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Report On

Radio Testing of the
Advanced Sterilization Products
Sterrad 100NX Low-Temperature Sterilization System

FCC Part 15 Subpart C §15.225
IC RSS-210 Issue 8 December 2010

Report No. SC1108039 July 2012

REPORT ON	Radio Testing of the Advanced Sterilization Products Low-Temperature Sterilization System
TEST REPORT NUMBER	SC1108039
REPORT DATE	July 2012
PREPARED FOR	Jim Schechter Staff Engineer (949) 789-3910 jschech4@its.jnj.com
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APPROVED BY	Chip R. Fleury **Name** Authorized Signatory
DATED	July 03, 2012

CONTENTS

SECTION 1

REPORT SUMMARY

Radio Testing of the
Advanced Sterilization Products
Low-Temperature Sterilization System

1.1 INTRODUCTION

The information contained in this report is intended to show verification of the Advanced Sterilization Products Low-Temperature Sterilization System to the requirements of FCC Part 15 Subpart C §15.225 and IC RSS-210 Issue 8 December 2010.

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	Advanced Sterilization Products
Model Number(s)	Sterrad
FCC ID Number	AXJ100NXRFID
IC Number	10207A-100NXRFID
Serial Number(s)	1042070041
Number of Samples Tested	1
Test Specification/Issue/Date	• FCC Part 15 Subpart C §15.225 (October 1, 2010). • RSS-210 - Licence-exempt Radio Apparatus (All Frequency Bands): Category I Equipment (Issue 8, December 2010). • RSS-Gen - General Requirements and Information for the Certification of Radio Apparatus (Issue 3, December 2010).
Start of Test	November 09, 2011
Finish of Test	June 26, 2012
Name of Engineer(s)	Ferdinand S. Custodio Kathy MacKenzie
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 FCC Part 15 Subpart C §15.225 with cross-reference to the corresponding IC RSS standard is shown below.

Section	FCC Part 15	§15.225 Spec Clause	RSS	Test Description	Result	Comments/Base Standard
	§15.31(e)			Voltage Requirement	Compliant	
	§15.203 and 204		RSS-Gen 7.1.2	Antenna Requirements	Compliant	See Test Note
2.1		§15.225(e)	RSS-210 A2.6 RSS-Gen 4.7 RSS-Gen 7.2.6	Frequency Tolerance	Compliant	
2.2	§15.215(c)			20dB Bandwidth	Compliant	
2.3			RSS-Gen 4.6.1	99% Emission Bandwidth	Compliant	
2.4		§15.225(a)(b)(c)	RSS-210 A2.6(a)(b)(c)	Emission Mask	Compliant	
2.5	§15.209	§15.225(d)	RSS-210 A2.6(d)	Spurious Radiated Emissions	Compliant	
2.5.12			RSS-Gen 4.10	Receiver Spurious Emissions	Compliant	
2.6		§15.207(a)	RSS-Gen 7.2.4	Conducted Emissions	Compliant	

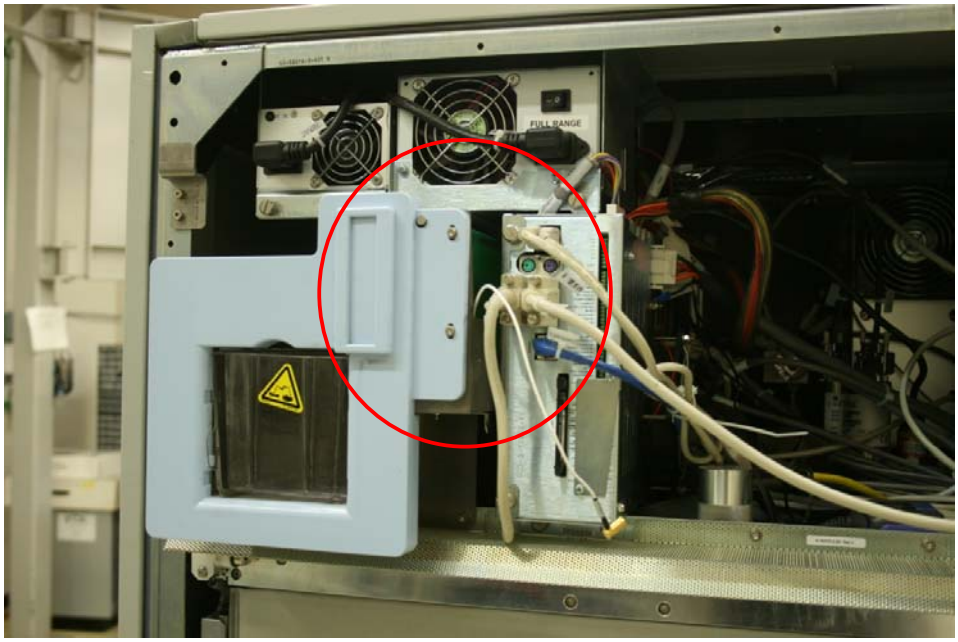
Test Note: This requirement does not apply to intentional radiators that are professionally installed.

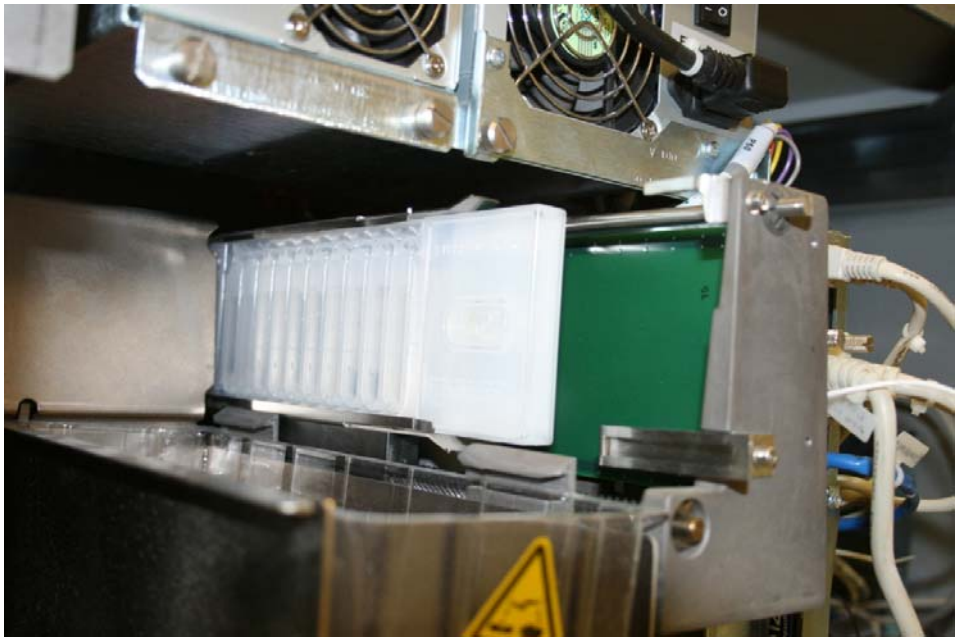
1.3 PRODUCT INFORMATION

1.3.1 Technical Description

The Equipment Under Test (EUT) was an Advanced Sterilization Products Low-Temperature Sterilization System as shown in the photograph below. The EUT has an internal RFID system that reads the STERRAD® 100NX® cassette which contains the hydrogen peroxide used for sterilization.

Equipment Under Test





Top photo shows location of RFID antenna. Bottom photo shows the actual antenna (PCBA) next to a cassette containing the RFID tag. The EUT uses an RFID module (FCC ID M4ZIN110). The whole unit is being certified with the custom antenna used.

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1.3.2 EUT General Description

EUT Description	Low-Temperature Sterilization System
Model Number(s)	Sterrad
Rated Voltage	208VAC 60Hz.
RFID Module Output Power	200 mW (typical)
Frequency Range	13.56 MHz in the 13.110 to 14.0101 MHz band
Number of Operating Frequencies	1
Antenna Type	PCBA
Antenna Q Factor	20
RFID Antenna Connector	RA SMB plug.
Modulation Used	ISO 15693 Compliant
Antenna Dimension	290mm x 90mm

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1.4 EUT TEST CONFIGURATION

1.4.1 Test Configuration Description

Test Configuration	Description
A	RFID module transmitting max power through the custom antenna.
B	RFID module transmitting max power, measurement through the antenna port.
C	RFID module transmitting max power, verified stand alone using a development kit

