

| Product Name | 802.11 b/g/n, 2.4G 1T1R, Wireless USB Module |
|--------------|--|
| Model No     | WN4605B                                      |
| FCC ID.      | ARS-B4319-L-WL                               |

| Applicant | Top Victory Electronics (Taiwan) Co Ltd                 |
|-----------|---|
| Address   | 10F., No.230, Liancheng Rd. Zhonghe City, Taipei County |
|           | 23553, Taiwan   |

| Date of Receipt | Dec. 09, 2010      |
|-----------------|--------------------|
| Issue Date      | Dec. 13, 2010      |
| Report No.      | 10C186R-RFUSP42V01 |
| Report Version  | V1.0               |

The test results relate only to the samples tested.

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# Test Report Certification

Issue Date: Dec. 13, 2010 Report No.: 10C186R-RFUSP42V01



Accredited by NIST (NVLAP)

NVLAP Lab Code: 200533-0

| Product Name        | 802.11 b/g/n, 2.4G 1T1R, Wireless USB Module                   |  |  |  |
|---------------------|--|--|--|--|
| Applicant           | Top Victory Electronics (Taiwan) Co Ltd                        |  |  |  |
| Address             | 10F., No.230, Liancheng Rd. Zhonghe City, Taipei County 23553, |  |  |  |
|                     | Taiwan   |  |  |  |
| Manufacturer        | DONG GUAN G-COM COMPUTER CO., LTD.                             |  |  |  |
| Model No.           | WN4605B  |  |  |  |
| FCC ID.             | ARS-B4319-L-WL   |  |  |  |
| EUT Rated Voltage   | DC 5V (Power by USB)   |  |  |  |
| EUT Test Voltage    | AC 120V/60Hz   |  |  |  |
| Trade Name          | LITE-ON  |  |  |  |
| Applicable Standard | FCC CFR Title 47 Part 15 Subpart C: 2009                       |  |  |  |
|                     | ANSI C63.4: 2003   |  |  |  |
| Test Result         | Complied   |  |  |  |

The test results relate only to the samples tested.

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Documented By :

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(Engineer / Eason Hung)

Approved By





(Manager / Vincent Lin)

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Attachment 1: EUT Test Photographs

Attachment 2: EUT Detailed Photographs

# 1. GENERAL INFORMATION

# 1.1. EUT Description

| Product Name       | 802.11 b/g/n, 2.4G 1T1R, Wireless USB Module                     |  |  |
|--------------------|--|--|--|
| Trade Name         | LITE-ON  |  |  |
| Model No.          | WN4605B  |  |  |
| FCC ID.            | ARS-B4319-L-WL   |  |  |
| Frequency Range    | 2412-2462MHz for 802.11b/g/n-20BW, 2422-2452MHz for 802.11n-40BW |  |  |
| Number of Channels | 802.11b/g/n-20MHz: 11, n-40MHz: 7                                |  |  |
| Data Speed         | 802.11b: 1-11Mbps, 802.11g: 6-54Mbps, 802.11n: 7.2-150Mbps       |  |  |
| Type of Modulation | 802.11b:DSSS (DBPSK, DQPSK, CCK)                                 |  |  |
|                    | 802.11g/n:OFDM (BPSK, QPSK, 16QAM, 64QAM)                        |  |  |
| Antenna Type       | PIFA   |  |  |
| Antenna Gain       | Refer to the table "Antenna List"                                |  |  |
| Channel Control    | Auto   |  |  |

#### Antenna List

| No. | Manufacturer | Part No.   | Antenna Type | Peak Gain          |
|-----|--------------|------------|--------------|--------------------|
| 1   | LITEON       | 3010000122 | PIFA         | 1.98dBi for 2.4GHz |
| 2   | LITEON       | 3010000123 | PIFA         | 1.87dBi for 2.4GHz |

- 1. The antenna of EUT is conform to FCC 15.203
- 2. Only the higher gain antenna was tested and recorded in this report.

802.11b/g/n-20MHz Center Frequency of Each Channel:

| ÷   |           | · ·         |           |             |           |             |           |
|---|-----------|-------------|-----------|-------------|-----------|-------------|-----------|
| Channel   | Frequency | Channel     | Frequency | Channel     | Frequency | Channel     | Frequency |
| Channel 01:                                     | 2412 MHz  | Channel 02: | 2417 MHz  | Channel 03: | 2422 MHz  | Channel 04: | 2427 MHz  |
| Channel 05:                                     | 2432 MHz  | Channel 06: | 2437 MHz  | Channel 07: | 2442 MHz  | Channel 08: | 2447 MHz  |
| Channel 09:                                     | 2452 MHz  | Channel 10: | 2457 MHz  | Channel 11: | 2462 MHz  |             |           |
| 802.11n-40MHz Center Frequency of Each Channel: |           |             |           |             |           |             |           |
| Channel   | Frequency | Channel     | Frequency | Channel     | Frequency | Channel     | Frequency |
| Channel 01:                                     | 2422 MHz  | Channel 02: | 2427 MHz  | Channel 03: | 2432 MHz  | Channel 04: | 2437 MHz  |
| Channel 05:                                     | 2442 MHz  | Channel 06: | 2447 MHz  | Channel 07: | 2452 MHz  |             |           |
|   |           |             |           |             |           |             |           |

