FCC 47 CFR PART 15 SUBPART C
INDUSTRY CANADA RSS-210 ISSUE 9

CERTIFICATION TEST REPORT

FOR

Near Field RF ID Tag Reader / Writer

MODEL NUMBER: UBS-200L

REPORT NUMBER: 12634792A

FCC ID: 2ASDF-UBS200

ISSUE DATE: 2019-04-24

Prepared for
Unified Information Devices
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NVLAP LAB CODE 100414-0

Revision History

Rev.	Issue Date	Revisions	Revised By
--		Initial Issue	

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1. ATTESTATION OF TEST RESULTS

COMPANY NAME:	Unified Information Devices 500 Park Av Suite 109 Lake Villa, IL 60046
EUT DESCRIPTION:	Near Field RF ID Tag Reader / Writer
MODEL:	UBS200L
SERIAL NUMBER:	non-serilized
DATE TESTED:	2019-01-18 & 2019-04-23

APPLICABLE STANDARDS	
STANDARD	**TEST RESULTS**
FCC PART 15 SUBPART C	Complies
INDUSTRY CANADA RSS-210 Issue 9	Complies
INDUSTRY CANADA 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 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. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of the U.S. government.

Approved & Released For
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Operation Leader
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UL LLC

Prepared By:

Test Engineer
CONSUMER TECHNOLOGY DIVISION
UL LLC

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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 9.

3. FACILITIES AND ACCREDITATION

The test sites and measurement facilities used to collect data are located at 333 Pfingsten Road, Northbrook, IL 60062 USA.

UL NBK is accredited by NVLAP, Laboratory Code 100414-0.

4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2. 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

4.3. MEASUREMENT UNCERTAINTY

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

Test	Range	Equipment	Uncertainty k=2
Radiated Emissions	30-200MHz	Bicon 10m Horz	2.15dB
Radiated Emissions	30-200MHz	Bicon 10m Vert	2.14dB
Radiated Emissions	200-1000MHz	LogP 10m Horz	1.84dB
Radiated Emissions	200-1000MHz	LogP 10m Vert	2.19dB
Radiated Emissions	9kHz-30MHz	Loop Antenna	2.52dB

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

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5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

The EUT is a Near Field RF ID reader / writer operating at 134.2kHz.

5.2. MAXIMUM FIELD STRENGTH

The transmitter has a maximum average filed strength as follows:

Frequency Range (MHz)	Mode	Field Strength @ 30m dBuV/m
0.134	Normal TX	25.03

5.3. DESCRIPTION OF AVAILABLE ANTENNAS

The radio utilizes tow possible antennas:

- Loop Antenna
- Rod Antenna

Antennas are selected via push button switch and only one antenna cat be used at a time.

5.4. SOFTWARE AND FIRMWARE

The firmware installed in the EUT during testing was:
Mainboard Firmware “UID_UPS-70L” version J11

The EUT driver software installed during testing was:
Driver is “VCP_drv” version 1.0

The test utility software used during testing was:
TeraTerm version 4.78.

5.5. WORST-CASE CONFIGURATION AND MODE

Below 30MHz both antenna was measured when oriented in all possible orientations. The loop antenna was tested when parallel to groundplane, perpendicular to ground plane and standing up. The rod antenna was tested when parallel to ground plane and standing up. Once worst case orientation for TX antenna was established additional measurements were made with tag present and without tag. In both case it was found that the fundamental emissions were lower by fraction of a db when tag was present. All final measurements were made without tag present.

5.6. MODIFICATIONS

Following modifications were required:

- Ferrite by Fair-Rite 0431173951 were installed inside the enclosure directly on each the wire leading to the antenna connector.
- Ferrite by Fair-Rite 0431173951 was installed on a cable between main control board and display board.

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5.7. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Support Equipment List				
Description	**Manufacturer**	**Model**	**Serial Number**	**FCC ID**
EUT	UID	UBS200L	-	-
Loop Antenna	UID	-	-	-
Rod Antenna	UID	-	-	-
EUT Power Supply	GlobTek Inc.	GT-41062-1812-T3	-	-
Laptop Computer	Asus	U318	-	-
Laptop Power Supply	Asus	ADP-90CD DB	-	-

I/O CABLES

I/O Cable List						
Cable No	**Port**	**# of identical ports**	**Connector Type**	**Cable Type**	**Cable Length (m)**	**Remarks**
1	Power Inp	1	Custom	two wire	1m	-
2	Atenna Ou	2	Custom	Two wire	1.5m	-
3	USB	2	USB A and B	-	1.5	-

TEST SETUP

The EUT with antennas attached connected to laptop computer via two USB cables and external power supply powering the EUT.

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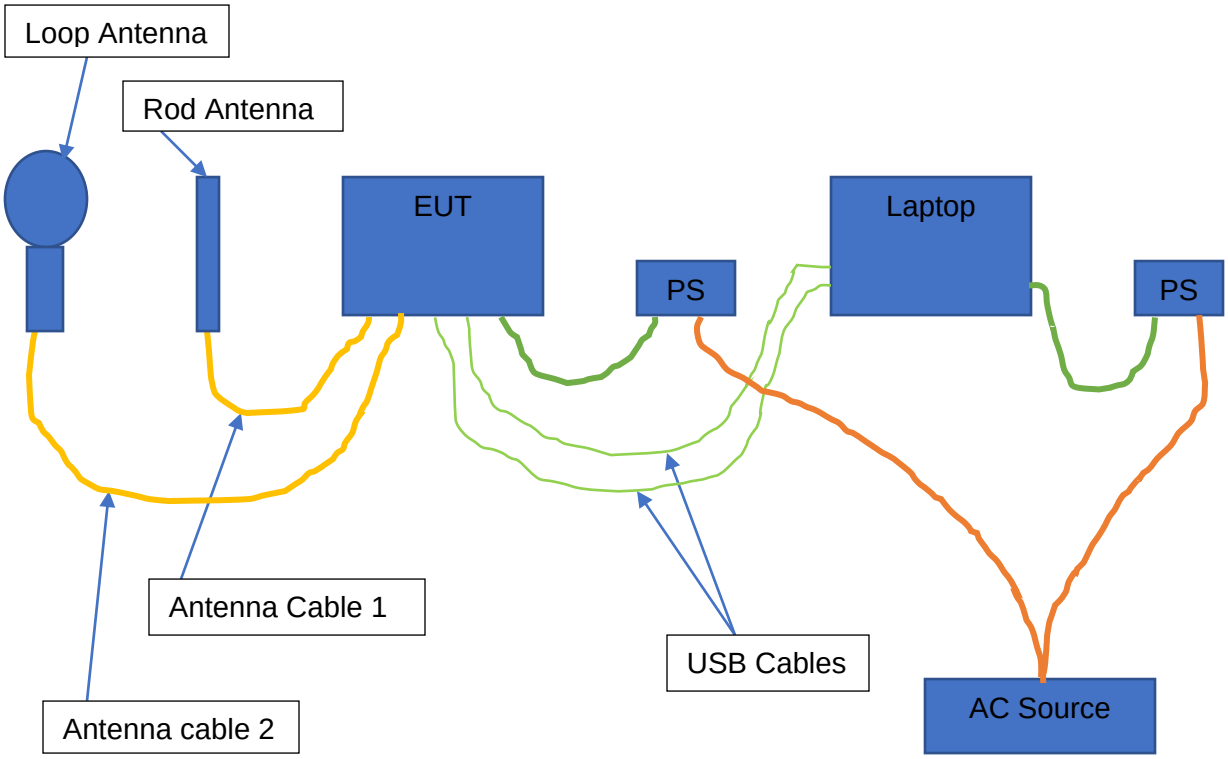
SETUP DIAGRAM FOR TESTS



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6. TEST AND MEASUREMENT EQUIPMENT

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

Description	Manufacturer	Model	Identifier	Cal. Date	Cal. Due
EMI Test Receiver	Rohde & Schwarz	ESCI	EMC4328	2018-12-26	2019-12-31
Bicon Antenna	Chase	VBA6106A	EMC4078	2018-03-28	2019-03-31
Log-P Antenna	Chase	UPA6109	EMC4313	2018-04-09	2019-04-30
Signal Analyzer	Aglient	N9030A PXA	EMC4360	2018-12-11	2019-12-31
EMI Test Receiver	Rohde & Schwarz	ESR	EMC4377	2018-12-26	2019-12-31
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	2018-12-19	2019-12-31
LISN - L2	Solar Electronics	8602-50-TS-50-N	EMC4064	2018-12-19	2019-12-31
*Clicks LISN	AFJ	LS 16	EMC4334	2018-12-19	2019-12-31
* used to power AE equipment					

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7. 20 dB AND 99% BW

LIMITS

For reference only

TEST PROCEDURE

ANSI C63.10

The transmitter output is connected to the spectrum analyzer.

Per ANSI C63.10 the RBW should be set to 1% to 5% of the 99 % bandwidth. The VBW should set to 3 times the RBW. The sweep time is coupled. The spectrum analyzer internal measurement function is utilized.

However, because of the signal type changing the RBW will change the bandwidth itself therefore default setting for RBW based on span was used.

RESULTS

Bandwidth

Frequency (MHz)	20dB Bandwidth (kHz)	99% Bandwidth (kHz)
0.1342	1.395	1.176

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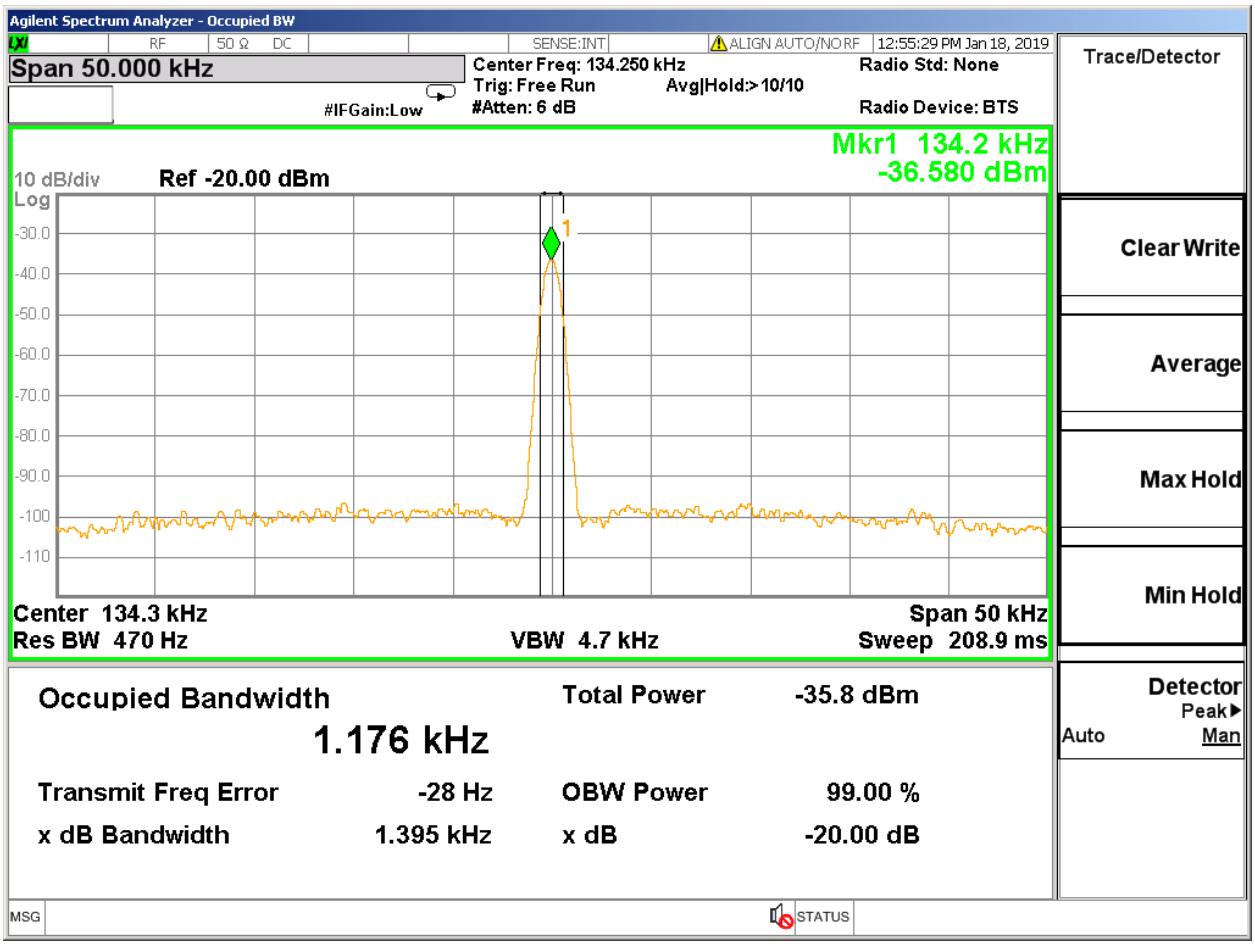
Bandwidth Measurement



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8. RADIATED EMISSION TEST RESULTS

8.1. LIMITS AND PROCEDURE

LIMITS

FCC §15.209 (a)
IC RSS-GEN, Section 8.9 (Transmitter)

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (m)
0.009–0.490	2400/F(kHz)	300
0.490–1.705	24000/F(kHz)	30
1.705–30.0	30	30
30–88	100	3
88 to 216	150	3
216 to 960	200	3
Above 960 MHz	500	3
Note: The lower limit shall apply at the transition frequency.		

TEST PROCEDURE

The EUT is placed on a non-conducting table 80 cm above the ground plane for below 1GHz measurements. The antenna to EUT distance is 3 meters for frequencies 9kHz-30MHz and 10 meters for frequencies 30MHz-1GHz.

Between 9kHz-490kHz the levels were extrapolated to 300m distance using distance factor (40*log(3/300)). Between 490kHz-30MHz the levels were extrapolated to 30m using disntace correction factor (40*log(3/30)). Between 30MHz-1GHz the levels were extrapolated to 3m distance using distance correction factor (20*log(10/3)).

For measurements below 1 GHz the resolution bandwidth is set to 120 kHz for peak detection measurements or 120 kHz for quasi-peak detection measurements for the 30-1000 MHz range, 9 kHz for peak detection measurements or 9 kHz for quasi-peak detection measurements for the 0.15-30 MHz range and 200 Hz for peak detection measurements or 200 Hz for quasi-peak detection measurements for the 9 to 150 kHz range. Peak detection is used unless otherwise noted as quasi-peak.

Below 30MHz the antenna height is not changed. Above 30MHz the frequency range of interest is monitored at a fixed antenna height and EUT azimuth. For all frequencies the EUT is rotated through 360 degrees to maximize emissions received. Above 30MHz the antenna is scanned from 1 to 4 meters above the ground plane to further maximize the emission. Below 30MHz the antenna is set to X, Y, and Z orientations. Above 30MHz measurements are made with the antenna polarized in both the vertical and the horizontal positions.