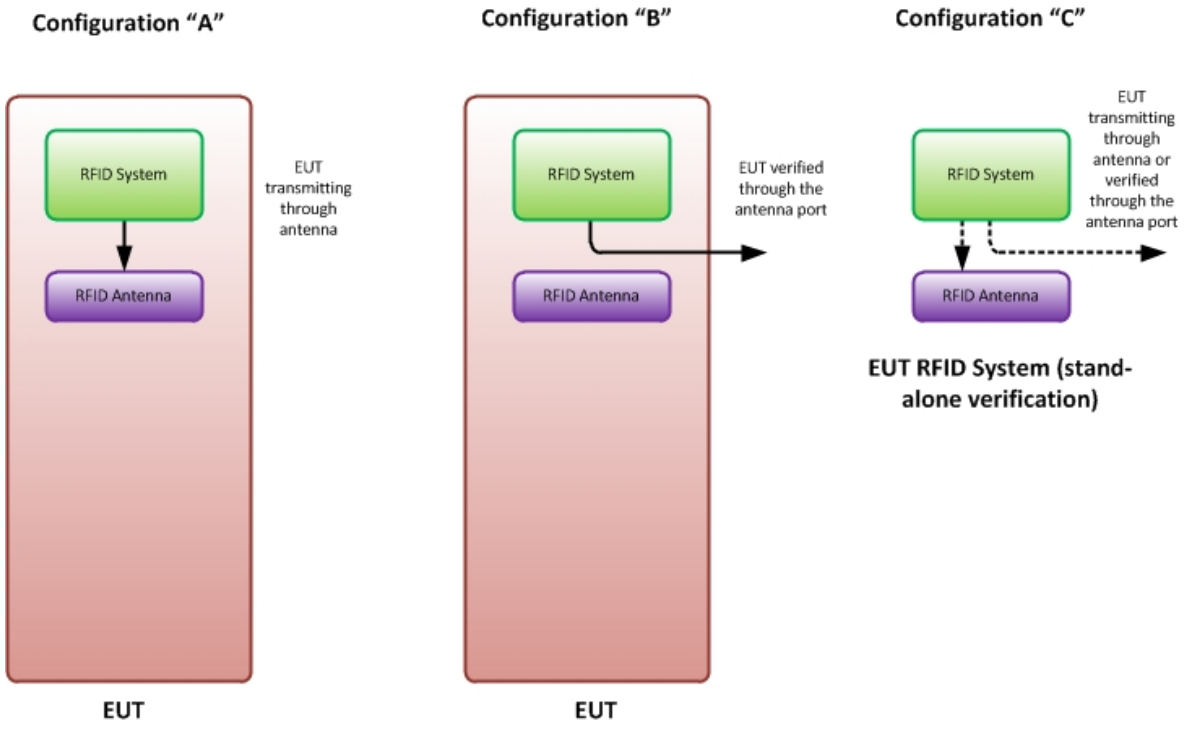
1.4.2 EUT Exercise Software

None. No special software was used during evaluation. Functionality of the RFID system was controlled under “Service Functions” on the main menu of the graphical user interface.

1.4.3 Support Equipment and I/O cables

Manufacturer	Equipment/Cable	Description
N/A	N/A	N/A

1.4.4 Simplified Test Configuration Diagrams



1.5 DEVIATIONS FROM THE STANDARD

All deviations made during testing from the applicable test standards or test plan are detailed under Section 1.2 of this test report.

1.6 MODIFICATION RECORD

Description of Modification	Modification Fitted By	Date Modification Fitted
Serial Number 1042070041		
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 ANSI C63.4-2009, American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the range of 9 kHz to 40 GHz.
For conducted and radiated emissions the equipment under test (EUT) was configured to measure its highest possible emission level. This level was based on the maximized cable configuration from exploratory testing per ANSI C63.4-2009. The test modes were adapted according to the Operating Instructions provided by the manufacturer/client.

1.8 TEST FACILITY

1.8.1 FCC – Registration No.: US5281

TUV SUD America Inc. (San Diego), a §2.498 listed test firm operates the EMC Laboratory registered under Sony Electronics Inc. Product Quality Division EMC. This laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files and the Registration is US5281.

1.8.2 Industry Canada (IC) Registration No.: 3067A

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

SECTION 2

TEST DETAILS

Radio Testing of the
Advanced Sterilization Products
Low-Temperature Sterilization System

2.1 FREQUENCY STABILITY

2.1.1 Specification Reference

Part 15 Subpart C §15.225(e)

2.1.2 Standard Applicable

(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.

2.1.3 Equipment Under Test and Modification State

Serial No: 1042070041 / Test Configuration C

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

June 26, 2012/KAM

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	24.1°C
Relative Humidity	42.6%
ATM Pressure	99.3 kPa

2.1.7 Additional Observations

- This is a conducted test.
- Measurement was done using a spectrum analyzer to measure the frequency variation of the EUT's RFID system.
- The RBW was set to 300 Hz for better resolution.
- The temperature was varied from −20 degrees C to +50 degrees C in 10 degree increments at normal supply voltage,
- The EUT was powered off, then powered on once the temperature stabilized and the frequency was then measured.

2.1.8 Test Results

RFID @ 13.56MHz					
Voltage (%)	Power (VDC)	Temp (°C)	Frequency (Hz)	Frequency Deviation	Deviation (%)
100	9.0	-20	13.55942	.00058	.004
100		-10	13.55942	.00058	.004
100		0	13.55942	.00058	.004
100		+10	13.55942	.00058	.004
100		+20	13.55959	.00041	.003
100		+30	13.55942	.00058	.004
100		+40	13.55942	.00058	.004
100		+50	13.55942	.00058	.004
115	10.35	+20	13.55977	.00023	.002
85	7.65	+20	13.55966	.00034	.003

Maximum Deviation = 0.004%
= 0.004% < 0.01% Limit (Complies)

2.2 20 dB BANDWIDTH

2.2.1 Specification Reference

Part 15 Subpart C §15.215(c)

2.2.2 Standard Applicable

(c) Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

2.2.3 Equipment Under Test and Modification State

Serial No: 1042070041 / Test Configuration B

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

November 30, 2011/FSC

2.2.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 4.1.

2.2.6 Environmental Conditions

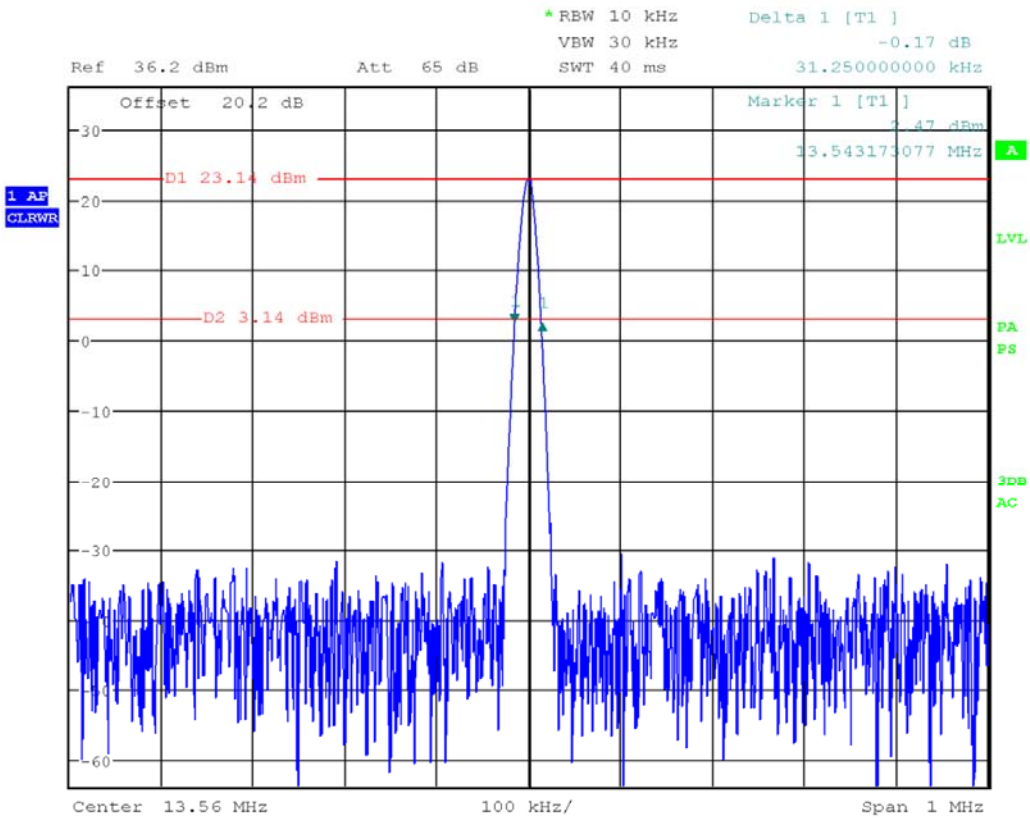
Ambient Temperature	23.4°C
Relative Humidity	42.9%
ATM Pressure	98.50 kPa

2.2.7 Additional Observations

- This is a conducted test.
- 20dB bandwidth verified using delta-marker measurements from the line drawn.
- Span is wide enough to capture the channel transmission.
- RBW is 1% of the span, VBW is ≥3X RBW.
- 20.2 offset is from the external attenuator used and cable loss.
- Sweep is auto.
- Detector is peak.

2.2.8 Test Results

See attached plots



Measured 20dB Bandwidth: 31.25kHz
Frequency Band: 13.110 to 14.010 MHz

13.56 MHz – (20dB BW/2) = 13.544375 MHz (within the frequency band - **Compliant**)
13.56 MHz + (20dB BW/2) = 13.575625 MHz (within the frequency band - **Compliant**)

2.3 99% EMISSION BANDWIDTH

2.3.1 Specification Reference

RSS-Gen Clause 4.6.1

2.3.2 Standard Applicable

When an occupied bandwidth value is not specified in the applicable RSS, the transmitted signal bandwidth to be reported is to be its 99% emission bandwidth, as calculated or measured.
The transmitter shall be operated at its maximum carrier power measured under normal test conditions. The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts. The resolution bandwidth shall be set to as close to 1% of the selected span as is possible without being below 1%. The video bandwidth shall be set to 3 times the resolution bandwidth. Video averaging is not permitted. Where practical, a sampling detector shall be used given that a peak or peak hold may produce a wider bandwidth than actual.
The trace data points are recovered and directly summed in linear terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached and that frequency recorded. The process is repeated for the highest frequency data points. This frequency is recorded. The span between the two recorded frequencies is the occupied bandwidth.