- 1. The EUT is a 802.11 b/g/n, 2.4G 1T1R, Wireless USB Module with a built-in 2.4GHz transceiver.
- 2. Regarding to the operation frequency, the lowest, middle and highest frequency are selected to perform the test.
- 3. Lowest and highest data rates are tested in each mode. Only worst case is shown in the report. (802.11b is 1Mbps \$\$\times\$ 802.11g is 6Mbps \$\$802.11n(20M-BW) is 7.2Mbps and \$\$802.11n(40M-BW) is 15Mbps).
- 4. These tests are conducted on a sample for the purpose of demonstrating compliance of 802.11b/g/n transmitter with Part 15 Subpart C Paragraph 15.247 of spread spectrum devices.

## **1.2. Operational Description**

The EUT is a 802.11 b/g/n, 2.4G 1T1R, Wireless USB Module, This device provided four kinds of transmitting speed 1, 2, 5.5 and 11Mbps and the device of RF carrier is DBPSK, DQPSK and CCK (IEEE 802.11b). The device provided of eight kinds of transmitting speed 6, 9, 12, 18, 24, 36, 48 and 54Mbps the device of RF carrier is BPSK, QPSK, 16QAM and 64QAM (IEEE 802.11g).

The device provided of eight kinds of transmitting speed 7.2,14.4,21.7,28.9,43.3,57.8,65 and 72.2Mbps in 802.11n(20M-BW) mode and 15,30,45,60,90,120,135 and 150 Mbps (40M-BW) the device of RF carrier is BPSK, QPSK, 16QAM and 64QAM (IEEE 802.11n).

This 802.11 b/g/n, 2.4G 1T1R, Wireless USB Module, compliant with IEEE 802.11b and IEEE 802.11g/n, is a high-efficiency Wireless LAN adapter. It allows your computer to connect to a wireless network and to share resources, such as files or printers without being bound to the network wires. Operation in 2.4GHz Direst Sequence Spread Spectrum (DSSS) and Orthogonal Frequency Division Multiplexing (OFDM) radio transmission, the 802.11 b/g/n, 2.4G 1T1R, Wireless USB Module Wired Equivalent Protection (WEP) algorithm is used. In addition, its standard compliance ensures that it can communicate with any IEEE 802.11b and IEEE 802.11g/n network.

| Test Mode: | Mode 1: Transmit (802.11b 1Mbps)               |
|------------|--|
|            | Mode 2: Transmit (802.11g 6Mbps)               |
|            | Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW) |
|            | Mode 4: Transmit (802.11n MCS0 15Mbps 40M-BW)  |

## **1.3.** Tested System Details

The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are:

| Pro | duct                     | Manufacturer | Model No. | Serial No.   | FCC ID     | Power Cord         |
|-----|--------------------------|--------------|-----------|--------------|------------|--------------------|
| 1   | Modem                    | ACEEX        | DM-1414   | 0102027533   | IFAXDM1414 | Non-Shielded, 1.8m |
| 2   | Notebook PC              | DELL         | РРТ       | N/A          | DoC        | Non-Shielded, 0.8m |
| 3   | Microphone &<br>Earphone | Lobos        | LB-EW020  | N/A          | N/A        | N/A                |
| 4   | USB Mouse                | DELL         | MO56UC    | G0X01JHA     | DoC        | N/A                |
| 5   | Monitor                  | LG           | W2261VT   | 907YHED07299 | DoC        | Non-Shielded, 1.8m |

| Signal Cable Type |                             | Signal cable Description                       |
|-------------------|-----------------------------|--|
| Α                 | RS-232 Cable                | Non-Shielded, 1.2m                             |
| В                 | VGA Cable                   | Shielded, 1.8m, with two ferrite cores bonded. |
| С                 | Mouse Cable                 | Non-Shielded, 2.0m                             |
| D                 | USB Cable                   | Non-Shielded, 0.1m                             |
| Е                 | Microphone & Earphone Cable | Non-Shielded, 1.5m                             |

# **1.4.** Configuration of Tested System



#### **1.5.** EUT Exercise Software

- (1) Setup the EUT as shown in Section 1.4
- (2) Execute Command on the Notebook.
- (3) Configure the test mode, the test channel, and the data rate.
- (4) Press "OK" to start the continuous transmission.
- (5) Verify that the EUT works properly.

