TEST REPORT

Report Number. : R14122222-E1

Applicant	:	HID Global Corporation 3950 RCA Blvd, Suite 5001 Palm Beach Gardens, FL 33410, United States
Model	:	SENTRY2Z
FCC ID	:	JQ6-SENTRY2Z
IC	:	2236B-SENTRY2Z
EUT Description	:	Verifier Sentry 2.0
Test Standard(s)	:	FCC 47 CFR PART 15 SUBPART C: 2022 ISED RSS-210 ISSUE 10 + A1: 2020 ISED RSS-GEN ISSUE 5 + A2: 2021

Date Of Issue:
2023-02-07

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

ACCREDITED
CERT #0751.06

Revision History

Rev.	Issue Date	Revisions	Revised By
V1	2022-09-27	Initial Issue	Charles Moody
V2	2023-02-07	Updated Section 6.4 Open Air Statement	Charles Moody

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME: HID Global Corporation
3950 RCA Blvd, Suite 5001
Palm Beach Gardens, FL 33410, United States

EUT DESCRIPTION: Verifier Sentry 2.0

MODEL: SENTRY2Z

SERIAL NUMBER: 4471692, 4476104

SAMPLE RECEIPT DATE: 2022-07-06, 2022-07-20

DATE TESTED: 2022-08-25 TO 2022-09-19

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
FCC PART 15 SUBPART C : 2022	See Section 2
ISED RSS-210 Issue 10 + A1: 2020, Annex B.6	See Section 2
ISED RSS-GEN Issue 5 + A2: 2021	See 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.

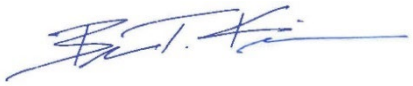
The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. 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 UL LLC By:

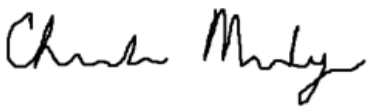
Michael Antola
Staff Engineer
Consumer, Medical and IT Segment
UL LLC

Reviewed By:



Brian Kiewra
Project Engineer
Consumer, Medical and IT Segment
UL LLC

Prepared By:



Charles Moody
Electrical Engineer
Consumer, Medical and IT Segment
UL LLC

2. TEST RESULTS SUMMARY

FCC Clause	ISED Clause	Requirement	Result	Comment
-	RSS-GEN 6.7	99% OBW	Reporting purposes only	ANSI C63.10 Section 6.9.3.
-	RSS-GEN 6.7	20dB BW	Reporting purposes only	ANSI C63.10 Section 6.9.2
§15.225(e)	RSS-210 Annex B.6 (b)	Frequency Stability	Complies	None
§15.225(a)	RSS-210 Annex B.6 (a)(i)	Fundamental Field Strength	Complies	None
§15.225 (b-d) §15.209	RSS-210 Annex B.6 (a) (ii-iv) RSS-GEN 8.9	Radiated Emissions	Complies	None
§15.207	RSS-Gen 8.8	AC Mains Conducted Emissions	NA	RFID radio not operational when in charging mode.

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.

3. 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: 2022, KDB 414788 D01 Radiated Test Site v01r01, RSS-GEN Issue 5 + A2: 2021, and RSS-210 Issue 10 + A1: 2020.

4. 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	

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 dBuV + 18.7 dB/m + 0.6 dB – 26.9 dB = 28.9 dBuV/m

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6. EQUIPMENT UNDER TEST

6.1. DESCRIPTION OF EUT

The EUT is a handheld scanning device with a built-in RFID radio used for biometric, identity authentication. This report covers the full emissions testing of the RFID radio.

6.2. MAXIMUM ELECTRIC FIELD STRENGTH

Testing was performed at a distance of 3m. The transmitter has a maximum peak radiated magnetic field strength as follows:

The maximum E-field reading with tag at 30m is 30.63 dBuV/m

The maximum E-field reading without tag at 30m is 29.46 dBuV/m

6.3. SOFTWARE AND FIRMWARE

The firmware installed on the EUT used for testing was v4.19.157-perf

The test utility software used during testing was CardReaderManager v1.9.01.0.

6.4. WORST-CASE CONFIGURATION AND MODE

The fundamental was investigated in the three orthogonal orientations X,Y,Z. The Y-orientation was found to be the worst case orientation and therefore, the EUT was tested in the Y-orientation.

For all final radiated testing, both radios were set to transmit as worst-case scenario. Radiated spurious emissions below 1 GHz, were performed with and without tag. The EUT was setup in battery mode since RFID would only be functioning in battery mode and not while on the charger.

For measurements below 30 MHz, these tests were performed other than at an open area test site. Adequate comparison measurements were confirmed against 30 m open area 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.

6.5. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
None				

I/O CABLES

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

TEST SETUP

The EUT is setup using the built-in display that is part of the EUT. This allowed for the RFID reader to begin scanning for a tag.

SETUP DIAGRAM

Please refer to R14122222-EP1 for setup diagrams.

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7. TEST AND MEASUREMENT EQUIPMENT

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

Test Equipment Used - Wireless Conducted Measurement Equipment

Equipment ID	Description	Manufacturer	Model Number	Last Cal.	Next Cal.
	Conducted Room 2				
SA0027	Spectrum Analyzer	Keysight Technologies	N9030A	2022-05-24	2023-05-24
76023 (EC0225)	Temp/Humid Chamber	Cincinnati Sub-Zero	ZPH-8-3.5-SCT/AC	2022-05-24	2023-05-24
HI0090	Environmental Meter	Fisher Scientific	15-077-963	2022-07-20	2023-07-20
-	DC Power Supply	Keysight Technologies	E3633A	NA	NA
SOFTEMI	Antenna Port Software	UL	Version 2022.5.4		
SOFTEMI	Antenna Port Software	UL	Version 2022.8.16		
	Additional Equipment used				
9911-4442	Near Field Probe Kit	ETS EMCO	7405	NA	NA

Test Equipment Used - Radiated Disturbance Emissions Test Equipment (Morrisville – Chamber 1)

Equip. ID	Description	Manufacturer/Brand	Model Number	Last Cal.	Next Cal.
	30-1000 MHz				
AT0066	Hybrid Broadband Antenna	Sunol Sciences Corp.	JB1	2022-03-01	2023-03-01
	Gain-Loss Chains				
C1-SAC02	Gain-loss string: 25-1000MHz	Various	Various	2022-05-05	2023-05-05
	Receiver & Software				
197954	Spectrum Analyzer	Rohde & Schwarz	ESW44	2022-04-14	2023-04-14
SOFTEMI	EMI Software	UL	Version 9.5 (18 Oct 2021)		
	Additional Equipment used				
200539	Environmental Meter	Fisher Scientific	15-077-963 (s/n 181474341)	2021-09-27	2022-09-27

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

Equip. ID	Description	Manufacturer/Brand	Model Number	Last Cal.	Next Cal.
	0.009-30MHz				
AT0059	Active Loop Antenna	ETS-Lindgren	6502	2021-09-24	2022-09-24
	Gain-Loss Chains				
C2-SAC01	Gain-loss string: 0.009-30MHz	Various	Various	2022-05-10	2023-05-10
	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				
200540	Environmental Meter	Fisher Scientific	15-077-963 (s/n 181474409)	2021-09-27	2022-09-27

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8. MEASUREMENT METHOD

20 dB Emission BW: ANSI C63.10 Section 6.9.2

99% Occupied BW: ANSI C63.10 Section 6.9.3

Frequency Tolerance: ANSI C63.10 Section 6.8

General Radiated Emissions: ANSI C63.10-2013 Section 6.3-6.5

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9. OCCUPIED BANDWIDTH

LIMITS

None; for reporting purposes only.