2.3.3 Equipment Under Test and Modification State

Serial No: 1042070041 / Test Configuration C

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

June 25,2012/KAM

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

Ambient Temperature	22.9°C
Relative Humidity	44.3%
ATM Pressure	98.5 kPa

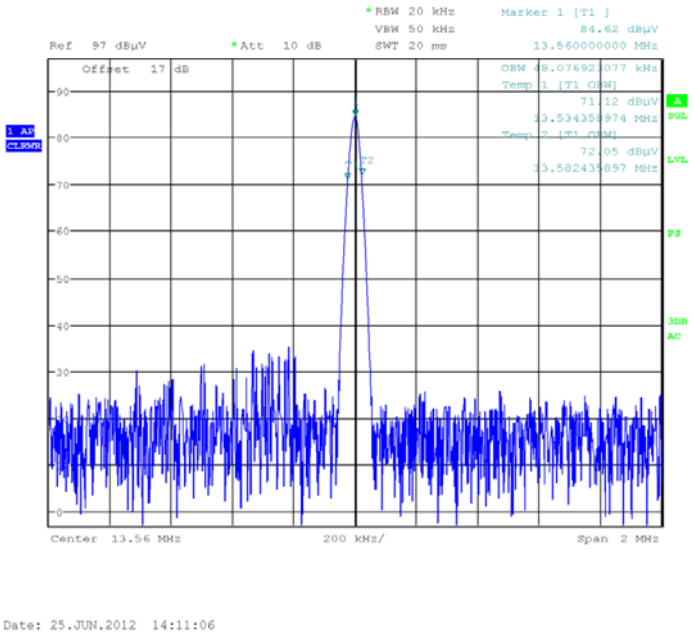
2.3.7 Additional Observations

- This is a conducted test.
- An offset of 17dB was added to compensate for the external attenuator and cable used.
- Span is wide enough to capture the channel transmission.
- RBW is 1% of the span.
- VBW is 3X RBW.
- Sweep is auto.
- Detector is peak.

- The % Power Bandwidth setting in the spectrum analyzer was set to 99% (default).
- The Channel Bandwidth measurement function of the spectrum analyzer was used for this test.

2.3.8 Test Results

Fundamental (13.56 MHz)
48.077 kHz



Fundamental Frequency

2.4 EMISSION MASK

2.4.1 Specification Reference

Part 15 Subpart C §15.225(a)(b)(c)

2.4.2 Standard Applicable

(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.

2.4.3 Equipment Under Test and Modification State

Serial No: 1042070041 / Test Configuration A

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

November 10, 2011/FSC

2.4.5 Test Equipment Used

The major items of test equipment used for the above tests are identified in Section 4.1.

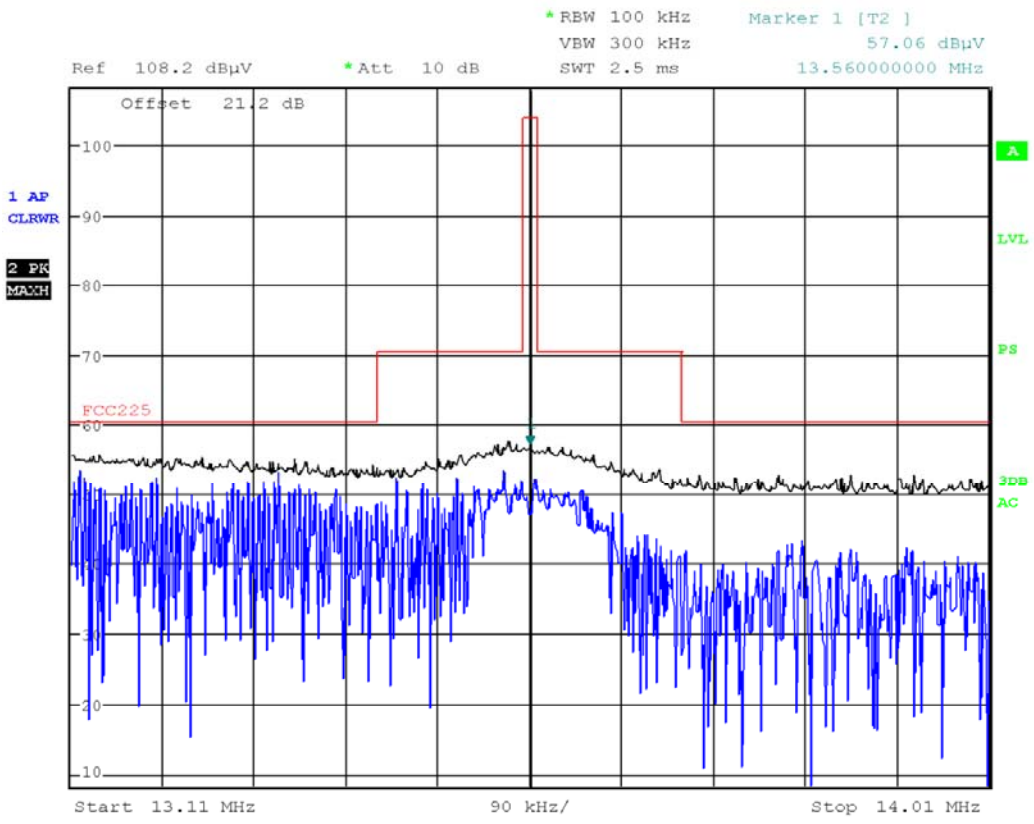
2.4.6 Environmental Conditions

Ambient Temperature	22.5°C
Relative Humidity	41.8%
ATM Pressure	99.90 kPa

2.4.7 Additional Observations

- This is a radiated test.
- An offset of 21.2dB was added to compensate for the antenna factor and cable used.
- Verification performed at 3 meters.
- Limits adjusted from 30 meters to 3 meters (+20 dB).
- Carrier frequency was maximized before verification.
- RBW is 100kHz.
- VBW is 3X RBW.
- Sweep is auto.
- Detector is peak.
- Trace is max hold.
- AC input varied from 176VAC, 208VAC and 239.2VAC. No variation in test result observed.

2.4.8 Test Results



Date: 30.NOV.2011 16:24:37

Test Notes: This is actual radiated measurement taken @ 3 meters. The whole RFID system is inside the EUT. This is the only configuration the RFID system will be used using a custom antenna.

2.5 SPURIOUS RADIATED EMISSIONS

2.5.1 Specification Reference

Part 15 Subpart C §15.225(d)

2.5.2 Standard Applicable

(d) The field strength of any emissions appearing outside of the 13.110–14.010 MHz band shall not exceed the general radiated emission limits in §15.209.

2.5.3 Equipment Under Test and Modification State

Serial No: 1042070041 / Test Configuration A and C

2.5.4 Date of Test/Verification

November 9, 2011; June 25, 2012

2.5.5 Test Equipment Used

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

2.5.6 Environmental Conditions

Ambient Temperature	22.5°C
Relative Humidity	63.8%
ATM Pressure	99.05 kPa

2.5.7 Additional Observations

- This is a radiated test. The spectrum was searched from 30MHz to 1GHz.
- Emissions observed are coming from the host and not from the intentional radiator (RFID system).
- Plot presented shows compliance to §15.109 limits, the EUT being a Class A device.
- There are no emissions found that do not comply with the restricted bands defined in FCC Part 15 Subpart C, 15.205.
- To show compliance of the RFID system to §15.209 requirements, the following steps were taken:
    1. The RFID system was turned “off” and the measurement repeated, no change in test result observed.
    2. Step 1 repeated with a very low RBW, no emissions variation was observed when toggling the RFID system “on” and “off”.
    3. Finally, each harmonic of the carrier frequency was maximized then verified using procedure in Step 2. See attached plots.

- Receive mode measurements were performed using Test Configuration C.
- Measurement was done using EMC32 V8.51 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 2.5.8 for sample computation.

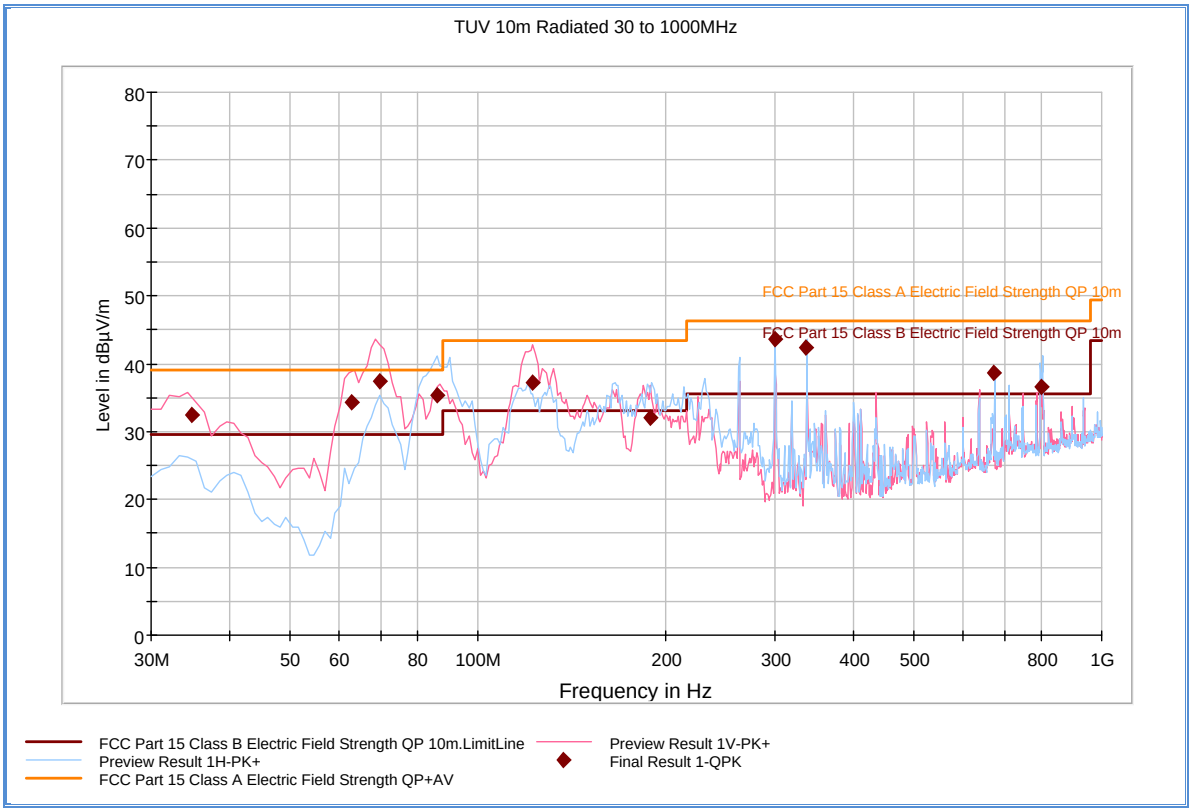
2.5.8 Sample Computation (Radiated Emission)

