

# FCC TEST REPORT

**REPORT NO.:** RF940503H01

**MODEL NO.:** GPSlim236 XX

**RECEIVED:** May 03, 2005

**TESTED:** May 05 to 10, 2005

**ISSUED:** May 23, 2005

**APPLICANT:** Holux Technology, Inc

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0536  
ILAC MRA



No. 2177-01



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## 1 CERTIFICATION

**PRODUCT :** Bluetooth GPS Receiver  
**BRAND NAME :** HOLUX  
**MODEL NO. :** GPSlim236 XX  
**APPLICANT :** Holux Technology, Inc  
**TESTED DATE:** May 05 to 10, 2005  
**TEST ITEM :** MASS-PRODUCTION  
**STANDARDS :** 47 CFR Part 15, Subpart C (Section 15.247),  
ANSI C63.4-2003

The above equipment (Model: GPSlim236 XX) has been tested by **Advance Data Technology Corporation**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

**PREPARED BY :** Midoli Peng , **DATE:** May 23, 2005  
( Midoli Peng )

**TECHNICAL ACCEPTANCE :** Hank Chung , **DATE:** May 23, 2005  
Responsible for RF ( Hank Chung )

**APPROVED BY :** Eric Lin , **DATE:** May 23, 2005  
( Eric Lin, Manager )

## 2 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

| <b>APPLIED STANDARD: 47 CFR Part 15, Subpart C</b> |   |               |   |
|--|---|---------------|---|
| <b>Standard Section</b>                            | <b>Test Type and Limit</b>  | <b>Result</b> | <b>REMARK</b>   |
| 15.207   | AC Power Conducted Emission   | PASS          | Meet the requirement of limit<br>Minimum passing margin is -2.89dB at 0.658 MHz |
| 15.247(a)(1)(I)-(ii)                               | Number of Hopping Frequency Used Spec.: At least 75 channels                                | PASS          | Meet the requirement of limit   |
| 15.247(a)(1)(ii)                                   | Dwell Time on Each Channel Spec. : Max. 0.4 second within 31.6 second                       | PASS          | Meet the requirement of limit   |
| 15.247(a)(1)(I)-(ii)                               | Hopping Channel Separation Spec. : Min. 25 kHz or 20 dB bandwidth, which ever is greater    | PASS          | Meet the requirement of limit   |
| 15.247(a)(2)                                       | Spectrum Bandwidth of a Frequency Hopping Sequence Spread Spectrum System Spec.: Max. 1 MHz | PASS          | Meet the requirement of limit   |
| 15.247(b)  | Maximum Peak Output Power Spec.: max. 30dBm   | PASS          | Meet the requirement of limit   |
| 15.247(c)  | Transmitter Radiated Emissions Spec.: Table 15.209  | PASS          | Meet the requirement of limit<br>Minimum passing margin is -9.3dB at 2370.00MHz |
| 15.247(c)  | Band Edge Measurement   | PASS          | Meet the requirement of limit   |

### 3 GENERAL INFORMATION

#### 3.1 GENERAL DESCRIPTION OF EUT

|                              |   |
|------------------------------|---|
| <b>PRODUCT</b>               | Bluetooth GPS Receiver  |
| <b>MODEL NO.</b>             | GPSlim236 XX  |
| <b>POWER SUPPLY</b>          | 3.7VDC from battery or<br>DC 5V from power adapter or<br>DC 5V from Cigarette adapter |
| <b>MODULATION TYPE</b>       | GFSK  |
| <b>MODULATION TECHNOLOGY</b> | FHSS  |
| <b>FREQUENCY RANGE</b>       | 2402MHz ~ 2480MHz   |
| <b>NUMBER OF CHANNEL</b>     | 79  |
| <b>OUTPUT POWER</b>          | 1.49dBm   |
| <b>ANTENNA TYPE</b>          | Patch antenna(for Bluetooth)<br>2M 28dB MMCX connector active antenna( for GPS)       |
| <b>DATA CABLE</b>            | NA  |
| <b>I/O PORTS</b>             | USB port x1   |
| <b>ASSOCIATED DEVICES</b>    | NA  |

**NOTE:**

1. The "X" of Model Names could be A~Z.
2. The EUT consist of bluetooth device and GPS receiver.
3. This test report was prepared for bluetooth device.
4. The EUT only has one model name and consists of two enclosure which are identical to each other in all aspects except for the f enclosure



5. The EUT could be supplied with Li-ion 3.7V battery or the following power adapter and Cigarette adapter:

| Power adapter     |              |   | Note  |
|-------------------|--------------|---|---|
| Brand             | Model Name   | Specification   | for battery recharge (through USB cable/1.5m/shielded/without core) |
| NA                | YFAF23073001 | Input: 100-240Vac, 0.15A, 50-60Hz<br>Output: DC 5V, 1A, 5W(Max) |   |
| Cigarette adapter |              |   |   |
| Brand             | Model Name   | Specification   |   |
| HOLUX             | CC-0103      | DC5V, 850mA   |   |
| Battery           |              |   | Note  |
| Brand             | Model Name   | Specification   |   |
| NA                | HX-N3650A    | 3.7V  |   |

6. The EUT was pre-tested in chamber as the following test modes:

| <b>For AC power conducted emission</b>                   |   |
|--|---|
| Test Mode  | Description   |
| <b>Mode A</b>  | <b>GPS connection + Bluetooth + battery recharge ( from Power adapter )</b>     |
| Mode B   | GPS connection + Bluetooth + battery + DC input through RS232-PS2 data cable    |
| <b>Mode C</b>  | <b>GPS connection + Bluetooth + battery + DC input through USB data cable</b>   |
| <b>For transmitter radiated emissions (30MHz ~ 1GHz)</b> |   |
| Test Mode  | Description   |
| Mode D   | GPS connection + Bluetooth + battery recharge ( from Power adapter )            |
| <b>Mode E</b>  | <b>GPS connection + Bluetooth + battery recharge ( from Cigarette adapter )</b> |
| Mode F   | GPS connection + Bluetooth + battery  |
| Mode G   | GPS connection + Bluetooth + battery + DC input through RS232-PS2 data cable    |
| <b>Mode H</b>  | <b>GPS connection + Bluetooth + battery + DC input through USB data cable</b>   |

The worst AC power conducted emission was found in Mode A and Mode C. The worst transmitter radiated emissions (30MHz ~ 1GHz) was found in Mode E and Mode H. The final test was executed under test mode with highest emission and recorded in this report individually.

7. The above EUT information was declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.



### 3.2 DESCRIPTION OF TEST MODES

Seventy-nine channels are provided to this EUT.

| Channel | Freq. (MHz) | Channel | Freq. (MHz) | Channel | Freq. (MHz) | Channel | Freq. (MHz) |
|---------|-------------|---------|-------------|---------|-------------|---------|-------------|
| 0       | 2402        | 20      | 2422        | 40      | 2442        | 60      | 2462        |
| 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      | 2431        | 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        |         |             |

**NOTE:**

1. Below 1 GHz, the channel 0, 39, and 78 were pre-tested in chamber. The channel 78, worst case one, was chosen for final test.
2. Above 1 GHz, the channel 0, 39, and 78 were tested individually.
3. The EUT was tested with the following modes:

| <b>For AC power conducted emission</b>                   |  |
|--|--|
| <b>Test Mode</b>   | <b>Description</b>   |
| Mode 1   | GPS connection + Bluetooth + battery recharge ( from Power adapter )     |
| Mode 2   | GPS connection + Bluetooth + battery + DC input through USB data cable   |
| <b>For transmitter radiated emissions (30MHz ~ 1GHz)</b> |  |
| <b>Test Mode</b>   | <b>Description</b>   |
| Mode 1   | GPS connection + Bluetooth + battery recharge ( from Cigarette adapter ) |
| Mode 2   | GPS connection + Bluetooth + battery + DC input through USB data cable   |
| <b>For transmitter radiated emissions (Above 1GHz)</b>   |  |
| <b>Test Mode</b>   | <b>Description</b>   |
| Mode D   | GPS connection + Bluetooth + battery recharge ( from Power adapter )     |





### **3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS**

The EUT is a Bluetooth GPS Receiver. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

**FCC Part 15, Subpart C. (15.247)**  
**ANSI C63.4 : 2003**

All test items have been performed and recorded as per the above standards.

**NOTE:** The EUT is also considered as a kind of computer peripheral, because the connection to computer is necessary for typical use. It has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC). The test report has been issued separately.

### 3.4 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

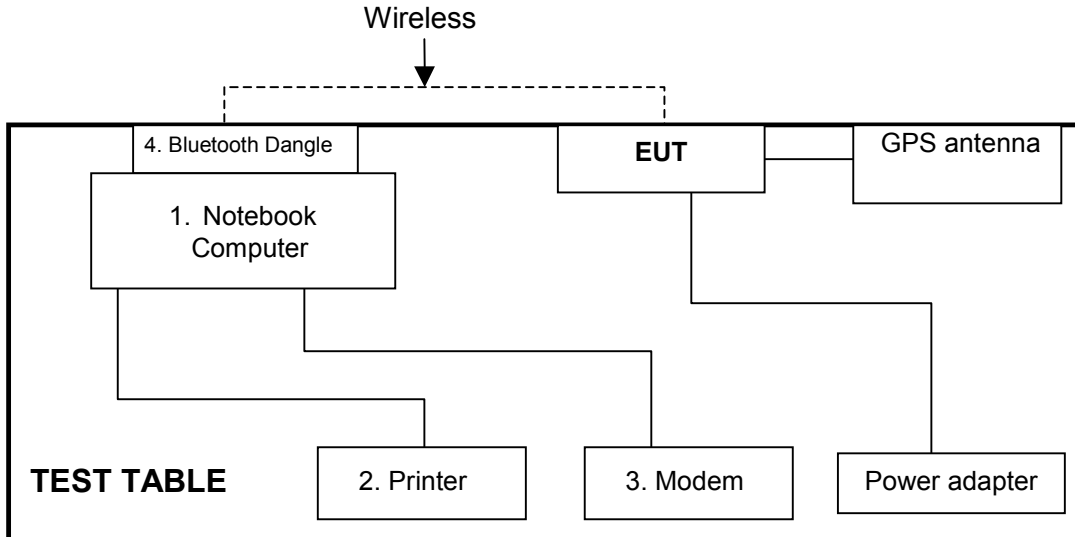
| No. | Product           | Brand  | Model No.  | Serial No.                 | FCC ID     |
|-----|-------------------|--------|------------|----------------------------|------------|
| 1   | NOTEBOOK COMPUTER | Dell   | PP01L      | TW-09c748-12800-165-3171   | DoC        |
| 2   | PRINTER           | HP     | C2642A     | MY79F1C3MZ                 | B94C2642X  |
| 3   | MODEM             | ACEEX  | 1414       | 0206026779                 | IFAXDM1414 |
| 4   | Bluetooth Dangle  | Corega | CG-BTUSB01 | 00T9001041200069<br>Rve.A1 | NA         |

| No. | Signal cable description  |
|-----|---|
| 1   | NA  |
| 2   | 1.1 m braid shielded wire, terminated with DB25 and Centronics connector via metallic frame, w/o core |
| 3   | 1.1 m braid shielded wire, terminated with DB25 and DB9 connector via metallic frame, w/o core.       |
| 4   | NA  |

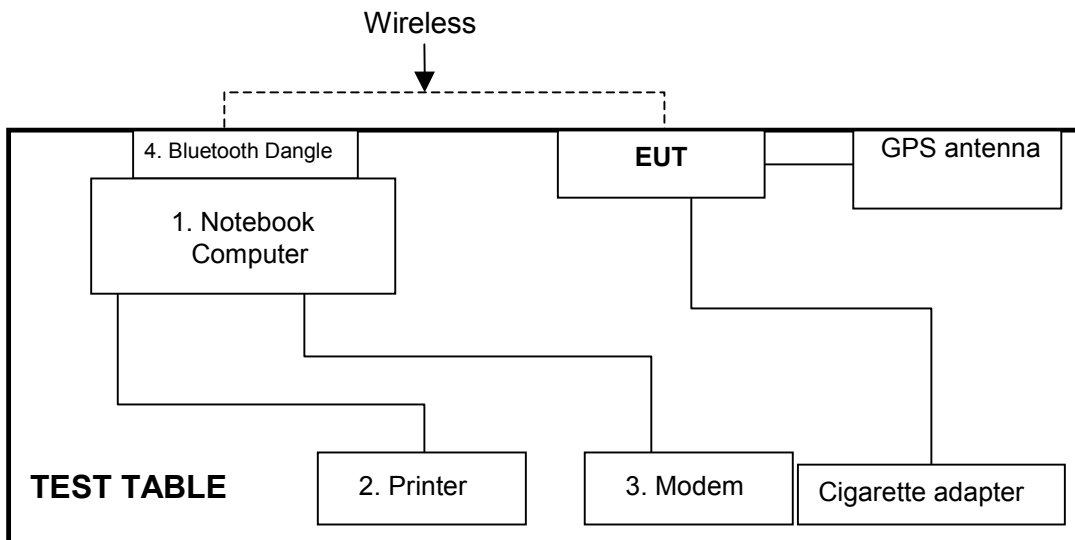
Note: 1. All power cords of the above support units are unshielded (1.8m).

