

FCC Part 15C

Measurement and Test Report

For

STONEX EUROPE srl

Via Cimabue 39, 20851 Lissone (MB), Italy

FCC ID: Y44STN21

| | |
|--|--|
| Report Concerns: Original Report | Equipment Type: GPS SURVEYING EQUIPMENT |
| Model: | <u>STONEX S9GNSS</u> |
| Report No.: | <u>STR10118241I</u> |
| Test Date: | <u>2010-11-24 to 2010-12-25</u> |
| Issue Date: | <u>2011-01-06</u> |
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Note: This test report is limited to the above client company and the product model only. It may not be duplicated without prior permitted by SEM.Test Compliance Service Co., Ltd.

TABLE OF CONTENTS

1. GENERAL INFORMATION.....4

 1.1 PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT).....4

 1.2 TEST STANDARDS.....4

 1.4 TEST METHODOLOGY4

 1.4 TEST FACILITY5

 1.5 EUT EXERCISE SOFTWARE5

 1.6 ACCESSORIES EQUIPMENT LIST AND DETAILS5

 1.7 EUT CABLE LIST AND DETAILS5

2. SUMMARY OF TEST RESULTS6

3. §15.203 - ANTENNA REQUIREMENT.....7

 3.1 STANDARD APPLICABLE.....7

 3.2 TEST RESULT.....7

4. §15.107 (A) CONDUCTED EMISSIONS8

 4.1 MEASUREMENT UNCERTAINTY8

 4.2 TEST EQUIPMENT LIST AND DETAILS8

 4.3 TEST PROCEDURE.....8

 4.4 BASIC TEST SETUP BLOCK DIAGRAM.....8

 4.5 ENVIRONMENTAL CONDITIONS9

 4.6 SUMMARY OF TEST RESULTS/PLOTS9

 4.7 CONDUCTED EMISSIONS TEST DATA.....9

5. NUMBER OF HOPPING CHANNELS AND CHANNEL SPACING12

 5.1 STANDARD APPLICABLE.....12

 5.2 TEST EQUIPMENT LIST AND DETAILS12

 5.3 TEST PROCEDURE.....12

 5.4 ENVIRONMENTAL CONDITIONS12

 5.5 SUMMARY OF TEST RESULTS/PLOTS13

6. DWELL TIME OF A HOPPING CHANNEL15

 6.1 STANDARD APPLICABLE.....15

 6.2 TEST EQUIPMENT LIST AND DETAILS15

 6.3 TEST PROCEDURE.....15

 6.4 ENVIRONMENTAL CONDITIONS15

 6.5 SUMMARY OF TEST RESULTS/PLOTS16

7. 20DB BANDWIDTH18

 7.1 STANDARD APPLICABLE.....18

 7.2 TEST EQUIPMENT LIST AND DETAILS18

 7.3 TEST PROCEDURE.....18

 7.4 ENVIRONMENTAL CONDITIONS18

 7.5 SUMMARY OF TEST RESULTS/PLOTS18

8. POWER OUTPUT.....21

 8.1 STANDARD APPLICABLE.....21

 8.2 TEST EQUIPMENT LIST AND DETAILS21

 8.3 TEST PROCEDURE.....21

 8.4 ENVIRONMENTAL CONDITIONS21

 8.5 SUMMARY OF TEST RESULTS/PLOTS21

9. FIELD STRENGTH OF SPURIOUS EMISSIONS22

 9.1 MEASUREMENT UNCERTAINTY22

 9.2 STANDARD APPLICABLE.....22

 9.3 TEST EQUIPMENT LIST AND DETAILS22

 9.4 TEST PROCEDURE.....23

 9.5 CORRECTED AMPLITUDE & MARGIN CALCULATION.....23

 9.6 ENVIRONMENTAL CONDITIONS23

 9.7 SUMMARY OF TEST RESULTS/PLOTS24

10. OUT OF BAND EMISSIONS.....34

 10.1 STANDARD APPLICABLE.....34

10.2 TEST EQUIPMENT LIST AND DETAILS34
10.3 TEST PROCEDURE.....34
10.4 ENVIRONMENTAL CONDITIONS34
10.5 SUMMARY OF TEST RESULTS/PLOTS35

1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant: STONEX EUROPE srl
 Address of applicant: Via Cimabue 39, 20851 Lissone (MB), Italy

Manufacturer: STONEX EUROPE srl
 Address of manufacturer: Via Cimabue 39, 20851 Lissone (MB), Italy

General Description of E.U.T

| Items | Description |
|---|--------------------------|
| EUT Description: | GPS SURVEYING EQUIPMENT |
| Trade Name: | STONEX |
| Model Tested: | STONEX S9GNSS, STONEX S8 |
| Rated Voltage: | 7.2V DC |
| RF Output Power | -6dBm~4dBm |
| Frequency range: | 2402-2480MHz |
| Number of channels: | 79 |
| Channel Separation: | 1MHz |
| Type of Antenna: | Integral Antenna |
| Size: | 18.5X18.5X9.5 cm |
| For more information refer to the circuit diagram form and the user's manual. | |

Note: The test data is gathered from a production sample, provided by the manufacture.

1.2 Test Standards

The following report is prepared on behalf of the STONEX EUROPE srl in accordance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.207, 15.209 and 15.247 of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC Part 15, Subpart C, and section 15.203, 15.205, 15.207, 15.209 and 15.247 of the Federal Communication Commissions rules.

Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product, which result in lowering the emission, should be checked to ensure compliance has been maintained.

1.4 Test Methodology

All measurements contained in this report were conducted with ANSI C63.4-2003, 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.

The equipment under test (EUT) was configured to measure its highest possible emission level. The test modes

were adapted with Low Channel, Middle Channel and High Channel, accordingly in reference to the Operating Instructions.

1.4 Test Facility

- **FCC – Registration No.: 994117**

SEM.Test Compliance Services Co., Ltd. EMC 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 994117.

- **Industry Canada (IC) Registration No.: 7673A**

The 3m Semi-anechoic chamber of SEM.Test Compliance Services Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 7673A.

- **CNAS Registration No.: L4062**

Shenzhen SEM.Test Electronics Service Co., Ltd. is a testing organization accredited by China National Accreditation Service for Conformity Assessment (CNAS) according to ISO/IEC 17025. The accreditation certificate number is L4062. All measurement facilities used to collect the measurement data are located at 3/F, Jinbao Commerce Building, Xin'an Fanshen Road, Bao'an District, Shenzhen, P.R.C (518101)

1.5 EUT Exercise Software

The EUT exercise program used during the testing was designed to exercise the system components.

1.6 Accessories Equipment List and Details

| Description | Manufacturer | Model | Serial Number |
|-------------|--------------|-------|---------------|
| PC | DELL | 380 | N/A |
| / | / | / | / |

1.7 EUT Cable List and Details

| Cable Description | Length (M) | Shielded/Unshielded | With Core/Without Core |
|-------------------|------------|---------------------|------------------------|
| / | / | / | / |
| / | / | / | / |

2. SUMMARY OF TEST RESULTS

| FCC RULES | DESCRIPTION OF TEST | RESULT |
|-----------------------------|--------------------------------|-----------|
| § 15.203; § 15.247(b)(4)(i) | Antenna Requirement | Compliant |
| § 15.209 | Conducted Emission | Compliant |
| § 15.247(a)(1)(iii) | Quantity of Hopping Channel | Compliant |
| § 15.247(a)(1) | Channel Separation | Compliant |
| § 15.247(a)(1)(iii) | Time of Occupancy (Dwell time) | Compliant |
| § 15.247(a) | 20dB Bandwidth | Compliant |
| § 15.247(b)(1) | Power Output | Compliant |
| § 15.209(a)(f) | Radiated Emission | Compliant |
| § 15.247(c) | Band edge | Compliant |

3. §15.203 - ANTENNA REQUIREMENT

3.1 Standard Applicable

According to FCC 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

3.2 Test Result

This product has a permanent antenna, fulfill the requirement of this section.

4. §15.107 (a) CONDUCTED EMISSIONS

4.1 Measurement Uncertainty

Base on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of any conducted emissions measurement is ± 2.88 dB.

4.2 Test Equipment List and Details

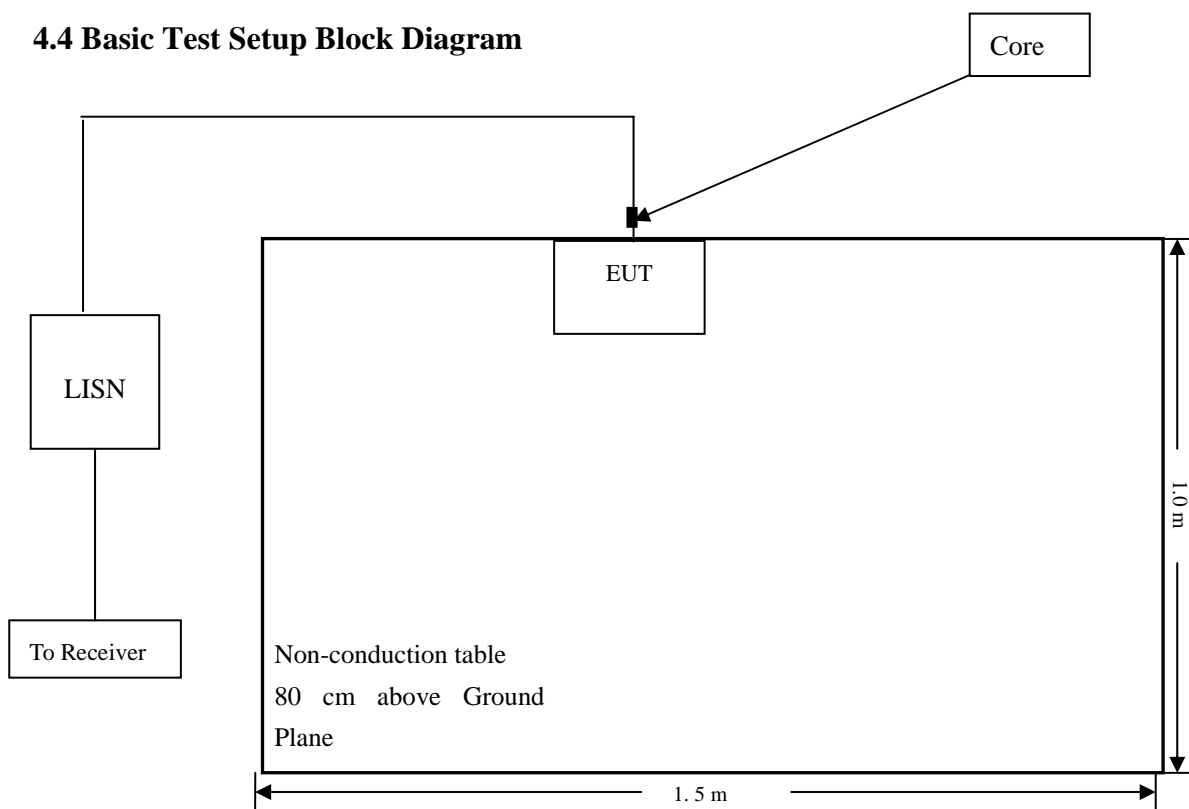
| Description | Manufacturer | Model | Serial Number | Cal. Date | Due. Date |
|-------------------|-----------------|----------|---------------|------------|------------|
| EMI Test Receiver | Rohde & Schwarz | ESPI | 101611 | 2010-08-12 | 2011-08-11 |
| L.I.S.N | Schwarz beck | NSLK8126 | 8126-224 | 2010-08-12 | 2011-08-11 |
| Pulse Limiter | Rohde & Schwarz | ESH3-Z2 | 100911 | 2010-08-12 | 2011-08-11 |

Statement of Traceability: All calibrations have been performed per the NVLAP requirements traceable to the NIST.

4.3 Test Procedure

Test is conducting under the description of ANSI C63.4-2003, 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.

