



## RF TEST REPORT

Product Name : USB Wireless LAN Dangle  
Model Number : USBWLZ

Applicant : Billionton Systems Inc.  
Address : No. 21, Sui-Lih Rd., Hsin-Chu, 300, Taiwan.

Received Date : Nov. 14, 2003  
Tested Date : Nov. 14 ~ Dec. 05, 2003

Notes :

1. This report will be invalid if duplicated or photocopied in part.
2. This report refers only to the specimen(s) submitted to testing, and be invalid as separately used.
3. This report is invalid without examination stamp and signature of this institute.
4. The tested specimen(s) will be preserved for thirty days from the data issued.
5. The report must not be used to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government.





**Ecom Sertech Corp.**

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Rd., ChuTung Chen, Hsinchu, Taiwan 310, R.O.C  
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FCC ID : NLF-USBWLZ  
Report No. : EC03-11-013FRF  
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## Test Report Certification

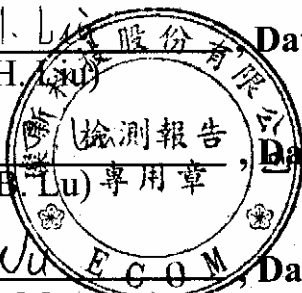
**Product Name** : USB Wireless LAN Dangle

**Model Number** : USBWLZ

**Applicant** : Billionton Systems Inc.

### Measurement Standard :

47 CFR Part 15, Subpart B and Subpart C (Section 15.247),  
ANSI C63.4-2001

**Tested By** : Y. H. Lu  **Date** : Dec. 09, 2003  
(Y. H. Lu)  
**Reviewed By** : S. B. Lu **Date** : Dec. 09, 2003  
(S. B. Lu)  
**Approved By** : C. F. Wu **Date** : Dec. 09, 2003  
(C.F.Wu ,Manager)

WE HEREBY CERTIFY THAT: The measurements shown in the attachment were made in accordance with the procedures indicated, and the energy emitted by the equipment was found to be within the limits applicable. We assume full responsibility for the accuracy and completeness of these measurements and vouch for the qualifications of all persons taking them.



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# 1. GENERAL INFORMATION

## 1.1 General Statement

MEASUREMENT DEVIATION : Comply with standard in full

TRACEABILITY : This test result is traceable to national or international std.

## 1.2 General Description of EUT & Power

MANUFACTURER : Billionton Systems Inc.

SAMPLE NAME : USB Wireless LAN Dangle

MODEL NAME : USBWLZ

FREQUENCY RANGE : 2412 MHz to 2462MHz

CHANNEL NUMBER : 11

AIR DATA RATE : 11Mbps(802.11b Mode)

TYPE OF MODULATION : Direct Sequence Spread Spectrum

FREQUENCY SELECTION : BY SOFTWARE

EUT Description : 2.4GHz (Direct Sequence Spread Spectrum)

Data Transceiver for USB Wireless LAN Dangle

ANTENNA TYPE : Omni directional Antenna, Antenna gain : -0.5dBi

POWER SOURCE : 5VDC (From Notebook PC)

DATA APPLIES TO :

| No. | Company                                 | Address                                                                  | Sample Name              | Model Name                     |
|-----|-----------------------------------------|--------------------------------------------------------------------------|--------------------------|--------------------------------|
| 1   | 2L INTERNATIONAL                        | DATABANKWEG 7-3821 AL<br>AMERSFOORT PO BOX 150-3800<br>AD AMERSFOORT, NE | USB Wiireless LAN Dangle | USBWLZ-N-2L2(CONCEPTR<br>ONIC) |
| 2   | MEDION<br>AKTIEGESELLSCHAF<br>T-GERMANY | GANSEMARKT 16-18 ESSEN GM<br>45127 GERMANY                               | USB Wiireless LAN Dangle | USBWLZ-N-MD(MEDION)            |
| 3   | MAXDATA SYSTEME<br>GMBH                 | Elbestrasse 12-16 D-45768 Marl<br>Germany                                | USB Wiireless LAN Dangle | USBWLZ-N-MAX(MAXDAT<br>A)      |
| 4   | GERICOM AG                              | INDUSTRIEZEILE 35, LINZ, A-4020<br>AUSTRIA                               | USB Wiireless LAN Dangle | USBWLZ-N-GE(GERICOM)           |
| 5   | PIROX<br>INTERNATIONAL B.V.             | SEVILLAWEG 81 ROTTERDAM<br>3047 AL NETHERLANDS                           | USB Wiireless LAN Dangle | USBWLZ-N-PR(PIROX)             |
| 6   | SITECOM EUROPE<br>B.V.                  | LICHTENAUERLAAN 222,<br>BRAINPARK 2, ROTTERDAM,<br>3062ME NETHERLANDS    | USB Wiireless LAN Dangle | USBWLZ-N-SC(SITECOM)           |
| 7   | SCM PC-CARD GmbH                        | SPEL RING 4 HETTENHAUSEN<br>85276 PFAFFENHOFEN ILM<br>GERMANY            | USB Wiireless LAN Dangle | USBWLZ-N-SCM(SCM)              |

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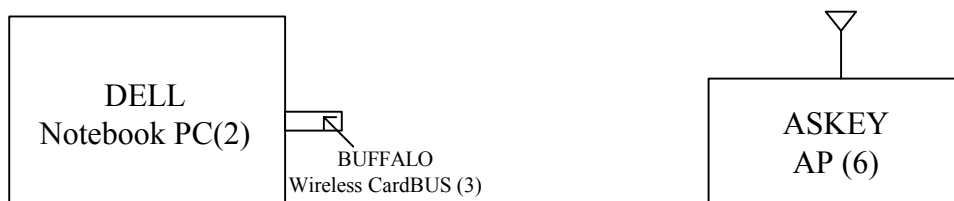
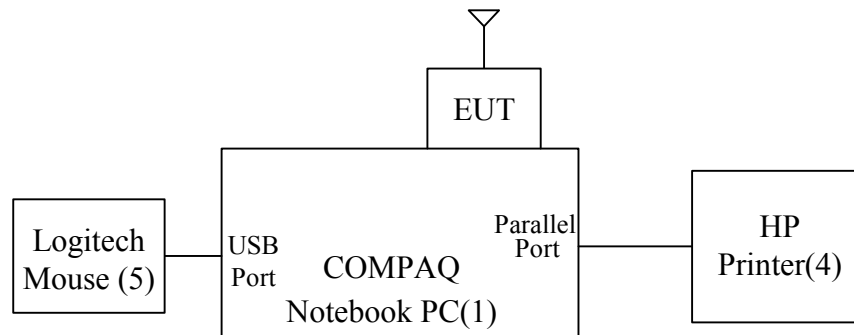
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| No. | Company                   | Address                                                               | Sample Name              | Model Name             |
|-----|---------------------------|-----------------------------------------------------------------------|--------------------------|------------------------|
| 8   | HAMA GMBH AND CO.KG       | DRESDNERSTRASSE 9 MONHEIM 86653 GERMANY                               | USB Wiireless LAN Dangle | USBWLZ-N-HM(HAMA)      |
| 9   | ANUBIS INTL CO., LTD.     | SUITE 504,EMPIRE CENTRE,68 MODY RD.,TSIM SHA TSUI, KOWLOON, HONG KONG | USB Wiireless LAN Dangle | USBWLZ-N-AN(TYPHOON)   |
| 10  | CARECA SPA                | VIA BORSELLINO, 14 42010 ARCETO DI SCANDIANO REGGIO EMILLA 42019 IT   | USB Wiireless LAN Dangle | USBWLZ-N-HA(EXAGERATE) |
| 11  | COM ONE                   | 11 PARC DE MARTICOT, 33610 CESTAS,FRANCE                              | USB Wiireless LAN Dangle | USBWLZ-N-COM(COM1)     |
| 12  | INTERDISCOUNT AG          | BERNSTRASSE 90, CH-3303 JEGENSTORF,SWITZERLAND                        | USB Wiireless LAN Dangle | USBWLZ-N-SM(MICROSPOT) |
| 13  | DATAMATIC S.P.A.          | VIA AGORDAT,34 MILANO MI 20124 ITALY                                  | USB Wiireless LAN Dangle | USBWLZ-N-DM(MEDIACOM)  |
| 14  | Prosonic Technology Corp. | 2F-1, No.148, Jian Guo N. Rd.,Sec.3, Taipei, Taiwan, R.O.C.           | USB Wiireless LAN Dangle | USBWLZ-N-PS(EXTREME)   |
| 15  | Citycom Technology Ltd.   | 3F-1, No. 755, Zhong Zheng Rd., Zhong He, Taipei, Taiwan, R.O.C.      | USB Wiireless LAN Dangle | USBWLZ-N-CTC(CUBIX)    |

### 1.3 Description of Peripherals

| No. | Product          | Manufacturer | Model No.    | Serial No.               | FCC ID         |
|-----|------------------|--------------|--------------|--------------------------|----------------|
| 1   | Notebook PC      | COMPAQ       | N 800V       | 5Y33KSQZMOXV 1YR         | DOC            |
| 2   | Notebook PC      | DELL         | PP01L        | CN-09C748-48155-1AP-6630 | DOC            |
| 3   | Wireless CardBUS | BUFFALO      | WLI-CB-G54A  | 14084330810693           | FDI-09101744-0 |
| 4   | Printer          | HP           | Deskjet 948c | CN19T6S011               | DOC            |
| 5   | Mouse            | Logitech     | M-BJ58       | LNA14607307              | DOC            |
| 6   | AP               | ASKEY        | RTW-026      | -----                    | -----          |

## 1.4 EUT & Peripherals Setup Diagram





## 1.5 EUT Operating Condition

1. Setup all computers like the setup diagram.
2. Notebook(1) ping 192.168.0.10 -t -l 5000 to Notebook(2)
3. Notebook(2) ping 192.168.0.10 -t -l 5000 to Notebook(1)
4. All of the function are under run.
5. Start test.

## 1.6 Description of Test Site

|                  |                                                                                                                                                                                    |
|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SITE DESCRIPTION | : FCC Certificate NO. : 90585<br>BSMI Certificate NO. : SL2-IN-E-0002<br>NVLAP Lab code : 200118-0<br>CNLA Certificate NO. : CNLA-ZL97018<br>VCCI Certificate NO. : R-1229, C-1250 |
| NAME OF SITE     | : Ecom Sertech Corp. Hsinchu<br>(Spin-off from ITRI / ERSO on Apr. 01, 2003)                                                                                                       |
| SITE LOCATION    | : Rm.258, Bldg.17, NO.195 , Sec. 4, Chung Hsing Rd.,<br>Chu-Tung Chen. Hsin-Chu, Taiwan 310 R.O.C.                                                                                 |

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## 1.7 Summary of Test Results

The EUT has been tested according to the following specifications :

| APPLIED STANDARD : 47 CFR Part 15, Subpart B and Subpart C |                                                                                                                                                      |        |                               |
|------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|--------|-------------------------------|
| Standard Section                                           | Test Type and Limit                                                                                                                                  | Result | REMARK                        |
| 15.107<br>15.207                                           | AC Power Conducted Emission<br>Limit : 15.107                                                                                                        | PASS   | Meet the requirement of limit |
| 15.247(a)(2)                                               | Spectrum Bandwidth of a Orthogonal Frequency Division Multiplex System<br>Limit : 6dB bandwidth > 500KHz                                             | PASS   | Meet the requirement of limit |
| 15.247(b)                                                  | Maximum Peak Output Power<br>Limit : max. 30dBm                                                                                                      | PASS   | Meet the requirement of limit |
| 15.109<br>15.205<br>15.209                                 | Transmitter Radiated Emissions<br>Limit : Table 15.209                                                                                               | PASS   | Meet the requirement of limit |
| 15.247(d)                                                  | Power Spectral Density<br>Limit : max. 8dBm                                                                                                          | PASS   | Meet the requirement of limit |
| 15.247(c)                                                  | Out of Band Emission and Restricted Band Radiation<br>Limit:20dB less than peak value of fundamental frequency<br>Restricted band Limit:Table 15.209 | PASS   | Meet the requirement of limit |

