

**FCC 15.249 & RSS-210  
2.4 GHz Report**

*for*

**Sunrex Technology Corp**

**No. 475, Sec. 4, Chang Ping Road, Daya Dist.,  
Taichung City 428, Taiwan**

**Brand : hp**  
**Product Name : Wireless Mouse**  
**Model Name : (1)HSA-S002M (2)HP Wireless  
Premium Mouse**  
**FCC ID : J75HSA-S002M**  
**IC : 7090A-HSAS002M**

**Prepared by: : AUDIX Technology Corporation,  
EMC Department**



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## TEST REPORT CERTIFICATION

Applicant : Sunrex Technology Corp  
Factory : Jing Mold Electronic Tech. (Shen Zhen) Co., Ltd.  
Product Name : Wireless Mouse  
Model No. : (1)HSA-S002M (2)HP Wireless Premium Mouse  
Serial No. : N/A  
Brand : hp  
Power Supply : DC 5V

Rules of Compliance and Measurement Standards:

FCC CFR 47 Part 15 Subpart C  
RSS-Gen (Issue 4): 2014  
RSS-210 (Issue 9): 2016  
ANSI C63.10:2013

**Audix Technology Corp.** tested the equipment mentioned in accordance with the requirements set forth in the above standards. Test results indicate that the equipment tested is capable of demonstrating compliance with the requirements as documented within this report.

**Audix Technology Corp.** does not assume responsibility for any conclusions and generalizations drawn from the test results with regard to other specimens and samples.

Date of Test: 2017. 04. 13 ~ 25

Date of Report: 2017. 04. 26

Producer:   
(Annie Yu/Administrator)

Signatory:   
(Ben Cheng/Manager)

## 1. REPORT HISTORY

| Revision | Date         | Revision Summary | Report Number |
|----------|--------------|------------------|---------------|
| 0        | 2017. 04. 26 | Original Report. | EM-F170131    |

## 2. SUMMARY OF TEST RESULTS

| Rule                            |                                          | Description                                                                   | Results               |
|---------------------------------|------------------------------------------|-------------------------------------------------------------------------------|-----------------------|
| FCC                             | IC                                       |                                                                               |                       |
| 15.207                          | RSS-Gen §8.8                             | Conducted Emission                                                            | <b>PASS</b>           |
| 15.205/<br>15.209/<br>15.249(a) | RSS-Gen §8.9<br>RSS-210<br>Annex B §B.10 | Radiated Band Edge and<br>Radiated Spurious Emission<br>Fundamental Frequency | <b>PASS</b>           |
| ----                            | ----                                     | Occupied Bandwidth 99% Power                                                  | <b>Reference only</b> |
| 15.203                          | ----                                     | Antenna Requirement                                                           | <b>PASS</b>           |

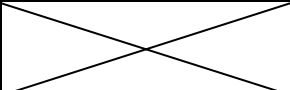
### 3. GENERAL INFORMATION

#### 3.1. Description of EUT

|                           |                                                                                                                                                                      |                             |                          |
|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|--------------------------|
| Product                   | Wireless Mouse                                                                                                                                                       |                             |                          |
| Model Number              | (1)HSA-S002M (2)HP Wireless Premium Mouse<br>The difference between above models please refer to the following table. The model HSA-S002M was tested in this report. |                             |                          |
|                           | <div>Difference<br/>Model</div>                                                                                                                                      | <b>Model Name</b>           | <b>Marketing Purpose</b> |
|                           | HP Wireless Premium Mouse                                                                                                                                            | Marketing Model Name (MMN)  | Different                |
|                           | HSA-S002M                                                                                                                                                            | Regulatory Model Name (RMN) | Different                |
|                           | Above all models have the same circuit and hardware. The differences are in model name and marketing purpose.                                                        |                             |                          |
| Serial Number             | N/A                                                                                                                                                                  |                             |                          |
| Brand Name                | hp                                                                                                                                                                   |                             |                          |
| Applicant                 | Sunrex Technology Corp<br>No. 475, Sec. 4, Chang Ping Road, Daya Dist., Taichung City 428, Taiwan                                                                    |                             |                          |
| Factory                   | Jing Mold Electronic Tech. (Shen Zhen) Co., Ltd.<br>Xin Qiao 3rd Industrial Estate Sha Jing, Bao An, Shenzhen, Guangdong, P.R. China                                 |                             |                          |
| Transmit Type             | 1T1R                                                                                                                                                                 |                             |                          |
| USB Cable                 | Shielded, Detachable, 1.8 m                                                                                                                                          |                             |                          |
| Wireless Dongle           | hp, Model: ERX-321A<br>FCC ID: J75ERX321A<br>IC: 7090A-ERX321A                                                                                                       |                             |                          |
| Battery                   | M/N: CY403035, 3.7V, 400mAh                                                                                                                                          |                             |                          |
| Date of Receipt of Sample | 2017. 02. 21                                                                                                                                                         |                             |                          |

### 3.2. EUT Specifications Assessed in Current Report

| Fundamental Range (MHz) | Channel Number | Modulation | Data Rate (kbps) |
|-------------------------|----------------|------------|------------------|
| 2403-2480               | 89             | GFSK       | 1                |

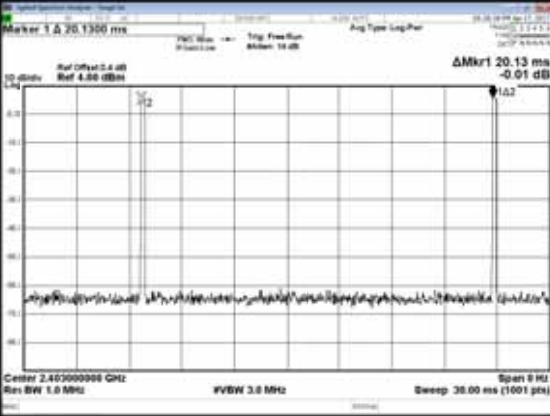
| Channel List   |                 |                |                 |                |                 |                                                                                       |                 |
|----------------|-----------------|----------------|-----------------|----------------|-----------------|---------------------------------------------------------------------------------------|-----------------|
| Channel Number | Frequency (MHz) | Channel Number | Frequency (MHz) | Channel Number | Frequency (MHz) | Channel Number                                                                        | Frequency (MHz) |
| 1              | 2403            | 21             | 2423            | 41             | 2443            | 61                                                                                    | 2463            |
| 2              | 2404            | 22             | 2424            | 42             | 2444            | 62                                                                                    | 2464            |
| 3              | 2405            | 23             | 2425            | 43             | 2445            | 63                                                                                    | 2465            |
| 4              | 2406            | 24             | 2426            | 44             | 2446            | 64                                                                                    | 2466            |
| 5              | 2407            | 25             | 2427            | 45             | 2447            | 65                                                                                    | 2467            |
| 6              | 2408            | 26             | 2428            | 46             | 2448            | 66                                                                                    | 2468            |
| 7              | 2409            | 27             | 2429            | 47             | 2449            | 67                                                                                    | 2469            |
| 8              | 2410            | 28             | 2430            | 48             | 2450            | 68                                                                                    | 2470            |
| 9              | 2411            | 29             | 2431            | 49             | 2451            | 69                                                                                    | 2471            |
| 10             | 2412            | 30             | 2432            | 50             | 2452            | 70                                                                                    | 2472            |
| 11             | 2413            | 31             | 2433            | 51             | 2453            | 71                                                                                    | 2473            |
| 12             | 2414            | 32             | 2434            | 52             | 2454            | 72                                                                                    | 2474            |
| 13             | 2415            | 33             | 2435            | 53             | 2455            | 73                                                                                    | 2475            |
| 14             | 2416            | 34             | 2436            | 54             | 2456            | 74                                                                                    | 2476            |
| 15             | 2417            | 35             | 2437            | 55             | 2457            | 75                                                                                    | 2477            |
| 16             | 2418            | 36             | 2438            | 56             | 2458            | 76                                                                                    | 2478            |
| 17             | 2419            | 37             | 2439            | 57             | 2459            | 77                                                                                    | 2479            |
| 18             | 2420            | 38             | 2440            | 58             | 2460            | 78                                                                                    | 2480            |
| 19             | 2421            | 39             | 2441            | 59             | 2461            |  |                 |
| 20             | 2422            | 40             | 2442            | 60             | 2462            |                                                                                       |                 |

### 3.3. Antenna Information

| Antenna Part Number | Manufacture             | Antenna Type        | Frequency (MHz) | Max Gain (dBi) |
|---------------------|-------------------------|---------------------|-----------------|----------------|
| ---                 | Sunrex Technology Corp. | PCB Printed Antenna | 2400 ~ 2483.5   | 2.42105dBi     |

### 3.4. Test Configuration

| Mode | Duty Cycle (x) | T (ms) | Duty Cycle Factor (dB) |
|------|----------------|--------|------------------------|
| GFSK | 0.01           | 21     | -39.63                 |

$$TX_{on}/TX_{on+off}=0.21/20.13=0.01$$

Note: When duty cycle is less than 98% (0.98) that duty cycle factor  $10\log(1/x)$  is needed to add in conducted test items measured in average detector.



| AC Conduction |                  |
|---------------|------------------|
| Test Case     | Normal operation |

| Item               |                                                          | Modulation | Test Channel |
|--------------------|----------------------------------------------------------|------------|--------------|
| Radiated Test Case | Radiated Band Edge <sup>Note1</sup>                      | GFSK       | 1/78         |
|                    | Radiated Spurious Emission (30MHz-1GHz) <sup>Note1</sup> | GFSK       | 1/39/78      |
|                    | Radiated Spurious Emission (Above 1GHz) <sup>Note1</sup> | GFSK       | 1/39/78      |
|                    | Fundamental Frequency                                    | GFSK       | 1/39/78      |
|                    | Occupied Bandwidth 99% Power                             | GFSK       | 1/39/78      |

Note 1:

☐ Mobile Device

☒ Portable Device, and it is operated as lie axis. The worst scenario for Radiated Spurious Emission as follow:

☒ Lie

☐ Side

☐ Stand

Note 2: We performed testing of the highest and lowest data rate.

### 3.5. Tested Supporting System List

#### 3.5.1. Support Peripheral Unit

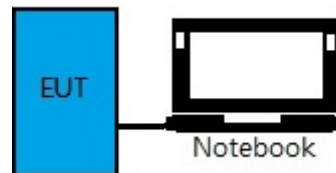
| No. | Product     | Brand  | Model No. | Serial No. | FCC ID |
|-----|-------------|--------|-----------|------------|--------|
| 1.  | Notebook PC | lenovo | TP00034A  | 895097     | N/A    |

#### 3.5.2. Cable Lists

| No. | Cable Description Of The Above Support Units                                                                                                              |
|-----|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1.  | Adapter: Chicony, M/N CPA09-A065N1,<br>DC Cord: Unshielded, Undetachable, 1.8m, Bonded two ferrite cores<br>AC Power Cord: Non-Shielded, Detachable, 1.8m |

### 3.6. Setup Configuration

#### 3.6.1. EUT Configuration for Power Line Emission



#### 3.6.2. EUT Configuration for Radiated Emission



#### 3.6.3. EUT Configuration for Conducted Test Items



### 3.7. Operating Condition of EUT

To press the whole button of EUT is used for enabling EUT RF function under continues transmitting and choosing data rate/ channel.