### 1.6. Test Facility

Ambient conditions in the laboratory:

| Items                      | Required (IEC 68-1) | Actual   |
|----------------------------|---------------------|----------|
| Temperature (°C)           | 15-35               | 20-35    |
| Humidity (%RH)             | 25-75               | 50-65    |
| Barometric pressure (mbar) | 860-1060            | 950-1000 |

The related certificate for our laboratories about the test site and management system can be downloaded from

QuieTek Corporation's Web Site: <u>http://www.quietek.com/tw/ctg/cts/accreditations.htm</u> The address and introduction of QuieTek Corporation's laboratories can be founded in our Web site: <u>http://www.quietek.com/</u>

Site Description: File on Federal Communications Commission FCC Engineering Laboratory 7435 Oakland Mills Road Columbia, MD 21046 Registration Number: 92195

> Accreditation on NVLAP NVLAP Lab Code: 200533-0





Site Name: Quietek Corporation Site Address: No. 5-22, Ruei-Shu Valley, Ruei-Ping Tsuen, Lin-Kou Shiang, Taipei, Taiwan, R.O.C. TEL: 886-2-8601-3788 / FAX : 886-2-8601-3789 E-Mail : <u>service@quietek.com</u>

FCC Accreditation Number: TW1014



# 2. Conducted Emission

## 2.1. Test Equipment

The following test equipment are used during the conducted emission test:

| Item | Instrument         | Manufacturer | Type No./Serial No | Last Cal. | Remark      |
|------|--------------------|--------------|--------------------|-----------|-------------|
| 1    | Test Receiver      | R & S        | ESCS 30/825442/17  | May, 2010 |             |
| 2    | L.I.S.N.           | R & S        | ESH3-Z5/825016/6   | May, 2010 | EUT         |
| 3    | L.I.S.N.           | Kyoritsu     | KNW-407/8-1420-3   | May, 2010 | Peripherals |
| 4    | Pulse Limiter      | R & S        | ESH3-Z2            | May, 2010 |             |
| 5    | No.1 Shielded Roor | n            |                    | N/A       |             |

Note: All instruments are calibrated every one year.

# 2.2. Test Setup



### 2.3. Limits

| FCC Part 15 Subpart C Paragraph 15.207 (dBuV) Limit |        |       |  |  |  |  |  |  |  |  |
|---|--------|-------|--|--|--|--|--|--|--|--|
| Frequency   | Limits |       |  |  |  |  |  |  |  |  |
| MHz   | QP     | AVG   |  |  |  |  |  |  |  |  |
| 0.15 - 0.50   | 66-56  | 56-46 |  |  |  |  |  |  |  |  |
| 0.50-5.0  | 56     | 46    |  |  |  |  |  |  |  |  |
| 5.0 - 30  | 60     | 50    |  |  |  |  |  |  |  |  |

#### 2.4. Test Procedure

The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm /50uH coupling impedance for the measuring equipment. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm /50uH coupling impedance with 50ohm termination. (Please refers to the block diagram of the test setup and photographs.)

Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4: 2003 on conducted measurement.

Conducted emissions were invested over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

#### 2.5. Uncertainty

± 2.26 dB

#### 2.6. Test Result of Conducted Emission

| Product    | : | 802.11 b/g/n, 2.4G 1T1R, Wireless USB Module            |
|------------|---|---|
| Test Item  | : | Conducted Emission Test                                 |
| Power Line | : | Line 1  |
| Test Mode  | : | Mode 4: Transmit (802.11n MCS0 15Mbps 40M-BW) (2437MHz) |

|   | Frequency  | Correct | Reading | Measurement | Margin  | Limit  |  |
|---|------------|---------|---------|-------------|---------|--------|--|
|   |            | Factor  | Level   | Level       |         |        |  |
| _ | MHz        | dB      | dBuV    | dBuV        | dB      | dBuV   |  |
|   | Line 1     |         |         |             |         |        |  |
|   | Quasi-Peak |         |         |             |         |        |  |
|   | 0.181      | 9.724   | 49.150  | 58.874      | -6.240  | 65.114 |  |
|   | 0.205      | 9.703   | 29.380  | 39.083      | -25.346 | 64.429 |  |
|   | 0.240      | 9.680   | 37.730  | 47.410      | -16.019 | 63.429 |  |
|   | 0.306      | 9.650   | 31.410  | 41.060      | -20.483 | 61.543 |  |
|   | 0.361      | 9.650   | 28.370  | 38.020      | -21.951 | 59.971 |  |
|   | 4.193      | 9.700   | 28.010  | 37.710      | -18.290 | 56.000 |  |
|   |            |         |         |             |         |        |  |
|   | Average    |         |         |             |         |        |  |
|   | 0.181      | 9.724   | 39.050  | 48.774      | -6.340  | 55.114 |  |
|   | 0.205      | 9.703   | 7.300   | 17.003      | -37.426 | 54.429 |  |
|   | 0.240      | 9.680   | 29.990  | 39.670      | -13.759 | 53.429 |  |
|   | 0.306      | 9.650   | 24.890  | 34.540      | -17.003 | 51.543 |  |
|   | 0.361      | 9.650   | 21.120  | 30.770      | -19.201 | 49.971 |  |
|   | 4.193      | 9.700   | 20.500  | 30.200      | -15.800 | 46.000 |  |

Note:

1. All Reading Levels are Quasi-Peak and average value.

2. "means the worst emission level.

