

**FCC PART 74**  
**MEASUREMENT AND TEST REPORT**  
**FOR**  
**ZHONG SHAN OCVACO TECHNOLOGY CO., LTD.**  
**NO.142, SOUTH TANSHEN ROAD, TANZHOU TOWN,**  
**ZHONGSHAN, CHINA**

**FCC ID: VUX716TR**

|  |  |
|--|--|
| <b>Report Concerns:</b><br>Original Report | <b>Equipment Type:</b><br>VHF WIRELESS MICROPHONE  |
| <b>Model:</b>                              | <u>MIC-716T/R</u>  |
| <b>Report No.:</b>                         | <u>STR08018016I</u>  |
| <b>Test/Witness Engineer:</b>              | <u>Innaz Lee</u>   |
| <b>Test Date:</b>                          | <u>2008-01-07 to 2008-01-10</u>  |
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| <b>Approved &amp; Authorized By:</b>       | <br>_____<br>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**

|  |           |
|--|-----------|
| <b>1. GENERAL INFORMATION.....</b>                             | <b>3</b>  |
| 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         |
| <b>2. SUMMARY OF TEST RESULTS.....</b>                         | <b>5</b>  |
| <b>3. §74.861(E)(1)(I)-OUTPUT POWER MEASUREMENT.....</b>       | <b>6</b>  |
| 3.1 STANDARD APPLICABLE.....                                   | 6         |
| 3.1 TEST EQUIPMENT LIST AND DETAIL.....                        | 6         |
| 3.2 TEST PROCEDURE.....  | 6         |
| 3.3 TEST RESULT/PLOTS.....                                     | 6         |
| <b>4. §74.861(E)(3)-MODULATION CHARACTERISTICS.....</b>        | <b>9</b>  |
| 4.1 STANDARD APPLICABLE.....                                   | 9         |
| 4.2 TEST EQUIPMENT LIST AND DETAILS.....                       | 9         |
| 4.3 TEST PROCEDURE.....  | 9         |
| 4.4 TEST RESULTS/PLOTS.....                                    | 9         |
| <b>5. §74.861(E)(5) - OCCUPIED BANDWIDTH OF EMISSION.....</b>  | <b>11</b> |
| 5.1 STANDARD APPLICABLE.....                                   | 11        |
| 5.2 TEST PROCEDURE.....  | 11        |
| 5.3 TEST RESULTS/PLOTS.....                                    | 11        |
| <b>6. §74.861 (E)(6)(III)- RADIATED SPURIOUS EMISSION.....</b> | <b>14</b> |
| 6.1 MEASUREMENT UNCERTAINTY.....                               | 14        |
| 6.2 STANDARD APPLICABLE.....                                   | 14        |
| 6.3 TEST EQUIPMENT LIST AND DETAILS.....                       | 14        |
| 6.4 TEST PROCEDURE.....  | 15        |
| 6.5 ENVIRONMENTAL CONDITIONS.....                              | 16        |
| 6.6 SUMMARY OF TEST RESULTS/PLOTS.....                         | 16        |
| <b>7. §2.1051-SPURIOUS EMISSION AT ANTENNA TERMINAL.....</b>   | <b>21</b> |
| 7.1 STANDARD APPLICABLE.....                                   | 21        |
| 7.2 TEST EQUIPMENT LIST AND DETAILS.....                       | 21        |
| 7.3 TEST PROCEDURE.....  | 21        |
| 7.4 SUMMARY OF TEST RESULTS/PLOTS.....                         | 21        |
| <b>8. §74.86(E)(4) - FREQUENCY STABILITY MEASUREMENT.....</b>  | <b>25</b> |
| 8.1 STANDARD APPLICABLE.....                                   | 25        |
| 8.2 TEST EQUIPMENT LIST AND DETAILS.....                       | 25        |
| 8.3 TEST PROCEDURE.....  | 25        |
| 8.4 TEST RESULTS/PLOTS.....                                    | 25        |

## 1. GENERAL INFORMATION

### 1.1 Product Description for Equipment Under Test (EUT)

#### Client Information

Applicant: ZHONG SHAN OCVACO TECHNOLOGY CO., LTD.  
Address of applicant: NO.142, SOUTH TANSHEN ROAD, TANZHOU TOWN,  
ZHONGSHAN, CHINA

Manufacturer: ZHONG SHAN OCVACO TECHNOLOGY CO., LTD.  
Address of manufacturer: NO.142, SOUTH TANSHEN ROAD, TANZHOU TOWN,  
ZHONGSHAN, CHINA

#### General Description of E.U.T

| Items   | Description             |
|---|-------------------------|
| EUT Description:  | VHF WIRELESS MICROPHONE |
| Trade Name:   | /                       |
| Model No.:  | MIC-716T/R              |
| Rated Voltage:  | DC 3V Battery           |
| Output Power:   | ≤0dBm                   |
| Frequency Range:  | 174.1 – 215.9 MHz       |
| Antenna Type:   | Integral Antenna        |
| Size:   | 29.0X4.0X4.0 cm         |
| For more information refer to the circuit diagram form and the user's manual. |                         |

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

### 1.2 Test Standards

The following report is prepared on behalf of ZHONG SHAN OCVACO TECHNOLOGY CO., LTD. in accordance with Part 74 Subpart H of the Federal Communication Commissions rules.

The objective is to determine compliance with 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.

### 1.3 Related Submittal(s)/Grant(s)

No Related Submittal(s).

## 1.4 Test Methodology

Measurements contained in this report were also conducted with TIA/EIA Standard 603, Telecommunications Industry Association Land Mobile FM or PM Communications Equipment Measurement and Performance Standards and 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.

## 1.5 Test Facility

The 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 files which the Registration No.: **759397**. Measurement required was performed at laboratory of Solid Industrial Co., Ltd. at 333 Bulong Highway Buji Longgang, Shenzhen, Guangdong, China.

## 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 Cord/Without Cord |
|-------------------|------------|---------------------|------------------------|
| /                 | /          | /                   | /                      |

## 2. SUMMARY OF TEST RESULTS

| FCC RULES        | DESCRIPTION OF TEST               | RESULT    |
|------------------|-----------------------------------|-----------|
| §74.861(e)(1)(i) | Output Power Measurement          | Compliant |
| §74.861(e)(3)    | Modulation Characteristics        | Compliant |
| §74.861(e)(5)    | Occupied Bandwidth Emission       | Compliant |
| §74.861(e)(6)    | Radiated Spurious Emission        | Compliant |
| §2.1051          | Spurious Emission at Antenna Port | Compliant |
| §74.86(e)(4)     | Frequency Stability               | Compliant |

### 3. §74.861(e)(1)(i)-OUTPUT POWER MEASUREMENT

#### 3.1 Standard Applicable

According to FCC 74.861(e)(1)(i), for low power auxiliary station operating in the 54–72, 76–88, and 174–216 MHz bands, the power of the measured unmodulated carrier power and the output of the transmitter power amplifier (antenna input power) may not exceed 50mW.

#### 3.1 Test Equipment List and Detail

| Manufacturer | Description       | Model  | Serial Number | Cal. Date  | Due. Date  |
|--------------|-------------------|--------|---------------|------------|------------|
| Agilent      | Spectrum Analyzer | E4402B | US41192821    | 2007-06-30 | 2008-06-29 |

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

#### 3.2 Test Procedure

1. The maximum peak output power was measured with a Spectrum Analyzer connected to the antenna terminal while EUT was operating in unmodulated situation.
2. Power was supplied to the battery input connector a power supply. The power supply was set for +3.0VDC. The Spectrum Analyzer was connected at antenna terminal to measure RF power of the carrier.
3. A Multimeter was connected in series with final RF Stage to measure the current; A Multimeter was used to measure final RF Stage supply voltage. Then the voltage v.s. current of the final RF Stage can be showed.