### 3.8. Description of Test Facility

|                          |   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|--------------------------|---|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Test Firm Name           | : | <b>AUDIX Technology Corporation</b><br><b>EMC Department</b><br>No. 53-11, Dingfu, Linkou Dist.,<br>New Taipei City 244, Taiwan                                                                                                                                                                                                                                                                                                                                 |
| Test Location & Facility | : | <b>No. 7 Shielded Room</b><br>No. 53-11, Dingfu, Linkou Dist.,<br>New Taipei City 244, Taiwan<br><br><b>Semi-Anechoic Chamber</b><br>No. 53-11, Dingfu, Linkou Dist.,<br>New Taipei City 244, Taiwan<br>IC Test Site Registration No.: 5183B-1<br>Renewal on September 17, 2014<br><br><b>Fully Anechoic Chamber</b><br>No. 53-11, Dingfu, Linkou Dist.,<br>New Taipei City 244, Taiwan<br>IC Test Site Registration No.: 5183B-4<br>Renewal on August 31, 2015 |
| NVLAP Lab. Code          | : | 200077-0                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| TAF Accreditation No     | : | 1724                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| FCC OET Designation      | : | TW1004 & TW1090                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

### 3.9. Measurement Uncertainty

| Test Item                        | Frequency Range | Uncertainty |
|----------------------------------|-----------------|-------------|
| Conduction Test                  | 150kHz~30MHz    | ±3.5dB      |
| Radiation Test<br>(Distance: 3m) | 30MHz~1000MHz   | ± 3.68dB    |
|                                  | Above 1GHz      | ± 5.82dB    |

Remark : Uncertainty =  $k_{uc}(y)$

| Test Item                    | Uncertainty |
|------------------------------|-------------|
| Occupied Bandwidth 99% Power | ± 1kHz      |

## 4. MEASUREMENT EQUIPMENT LIST

### 4.1. Conducted Emission Measurement

| Item | Type          | Manufacturer | Model No. | Serial No. | Cal. Date    | Cal. Interval |
|------|---------------|--------------|-----------|------------|--------------|---------------|
| 1.   | Test Receiver | R&S          | ESCI      | 101276     | 2017. 03. 23 | 1 Year        |
| 2.   | A.M.N.        | R&S          | ESH2-Z5   | 100366     | 2016. 07. 27 | 1 Year        |
| 3.   | L.I.S.N.      | Kyoritsu     | KNW-407   | 8-1539-3   | 2017. 01. 23 | 1 Year        |
| 4.   | Pulse Limiter | R&S          | ESH3-Z2   | 101495     | 2017. 01. 16 | 1 Year        |
| 5.   | Test Software | Audix        | e3        | V.120619C  | N.C.R.       | N.C.R.        |

### 4.2. Radiated Emission Measurement

| Item | Type                | Manufacturer | Model No.                  | Serial No.  | Cal. Date    | Cal. Interval |
|------|---------------------|--------------|----------------------------|-------------|--------------|---------------|
| 1.   | Spectrum Analyzer   | Agilent      | N9010A-526                 | MY53400071  | 2016. 09. 19 | 1 Year        |
| 2.   | Spectrum Analyzer   | Agilent      | N9010A-526                 | MY53400071  | 2016. 09. 19 | 1 Year        |
| 3.   | Test Receiver       | R & S        | ESCS30                     | 100338      | 2016. 06. 22 | 1 Year        |
| 4.   | Amplifier           | HP           | 8447D                      | 2944A06305  | 2017. 02. 16 | 1 Year        |
| 5.   | Amplifier           | HP           | 8449B                      | 3008A02678  | 2017. 03. 06 | 1 Year        |
| 6.   | Bilog Antenna       | TESEQ        | CBL6112D                   | 33821       | 2017. 01. 21 | 1 Year        |
| 7.   | Horn Antenna        | ETS-Lindgren | 3117                       | 00135902    | 2017. 03. 08 | 1 Year        |
| 8.   | 2.4GHz Notch Filter | K&L          | 7NSL10-244<br>1.5E130.5-00 | 1           | 2016. 07. 27 | 1 Year        |
| 9.   | Test Software       | Audix        | e3                         | V.6.1206197 | N.C.R.       | N.C.R.        |
| 10.  | Test Software       | Audix        | e3                         | V.6.110601  | N.C.R.       | N.C.R.        |

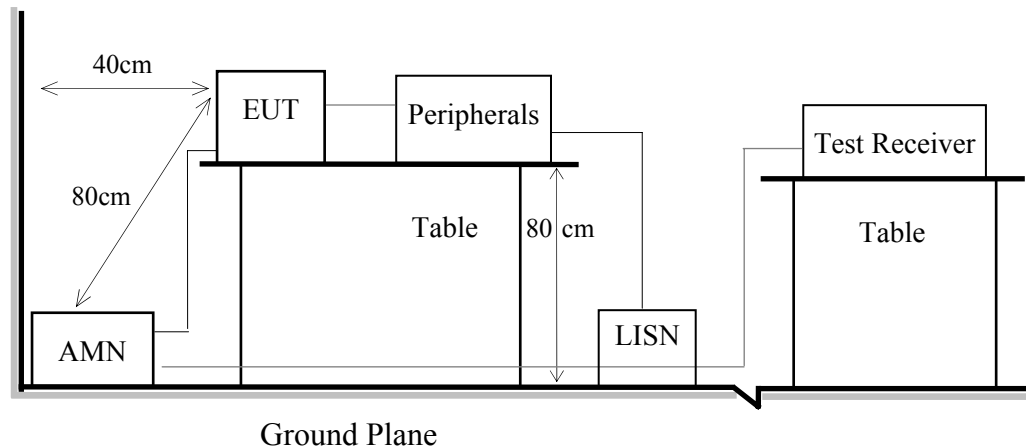
### 4.3. RF Conducted Measurement

| Item | Type              | Manufacturer | Model No.  | Serial No. | Cal. Date    | Cal. Interval |
|------|-------------------|--------------|------------|------------|--------------|---------------|
| 1.   | Spectrum Analyzer | Agilent      | N9030A-544 | US51350140 | 2016. 06. 07 | 1 Year        |

## 5. CONDUCTED EMISSION MEASUREMENT

### 5.1. Block Diagram of Test Setup

Shielded Room Setup Diagram



### 5.2. Power Line Conducted Emission Limit

| Frequency       | Conducted Limit    |                    |
|-----------------|--------------------|--------------------|
|                 | Quasi-Peak Level   | Average Level      |
| 150kHz ~ 500kHz | 66 ~ 56 dB $\mu$ V | 56 ~ 46 dB $\mu$ V |
| 500kHz ~ 5MHz   | 56 dB $\mu$ V      | 46 dB $\mu$ V      |
| 5MHz ~ 30MHz    | 60 dB $\mu$ V      | 50 dB $\mu$ V      |

Remark 1.: If the average limit is met when using a Quasi-Peak detector, the measurement using the average detector is not required.

2.: The lower limit applies to the band edges.

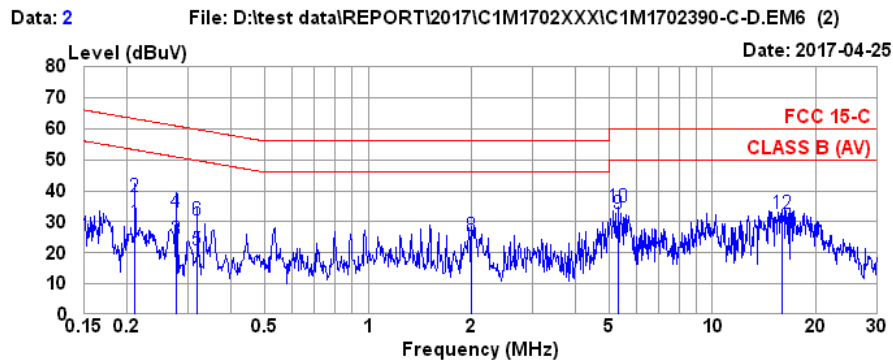
### 5.3. Test Procedure

- 5.3.1. To set up the EUT as indicated in ANSI C 63.10. The EUT was placed on the table which has 80 cm height to the ground and 40 cm distance to the conducting wall.
- 5.3.2. Power supplier of the EUT was connected to the AC mains through an Artificial Mains Network (A.M.N.).
- 5.3.3. The AC power supplies to all peripheral devices must be provided through line impedance stabilization network (L.I.S.N.)
- 5.3.4. Checking frequency range from 150 kHz to 30 MHz and record the emission which does not have 20 dB below limit.

## 5.4. Conducted Emission Measurement Results

**PASSED.**

|              |                        |            |          |
|--------------|------------------------|------------|----------|
| Test Date    | 2017/04/25             | Temp./Hum. | 25°C/50% |
| Test Voltage | AC 120V/60Hz (via USB) |            |          |



Site no. : No.7 Shielded Room Data no. : 2  
Condition : ESH2-Z5 366(ADAPTER) Phase : NEUTRAL  
Limit : FCC 15-C  
Env. / Ins. : 25°C / 50% ESCI(1276) Engineer : Nick Du  
EUT : HSA-S002M  
Power Rating : 120Vac/60Hz  
Test Mode : Charge

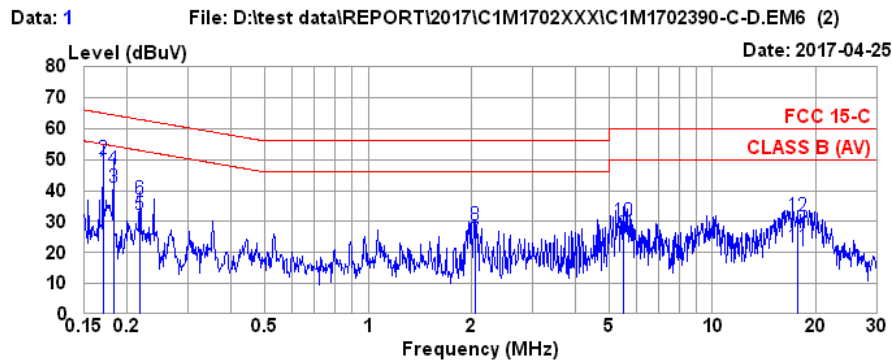
|    | Freq.<br>(MHz) | AMN<br>Factor<br>(dB) | Cable<br>Loss<br>(dB) | Pulse<br>Att.<br>(dB) | Reading<br>(dBμV) | Emission<br>Level<br>(dBμV) | Limits<br>(dBμV) | Margin<br>(dB) | Remark  |
|----|----------------|-----------------------|-----------------------|-----------------------|-------------------|-----------------------------|------------------|----------------|---------|
| 1  | 0.211          | 0.17                  | 0.04                  | 9.85                  | 19.76             | 29.82                       | 53.18            | 23.36          | Average |
| 2  | 0.211          | 0.17                  | 0.04                  | 9.85                  | 28.24             | 38.30                       | 63.18            | 24.88          | QP      |
| 3  | 0.277          | 0.18                  | 0.04                  | 9.85                  | 14.06             | 24.13                       | 50.90            | 26.77          | Average |
| 4  | 0.277          | 0.18                  | 0.04                  | 9.85                  | 22.93             | 33.00                       | 60.90            | 27.90          | QP      |
| 5  | 0.320          | 0.18                  | 0.04                  | 9.85                  | 10.92             | 20.99                       | 49.71            | 28.72          | Average |
| 6  | 0.320          | 0.18                  | 0.04                  | 9.85                  | 20.51             | 30.58                       | 59.71            | 29.13          | QP      |
| 7  | 1.991          | 0.25                  | 0.07                  | 9.96                  | 10.91             | 21.19                       | 46.00            | 24.81          | Average |
| 8  | 1.991          | 0.25                  | 0.07                  | 9.96                  | 15.35             | 25.63                       | 56.00            | 30.37          | QP      |
| 9  | 5.333          | 0.39                  | 0.12                  | 9.86                  | 22.17             | 32.54                       | 50.00            | 17.46          | Average |
| 10 | 5.333          | 0.39                  | 0.12                  | 9.86                  | 24.34             | 34.71                       | 60.00            | 25.29          | QP      |
| 11 | 15.970         | 0.84                  | 0.22                  | 9.91                  | 13.29             | 24.26                       | 50.00            | 25.74          | Average |
| 12 | 15.970         | 0.84                  | 0.22                  | 9.91                  | 21.73             | 32.70                       | 60.00            | 27.30          | QP      |

Remarks: 1. Emission Level= AMN Factor + Cable Loss + Pulse Att. + Reading.  
2. If the average limit is met when using a quasi-peak detector,  
the EUT shall be deemed to meet both limits and measurement  
with average detector is unnecessary.