### 3.5 CONFIGURATION OF SYSTEM UNDER TEST

For AC power conducted emission (Test mode 1) :

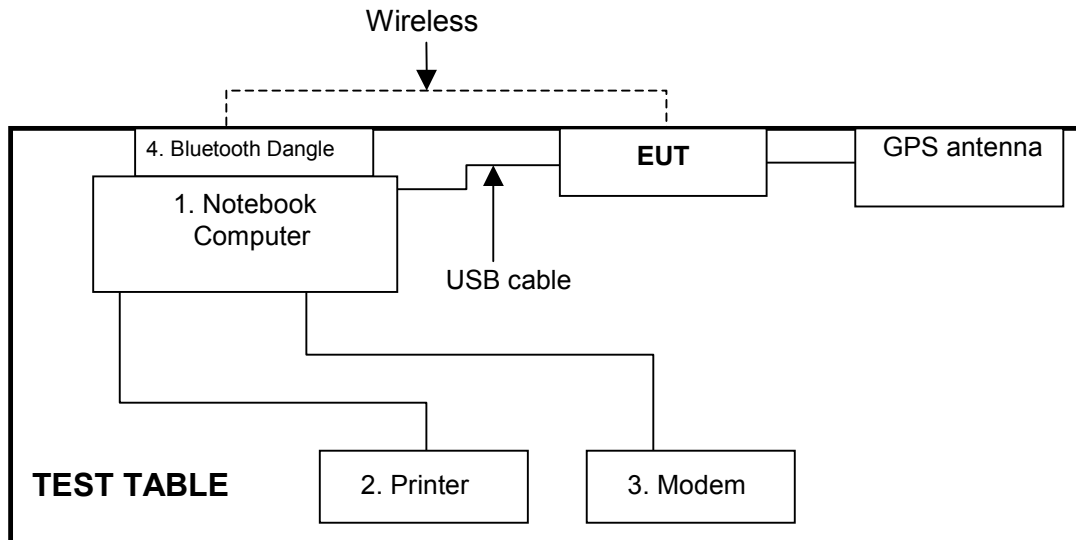


For transmitter radiated emissions (30MHz ~ 1GHz) (Test mode 1) :



**For AC power conducted emission (Test mode 2) :**

**For transmitter radiated emissions (30MHz ~ 1GHz) (Test mode 2) :**



**NOTE:** 1. Please refer to the photos of test configuration in Item 5 also.

## 4 TEST PROCEDURES AND RESULTS

### 4.1 CONDUCTED EMISSION MEASUREMENT

#### 4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

| FREQUENCY OF EMISSION (MHz) | CONDUCTED LIMIT (dB $\mu$ V) |          |
|-----------------------------|------------------------------|----------|
|                             | Quasi-peak                   | Average  |
| 0.15-0.5                    | 66 to 56                     | 56 to 46 |
| 0.5-5                       | 56                           | 46       |
| 5-30                        | 60                           | 50       |

**Notes:**

1. The lower limit shall apply at the transition frequencies.
2. All emanations from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

#### 4.1.2 TEST INSTRUMENTS

| DESCRIPTION & MANUFACTURER         | MODEL NO. | SERIAL NO.  | CALIBRATED UNTIL |
|------------------------------------|-----------|-------------|------------------|
| *ROHDE & SCHWARZ<br>Test Receiver  | ESCS 30   | 847124/029  | Dec. 07, 2005    |
| *ROHDE & SCHWARZ LISN<br>(for EUT) | ESHS-Z5   | 848773/004  | Nov. 08, 2005    |
| *KYORITSU LISN (for peripheral)    | KNW-407   | 8/1395/12   | Jul. 23, 2005    |
| *RF Cable (JETBAO)                 | RG233/U   | Cable_CA_01 | Jul. 02, 2005    |
| *Terminator(for KYORITSU)          | 50        | 3           | Oct. 12, 2005    |
| *Software                          | Cond-V2e  | NA          | NA               |

**Note:**

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in ADT Shielded Room No. A.
3. The VCCI Con A Registration No. is C-817.
4. \* = These equipment are used for the final measurement.
5. The measurement uncertainty is 2.53 dB, which is calculated as per the document CISPR 16-4



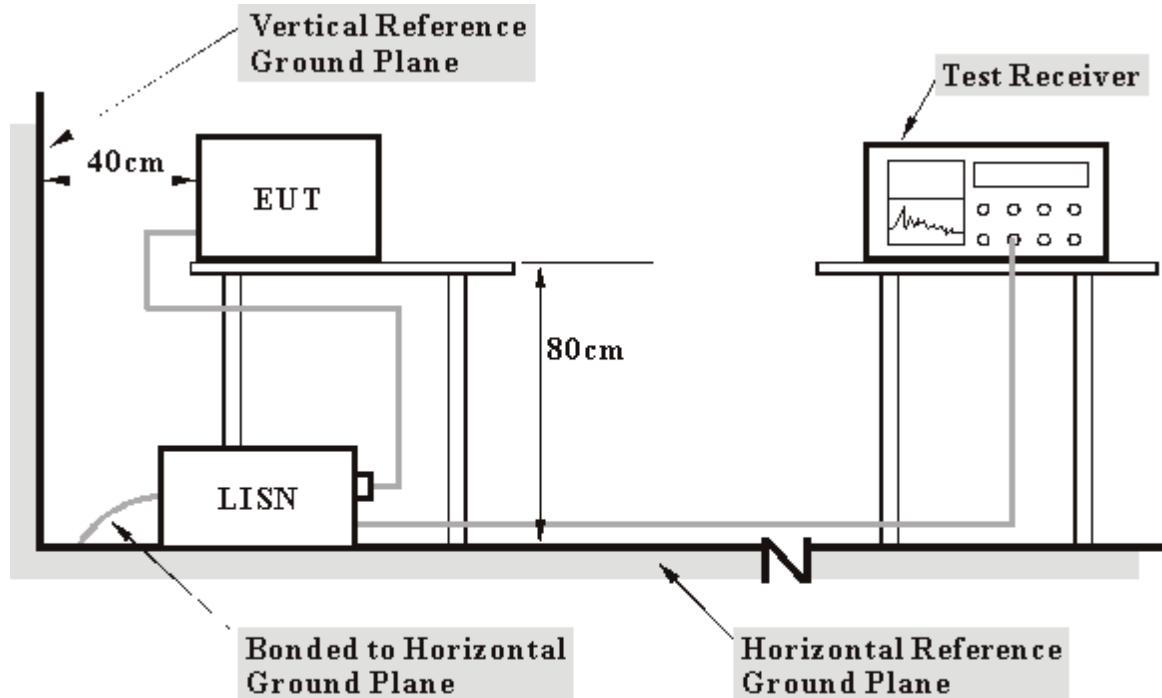
#### 4.1.3 TEST PROCEDURES

- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- c. The frequency range from 150kHz to 30MHz was searched. Emission levels under Limit - 20dB was not recorded.

#### 4.1.4 DEVIATION FROM TEST STANDARD

No deviation

#### 4.1.5 TEST SETUP



- Note:**
1. Support units were connected to second LISN.
  2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

#### 4.1.6 EUT OPERATING CONDITIONS

- a. Placed the EUT on the testing table.
- b. The support unit 1 (Notebook computer) ran a test program “WDS Commander V5.0.2.7 / GPS Viewer.exe” to enable EUT under transmission condition continuously at specific channel frequency.
- c. Notebook computer sends "H" messages to modem.
- d. Notebook computer sends "H" messages to printer, and the printer prints them on paper.

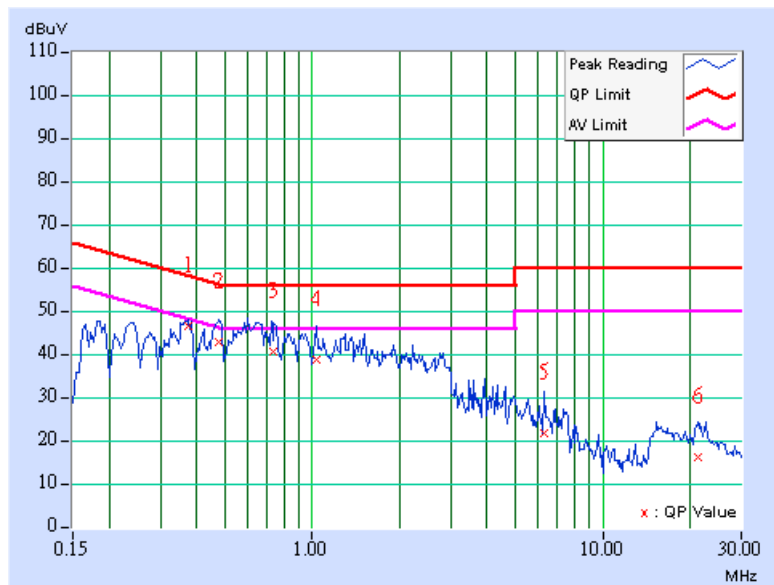


4.1.7 TEST RESULTS(MODE 1)

|                                 |                              |                      |              |
|---------------------------------|------------------------------|----------------------|--------------|
| <b>EUT</b>                      | Bluetooth GPS Receiver       | <b>MODEL</b>         | GPSlim236 XX |
| <b>TEST MODE</b>                | Mode 1                       | <b>6dB BANDWIDTH</b> | 9 kHz        |
| <b>INPUT POWER (SYSTEM)</b>     | 120Vac, 60 Hz                | <b>PHASE</b>         | Line (L)     |
| <b>ENVIRONMENTAL CONDITIONS</b> | 25 deg. C, 79%RH,<br>984 hPa | <b>TESTED BY</b>     | Rex Huang    |

| No | Freq.<br>[MHz] | Corr.<br>Factor<br>(dB) | Reading Value |     | Emission Level |     | Limit     |       | Margin |     |
|----|----------------|-------------------------|---------------|-----|----------------|-----|-----------|-------|--------|-----|
|    |                |                         | [dB (uV)]     |     | [dB (uV)]      |     | [dB (uV)] |       | (dB)   |     |
|    |                |                         | Q.P.          | AV. | Q.P.           | AV. | Q.P.      | AV.   | Q.P.   | AV. |
| 1  | 0.377          | 0.17                    | 45.30         | -   | 45.47          | -   | 58.35     | 48.35 | -12.89 | -   |
| 2  | 0.474          | 0.17                    | 41.44         | -   | 41.61          | -   | 56.44     | 46.44 | -14.83 | -   |
| 3  | 0.736          | 0.19                    | 39.52         | -   | 39.71          | -   | 56.00     | 46.00 | -16.29 | -   |
| 4  | 1.033          | 0.20                    | 37.43         | -   | 37.63          | -   | 56.00     | 46.00 | -18.37 | -   |
| 5  | 6.320          | 0.57                    | 20.32         | -   | 20.89          | -   | 60.00     | 50.00 | -39.11 | -   |
| 6  | 21.242         | 1.37                    | 14.78         | -   | 16.15          | -   | 60.00     | 50.00 | -43.85 | -   |

- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
  2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
  3. The emission levels of other frequencies were very low against the limit.
  4. Margin value = Emission level - Limit value
  5. Correction factor = Insertion loss + Cable loss
  6. Emission Level = Correction Factor + Reading Value.



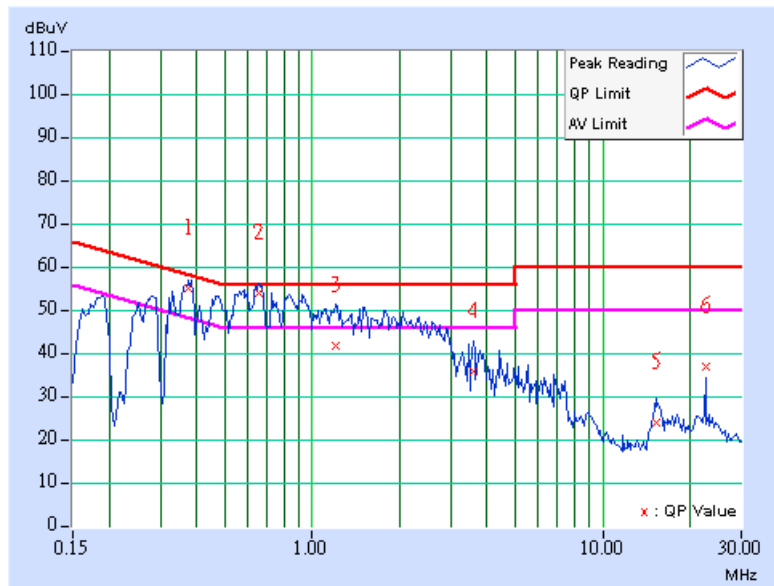




|                                 |                              |                      |              |
|---------------------------------|------------------------------|----------------------|--------------|
| <b>EUT</b>                      | Bluetooth GPS Receiver       | <b>MODEL</b>         | GPSlim236 XX |
| <b>TEST MODE</b>                | Mode 1                       | <b>6dB BANDWIDTH</b> | 9 kHz        |
| <b>INPUT POWER (SYSTEM)</b>     | 120Vac, 60 Hz                | <b>PHASE</b>         | Neutral (N)  |
| <b>ENVIRONMENTAL CONDITIONS</b> | 25 deg. C, 79%RH,<br>984 hPa | <b>TESTED BY</b>     | Rex Huang    |

| No | Freq.<br>[MHz] | Corr.<br>Factor<br>(dB) | Reading Value |              | Emission Level |              | Limit        |              | Margin       |              |
|----|----------------|-------------------------|---------------|--------------|----------------|--------------|--------------|--------------|--------------|--------------|
|    |                |                         | [dB (uV)]     |              | [dB (uV)]      |              | [dB (uV)]    |              | (dB)         |              |
|    |                |                         | Q.P.          | AV.          | Q.P.           | AV.          | Q.P.         | AV.          | Q.P.         | AV.          |
| 1  | 0.377          | 0.17                    | 53.99         | 42.87        | 54.16          | 43.04        | 58.35        | 48.35        | -4.20        | -5.32        |
| 2  | <b>0.658</b>   | <b>0.18</b>             | <b>52.93</b>  | <b>40.52</b> | <b>53.11</b>   | <b>40.70</b> | <b>56.00</b> | <b>46.00</b> | <b>-2.89</b> | <b>-5.30</b> |
| 3  | 1.201          | 0.21                    | 40.52         | -            | 40.73          | -            | 56.00        | 46.00        | -15.27       | -            |
| 4  | 3.598          | 0.41                    | 34.63         | -            | 35.04          | -            | 56.00        | 46.00        | -20.96       | -            |
| 5  | 15.234         | 0.90                    | 22.81         | -            | 23.71          | -            | 60.00        | 50.00        | -36.29       | -            |
| 6  | 22.570         | 1.21                    | 35.71         | -            | 36.92          | -            | 60.00        | 50.00        | -23.08       | -            |

- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
  2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
  3. The emission levels of other frequencies were very low against the limit.
  4. Margin value = Emission level - Limit value
  5. Correction factor = Insertion loss + Cable loss
  6. Emission Level = Correction Factor + Reading Value.



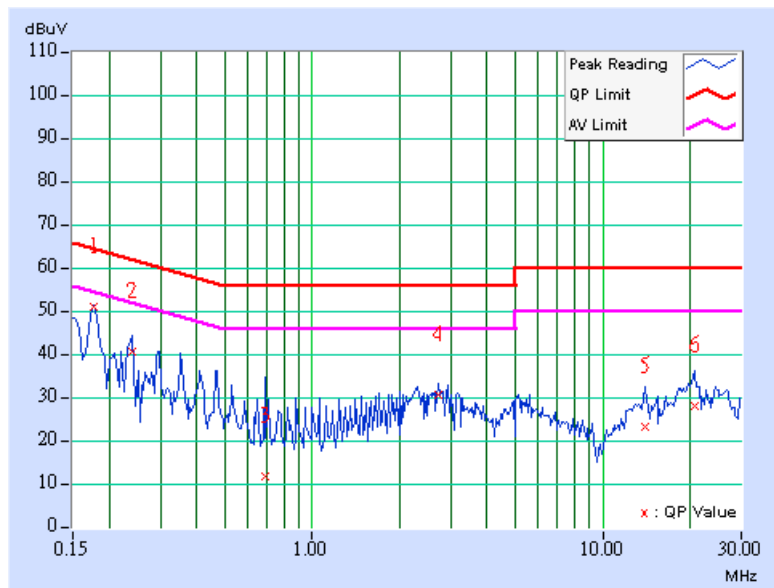


4.1.8 TEST RESULTS(MODE 2)

|                                 |                              |                      |              |
|---------------------------------|------------------------------|----------------------|--------------|
| <b>EUT</b>                      | Bluetooth GPS Receiver       | <b>MODEL</b>         | GPSlim236 XX |
| <b>TEST MODE</b>                | Mode 2                       | <b>6dB BANDWIDTH</b> | 9 kHz        |
| <b>INPUT POWER (SYSTEM)</b>     | 120Vac, 60 Hz                | <b>PHASE</b>         | Line (L)     |
| <b>ENVIRONMENTAL CONDITIONS</b> | 25 deg. C, 79%RH,<br>984 hPa | <b>TESTED BY</b>     | Rex Huang    |

| No | Freq.<br>[MHz] | Corr.<br>Factor<br>(dB) | Reading Value |     | Emission Level |     | Limit     |       | Margin |     |
|----|----------------|-------------------------|---------------|-----|----------------|-----|-----------|-------|--------|-----|
|    |                |                         | [dB (uV)]     |     | [dB (uV)]      |     | [dB (uV)] |       | (dB)   |     |
|    |                |                         | Q.P.          | AV. | Q.P.           | AV. | Q.P.      | AV.   | Q.P.   | AV. |
| 1  | 0.177          | 0.14                    | 49.72         | -   | 49.86          | -   | 64.61     | 54.61 | -14.75 | -   |
| 2  | 0.240          | 0.15                    | 39.33         | -   | 39.48          | -   | 62.10     | 52.10 | -22.62 | -   |
| 3  | 0.685          | 0.18                    | 10.43         | -   | 10.61          | -   | 56.00     | 46.00 | -45.39 | -   |
| 4  | 2.709          | 0.32                    | 29.46         | -   | 29.78          | -   | 56.00     | 46.00 | -26.22 | -   |
| 5  | 13.988         | 0.94                    | 21.88         | -   | 22.82          | -   | 60.00     | 50.00 | -37.18 | -   |
| 6  | 20.695         | 1.35                    | 26.84         | -   | 28.19          | -   | 60.00     | 50.00 | -31.81 | -   |

- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
  2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
  3. The emission levels of other frequencies were very low against the limit.
  4. Margin value = Emission level - Limit value
  5. Correction factor = Insertion loss + Cable loss
  6. Emission Level = Correction Factor + Reading Value.

