CERTIFICATION TEST REPORT

Report Number. : 13492511A

Applicant	:	Alliance Laundry Systems LLC 221 Shepard St. PO Box 990 Ripon, WI 54971 US
Model	:	205131
FCC ID	:	2ANOT-205131
IC	:	23166-205131
EUT Description	:	USB NFC Reader/Writer
Test Standard(s)	:	FCC 47 CFR PART 15 SUBPART C INDUSTRY CANADA RSS-210 ISSUE 10

Date Of Issue:
2020-11-18

Prepared by:
UL LLC
333 Pfingsten Road
Northbrook, IL 60062
US

NVLAP TESTING

NVLAP LAB CODE: 100414-0

Revision History

Rev.	Issue Date	Revisions	Revised By
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1. ATTESTATION OF TEST RESULTS

COMPANY NAME:	**Alliance Laundry Systems LLC** **221 Shepard St** **PO Box 990** **Ripon, WI 54971** **US**
EUT DESCRIPTION:	USB NFC Reader/Writer
MODEL:	205131
SERIAL NUMBER:	non-serialized
SAMPLE RECEIPT DATE:	2020-10-26
DATE TESTED:	2020-10-26 – 2020-11-12

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
FCC PART 15 SUBPART C	Complies
ISED RSS-210 Issue 10, Annex B.6	Complies
ISED RSS-GEN Issue 5	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 Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the U.S. government.

Approved & Released For
UL LLC By:

Jeff Moser
Operations Manager
Consumer Technology Division
UL LLC

Prepared By:

Bart Mucha
Test Engineer
Consumer Technology Division
UL LLC

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.10-2013, FCC CFR 47 Part 2, FCC CFR 47 Part 15, RSS-GEN Issue 5, and RSS-210 Issue 10 Annex B.6.

3. FACILITIES AND ACCREDITATION

	Address	ISED CABID	ISED Company Number	FCC Registration
☒	333 Pfingsten Road, Northbrook, IL 60062-2096, USA	US0065	2180A	152210

333 Pfingsten Road
☒ Chamber 10m

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	U_{Lab}
Worst Case Conducted Disturbance, 0.15 to 30 MHz	3.40 dB
Worst Case Radiated Disturbance Loop, 9KHz to 30 MHz	2.87 dB
Worst Case Radiated Disturbance, 30 to 1000 MHz	5.86 dB
Worst Case Frequency Error with Spectrum Analyzer	141.16 Hz
Worst Case Occupied Bandwidth	0.09dB / 2.00%

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

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT, Model 205131 is a USB NFC RFID reader/writer

5.2. MAXIMUM ELECTRIC FIELD STRENGTH

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

5.2.1. EUT WITH AC/DC ADAPTER

Frequency Range (MHz)	Mode		E Field at 30m distance (dBuV/m)
13.56	Maximum flield strength	no tag	37.93
		with tag	37.31

5.3. SOFTWARE AND FIRMWARE

The test utility software used during testing was ST25R3911B Discovery GUI and firmware version for the EUT was 1.2.6.

5.4. WORST-CASE CONFIGURATION AND MODE

The fundamental of the EUT was investigated under two orthogonal orientations X (parallel to ground), Y (long edge perpendicular to ground). Worst case fundamental was recorded with EUT in Y position (perpendicular to ground) and RX antenna in X-Axis (parallel to EUT). The test software was anabled to read multiple NFC standards however the tag used for testing was the iso15693. Per manufacturer this is the only standard that will be enabled in productions software.

The worst case position of the EUT was investigated under two configurations:

- Reading mode with no tag near by
- Reading mode with tag present near by

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
Laptop Computer	Lenovo	4236-NUU	R8-MG97W	-
Power Supply	Lenovo	-	-	-

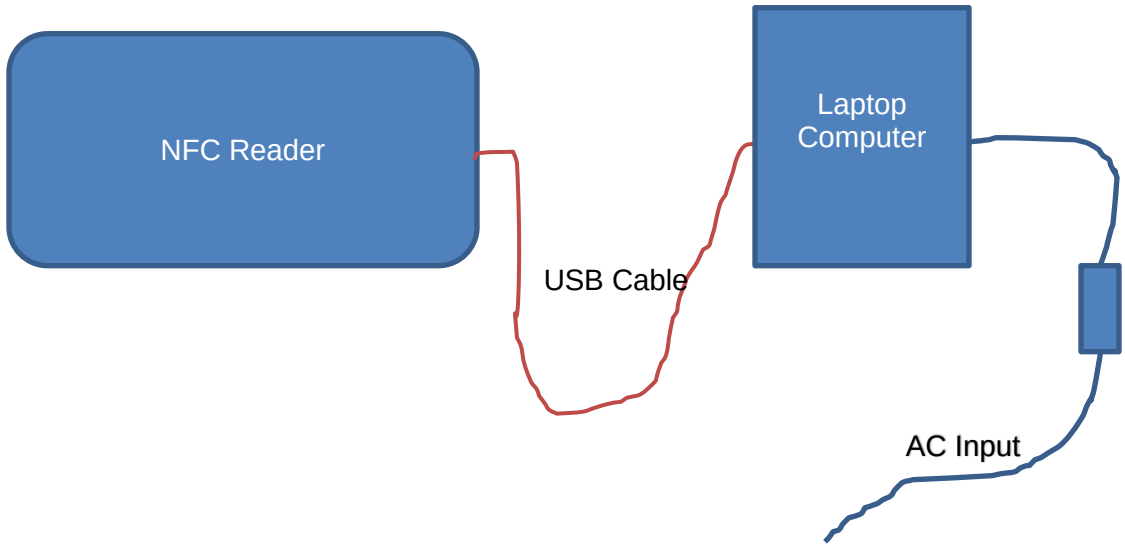
I/O CABLES

I/O Cable List						
Cable No	Port	# of identical ports	Connector Type	Cable Type	Cable Length (m)	Remarks
1	USB	1	MicoUSB	USB	50cm	102-1092-BL-F0100 supplied with EUT

TEST SETUP

The EUT is a NFC reader/writer contained in plastic enclosure. EUT is powered with 5VDC via USB and power source is a laptop computer.

SETUP DIAGRAM



6. TEST AND MEASUREMENT EQUIPMENT

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

UL SOFTWARE			
*Radiated Software	UL	UL EMC	Below 30MHz, 6/24/15
*AC Line Conducted Software	UL	UL EMC	Ver 9.5, April 3, 2015

Note: * indicates automation software version used in the compliance certification testing

Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
EMI Test Receiver	Rohde & Schwarz	ESCI	EMC4328	2019-12-28	2020-12-31
Bicon Antenna	Electro-Metrics	EM6912A	EMC4070	2019-12-31	2020-12-31
Log-P Antenna	Chase	UPA6109	EMC4258	2019-12-31	2020-12-31
Loop Antenna	EMCO	6502/1	EMC4026	2020-01-28	2021-01-31
EMI Test Receiver	Rohde & Schwarz	ESR	EMC4377	2019-12-30	2020-12-31
Transient Limiter	Electro-Metrics	EM7600-2	EMC4224	N/A	N/A
High-Pass Filter	Solar Electronics	2803-150	EMC4327	N/A	N/A
Attenuator	HP	8494B	2831A00838	N/A	N/A
LISN - L1	Solar Electronics	8602-50-TS-50-N	EMC4066	2019-12-16	2020-12-31
LISN - L2	Solar Electronics	8602-50-TS-50-N	EMC4064	2019-12-16	2020-12-31
Environmental Chamber	Espec	BTX-475	EMC4378	2020-05-07	2021-05-31
Signal Analyzer	Aglient	N9030A PXA	EMC4360	2019-12-22	2020-12-31

7. MEASUREMENT METHOD

Occupied BW (20dB): ANSI C63.10-2013 Section 6.9.2

Occupied BW (99%): ANSI C63.10-2013 Section 6.9.3

Frequency Stability : ANSI C63.10-2013 Clause 6.8

General Radiated emissions: ANSI C63.10 Section 6.3 to 6.5

AC Power Line Conducted Emissions: ANSI C63.10-2013, Section 6.2.

8. OCCUPIED BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

The transmitter output is coupled to the spectrum analyzer via near filed probe. The RBW is set to 3kHz. The VBW is set to minimum 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized and 20dB bandwidth measurement.

Note: Since the transmitter signal is mainly CW-like it is impractical to use an RBW setting of 1 - 5% of the emission bandwidth since the emission bandwidth will be proportional to the RBW.

