


FCC PART 15C
MEASUREMENT AND TEST REPORT
FOR

JUNENG ELECTRONICS TECHNOLOGY CO., LTD.

Hua Qiang Road, Xin Cheng Zone, Shi Long Town, Dong Guan City,
GuangDong, China

FCC ID: UM60310

| | |
|--|---|
| Report Concerns: Original Report | Equipment Type: 2.4G Wireless Optical Mouse |
| Model: | <u>JM-031R</u> |
| Report No.: | <u>STR09128137I</u> |
| Test/Witness Engineer: | <u>Susan Su</u> |
| Test Date: | <u>2009-12-24 to 2009-12-28</u> |
| Issue Date: | <u>2009-12-31</u> |
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| Approved & Authorized By: |  _____ Jandy So / PSQ Manager |

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..... | 3 |
| 1.1 PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT)..... | 3 |
| 1.2 TEST STANDARDS..... | 3 |
| 1.3 RELATED SUBMITTAL(S)/GRANT(S) | 3 |
| 1.4 TEST METHODOLOGY | 4 |
| 1.5 TEST FACILITY | 4 |
| 1.6 EUT EXERCISE SOFTWARE | 4 |
| 1.7 ACCESSORIES EQUIPMENT LIST AND DETAILS | 4 |
| 1.8 EUT CABLE LIST AND DETAILS | 4 |
| 2. SUMMARY OF TEST RESULTS | 5 |
| 3. §15.203 - ANTENNA REQUIREMENT | 6 |
| 3.1 STANDARD APPLICABLE..... | 6 |
| 3.2 TEST RESULT..... | 6 |
| 4. §15.205, §15.209, §15.249 (A)- RADIATED EMISSION..... | 7 |
| 4.1 MEASUREMENT UNCERTAINTY | 7 |
| 4.2 STANDARD APPLICABLE..... | 7 |
| 4.3 TEST EQUIPMENT LIST AND DETAILS | 8 |
| 4.4 TEST PROCEDURE..... | 8 |
| 4.5 CORRECTED AMPLITUDE & MARGIN CALCULATION..... | 9 |
| 4.6 ENVIRONMENTAL CONDITIONS | 9 |
| 4.7 SUMMARY OF TEST RESULTS/PLOTS | 9 |
| 5. §15.249(B) OUT OF BAND EMISSIONS | 18 |
| 5.1 STANDARD APPLICABLE..... | 18 |
| 5.2 TEST EQUIPMENT LIST AND DETAILS | 18 |
| 5.3 TEST PROCEDURE..... | 18 |
| 5.4 ENVIRONMENTAL CONDITIONS | 18 |
| 5.5 SUMMARY OF TEST RESULTS/PLOTS | 19 |

1. GENERAL INFORMATION

1.1 Product Description for Equipment Under Test (EUT)

Client Information

Applicant: JUNENG ELECTRONICS TECHNOLOGY CO., LTD.
Address of applicant: Hua Qiang Road, Xin Cheng Zone, Shi Long Town, Dong Guan City, Guangdong, China

Manufacturer: JUNENG ELECTRONICS TECHNOLOGY CO., LTD.
Address of manufacturer: Hua Qiang Road, Xin Cheng Zone, Shi Long Town, Dong Guan City, Guangdong, China

General Description of E.U.T

| Items | Description |
|---|-----------------------------|
| EUT Description: | 2.4G Wireless Optical Mouse |
| Trade Name: | / |
| Model No.: | JM-031R |
| Rated Voltage: | DC 3V |
| Output Power: | <0dBm |
| Frequency Range: | 2403~2479MHz |
| No. of Channel: | 77 |
| Antenna Type: | Integral Antenna |
| Size: | 9.2X5.3X3.0cm |
| For more information refer to the circuit diagram form and the user's manual. | |

The test data is gathered from a production sample, provided by the manufacturer.

1.2 Test Standards

The following report is prepared on behalf of the JUNENG ELECTRONICS TECHNOLOGY CO., LTD. in accordance with FCC Part 15, Subpart B, Subpart C, and section 15.107, 15.203, 15.205, 15.207, 15.209 and 15.249 of the Federal Communication Commissions rules.

The objective is to determine compliance with FCC Part 15, Subpart C, and section 15.107,15.203, 15.205, 15.207, 15.209 and 15.249 of the Federal Communication Commissions rules.

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

1.3 Related Submittal(s)/Grant(s)

No Related Submittal(s).

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 according to the Operating Instructions and let the EUT keep transmitting.

1.5 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.

1.6 EUT Exercise Software

The EUT exercise program used during the testing was designed to exercise the system components. The test software is started while the whole system is on.

1.7 Accessories Equipment List and Details

| Manufacturer | Description | Model | Serial Number |
|--------------|-------------|-------|---------------|
| / | / | / | / |

1.8 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 | Antenna Requirement | Compliant |
| §15.207 (a) | Conducted Emission | N/A |
| §15.205 | Restricted Band of Operation | Compliant |
| §15.209 | Radiated Emission | Compliant |
| §15.249(a) | Field Strength | Compliant |
| §15.249(d) | Out of Band Emission | 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 an integral antenna, fulfill the requirement of this section.

4. §15.205, §15.209, §15.249 (a)- RADIATED EMISSION

4.1 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 ± 3.0 dB.

4.2 Standard Applicable

According to §15.249(a), the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following:

| Fundamental Frequency | Field strength of fundamental (milli-volts/meter) | Field strength of fundamental (micro-volts/meter) |
|-----------------------|--|--|
| 902-928 MHz | 50 | 500 |
| 2400-2483.5 MHz | 50 | 500 |
| 5725-5875 MHz | 50 | 500 |
| 24.0-24.25 GHz | 250 | 2500 |

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.