TEST PROCEDURE

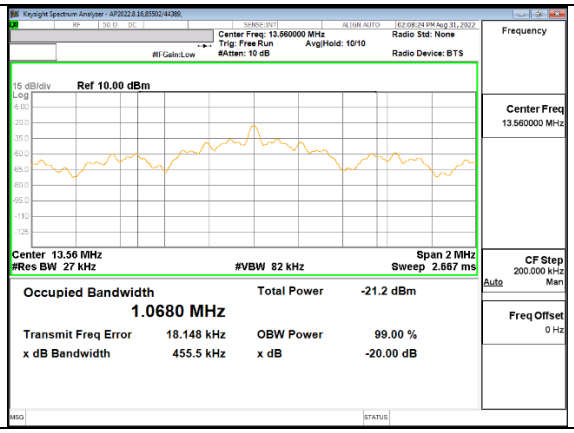
The transmitter output is connected to the spectrum analyzer. The RBW is set to 1-5% of the OBW . The VBW is set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal 99% bandwidth function is utilized.

RESULTS

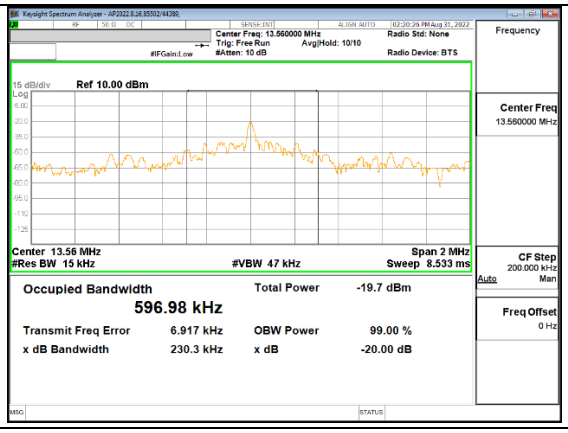
99% and 20dB BW

Mode	Frequency (MHz)	99% Bandwidth (kHz)	20dB Bandwidth (kHz)
With tag	13.56	1068.00	455.50
Without Tag	13.56	596.98	230.30

Occupied Bandwidth / 20 dB Bandwdth



With Tag



Without Tag

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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.

RSS-210 Annex B.6: Carrier frequency stability shall be maintained to ±0.01% (±100 ppm).

****NOTE:** The manufacturer of the EUT has declared the voltage range of the EUT to only operate from 95% to 105% of the rated supply voltage. Therefore for testing, 4.75V (95% rated) and 5.25V (105% rated) was used.

TEST PROCEDURE

ANSI 63.10:2013 Clause 6.8.1 and 6.8.2

RESULTS

No non-compliance noted.

10.1. WITH TAG (Card)

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)
5.00	50	13.5598748	3.662	13.5598700	4.017	13.5598649	4.392	13.5598590	4.832	± 100
5.00	40	13.5599020	1.657	13.5598919	2.400	13.5598839	2.994	13.5598792	3.343	± 100
5.00	30	13.5599511	-1.965	13.5599386	-1.040	13.5599308	-0.467	13.5599228	0.123	± 100
5.00	***20***	***13.5599245***	***0.000***	***13.5599109***	***1.003***	***13.5599065***	***1.328***	***13.5599023***	***1.635***	***± 100***
5.00	10	13.5600261	-7.492	13.5600188	-6.954	13.5600142	-6.615	13.5600086	-6.205	± 100
5.00	0	13.5600877	-12.033	13.5600822	-11.629	13.5600755	-11.137	13.5600667	-10.485	± 100
5.00	-10	13.5601044	-13.268	13.5601021	-13.101	13.5600998	-12.926	13.5600973	-12.744	± 100
5.00	-20	13.5600478	-9.091	13.5600597	-9.970	13.5600739	-11.018	13.5600908	-12.267	± 100
4.75	20	13.5599648	-2.973	13.5599573	-2.419	13.5599531	-2.110	13.5599520	-2.029	± 100
5.25	20	13.5599392	-1.085	13.5599360	-0.846	13.5599340	-0.700	13.5599260	-0.112	± 100

Tested by: 27465/44389, 85502/44389
Test date: 2022-08-29, 2022-09-08

10.2. WITHOUT TAG

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)
5.00	50	13.5598712	3.683	13.5598801	3.022	13.5598854	2.631	13.5598864	2.558	± 100
5.00	40	13.5599684	-3.486	13.5599597	-2.847	13.5599512	-2.222	13.5599405	-1.430	± 100
5.00	30	13.5599659	-3.307	13.5599744	-3.931	13.5599766	-4.092	13.5599865	-4.822	± 100
5.00	***20***	***13.5599211***	***0.000***	***13.5599415***	***-1.504***	***13.5599513***	***-2.224***	***13.5599603***	***-2.890***	***± 100***
5.00	10	13.5601017	-13.319	13.5600979	-13.039	13.5600937	-12.728	13.5600887	-12.362	± 100
5.00	0	13.5600976	-13.017	13.5601096	-13.900	13.5601149	-14.292	13.5601164	-14.401	± 100
5.00	-10	13.5601394	-16.099	13.5601397	-16.119	13.5601397	-16.121	13.5601394	-16.096	± 100
5.00	-20	13.5601384	-16.022	13.5601375	-15.960	13.5601373	-15.943	13.5601362	-15.864	± 100
4.75	20	13.5599900	-5.083	13.5599969	-5.589	13.5600001	-5.830	13.5600073	-6.356	± 100
5.25	20	13.5599506	-2.173	13.5599596	-2.838	13.5599686	-3.504	13.5599818	-4.478	± 100

Tested by: 84740/44389, 85502/44389
Test date: 2022-08-29, 2022-09-08

11. RADIATED EMISSIONS TEST RESULTS

11.1. 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)	Limits (uA/m) - ISED Only	Measurement Distance (m)
0.009 – 0.490	2400 / F (kHz)	6.37/F (F in kHz)	300
0.490 – 1.705	24000 / F (kHz)	63.7/F (F in kHz)	30
1.705 – 30.0	30	0.08	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)

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 9 kHz to the 10th harmonic of the highest fundamental frequency, or 1000 MHz, whichever is greater.