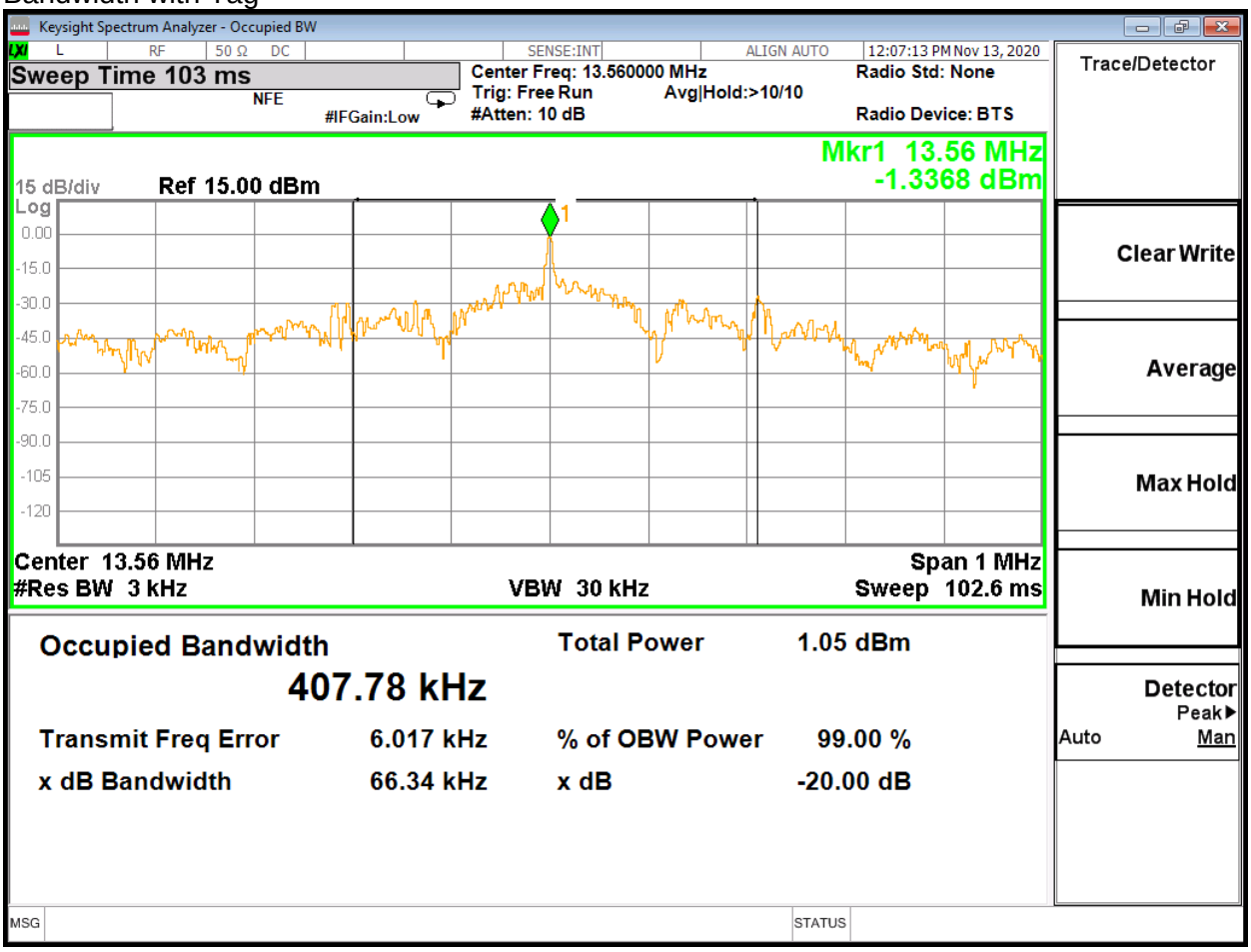
RESULTS

99% and 20dB BW

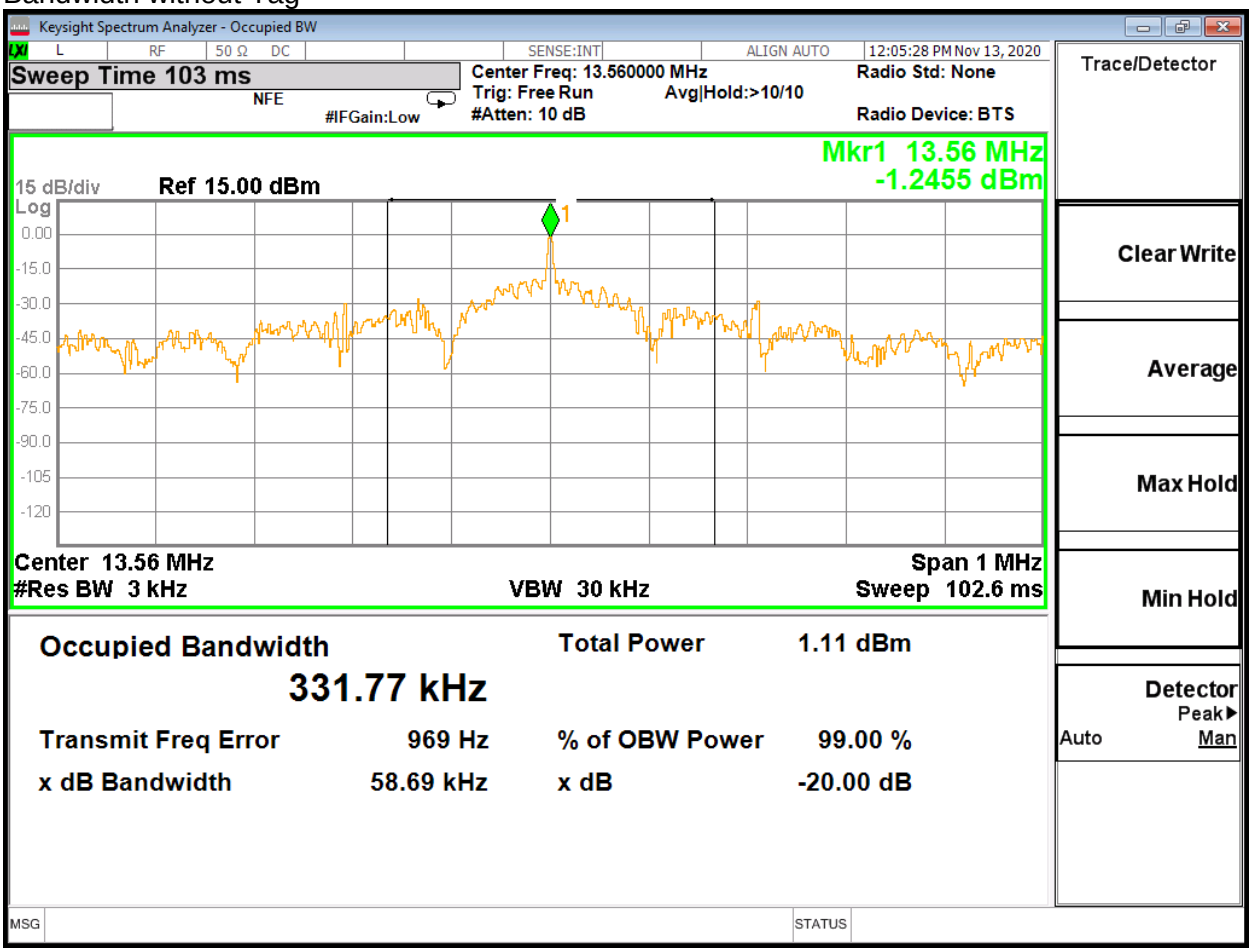
Mode	Frequency (MHz)	99% Bandwidth (KHz)	20dB Bandwidth (KHz)
No Tag	13.56	331.77	58.69
With Tag	13.56	407.78	66.34

8.1. 20dB and 99% Bandwidth

Bandwidth with Tag



Bandwidth without Tag



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 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 frequency 15.965 KHz resulted in a level of -12.57 dBuV/m, which is equivalent to -12.57-51.5 = -64.07 dBuA/m, which has the same margin, -56.1 dB, to the corresponding RSS-GEN Table 6 limit as it has to be 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.

Base 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.

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.

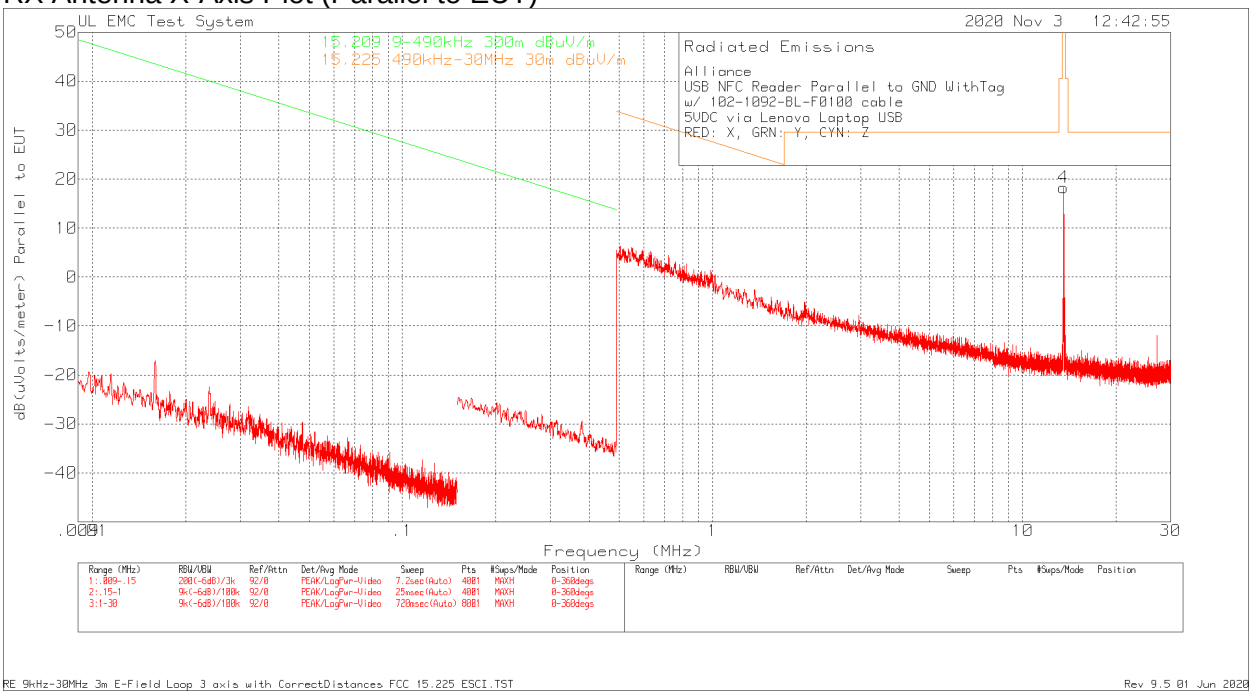
RESULTS

Note for below 30 MHz scans: 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).

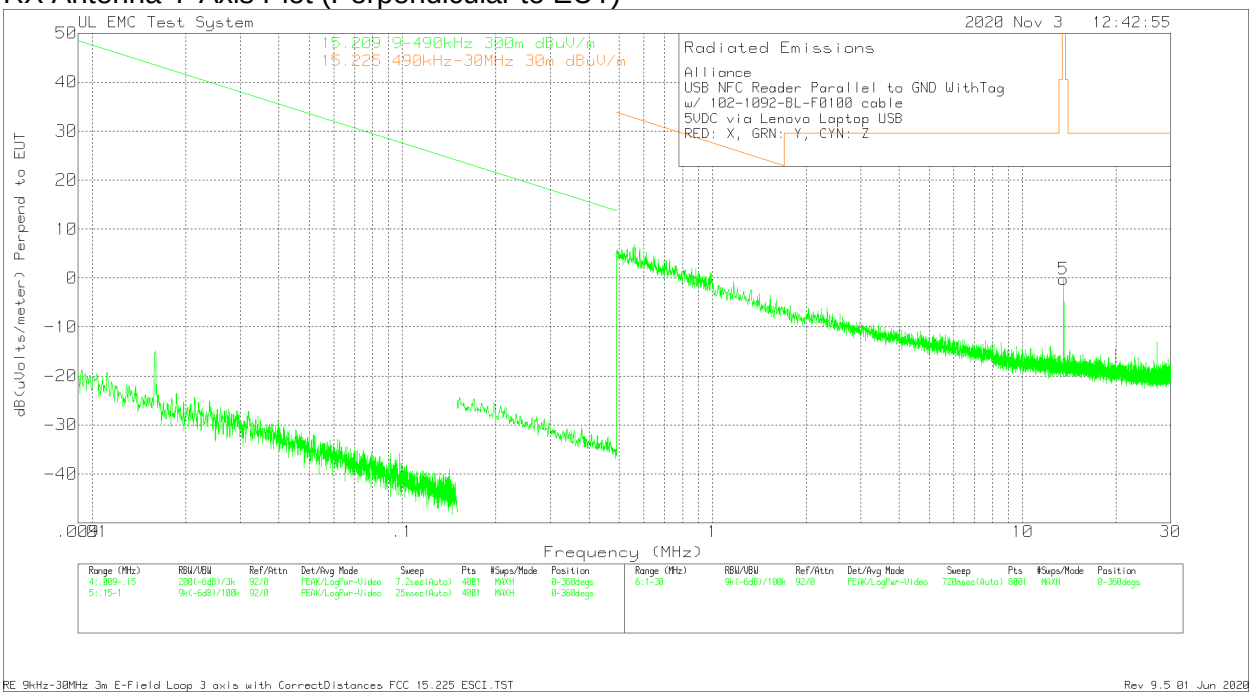
9.2. FUNDAMENTAL AND SPURIOUS EMISSIONS (0.009 - 30 MHz)

9.2.1. Data with Tag, EUT X-Axis, Parallel to Ground

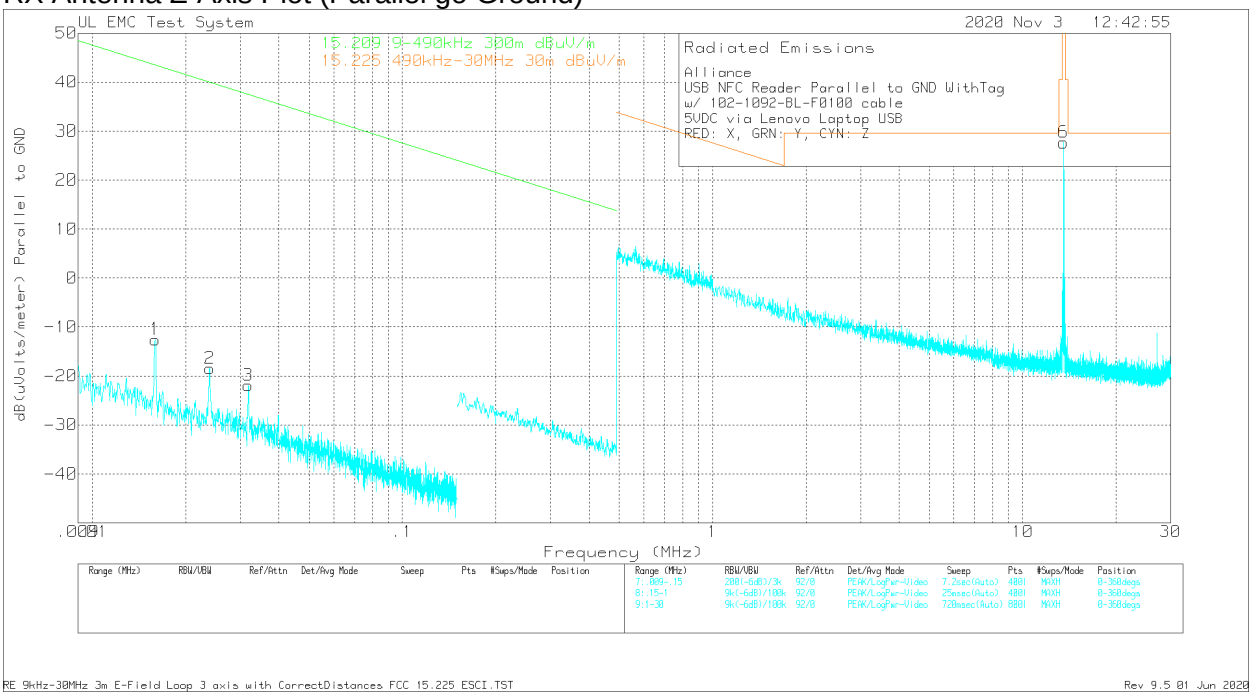
RX Antenna X-Axis Plot (Parallel to EUT)



RX Antenna Y-Axis Plot (Perpendicular to EUT)



RX Antenna Z-Axis Plot (Parallel go Ground)