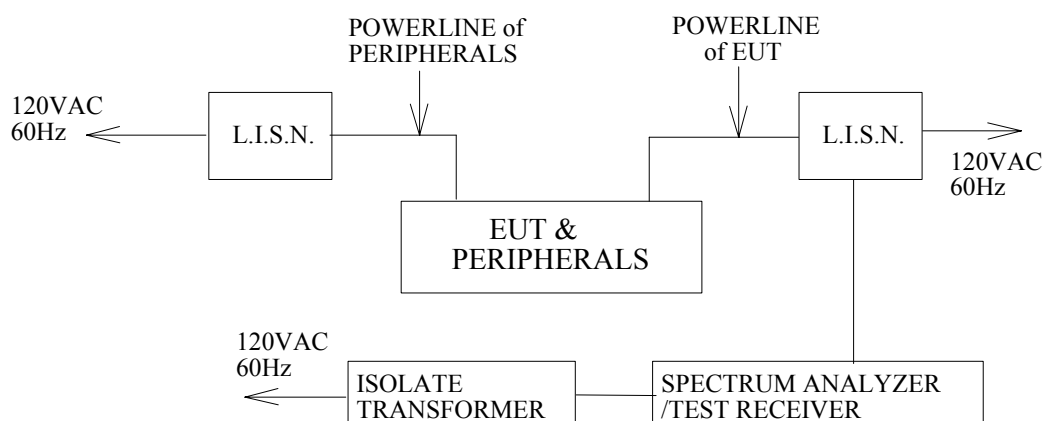
## 2. CONDUCTED POWERLINE TEST

### 2.1 Test Equipments

The following test equipments are used during the conducted powerline tests :

| Manufacturer or Type        | Model No.    | Serial No.             | Date of Calibration                           | Calibration Period | Remark  |
|-----------------------------|--------------|------------------------|-----------------------------------------------|--------------------|---------|
| SPECTRUM ANALYZER & DISPLAY | HP 8568A     | 2235A02320             | APR. 01, 2003                                 | 1 Year             | PRETEST |
| QUASI-PEAK ADAPTER          | HP 85650 A   | 2341A00672             | APR. 01, 2003                                 | 1 Year             | PRETEST |
| ISOLATION TRANSFORMER       | SOLAR 7032-1 | N/A                    | N/A                                           | N/A                | FINAL   |
| L.I.S.N.                    | EMCO 3850/2  | 9311-1025<br>9401-1028 | JAN. 08, 2003<br>For Characteristic impedance | 1 Year             | FINAL   |
|                             |              |                        | MAY 18, 2003<br>For Insertion loss            |                    |         |
| TEST RECEIVER               | R/S ESHS30   | 838550/003             | JUN. 07, 2003                                 | 1 Year             | FINAL   |
| SHIELDED ROOM               | KEENE 5983   | No.1                   | N/A                                           | N/A                | FINAL   |
| PULSE LIMIT                 | R/S EHS3Z2   | 357.8810.52            | JUL. 10, 2003                                 | 1 Year             | FINAL   |
| N TYPE COAXIAL CABLE        | -----        | -----                  | JUL. 10, 2003                                 | 1 Year             | FINAL   |
| 50Ω TERMINATOR              | -----        | -----                  | JUL. 10, 2003                                 | 1 Year             | FINAL   |

### 2.2 Test Setup





## 2.3 Conducted Power Line Emission Limit

For unintentional device, according to § 15.107(a) Line Conducted Emission Limits is as following :

| Frequency<br>(MHz) | Maximum RF Line Voltage (dB $\mu$ v) |      |         |       |
|--------------------|--------------------------------------|------|---------|-------|
|                    | CLASS A                              |      | CLASS B |       |
|                    | Q.P.                                 | Ave. | Q.P.    | Ave.  |
| 0.15 - 0.50        | 79                                   | 66   | 66-56   | 56-46 |
| 0.50 - 5.00        | 73                                   | 60   | 56      | 46    |
| 5.00 - 30.0        | 73                                   | 60   | 60      | 50    |

For intentional device, according to § 15.207(a) Line Conducted Emission Limit is same as above table.

## 2.4 Test Procedure

The test procedure is performed in a 12ft×12ft×8ft(L×W×H) shielded room. the EUT along with its peripherals were placed on a 1.0m(W)×1.5m(L) and 0.8m in height wooden table and the EUT was adjusted to maintain a 0.4 meter space from a vertical reference plane. The EUT was connected to power mains through a line impedance stabilization network (LISN) which provides 50 ohm coupling impedance for measuring instrument and the chassis ground was bounded to the horizontal ground plane of shielded room. All peripherals were connected to the second LISN and the chassis ground also bounded to the horizontal ground plane of shielded room. The excess power cable between the EUT and the LISN was bundled. The power cables of peripherals were unbundled. All connecting cables of EUT and peripherals were moved to find the maximum emission.

## 2.5 Uncertainty of Conducted Emission

The uncertainty of conducted emission is  $\pm 1.36$ dB.

## 2.6 Conducted RF Voltage Measurement

The frequency spectrum from 0.15 MHz to 30 MHz was investigated. All emissions not reported below are more than 20 dB below the prescribed limits.

Temperature : 26 °C

Humidity : 65 % RH

| Frequency<br>(MHz) | Loss(dB) |      | Measurement |       |          |       | L1 Emission<br>(dBμV) |       | L2 Emission<br>(dBμV) |       | Limits<br>(dBμV) |       |
|--------------------|----------|------|-------------|-------|----------|-------|-----------------------|-------|-----------------------|-------|------------------|-------|
|                    |          |      | L1(dBμV)    |       | L2(dBμV) |       |                       |       |                       |       |                  |       |
|                    | L1       | L2   | Q.P.        | Ave.  | Q.P.     | Ave.  | Q.P.                  | Ave.  | Q.P.                  | Ave.  | Q.P.             | Ave.  |
| 0.150              | 0.10     | 0.20 | *           | *     | *        | *     | *                     | *     | *                     | *     | 66.00            | 56.00 |
| 0.201              | 0.10     | 0.20 | 52.50       | 48.80 | 49.00    | 46.90 | 52.60                 | 48.90 | 49.20                 | 47.10 | 63.57            | 53.57 |
| 0.405              | 0.10     | 0.20 | 43.50       | 41.70 | 41.80    | 40.70 | 43.60                 | 41.80 | 42.00                 | 40.90 | 57.75            | 47.75 |
| 0.540              | 0.10     | 0.20 | 39.20       | *     | 37.90    | *     | 39.30                 | *     | 38.10                 | *     | 56.00            | 46.00 |
| 2.020              | 0.10     | 0.20 | *           | *     | 33.10    | *     | *                     | *     | 33.30                 | *     | 56.00            | 46.00 |
| 2.090              | 0.11     | 0.20 | 33.30       | *     | *        | *     | 33.41                 | *     | *                     | *     | 56.00            | 46.00 |
| 3.370              | 0.20     | 0.20 | 38.40       | *     | *        | *     | 38.60                 | *     | *                     | *     | 56.00            | 46.00 |
| 3.500              | 0.20     | 0.20 | *           | *     | 39.30    | *     | *                     | *     | 39.50                 | *     | 56.00            | 46.00 |
| 4.710              | 0.20     | 0.20 | *           | *     | 36.70    | *     | *                     | *     | 36.90                 | *     | 56.00            | 46.00 |
| 4.850              | 0.20     | 0.20 | 36.60       | *     | *        | *     | 36.80                 | *     | *                     | *     | 56.00            | 46.00 |
| 14.550             | 0.56     | 0.60 | 42.80       | *     | *        | *     | 43.36                 | *     | *                     | *     | 60.00            | 50.00 |
| 14.800             | 0.58     | 0.60 | *           | *     | 41.70    | *     | *                     | *     | 42.30                 | *     | 60.00            | 50.00 |
| 17.050             | 0.71     | 0.72 | 41.10       | *     | *        | *     | 41.81                 | *     | *                     | *     | 60.00            | 50.00 |
| 17.300             | 0.76     | 0.79 | *           | *     | 41.00    | *     | *                     | *     | 41.79                 | *     | 60.00            | 50.00 |
| 30.000             | 1.40     | 1.80 | *           | *     | *        | *     | *                     | *     | *                     | *     | 60.00            | 50.00 |

REMARKS : 1. \* Undetectable or the Q.P. value is lower than the limits of Ave.  
2. Mode : Wireless 802.11b Transmitting test.  
3. The EUT can be operated in TX, RX and Stand-by mode. After a preliminary Scan. We found EUT in TX mode generated highest emission. The EUT was Set to TX mode in final test.

## 2.7 Photos of Conduction Test



### 3. RADIATED EMISSION TEST

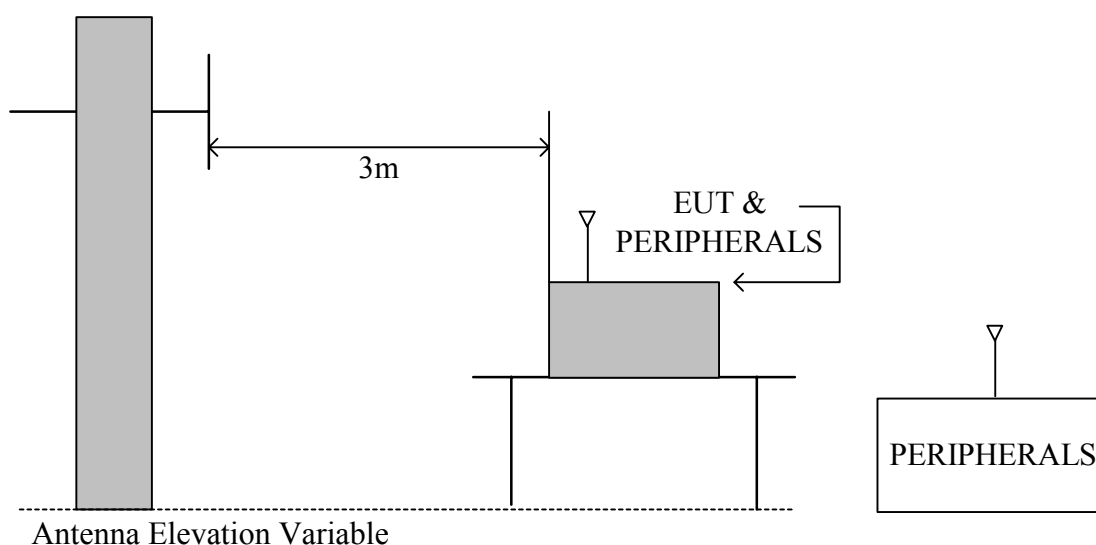
#### 3.1 Test Equipments

The following test equipments are utilized in making the measurements contained in this report.

