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Report On

Application for Grant of Equipment Authorization Class II
Permissive Change/Reassessment of the
On Ramp Wireless
uNode RF Module Model ULPU100

FCC Part 15 Subpart C §15.247
IC RSS-210 Issue 8 December 2010

Report No. SC1205155

May 2012





REPORT ON Class II permissive Change Reassessment of the
On Ramp Wireless
RF Module

TEST REPORT NUMBER SC1205155

PREPARED FOR On Ramp Wireless
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DATED May 21, 2012



Revision History

| SC1205155 On Ramp Wireless uNode RF Module | | | | | |
|---|-----------------|--------------|--------|-------------------|--------------------|
| DATE | OLD REVISION | NEW REVISION | REASON | PAGES AFFECTED | APPROVED BY |
| 05/21/12 | Initial Release | | | | Ferdinand Custodio |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |



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SECTION 1

REPORT SUMMARY

Radio Testing of the
On Ramp Wireless
RF Module



1.1 INTRODUCTION

The information contained in this report is intended to show verification of the On Ramp Wireless RF Module to the requirements of FCC Part 15 Subpart C §15.247 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 | On Ramp Wireless |
| Model Number(s) | ULPU100 |
| FCC ID Number | XTE-ULPU100 |
| IC Number | 8655A-ULPU100 |
| Serial Number(s) | 5300902F |
| Number of Samples Tested | 1 |
| Test Specification/Issue/Date | <ul style="list-style-type: none">• FCC Part 15 Subpart C §15.247 (October 1, 2011).• 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 | May 16, 2012 |
| Finish of Test | May 17, 2012 |
| Name of Engineer(s) | Juan Manuel Gonzalez Kathy MacKenzie |
| Related Document(s) | TUV SUD America Report Number SC1109339. 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 §15.247 with cross-reference to the corresponding IC RSS standard is shown below.

| Section | §15.247 Spec Clause | RSS | Test Description | Result |
|---------|---------------------|------------------|--|-----------|
| - | §15.247(b)(3) | RSS-210 A8.4 (4) | Peak Output Power | N/A* |
| - | §15.207(a) | RSS-Gen 7.2.4 | Conducted Emissions | N/A** |
| - | §15.215(c) | RSS-Gen 4.6.3 | 20 dB Bandwidth | N/A** |
| - | | RSS-Gen 4.6.1 | 99% Emission Bandwidth | N/A** |
| - | §15.247(a)(2) | RSS-210 A8.2(a) | Minimum 6 dB RF Bandwidth | N/A** |
| - | §15.247(d) | RSS-210 A8.5 | Out-of-Band Emissions - Conducted | N/A** |
| - | §15.247(d) | RSS-210 A8.5 | Band-edge Compliance of RF Conducted Emissions | N/A** |
| 2.1 | §15.247(d) | RSS-210 A8.5 | Spurious Radiated Emissions | Compliant |
| 2.1 | | RSS-Gen 4.10 | Receiver Spurious Emissions | Compliant |

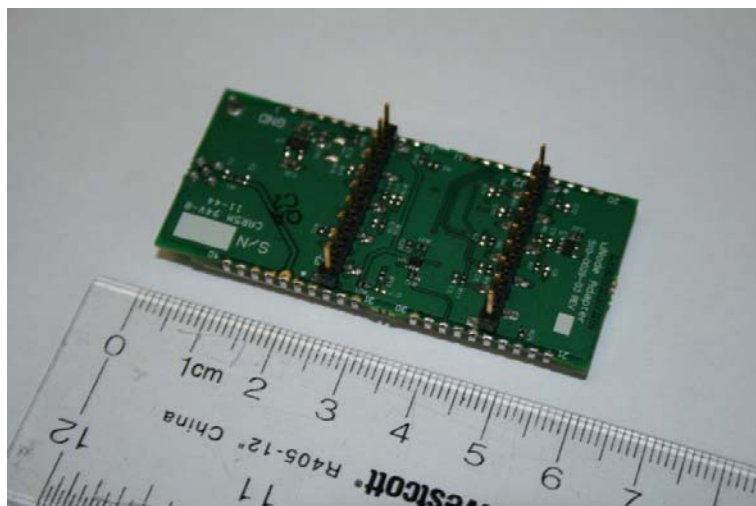
NA* Prior to testing, the output power on the EUT was measured and compared to the original filing. On Ramp Wireless limits the power via their client utility to a level identical that is listed in the original certification.

NA** Not included in this permissive change. Addition of ground PCB vias and microwave absorbing material would not change previous test results.

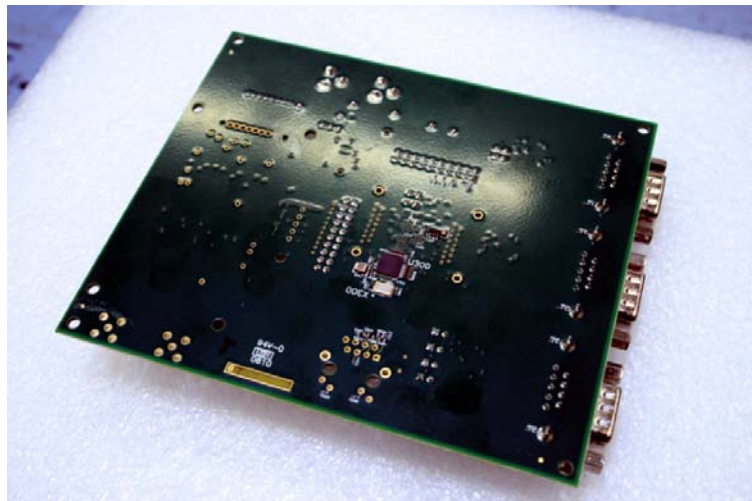
1.3 PRODUCT INFORMATION

1.3.1 Technical Description

The Equipment Under Test (EUT) was an On Ramp Wireless uNode ULPU100 RF Module as shown in the photograph below. The EUT is a wireless module primarily for smart grid and remote monitoring application. Typical install requires soldering into the host PCB. For testing purposes, the EUT was installed in an adaptor board plus an eHost developer board (proprietary to the client). This board provides command and control interface, power supplies, indicator LEDs, and a sturdy mounting base. The EUT is already approved under FCC ID XTE-ULPU100 and IC 8655A-ULPU100, it is being reassessed due to addition of ground PCB vias and microwave absorber material on the metal lid under the PA area.