Measuring equipment raw measurement (dbµV) @ 30 MHz			24.4
Correction Factor (dB)	Asset# 1066 (cable)	0.3	-12.6
	Asset# 1172 (cable)	0.3	
	Asset# 1016 (preamplifier)	-30.7	
	Asset# 1175(cable)	0.3	
	Asset# 1002 (antenna)	17.2	
Reported QuasiPeak Final Measurement (dbµV/m) @ 30MHz			**11.8**

2.5.9 Test Results

See attached plots.

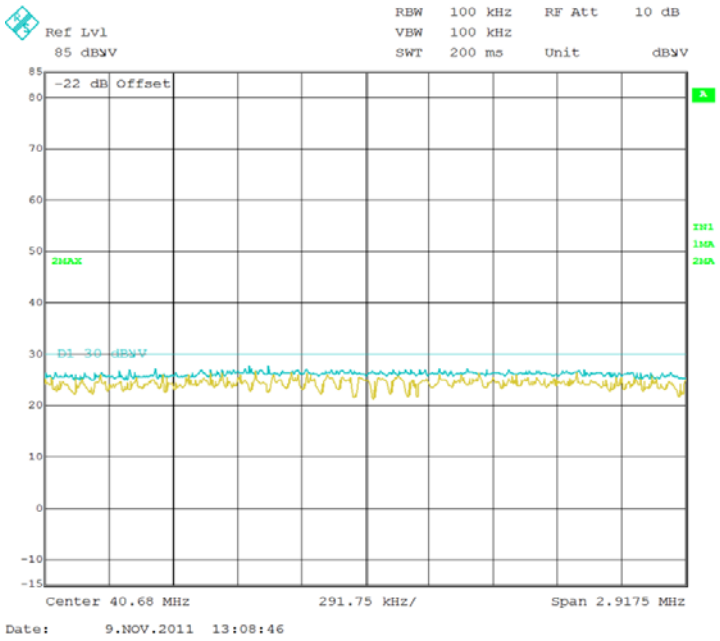
2.5.10 Test Results Below 1GHz



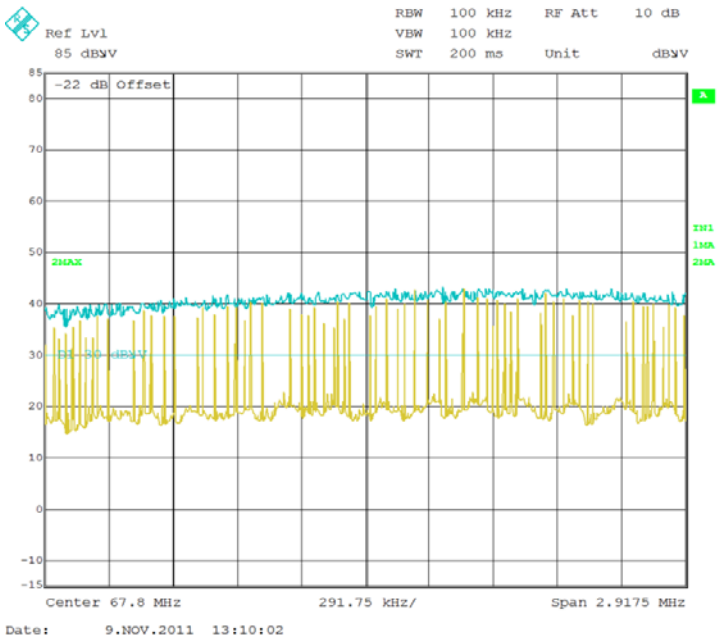
Quasi Peak Data (§15.109 Limits)

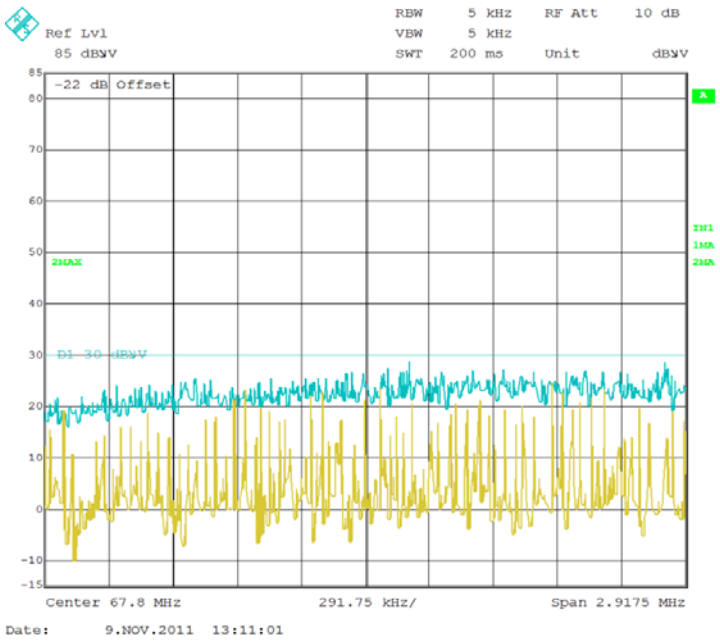
Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
34.831111	32.4	1000.0	120.000	263.0	V	180.0	-14.9	6.6	39.0
62.897778	34.2	1000.0	120.000	200.0	V	321.0	-22.6	4.8	39.0
69.800000	37.5	1000.0	120.000	200.0	V	242.0	-22.7	1.5	39.0
85.964444	35.3	1000.0	120.000	395.0	H	195.0	-21.9	3.7	39.0
122.448889	37.3	1000.0	120.000	139.0	V	254.0	-21.6	6.2	43.5
188.988889	32.0	1000.0	120.000	324.0	H	25.0	-17.3	11.5	43.5
299.004444	43.5	1000.0	120.000	400.0	H	37.0	-13.8	2.9	46.4
336.366667	42.4	1000.0	120.000	152.0	H	317.0	-12.1	4.0	46.4
672.753333	38.7	1000.0	120.000	100.0	H	-6.0	-4.6	7.7	46.4
802.044444	36.5	1000.0	120.000	175.0	H	313.0	-2.5	9.9	46.4

2.5.11 RFID Spurious Emissions Verification to §15.209 Limits

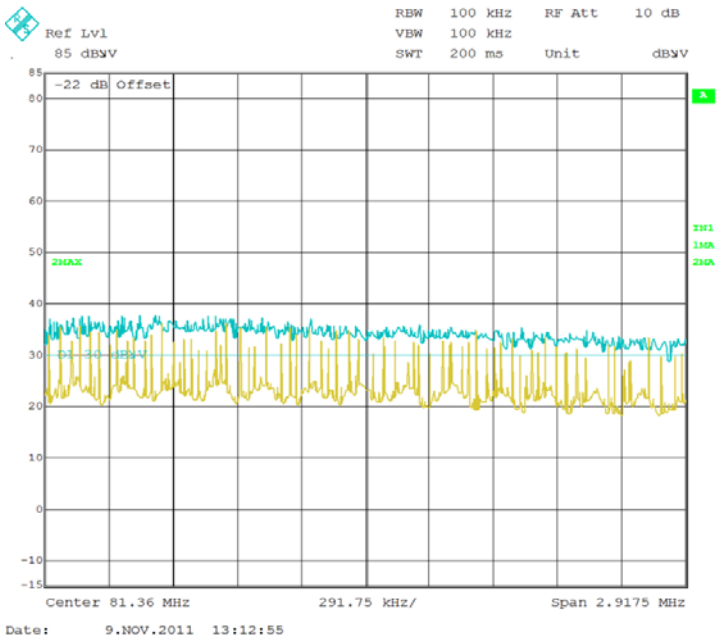


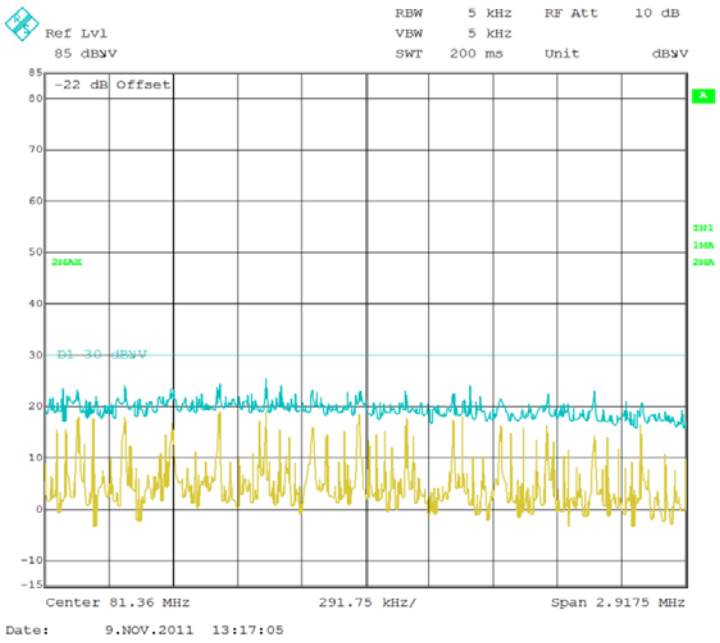
Plot shows 3rd and 4th Harmonic scans complying with §15.209 Limits