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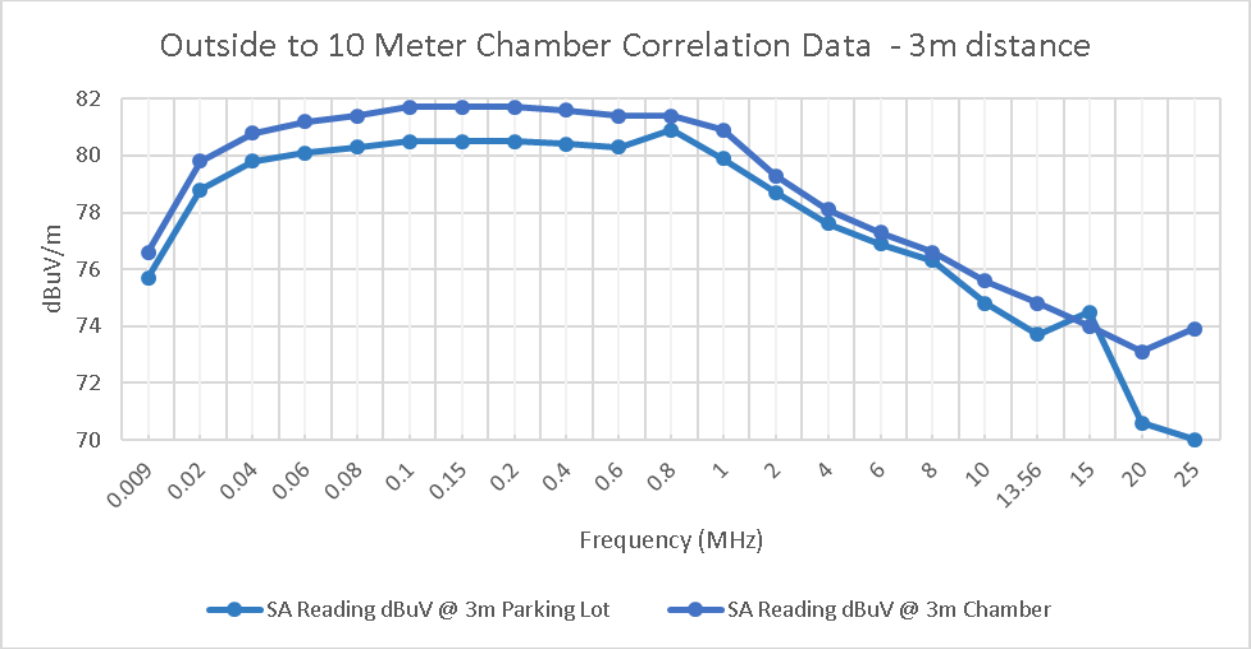
RESULTS

8.2. TX EMISSIONS 0.009MHz TO 30 MHz

8.2.1. Outdoor to 10m SAC Correlation Data

Correlation Data for measurements 9kHz-30MHz between Outside and 10m semi-anechoic chamber at Underwriter Laboratories in Northbrook, IL.



Correlation measurements were conducted using a signal source with an antenna outside in open area (parking lot). Immediately following the measurements the same setup was moved inside the 10 meter semi-anechoic chamber and the measurements were repeated. The above plot shows the difference in levels measured between outside and the 10 meter semi anechoic chamber. Measurements are required per KDB414788.

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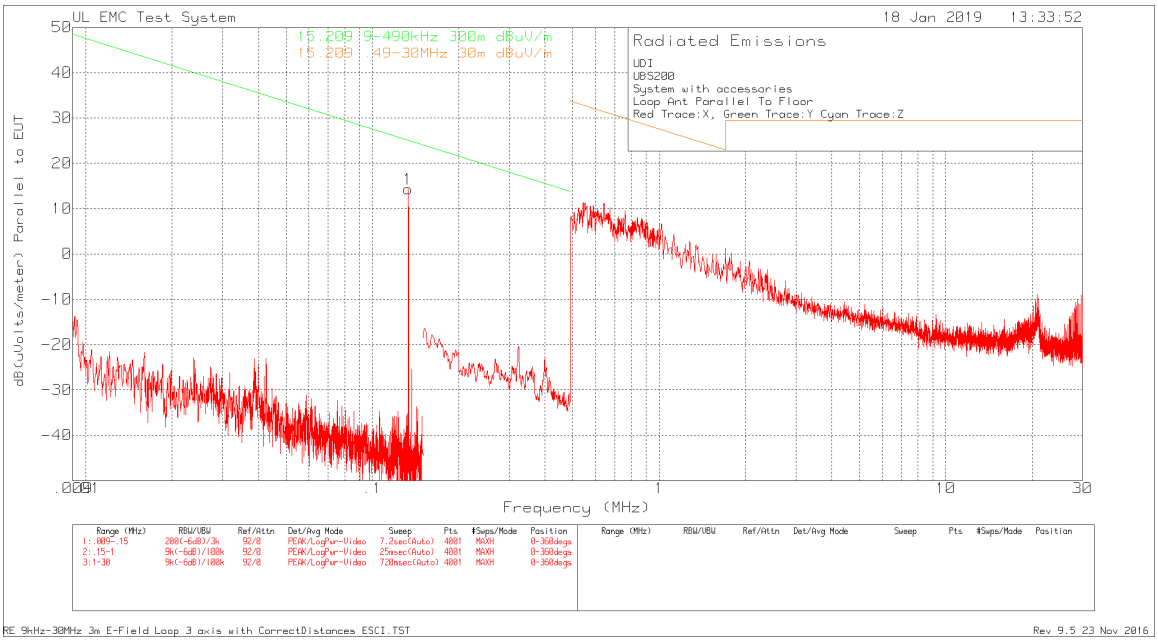
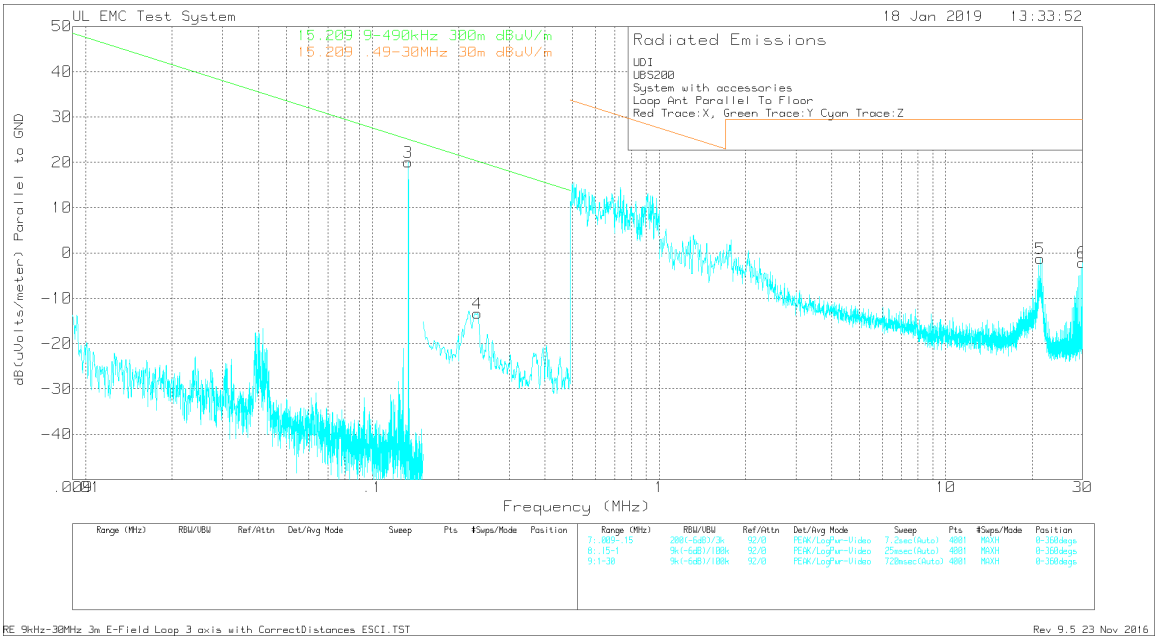
8.2.2. Loop Antenna Parallel to Floor



RX Antenna Parallel to EUT



RX Antenna Parallel to Floor

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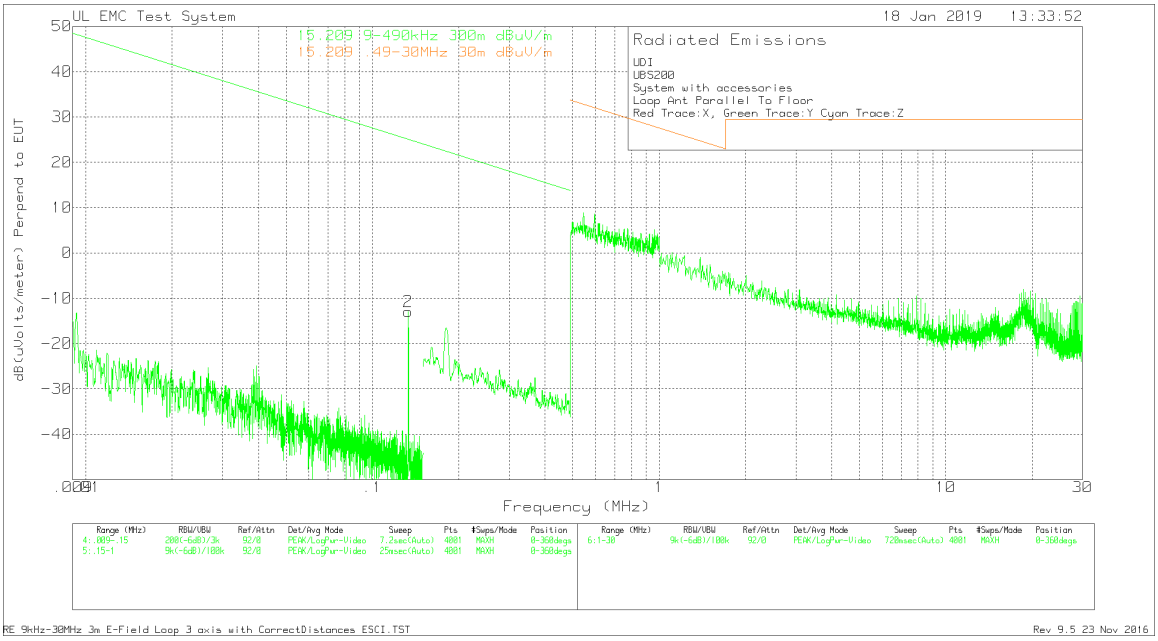

RX Antenna Perpendicular to EUT

```
Trace Markers - for reference only
      Test          Meter        Transducer  Gain/Loss  Corrected  Limit:1    2
No. Frequency     Reading         Factor      Factor    Reading dB(uVolts/meter)
      (MHz)                        (dB)        (dB)
================================================================================
1 .13336         81.97dBuV Pk      12.2       -79.9       14.27      25.1        -
                  Azimuth:0-360                         Margin (dB)  -10.83       -
2 .13336         54.8dBuV Pk       12.2       -79.9       -12.9      25.1        -
                  Azimuth:0-360                         Margin (dB)  -38          -
3 .13336         87.69dBuV Pk      12.2       -79.9       19.99      25.1        -
                  Azimuth:0-360                         Margin (dB)  -5.11        -
4 .23254         54.63dBuV Pk      11.9       -79.9       -13.37     20.27       -
                  Azimuth:0-360                         Margin (dB)  -33.64       -
5 21.3435        27.97dBuV Pk      10.3       -39.5       -1.23      -       29.54
                  Azimuth:0-360                         Margin (dB)  -      -30.77
6 29.93475       27.86dBuV Pk      9.4        -39.4       -2.14      -       29.54
                  Azimuth:0-360                         Margin (dB)  -      -31.68

Radiated Emission Data - worst case measured
      Test          Meter        Transducer  Gain/Loss  Corrected  Limit:1     2
    Frequency     Reading         Factor      Factor    Reading dB(uVolts/meter)
      (MHz)                        (dB)        (dB)
================================================================================
.13422           87.87dBuV Av      12.2       -79.9       20.17      25.04       -
Azimuth: 243                                            Margin (dB): -4.87        -

LIMIT 1: 15.209 9-490kHz 300m dBuV/m
LIMIT 2: 15.209 .49-30MHz 30m dBuV/m

Pk - Peak detector
Qp - Quasi-Peak detector
Av - Average detection
```


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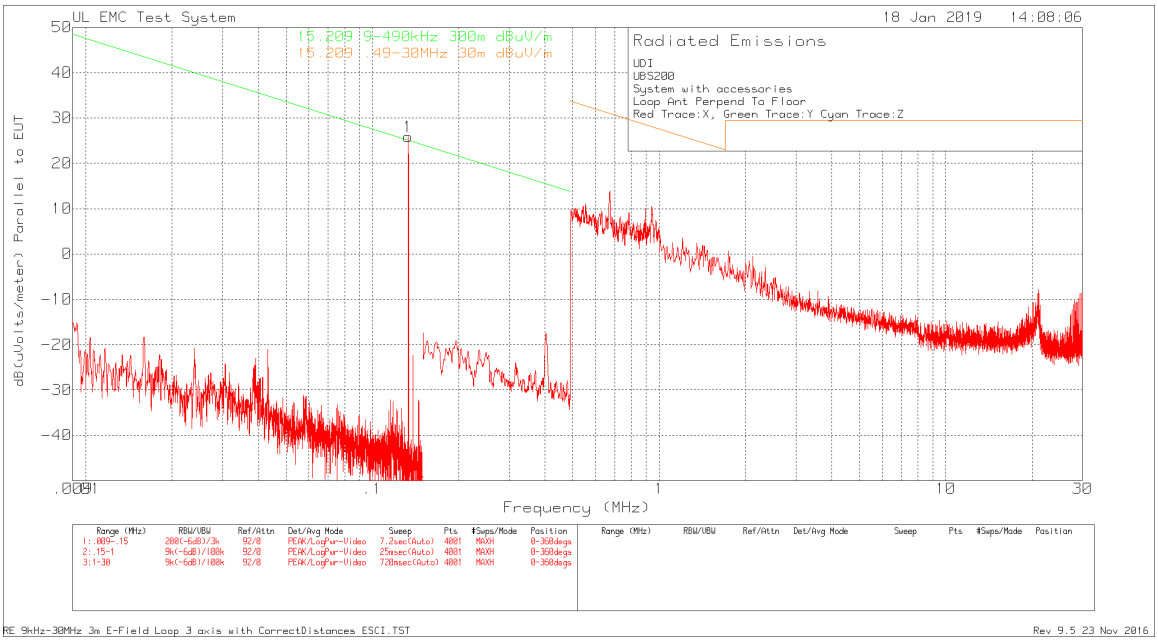
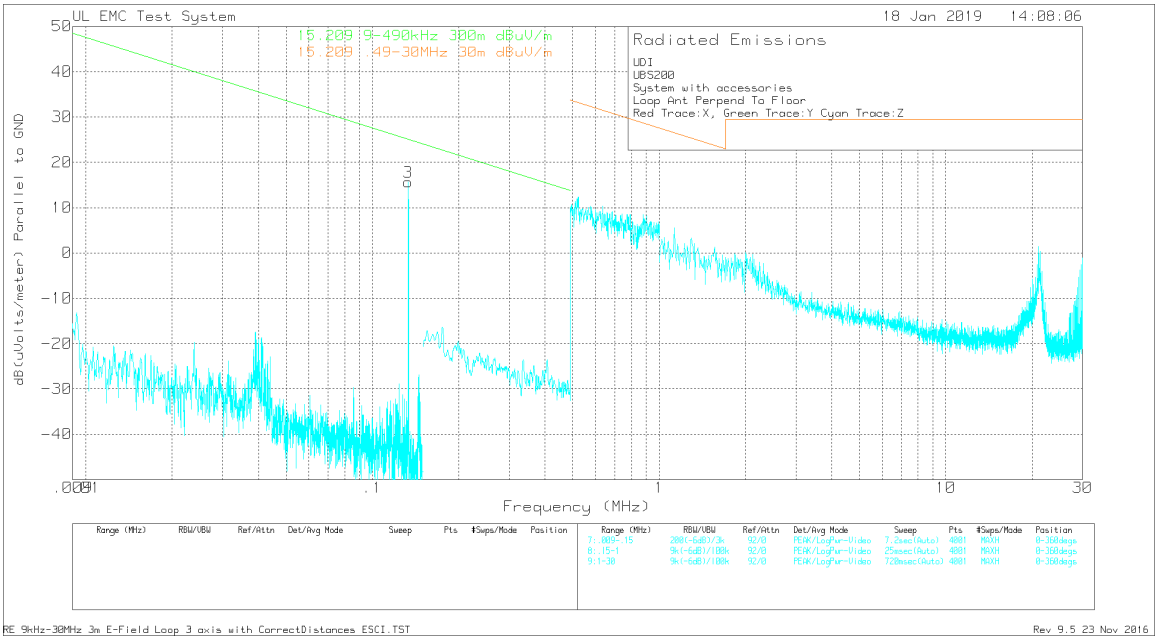
8.2.3. Loop Antenna Perpendicular to Floor