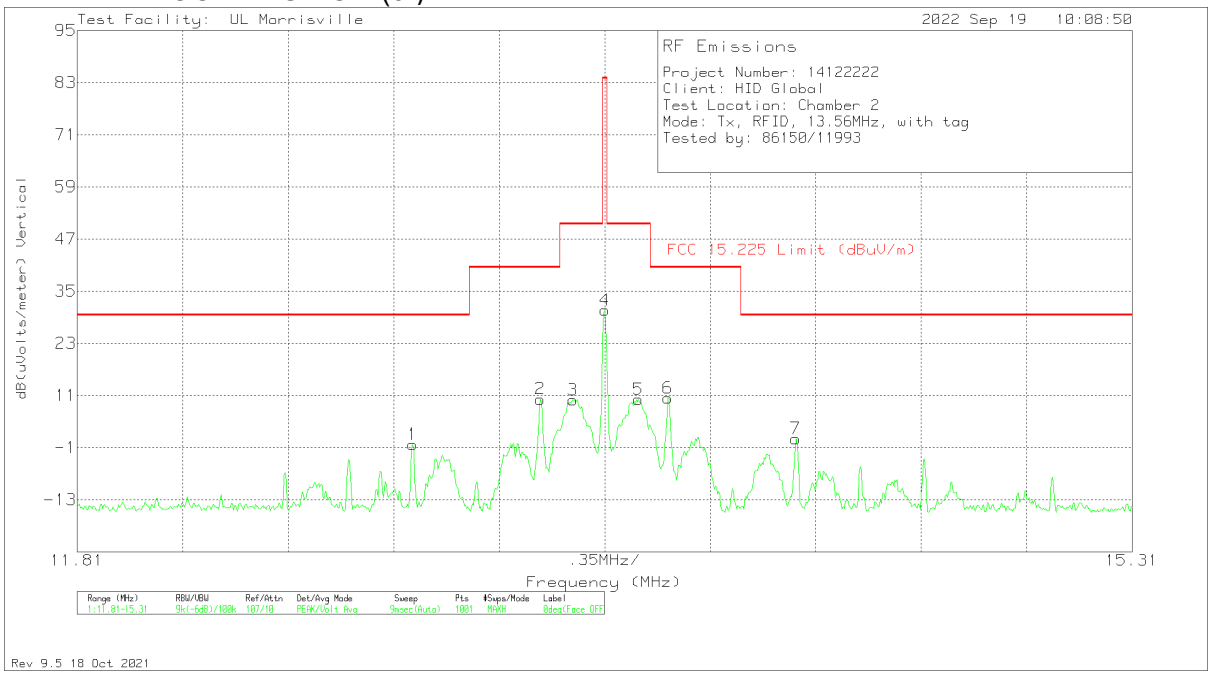
RESULTS

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

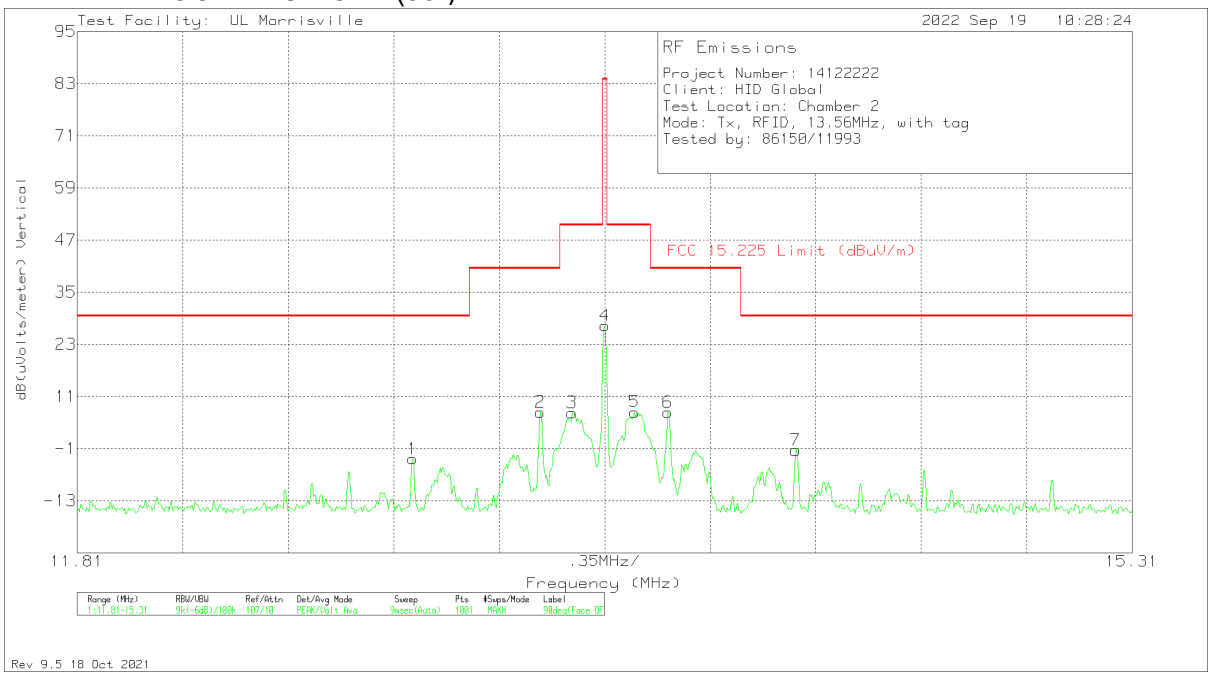
Note for below 30 MHz scans: All measurements were made at a test distance of 3 m. The measured data was extrapolated from the test distance (3m) to the specification distance (300 m from 9-490 kHz and 30 m from 490 kHz – 30 MHz) to clearly show the relative levels of fundamental and spurious emissions 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).

FUNDAMENTAL WITH TAG

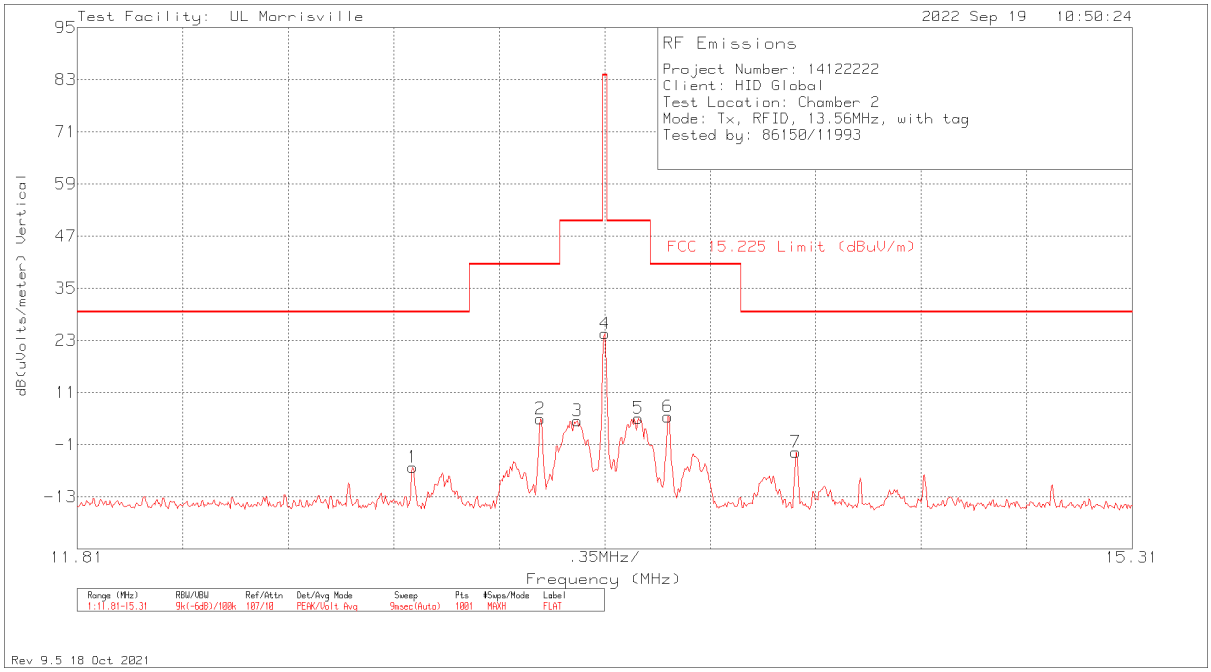
ANTENNA LOOP FACE ON (0°)



ANTENNA LOOP FACE OFF (90°)