4.3 Test Equipment List and Details

| Manufacturer | Description | Model | Serial Number | Cal. Date | Due. Date |
|--------------------------|---------------|-----------|---------------|------------|------------|
| Spectrum Analyzer | ROHDE&SCHWARZ | FSEA20 | DE25181 | 2009-08-12 | 2010-08-11 |
| Positioning Controller | C&C | CC-C-1F | N/A | 2009-08-12 | 2010-08-11 |
| Trilog Broadband Antenna | SCHWARZBECK | VULB9163 | 9163-333 | 2009-07-21 | 2010-07-20 |
| Horn Antenna | SCHWARZBECK | BBHX 9120 | 9120-426 | 2009-07-21 | 2010-07-20 |
| RF Switch | EM | EMSW18 | SW060023 | 2009-08-12 | 2010-08-11 |
| Amplifier | Agilent | 8447F | 3113A06717 | 2009-08-12 | 2010-08-11 |
| Coaxial Cable | SCHWARZBECK | AK9513 | 9513-10 | 2009-08-12 | 2010-08-11 |
| EMI Test Receiver | ROHDE&SCHWARZ | ESPI | 25498514 | 2009-08-12 | 2010-08-11 |

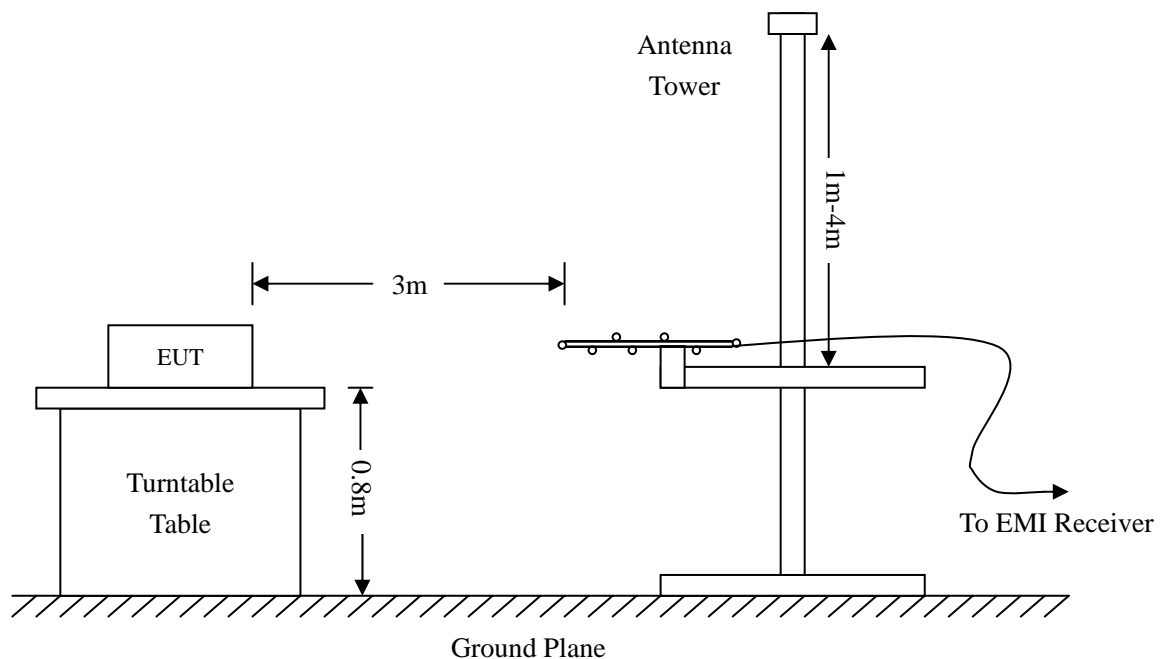
Statement of Traceability: All calibrations have been performed per the NVLAP requirements traceable to the NIST.

4.4 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.



4.5 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 -6dB μ V means the emission is 6dB μ V below the maximum limit for Class B. The equation for margin calculation is as follows:

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

4.6 Environmental Conditions

| | |
|--------------------|-----------|
| Temperature: | 26° C |
| Relative Humidity: | 50% |
| ATM Pressure: | 1012 mbar |

4.7 Summary of Test Results/Plots

According to the data below, the FCC Part 15.205, 15.209 and 15.249 standards, and had the worst margin of:

-1.4 dB μ V at 4806 MHz in the Horizontal polarization, 30 MHz to 25 GHz, 3Meters