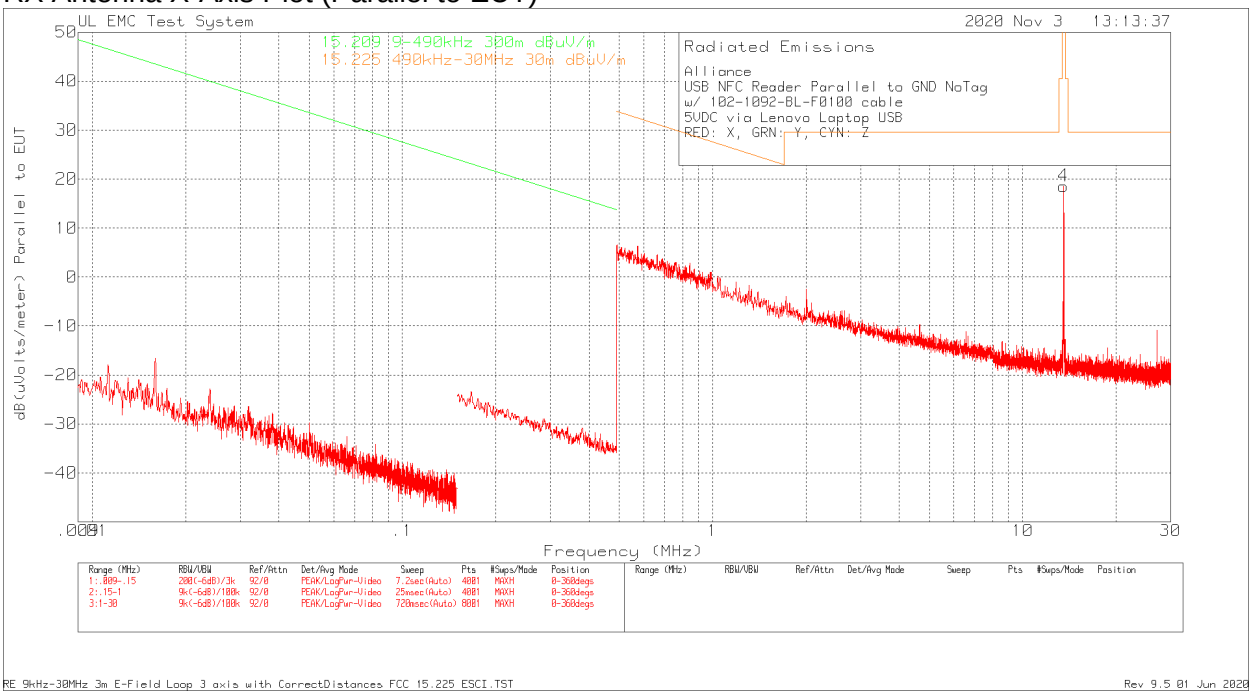


Tabular Data with worst case RX antenna orientation maximized

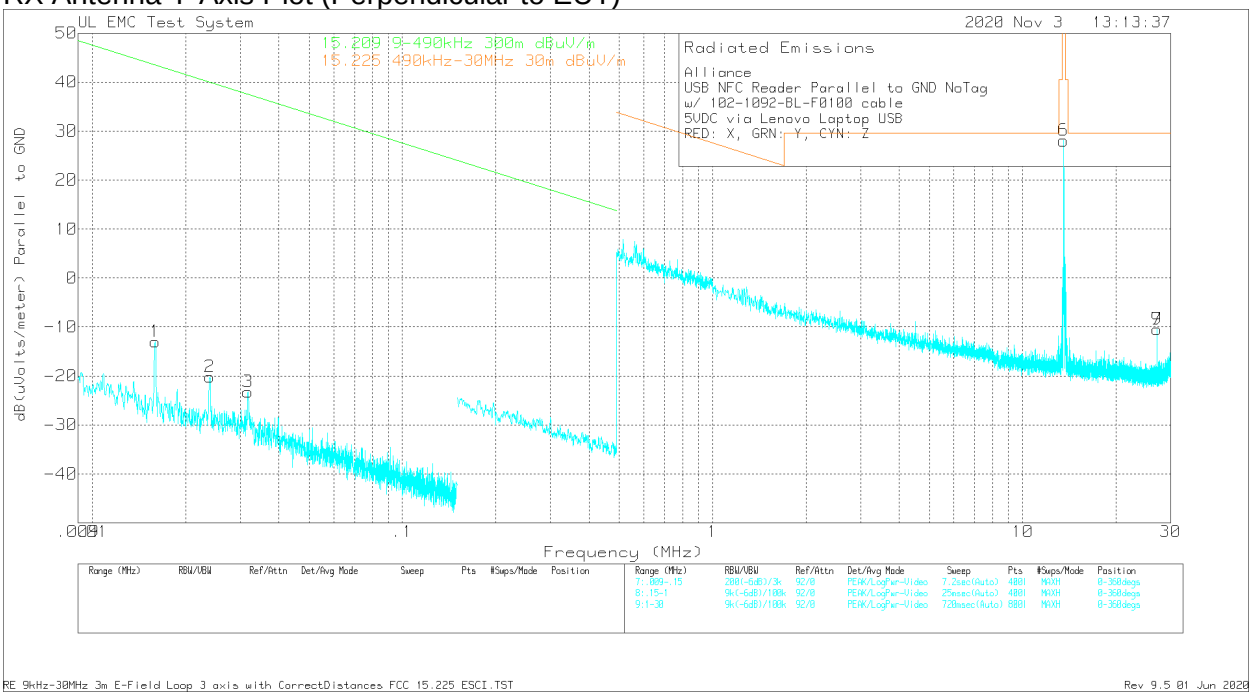
Alliance												
USB NFC Reader Parallel to GND WithTag												
w/ 102-1092-BL-F0100 cable												
5VDC via Lenovo Laptop USB												
RED: X, GRN: Y, CYN: Z												
Trace MArkers												
Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	Path Factor dB	Distance Correction Factor dB	Level dBuV/m	Limit 15.209 9-490kHz 300m dBuV/m	Margin (dB)	Limit 15.225 490kHz-30MHz 30m dBuV/m	Margin (dB)	Azimuth [Degs]
X-Axis (Parallel to EUT)												
4	13.56063	46.55	Pk	11.3	0.4	-40	18.25	-	-	84	-65.75	0-360
Y-Axis (Perpendicular to EUT)												
5	13.56063	28.06	Pk	11.3	0.4	-40	-0.24	-	-	84	-84.24	0-360
Z-Axis (Parallel to Ground)												
1	0.015965	46.43	Pk	20.9	0.1	-80	-12.57	43.53	-56.1	-	-	0-360
2	0.02391	43.14	Pk	18.3	0.1	-80	-18.46	40.03	-58.49	-	-	0-360
3	0.031855	40.8	Pk	17.2	0.1	-80	-21.9	37.53	-59.43	-	-	0-360
6	13.56063	55.97	Pk	11.3	0.4	-40	27.67	-	-	84	-56.33	0-360
Radiated Emission Data												
	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	Path Factor dB	Distance Correction Factor dB	Level dBuV/m	Limit 15.209 9-490kHz 300m dBuV/m	Margin (dB)	Limit 15.225 490kHz-30MHz 30m dBuV/m	Margin (dB)	Azimuth [Degs]
Z-Axis (Parallel to Ground)												
	13.56	55.94	Pk	11.3	0.4	-40	27.64	-	-	84	-56.36	16
	13.56	55.33	Qp	11.3	0.4	-40	27.03	-	-	84	-56.97	16
Pk - Peak detector												
Qp - Quasi-Peak detector												

9.2.1. Data without Tag, EUT X-Axis, Parallel to Ground

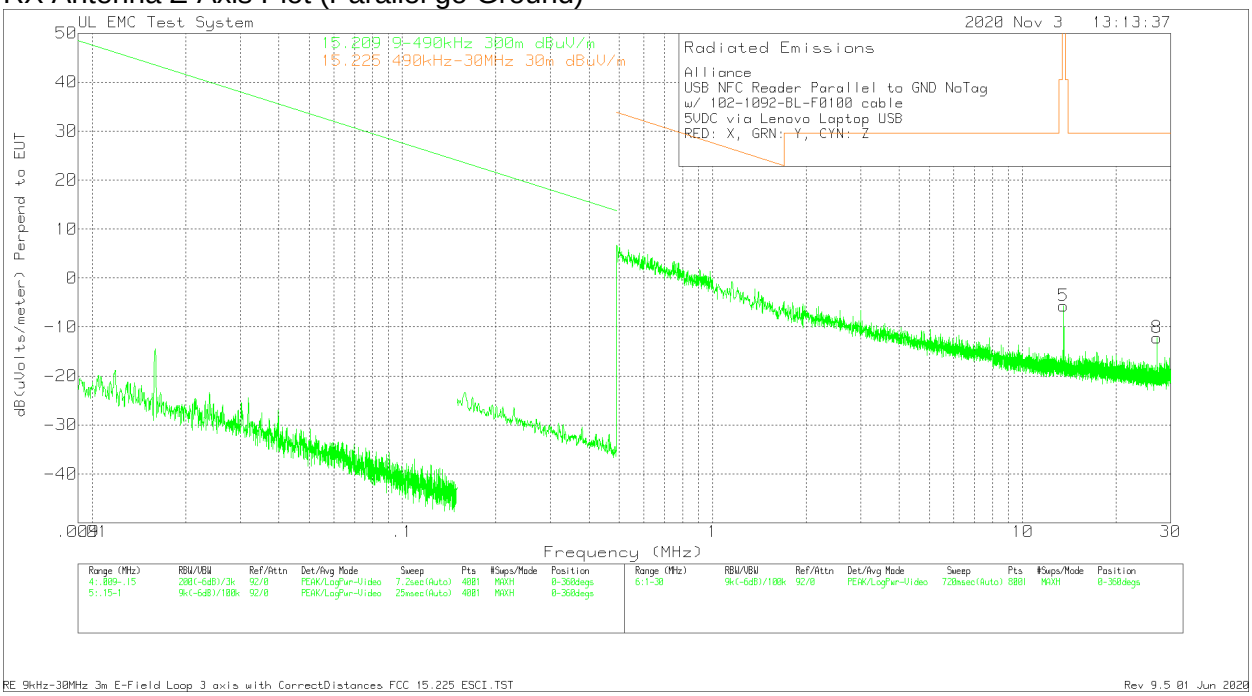
RX Antenna X-Axis Plot (Parallel to EUT)



RX Antenna Y-Axis Plot (Perpendicular to EUT)



RX Antenna Z-Axis Plot (Parallel go Ground)

