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Report On

Radio Testing of the
XEDION AG
Transponder Reader LF

CFR 47 Part 15, Subpart C

Report No. SD72119117-0816H

December 2016

REPORT ON	Radio Testing of the XEDION AG Transponder Reader LF
TEST REPORT NUMBER	SD72119117-0816H
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DATED	December 1, 2016

Revision History

SD72119117-0816H XEDION AG Transponder Reader LF					
DATE	OLD REVISION	NEW REVISION	REASON	PAGES AFFECTED	APPROVED BY
12/01/2016	Initial Release				Juan Manuel Gonzalez

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SECTION 1

REPORT SUMMARY

Radio Testing of the
XEDION AG
Transponder Reader LF

1.1 INTRODUCTION

The information contained in this report is intended to show verification of the XEDION AG Transponder Reader LF to the requirements of the CFR 47 Part 15, Subpart C.

Objective	To perform Radio Testing to determine the Equipment Under Test's (EUT's) compliance with the Test Specification, for the series of tests carried out.
Manufacturer	XEDION AG
FCC ID Number	2AI9HLIVELY
Serial Number(s)	1606BY0036
Number of Samples Tested	1
Test Specification/Issue/Date	<ul style="list-style-type: none">CFR 47 Part 15, Subpart C (October 1, 2015)
Start of Test	August 17, 2016
Finish of Test	November 16, 2016
Test Facility location(s)	Tests listed in this test report were performed at: TÜV SÜD America Inc. (Mira Mesa and Rancho Bernardo Locations) 10040 Mesa Rim Road, San Diego, CA 92121-2912 (32.901268,-117.177681). Phone: 858 678 1400, FAX: 858-546 0364 16936 Via Esprillo, San Diego, CA 92127-1708 (33.018644,-117.092409). Phone: 858 678 1400 Fax: 858 546 0364.
Name of Engineer(s)	Nikolay Shtin, Alex Chang
Related Document(s)	None. Supporting documents for EUT certification are separate exhibits.

1.2 BRIEF SUMMARY OF RESULTS

A brief summary of the tests carried out in accordance with CFR 47 Part 15, Subpart C standard is shown below.

Section	FCC	Test Description	Result	Comments/Base Standard
-	§2.1046(a)	Conducted output power	N/A*	
2.1	§2.1049, §2.202(a)	Occupied Bandwidth	As Reported	
2.2	§15.205, §15.209	Radiated Emissions	Compliant	
2.3	§15.207(a)	AC Conducted Emissions	Compliant	

N/A* Not applicable. No requirements on the EUT output power.

1.3 PRODUCT INFORMATION

1.3.1 Technical Description

The Equipment Under Test (EUT) was a XEDION AG Transponder Reader LF as shown in the photograph below.



Equipment Under Test



1.3.2 EUT General Description

EUT Description	RFID reader
Model Name	Transponder Reader LF
Part Number	02-1-000010
Rated Voltage	24.0 VDC
Mode Verified	RFID Transponder
Device Capabilities	RFID Transponder
Frequency Range	134.200 kHz
Primary Unit (EUT)	<input type="checkbox"/> Production <input checked="" type="checkbox"/> Pre-Production <input type="checkbox"/> Engineering
Output Power	66.6 dBµV/m @ 10 meters
Number of Operating Frequencies	1
Channel Verified	134.200 KHz
Antenna Type (used during evaluation)	External Mini Rod Antenna
Modulation Used	ASK

1.4 EUT TEST CONFIGURATION

1.4.1 Test Configuration Description

Test Configuration	Description
Default	EUT in the test mode reading transponder continuously.

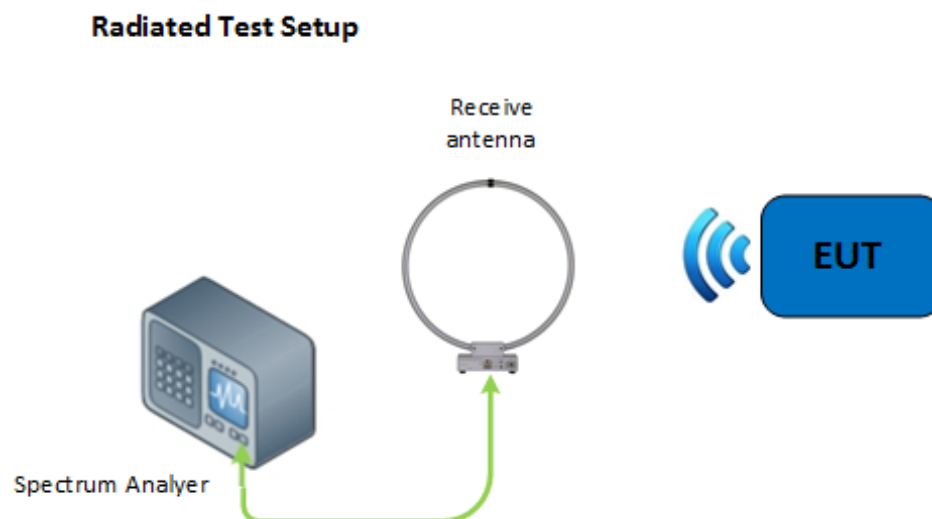
1.4.2 EUT Exercise Software

None.

1.4.3 Support Equipment and I/O cables

Manufacturer	Equipment/Cable	Description
	Mini Rod Antenna with 1m cable	P/N: 01-1-000006
	Shielded power cable	P/N: 05-1-000038
	RS-232 cable 2m	P/N: 05-1-000050

1.4.4 Simplified Test Configuration Diagram



Not To Scale – Illustration Purpose Only
Objects may not represent actual image of
original equipment or set-up.

1.5 DEVIATIONS FROM THE STANDARD

No deviations from the applicable test standards or test plan were made during testing.

1.6 MODIFICATION RECORD

Description of Modification	Modification Fitted By	Date Modification Fitted
Serial Number: N/A		
N/A	-	-

The table above details modifications made to the EUT during the test programme. The modifications incorporated during each test (if relevant) are recorded on the appropriate test pages.

1.7 TEST METHODOLOGY

All measurements contained in this report were conducted with C63.10-2013: American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

1.8 TEST FACILITY LOCATION

1.8.1 TÜV SÜD America Inc. (Mira Mesa)

10040 Mesa Rim Road, San Diego, CA 92121-2912 (32.901268,-117.177681). Phone: 858 678 1400 FAX: 858-546 0364

1.8.2 TÜV SÜD America Inc. (Rancho Bernardo)

16936 Via Esprillo, San Diego, CA 92127-1708 (33.018644,-117.092409). Phone: 858 678 1400 Fax: 858 546 0364.

1.9 TEST FACILITY REGISTRATION

1.9.1 FCC – Registration No.: US1146

TUV SUD America Inc. (San Diego), is an accredited test facility with the site description report on file and has met all the requirements specified in §2.498 of the FCC rules. The acceptance letter from the FCC is maintained in our files and the Registration is US1146.