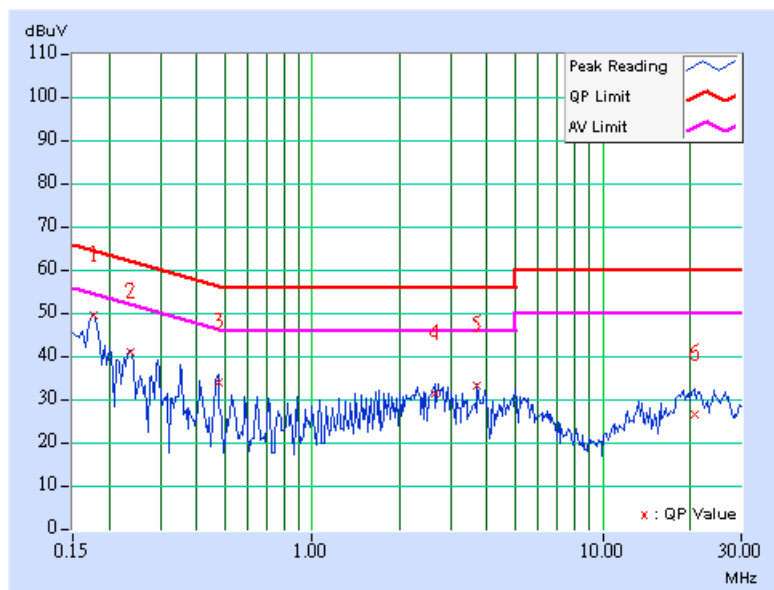




|                                 |                              |                      |              |
|---------------------------------|------------------------------|----------------------|--------------|
| <b>EUT</b>                      | Bluetooth GPS Receiver       | <b>MODEL</b>         | GPSlim236 XX |
| <b>TEST MODE</b>                | Mode 2                       | <b>6dB BANDWIDTH</b> | 9 kHz        |
| <b>INPUT POWER (SYSTEM)</b>     | 120Vac, 60 Hz                | <b>PHASE</b>         | Neutral (N)  |
| <b>ENVIRONMENTAL CONDITIONS</b> | 25 deg. C, 79%RH,<br>984 hPa | <b>TESTED BY</b>     | Rex Huang    |

| No | Freq.<br>[MHz] | Corr.<br>Factor<br>(dB) | Reading Value |     | Emission Level |     | Limit     |       | Margin |     |
|----|----------------|-------------------------|---------------|-----|----------------|-----|-----------|-------|--------|-----|
|    |                |                         | [dB (uV)]     |     | [dB (uV)]      |     | [dB (uV)] |       | (dB)   |     |
|    |                |                         | Q.P.          | AV. | Q.P.           | AV. | Q.P.      | AV.   | Q.P.   | AV. |
| 1  | 0.177          | 0.14                    | 48.42         | -   | 48.56          | -   | 64.61     | 54.61 | -16.05 | -   |
| 2  | 0.236          | 0.15                    | 39.90         | -   | 40.05          | -   | 62.24     | 52.24 | -22.18 | -   |
| 3  | 0.474          | 0.17                    | 32.87         | -   | 33.04          | -   | 56.44     | 46.44 | -23.40 | -   |
| 4  | 2.650          | 0.32                    | 30.21         | -   | 30.53          | -   | 56.00     | 46.00 | -25.47 | -   |
| 5  | 3.707          | 0.42                    | 32.01         | -   | 32.43          | -   | 56.00     | 46.00 | -23.57 | -   |
| 6  | 20.703         | 1.15                    | 25.37         | -   | 26.52          | -   | 60.00     | 50.00 | -33.48 | -   |

- REMARKS:**
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
  2. "-": The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.
  3. The emission levels of other frequencies were very low against the limit.
  4. Margin value = Emission level - Limit value
  5. Correction factor = Insertion loss + Cable loss
  6. Emission Level = Correction Factor + Reading Value.



## 4.2 NUMBER OF HOPPING FREQUENCY USED

### 4.2.1 LIMIT OF HOPPING FREQUENCY USED

At least 15 hopping frequencies, and should be equally spaced.

### 4.2.2 TEST INSTRUMENTS

| Description & Manufacturer | Model No. | Serial No. | Calibrated Until |
|----------------------------|-----------|------------|------------------|
| R&S SPECTRUM ANALYZER      | FSP40     | 100037     | May. 26, 2005    |

**Note:**

1. The measurement uncertainty is 226Hz, which is calculated as per the document ETSI TR 100 028.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.



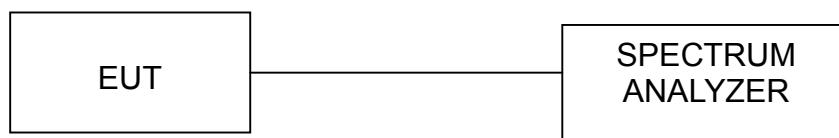
#### 4.2.3 TEST PROCEDURES

1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
2. Turn on the EUT and connect its antenna terminal to measurement via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
3. Set the SA on MaxHold Mode, and then keep the EUT in hopping mode. Record all the signals from each channel until each one has been recorded.
4. Set the SA on View mode and then plot the result on SA screen.
5. Repeat above procedures until all frequencies measured were complete.

#### 4.2.4 DEVIATION FROM TEST STANDARD

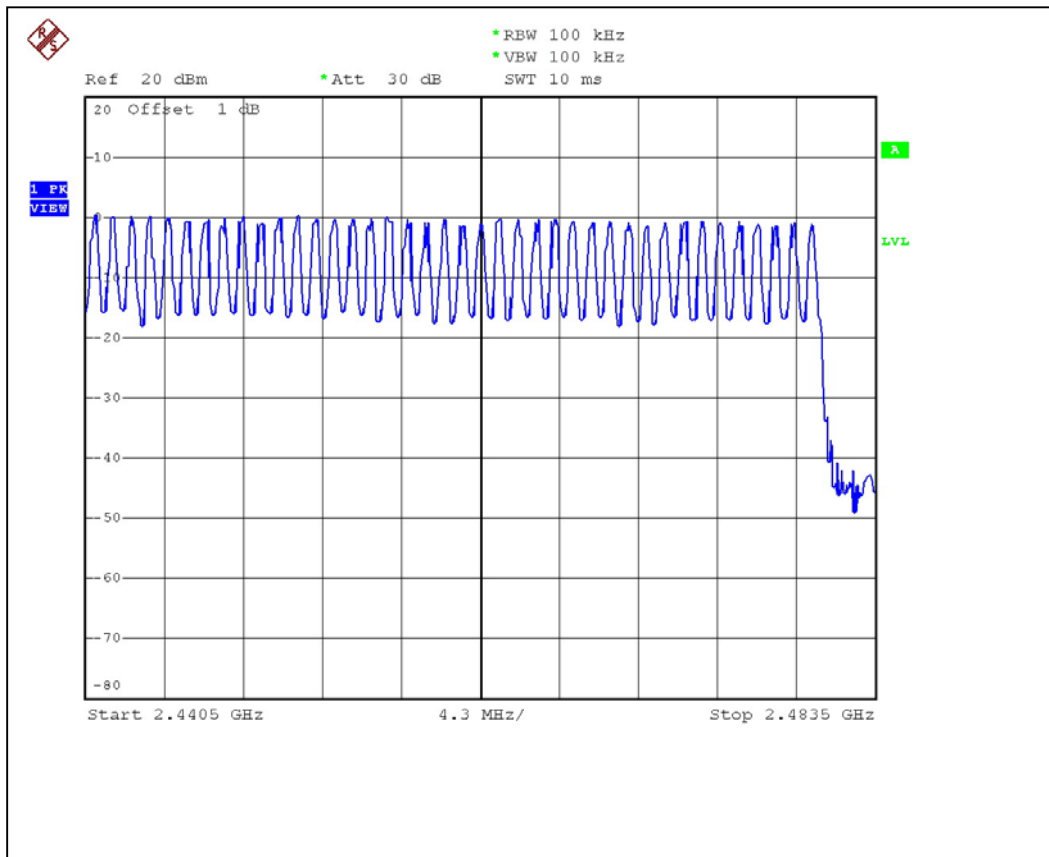
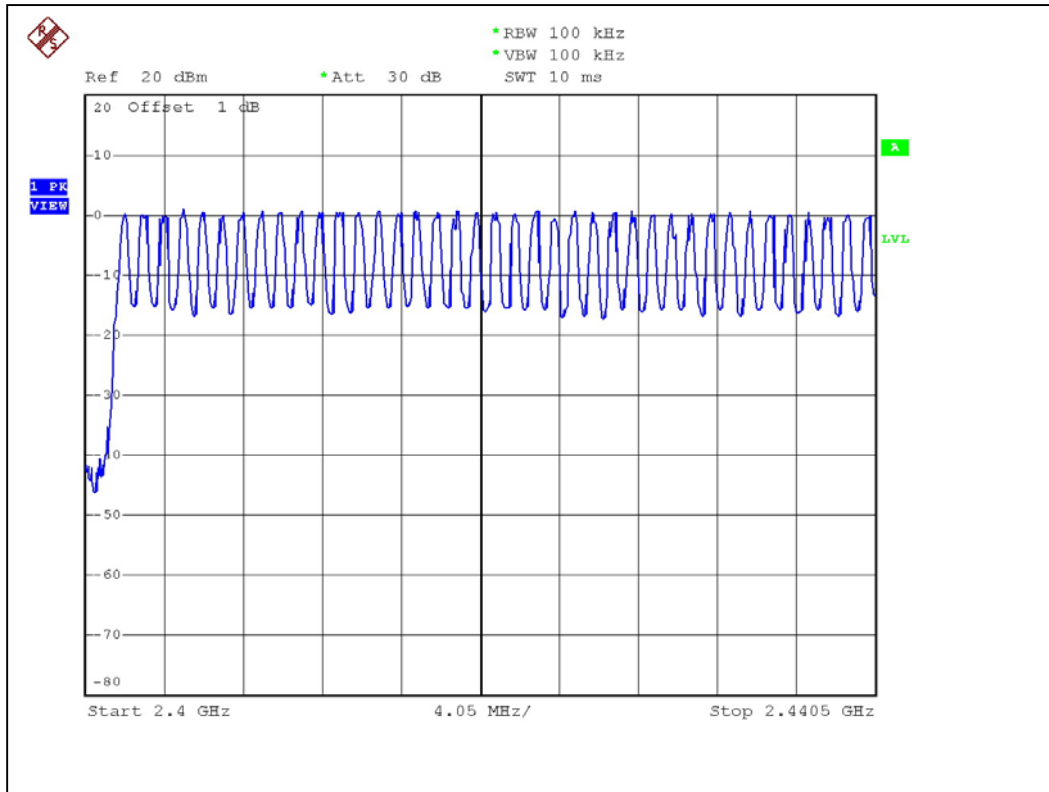
No deviation

#### 4.2.5 TEST SETUP



#### 4.2.6 TEST RESULTS

There are 79 hopping frequencies in the hopping mode. Please refer to next two pages for the test result. On the plots, it shows that the hopping frequencies are equally spaced.





**4.3 DWELL TIME ON EACH CHANNEL**

**4.3.1 LIMIT OF DWELL TIME USED**

For FHSS, the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 31.6 second period. For hybrid systems, the average time of occupancy on any frequency should not exceed 0.4 seconds within a time period in seconds equal to the number of hopping frequencies employed multiplied by 0.4.

**4.3.2 TEST INSTRUMENTS**

| Description & Manufacturer | Model No. | Serial No. | Calibrated Until |
|----------------------------|-----------|------------|------------------|
| R&S SPECTRUM ANALYZER      | FSP40     | 100037     | May. 26, 2005    |

**Note:**

1. The measurement uncertainty is 226Hz, which is calculated as per the document ETSI TR 100 028.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.



#### 4.3.3 TEST PROCEDURES

1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
2. Turn on the EUT and connect its antenna terminal to measurement via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated in its linear range.
3. Adjust the center frequency of SA on any frequency be measured and set SA to zero span mode. And then, set RBW and VBW of spectrum analyzer to proper value.
4. Measure the time duration of one transmission on the measured frequency. And then plot the result with time difference of this time duration.
5. Repeat above procedures until all frequencies measured were complete.

