

# MEASUREMENT REPORT

*of*

## ***HF RFID Module***

**Applicant** : Jogtek Corp.  
**EUT** : HF RFID Module  
**FCC ID** : VZPTM-001  
**Model** : TM-001

Test by :

***Training Research Co., Ltd.***

**TEL : 886-2-26935155**      **FAX : 886-2-26934440**

No. 255, Nan-yang Street, Shijr, Taipei Hsien 221, Taiwan

## CERTIFICATION

### We here by verify that:

The test data, data evaluation, test procedures and equipment configurations shown in this report were made mainly in accordance with the procedures given in ANSI C63.4 (2003) as a reference. All tests were conducted by **Training Research Co., Ltd.**, No. 255, Nan-yang Street, Shijr, Taipei Hsien 221, Taiwan. Also, we attest to the accuracy of each.

We further submit that the energy emitted by the sample EUT tested as described in the report is **in compliance with** the technical requirements set forth in the FCC Rules Part 15 Subpart C Section 15.225.

**Applicant** : Jogtek Corp.

**Applicant address** : 7F., No.300, Yangguang St., Neihu District, Taipei 114, Taiwan

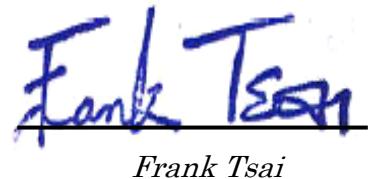
**Report No.** : G2115070211

**Test Date** : January 30, 2008

Prepared by:

  
Jack Tsai

Approved by:

  
Frank Tsai

### Conditions of issue :

- (1) This test report shall not be reproduced except in full, without written approval of TRC. And the test result contained within this report only relate to the sample submitted for testing.
- (2) This report must not be used by the client to claim product endorsement by NVLAP or any agency of U.S. Government.
- (3) This test report, measurements made by TRC are traceable to the NIST only Conducted and Radiated Method.



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## ***Chapter 1 General***

### **1.1 Introduction**

The following measurement report is submitted on behalf of Applicant in support of a RF mouse certification in accordance with Part 2 Subpart J and Part 15 Subpart C of the Commission's Rules and Regulations.

### **1.2 Description of EUT**

|                            |   |                       |
|----------------------------|---|-----------------------|
| <b>FCC ID</b>              | : | VZPTM-001             |
| <b>Product Name</b>        | : | HF RFID Module        |
| <b>Model</b>               | : | TM-001                |
| <b>Frequency Range</b>     | : | 13.553MHz ~ 13.567MHz |
| <b>Operating Frequency</b> | : | 13.56MHz              |
| <b>Modulation Skill</b>    | : | ASK                   |
| <b>Power Type</b>          | : | DC Power Supply (5V)  |

### **1.3 Test method**

All measurements contained in this report were performed according to the techniques described in Measurement procedure ANSI C63.4 – 2003.

Pretest was found that the emission of operating mode is worse than standby mode. So, the final test is made at the operating mode (transmitted). The EUT set in 13.56MHz continuously transmitting mode, which transmitted the maximum emission.

The test placement as the photographs showed is the worst case emission placed. (If the emission is close to the ambient, the resolution BW and view resolution will be reduced and the data will be recorded by detection of maximum hold peak mode.)

### **1.4 Description of Support Equipment**

No support equipment:

The EUT itself forms a system. No support equipment is required for its normal operation

## 1.5 Test Procedure

All measurements contained in this report were performed mainly according to the techniques described in Measurement procedure ANSI C63.4 (2003).

## 1.6 Location of the Test Site

The radiated emissions measurements required by the rules were performed on the **three-meter, Anechoic Chamber (FCC Registration Number: 93906)** maintained by *Training Research Co., Ltd.* 1F, No. 255, Nan-yang Street, Shijr, Taipei Hsien 221, Taiwan, R.O.C. Complete description and measurement data have been placed on file with the commission. The conducted power line emissions tests and other test items were performed in an anechoic chamber also located at *Training Research Co., Ltd.* 1F, No. 255, Nan-yang Street, Shijr, Taipei Hsien 221, Taiwan, R.O.C. *Training Research Co., Ltd.* is listed by the FCC as a facility available to do measurement work for others on a contract basis.

## 1.7 General Test Condition

The conditions under which the EUT operates were varied to determine their effect on the equipment's emission characteristics. The final configuration of the test system and the mode of operation used during these tests were chosen as that which produced the highest emission levels. However, only those conditions which the EUT was considered likely to encounter in normal use were investigated.

In test, they were set in high power and continuously transmitting mode. The setting up procedure is recorded on 1.3 Test Method.