Equipment Under Test



Equipment Under Test (installed in an eHost developer board)



1.3.2 EUT General Description

| | |
|---------------------------------------|---|
| EUT Description | uNode RF Module |
| Model Number(s) | ULPU100 |
| Rated Voltage | 3.6VDC Nominal voltage. |
| Output Power | 138 mW |
| Frequency Range | 2402 MHz to 2475.63 MHz |
| Number of Operating Frequencies | 38 |
| Channels Verified | Channel 1 (Low Channel 2402 MHz) Channel 20 (Mid Channel 2439.81 MHz) Channel 38 (High Channel 2475.63 MHz) |
| Antenna Type (used during evaluation) | 2.4 GHz Wireless LAN antenna. |
| Antenna Gain | 2 dBi |
| EUT Antenna Connector | Type "MMCX". Adapter provided to adapt with the test antenna. |
| Modulation Used | DSSS-DBPSK |

1.3.3 Test Antenna Details

| | |
|---------------------|--|
| Model | HG2402RDR-RSP |
| Manufacturer | L-COM Global Connectivity |
| Antenna Connector | RP-SMA Connector Crimped and Soldered |
| General Description | Compact 2.4GHz Omni-directional "Rubber Duck" WiFi antenna |
| Design | Coaxial sleeve with an Omni-directional pattern |
| Length | 79.5mm |

1.4 EUT TEST CONFIGURATION

1.4.1 Test Configuration Description

| Test Configuration | Description |
|--------------------|--|
| Default | EUT transmitting max power through the test antenna. |

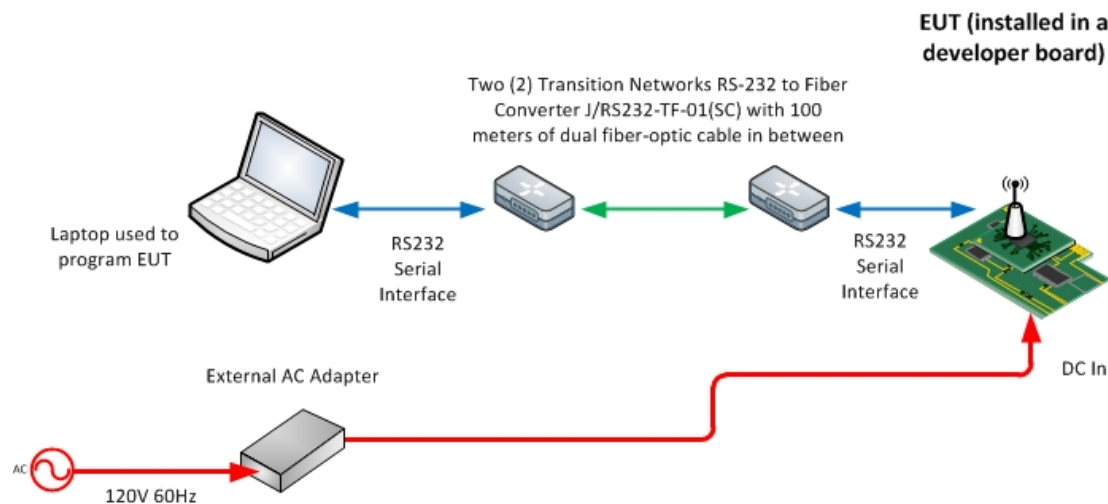
1.4.2 EUT Exercise Software

"Python Commands" software provided by the client was used to exercise the EUT. The line commands are typed and executed one at a time. Simplified example: Reset, Frequency, TX power, TX ON. Once set the EUT will continue in its configured mode until new commands are sent. Each time the EUT must change its channel, TX power, or mode (RX or TX), operator intervention is required to send commands.

1.4.3 Support Equipment and I/O cables

| Manufacturer | Equipment/Cable | Description |
|---------------------|---|--|
| On-Ramp | Support Developer Board | eHost PCA 510-0005-05/ PCB 405-0005-05 SN: 80 |
| Dell | Support Laptop | Latitude E5500 SN: GRMMMK1 36499111345 |
| Transition Networks | Support Serial RS232 to Fiber media Converter (2X) | J/RS232-TF-01(SC) |
| - | Fiber Optic Cable Assembly | 100 meters Ready-To-Use Duplex (SC) Fiber Optic Cable Assembly |
| CUI Inc. | Support AC Adapter | Model 3A-211DN05 5VDC Output 4A |
| - | Crossover serial cable (Between eHost and Support PC) | 1.8m, standard RS232 serial cable |

1.4.4 Simplified Test Configuration Diagram





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 5300902F | | |
| 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
On Ramp Wireless
RF Module



2.1 SPURIOUS RADIATED EMISSIONS

2.1.1 Specification Reference

Part 15 Subpart C §15.247(d)

2.1.2 Standard Applicable

(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

2.1.3 Equipment Under Test and Modification State

Serial No: 5300902F / Default Test Configuration

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

May 16 and 17, 2012/JMG

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 | 100.3 kPa |

2.1.7 Additional Observations

- This is a radiated test. The spectrum was searched from 30MHz to the 10th harmonic (25GHz).
- There are no emissions found that do not comply to the restricted bands defined in FCC Part 15 Subpart C, 15.205 or Part 15.247(d).
- 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 2.1.8 for sample computation.



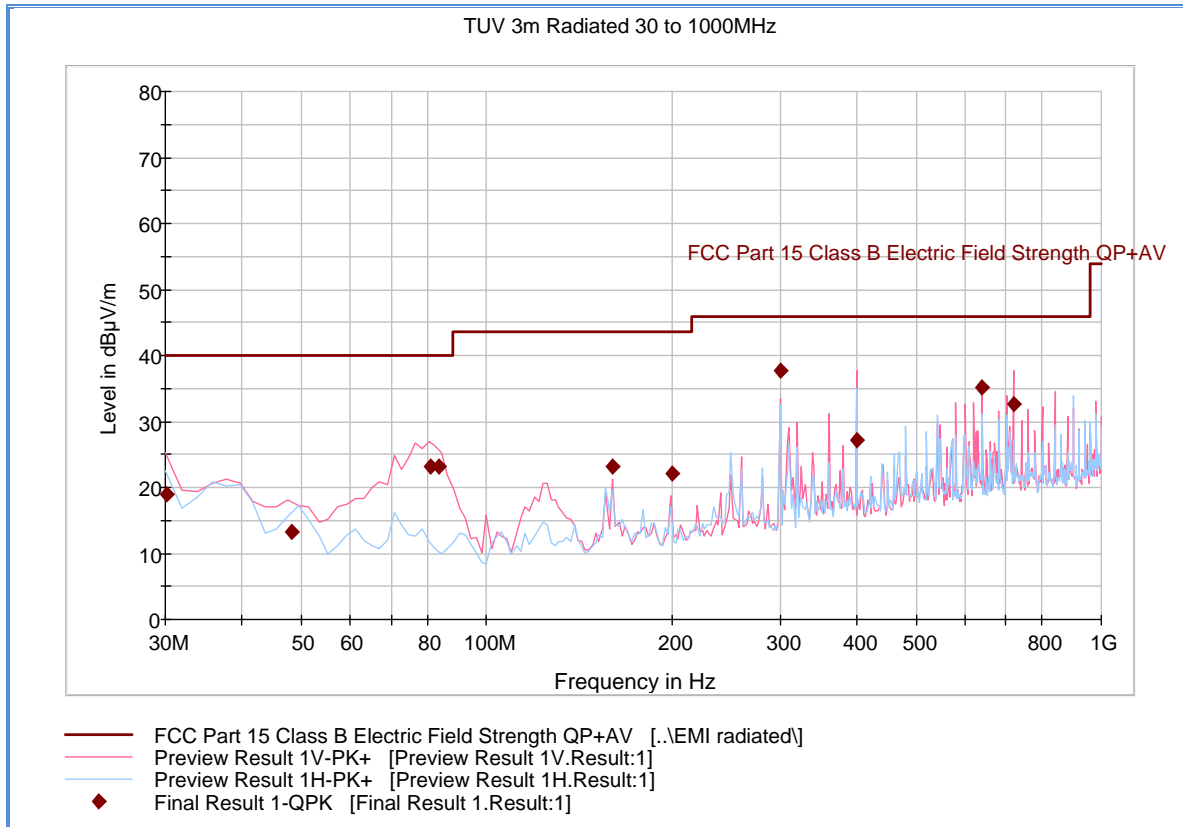
2.1.8 Sample Computation (Radiated Emission)

| | | | |
|---|----------------------------|-------|-------|
| Measuring equipment raw measurement (db μ V) @ 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 (db μ V/m) @ 30MHz | | | 11.8 |

2.1.9 Test Results

See attached plots.