4.4 Basic Test Setup Block Diagram



4.5 Environmental Conditions

| | |
|--------------------|-----------|
| Temperature: | 23 °C |
| Relative Humidity: | 52% |
| ATM Pressure: | 1011 mbar |

4.6 Summary of Test Results/Plots

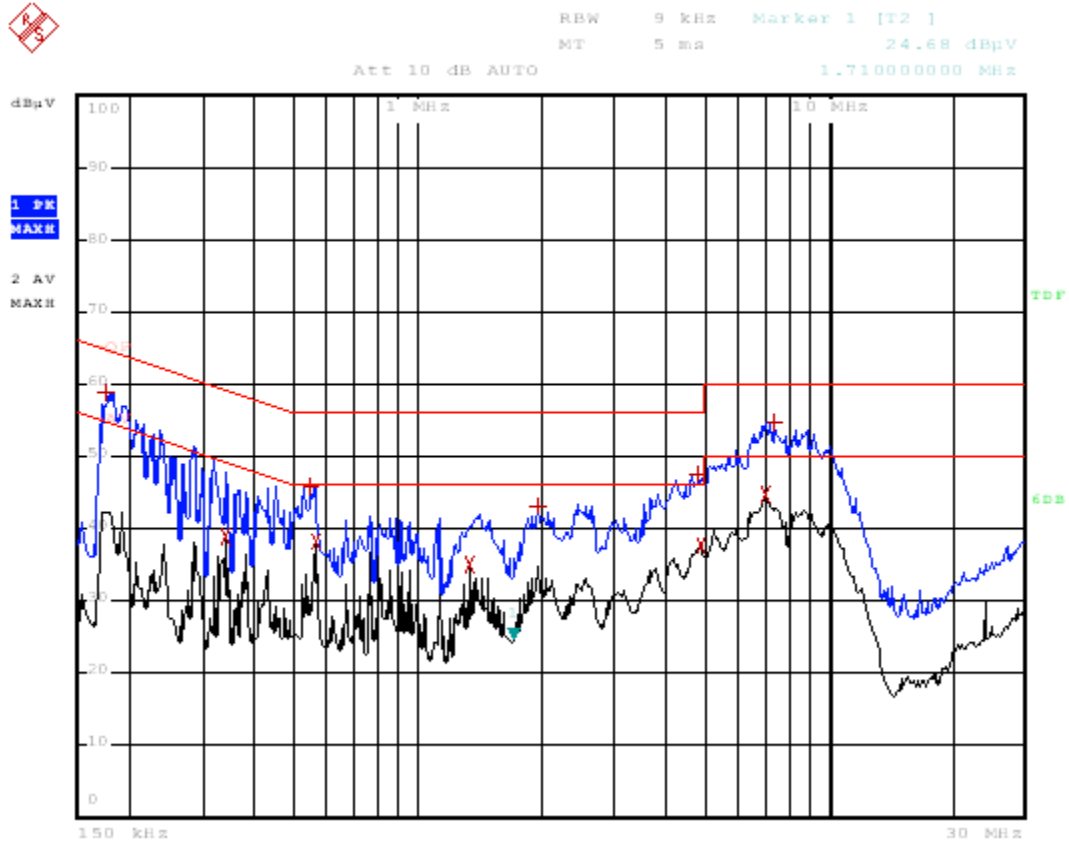
According to the data in section 3.7, the EUT complied with the FCC 15.107 Conducted margin for a Class B device, with the *worst* margin reading of:

-5.17 dB μ V at 7.41 MHz in the Neutral, Peak detector, 0.15-30MHz

4.7 Conducted Emissions Test Data

Plot of Conducted Emissions Test Data

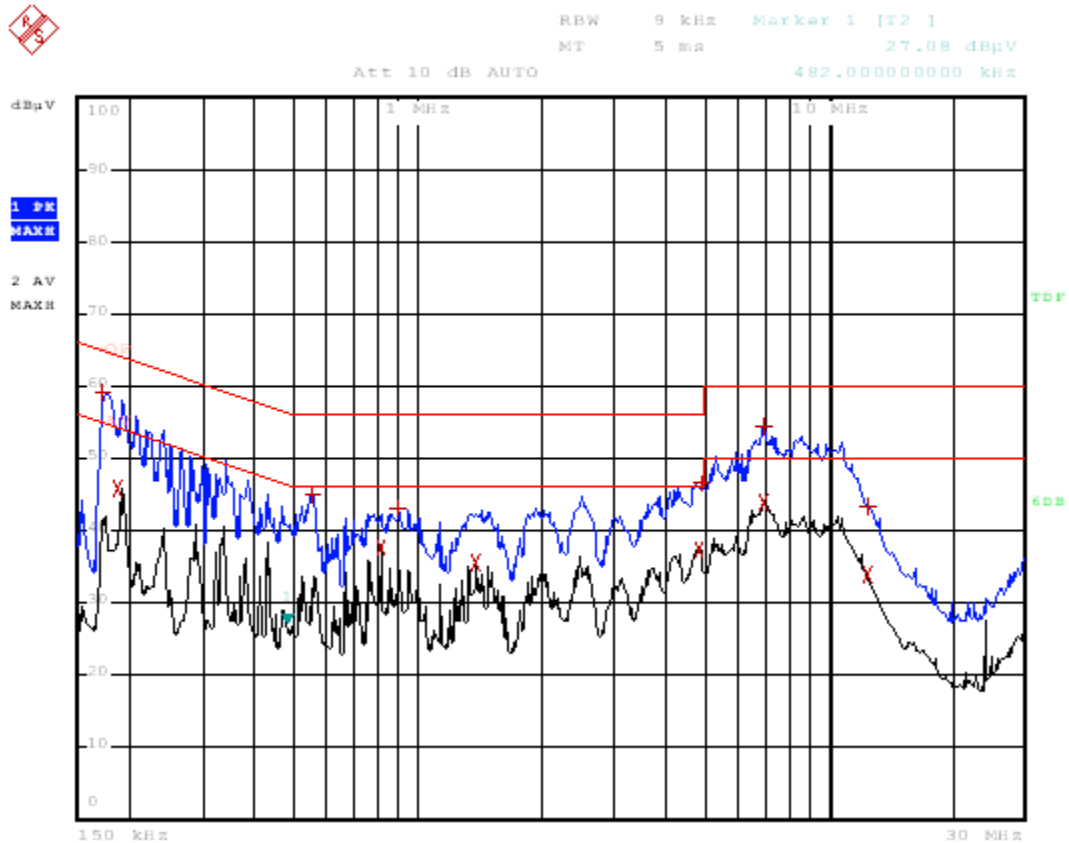
Conducted Disturbance
 EUT: GPS SURVEYING EQUIPMENT
 M/N: STONEX S9GNSS
 Operating Condition: Charging
 Test Specification: N
 Comment: 120V60Hz



| EDIT PEAK LIST (Prescan Results) | | | |
|----------------------------------|-----------|------------|----------------|
| TRACE | FREQUENCY | LEVEL dBµV | DELTA LIMIT dB |
| Trace1: | -QP | | |
| Trace2: | -AV | | |
| Trace3: | --- | | |
| 1 Max Peak | 178 kHz | 58.80 | -5.77 |
| 2 Average | 338 kHz | 38.91 | -10.33 |
| 1 Max Peak | 546 kHz | 45.72 | -10.27 |
| 2 Average | 566 kHz | 38.28 | -7.71 |
| 2 Average | 1.342 MHz | 35.15 | -10.84 |
| 1 Max Peak | 1.97 MHz | 43.08 | -12.91 |
| 1 Max Peak | 4.778 MHz | 47.57 | -8.42 |
| 2 Average | 4.886 MHz | 37.55 | -8.44 |
| 2 Average | 7.038 MHz | 44.73 | -5.26 |
| 1 Max Peak | 7.41 MHz | 54.82 | -5.17 |

Plot of Conducted Emissions Test Data

Conducted Disturbance
 EUT: GPS SURVEYING EQUIPMENT
 M/N: STONEX S9GNSS
 Operating Condition: Charging
 Test Specification: N
 Comment: 120V60Hz



| EDIT PEAK LIST (Prescan Results) | | | |
|----------------------------------|------------|------------|----------------|
| TRACE | FREQUENCY | LEVEL dBµV | DELTA LIMIT dB |
| Trace1: | -QP | | |
| Trace2: | -AV | | |
| Trace3: | --- | | |
| 1 Max Peak | 174 kHz | 59.15 | -5.61 |
| 2 Average | 190 kHz | 45.73 | -8.30 |
| 1 Max Peak | 554 kHz | 44.99 | -11.00 |
| 2 Average | 810 kHz | 37.67 | -8.32 |
| 1 Max Peak | 894 kHz | 43.17 | -12.82 |
| 2 Average | 1.39 MHz | 35.57 | -10.42 |
| 2 Average | 4.858 MHz | 37.42 | -8.57 |
| 1 Max Peak | 4.902 MHz | 46.70 | -9.29 |
| 2 Average | 6.942 MHz | 43.84 | -6.15 |
| 1 Max Peak | 6.97 MHz | 54.37 | -5.62 |
| 2 Average | 12.414 MHz | 33.99 | -16.00 |
| 1 Max Peak | 12.434 MHz | 43.41 | -16.58 |

5. NUMBER OF HOPPING CHANNELS AND CHANNEL SPACING

5.1 Standard Applicable

According to FCC 15.247(a)(1), frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, and frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.

5.2 Test Equipment List and Details

| Description | Manufacturer | Model | Serial Number | Cal. Date | Due. Date |
|-------------------|--------------|-------------|---------------|------------|------------|
| Spectrum Analyzer | Agilent | E4402B | US41192821 | 2010-08-12 | 2011-08-11 |
| Attenuator | ATTEN | ATS100-4-20 | / | 2010-08-12 | 2011-08-11 |

Statement of Traceability: All calibrations have been performed per the NVLAP requirements traceable to the NIST.

5.3 Test Procedure

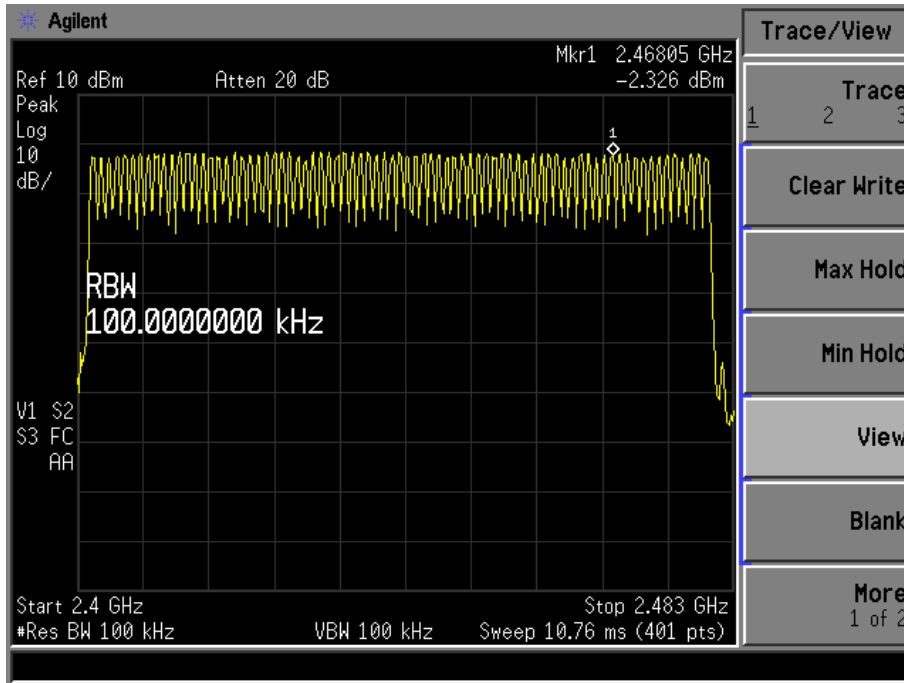
Set the Lowest channel to the Highest Channel, observed the band of 2400MHz to 2438.5MHz, than count it out the number of channels for comparing with the FCC rules. Adjust channel spacing can be read by adjusting the Analyzer SPAN.