## ***Chapter 2 Conducted Emissions Measurements***

### **2.1 Test Condition & Setup**

The EUT is DC Power Supply (5V).

According to the rule of section 15.207(c). The EUT exempt to the power line conducted test.

### **2.2 List of Test Instruments**

**N/A (Not applicable)**

### **2.3 Test Result of Conducted Emissions**

**N/A (Not applicable)**

## Chapter 3 Radiated Emission Measurements

### 3.1 Harmonic and Spurious Emission

#### 3.1.1 Test Condition and Setup

##### **Pretest:**

Prior to the final test, the EUT is placed in an anechoic chamber, and scan from 26MHz to 1GHz. The devices to determine which attitude and configuration produces the highest emission relative to the limit. This is done to ensure the radiation exactly emits from the EUT.

##### **Final test:**

Final radiation measurements is made on a **3-meter** anechoic chamber. The EUT's maximum emission of radiation is placed on a nonconductive table, which is 0.8m height, the top surface is 1.0 x 1.5 meter. All placement is according to ANSI C63.4 - 2003.

The spectrum is examined from 30MHz to 1000MHz measured by HP spectrum. The whole range antenna is used to measure frequency from 30MHz to 1GHz.

The final test is used the spectrum analyzer. Measure more than six top marked frequencies generated from pretest by computer step by step at each frequency. The EUT is rotated 360 degrees, and antenna is raised and lowered from 1 to 4 meters to find the maximum emission levels. The antenna is used with both horizontal and vertical polarization.

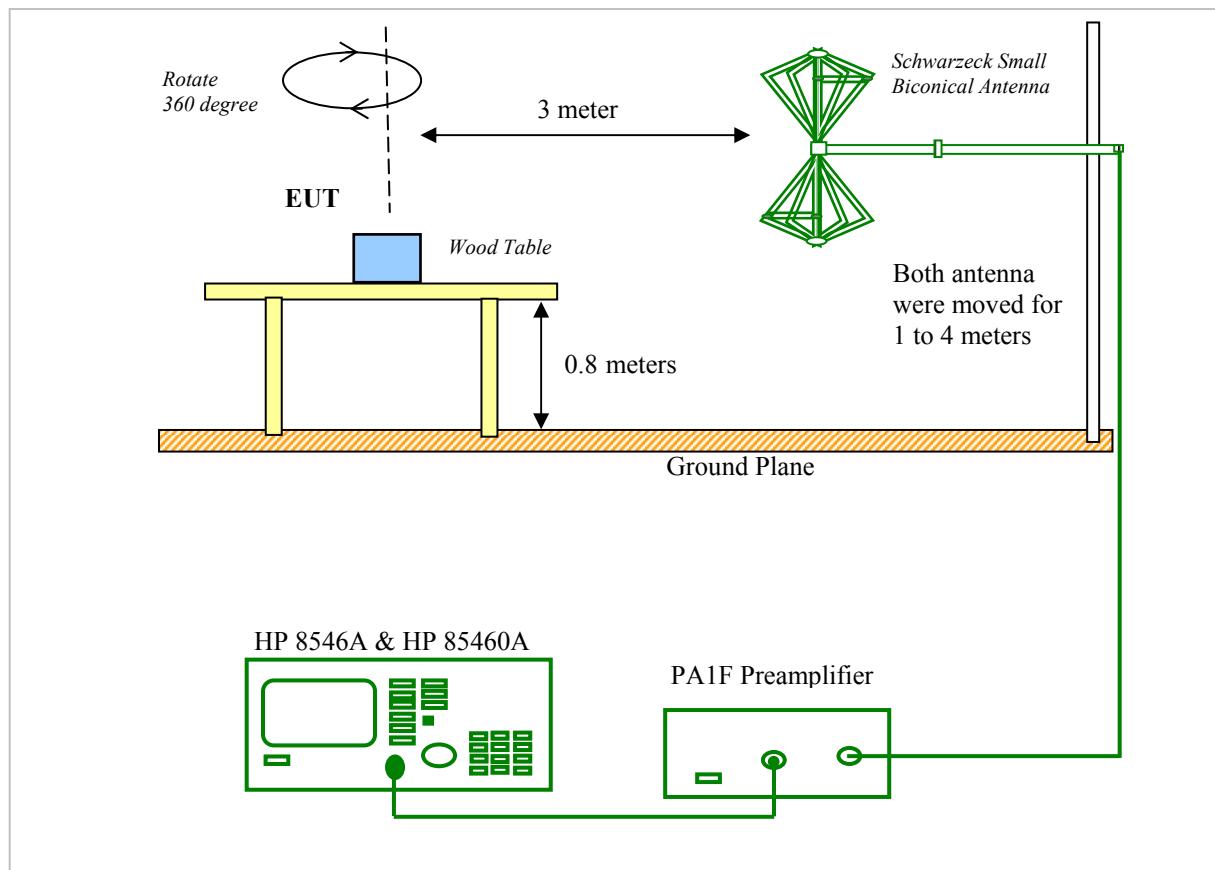
Appropriated preamplifier, which is made by TRC is used for improving sensitivity and precautions is taken to avoid overloading. The spectrum analyzer's 6dB bandwidth is set to 120 kHz, and the EUT is measured at quasi-peak mode. (30MHz to 1GHz)