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**Fax: +886 2 26099303**

|              |                        |            |          |
|--------------|------------------------|------------|----------|
| Test Date    | 2017/04/25             | Temp./Hum. | 25°C/50% |
| Test Voltage | AC 120V/60Hz (via USB) |            |          |



Site no. : No.7 Shielded Room Data no. : 1  
Condition : ESH2-Z5 366(ADAPTER) Phase : LINE  
Limit : FCC 15-C  
Env. / Ins. : 25°C / 50% ESCI(1276) Engineer : Nick Du  
EUT : HSA-S002M  
Power Rating : 120Vac/60Hz  
Test Mode : Charge

|    | Freq.<br>(MHz) | AMN<br>Factor<br>(dB) | Cable<br>Loss<br>(dB) | Pulse<br>Att.<br>(dB) | Reading<br>(dBμV) | Emission<br>Level<br>(dBμV) | Limits<br>(dBμV) | Margin<br>(dB) | Remark  |
|----|----------------|-----------------------|-----------------------|-----------------------|-------------------|-----------------------------|------------------|----------------|---------|
| 1  | 0.170          | 0.17                  | 0.03                  | 9.85                  | 36.24             | 46.29                       | 54.94            | 8.65           | Average |
| 2  | 0.170          | 0.17                  | 0.03                  | 9.85                  | 40.05             | 50.10                       | 64.94            | 14.84          | QP      |
| 3  | 0.182          | 0.17                  | 0.04                  | 9.85                  | 31.02             | 41.08                       | 54.37            | 13.29          | Average |
| 4  | 0.182          | 0.17                  | 0.04                  | 9.85                  | 37.00             | 47.06                       | 64.37            | 17.31          | QP      |
| 5  | 0.217          | 0.16                  | 0.04                  | 9.85                  | 22.27             | 32.32                       | 52.92            | 20.60          | Average |
| 6  | 0.217          | 0.16                  | 0.04                  | 9.85                  | 27.28             | 37.33                       | 62.92            | 25.59          | QP      |
| 7  | 2.044          | 0.25                  | 0.07                  | 9.96                  | 13.60             | 23.88                       | 46.00            | 22.12          | Average |
| 8  | 2.044          | 0.25                  | 0.07                  | 9.96                  | 18.81             | 29.09                       | 56.00            | 26.91          | QP      |
| 9  | 5.505          | 0.41                  | 0.13                  | 9.87                  | 15.41             | 25.82                       | 50.00            | 24.18          | Average |
| 10 | 5.505          | 0.41                  | 0.13                  | 9.87                  | 19.94             | 30.35                       | 60.00            | 29.65          | QP      |
| 11 | 17.661         | 1.02                  | 0.23                  | 9.92                  | 10.48             | 21.65                       | 50.00            | 28.35          | Average |
| 12 | 17.661         | 1.02                  | 0.23                  | 9.92                  | 20.72             | 31.89                       | 60.00            | 28.11          | QP      |

Remarks: 1. Emission Level= AMN Factor + Cable Loss + Pulse Att. + Reading.  
2. If the average limit is met when using a quasi-peak detector,  
the EUT shall be deemed to meet both limits and measurement  
with average detector is unnecessary.

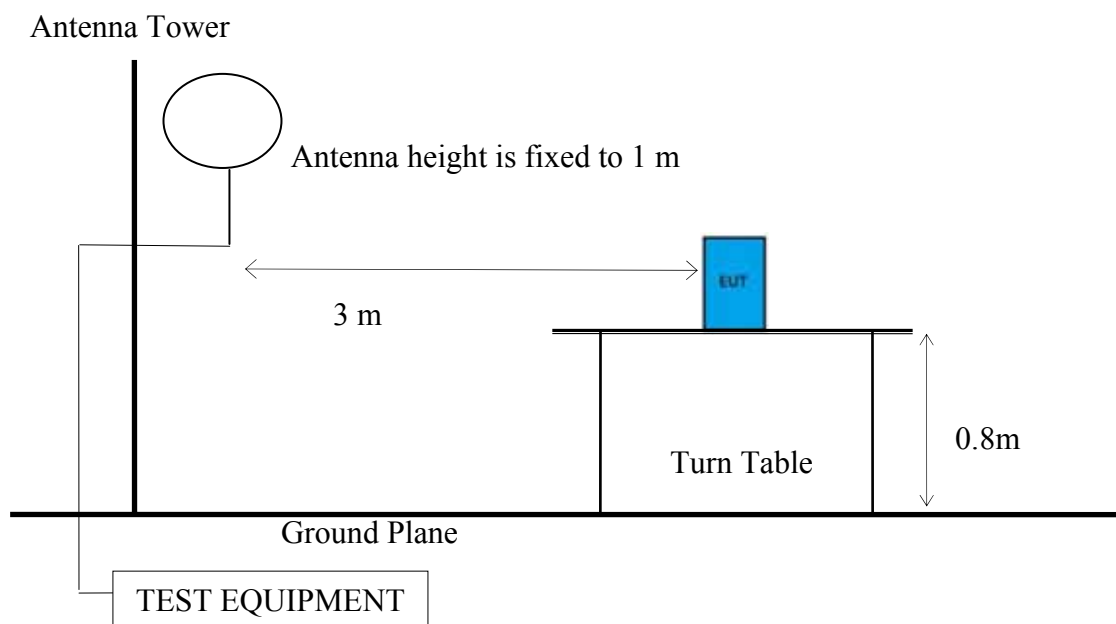
## 6. RADIATED EMISSION MEASUREMENT

### 6.1. Block Diagram of Test Setup

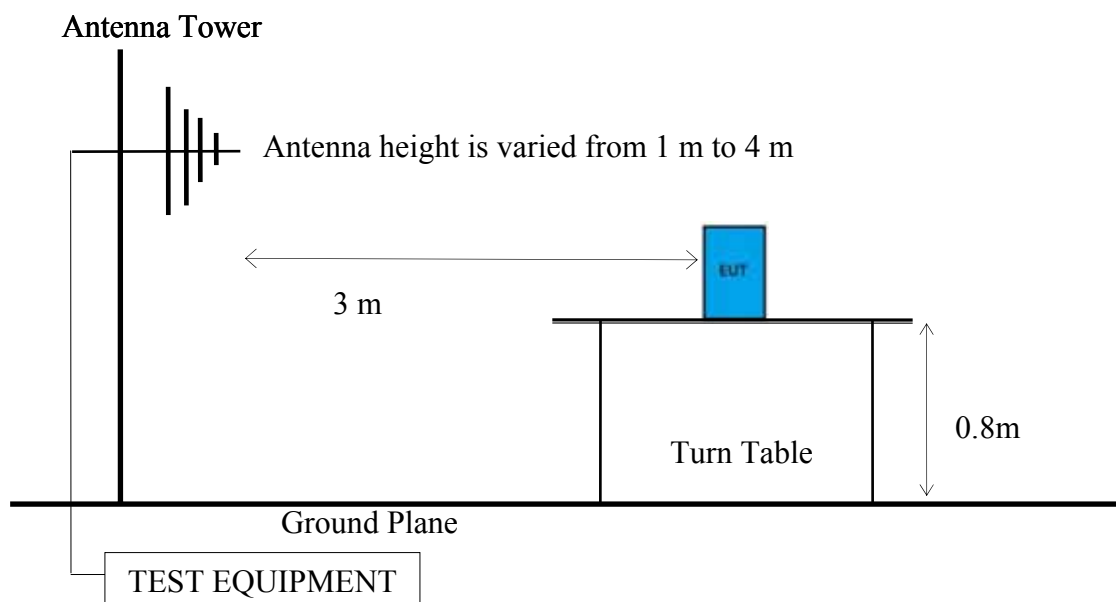
#### 6.1.1. Block Diagram of EUT

Indicated as section 3.6

#### 6.1.2. Semi Anechoic Chamber (3m) Setup Diagram for 9kHz-30MHz

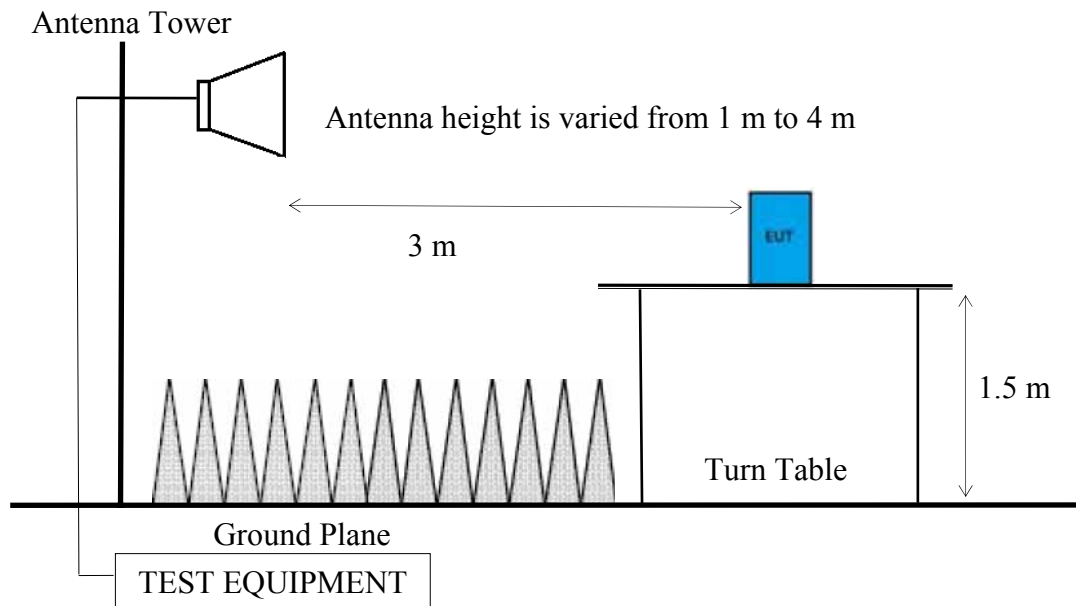


#### 6.1.3. Semi Anechoic Chamber (3m) Setup Diagram for 30-1000 MHz





#### 6.1.4. Fully Anechoic Chamber (3m) Setup Diagram for above 1GHz



## 6.2. Radiated Emission Limits

### 6.2.1. General Limit

In any 100kHz bandwidth outside the frequency band, the radio frequency power produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level. In addition, radiated emissions which fall in restricted bands, as defined in Section 15.205/RSS-Gen Section 8.10 table 6, must also comply with the radiated emission limits specified as below.

| Frequency (MHz) | Distance (m) | Limits                                                  |           |
|-----------------|--------------|---------------------------------------------------------|-----------|
|                 |              | dB $\mu$ V/m                                            | $\mu$ V/m |
| 0.009 - 0.490   | 300          | 67.6                                                    | 2400/kHz  |
| 0.490 - 1.705   | 30           | 87.6                                                    | 24000/kHz |
| 1.705 - 30      | 30           | 29.5                                                    | 30        |
| 30 - 88         | 3            | 40.0                                                    | 100       |
| 88- 216         | 3            | 43.5                                                    | 150       |
| 216- 960        | 3            | 46.0                                                    | 200       |
| Above 960       | 3            | 54.0                                                    | 500       |
| Above 1000      | 3            | 74.0 dB $\mu$ V/m (Peak)<br>54.0 dB $\mu$ V/m (Average) |           |

Remark : (1) dB $\mu$ V/m = 20 log ( $\mu$ V/m)

(2) The tighter limit applies to the edge between two frequency bands.