#### 4.3.4 DEVIATION FROM TEST STANDARD

No deviation

#### 4.3.5 TEST SETUP



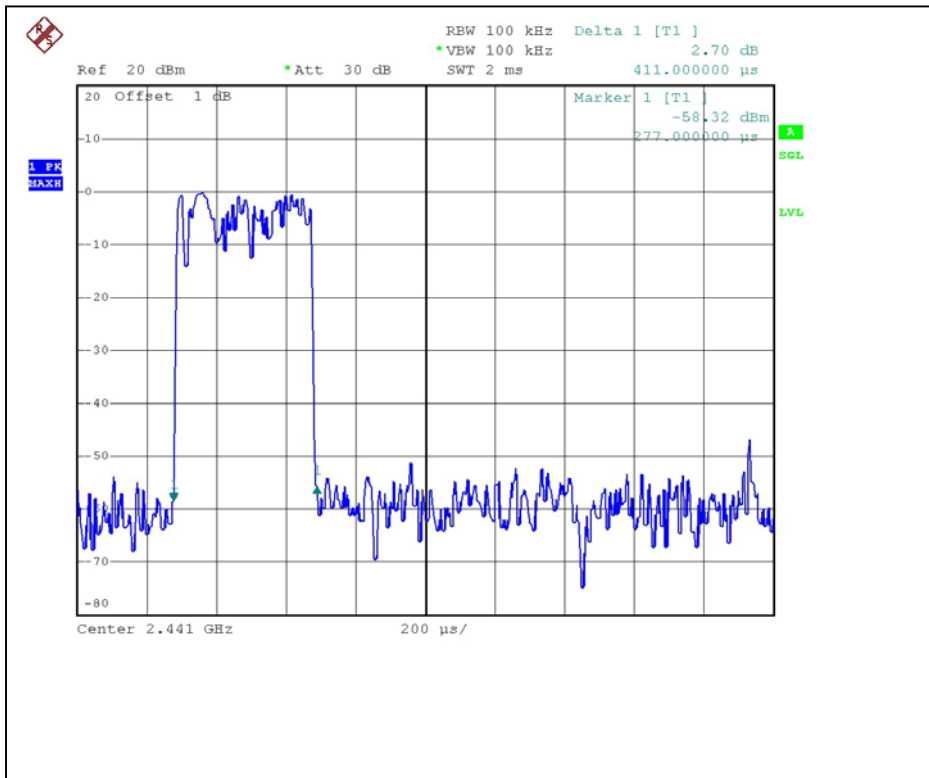
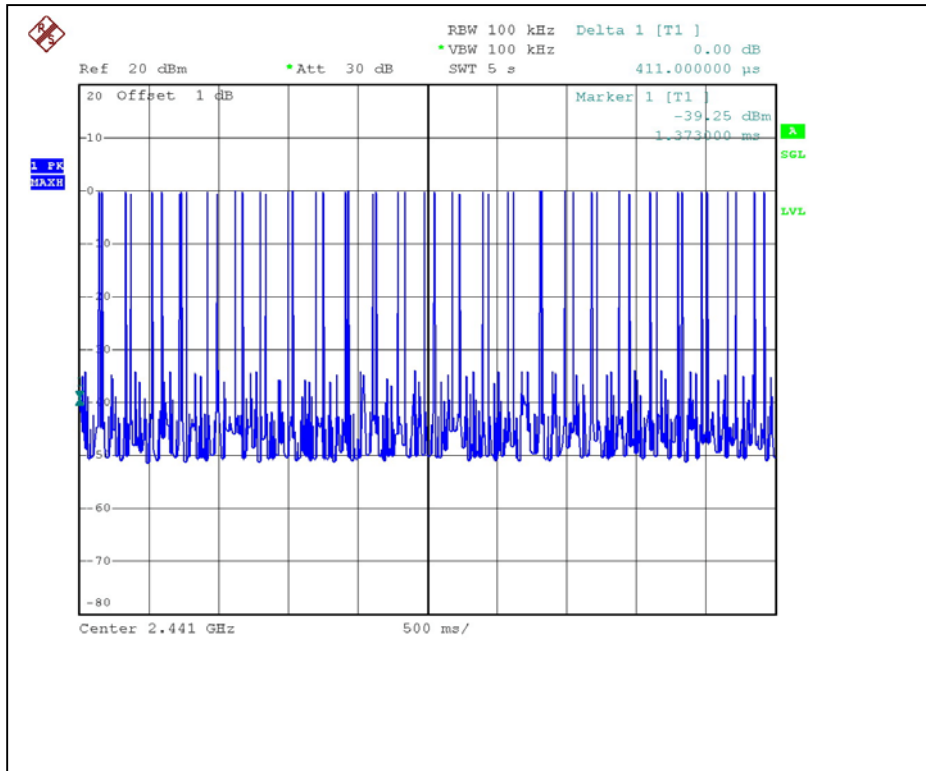
## 4.3.6 TEST RESULTS

| Mode | Number of transmission in a 31.6 (79Hopping*0.4) | Length of transmission time (msec) | Result (msec) | Limit (msec) |
|------|--|------------------------------------|---------------|--------------|
| DH1  | 51 (times / 5 sec) *6.32=322.32 times            | 0.411                              | 132.47        | 400          |
| DH3  | 30 (times / 5 sec) *6.32=189.6 times             | 1.691                              | 320.61        | 400          |
| DH5  | 21 (times / 5 sec) *6.32=132.72 times            | 2.939                              | 390.06        | 400          |

Test plots of the transmitting time slot are shown on next three pages.

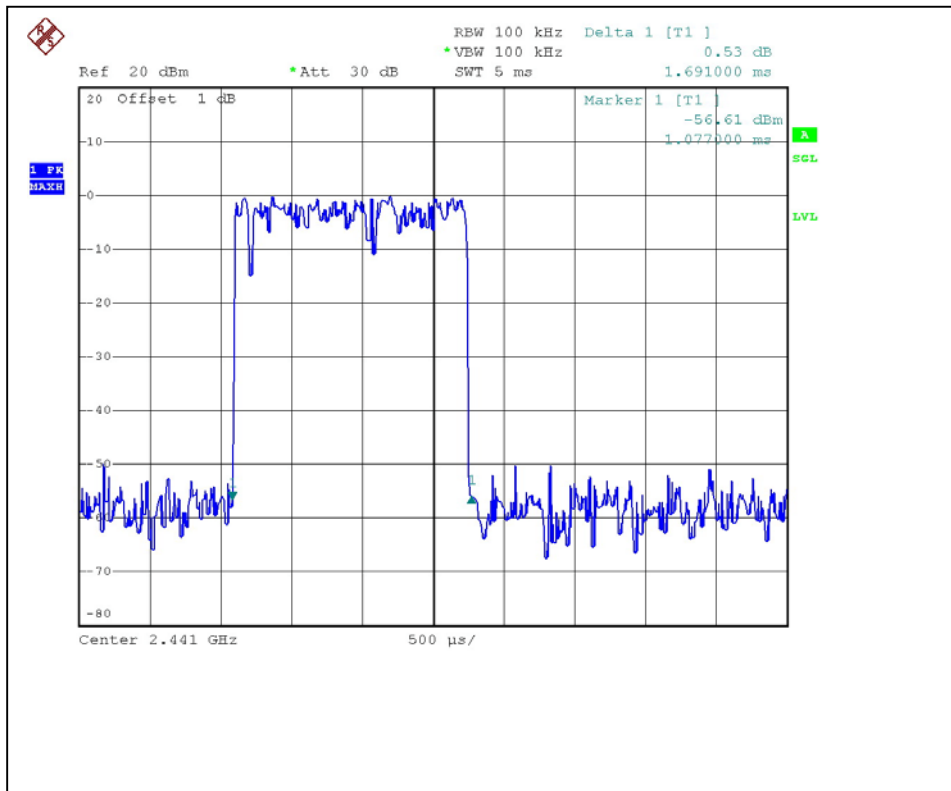
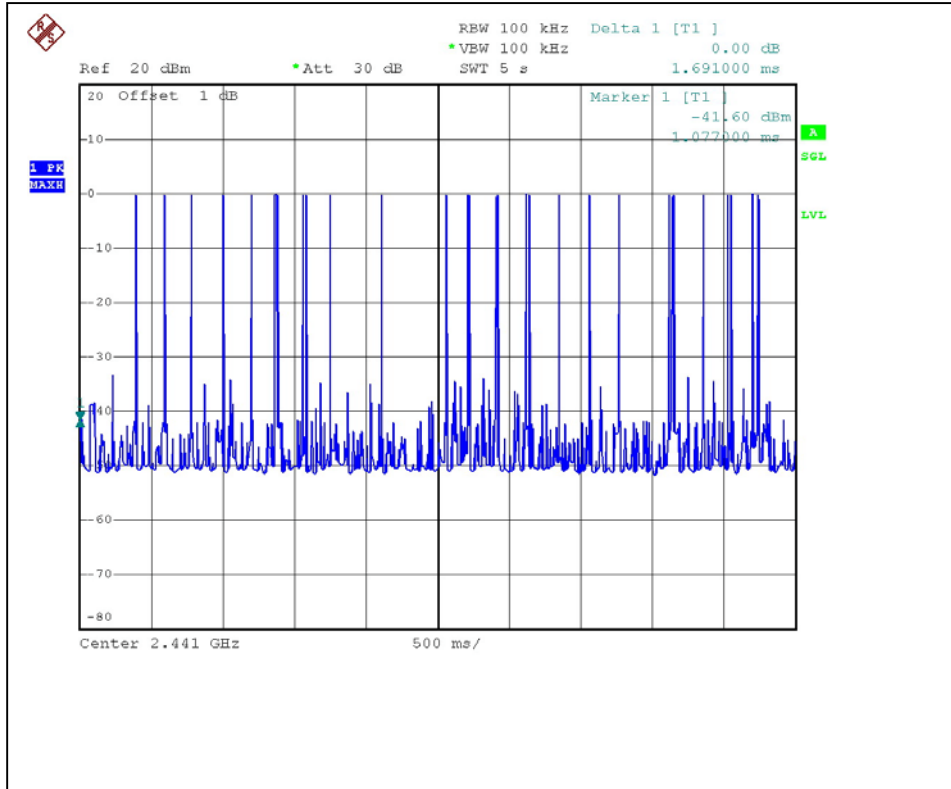


DH1

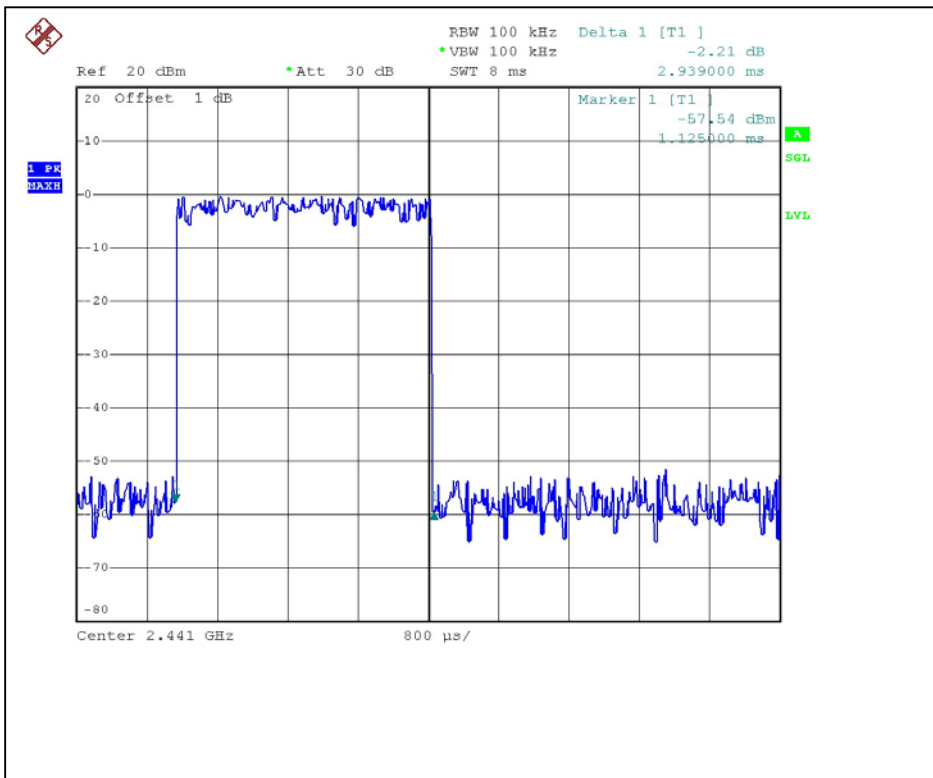
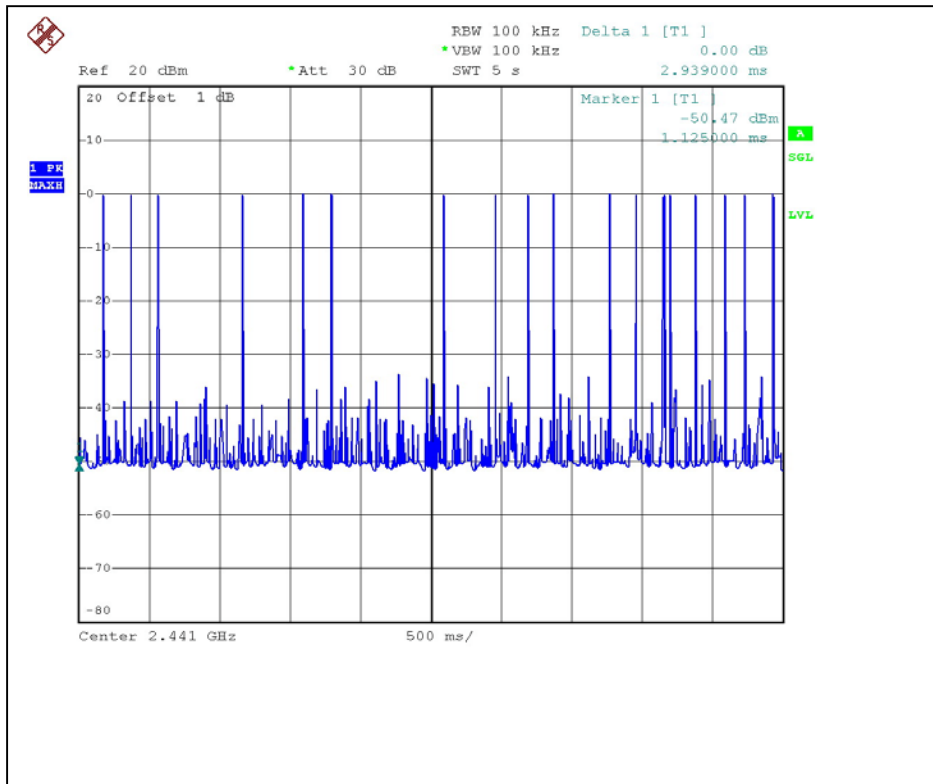




DH3



# DH5



## 4.4 CHANNEL BANDWIDTH

### 4.4.1 TEST INSTRUMENTS

| Description & Manufacturer | Model No. | Serial No. | Calibrated Until |
|----------------------------|-----------|------------|------------------|
| R&S SPECTRUM ANALYZER      | FSP40     | 100037     | May 26, 2005     |

**Note:**

1. The measurement uncertainty is 226Hz, which is calculated as per the document ETSI TR 100 028.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

#### 4.4.2 TEST PROCEDURE

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. Measure the frequency difference of two frequencies that were attenuated 20dB from the reference level. Record the frequency difference as the emission bandwidth.
4. Repeat above procedures until all frequencies measured were complete.