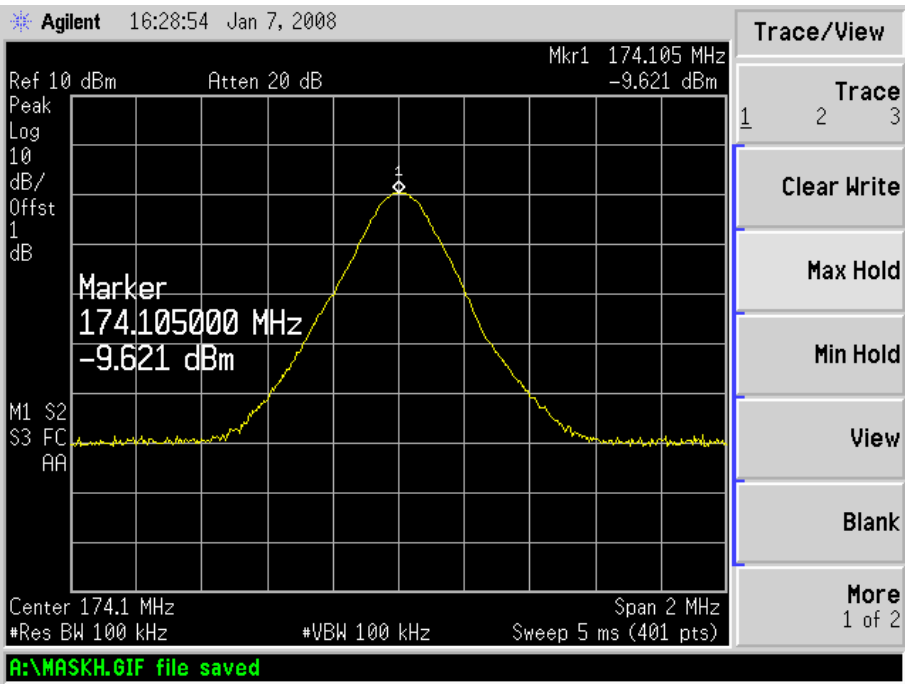
#### 3.3 Test Result/Plots

| Channel   | Frequency (MHz) | Output Power (dBm) | Limit (dBm) |
|-----------|-----------------|--------------------|-------------|
| Low CH    | 174.10          | -9.621             | 17          |
| Middle CH | 195.00          | -9.518             | 17          |
| High CH   | 215.90          | -0.609             | 17          |

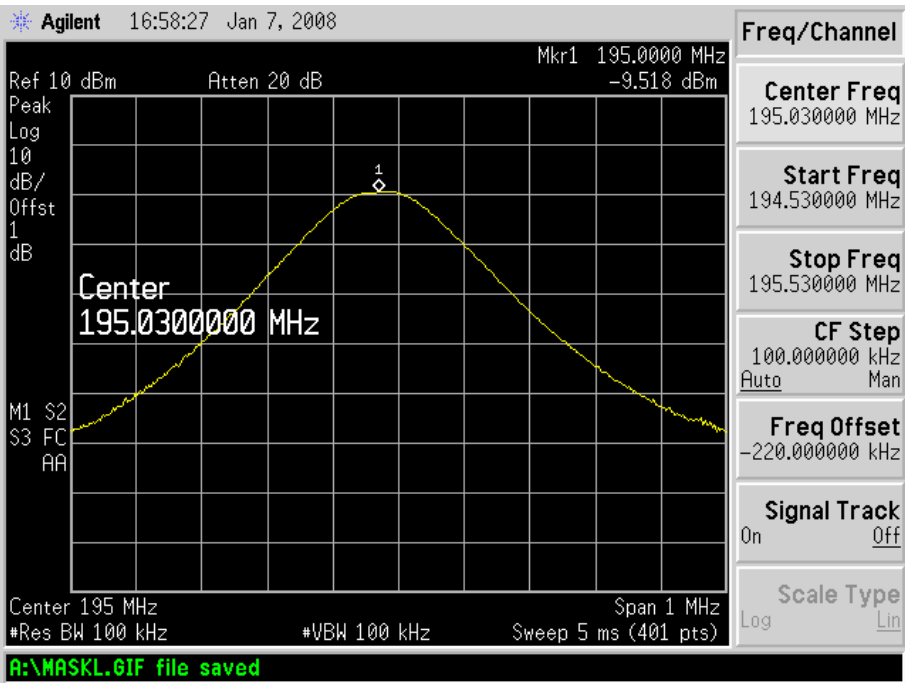
DC Voltages and Current into Final Amplifier:

FINAL AMPLIFIER ONLY     INPUT POWER = (3.0V) x (0.28mA) = 0.84 mW.

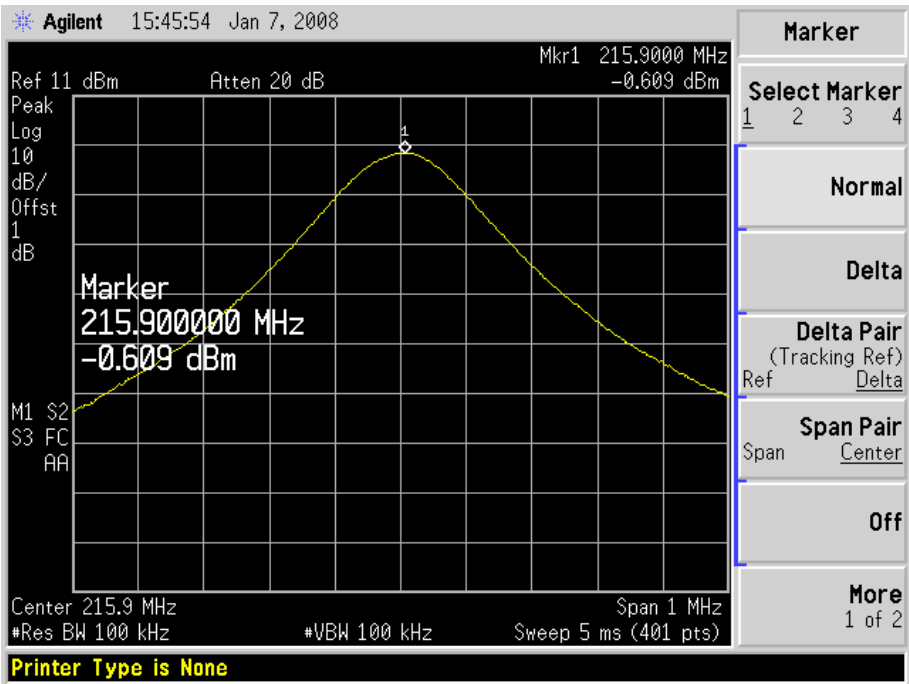
Low Channel:



Middle Channel:



High Channel:





## 4. §74.861(e)(3)-MODULATION CHARACTERISTICS

### 4.1 Standard Applicable

According to FCC 2.1047 (a), for Voice Modulated Communication Equipment, the frequency response of the audio modulating circuit over a range of 100Hz to 5000Hz shall be measured. For equipment required to have an audio low-pass filter, the frequency response of the filter or of all circuitry installed between the modulation limiter and the modulated stage shall be measured.

According to §74.861(e)(3), any form of modulation may be used. A maximum deviation of  $\pm 75$  kHz is permitted when frequency modulation is employed.

### 4.2 Test Equipment List and Details

| Description         | Manufacturer    | Model    | Serial Number | Cal. Date  | Due. Date  |
|---------------------|-----------------|----------|---------------|------------|------------|
| Modulation Analyzer | Rohde & Schwarz | FAM 54   | 334.2015.54   | 2007-06-30 | 2008-06-29 |
| Audio Generator     | MEILI           | MFG-3005 | 200612187     | 2007-06-30 | 2008-06-29 |

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

### 4.3 Test Procedure

- 1) Position the EUT as shown in figure 1, adjust the audio input frequency from 100Hz to 15000 Hz and the input level from 0V to maximum permitted input voltage with recording each carrier frequency deviation responding to respective input level.
- 2) Repeat step 1 with changing the input frequency for 100, 300, 1000, 10000 and 15000 Hz in sequence.