1.9.2 Innovation, Science and Economic Development Canada Registration No.: 3067A

The 10m Semi-anechoic chamber of TUV SUD America Inc. (San Diego) has been registered by Certification and Engineering Bureau of Innovation, Science and Economic Development Canada for radio equipment testing with Registration No. 3067A.



1.9.3 BSMI – Laboratory Code: SL2-IN-E-028R (US0102)

TUV Product Service Inc. (San Diego) is a recognized EMC testing laboratory by the BSMI under the MRA (Mutual Recognition Arrangement) with the United States. Accreditation includes CNS 13438 up to 6GHz.

1.9.4 VCCI – Registration No. A-0230

TUV SUD America Inc. (San Diego) is a VCCI registered measurement facility which includes radiated field strength measurement, radiated field strength measurement above 1GHz, mains port interference measurement and telecommunication port interference measurement.

SECTION 2

TEST DETAILS

Radio Testing of the
XEDION AG
Transponder Reader LF

2.1 OCCUPIED BANDWIDTH

2.1.1 Specification Reference

FCC 47 CFR Part 2, Clause 2.1049 and 2.202(a)

2.1.2 Standard Applicable

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured.

2.1.3 Equipment Under Test and Modification State

Serial No: 1606BY0036 / Default Test Configuration

2.1.4 Date of Test/Initial of test personnel who performed the test

August 17, 2016/NS

2.1.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.1.6 Environmental Conditions

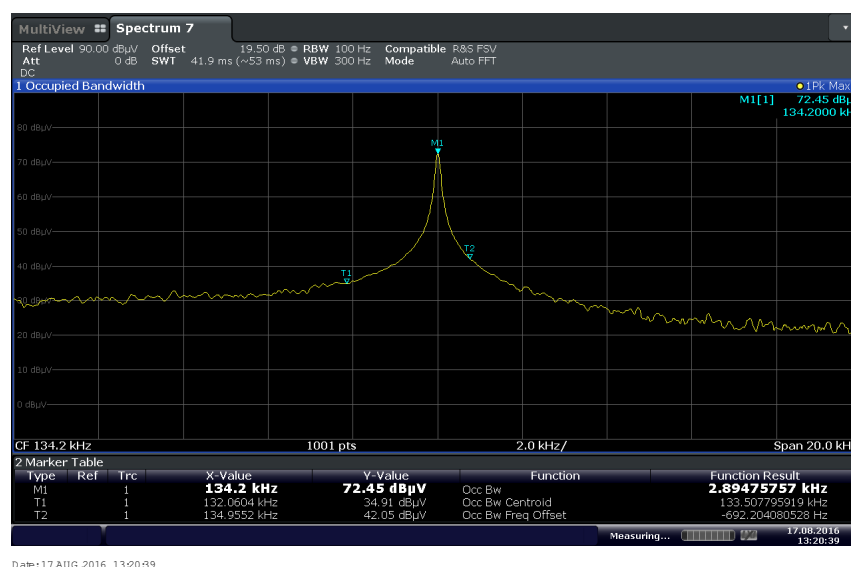
Ambient Temperature	22.5°C
Relative Humidity	54.7%
ATM Pressure	98.8kPa

2.1.7 Additional Observations

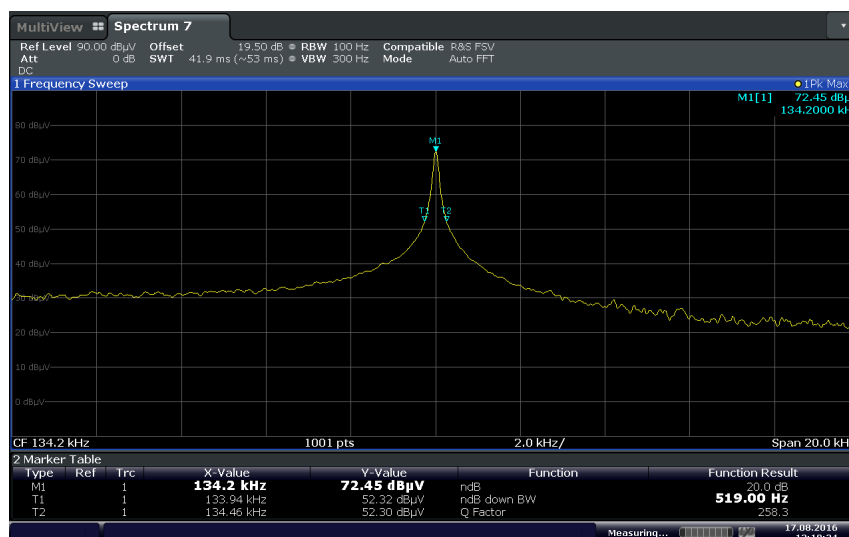
- This is a radiated test using a loop antenna connected to the spectrum analyzer.
- A peak output reading was taken.
- For 99% bandwidth, the OBW measurement function of the spectrum analyzer was used.
- 20dB bandwidth verified using the "n" dB down marker function of the spectrum analyzer.
- Span is wide enough to capture the channel transmission.
- RBW is 100 Hz
- VBW is 300 Hz.
- Sweep is auto.
- Detector is peak.
- Trace is Max Hold.

2.1.8 Test Results

Frequency	20 dB Bandwidth	99% Bandwidth
134.200 kHz	0.519 kHz	2.895 kHz



99% OBW



Date: 17.AUG.2016 13:19:35

20 dB BW

2.2 RADIATED EMISSIONS

2.2.1 Specification Reference

FCC 47 CFR Part 15, Clause 15.205 and 15.209

2.2.2 Standard Applicable

§ 15.209 Radiated emission limits; general requirements.

(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:

Frequency of emission (MHz)	Field Strength (microvolts/meter)	Measurement distance (meters)
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.

(b) In the emission table above, the tighter limit applies at the band edges.

(c) The level of any unwanted emissions from an intentional radiator operating under these general provisions shall not exceed the level of the fundamental emission. For intentional radiators which operate under the provisions of other sections within this part and which are required to reduce their unwanted emissions to the limits specified in this table, the limits in this table are based on the frequency of the unwanted emission and not the fundamental frequency. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency.

(d) The emission limits shown in 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 emission limits in these three bands are based on measurements employing an average detector.

§ 15.205 Restricted bands of operation.

(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	MHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
¹ 0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	(²)
13.36-13.41			

¹ Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz
² Above 38.6

(b) Except as provided in paragraphs (d) and (e) of this section, the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in § 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in § 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in § 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in § 15.35 apply to these measurements.

(c) Except as provided in paragraphs (d) and (e) of this section, regardless of the field strength limits specified elsewhere in this subpart, the provisions of this section apply to emissions from any intentional radiator.