RX Antenna Parallel to EUT



RX Antenna Parallel to Floor

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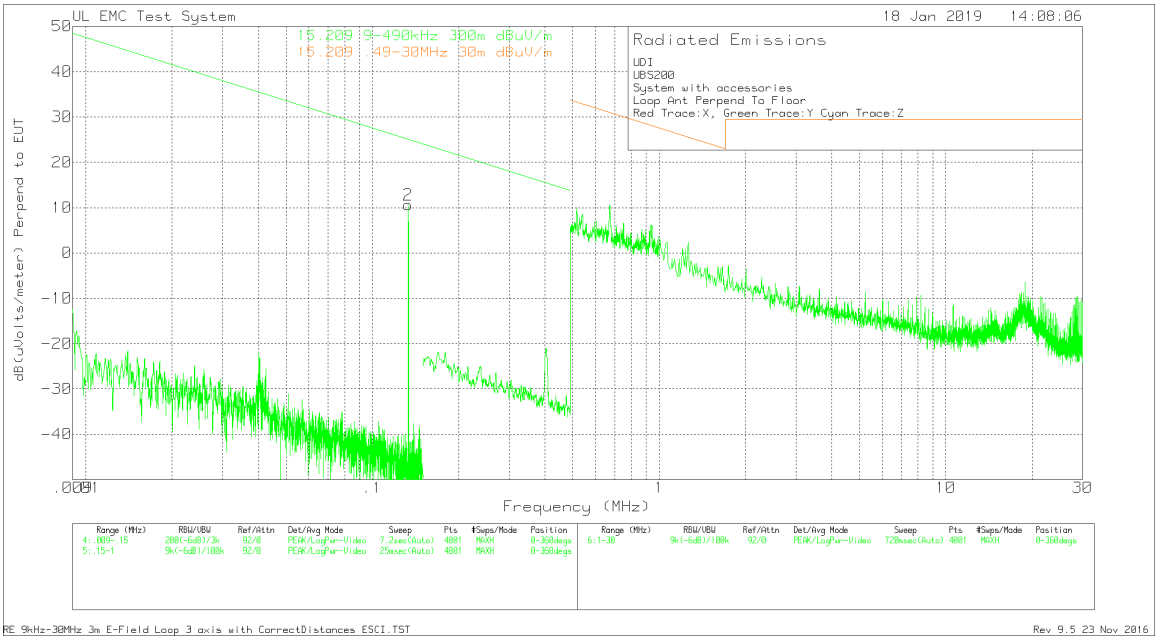

RX Antenna Perpendicular to EUT

Trace Markers - for reference only

No.	Test Frequency (MHz)	Meter Reading	Transducer Factor (dB)	Gain/Loss Factor (dB)	Corrected Reading	Limit:1 dB(uVolts/meter)	2
1	.13336	93.58dBuV Pk	12.2	-79.9	25.88	25.1	-
		Azimuth:0-360			Margin (dB)	.78	-
2	.13336	78.34dBuV Pk	12.2	-79.9	10.64	25.1	-
		Azimuth:0-360			Margin (dB)	-14.46	-
3	.13336	83.32dBuV Pk	12.2	-79.9	15.62	25.1	-
		Azimuth:0-360			Margin (dB)	-9.48	-

Radiated Emission Data - worst case measured

Test Frequency (MHz)	Meter Reading	Transducer Factor (dB)	Gain/Loss Factor (dB)	Corrected Reading	Limit:1 dB(uVolts/meter)	2
.13423	92.6dBuV Qp	12.2	-79.9	24.9	25.04	-
Azimuth: 85				Margin (dB):	-.14	-
.13423	92.73dBuV Av	12.2	-79.9	25.03	25.04	-
Azimuth: 85				Margin (dB):	-.01	-
.13423	92.74dBuV Pk	12.2	-79.9	25.04	25.04	-
Azimuth: 85				Margin (dB):	0	-

LIMIT 1: 15.209 9-490kHz 300m dBuV/m
LIMIT 2: 15.209 .49-30MHz 30m dBuV/m

Pk - Peak detector
Qp - Quasi-Peak detector
Av - Average detection

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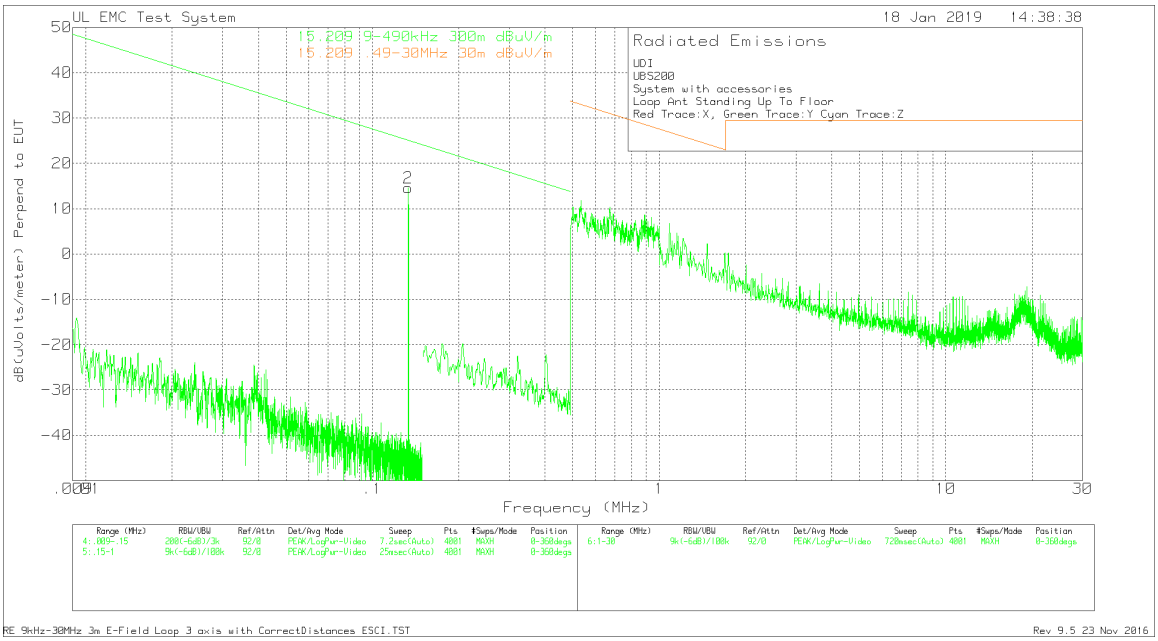
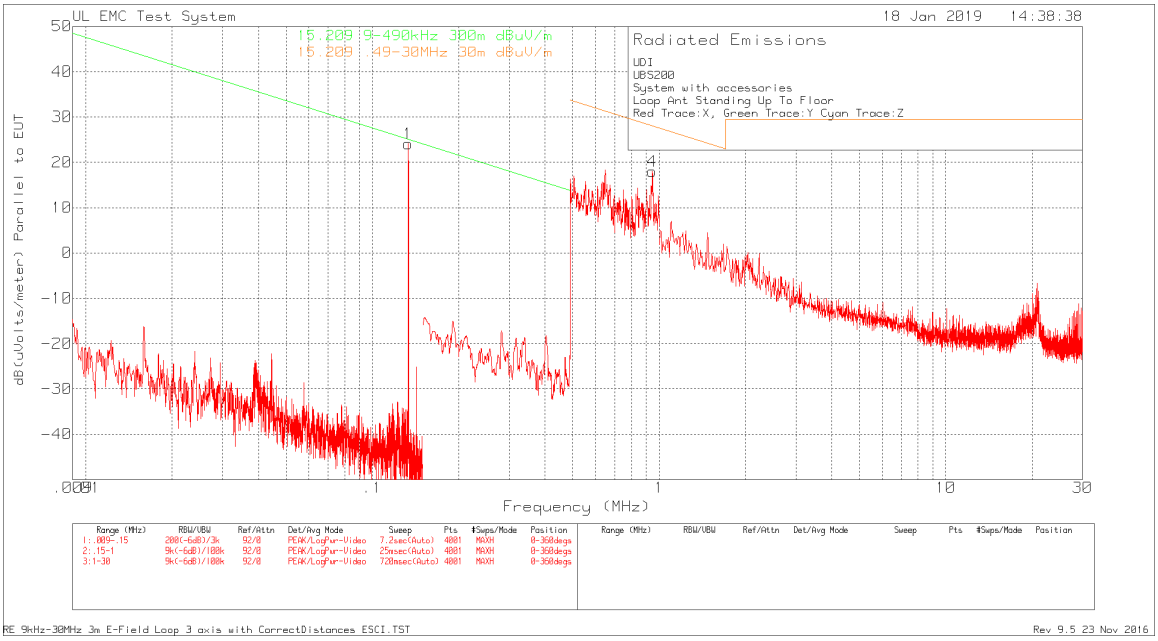
8.2.4. Loop Antenna Standing Up



RX Antenna Perpendicular to EUT



RX Antenna Parallel to EUT

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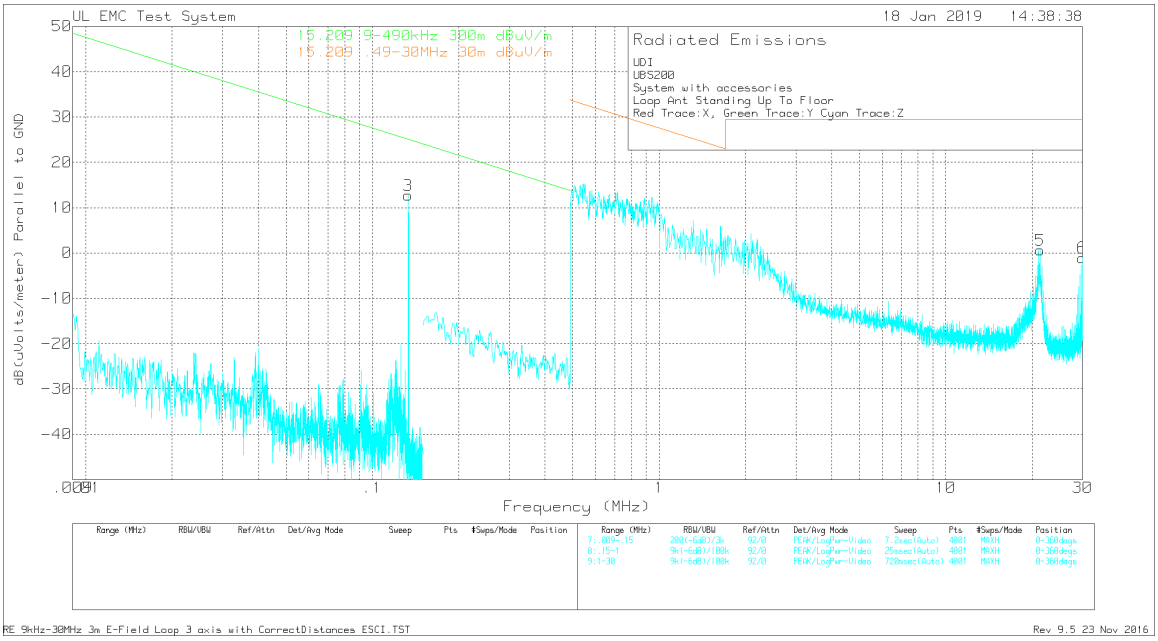

RX Antenna Parallel to Floor

```
Trace Markers - for reference only
      Test        Meter       Transducer  Gain/Loss  Corrected  Limit:1   2
No. Frequency    Reading       Factor      Factor    Reading dB(uVolts/meter)
      (MHz)                     (dB)        (dB)
================================================================================
1 .13336        91.8dBuV Pk      12.2       -79.9       24.1       25.1        -
                 Azimuth:0-360                        Margin (dB)  -1          -
4 .94662        45.69dBuV Pk     12.2       -39.9       17.99       -       28.08
                 Azimuth:0-360                        Margin (dB)   -      -10.09
2 .13336        82.31dBuV Pk     12.2       -79.9       14.61      25.1        -
                 Azimuth:0-360                        Margin (dB)  -10.49       -
3 .13336        80.44dBuV Pk     12.2       -79.9       12.74      25.1        -
                 Azimuth:0-360                        Margin (dB)  -12.36       -
5 21.3435       29.82dBuV Pk     10.3       -39.5        .62        -       29.54
                 Azimuth:0-360                        Margin (dB)   -      -28.92
6 29.93475      28.95dBuV Pk     9.4        -39.4       -1.05       -       29.54
                 Azimuth:0-360                        Margin (dB)   -      -30.59

Radiated Emission Data - worst case measured
      Test        Meter       Transducer  Gain/Loss  Corrected  Limit:1   2
    Frequency    Reading       Factor      Factor    Reading dB(uVolts/meter)
      (MHz)                     (dB)        (dB)
================================================================================
.13423          92.01dBuV Qp     12.2       -79.9       24.31      25.04       -
Azimuth: 277                                          Margin (dB): -.73         -

.13423          92.14dBuV Av     12.2       -79.9       24.44      25.04       -
Azimuth: 277                                          Margin (dB): -.6          -

.13423          92.01dBuV Qp     12.2       -79.9       24.31      25.04       -
Azimuth: 277                                          Margin (dB): -.73         -

LIMIT 1: 15.209 9-490kHz 300m dBuV/m
LIMIT 2: 15.209 .49-30MHz 30m dBuV/m

Pk - Peak Detector
Qp - Quasi-Peak detector
Av - Average detection
```


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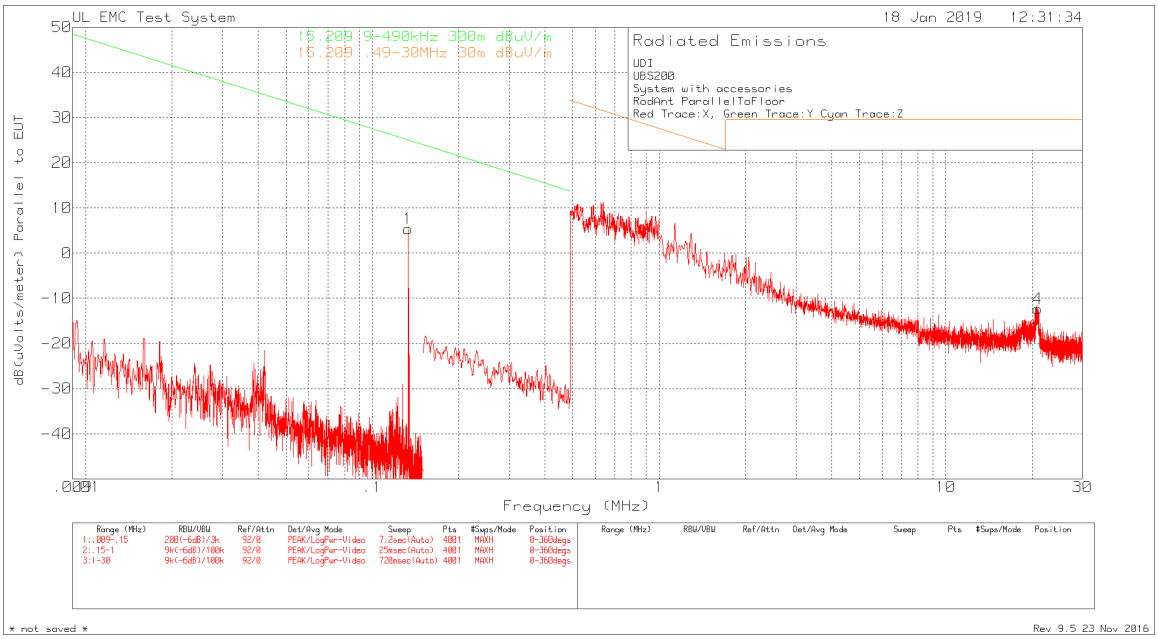
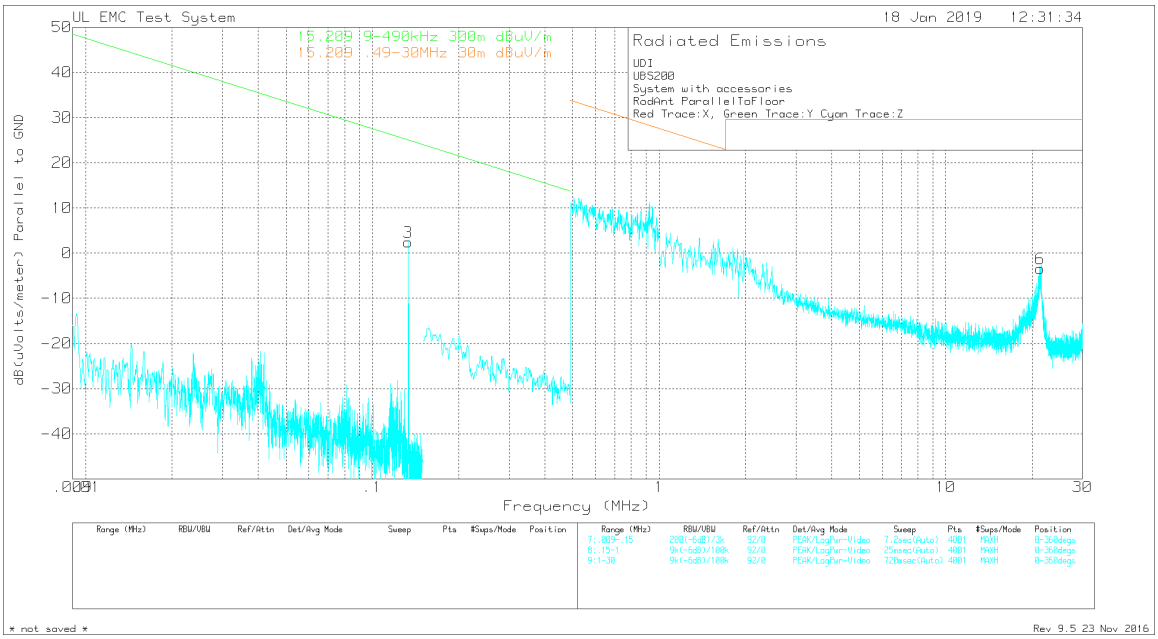
8.2.5. Rod Antenna Parallel to Floor