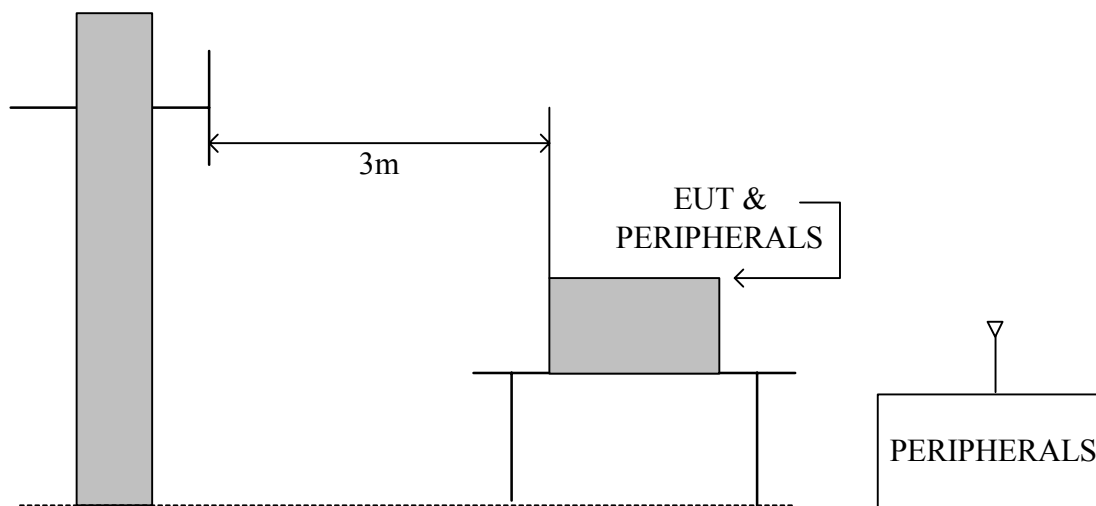
| Manufacturer or Type | Model No.   | Serial No. | Date of Calibration | Calibration Period | Remark |
|----------------------|-------------|------------|---------------------|--------------------|--------|
| CHASE BI-LOG ANTENNA | CBL6112B    | 2562       | MAY 20, 2003        | 1 Year             | FINAL  |
| OPEN SITE            | -----       | No.1       | JUN. 10~12, 2003    | 1 Year             | FINAL  |
| N TYPE COAXIAL CABLE | CHA9525     | 015        | JUL. 13, 2003       | 1 Year             | FINAL  |
| Horn Antenna         | AH-118      | 10089      | FEB. 25, 2003       | 1 Year             | FINAL  |
| HP Pre-amplifier     | 8449B       | 3008A01471 | NOV. 07, 2003       | 1 Year             | FINAL  |
| HP High pass filter  | 84300/80038 | 011        | cal. on use         | 1 Year             | FINAL  |
| Horn Antenna         | AH-840      | 03077      | FEB. 25, 2003       | 1 Year             | FINAL  |

#### 3.2 Test Setup

The diagram below shows the test setup that is utilized to make the measurements for emission from 30 to 1GHz.



The diagram below shows the test setup that is utilized to make the measurements for emission above 1GHz.



Antenna Elevation Variable

### 3.3 Radiation Limit

For unintentional device, according to § 15.109(a), except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values :

| Frequency (MHz) | Distance (Meters) | Radiated (dBμV/M) | Radiated (μV/M) |
|-----------------|-------------------|-------------------|-----------------|
| 30-88           | 3                 | 40.0              | 100             |
| 88-216          | 3                 | 43.5              | 150             |
| 216-960         | 3                 | 46.0              | 200             |
| Above 960       | 3                 | 54.0              | 500             |

For intentional device, according to § 15.209(a), the general requirement of field strength of radiated emissions from intentional radiators at a distance of 3 meters shall not exceed the above table.

### 3.4 Test Procedures

- a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 10 meter open area test site. 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 polarization 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 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 120 KHz 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 and 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.

### 3.5 Uncertainty of Radiated Emission

The uncertainty of radiated emission is  $\pm 2.72$ dB.



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### 3.6 Radiated RF Noise Measurement

Test Requirement: 15.109, 15.209

The frequency spectrum from 30 MHz to 1000 MHz was investigated. All emissions not reported below are more than 20 dB below the prescribed limits.

All readings are quasi-peak values.

Temperature : 24.6 °C

Humidity : 70 % RH

| Frequency<br>(MHz) | Antenna<br>Factor<br>(dB) | Cable<br>Loss<br>(dB) | Meter Reading<br>at 3m(dBμV/M) |          | Limits<br>at 3m<br>(dBμV/M) | Emission Level<br>at 3m(dBμV/M) |          |
|--------------------|---------------------------|-----------------------|--------------------------------|----------|-----------------------------|---------------------------------|----------|
|                    |                           |                       | Horizontal                     | Vertical |                             | Horizontal                      | Vertical |
| 30.00              | 21.39                     | 0.90                  | *                              | *        | 40.00                       | *                               | *        |
| 131.99             | 13.23                     | 2.15                  | 12.10                          | 11.40    | 43.50                       | 27.48                           | 26.78    |
| 175.99             | 10.46                     | 2.60                  | 13.50                          | 11.20    | 43.50                       | 26.56                           | 24.26    |
| 263.99             | 13.20                     | 3.31                  | 9.40                           | 7.60     | 46.00                       | 25.92                           | 24.12    |
| 307.99             | 13.80                     | 3.65                  | 16.30                          | 13.40    | 46.00                       | 33.75                           | 30.85    |
| 395.99             | 17.09                     | 4.18                  | 19.90                          | 12.80    | 46.00                       | 41.17                           | 34.07    |
| 439.99             | 17.67                     | 4.48                  | 19.30                          | 13.90    | 46.00                       | 41.45                           | 36.05    |
| 463.24             | 17.92                     | 4.64                  | 11.20                          | 10.80    | 46.00                       | 33.77                           | 33.37    |
| 483.99             | 18.15                     | 4.79                  | 16.30                          | 12.30    | 46.00                       | 39.24                           | 35.24    |
| 703.98             | 19.47                     | 5.92                  | 10.50                          | 8.60     | 46.00                       | 35.89                           | 33.99    |
| 1000.00            | 21.58                     | 7.00                  | *                              | *        | 54.00                       | *                               | *        |

REMARKS : 1. \*Undetectable

2. Emission level (dBμV/M) = Antenna Factor (dB/m) + Cable loss (dB) + Meter Reading (dBμV).

3. According to technical experiences, all spurious emission at channel 1,6,11 are almost the same below 1GHz, so that the channel 1 was chosen as representation for the test.

4. The EUT can be operated in TX, RX and Stand-by mode. After a preliminary Scan. We found EUT in TX mode generated highest emission. The EUT was Set to TX mode in final test.

5. Mode : Wireless 802.11b Transmitting test.

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Test Requirement: 15.109 ,15.209

The frequency spectrum above 1 GHz was investigated. All emissions not reported below are more than 40 dB below the prescribed limits. Readings are both peak and average values.

|              |                         |                 |                |
|--------------|-------------------------|-----------------|----------------|
| Company      | Billionton Systems Inc. | Test Date :     | 2003/11/18     |
| Product Name | USB Wireless LAN Dangle | Test By:        | Y. H. Liu      |
| Model Name   | USBWLZ                  | TEMP&Humidity : | 24.6°C , 41.1% |

| CH1 RX         |                   |              |               | Measurement Distance at 1m Horizontal polarity |              |                |                   |                   |                |                 |                   |
|----------------|-------------------|--------------|---------------|------------------------------------------------|--------------|----------------|-------------------|-------------------|----------------|-----------------|-------------------|
| Freq.<br>(MHz) | Reading<br>(dBμV) | AF<br>(dBμV) | Cable<br>(dB) | Pre-amp<br>(dB)                                | Dist<br>(dB) | Filter<br>(dB) | Level<br>(dBμV/m) | Limit<br>(dBμV/m) | Margin<br>(dB) | Mark<br>(P/Q/A) | Height<br>(Meter) |
| 4823.79        | 45.99             | 34.44        | 2.82          | 35.16                                          | 9.50         | 0.00           | 38.59             | 74                | -35.41         | P               | 1.0               |
| 4823.79        | 36.41             | 34.44        | 2.82          | 35.16                                          | 9.50         | 0.00           | 29.01             | 54                | -24.99         | A               | 1.0               |
| 7235.94        | 41.52             | 39.81        | 4.79          | 35.65                                          | 9.50         | 0.00           | 40.97             | 74                | -33.03         | P               | 1.0               |
| 7235.94        | 30.18             | 39.81        | 4.79          | 35.65                                          | 9.50         | 0.00           | 29.63             | 54                | -24.37         | A               | 1.0               |
| 9647.92        | 44.95             | 38.54        | 5.90          | 36.44                                          | 9.50         | 0.00           | 43.45             | 74                | -30.55         | P               | 1.0               |
| 9647.92        | 32.30             | 38.54        | 5.90          | 36.44                                          | 9.50         | 0.00           | 30.80             | 54                | -23.20         | A               | 1.0               |

|                                                                                                                                       |
|---------------------------------------------------------------------------------------------------------------------------------------|
| 1. AF: Antenna Factor, Closs: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)                |
| 2. Analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz                                                       |
| 3. Dist : correction to extra plate reading to 3m specification distance 1m measurement distance = -9.5dB                             |
| 4. The result basic equation calculation as follow :<br>Level = Reading + AF + Closs - Preamp + Filter - Dist, Margin = Level - Limit |
| 5. The test limit is 3M limit.                                                                                                        |
| 6. The other emission levels were very low against the limit.                                                                         |
| 7. For Wireless 802.11b mode at 11Mbps.                                                                                               |

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Test Requirement: 15.109 ,15.209

The frequency spectrum above 1 GHz was investigated. All emissions not reported below are more than 40 dB below the prescribed limits. Readings are both peak and average values.

|              |                         |                 |                |
|--------------|-------------------------|-----------------|----------------|
| Company      | Billionton Systems Inc. | Test Date :     | 2003/11/18     |
| Product Name | USB Wireless LAN Dangle | Test By:        | Y. H. Liu      |
| Model Name   | USBWLZ                  | TEMP&Humidity : | 24.6°C , 41.1% |

| CH1 RX      |                |           |            | Measurement Distance at 1m Vertical polarity |           |             |                |                |             |              |                |
|-------------|----------------|-----------|------------|----------------------------------------------|-----------|-------------|----------------|----------------|-------------|--------------|----------------|
| Freq. (MHz) | Reading (dBμV) | AF (dBμV) | Cable (dB) | Pre-amp (dB)                                 | Dist (dB) | Filter (dB) | Level (dBμV/m) | Limit (dBμV/m) | Margin (dB) | Mark (P/Q/A) | Height (Meter) |
| 4823.83     | 46.32          | 34.44     | 2.82       | 35.16                                        | 9.50      | 0.00        | 38.92          | 74             | -35.08      | P            | 1.0            |
| 4823.83     | 37.38          | 34.44     | 2.82       | 35.16                                        | 9.50      | 0.00        | 29.98          | 54             | -24.02      | A            | 1.0            |
| 7235.84     | 42.90          | 39.81     | 4.79       | 35.65                                        | 9.50      | 0.00        | 42.35          | 74             | -31.65      | P            | 1.0            |
| 7235.84     | 31.23          | 39.81     | 4.79       | 35.65                                        | 9.50      | 0.00        | 30.68          | 54             | -23.32      | A            | 1.0            |
| 9647.98     | 44.73          | 38.54     | 5.90       | 36.44                                        | 9.50      | 0.00        | 43.23          | 74             | -30.77      | P            | 1.0            |
| 9647.98     | 33.46          | 38.54     | 5.90       | 36.44                                        | 9.50      | 0.00        | 31.96          | 54             | -22.04      | A            | 1.0            |

|                                                                                                                                       |
|---------------------------------------------------------------------------------------------------------------------------------------|
| 1. AF: Antenna Factor, Closs: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)                |
| 2. Analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz,VBW=10Hz                                                        |
| 3. Dist : correction to extra plate reading to 3m specification distance 1m measurement distance = -9.5dB                             |
| 4. The result basic equation calculation as follow :<br>Level = Reading + AF + Closs - Preamp + Filter - Dist, Margin = Level - Limit |
| 5. The test limit is 3M limit.                                                                                                        |
| 6. The other emission levels were very low against the limit.                                                                         |
| 7. For Wireless 802.11b mode at 11Mbps.                                                                                               |

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Test Requirement: 15.109 ,15.209

The frequency spectrum above 1 GHz was investigated. All emissions not reported below are more than 40 dB below the prescribed limits. Readings are both peak and average values.