(3) Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.

(4) Fundamental and emission fall within operation band are exempted from this section.

(5) Pursuant to ANSI C63.10: 6.6.4.3, if the maximized peak measured value complies with the average limit, then it is unnecessary to perform an average measurement.

### 6.2.2. Limite for Fundamental & Harmonics Frequency

| Fundamental Frequency | Field strength of fundamental |               | Field strength of harmonics |              |
|-----------------------|-------------------------------|---------------|-----------------------------|--------------|
|                       | mV/m                          | dB $\mu$ V/m  | $\mu$ V/m                   | dB $\mu$ V/m |
| 902-928MHz            | 50                            | 114 (Peak)    | 500                         | 74 (Peak)    |
|                       |                               | 94 (Average)  |                             | 54 (Average) |
| 2400-2483.5MHz        | 50                            | 114 (Peak)    | 500                         | 74 (Peak)    |
|                       |                               | 94 (Average)  |                             | 54 (Average) |
| 5725-5875MHz          | 50                            | 114 (Peak)    | 500                         | 74 (Peak)    |
|                       |                               | 94 (Average)  |                             | 54 (Average) |
| 24.0-24.25GHz         | 250                           | 128 (Peak)    | 2500                        | 88 (Peak)    |
|                       |                               | 108 (Average) |                             | 68 (Average) |

Remark: mV/m=1000 $\mu$ V/m; dB $\mu$ V/m = 20 log ( $\mu$ V/m)

### 6.3. Test Procedure

#### **Frequency Range 9kHz~30MHz:**

The EUT setup on the turn table which has 0.8 m height to the ground. The turn table rotated 360 degrees and antenna fixed to 1 m to find the maximum emission level. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10-2013 regulation.

- (1) RBW = 9kHz with peak and average detector.
- (2) Detector: average and peak (9kHz-490kHz)  
Q.P. (490kHz-30MHz)

#### **Frequency Range 30MHz ~ 25GHz:**

The EUT setup on the turn find table which has 80 cm (for 30-1000 MHz) and 1.5m (for above 1GHz) height to the ground. The turn table rotated 360 degrees and antenna varied from 1 m to 4 m to find the maximum emission level. Both horizontal and vertical polarization are required. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10-2013 regulation.

#### **Frequency below 1 GHz:**

Spectrum Analyzer is used for pre-testing with following setting:

- (1) RBW = 120KHz
- (2) VBW  $\geq 3 \times$  RBW.
- (3) Detector = Peak.
- (4) Sweep time = auto.
- (5) Trace mode = max hold.
- (6) Allow sweeps to continue until the trace stabilizes.
- (7) When peak-detected value is lower than limit that the measurement using the Q.P. detector is not required. Otherwise using Q.P. for finally measurement.

#### **Frequency above 1GHz to 10th harmonic:**

##### **Peak Detector:**

- (1) RBW = 1MHz
- (2) VBW  $\geq 3 \times$  RBW.
- (3) Detector = Peak.
- (4) Sweep time = auto.
- (5) Trace mode = max hold.
- (6) Allow sweeps to continue until the trace stabilizes.
- (7) When peak-detected value is lower than limit that the measurement using the average detector is not required. Otherwise using average for finally measurement.

**Average Detector:**☐ **Option 1:**

(1) RBW = 1MHz

(2) VBW  $\geq 1/T$ .N/A:  $1/T$  is not implemented when duty cycle presented in section 3.4 is  $\geq 98\%$ .

(1) Detector = Peak.

(2) Sweep time = auto.

(3) Trace mode = max hold.

(4) Allow sweeps to continue until the trace stabilizes.

☒ **Option 2:**

Average Emission Level = Peak Emission Level + D.C.C.F.

**6.4. Measurement Result Explanation**☒ Peak Emission Level = Antenna Factor + Cable Loss + Meter Reading☐ Average Emission Level = Antenna Factor + Cable Loss + Meter Reading☒ Average Emission Level = Peak Emission Level + DCCFDuty Cycle Correction Factor (DCCF) =  $20\log(TX_{on}/TX_{on+off})$  presented in section 3.4☐ EPR = Peak Emission Level - 95.2dB - 2.14dB**6.5. Test Results****PASSED.**

|              |                       |            |          |
|--------------|-----------------------|------------|----------|
| Test Date    | 2017/04/13            | Temp./Hum. | 26°C/43% |
| Test Voltage | DC 3.7V (Via Battery) |            |          |

### 6.5.1. Emissions within Restricted Frequency Bands

#### 6.5.1.1. Frequency 9kHz~30MHz

**The emissions (9kHz~30MHz) not reported for there is no emission be found.**

#### 6.5.1.2. Frequency Below 1 GHz

| Modulation | Charge | Frequency | --- |
|------------|--------|-----------|-----|
|------------|--------|-----------|-----|

#### **Antenna at Horizontal Polarization**

| Emission<br>Frequency<br>(MHz) | Antenna<br>Factor<br>(dB/m) | Cable<br>Loss<br>(dB) | Meter<br>Reading<br>(dBμV) | Emission<br>Level<br>(dBμV/m) | Limits<br>(dBμV/m) | Margin<br>(dB) | Detector |
|--------------------------------|-----------------------------|-----------------------|----------------------------|-------------------------------|--------------------|----------------|----------|
| 245.34                         | 18.62                       | 3.77                  | 10.15                      | 32.54                         | 46.00              | 13.46          | Peak     |
| 375.32                         | 22.10                       | 5.29                  | 2.09                       | 29.48                         | 46.00              | 16.52          | Peak     |
| 474.26                         | 23.51                       | 6.22                  | 3.61                       | 33.34                         | 46.00              | 12.66          | Peak     |

#### **Antenna at Vertical Polarization**

| Emission<br>Frequency<br>(MHz) | Antenna<br>Factor<br>(dB/m) | Cable<br>Loss<br>(dB) | Meter<br>Reading<br>(dBμV) | Emission<br>Level<br>(dBμV/m) | Limits<br>(dBμV/m) | Margin<br>(dB) | Detector |
|--------------------------------|-----------------------------|-----------------------|----------------------------|-------------------------------|--------------------|----------------|----------|
| 236.61                         | 18.12                       | 3.69                  | 5.55                       | 27.36                         | 46.00              | 18.64          | Peak     |
| 474.26                         | 23.51                       | 6.22                  | 1.91                       | 31.64                         | 46.00              | 14.36          | Peak     |
| 964.11                         | 27.60                       | 8.61                  | 2.55                       | 38.76                         | 54.00              | 15.24          | Peak     |

|            |      |           |            |
|------------|------|-----------|------------|
| Modulation | GFSK | Frequency | TX 2403MHz |
|------------|------|-----------|------------|

**Antenna at Horizontal Polarization**

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|--------------------------|-----------------------|-----------------|----------------------|-------------------------|-----------------|-------------|----------|
| 328.76                   | 20.73                 | 4.71            | 2.74                 | 28.18                   | 46.00           | 17.82       | Peak     |
| 481.05                   | 23.58                 | 6.27            | 2.48                 | 32.33                   | 46.00           | 13.67       | Peak     |
| 859.35                   | 26.91                 | 7.95            | 2.27                 | 37.13                   | 46.00           | 8.87        | Peak     |

**Antenna at Vertical Polarization**

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|--------------------------|-----------------------|-----------------|----------------------|-------------------------|-----------------|-------------|----------|
| 232.73                   | 17.88                 | 3.66            | 4.77                 | 26.31                   | 46.00           | 19.69       | Peak     |
| 476.20                   | 23.53                 | 6.23            | 2.83                 | 32.59                   | 46.00           | 13.41       | Peak     |
| 589.69                   | 24.64                 | 6.72            | 2.25                 | 33.61                   | 46.00           | 12.39       | Peak     |

|            |      |           |            |
|------------|------|-----------|------------|
| Modulation | GFSK | Frequency | TX 2441MHz |
|------------|------|-----------|------------|

**Antenna at Horizontal Polarization**

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|--------------------------|-----------------------|-----------------|----------------------|-------------------------|-----------------|-------------|----------|
| 338.46                   | 21.02                 | 4.83            | 2.46                 | 28.31                   | 46.00           | 17.69       | Peak     |
| 474.26                   | 23.51                 | 6.22            | 2.38                 | 32.11                   | 46.00           | 13.89       | Peak     |
| 580.96                   | 24.56                 | 6.69            | 1.25                 | 32.50                   | 46.00           | 13.50       | Peak     |

**Antenna at Vertical Polarization**

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|--------------------------|-----------------------|-----------------|----------------------|-------------------------|-----------------|-------------|----------|
| 230.79                   | 17.78                 | 3.64            | 5.50                 | 26.92                   | 46.00           | 19.08       | Peak     |
| 335.55                   | 20.95                 | 4.80            | 1.95                 | 27.70                   | 46.00           | 18.30       | Peak     |
| 473.29                   | 23.51                 | 6.22            | 2.93                 | 32.66                   | 46.00           | 13.34       | Peak     |

|            |      |           |            |
|------------|------|-----------|------------|
| Modulation | GFSK | Frequency | TX 2480MHz |
|------------|------|-----------|------------|

**Antenna at Horizontal Polarization**

| Emission<br>Frequency<br>(MHz) | Antenna<br>Factor<br>(dB/m) | Cable<br>Loss<br>(dB) | Meter<br>Reading<br>(dBμV) | Emission<br>Level<br>(dBμV/m) | Limits<br>(dBμV/m) | Margin<br>(dB) | Detector |
|--------------------------------|-----------------------------|-----------------------|----------------------------|-------------------------------|--------------------|----------------|----------|
| 331.67                         | 20.80                       | 4.74                  | 3.73                       | 29.27                         | 46.00              | 16.73          | Peak     |
| 476.20                         | 23.53                       | 6.23                  | 1.70                       | 31.46                         | 46.00              | 14.54          | Peak     |
| 636.25                         | 25.09                       | 6.88                  | 1.54                       | 33.51                         | 46.00              | 12.49          | Peak     |

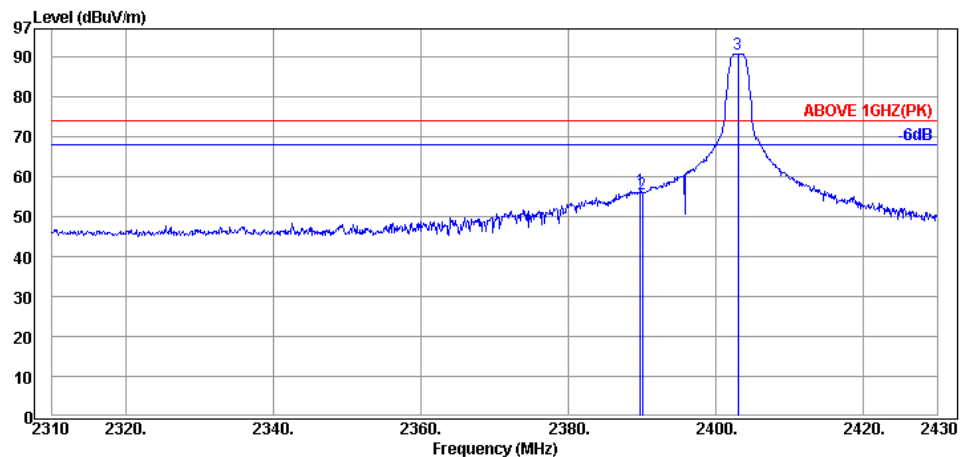
**Antenna at Vertical Polarization**

| Emission<br>Frequency<br>(MHz) | Antenna<br>Factor<br>(dB/m) | Cable<br>Loss<br>(dB) | Meter<br>Reading<br>(dBμV) | Emission<br>Level<br>(dBμV/m) | Limits<br>(dBμV/m) | Margin<br>(dB) | Detector |
|--------------------------------|-----------------------------|-----------------------|----------------------------|-------------------------------|--------------------|----------------|----------|
| 240.49                         | 18.37                       | 3.73                  | 5.16                       | 27.26                         | 46.00              | 18.74          | Peak     |
| 471.35                         | 23.50                       | 6.20                  | 2.30                       | 32.00                         | 46.00              | 14.00          | Peak     |
| 630.43                         | 25.03                       | 6.86                  | 2.04                       | 33.93                         | 46.00              | 12.07          | Peak     |