2.2.3 Equipment Under Test and Modification State

Serial No: 1606BY0036 / Default Test Configuration

2.2.4 Date of Test/Initial of test personnel who performed the test

August 17 , 2016/NS and AC

2.2.5 Test Equipment Used

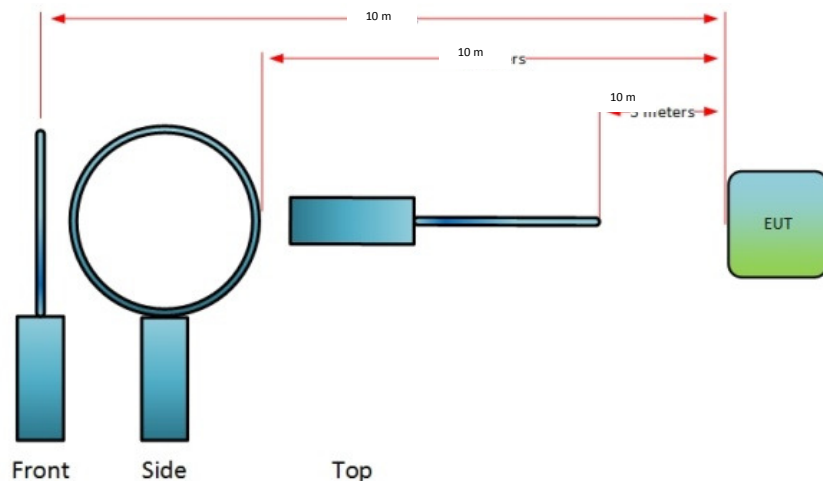
The major items of test equipment used for the above tests are identified in Section 3.1.

2.2.6 Environmental Conditions

Ambient Temperature	22.5-24.2°C
Relative Humidity	46.0-54.7%
ATM Pressure	98.8-99.2kPa

2.2.7 Additional Observations

- This is a radiated test. The spectrum was searched from 9 kHz to 1GHz.
- Below 30MHz, prescans were performed to determine best test antenna orientation with the highest recorded emissions. Verification was performed using “Side” configuration (see the figure below) corresponding to the best antenna orientation as found during the prescans.



- Measurement was done at 10 meters. Limits below 30MHz were corrected using extrapolation factor of 40 dB/decade. See sample computation below:
Limit @ 9kHz = $2400/F(\text{kHz}) \mu\text{V/m}$
= $20 \log (2400/9) \text{ dB}\mu\text{V/m}$
= $48.52 \text{ dB}\mu\text{V/m @ 300 meters}$
= $48.52 \text{ dB}\mu\text{V/m} + (40 \log 300/10) \text{ @ 10 meters}$
= $107.60 \text{ dB}\mu\text{V/m @ 10 meters}$
- Measurement was done using EMC32 V8.5.3 automated software. Reported level is the actual level with all the correction factors factored in. Correction Factor column is for informational purposes only. See Sections 2.2.8 and 2.2.9 for sample computations.

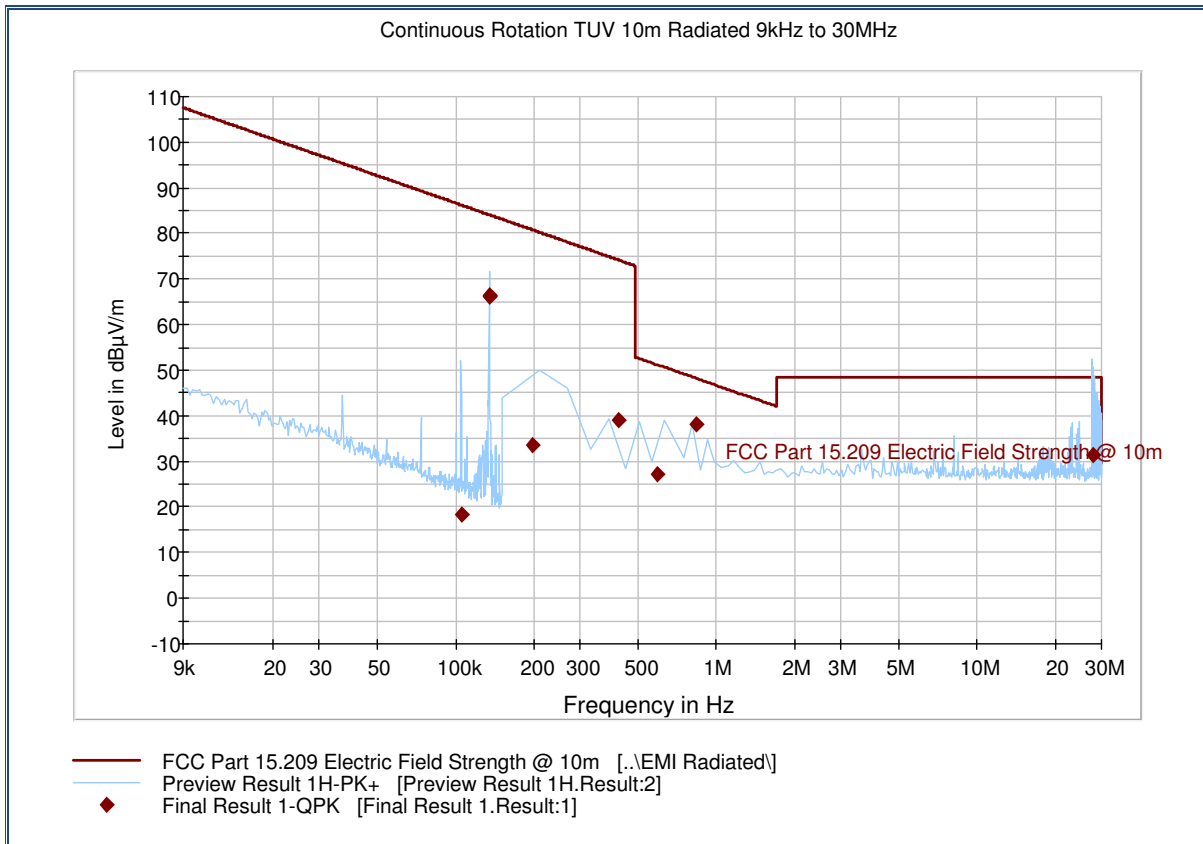
2.2.8 Sample Computation (Radiated Emission 9 kHz to 30 MHz)

Measuring equipment raw measurement (db μ V) @ 9 kHz			25.0
Correction Factor (dB)	Asset# 1066 (cable)	0.1	24.8
	Asset# 8850 (cable)	0.3	
	Asset# 6628 (antenna)	24.4	
Reported QuasiPeak Final Measurement (db μ V/m) @ 9kHz			49.8

2.2.9 Sample Computation (Radiated Emission 30 MHz to 1 GHz)

Measuring equipment raw measurement (db μ V) @ 30 MHz			24.4
Correction Factor (dB)	Asset# 1026 (cable)	0.3	-12.6
	Asset# 1172 (cable)	0.3	
	Asset# 1016 (preamplifier)	-30.7	
	Asset# 8850 (cable)	0.3	
	Asset# 1033 (antenna)	17.2	
Reported QuasiPeak Final Measurement (db μ V/m) @ 30MHz			11.8