3. Measurement Level = Reading Level + Correct Factor

| Product    | : 802.11 b/g | /n, 2.4G 1T1R,  | Wireless USB Modul | le            |        |
|------------|--------------|-----------------|--------------------|---------------|--------|
| Test Item  | : Conducted  | l Emission Test |                    |               |        |
| Power Line | : Line 2     |                 |                    |               |        |
| Test Mode  | : Mode 4: T  | ransmit (802.11 | n MCS0 15Mbps 40N  | M-BW) (2437MH | [z)    |
|            |              |                 |                    |               |        |
| Frequency  | Correct      | Reading         | Measurement        | Margin        | Limit  |
|            | Factor       | Level           | Level              |               |        |
| MHz        | dB           | dBuV            | dBuV               | dB            | dBuV   |
| Line 2     |              |                 |                    |               |        |
| Quasi-Peak |              |                 |                    |               |        |
| 0.162      | 9.751        | 34.680          | 44.431             | -21.226       | 65.657 |
| 0.181      | 9.732        | 47.950          | 57.682             | -7.432        | 65.114 |
| 0.244      | 9.689        | 37.830          | 47.519             | -15.795       | 63.314 |
| 0.302      | 9.660        | 31.750          | 41.410             | -20.247       | 61.657 |
| 0.365      | 9.651        | 28.170          | 37.821             | -22.036       | 59.857 |
| 3.763      | 9.700        | 28.280          | 37.980             | -18.020       | 56.000 |
|            |              |                 |                    |               |        |
| Average    |              |                 |                    |               |        |
| 0.162      | 9.751        | 8.340           | 18.091             | -37.566       | 55.657 |
| 0.181      | 9.732        | 37.460          | 47.192             | -7.922        | 55.114 |
| 0.244      | 9.689        | 29.300          | 38.989             | -14.325       | 53.314 |
| 0.302      | 9.660        | 25.200          | 34.860             | -16.797       | 51.657 |
| 0.365      | 9.651        | 21.730          | 31.381             | -18.476       | 49.857 |
| 3.763      | 9.700        | 20.090          | 29.790             | -16.210       | 46.000 |

- 1. All Reading Levels are Quasi-Peak and average value.
- 2. "means the worst emission level.
- 3. Measurement Level = Reading Level + Correct Factor

# 3. Peak Power Output

#### **3.1.** Test Equipment

|   | Equipment           | Manufacturer | Model No./Serial No.   | Last Cal.  |
|---|---------------------|--------------|------------------------|------------|
| Х | Power Meter         | Anritsu      | ML2495A/6K00003357     | May, 2010  |
| Х | Power Sensor        | Anritsu      | MA2411B/0738448        | Jun, 2010  |
|   | 8-WAY Power Divider | JFW          | 50PD-647 / 526770 0916 | Apr., 2010 |

Note:

1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

- 2. The test instruments marked with "X" are used to measure the final test results.
- 3. The power combiner is used for measure 11n mode.

#### 3.2. Test Setup

Conducted Measurement



#### 3.3. Limits

The maximum peak power shall be less 1 Watt.

#### **3.4.** Test Procedure

The EUT was tested according to DTS test procedure of Mar. 2005 KDB558074 for compliance to FCC 47CFR 15.247 requirements.

# 3.5. Uncertainty

± 1.27 dB

# 3.6. Test Result of Peak Power Output

| Product   | : | 802.11 b/g/n, 2.4G 1T1R, Wireless USB Module |
|-----------|---|--|
| Test Item | : | Peak Power Output Data                       |
| Test Site | : | No.3 OATS                                    |
| Test Mode | : | Mode 1: Transmit (802.11b 1Mbps)             |

| Channal No. | Frequency | For d | Average<br>ifferent Da | e Power<br>ata Rate (N | /lbps) | Peak<br>Power | Required | Pogult |
|-------------|-----------|-------|------------------------|------------------------|--------|---------------|----------|--------|
| Channel No  | (MHz)     | 1     | 2                      | 5.5                    | 11     | 1             | Limit    | Kesuit |
|             |           |       | Measur                 |                        |        |               |          |        |
| 01          | 2412      | 20.40 | 19.81                  | 19.51                  | 19.62  | 23.00         | <30dBm   | Pass   |
| 06          | 2437      | 19.80 |                        |                        |        | 22.50         | <30dBm   | Pass   |
| 11          | 2462      | 19.43 |                        |                        |        | 22.14         | <30dBm   | Pass   |

| Product   | : | 802.11 b/g/n, 2.4G 1T1R, Wireless USB Module |
|-----------|---|--|
| Test Item | : | Peak Power Output Data                       |
| Test Site | : | No.3 OATS                                    |
| Test Mode | : | Mode 2: Transmit (802.11g 6Mbps)             |

|            | Fraguancy |       | F     | For diffe | Average<br>erent Da | e Power<br>ata Rate | r<br>e (Mbps | 5)    |       | Peak<br>Power | Pequired |        |
|------------|-----------|-------|-------|-----------|---------------------|---------------------|--------------|-------|-------|---------------|----------|--------|
| Channel No | (MHz)     | 6     | 9     | 12        | 18                  | 24                  | 36           | 48    | 54    | 6             | Limit    | Result |
|            |           |       |       | Ν         | Measure             | ement L             | level (d     | Bm)   |       |               |          |        |
| 01         | 2412      | 14.70 | 13.77 | 13.91     | 13.81               | 13.92               | 13.72        | 14.12 | 14.07 | 22.15         | <30dBm   | Pass   |
| 06         | 2437      | 14.52 |       |           |                     |                     |              |       |       | 22.03         | <30dBm   | Pass   |
| 11         | 2462      | 12.81 |       |           |                     |                     |              |       |       | 20.32         | <30dBm   | Pass   |