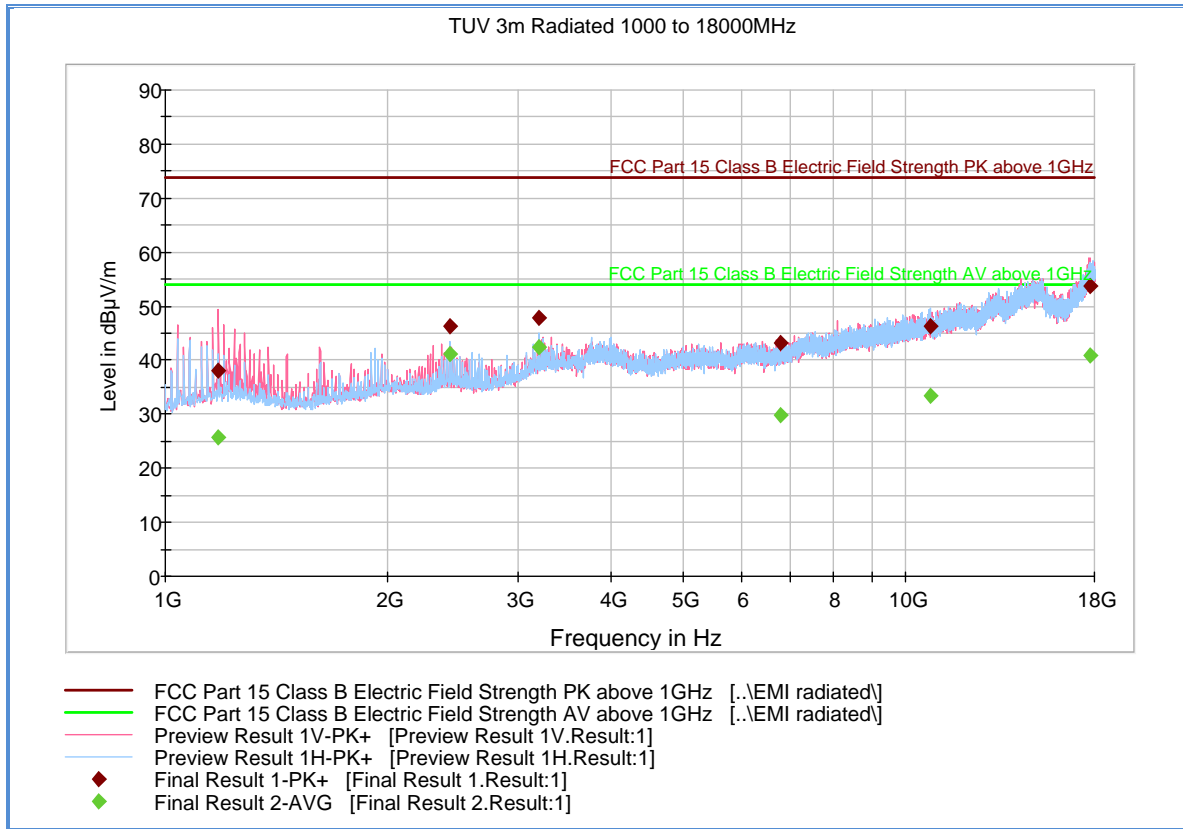
2.1.10 Test Results Below 1GHz (Receive Mode)



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) |
|-----------------|--------------------|-----------------|-----------------|-------------|--------------|---------------|------------|-------------|----------------|
| 30.120000 | 19.0 | 1000.0 | 120.000 | 232.0 | V | 177.0 | -12.3 | 21.0 | 40.0 |
| 48.054990 | 13.3 | 1000.0 | 120.000 | 100.0 | V | 150.0 | -20.1 | 26.7 | 40.0 |
| 81.181082 | 23.2 | 1000.0 | 120.000 | 125.0 | V | 359.0 | -21.9 | 16.8 | 40.0 |
| 83.732745 | 23.1 | 1000.0 | 120.000 | 113.0 | V | 108.0 | -21.6 | 16.9 | 40.0 |
| 160.000481 | 23.2 | 1000.0 | 120.000 | 105.0 | V | 247.0 | -17.9 | 20.3 | 43.5 |
| 199.998236 | 22.0 | 1000.0 | 120.000 | 103.0 | V | 243.0 | -16.5 | 21.5 | 43.5 |
| 300.000401 | 37.7 | 1000.0 | 120.000 | 136.0 | V | 220.0 | -13.1 | 8.3 | 46.0 |
| 399.978677 | 27.3 | 1000.0 | 120.000 | 117.0 | V | 286.0 | -9.7 | 18.7 | 46.0 |
| 639.980762 | 35.2 | 1000.0 | 120.000 | 152.0 | V | 120.0 | -4.1 | 10.8 | 46.0 |
| 720.000160 | 32.6 | 1000.0 | 120.000 | 117.0 | V | 110.0 | -2.6 | 13.4 | 46.0 |