RX antenna parallel to EUT



RX antenna parallel to floor

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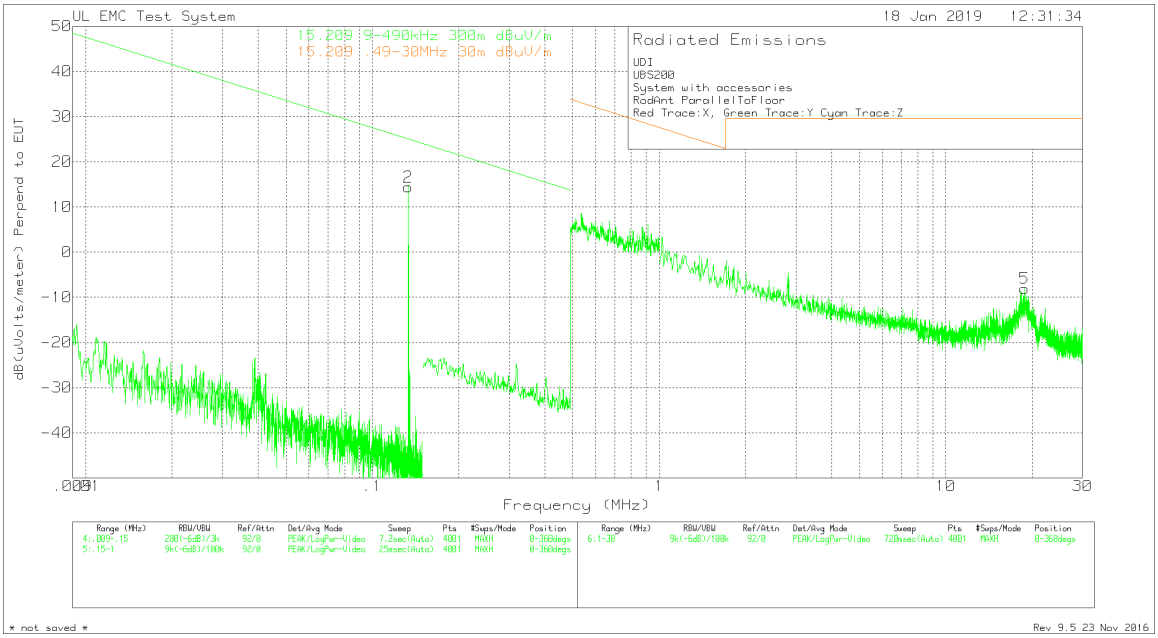

Rx antenna perpendicular EUT

Trace Markers - for reference only

No.	Test Frequency (MHz)	Meter Reading	Transducer Factor (dB)	Gain/Loss Factor (dB)	Corrected Reading	Limit:1 dB(uVolts/meter)	2
1	.13336	73.12dBuV Pk	12.2	-79.9	5.42	25.1	-
		Azimuth:0-360			Margin (dB)	-19.68	-
4	20.93025	16.79dBuV Pk	10.4	-39.5	-12.31	-	29.54
		Azimuth:0-360			Margin (dB)	-	-41.85
2	.13339	82.14dBuV Pk	12.2	-79.9	14.44	25.1	-
		Azimuth:0-360			Margin (dB)	-10.66	-
5	18.7915	20.68dBuV Pk	10.8	-39.5	-8.02	-	29.54
		Azimuth:0-360			Margin (dB)	-	-37.56
3	.13336	70.09dBuV Pk	12.2	-79.9	2.39	25.1	-
		Azimuth:0-360			Margin (dB)	-22.71	-
6	21.37975	25.75dBuV Pk	10.3	-39.5	-3.45	-	29.54
		Azimuth:0-360			Margin (dB)	-	-32.99

Radiated Emission Data - worst case measured

Test Frequency (MHz)	Meter Reading	Transducer Factor (dB)	Gain/Loss Factor (dB)	Corrected Reading	Limit:1 dB(uVolts/meter)	2
.13422	82.24dBuV Qp	12.2	-79.9	14.54	25.04	-
Azimuth: 258				Margin (dB):	-10.5	-
.13422	82.37dBuV Av	12.2	-79.9	14.67	25.04	-
Azimuth: 258				Margin (dB):	-10.37	-
.13422	82.39dBuV Pk	12.2	-79.9	14.69	25.04	-
Azimuth: 258				Margin (dB):	-10.35	-

LIMIT 1: 15.209 9-490kHz 300m dBuV/m
LIMIT 2: 15.209 .49-30MHz 30m dBuV/m

Pk - Peak detector
Qp - Quasi-Peak detector
Av - Average detection

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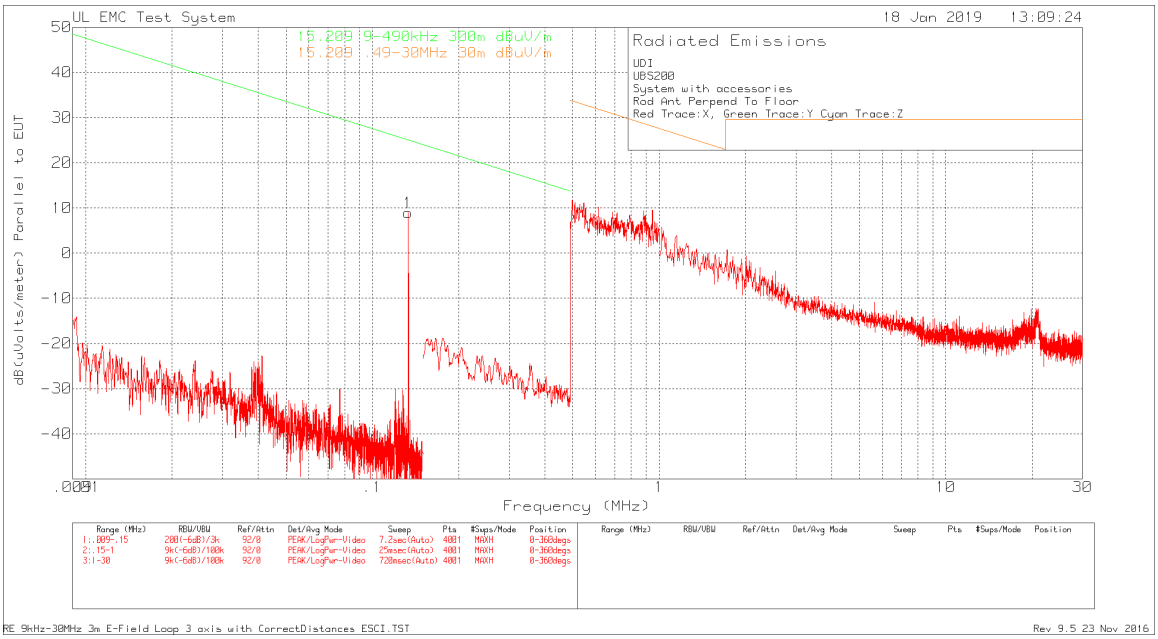
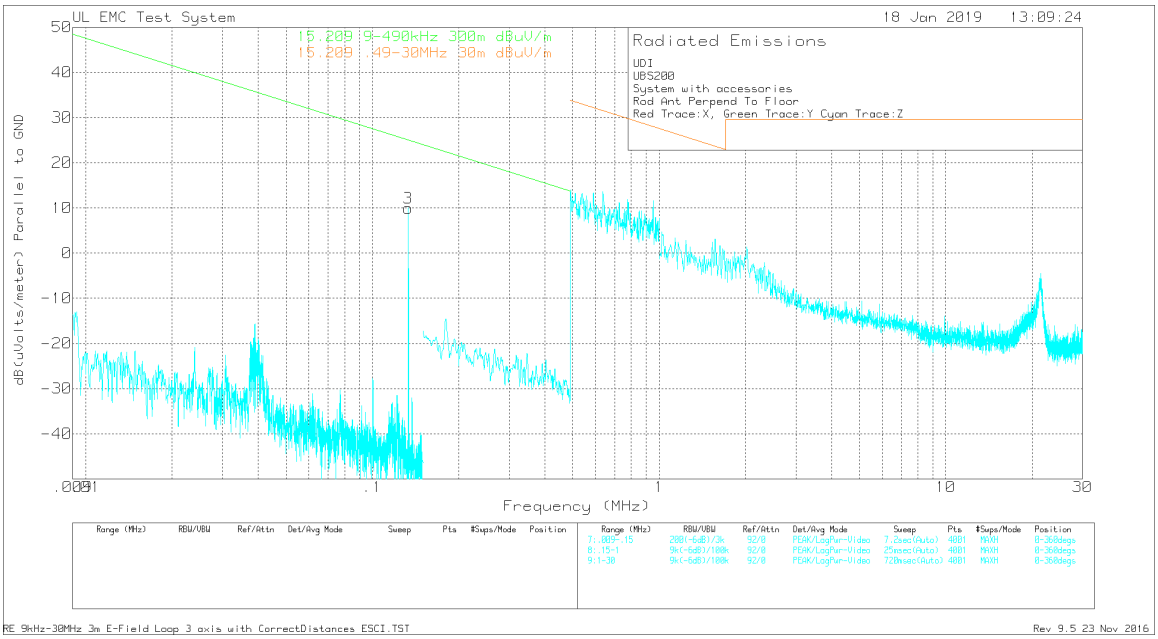
8.2.6. Rod Antenna Perpendicular to Floor



RX antenna parallel to EUT



RX antenna parallel to floor

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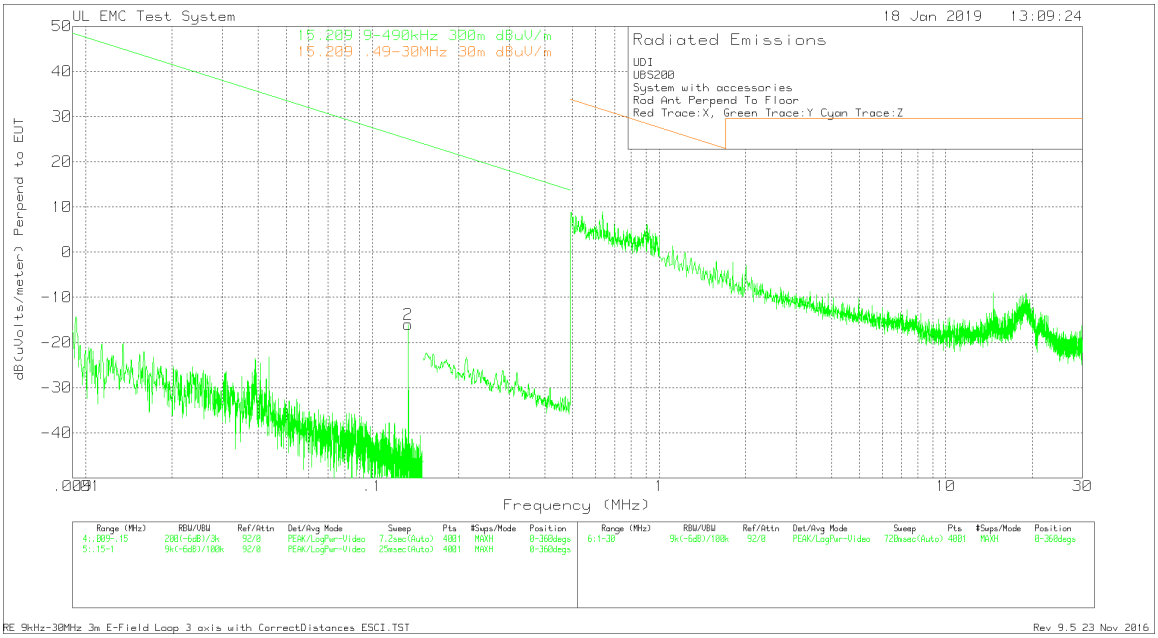

RX antenna perpendicular to EUT

```
Trace Markers - for reference only
      Test        Meter       Transducer  Gain/Loss  Corrected  Limit:1   2
No. Frequency    Reading       Factor      Factor    Reading dB(uVolts/meter)
      (MHz)                     (dB)        (dB)
================================================================================
1 .13336        76.62dBuV Pk     12.2       -79.9       8.92       25.1    -
                 Azimuth:0-360                        Margin (dB)  -16.18   -
2 .13336        51.7dBuV Pk      12.2       -79.9       -16        25.1    -
                 Azimuth:0-360                        Margin (dB)  -41.1    -
3 .13336        77.66dBuV Pk     12.2       -79.9       9.96       25.1    -
                 Azimuth:0-360                        Margin (dB)  -15.14   -

Radiated Emission Data - worst case measured
      Test        Meter       Transducer  Gain/Loss  Corrected  Limit:1   2
    Frequency    Reading       Factor      Factor    Reading dB(uVolts/meter)
      (MHz)                     (dB)        (dB)
================================================================================
.13422          77.62dBuV Qp     12.2       -79.9       9.92       25.04   -
Azimuth: 227                                          Margin (dB): -15.12   -

.13422          77.72dBuV Av     12.2       -79.9       10.02      25.04   -
Azimuth: 227                                          Margin (dB): -15.02   -

.13422          77.75dBuV Pk     12.2       -79.9       10.05      25.04   -
Azimuth: 227                                          Margin (dB): -14.99   -

LIMIT 1: 15.209 9-490kHz 300m dBuV/m
LIMIT 2: 15.209 .49-30MHz 30m dBuV/m

Pk - Peak detector
Qp - Quasi-Peak detector
Av - Average detection
```