- Product : 802.11 b/g/n, 2.4G 1T1R, Wireless USB Module
- Test Item : Peak Power Output Data
- Test Site : No.3 OATS
- Test Mode : Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW)

|            |           |       | Average Power     Peak |           |          |          |          |      |       |       |          |        |
|------------|-----------|-------|------------------------|-----------|----------|----------|----------|------|-------|-------|----------|--------|
|            | Fraguancy |       | F                      | For diffe | erent Da | ata Rate | e (Mbps  | s)   |       | Power | Pequired |        |
| Channel No | (MHz)     | 7.2   | 14.4                   | 21.7      | 28.9     | 43.3     | 57.8     | 65   | 72.2  | 7.2   | Limit    | Result |
|            |           |       |                        | Ν         | Measure  | ement L  | .evel (d | Bm)  |       |       |          |        |
| 01         | 2412      | 13.50 | 13.29                  | 13.15     | 13.15    | 12.98    | 12.85    | 12.8 | 12.79 | 21.15 | <30dBm   | Pass   |
| 06         | 2437      | 11.56 |                        |           |          |          | -        | -    |       | 20.17 | <30dBm   | Pass   |
| 11         | 2462      | 12.05 |                        |           |          |          |          |      |       | 20.62 | <30dBm   | Pass   |

| Product   | : | 802.11 b/g/n, 2.4G 1T1R, Wireless USB Module  |
|-----------|---|---|
| Test Item | : | Peak Power Output Data                        |
| Test Site | : | No.3 OATS                                     |
| Test Mode | : | Mode 4: Transmit (802.11n MCS0 15Mbps 40M-BW) |

|            |           |       | Average Power                        |       |       |       |       | Peak  |          |       |        |        |
|------------|-----------|-------|--------------------------------------|-------|-------|-------|-------|-------|----------|-------|--------|--------|
|            | Frequency |       | For different Data Rate (Mbps) Power |       |       |       |       |       | Required |       |        |        |
| Channel No | (MHz)     | 15    | 30                                   | 45    | 60    | 90    | 120   | 135   | 150      | 15    | Limit  | Result |
|            |           |       | Measurement Level (dBm)              |       |       |       |       |       |          |       |        |        |
| 01         | 2422      | 12.57 | 12.18                                | 12.14 | 12.02 | 11.95 | 11.91 | 11.71 | 12.36    | 21.59 | <30dBm | Pass   |
| 04         | 2437      | 12.45 |                                      |       |       |       |       |       |          | 21.05 | <30dBm | Pass   |
| 07         | 2452      | 12.35 |                                      |       |       |       |       |       |          | 20.67 | <30dBm | Pass   |

# 4. Radiated Emission

#### 4.1. Test Equipment

The following test equipment are used during the radiated emission test:

| Test Site |   | Equipment         | Manufacturer    | Model No./Serial No.  | Last Cal.  |
|-----------|---|-------------------|-----------------|-----------------------|------------|
| Site # 3  | Х | Bilog Antenna     | Schaffner Chase | CBL6112B/2673         | Sep., 2010 |
|           | Х | Horn Antenna      | Schwarzbeck     | BBHA9120D/D305        | Sep., 2010 |
|           | Х | Horn Antenna      | Schwarzbeck     | BBHA9170/208          | Jul., 2010 |
|           | Х | Pre-Amplifier     | Agilent         | 8447D/2944A09549      | Sep., 2010 |
|           | Х | Spectrum Analyzer | Agilent         | E4407B / US39440758   | May, 2010  |
|           | Х | Test Receiver     | R & S           | ESCS 30/ 825442/018   | Sep., 2010 |
|           | Х | Coaxial Cable     | QuieTek         | QTK-CABLE/ CAB5       | Feb., 2010 |
|           | Х | Controller        | QuieTek         | QTK-CONTROLLER/ CTRL3 | N/A        |
|           | Х | Coaxial Switch    | Anritsu         | MP59B/6200265729      | N/A        |

Note: 1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

2. The test instruments marked with "X" are used to measure the final test results.

#### 4.2. Test Setup

Radiated Emission Below 1GHz



Radiated Emission Above 1GHz



# 4.3. Limits

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 20dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

| FCC Part 15 Subpart C Paragraph 15.209(a) Limits |          |           |  |  |  |  |
|--|----------|-----------|--|--|--|--|
| Frequency<br>MHz                                 | uV/m @3m | dBuV/m@3m |  |  |  |  |
| 30-88  | 100      | 40        |  |  |  |  |
| 88-216   | 150      | 43.5      |  |  |  |  |
| 216-960  | 200      | 46        |  |  |  |  |
| Above 960  | 500      | 54        |  |  |  |  |

Remarks: E field strength  $(dBuV/m) = 20 \log E$  field strength (uV/m)

#### 4.4. Test Procedure

The EUT was setup according to ANSI C63.4, 2003 and tested according to DTS test procedure of Mar. 2005 KDB558074 for compliance to FCC 47CFR 15.247 requirements.