If the emission is close to the frequency band of ambient, the tester will recheck the data and the corrected data will be written in the test data sheet. If the emission is just within the ambient, the data from shield room will be taken as the final data.

### 3.1.2 List of Test Instruments

| Instrument Name                           | Model                | Brand      | Serial No. | Calibration Date |
|---|----------------------|------------|------------|------------------|
| EMI Receiver                              | 8546A                | HP         | 3520A00242 | 03/05/08         |
| RF Filter Section                         | 85460A               | HP         | 3448A00217 | 03/05/08         |
| Small Biconical Antenna                   | UBAA9114 & BBVU9135  | SCHWARZECK | 127        | 03/07/08         |
| Pre-amplifier                             | PA1F                 | TRC        | 1FAC       | 05/08/08         |
| Auto Switch Box (>30MHz)                  | ASB-01               | TRC        | 9904-01    | 03/05/08         |
| Coaxial Cable (Double shielded, 15 meter) | A30A30-0058-50FS-15M | JYEBAO     | SMA-01     | 05/08/08         |
| Coaxial Cable (1.1 meter)                 | A30A30-0058-50FS-1M  | JYEBAO     | SMA-02     | 05/08/08         |

### 3.1.3 Configuration of System Under Test



### 3.1.4 Test Result of Harmonic and Spurious Emission

The highest peak values of radiated emissions from the EUT at various antenna heights, antenna polarization, EUT orientation, etc. are recorded on the following.

Testing room : Temperature : 25 ° C      Humidity : 73 % RH

***Test Result of Harmonic and Spurious Emission for Horizontal - Z***

| Frequency | Reading Amplitude | Ant. Height | Table  | Correction Factors | Corrected Amplitude | Class B Limit | Margin |
|-----------|-------------------|-------------|--------|--------------------|---------------------|---------------|--------|
| MHz       | dB $\mu$ V        | m           | degree | dB/m               | dB $\mu$ V/m        | dB $\mu$ V/m  | dB     |
| 32.42     | 19.87             | 1.00        | 172    | 7.13               | 27.00               | 40.00         | -13.00 |
| 260.37    | 29.13             | 1.00        | 239    | -3.88              | 25.25               | 46.00         | -20.75 |
| 341.61    | 34.79             | 1.00        | 148    | -2.38              | 32.41               | 46.00         | -13.59 |
| 369.50    | 31.13             | 1.00        | 138    | -1.81              | 29.32               | 46.00         | -16.68 |
| 437.40    | 30.00             | 1.00        | 259    | 0.62               | 30.62               | 46.00         | -15.38 |
| 570.77    | 24.20             | 1.00        | 147    | 5.64               | 29.84               | 46.00         | -16.16 |

***Test Result of Harmonic and Spurious Emission for Vertical - X***

| Frequency | Reading Amplitude | Ant. Height | Table  | Correction Factors | Corrected Amplitude | Class B Limit | Margin |
|-----------|-------------------|-------------|--------|--------------------|---------------------|---------------|--------|
| MHz       | dB $\mu$ V        | m           | degree | dB/m               | dB $\mu$ V/m        | dB $\mu$ V/m  | dB     |
| 137.91    | 24.15             | 1.00        | 54     | -3.37              | 20.78               | 43.50         | -22.72 |
| 289.47    | 24.75             | 1.00        | 7      | -3.38              | 21.37               | 46.00         | -24.63 |
| 341.61    | 27.08             | 1.00        | 119    | -2.38              | 24.70               | 46.00         | -21.30 |
| 465.29    | 25.38             | 1.00        | 98     | 1.36               | 26.74               | 46.00         | -19.26 |
| 491.96    | 26.36             | 1.00        | 92     | 1.65               | 28.01               | 46.00         | -17.99 |
| 570.77    | 27.51             | 1.00        | 57     | 5.64               | 33.15               | 46.00         | -12.85 |