### 4.4 Test Results/Plots

$$B_n = 2M + 2DK$$

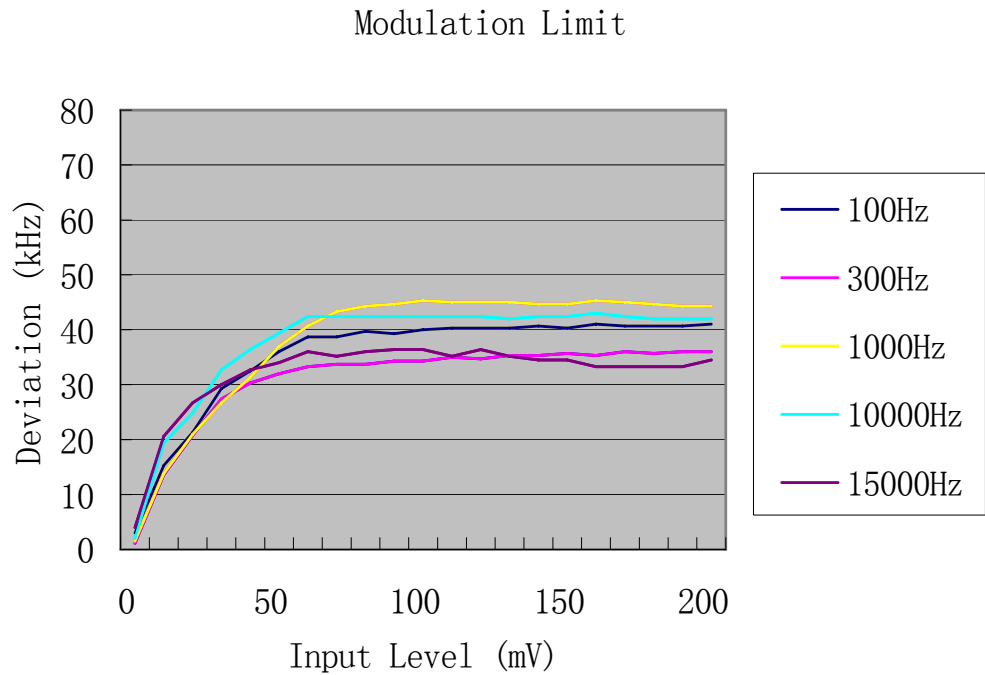
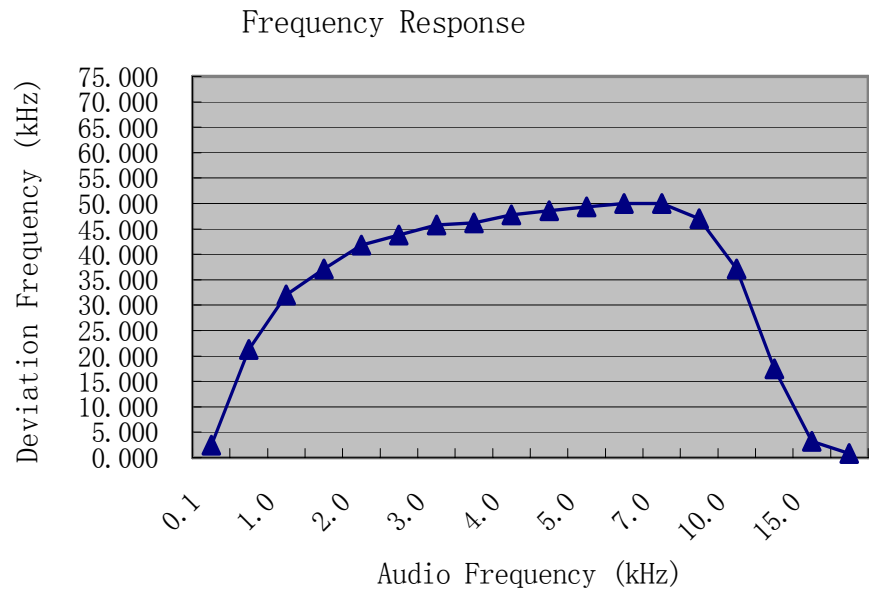
$$M = 10000$$

$$D = 52 \text{ kHz (Peak Deviation refer to the test plot)}$$

$$K = 1$$

$$B_n = 2(10k) + 2(46k)(1) = 112k$$

Type of Emission: 112KF3E



## 5. §74.861(e)(5) - OCCUPIED BANDWIDTH OF EMISSION

### 5.1 Standard Applicable

According to FCC 2.1049 (c) (1), for radiotelephone transmitter, other than single sideband or independent sideband transmitter, when modulated by a 2.5 kHz tone at an input level 16 dB greater than that necessary to produce 50 percent modulation.

According to §74.861(e)(5), the operating bandwidth shall not exceed 200 kHz.

| Description     | Manufacturer      | Model    | Serial Number | Cal. Date  | Due. Date  |
|-----------------|-------------------|----------|---------------|------------|------------|
| Agilent         | Spectrum Analyzer | E4402B   | US41192821    | 2007-06-30 | 2008-06-29 |
| Audio Generator | MEILI             | MFG-3005 | 200612187     | 2007-06-30 | 2008-06-29 |

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

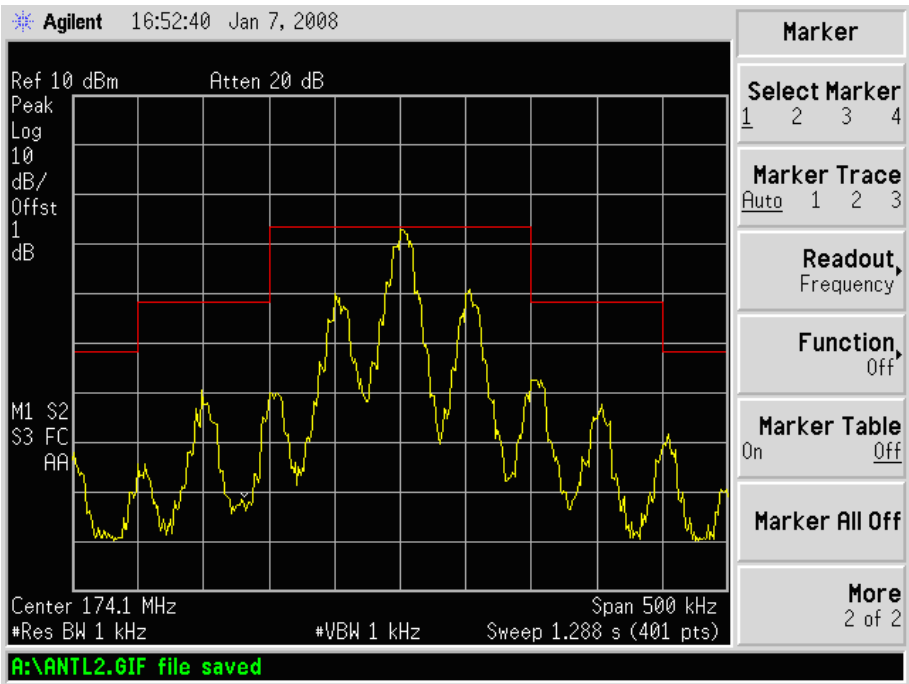
### 5.2 Test Procedure

According to TIA-603 for additional Test Set-Up procedures, the occupied bandwidth of emission was measured with a Spectrum Analyzer connected to the antenna terminal while EUT was operating in 2.5kHz tone at an input level 16 dB greater than that necessary to produce 50 percent modulation. Then mark the -26dB Bandwidth and record it.

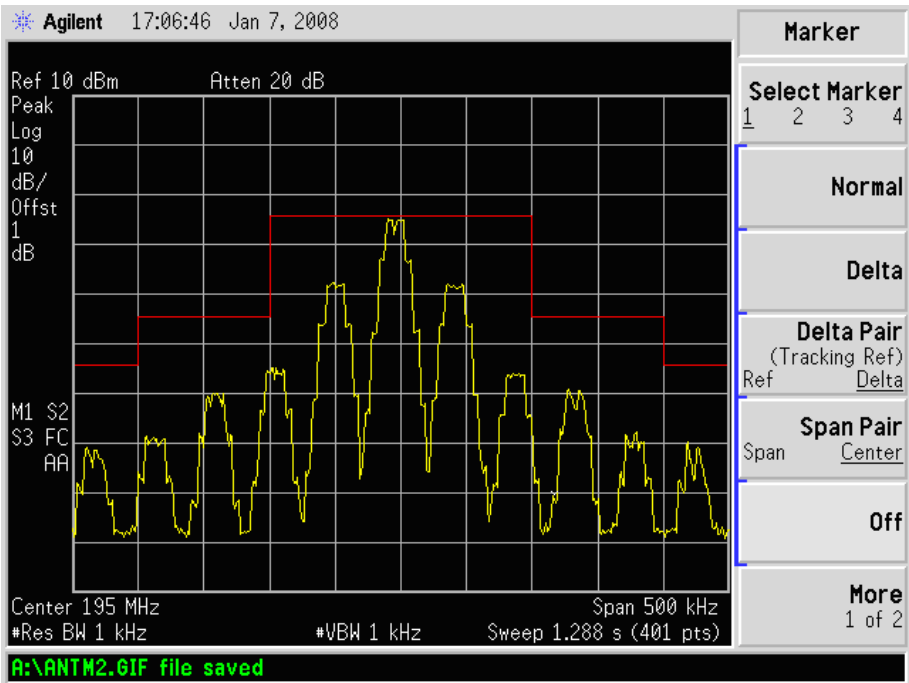
### 5.3 Test Results/Plots

| Channel   | Freq (MHz) | Measured Bandwidth (KHz) | Limit (kHz) |
|-----------|------------|--------------------------|-------------|
| Low CH    | 174.10     | 124.20                   | 200         |
| Middle CH | 195.00     | 122.40                   | 200         |
| High CH   | 215.90     | 131.70                   | 200         |