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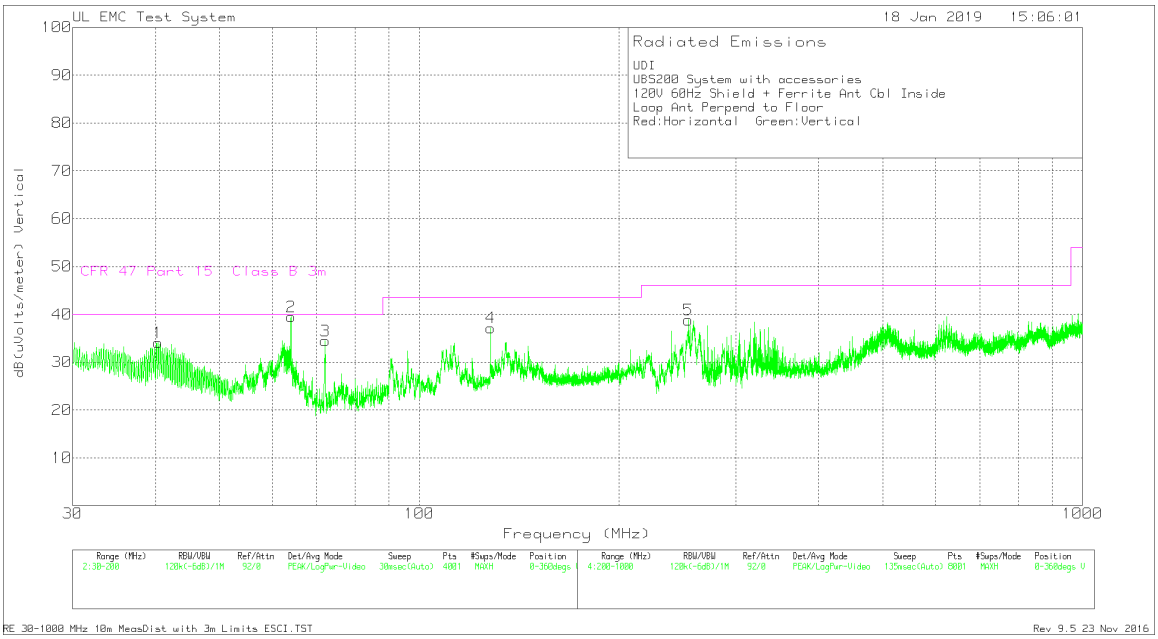
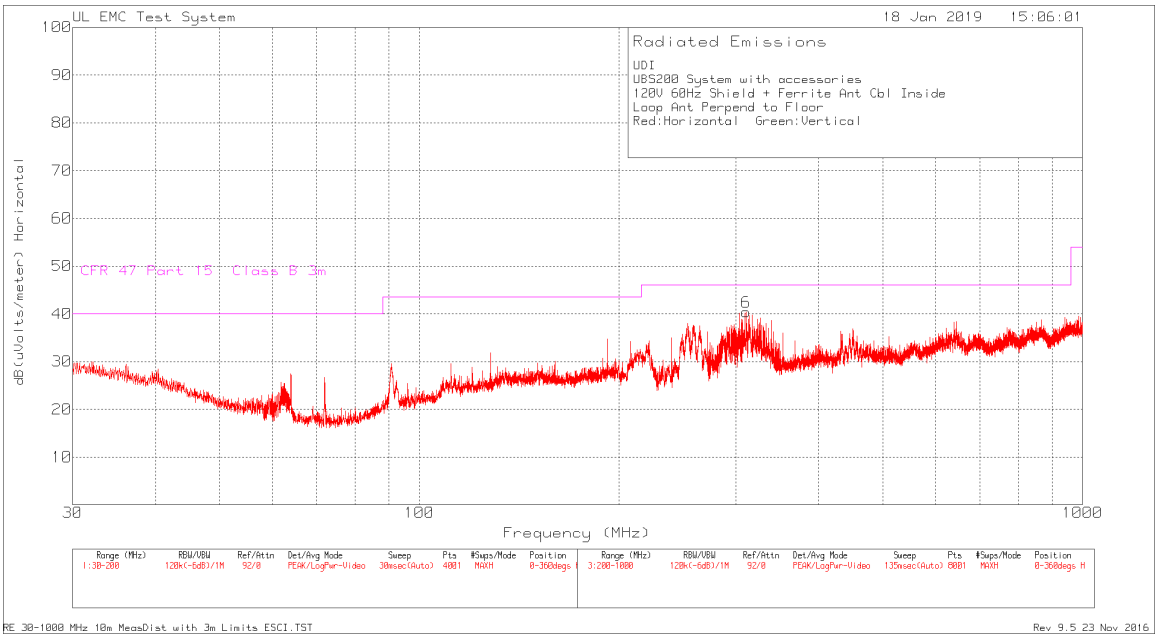
8.3. TX SPURIOUS EMISSION 30 TO 1000 MHz

8.3.1. Radiated Spurious Emissions – Loop Antenna (worst case orientation)





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```
UDI
UBS200 System with accessories
120V 60Hz Shield + Ferrite Ant Cbl Inside
Loop Ant Perpend to Floor
Red:Horizontal  Green:Vertical

Trace Markers
      Test        Meter       Transducer  Gain/Loss  Corrected  Limit:1
No. Frequency    Reading       Factor      Factor    Reading dB(uVolts/meter)
      (MHz)                     (dB)        (dB)
=====================================================================
1 40.37          39.51dBuV Pk     14.1      -19.5       34.11      40
                  Azimuth:0-360  Height:101 Vert     Margin (dB)  -5.89
2 64.0425        53.03dBuV Pk     6.3       -19.8       39.53      40
                  Azimuth:0-360  Height:251 Vert     Margin (dB)  -.47
3 72.1175        47.8dBuV Pk      6.2       -19.5       34.5       40
                  Azimuth:0-360  Height:251 Vert     Margin (dB)  -5.5
4 128.0475       42.88dBuV Pk     13.9      -19.6       37.18      43.52
                  Azimuth:0-360  Height:101 Vert     Margin (dB)  -6.34
6 310.8          45.29dBuV Pk     13.4      -18.3       40.39      46.02
                  Azimuth:0-360  Height:299 Horz     Margin (dB)  -5.63
5 254.2          45.13dBuV Pk     12.2      -18.5       38.83      46.02
                  Azimuth:0-360  Height:98 Vert      Margin (dB)  -7.19


Radiated Emission Data
      Test        Meter       Transducer  Gain/Loss  Corrected  Limit:1
    Frequency    Reading       Factor      Factor    Reading dB(uVolts/meter)
      (MHz)                     (dB)        (dB)
========================================================================
64.0173         52.12dBuV Qp      6.3       -19.8       38.62      40
Azimuth: 113  Height:261 Vert                        Margin (dB): -1.38

LIMIT 1: CFR 47 Part 15  Class B 3m

Pk - Peak Detector
Qp - Quasi-Peak detector
```


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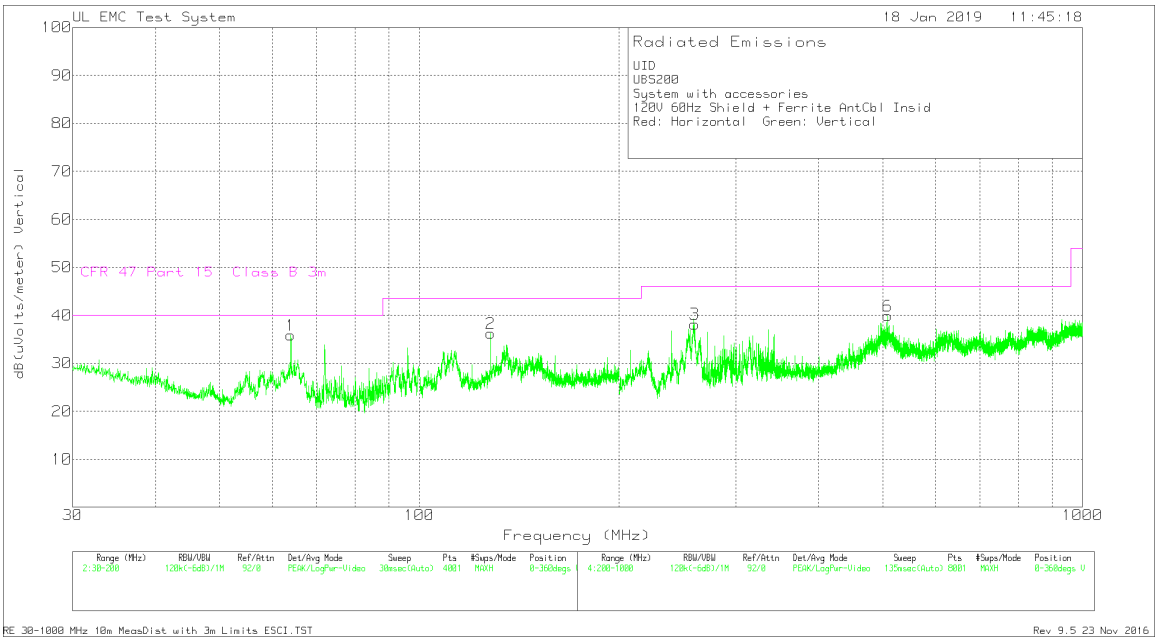
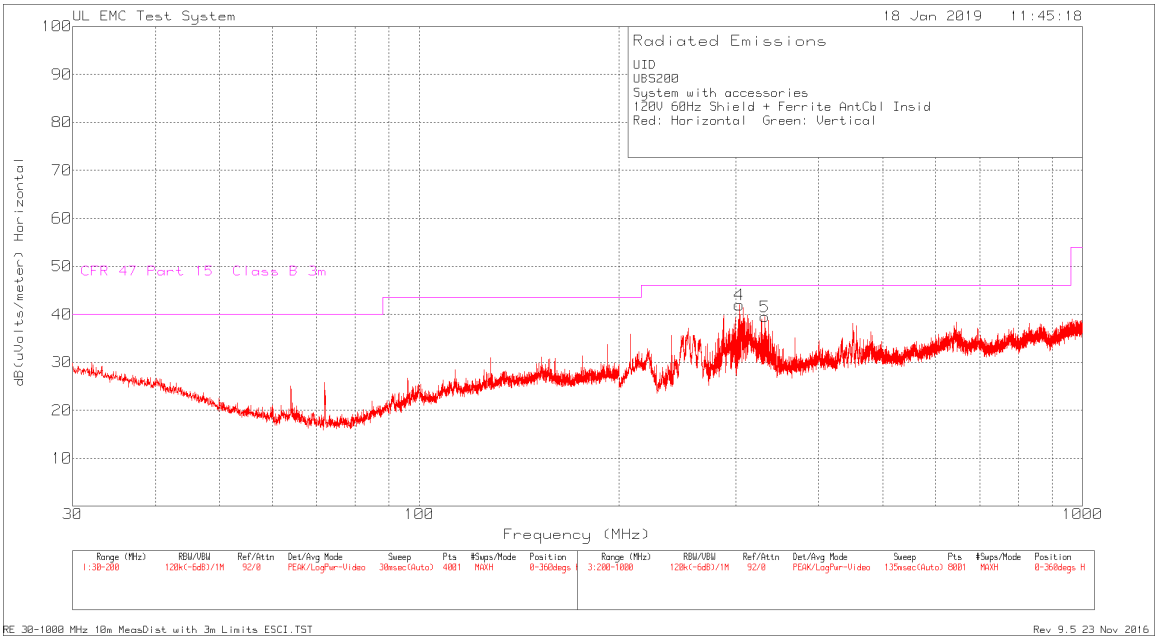
8.3.2. Radiated Spurious Emissions – Rod Antenna (worst case orientation)





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```
UID
UBS200
System with accessories
120V 60Hz Shield + Ferrite AntCbl Insid
Red: Horizontal  Green: Vertical

Trace Markers
      Test        Meter       Transducer  Gain/Loss  Corrected  Limit:1
No. Frequency    Reading       Factor      Factor    Reading dB(uVolts/meter)
      (MHz)                     (dB)        (dB)
=========================================================================
1 64            49.35dBuV Pk     6.3       -19.8       35.85      40
                 Azimuth:0-360  Height:252 Vert     Margin (dB)  -4.15
2 128.0475      41.93dBuV Pk     13.9      -19.6       36.23      43.52
                 Azimuth:0-360  Height:101 Vert     Margin (dB)  -7.29
4 303.6         47.37dBuV Pk     13.2      -18.6       41.97      46.02
                 Azimuth:0-360  Height:399 Horz     Margin (dB)  -4.05
5 331.9         43.37dBuV Pk     14.2      -18.1       39.47      46.02
                 Azimuth:0-360  Height:399 Horz     Margin (dB)  -6.55
3 260           44.78dBuV Pk     12.4      -19         38.18      46.02
                 Azimuth:0-360  Height:99 Vert      Margin (dB)  -7.84
6 508.8         39.2dBuV Pk      17.5      -16.8       39.9       46.02
                 Azimuth:0-360  Height:298 Vert     Margin (dB)  -6.12

LIMIT 1: CFR 47 Part 15  Class B 3m
Pk - Peak detector
```


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9. AC MAINS LINE CONDUCTED EMISSIONS

LIMITS

§15.207 (a)
IC RSS-GEN, Section 7.2.2

Frequency of emission (MHz)	Conducted Limit (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
* Decreases with the logarithm of the frequency.		

TEST PROCEDURE

ANSI C63.10

RESULTS

No non-compliance noted:

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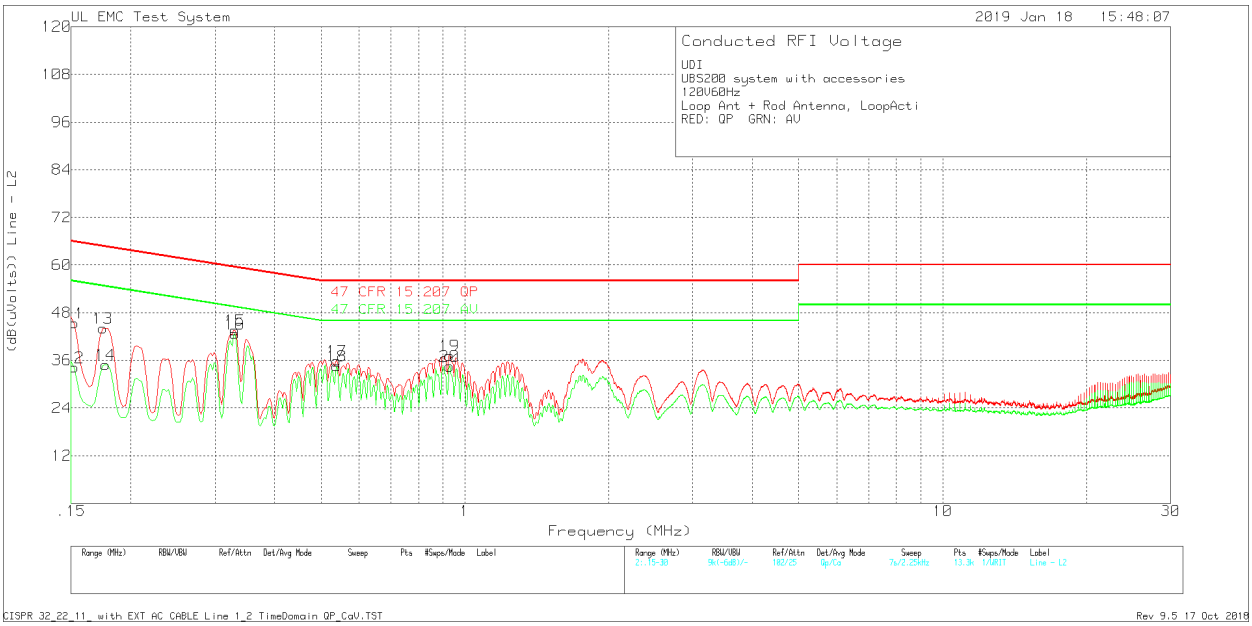
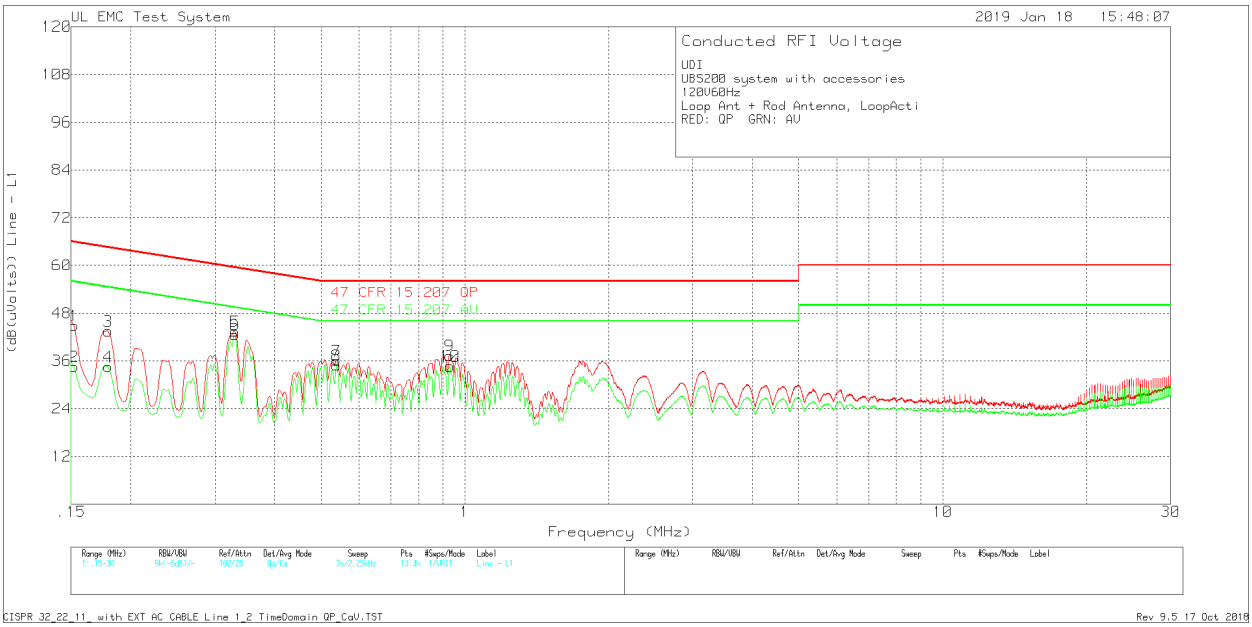
Loop Antenna Configuration