Note:

1. Margin = Amplitude – limit, if margin is minus means under limit.
2. Corrected Amplitude = Reading Amplitude + Correction Factors
3. Correction factor = Antenna factor + (Cable Loss – Amplitude gain) + Switching Box Loss

## 3.2 Peak Power of Fundamental Frequency, Harmonic and Spurious Measurement

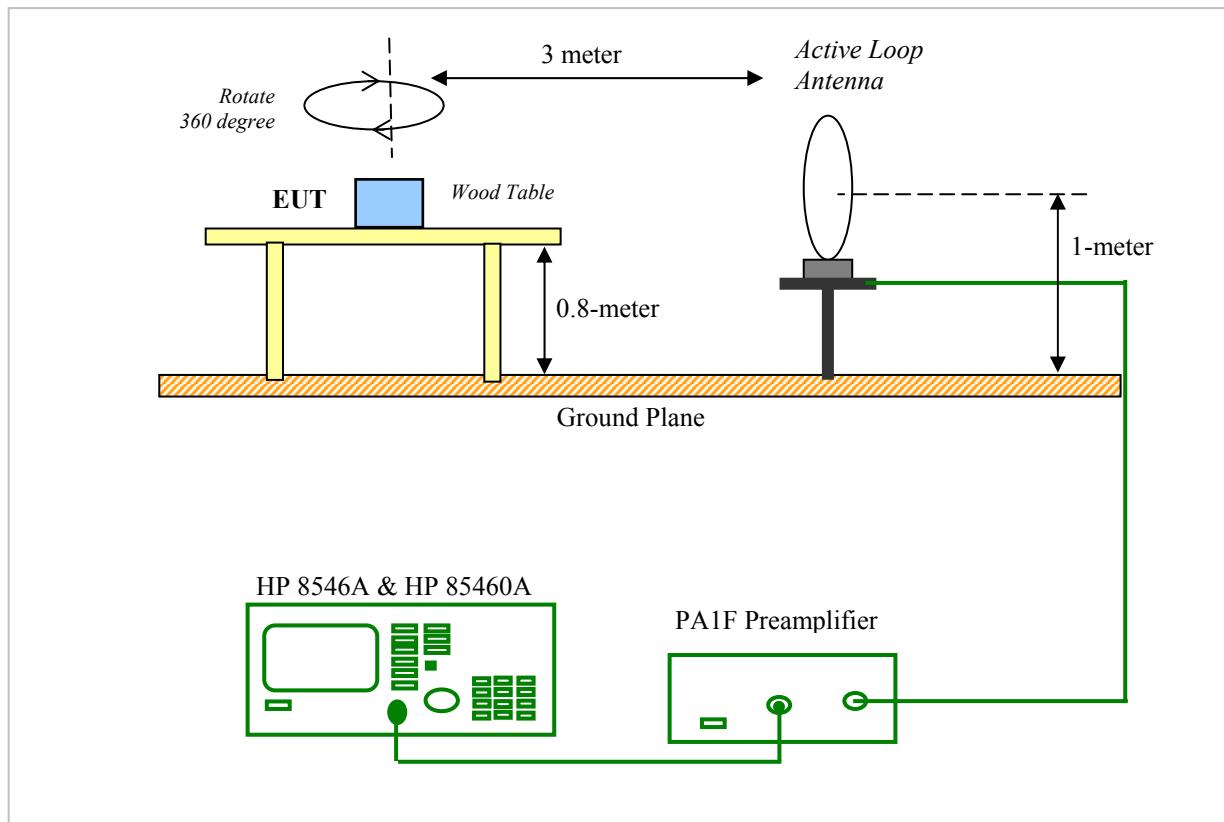
### 3.2.1 Test Condition and Setup

- A) The EUT was setup in the anechoic chamber
- B) Set the Loop Antenna height 1m, Vertical and rotate the antenna to find the azimuth of the highest emission and record the reading.
- C) Keep the antenna azimuth and turn the EUT 360 degree and record the highest emission.
- D) Raise the antenna to 2 meters and repeat set (B) and (C).
- E) Change the antenna Horizontal and repeat (B) to (D).
- F) Record the highest reading in test report.