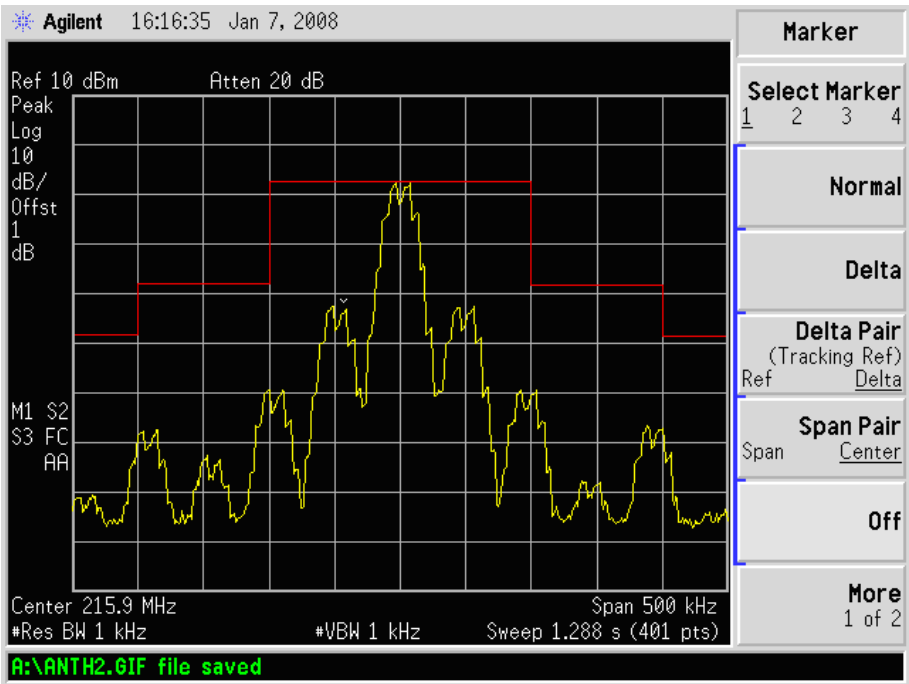
Low Channel:



Middle Channel:



High Channel:



## 6. §74.861 (e)(6)(iii)- RADIATED SPURIOUS EMISSION

### 6.1 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  $\pm 3.0$  dB.

### 6.2 Standard Applicable

According to FCC 2.1053, measurements shall be made to detect spurious emission that may be radiated directly from the cabinet, control circuits, power leads, or intermediated circuit elements under normal condition of installation and operation. Information submitted shall include the relative radiated power of spurious emission with reference to the rated power output of the transmitter, assuming all emissions are radiated from a halfwave dipole antenna.

According to FCC74.861 (e)(6), the mean power of emissions shall be attenuated below the mean output power of the transmitter in accordance with the following schedule:

1. On any frequency removed from the operating frequency by more than 50 percent up to and including 100 percent of the authorized bandwidth: at least 25 dB.
2. On any frequency removed from the operating frequency by more than 100 percent up to and including 250 percent of the authorized bandwidth: at least 35 dB.

On any frequency removed from the operating frequency by more than 250 percent up to and the authorized bandwidth shall be attenuated below the un-modulated carrier by at least 43 plus 10 Log (output power in watts) dB.

### 6.3 Test Equipment List and Details

| Manufacturer     | Description             | Model     | Serial Number | Cal. Date  | Due. Date  |
|------------------|-------------------------|-----------|---------------|------------|------------|
| Rohde & Schwarz  | EMI Test Receiver       | ESI26     | 830245/009    | 2007-06-30 | 2008-06-29 |
| ETS              | Multi_Device Controller | 2090      | 57230         | 2007-06-30 | 2008-06-29 |
| Antenna          | Schwarzbeck             | VUBA9117  | 115           | 2007-06-30 | 2008-06-29 |
| 3m chamber       | Albatross Projects      | 9X6X6     | ----          | 2007-06-30 | 2008-06-29 |
| Rohde & Schwarz  | Horn Antenna            | HF906     | 100014        | 2007-06-30 | 2008-06-29 |
| Signal Generator | Rohde & Schwarz         | SMR20     | 100047        | 2007-06-30 | 2008-06-29 |
| Dipole Antenna   | Schwarzbeck             | H00009170 | 9136          | 2007-06-30 | 2008-06-29 |

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

## 6.4 Test Procedure

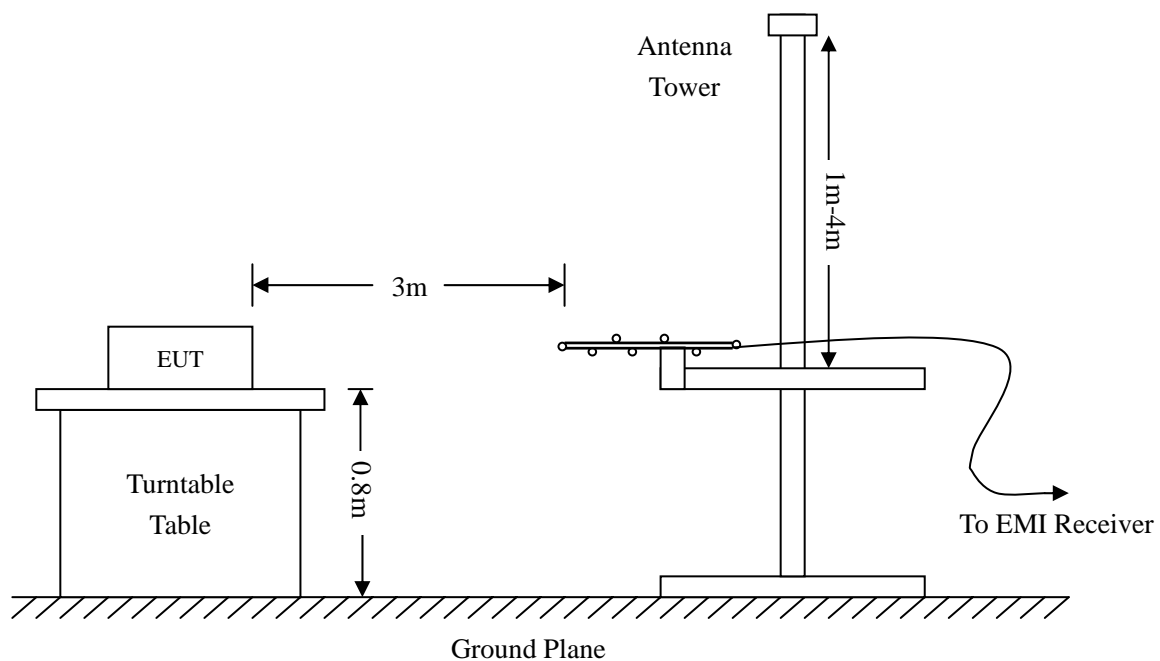
The setup of EUT is according with per TIA/EIA Standard 603 and ANSI C63.4-2003 measurement procedure.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.

The frequency range up to tenth harmonic of the fundamental frequency was investigated.

Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

Spurious attenuation limit in dB =  $43 + 10 \log_{10}(\text{power in Watts})$



## 6.5 Environmental Conditions

|                    |           |
|--------------------|-----------|
| Temperature:       | 26° C     |
| Relative Humidity: | 52%       |
| ATM Pressure:      | 1022 mbar |

## 6.6 Summary of Test Results/Plots

According to the data below, the FCC Part 74.861 standards, and had the worst margin of:

**-19.50 dBμV at 312.70 MHz in the Vertical of High channel polarization, 30 MHz to 3 GHz, 3Meters.**

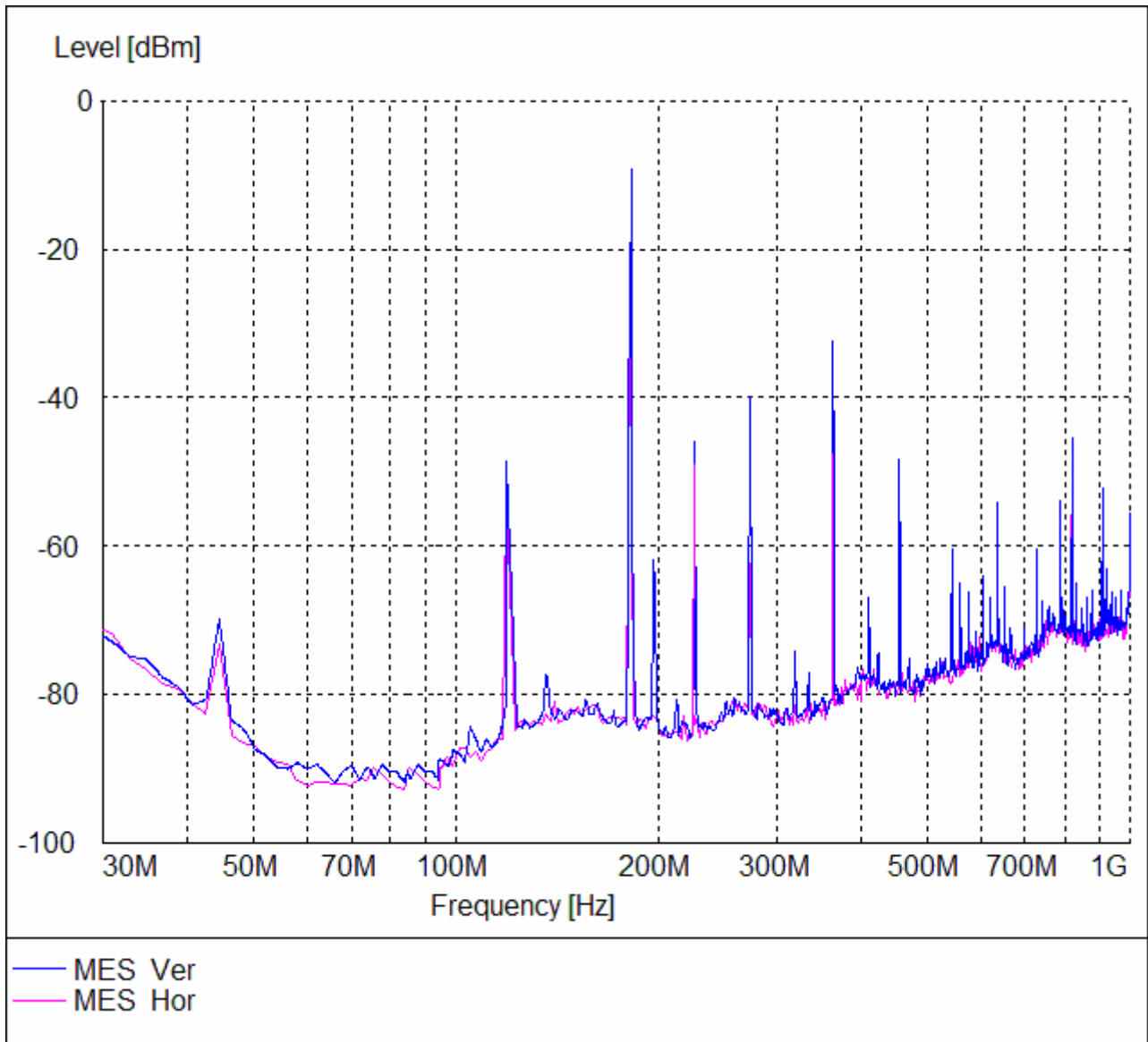
| Frequency              | SG Reading | Height | Polar | Cable loss | Antenna Gain | Corrected Ampl. | FCC Part 74 Limit | FCC Part 74 Margin |
|------------------------|------------|--------|-------|------------|--------------|-----------------|-------------------|--------------------|
| MHz                    | dBm        | Meter  | H / V | dB         | dB           | dBm             | dBm               | dB                 |
| Low Channel, 1-3GHz    |            |        |       |            |              |                 |                   |                    |
| 384.52                 | -34.8      | 1.3    | V     | 1.9        | 0            | -36.7           | -13               | -23.7              |
| 384.52                 | -37.3      | 1.5    | H     | 1.9        | 0            | -39.22          | -13               | -26.2              |
| 288.00                 | -38.6      | 1.3    | V     | 1.5        | 0            | -40.1           | -13               | -27.1              |
| 240.30                 | -41.4      | 1.2    | H     | 1.3        | 0            | -42.74          | -13               | -29.7              |
| 816.65                 | -39.5      | 1.3    | H     | 3.3        | 0            | -42.77          | -13               | -29.8              |
| 288.00                 | -42.0      | 1.2    | H     | 1.5        | 0            | -43.5           | -13               | -30.5              |
| 144.12                 | -43.4      | 1.5    | H     | 1.1        | 0            | -44.53          | -13               | -31.5              |
| 240.30                 | -44.9      | 1.5    | V     | 1.3        | 0            | -46.2           | -13               | -33.2              |
| 816.65                 | -43.9      | 1.1    | V     | 3.3        | 0            | -47.2           | -13               | -34.2              |
| 144.12                 | -47.2      | 1.2    | V     | 1.1        | 0            | -48.3           | -13               | -35.3              |
| 456.70                 | -46.3      | 1.3    | H     | 2.2        | 0            | -48.5           | -13               | -35.5              |
| 456.70                 | -47.6      | 1.1    | V     | 2.2        | 0            | -49.8           | -13               | -36.8              |
| Middle Channel, 1-3GHz |            |        |       |            |              |                 |                   |                    |
| 312.00                 | -36.4      | 1.2    | V     | 1.7        | 0            | -38.12          | -13               | -25.1              |
| 585.60                 | -39.6      | 1.0    | V     | 2.7        | 0            | -42.34          | -13               | -29.3              |
| 312.00                 | -42.6      | 1.2    | H     | 1.7        | 0            | -44.3           | -13               | -31.3              |
| 145.30                 | -44.0      | 1.0    | H     | 1.1        | 0            | -45.1           | -13               | -32.1              |
| 264.40                 | -45.0      | 1.3    | V     | 1.4        | 0            | -46.37          | -13               | -33.4              |
| 145.30                 | -46.1      | 1.2    | V     | 1.1        | 0            | -47.2           | -13               | -34.2              |
| 780.00                 | -44.2      | 1.5    | V     | 3.3        | 0            | -47.5           | -13               | -34.5              |
| 585.60                 | -46.6      | 1.5    | H     | 2.7        | 0            | -49.27          | -13               | -36.3              |
| 384.70                 | -47.6      | 1.5    | H     | 1.9        | 0            | -49.5           | -13               | -36.5              |
| 384.70                 | -50.9      | 1.2    | V     | 1.9        | 0            | -52.77          | -13               | -39.8              |
| 264.40                 | -57.5      | 1.2    | H     | 1.4        | 0            | -58.92          | -13               | -45.9              |
| 780.00                 | -56.3      | 1.3    | H     | 3.3        | 0            | -59.6           | -13               | -46.6              |