5.4 Environmental Conditions

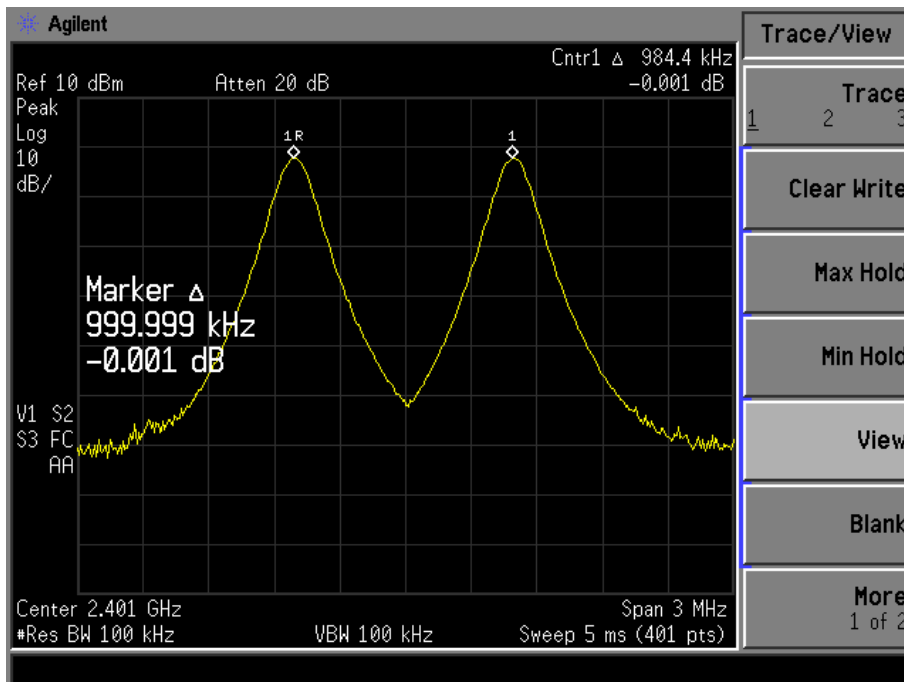
| | |
|--------------------|-----------|
| Temperature: | 24 °C |
| Relative Humidity: | 54% |
| ATM Pressure: | 1011 mbar |

5.5 Summary of Test Results/Plots

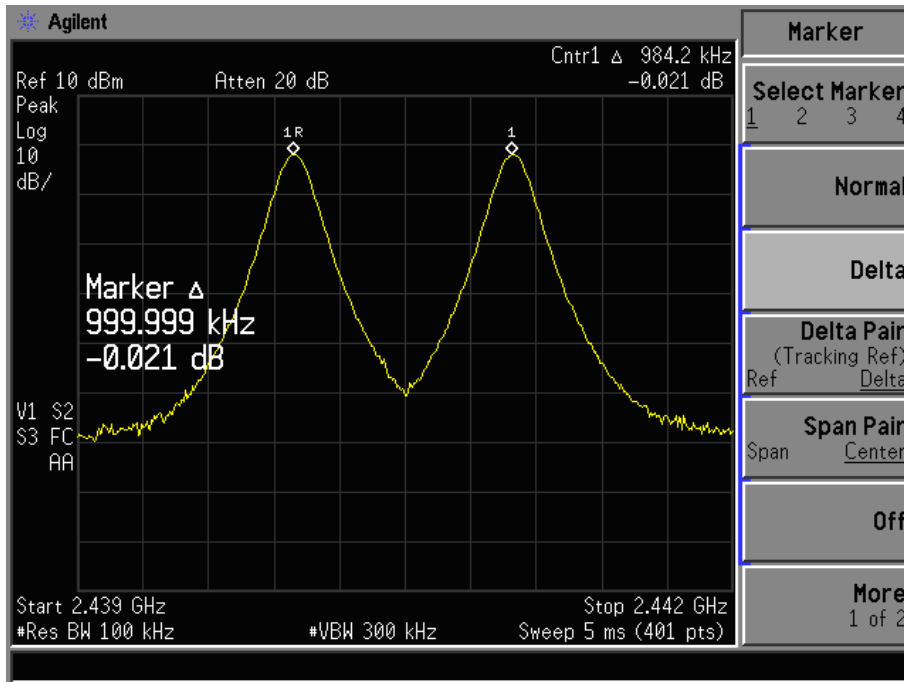
No. of Channel=79



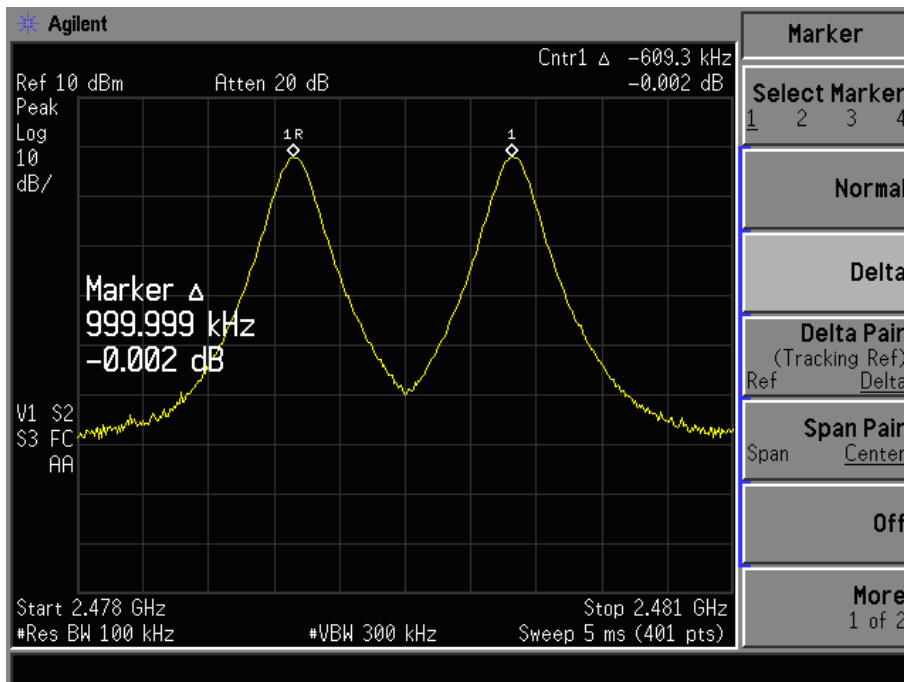
Channel Spacing (Low CH=1MHz)



Channel Spacing (Middle CH=1MHz)



Channel Spacing (High CH=1MHz)



6. DWELL TIME OF A HOPPING CHANNEL

6.1 Standard Applicable

According to 15.247(a)(1)(iii), Frequency hopping systems in the 2400–2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

6.2 Test Equipment List and Details

| Description | Manufacturer | Model | Serial Number | Cal. Date | Due. Date |
|-------------------|--------------|-------------|---------------|------------|------------|
| Spectrum Analyzer | Agilent | E4402B | US41192821 | 2010-08-12 | 2011-08-11 |
| Attenuator | ATTEN | ATS100-4-20 | / | 2010-08-12 | 2011-08-11 |

Statement of Traceability: All calibrations have been performed per the NVLAP requirements traceable to the NIST.

6.3 Test Procedure

1. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
2. Set center frequency of spectrum analyzer = operating frequency.
3. Set the spectrum analyzer as RBW, VBW=100KHz, Span = 0Hz.
4. Repeat above procedures until all frequency measured was complete.

6.4 Environmental Conditions

| | |
|--------------------|-----------|
| Temperature: | 24 °C |
| Relative Humidity: | 54% |
| ATM Pressure: | 1011 mbar |

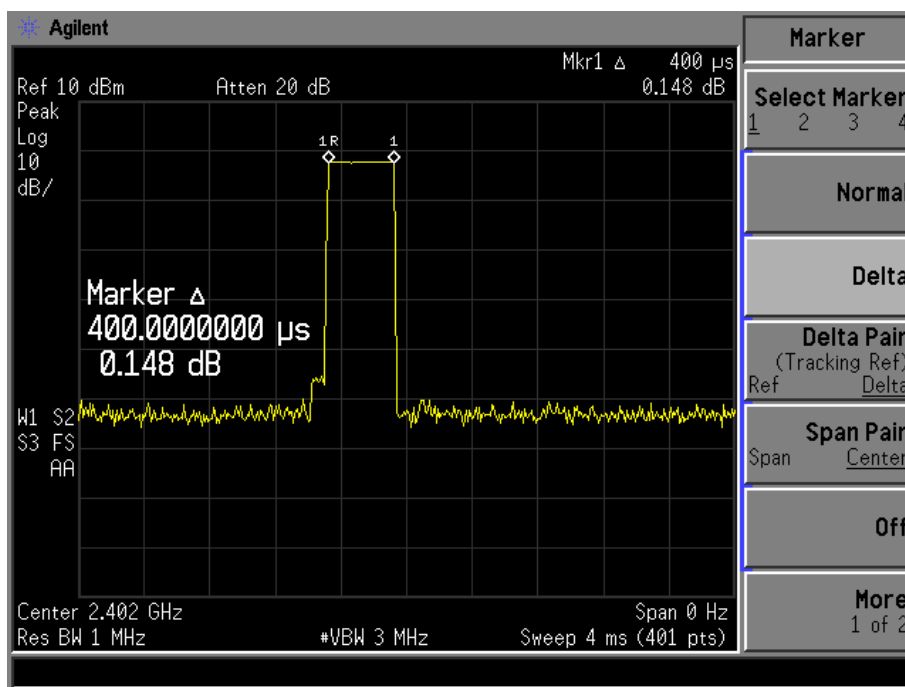
6.5 Summary of Test Results/Plots

The dwell time within a 31.6 second period in data mode is independent from the packet type (packet length). The calculation for a 31.6 second period is as follows:

$$\text{Dwell time} = \text{time slot length} * \text{hop rate} / \text{number of hopping channels} * 31.6\text{s}$$

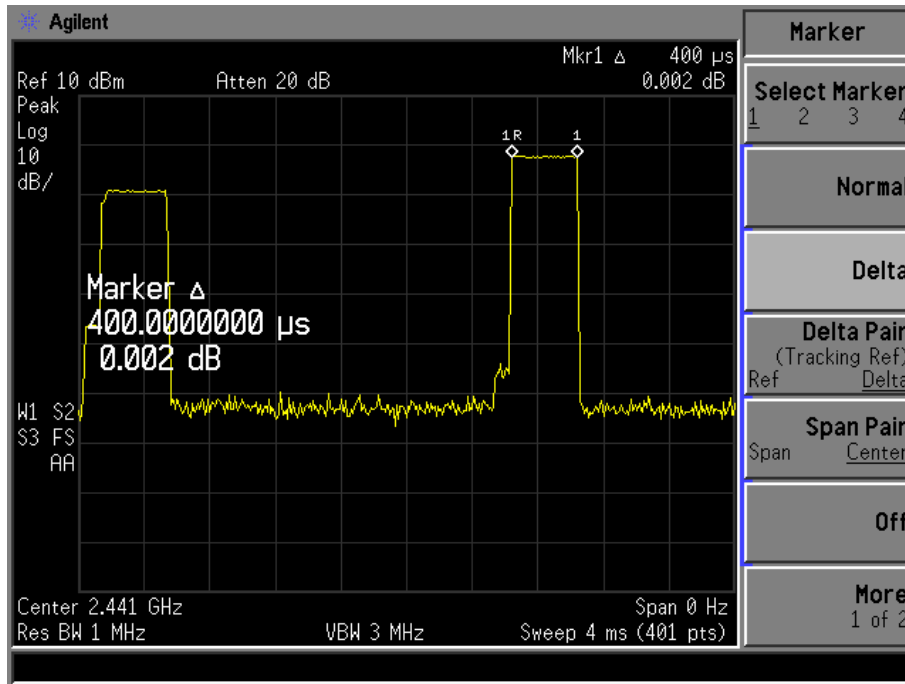
Test data is corrected with the worse case, which the packet length is DH1.

CH Low:



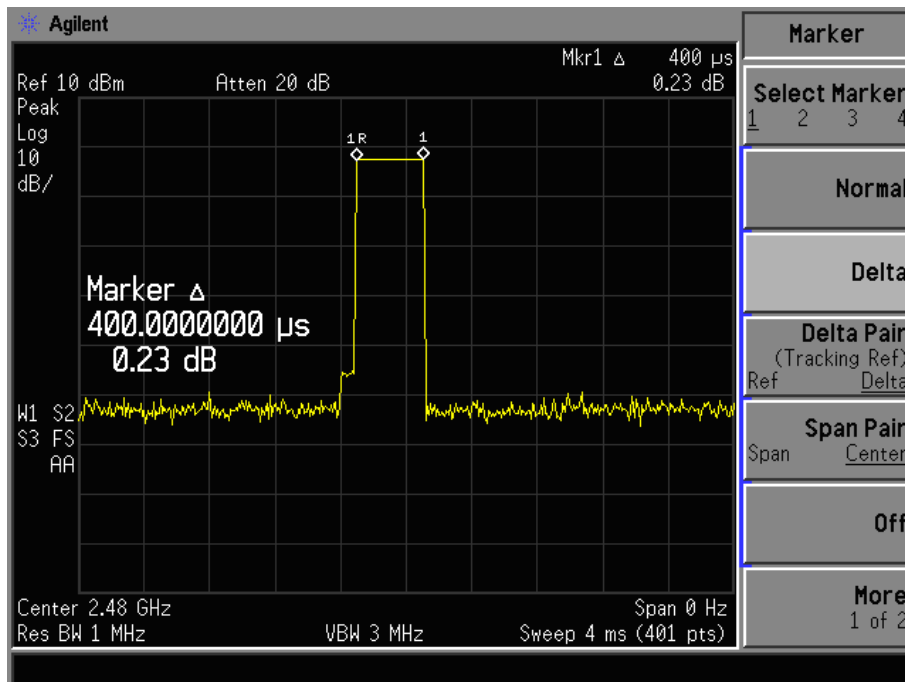
$$\text{DH1 time slot} = 0.40 \text{ (ms)} * (1600/(79)) * 31.6 = 256 \text{ (ms)} < 400 \text{ (ms)}$$

CH Mid:



$DH1 \text{ time slot} = 0.40 \text{ (ms)} * (1600/(79)) * 31.6 = 256 \text{ (ms)} < 400 \text{ (ms)}$

CH High:



$DH1 \text{ time slot} = 0.40 \text{ (ms)} * (1600/(79)) * 31.6 = 256 \text{ (ms)} < 400 \text{ (ms)}$

7. 20dB BANDWIDTH

7.1 Standard Applicable

According to 15.247(a)(1)(iii). For frequency hopping systems operating in the 2400MHz-2483.5 MHz no limit for 20dB bandwidth.