|              |                         |                 |                |
|--------------|-------------------------|-----------------|----------------|
| Company      | Billionton Systems Inc. | Test Date :     | 2003/11/18     |
| Product Name | USB Wireless LAN Dangle | Test By:        | Y. H. Liu      |
| Model Name   | USBWLZ                  | TEMP&Humidity : | 24.6°C , 41.1% |

| CH6 RX         |                   |              |               | Measurement Distance at 1m Horizontal polarity |              |                |                   |                   |                |                 |                   |
|----------------|-------------------|--------------|---------------|------------------------------------------------|--------------|----------------|-------------------|-------------------|----------------|-----------------|-------------------|
| Freq.<br>(MHz) | Reading<br>(dBμV) | AF<br>(dBμV) | Cable<br>(dB) | Pre-amp<br>(dB)                                | Dist<br>(dB) | Filter<br>(dB) | Level<br>(dBμV/m) | Limit<br>(dBμV/m) | Margin<br>(dB) | Mark<br>(P/Q/A) | Height<br>(Meter) |
| 4873.82        | 45.32             | 34.77        | 2.73          | 35.20                                          | 9.50         | 0.00           | 38.12             | 74                | -35.88         | P               | 1.0               |
| 4873.82        | 36.70             | 34.77        | 2.73          | 35.20                                          | 9.50         | 0.00           | 29.50             | 54                | -24.50         | A               | 1.0               |
| 7310.83        | 41.38             | 39.78        | 4.82          | 35.64                                          | 9.50         | 0.00           | 40.84             | 74                | -33.16         | P               | 1.0               |
| 7310.83        | 30.28             | 39.78        | 4.82          | 35.64                                          | 9.50         | 0.00           | 29.74             | 54                | -24.26         | A               | 1.0               |
| 9747.87        | 43.78             | 38.53        | 5.90          | 36.60                                          | 9.50         | 0.00           | 42.11             | 74                | -31.89         | P               | 1.0               |
| 9747.87        | 31.46             | 38.53        | 5.90          | 36.60                                          | 9.50         | 0.00           | 29.79             | 54                | -24.21         | A               | 1.0               |

|                                                                                                                                       |
|---------------------------------------------------------------------------------------------------------------------------------------|
| 1. AF: Antenna Factor, Closs: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)                |
| 2. Analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz,VBW=10Hz                                                        |
| 3. Dist : correction to extra plate reading to 3m specification distance 1m measurement distance = -9.5dB                             |
| 4. The result basic equation calculation as follow :<br>Level = Reading + AF + Closs - Preamp + Filter - Dist, Margin = Level - Limit |
| 5. The test limit is 3M limit.                                                                                                        |
| 6. The other emission levels were very low against the limit.                                                                         |
| 7. For Wireless 802.11b mode at 11Mbps.                                                                                               |

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Test Requirement: 15.109, 15.209

The frequency spectrum above 1 GHz was investigated. All emissions not reported below are more than 40 dB below the prescribed limits. Readings are both peak and average values.

|              |                         |                 |                |
|--------------|-------------------------|-----------------|----------------|
| Company      | Billionton Systems Inc. | Test Date :     | 2003/11/18     |
| Product Name | USB Wireless LAN Dangle | Test By:        | Y. H. Liu      |
| Model Name   | USBWLZ                  | TEMP&Humidity : | 24.6°C , 41.1% |

| CH6 RX      |                |           |            | Measurement Distance at 1m Vertical polarity |           |             |                |                |             |              |                |
|-------------|----------------|-----------|------------|----------------------------------------------|-----------|-------------|----------------|----------------|-------------|--------------|----------------|
| Freq. (MHz) | Reading (dBμV) | AF (dBμV) | Cable (dB) | Pre-amp (dB)                                 | Dist (dB) | Filter (dB) | Level (dBμV/m) | Limit (dBμV/m) | Margin (dB) | Mark (P/Q/A) | Height (Meter) |
| 4873.81     | 46.74          | 34.77     | 2.73       | 35.20                                        | 9.50      | 0.00        | 39.54          | 74             | -34.46      | P            | 1.0            |
| 4873.81     | 35.24          | 34.77     | 2.73       | 35.20                                        | 9.50      | 0.00        | 28.04          | 54             | -25.96      | A            | 1.0            |
| 7310.45     | 40.83          | 39.78     | 4.82       | 35.64                                        | 9.50      | 0.00        | 40.29          | 74             | -33.71      | P            | 1.0            |
| 7310.45     | 32.85          | 39.78     | 4.82       | 35.64                                        | 9.50      | 0.00        | 32.31          | 54             | -21.69      | A            | 1.0            |
| 9747.25     | 42.15          | 38.53     | 5.90       | 36.60                                        | 9.50      | 0.00        | 40.48          | 74             | -33.52      | P            | 1.0            |
| 9747.25     | 30.87          | 38.53     | 5.90       | 36.60                                        | 9.50      | 0.00        | 29.20          | 54             | -24.80      | A            | 1.0            |

|                                                                                                                                       |
|---------------------------------------------------------------------------------------------------------------------------------------|
| 1. AF: Antenna Factor, Closs: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)                |
| 2. Analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz                                                       |
| 3. Dist : correction to extra plate reading to 3m specification distance 1m measurement distance = -9.5dB                             |
| 4. The result basic equation calculation as follow :<br>Level = Reading + AF + Closs - Preamp + Filter - Dist, Margin = Level - Limit |
| 5. The test limit is 3M limit.                                                                                                        |
| 6. The other emission levels were very low against the limit.                                                                         |
| 7. For Wireless 802.11b mode at 11Mbps.                                                                                               |

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Test Requirement: 15.109, 15.209

The frequency spectrum above 1 GHz was investigated. All emissions not reported below are more than 40 dB below the prescribed limits. Readings are both peak and average values.

|              |                         |                 |                |
|--------------|-------------------------|-----------------|----------------|
| Company      | Billionton Systems Inc. | Test Date :     | 2003/11/18     |
| Product Name | USB Wireless LAN Dangle | Test By:        | Y. H. Liu      |
| Model Name   | USBWLZ                  | TEMP&Humidity : | 24.6°C , 41.1% |

| CH11 RX     |                |           |            | Measurement Distance at 1m Horizontal polarity |           |             |                |                |             |              |                |
|-------------|----------------|-----------|------------|------------------------------------------------|-----------|-------------|----------------|----------------|-------------|--------------|----------------|
| Freq. (MHz) | Reading (dBμV) | AF (dBμV) | Cable (dB) | Pre-amp (dB)                                   | Dist (dB) | Filter (dB) | Level (dBμV/m) | Limit (dBμV/m) | Margin (dB) | Mark (P/Q/A) | Height (Meter) |
| 4923.97     | 47.02          | 35.10     | 2.64       | 35.24                                          | 9.50      | 0.00        | 40.02          | 74             | -33.98      | P            | 1.0            |
| 4923.97     | 38.26          | 35.10     | 2.64       | 35.24                                          | 9.50      | 0.00        | 31.26          | 54             | -22.74      | A            | 1.0            |
| 7385.48     | 43.12          | 39.75     | 4.85       | 35.62                                          | 9.50      | 0.00        | 42.60          | 74             | -31.40      | P            | 1.0            |
| 7385.48     | 31.18          | 39.75     | 4.85       | 35.62                                          | 9.50      | 0.00        | 30.66          | 54             | -23.34      | A            | 1.0            |
| 9848.16     | 44.20          | 38.52     | 5.90       | 36.76                                          | 9.50      | 0.00        | 42.36          | 74             | -31.64      | P            | 1.0            |
| 9848.16     | 32.57          | 38.52     | 5.90       | 36.76                                          | 9.50      | 0.00        | 30.73          | 54             | -23.27      | A            | 1.0            |

|                                                                                                                                       |
|---------------------------------------------------------------------------------------------------------------------------------------|
| 1. AF: Antenna Factor, Closs: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)                |
| 2. Analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz                                                       |
| 3. Dist : correction to extra plate reading to 3m specification distance 1m measurement distance = -9.5dB                             |
| 4. The result basic equation calculation as follow :<br>Level = Reading + AF + Closs - Preamp + Filter - Dist, Margin = Level - Limit |
| 5. The test limit is 3M limit.                                                                                                        |
| 6. The other emission levels were very low against the limit.                                                                         |
| 7. For Wireless 802.11b mode at 11Mbps.                                                                                               |

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Test Requirement: 15.109, 15.209

The frequency spectrum above 1 GHz was investigated. All emissions not reported below are more than 40 dB below the prescribed limits. Readings are both peak and average values.

|              |                         |                 |                |
|--------------|-------------------------|-----------------|----------------|
| Company      | Billionton Systems Inc. | Test Date :     | 2003/11/18     |
| Product Name | USB Wireless LAN Dangle | Test By:        | Y. H. Liu      |
| Model Name   | USBWLZ                  | TEMP&Humidity : | 24.6°C , 41.1% |

| CH11 RX     |                |           |            | Measurement Distance at 1m Vertical polarity |           |             |                |                |             |              |                |
|-------------|----------------|-----------|------------|----------------------------------------------|-----------|-------------|----------------|----------------|-------------|--------------|----------------|
| Freq. (MHz) | Reading (dBμV) | AF (dBμV) | Cable (dB) | Pre-amp (dB)                                 | Dist (dB) | Filter (dB) | Level (dBμV/m) | Limit (dBμV/m) | Margin (dB) | Mark (P/Q/A) | Height (Meter) |
| 4823.68     | 45.37          | 34.44     | 2.82       | 35.16                                        | 9.50      | 0.00        | 37.96          | 74             | -36.04      | P            | 1.0            |
| 4823.68     | 33.72          | 34.44     | 2.82       | 35.16                                        | 9.50      | 0.00        | 26.31          | 54             | -27.69      | A            | 1.0            |
| 7385.46     | 43.21          | 39.75     | 4.85       | 35.62                                        | 9.50      | 0.00        | 42.69          | 74             | -31.31      | P            | 1.0            |
| 7385.46     | 31.24          | 39.75     | 4.85       | 35.62                                        | 9.50      | 0.00        | 30.72          | 54             | -23.28      | A            | 1.0            |
| 9847.83     | 44.21          | 38.52     | 5.90       | 36.76                                        | 9.50      | 0.00        | 42.37          | 74             | -31.63      | P            | 1.0            |
| 9847.83     | 32.65          | 38.52     | 5.90       | 36.76                                        | 9.50      | 0.00        | 30.81          | 54             | -23.19      | A            | 1.0            |

|                                                                                                                                       |
|---------------------------------------------------------------------------------------------------------------------------------------|
| 1. AF: Antenna Factor, Closs: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)                |
| 2. Analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz                                                       |
| 3. Dist : correction to extra plate reading to 3m specification distance 1m measurement distance = -9.5dB                             |
| 4. The result basic equation calculation as follow :<br>Level = Reading + AF + Closs - Preamp + Filter - Dist, Margin = Level - Limit |
| 5. The test limit is 3M limit.                                                                                                        |
| 6. The other emission levels were very low against the limit.                                                                         |
| 7. For Wireless 802.11b mode at 11Mbps.                                                                                               |

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Test Requirement: 15.205

The frequency spectrum above 1 GHz was investigated. All emissions not reported below are more than 40 dB below the prescribed limits. Readings are both peak and average values.