### 3.2.2 List of Test Instruments

| Instrument Name     | Model  | Brand     | Serial No. | Calibration Date |
|---------------------|--------|-----------|------------|------------------|
| EMI Receiver        | 8546A  | HP        | 3520A00242 | 03/05/08         |
| RF Filter Section   | 85460A | HP        | 3448A00217 | 03/05/08         |
| Pre-amplifier       | PA1F   | TRC       | 1FAC       | 03/07/08         |
| Active Loop Antenna | AL-130 | COM-POWER | 17101      | 05/10/08         |

### 3.2.3 Configuration of System Under Test



### 3.2.4 Test Result of Fundamental Emission

Testing room : Temperature : 25 ° C      Humidity : 73 % RH

*Test Result of Fundamental Emission for Horizontal - Z*

| Frequency | Reading Amplitude | Ant. Height | Table  | Correction Factors | Distance Correction | Corrected Amplitude | Class B Limit | Margin |
|-----------|-------------------|-------------|--------|--------------------|---------------------|---------------------|---------------|--------|
| MHz       | dB $\mu$ V        | m           | degree | dB/m               | dB                  | dB $\mu$ V/m        | dB $\mu$ V/m  | dB     |
| 13.5600   | 56.29             | 1.00        | 56     | 8.14               | -19.08              | 45.35               | 84.00         | -38.65 |

*Test Result of Harmonic and Spurious Emission for Horizontal - Z*

| Frequency | Reading Amplitude | Ant. Height | Table  | Correction Factors | Distance Correction | Corrected Amplitude | Class B Limit | Margin |
|-----------|-------------------|-------------|--------|--------------------|---------------------|---------------------|---------------|--------|
| MHz       | dB $\mu$ V        | m           | degree | dB/m               | dB                  | dB $\mu$ V/m        | dB $\mu$ V/m  | dB     |
| 23.1580   | 15.21             | 1.00        | 64     | 11.12              | -19.08              | 7.25                | 29.54         | -22.29 |
| 28.6404   | 16.18             | 1.00        | 76     | 11.05              | -19.08              | 8.15                | 29.54         | -21.39 |

*Test Result of Fundamental Emission for Vertical - X*

| Frequency | Reading Amplitude | Ant. Height | Table  | Correction Factors | Distance Correction | Corrected Amplitude | Class B Limit | Margin |
|-----------|-------------------|-------------|--------|--------------------|---------------------|---------------------|---------------|--------|
| MHz       | dB $\mu$ V        | m           | degree | dB/m               | dB                  | dB $\mu$ V/m        | dB $\mu$ V/m  | dB     |
| 13.5600   | 62.40             | 1.00        | 89     | 8.14               | -19.08              | 51.46               | 84.00         | -32.54 |

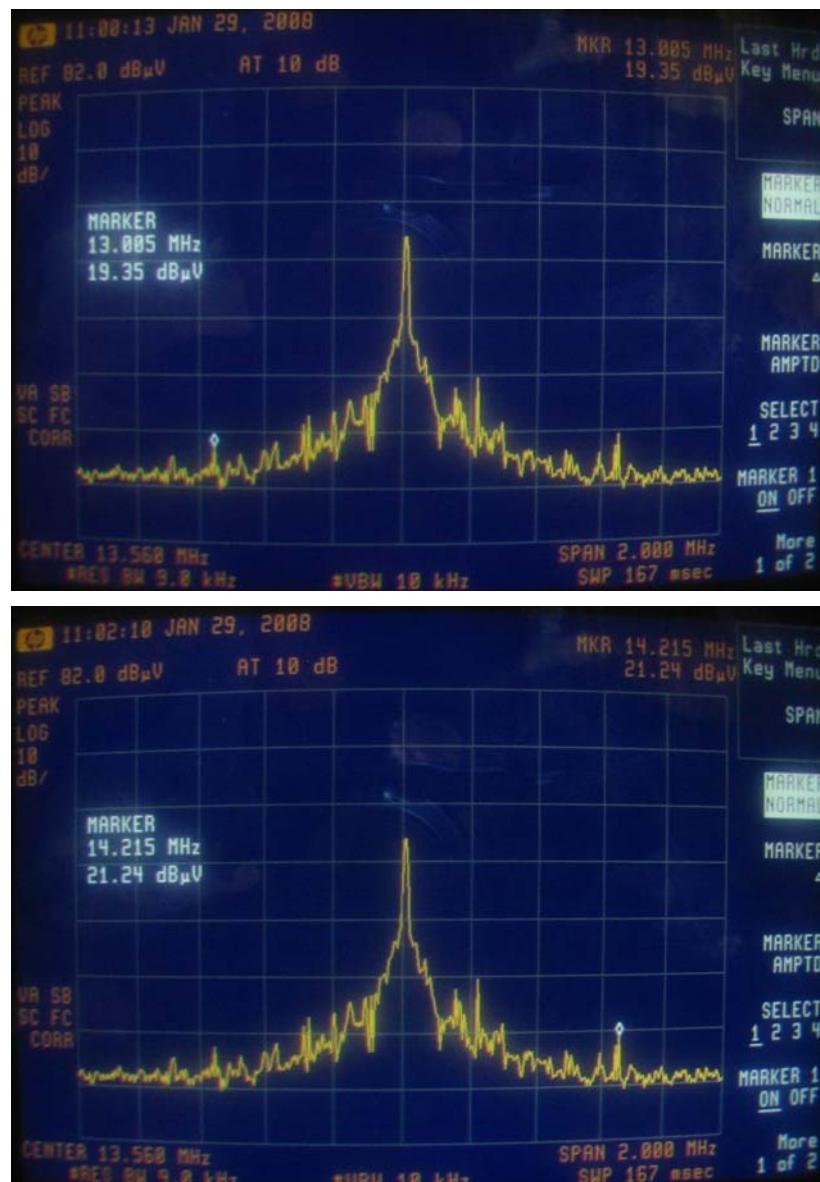
*Test Result of Harmonic and Spurious Emission for Vertical - X*