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UDI
UBS200 system with accessories
120V60Hz
Loop Ant + Rod Antenna, LoopActi
RED: QP GRN: AV

Trace Markers

No.	Test Frequency (MHz)	Meter Reading	Transducer Factor (dB)	Gain/Loss Factor (dB)	Corrected Reading (dB(uVolts))	Limit: 1	2
Line							
1	.15225	30.12dBuV Qp	.1	14.7	44.92	65.88	-
					Margin (dB)	-20.96	-
2	.15225	19.76dBuV Ca	.1	14.7	34.56	-	55.88
					Margin (dB)	-	-21.32
3	.17925	31.19dBuV Qp	0	12.3	43.49	64.52	-
					Margin (dB)	-21.03	-
4	.17925	22.23dBuV Ca	0	12.3	34.53	-	54.52
					Margin (dB)	-	-19.99
5	.33	32.75dBuV Qp	0	10.7	43.45	59.45	-
					Margin (dB)	-16	-
6	.33	31.92dBuV Ca	0	10.7	42.62	-	49.45
					Margin (dB)	-	-6.83
7	.53925	25.42dBuV Qp	0	10.6	36.02	56	-
					Margin (dB)	-19.98	-
8	.53925	24.27dBuV Ca	0	10.6	34.87	-	46
					Margin (dB)	-	-11.13
9	.9285	26.86dBuV Qp	0	10.5	37.36	56	-
					Margin (dB)	-18.64	-
10	.93075	24.16dBuV Ca	0	10.5	34.66	-	46
					Margin (dB)	-	-11.34
Neutral							
11	.15225	30.58dBuV Qp	.1	14.7	45.38	65.88	-
					Margin (dB)	-20.5	-
12	.15225	19.42dBuV Ca	.1	14.7	34.22	-	55.88
					Margin (dB)	-	-21.66
13	.17475	31.27dBuV Qp	.1	12.7	44.07	64.73	-
					Margin (dB)	-20.66	-
14	.177	22.24dBuV Ca	.1	12.5	34.84	-	54.63
					Margin (dB)	-	-19.79
15	.33	32.88dBuV Qp	0	10.7	43.58	59.45	-
					Margin (dB)	-15.87	-
16	.33	32dBuV Ca	0	10.7	42.7	-	49.45
					Margin (dB)	-	-6.75
17	.53925	25.2dBuV Qp	0	10.6	35.8	56	-
					Margin (dB)	-20.2	-
18	.53925	23.99dBuV Ca	0	10.6	34.59	-	46
					Margin (dB)	-	-11.41
19	.9285	26.75dBuV Qp	0	10.5	37.25	56	-
					Margin (dB)	-18.75	-
20	.9285	23.99dBuV Ca	0	10.5	34.49	-	46
					Margin (dB)	-	-11.51

LIMIT 1: 47 CFR 15.207 QP
LIMIT 2: 47 CFR 15.207 AV

Qp - Quasi-Peak detector
Ca - CISPR Average detection

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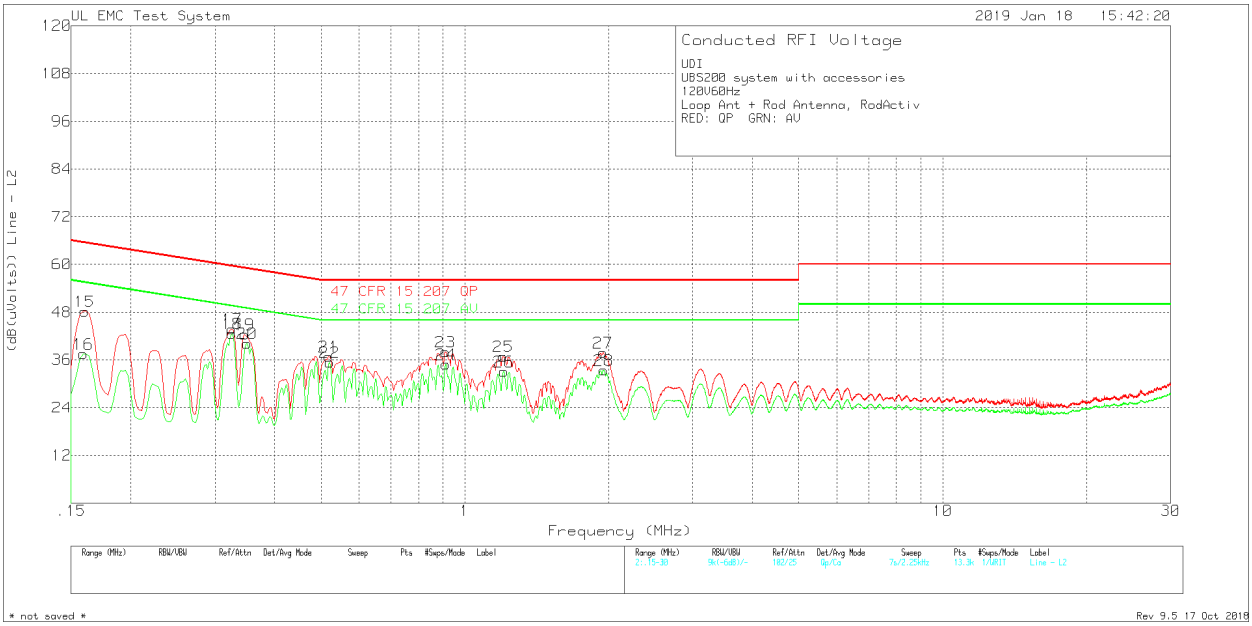
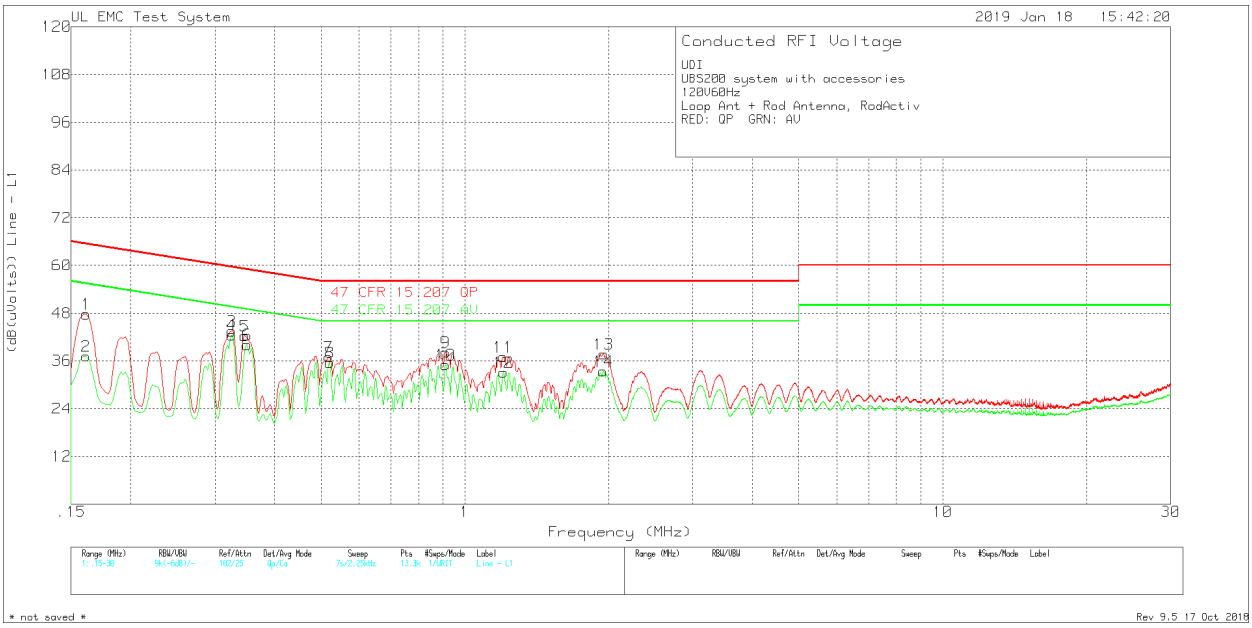
Rod Antenna Configuration





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UDI
UBS200 system with accessories
120V60Hz
Loop Ant + Rod Antenna, RodActiv
RED: QP GRN: AV

Trace Markers

No.	Test Frequency (MHz)	Meter Reading	Transducer Factor (dB)	Gain/Loss Factor (dB)	Corrected Reading (dB(uVolts))	Limit:1	2
Line							
1	.16125	33.75dBuV Qp	.1	13.9	47.75	65.4	-
					Margin (dB)	-17.65	-
2	.16125	23.2dBuV Ca	.1	13.9	37.2	-	55.4
					Margin (dB)	-	-18.2
3	.3255	32.81dBuV Qp	0	10.7	43.51	59.57	-
					Margin (dB)	-16.06	-
4	.3255	31.82dBuV Ca	0	10.7	42.52	-	49.57
					Margin (dB)	-	-7.05
5	.34575	31.62dBuV Qp	0	10.7	42.32	59.06	-
					Margin (dB)	-16.74	-
6	.35025	29.36dBuV Ca	0	10.7	40.06	-	48.96
					Margin (dB)	-	-8.9
7	.519	26.46dBuV Qp	0	10.6	37.06	56	-
					Margin (dB)	-18.94	-
8	.52125	25.02dBuV Ca	0	10.6	35.62	-	46
					Margin (dB)	-	-10.38
9	.9105	27.62dBuV Qp	0	10.5	38.12	56	-
					Margin (dB)	-17.88	-
10	.9105	24.5dBuV Ca	0	10.5	35	-	46
					Margin (dB)	-	-11
11	1.203	26.49dBuV Qp	0	10.5	36.99	56	-
					Margin (dB)	-19.01	-
12	1.20525	22.66dBuV Ca	0	10.5	33.16	-	46
					Margin (dB)	-	-12.84
13	1.95	27.13dBuV Qp	0	10.6	37.73	56	-
					Margin (dB)	-18.27	-
14	1.94775	22.78dBuV Ca	0	10.6	33.38	-	46
					Margin (dB)	-	-12.62
Neutral							
15	.16013	34.11dBuV Qp	.1	14	48.21	65.46	-
					Margin (dB)	-17.25	-
16	.159	23.28dBuV Ca	.1	14.1	37.48	-	55.52
					Margin (dB)	-	-18.04
17	.3255	33.01dBuV Qp	0	10.7	43.71	59.57	-
					Margin (dB)	-15.86	-
18	.3255	31.94dBuV Ca	0	10.7	42.64	-	49.57
					Margin (dB)	-	-6.93
19	.34575	31.67dBuV Qp	0	10.7	42.37	59.06	-
					Margin (dB)	-16.69	-
20	.35025	29.48dBuV Ca	0	10.7	40.18	-	48.96
					Margin (dB)	-	-8.78
21	.519	26.23dBuV Qp	0	10.6	36.83	56	-
					Margin (dB)	-19.17	-
22	.52125	24.8dBuV Ca	0	10.6	35.4	-	46
					Margin (dB)	-	-10.6
23	.9105	27.51dBuV Qp	0	10.5	38.01	56	-
					Margin (dB)	-17.99	-
24	.91275	24.36dBuV Ca	0	10.5	34.86	-	46
					Margin (dB)	-	-11.14
25	1.203	26.37dBuV Qp	0	10.5	36.87	56	-
					Margin (dB)	-19.13	-
26	1.2075	22.56dBuV Ca	0	10.5	33.06	-	46
					Margin (dB)	-	-12.94
27	1.9455	27.21dBuV Qp	0	10.6	37.81	56	-
					Margin (dB)	-18.19	-
28	1.95225	22.8dBuV Ca	0	10.6	33.4	-	46
					Margin (dB)	-	-12.6

LIMIT 1: 47 CFR 15.207 QP
LIMIT 2: 47 CFR 15.207 AV

Qp - Quasi-Peak detector
Ca - CISPR Average detection

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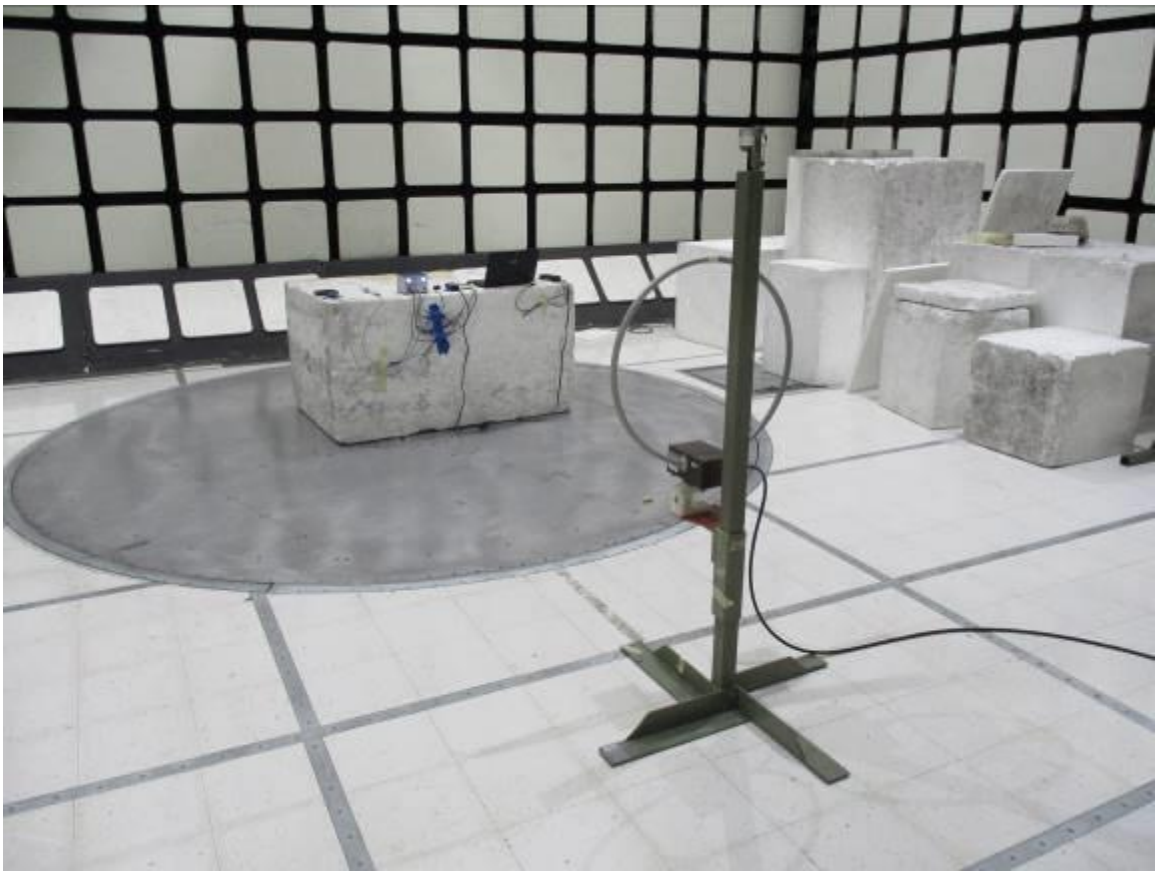
10. SETUP PHOTOS