7.2 Test Equipment List and Details

| Description | Manufacturer | Model | Serial Number | Cal. Date | Due. Date |
|-------------------|--------------|-------------|---------------|------------|------------|
| Spectrum Analyzer | Agilent | E4402B | US41192821 | 2010-08-12 | 2011-08-11 |
| Attenuator | ATTEN | ATS100-4-20 | / | 2010-08-12 | 2011-08-11 |

Statement of Traceability: All calibrations have been performed per the NVLAP requirements traceable to the NIST.

7.3 Test Procedure

1. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
2. Set center frequency of spectrum analyzer = operating frequency.
3. The spectrum analyzer as RBW=10KHz (1 % of Bandwidth.), Sweep=auto
4. Mark the peak frequency and -20dB (upper and lower) frequency.

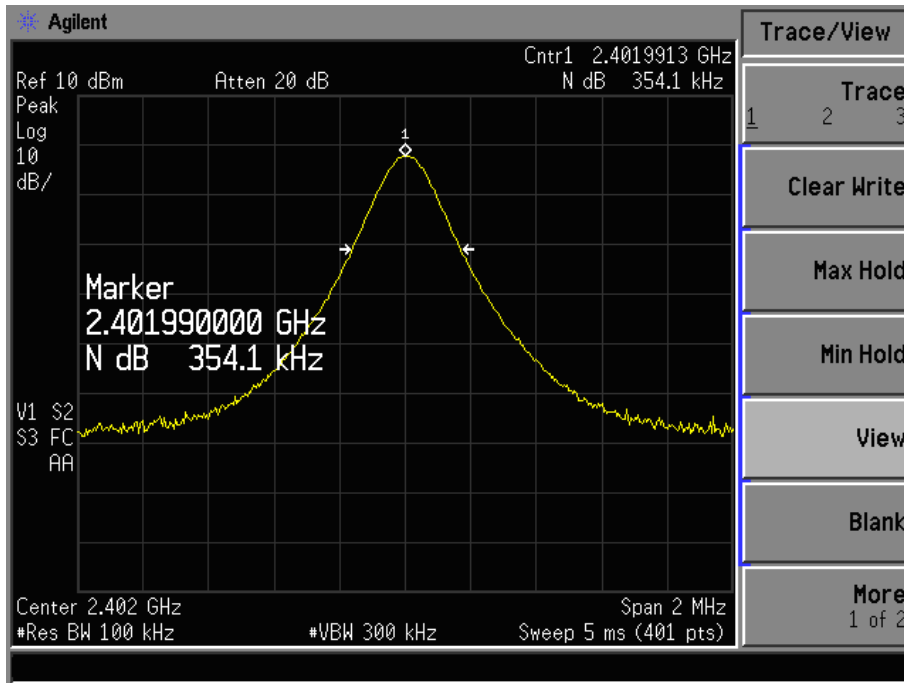
7.4 Environmental Conditions

| | |
|--------------------|-----------|
| Temperature: | 25 °C |
| Relative Humidity: | 53% |
| ATM Pressure: | 1018 mbar |

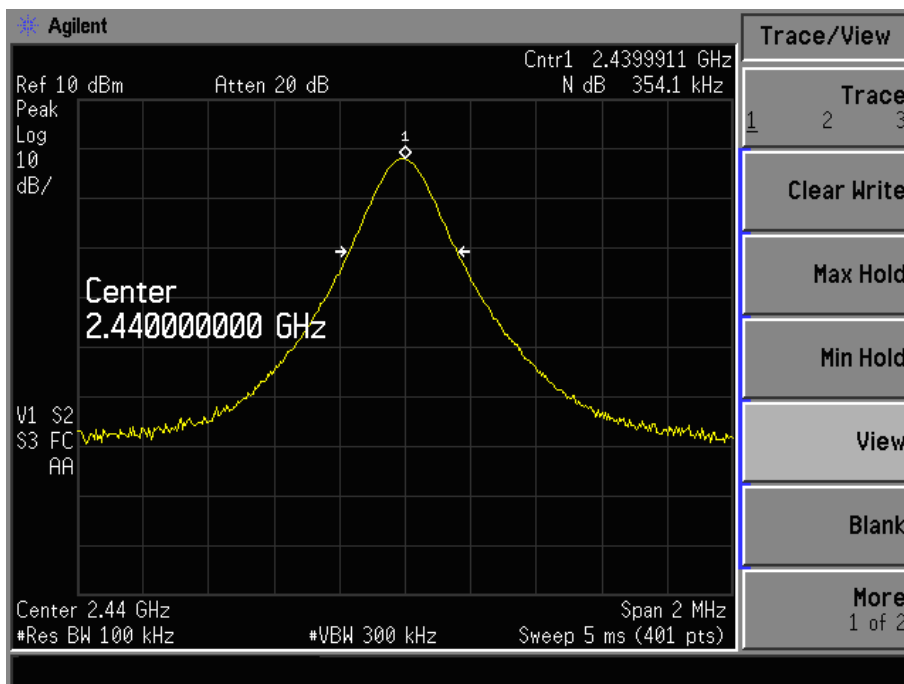
7.5 Summary of Test Results/Plots

| Frequency MHz | 20 dB Bandwidth kHz | Limit dB |
|------------------|------------------------|-------------|
| 2402 | 354.1 | / |
| 2441 | 354.1 | / |
| 2480 | 354.1 | / |

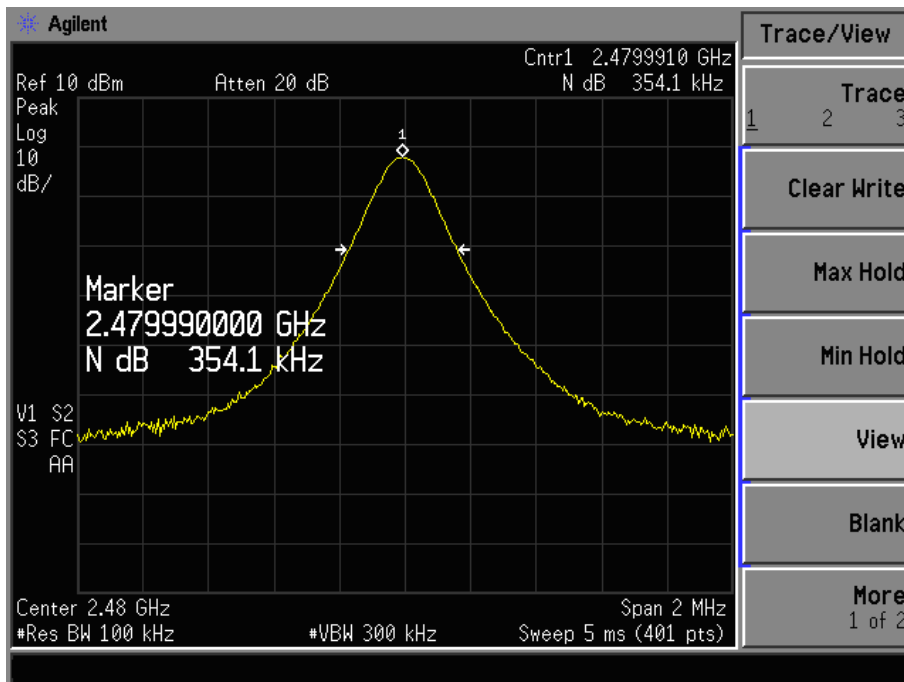
CH Low:



CH Mid:



CH High:



8. POWER OUTPUT

8.1 Standard Applicable

According to 15.247(b)(1). For frequency hopping systems operating in the 2400–2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725–5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400–2483.5 MHz band: 0.125 watts.

8.2 Test Equipment List and Details

| Description | Manufacturer | Model | Serial Number | Cal. Date | Due. Date |
|--------------------------|----------------------|----------|---------------|------------|------------|
| Spectrum Analyzer | R&S | FSP | 836079/035 | 2010-04-16 | 2011-04-15 |
| EMI Test Receiver | R&S | ESVB | 825471/005 | 2010-08-12 | 2011-08-11 |
| Positioning Controller | C&C | CC-C-1F | N/A | 2010-08-12 | 2011-08-11 |
| RF Switch | EM | EMSW18 | SW060023 | 2010-08-12 | 2011-08-11 |
| Pre-amplifier | Agilent | 8447F | 3113A06717 | 2010-08-12 | 2011-08-11 |
| Pre-amplifier | Compliance Direction | PAP-0118 | 24002 | 2010-08-12 | 2011-08-11 |
| Trilog Broadband Antenna | SCHWARZBECK | VULB9163 | 9163-333 | 2010-07-21 | 2011-07-20 |
| Horn Antenna | ETS | 3117 | 00086197 | 2010-07-21 | 2011-07-20 |

Statement of Traceability: All calibrations have been performed per the NVLAP requirements traceable to the NIST.

8.3 Test Procedure

The device under test has an integral antenna and the power was measured on a radiated basis.

8.4 Environmental Conditions

| | |
|--------------------|-----------|
| Temperature: | 24 °C |
| Relative Humidity: | 55% |
| ATM Pressure: | 1011 mbar |

8.5 Summary of Test Results/Plots

2402 MHz 0.6810 mW EIRP

2441 MHz 0.6423 mW EIRP

2480 MHz 0.6210 mW EIRP

Note: The Antenna Gain is under considering.

9. FIELD STRENGTH OF SPURIOUS EMISSIONS

9.1 Measurement Uncertainty

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiation emissions measurement is ± 5.10 dB.

9.2 Standard Applicable

According to §15.247(c), 15.205 15.209(b) & 15.35 (b), the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

Section 15.209:

30 - 88 MHz 40 dBuV/m @3M

88 -216 MHz 43.5 dBuV/m @3M

216 -960 MHz 46 dBuV/m @3M

Above 960 MHz 54dBuV/m @3M

The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in §15.35 for limiting peak emissions apply.

EMISSIONS RADIATED OUTSIDE OF THE SPECIFIED FREQUENCY BANDS, EXCEPT FOR HARMONICS, SHALL BE ATTENUATED BY AT LEAST 20 dB BELOW THE LEVEL OF THE FUNDAMENTAL OR TO THE GENERAL RADIATED EMISSION LIMITS IN 15.209,WHICHEVER IS THE LESSER ATTENUATION.

Emissions that fall in the restricted bands (15.205) must be less than 54dBuV/m otherwise the spurious and harmonics must be attenuated by at least 20dB.