#### 4.4.3 DEVIATION FROM TEST STANDARD

No deviation

#### 4.4.4 TEST SETUP



#### 4.4.5 EUT OPERATING CONDITION

The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

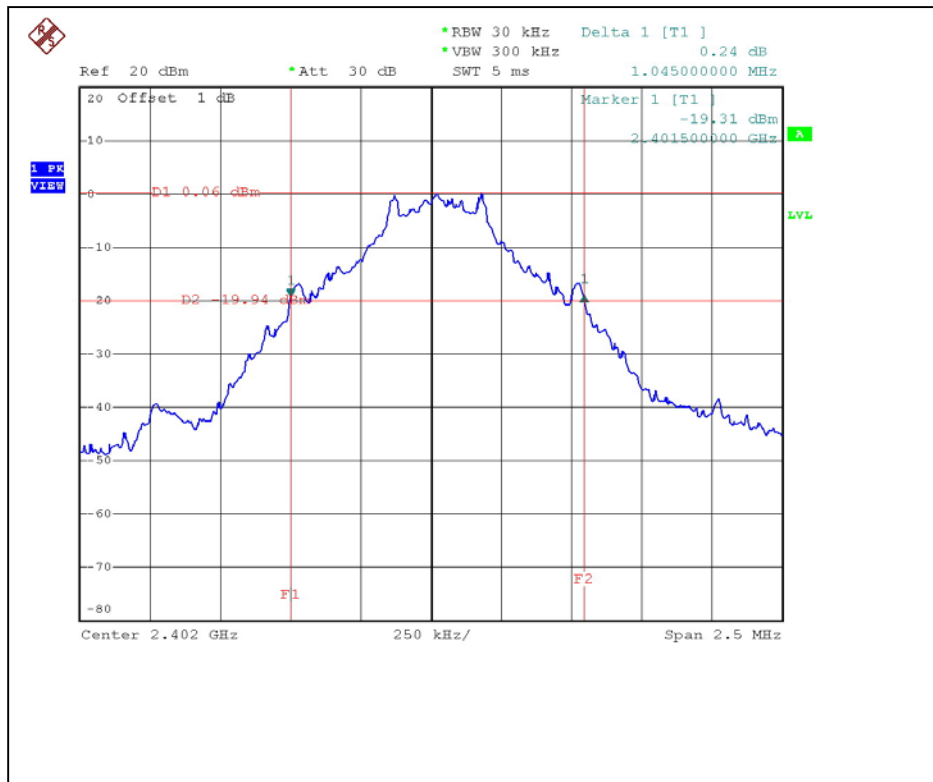
## 4.4.6 TEST RESULTS

|                                 |                             |                             |               |
|---------------------------------|-----------------------------|-----------------------------|---------------|
| <b>EUT</b>                      | Bluetooth GPS Receiver      | <b>MODEL</b>                | GPSlim236 XX  |
| <b>ENVIRONMENTAL CONDITIONS</b> | 18deg. C, 72%RH,<br>984 hPa | <b>INPUT POWER (SYSTEM)</b> | 120Vac, 60 Hz |
| <b>TESTED BY</b>                | Rex Huang                   |                             |               |

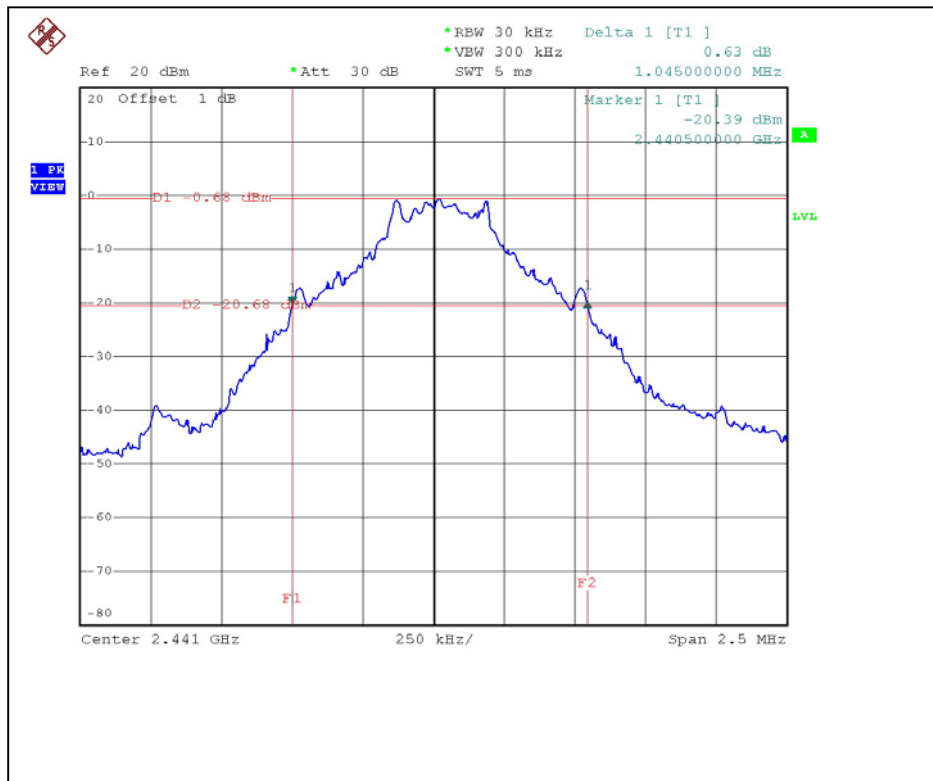
| <b>CHANNEL</b> | <b>CHANNEL FREQUENCY (MHz)</b> | <b>20dB BANDWIDTH (kHz)</b> |
|----------------|--------------------------------|-----------------------------|
| 0              | 2402                           | 1045                        |
| 39             | 2441                           | 1045                        |
| 78             | 2480                           | 1050                        |



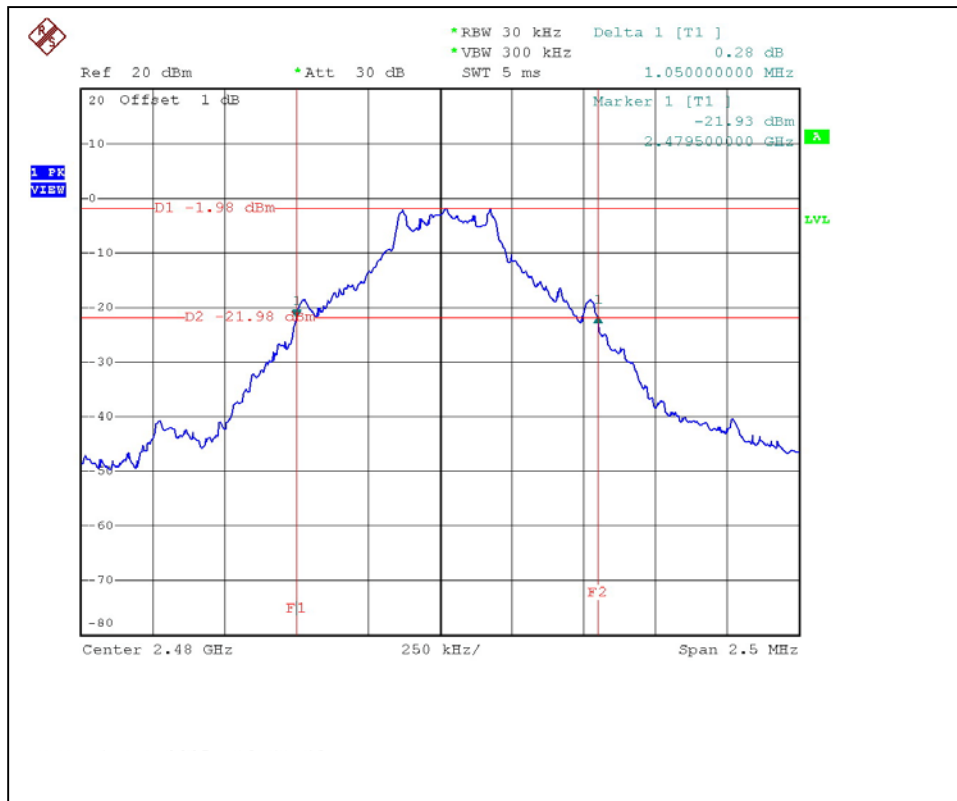
### Channel 0



### Channel 39



### Channel 78



## 4.5 HOPPING CHANNEL SEPARATION

### 4.5.1 LIMIT OF HOPPING CHANNEL SEPARATION

At least 25kHz or 20dB bandwidth (whichever is greater).

### 4.5.2 TEST INSTRUMENTS

| Description & Manufacturer | Model No. | Serial No. | Calibrated Until |
|----------------------------|-----------|------------|------------------|
| R&S SPECTRUM ANALYZER      | FSP40     | 100037     | May 26, 2005     |

**Note:**

1. The measurement uncertainty is 226Hz, which is calculated as per the document ETSI TR 100 028.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

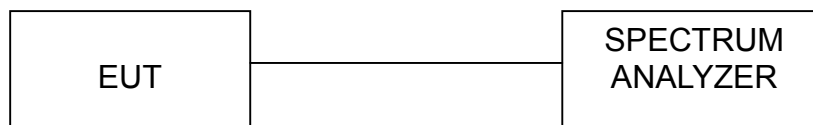
#### 4.5.3 TEST PROCEDURES

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range.
3. By using the MaxHold function record the separation of two adjacent channels.
4. Measure the frequency difference of these two adjacent channels by SA MARK function. And then plot the result on SA screen.
5. Repeat above procedures until all frequencies measured were complete.

#### 4.5.4 DEVIATION FROM TEST STANDARD

No deviation

#### 4.5.5 TEST SETUP



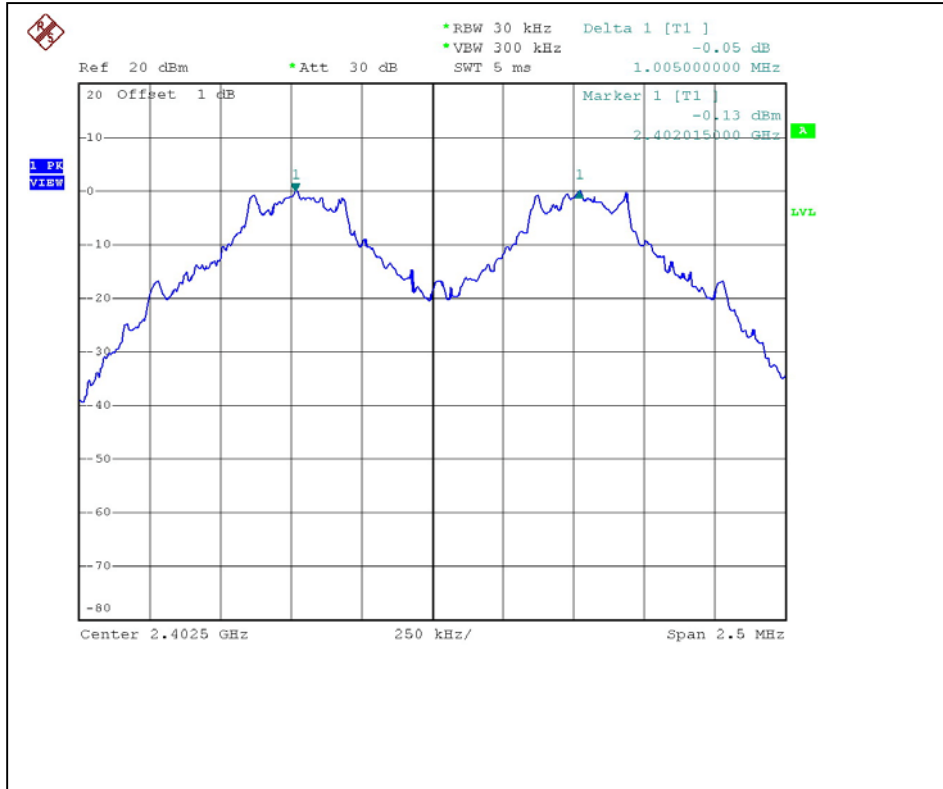
## 4.5.6 TEST RESULTS

|                                 |                              |                             |               |
|---------------------------------|------------------------------|-----------------------------|---------------|
| <b>EUT</b>                      | Bluetooth GPS Receiver       | <b>MODEL</b>                | GPSlim236 XX  |
| <b>ENVIRONMENTAL CONDITIONS</b> | 24 deg. C, 58%RH,<br>984 hPa | <b>INPUT POWER (SYSTEM)</b> | 120Vac, 60 Hz |
| <b>TESTED BY</b>                | Rex Huang                    |                             |               |

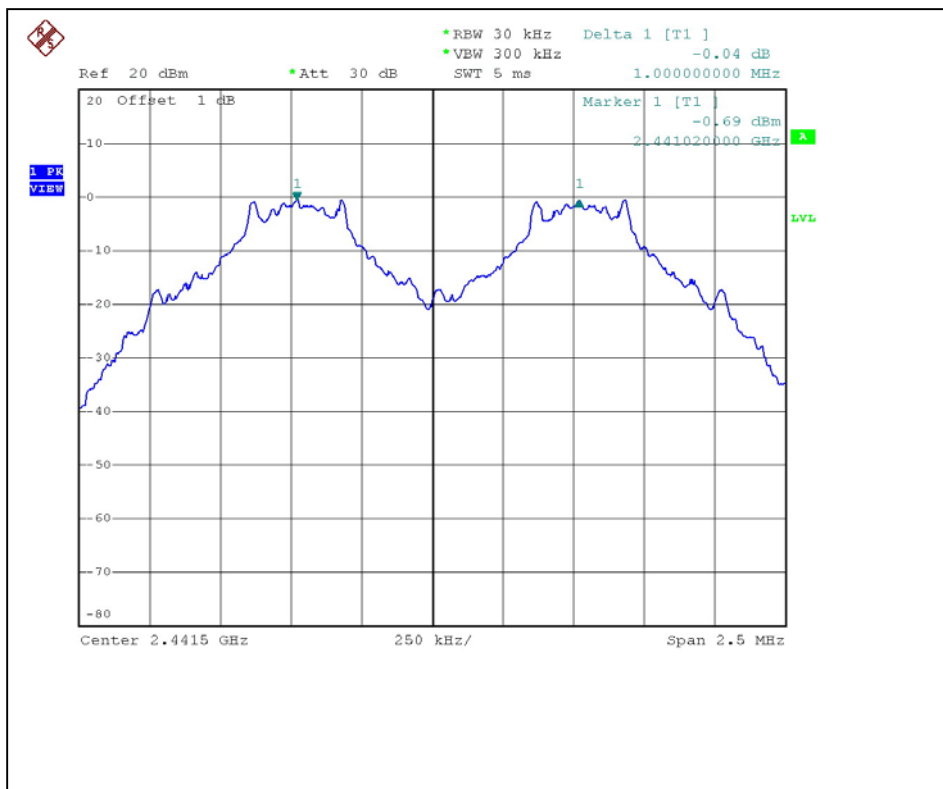
| <b>Channel</b> | <b>Frequency (MHz)</b> | <b>Adjacent Channel Separation</b> | <b>Minimum Limit (kHz)</b> | <b>Pass / Fail</b> |
|----------------|------------------------|------------------------------------|----------------------------|--------------------|
| 0              | 2402                   | 1.005MHz                           | 1045                       | PASS               |
| 39             | 2441                   | 1.000MHz                           | 1045                       | PASS               |
| 78             | 2480                   | 1.000MHz                           | 1050                       | PASS               |

The minimum limit is 20dB bandwidth. Test results please refer to next three pages.