2.2.10 Test Results (9 kHz to 30 MHz)

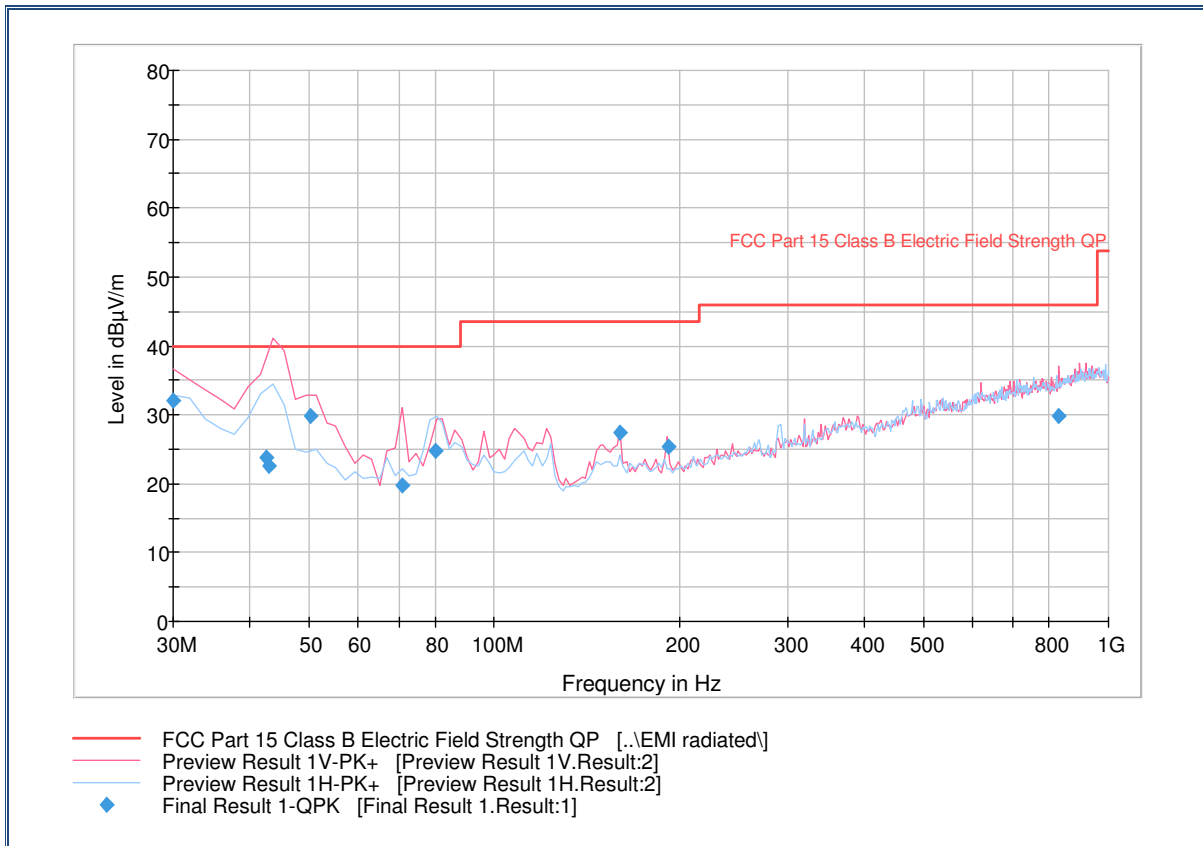


Quasi Peak Data

Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
0.105490	18.2	1000.0	0.200	100.0	H	326.0	19.5	68.0	86.2
0.134476	66.3	1000.0	9.000	100.0	H	-8.0	19.5	17.9	84.1
0.134759	66.6	1000.0	9.000	150.0	H	-8.0	19.5	17.5	84.1
0.196320	33.5	1000.0	9.000	106.0	H	10.0	19.5	47.3	80.8
0.420779	38.9	1000.0	9.000	100.0	H	-8.0	19.5	35.3	74.2
0.597057	27.2	1000.0	9.000	100.0	H	4.0	19.7	23.9	51.2
0.839516	38.0	1000.0	9.000	100.0	H	3.0	19.6	10.2	48.2
27.773173	31.3	1000.0	9.000	100.0	H	-8.0	23.6	17.3	48.6

Test Notes:

2.2.11 Test Results (30 MHz to 1 GHz)



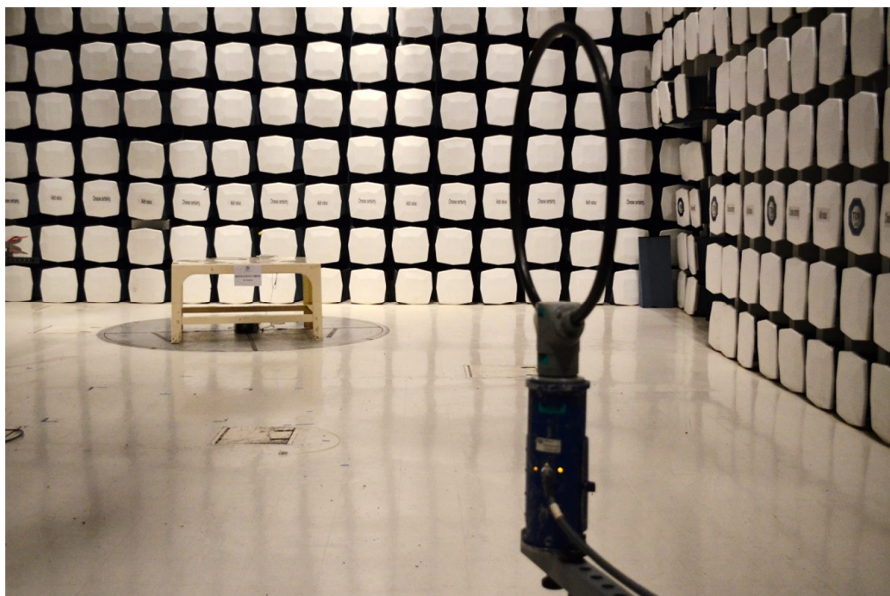
Quasi Peak Data

Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
30.040000	32.0	1000.0	120.000	100.0	V	166.0	-4.6	8.0	40.0
42.551102	23.9	1000.0	120.000	100.0	V	224.0	-11.6	16.1	40.0
42.887214	22.6	1000.0	120.000	100.0	V	110.0	-11.7	17.4	40.0
50.182766	29.8	1000.0	120.000	100.0	V	95.0	-13.1	10.2	40.0
70.861643	19.8	1000.0	120.000	200.0	V	39.0	-15.5	20.2	40.0
80.021082	24.9	1000.0	120.000	259.0	H	10.0	-15.7	15.1	40.0
160.000481	27.3	1000.0	120.000	100.0	V	114.0	-11.3	16.2	43.5
192.022685	25.3	1000.0	120.000	100.0	V	135.0	-10.5	18.2	43.5
829.801764	29.7	1000.0	120.000	155.0	V	24.0	6.5	16.3	46.0