9.3 Test Equipment List and Details

| Description | Manufacturer | Model | Serial Number | Cal. Date | Due. Date |
|--------------------------|----------------------|----------|---------------|------------|------------|
| Spectrum Analyzer | R&S | FSP | 836079/035 | 2010-04-16 | 2011-04-15 |
| EMI Test Receiver | R&S | ESVB | 825471/005 | 2010-08-12 | 2011-08-11 |
| Positioning Controller | C&C | CC-C-1F | N/A | 2010-08-12 | 2011-08-11 |
| RF Switch | EM | EMSW18 | SW060023 | 2010-08-12 | 2011-08-11 |
| Pre-amplifier | Agilent | 8447F | 3113A06717 | 2010-08-12 | 2011-08-11 |
| Pre-amplifier | Compliance Direction | PAP-0118 | 24002 | 2010-08-12 | 2011-08-11 |
| Trilog Broadband Antenna | SCHWARZBECK | VULB9163 | 9163-333 | 2010-07-21 | 2011-07-20 |
| Horn Antenna | ETS | 3117 | 00086197 | 2010-07-21 | 2011-07-20 |

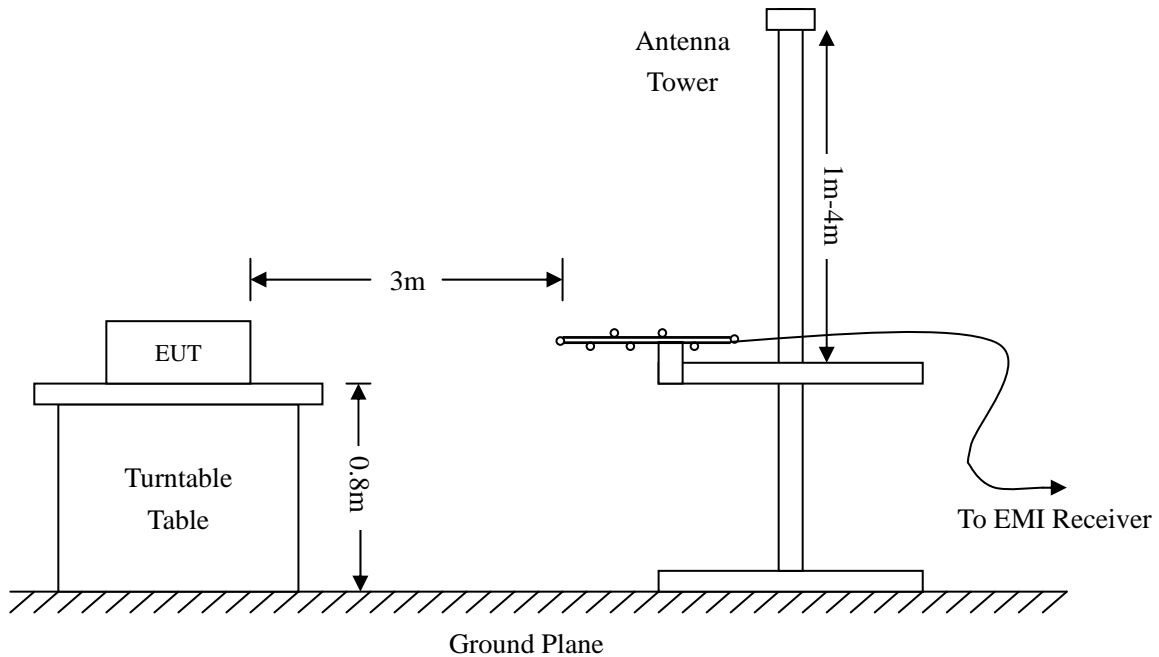
Statement of Traceability: All calibrations have been performed per the NVLAP requirements traceable to the NIST.

9.4 Test Procedure

The setup of EUT is according with per ANSI C63.4-2003 measurement procedure. The specification used was with the FCC Part 15.205 15.247(a) and FCC Part 15.209 Limit.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.



9.5 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and the Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Ant. Factor} + \text{Cable Loss} - \text{Ampl. Gain}$$

The “Margin” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -6dBμV means the emission is 6dBμV below the maximum limit for Class B. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Corr. Ampl.} - \text{FCC Part 15 Limit}$$

9.6 Environmental Conditions

| | |
|--------------------|-----------|
| Temperature: | 25 °C |
| Relative Humidity: | 52% |
| ATM Pressure: | 1012 mbar |

9.7 Summary of Test Results/Plots

According to the data below, the FCC Part 15.205, 15.209 and 15.247 standards, and had the worst margin of:

-3.0 dB μ V at 4882 MHz in the Horizontal polarization for Low Channel, 30 MHz to 25 GHz, 3 Meters

Note: this EUT was tested in 3 orthogonal positions and the worst case position data was reported.

Radiated Disturbance

EUT: GPS SURVEYING EQUIPMENT

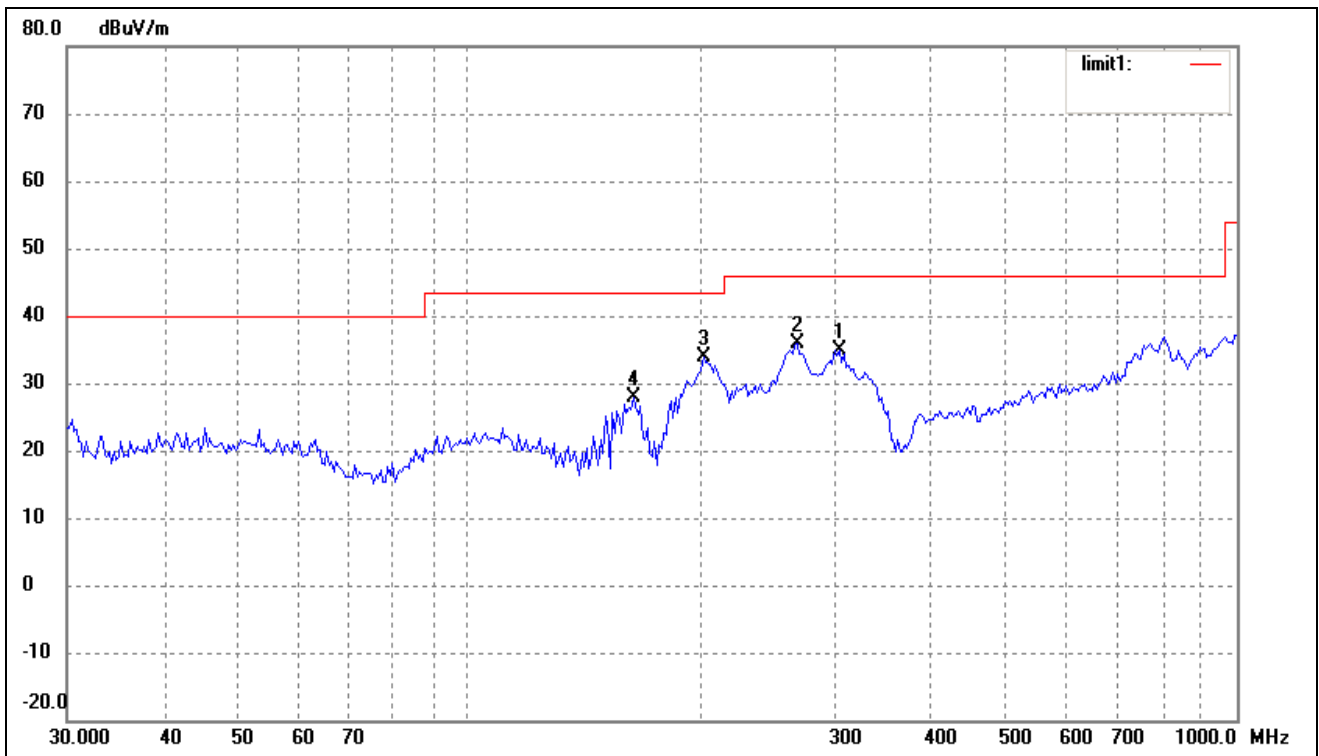
M/N: STONEX S9GNSS

Operating Condition: Charging

Test Specification: Horizontal & Vertical

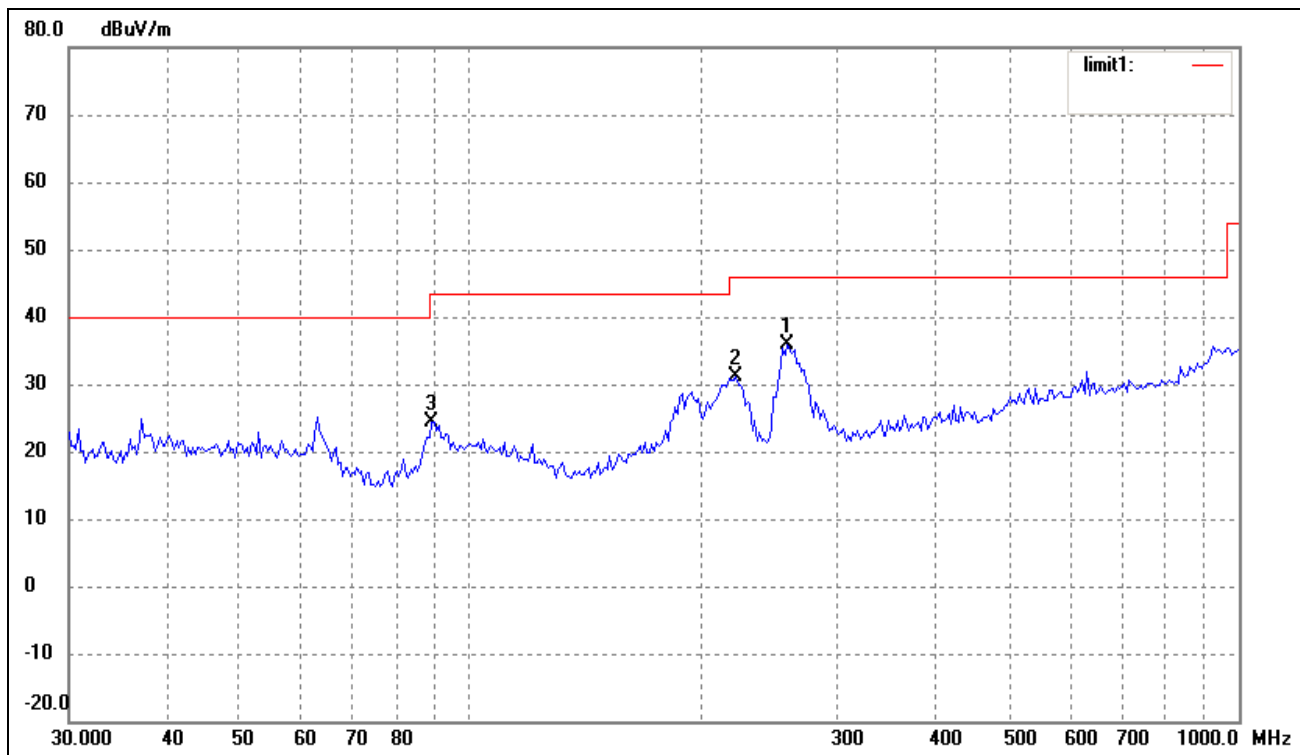
Comment: 120V60Hz

Horizontal



| No. | Frequency (MHz) | Reading (dBuV/m) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Degree (°) | Height (cm) | Remark |
|-----|-----------------|------------------|----------------|-----------------|----------------|-------------|------------|-------------|--------|
| 1 | 303.5437 | 26.32 | 8.68 | 35.00 | 46.00 | -11.00 | 360 | 100 | peak |
| 2 | 267.5455 | 27.77 | 8.12 | 35.89 | 46.00 | -10.11 | 0 | 100 | peak |
| 3 | 202.1005 | 28.09 | 5.75 | 33.84 | 43.50 | -9.66 | 0 | 200 | peak |
| 4 | 163.7550 | 23.93 | 3.86 | 27.79 | 43.50 | -15.71 | 360 | 200 | peak |