The EUT is placed on a turn table which is 0.8 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna is scanned between 1 meter and 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.4:2003 on radiated measurement.

The resolution bandwidth below 1GHz setting on the field strength meter is 120 kHz and above 1GHz is 1MHz.

Radiated emission measurements below 1GHz are made using broadband Bilog antenna and above 1GHz are made using Horn Antennas.

The measurement is divided into the Preliminary Measurement and the Final Measurement. The suspected frequencies are searched for in Preliminary Measurement with the measurement antenna kept pointed at the source of the emission both in azimuth and elevation, with the polarization of the antenna oriented for maximum response. The antenna is pointed at an angle towards the source of the emission, and the EUT is rotated in both height and polarization to maximize the measured emission. The emission is kept within the illumination area of the 3 dB bandwidth of the antenna. The worst radiated emission is measured in the Open Area Test Site on the Final Measurement. The frequency range from 30MHz to 10th harminics is checked.

#### 4.5. Uncertainty

- ± 3.9 dB above 1GHz
- ± 3.8 dB below 1GHz

#### 4.6. Test Result of Radiated Emission

| Product   | : | 802.11 b/g/n, 2.4G 1T1R, Wireless USB Module |
|-----------|---|--|
| Test Item | : | Harmonic Radiated Emission Data              |
| Test Site | : | No.3 OATS                                    |
| Test Mode | : | Mode 1: Transmit (802.11b 1Mbps) (2412MHz)   |

| Frequency        | Correct | Reading | Measurement | Margin  | Limit  |
|------------------|---------|---------|-------------|---------|--------|
|                  | Factor  | Level   | Level       |         |        |
| MHz              | dB      | dBuV    | dBuV/m      | dB      | dBuV/m |
| Horizontal       |         |         |             |         |        |
| Peak Detector:   |         |         |             |         |        |
| 4824.000         | 3.261   | 39.140  | 42.401      | -31.599 | 74.000 |
| 7236.000         | 10.650  | 36.830  | 47.480      | -26.520 | 74.000 |
| 9648.000         | 13.337  | 36.730  | 50.066      | -23.934 | 74.000 |
| Average          |         |         |             |         |        |
| <b>Detector:</b> |         |         |             |         |        |
|                  |         |         |             |         |        |
| Vertical         |         |         |             |         |        |
| Peak Detector:   |         |         |             |         |        |
| 4824.000         | 6.421   | 38.240  | 44.661      | -29.339 | 74.000 |
| 7236.000         | 11.495  | 37.100  | 48.595      | -25.405 | 74.000 |
| 9648.000         | 13.807  | 37.120  | 50.926      | -23.074 | 74.000 |
|                  |         |         |             |         |        |

#### Average

#### **Detector:**

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- 1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- 3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
- 4. Measurement Level = Reading Level + Correct Factor.
- 5. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.
- 7. The emission levels of other frequencies are very lower than the limit and not show in test report.

| Product        | : 802.11 b/g/n, 2.4G 1T1R, Wireless USB Module |                   |                   |         |        |  |
|----------------|--|-------------------|-------------------|---------|--------|--|
| Test Item      | : Harmon                                       | ic Radiated Emiss | sion Data         |         |        |  |
| Test Site      | : No.3 OA                                      | ATS               |                   |         |        |  |
| Test Mode      | : Mode 1:                                      | Transmit (802.11  | b 1Mbps) (2437 MH | z)      |        |  |
|                |  |                   |                   |         |        |  |
| Frequency      | Correct  | Reading           | Measurement       | Margin  | Limit  |  |
|                | Factor   | Level             | Level             |         |        |  |
| MHz            | dB   | dBuV              | dBuV/m            | dB      | dBuV/m |  |
| Horizontal     |  |                   |                   |         |        |  |
| Peak Detector: |  |                   |                   |         |        |  |
| 4874.000       | 3.038  | 37.690            | 40.727            | -33.273 | 74.000 |  |
| 7311.000       | 11.795   | 36.330            | 48.124            | -25.876 | 74.000 |  |
| 9748.000       | 12.635   | 37.160            | 49.795            | -24.205 | 74.000 |  |
| Average        |  |                   |                   |         |        |  |
| Detector:      |  |                   |                   |         |        |  |
|                |  |                   |                   |         |        |  |
| Vertical       |  |                   |                   |         |        |  |
| Peak Detector: |  |                   |                   |         |        |  |
| 4874.000       | 5.812  | 40.320            | 46.131            | -27.869 | 74.000 |  |
| 7311.000       | 12.630   | 35.790            | 48.419            | -25.581 | 74.000 |  |
| 9748.000       | 13.126   | 37.150            | 50.276            | -23.724 | 74.000 |  |
| Average        |  |                   |                   |         |        |  |

#### **Detector:**

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- 1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- 3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
- 4. Measurement Level = Reading Level + Correct Factor.
- 5. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.
- 7. The emission levels of other frequencies are very lower than the limit and not show in test report.