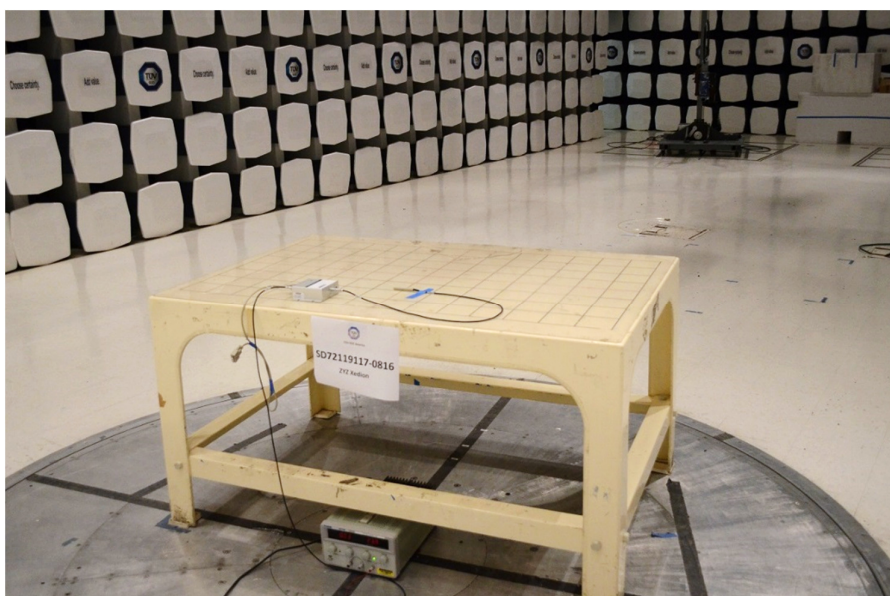
Test Notes:

2.2.12 Test Set up Pictures

9 kHz to 30 MHz (Front)



9 kHz to 30 MHz (Back)

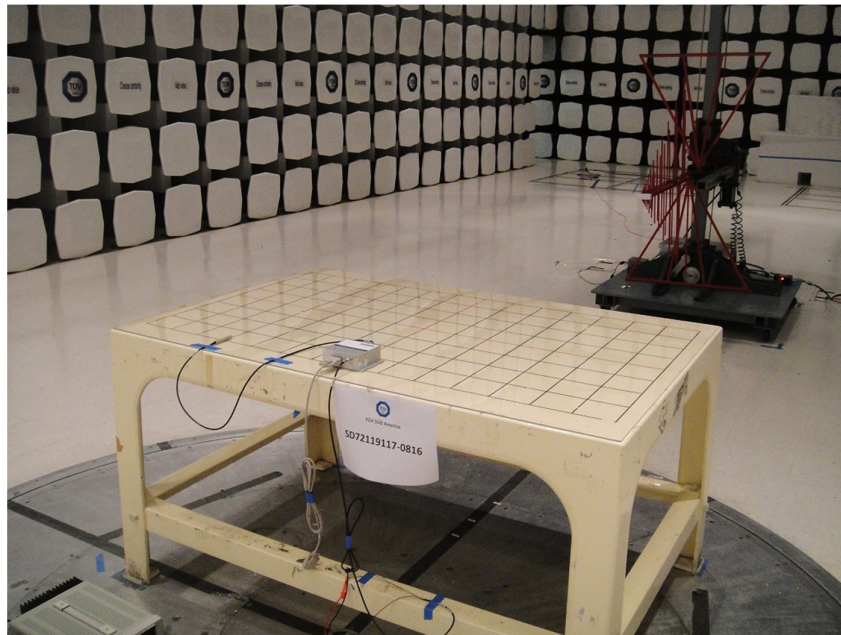


2.2.13 Test Set up Pictures

30 to 1000 MHz (Front)



30 to 1000 MHz (Back)



2.3 Conducted Emissions

2.3.1 Specification Reference

Part 15 Subpart C §15.207(a)

2.3.2 Standard Applicable

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 50 μ H/50 ohms line impedance stabilization network (LISN).

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

**Decreases with the logarithm of the frequency.*

2.3.3 Equipment Under Test and Modification State

Serial No: 1606BY0036 / Default Test Configuration

2.3.4 Date of Test/Initial of test personnel who performed the test

November 16, 2016 /NS

2.3.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 3.1.

2.3.6 Environmental Conditions/ Test Location

Test performed at TÜV SÜD America Inc. Rancho Bernardo facility

Ambient Temperature	24.2°C
Relative Humidity	52.3%
ATM Pressure	99.8 kPa

2.3.7 Additional Observations

- The EUT was powered from a laboratory DC power supply.

- Measurement was done using EMC32 V8.5.3 automated software. Reported level is the actual level with all the correction factors factored in. Correction Factor column is for informational purposes only. See Section 2.3.8 for sample computation.

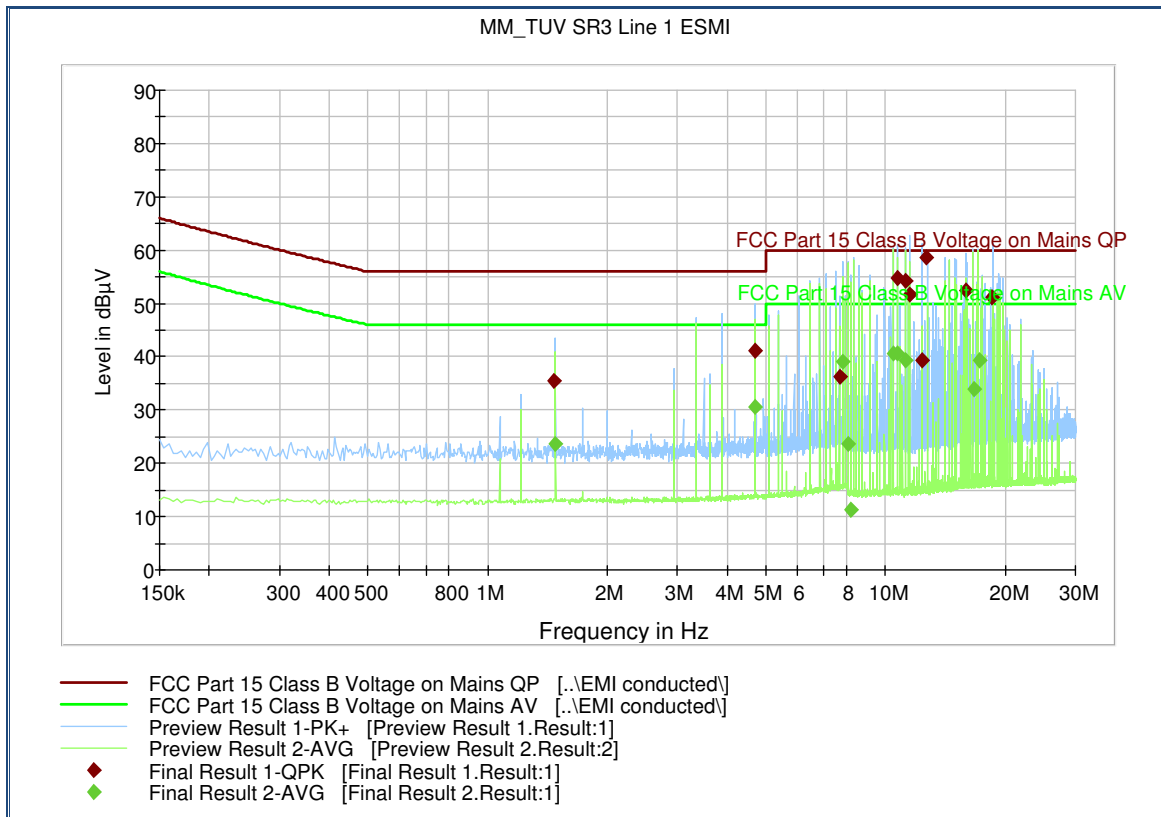
2.3.8 Sample Computation (Conducted Emission – Quasi Peak)

