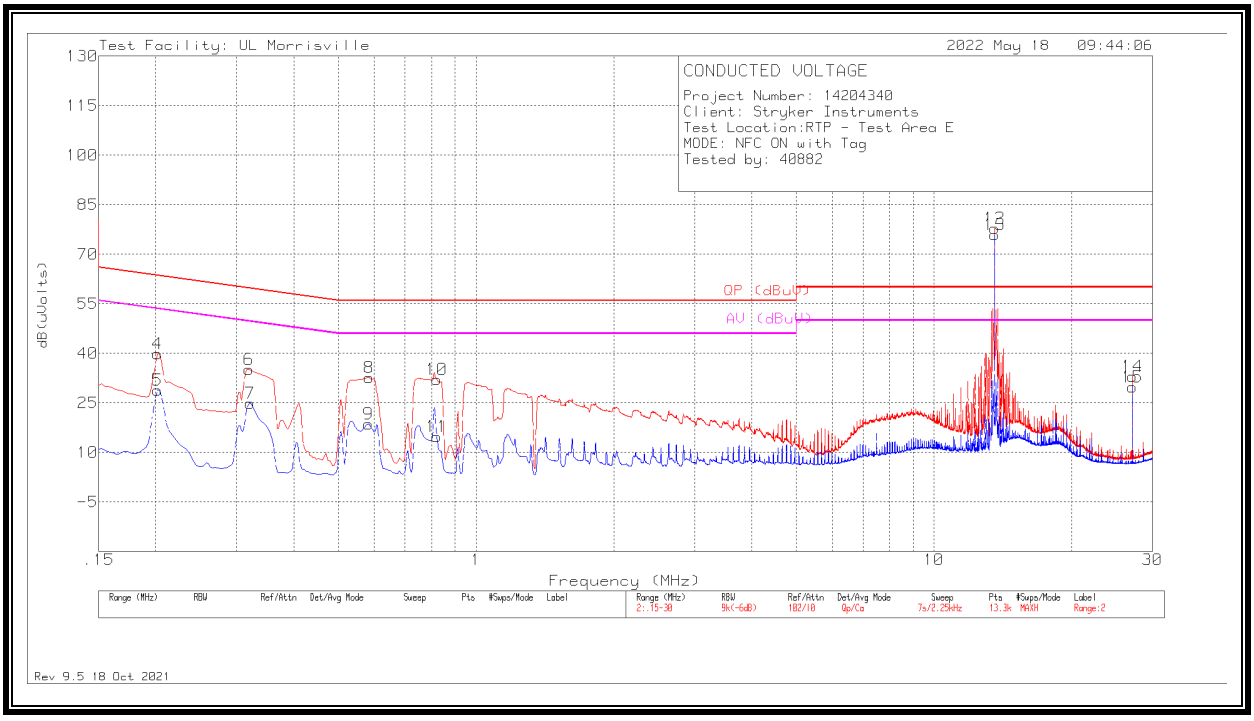
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN001 (dB)	CBL004_206212 (dB)	Corrected Reading dB(uVolts)	QP (dBuV)	Margin (dB)	AV (dBuV)	Margin (dB)
4	.20175	30.33	Qp	.1	9.8	40.23	63.54	-23.31	-	-
5	.20175	18.14	Ca	.1	9.8	28.04	-	-	53.54	-25.5
6	.33225	24.55	Qp	.1	9.8	34.45	59.39	-24.94	-	-
7	.33225	14.58	Ca	.1	9.8	24.48	-	-	49.39	-24.91
8	.5595	22.55	Qp	.1	9.8	32.45	56	-23.55	-	-
9	.5595	9.64	Ca	.1	9.8	19.54	-	-	46	-26.46
10	.816	22.49	Qp	.1	9.8	32.39	56	-23.61	-	-
11	.816	9.39	Ca	.1	9.8	19.29	-	-	46	-26.71
12	.996	21.7	Qp	.1	9.8	31.6	56	-24.4	-	-
13	.996	7.48	Ca	.1	9.8	17.38	-	-	46	-28.62
14	13.56	53.09	Qp	.1	10.1	63.29	**60**	**3.29**	-	-
15	13.56	28.16	Ca	.1	10.1	38.36	-	-	50	-11.64