### Channel 0

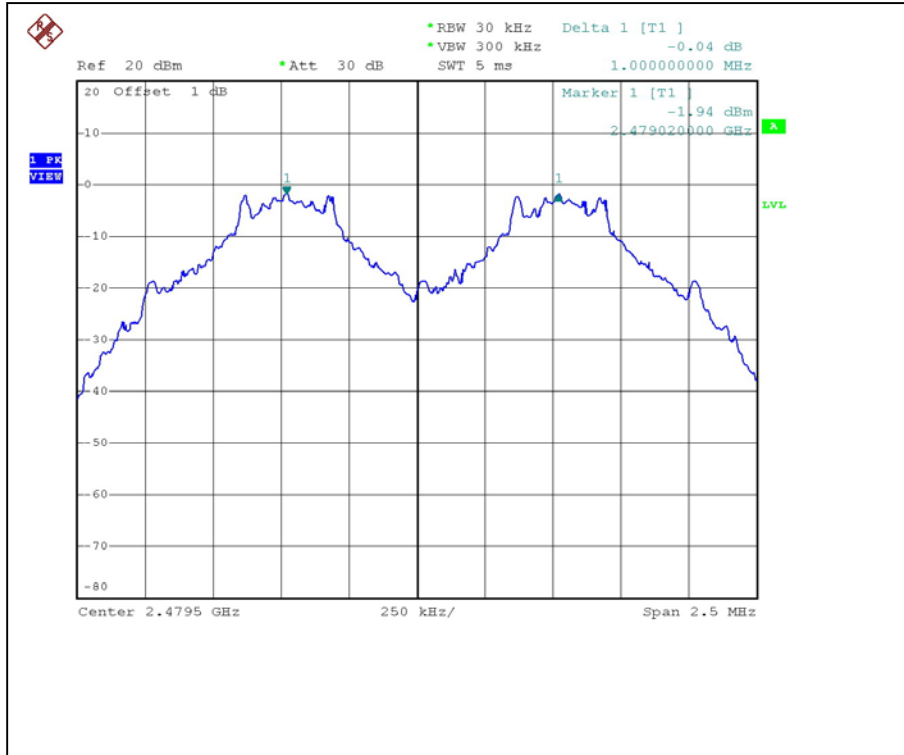


### Channel 39





### Channel 78



## 4.6 MAXIMUM PEAK OUTPUT POWER

### 4.6.1 LIMITS OF MAXIMUM PEAK OUTPUT POWER MEASUREMENT

The Maximum Peak Output Power Measurement is 30dBm.

### 4.6.2 INSTRUMENTS

| Description & Manufacturer | Model No. | Serial No. | Calibrated Until |
|----------------------------|-----------|------------|------------------|
| R&S SPECTRUM ANALYZER      | FSP40     | 100037     | May 26, 2005     |

**Note:**

1. The measurement uncertainty is 226Hz, which is calculated as per the document ETSI TR 100 028.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.





#### 4.6.3 TEST PROCEDURES

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
3. The center frequency of the spectrum analyzer is set to the fundamental frequency and using 1 MHz RBW and 3 MHz VBW.
4. Measure the frequency difference of two frequencies that were attenuated 20dB from the reference level. Record the frequency difference as the emission bandwidth.
5. Repeat above procedures until all frequencies measured were complete.

#### 4.6.4 DEVIATION FROM TEST STANDARD

No deviation

#### 4.6.5 TEST SETUP



For the actual test configuration, please refer to the related Item – Photographs of the Test Configuration.

#### 4.6.6 EUT OPERATING CONDITION

The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

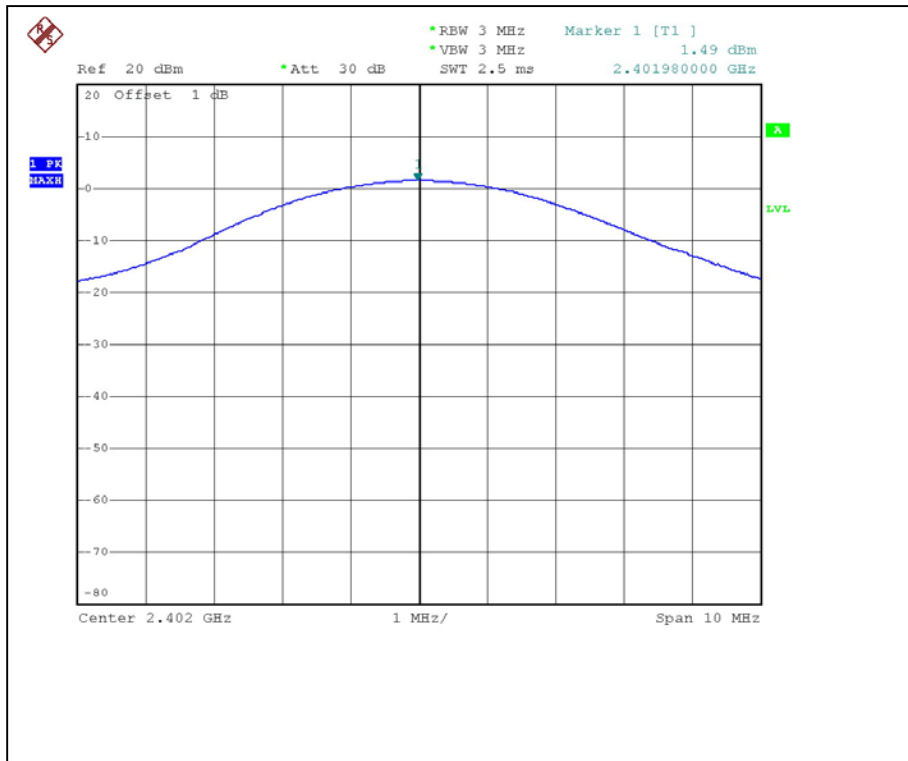
## 4.6.7 TEST RESULTS

|                                 |                              |                             |               |
|---------------------------------|------------------------------|-----------------------------|---------------|
| <b>EUT</b>                      | Bluetooth GPS Receiver       | <b>MODEL</b>                | GPSlim236 XX  |
| <b>ENVIRONMENTAL CONDITIONS</b> | 24 deg. C, 58%RH,<br>984 hPa | <b>INPUT POWER (SYSTEM)</b> | 120Vac, 60 Hz |
| <b>TESTED BY</b>                | Rex Huang                    |                             |               |

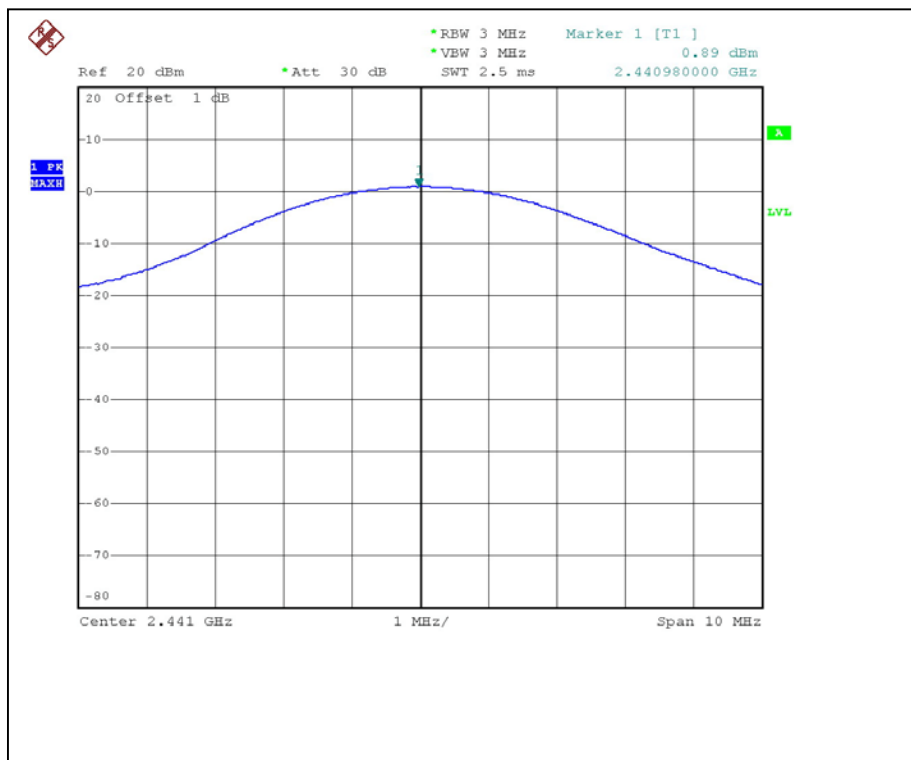
| <b>CHANNEL</b> | <b>CHANNEL FREQUENCY (MHz)</b> | <b>PEAK POWER OUTPUT (dBm)</b> | <b>PEAK POWER LIMIT (dBm)</b> | <b>PASS/FAIL</b> |
|----------------|--------------------------------|--------------------------------|-------------------------------|------------------|
| 0              | 2402                           | 1.49                           | 30                            | PASS             |
| 39             | 2441                           | 0.89                           | 30                            | PASS             |
| 78             | 2480                           | -0.32                          | 30                            | PASS             |



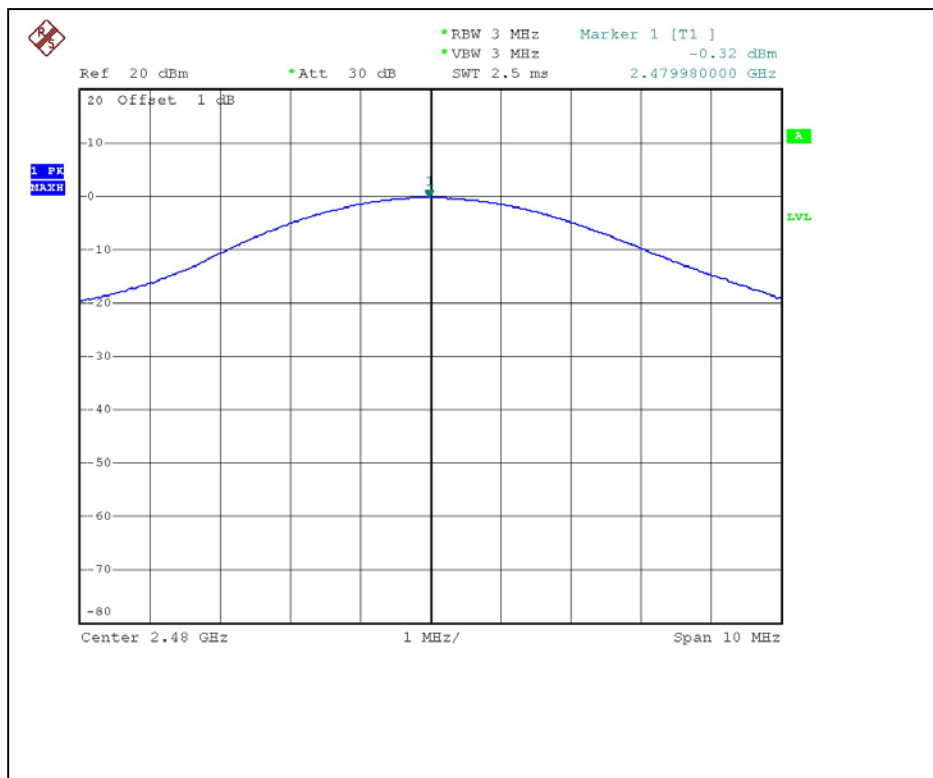
### Channel 0



### Channel 39



### Channel 78





**4.7 RADIATED EMISSION MEASUREMENT**

**4.7.1 LIMITS OF RADIATED EMISSION MEASUREMENT**

Emissions radiated outside of the specified bands, shall be according to the general radiated limits in 15.209 as following:

| Frequencies (MHz) | Field strength (microvolts/meter) | Measurement distance (meters) |
|-------------------|-----------------------------------|-------------------------------|
| 0.009-0.490       | 2400/F(kHz)                       | 300                           |
| 0.490-1.705       | 24000/F(kHz)                      | 30                            |
| 1.705-30.0        | 30                                | 30                            |
| 30-88             | 100                               | 3                             |
| 88-216            | 150                               | 3                             |
| 216-960           | 200                               | 3                             |
| Above 960         | 500                               | 3                             |

As shown in 15.35(b), for frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.



## 4.7.2 TEST INSTRUMENTS

| DESCRIPTION & MANUFACTURER     | MODEL NO.           | SERIAL NO.          | CALIBRATED UNTIL |
|--------------------------------|---------------------|---------------------|------------------|
| HP Spectrum Analyzer           | 8594E               | 3710A04861          | Sep. 23, 2005    |
| ADVANTEST Spectrum Analyzer    | R3271A              | 85060311            | Jun. 29, 2005    |
| CHASE RF Pre_Amplifier         | CPA9232             | 1057                | Aug. 06, 2005    |
| HP Pre_Amplifier               | 8449B               | 3008A01922          | Oct. 13, 2005    |
| ROHDE & SCHWARZ Test Receiver  | ESCS30              | 100287              | Dec. 08, 2005    |
| CHASE Broadband Antenna        | VULB9168            | 138                 | Dec. 21, 2005    |
| Schwarzbeck Horn_Antenna       | BBHA9120            | D124                | Jun. 16, 2005    |
| Schwarzbeck Horn_Antenna       | BBHA 9170           | BBHA9170153         | Jan. 30, 2006    |
| SCHWARZBECK Biconical Antenna  | VHBA9123            | 459                 | Jun. 26, 2006    |
| SCHWARZBECK Periodic Antenna   | UPA6108             | 1148                | Jun. 26, 2006    |
| RF Switches (ARNITSU)          | CS-201              | 1565157             | Jul. 15, 2005    |
| RF CABLE (Chaintek) 1GHz-20GHz | SF102               | 22054-2             | Nov. 15, 2005    |
| RF Cable(RICHTEC)              | 9913-30M            | STCCAB-30M-1GHz-021 | Jul. 15, 2005    |
| Software                       | ADT_Radiated_V 5.14 | NA                  | NA               |
| CHANCE MOST Antenna Tower      | AT-100              | 0203                | NA               |
| CHANCE MOST Turn Table         | TT-100              | 0203                | NA               |

- Note: 1. The calibration interval of the above test instruments is 12 months (36 months for Periodic Antenna) and the calibrations are traceable to NML/ROC and NIST/USA.  
 2. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.  
 3. The test was performed in ADT Open Site No. C.  
 4. The FCC Site Registration No. is 656396.  
 5. The VCCI Site Registration No. is R-1626.  
 6. The CANADA Site Registration No. is IC 4824-3.  
 7. The following table is for the measurement uncertainty, which is calculated as per the document CISPR 16-4.

| Measurement                       | Value   |
|-----------------------------------|---------|
| Radiated emissions (30MHz-1GHz)   | 2.98 dB |
| Radiated emissions (1GHz ~18GHz)  | 2.21 dB |
| Radiated emissions (18GHz ~20GHz) | 1.88 dB |

#### 4.7.3 TEST PROCEDURES

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 10 meter semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
- f. If the emission level of the EUT in peak mode was 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10 dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

**NOTE:**

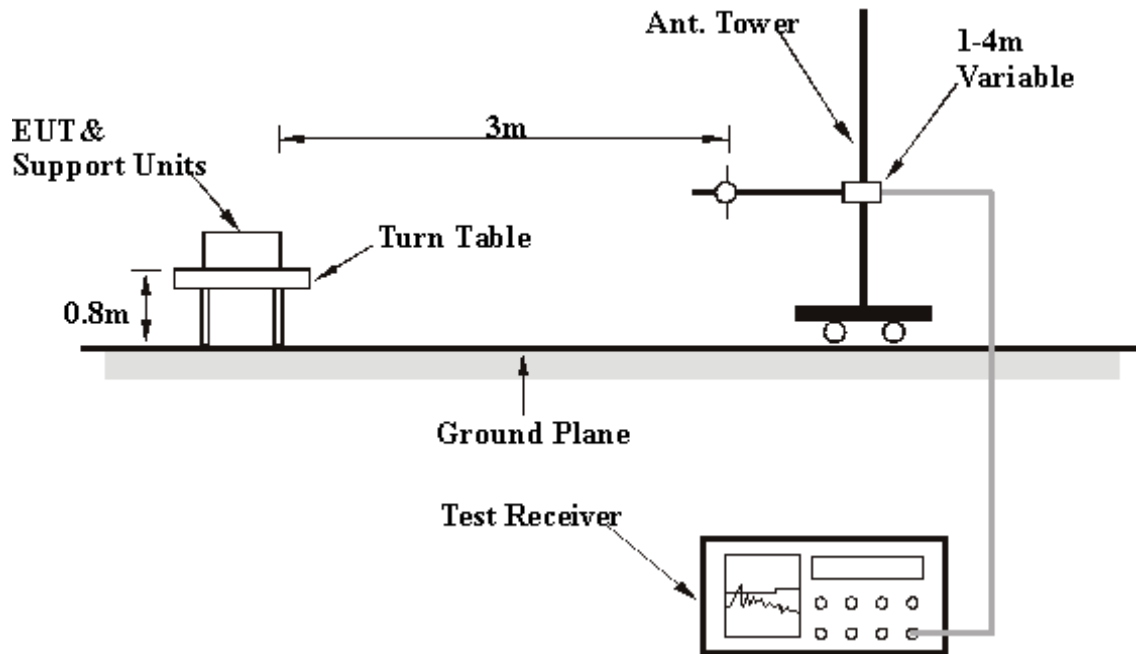
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Peak detection (PK) and Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 MHz for Peak detection at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 10 Hz for Average detection (AV) at frequency above 1GHz.