| Product               | : 802.11 b/g/n, 2.4G 1T1R, Wireless USB Module |                  |                   |         |        |  |
|-----------------------|--|------------------|-------------------|---------|--------|--|
| Test Item             | : Harmonic Radiated Emission Data              |                  |                   |         |        |  |
| Test Site             | : No.3 OATS                                    |                  |                   |         |        |  |
| Test Mode             | : Mode 1:                                      | Transmit (802.11 | b 1Mbps) (2462 MH | z)      |        |  |
|                       |  |                  |                   |         |        |  |
| Frequency             | Correct  | Reading          | Measurement       | Margin  | Limit  |  |
|                       | Factor   | Level            | Level             |         |        |  |
| MHz                   | dB   | dBuV             | dBuV/m            | dB      | dBuV/m |  |
| Horizontal            |  |                  |                   |         |        |  |
| Peak Detector:        |  |                  |                   |         |        |  |
| 4924.000              | 2.858  | 37.520           | 40.377            | -33.623 | 74.000 |  |
| 7386.000              | 12.127   | 35.970           | 48.098            | -25.902 | 74.000 |  |
| 9848.000              | 12.852   | 36.510           | 49.363            | -24.637 | 74.000 |  |
| Average               |  |                  |                   |         |        |  |
| Detector:             |  |                  |                   |         |        |  |
|                       |  |                  |                   |         |        |  |
| Vertical              |  |                  |                   |         |        |  |
| <b>Peak Detector:</b> |  |                  |                   |         |        |  |
| 4924.000              | 5.521  | 38.410           | 43.930            | -30.070 | 74.000 |  |
| 7386.000              | 13.254   | 35.710           | 48.964            | -25.036 | 74.000 |  |
| 9848.000              | 13.367   | 36.470           | 49.837            | -24.163 | 74.000 |  |
|                       |  |                  |                   |         |        |  |

- **Detector:** 
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- 1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- 3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
- 4. Measurement Level = Reading Level + Correct Factor.
- 5. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.
- 7. The emission levels of other frequencies are very lower than the limit and not show in test report.

| Product        | : 802.11 b/g/n, 2.4G 1T1R, Wireless USB Module |                                   |                    |         |        |  |  |
|----------------|--|-----------------------------------|--------------------|---------|--------|--|--|
| Test Item      | : Harmon                                       | : Harmonic Radiated Emission Data |                    |         |        |  |  |
| Test Site      | : No.3 OA                                      | ATS                               |                    |         |        |  |  |
| Test Mode      | : Mode 2                                       | : Transmit (802.11                | lg 6Mbps) (2412MHz | z)      |        |  |  |
|                |  |                                   |                    |         |        |  |  |
| Frequency      | Correct  | Reading                           | Measurement        | Margin  | Limit  |  |  |
|                | Factor   | Level                             | Level              |         |        |  |  |
| MHz            | dB   | dBuV                              | dBuV/m             | dB      | dBuV/m |  |  |
| Horizontal     |  |                                   |                    |         |        |  |  |
| Peak Detector: |  |                                   |                    |         |        |  |  |
| 4824.000       | 3.261  | 41.170                            | 44.431             | -29.569 | 74.000 |  |  |
| 7236.000       | 10.650   | 36.790                            | 47.440             | -26.560 | 74.000 |  |  |
| 9648.000       | 13.337   | 37.230                            | 50.566             | -23.434 | 74.000 |  |  |
|                |  |                                   |                    |         |        |  |  |
| Average        |  |                                   |                    |         |        |  |  |
| Detector:      |  |                                   |                    |         |        |  |  |
|                |  |                                   |                    |         |        |  |  |
| Vertical       |  |                                   |                    |         |        |  |  |
| Peak Detector: |  |                                   |                    |         |        |  |  |
| 4824.000       | 6.421  | 41.780                            | 48.201             | -25.799 | 74.000 |  |  |
| 7236.000       | 11.495   | 36.660                            | 48.155             | -25.845 | 74.000 |  |  |
| 9648.000       | 13.807   | 36.630                            | 50.436             | -23.564 | 74.000 |  |  |
| Average        |  |                                   |                    |         |        |  |  |

# **Detector:**

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- 1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- 3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
- 4. Measurement Level = Reading Level + Correct Factor.
- 5. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.
- 7. The emission levels of other frequencies are very lower than the limit and not show in test report.