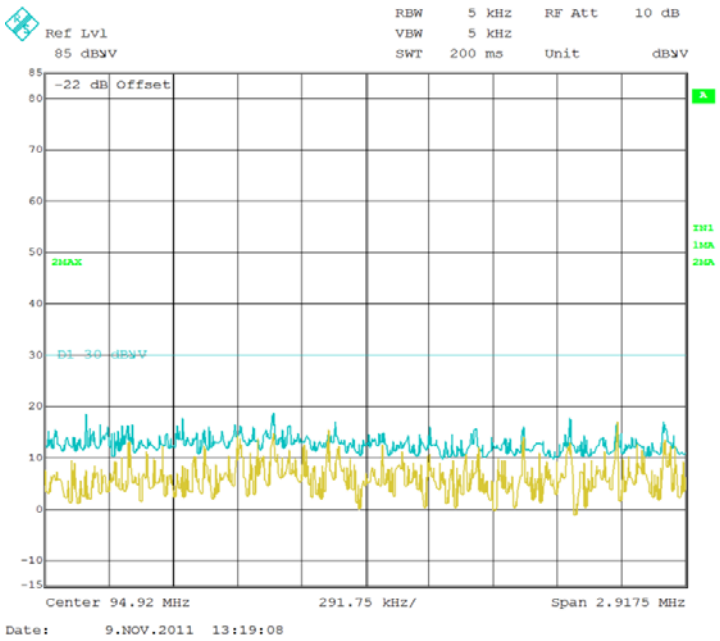


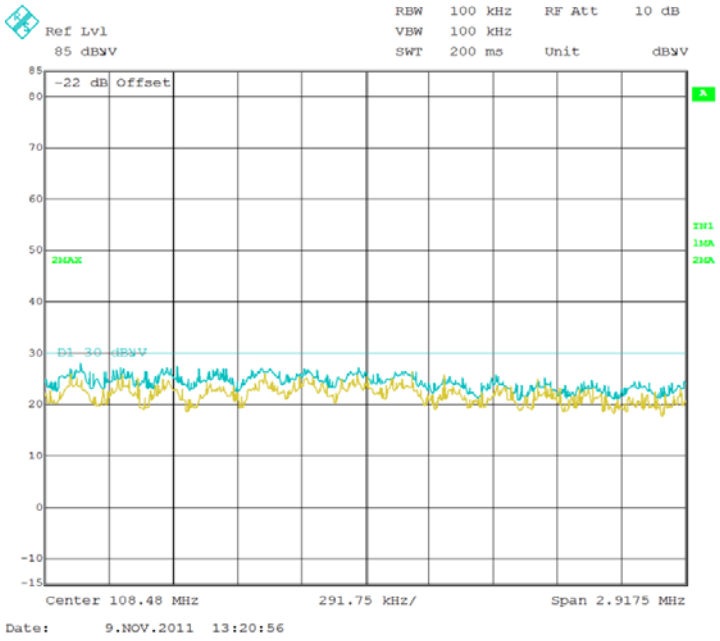
First plot showing 5th Harmonic scan not complying with §15.209 Limits. Second plot showing same scan with lower RBW setting. RFID system was turned "off" at this point, no change in emissions observed. EUT complies.



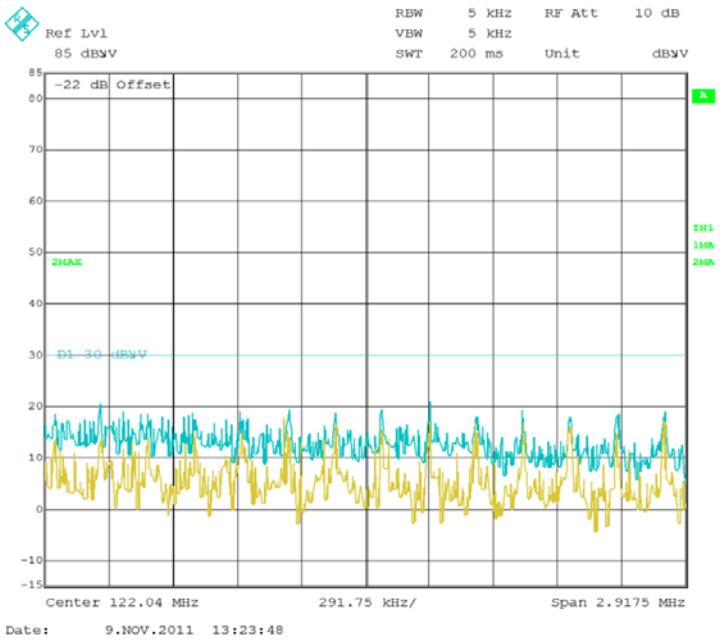


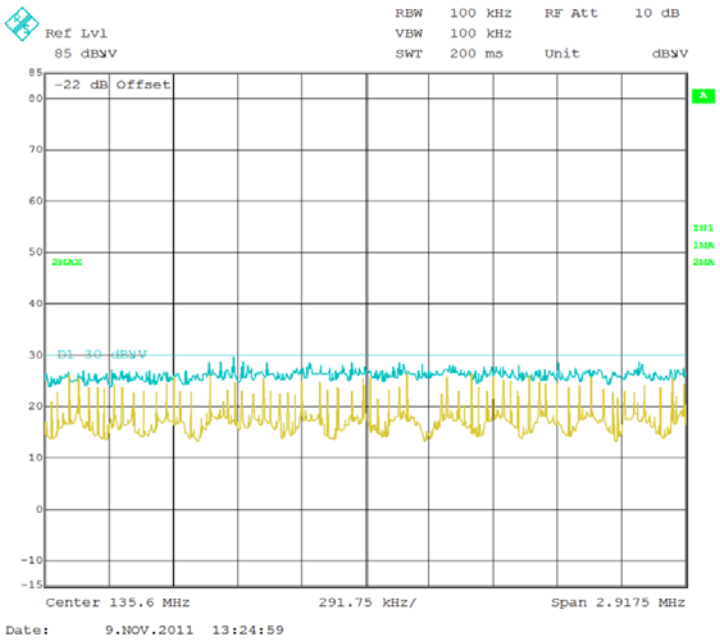
First plot showing 6th Harmonic scan not complying with §15.209 Limits. Second plot showing same scan with lower RBW setting. RFID system was turned "off" at this point, no change in emissions observed. EUT complies.





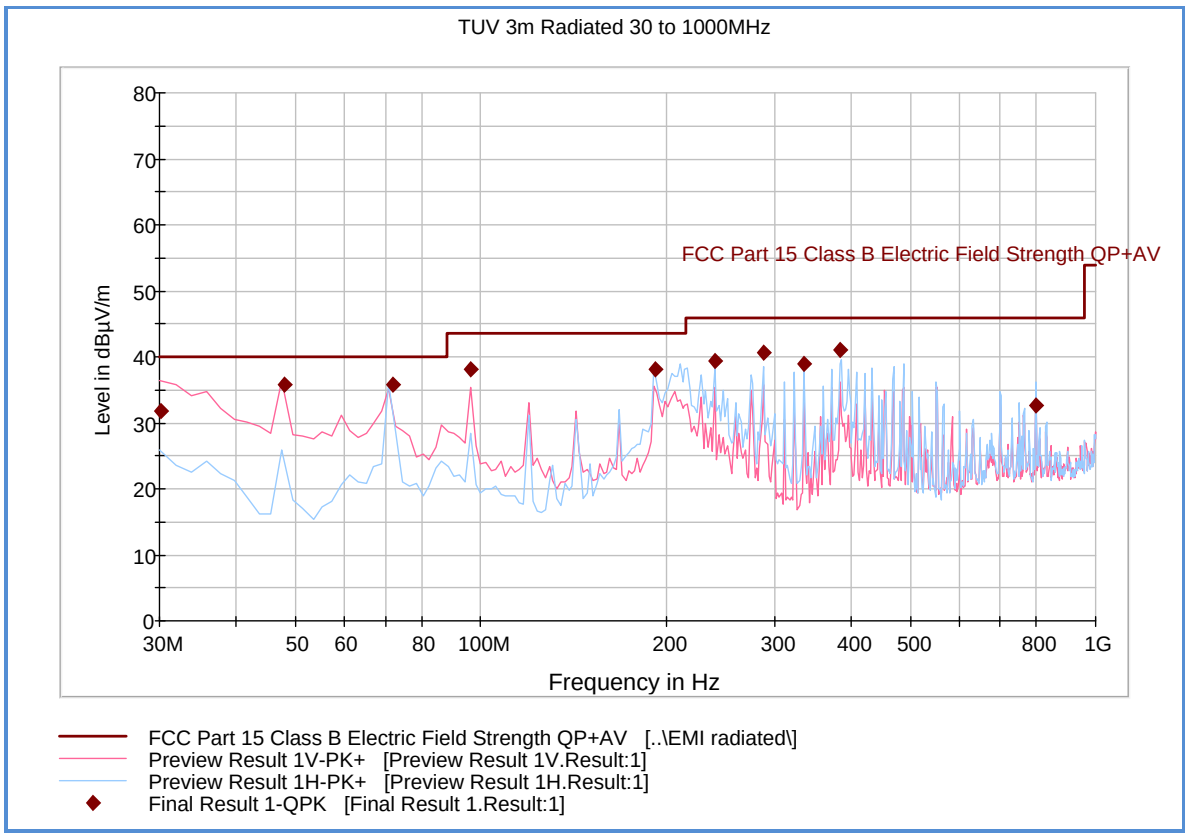
Same verification methodology was applied to the 7th and 8th Harmonics. EUT complies.