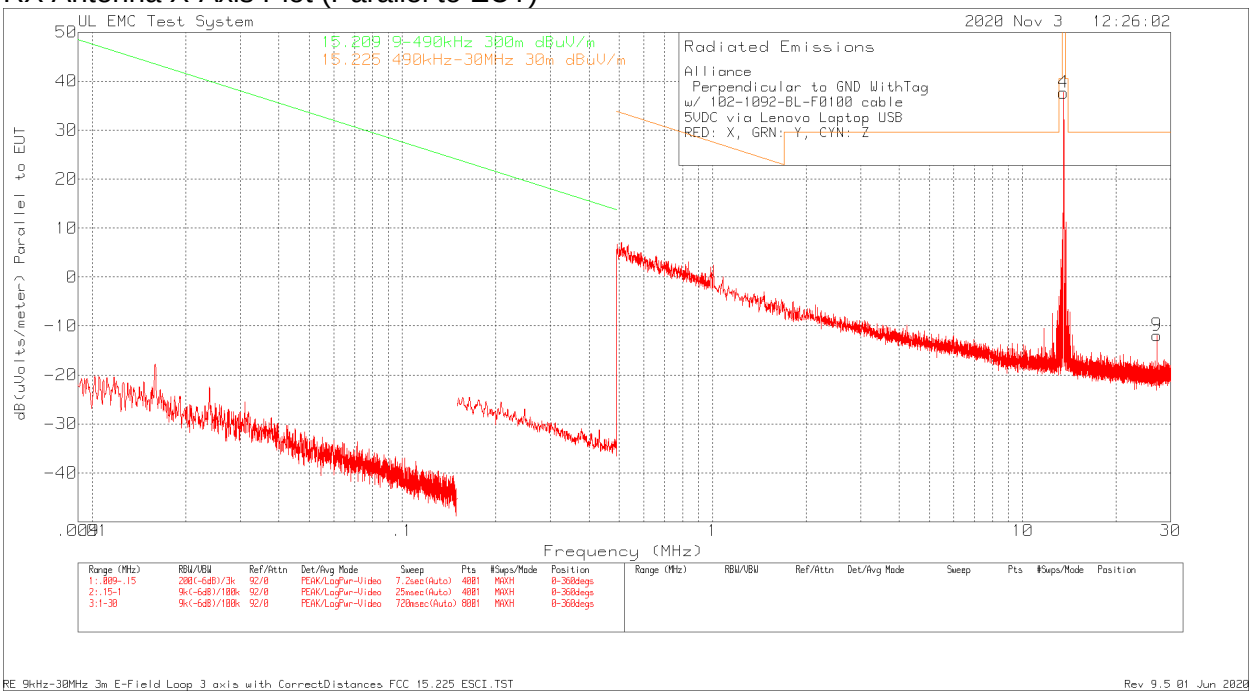


Tabular Data with wors case RX antenna orientation maximized

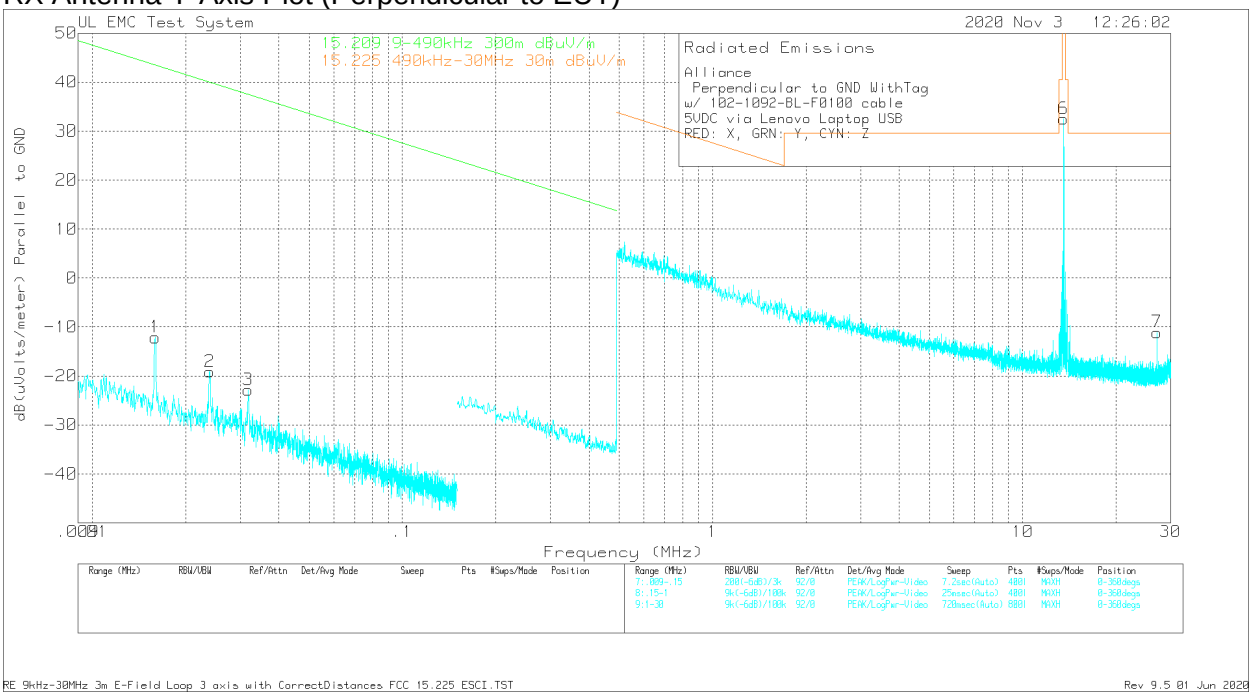
Alliance												
USB NFC Reader Parallel to GND NoTag												
w/ 102-1092-BL-F0100 cable												
5VDC via Lenovo Laptop USB												
RED: X, GRN: Y, CYN: Z												
Trace MArkers												
Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	Path Factor dB	Distance Correction Factor dB	Level dBuV/m	Limit 15.209 9-490kHz 300m dBuV/m	Margin (dB)	Limit 15.225 490kHz-30MHz 30m dBuV/m	Margin (dB)	Azimuth [Degs]
X-Axis (Parallel to EUT												
4	13.56063	46.87	Pk	11.3	0.4	-40	18.57	-	-	84	-65.43	0-360
Y-Axis (Perpendicular to EUT)												
5	13.56063	22.63	Pk	11.3	0.4	-40	-5.67	-	-	84	-89.67	0-360
8	27.12356	17.82	Pk	9.4	0.6	-40	-12.18	-	-	29.54	-41.72	0-360
Z-Axis (Parallel to Ground)												
1	0.01593	45.95	Pk	20.9	0.1	-80	-13.05	43.55	-56.6	-	-	0-360
2	0.02398	41.42	Pk	18.3	0.1	-80	-20.18	40	-60.18	-	-	0-360
3	0.03175	39.3	Pk	17.3	0.1	-80	-23.3	37.56	-60.86	-	-	0-360
6	13.56063	56.36	Pk	11.3	0.4	-40	28.06	-	-	84	-55.94	0-360
7	27.12175	19.54	Pk	9.4	0.6	-40	-10.46	-	-	29.54	-40	0-360
9	27.12175	19.54	Pk	9.4	0.6	-40	-10.46	-	-	29.54	-40	0-360
Radiated Emission Data												
	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	Path Factor dB	Distance Correction Factor dB	Level dBuV/m	Limit 15.209 9-490kHz 300m dBuV/m	Margin (dB)	Limit 15.225 490kHz-30MHz 30m dBuV/m	Margin (dB)	Azimuth [Degs]
Z-Axis (Parallel to Ground)												
	13.5601	56.27	Pk	11.3	0.4	-40	27.97	-	-	84	-56.03	360
	13.5601	55.7	Qp	11.3	0.4	-40	27.4	-	-	84	-56.6	360
Pk - Peak detector												
Qp - Quasi-Peak detector												

9.2.1. Data with Tag, EUT Y-Axis, Perpendicular to Ground

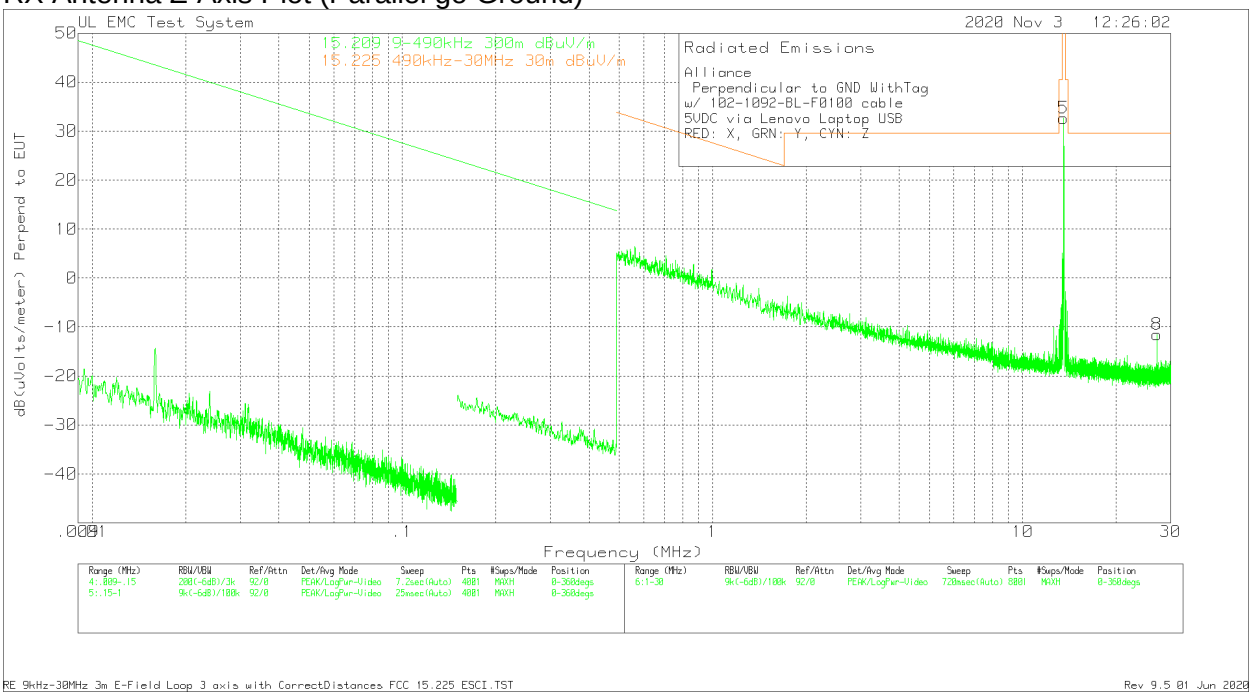
RX Antenna X-Axis Plot (Parallel to EUT)



RX Antenna Y-Axis Plot (Perpendicular to EUT)



RX Antenna Z-Axis Plot (Parallel go Ground)

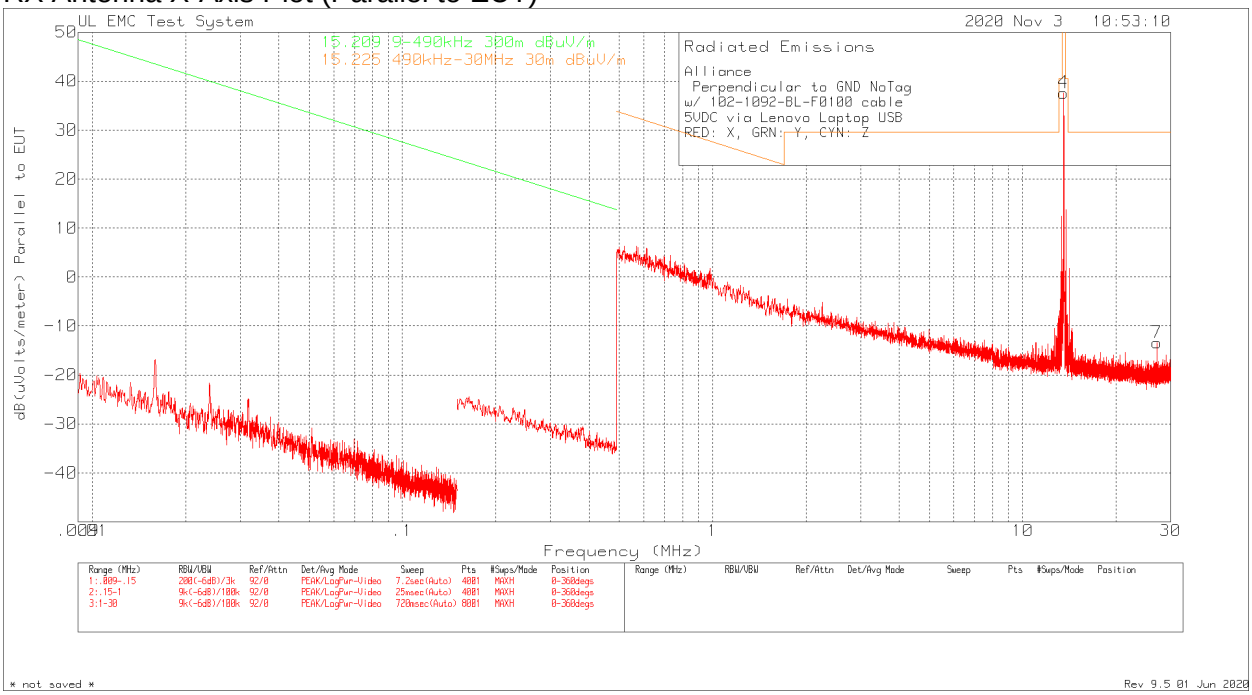


Tabular Data with wors case RX antenna orientation maximized

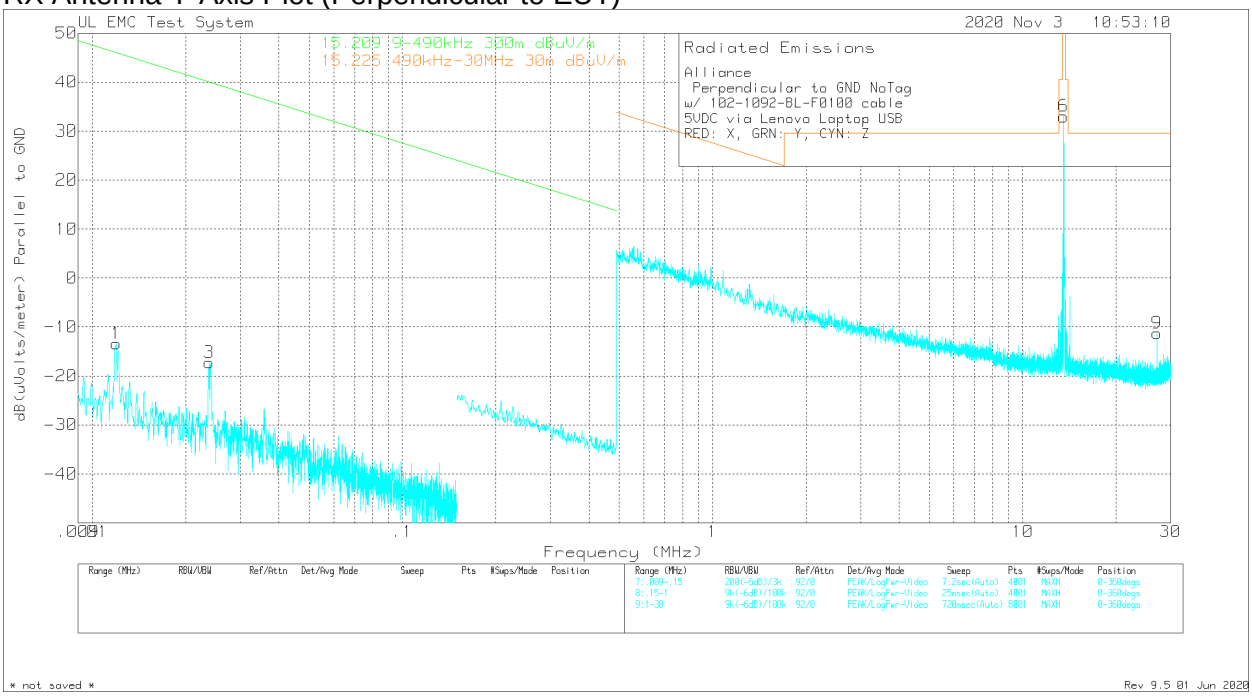
Alliance												
Perpendicular to GND WithTag												
w/ 102-1092-BL-F0100 cable												
5VDC via Lenovo Laptop USB												
RED: X, GRN: Y, CYN: Z												
Trace MArkers												
Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	Path Factor dB	Distance Correction Factor dB	Level dBuV/m	Limit 15.209 9-490kHz 300m dBuV/m	Margin (dB)	Limit 15.225 490kHz-30MHz 30m dBuV/m	Margin (dB)	Azimuth [Degs]
X-Axis (Parallel to EUT)												
4	13.56063	65.95	Pk	11.3	0.4	-40	37.65	-	-	84	-46.35	0-360
9	27.12356	18.11	Pk	9.4	0.6	-40	-11.89	-	-	29.54	-41.43	0-360
Y-Axis (Perpendicular to EUT)												
5	13.56063	60.91	Pk	11.3	0.4	-40	32.61	-	-	84	-51.39	0-360
8	27.12175	18.48	Pk	9.4	0.6	-40	-11.52	-	-	29.54	-41.06	0-360
Z-Axis (Parallel to Ground)												
1	0.01593	46.87	Pk	20.9	0.1	-80	-12.13	43.55	-55.68	-	-	0-360
2	0.02389	42.43	Pk	18.3	0.1	-80	-19.17	40.03	-59.2	-	-	0-360
3	0.03182	39.81	Pk	17.2	0.1	-80	-22.89	37.54	-60.43	-	-	0-360
6	13.56063	60.84	Pk	11.3	0.4	-40	32.54	-	-	84	-51.46	0-360
7	27.12175	18.92	Pk	9.4	0.6	-40	-11.08	-	-	29.54	-40.62	0-360
Radiated Emission Data												
X-Axis (Parallel to EUT)												
	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	Path Factor dB	Distance Correction Factor dB	Level dBuV/m	Limit 15.209 9-490kHz 300m dBuV/m	Margin (dB)	Limit 15.225 490kHz-30MHz 30m dBuV/m	Margin (dB)	Azimuth [Degs]
	13.560063	65.61	Pk	11.3	0.4	-40	37.31	-	-	84	-46.69	360
	13.560063	65.05	Qp	11.3	0.4	-40	36.75	-	-	84	-47.25	360
Pk - Peak detector												
Qp - Quasi-Peak detector												