2.1.11 Test Results Above 1GHz (Receive Mode)



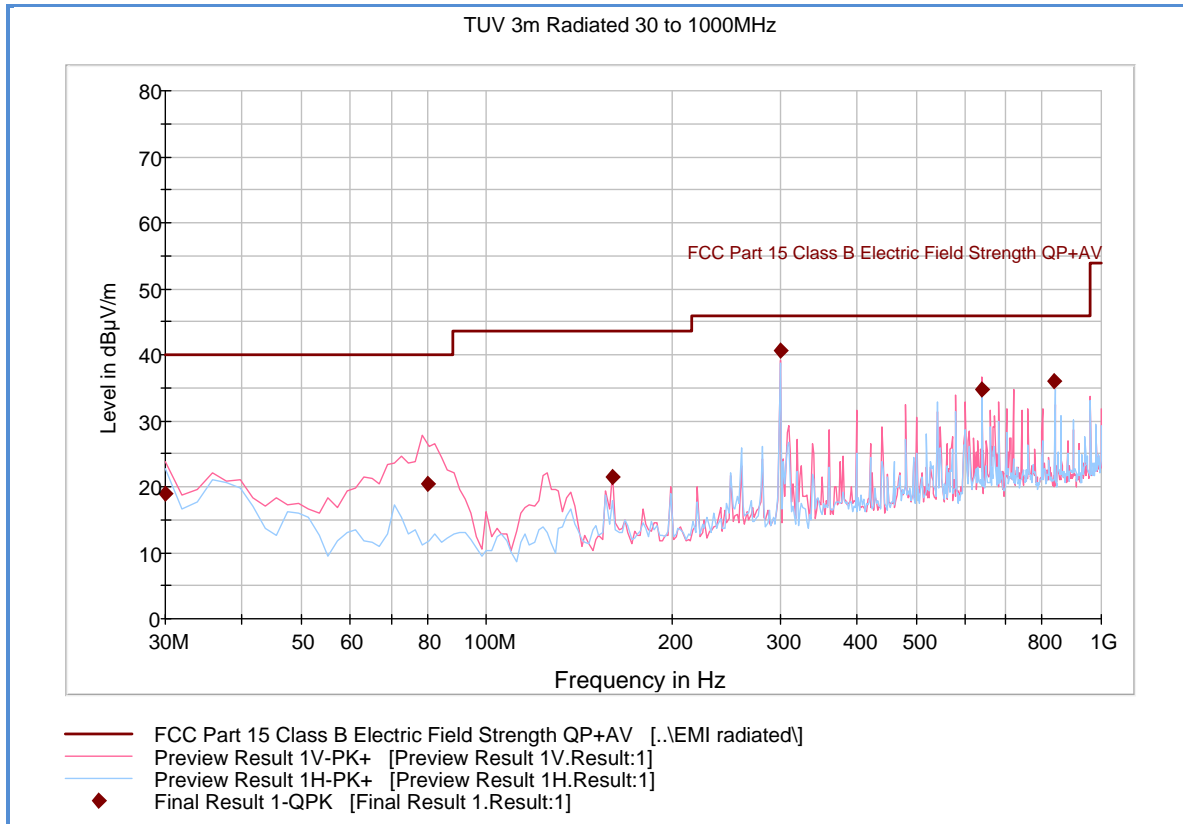
Peak Data

| Frequency (MHz) | MaxPeak (dBµV/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Polarization | Azimuth (deg) | Corr. (dB) | Margin (dB) | Limit (dBµV/m) |
|-----------------|------------------|-----------------|-----------------|-------------|--------------|---------------|------------|-------------|----------------|
| 1178.280000 | 37.9 | 1000.0 | 1000.000 | 110.0 | V | 66.0 | -9.8 | 36.0 | 73.9 |
| 2419.960000 | 46.4 | 1000.0 | 1000.000 | 104.0 | H | 194.0 | -4.7 | 27.5 | 73.9 |
| 3199.940000 | 47.8 | 1000.0 | 1000.000 | 115.0 | H | 176.0 | -1.0 | 26.1 | 73.9 |
| 6788.720000 | 43.3 | 1000.0 | 1000.000 | 146.0 | V | 287.0 | 5.4 | 30.6 | 73.9 |
| 10831.160000 | 46.2 | 1000.0 | 1000.000 | 322.0 | H | 233.0 | 11.2 | 27.7 | 73.9 |
| 17733.120000 | 53.7 | 1000.0 | 1000.000 | 377.0 | V | 145.0 | 20.7 | 20.2 | 73.9 |

Average Data

| Frequency (MHz) | Average (dBµV/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Polarization | Azimuth (deg) | Corr. (dB) | Margin (dB) | Limit (dBµV/m) |
|-----------------|------------------|-----------------|-----------------|-------------|--------------|---------------|------------|-------------|----------------|
| 1178.280000 | 25.8 | 1000.0 | 1000.000 | 110.0 | V | 66.0 | -9.8 | 28.1 | 53.9 |
| 2419.960000 | 41.2 | 1000.0 | 1000.000 | 104.0 | H | 194.0 | -4.7 | 12.7 | 53.9 |
| 3199.940000 | 42.4 | 1000.0 | 1000.000 | 115.0 | H | 176.0 | -1.0 | 11.5 | 53.9 |
| 6788.720000 | 29.7 | 1000.0 | 1000.000 | 146.0 | V | 287.0 | 5.4 | 24.2 | 53.9 |
| 10831.160000 | 33.3 | 1000.0 | 1000.000 | 322.0 | H | 233.0 | 11.2 | 20.6 | 53.9 |
| 17733.120000 | 40.8 | 1000.0 | 1000.000 | 377.0 | V | 145.0 | 20.7 | 13.1 | 53.9 |