|              |                         |                 |                |
|--------------|-------------------------|-----------------|----------------|
| Company      | Billionton Systems Inc. | Test Date :     | 2003/11/18     |
| Product Name | USB Wireless LAN Dangle | Test By:        | Y. H. Liu      |
| Model Name   | USBWLZ                  | TEMP&Humidity : | 24.6°C , 41.1% |

| CH1 TX      |                |           |            | Measurement Distance at 1m Horizontal polarity |           |             |                |                       |             |              |                |
|-------------|----------------|-----------|------------|------------------------------------------------|-----------|-------------|----------------|-----------------------|-------------|--------------|----------------|
| Freq. (MHz) | Reading (dBμV) | AF (dBμV) | Cable (dB) | Pre-amp (dB)                                   | Dist (dB) | Filter (dB) | Level (dBμV/m) | Limit (dBμV/m)        | Margin (dB) | Mark (P/Q/A) | Height (Meter) |
| 2332.00     | 46.84          | 31.87     | 4.28       | 35.30                                          | 9.50      | 0.00        | 38.18          | 74                    | -35.82      | P            | 1.00           |
| 2332.00     | 43.65          | 31.87     | 4.28       | 35.30                                          | 9.50      | 0.00        | 34.99          | 54                    | -19.01      | A            | 1.00           |
| 2410.84     | 74.42          | 31.79     | 3.68       | 0.00                                           | 9.50      | 0.00        | 100.39         | Fundamental Frequency |             | P            | 1.00           |
| 2410.84     | 70.96          | 31.79     | 3.68       | 0.00                                           | 9.50      | 0.00        | 96.93          |                       |             | A            | 1.00           |
| 4823.92     | 49.78          | 34.44     | 2.82       | 35.16                                          | 9.50      | 2.00        | 44.38          | 74                    | -29.62      | P            | 1.00           |
| 4823.92     | 44.30          | 34.44     | 2.82       | 35.16                                          | 9.50      | 2.00        | 38.90          | 54                    | -15.10      | A            | 1.00           |
| 7235.97     | 43.25          | 39.81     | 4.79       | 35.65                                          | 9.50      | 2.00        | 44.70          | 74                    | -29.30      | P            | 1.00           |
| 7235.97     | 32.68          | 39.81     | 4.79       | 35.65                                          | 9.50      | 2.00        | 34.13          | 54                    | -19.87      | A            | 1.00           |
| 9647.93     | 47.40          | 38.54     | 5.90       | 36.44                                          | 9.50      | 0.61        | 46.51          | 74                    | -27.49      | P            | 1.00           |
| 9647.93     | 39.94          | 38.54     | 5.90       | 36.44                                          | 9.50      | 0.61        | 39.05          | 54                    | -14.95      | A            | 1.00           |
| 12054.20    | -----          | -----     | -----      | -----                                          | 9.50      | 0.80        | -----          | -----                 | -----       | -----        | 1.00           |
| 14465.04    | -----          | -----     | -----      | -----                                          | 0.00      | 0.66        | -----          | -----                 | -----       | -----        | 1.00           |
| 16875.88    | -----          | -----     | -----      | -----                                          | 0.00      | 0.43        | -----          | -----                 | -----       | -----        | 1.00           |
| 19286.72    | -----          | -----     | -----      | -----                                          | 0.00      | 1.94        | -----          | -----                 | -----       | -----        | 1.00           |
| 21697.56    | -----          | -----     | -----      | -----                                          | 0.00      | 0.82        | -----          | -----                 | -----       | -----        | 1.00           |
| 24108.40    | -----          | -----     | -----      | -----                                          | 0.00      | 2.93        | -----          | -----                 | -----       | -----        | 1.00           |

**Note :**

1. The measurement was searched to 10th harmonic, Remark "----" means that the emissions level is too low to be measured.
2. AF: Antenna Factor, Closs: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
3. Analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
4. Remark "\*" means that Restricted band.
5. Dist : correction to extra plate reading to 3m specification distance 1m measurement distance = -9.5dB
6. The result basic equation calculation is as follow:  
Level=Reading+AF+Closs-Preamp+Filter-Dist,Margin=Level-Limit
7. The other emission levels were very low against the limit
8. The test limit distance is 3M limit.
9. For Wireless 802.11b mode at 11Mbps.



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Test Requirement: 15.205

The frequency spectrum above 1 GHz was investigated. All emissions not reported below are more than 40 dB below the prescribed limits. Readings are both peak and average values.

|              |                         |                 |                |
|--------------|-------------------------|-----------------|----------------|
| Company      | Billionton Systems Inc. | Test Date :     | 2003/11/18     |
| Product Name | USB Wireless LAN Dangle | Test By:        | Y. H. Liu      |
| Model Name   | USBWLZ                  | TEMP&Humidity : | 24.6°C , 41.1% |

| CH1 TX      |                |           |            | Measurement Distance at 1m Vertical polarity |           |             |                |                       |             |              |                |
|-------------|----------------|-----------|------------|----------------------------------------------|-----------|-------------|----------------|-----------------------|-------------|--------------|----------------|
| Freq. (MHz) | Reading (dBμV) | AF (dBμV) | Cable (dB) | Pre-amp (dB)                                 | Dist (dB) | Filter (dB) | Level (dBμV/m) | Limit (dBμV/m)        | Margin (dB) | Mark (P/Q/A) | Height (Meter) |
| 2332.00     | 53.01          | 31.87     | 4.28       | 35.30                                        | 9.50      | 0.00        | 44.35          | 74                    | -29.65      | P            | 1.00           |
| 2332.00     | 50.51          | 31.87     | 4.28       | 35.30                                        | 9.50      | 0.00        | 41.85          | 54                    | -12.15      | A            | 1.00           |
| 2412.78     | 81.83          | 31.79     | 3.66       | 0.00                                         | 9.50      | 0.00        | 107.78         | Fundamental Frequency |             | P            | 1.00           |
| 2412.78     | 78.91          | 31.79     | 3.66       | 0.00                                         | 9.50      | 0.00        | 104.86         |                       |             | A            | 1.00           |
| 4823.82     | 52.15          | 34.44     | 2.82       | 35.16                                        | 9.50      | 2.00        | 46.75          | 74                    | -27.25      | P            | 1.00           |
| 4823.82     | 49.11          | 34.44     | 2.82       | 35.16                                        | 9.50      | 2.00        | 43.71          | 54                    | -10.29      | A            | 1.00           |
| 7235.72     | 43.35          | 39.81     | 4.79       | 35.65                                        | 9.50      | 2.00        | 44.80          | 74                    | -29.20      | P            | 1.00           |
| 7235.72     | 31.56          | 39.81     | 4.79       | 35.65                                        | 9.50      | 2.00        | 33.01          | 54                    | -20.99      | A            | 1.00           |
| 9647.73     | 50.87          | 38.54     | 5.90       | 36.44                                        | 9.50      | 0.61        | 49.98          | 74                    | -24.02      | P            | 1.00           |
| 9647.73     | 44.61          | 38.54     | 5.90       | 36.44                                        | 9.50      | 0.61        | 43.72          | 54                    | -10.28      | A            | 1.00           |
| 12063.90    | -----          | -----     | -----      | -----                                        | 9.50      | 0.80        | -----          | -----                 | -----       | -----        | 1.00           |
| 14476.68    | -----          | -----     | -----      | -----                                        | 0.00      | 0.67        | -----          | -----                 | -----       | -----        | 1.00           |
| 16889.46    | -----          | -----     | -----      | -----                                        | 0.00      | 0.43        | -----          | -----                 | -----       | -----        | 1.00           |
| 19302.24    | -----          | -----     | -----      | -----                                        | 0.00      | 1.96        | -----          | -----                 | -----       | -----        | 1.00           |
| 21715.02    | -----          | -----     | -----      | -----                                        | 0.00      | 0.81        | -----          | -----                 | -----       | -----        | 1.00           |
| 24127.80    | -----          | -----     | -----      | -----                                        | 0.00      | 2.90        | -----          | -----                 | -----       | -----        | 1.00           |

### Note :

1. The measurement was searched to 10th harmonic, Remark "----" means that the emissions level is too low to be measured.
2. AF: Antenna Factor, Closs: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
3. Analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
4. Remark "\*" means that Restricted band.
5. Dist : correction to extra plate reading to 3m specification distance 1m measurement distance = -9.5dB
6. The result basic equation calculation is as follow:  
Level=Reading+AF+Closs-Preamp+Filter-Dist, Margin=Level-Limit
7. The other emission levels were very low against the limit
8. The test limit distance is 3M limit.
9. For Wireless 802.11b mode at 11Mbps.

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FCC ID : NLF-USBWLZ  
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Test Requirement: 15.205

The frequency spectrum above 1 GHz was investigated. All emissions not reported below are more than 40 dB below the prescribed limits. Readings are both peak and average values.

|              |                         |                 |                |
|--------------|-------------------------|-----------------|----------------|
| Company      | Billionton Systems Inc. | Test Date :     | 2003/11/18     |
| Product Name | USB Wireless LAN Dangle | Test By:        | Y. H. Liu      |
| Model Name   | USBWLZ                  | TEMP&Humidity : | 24.6°C , 41.1% |

| CH6 TX      |                |           |            | Measurement Distance at 1m Horizontal polarity |           |             |                |                       |             |              |                |
|-------------|----------------|-----------|------------|------------------------------------------------|-----------|-------------|----------------|-----------------------|-------------|--------------|----------------|
| Freq. (MHz) | Reading (dBμV) | AF (dBμV) | Cable (dB) | Pre-amp (dB)                                   | Dist (dB) | Filter (dB) | Level (dBμV/m) | Limit (dBμV/m)        | Margin (dB) | Mark (P/Q/A) | Height (Meter) |
| 2438.22     | 76.04          | 31.76     | 3.47       | 0.00                                           | 9.50      | 0.00        | 101.77         | Fundamental Frequency |             | P            | 1.00           |
| 2438.22     | 67.71          | 31.76     | 3.47       | 0.00                                           | 9.50      | 0.00        | 93.44          |                       |             | A            | 1.00           |
| 4873.87     | 50.34          | 34.77     | 2.73       | 35.20                                          | 9.50      | 1.80        | 44.94          | 74                    | -29.06      | P            | 1.00           |
| 4873.87     | 37.15          | 34.77     | 2.73       | 35.20                                          | 9.50      | 1.80        | 31.75          | 54                    | -22.25      | A            | 1.00           |
| 7310.88     | 43.21          | 39.78     | 4.82       | 35.64                                          | 9.50      | 2.00        | 44.67          | 74                    | -29.33      | P            | 1.00           |
| 7310.88     | 31.89          | 39.78     | 4.82       | 35.64                                          | 9.50      | 2.00        | 33.35          | 54                    | -20.65      | A            | 1.00           |
| 9747.93     | 47.62          | 38.53     | 5.90       | 36.60                                          | 9.50      | 0.55        | 46.50          | 74                    | -27.50      | P            | 1.00           |
| 9747.93     | 37.10          | 38.53     | 5.90       | 36.60                                          | 9.50      | 0.55        | 35.98          | 54                    | -18.02      | A            | 1.00           |
| 12191.10    | -----          | -----     | -----      | -----                                          | 9.50      | 0.80        | -----          | -----                 | -----       | -----        | 1.00           |
| 14629.32    | -----          | -----     | -----      | -----                                          | 0.00      | 0.60        | -----          | -----                 | -----       | -----        | 1.00           |
| 17067.54    | -----          | -----     | -----      | -----                                          | 0.00      | 0.53        | -----          | -----                 | -----       | -----        | 1.00           |
| 19505.76    | -----          | -----     | -----      | -----                                          | 0.00      | 2.21        | -----          | -----                 | -----       | -----        | 1.00           |
| 21943.98    | -----          | -----     | -----      | -----                                          | 0.00      | 0.72        | -----          | -----                 | -----       | -----        | 1.00           |
| 24382.20    | -----          | -----     | -----      | -----                                          | 0.00      | 2.49        | -----          | -----                 | -----       | -----        | 1.00           |

**Note :**

1. The measurement was searched to 10th harmonic, Remark “---” means that the emissions level is too low to be measured.
2. AF: Antenna Factor, Closs: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
3. Analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
4. Remark “\*” means that Restricted band.
5. Dist : correction to extra plate reading to 3m specification distance 1m measurement distance = -9.5dB
6. The result basic equation calculation is as follow:  
Level=Reading+AF+Closs+Preamp+Filter-Dist, Margin=Level-Limit
7. The other emission levels were very low against the limit
8. The test limit distance is 3M limit.
9. For Wireless 802.11b mode at 11Mbps.