### 6.5.1.3. Frequency Above 1 GHz to 10<sup>th</sup> harmonics

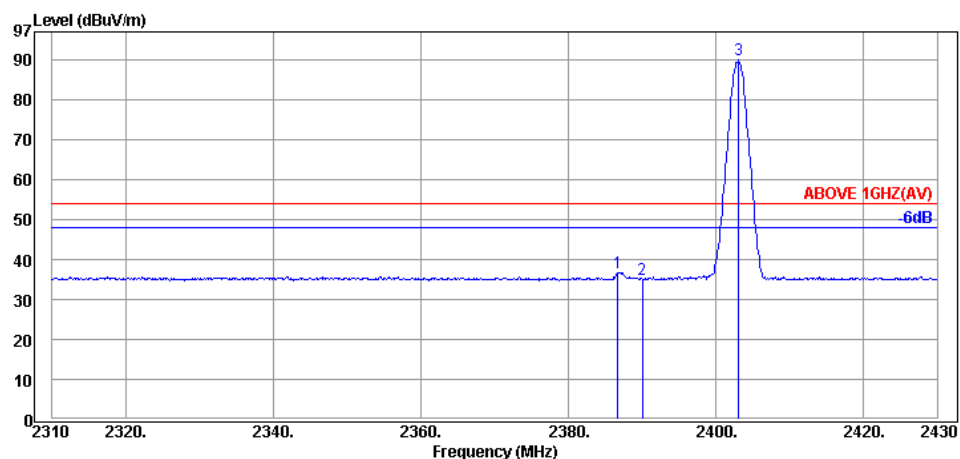
#### Band Edge:

| Modulation | GFSK | Frequency | TX 2403MHz |
|------------|------|-----------|------------|
|------------|------|-----------|------------|



#### Antenna at Horizontal Polarization

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|--------------------------|-----------------------|-----------------|----------------------|-------------------------|-----------------|-------------|----------|
| 2389.80                  | 31.68                 | 6.08            | 18.76                | 56.52                   | 74.00           | 17.48       | Peak     |
| 2390.04                  | 31.68                 | 6.08            | 17.82                | 55.58                   | 74.00           | 18.42       | Peak     |
| 2403.00                  | 31.69                 | 6.10            | 52.83                | 90.62                   | ---             | ---         | Peak     |

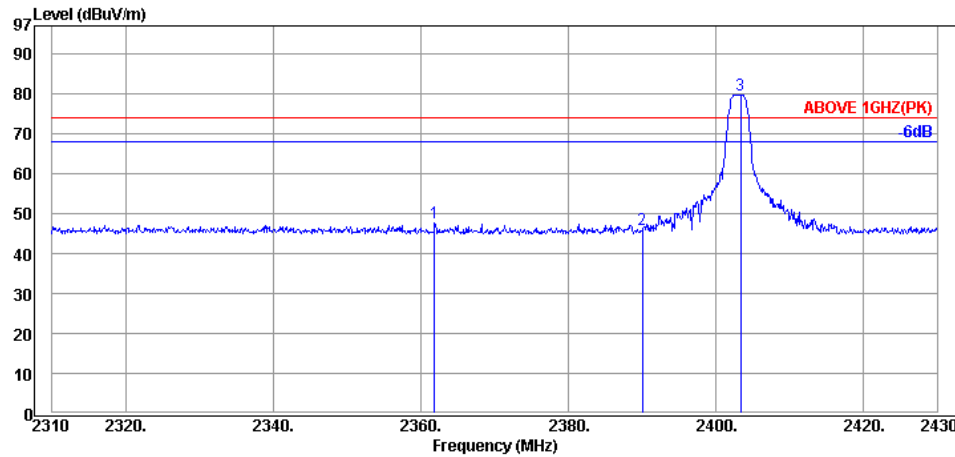


#### Antenna at Horizontal Polarization

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|--------------------------|-----------------------|-----------------|----------------------|-------------------------|-----------------|-------------|----------|
| 2386.68                  | 31.68                 | 6.07            | -1.12                | 36.63                   | 54.00           | 17.37       | Average  |
| 2390.04                  | 31.68                 | 6.08            | -2.65                | 35.11                   | 54.00           | 18.89       | Average  |
| 2403.12                  | 31.69                 | 6.10            | 52.08                | 89.87                   | ---             | ---         | Average  |

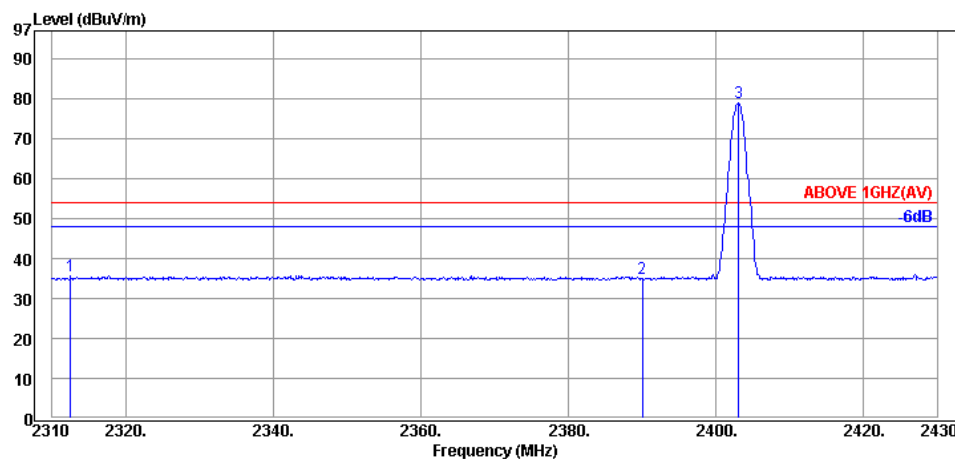


|            |      |           |            |
|------------|------|-----------|------------|
| Modulation | GFSK | Frequency | TX 2403MHz |
|------------|------|-----------|------------|



#### Antenna at Vertical Polarization

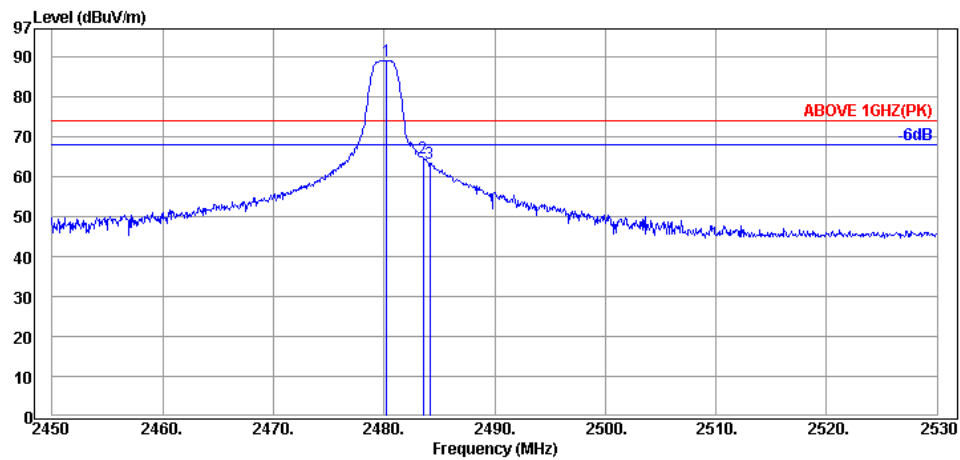
| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|--------------------------|-----------------------|-----------------|----------------------|-------------------------|-----------------|-------------|----------|
| 2361.84                  | 31.64                 | 6.04            | 9.84                 | 47.52                   | 74.00           | 26.48       | Peak     |
| 2390.04                  | 31.68                 | 6.08            | 8.39                 | 46.15                   | 74.00           | 27.85       | Peak     |
| 2403.36                  | 31.69                 | 6.10            | 41.88                | 79.67                   | ---             | ---         | Peak     |



#### Antenna at Vertical Polarization

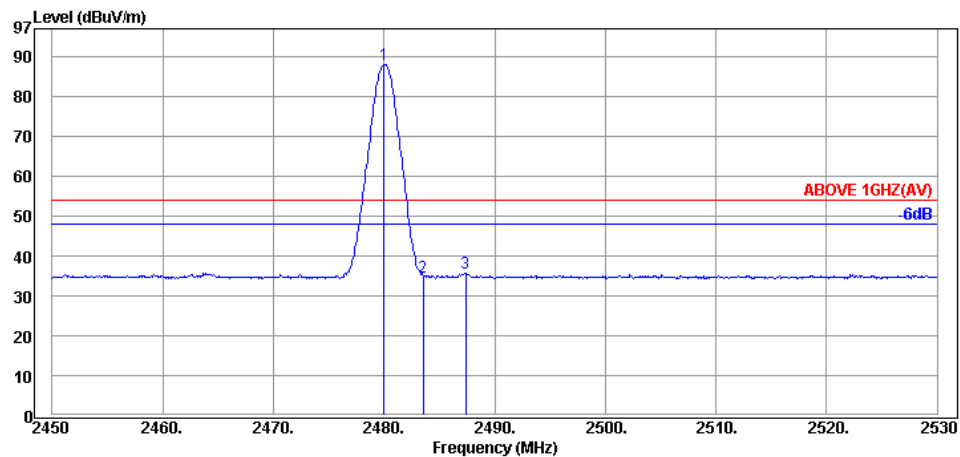
| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|--------------------------|-----------------------|-----------------|----------------------|-------------------------|-----------------|-------------|----------|
| 2312.52                  | 31.59                 | 5.98            | -1.87                | 35.70                   | 54.00           | 18.30       | Average  |
| 2390.04                  | 31.68                 | 6.08            | -2.74                | 35.02                   | 54.00           | 18.98       | Average  |
| 2403.12                  | 31.69                 | 6.10            | 41.34                | 79.13                   | ---             | ---         | Average  |

|            |      |           |            |
|------------|------|-----------|------------|
| Modulation | GFSK | Frequency | TX 2480MHz |
|------------|------|-----------|------------|