Same verification methodology was applied to the 9th and 10th Harmonics. EUT complies.

2.5.12 Receive Mode Below 1GHz



Quasi Peak Data (§15.109 Limits)

Frequency (MHz)	QuasiPeak (dBµV/m)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)
30.120000	31.8	1000.0	120.000	100.0	V	2.0	-12.3	8.2	40.0
48.014990	35.7	1000.0	120.000	100.0	V	250.0	-20.1	4.3	40.0
71.981643	35.8	1000.0	120.000	268.0	H	328.0	-22.2	4.2	40.0
96.012184	38.1	1000.0	120.000	115.0	V	128.0	-20.5	5.4	43.5
192.022685	38.2	1000.0	120.000	154.0	H	167.0	-16.5	5.3	43.5
240.019880	39.4	1000.0	120.000	145.0	H	354.0	-14.5	6.6	46.0
288.017074	40.6	1000.0	120.000	127.0	H	18.0	-13.4	5.4	46.0
335.990381	39.0	1000.0	120.000	100.0	H	123.0	-11.9	7.0	46.0
384.027575	41.1	1000.0	120.000	100.0	H	25.0	-9.2	4.9	46.0
797.675671	32.6	1000.0	120.000	140.0	H	269.0	-2.0	13.4	46.0

2.6 CONDUCTED EMISSIONS

2.6.1 Specification Reference

Part 15 Subpart C §15.207(a)

2.6.2 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 µH/50 ohms line impedance stabilization network (LISN).

Frequency of emission (MHz)	Conducted limit (dBµV)	
	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.*

2.6.3 Equipment Under Test and Modification State

Serial No: 1042070041 / Test Configuration C

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

June 25, 2012/KAM

2.6.5 Test Equipment Used

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

2.6.6 Environmental Conditions

Ambient Temperature	22.9°C
Relative Humidity	43.9%
ATM Pressure	98.5 kPa

2.6.7 Additional Observations

- The EUT is a Class A compliant equipment.
- To show general compliance to the present requirement, the RFID system of the EUT was verified standalone using a Development kit provided by the module manufacturer.
- The RFID module was configured as per specification.

- The antenna was replaced by a 50Ω load for this test.
- Measurement was done using EMC32 V8.52 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 2.6.8 for sample computation.

2.6.8 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# 1171 (LISN)	0.30	
Reported QuasiPeak Final Measurement (dbµV) @ 150kHz			**26.2**

2.6.9 Test Results

Compliant. See attached plots and tables.

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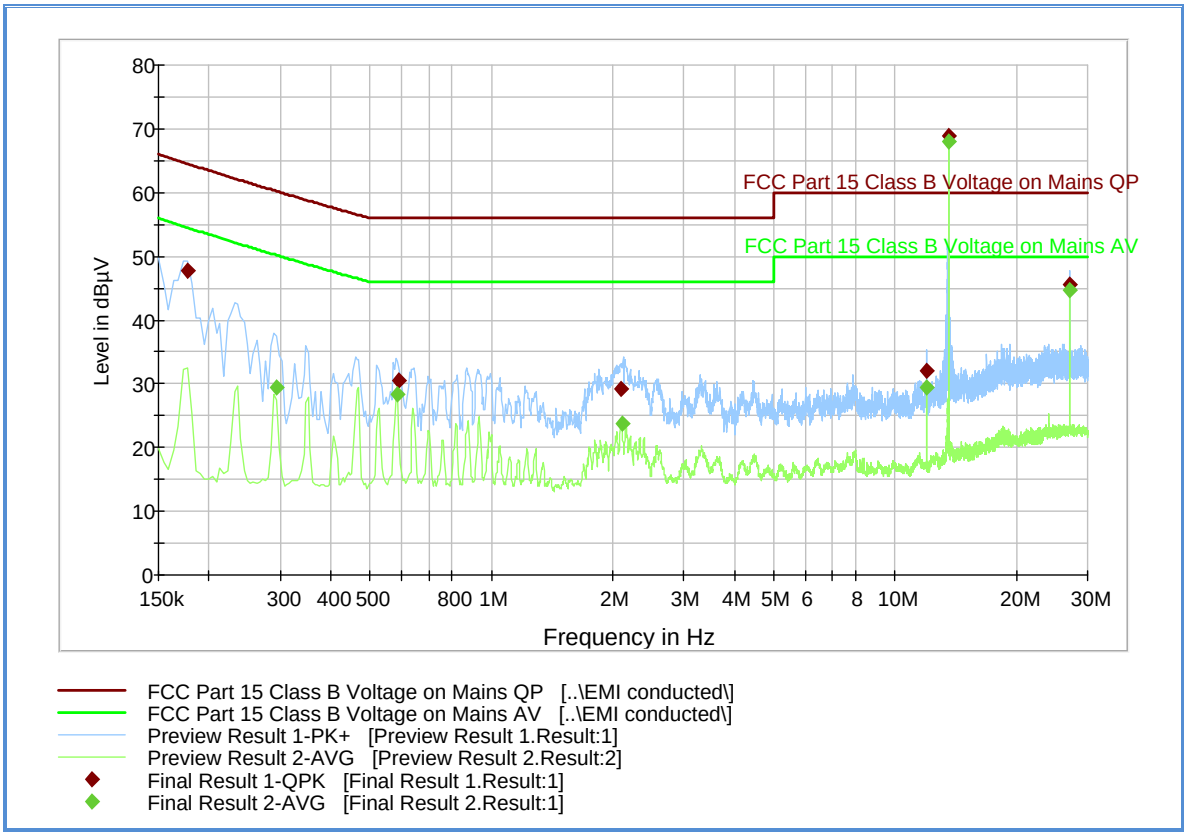
2.6.10 Line 1 (Hot)



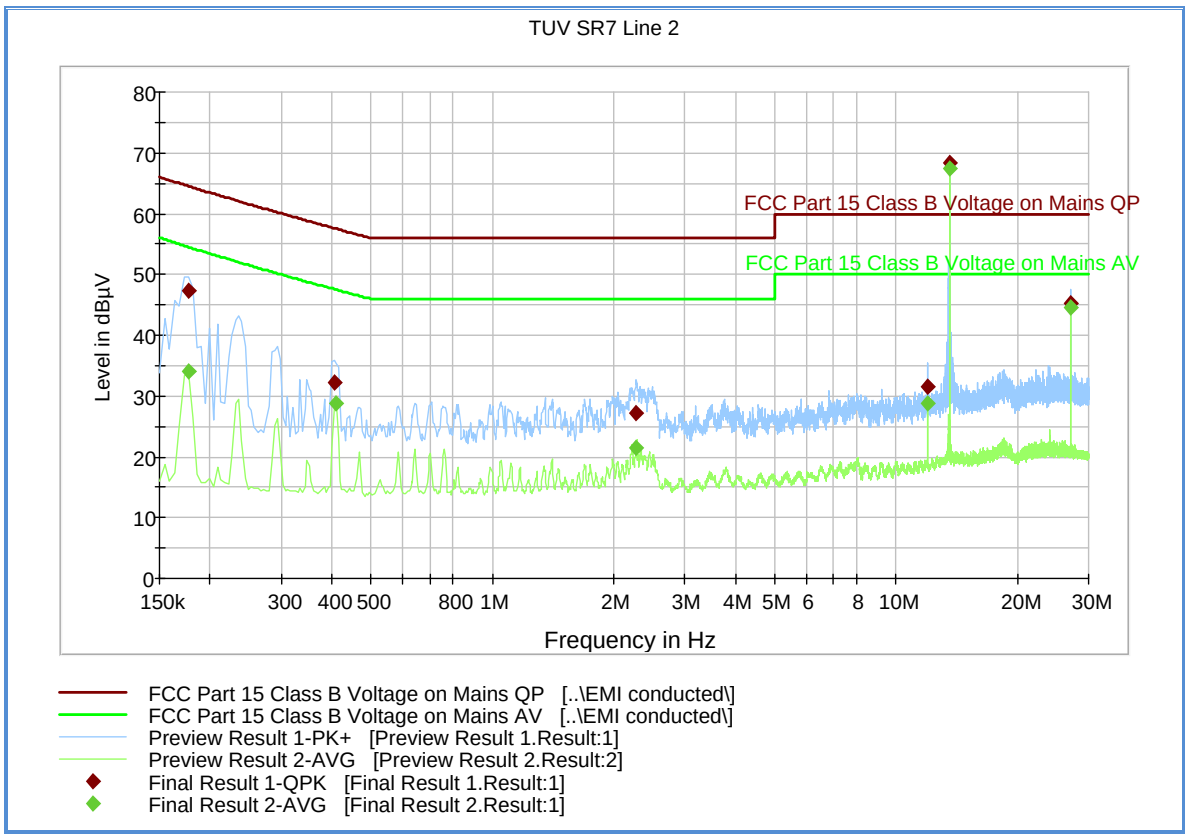
Quasi Peak

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV)
0.177000	47.6	1000.0	9.000	Off	L1	20.5	16.9	64.5
0.591000	30.5	1000.0	9.000	Off	L1	20.2	25.5	56.0
2.094000	29.3	1000.0	9.000	Off	L1	20.1	26.7	56.0
11.998500	32.1	1000.0	9.000	Off	L1	20.5	27.9	60.0
13.560000	68.9	1000.0	9.000	Off	L1	20.5	-8.9	60.0
27.118500	45.6	1000.0	9.000	Off	L1	21.2	14.4	60.0