Measuring equipment raw measurement (dbμV) @ 150kHz			5.5
Correction Factor (dB)	Asset# 8607 (20 dB attenuator)	19.9	20.7
	Asset# 1177 (cable)	0.15	
	Asset# 1176 (cable)	0.35	
	Asset# 7568 (LISN)	0.30	
Reported QuasiPeak Final Measurement (dbμV) @ 150kHz			26.2

2.3.9 Test Results

Compliant. See attached plots and tables.

2.3.10 Line 1 (Hot)



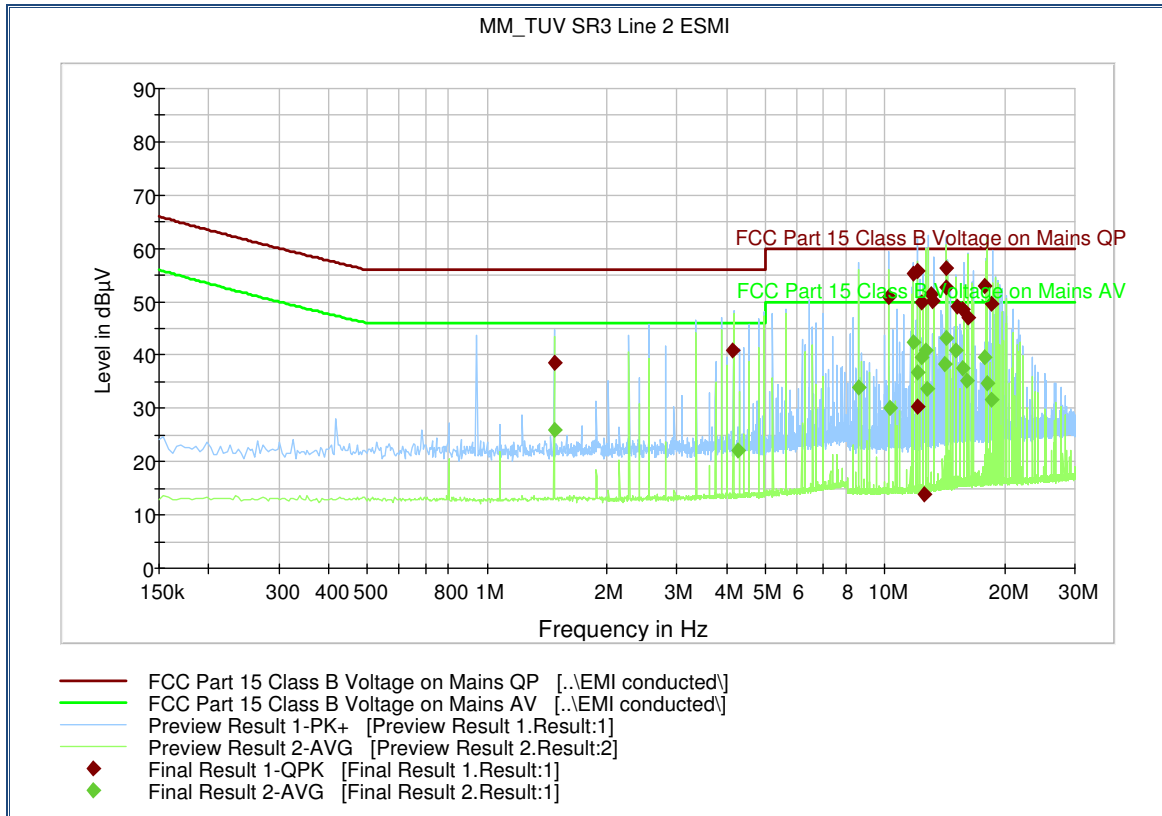
Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBμV)	Comment
1.473500	35.6	1000.0	9.000	Off	L1	20.1	20.4	56.0	
4.693500	41.1	1000.0	9.000	Off	L1	20.1	14.9	56.0	
7.656000	36.4	1000.0	9.000	Off	L1	20.1	23.6	60.0	
10.738500	54.7	1000.0	9.000	Off	L1	20.2	5.3	60.0	
11.270000	54.3	1000.0	9.000	Off	L1	20.1	5.7	60.0	
11.537500	51.7	1000.0	9.000	Off	L1	20.1	8.3	60.0	
12.354500	39.4	1000.0	9.000	Off	L1	20.2	20.6	60.0	
12.615000	58.5	1000.0	9.000	Off	L1	20.2	1.5	60.0	
15.970000	52.4	1000.0	9.000	Off	L1	20.7	7.6	60.0	
18.519000	51.2	1000.0	9.000	Off	L1	20.8	8.8	60.0	

Final Result 2

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - AVG (dB)	Limit - AVG (dBμV)	Comment
1.478000	23.6	1000.0	9.000	Off	L1	20.1	22.4	46.0	
4.698500	30.6	1000.0	9.000	Off	L1	20.1	15.4	46.0	
7.782000	39.1	1000.0	9.000	Off	L1	20.1	10.9	50.0	
8.045000	23.7	1000.0	9.000	Off	L1	20.1	26.3	50.0	
8.196000	11.3	1000.0	9.000	Off	L1	20.1	38.7	50.0	
10.470000	40.5	1000.0	9.000	Off	L1	20.2	9.5	50.0	
10.738500	40.7	1000.0	9.000	Off	L1	20.2	9.3	50.0	
11.270000	39.3	1000.0	9.000	Off	L1	20.1	10.7	50.0	
16.636500	34.0	1000.0	9.000	Off	L1	20.7	16.0	50.0	
17.176500	39.3	1000.0	9.000	Off	L1	20.8	10.7	50.0	