2.1.12 Test Results Below 1GHz (High Channel – Worst Case Configuration)

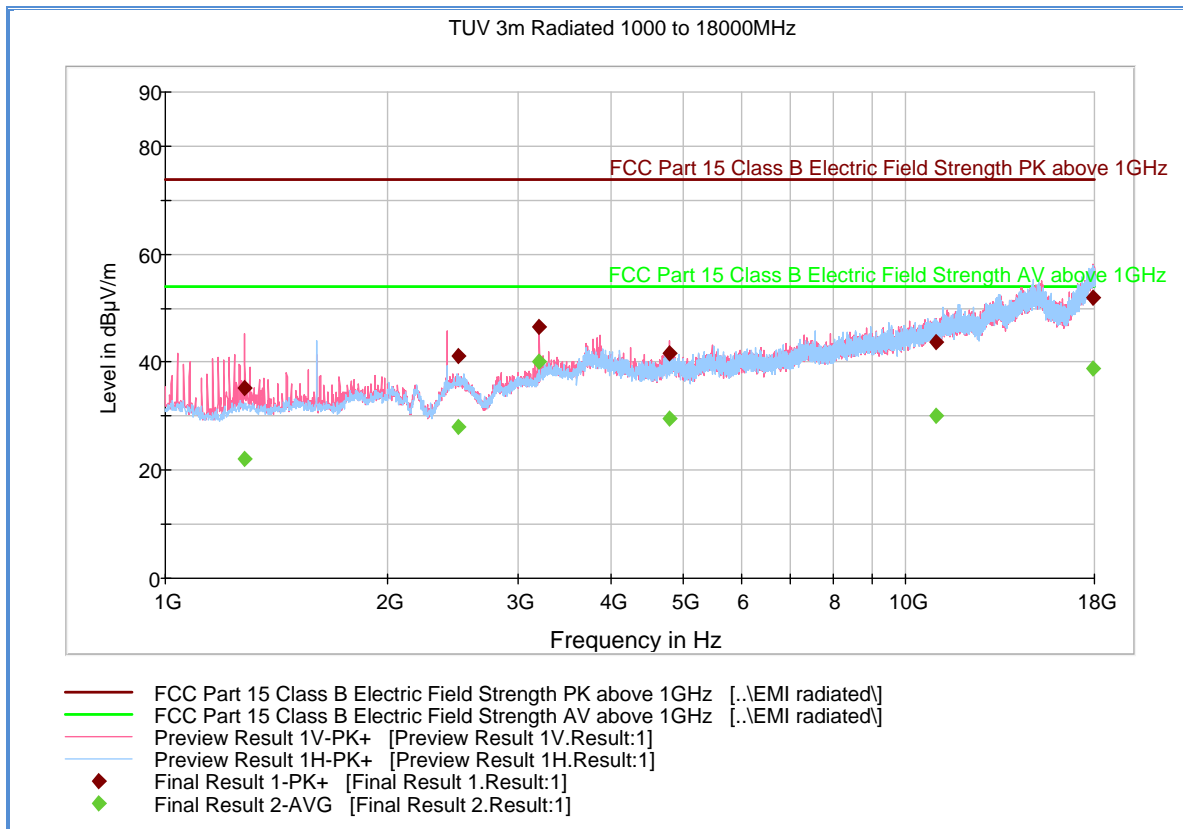


Quasi Peak Data

| Frequency (MHz) | QuasiPeak (dBμV/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Polarization | Azimuth (deg) | Corr. (dB) | Margin (dB) | Limit (dBμV/m) |
|-----------------|--------------------|-----------------|-----------------|-------------|--------------|---------------|------------|-------------|----------------|
| 30.000000 | 18.9 | 1000.0 | 120.000 | 313.0 | V | 10.0 | -12.2 | 21.1 | 40.0 |
| 79.997194 | 20.5 | 1000.0 | 120.000 | 100.0 | V | 171.0 | -22.0 | 19.5 | 40.0 |
| 160.000481 | 21.6 | 1000.0 | 120.000 | 115.0 | V | 264.0 | -17.9 | 21.9 | 43.5 |
| 300.000401 | 40.7 | 1000.0 | 120.000 | 144.0 | V | 214.0 | -13.1 | 5.3 | 46.0 |
| 639.980762 | 34.7 | 1000.0 | 120.000 | 140.0 | V | 92.0 | -4.1 | 11.3 | 46.0 |
| 840.001202 | 36.0 | 1000.0 | 120.000 | 122.0 | H | 149.0 | -1.9 | 10.0 | 46.0 |

Test Notes: Only worst case channel presented for spurious emissions below 1GHz.

2.1.13 Test Results Above 1GHz (Low Channel including Band Edges)



Peak Data

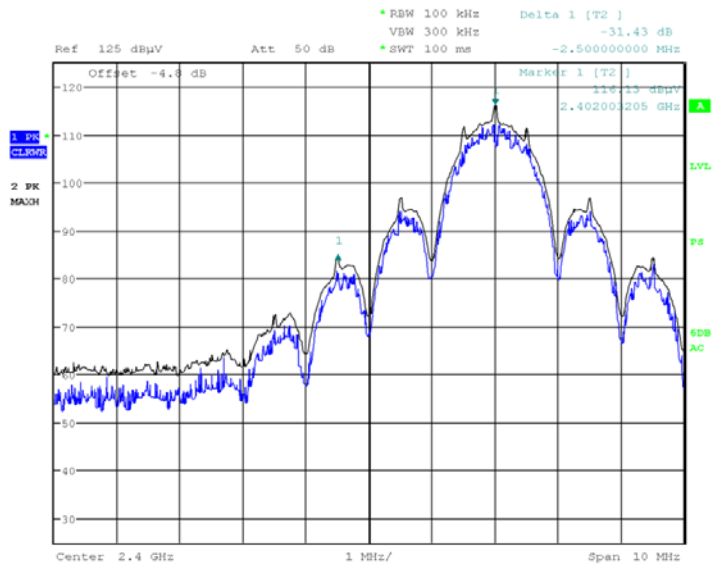
| Frequency (MHz) | MaxPeak (dBµV/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Polarization | Azimuth (deg) | Corr. (dB) | Margin (dB) | Limit (dBµV/m) |
|-----------------|------------------|-----------------|-----------------|-------------|--------------|---------------|------------|-------------|----------------|
| 1278.300000 | 35.1 | 1000.0 | 1000.000 | 130.0 | V | 224.0 | -9.3 | 38.8 | 73.9 |
| 2483.520000 | 41.2 | 1000.0 | 1000.000 | 100.0 | V | 58.0 | -4.6 | 32.7 | 73.9 |
| 3202.660000 | 46.6 | 1000.0 | 1000.000 | 188.0 | V | 181.0 | -0.9 | 27.3 | 73.9 |
| 4803.040000 | 41.7 | 1000.0 | 1000.000 | 112.0 | V | 4.0 | 2.1 | 32.2 | 73.9 |
| 10994.080000 | 43.6 | 1000.0 | 1000.000 | 100.0 | V | 15.0 | 11.4 | 30.3 | 73.9 |
| 17933.680000 | 51.9 | 1000.0 | 1000.000 | 363.0 | V | 353.0 | 21.0 | 22.0 | 73.9 |

Average Data

| Frequency (MHz) | Average (dBµV/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Polarization | Azimuth (deg) | Corr. (dB) | Margin (dB) | Limit (dBµV/m) |
|-----------------|------------------|-----------------|-----------------|-------------|--------------|---------------|------------|-------------|----------------|
| 1278.300000 | 22.1 | 1000.0 | 1000.000 | 130.0 | V | 224.0 | -9.3 | 31.8 | 53.9 |
| 2483.520000 | 28.1 | 1000.0 | 1000.000 | 100.0 | V | 58.0 | -4.6 | 25.8 | 53.9 |
| 3202.660000 | 40.0 | 1000.0 | 1000.000 | 188.0 | V | 181.0 | -0.9 | 13.9 | 53.9 |
| 4803.040000 | 29.6 | 1000.0 | 1000.000 | 112.0 | V | 4.0 | 2.1 | 24.3 | 53.9 |
| 10994.080000 | 30.2 | 1000.0 | 1000.000 | 100.0 | V | 15.0 | 11.4 | 23.7 | 53.9 |
| 17933.680000 | 38.8 | 1000.0 | 1000.000 | 363.0 | V | 353.0 | 21.0 | 15.1 | 53.9 |

Test Notes: Measurement was performed with a 2.4GHz notch filter. Band edge measurements were performed with the notch filter removed. Lower band edge was verified manually using 100kHz RBW (see attached plot Section 2.1.14).