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Test Requirement: 15.205

The frequency spectrum above 1 GHz was investigated. All emissions not reported below are more than 40 dB below the prescribed limits. Readings are both peak and average values.

|              |                         |                 |                |
|--------------|-------------------------|-----------------|----------------|
| Company      | Billionton Systems Inc. | Test Date :     | 2003/11/18     |
| Product Name | USB Wireless LAN Dangle | Test By:        | Y. H. Liu      |
| Model Name   | USBWLZ                  | TEMP&Humidity : | 24.6°C , 41.1% |

| CH6 TX      |                |           |            | Measurement Distance at 1m Vertical polarity |           |             |                |                       |             |              |                |
|-------------|----------------|-----------|------------|----------------------------------------------|-----------|-------------|----------------|-----------------------|-------------|--------------|----------------|
| Freq. (MHz) | Reading (dBμV) | AF (dBμV) | Cable (dB) | Pre-amp (dB)                                 | Dist (dB) | Filter (dB) | Level (dBμV/m) | Limit (dBμV/m)        | Margin (dB) | Mark (P/Q/A) | Height (Meter) |
| 2438.27     | 83.86          | 31.76     | 3.47       | 0.00                                         | 9.50      | 0.00        | 109.59         | Fundamental Frequency |             | P            | 1.00           |
| 2438.27     | 75.51          | 31.76     | 3.47       | 0.00                                         | 9.50      | 0.00        | 101.24         |                       |             | A            | 1.00           |
| 4873.96     | 45.55          | 34.77     | 2.73       | 35.20                                        | 9.50      | 1.80        | 40.15          | 74                    | -33.85      | P            | 1.00           |
| 4873.96     | 41.23          | 34.77     | 2.73       | 35.20                                        | 9.50      | 1.80        | 35.83          | 54                    | -18.17      | A            | 1.00           |
| 7310.97     | 39.65          | 39.78     | 4.82       | 35.64                                        | 9.50      | 2.00        | 41.11          | 74                    | -32.89      | P            | 1.00           |
| 7310.97     | 26.37          | 39.78     | 4.82       | 35.64                                        | 9.50      | 2.00        | 27.83          | 54                    | -26.17      | A            | 1.00           |
| 9747.95     | 41.60          | 38.53     | 5.90       | 36.60                                        | 9.50      | 0.55        | 40.48          | 74                    | -33.52      | P            | 1.00           |
| 9747.95     | 35.96          | 38.53     | 5.90       | 36.60                                        | 9.50      | 0.55        | 34.84          | 54                    | -19.16      | A            | 1.00           |
| 12191.35    | -----          | -----     | -----      | -----                                        | 9.50      | 0.80        | -----          | -----                 | -----       | -----        | 1.00           |
| 14629.62    | -----          | -----     | -----      | -----                                        | 0.00      | 0.60        | -----          | -----                 | -----       | -----        | 1.00           |
| 17067.89    | -----          | -----     | -----      | -----                                        | 0.00      | 0.53        | -----          | -----                 | -----       | -----        | 1.00           |
| 19506.16    | -----          | -----     | -----      | -----                                        | 0.00      | 2.21        | -----          | -----                 | -----       | -----        | 1.00           |
| 21944.43    | -----          | -----     | -----      | -----                                        | 0.00      | 0.72        | -----          | -----                 | -----       | -----        | 1.00           |
| 24382.70    | -----          | -----     | -----      | -----                                        | 0.00      | 2.49        | -----          | -----                 | -----       | -----        | 1.00           |

**Note :**

1. The measurement was searched to 10th harmonic, Remark “---” means that the emissions level is too low to be measured.
2. AF: Antenna Factor, Closs: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
3. Analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
4. Remark “\*” means that Restricted band.
5. Dist : correction to extra plate reading to 3m specification distance 1m measurement distance = -9.5dB
6. The result basic equation calculation is as follow:  
Level=Reading+AF+Closs+Preamp+Filter-Dist, Margin=Level-Limit
7. The other emission levels were very low against the limit
8. The test limit distance is 3M limit.
9. For Wireless 802.11b mode at 11Mbps.

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Test Requirement: 15.205

The frequency spectrum above 1 GHz was investigated. All emissions not reported below are more than 40 dB below the prescribed limits. Readings are both peak and average values.

|              |                         |                 |                |
|--------------|-------------------------|-----------------|----------------|
| Company      | Billionton Systems Inc. | Test Date :     | 2003/11/18     |
| Product Name | USB Wireless LAN Dangle | Test By:        | Y. H. Liu      |
| Model Name   | USBWLZ                  | TEMP&Humidity : | 24.6°C , 41.1% |

| CH11 TX     |                |           |            | Measurement Distance at 1m Horizontal polarity |           |             |                |                       |             |              |                |
|-------------|----------------|-----------|------------|------------------------------------------------|-----------|-------------|----------------|-----------------------|-------------|--------------|----------------|
| Freq. (MHz) | Reading (dBμV) | AF (dBμV) | Cable (dB) | Pre-amp (dB)                                   | Dist (dB) | Filter (dB) | Level (dBμV/m) | Limit (dBμV/m)        | Margin (dB) | Mark (P/Q/A) | Height (Meter) |
| 2462.00     | 74.29          | 31.74     | 3.29       | 0.00                                           | 9.50      | 0.00        | 99.82          | Fundamental Frequency |             | P            | 1.00           |
| 2462.00     | 66.24          | 31.74     | 3.29       | 0.00                                           | 9.50      | 0.00        | 91.77          |                       |             | A            | 1.00           |
| 2491.96     | 43.98          | 31.71     | 3.06       | 35.30                                          | 9.50      | 0.00        | 33.95          | 74                    | -40.05      | P            | 1.00           |
| 2491.96     | 39.74          | 31.71     | 3.06       | 35.30                                          | 9.50      | 0.00        | 29.71          | 54                    | -24.29      | A            | 1.00           |
| 4923.84     | 50.73          | 35.10     | 2.64       | 35.24                                          | 9.50      | 1.60        | 45.33          | 74                    | -28.67      | P            | 1.00           |
| 4923.84     | 38.11          | 35.10     | 2.64       | 35.24                                          | 9.50      | 1.60        | 32.71          | 54                    | -21.29      | A            | 1.00           |
| 7385.72     | 44.95          | 39.75     | 4.85       | 35.62                                          | 9.50      | 2.00        | 46.43          | 74                    | -27.57      | P            | 1.00           |
| 7385.72     | 32.17          | 39.75     | 4.85       | 35.62                                          | 9.50      | 2.00        | 33.65          | 54                    | -20.35      | A            | 1.00           |
| 9847.87     | 48.22          | 38.52     | 5.90       | 36.76                                          | 9.50      | 0.49        | 46.87          | 74                    | -27.13      | P            | 1.00           |
| 9847.87     | 39.08          | 38.52     | 5.90       | 36.76                                          | 9.50      | 0.49        | 37.73          | 54                    | -16.27      | A            | 1.00           |
| 12310.00    | -----          | -----     | -----      | -----                                          | 9.50      | 0.80        | -----          | -----                 | -----       | -----        | 1.00           |
| 14772.00    | -----          | -----     | -----      | -----                                          | 0.00      | 0.48        | -----          | -----                 | -----       | -----        | 1.00           |
| 17234.00    | -----          | -----     | -----      | -----                                          | 0.00      | 0.59        | -----          | -----                 | -----       | -----        | 1.00           |
| 19696.00    | -----          | -----     | -----      | -----                                          | 0.00      | 2.40        | -----          | -----                 | -----       | -----        | 1.00           |
| 22158.00    | -----          | -----     | -----      | -----                                          | 0.00      | 0.70        | -----          | -----                 | -----       | -----        | 1.00           |
| 24620.00    | -----          | -----     | -----      | -----                                          | 0.00      | 2.13        | -----          | -----                 | -----       | -----        | 1.00           |

**Note :**

1. The measurement was searched to 10th harmonic, Remark "----" means that the emissions level is too low to be measured.
2. AF: Antenna Factor, Closs: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
3. Analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
4. Remark "\*" means that Restricted band.
5. Dist : correction to extra plate reading to 3m specification distance 1m measurement distance = -9.5dB
6. The result basic equation calculation is as follow:  
Level=Reading+AF+Closs-Preamp+Filter-Dist,Margin=Level-Limit
7. The other emission levels were very low against the limit
8. The test limit distance is 3M limit.
9. For Wireless 802.11b mode at 11Mbps.



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Test Requirement: 15.205

The frequency spectrum above 1 GHz was investigated. All emissions not reported below are more than 40 dB below the prescribed limits. Readings are both peak and average values.

|              |                         |                 |                |
|--------------|-------------------------|-----------------|----------------|
| Company      | Billionton Systems Inc. | Test Date :     | 2003/11/18     |
| Product Name | USB Wireless LAN Dangle | Test By:        | Y. H. Liu      |
| Model Name   | USBWLZ                  | TEMP&Humidity : | 24.6°C , 41.1% |

| CH11 TX     |                |           |            | Measurement Distance at 1m Vertical polarity |           |             |                |                       |             |              |                |
|-------------|----------------|-----------|------------|----------------------------------------------|-----------|-------------|----------------|-----------------------|-------------|--------------|----------------|
| Freq. (MHz) | Reading (dBμV) | AF (dBμV) | Cable (dB) | Pre-amp (dB)                                 | Dist (dB) | Filter (dB) | Level (dBμV/m) | Limit (dBμV/m)        | Margin (dB) | Mark (P/Q/A) | Height (Meter) |
| 2461.88     | 82.68          | 31.74     | 3.29       | 0.00                                         | 9.50      | 0.00        | 108.21         | Fundamental Frequency |             | P            | 1.00           |
| 2461.88     | 74.93          | 31.74     | 3.29       | 0.00                                         | 9.50      | 0.00        | 100.46         |                       |             | A            | 1.00           |
| 2491.96     | 47.03          | 31.71     | 3.06       | 35.30                                        | 9.50      | 0.00        | 37.00          | 74                    | -15.69      | P            | 1.00           |
| 2491.96     | 43.50          | 31.71     | 3.06       | 35.30                                        | 9.50      | 0.00        | 33.47          | 54                    | -4.30       | A            | 1.00           |
| 4923.89     | 56.47          | 35.10     | 2.64       | 35.24                                        | 9.50      | 1.60        | 51.07          | 74                    | -33.66      | P            | 1.00           |
| 4923.89     | 53.86          | 35.10     | 2.64       | 35.24                                        | 9.50      | 1.60        | 48.46          | 54                    | -24.45      | A            | 1.00           |
| 7385.92     | 45.65          | 39.75     | 4.85       | 35.62                                        | 9.50      | 2.00        | 47.13          | 74                    | -27.77      | P            | 1.00           |
| 7385.92     | 33.57          | 39.75     | 4.85       | 35.62                                        | 9.50      | 2.00        | 35.05          | 54                    | -18.08      | A            | 1.00           |
| 9847.90     | 52.69          | 38.52     | 5.90       | 36.76                                        | 9.50      | 0.49        | 51.34          | 74                    | -29.39      | P            | 1.00           |
| 9847.90     | 48.19          | 38.52     | 5.90       | 36.76                                        | 9.50      | 0.49        | 46.84          | 54                    | -20.54      | A            | 1.00           |
| 12309.40    | -----          | -----     | -----      | -----                                        | 9.50      | 0.80        | -----          | -----                 | -----       | -----        | 1.00           |
| 14771.28    | -----          | -----     | -----      | -----                                        | 0.00      | 0.48        | -----          | -----                 | -----       | -----        | 1.00           |
| 17233.16    | -----          | -----     | -----      | -----                                        | 0.00      | 0.59        | -----          | -----                 | -----       | -----        | 1.00           |
| 19695.04    | -----          | -----     | -----      | -----                                        | 0.00      | 2.40        | -----          | -----                 | -----       | -----        | 1.00           |
| 22156.92    | -----          | -----     | -----      | -----                                        | 0.00      | 0.70        | -----          | -----                 | -----       | -----        | 1.00           |
| 24618.80    | -----          | -----     | -----      | -----                                        | 0.00      | 2.13        | -----          | -----                 | -----       | -----        | 1.00           |

### Note :

1. The measurement was searched to 10th harmonic, Remark "----" means that the emissions level is too low to be measured.
2. AF: Antenna Factor, Closs: Cable Loss, Pre-Amp: Preamplifier gain, Filter: High Pass Filter Insertion Loss (3.5GHz)
3. Analyzer setting P(Peak): RBW=1MHz, VBW=1MHz, A(Average): RBW=1MHz, VBW=10Hz
4. Remark "\*" means that Restricted band.
5. Dist : correction to extra plate reading to 3m specification distance 1m measurement distance = -9.5dB
6. The result basic equation calculation is as follow:  
Level=Reading+AF+Closs-Preamp+Filter-Dist, Margin=Level-Limit
7. The other emission levels were very low against the limit
8. The test limit distance is 3M limit.
9. For Wireless 802.11b mode at 11Mbps.