Plot of Radiation Emissions Test

Radiated Disturbance

EUT: 2.4G Wireless Optical Mouse

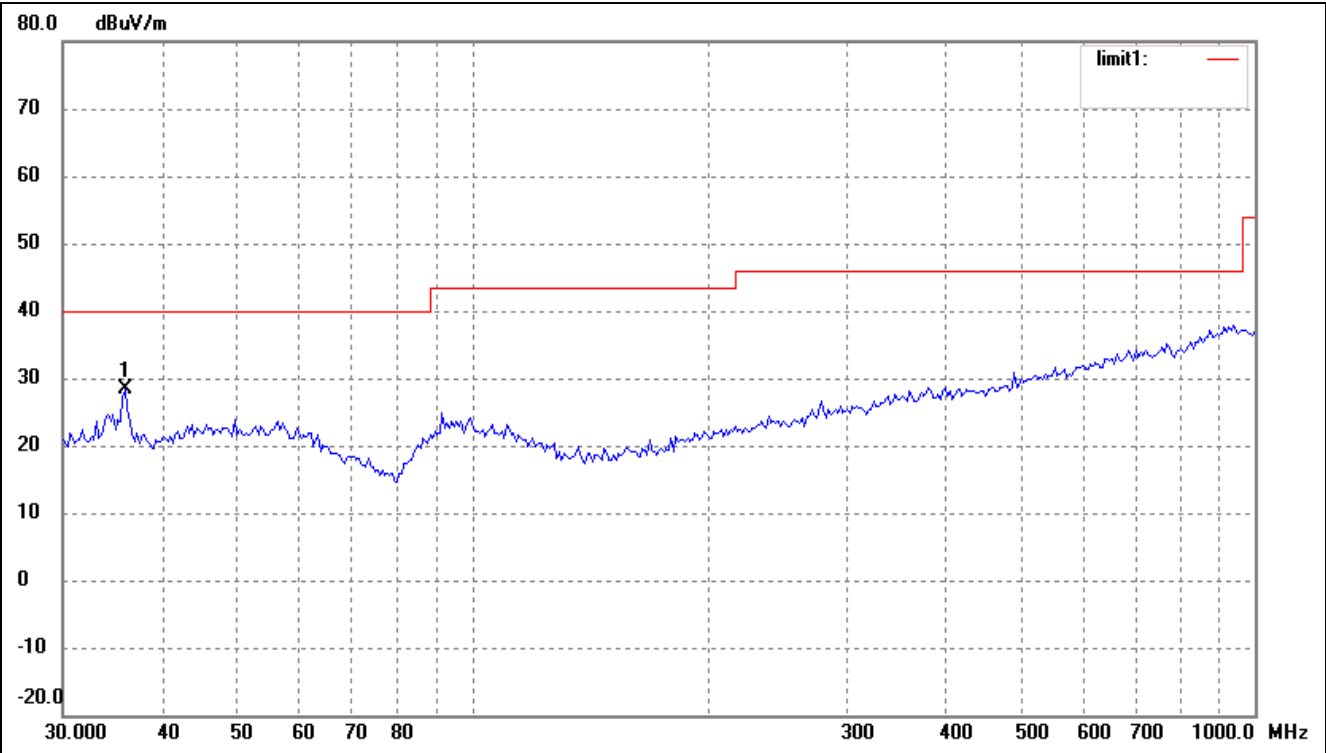
M/N: JM-031R

Operating Condition: Transmitting below 1GHz

Test Specification: Horizontal & Vertical

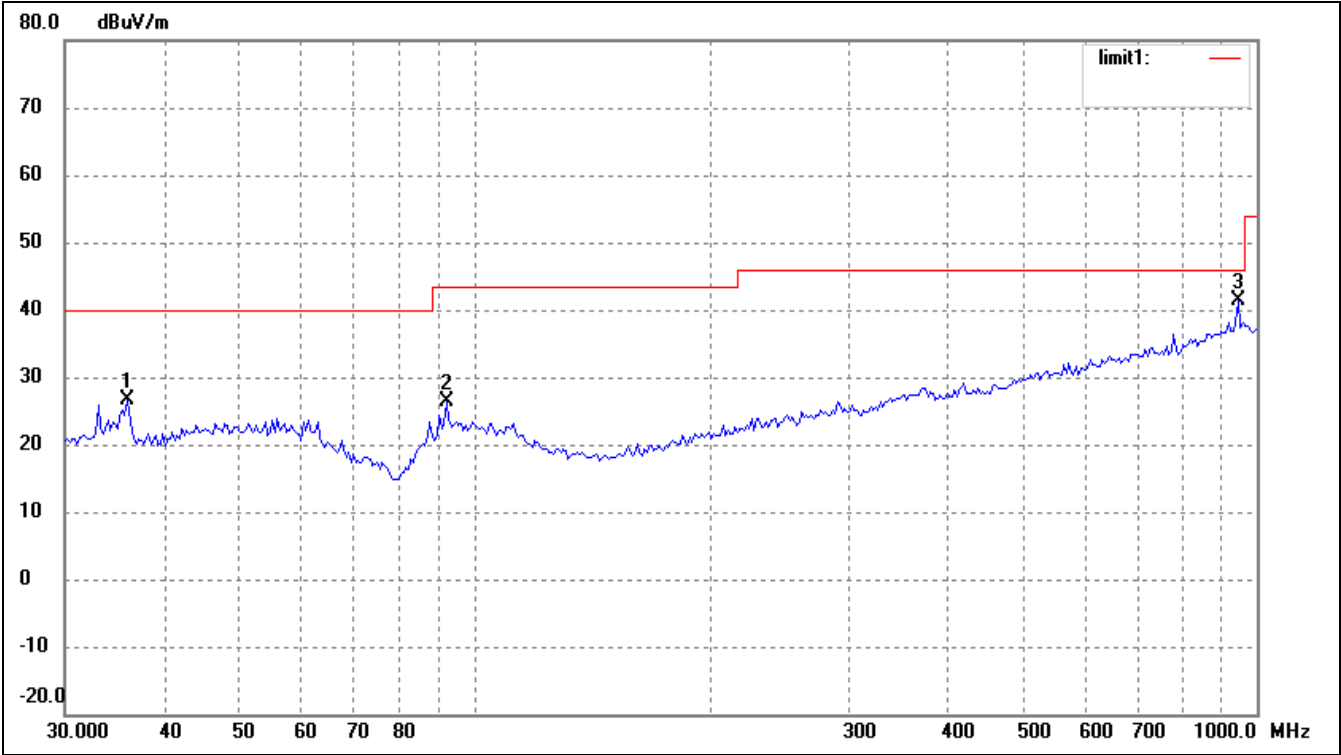
Low Channel

Horizontal:



| No. | Frequency | Reading | Correct | Result | Limit | Margin | Degree | Height | Remark |
|-----|-----------|----------|------------|----------|----------|--------|--------|--------|--------|
| | (MHz) | (dBuV/m) | Factor(dB) | (dBuV/m) | (dBuV/m) | (dB) | (°) | (cm) | |
| 1 | 36.0007 | 21.50 | 6.84 | 28.34 | 40.00 | -11.66 | 124 | 100 | peak |