RADIATED EMISSION BELOW 30 MHz – TX Loop and Rod Parallel to Ground, RX Loop X



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RADIATED EMISSION BELOW 30 MHz – TX Loop and Rod Parallel to Ground, RX Loop Y

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RADIATED EMISSION BELOW 30 MHz – TX Loop and Rod Parallel to Ground, RX Loop Z

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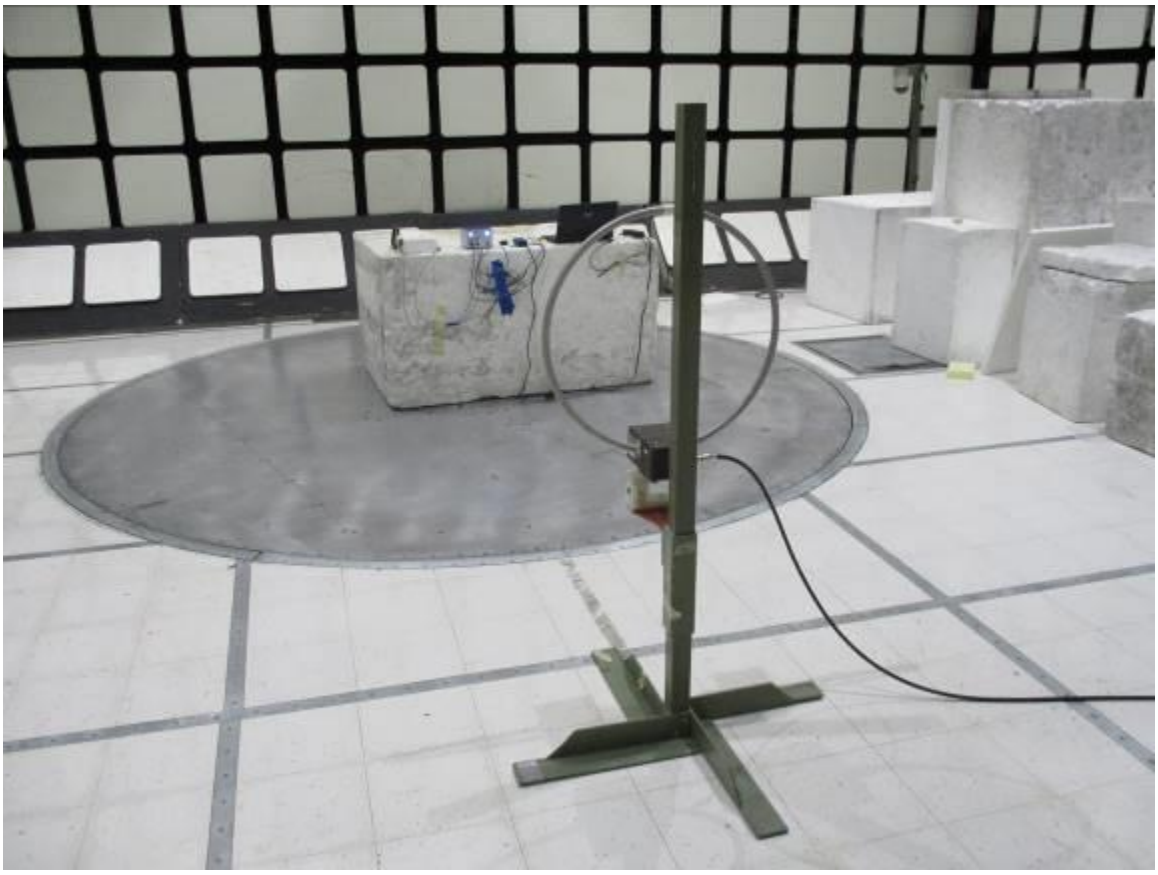
RADIATED EMISSION BELOW 30 MHz – TX Loop Perpendicular to Ground, RX Loop X



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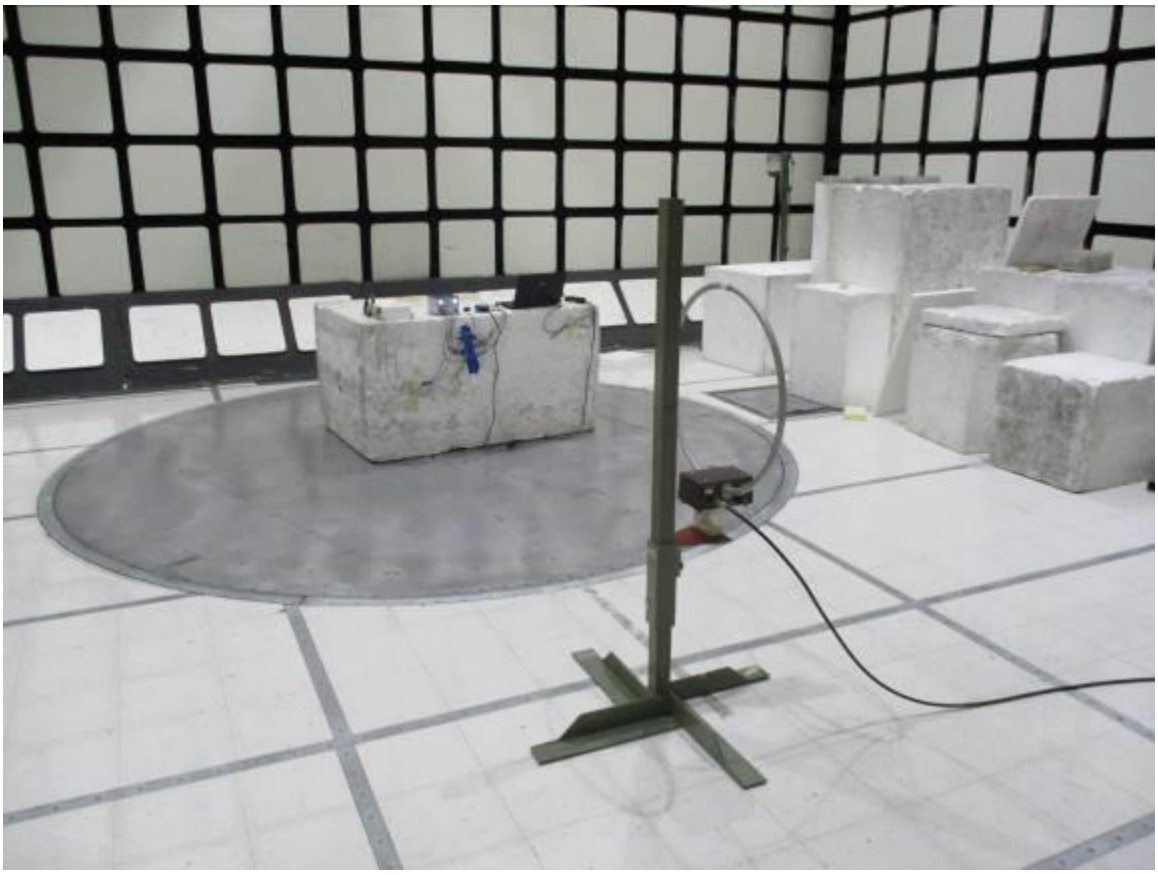
RADIATED EMISSION BELOW 30 MHz – TX Loop Perpendicular to Ground, RX Loop Y



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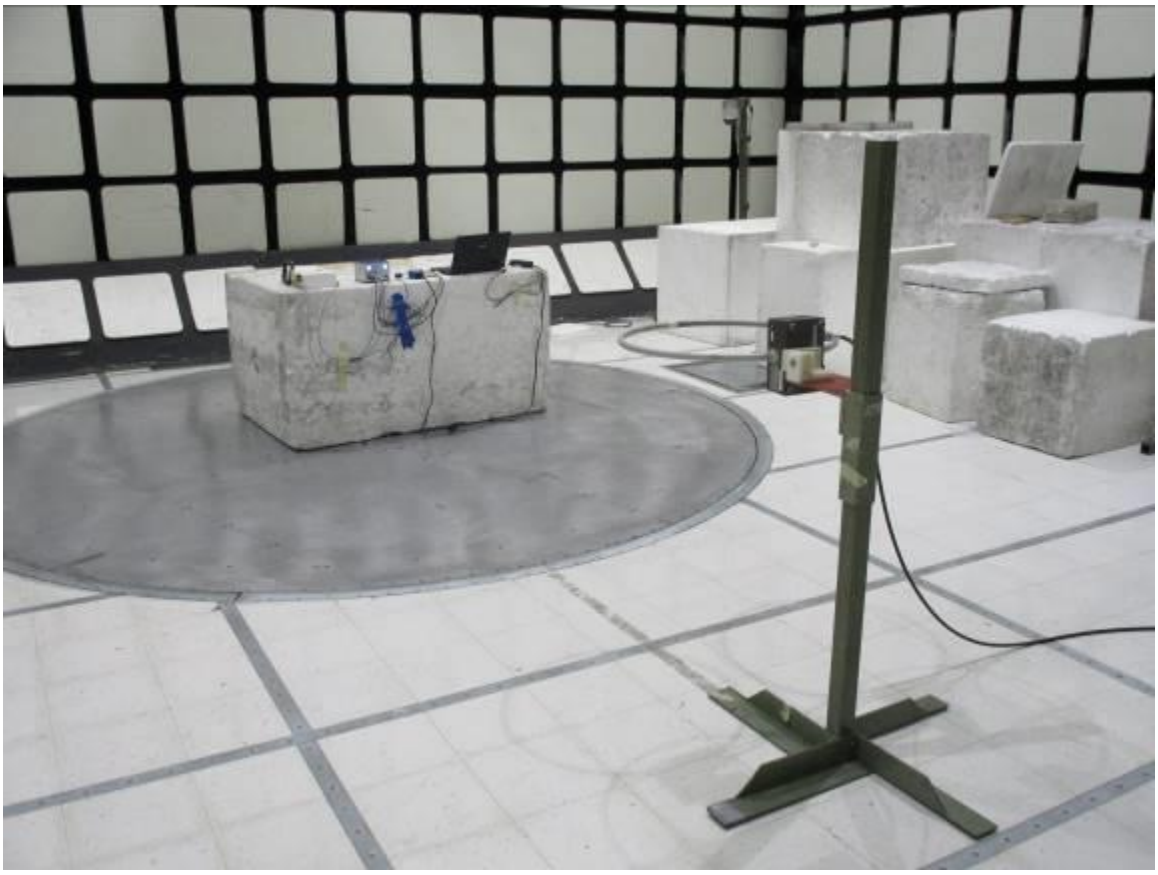
RADIATED EMISSION BELOW 30 MHz – TX Loop Perpendicular to Ground, RX Loop Z



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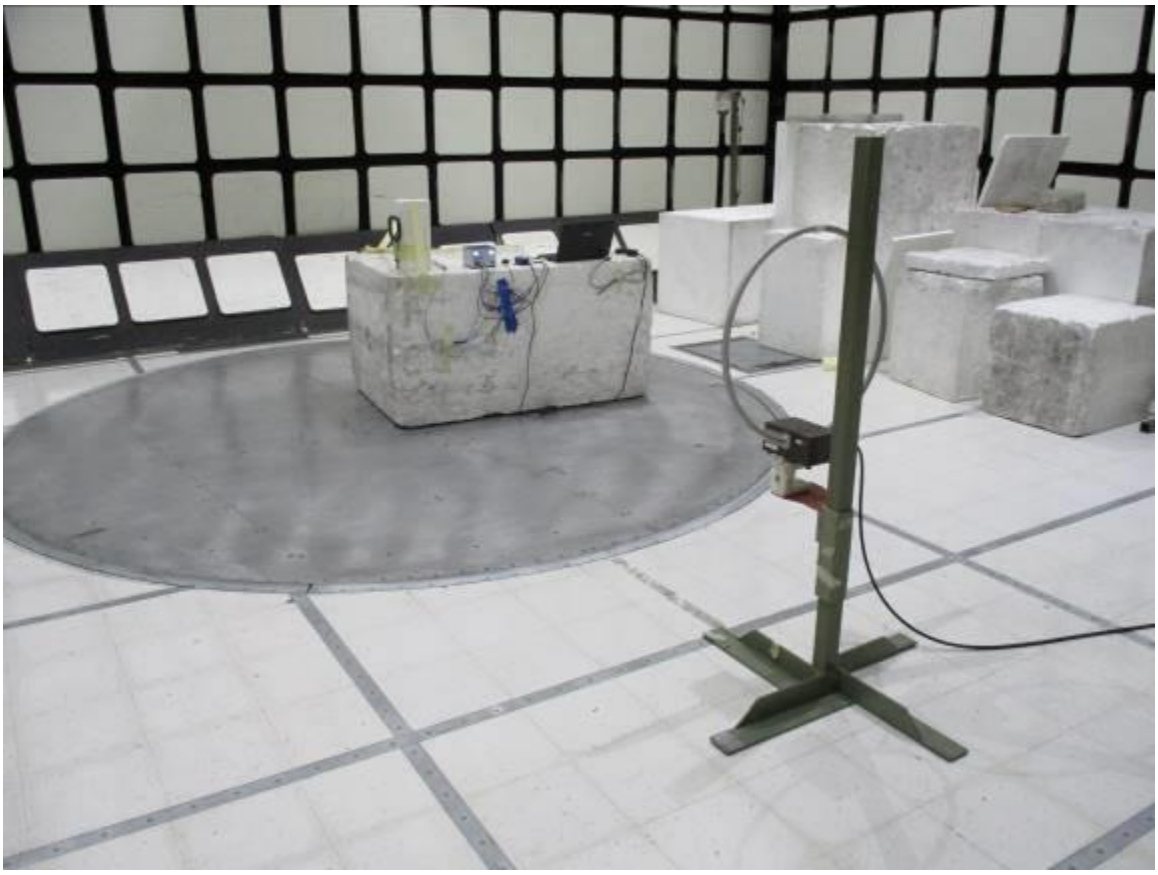
RADIATED EMISSION BELOW 30 MHz – TX Loop Upright, RX Loop X