### 3.7 Photos of Open Site





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## 4. 6dB BANDWIDTH MEASUREMENT

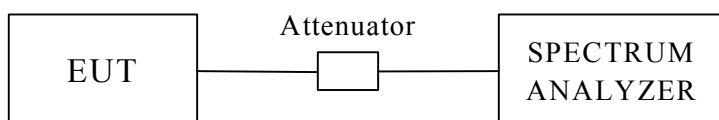
### 4.1 Test Equipments

| Description & Manufacturer        | Model No. | Serial No.  | Date of Calibration |
|-----------------------------------|-----------|-------------|---------------------|
| ROHDE & SCHWARZ SPECTRUM ANALYZER | FSEK30    | 835253/002  | JUN. 17, 2003       |
| HP ATTENUATOR                     | 8496B     | 3247A18505  | Cal. on use         |
| HP PLOTTER                        | 7750A     | 725A 852141 | N/A                 |

Note :

1. The measurement uncertainty is less than  $\pm 2.6\text{dB}$ , which is calculated as per the NAMAS document NIS81.
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 Test Setup



### 4.3 Limits of 6dB Bandwidth Measurement

The minimum of 6dB Bandwidth Measurement is  $>500\text{KHz}$

### 4.4 Test Procedure

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with 100 KHz RBW and 100 KHz VBW. The 6dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 6dB.

### 4.5 Uncertainty of Conducted Emission

The uncertainty of conducted emission is  $\pm 200\text{KHz}$ .

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#### 4.6 Test Results

|                             |                         |                                 |                 |
|-----------------------------|-------------------------|---------------------------------|-----------------|
| <b>Input Power (System)</b> | 5VDC (From Notebook PC) | <b>Environmental Conditions</b> | 24.6°C, 41.1%RH |
| <b>Tested By</b>            | Y. H. Liu               |                                 |                 |

| <b>Channel</b> | <b>Channel Frequency (MHz)</b> | <b>6dB Bandwidth (MHz)</b> | <b>Minimum Limit (MHz)</b> | <b>Pass / Fail</b> |
|----------------|--------------------------------|----------------------------|----------------------------|--------------------|
| 1              | 2412                           | 11.18                      | 0.5                        | PASS               |
| 6              | 2437                           | 11.22                      | 0.5                        | PASS               |
| 11             | 2462                           | 11.22                      | 0.5                        | PASS               |

Note : 1. For 802.11b Mode

2. At final test to get the worst-case emission at 11 Mbps.

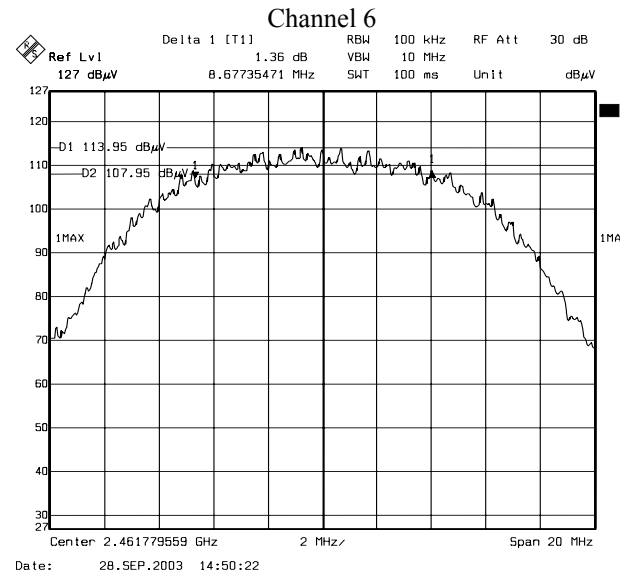
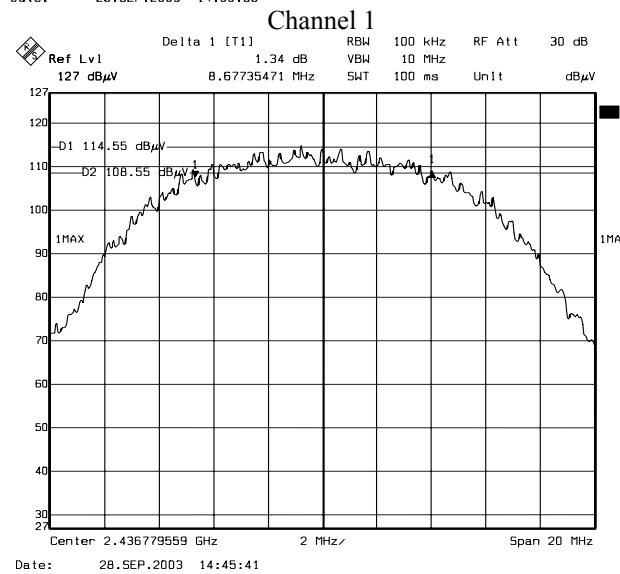
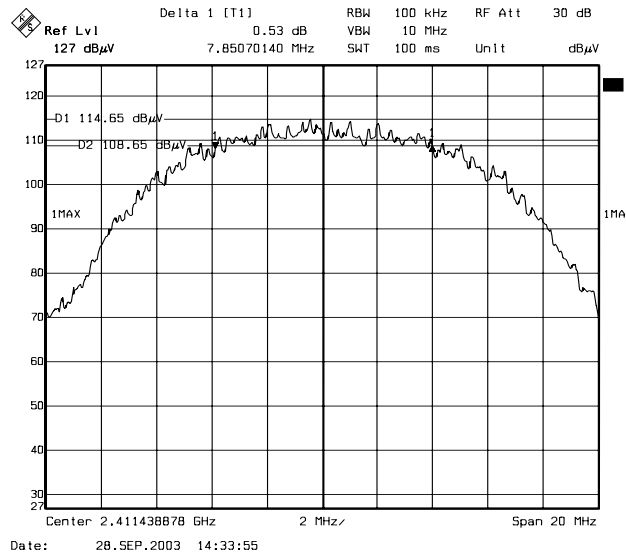


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### 4.7 Photo of 6db Bandwidth Measurement



Channel 11

Note : For 802.11b Mode



## 5. MAXIMUM PEAK OUTPUT POWER

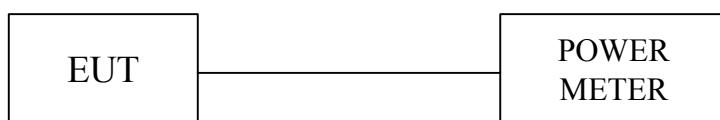
### 5.1 Test Equipments

| Description & Manufacturer        | Model No. | Serial No.  | Date of Calibration |
|-----------------------------------|-----------|-------------|---------------------|
| ROHDE & SCHWARZ SPECTRUM ANALYZER | FSEK30    | 835253/002  | JUN. 17, 2003       |
| HP ATTENUATOR                     | 8496B     | 3247A18505  | Cal. on use         |
| HP PLOTTER                        | 7750A     | 725A 852141 | N/A                 |
| GIGASTRONICS POWER METER          | 8542      | 1828329     | SEPT. 19, 2003      |

Note :

1. The measurement uncertainty is less than +/- 2.6dB, which is calculated as per the NAMAS document NIS81.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

### 5.2 Test Setup



### 5.3 Limits of Maximum Peak Output Power

The Maximum Peak Output Power Measurement is 30dBm.



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### 5.4 Test Procedure

The RF power output was measured with a Power meter connected to the RF Antenna connector ( conducted measurement ) while EUT was operating in transmit mode at the appropriate center frequency.

### 5.5 Uncertainty of Conducted Emission

The uncertainty of conducted emission is  $\pm 1.82\text{dB}$ .

### 5.6 Test Results

|                             |                         |                                 |                 |
|-----------------------------|-------------------------|---------------------------------|-----------------|
| <b>Input Power (System)</b> | 5VDC (From Notebook PC) | <b>Environmental Conditions</b> | 24.6°C, 41.1%RH |
| <b>Tested By</b>            | Y. H. Liu               |                                 |                 |

| <b>Channel</b> | <b>Channel Frequency (MHz)</b> | <b>Peak Power Output (dBm)</b> | <b>Peak Power Limit (dBm)</b> | <b>Pass / Fail</b> |
|----------------|--------------------------------|--------------------------------|-------------------------------|--------------------|
| 1              | 2412                           | 15.86                          | 30                            | PASS               |
| 6              | 2437                           | 15.38                          | 30                            | PASS               |
| 11             | 2462                           | 14.84                          | 30                            | PASS               |

Note : 1. For 802.11b Mode

2. At final test to get the worst-case emission at 11Mbps.

3. The result basic equation calculation as follow :

Peak Power Output = Peak Power Reading + Cable loss + Attenuator



## 6. POWER SPECTRAL DENSITY MEASUREMENT

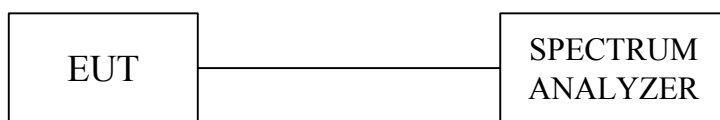
### 6.1 Test Equipments

| Description & Manufacturer        | Model No. | Serial No.  | Date of Calibration |
|-----------------------------------|-----------|-------------|---------------------|
| ROHDE & SCHWARZ SPECTRUM ANALYZER | FSEK30    | 835253/002  | JUN. 17, 2003       |
| HP PLOTTER                        | 7750A     | 725A 852141 | N/A                 |

NOTE :

1. The measurement uncertainty is less than +/- 2.6dB, which is calculated as per the NAMAS document NIS81.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

### 6.2 Test Setup



### 6.3 Limits of Power Spectral Density Measurement

The Maximum Power Spectral Density Measurement is 8dBm.



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### 6.4 Test Procedure

The transmitter output was connected to the spectrum analyzer, the bandwidth of the fundamental frequency was measured with the spectrum analyzer using 3KHz RBW and 30KHz VBW, set sweep time=span / 3KHz.

The power spectral density was measured and recorded.

The sweep time is allowed to be longer than span / 3KHz for a full response of the mixer in the spectrum analyzer.

### 6.5 Uncertainty of Conducted Emission

The uncertainty of conducted emission is  $\pm 1.82\text{dB}$ .

### 6.6 Test Results

|                             |                         |                                 |                 |
|-----------------------------|-------------------------|---------------------------------|-----------------|
| <b>Input Power (System)</b> | 5VDC (From Notebook PC) | <b>Environmental Conditions</b> | 24.6°C, 41.1%RH |
| <b>Tested By</b>            | Y. H. Liu               |                                 |                 |

| <b>Channel</b> | <b>Channel Frequency (MHz)</b> | <b>Final RF Power Level in 3KHz BW (dBm)</b> | <b>Maximum Limit (dBm)</b> | <b>Pass / Fail</b> |
|----------------|--------------------------------|----------------------------------------------|----------------------------|--------------------|
| 1              | 2412                           | -22.09                                       | 8                          | PASS               |
| 6              | 2437                           | -21.27                                       | 8                          | PASS               |
| 11             | 2462                           | -21.75                                       | 8                          | PASS               |

Note: 1. For 11Mbps (802.11b mode) at final test to get the worst-case emission at 11Mbps.