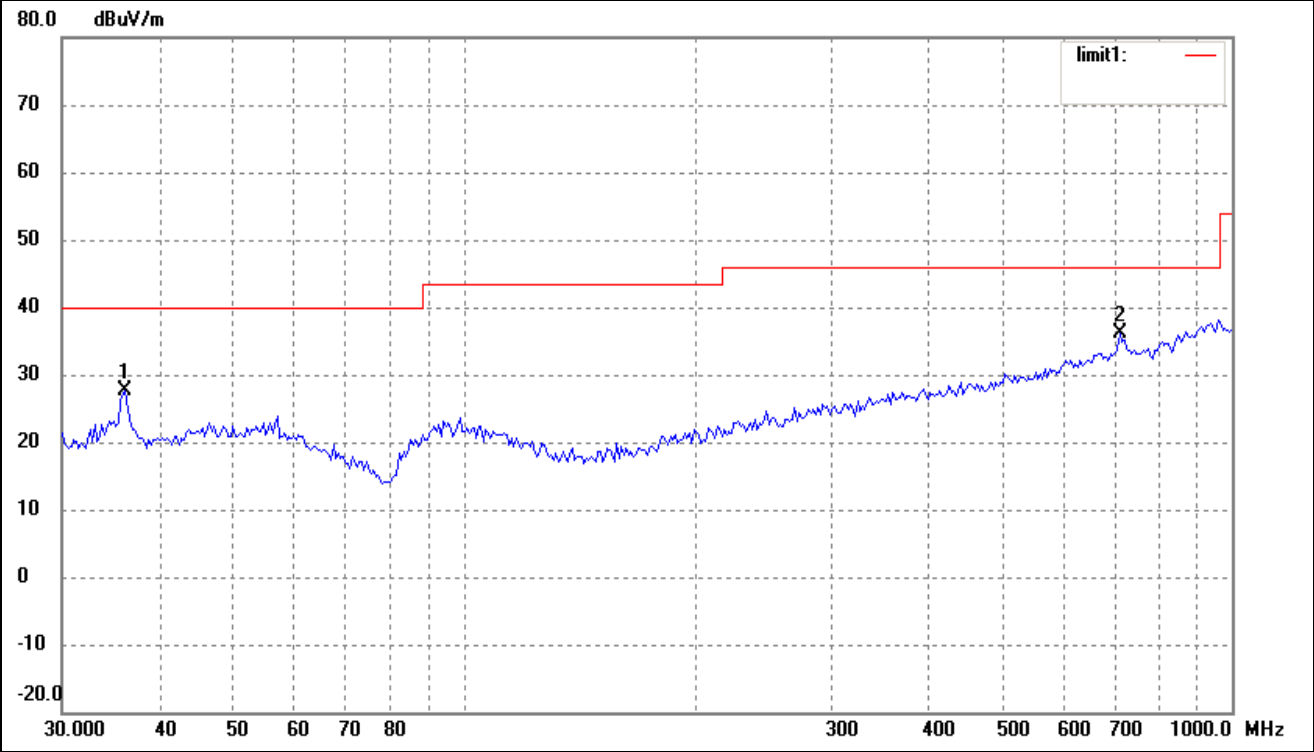
Vertical:



| No. | Frequency | Reading | Correct | Result | Limit | Margin | Degree | Height | Remark |
|-----|-----------|----------|------------|----------|----------|--------|--------|--------|--------|
| | (MHz) | (dBuV/m) | Factor(dB) | (dBuV/m) | (dBuV/m) | (dB) | (°) | (cm) | |
| 1 | 36.0007 | 19.80 | 6.84 | 26.64 | 40.00 | -13.36 | 315 | 100 | peak |
| 2 | 92.1388 | 18.77 | 7.50 | 26.27 | 43.50 | -17.23 | 92 | 100 | peak |
| 3 | 945.4399 | 20.34 | 21.06 | 41.40 | 46.00 | -4.60 | 310 | 100 | QP |

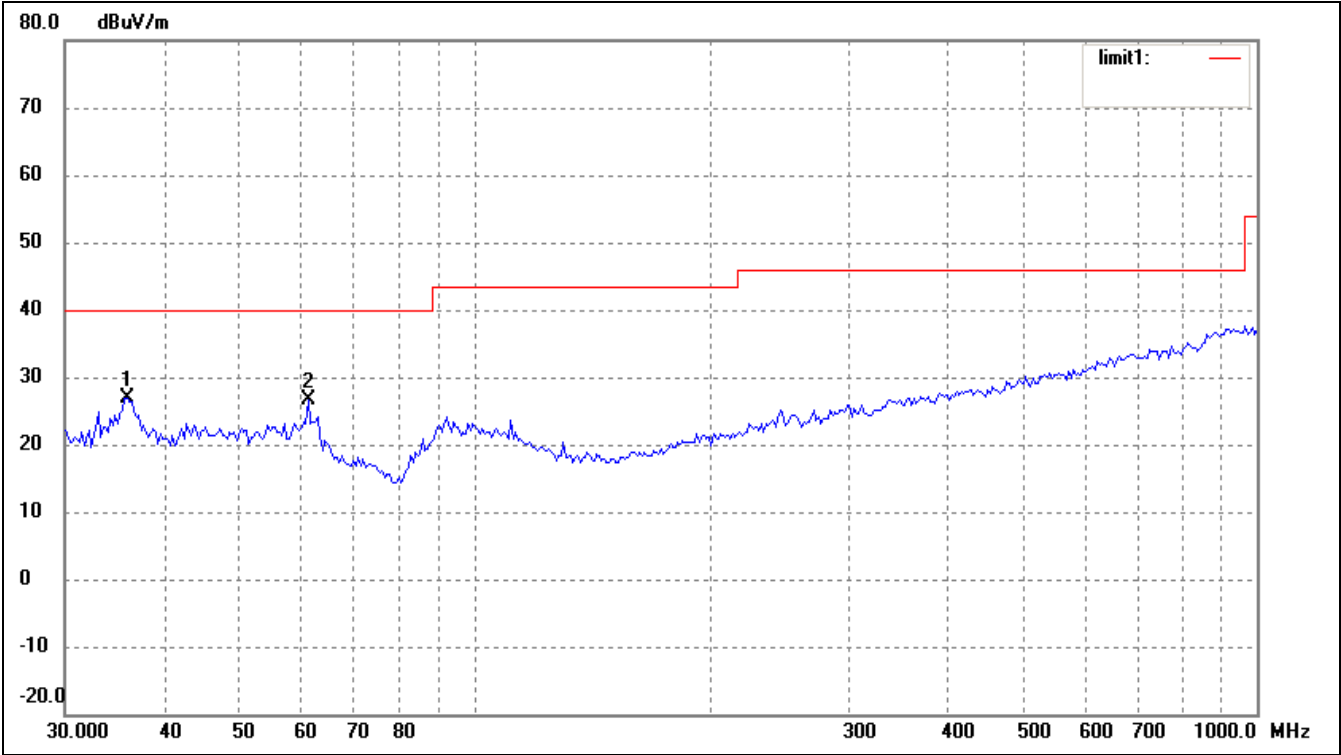
Middle Channel

Horizontal:



| No. | Frequency | Reading | Correct | Result | Limit | Margin | Degree | Height | Remark |
|-----|-----------|----------|------------|----------|----------|--------|--------|--------|--------|
| | (MHz) | (dBuV/m) | Factor(dB) | (dBuV/m) | (dBuV/m) | (dB) | (°) | (cm) | |
| 1 | 36.2541 | 20.82 | 6.83 | 27.65 | 40.00 | -12.35 | 24 | 100 | peak |
| 2 | 714.1734 | 18.57 | 17.49 | 36.06 | 46.00 | -9.94 | 81 | 100 | peak |