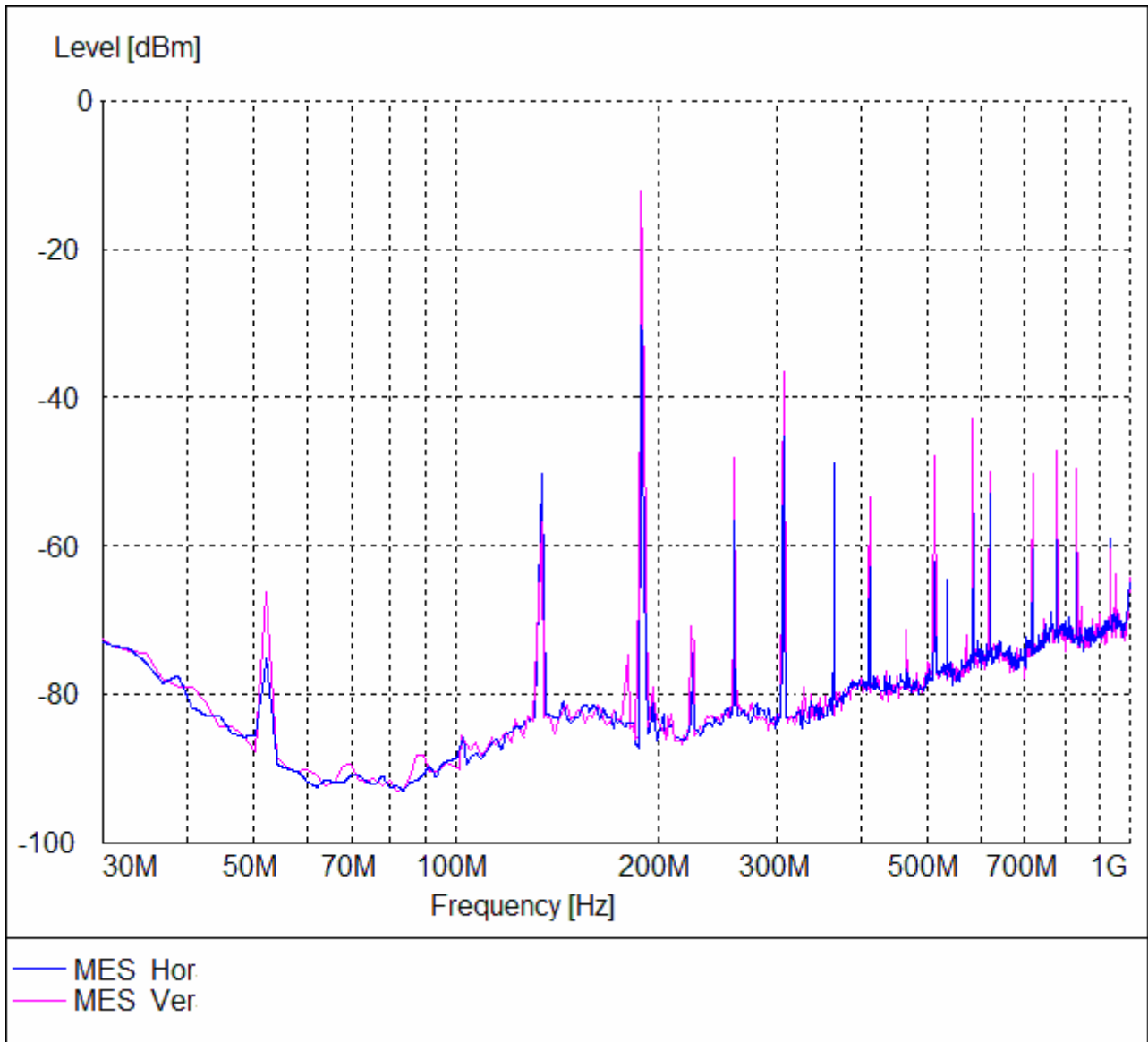
| High Channel, 1-3GHz |       |     |   |     |   |        |     |       |
|----------------------|-------|-----|---|-----|---|--------|-----|-------|
| 312.70               | -30.8 | 1.5 | V | 1.7 | 0 | -32.49 | -13 | -19.5 |
| 156.10               | -38.0 | 1.2 | H | 1.1 | 0 | -39.1  | -13 | -26.1 |
| 936.14               | -36.4 | 1.0 | V | 3.6 | 0 | -40    | -13 | -27.0 |
| 431.00               | -39.1 | 1.1 | V | 2.2 | 0 | -41.34 | -13 | -28.3 |
| 312.70               | -41.7 | 1.3 | H | 1.7 | 0 | -43.42 | -13 | -30.4 |
| 647.52               | -41.2 | 1.2 | V | 2.9 | 0 | -44.1  | -13 | -31.1 |
| 839.10               | -42.2 | 1.3 | V | 3.3 | 0 | -45.5  | -13 | -32.5 |
| 156.10               | -46.4 | 1.2 | V | 1.1 | 0 | -47.5  | -13 | -34.5 |
| 936.14               | -44.5 | 1.2 | H | 3.6 | 0 | -48.1  | -13 | -35.1 |
| 647.52               | -49.9 | 1.2 | H | 2.9 | 0 | -52.8  | -13 | -39.8 |
| 839.10               | -50.2 | 1.5 | H | 3.3 | 0 | -53.49 | -13 | -40.5 |
| 431.00               | -60.6 | 1.1 | H | 2.2 | 0 | -62.76 | -13 | -49.8 |

Note: Testing is carried out with frequency rang 30MHz to the tenth harmonics. Emissions undetected below the base noise are not reported.

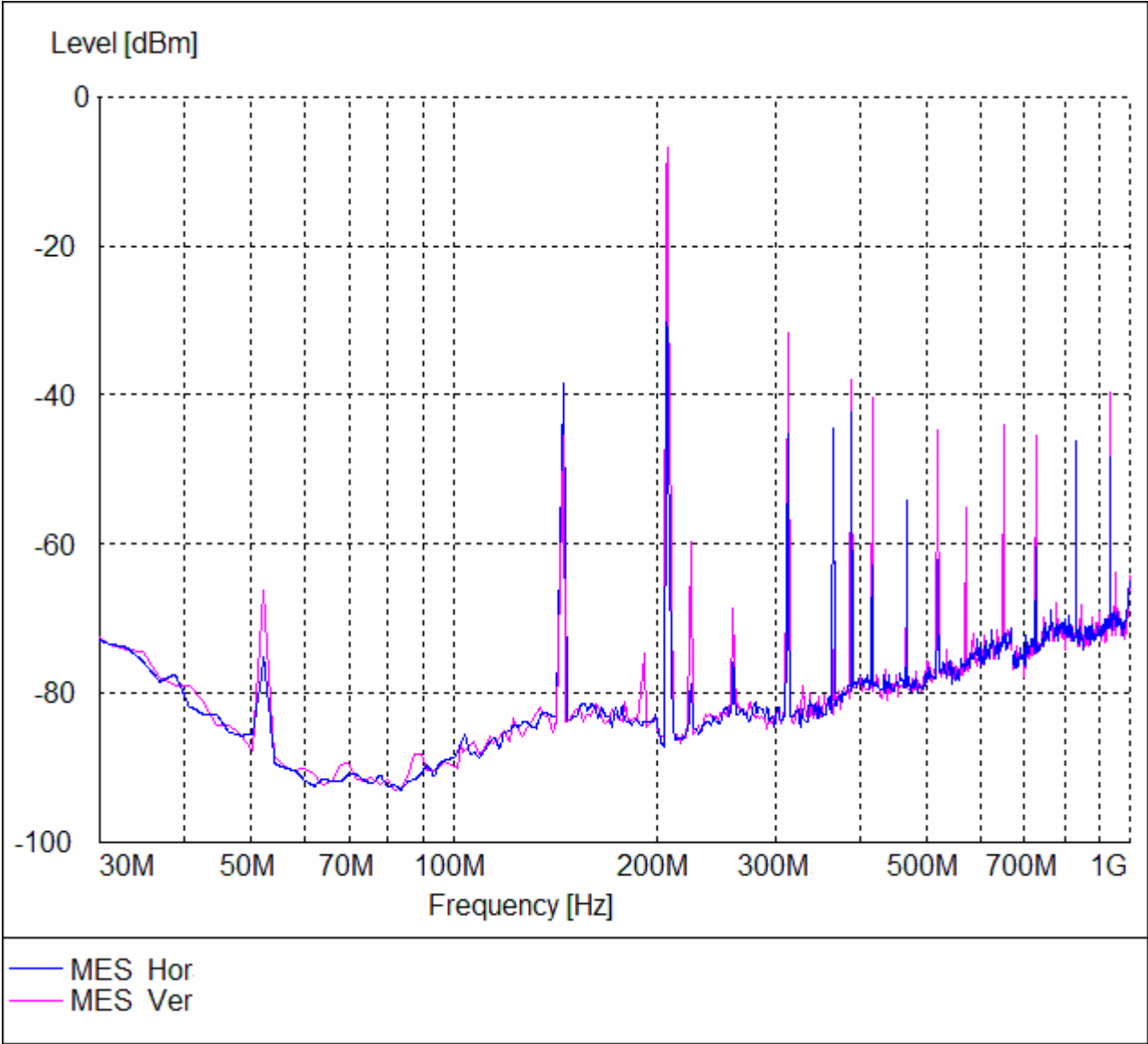
Low Channel:



Middle Channel:



High Channel:



## 7. §2.1051-SPURIOUS EMISSION AT ANTENNA TERMINAL

### 7.1 Standard Applicable

According to §2.1051, the radio frequency voltage or powers generated within the equipment and appearing on a spurious frequency shall be checked at the equipment output terminals when properly loaded with a suitable artificial antenna. Curves or equivalent data shall show the magnitude of each harmonic and other spurious emission that can be detected when the equipment is operated under the conditions specified in §2.1049 as appropriate.