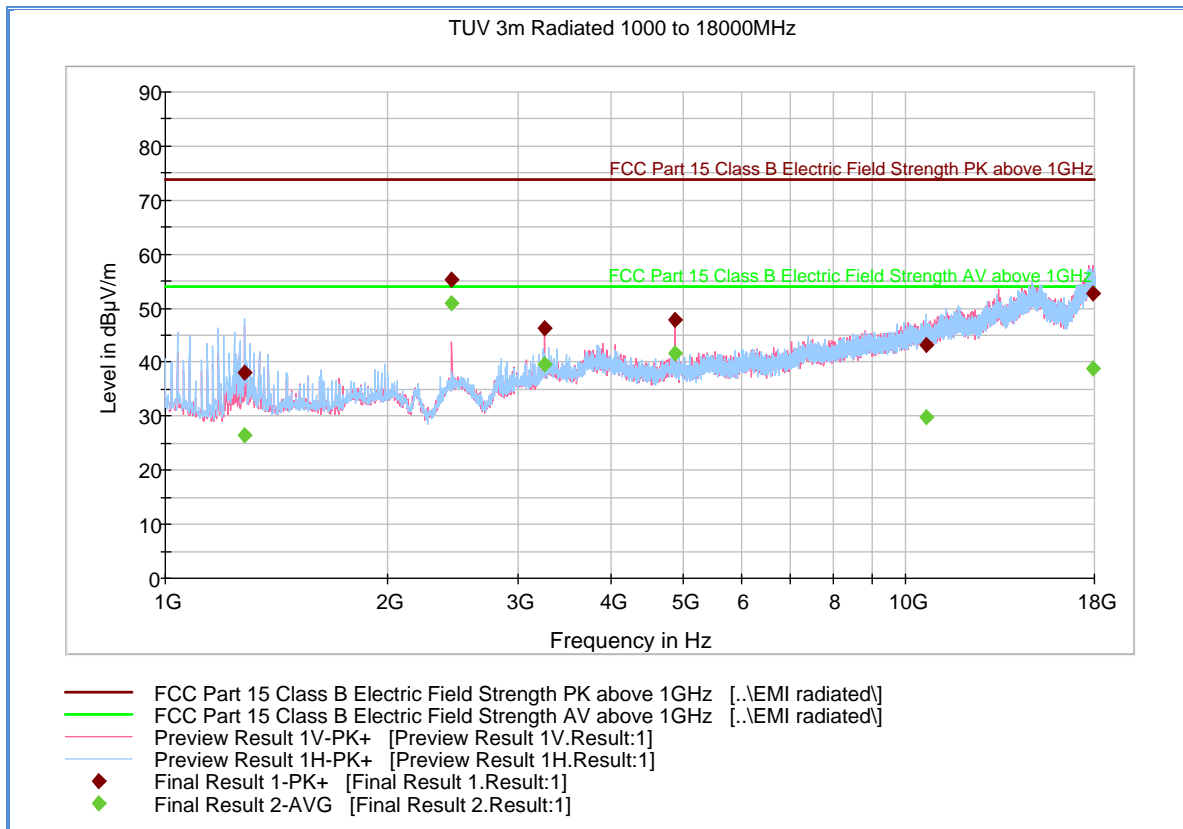
2.1.14 Test Results Lower Band Edge (Radiated - Low Channel using 100 kHz RBW)



Date: 17.MAY.2012 16:03:31

Test Notes: Carrier frequency (Low Channel) was maximized for this test. Correction factor of -4.8dB is from the cable, antenna and preamp used. The EUT complies with the conducted power limits based on the use of RMS averaging over a time interval therefore the limit for this test is -30dBc. The highest measured emission close to the lower band edge is -31.43dBc. EUT complies.

2.1.15 Test Results Above 1GHz (Mid Channel)



Peak Data

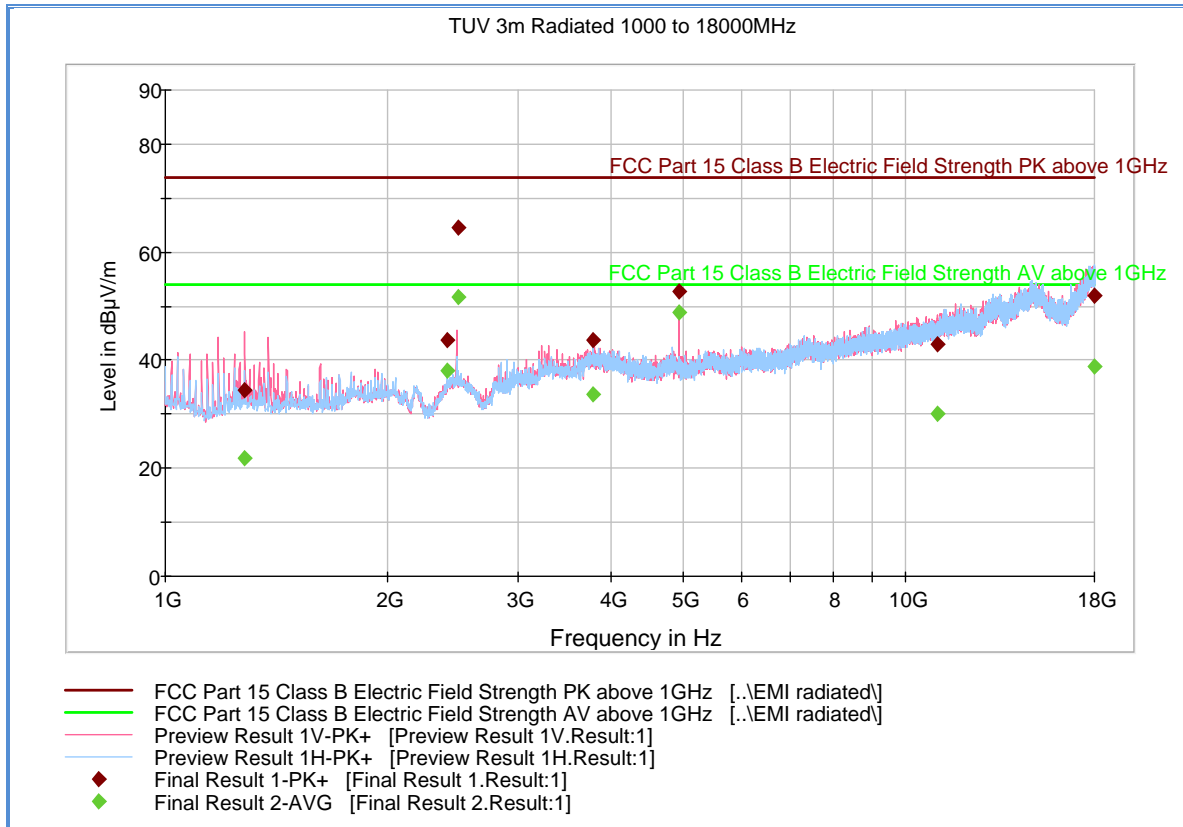
| Frequency (MHz) | MaxPeak (dBμV/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Polarization | Azimuth (deg) | Corr. (dB) | Margin (dB) | Limit (dBμV/m) |
|-----------------|------------------|-----------------|-----------------|-------------|--------------|---------------|------------|-----------------|----------------|
| 1278.300000 | 38.1 | 1000. | 1000.000 | 100.0 | H | 190.0 | -9.3 | 35.8 | 73.9 |
| 2439.800000 | 55.3 | 1000. | 1000.000 | 227.0 | V | 15.0 | -4.7 | Fund. w/ filter | |
| 3253.080000 | 46.3 | 1000. | 1000.000 | 125.0 | V | 190.0 | -0.7 | 27.6 | 73.9 |
| 4879.620000 | 47.8 | 1000. | 1000.000 | 126.0 | V | 238.0 | 2.2 | 26.1 | 73.9 |
| 10653.960000 | 43.2 | 1000. | 1000.000 | 194.0 | H | 76.0 | 11.1 | 30.7 | 73.9 |
| 17958.980000 | 52.6 | 1000. | 1000.000 | 387.0 | V | 151.0 | 21.2 | 21.3 | 73.9 |