#### Antenna at Horizontal Polarization

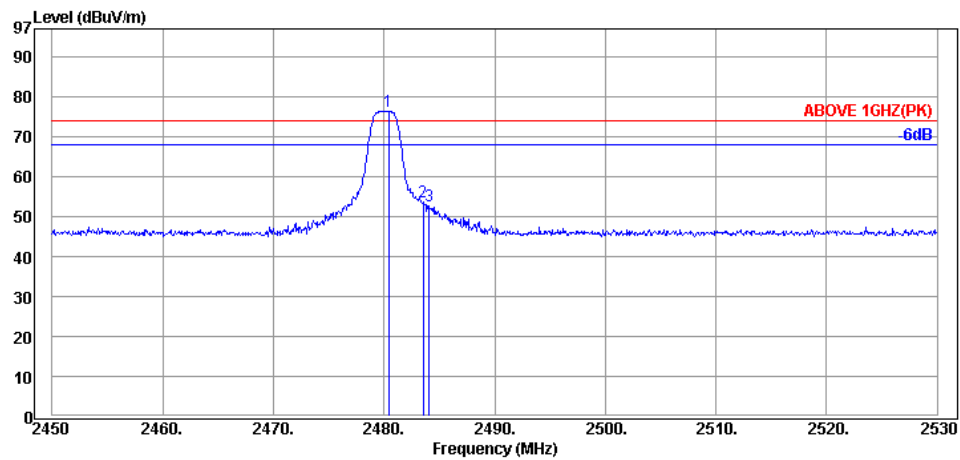
| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|--------------------------|-----------------------|-----------------|----------------------|-------------------------|-----------------|-------------|----------|
| 2480.24                  | 31.78                 | 6.18            | 50.92                | 88.88                   | ---             | ---         | Peak     |
| 2483.52                  | 31.78                 | 6.19            | 26.75                | 64.72                   | 74.00           | 9.28        | Peak     |
| 2484.16                  | 31.78                 | 6.19            | 25.31                | 63.28                   | 74.00           | 10.72       | Peak     |



#### Antenna at Horizontal Polarization

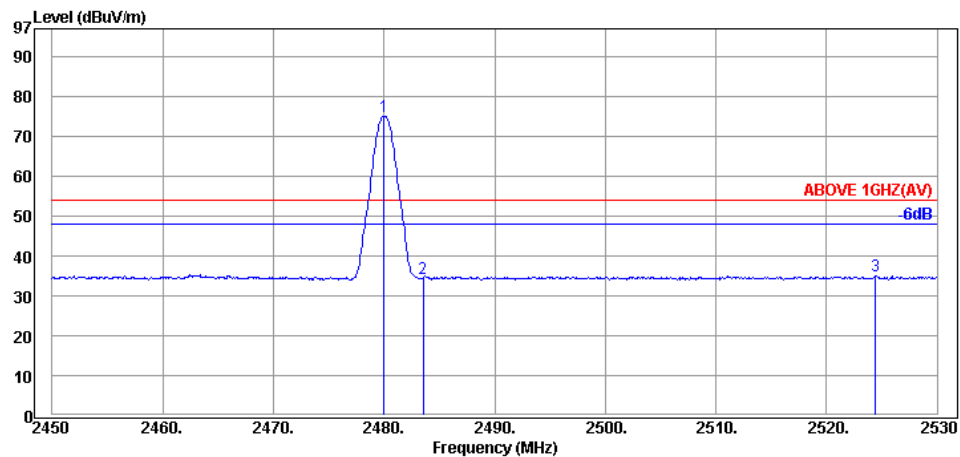
| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|--------------------------|-----------------------|-----------------|----------------------|-------------------------|-----------------|-------------|----------|
| 2480.00                  | 31.78                 | 6.18            | 50.11                | 88.07                   | ---             | ---         | Average  |
| 2483.52                  | 31.78                 | 6.19            | -3.15                | 34.82                   | 54.00           | 19.18       | Average  |
| 2487.36                  | 31.78                 | 6.19            | -2.30                | 35.67                   | 54.00           | 18.33       | Average  |

|            |      |           |            |
|------------|------|-----------|------------|
| Modulation | GFSK | Frequency | TX 2480MHz |
|------------|------|-----------|------------|



#### Antenna at Vertical Polarization

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|--------------------------|-----------------------|-----------------|----------------------|-------------------------|-----------------|-------------|----------|
| 2480.40                  | 31.78                 | 6.18            | 38.31                | 76.27                   | ---             | ---         | Peak     |
| 2483.52                  | 31.78                 | 6.19            | 15.62                | 53.59                   | 74.00           | 20.41       | Peak     |
| 2484.08                  | 31.78                 | 6.19            | 14.59                | 52.56                   | 74.00           | 21.44       | Peak     |



#### Antenna at Vertical Polarization

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|--------------------------|-----------------------|-----------------|----------------------|-------------------------|-----------------|-------------|----------|
| 2480.00                  | 31.78                 | 6.18            | 37.17                | 75.13                   | ---             | ---         | Average  |
| 2483.52                  | 31.78                 | 6.19            | -3.74                | 34.23                   | 54.00           | 19.77       | Average  |
| 2524.40                  | 31.82                 | 6.25            | -2.93                | 35.14                   | 54.00           | 18.86       | Average  |

**6.5.2. Emissions outside the frequency band:**

The emissions (up to 25GHz) not reported for there is no emission be found.

|            |      |           |            |
|------------|------|-----------|------------|
| Modulation | GFSK | Frequency | TX 2403MHz |
|------------|------|-----------|------------|

**Antenna at Horizontal Polarization**

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|--------------------------|-----------------------|-----------------|----------------------|-------------------------|-----------------|-------------|----------|
| 4805.00                  | 33.82                 | 8.87            | 20.82                | 63.51                   | 74.00           | 10.49       | Peak     |
| 7905.00                  | 35.76                 | 11.59           | -0.77                | 46.58                   | 74.00           | 27.42       | Peak     |
| 9610.00                  | 36.61                 | 12.50           | -1.21                | 47.90                   | 74.00           | 26.10       | Peak     |

| Emission Frequency (MHz) | Peak Emission Level (dBμV/m) | DCCF (dB) | Average Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Remark  |
|--------------------------|------------------------------|-----------|---------------------------------|-----------------|-------------|---------|
| 4805                     | 63.51                        | -39.63    | 23.88                           | 54.00           | 30.12       | Average |
| 7090                     | 46.58                        | -39.63    | 6.95                            | 54.00           | 47.05       | Average |
| 9610                     | 47.9                         | -39.63    | 8.27                            | 54.00           | 45.73       | Average |

**Antenna at Vertical Polarization**

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|--------------------------|-----------------------|-----------------|----------------------|-------------------------|-----------------|-------------|----------|
| 4805.00                  | 33.82                 | 8.87            | 15.08                | 57.77                   | 74.00           | 16.23       | Peak     |
| 7090.00                  | 35.68                 | 10.89           | -1.30                | 45.27                   | 74.00           | 28.73       | Peak     |
| 9610.00                  | 36.61                 | 12.50           | -1.19                | 47.92                   | 74.00           | 26.08       | Peak     |

| Emission Frequency (MHz) | Peak Emission Level (dBμV/m) | DCCF (dB) | Average Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Remark  |
|--------------------------|------------------------------|-----------|---------------------------------|-----------------|-------------|---------|
| 4805                     | 57.77                        | -39.63    | 18.14                           | 54.00           | 35.86       | Average |
| 7090                     | 45.27                        | -39.63    | 5.64                            | 54.00           | 48.36       | Average |
| 9610                     | 47.92                        | -39.63    | 8.29                            | 54.00           | 45.71       | Average |

|            |        |           |            |
|------------|--------|-----------|------------|
| Modulation | T-FHSS | Frequency | TX 2441MHz |
|------------|--------|-----------|------------|

#### Antenna at Horizontal Polarization

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|--------------------------|-----------------------|-----------------|----------------------|-------------------------|-----------------|-------------|----------|
| 4885.00                  | 33.86                 | 9.14            | 57.68                | 66.17                   | 74.00           | 7.83        | Peak     |
| 7325.00                  | 35.63                 | 11.95           | 34.28                | 47.04                   | 74.00           | 26.96       | Peak     |
| 9760.00                  | 36.75                 | 13.48           | -1.16                | 49.07                   | 74.00           | 24.93       | Peak     |

| Emission Frequency (MHz) | Peak Emission Level (dBμV/m) | DCCF (dB) | Average Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Remark  |
|--------------------------|------------------------------|-----------|---------------------------------|-----------------|-------------|---------|
| 4885                     | 66.17                        | -39.63    | 26.54                           | 54.00           | 27.46       | Average |
| 7325                     | 47.04                        | -39.63    | 7.41                            | 54.00           | 46.59       | Average |
| 9760                     | 49.07                        | -39.63    | 9.44                            | 54.00           | 44.56       | Average |

#### Antenna at Vertical Polarization

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|--------------------------|-----------------------|-----------------|----------------------|-------------------------|-----------------|-------------|----------|
| 4880.00                  | 33.85                 | 9.14            | 16.42                | 59.41                   | 74.00           | 14.59       | Peak     |
| 7325.00                  | 35.63                 | 11.95           | 0.07                 | 47.65                   | 74.00           | 26.35       | Peak     |
| 9760.00                  | 36.75                 | 13.48           | -2.12                | 48.11                   | 74.00           | 25.89       | Peak     |

| Emission Frequency (MHz) | Peak Emission Level (dBμV/m) | DCCF (dB) | Average Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Remark  |
|--------------------------|------------------------------|-----------|---------------------------------|-----------------|-------------|---------|
| 4880                     | 59.41                        | -39.63    | 19.78                           | 54.00           | 34.22       | Average |
| 7325                     | 47.65                        | -39.63    | 8.02                            | 54.00           | 45.98       | Average |
| 9760                     | 48.11                        | -39.63    | 8.48                            | 54.00           | 45.52       | Average |

|            |      |           |            |
|------------|------|-----------|------------|
| Modulation | GFSK | Frequency | TX 2480MHz |
|------------|------|-----------|------------|

**Antenna at Horizontal Polarization**

| Emission<br>Frequency<br>(MHz) | Antenna<br>Factor<br>(dB/m) | Cable<br>Loss<br>(dB) | Meter<br>Reading<br>(dBμV) | Emission<br>Level<br>(dBμV/m) | Limits<br>(dBμV/m) | Margin<br>(dB) | Detector |
|--------------------------------|-----------------------------|-----------------------|----------------------------|-------------------------------|--------------------|----------------|----------|
| 4960.00                        | 33.88                       | 9.40                  | 23.94                      | 67.22                         | 74.00              | 6.78           | Peak     |
| 7440.00                        | 35.61                       | 12.56                 | -1.76                      | 46.41                         | 74.00              | 27.59          | Peak     |
| 9920.00                        | 36.92                       | 13.51                 | -0.81                      | 49.62                         | 74.00              | 24.38          | Peak     |

| Emission<br>Frequency<br>(MHz) | Peak Emission<br>Level<br>(dBμV/m) | DCCF<br>(dB) | Average<br>Emission Level<br>(dBμV/m) | Limits<br>(dBμV/m) | Margin<br>(dB) | Remark  |
|--------------------------------|------------------------------------|--------------|---------------------------------------|--------------------|----------------|---------|
| 4960                           | 67.22                              | -39.63       | 27.59                                 | 54.00              | 26.41          | Average |
| 7440                           | 46.41                              | -39.63       | 6.78                                  | 54.00              | 47.22          | Average |
| 9920                           | 49.62                              | -39.63       | 9.99                                  | 54.00              | 44.01          | Average |