ANTENNA LOOP FACE FLAT

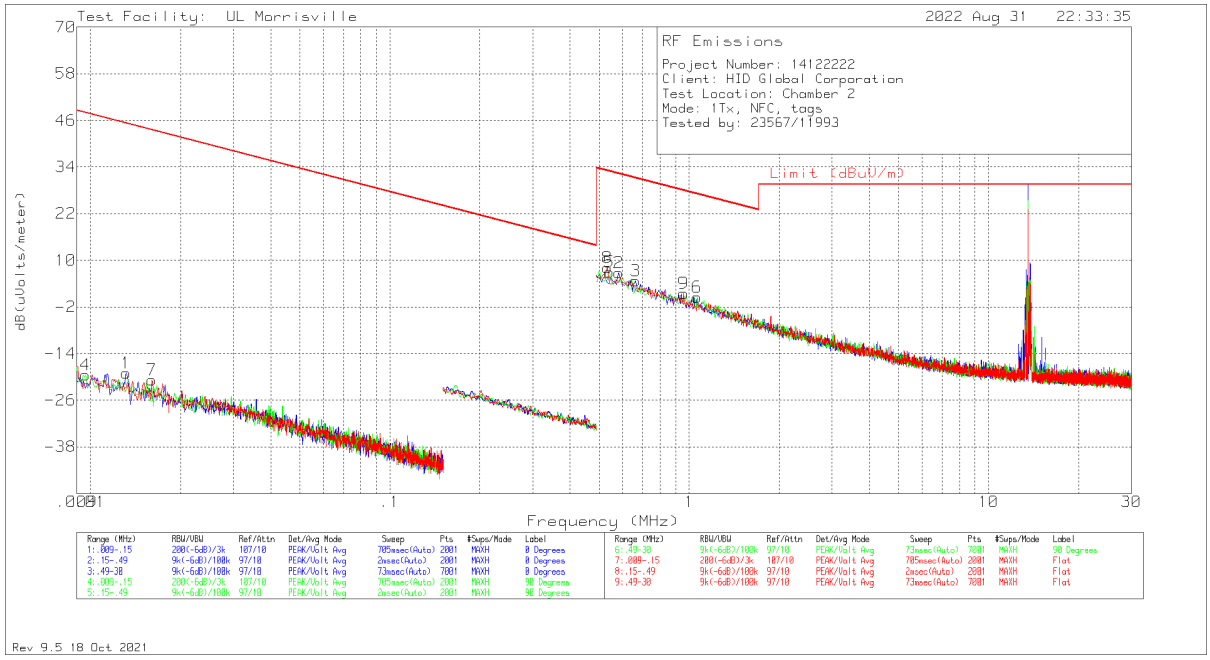


Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0059 (dB/m)	Gain/Loss (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uVolts/meter)	FCC 15.225 Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Loop Angle
Face on (0°)											
1	12.923	28.41	Pk	10.6	.7	-40	-.29	29.5	-29.79	5	0 degs
2	13.3465	38.88	Pk	10.6	.7	-40	10.18	40.5	-30.32	5	0 degs
3	13.455	38.64	Pk	10.6	.7	-40	9.94	50.5	-40.56	5	0 degs
4	13.56	59.33	Pk	10.6	.7	-40	30.63	84	-53.37	5	0 degs
5	13.672	38.8	Pk	10.6	.7	-40	10.1	50.5	-40.4	5	0 degs
6	13.77	39.08	Pk	10.6	.7	-40	10.38	40.5	-30.12	5	0 degs
7	14.1935	29.75	Pk	10.6	.7	-40	1.05	29.5	-28.45	5	0 degs
Face off (90°)											
1	12.923	25.33	Pk	10.6	.7	-40	-3.37	29.5	-32.87	273	90 degs
2	13.3465	36.09	Pk	10.6	.7	-40	7.39	40.5	-33.11	273	90 degs
3	13.4515	35.95	Pk	10.6	.7	-40	7.25	50.5	-43.25	273	90 degs
4	13.56	56	Pk	10.6	.7	-40	27.3	84	-56.7	273	90 degs
5	13.658	36.14	Pk	10.6	.7	-40	7.44	50.5	-43.06	273	90 degs
6	13.77	36.05	Pk	10.6	.7	-40	7.35	40.5	-33.15	273	90 degs
7	14.1935	27.34	Pk	10.6	.7	-40	-1.36	29.5	-30.86	273	90 degs
Flat											
1	12.923	22.52	Pk	10.6	.7	-40	-6.18	29.5	-35.68	322	Flat
2	13.3465	33.63	Pk	10.6	.7	-40	4.93	40.5	-35.57	322	Flat
3	13.469	33.2	Pk	10.6	.7	-40	4.5	50.5	-46	322	Flat
4	13.56	53.25	Pk	10.6	.7	-40	24.55	84	-59.45	322	Flat
5	13.672	33.79	Pk	10.6	.7	-40	5.09	50.5	-45.41	322	Flat
6	13.77	34.13	Pk	10.6	.7	-40	5.43	40.5	-35.07	322	Flat
7	14.1935	25.98	Pk	10.6	.7	-40	-2.72	29.5	-32.22	322	Flat

Pk - Peak detector

SPURIOUS EMISSIONS WITH TAG

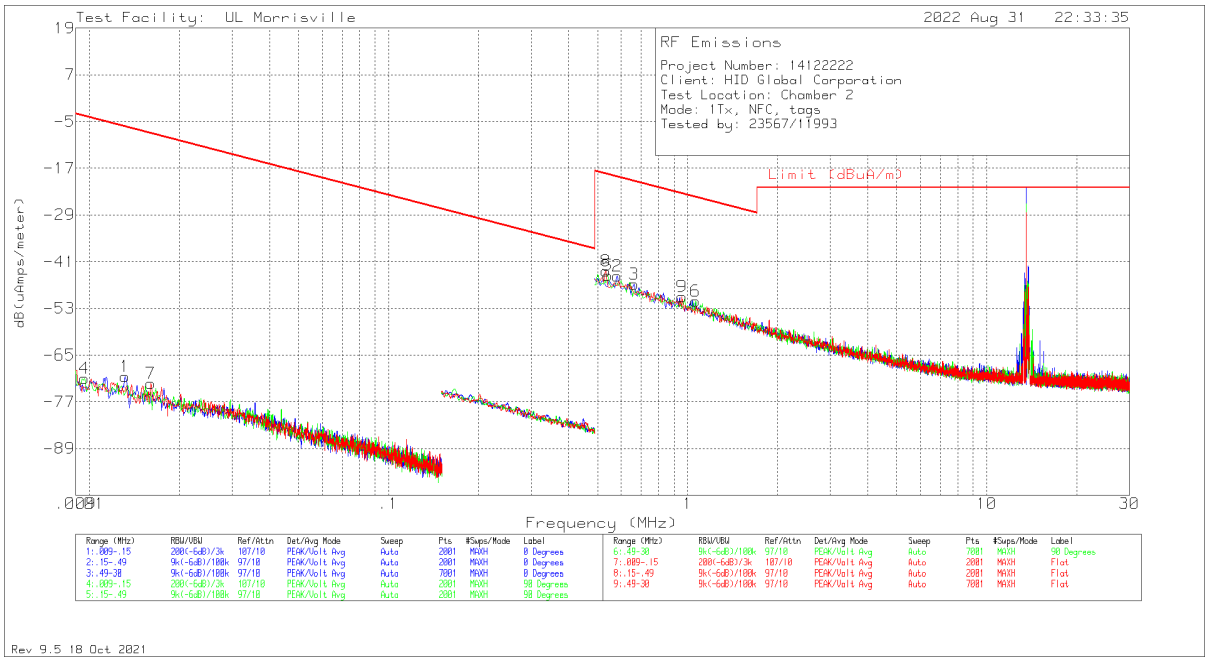
E-FIELD



Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0059 (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)	Height (cm)	Loop Angle
4	.00964	41.09	Pk	19.3	.1	-80	-19.51	47.92	67.92	-67.43	0-360	401	90 degs
1	.01319	43.47	Pk	17.4	.1	-80	-19.03	45.2	65.2	-64.23	0-360	401	0 degs
7	.01603	43.07	Pk	16	.1	-80	-20.83	43.51	63.51	-64.34	0-360	401	Flat
8	.53216	37.8	Pk	10.2	.1	-40	8.1	33.08	-	-24.98	0-360	401	Flat
5	.54059	36.64	Pk	10.2	.1	-40	6.94	32.95	-	-26.01	0-360	401	90 degs
2	.58275	36.38	Pk	10.2	.2	-40	6.78	32.29	-	-25.51	0-360	401	0 degs
3	.66286	34.34	Pk	10.2	.2	-40	4.74	31.18	-	-26.44	0-360	401	0 degs
9	.95798	31.04	Pk	10.3	.2	-40	1.54	27.98	-	-26.44	0-360	401	Flat
6	1.06338	29.83	Pk	10.4	.2	-40	.43	27.07	-	-26.64	0-360	401	90 degs