Qp – Quasi-peak detection
Ca – CISPR Average detection

Note: 13.56MHz is a fundamental frequency of the EUT. Data under the following section 10.3 indicate that when the antenna terminal is terminated the fundamental amplitude is lowered below the limit line.

10.2. NFC –TAG

LINE 1 RESULTS

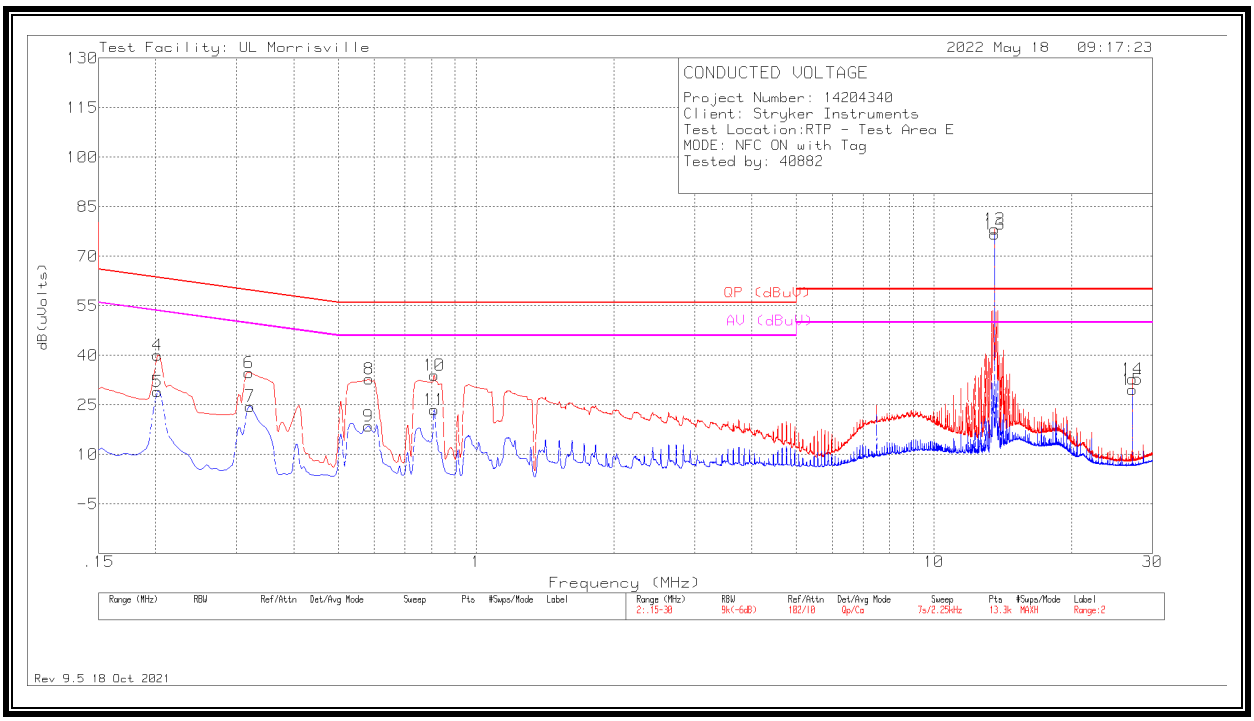


Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN001 (dB)	CBL004_206212 (dB)	Corrected Reading dB(uVolts)	QP (dBuV)	Margin (dB)	AV (dBuV)	Margin (dB)
4	.20175	30.02	Qp	.1	9.8	39.92	63.54	-23.62	-	-
5	.20175	18.91	Ca	.1	9.8	28.81	-	-	53.54	-24.73
6	.31875	25.25	Qp	.1	9.8	35.15	59.74	-24.59	-	-
7	.321	14.98	Ca	.1	9.8	24.88	-	-	49.68	-24.8
8	.58425	22.82	Qp	.1	9.8	32.72	56	-23.28	-	-
9	.582	8.69	Ca	.1	9.8	18.59	-	-	46	-27.41
10	.8205	22.21	Qp	.1	9.8	32.11	56	-23.89	-	-
11	.8205	4.84	Ca	.1	9.8	14.74	-	-	46	-31.26
12	13.56	67.66	Qp	.1	10.1	77.86	**60**	**17.86**	-	-
13	13.56	65.73	Ca	.1	10.1	75.93	-	-	**50**	**25.93**
14	27.12075	22.76	Qp	0	10.3	33.06	60	-26.94	-	-
15	27.12075	19.54	Ca	0	10.3	29.84	-	-	50	-20.16