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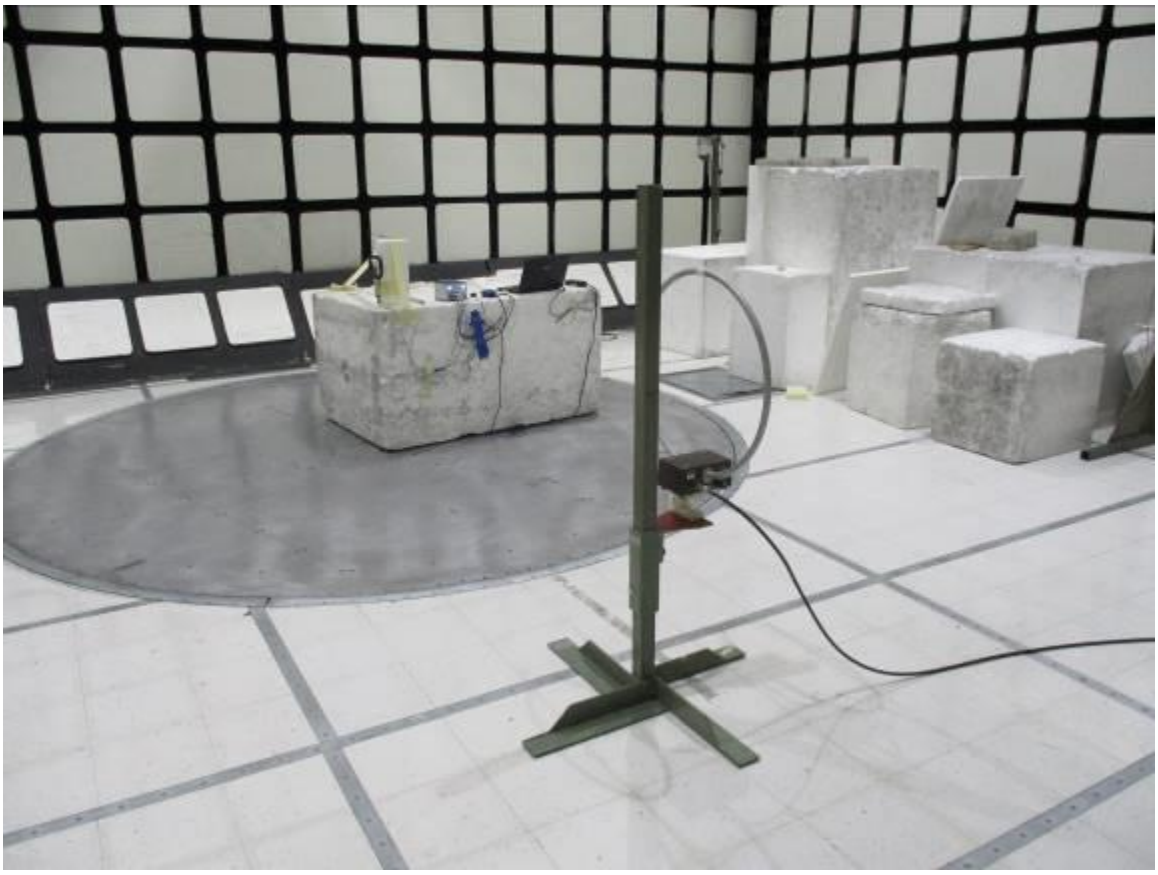
RADIATED EMISSION BELOW 30 MHz – TX Loop Upright, RX Loop Y



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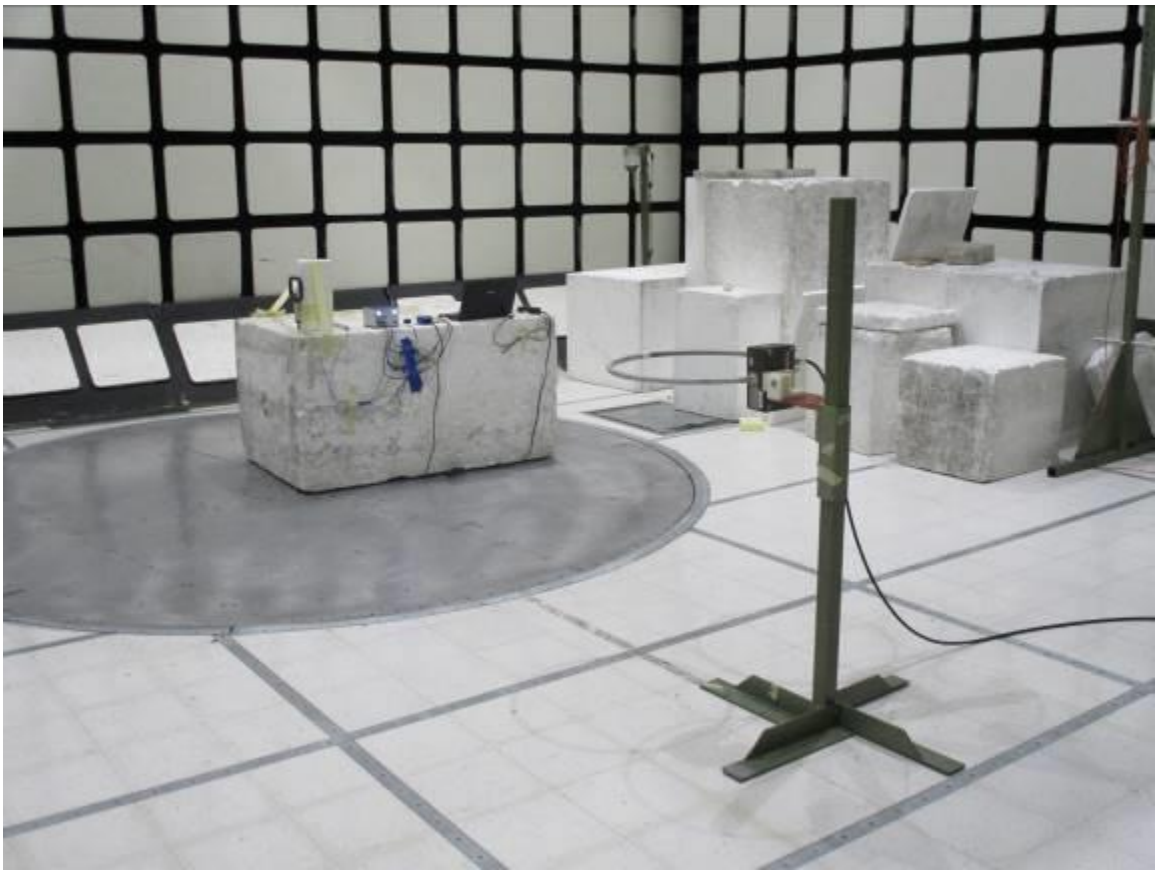
RADIATED EMISSION BELOW 30 MHz – TX Loop Upright, RX Loop Z



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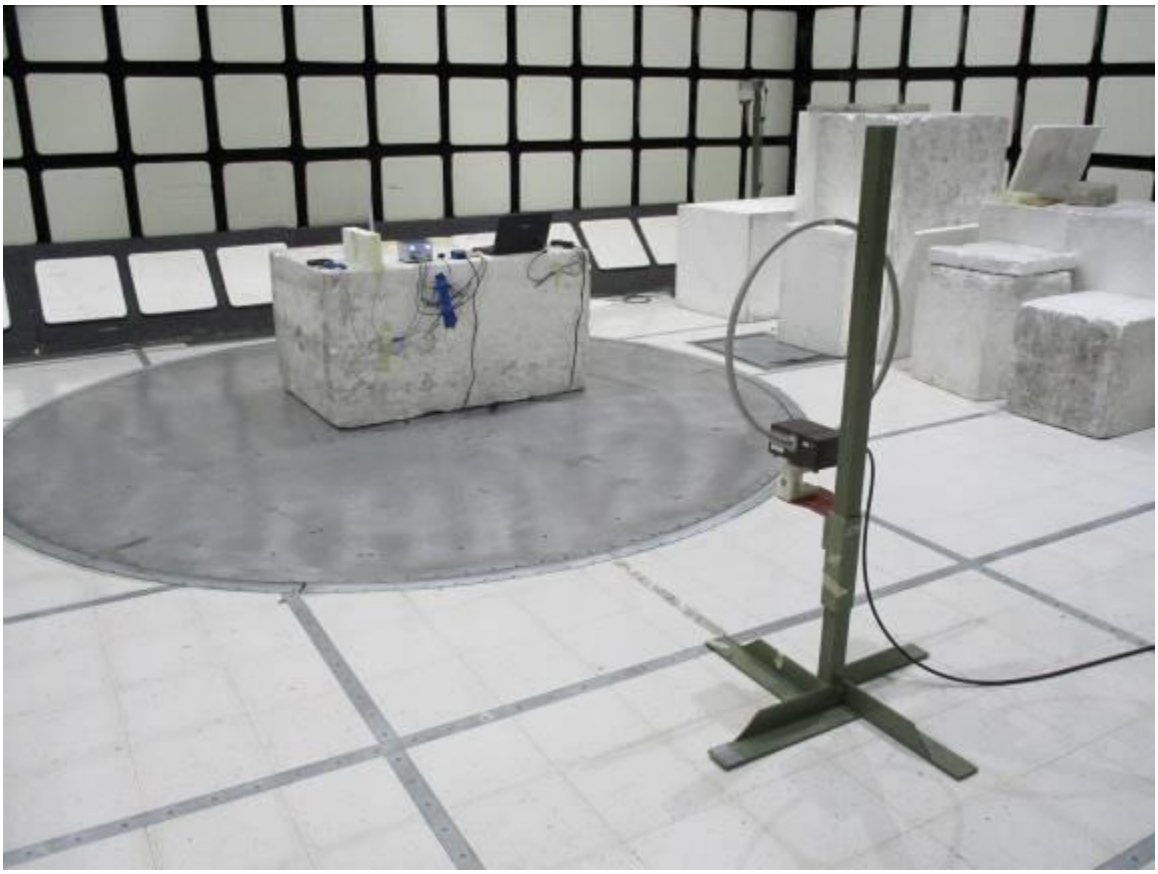
RADIATED EMISSION BELOW 30 MHz – TX Rod Upright, RX Loop X



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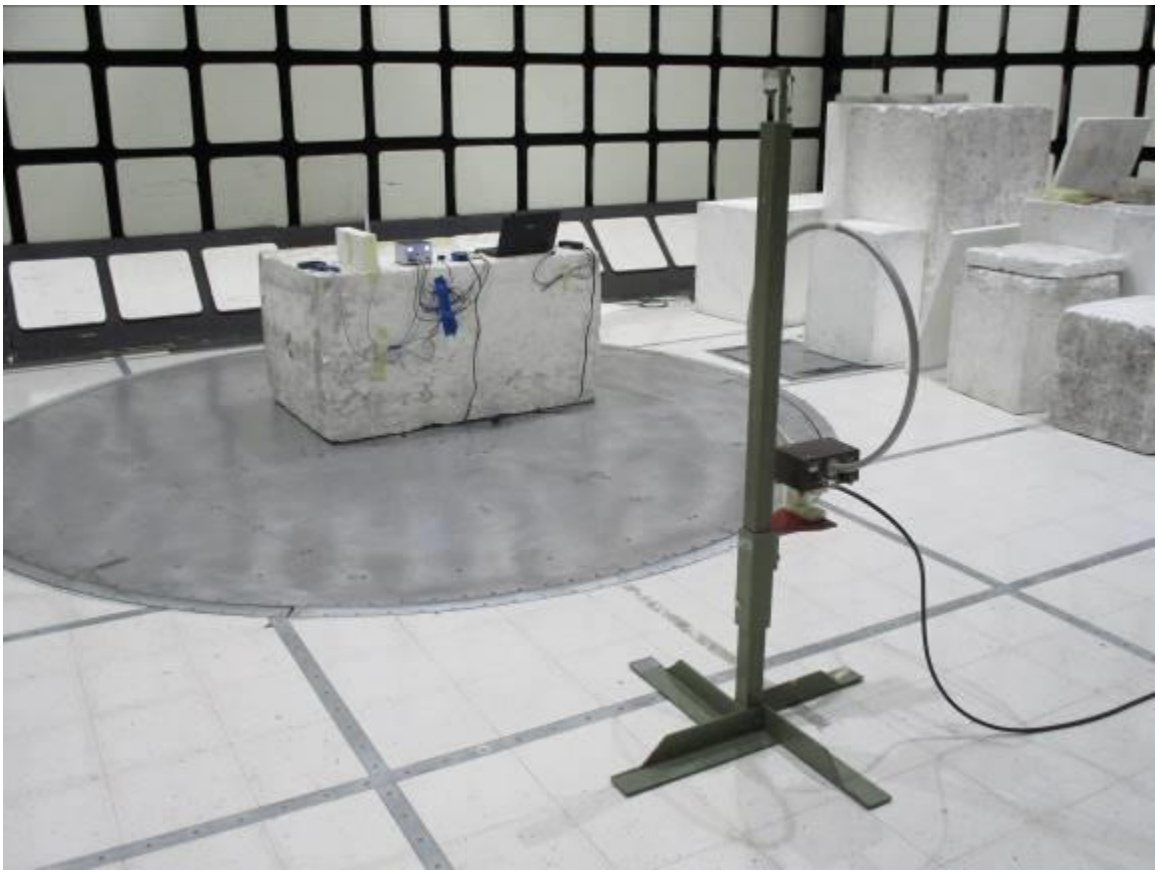
RADIATED EMISSION BELOW 30 MHz – TX Rod Upright, RX Loop Y



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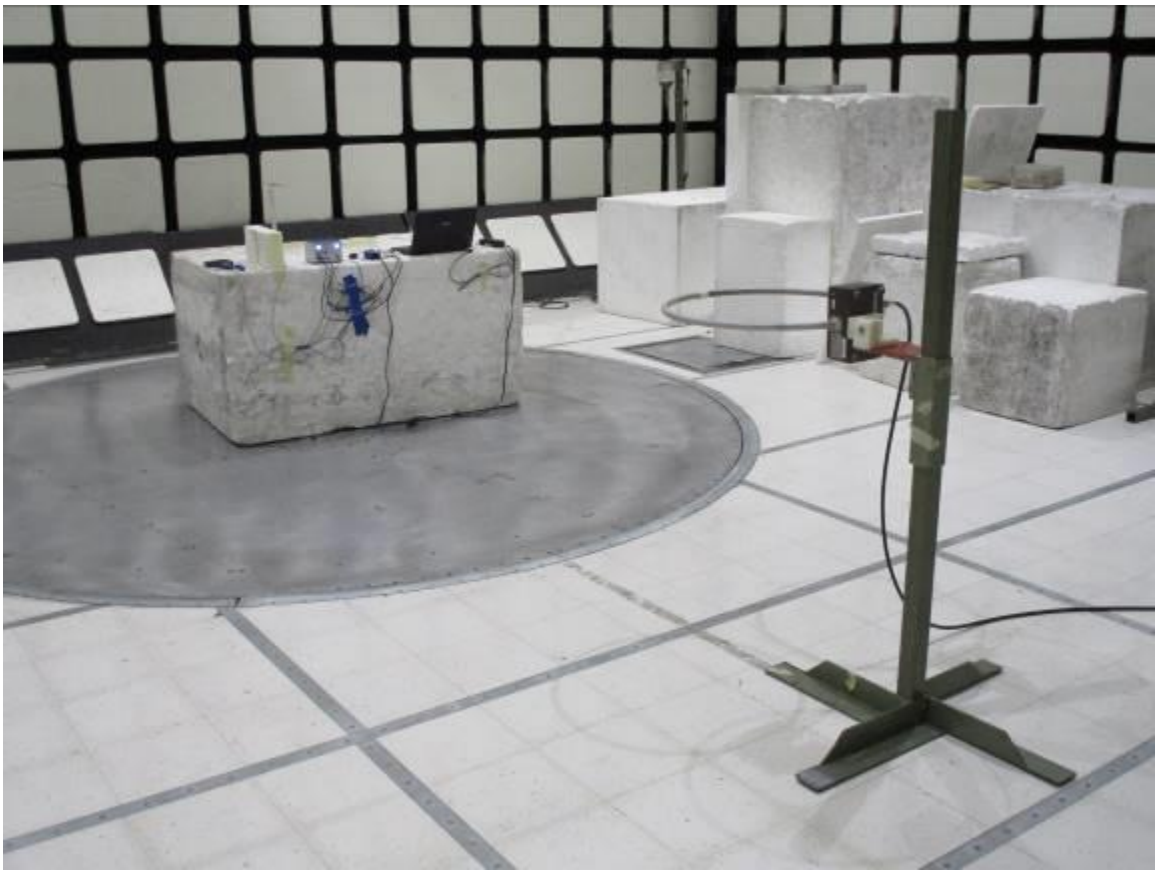
RADIATED EMISSION BELOW 30 MHz – TX Rod Upright, RX Loop Z



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RADIATED EMISSION BELOW 30MHz – 1GHz General Setup

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Line Conducted Emissions

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END OF TEST REPORT

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