Pk - Peak detector

H-FIELD

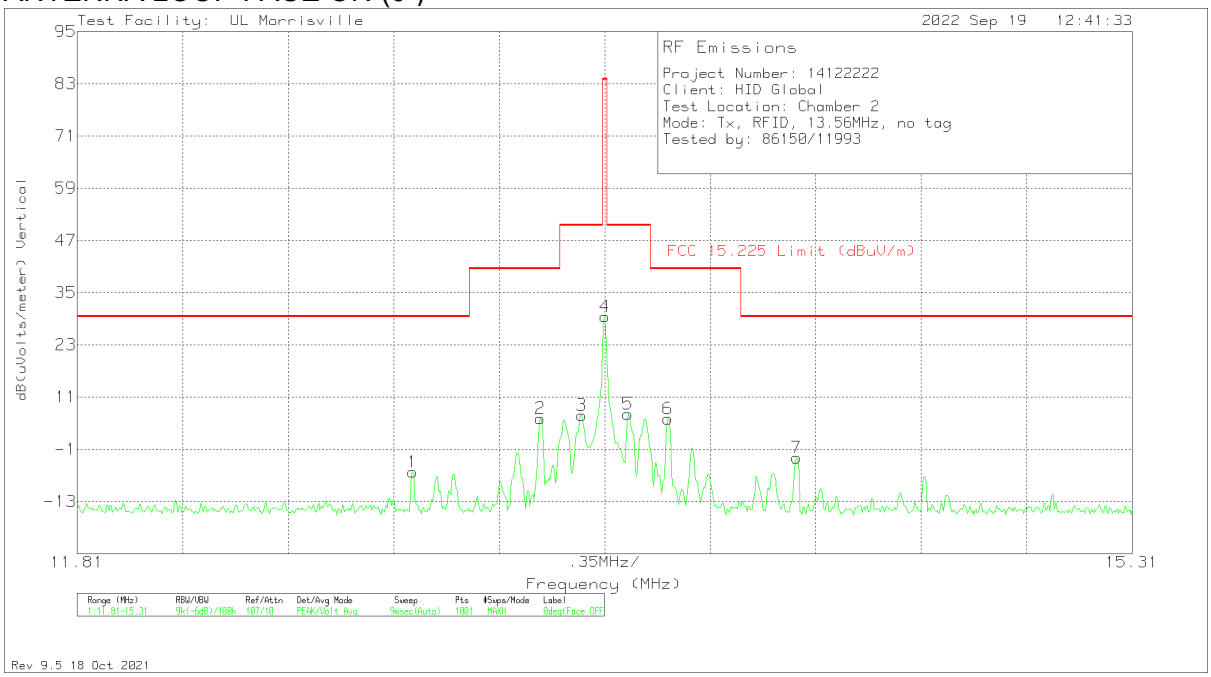


Marker	Frequency (MHz)	Meter Reading (dBuA)	Det	AT0059 (dB/m)	Gain/Loss (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uAmps/meter)	QP/AV Limit (dBuA/m)	PK Limit (dBuA/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Loop Angle
4	.00964	41.09	Pk	-32.2	.1	-80	-71.01	-3.58	16.42	-67.43	0-360	401	90 degs
1	.01319	43.47	Pk	-34.1	.1	-80	-70.53	-6.3	13.70	-64.23	0-360	401	0 degs
7	.01603	43.07	Pk	-35.5	.1	-80	-72.33	-7.99	12.01	-64.34	0-360	401	Flat
8	.53216	37.8	Pk	-41.3	.1	-40	-43.4	-18.42	-	-24.98	0-360	401	Flat
5	.54059	36.64	Pk	-41.3	.1	-40	-44.56	-18.55	-	-26.01	0-360	401	90 degs
2	.58275	36.38	Pk	-41.3	.2	-40	-44.72	-19.21	-	-25.51	0-360	401	0 degs
3	.66286	34.34	Pk	-41.3	.2	-40	-46.76	-20.32	-	-26.44	0-360	401	0 degs
9	.95798	31.04	Pk	-41.2	.2	-40	-49.96	-23.52	-	-26.44	0-360	401	Flat
6	1.06338	29.83	Pk	-41.1	.2	-40	-51.07	-24.43	-	-26.64	0-360	401	90 degs

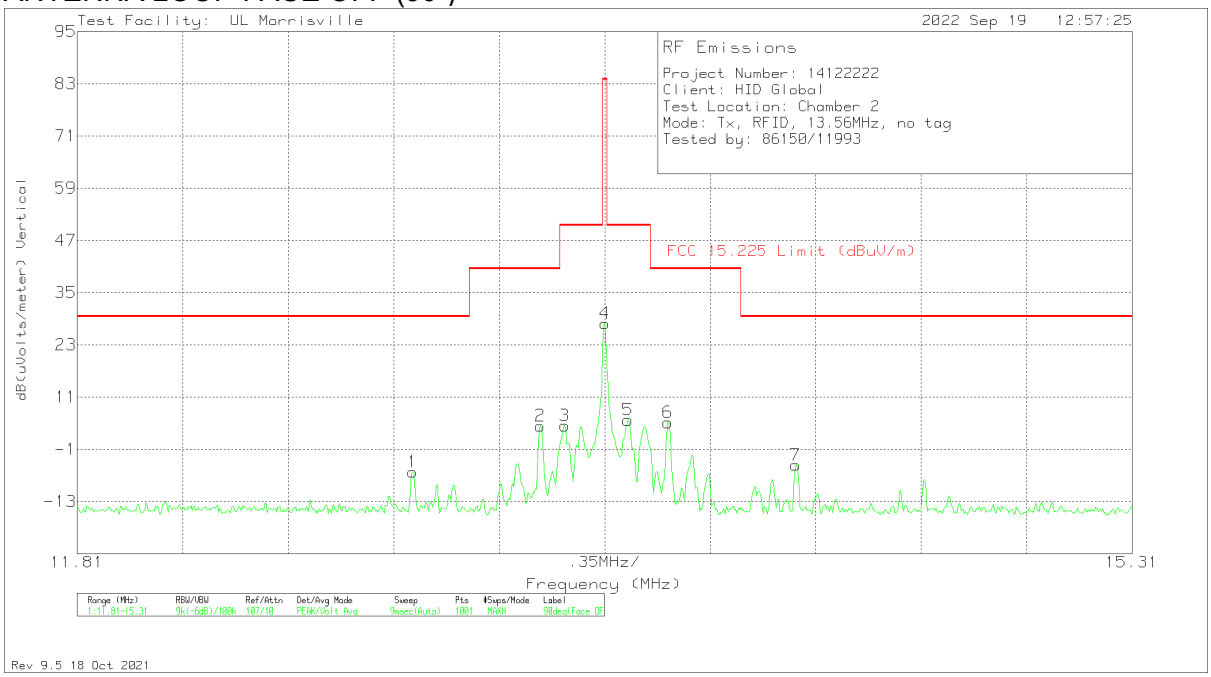
Pk - Peak detector

FUNDAMENTAL WITHOUT TAG

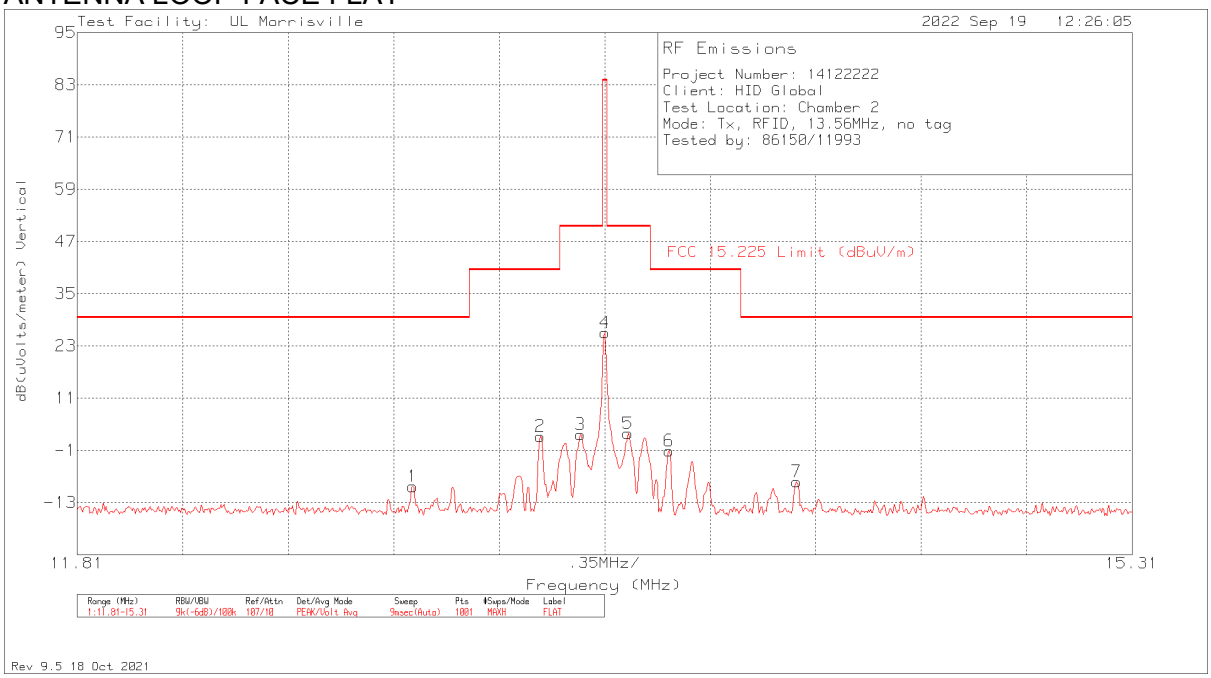
ANTENNA LOOP FACE ON (0°)