Qp – Quasi-peak detection
Ca – CISPR Average detection

Note: 13.56MHz is a fundamental frequency of the EUT. Data under the following section 10.3 indicate that when the antenna terminal is terminated the fundamental amplitude is lowering below the limit line.

LINE 2 RESULT



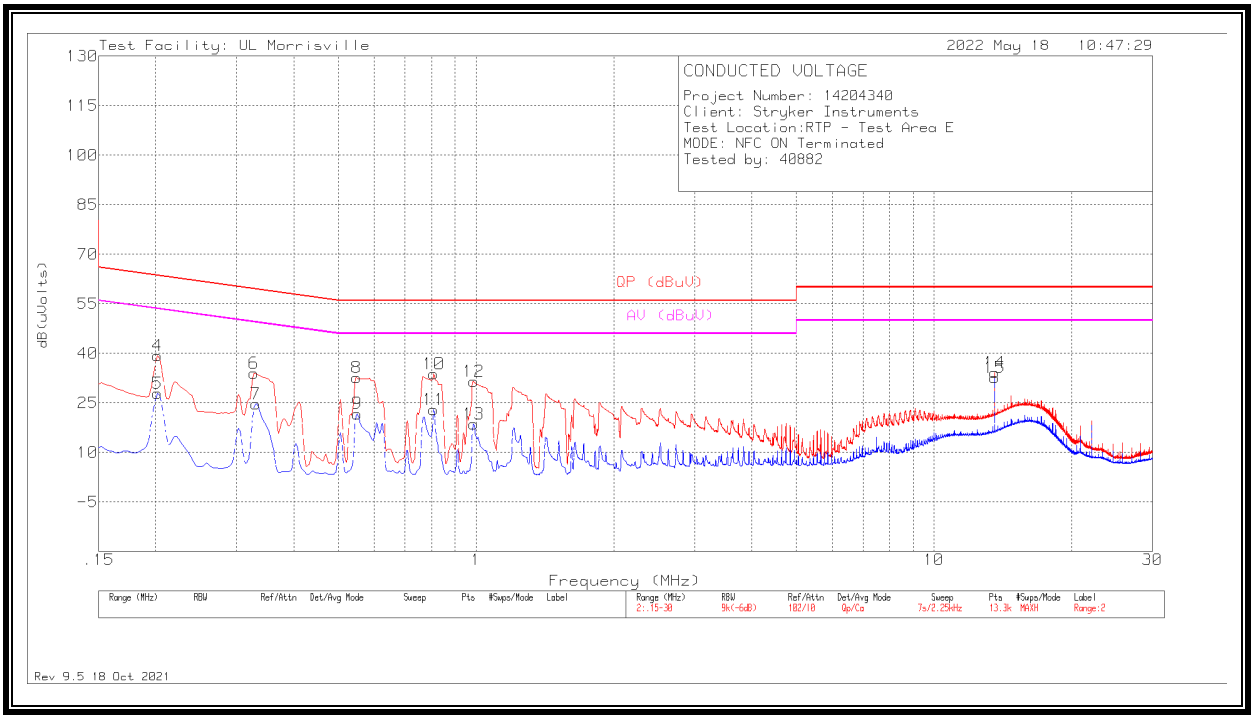
Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN001 (dB)	CBL004_206212 (dB)	Corrected Reading dB(uVolts)	QP (dBuV)	Margin (dB)	AV (dBuV)	Margin (dB)
4	.20175	30.18	Qp	.1	9.8	40.08	63.54	-23.46	-	-
5	.20175	19.14	Ca	.1	9.8	29.04	-	-	53.54	-24.5
6	.31875	24.86	Qp	.1	9.8	34.76	59.74	-24.98	-	-
7	.321	14.69	Ca	.1	9.8	24.59	-	-	49.68	-25.09
9	.582	8.7	Ca	.1	9.8	18.6	-	-	46	-27.4
8	.58425	22.9	Qp	.1	9.8	32.8	56	-23.2	-	-
10	.8115	24.12	Qp	.1	9.8	34.02	56	-21.98	-	-
11	.8115	13.68	Ca	.1	9.8	23.58	-	-	46	-22.42
12	13.56	68.06	Qp	.1	10.1	78.26	**60**	**18.26**	-	-
13	13.56	66.54	Ca	.1	10.1	76.74	-	-	**50**	**26.74**
14	27.12075	22.5	Qp	0	10.3	32.8	60	-27.2	-	-
15	27.12075	19.37	Ca	0	10.3	29.67	-	-	50	-20.33