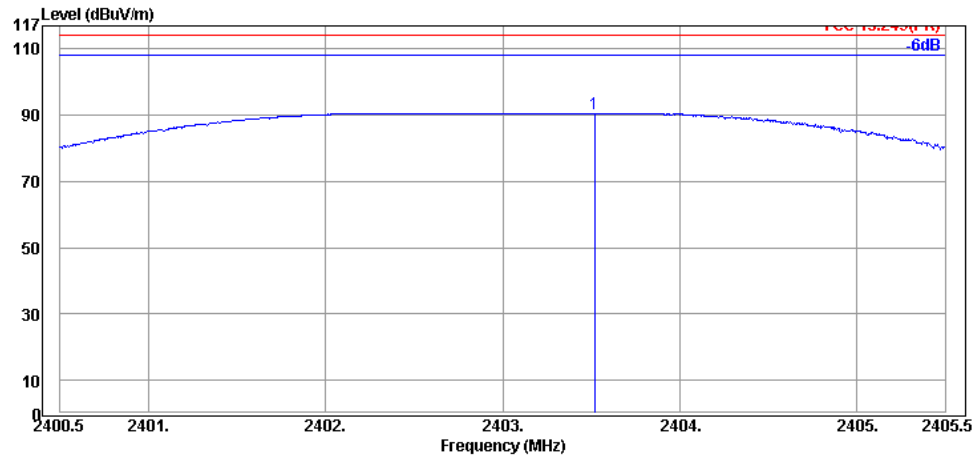
**Antenna at Vertical Polarization**

| Emission<br>Frequency<br>(MHz) | Antenna<br>Factor<br>(dB/m) | Cable<br>Loss<br>(dB) | Meter<br>Reading<br>(dBμV) | Emission<br>Level<br>(dBμV/m) | Limits<br>(dBμV/m) | Margin<br>(dB) | Detector |
|--------------------------------|-----------------------------|-----------------------|----------------------------|-------------------------------|--------------------|----------------|----------|
| 4960.00                        | 33.88                       | 9.40                  | 20.37                      | 63.65                         | 74.00              | 10.35          | Peak     |
| 7440.00                        | 35.61                       | 12.56                 | -0.82                      | 47.35                         | 74.00              | 26.65          | Peak     |
| 9920.00                        | 36.92                       | 13.51                 | -1.37                      | 49.06                         | 74.00              | 24.94          | Peak     |

| Emission<br>Frequency<br>(MHz) | Peak Emission<br>Level<br>(dBμV/m) | DCCF<br>(dB) | Average<br>Emission Level<br>(dBμV/m) | Limits<br>(dBμV/m) | Margin<br>(dB) | Remark  |
|--------------------------------|------------------------------------|--------------|---------------------------------------|--------------------|----------------|---------|
| 4960                           | 63.65                              | -39.63       | 24.02                                 | 54.00              | 29.98          | Average |
| 7440                           | 47.35                              | -39.63       | 7.72                                  | 54.00              | 46.28          | Average |
| 9920                           | 49.06                              | -39.63       | 9.43                                  | 54.00              | 44.57          | Average |

### 6.5.3. Fundamental Frequency:

|            |      |           |            |
|------------|------|-----------|------------|
| Modulation | GFSK | Frequency | TX 2403MHz |
|------------|------|-----------|------------|



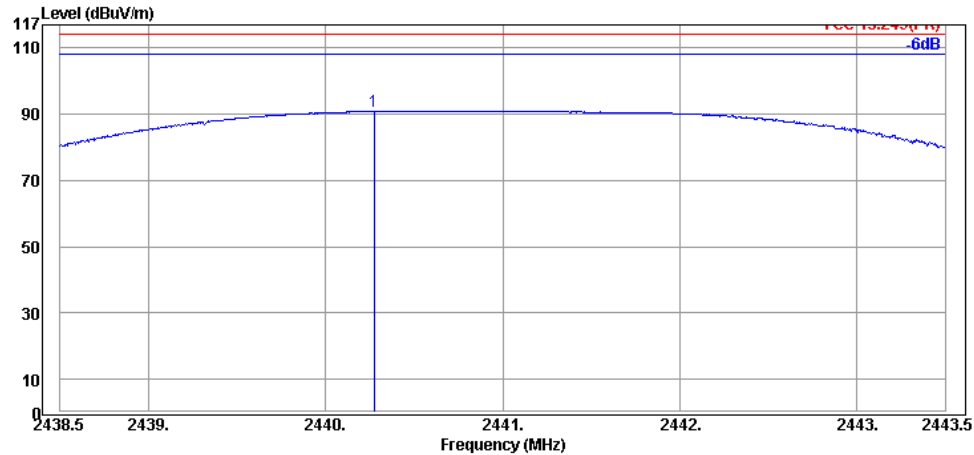
#### Antenna at Horizontal Polarization

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|--------------------------|-----------------------|-----------------|----------------------|-------------------------|-----------------|-------------|----------|
| 2403.52                  | 31.69                 | 6.10            | 52.87                | 90.66                   | 114.00          | 23.34       | Peak     |

| Emission Frequency (MHz) | Peak Emission Level (dBμV/m) | DCCF (dB) | Average Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Remark  |
|--------------------------|------------------------------|-----------|---------------------------------|-----------------|-------------|---------|
| 2403.52                  | 90.66                        | -39.63    | 51.03                           | 94.00           | 42.97       | Average |

Remark: Horizontal is the strongest polarization and peak value has complied with limit, so vertical won't be listed in test report.

|            |      |           |            |
|------------|------|-----------|------------|
| Modulation | GFSK | Frequency | TX 2441MHz |
|------------|------|-----------|------------|



#### Antenna at Horizontal Polarization

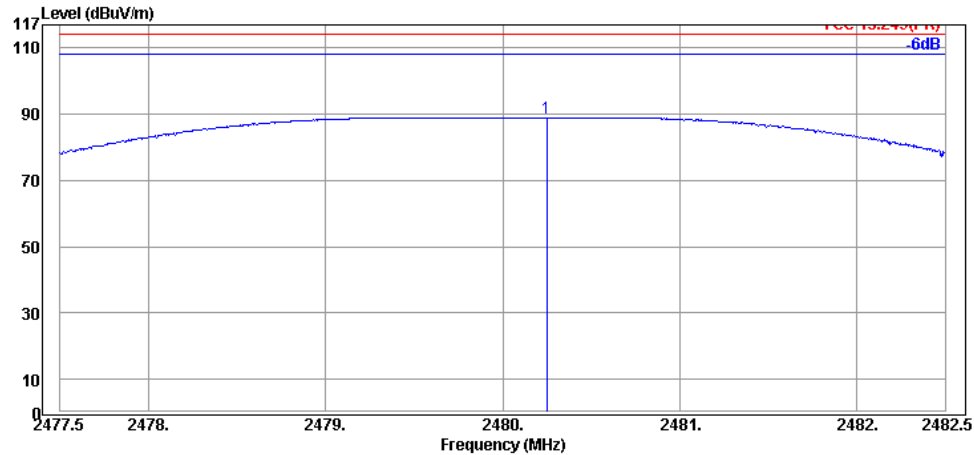
| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|--------------------------|-----------------------|-----------------|----------------------|-------------------------|-----------------|-------------|----------|
| 2440.28                  | 31.74                 | 6.13            | 52.96                | 90.83                   | 114.00          | 23.17       | Peak     |

| Emission Frequency (MHz) | Peak Emission Level (dBμV/m) | DCCF (dB) | Average Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Remark  |
|--------------------------|------------------------------|-----------|---------------------------------|-----------------|-------------|---------|
| 2440.28                  | 90.83                        | -39.63    | 51.20                           | 94.00           | 42.80       | Average |

Remark: Horizontal is the strongest polarization and peak value has complied with limit, so vertical won't be listed in test report.



|            |      |           |            |
|------------|------|-----------|------------|
| Modulation | GFSK | Frequency | TX 2480MHz |
|------------|------|-----------|------------|



#### Antenna at Horizontal Polarization

| Emission Frequency (MHz) | Antenna Factor (dB/m) | Cable Loss (dB) | Meter Reading (dBμV) | Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Detector |
|--------------------------|-----------------------|-----------------|----------------------|-------------------------|-----------------|-------------|----------|
| 2480.25                  | 31.78                 | 6.18            | 50.97                | 88.93                   | 114.00          | 25.07       | Peak     |

| Emission Frequency (MHz) | Peak Emission Level (dBμV/m) | DCCF (dB) | Average Emission Level (dBμV/m) | Limits (dBμV/m) | Margin (dB) | Remark  |
|--------------------------|------------------------------|-----------|---------------------------------|-----------------|-------------|---------|
| 2480.25                  | 88.93                        | -39.63    | 49.30                           | 94.00           | 44.70       | Average |

Remark: Horizontal is the strongest polarization and peak value has complied with limit, so vertical won't be listed in test report.

## 7. OCCUPIED BANDWIDTH 99% POWER MEASUREMENT

|              |                       |            |          |
|--------------|-----------------------|------------|----------|
| Test Date    | 2017/04/19            | Temp./Hum. | 26°C/43% |
| Test Voltage | DC 3.7V (Via Battery) |            |          |

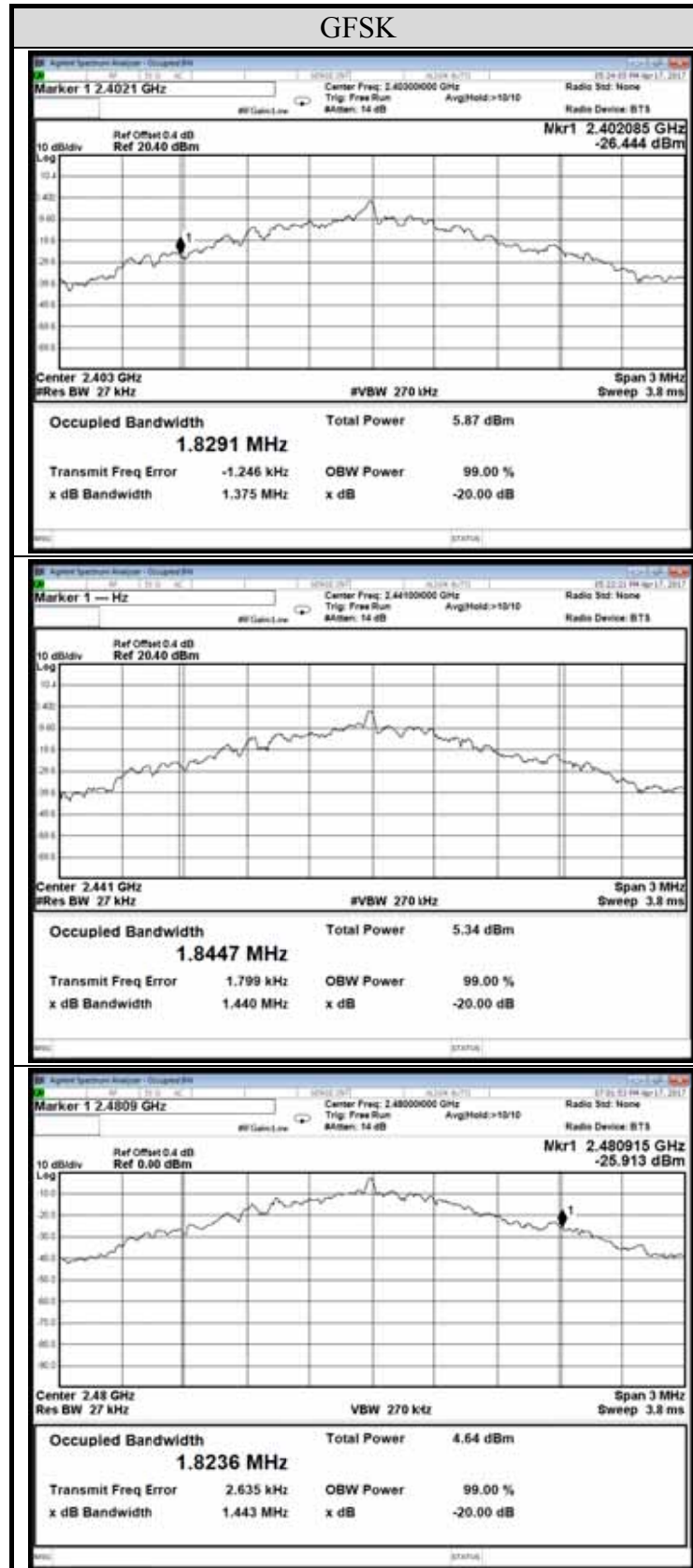
### 7.1.1. Occupied Bandwidth 99% Power Result

| Modulation Type | Centre Frequency (MHz) | Occupied Bandwidth 99% Power (MHz) |
|-----------------|------------------------|------------------------------------|
| GFSK            | 2403                   | 1.8291                             |
|                 | 2441                   | 1.8447                             |
|                 | 2480                   | 1.8236                             |