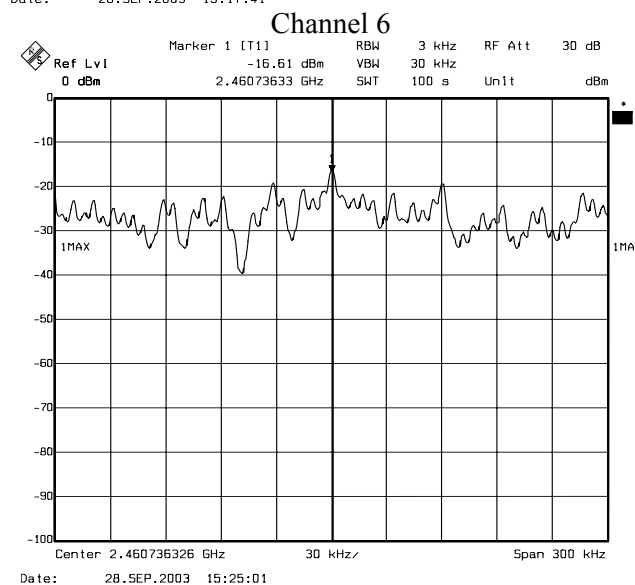
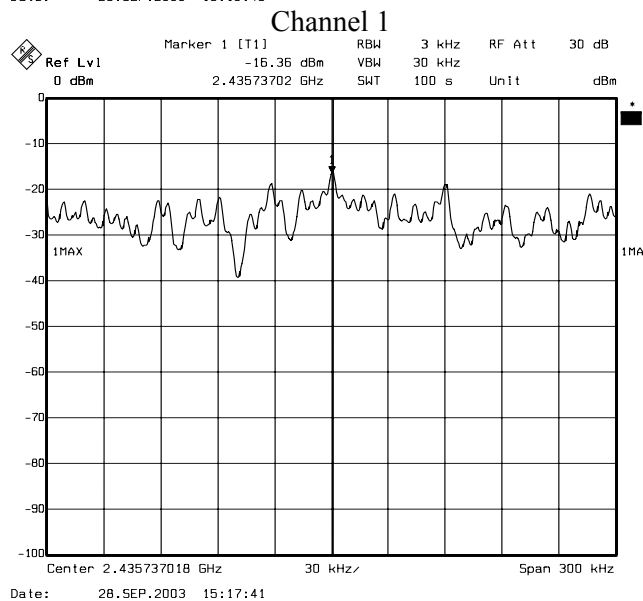
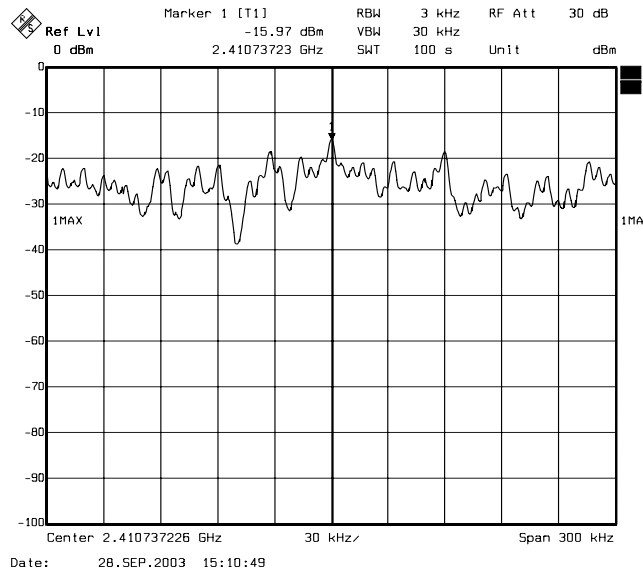


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### 6.7 Photo of Power Spectral Density Measurement



Channel 11

Note: 802.11b Mode (11Mbps)

## 7. OUT OF BAND MEASUREMENT

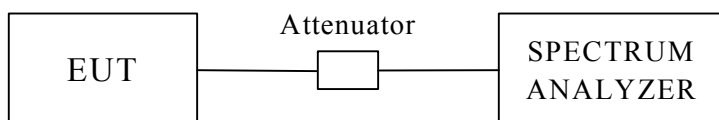
### 7.1 Test Equipments

| Description & Manufacturer        | Model No. | Serial No.  | Date of Calibration |
|-----------------------------------|-----------|-------------|---------------------|
| ROHDE & SCHWARZ SPECTRUM ANALYZER | FSEK30    | 835253/002  | JUN. 17, 2003       |
| HP ATTENUATOR                     | 8496B     | 3247A18505  | Cal. on use         |
| HP PLOTTER                        | 7750A     | 725A 852141 | N/A                 |

Note :

1. The measurement uncertainty is less than  $\pm 2.6\text{dB}$ , which is calculated as per the NAMAS document NIS81.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

### 7.2 Test Setup



### 7.3 Limits of Out of Band Emissions Measurement

1. Below  $-20\text{dB}$  of the highest emission level of operating band (in 100KHz Resolution Bandwidth).
2. Fall in the restricted bands listed in section 15.205. The maximum permitted average field strength is listed in section 15.209.

## 7.4 Test Procedure

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

## 7.5 Uncertainty of Conducted Emission

The uncertainty of conducted emission is  $\pm 1.82\text{dB}$ .

## 7.6 Test Results

### A. Conducted

Refer to 7.7 photo of out band Emission measurement

### B. Radiated

#### For 802.11b mode

Refer to the section 3.6, the measured radiated band edge emissions are listed below :

|                             |                         |                                 |                 |
|-----------------------------|-------------------------|---------------------------------|-----------------|
| <b>Input Power (System)</b> | 5VDC (From Notebook PC) | <b>Environmental Conditions</b> | 24.6°C, 41.1%RH |
| <b>Tested By</b>            | Y. H. Liu               |                                 |                 |

| Band edge Frequency (MHz) | Measured radiated band edge field strength (dBuV/m) |            | Horizontal radiated band edge field strength limit (dBuV/m) |            | Test result |
|---------------------------|-----------------------------------------------------|------------|-------------------------------------------------------------|------------|-------------|
|                           | Horizontal                                          | Vertical   | Horizontal                                                  | Vertical   |             |
| 2399.9                    | 57.64 (PK)                                          | 65.03 (PK) | 80.39 (PK)                                                  | 87.78 (PK) | PASS        |
|                           | 54.18 (AV)                                          | 62.11 (AV) | 79.82 (AV)                                                  | 88.21 (AV) |             |
| 2483.5                    | 52.68 (PK)                                          | 61.07 (PK) | 74.00 (PK)                                                  | 74.00 (PK) | PASS        |
|                           | 44.63 (AV)                                          | 53.32 (AV) | 54.00 (AV)                                                  | 54.00 (AV) |             |

Note : 1. Radiated band edge field strength is measured with FCC recommended mark-delta method.

2. Measured radiated band edge field strength Test Results = Radiated fundamental emission field strength — DELTA.

3. DELTA = Relative measurement between conducted measured peak level of fundamental emission and relevant bandedge emission. Please refer to 7.7 photo of out of Band Measurement.

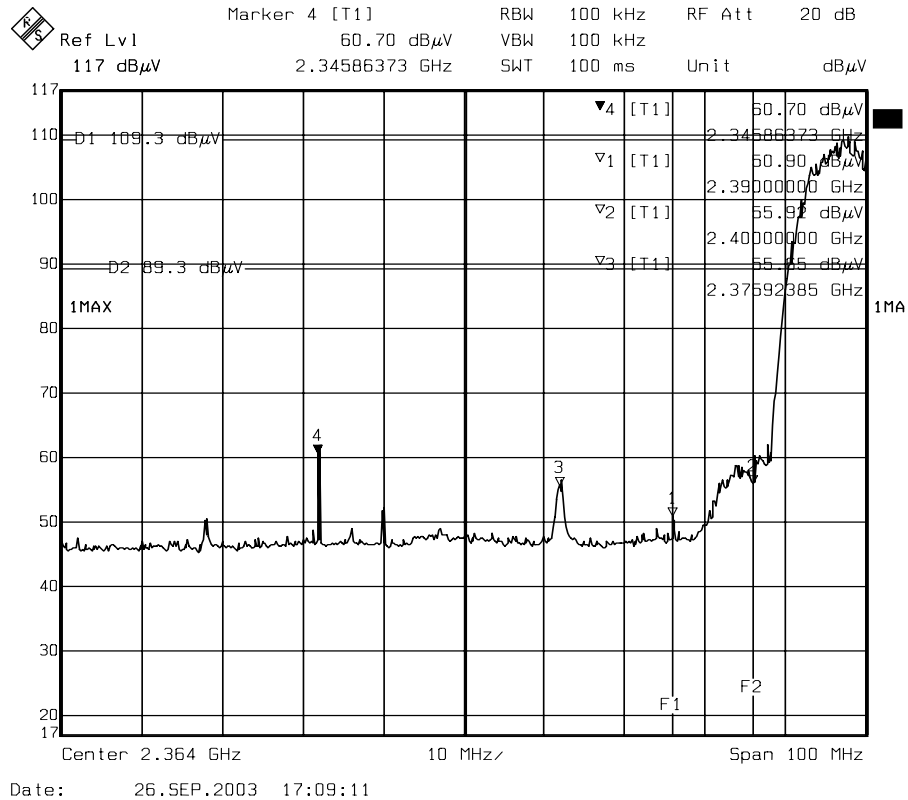


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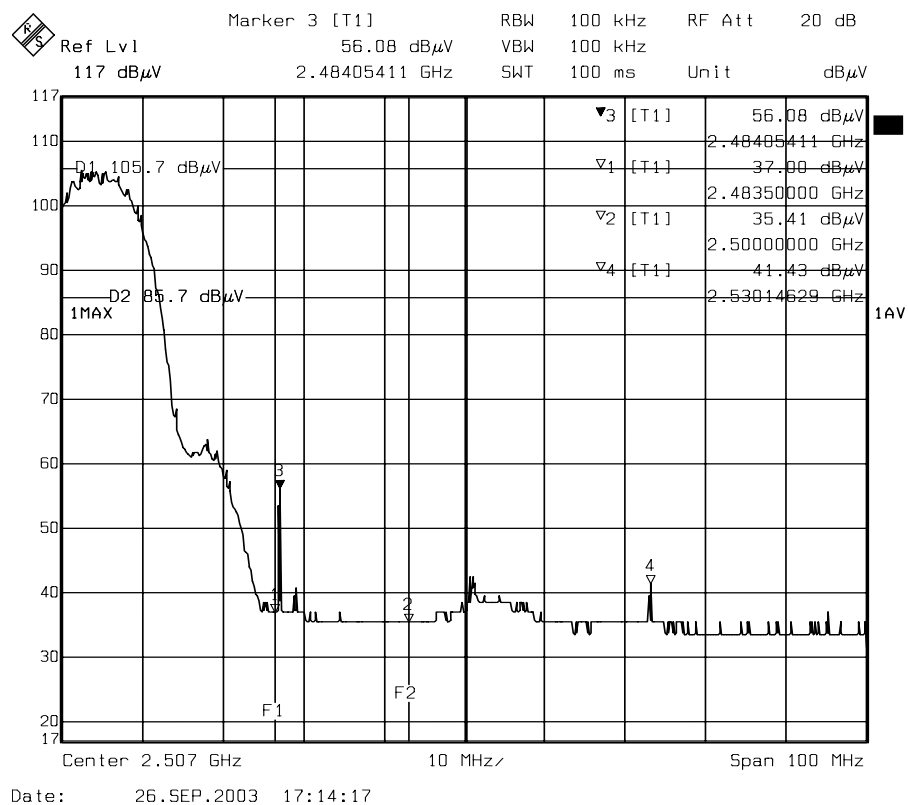
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### 7.7 Photo of Out of Band Measurement



FRONT



BACK

Note : For 802.11b Mode



## **8. ANTENNA REQUIREMENT**

### **8.1 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 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

### **8.2 Antenna Connected Construction**

The antenna used in this product is Omni directional antenna. The maximum Gain of the antenna only -0.5dBi.