ANTENNA LOOP FACE OFF (90°)



ANTENNA LOOP FACE FLAT

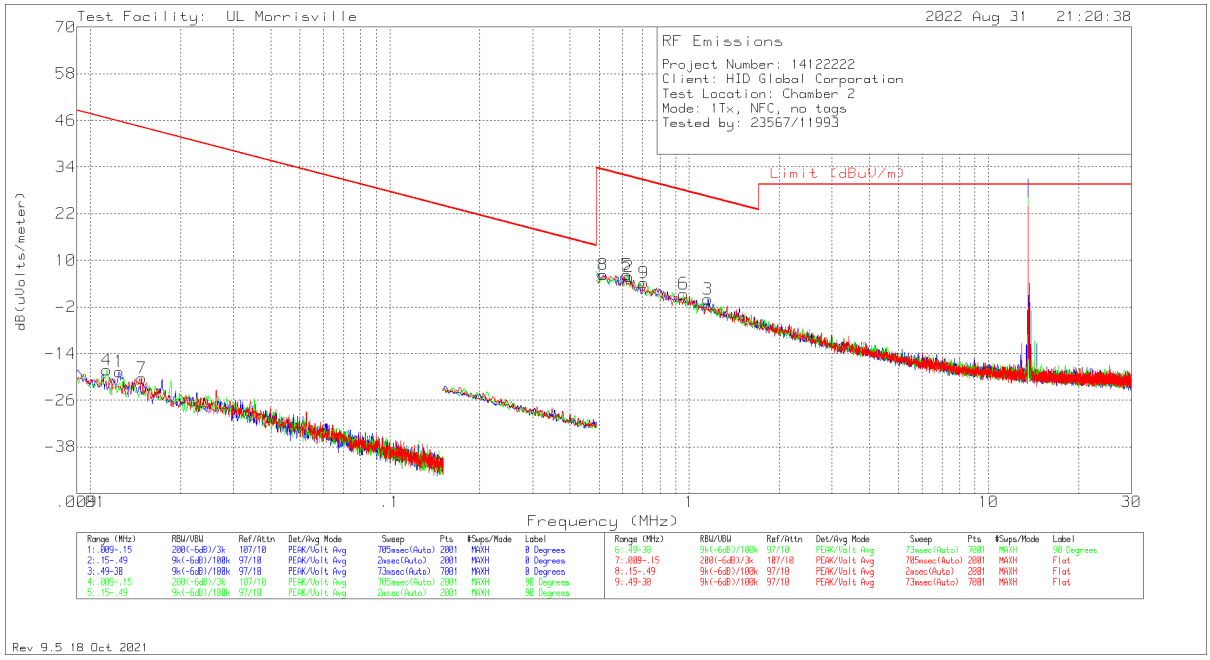


Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0059 (dB/m)	Gain/Loss (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uVolts/meter)	FCC 15.225 Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Loop Angle
Face on (0°)											
1	12.923	22.47	Pk	10.6	.7	-40	-6.23	29.5	-35.73	337	0 degs
2	13.3465	34.77	Pk	10.6	.7	-40	6.07	40.5	-34.43	337	0 degs
3	13.483	35.52	Pk	10.6	.7	-40	6.82	50.5	-43.68	337	0 degs
4	13.56	58.16	Pk	10.6	.7	-40	29.46	84	-54.54	337	0 degs
5	13.637	35.8	Pk	10.6	.7	-40	7.1	50.5	-43.4	337	0 degs
6	13.77	34.72	Pk	10.6	.7	-40	6.02	40.5	-34.48	337	0 degs
7	14.197	25.76	Pk	10.6	.7	-40	-2.94	29.5	-32.44	337	0 degs
Face off (90°)											
1	12.923	22.48	Pk	10.6	.7	-40	-6.22	29.5	-35.72	270	90 degs
2	13.3465	33.07	Pk	10.6	.7	-40	4.37	40.5	-36.13	270	90 degs
3	13.427	33.13	Pk	10.6	.7	-40	4.43	50.5	-46.07	270	90 degs
4	13.56	56.63	Pk	10.6	.7	-40	27.93	84	-56.07	270	90 degs
5	13.637	34.42	Pk	10.6	.7	-40	5.72	50.5	-44.78	270	90 degs
6	13.77	33.85	Pk	10.6	.7	-40	5.15	40.5	-35.35	270	90 degs
7	14.1935	24.06	Pk	10.6	.7	-40	-4.64	29.5	-34.14	270	90 degs
Flat											
1	12.923	19.38	Pk	10.6	.7	-40	-9.32	29.5	-38.82	347	Flat
2	13.3465	30.9	Pk	10.6	.7	-40	2.2	40.5	-38.3	347	Flat
3	13.4795	31.3	Pk	10.6	.7	-40	2.6	50.5	-47.9	347	Flat
4	13.56	54.68	Pk	10.6	.7	-40	25.98	84	-58.02	347	Flat
5	13.637	31.58	Pk	10.6	.7	-40	2.88	50.5	-47.62	347	Flat
6	13.7735	27.55	Pk	10.6	.7	-40	-1.15	40.5	-41.65	347	Flat
7	14.197	20.47	Pk	10.6	.7	-40	-8.23	29.5	-37.73	347	Flat