| Frequency | Reading Amplitude | Ant. Height | Table  | Correction Factors | Distance Correction | Corrected Amplitude | Class B Limit | Margin |
|-----------|-------------------|-------------|--------|--------------------|---------------------|---------------------|---------------|--------|
| MHz       | dB $\mu$ V        | m           | degree | dB/m               | dB                  | dB $\mu$ V/m        | dB $\mu$ V/m  | dB     |
| 23.1580   | 20.73             | 1.00        | 143    | 11.12              | -19.08              | 12.77               | 29.54         | -16.77 |
| 28.6404   | 20.24             | 1.00        | 136    | 11.05              | -19.08              | 12.21               | 29.54         | -17.33 |

### 3.3 Test Result of the Bandedge

The following show our observations referring to the single channel respectively. Test Condition & Setup same as 3.2.1 to 3.2.2.

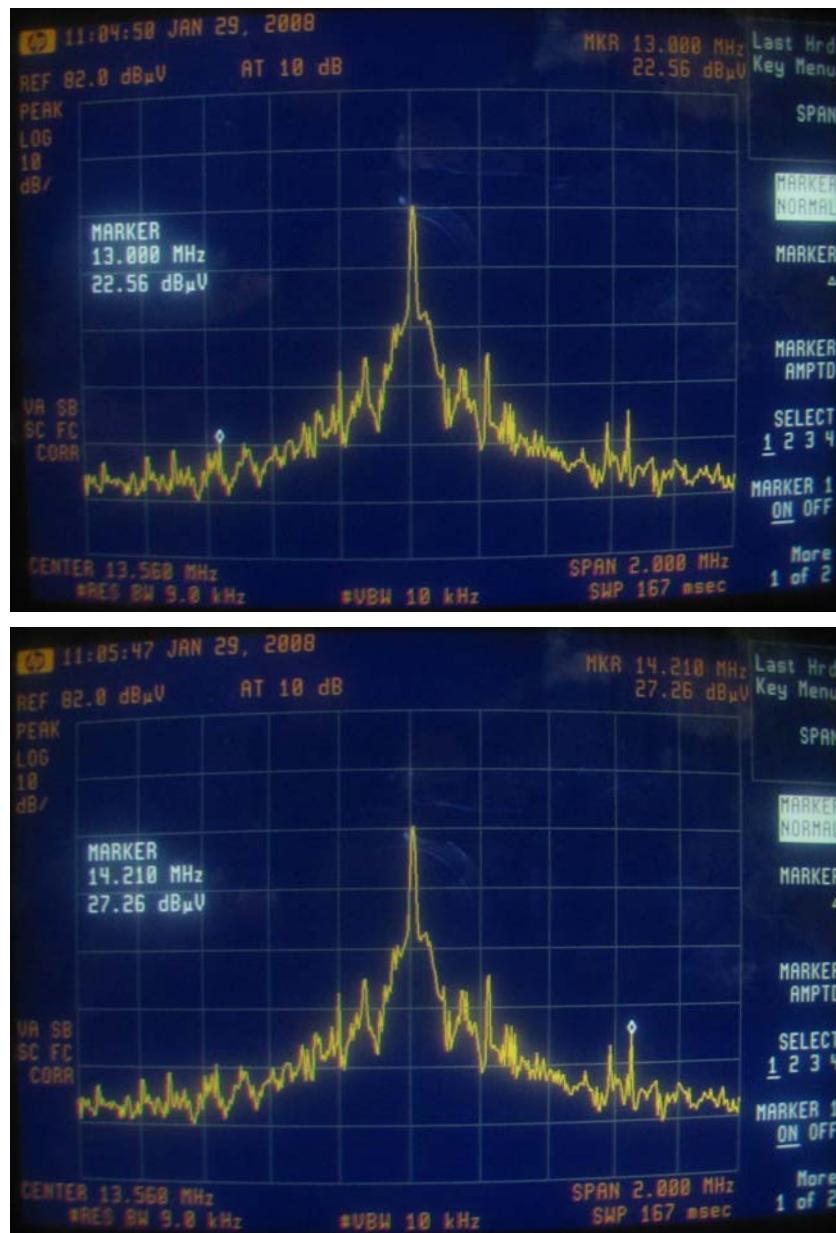
*Antenna polarity: Horizontal, Frequency Band: 13.553MHz ~ 13.567MHz*