Vertical

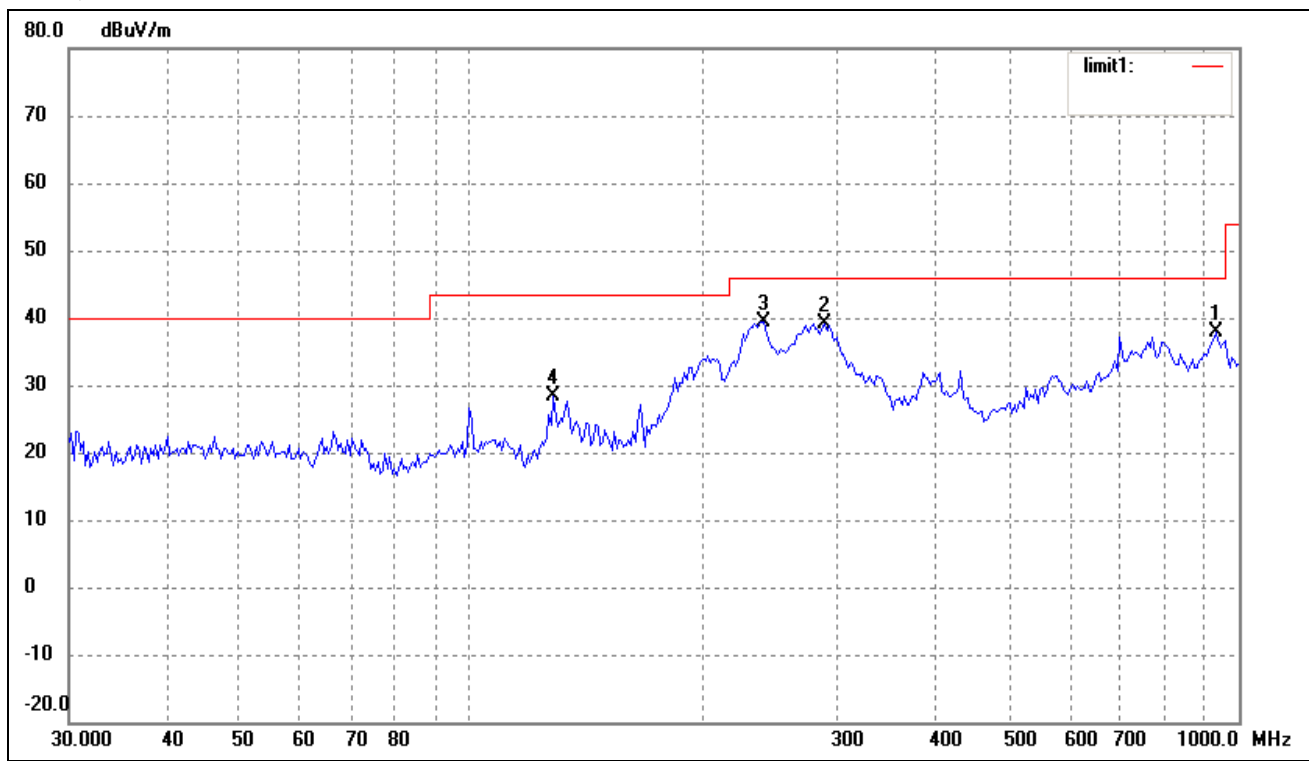


| No. | Frequency (MHz) | Reading (dBuV/m) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Degree (°) | Height (cm) | Remark |
|-----|-----------------|------------------|----------------|-----------------|----------------|-------------|------------|-------------|--------|
| 1 | 258.3264 | 28.03 | 7.88 | 35.91 | 46.00 | -10.09 | 360 | 100 | peak |
| 2 | 221.3921 | 24.80 | 6.41 | 31.21 | 46.00 | -14.79 | 0 | 300 | peak |
| 3 | 88.9639 | 18.13 | 6.20 | 24.33 | 43.50 | -19.17 | 0 | 200 | peak |

From 30 MHz to 1 GHz

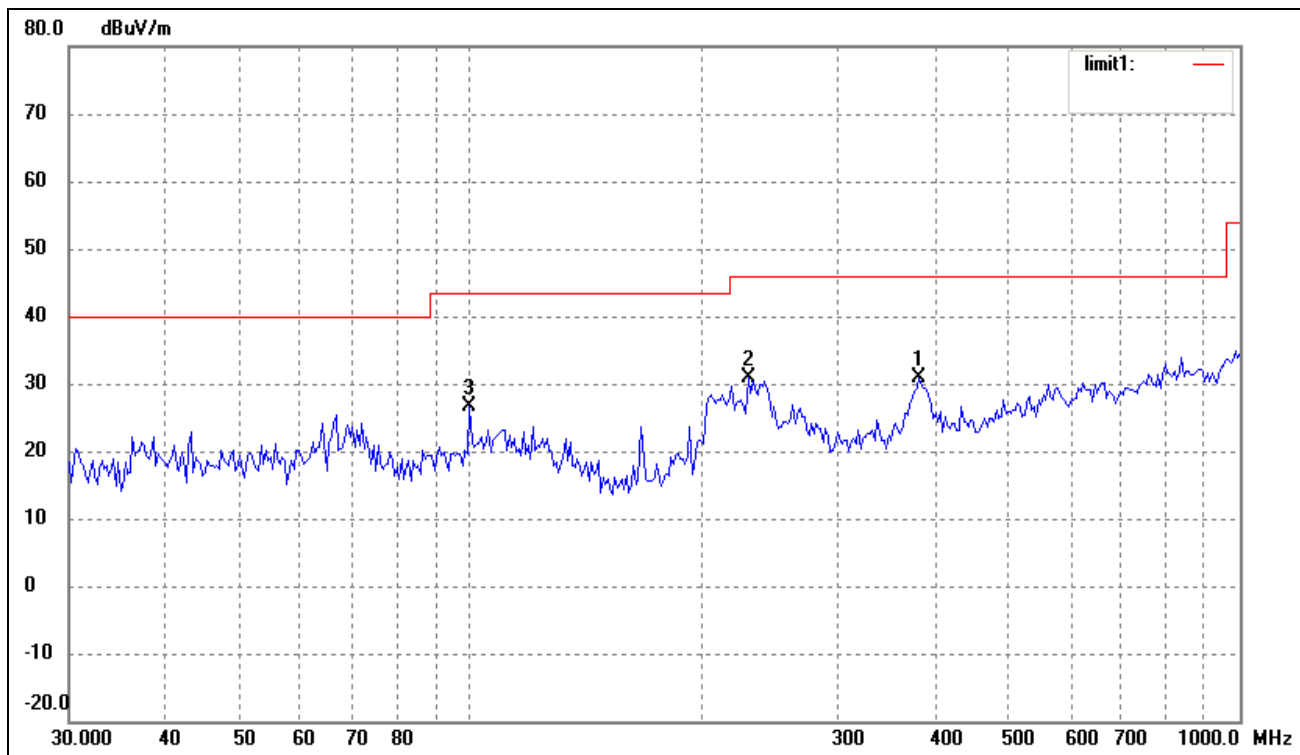
Test Mode: Transmitting-Low channel

Horizontal



| No. | Frequency (MHz) | Reading (dBuV/m) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Degree (°) | Height (cm) | Remark |
|-----|-----------------|------------------|----------------|-----------------|----------------|-------------|------------|-------------|--------|
| 1 | 932.2715 | 20.50 | 17.33 | 37.83 | 46.00 | -8.17 | 360 | 100 | peak |
| 2 | 289.0021 | 30.67 | 8.54 | 39.21 | 46.00 | -6.79 | 0 | 100 | peak |
| 3 | 240.8304 | 32.00 | 7.46 | 39.46 | 46.00 | -6.54 | 0 | 200 | peak |
| 4 | 128.1130 | 24.35 | 4.12 | 28.47 | 43.50 | -15.03 | 360 | 200 | peak |

Vertical

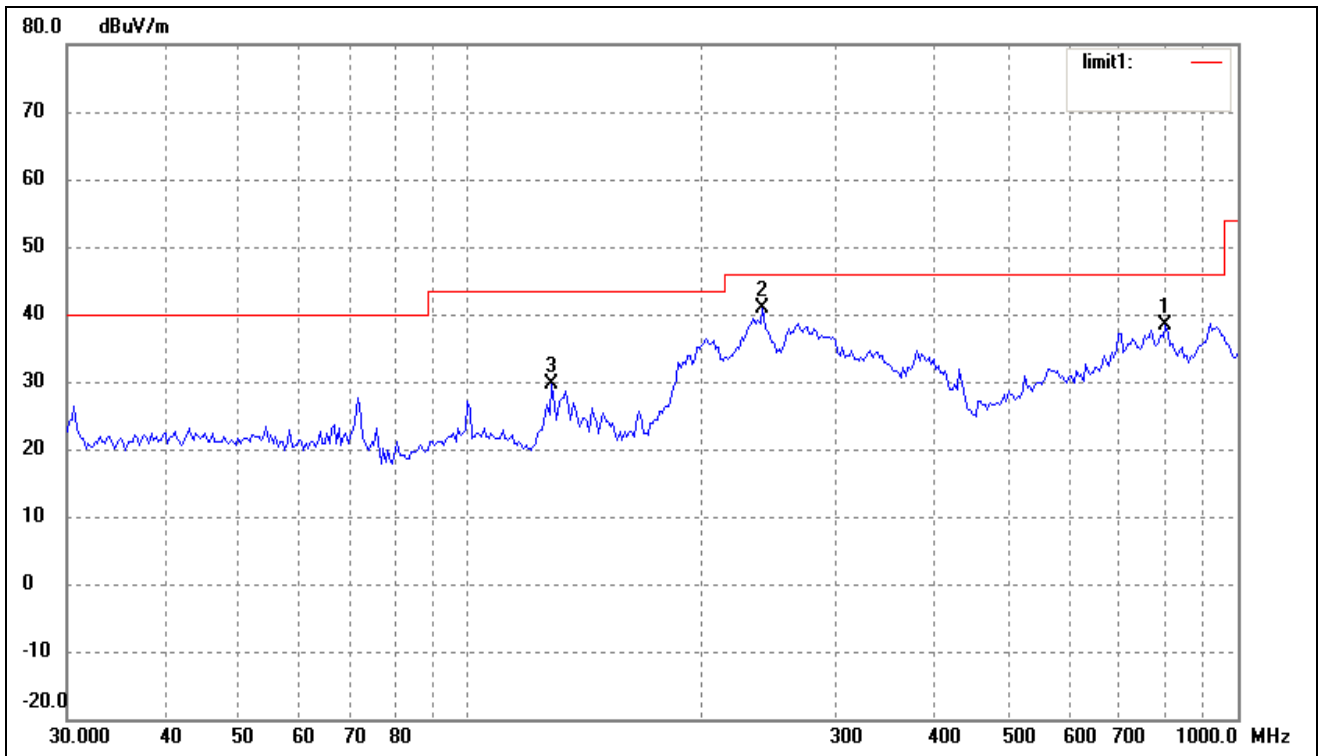


| No. | Frequency (MHz) | Reading (dBuV/m) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Degree (°) | Height (cm) | Remark |
|-----|-----------------|------------------|----------------|-----------------|----------------|-------------|------------|-------------|--------|
| 1 | 382.5879 | 20.90 | 9.94 | 30.84 | 46.00 | -15.16 | 0 | 100 | peak |
| 2 | 229.2931 | 24.00 | 6.85 | 30.85 | 46.00 | -15.15 | 360 | 200 | peak |
| 3 | 99.5281 | 18.79 | 7.78 | 26.57 | 43.50 | -16.93 | 0 | 200 | peak |

From 30 MHz to 1 GHz

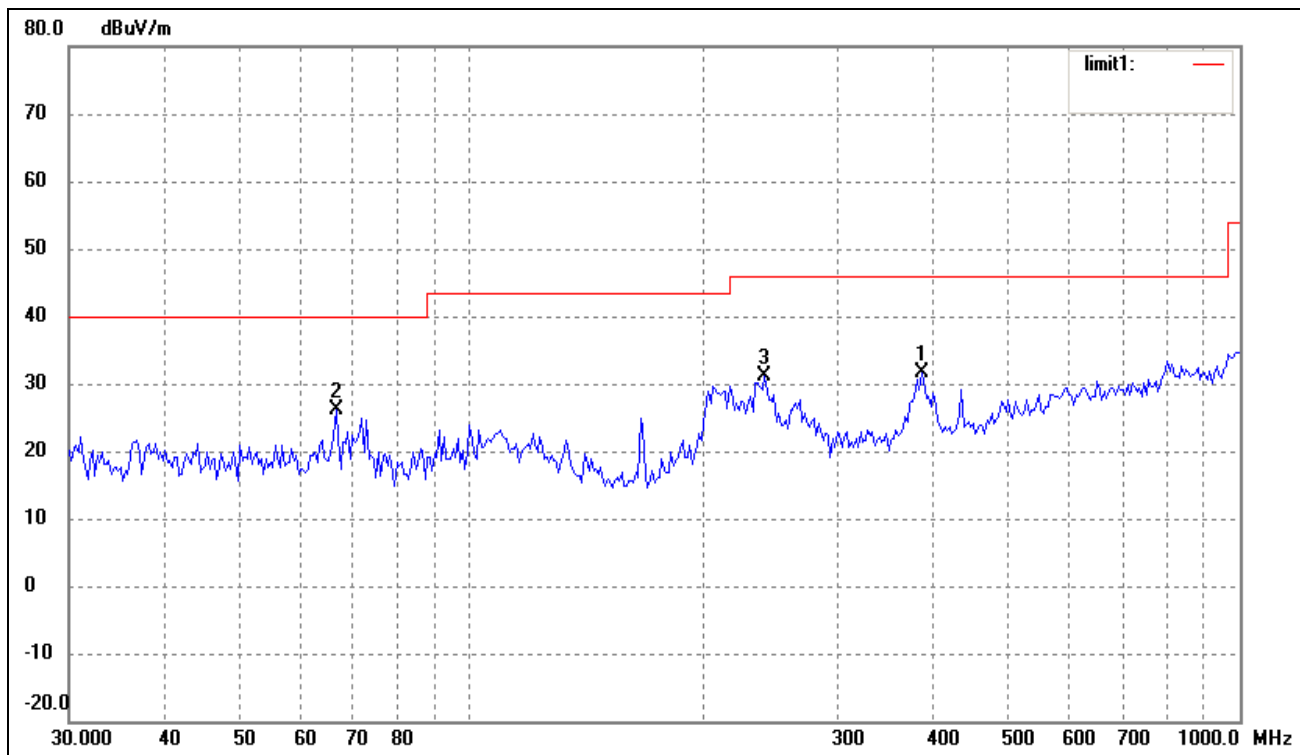
Test Mode: Transmitting-Middle channel

Horizontal



| No. | Frequency (MHz) | Reading (dBuV/m) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Degree (°) | Height (cm) | Remark |
|-----|-----------------|------------------|----------------|-----------------|----------------|-------------|--------------|-------------|--------|
| 1 | 804.6028 | 22.91 | 15.57 | 38.48 | 46.00 | -7.52 | 360 | 100 | peak |
| 2 | 240.8304 | 33.34 | 7.46 | 40.80 | 46.00 | -5.20 | 206 | 125 | QP |
| 3 | 128.1130 | 25.56 | 4.12 | 29.68 | 43.50 | -13.82 | 0 | 200 | peak |