Pk - Peak detector

SPURIOUS EMISSIONS WITHOUT TAG

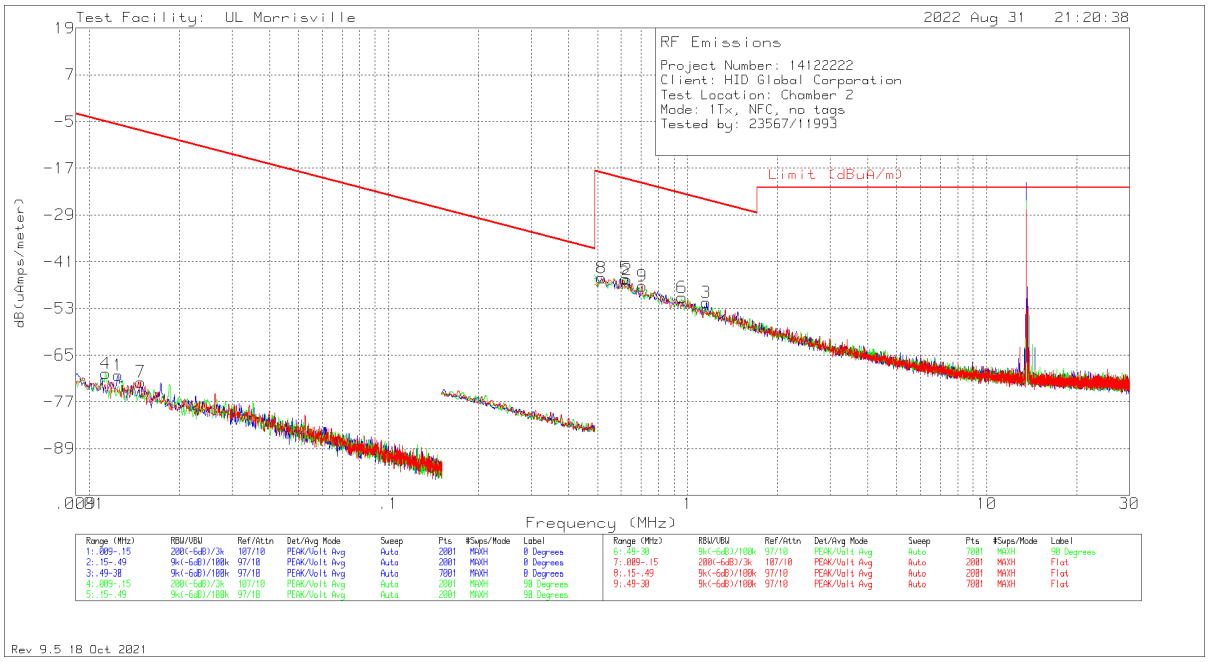
E-FIELD



Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0059 (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)	Height (cm)	Loop Angle
4	.01134	43.45	Pk	18.3	.1	-80	-18.15	46.51	66.51	-64.66	0-360	401	90 degs
1	.01248	43.58	Pk	17.7	.1	-80	-18.62	45.68	65.68	-64.3	0-360	101	0 degs
7	.01482	42.92	Pk	16.6	.1	-80	-20.38	44.19	64.19	-64.57	0-360	401	Flat
8	.5153	36.06	Pk	10.2	.1	-40	6.36	33.36	-	-27	0-360	401	Flat
5	.6207	35.84	Pk	10.2	.2	-40	6.24	31.75	-	-25.51	0-360	401	90 degs
2	.62913	35.41	Pk	10.2	.2	-40	5.81	31.63	-	-25.82	0-360	101	0 degs
9	.70502	33.8	Pk	10.2	.2	-40	4.2	30.64	-	-26.44	0-360	401	Flat
6	.95798	30.89	Pk	10.3	.2	-40	1.39	27.98	-	-26.59	0-360	401	90 degs
3	1.15191	29.49	Pk	10.4	.2	-40	.09	26.38	-	-26.29	0-360	101	0 degs

Pk - Peak detector

H-FIELD



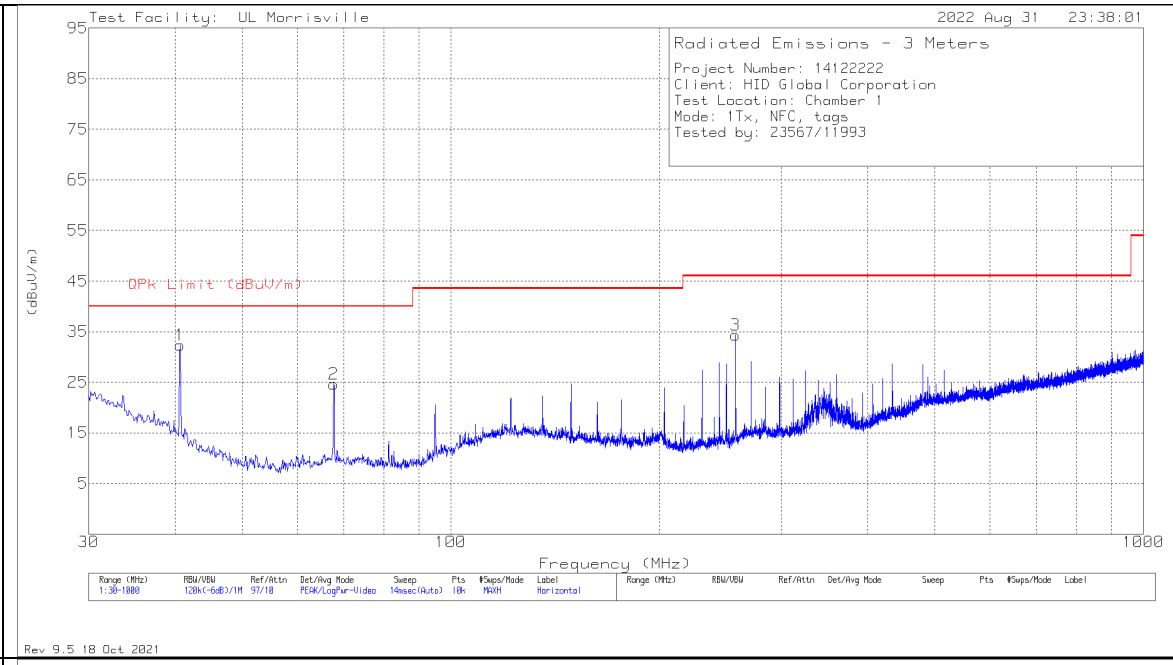
Marker	Frequency (MHz)	Meter Reading (dBuA)	Det	AT0059 (dB/m)	Gain/Loss (dB)	Dist. Corr. Factor (dB)	Corrected Reading dB(uAmps/meter)	QP/AV Limit (dBuA/m)	PK Limit (dBuA/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Loop Angle
4	.01134	43.45	Pk	-33.2	.1	-80	-69.65	-4.99	15.01	-64.66	0-360	401	90 degs
1	.01248	43.58	Pk	-33.8	.1	-80	-70.12	-5.82	14.18	-64.3	0-360	101	0 degs
7	.01482	42.92	Pk	-34.9	.1	-80	-71.88	-7.31	12.69	-64.57	0-360	401	Flat
8	.5153	36.06	Pk	-41.3	.1	-40	-45.14	-18.14	-	-27	0-360	401	Flat
5	.6207	35.84	Pk	-41.3	.2	-40	-45.26	-19.75	-	-25.51	0-360	401	90 degs
2	.62913	35.41	Pk	-41.3	.2	-40	-45.69	-19.87	-	-25.82	0-360	101	0 degs
9	.70502	33.8	Pk	-41.3	.2	-40	-47.3	-20.86	-	-26.44	0-360	401	Flat
6	.95798	30.89	Pk	-41.2	.2	-40	-50.11	-23.52	-	-26.59	0-360	401	90 degs
3	1.15191	29.49	Pk	-41.1	.2	-40	-51.41	-25.12	-	-26.29	0-360	101	0 degs