9.2.1. Data without Tag, EUT Y-Axis, Perpendicular to Ground

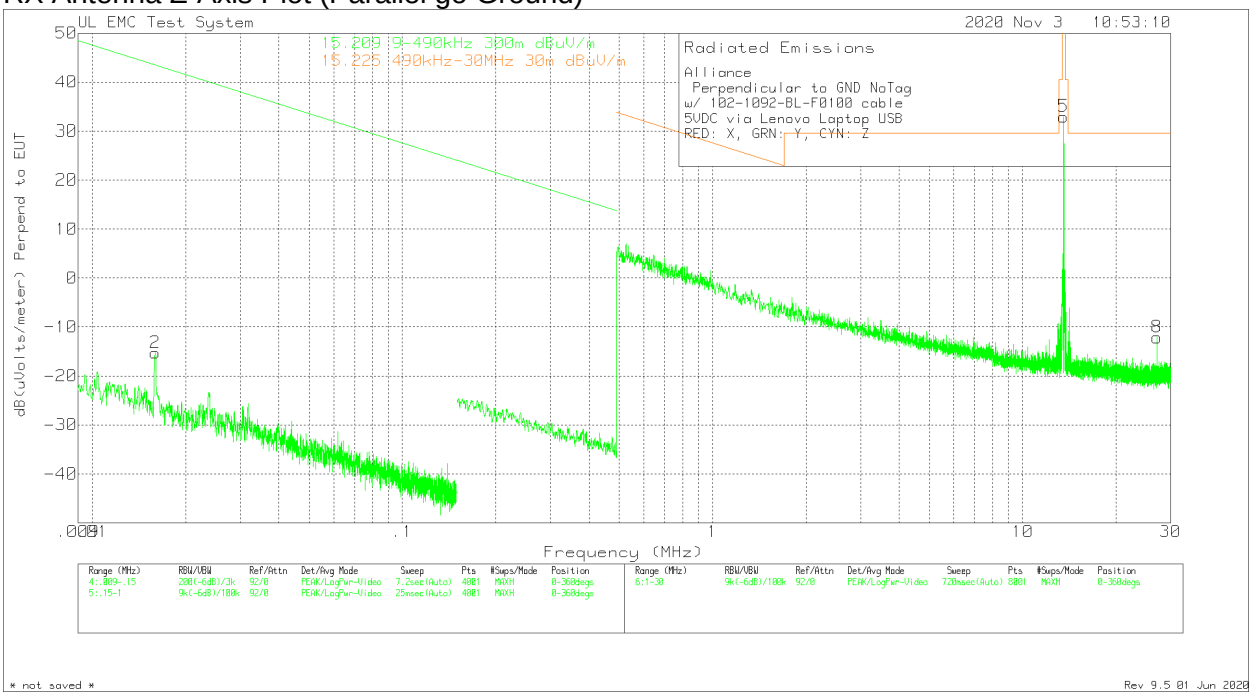
RX Antenna X-Axis Plot (Parallel to EUT)



RX Antenna Y-Axis Plot (Perpendicular to EUT)



RX Antenna Z-Axis Plot (Parallel go Ground)



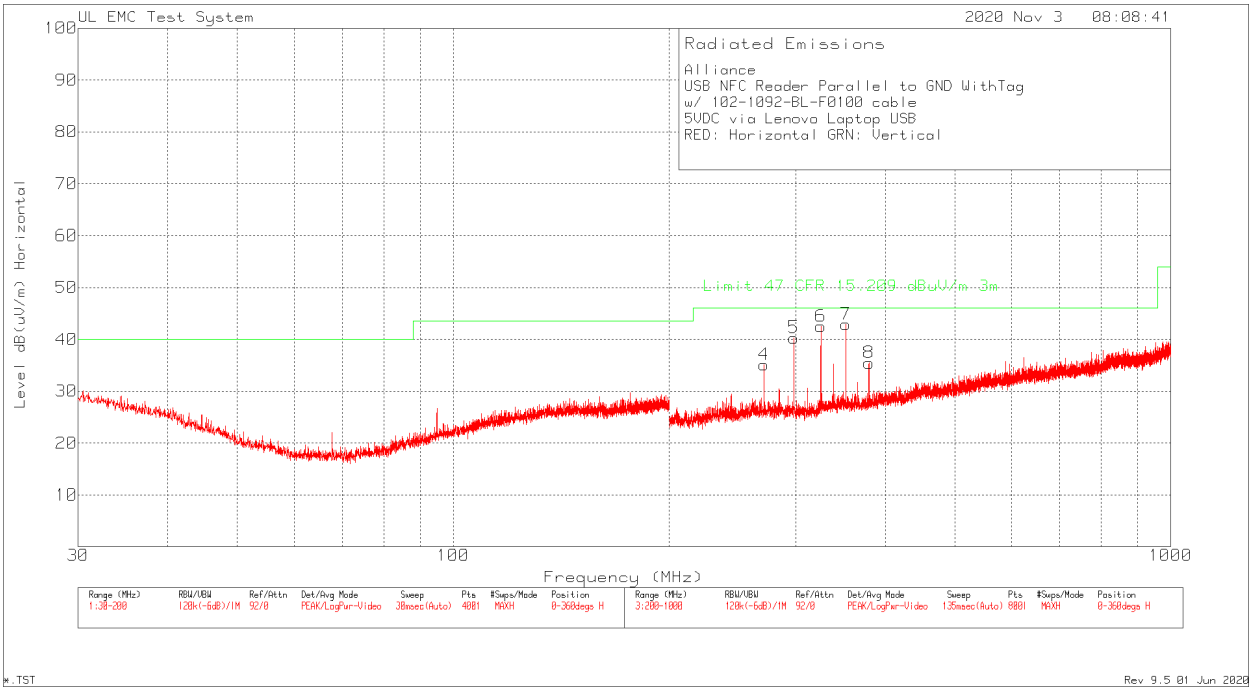
Tabular Data with wors case RX antenna orientation maximized

Alliance												
Perpendicular to GND NoTag												
w/ 102-1092-BL-F0100 cable												
5VDC via Lenovo Laptop USB												
RED: X, GRN: Y, CYN: Z												
Trace MArkers												
Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	Path Factor dB	Distance Correction Factor dB	Level dBuV/m	Limit 15.209 9-490kHz 300m dBuV/m	Margin (dB)	Limit 15.225 490kHz-30MHz 30m dBuV/m	Margin (dB)	Azimuth [Degs]
X-Axis (Parallel to EUT)												
4	13.56063	65.92	Pk	11.3	0.4	-40	37.62	-	-	84	-46.38	0-360
7	27.12538	16.56	Pk	9.4	0.6	-40	-13.44	-	-	29.54	-42.98	0-360
2	0.01593	43.75	Pk	20.9	0.1	-80	-15.25	43.55	-58.8	-	-	0-360
Y-Axis (Perpendicular to EUT)												
5	13.56063	61.26	Pk	11.3	0.4	-40	32.96	-	-	84	-51.04	0-360
8	27.12175	17.87	Pk	9.4	0.6	-40	-12.13	-	-	29.54	-41.67	0-360
Z-Axis (Parallel to Ground)												
1	0.01194	43.51	Pk	23	0.1	-80	-13.39	46.06	-59.45	-	-	0-360
3	0.023805	44.34	Pk	18.3	0.1	-80	-17.26	40.06	-57.32	-	-	0-360
6	13.56063	61.29	Pk	11.3	0.4	-40	32.99	-	-	84	-51.01	0-360
9	27.12175	18.74	Pk	9.4	0.6	-40	-11.26	-	-	29.54	-40.8	0-360
Radiated Emission Data												
	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB/m	Path Factor dB	Distance Correction Factor dB	Level dBuV/m	Limit 15.209 9-490kHz 300m dBuV/m	Margin (dB)	Limit 15.225 490kHz-30MHz 30m dBuV/m	Margin (dB)	Azimuth [Degs]
	X-Axis (Parallel to EUT)											
	13.560125	66.23	Pk	11.3	0.4	-40	37.93	-	-	84	-46.07	354
	13.560125	65.64	Qp	11.3	0.4	-40	37.34	-	-	84	-46.66	354
Pk - Peak detector												
Qp - Quasi-Peak detector												

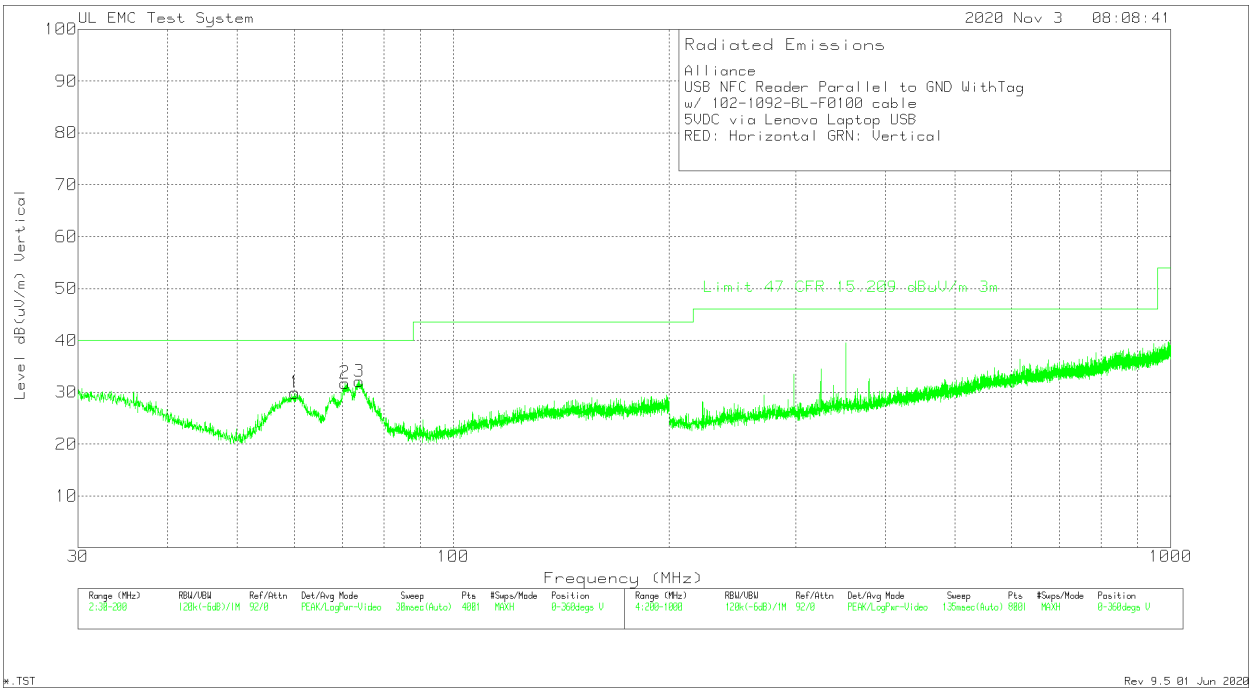
9.3. TX SPURIOUS EMISSION 30 TO 1000 MHz