#### 4.7.4 DEVIATION FROM TEST STANDARD

No deviation



## 4.7.5 TEST SETUP



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

## 4.7.6 TEST RESULTS(MODE 1)

|                                 |                           |                          |              |
|---------------------------------|---------------------------|--------------------------|--------------|
| <b>EUT</b>                      | Bluetooth GPS Receiver    | <b>MODEL</b>             | GPSlim236 XX |
| <b>TEST MODE</b>                | Mode 1                    |                          |              |
| <b>CHANNEL</b>                  | 78                        | <b>FREQUENCY RANGE</b>   | Below 1GHz   |
| <b>INPUT POWER (SYSTEM)</b>     | 120Vac, 60 Hz             | <b>DETECTOR FUNCTION</b> | Quasi-Peak   |
| <b>ENVIRONMENTAL CONDITIONS</b> | 24 deg. C, 58%RH, 984 hPa | <b>TESTED BY</b>         | Rex Huang    |

**ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M**

| No. | Freq. (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
|-----|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| 1   | 128.02      | 21.00 QP                | 43.50          | -22.50      | 1.97 H             | 292                  | 8.80             | 12.10                    |
| 2   | 191.99      | 25.00 QP                | 43.50          | -18.50      | 1.83 H             | 27                   | 13.30            | 11.70                    |
| 3   | 255.99      | 27.30 QP                | 46.00          | -18.70      | 1.68 H             | 272                  | 13.90            | 13.40                    |
| 4   | 384.02      | 29.20 QP                | 46.00          | -16.80      | 1.62 H             | 76                   | 11.30            | 17.90                    |
| 5   | 512.02      | 29.60 QP                | 46.00          | -16.40      | 1.38 H             | 215                  | 8.30             | 21.20                    |
| 6   | 640.00      | 33.10 QP                | 46.00          | -12.90      | 1.13 H             | 349                  | 9.20             | 23.90                    |

**ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M**

| No. | Freq. (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
|-----|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| 1   | 128.02      | 22.40 QP                | 43.50          | -21.10      | 1.00 V             | 244                  | 10.30            | 12.10                    |
| 2   | 192.00      | 23.30 QP                | 43.50          | -20.20      | 1.00 V             | 149                  | 11.60            | 11.70                    |
| 3   | 255.98      | 24.60 QP                | 46.00          | -21.40      | 1.00 V             | 50                   | 11.20            | 13.40                    |
| 4   | 384.02      | 27.50 QP                | 46.00          | -18.50      | 1.00 V             | 68                   | 9.60             | 17.90                    |
| 5   | 512.01      | 30.20 QP                | 46.00          | -15.80      | 1.18 V             | 185                  | 9.00             | 21.20                    |
| 6   | 639.99      | 33.20 QP                | 46.00          | -12.80      | 1.59 V             | 302                  | 9.30             | 23.90                    |

- REMARKS:**
1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
  2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
  3. The other emission levels were very low against the limit.
  4. Margin value = Emission level – Limit value.

## 4.7.7 TEST RESULTS(MODE 2)

|                                 |                           |                          |              |
|---------------------------------|---------------------------|--------------------------|--------------|
| <b>EUT</b>                      | Bluetooth GPS Receiver    | <b>MODEL</b>             | GPSlim236 XX |
| <b>TEST MODE</b>                | Mode 2                    |                          |              |
| <b>CHANNEL</b>                  | 78                        | <b>FREQUENCY RANGE</b>   | Below 1GHz   |
| <b>INPUT POWER (SYSTEM)</b>     | 120Vac, 60 Hz             | <b>DETECTOR FUNCTION</b> | Quasi-Peak   |
| <b>ENVIRONMENTAL CONDITIONS</b> | 24 deg. C, 58%RH, 984 hPa | <b>TESTED BY</b>         | Rex Huang    |

**ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M**

| No. | Freq. (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
|-----|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| 1   | 128.01      | 25.10 QP                | 43.50          | -18.40      | 1.92 H             | 343                  | 13.00            | 12.10                    |
| 2   | 192.01      | 30.40 QP                | 43.50          | -13.10      | 1.83 H             | 181                  | 18.60            | 11.70                    |
| 3   | 256.00      | 27.70 QP                | 46.00          | -18.30      | 1.67 H             | 310                  | 14.30            | 13.40                    |
| 4   | 384.00      | 30.60 QP                | 46.00          | -15.40      | 1.52 H             | 170                  | 12.70            | 17.90                    |
| 5   | 512.01      | 29.90 QP                | 46.00          | -16.10      | 1.42 H             | 35                   | 8.70             | 21.20                    |
| 6   | 640.02      | 33.50 QP                | 46.00          | -12.50      | 1.21 H             | 70                   | 9.60             | 23.90                    |

**ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M**

| No. | Freq. (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
|-----|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| 1   | 128.02      | 25.80 QP                | 43.50          | -17.80      | 1.00 V             | 64                   | 13.60            | 12.10                    |
| 2   | 192.00      | 26.90 QP                | 43.50          | -16.60      | 1.00 V             | 68                   | 15.20            | 11.70                    |
| 3   | 256.00      | 26.80 QP                | 46.00          | -19.20      | 1.00 V             | 192                  | 13.40            | 13.40                    |
| 4   | 384.00      | 28.20 QP                | 46.00          | -17.80      | 1.06 V             | 7                    | 10.30            | 17.90                    |
| 5   | 512.02      | 29.90 QP                | 46.00          | -16.10      | 1.23 V             | 347                  | 8.70             | 21.20                    |
| 6   | 640.02      | 33.70 QP                | 46.00          | -12.30      | 1.40 V             | 203                  | 9.80             | 23.90                    |

- REMARKS:**
1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB/m)
  2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
  3. The other emission levels were very low against the limit.
  4. Margin value = Emission level – Limit value.



|                                 |                              |                          |                          |
|---------------------------------|------------------------------|--------------------------|--------------------------|
| <b>EUT</b>                      | Bluetooth GPS Receiver       | <b>MODEL</b>             | GPSlim236 XX             |
| <b>CHANNEL</b>                  | Channel 0                    | <b>FREQUENCY RANGE</b>   | 1 ~25GHz                 |
| <b>INPUT POWER (SYSTEM)</b>     | 120Vac, 60 Hz                | <b>DETECTOR FUNCTION</b> | Peak(PK)<br>Average (AV) |
| <b>ENVIRONMENTAL CONDITIONS</b> | 29 deg. C, 61%RH,<br>984 hPa | <b>TESTED BY</b>         | Rex Huang                |

| <b>ANTENNA POLARITY &amp; TEST DISTANCE: HORIZONTAL AT 3 M</b> |                |                         |                |              |                    |                      |                  |                          |
|--|----------------|-------------------------|----------------|--------------|--------------------|----------------------|------------------|--------------------------|
| No.  | Freq. (MHz)    | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB)  | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1  | 2370.00        | 54.30 PK                | 74.00          | -19.70       | 1.23 H             | 18                   | 23.80            | 30.50                    |
| <b>1</b>   | <b>2370.00</b> | <b>44.70 AV</b>         | <b>54.00</b>   | <b>-9.30</b> | <b>1.23 H</b>      | <b>18</b>            | <b>14.20</b>     | <b>30.50</b>             |
| 2  | 2390.00        | 42.70 PK                | 74.00          | -31.30       | 1.25 H             | 19                   | 9.00             | 33.70                    |
| 2  | 2390.00        | 33.10 AV                | 54.00          | -20.90       | 1.25 H             | 19                   | -0.60            | 33.70                    |
| 3  | *2402.00       | 94.00 PK                |                |              | 1.25 H             | 19                   | 64.20            | 29.80                    |
| 3  | *2402.00       | 84.40 AV                |                |              | 1.25 H             | 19                   | 54.60            | 29.80                    |
| 4  | 4804.00        | 49.40 PK                | 74.00          | -24.60       | 1.53 H             | 284                  | 14.40            | 35.00                    |
| 4  | 4804.00        | 39.80 AV                | 54.00          | -14.20       | 1.53 H             | 284                  | 4.80             | 35.00                    |
| 5  | 7206.00        | 49.60 PK                | 74.00          | -24.40       | 1.57 H             | 315                  | 9.10             | 40.40                    |
| 5  | 7206.00        | 40.00 AV                | 54.00          | -14.00       | 1.57 H             | 315                  | -0.50            | 40.40                    |
| 6  | 9608.00        | 51.60 PK                | 74.00          | -22.40       | 1.71 H             | 32                   | 7.70             | 43.90                    |
| 6  | 9608.00        | 42.00 AV                | 54.00          | -12.00       | 1.71 H             | 32                   | -1.90            | 43.90                    |

| <b>ANTENNA POLARITY &amp; TEST DISTANCE: VERTICAL AT 3 M</b> |             |                         |                |             |                    |                      |                  |                          |
|--|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| No.  | Freq. (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1  | 2370.00     | 47.20 PK                | 74.00          | -26.80      | 1.00 V             | 0                    | 16.70            | 30.50                    |
| 1  | 2370.00     | 37.60 AV                | 54.00          | -16.40      | 1.00 V             | 0                    | 7.10             | 30.50                    |
| 2  | 2390.00     | 33.80 PK                | 74.00          | -40.20      | 1.00 V             | 358                  | 0.10             | 33.70                    |
| 2  | 2390.00     | 24.20 AV                | 54.00          | -29.80      | 1.00 V             | 358                  | -9.50            | 33.70                    |
| 3  | *2402.00    | 85.10 PK                |                |             | 1.00 V             | 358                  | 55.30            | 29.80                    |
| 3  | *2402.00    | 75.50 AV                |                |             | 1.00 V             | 358                  | 45.70            | 29.80                    |
| 4  | 4804.00     | 49.80 PK                | 74.00          | -24.20      | 1.00 V             | 207                  | 14.80            | 35.00                    |
| 4  | 4804.00     | 40.20 AV                | 54.00          | -13.80      | 1.00 V             | 207                  | 5.20             | 35.00                    |
| 5  | 7206.00     | 48.80 PK                | 74.00          | -25.20      | 1.16 V             | 102                  | 8.30             | 40.40                    |
| 5  | 7206.00     | 39.20 AV                | 54.00          | -14.80      | 1.16 V             | 102                  | -1.30            | 40.40                    |
| 6  | 9608.00     | 51.50 PK                | 74.00          | -22.50      | 1.43 V             | 157                  | 7.60             | 43.90                    |
| 6  | 9608.00     | 41.90 AV                | 54.00          | -12.10      | 1.43 V             | 157                  | -2.00            | 43.90                    |

- REMARKS:**
1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB)
  2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
  3. The other emission levels were very low against the limit.
  4. Margin value = Emission level – Limit value.
  5. “ \* “ : Fundamental frequency
  6. The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625\*5 per 247 ms per channel. Therefore, the duty cycle be equal to:  $20\log(3.125/100) = -30\text{dB}$
  7. Average value = peak reading  $-20\log(\text{duty cycle})$



|                                 |                              |                          |                          |
|---------------------------------|------------------------------|--------------------------|--------------------------|
| <b>EUT</b>                      | Bluetooth GPS Receiver       | <b>MODEL</b>             | GPSlim236 XX             |
| <b>CHANNEL</b>                  | Channel 39                   | <b>FREQUENCY RANGE</b>   | 1 ~25GHz                 |
| <b>INPUT POWER (SYSTEM)</b>     | 120Vac, 60 Hz                | <b>DETECTOR FUNCTION</b> | Peak(PK)<br>Average (AV) |
| <b>ENVIRONMENTAL CONDITIONS</b> | 29 deg. C, 61%RH,<br>984 hPa | <b>TESTED BY</b>         | Rex Huang                |

| <b>ANTENNA POLARITY &amp; TEST DISTANCE: HORIZONTAL AT 3M</b> |             |                         |                |             |                    |                      |                  |                          |
|---|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| No.   | Freq. (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1   | *2441.00    | 91.10 PK                |                |             | 1.25 H             | 20                   | 61.20            | 29.90                    |
| 1   | *2441.00    | 81.50 AV                |                |             | 1.25 H             | 20                   | 51.60            | 29.90                    |
| 2   | 4882.00     | 47.50 PK                | 74.00          | -26.50      | 1.54 H             | 289                  | 12.10            | 35.30                    |
| 2   | 4882.00     | 37.90 AV                | 54.00          | -16.10      | 1.54 H             | 289                  | 2.50             | 35.30                    |
| 3   | 7323.00     | 49.50 PK                | 74.00          | -24.50      | 1.56 H             | 318                  | 8.80             | 40.70                    |
| 3   | 7323.00     | 39.90 AV                | 54.00          | -14.10      | 1.56 H             | 318                  | -0.80            | 40.70                    |
| 4   | 9764.00     | 51.10 PK                | 74.00          | -22.90      | 1.74 H             | 29                   | 7.50             | 43.60                    |
| 4   | 9764.00     | 41.50 AV                | 54.00          | -12.50      | 1.74 H             | 29                   | -2.10            | 43.60                    |

| <b>ANTENNA POLARITY &amp; TEST DISTANCE: VERTICAL AT 3M</b> |             |                         |                |             |                    |                      |                  |                          |
|---|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| No.   | Freq. (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1   | *2441.00    | 83.20 PK                |                |             | 1.00 V             | 15                   | 53.30            | 29.90                    |
| 1   | *2441.00    | 73.60 AV                |                |             | 1.00 V             | 15                   | 43.70            | 29.90                    |
| 2   | 4882.00     | 48.30 PK                | 74.00          | -25.70      | 1.00 V             | 178                  | 12.90            | 35.30                    |
| 2   | 4882.00     | 38.70 AV                | 54.00          | -15.30      | 1.00 V             | 178                  | 3.30             | 35.30                    |
| 3   | 7323.00     | 48.60 PK                | 74.00          | -25.40      | 1.18 V             | 96                   | 7.90             | 40.70                    |
| 3   | 7323.00     | 39.00 AV                | 54.00          | -15.00      | 1.18 V             | 96                   | -1.70            | 40.70                    |
| 4   | 9764.00     | 50.70 PK                | 74.00          | -23.30      | 1.45 V             | 143                  | 7.10             | 43.60                    |
| 4   | 9764.00     | 41.10 AV                | 54.00          | -12.90      | 1.45 V             | 143                  | -2.50            | 43.60                    |