Pk - Peak detector

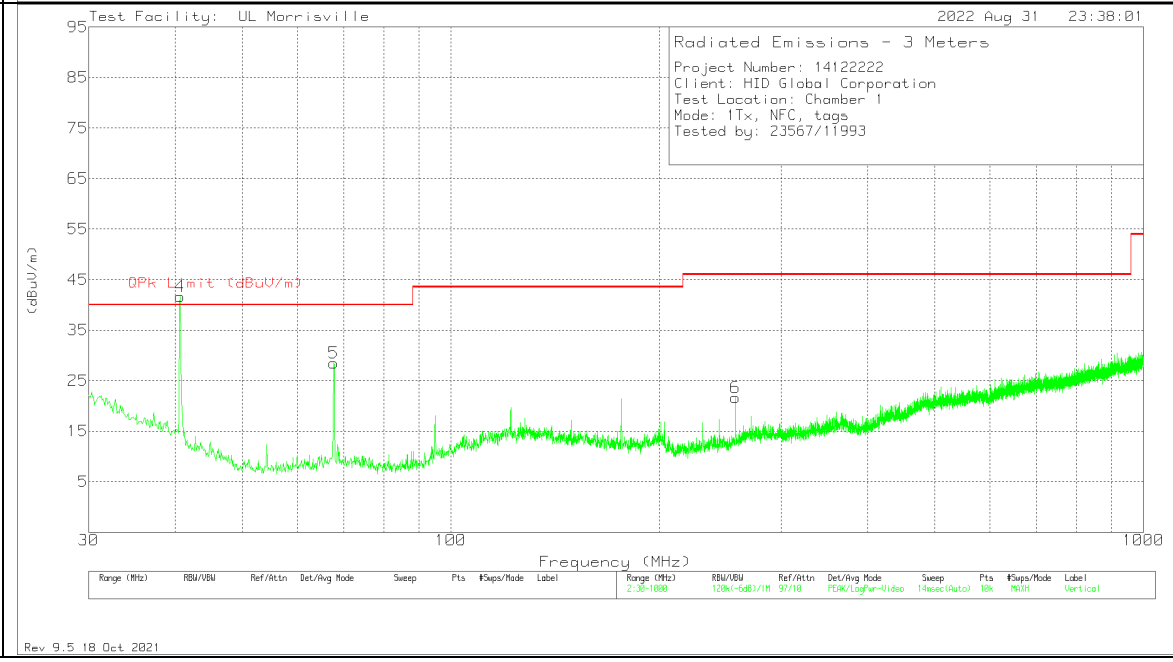
11.3. TX SPURIOUS EMISSIONS 30-1000 MHz

WITH TAG

Horizontal



Vertical



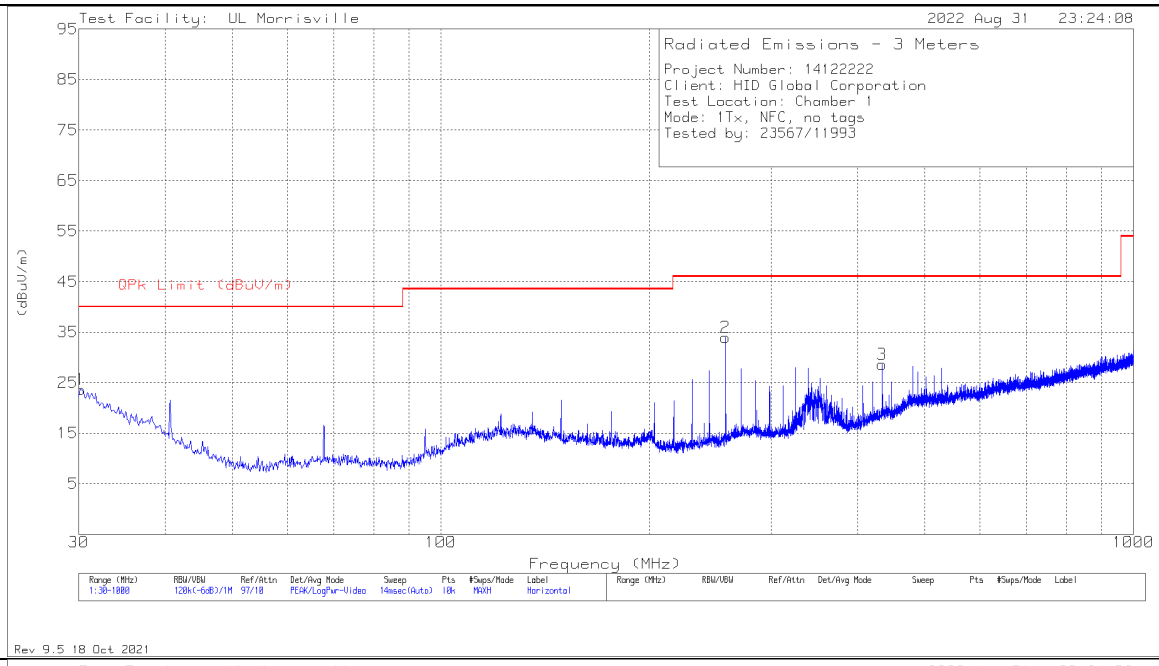
DATA

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0066 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	40.67	44.23	Pk	19.4	-31.3	32.33	40	-7.67	0-360	399	H
4	40.6858	41.37	Qp	19.4	-31.3	29.47	40	-10.53	131	384	V
2	67.733	41.16	Pk	14.3	-30.8	24.66	40	-15.34	0-360	200	H
5	67.733	44.95	Pk	14.3	-30.8	28.45	40	-11.55	0-360	100	V
3	257.659	45.75	Pk	17.6	-29	34.35	46.02	-11.67	0-360	99	H
6	257.659	33.03	Pk	17.6	-29	21.63	46.02	-24.39	0-360	100	V

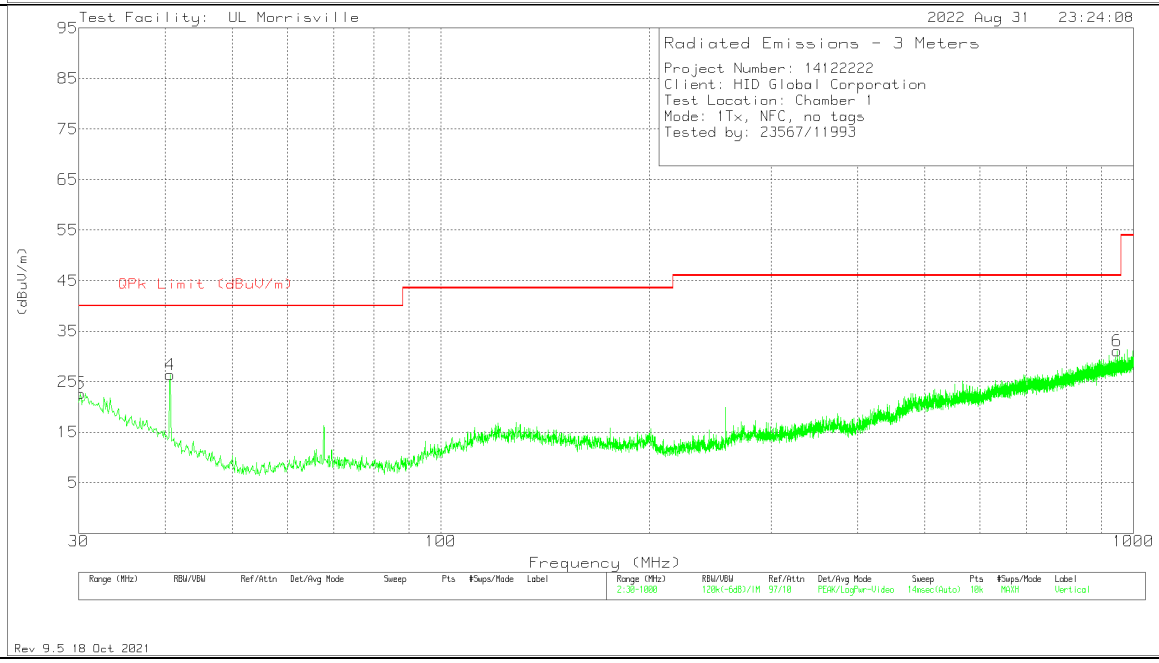
Pk - Peak detector
Qp - Quasi-Peak detector

WITHOUT TAGS

Horizontal



Vertical



DATA

Marker	Frequency (MHz)	Meter Reading (dBuV)	Det	AT0066 (dB/m)	Gain/Loss (dB)	Corrected Reading (dBuV/m)	QPk Limit (dBuV/m)	Margin (dB)	Azimuth (Degs)	Height (cm)	Polarity
1	30.194	28.29	Pk	26.7	-31.3	23.69	40	-16.31	0-360	399	H
5	30.194	27.31	Pk	26.7	-31.3	22.71	40	-17.29	0-360	100	V
4	40.67	38.27	Pk	19.4	-31.3	26.37	40	-13.63	0-360	100	V
2	257.659	45.32	Pk	17.6	-29	33.92	46.02	-12.1	0-360	99	H
3	433.908	33.92	Pk	22.3	-27.6	28.62	46.02	-17.4	0-360	200	H
6	947.329	26.57	Pk	28.6	-24.1	31.07	46.02	-14.95	0-360	100	V

Pk - Peak detector

12. SETUP PHOTOS

Please refer to R14122222-EP1 for setup photos

END OF TEST REPORT

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