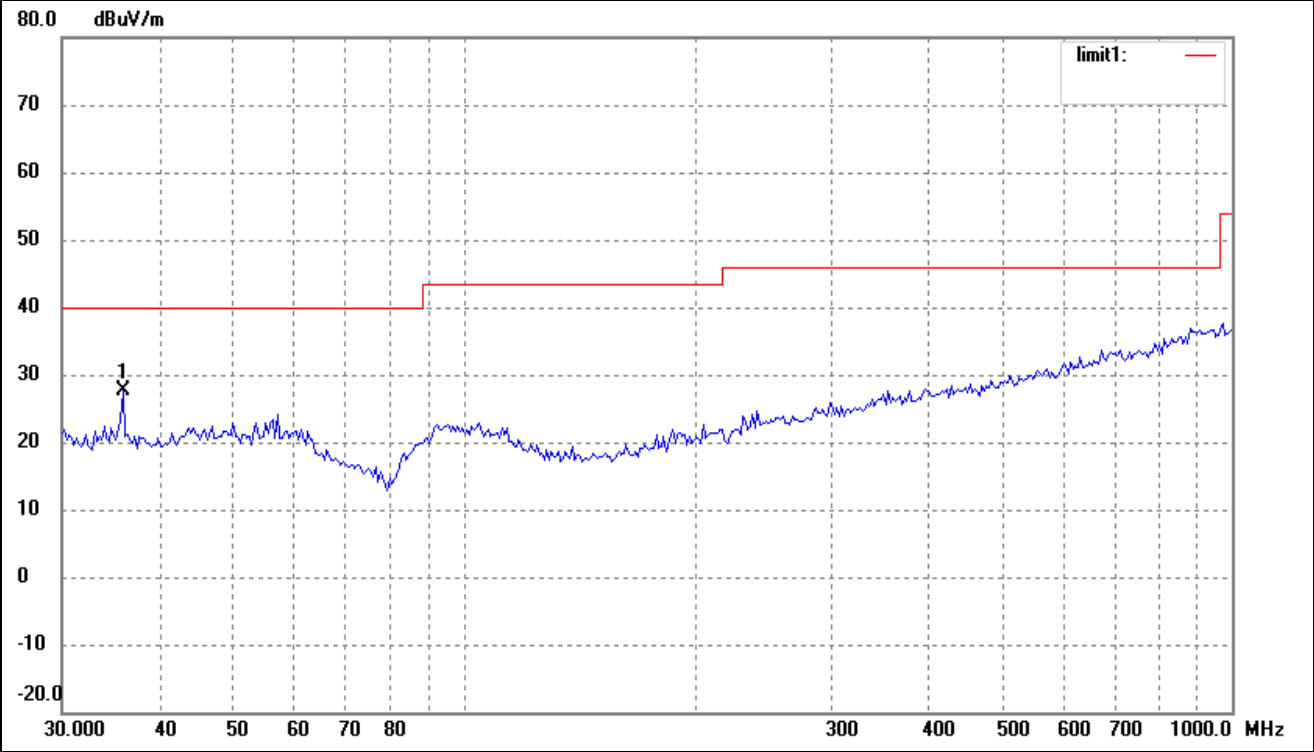
Vertical:



| No. | Frequency | Reading | Correct | Result | Limit | Margin | Degree | Height | Remark |
|-----|-----------|----------|------------|----------|----------|--------|--------|--------|--------|
| | (MHz) | (dBuV/m) | Factor(dB) | (dBuV/m) | (dBuV/m) | (dB) | (°) | (cm) | |
| 1 | 36.0007 | 20.03 | 6.84 | 26.87 | 40.00 | -13.13 | 16 | 100 | peak |
| 2 | 61.3463 | 19.65 | 7.00 | 26.65 | 40.00 | -13.35 | 314 | 100 | peak |