9.3.1. Data with Tag, EUT X-Axis, Parallel to Ground

RX Antenna Horizontal



RX Antenna Vertical

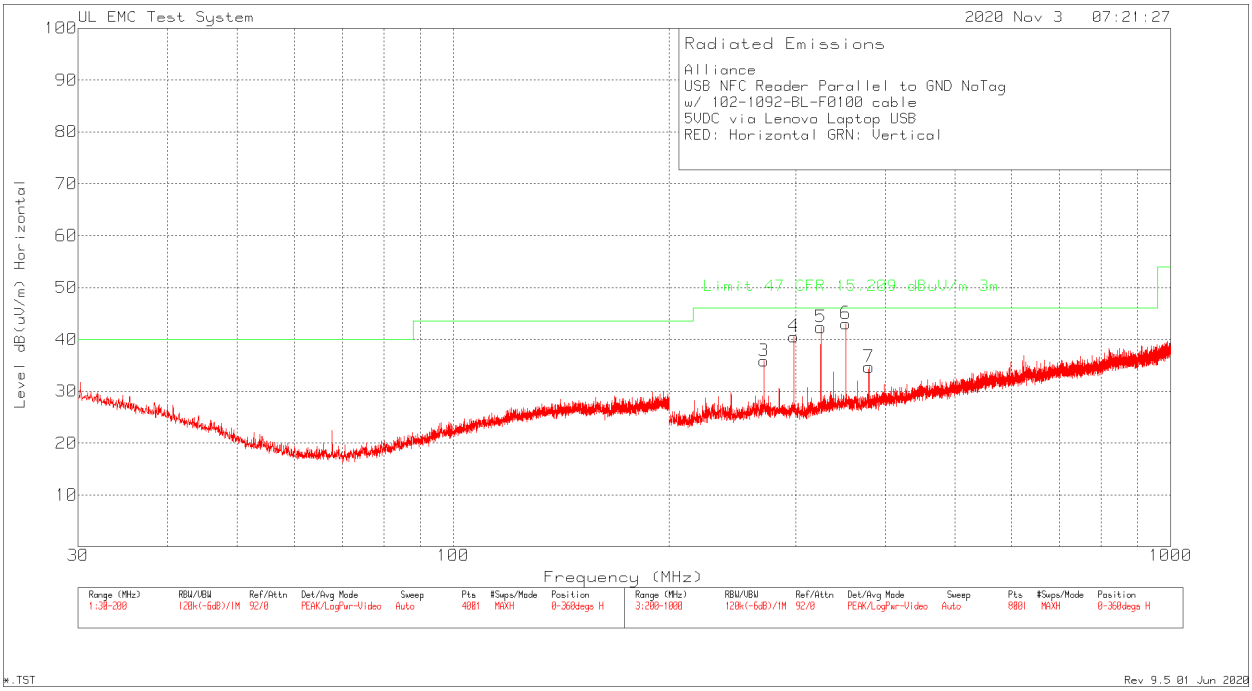


Tabular Data

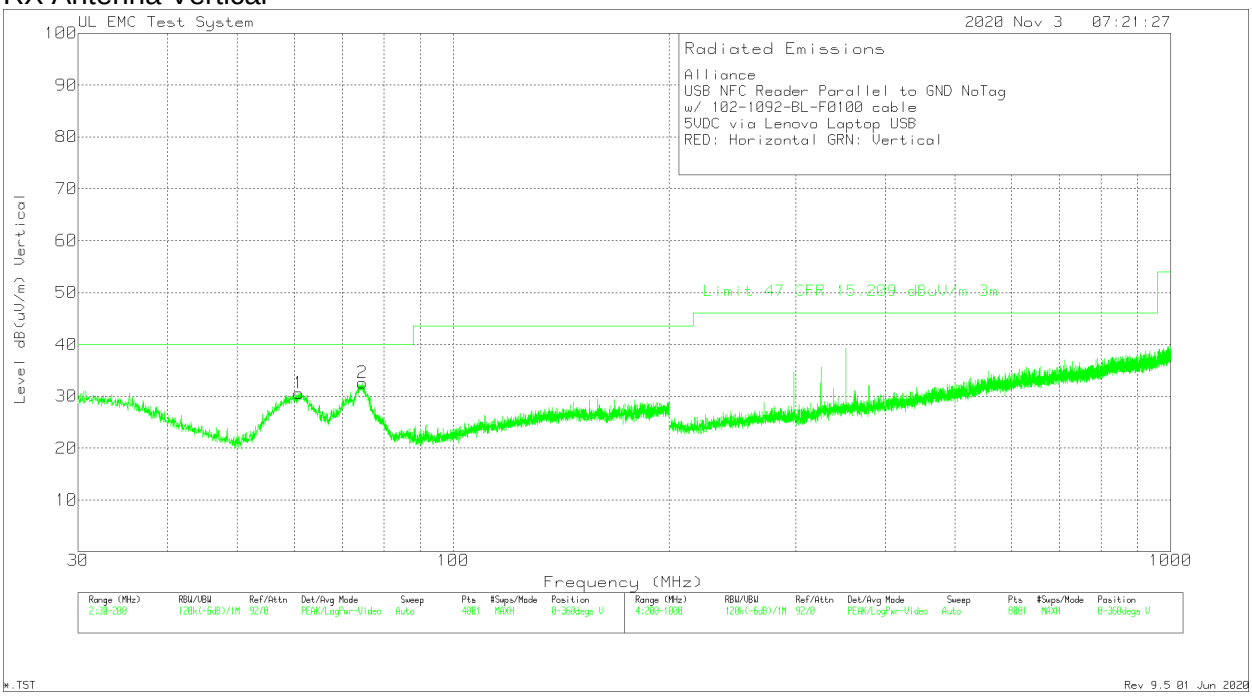
Alliance												
USB NFC Reader Parallel to GND WithTag												
w/ 102-1092-BL-F0100 cable												
5VDC via Lenovo Laptop USB												
RED: Horizontal GRN: Vertical												
Trace MArkers												
Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB dB/m	Path Factor dB	10m to 3m Factor dB	Level @ 3m dBuV/m	Limit 47 CFR 15.209 @ 3m dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	60.1325	43	Pk	6.4	-30	10.5	29.9	40	-10.1	0-360	251	V
2	70.5875	44.77	Pk	6.4	-29.9	10.5	31.77	40	-8.23	0-360	399	V
3	73.9875	44.76	Pk	6.8	-30	10.5	32.06	40	-7.94	0-360	399	V
4	271.2	40.27	Pk	13.3	-29	10.5	35.07	46.02	-10.95	0-360	299	H
5	298.3	44.7	Pk	13.9	-28.8	10.5	40.3	46.02	-5.72	0-360	299	H
6	325.4	45.94	Pk	14.7	-28.6	10.5	42.54	46.02	-3.48	0-360	199	H
7	352.5	45.17	Pk	15.7	-28.5	10.5	42.87	46.02	-3.15	0-360	299	H
8	379.7	37.44	Pk	15.8	-28.3	10.5	35.44	46.02	-10.58	0-360	299	H
Radiated Emission Data												
	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB dB/m	Path Factor dB	10m to 3m Factor dB	Level @ 3m dBuV/m	Limit 47 CFR 15.209 @ 3m dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
	352.5593	45.22	Qp	15.7	-28.5	10.5	42.92	46.02	-3.1	45	243	H
	325.4452	45.74	Qp	14.7	-28.6	10.5	42.34	46.02	-3.68	38	295	H
	298.3232	45.66	Qp	13.9	-28.8	10.5	41.26	46.02	-4.76	36	258	H
Pk - Peak detector												
Qp - Quasi-Peak detector												

9.3.1. Data without Tag, EUT X-Axis, Parallel to Ground

RX Antenna Horizontal



RX Antenna Vertical

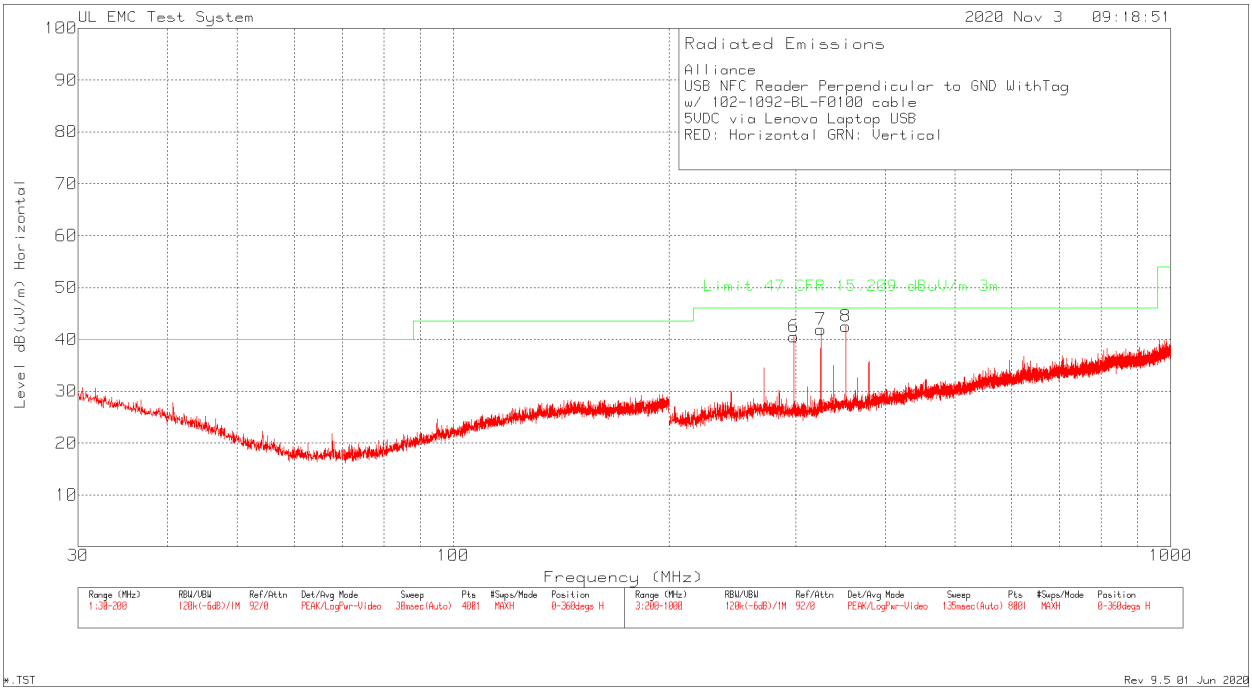


Tabular Data

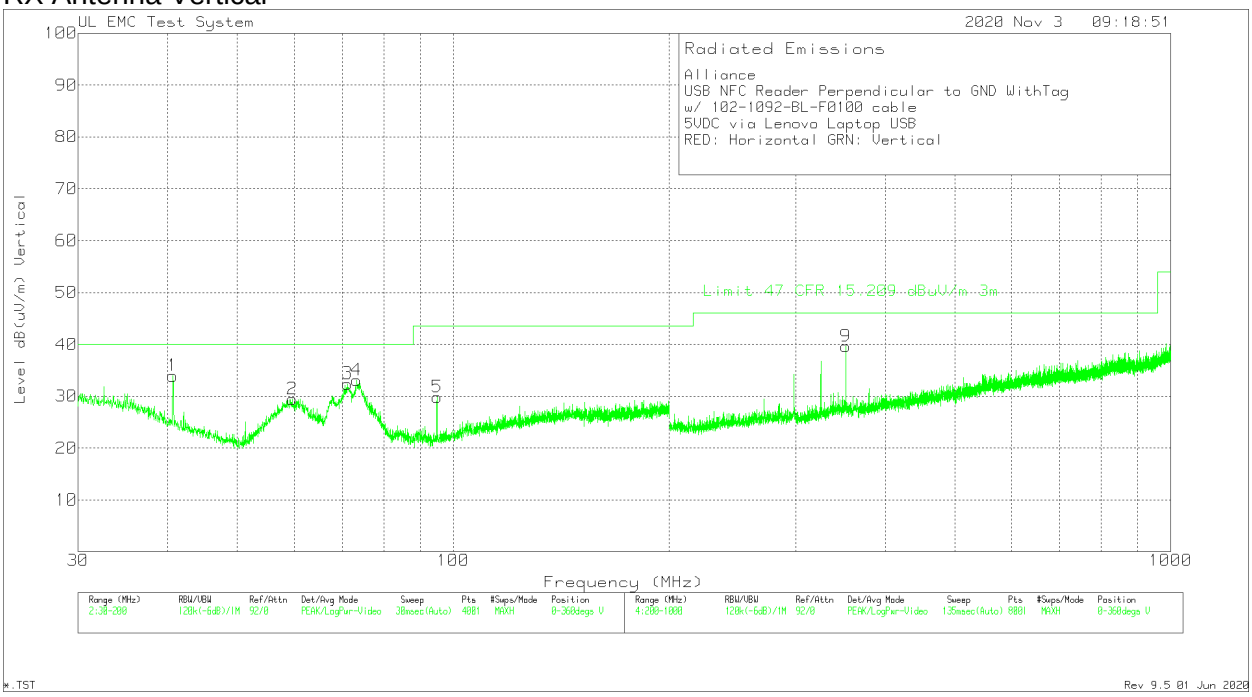
Alliance												
USB NFC Reader Parallel to GND NoTag												
w/ 102-1092-BL-F0100 cable												
5VDC via Lenovo Laptop USB												
RED: Horizontal GRN: Vertical												
Trace MArkers												
Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB dB/m	Path Factor dB	10m to 3m Factor dB	Level @ 3m dBuV/m	Limit 47 CFR 15.209 @ 3m dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	60.8975	43.8	Pk	6.3	-30	10.5	30.6	40	-9.4	0-360	251	V
2	74.71	45.22	Pk	6.9	-30	10.5	32.62	40	-7.38	0-360	400	V
3	271.2	41.05	Pk	13.3	-29	10.5	35.85	46.02	-10.17	0-360	299	H
4	298.3	44.96	Pk	13.9	-28.8	10.5	40.56	46.02	-5.46	0-360	299	H
5	325.4	45.75	Pk	14.7	-28.6	10.5	42.35	46.02	-3.67	0-360	199	H
6	352.5	45.36	Pk	15.7	-28.5	10.5	43.06	46.02	-2.96	0-360	299	H
7	379.7	36.68	Pk	15.8	-28.3	10.5	34.68	46.02	-11.34	0-360	199	H
Radiated Emission Data												
	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB dB/m	Path Factor dB	10m to 3m Factor dB	Level @ 3m dBuV/m	Limit 47 CFR 15.209 @ 3m dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
	352.5586	45.35	Qp	15.7	-28.5	10.5	43.05	46.02	-2.97	42	244	H
	325.4431	45.7	Qp	14.7	-28.6	10.5	42.3	46.02	-3.72	37	291	H
	298.3235	45.42	Qp	13.9	-28.8	10.5	41.02	46.02	-5	37	251	H
Pk - Peak detector												
Qp - Quasi-Peak detector												