- REMARKS:**
1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB)
  2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
  3. The other emission levels were very low against the limit.
  4. Margin value = Emission level – Limit value.
  5. " \* " : Fundamental frequency
  6. The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625\*5 per 247 ms per channel. Therefore, the duty cycle be equal to:  $20\log(3.125/100) = -30\text{dB}$
  7. Average value = peak reading  $-20\log(\text{duty cycle})$



|                                 |                              |                          |                          |
|---------------------------------|------------------------------|--------------------------|--------------------------|
| <b>EUT</b>                      | Bluetooth GPS Receiver       | <b>MODEL</b>             | GPSlim236 XX             |
| <b>CHANNEL</b>                  | Channel 78                   | <b>FREQUENCY RANGE</b>   | 1 ~25GHz                 |
| <b>INPUT POWER (SYSTEM)</b>     | 120Vac, 60 Hz                | <b>DETECTOR FUNCTION</b> | Peak(PK)<br>Average (AV) |
| <b>ENVIRONMENTAL CONDITIONS</b> | 29 deg. C, 61%RH,<br>984 hPa | <b>TESTED BY</b>         | Rex Huang                |

| ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3M |             |                         |                |             |                    |                      |                  |                          |
|--|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| No.  | Freq. (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1  | *2480.00    | 91.10 PK                |                |             | 1.15 H             | 13                   | 61.00            | 30.10                    |
| 1  | *2480.00    | 81.50 AV                |                |             | 1.15 H             | 13                   | 51.40            | 30.10                    |
| 2  | 2483.50     | 40.30 PK                | 74.00          | -33.70      | 1.15 H             | 13                   | 10.20            | 30.10                    |
| 2  | 2483.50     | 32.70 AV                | 54.00          | -21.30      | 1.15 H             | 13                   | 2.60             | 30.10                    |
| 3  | 2488.20     | 47.40 PK                | 74.00          | -26.60      | 1.15 H             | 13                   | 17.30            | 30.10                    |
| 3  | 2488.20     | 39.80 AV                | 54.00          | -14.20      | 1.15 H             | 13                   | 9.70             | 30.10                    |
| 4  | 4960.00     | 46.20 PK                | 74.00          | -27.80      | 1.54 H             | 288                  | 10.50            | 35.70                    |
| 4  | 4960.00     | 36.60 AV                | 54.00          | -17.40      | 1.54 H             | 288                  | 0.90             | 35.70                    |
| 5  | 7440.00     | 49.40 PK                | 74.00          | -24.60      | 1.60 H             | 321                  | 8.40             | 40.90                    |
| 5  | 7440.00     | 39.80 AV                | 54.00          | -14.20      | 1.60 H             | 321                  | -1.20            | 40.90                    |
| 6  | 9920.00     | 50.60 PK                | 74.00          | -23.40      | 1.73 H             | 26                   | 7.30             | 43.30                    |
| 6  | 9920.00     | 41.00 AV                | 54.00          | -13.00      | 1.73 H             | 26                   | -2.30            | 43.30                    |

| ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3M |             |                         |                |             |                    |                      |                  |                          |
|--|-------------|-------------------------|----------------|-------------|--------------------|----------------------|------------------|--------------------------|
| No.  | Freq. (MHz) | Emission Level (dBuV/m) | Limit (dBuV/m) | Margin (dB) | Antenna Height (m) | Table Angle (Degree) | Raw Value (dBuV) | Correction Factor (dB/m) |
| 1  | *2480.00    | 84.40 PK                |                |             | 1.00 V             | 9                    | 54.30            | 30.10                    |
| 1  | *2480.00    | 74.80 AV                |                |             | 1.00 V             | 9                    | 44.70            | 30.10                    |
| 2  | 2483.50     | 35.60 PK                | 74.00          | -38.40      | 1.00 V             | 9                    | 5.50             | 30.10                    |
| 2  | 2483.50     | 26.00 AV                | 54.00          | -28.00      | 1.00 V             | 9                    | -4.10            | 30.10                    |
| 3  | 2488.20     | 42.70 PK                | 74.00          | -31.30      | 1.00 V             | 9                    | 12.60            | 30.10                    |
| 3  | 2488.20     | 33.10 AV                | 54.00          | -20.90      | 1.00 V             | 9                    | 3.00             | 30.10                    |
| 4  | 4960.00     | 46.70 PK                | 74.00          | -27.30      | 1.00 V             | 167                  | 11.00            | 35.70                    |
| 4  | 4960.00     | 37.10 AV                | 54.00          | -16.90      | 1.00 V             | 167                  | 1.40             | 35.70                    |
| 5  | 7440.00     | 49.00 PK                | 74.00          | -25.00      | 1.24 V             | 92                   | 8.00             | 40.90                    |
| 5  | 7440.00     | 39.40 AV                | 54.00          | -14.60      | 1.24 V             | 92                   | -1.60            | 40.90                    |
| 6  | 9220.00     | 50.70 PK                | 74.00          | -23.30      | 1.49 V             | 151                  | 7.10             | 43.60                    |
| 6  | 9220.00     | 41.10 AV                | 54.00          | -12.90      | 1.49 V             | 151                  | -2.50            | 43.60                    |

- REMARKS:**
1. Emission level(dBuV/m)=Raw Value(dBuV) + Correction Factor(dB)
  2. Correction Factor(dB/m) = Antenna Factor (dB/m) + Cable Factor (dB)
  3. The other emission levels were very low against the limit.
  4. Margin value = Emission level – Limit value.
  5. “ \* ” : Fundamental frequency
  6. The DH5 packet was the worse case duty cycle for a transmit dwell time on a channel, based upon bluetooth theory the transmitter is on 0.625\*5 per 247 ms per channel. Therefore, the duty cycle be equal to:  $20\log(3.125/100) = -30\text{dB}$
  7. Average value = peak reading  $-20\log(\text{duty cycle})$

## 4.8 BAND EDGES MEASUREMENT

### 4.8.1 LIMITS OF BAND EDGES MEASUREMENT

Below  $-20\text{dB}$  of the highest emission level of operating band (in 100KHz RBW).

### 4.8.2 TEST INSTRUMENTS

| Description & Manufacturer | Model No. | Serial No. | Calibrated Until |
|----------------------------|-----------|------------|------------------|
| R&S SPECTRUM ANALYZER      | FSP40     | 100037     | May 26, 2005     |

**Note:**

1. The measurement uncertainty is 2.79dB, which is calculated as per the document ETSI TR 100 028
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

### 4.8.3 TEST PROCEDURE

The transmitter output was connected to the spectrum analyzer via a low lose cable. Set both RBW and VBW of spectrum analyzer to 100 kHz with suitable frequency span including 100 MHz bandwidth from band edge. The band edges was measured and recorded.

### 4.8.4 DEVIATION FROM TEST STANDARD

No deviation

#### 4.8.5 EUT OPERATING CONDITION

The software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel frequencies individually.

#### 4.8.6 TEST RESULTS

The spectrum plots are attached on the following 2 pages. D2 line indicates the highest level, D1 line indicates the 20dB offset below D2. It shows compliance with the requirement in part 15.247(C).

Note - The delta method is only used up to 2 MHz away from the restricted bandage, The radiated emissions which located in other restricted frequency band, the result, please refer to 4.2.

#### **NOTE (Peak):**

The band edge emission plot on the following first page show 51.32dB delta between carrier maximum power and local maximum emission in restrict band (2.3900GHz). The emission of carrier strength list in the test result of channel 0 at the item 4.2 is 94.00dBuV/m, so the maximum field strength in restrict band is  $94.00 - 51.32 = 42.68$ dBuV/m which is under 74 dBuV/m limit.

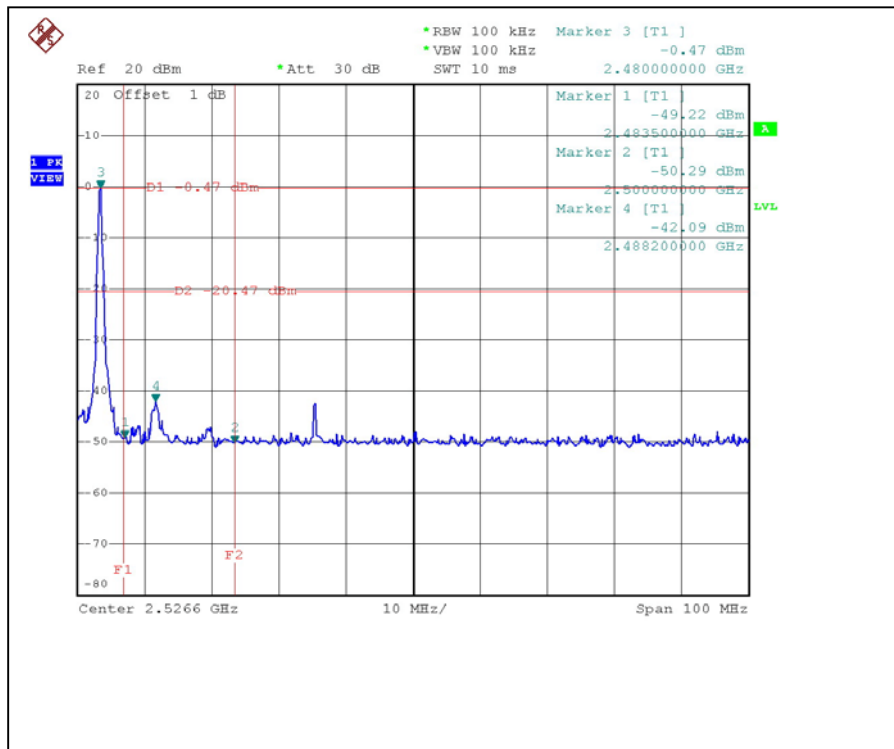
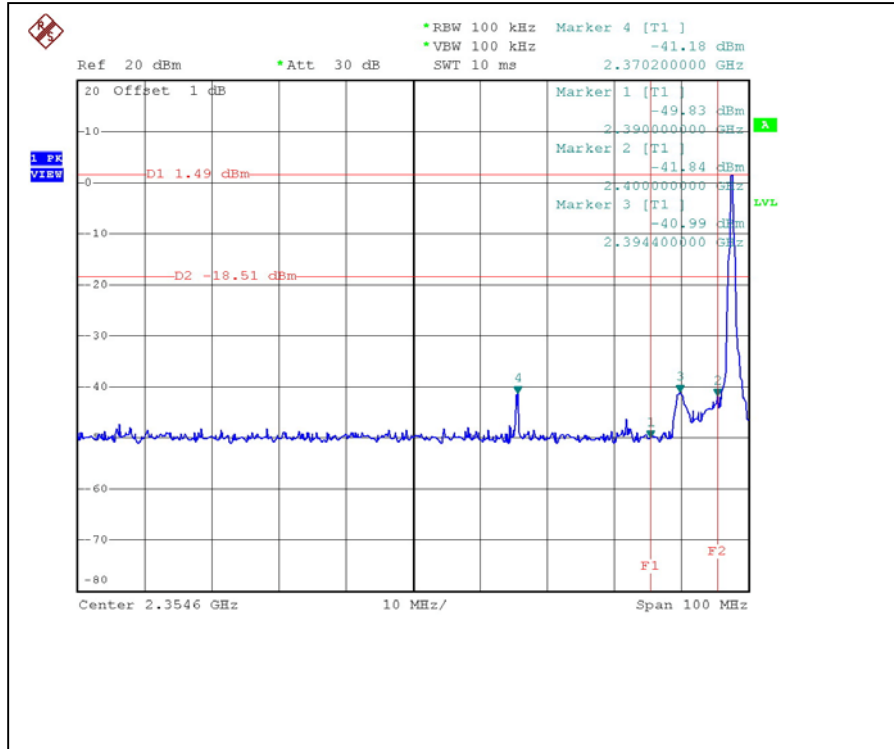
The band edge emission plot on the following first page shows 48.75dB delta between carrier maximum power and local maximum emission in restrict band (2.4835GHz). The emission of carrier strength list in the test result of channel 78 at the item 4.2 is 91.10dBuV/m, so the maximum field strength in restrict band is  $91.10 - 48.75 = 42.35$ dBuV/m which is under 74 dBuV/m limit.

#### **NOTE (Average):**

The band edge emission plot on the following second page shows 51.32dB delta between carrier maximum power and local maximum emission in restrict band (2.3900GHz). The emission of carrier strength list in the test result of channel 0 at the item 4.2 is 84.40dBuV/m, so the maximum field strength in restrict band is  $84.40 - 51.32 = 33.08$ dBuV/m which is under 54 dBuV/m limit.

The band edge emission plot on the following second page shows 48.75dB delta between carrier maximum power and local maximum emission in restrict band (2.4835GHz). The emission of carrier strength list in the test result of channel 78 at the item 4.2 is 81.50dBuV/m, so the maximum field strength in restrict band is  $81.50 - 48.75 = 32.75$ dBuV/m which is under 54 dBuV/m limit.





## 4.9 ANTENNA REQUIREMENT

### 4.9.1 STANDARD APPLICABLE

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6 dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

### 4.9.2 ANTENNA CONNECTED CONSTRUCTION

The antenna used in this product are as following.

|   |
|---|
| <b>for Bluetooth</b>  |
| Patch antenna without connector / Gain : 0dBi                                     |
| <b>for GPS antenna</b>  |
| Active antenna with MMCX connector / Gain : 28dBi<br>(only for test not for sale) |

## 5 PHOTOGRAPHS OF THE TEST CONFIGURATION

CONDUCTED EMISSION TEST (Mode 1)



CONDUCTED EMISSION TEST (Mode 2)



RADIATED EMISSION TEST(Mode 1)





### RADIATED EMISSION TEST (Mode 2)





## 6 INFORMATION ON THE TESTING LABORATORIES

We, ADT Corp., were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025:

|                    |                      |
|--------------------|----------------------|
| <b>USA</b>         | FCC, NVLAP, UL, A2LA |
| <b>Germany</b>     | TUV Rheinland        |
| <b>Japan</b>       | VCCI                 |
| <b>Norway</b>      | NEMKO                |
| <b>Canada</b>      | INDUSTRY CANADA, CSA |
| <b>R.O.C.</b>      | CNLA, BSMI, DGT      |
| <b>Netherlands</b> | Telefication         |
| <b>Singapore</b>   | PSB, GOST-ASIA (MOU) |
| <b>Russia</b>      | CERTIS (MOU)         |

Copies of accreditation certificates of our laboratories obtained from approval agencies can be downloaded from our web site: [www.adt.com.tw/index.5/phtml](http://www.adt.com.tw/index.5/phtml).

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**Web Site:** [www.adt.com.tw](http://www.adt.com.tw)

The address and road map of all our labs can be found in our web site also.