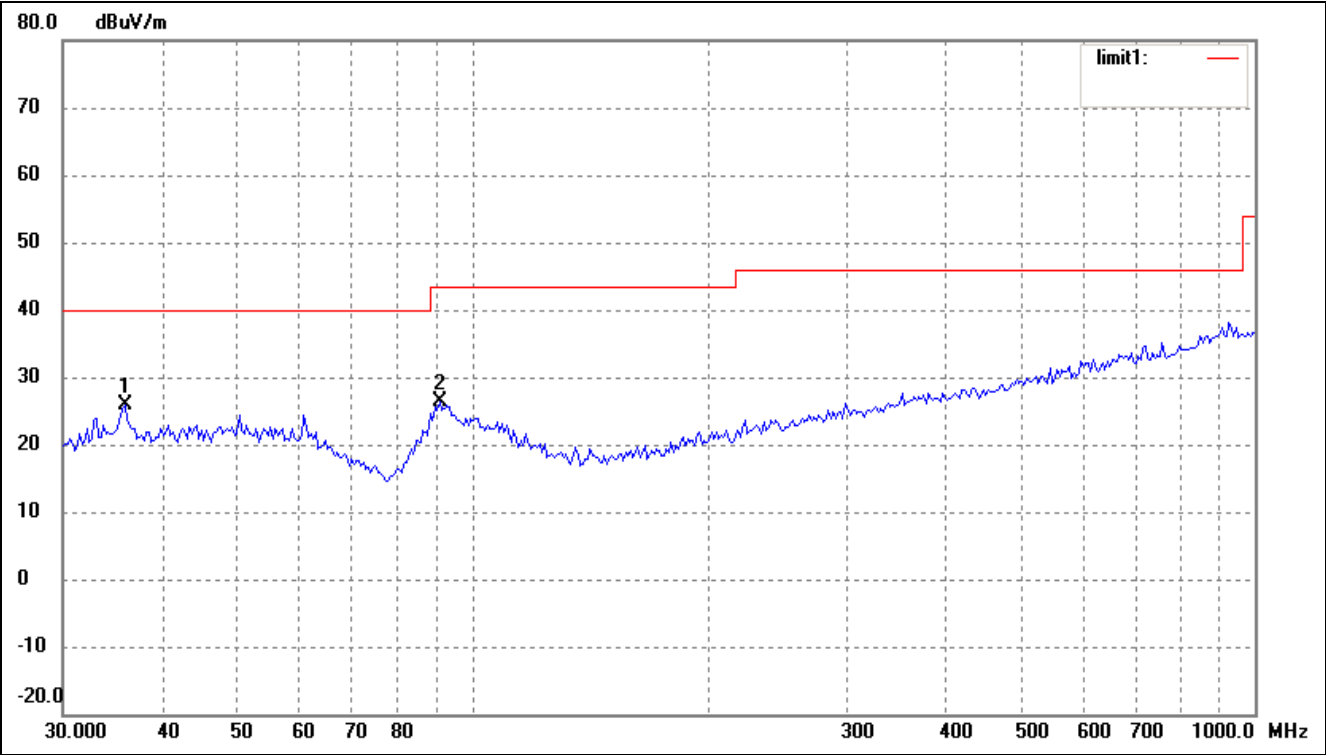
High Channel

Horizontal



| No. | Frequency | Reading | Correct | Result | Limit | Margin | Degree | Height | Remark |
|-----|-----------|----------|------------|----------|----------|--------|--------|--------|--------|
| | (MHz) | (dBuV/m) | Factor(dB) | (dBuV/m) | (dBuV/m) | (dB) | (°) | (cm) | |
| 1 | 36.0007 | 20.71 | 6.84 | 27.55 | 40.00 | -12.45 | 120 | 100 | peak |

Vertical



| No. | Frequency | Reading | Correct | Result | Limit | Margin | Degree | Height | Remark |
|-----|-----------|----------|------------|----------|----------|--------|--------|--------|--------|
| | (MHz) | (dBuV/m) | Factor(dB) | (dBuV/m) | (dBuV/m) | (dB) | (°) | (cm) | |
| 1 | 36.0007 | 19.02 | 6.84 | 25.86 | 40.00 | -14.14 | 11 | 100 | peak |
| 2 | 90.8554 | 19.09 | 7.25 | 26.34 | 43.50 | -17.16 | 71 | 100 | peak |

Test Data Above 1GHz

| 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) | | | | | | | | | | |
| 4806 | AV | 43.6 | 266 | V | 34.1 | 5.2 | 33 | 49.9 | 54 | -4.1 |
| 4806 | AV | 46.3 | 137 | H | 34.1 | 5.2 | 33 | 52.6 | 54 | -1.4 |
| 4806 | PK | 44.8 | 145 | V | 34.1 | 5.2 | 33 | 51.1 | 74 | -22.9 |
| 4806 | PK | 47.1 | 64 | H | 34.1 | 5.2 | 33 | 53.4 | 74 | -20.6 |
| 7209 | AV | 37.5 | 153 | V | 37.4 | 6.1 | 33.5 | 47.5 | 54 | -6.5 |
| 7209 | AV | 38.8 | 98 | H | 37.4 | 6.1 | 33.5 | 48.8 | 54 | -5.2 |
| 7209 | PK | 38.1 | 56 | V | 37.4 | 6.1 | 33.5 | 48.1 | 74 | -25.9 |
| 7209 | PK | 39.7 | 60 | H | 37.4 | 6.1 | 33.5 | 49.7 | 74 | -24.3 |
| 2403 | AV | 81.3 | 266 | V | 29.1 | 3.7 | 34 | 80.1 | 94 | -13.9 |
| 2403 | AV | 83.8 | 185 | H | 29.1 | 3.7 | 34 | 82.6 | 94 | -11.4 |
| 2403 | PK | 82.6 | 90 | V | 29.1 | 3.7 | 34 | 81.4 | 114 | -32.6 |
| 2403 | PK | 85.0 | 43 | H | 29.1 | 3.7 | 34 | 83.8 | 114 | -30.2 |
| Middle Channel (1G to 25GHz) | | | | | | | | | | |
| 4882 | AV | 43.4 | 232 | V | 34.1 | 5.2 | 33 | 49.7 | 54 | -4.3 |
| 4882 | AV | 45.1 | 36 | H | 34.1 | 5.2 | 33 | 51.4 | 54 | -2.6 |
| 4882 | PK | 45.3 | 321 | V | 34.1 | 5.2 | 33 | 51.6 | 74 | -22.4 |
| 4882 | PK | 46.9 | 165 | H | 34.1 | 5.2 | 33 | 53.2 | 74 | -20.8 |
| 7323 | AV | 38.9 | 332 | V | 37.4 | 6.1 | 33.5 | 48.9 | 54 | -5.1 |
| 7323 | AV | 40.2 | 257 | H | 37.4 | 6.1 | 33.5 | 50.2 | 54 | -3.8 |
| 7323 | PK | 39.6 | 149 | V | 37.4 | 6.1 | 33.5 | 49.6 | 74 | -24.4 |
| 7323 | PK | 41.7 | 68 | H | 37.4 | 6.1 | 33.5 | 51.7 | 74 | -22.3 |
| 2441 | AV | 82.5 | 42 | V | 29.1 | 3.7 | 34 | 81.3 | 94 | -12.7 |
| 2441 | AV | 85.0 | 269 | H | 29.1 | 3.7 | 34 | 83.8 | 94 | -10.2 |
| 2441 | PK | 83.7 | 66 | V | 29.1 | 3.7 | 34 | 82.5 | 114 | -31.5 |
| 2441 | PK | 86.8 | 42 | H | 29.1 | 3.7 | 34 | 85.6 | 114 | -28.4 |