2.3.11 Line 2 (Neutral)



Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
1.478000	38.5	1000.0	9.000	Off	N	20.1	17.5	56.0	
4.157500	40.9	1000.0	9.000	Off	N	20.1	15.1	56.0	
10.202500	51.0	1000.0	9.000	Off	N	20.2	9.0	60.0	
11.809500	55.3	1000.0	9.000	Off	N	20.1	4.7	60.0	
12.069000	30.4	1000.0	9.000	Off	N	20.1	29.6	60.0	
12.079000	55.7	1000.0	9.000	Off	N	20.1	4.3	60.0	
12.351500	49.9	1000.0	9.000	Off	N	20.2	10.1	60.0	
12.519000	13.8	1000.0	9.000	Off	N	20.2	46.2	60.0	
13.017000	51.4	1000.0	9.000	Off	N	20.3	8.6	60.0	
13.146500	50.2	1000.0	9.000	Off	N	20.3	9.8	60.0	
14.222500	52.6	1000.0	9.000	Off	N	20.5	7.4	60.0	
14.226000	56.4	1000.0	9.000	Off	N	20.5	3.6	60.0	
15.161000	49.0	1000.0	9.000	Off	N	20.7	11.0	60.0	
15.698500	48.7	1000.0	9.000	Off	N	20.7	11.3	60.0	
16.233500	47.0	1000.0	9.000	Off	N	20.7	13.0	60.0	
17.851500	53.0	1000.0	9.000	Off	N	20.8	7.0	60.0	
18.519000	49.7	1000.0	9.000	Off	N	20.8	10.3	60.0	

Final Result 2

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)	Comment
1.478000	25.9	1000.0	9.000	Off	N	20.1	20.1	46.0	
4.292500	22.2	1000.0	9.000	Off	N	20.1	23.8	46.0	
8.585500	33.9	1000.0	9.000	Off	N	20.1	16.1	50.0	
10.337000	30.2	1000.0	9.000	Off	N	20.2	19.8	50.0	
11.809500	42.3	1000.0	9.000	Off	N	20.1	7.7	50.0	
12.082500	36.8	1000.0	9.000	Off	N	20.1	13.2	50.0	
12.344500	39.7	1000.0	9.000	Off	N	20.1	10.3	50.0	
12.617000	41.0	1000.0	9.000	Off	N	20.2	9.0	50.0	
12.753000	33.6	1000.0	9.000	Off	N	20.3	16.4	50.0	
14.091000	38.4	1000.0	9.000	Off	N	20.4	11.6	50.0	
14.227000	43.2	1000.0	9.000	Off	N	20.5	6.8	50.0	
15.030500	40.9	1000.0	9.000	Off	N	20.6	9.1	50.0	
15.698500	37.5	1000.0	9.000	Off	N	20.7	12.5	50.0	
16.107500	35.1	1000.0	9.000	Off	N	20.7	14.9	50.0	
17.851500	39.7	1000.0	9.000	Off	N	20.8	10.3	50.0	
18.122500	34.8	1000.0	9.000	Off	N	20.8	15.2	50.0	
18.523500	31.5	1000.0	9.000	Off	N	20.8	18.5	50.0	

2.3.12 Test Set up Picture





SECTION 3

TEST EQUIPMENT USED

3.1 TEST EQUIPMENT USED

List of absolute measuring and other principal items of test equipment.

ID Number (SDGE/SDRB)	Test Equipment	Type	Serial Number	Manufacturer	Cal Date	Cal Due Date
Radiated Emission						
7611	Signal/Spectrum Analyzer	FSW26	102017	Rhode & Schwarz	02/01/16	02/01/17
1040	EMI Test Receiver	ESIB40	100292	Rhode & Schwarz	10/07/16	10/07/17
1033	Bilog Antenna	3142C	00044556	EMCO	10/11/16	10/11/18
6628	Loop Antenna	HFH 2 –Z2	880 458/25	Rhode & Schwarz	10/28/15	10/28/16
1016	Antenna Amplifier	PAM0202	187	PAM	10/17/2016	10/17/2017
1026	High-frequency cable	3M-7/C2	N/A	MicroCoax	03/02/2016	03/02/2017
1066	High-frequency cable	1066/C2	N/A	MicroCoax	03/16/2016	03/16/2017
8850	High-frequency cable	N/A	N/A	N/A	10/17/2016	10/17/2017
Conducted Test Setup						
1049	EMI Test Receiver	ESU	100133	Rhode & Schwarz	03/17/16	03/17/17
6836	LISN	FCC-LISN-50-25-2	5024	FCC	4/29/16	04/29/17
Miscellaneous						
-	Test Software	EMC32	V8.5.3	Rhode & Schwarz	N/A	
6455	DC Power Supply	E3611A	2529	HP	N/A	
11312	Mini Environmental Quality Meter	850027	N/A	Sper Scientific	10/19/15	10/19/16
06709	Environmental Sensor	VUE	401005	Vantage	10/03/16	10/03/17

3.2 MEASUREMENT UNCERTAINTY

For a 95% confidence level, the measurement uncertainties for defined systems are:

3.2.1 Conducted Emissions (AC) Measurements

Contribution		Probability Distribution Type	Probability Distribution x_i	Standard Uncertainty $u(x_i)$	$[u(x_i)]^2$
1	Receiver/Spectrum Analyzer	Rectangular	0.36	0.21	0.04
2	Cables	Rectangular	0.50	0.29	0.08
3	LISN	Rectangular	0.66	0.38	0.15
4	Attenuator	Rectangular	0.30	0.17	0.03
5	EUT Setup	Rectangular	1.00	0.58	0.33
Combined Uncertainty (u_c):					0.80
Coverage Factor (k):					2
Expanded Uncertainty:					1.59