Average Data

| Frequency (MHz) | Average (dBμV/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Polarization | Azimuth (deg) | Corr. (dB) | Margin (dB) | Limit (dBμV/m) |
|-----------------|------------------|-----------------|-----------------|-------------|--------------|---------------|------------|-----------------|----------------|
| 1278.300000 | 26.6 | 1000.0 | 1000.000 | 100.0 | H | 190.0 | -9.3 | 27.3 | 53.9 |
| 2439.800000 | 51.0 | 1000.0 | 1000.000 | 227.0 | V | 15.0 | -4.7 | Fund. w/ filter | |
| 3253.080000 | 39.7 | 1000.0 | 1000.000 | 125.0 | V | 190.0 | -0.7 | 14.2 | 53.9 |
| 4879.620000 | 41.8 | 1000.0 | 1000.000 | 126.0 | V | 238.0 | 2.2 | 12.1 | 53.9 |
| 10653.960000 | 29.9 | 1000.0 | 1000.000 | 194.0 | H | 76.0 | 11.1 | 24.0 | 53.9 |
| 17958.980000 | 38.9 | 1000.0 | 1000.000 | 387.0 | V | 151.0 | 21.2 | 15.0 | 53.9 |

Test Notes: Measurement was performed with a 2.4GHz notch filter. Band edge measurements were performed with the notch filter removed, however no emissions were observed (noise floor).

2.1.16 Test Results Above 1GHz (High Channel including Band Edges)



Peak Data

| Frequency (MHz) | MaxPeak (dBµV/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Polarization | Azimuth (deg) | Corr. (dB) | Margin (dB) | Limit (dBµV/m) |
|-----------------|------------------|-----------------|-----------------|-------------|--------------|---------------|------------|-----------------|----------------|
| 1278.340000 | 34.5 | 1000.0 | 1000.000 | 104.0 | V | 56.0 | -9.3 | 39.4 | 73.9 |
| 2399.940000 | 43.7 | 1000.0 | 1000.000 | 109.0 | H | 196.0 | -4.8 | Fund. w/ filter | |
| 2483.440000 | 64.6 | 1000.0 | 1000.000 | 165.0 | V | 13.0 | -4.6 | 9.3 | 73.9 |
| 3779.920000 | 43.7 | 1000.0 | 1000.000 | 123.0 | H | 145.0 | 2.9 | 30.2 | 73.9 |
| 4951.260000 | 52.6 | 1000.0 | 1000.000 | 107.0 | V | 301.0 | 2.3 | 21.3 | 73.9 |
| 11050.060000 | 42.8 | 1000.0 | 1000.000 | 100.0 | V | 140.0 | 11.6 | 31.1 | 73.9 |
| 17970.360000 | 52.0 | 1000.0 | 1000.000 | 154.0 | H | 154.0 | 21.2 | 21.9 | 73.9 |

Average Data

| Frequency (MHz) | Average (dBµV/m) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Polarization | Azimuth (deg) | Corr. (dB) | Margin (dB) | Limit (dBµV/m) |
|-----------------|------------------|-----------------|-----------------|-------------|--------------|---------------|------------|-----------------|----------------|
| 1278.340000 | 21.8 | 1000.0 | 1000.000 | 104.0 | V | 56.0 | -9.3 | 32.1 | 53.9 |
| 2399.940000 | 37.9 | 1000.0 | 1000.000 | 109.0 | H | 196.0 | -4.8 | Fund. w/ filter | |
| 2483.440000 | 51.8 | 1000.0 | 1000.000 | 165.0 | V | 13.0 | -4.6 | 2.1 | 53.9 |
| 3779.920000 | 33.8 | 1000.0 | 1000.000 | 123.0 | H | 145.0 | 2.9 | 20.1 | 53.9 |
| 4951.260000 | 48.9 | 1000.0 | 1000.000 | 107.0 | V | 301.0 | 2.3 | 5.0 | 53.9 |
| 11050.060000 | 30.1 | 1000.0 | 1000.000 | 100.0 | V | 140.0 | 11.6 | 23.8 | 53.9 |
| 17970.360000 | 38.9 | 1000.0 | 1000.000 | 154.0 | H | 154.0 | 21.2 | 15.0 | 53.9 |

Test Notes: Measurement was performed with a 2.4GHz notch filter. Band edge measurements were performed with the notch filter removed.



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 |
|--------------------------|--------------------------------------|--------------------|---------------|----------------------------|---------------------------|--------------|
| 1033 | Bilog Antenna | 3142C | 00044556 | EMCO | 08/01/11 | 08/01/12 |
| 1040 | EMI Test Receiver | ESIB40 | 100292 | Rhode & Schwarz | 08/10/11 | 08/10/12 |
| 1049 | EMI Test Receiver | ESU | 100133 | Rhode & Schwarz | 06/15/11 | 06/15/12 |
| 6815 | 2.4GHz Band Notch Filter | BRM50702 | 008 | Micro-Tronics | Verified by 1040 | |
| 1051 | Double-ridged waveguide horn antenna | 3115 | 9412-4364 | EMCO | 11/07/11 | 11/07/12 |
| 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 |
| 1150 | Horn antenna | RA42-K-F-4B-C | 012054-004 | CMT | Verified by 1003 and 1049 | |
| 1151 | Pre-amplifier | TS-PR26 | 100026 | Rhode & Schwarz | Verified by 1003 and 1049 | |
| 8628 | Pre-amplifier | QLJ 01182835-JO | 8986002 | QuinStar Technologies Inc. | 08/17/11 | 08/17/12 |
| 8543 | High-frequency cable | Micropore 19057793 | N/A | United Microwave Products | 08/17/11 | 08/17/12 |
| 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 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 | Preamplifier | Rectangular | 0.50 | 0.29 | 0.08 |
| 4 | Antenna | Rectangular | 0.75 | 0.43 | 0.19 |
| 5 | Site | Rectangular | 2.00 | 1.15 | 1.33 |
| 6 | EUT Setup | Rectangular | 1.00 | 0.58 | 0.33 |
| Combined Uncertainty (u_c): | | | | | 1.45 |
| Coverage Factor (k): | | | | | 2 |
| Expanded Uncertainty: | | | | | 2.89 |