| High Channel (1G to 25GHz) | | | | | | | | | | |
|----------------------------|----|------|-----|---|------|-----|------|------|-----|-------|
| 4958 | AV | 40.6 | 15 | V | 34.1 | 5.2 | 33 | 46.9 | 54 | -7.1 |
| 4958 | AV | 41.9 | 265 | H | 34.1 | 5.2 | 33 | 48.2 | 54 | -5.8 |
| 4958 | PK | 42.2 | 244 | V | 34.1 | 5.2 | 33 | 48.5 | 74 | -25.5 |
| 4958 | PK | 43.3 | 45 | H | 34.1 | 5.2 | 33 | 49.6 | 74 | -24.4 |
| 7437 | AV | 35.7 | 69 | V | 37.4 | 6.1 | 33.5 | 45.7 | 54 | -8.3 |
| 7437 | AV | 36.5 | 72 | H | 37.4 | 6.1 | 33.5 | 46.5 | 54 | -7.5 |
| 7437 | PK | 36.3 | 64 | V | 37.4 | 6.1 | 33.5 | 46.3 | 74 | -27.7 |
| 7437 | PK | 38.1 | 69 | H | 37.4 | 6.1 | 33.5 | 48.1 | 74 | -25.9 |
| 2479 | AV | 85.7 | 255 | V | 29.1 | 3.7 | 34 | 84.5 | 94 | -9.5 |
| 2479 | AV | 86.4 | 58 | H | 29.1 | 3.7 | 34 | 85.2 | 94 | -8.8 |
| 2479 | PK | 86.6 | 124 | V | 29.1 | 3.7 | 34 | 85.4 | 114 | -28.6 |
| 2479 | PK | 87.5 | 159 | H | 29.1 | 3.7 | 34 | 86.3 | 114 | -27.7 |

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. Emissions 20dB lower than the limit are not reported.

5. §15.249(b) OUT OF BAND EMISSIONS

5.1 Standard Applicable

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in §15.209, whichever is the lesser attenuation.

5.2 Test Equipment List and Details

| Manufacturer | Description | Model | Serial Number | Cal. Date | Due. Date |
|--------------------------|-------------------|-----------|---------------|------------|------------|
| Spectrum Analyzer | ROHDE&SCHWARZ | FSEA20 | DE25181 | 2009-08-12 | 2010-08-11 |
| Positioning Controller | C&C | CC-C-1F | N/A | 2009-08-12 | 2010-08-11 |
| Trilog Broadband Antenna | SCHWARZBECK | VULB9163 | 9163-333 | 2009-07-21 | 2010-07-20 |
| Horn Antenna | SCHWARZBECK | BBHX 9120 | 9120-426 | 2009-07-21 | 2010-07-20 |
| RF Switch | EM | EMSW18 | SW060023 | 2009-08-12 | 2010-08-11 |
| Amplifier | Agilent | 8447F | 3113A06717 | 2009-08-12 | 2010-08-11 |
| Coaxial Cable | SCHWARZBECK | AK9513 | 9513-10 | 2009-08-12 | 2010-08-11 |
| EMI Test Receiver | ROHDE&SCHWARZ | ESPI | 25498514 | 2009-08-12 | 2010-08-11 |
| Agilent | Spectrum Analyzer | E4402B | US41192821 | 2009-08-12 | 2010-08-11 |

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

5.3 Test Procedure

As the radiation test, set the Lowest and Highest Transmitting Channel, observed the outside band of 2400MHz to 2438.5MHz, than mark the higher-level emission for comparing with the FCC rules.

5.4 Environmental Conditions

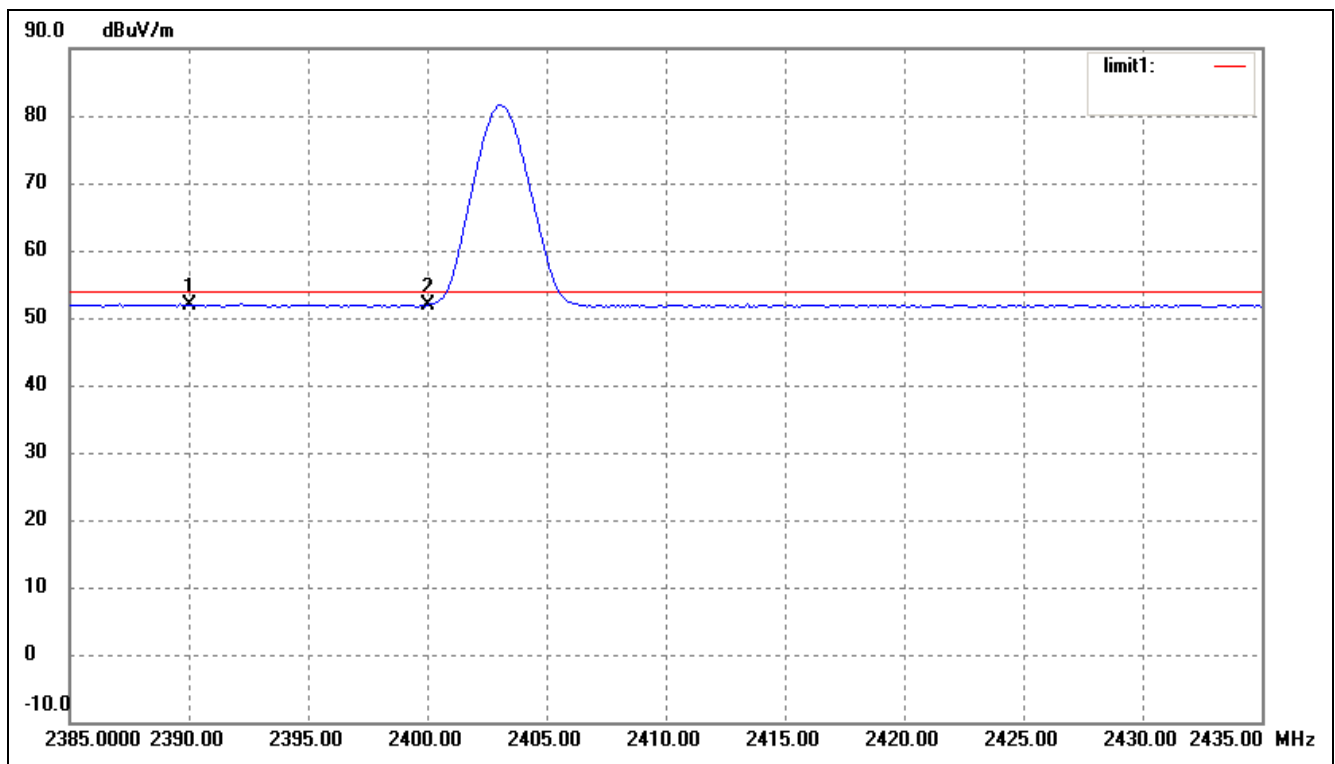
| | |
|--------------------|-----------|
| Temperature: | 22 °C |
| Relative Humidity: | 44 % |
| ATM Pressure: | 1012 mbar |