### 7.2 Test Equipment List and Details

| Manufacturer | Description          | Model        | Serial Number | Cal. Date  | Due. Date  |
|--------------|----------------------|--------------|---------------|------------|------------|
| Agilent      | Spectrum Analyzer    | E4402B       | US41192821    | 2007-06-30 | 2008-06-29 |
| ETS          | 50 ohm Coaxial Cable | SUCOFLEX 104 | 25498514      | 2007-06-30 | 2008-06-29 |

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

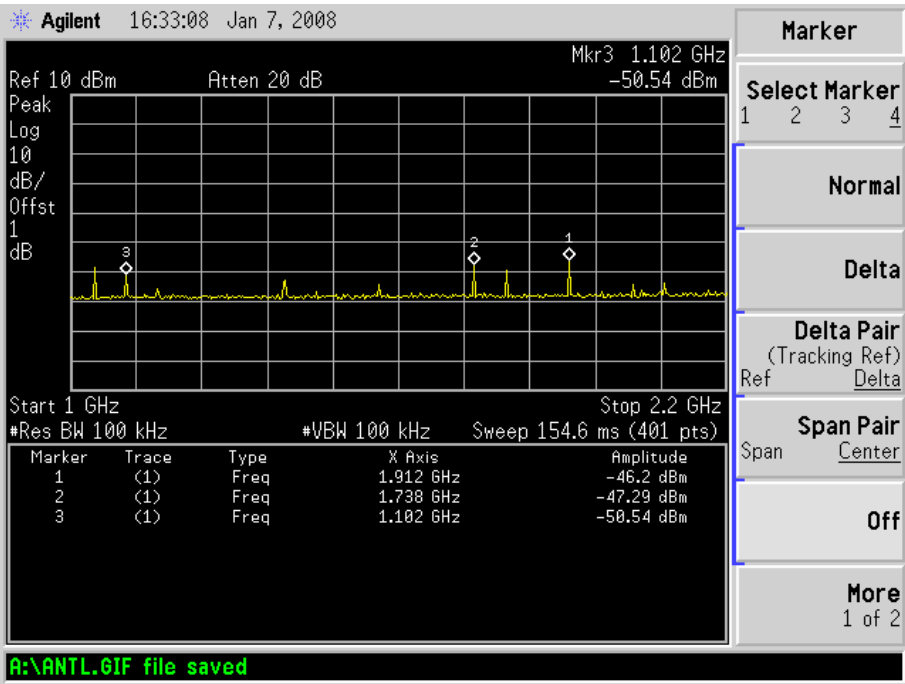
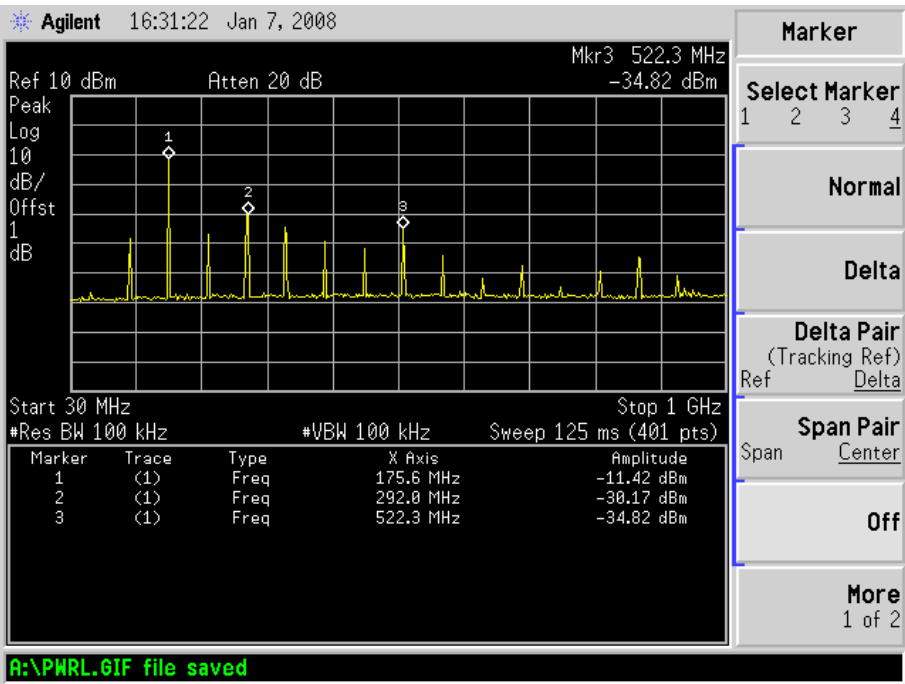
### 7.3 Test Procedure

Connect a suitable artificial antenna properly, set the Low, Middle and High Transmitting Channel, observed the spurious emissions from antenna port, and then mark the higher-level emission for comparing with the FCC rules.

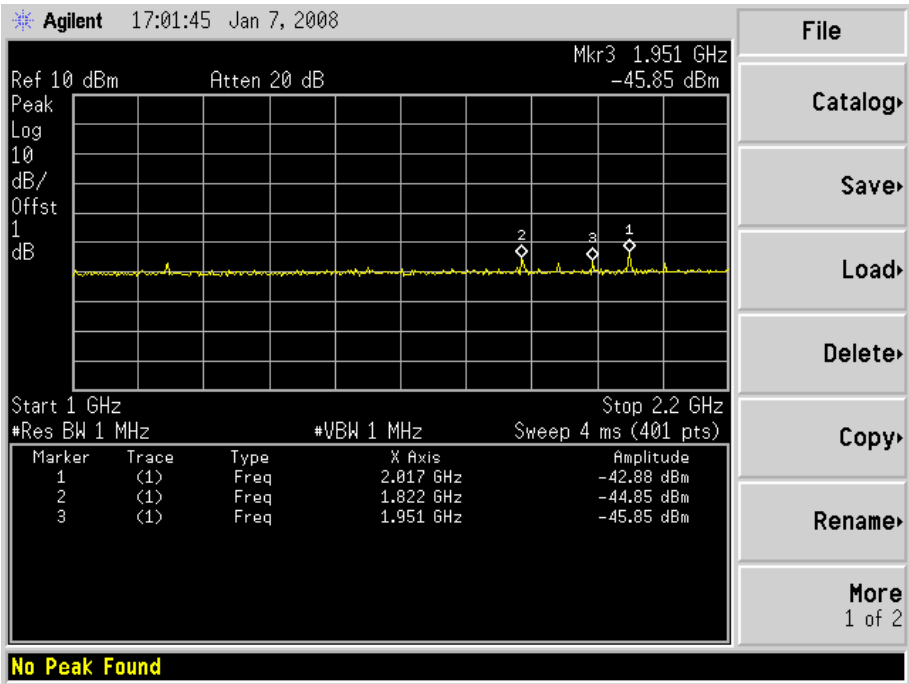
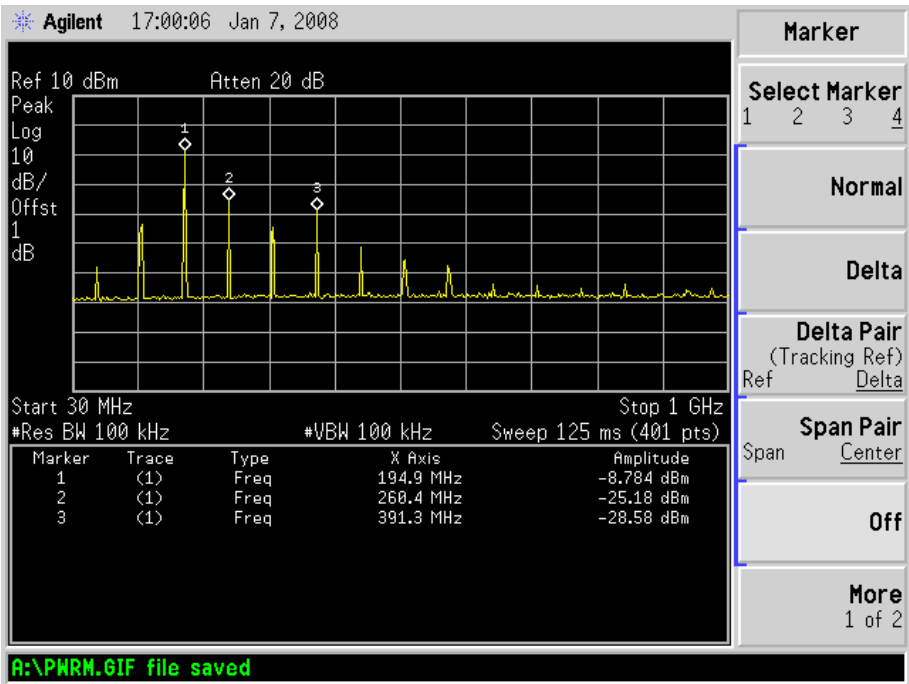
### 7.4 Summary of Test Results/Plots