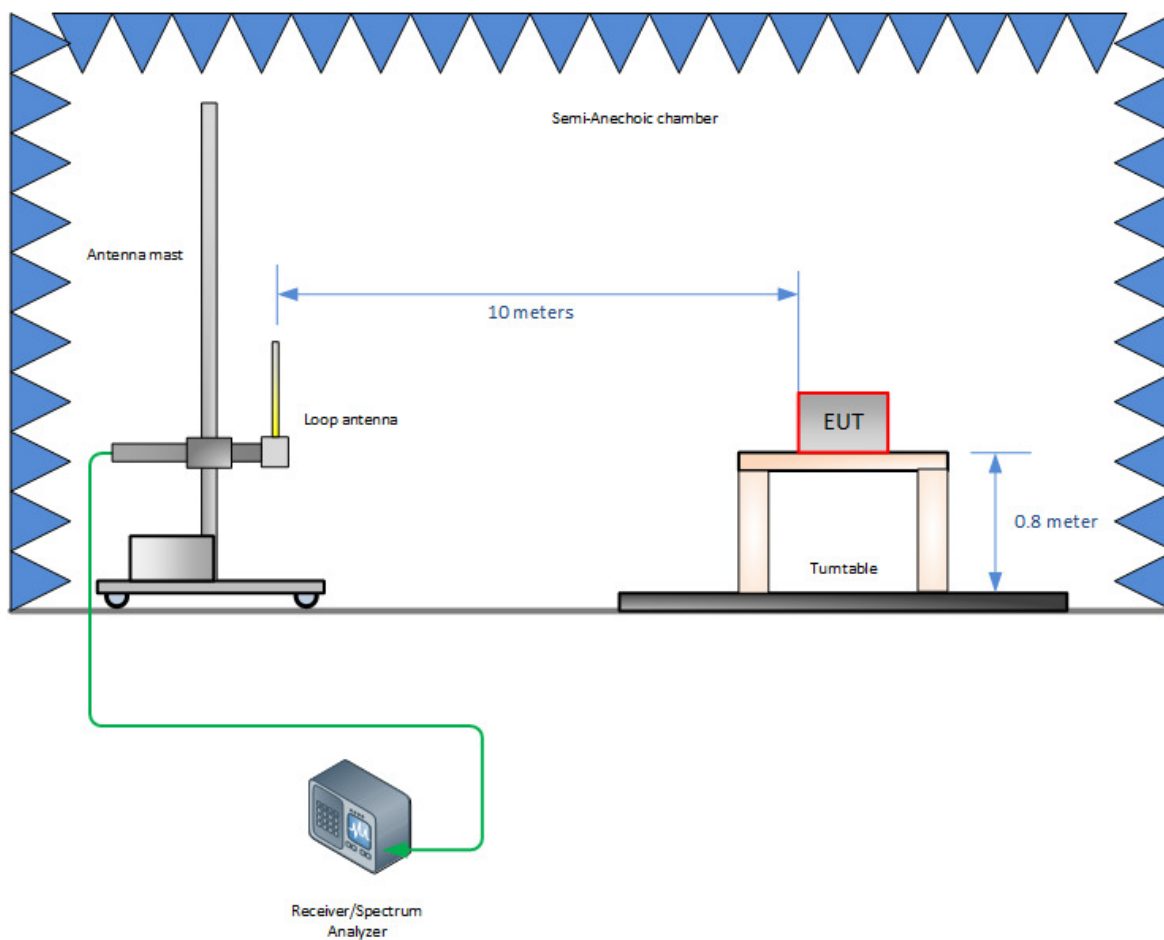
3.2.2 Radiated Emission Measurements (Below 1GHz)

Contribution		Probability Distribution Type	Probability Distribution x_i	Standard Uncertainty $u(x_i)$	$[u(x_i)]^2$
1	Receiver/Spectrum Analyzer	Rectangular	0.45	0.26	0.07
2	Cables	Rectangular	0.50	0.29	0.08
3	Preamp	Rectangular	0.50	0.29	0.08
4	Antenna	Rectangular	0.75	0.43	0.19
5	Site	Rectangular	2.70	1.56	2.43
6	EUT Setup	Rectangular	1.00	0.58	0.33
Combined Uncertainty (u_c):					1.78
Coverage Factor (k):					2
Expanded Uncertainty:					3.57

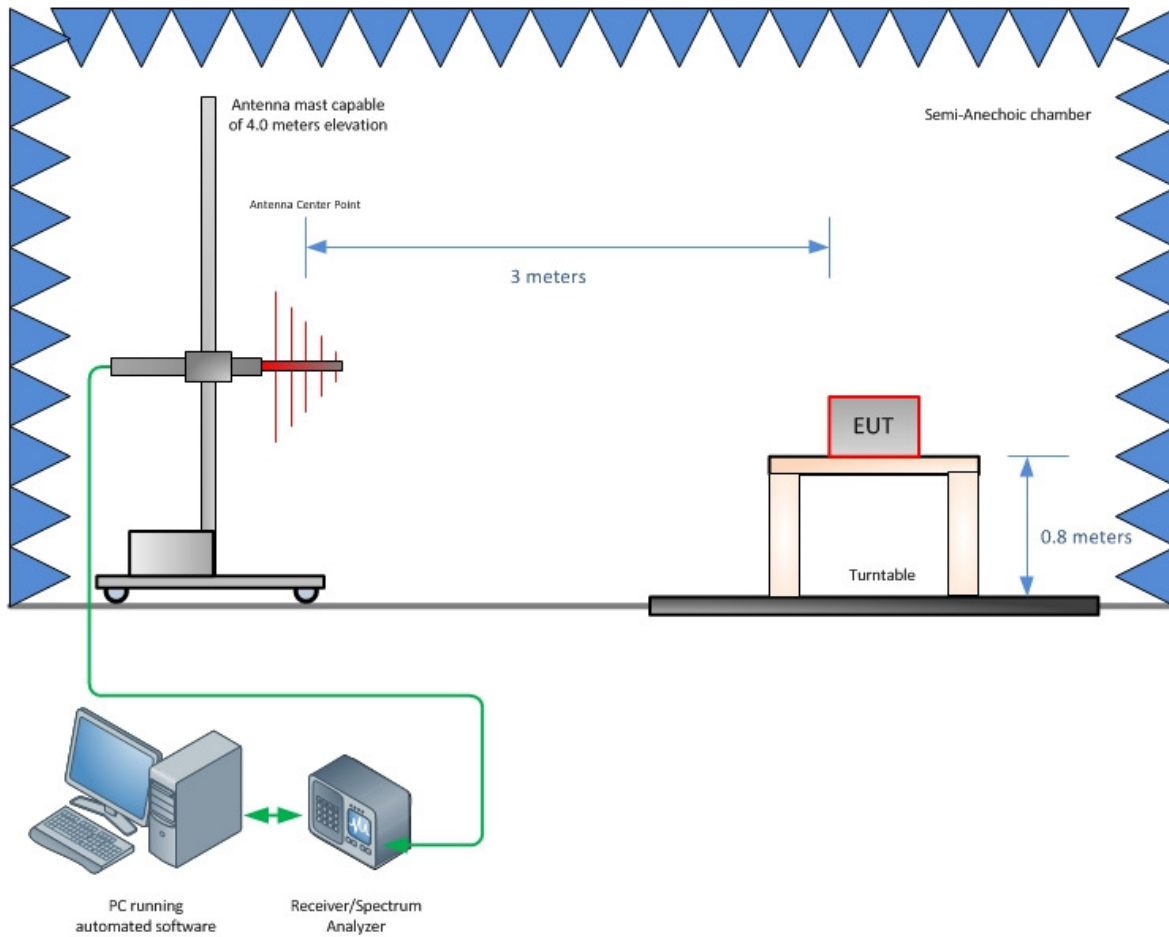
SECTION 4

DIAGRAM OF TEST SETUP

4.1 TEST SETUP DIAGRAM (RADIATED EMISSIONS)



Radiated Emission Test Setup (Below 30 MHz)



Radiated Emission Test Setup (30MHz to 1GHz)



SECTION 5

ACCREDITATION, DISCLAIMERS AND COPYRIGHT



5.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT

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