Vertical

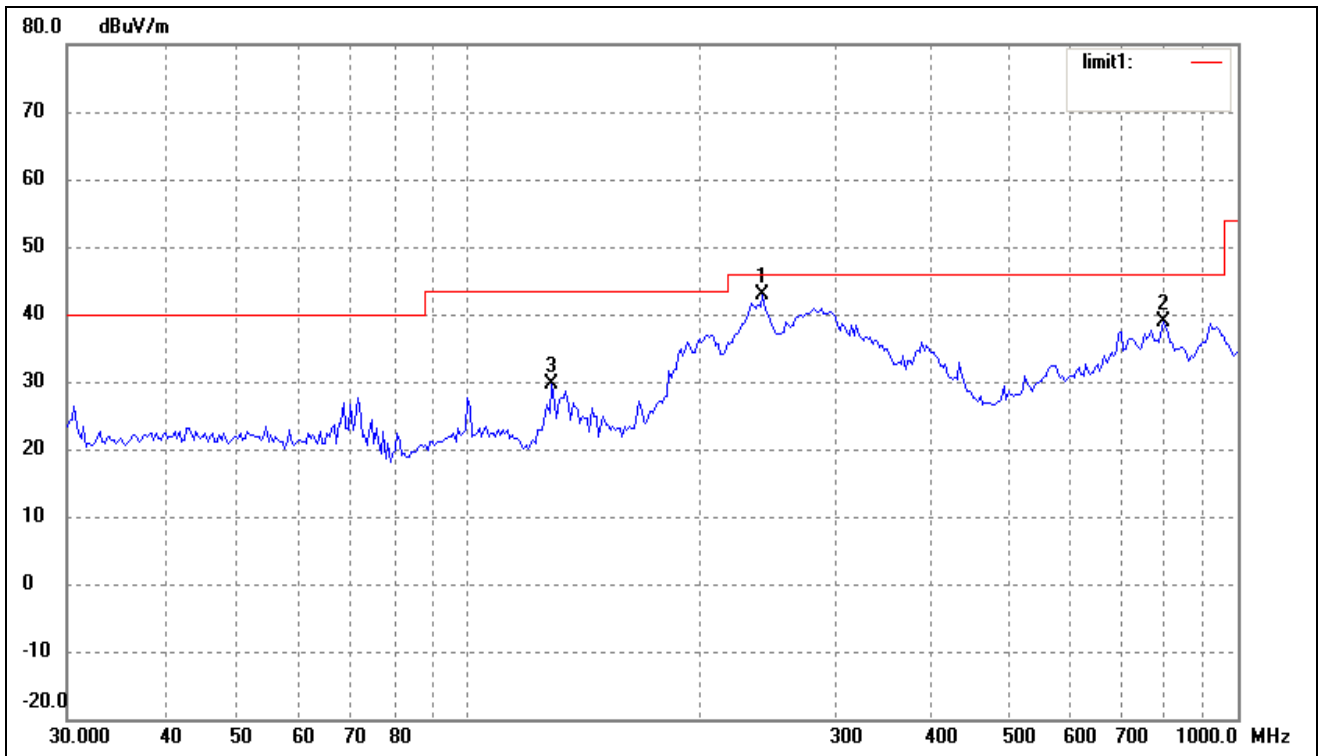


| No. | Frequency (MHz) | Reading (dBuV/m) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Degree (°) | Height (cm) | Remark |
|-----|-----------------|------------------|----------------|-----------------|----------------|-------------|--------------|-------------|--------|
| 1 | 385.2805 | 21.58 | 9.96 | 31.54 | 46.00 | -14.46 | 360 | 100 | peak |
| 2 | 66.7325 | 21.63 | 4.51 | 26.14 | 40.00 | -13.86 | 0 | 200 | peak |
| 3 | 240.8304 | 23.70 | 7.46 | 31.16 | 46.00 | -14.84 | 360 | 200 | peak |

From 30 MHz to 1 GHz

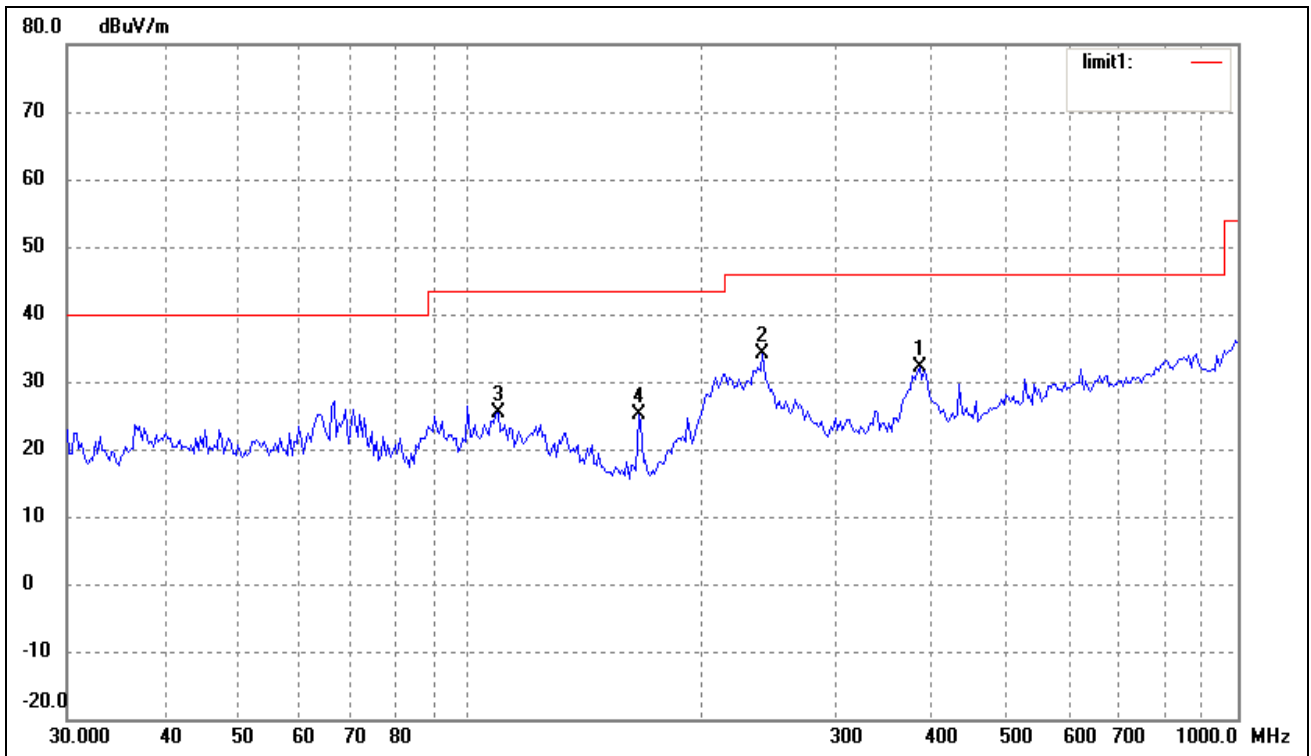
Test Mode: Transmitting-High channel

Horizontal



| No. | Frequency (MHz) | Reading (dBuV/m) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Degree (°) | Height (cm) | Remark |
|-----|-----------------|------------------|----------------|-----------------|----------------|-------------|------------|-------------|--------|
| 1 | 240.8304 | 35.34 | 7.46 | 42.80 | 46.00 | -3.20 | 102 | 124 | QP |
| 2 | 798.9797 | 23.49 | 15.50 | 38.99 | 46.00 | -7.01 | 360 | 100 | peak |
| 3 | 128.1130 | 25.56 | 4.12 | 29.68 | 43.50 | -13.82 | 0 | 200 | peak |

Vertical



| No. | Frequency (MHz) | Reading (dBuV/m) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Degree (°) | Height (cm) | Remark |
|-----|-----------------|------------------|----------------|-----------------|----------------|-------------|--------------|-------------|--------|
| 1 | 385.2805 | 22.29 | 9.96 | 32.25 | 46.00 | -13.75 | 360 | 100 | peak |
| 2 | 240.8304 | 26.55 | 7.46 | 34.01 | 46.00 | -11.99 | 0 | 100 | peak |
| 3 | 109.0286 | 18.33 | 7.03 | 25.36 | 43.50 | -18.14 | 0 | 200 | peak |
| 4 | 166.0680 | 21.20 | 3.93 | 25.13 | 43.50 | -18.37 | 360 | 200 | peak |

| Frequency MHz | Detector | Meter Reading dBuV | Direction Degree | Polar H / V | Antenna Loss dB | Cable loss dB | Amplifier dB | Correction Amplitude dBuV/m | Limit dBuV/m | Margin dB |
|------------------------------|----------|--------------------|------------------|-------------|-----------------|---------------|--------------|-----------------------------|--------------|-----------|
| Low Channel (1G to 25GHz) | | | | | | | | | | |
| 4804.0 | AV | 44.1 | 57 | H | 34.1 | 5.2 | 33.0 | 52.1 | 54 | -3.6 |
| 4804.0 | AV | 42.8 | 35 | V | 34.1 | 5.2 | 33.0 | 49.1 | 54 | -4.9 |
| 7206.0 | AV | 37.5 | 60 | H | 37.4 | 6.1 | 33.5 | 47.5 | 54 | -6.5 |
| 7206.0 | AV | 36.4 | 79 | V | 37.4 | 6.1 | 33.5 | 46.4 | 54 | -7.6 |
| 2402.0 | AV | 84.6 | 45 | H | 29.1 | 3.7 | 34.0 | 83.4 | | (Fund.) |
| 2402.0 | AV | 83.7 | 359 | V | 29.1 | 3.7 | 34.0 | 82.5 | | (Fund.) |
| 4804.0 | PK | 56.4 | 65 | H | 34.1 | 5.2 | 33.0 | 62.7 | 74 | -11.3 |
| 4804.0 | PK | 53.97 | 98 | V | 34.1 | 5.2 | 33.0 | 60.27 | 74 | -13.73 |
| 7206.0 | PK | 47.30 | 256 | H | 37.4 | 6.1 | 33.5 | 57.30 | 74 | -16.7 |
| 7206.0 | PK | 47.92 | 185 | V | 37.4 | 6.1 | 33.5 | 57.92 | 74 | -16.08 |
| 2402.0 | PK | 89.8 | 78 | H | 29.1 | 3.7 | 34.0 | 88.6 | | (Fund.) |
| 2402.0 | PK | 85.9 | 44 | V | 29.1 | 3.7 | 34.0 | 84.7 | | (Fund.) |
| Middle Channel (1G to 25GHz) | | | | | | | | | | |
| 4882.0 | AV | 44.7 | 21 | H | 34.1 | 5.2 | 33.0 | 51.0 | 54 | -3.0 |
| 4882.0 | AV | 43.4 | 34 | V | 34.1 | 5.2 | 33.0 | 49.7 | 54 | -4.3 |
| 7323.0 | AV | 38.2 | 342 | H | 37.4 | 6.1 | 33.5 | 48.2 | 54 | -5.8 |
| 7323.0 | AV | 36.1 | 30 | V | 37.4 | 6.1 | 33.5 | 46.1 | 54 | -7.9 |
| 2441.0 | AV | 88.5 | 98 | H | 29.1 | 3.7 | 34.0 | 87.3 | | (Fund.) |
| 2441.0 | AV | 86.2 | 72 | V | 29.1 | 3.7 | 34.0 | 85.0 | | (Fund.) |
| 4882.0 | PK | 48.7 | 237 | H | 34.1 | 5.2 | 33.0 | 55.0 | 74 | -19.0 |
| 4882.0 | PK | 46.5 | 354 | V | 37.4 | 6.1 | 33.5 | 52.8 | 74 | -21.2 |
| 7323.0 | PK | 43.7 | 264 | H | 37.4 | 6.1 | 33.5 | 53.7 | 74 | -20.2 |
| 7323.0 | PK | 41.4 | 187 | V | 34.1 | 5.2 | 33.0 | 51.4 | 74 | -22.6 |
| 2441.0 | PK | 89.6 | 55 | H | 29.1 | 3.7 | 34.0 | 88.4 | | (Fund.) |
| 2441.0 | PK | 87.4 | 49 | V | 29.1 | 3.7 | 34.0 | 86.2 | | (Fund.) |