Refer to the attached plots.

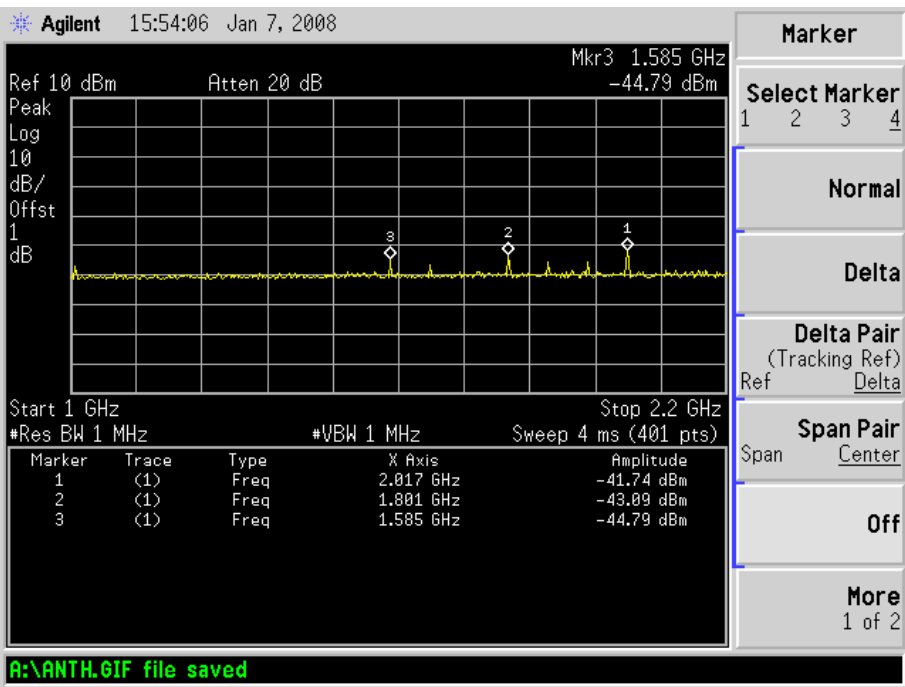
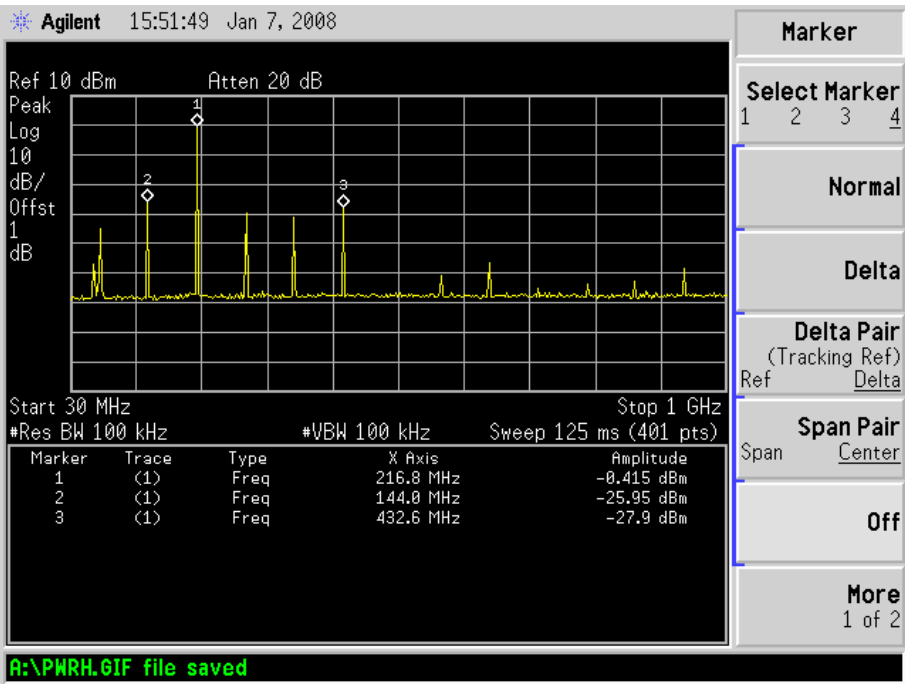
Lowest Channel:



Middle Channel:



Highest Channel:





## 8. §74.86(e)(4) - FREQUENCY STABILITY MEASUREMENT

### 8.1 Standard Applicable

According to FCC 2.1055(a)(1), the frequency stability shall be measure with variation of ambient temperature from  $-30^{\circ}\text{C}$  to  $+50^{\circ}\text{C}$ , and according to FCC 2.1055(d)(2), the frequency stability shall be measured with reducing primary supply voltage to the battery operating end point which is specified by the manufacturer.

According to FCC 74.861, the frequency tolerance of the transmitter shall be 0.005 percent.

### 8.2 Test Equipment List and Details

| Manufacturer | Description           | Model   | Serial Number | Cal. Date  | Due. Date  |
|--------------|-----------------------|---------|---------------|------------|------------|
| Agilent      | Spectrum Analyzer     | E4402B  | US41192821    | 2007-06-30 | 2008-06-29 |
| GONGWEN      | Moisture Test Chamber | GDS-150 | SEMT-0013     | 2007-06-30 | 2008-06-29 |

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

### 8.3 Test Procedure

1. Setup the configuration of the ambient temperature form  $-30^{\circ}\text{C}$  to  $50^{\circ}\text{C}$  with sufficient time. And measure the different power of the EUT with an artificial power from highest to end point voltage.
2. Set frequency counter center frequency to the right frequency needs to be measured.

### 8.4 Test Results/Plots

| Test conditions                       |                                | Frequency Error (kHz) |             |             |
|---------------------------------------|--------------------------------|-----------------------|-------------|-------------|
|                                       |                                | 174.10MHz             | 195.00MHz   | 215.90MHz   |
| $T_{\text{nom}}(22^{\circ}\text{C})$  | $V_{\text{nom}}(3.0\text{V})$  | -0.076                | -0.072      | -0.068      |
| $T_{\text{min}}(-30^{\circ}\text{C})$ | $V_{\text{min}}(2.55\text{V})$ | -0.070                | -0.068      | -0.070      |
|                                       | $V_{\text{max}}(3.45\text{V})$ | -0.072                | -0.078      | -0.076      |
| $T_{\text{max}}(+50^{\circ})$         | $V_{\text{min}}(2.55\text{V})$ | -0.072                | -0.075      | -0.080      |
|                                       | $V_{\text{max}}(3.45\text{V})$ | -0.083                | -0.088      | -0.082      |
| Max. frequency error (kHz)            |                                | -0.083                | -0.088      | -0.082      |
| Limit (kHz)                           |                                | $\pm 0.087$           | $\pm 0.098$ | $\pm 0.108$ |
| End Point                             |                                | DC 1.9V               |             |             |