Average

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - Ave (dB)	Limit – Ave (dBµV)
0.294000	29.4	1000.0	9.000	Off	L1	20.3	20.7	50.2
0.586500	28.3	1000.0	9.000	Off	L1	20.2	17.7	46.0
2.107500	23.7	1000.0	9.000	Off	L1	20.1	22.3	46.0
11.998500	29.4	1000.0	9.000	Off	L1	20.5	20.6	50.0
13.560000	68.0	1000.0	9.000	Off	L1	20.5	-18.0	50.0
27.118500	44.8	1000.0	9.000	Off	L1	21.2	5.2	50.0

2.6.11 Line 2 (Neutral)



Quasi Peak

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - QPK (dB)	Limit - QPK (dBµV)
0.177000	47.4	1000.0	9.000	Off	N	20.9	17.1	64.5
0.406500	32.3	1000.0	9.000	Off	N	20.6	25.3	57.6
2.274000	27.3	1000.0	9.000	Off	N	20.5	28.7	56.0
11.998500	31.7	1000.0	9.000	Off	N	20.9	28.3	60.0
13.560000	68.3	1000.0	9.000	Off	N	20.9	Fundamental	
27.118500	45.4	1000.0	9.000	Off	N	21.6	14.6	60.0

Average

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin - Ave (dB)	Limit – Ave (dBµV)
0.177000	34.0	1000.0	9.000	Off	N	20.9	20.5	54.5
0.411000	28.9	1000.0	9.000	Off	N	20.6	18.6	47.5
2.269500	21.5	1000.0	9.000	Off	N	20.5	24.5	46.0
11.998500	28.7	1000.0	9.000	Off	N	20.9	21.3	50.0
13.560000	67.3	1000.0	9.000	Off	N	20.9	Fundamental	
27.118500	44.6	1000.0	9.000	Off	N	21.6	5.4	50.0

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
6628	Loop Antenna	HFH 2 –Z2	880 458/25	Rhode & Schwarz	05/09/11	05/09/12
1033	Bilog Antenna	3142C	00044556	EMCO	04/01/11	04/01/12
1002	Bilog Antenna	3142C	00058717	EMCO	12/06/11	12/06/12
1027/1028	EMI Test Receiver	ESMI	848926/003	Rhode & Schwarz	03/20/12	03/20/13
6528	EMI Test Receiver	ESCS 30	847793/001	Rhode & Schwarz	02/29/12	02/28/13
1040	EMI Test Receiver	ESIB40	100292	Rhode & Schwarz	08/10/11	08/10/12
1049	EMI Test Receiver	ESU	100133	Rhode & Schwarz	06/13/12	06/13/13
7500	Spectrum Analyzer	E4440A	MY43362168	Agilent	03/01/12	03/12/13
1016	Pre-amplifier	PAM-0202	187	PAM	08/17/11	08/17/12
1003	Signal Generator	SMR-40	1104.0002.40	Rhode & Schwarz	10/13/11	10/13/12
7514	Multimeter	34410A	MY45002624	Agilent	08/01/11	08/01/12
	Test Software	EMC32	V8.52	Rhode & Schwarz	N/A	

3.2 MEASUREMENT UNCERTAINTY

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

3.2.1 Conducted Port Measurements

	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	EUT Setup	Rectangular	1.00	0.58	0.33
				Combined Uncertainty (u_c):	0.67
				Coverage Factor (k):	2
				Expanded Uncertainty:	1.39

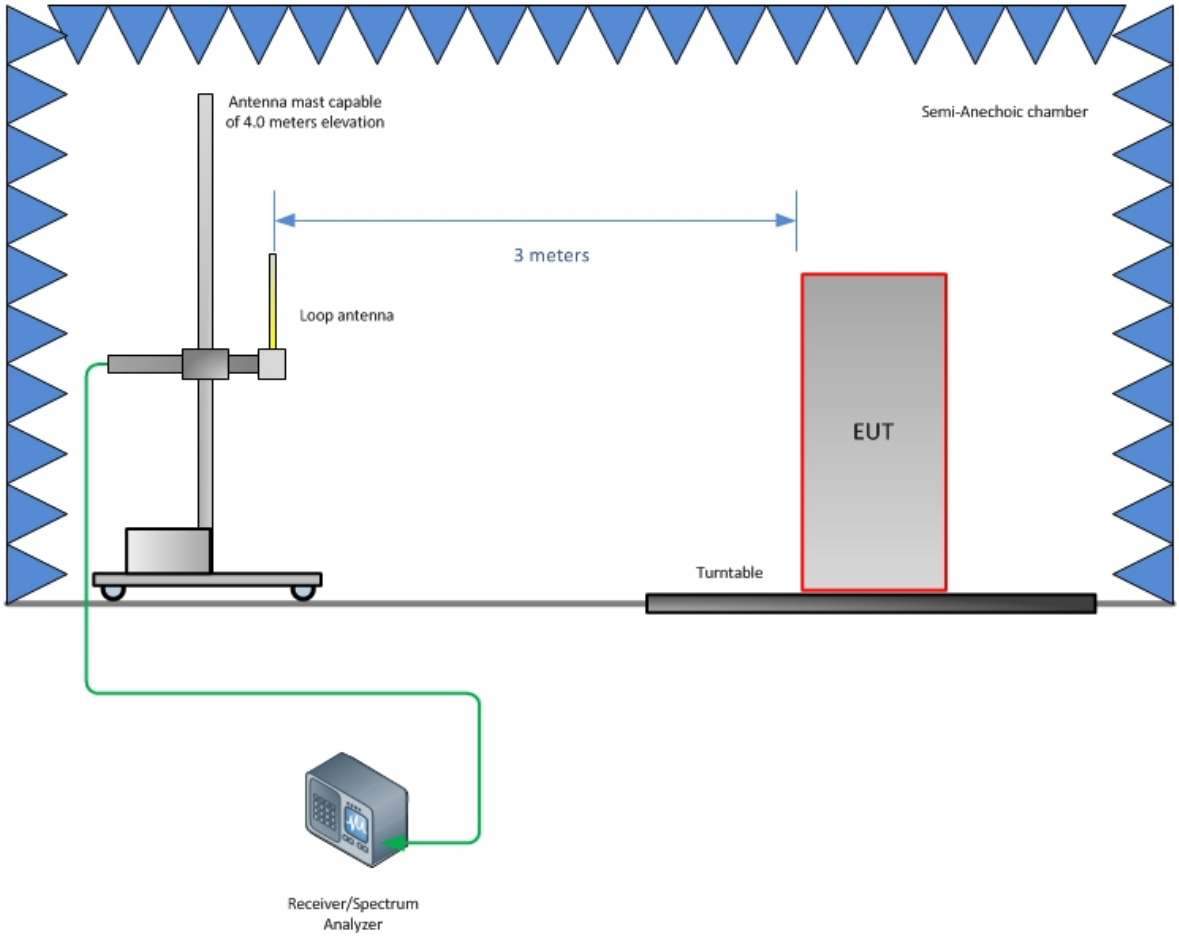
3.2.2 Radiated Emission Measurements

	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	0.41	0.24	0.06
5	Site	Rectangular	2.00	1.15	1.33
6	EUT Setup	Rectangular	1.00	0.58	0.33
				Combined Uncertainty (u_c):	1.38
				Coverage Factor (k):	2
				Expanded Uncertainty:	2.79