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### 7.1.2. Measurement Plots



## **8. DEVIATION TO TEST SPECIFICATIONS**

**【NONE】**



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# APPENDIX A

## TEST PHOTOGRAPHS

(Model: (1)HSA-S002M (2)HP Wireless Premium Mouse)

## A.1 Conducted Emission Measurement



## A.2 Photos of Radiated Emission Measurement

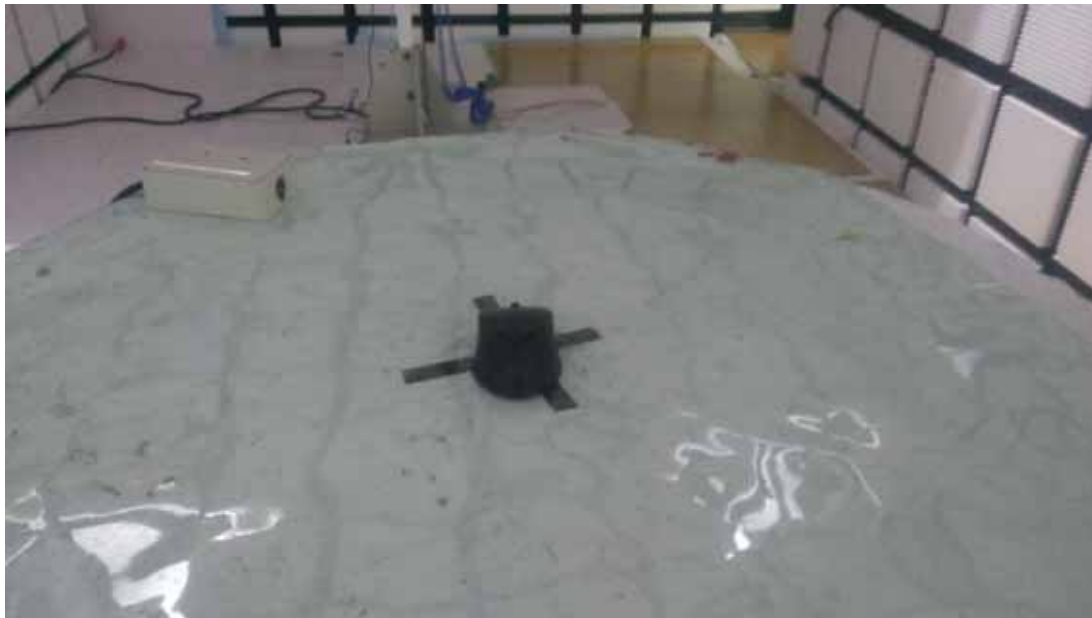
Frequency Below 1GHz



Frequency Above 1GHz



Zoom Size







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# APPENDIX B

## EUT PHOTOGRAPHS

(Model: (1)HSA-S002M (2)HP Wireless Premium Mouse)

Figure 1  
General Appearance (Front and Side View)



Figure 2  
General Appearance (Back and Side View)



Figure 3  
General Appearance (Bottom View)



Figure 4  
Internal View (Removed Cover)



Figure 5  
Internal View (Battery)



Figure 6  
Internal View (Removed Main Board)





Figure 7  
Internal View (Main Board, Front View)

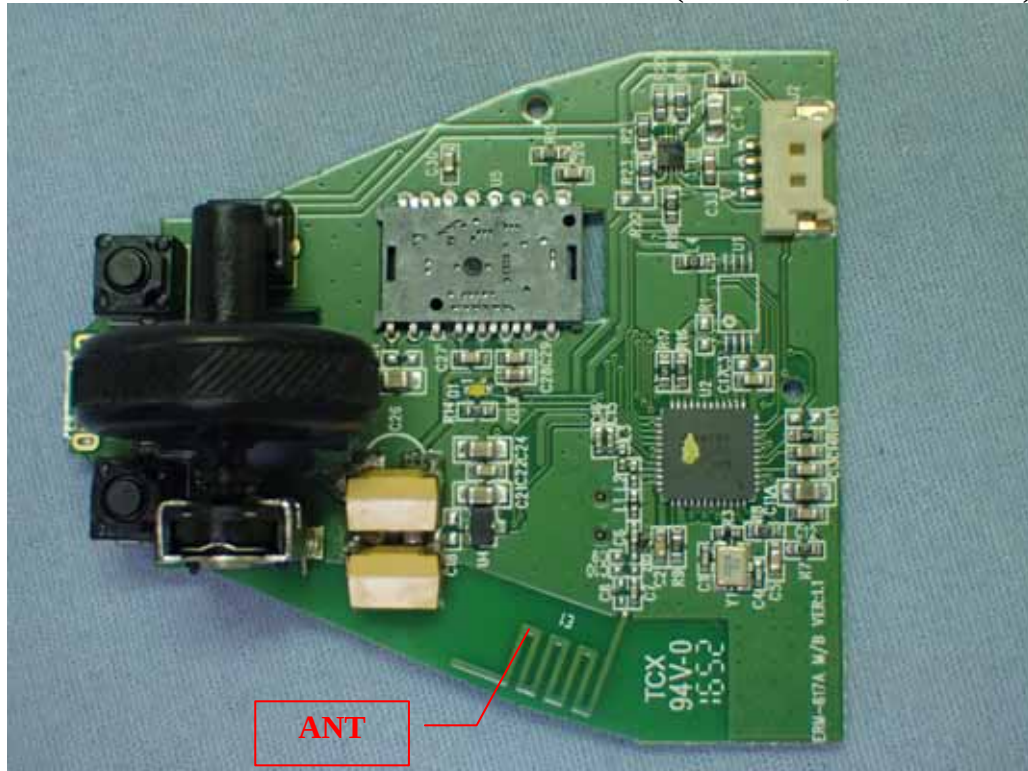


Figure 8  
Internal View (Main Board, Back View)

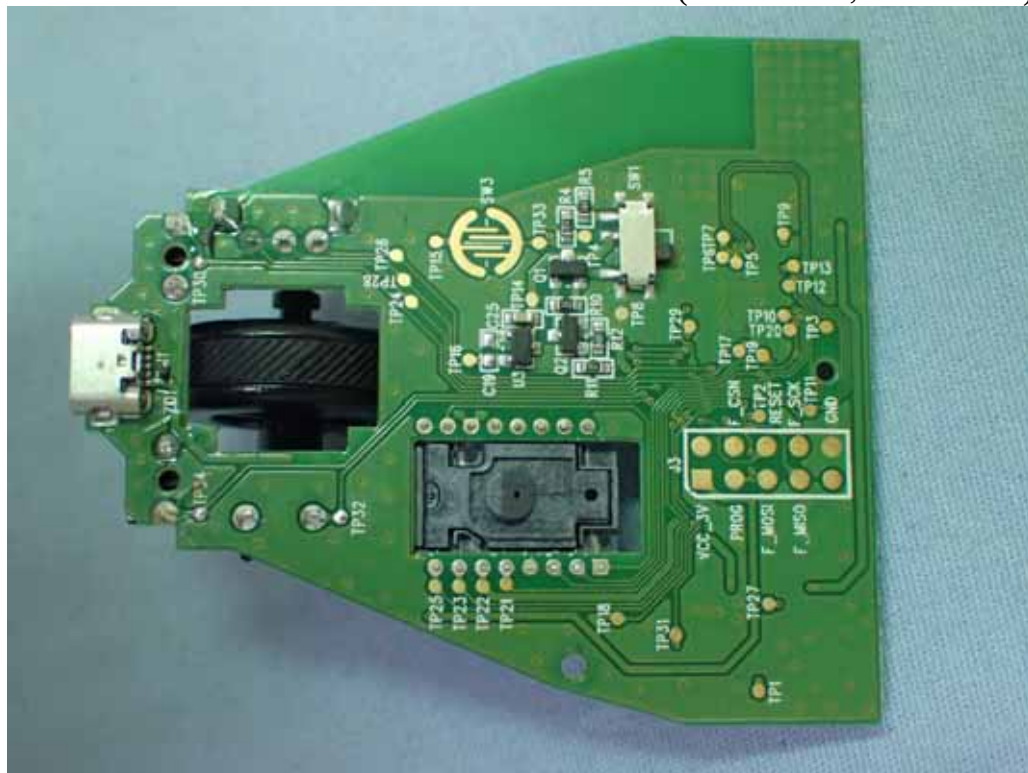


Figure 9  
Wireless Dongle (Front View)

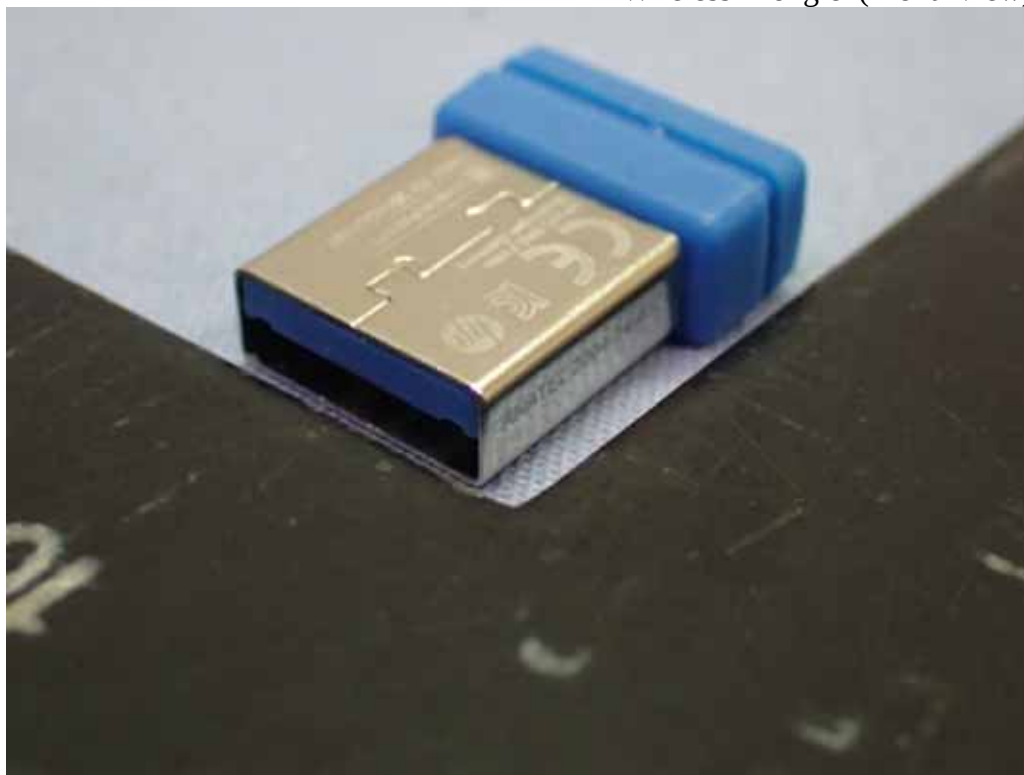


Figure 10  
Wireless Dongle (Back View)



Figure 11  
Wireless Dongle (Label View)



Figure 12  
USB Cable