3.2.2 Radiated Emission Measurements (Above 1GHz)

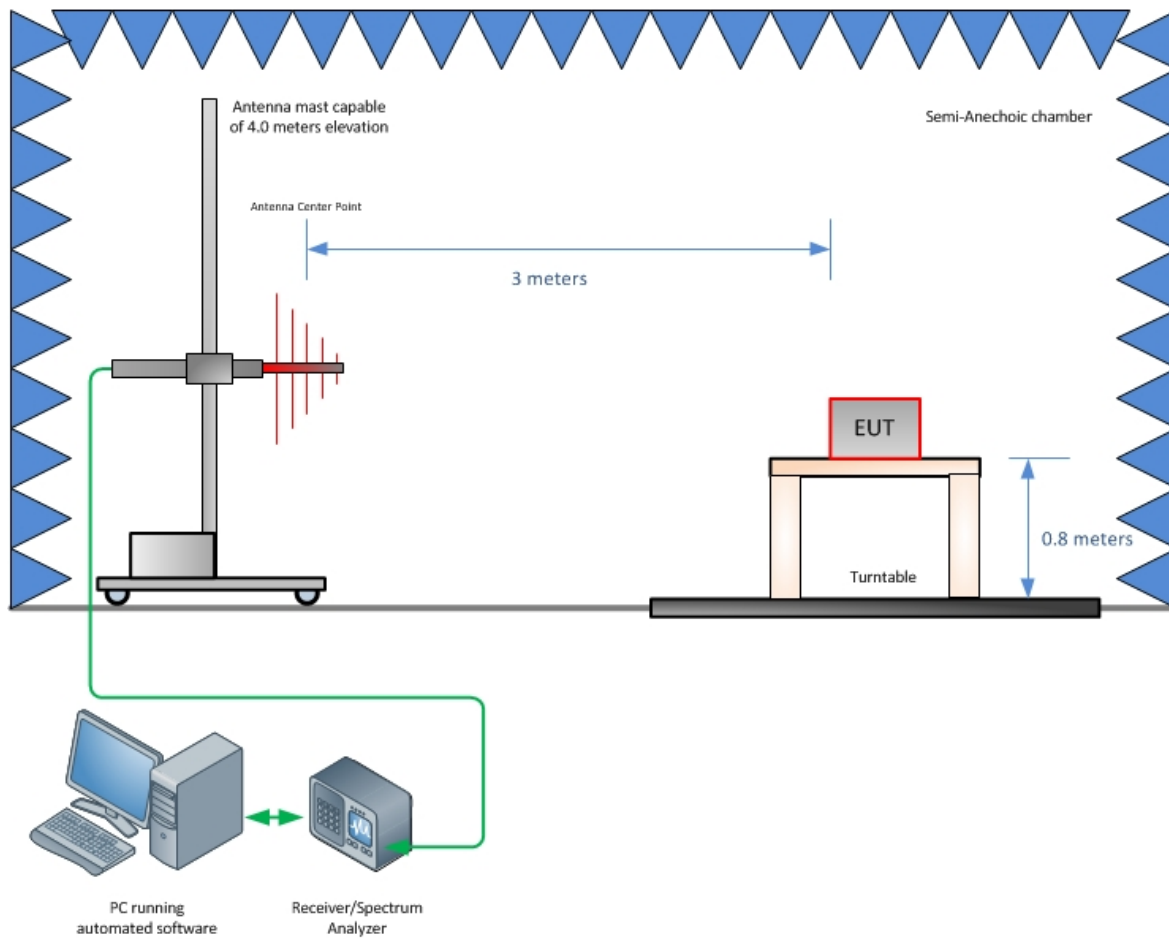
| Contribution | | Probability Distribution Type | Probability Distribution x_i | Standard Uncertainty $u(x_i)$ | $[u(x_i)]^2$ |
|---------------------------------|----------------------------|-------------------------------|--------------------------------|-------------------------------|--------------|
| 1 | Receiver/Spectrum Analyzer | Rectangular | 0.45 | 0.26 | 0.07 |
| 2 | Cables | Rectangular | 0.50 | 0.29 | 0.08 |
| 3 | Preamplifier | 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 |



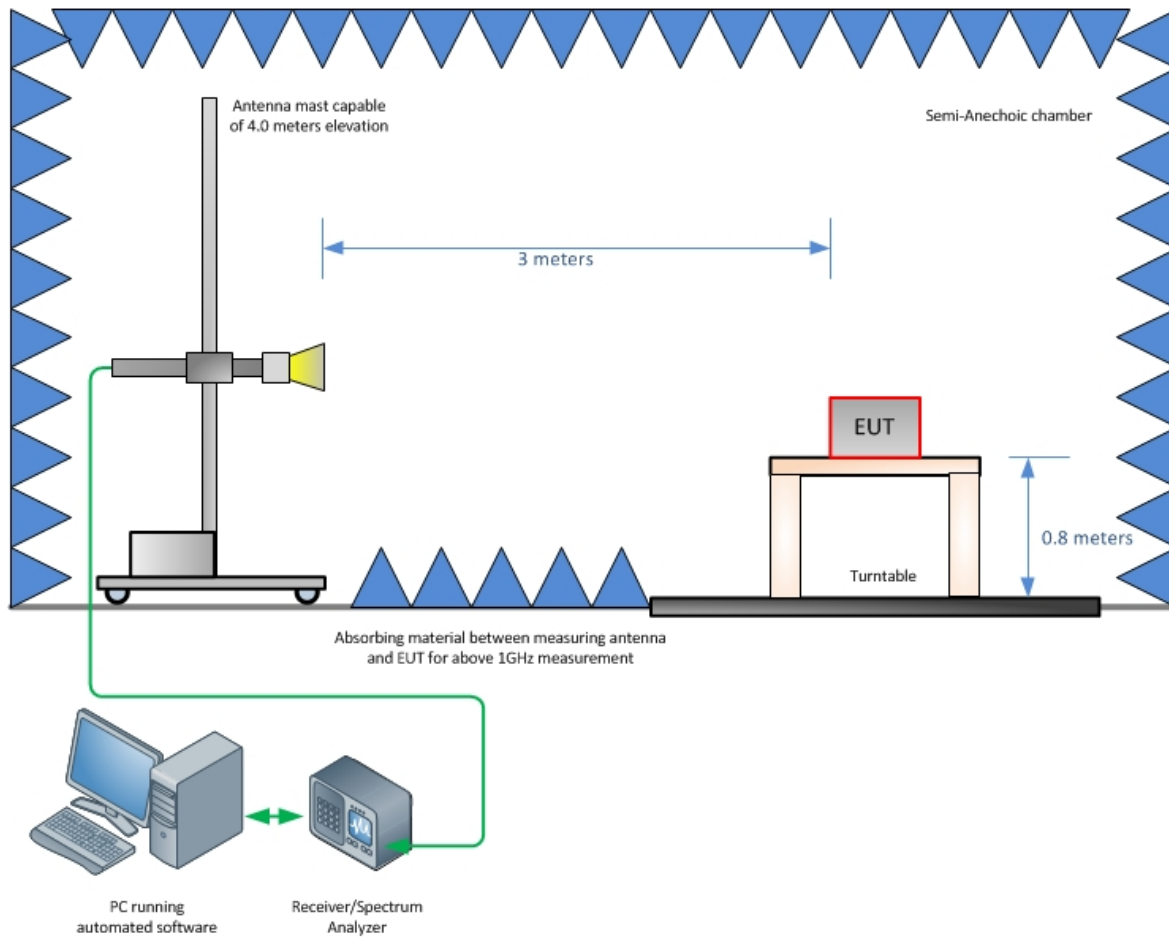
SECTION 4

DIAGRAM OF TEST SETUP

4.1 TEST SETUP DIAGRAM



Radiated Emission Test Setup (Below 1GHz)



Radiated Emission Test Setup (Above 1GHz)



SECTION 5

ACCREDITATION, DISCLAIMERS AND COPYRIGHT



5.1 ACCREDITATION, DISCLAIMERS AND COPYRIGHT

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