5.5 Summary of Test Results/Plots

| Frequency MHz | Limit dBuv | Result |
|------------------|---------------|--------|
| Low Edge | <54 | Pass |
| High Edge | <54 | Pass |

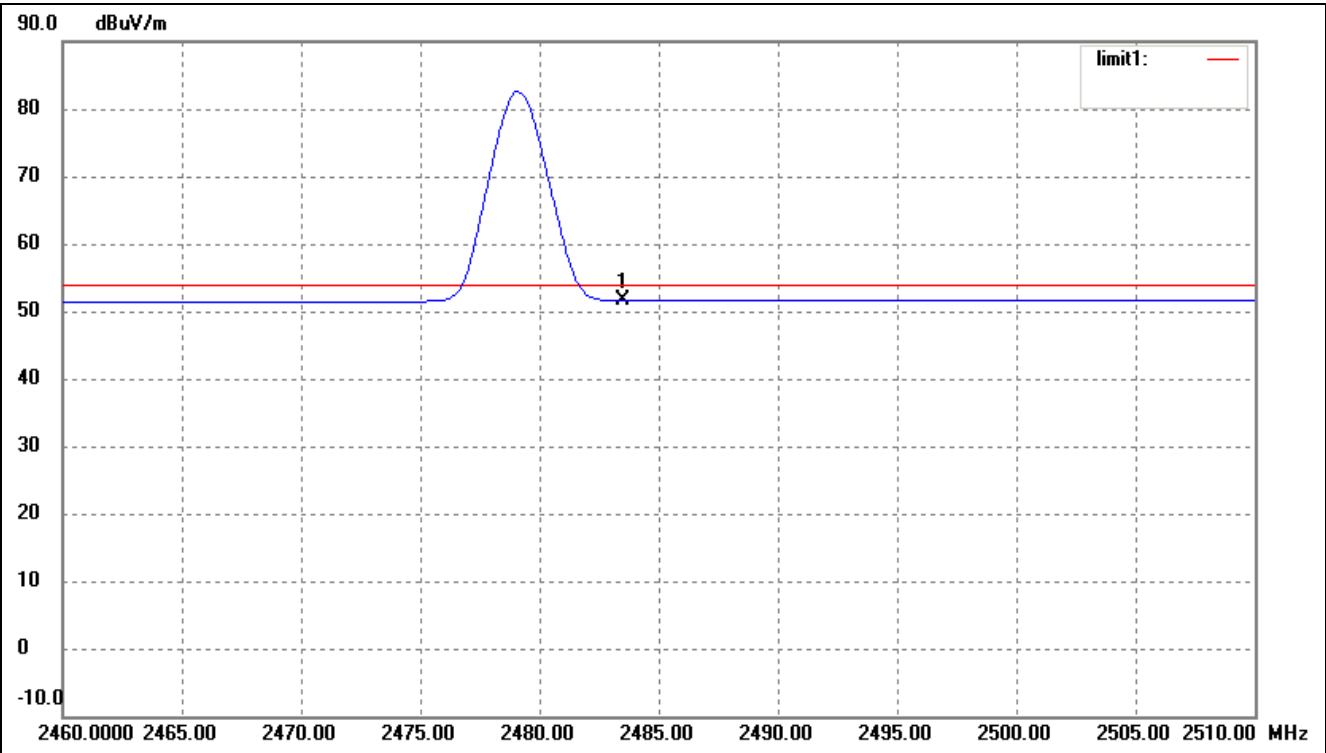
The edge emissions are below the FCC 15.209 Limits. Please refer to the test plots below.

Lowest Bandedge



| No. | Frequency (MHz) | Reading (dBuV/m) | Correct Factor(dB) | Result (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Remark |
|-----|--------------------|---------------------|-----------------------|--------------------|-------------------|----------------|---------------|
| 1 | 2390.000 | 13.03 | 38.86 | 51.89 | 54.00 | -2.11 | AV Detector |
| | 2390.000 | 20.59 | 38.86 | 59.45 | 74.00 | -14.55 | Peak Detector |
| 2 | 2400.000 | 12.85 | 38.95 | 51.80 | 54.00 | -2.20 | AV Detector |
| | 2400.000 | 22.72 | 38.95 | 61.67 | 74.00 | -12.33 | Peak Detector |

Highest Bandedge



| No. | Frequency | Reading | Correct | Result | Limit | Margin | Remark |
|-----|-----------|----------|------------|----------|----------|--------|---------------|
| | (MHz) | (dBuV/m) | Factor(dB) | (dBuV/m) | (dBuV/m) | (dB) | |
| 1 | 2483.500 | 12.31 | 39.24 | 51.55 | 54.00 | -2.45 | AV Detector |
| | 2483.500 | 20.61 | 39.24 | 59.85 | 74.00 | -14.15 | Peak Detector |

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