| Frequency | Reading Amplitude | Ant. Height | Table  | Correction Factors | Distance Correction | Corrected Amplitude | Class B Limit | Margin |
|-----------|-------------------|-------------|--------|--------------------|---------------------|---------------------|---------------|--------|
| MHz       | dBμV              | m           | degree | dB/m               | dB                  | dBμV/m              | dBμV/m        | dB     |
| 13.0050   | 19.35             | 1.00        | 56     | 8.75               | -19.08              | 9.02                | 29.54         | -20.52 |
| 14.2150   | 21.24             | 1.00        | 56     | 7.51               | -19.08              | 9.67                | 29.54         | -19.87 |

*Antenna polarity: Vertical*

*Frequency Band: 13.553MHz ~ 13.567MHz*



| Frequency | Reading Amplitude | Ant. Height | Table  | Correction Factors | Distance Correction | Corrected Amplitude | Class B Limit | Margin |
|-----------|-------------------|-------------|--------|--------------------|---------------------|---------------------|---------------|--------|
| MHz       | dBμV              | m           | degree | dB/m               | dB                  | dBμV/m              | dBμV/m        | dB     |
| 13.0000   | 22.56             | 1.00        | 143    | 8.72               | -19.08              | 12.20               | 29.54         | -17.34 |
| 14.2100   | 27.26             | 1.00        | 143    | 7.49               | -19.08              | 15.67               | 29.54         | -13.87 |

## Chapter 4 Frequency Stability (Part 2.1055, 15.225 (e))

### 4.1 Test procedure: (Temperature)

(1) Frequency shift vs. temperature:

The nominal room temperature 20°C, and the reference frequency is 13.560000MHz.