Qp – Quasi-peak detection
Ca – CISPR Average detection

Note: 13.56MHz is a fundamental frequency of the EUT. Data under the following section 10.3 indicate that when the antenna terminal is terminated the fundamental amplitude is lowering below the limit line.

10.3. NFC – ANTENNA TERMINATED

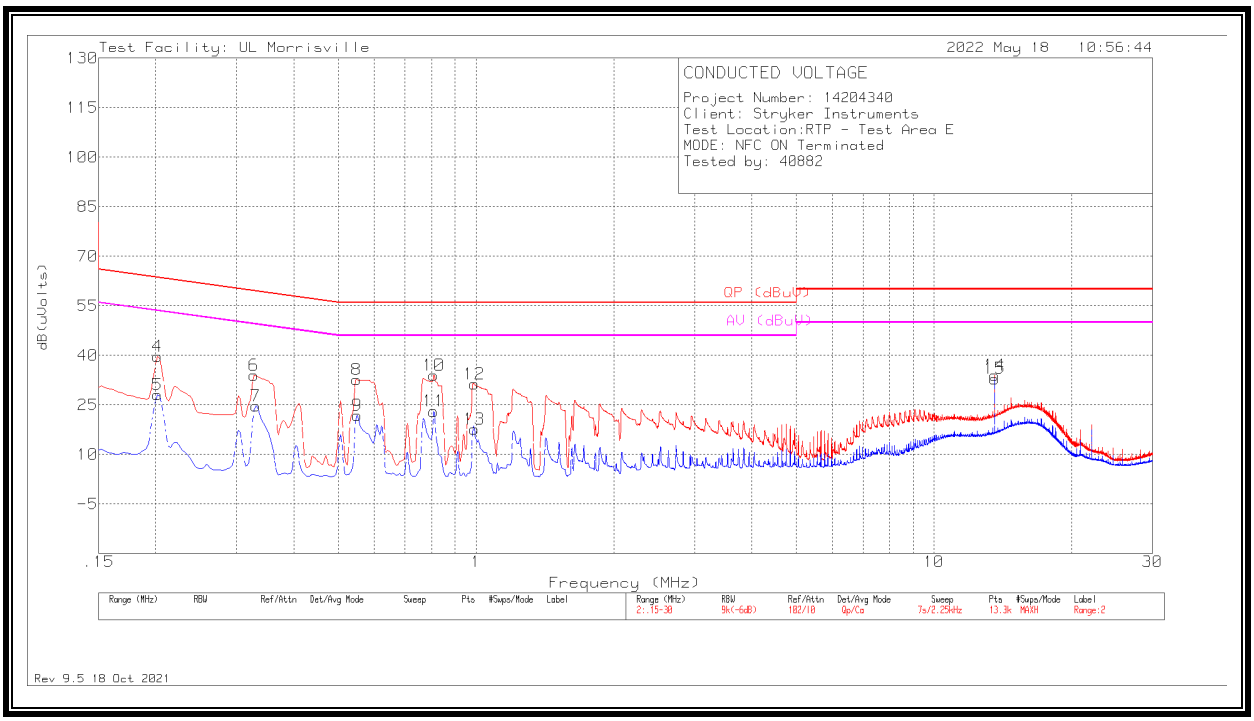
LINE 1 RESULTS



Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN001 (dB)	CBL004_206212 (dB)	Corrected Reading dB(uVolts)	QP (dBuV)	Margin (dB)	AV (dBuV)	Margin (dB)
4	.20175	29.44	Qp	.1	9.8	39.34	63.54	-24.2	-	-
5	.20175	17.94	Ca	.1	9.8	27.84	-	-	53.54	-25.7
6	.32775	24.15	Qp	.1	9.8	34.05	59.51	-25.46	-	-
7	.33	14.82	Ca	.1	9.8	24.72	-	-	49.45	-24.73
8	.54825	22.71	Qp	.1	9.8	32.61	56	-23.39	-	-
9	.5505	11.85	Ca	.1	9.8	21.75	-	-	46	-24.25
10	.80925	23.87	Qp	.1	9.8	33.77	56	-22.23	-	-
11	.80925	13.11	Ca	.1	9.8	23.01	-	-	46	-22.99
12	.987	21.69	Qp	.1	9.8	31.59	56	-24.41	-	-
13	.98925	8.75	Ca	.1	9.8	18.65	-	-	46	-27.35
14	13.56	24.06	Qp	.1	10.1	34.26	60	-25.74	-	-
15	13.56	22.55	Ca	.1	10.1	32.75	-	-	50	-17.25