| High Channel (1G to 25GHz) | | | | | | | | | | |
|----------------------------|----|------|-----|---|------|-----|------|------|----|---------|
| 4960.0 | AV | 40.8 | 17 | H | 37.4 | 6.1 | 33.5 | 50.8 | 54 | -3.2 |
| 4960.0 | AV | 38.2 | 13 | V | 37.4 | 6.1 | 33.5 | 48.2 | 54 | -5.8 |
| 7440.0 | AV | 36.7 | 355 | H | 34.1 | 5.2 | 33.0 | 43.0 | 54 | -11.0 |
| 7440.0 | AV | 33.6 | 66 | V | 34.1 | 5.2 | 33.0 | 39.9 | 54 | -14.1 |
| 2480.0 | AV | 84.6 | 63 | H | 29.1 | 3.7 | 34.0 | 83.4 | | (Fund.) |
| 2480.0 | AV | 81.3 | 85 | V | 29.1 | 3.7 | 34.0 | 80.1 | | (Fund.) |
| 4960.0 | PK | 57.4 | 50 | H | 34.1 | 5.2 | 33.0 | 63.7 | 74 | -10.3 |
| 4960.0 | PK | 53.8 | 59 | V | 34.1 | 5.2 | 33.0 | 60.1 | 74 | -13.9 |
| 7440.0 | PK | 38.4 | 269 | H | 37.4 | 6.1 | 33.5 | 48.4 | 74 | -25.6 |
| 7440.0 | PK | 35.2 | 64 | V | 37.4 | 6.1 | 33.5 | 45.2 | 74 | -28.8 |
| 2480.0 | PK | 88.3 | 85 | H | 29.1 | 3.7 | 34.0 | 87.1 | | (Fund.) |
| 2480.0 | PK | 84.7 | 55 | V | 29.1 | 3.7 | 34.0 | 83.5 | | (Fund.) |

Note: Testing is carried out with frequency rang 30MHz to the tenth harmonics, which above 5th Harmonics is close to the noise base even antenna close up to 1meter distance according the measurement of ANSI C63.4.

10. OUT OF BAND EMISSIONS

10.1 Standard Applicable

According to §15.247 (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.

10.2 Test Equipment List and Details

| Description | Manufacturer | Model | Serial Number | Cal. Date | Due. Date |
|--------------------------|----------------------|----------|---------------|------------|------------|
| Spectrum Analyzer | R&S | FSP | 836079/035 | 2010-04-16 | 2011-04-15 |
| EMI Test Receiver | R&S | ESVB | 825471/005 | 2010-08-12 | 2011-08-11 |
| Positioning Controller | C&C | CC-C-1F | N/A | 2010-08-12 | 2011-08-11 |
| RF Switch | EM | EMSW18 | SW060023 | 2010-08-12 | 2011-08-11 |
| Pre-amplifier | Agilent | 8447F | 3113A06717 | 2010-08-12 | 2011-08-11 |
| Pre-amplifier | Compliance Direction | PAP-0118 | 24002 | 2010-08-12 | 2011-08-11 |
| Trilog Broadband Antenna | SCHWARZBECK | VULB9163 | 9163-333 | 2010-07-21 | 2011-07-20 |
| Horn Antenna | ETS | 3117 | 00086197 | 2010-07-21 | 2011-07-20 |

Statement of Traceability: All calibrations have been performed per the NVLAP requirements traceable to the NIST.

10.3 Test Procedure

1. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
2. Set the spectrum analyzer as RBW, VBW=100KHz, Span=100MHz, Sweep = auto
3. Set the Lowest and Highest Transmitting Channel, observed the outside band of 2400MHz to 2438.5MHz, then mark the higher-level emission for comparing with the FCC rules.

10.4 Environmental Conditions

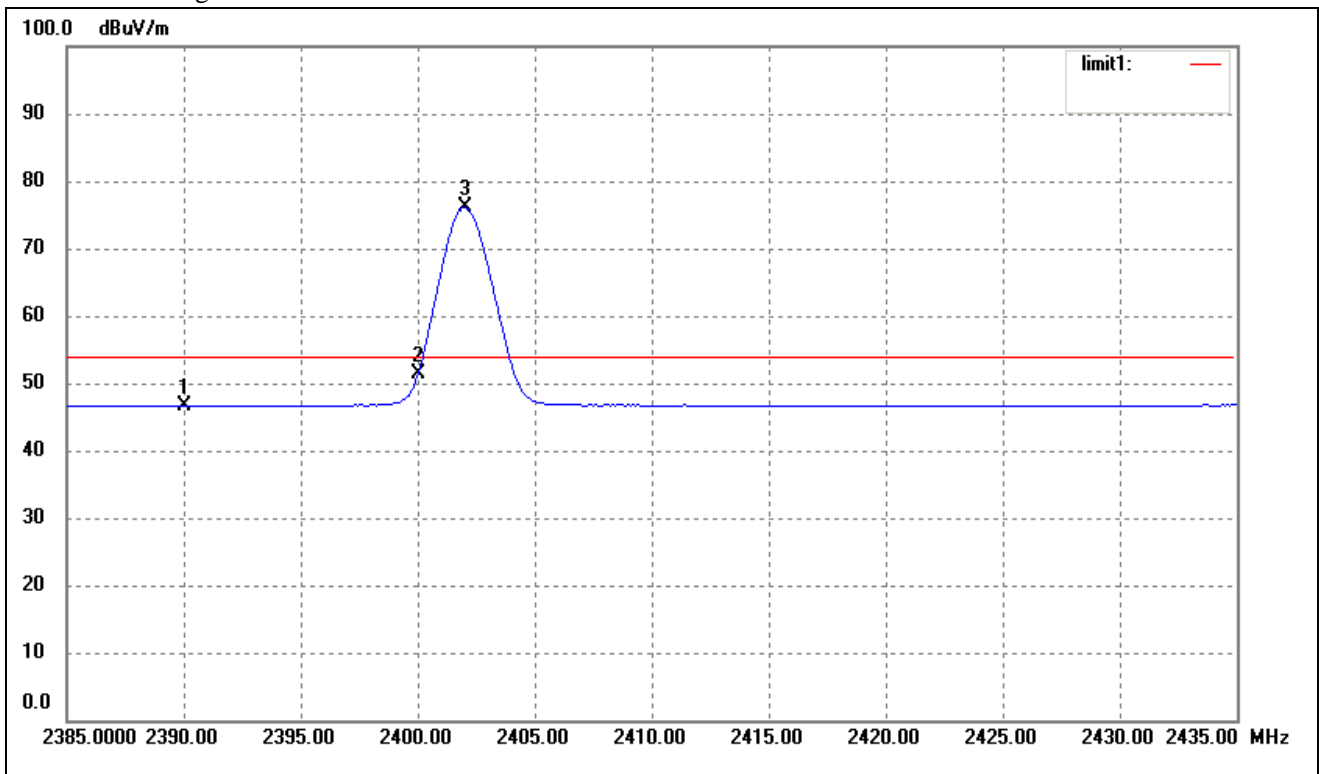
| | |
|--------------------|-----------|
| Temperature: | 23°C |
| Relative Humidity: | 54% |
| ATM Pressure: | 1011 mbar |

10.5 Summary of Test Results/Plots

| Test mode | Frequency MHz | Limit dBuV /dB | Result |
|-----------|---------------|----------------|--------|
| Lowest | 2390.00 | <54dBuv | Pass |
| | 2400.00 | >20dB ATT | Pass |
| Highest | 2483.50 | <54dBuv | Pass |

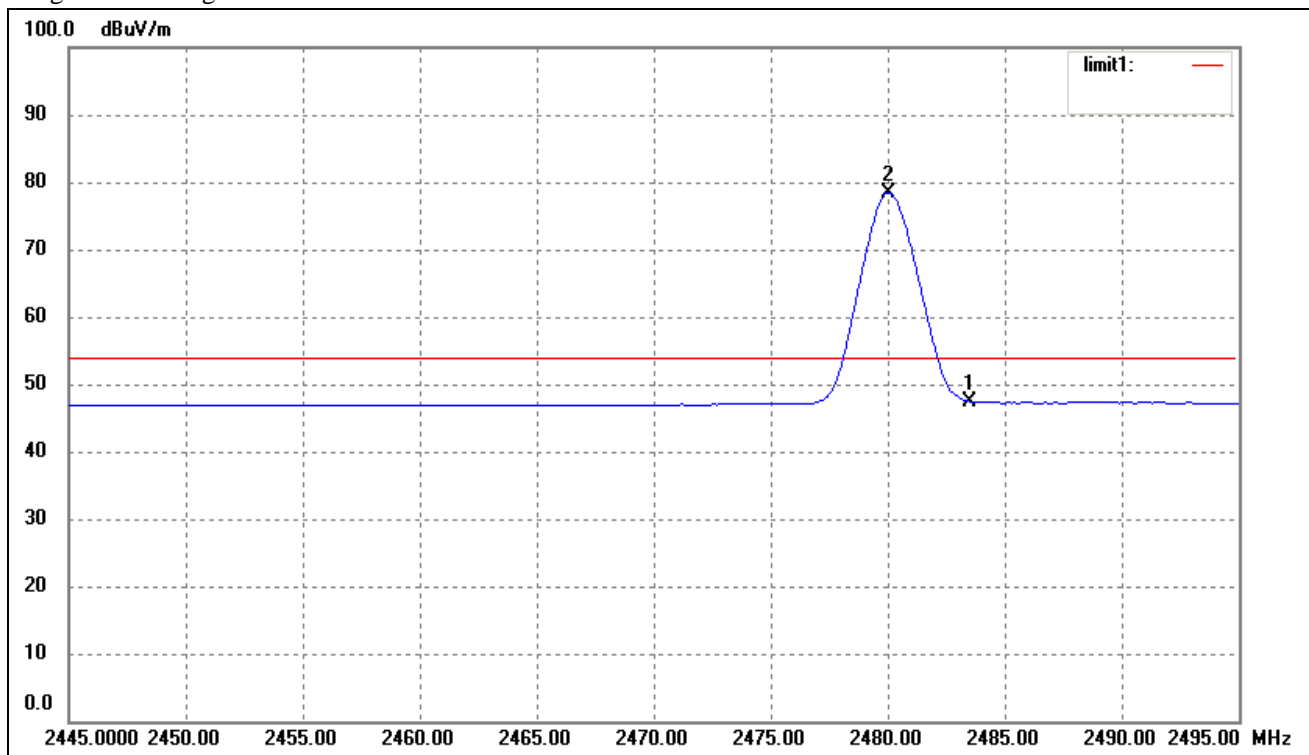
The edge emissions are below the FCC 15.209 Limits. Please refer to the test plots below.

Lowest Bandedge



| No. | Frequency (MHz) | Reading (dBuV/m) | Correct dB/m | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----|-----------------|------------------|--------------|-----------------|----------------|-------------|------------------|
| 1 | 2390.000 | 12.03 | 34.59 | 46.62 | 54.00 | -7.38 | Average Detector |
| | 2390.000 | 21.65 | 34.59 | 56.24 | 74.00 | -18.79 | Peak Detector |
| 2 | 2400.000 | 16.66 | 34.68 | 51.34 | / | / | Average Detector |
| 3 | 2402.000 | 41.33 | 34.69 | 76.02 | / | / | Average Detector |

Highest Bandedge



| No. | Frequency (MHz) | Reading (dBuV/m) | Correct (dB/m) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----|-----------------|------------------|----------------|-----------------|----------------|-------------|------------------|
| 1 | 2483.500 | 12.88 | 34.97 | 47.55 | 54.00 | -6.15 | Average Detector |
| | 2483.500 | 23.70 | 34.97 | 58.67 | 74.00 | -15.33 | Peak Detector |
| 2 | 2480.000 | 43.40 | 34.96 | 78.36 | / | / | Average Detector |

***** END OF REPORT *****