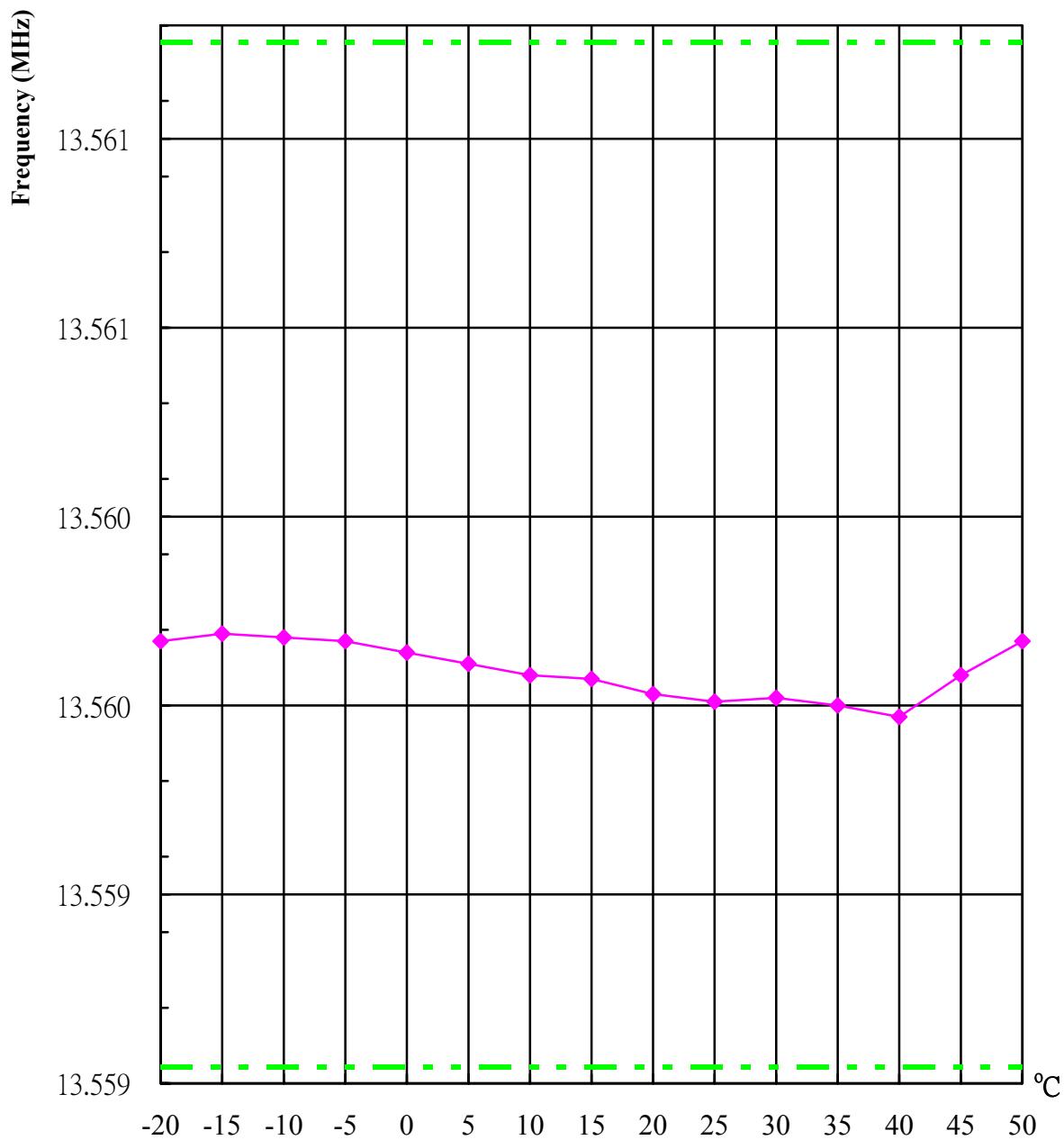
(2) The EUT was put in an environmental chamber and set up the temperature of this chamber from -20°C to +50°C and recorded the frequency has been shift at  $\pm 0.01\%$

### 4.2 Test Result:

*Temperature Variation Table*

| <b>Temperature<br/>( Centigrade )</b> | <b>Frequency<br/>( MHz )</b> | <b>Frequency Stability<br/>( <math>\pm 0.01\%</math> )</b> |
|---------------------------------------|------------------------------|--|
| -20                                   | 13.559770                    |  |
| -15                                   | 13.559790                    |  |
| -10                                   | 13.559780                    |  |
| -5                                    | 13.559770                    |  |
| 0                                     | 13.559740                    |  |
| 5                                     | 13.559710                    |  |
| 10                                    | 13.559680                    | 13.558644  |
| 15                                    | 13.559670                    | ~  |
| 20                                    | 13.559630                    | 13.561356  |
| 25                                    | 13.559610                    |  |
| 30                                    | 13.559620                    |  |
| 35                                    | 13.559600                    |  |
| 40                                    | 13.559570                    |  |
| 45                                    | 13.559680                    |  |
| 50                                    | 13.559770                    |  |

**Chart 4.1 Temperatuer Variation Vs. Frequency**



### 4.3 Test Equipment:

| Instrument Name                | Model No. | Brand    | Serial No. | Next time |
|--------------------------------|-----------|----------|------------|-----------|
| Spectrum Analyzer              | MS2665C   | Anritsu  | 6200175476 | 12/19/08  |
| Digital Multimeter             | GDM-8055  | GW       | 8080365    | 12/15/08  |
| Temperature & Humidity Chamber | THS-ML1   | King Son | 240        | 12/27/08  |

The level of confidence of 95% , the uncertainty of measurement is  $\pm 12\text{Hz}$  .

### 4.4 Test procedure:(voltage)

(1) Frequency shift vs. voltage:

Nominal power is 5Vdc and the reference Frequency is 13.560000MHz

(2) The EUT was powered at 85% and 115% of nominal.

### 4.5 Test Result:

**Frequency Stability of Voltage Variation Measurement Table**

| <i>Supply Voltage<br/>( Volt )</i> | <i>Frequency<br/>( MHz )</i> | <i>Frequency Stability<br/>( <math>\pm 0.01\%</math> )</i> |
|------------------------------------|------------------------------|--|
| 10.20 ( 85% )                      | 13.559670                    | 13.558644  |
| 12.00 ( 100% )                     | 13.559690                    | ~<br>13.561356   |
| 13.80 ( 115% )                     | 13.559720                    |  |

**Chart 4.2 Voltage Variation Vs. Frequency**