Qp – Quasi-peak detection
Ca – CISPR Average detection

LINE 2 RESULT



Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	LISN001 (dB)	CBL004_206212 (dB)	Corrected Reading dB(uVolts)	QP (dBuV)	Margin (dB)	AV (dBuV)	Margin (dB)
4	.20175	29.75	Qp	.1	9.8	39.65	63.54	-23.89	-	-
5	.20175	18.2	Ca	.1	9.8	28.1	-	-	53.54	-25.44
6	.32775	24.11	Qp	.1	9.8	34.01	59.51	-25.5	-	-
7	.33	14.76	Ca	.1	9.8	24.66	-	-	49.45	-24.79
8	.54825	22.83	Qp	.1	9.8	32.73	56	-23.27	-	-
9	.5505	11.89	Ca	.1	9.8	21.79	-	-	46	-24.21
10	.80925	24.07	Qp	.1	9.8	33.97	56	-22.03	-	-
11	.80925	13.18	Ca	.1	9.8	23.08	-	-	46	-22.92
12	.9915	21.38	Qp	.1	9.8	31.28	56	-24.72	-	-
13	.9915	7.78	Ca	.1	9.8	17.68	-	-	46	-28.32
14	13.56	23.83	Qp	.1	10.1	34.03	60	-25.97	-	-
15	13.56	22.75	Ca	.1	10.1	32.95	-	-	50	-17.05

Qp – Quasi-peak detection
Ca – CISPR Average detection

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11. SETUP PHOTOS

Refer to exhibit R14204340-EP3 for setup photos.

END OF TEST REPORT

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