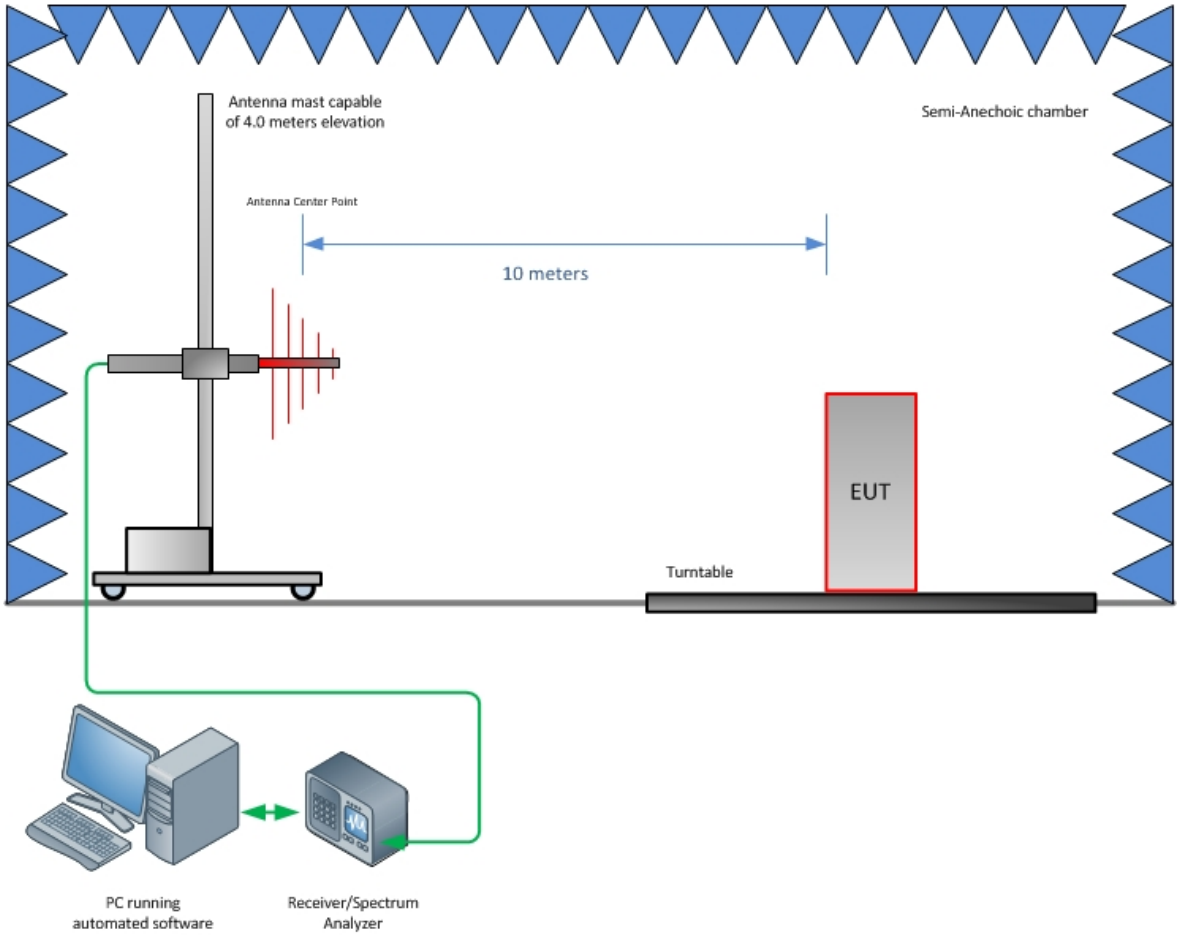
SECTION 4

DIAGRAM OF TEST SETUP

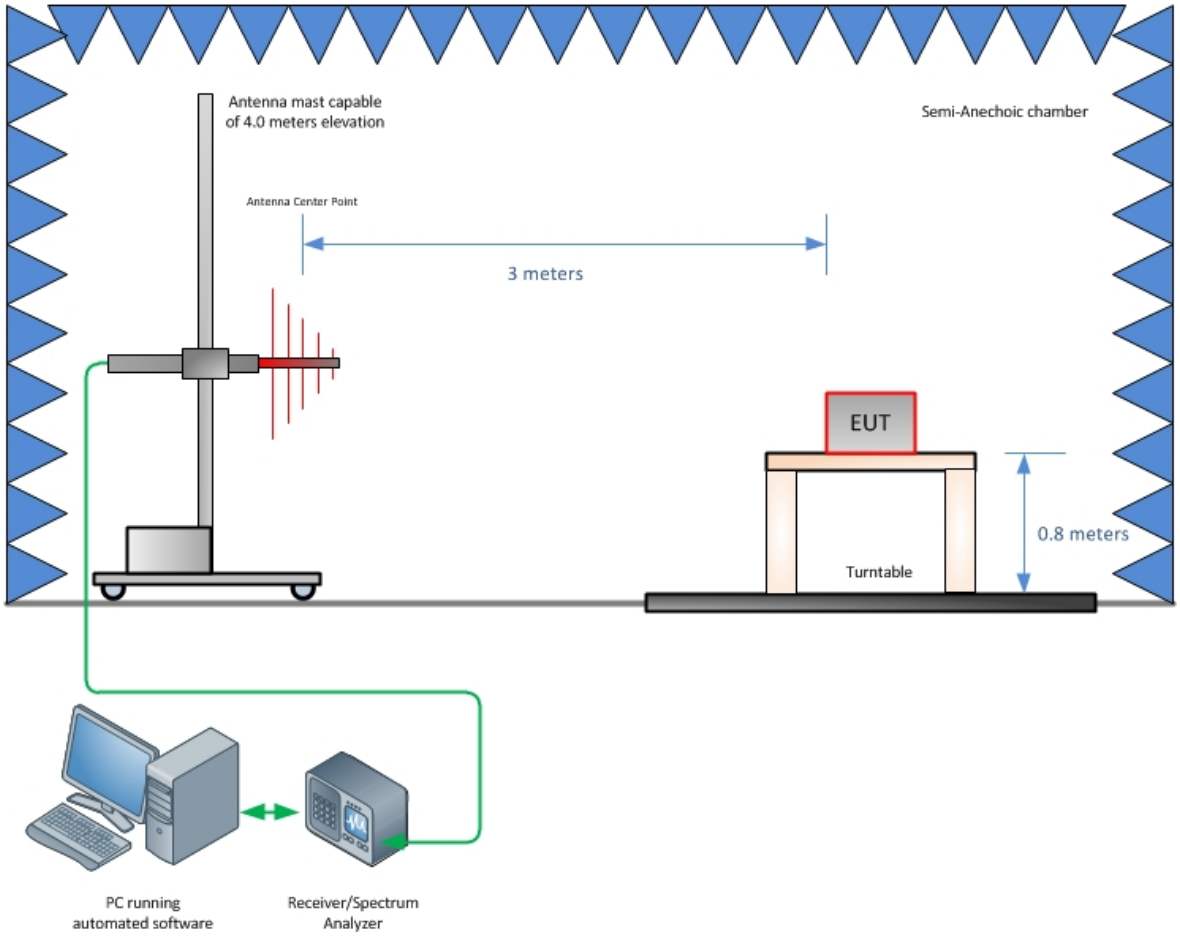
4.1 TEST SETUP DIAGRAM (EMISSION MASK)



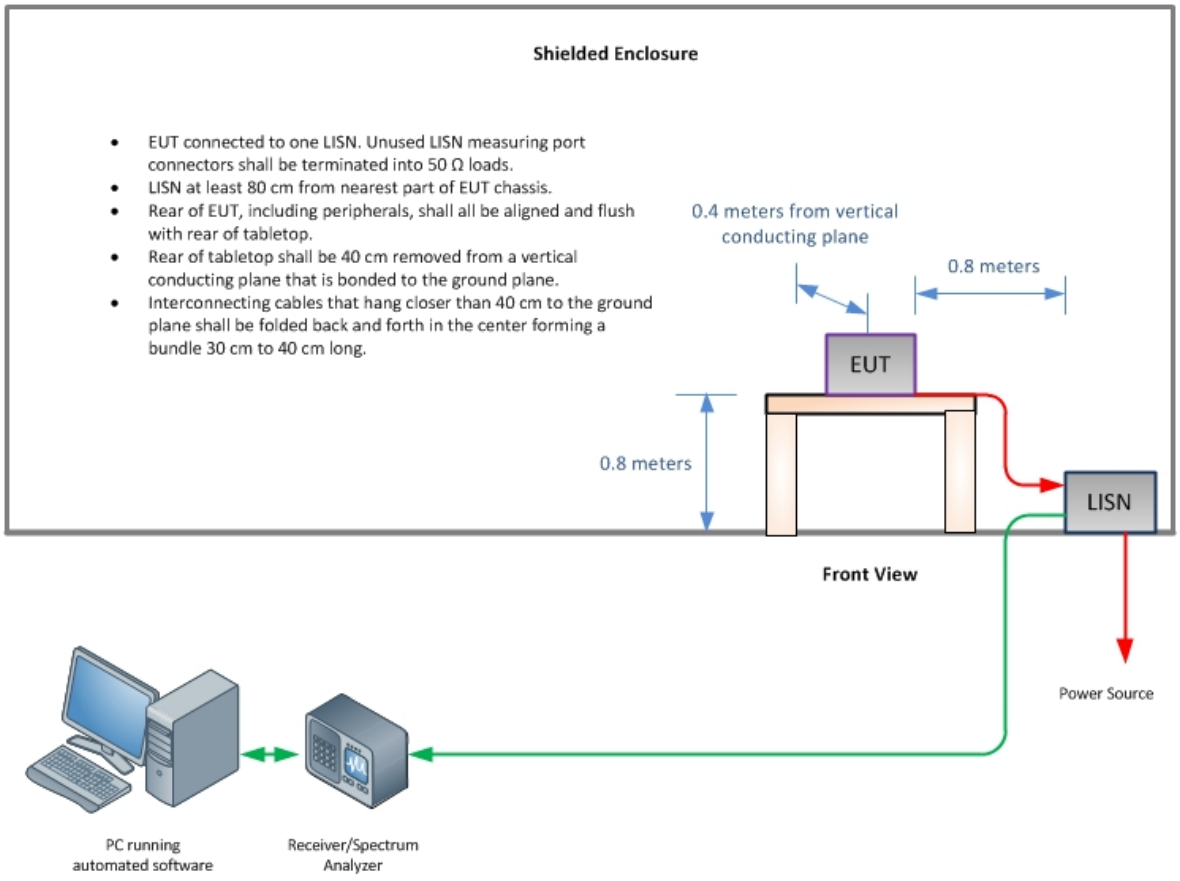
4.2 TEST SETUP DIAGRAM (RADIATED EMISSIONS 30 TO 1000MHZ)



4.3 TEST SETUP DIAGRAM (RADIATED EMISSIONS 30 TO 1000MHZ – RECEIVE MODE/RFID MODULE + ANTENNA VERIFIED STAND-ALONE)



4.4 TEST SETUP DIAGRAM (CONDUCTED EMISSIONS/RFID MODULE + ANTENNA VERIFIED STAND-ALONE)



SECTION 5

ACCREDITATION, DISCLAIMERS AND COPYRIGHT

5.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT

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NVLAP Lab Code: 100268-0

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