9.3.1. Data with Tag, EUT Y-Axis, Parallel to Ground

RX Antenna Horizontal



RX Antenna Vertical

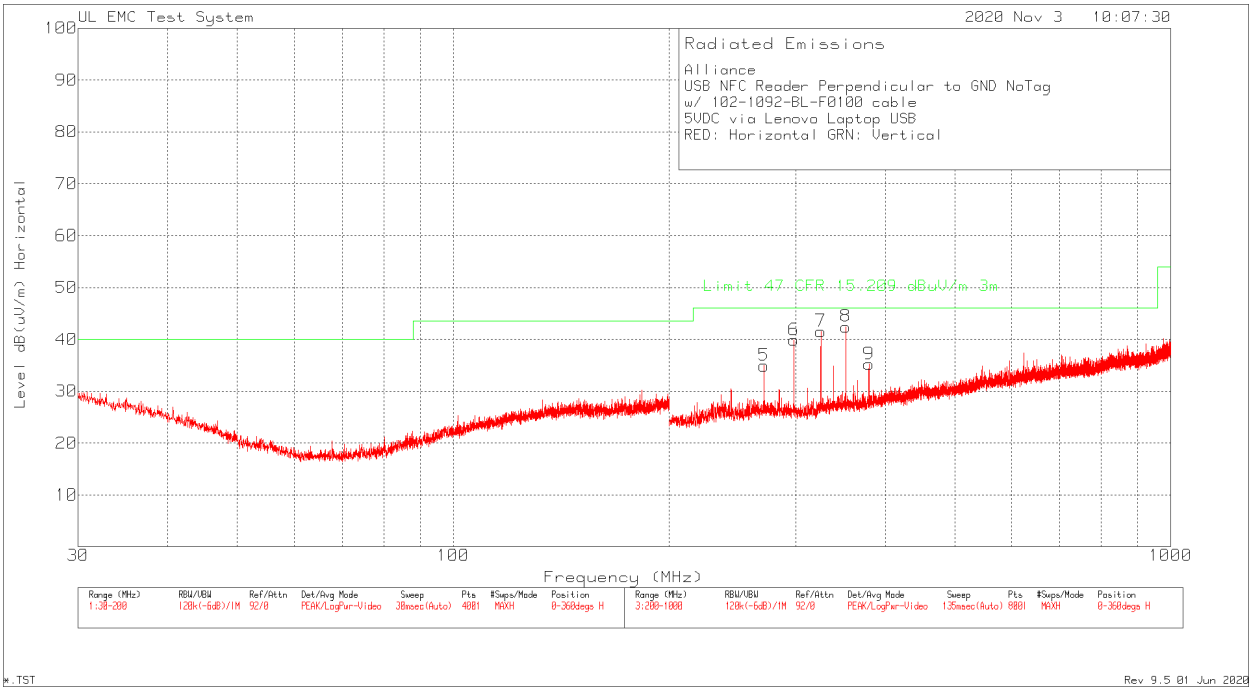


Tabular Data

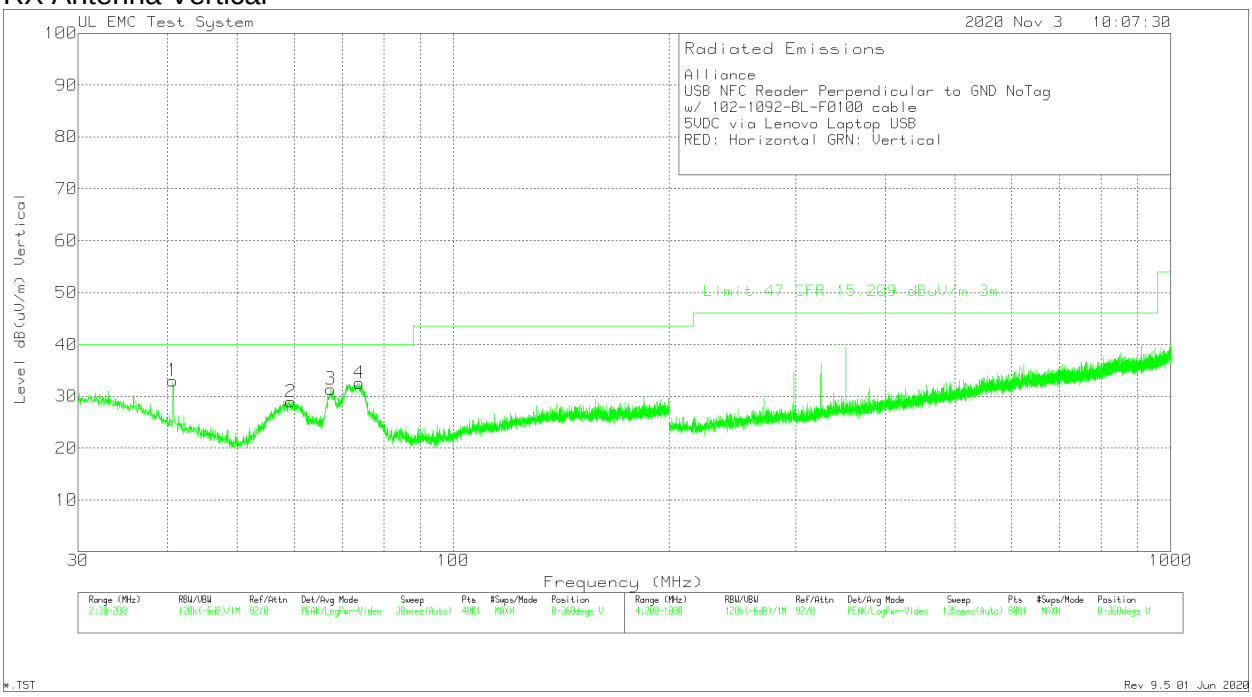
Alliance												
USB NFC Reader Perpendicular to GND WithTag												
w/ 102-1092-BL-F0100 cable												
5VDC via Lenovo Laptop USB												
RED: Horizontal GRN: Vertical												
Trace MArkers												
Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB dB/m	Path Factor dB	10m to 3m Factor dB	Level @ 3m dBuV/m	Limit 47 CFR 15.209 @ 3m dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	40.6675	39.93	Pk	13.6	-30.1	10.5	33.93	40	-6.07	0-360	101	V
2	59.6225	42.44	Pk	6.5	-30	10.5	29.44	40	-10.56	0-360	251	V
3	71.2675	45.5	Pk	6.4	-30	10.5	32.4	40	-7.6	0-360	399	V
4	73.35	45.86	Pk	6.7	-30	10.5	33.06	40	-6.94	0-360	251	V
5	94.94	38.71	Pk	10.5	-29.9	10.5	29.81	43.52	-13.71	0-360	101	V
6	298.3	44.91	Pk	13.9	-28.8	10.5	40.51	46.02	-5.51	0-360	299	H
7	325.4	45.32	Pk	14.7	-28.6	10.5	41.92	46.02	-4.1	0-360	199	H
8	352.5	44.83	Pk	15.7	-28.5	10.5	42.53	46.02	-3.49	0-360	299	H
9	352.5	41.91	Pk	15.7	-28.5	10.5	39.61	46.02	-6.41	0-360	99	V
Radiated Emission Data												
	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB dB/m	Path Factor dB	10m to 3m Factor dB	Level @ 3m dBuV/m	Limit 47 CFR 15.209 @ 3m dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
	40.6784	37.94	Qp	13.6	-30.1	10.5	31.94	40	-8.06	242	137	V
	352.559	45.49	Qp	15.7	-28.5	10.5	43.19	46.02	-2.83	34	234	H
	325.4435	45.24	Qp	14.7	-28.6	10.5	41.84	46.02	-4.18	34	289	H
	298.323	44.97	Qp	13.9	-28.8	10.5	40.57	46.02	-5.45	38	257	H
	298.323	44.98	Qp	13.9	-28.8	10.5	40.58	46.02	-5.44	38	257	H
Pk - Peak detector												
Qp - Quasi-Peak detector												

9.3.1. Data without Tag, EUT Y-Axis, Perpendicular to Ground

RX Antenna Horizontal



RX Antenna Vertical



Tabular Data

Alliance												
USB NFC Reader Perpendicular to GND NoTag												
w/ 102-1092-BL-F0100 cable												
5VDC via Lenovo Laptop USB												
RED: Horizontal GRN: Vertical												
Trace MArkers												
Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB dB/m	Path Factor dB	10m to 3m Factor dB	Level @ 3m dBuV/m	Limit 47 CFR 15.209 @ 3m dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
1	40.6675	39.03	Pk	13.6	-30.1	10.5	33.03	40	-6.97	0-360	101	V
2	59.3675	41.95	Pk	6.5	-30	10.5	28.95	40	-11.05	0-360	251	V
3	67.485	44.69	Pk	6.2	-30	10.5	31.39	40	-8.61	0-360	251	V
4	73.9025	45.24	Pk	6.8	-30	10.5	32.54	40	-7.46	0-360	400	V
5	271.2	40.13	Pk	13.3	-29	10.5	34.93	46.02	-11.09	0-360	299	H
6	298.3	44.25	Pk	13.9	-28.8	10.5	39.85	46.02	-6.17	0-360	299	H
7	325.4	44.95	Pk	14.7	-28.6	10.5	41.55	46.02	-4.47	0-360	299	H
8	352.5	44.76	Pk	15.7	-28.5	10.5	42.46	46.02	-3.56	0-360	299	H
9	379.7	37.26	Pk	15.8	-28.3	10.5	35.26	46.02	-10.76	0-360	299	H
Radiated Emission Data												
	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	Antenna Factor dB dB/m	Path Factor dB	10m to 3m Factor dB	Level @ 3m dBuV/m	Limit 47 CFR 15.209 @ 3m dBuV/m	Margin (dB)	Azimuth [Degs]	Height [cm]	Polarity
	352.5592	45.49	Qp	15.7	-28.5	10.5	43.19	46.02	-2.83	37	236	H
	325.4439	45	Qp	14.7	-28.6	10.5	41.6	46.02	-4.42	38	283	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 ±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.

10.1. Frequecny Stablility Data

10.1.1. Tabular Data

Reference Frequency: EUT Channel 13.56 MHz @ 20ºC Limit: ± 100 ppm = 1.356 kHz										
Power Supply	Envir. Temp	Frequency Deviation Measureed with Time Elapse								
(Vac)	(ºC)	Startup (MHz)	Delta (ppm)	@ 2 mins (MHz)	Delta (ppm)	@ 5 mins (MHz)	Delta (ppm)	@ 10 mins (MHz)	Delta (ppm)	Limit (ppm)
120.00	50	13.5600513	1.616	13.5600518	1.574	13.5600571	1.188	13.5601356	-4.606	± 100
120.00	40	13.5600589	1.056	13.5600503	1.691	13.5600219	3.784	13.5600477	1.881	± 100
120.00	30	13.5601480	-5.517	13.5600679	0.393	13.5600559	1.278	13.5601299	-4.184	± 100
120.00	20	13.5600732	0.000	13.5600731	0.004	13.5600732	-0.002	13.5600732	-0.004	± 100
120.00	10	13.5601416	-5.043	13.5600795	-0.464	13.5601090	-2.644	13.5600938	-1.520	± 100
120.00	0	13.5601486	-5.561	13.5601506	-5.710	13.5601410	-5.004	13.5601322	-4.349	± 100
120.00	-10	13.5599662	7.893	13.5601394	-4.880	13.5601567	-6.162	13.5601539	-5.954	± 100
120.00	-20	13.5600959	-1.678	13.5601407	-4.978	13.5601498	-5.653	13.5601683	-7.012	± 100
102.00	20	13.5600733	-0.007	13.5600732	-0.003	13.5600611	0.891	13.5601963	-9.081	± 100
138.00	20	13.5600733	-0.011	13.5600637	0.697	13.5600734	-0.013	13.5601200	-3.449	± 100

11. 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 (MHz)	Limits (dBµV)	
	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

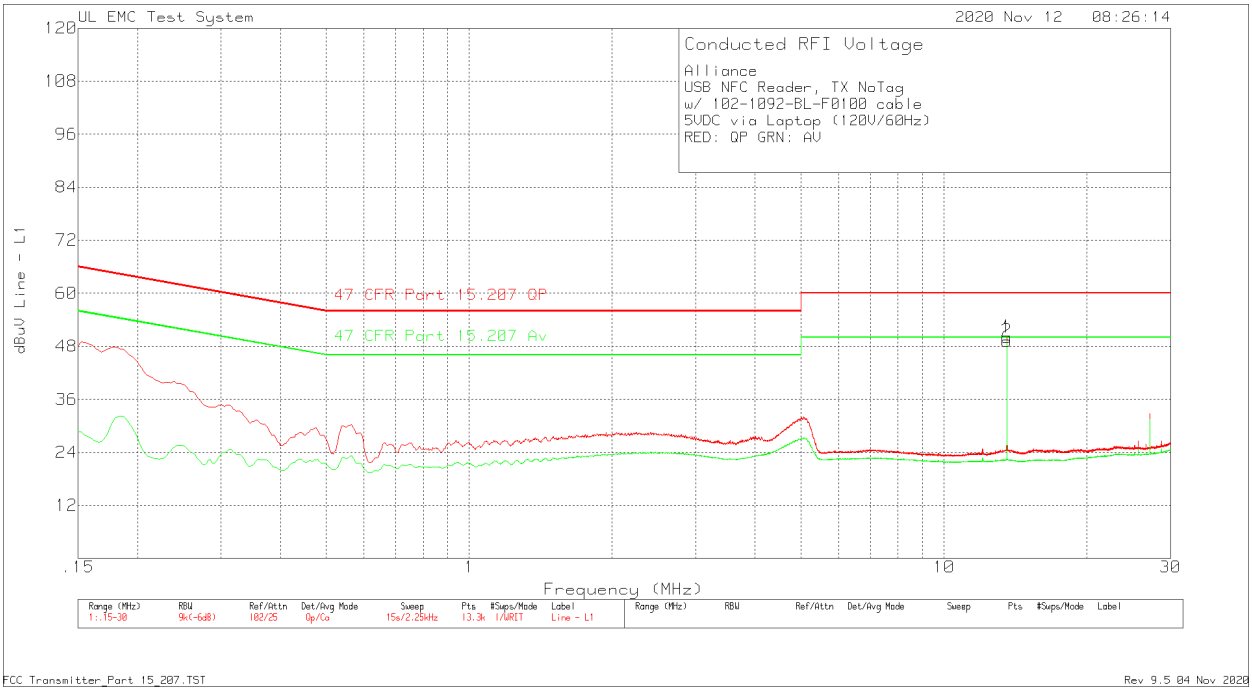
ANSI C63.10:2013

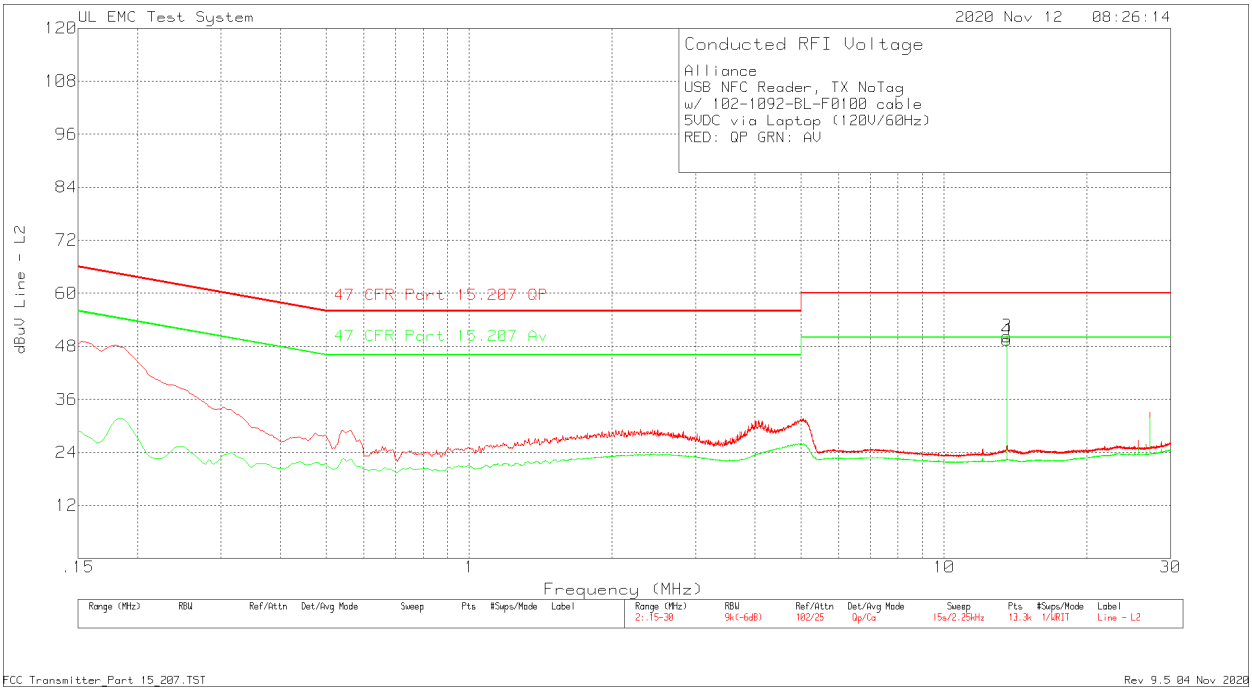
RESULTS

No non-compliance noted:

11.1. Line Conducted Emissions with Tag

Line Conducted Emissions Plot Data



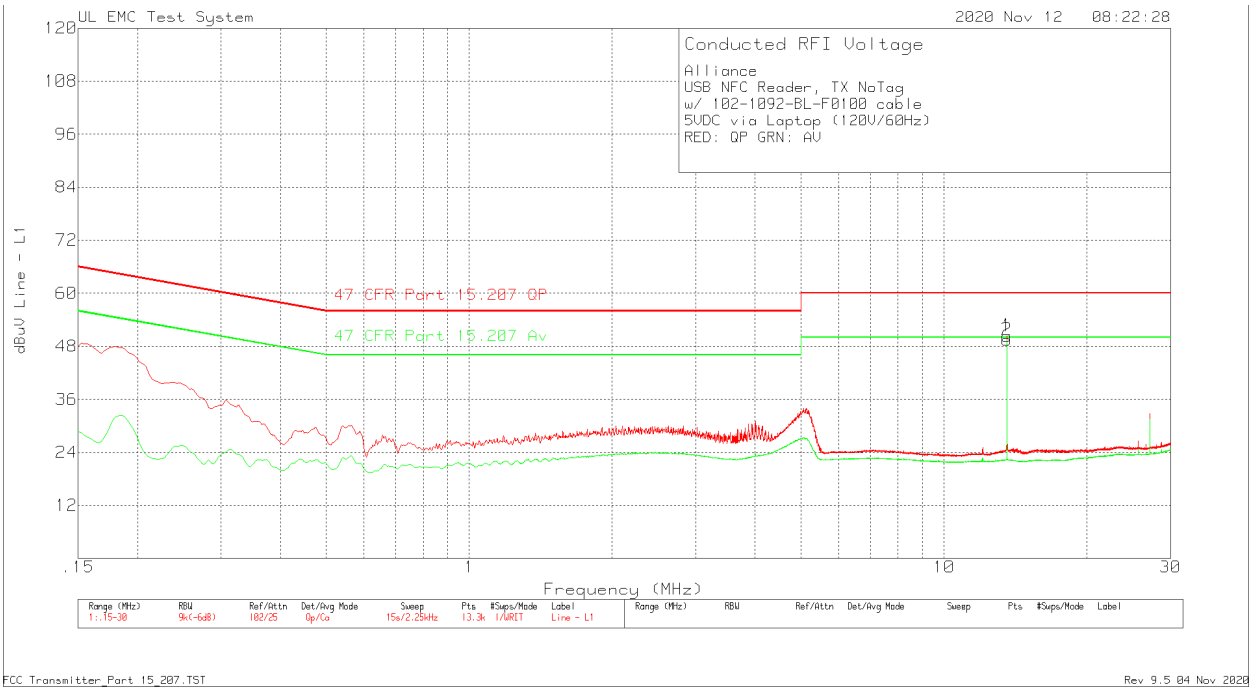


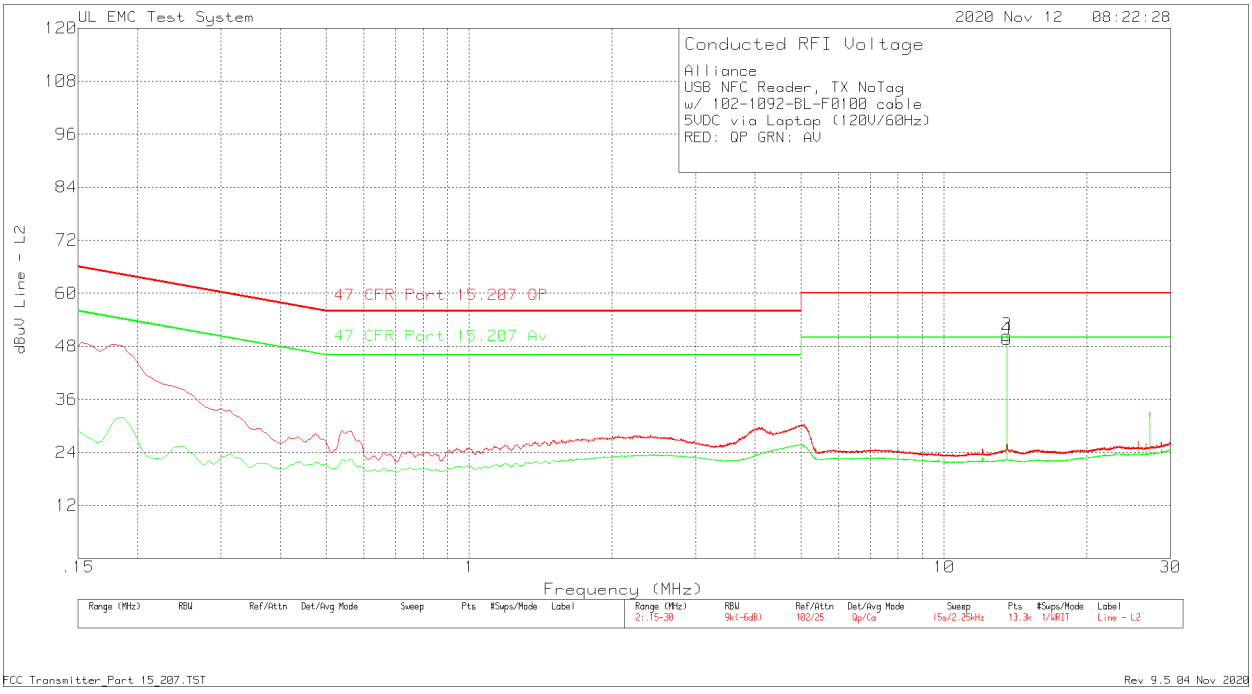
Line Conducted Emissions Tabular Data

Alliance										
USB NFC Reader, TX NoTag										
w/ 102-1092-BL-F0100 cable										
5VDC via Laptop (120V/60Hz)										
RED: QP GRN: AV										
Trace MArkers										
Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	LISN Factor dB	Path Factor dB	Level dBuV	47 CFR Part 15.207 QP dBuV	Margin (dB)	47 CFR Part 15.207 Av dBuV	Margin (dB)
Line 1										
1	13.56	38.87	Qp	0	11.2	50.07	60	-9.93	-	-
2	13.56	38	Ca	0	11.2	49.2	60	-10.8	50	-0.8
Line 2										
3	13.56	39.17	Qp	0	11.1	50.27	60	-9.73	-	-
4	13.56	38.32	Ca	0	11.1	49.42	60	-10.58	50	-0.58
Qp - Quasi-Peak detector										
Ca - CISPR Average detection										

11.1. Line Conducted Emissions without Tag

Line Conducted Emissions Plot Data





Line Conducted Emissions Tabular Data

Alliance										
USB NFC Reader, TX NoTag										
w/ 102-1092-BL-F0100 cable										
5VDC via Laptop (120V/60Hz)										
RED: QP GRN: AV										
Trace MArkers										
Marker No.	Test Frequency (MHz)	Meter Reading (dBuV)	Detector	LISN Factor dB	Path Factor dB	Level dBuV	47 CFR Part 15.207 QP dBuV	Margin (dB)	47 CFR Part 15.207 Av dBuV	Margin (dB)
Line 1										
1	13.56	39.17	Qp	0	11.2	50.37	60	-9.63	-	-
2	13.56	38.28	Ca	0	11.2	49.48	60	-10.52	50	-0.52
Line 2										
3	13.56	39.44	Qp	0	11.1	50.54	60	-9.46	-	-
4	13.56	38.57	Ca	0	11.1	49.67	60	-10.33	50	-0.33
Qp - Quasi-Peak detector										
Ca - CISPR Average detection										