| Product               | : 802.11 b/g/n, 2.4G 1T1R, Wireless USB Module |                  |                    |         |        |  |  |
|-----------------------|--|------------------|--------------------|---------|--------|--|--|
| Test Item             | : Harmonic Radiated Emission Data              |                  |                    |         |        |  |  |
| Test Site             | : No.3 OA                                      | : No.3 OATS      |                    |         |        |  |  |
| Test Mode             | : Mode 2:                                      | Transmit (802.11 | lg 6Mbps) (2437 MH | z)      |        |  |  |
|                       |  |                  |                    |         |        |  |  |
| Frequency             | Correct  | Reading          | Measurement        | Margin  | Limit  |  |  |
|                       | Factor   | Level            | Level              |         |        |  |  |
| MHz                   | dB   | dBuV             | dBuV/m             | dB      | dBuV/m |  |  |
| Horizontal            |  |                  |                    |         |        |  |  |
| <b>Peak Detector:</b> |  |                  |                    |         |        |  |  |
| 4874.000              | 3.038  | 37.650           | 40.687             | -33.313 | 74.000 |  |  |
| 7311.000              | 11.795   | 35.810           | 47.604             | -26.396 | 74.000 |  |  |
| 9748.000              | 12.635   | 37.280           | 49.915             | -24.085 | 74.000 |  |  |
| Avonago               |  |                  |                    |         |        |  |  |
| Average<br>Dotootor:  |  |                  |                    |         |        |  |  |
| Detector.             |  |                  |                    |         |        |  |  |
|                       |  |                  |                    |         |        |  |  |
| Peak Detector:        |  |                  |                    |         |        |  |  |
| 4874.000              | 5.812  | 41.160           | 46.971             | -27.029 | 74.000 |  |  |
| 7311.000              | 12.630   | 35.880           | 48.509             | -25.491 | 74.000 |  |  |
| 9748.000              | 13.126   | 37.250           | 50.376             | -23.624 | 74.000 |  |  |
| Average               |  |                  |                    |         |        |  |  |
| Detector:             |  |                  |                    |         |        |  |  |

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- 1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- 3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
- 4. Measurement Level = Reading Level + Correct Factor.
- 5. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.
- 7. The emission levels of other frequencies are very lower than the limit and not show in test report.

| Product              | : 802.11 b/g/n, 2.4G 1T1R, Wireless USB Module |                  |                   |         |        |  |  |
|----------------------|--|------------------|-------------------|---------|--------|--|--|
| Test Item            | : Harmonic Radiated Emission Data              |                  |                   |         |        |  |  |
| Test Site            | : No.3 OA                                      | : No.3 OATS      |                   |         |        |  |  |
| Test Mode            | : Mode 2:                                      | Transmit (802.11 | g 6Mbps) (2462 MH | z)      |        |  |  |
|                      |  |                  |                   |         |        |  |  |
| Frequency            | Correct  | Reading          | Measurement       | Margin  | Limit  |  |  |
|                      | Factor   | Level            | Level             |         |        |  |  |
| MHz                  | dB   | dBuV             | dBuV/m            | dB      | dBuV/m |  |  |
| Horizontal           |  |                  |                   |         |        |  |  |
| Peak Detector:       |  |                  |                   |         |        |  |  |
| 4924.000             | 2.858  | 37.850           | 40.707            | -33.293 | 74.000 |  |  |
| 7386.000             | 12.127   | 35.260           | 47.388            | -26.612 | 74.000 |  |  |
| 9848.000             | 12.852   | 37.180           | 50.033            | -23.967 | 74.000 |  |  |
| Avorago              |  |                  |                   |         |        |  |  |
| Average<br>Detector: |  |                  |                   |         |        |  |  |
|                      |  |                  |                   |         |        |  |  |
| Vertical             |  |                  |                   |         |        |  |  |
| Peak Detector:       |  |                  |                   |         |        |  |  |
| 4924.000             | 5.521  | 42.620           | 48.140            | -25.860 | 74.000 |  |  |
| 7386.000             | 13.254   | 35.790           | 49.044            | -24.956 | 74.000 |  |  |
| 9848.000             | 13.367   | 36.780           | 50.147            | -23.853 | 74.000 |  |  |
|                      |  |                  |                   |         |        |  |  |

- **Detector:** 
  - --

- 1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- 3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
- 4. Measurement Level = Reading Level + Correct Factor.
- 5. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.
- 7. The emission levels of other frequencies are very lower than the limit and not show in test report.

| Product        | : 802.11 b/g/n, 2.4G 1T1R, Wireless USB Module |                  |                   |              |        |  |
|----------------|--|------------------|-------------------|--------------|--------|--|
| Test Item      | : Harmonic Radiated Emission Data              |                  |                   |              |        |  |
| Test Site      | : No.3 OATS                                    |                  |                   |              |        |  |
| Test Mode      | : Mode 3:                                      | Transmit (802.11 | n MCS0 7.2Mbps 20 | M-BW)(2412MH | Iz)    |  |
|                |  |                  |                   |              |        |  |
| Frequency      | Correct  | Reading          | Measurement       | Margin       | Limit  |  |
|                | Factor   | Level            | Level             |              |        |  |
| MHz            | dB   | dBuV             | dBuV/m            | dB           | dBuV/m |  |
| Horizontal     |  |                  |                   |              |        |  |
| Peak Detector: |  |                  |                   |              |        |  |
| 4824.000       | 3.261  | 38.540           | 41.801            | -32.199      | 74.000 |  |
| 7236.000       | 10.650   | 36.970           | 47.620            | -26.380      | 74.000 |  |
| 9648.000       | 13.337   | 36.800           | 50.136            | -23.864      | 74.000 |  |
| Average        |  |                  |                   |              |        |  |
| Detector:      |  |                  |                   |              |        |  |
|                |  |                  |                   |              |        |  |
| Vertical       |  |                  |                   |              |        |  |
| Peak Detector: |  |                  |                   |              |        |  |
| 4824.000       | 6.421  | 40.610           | 47.031            | -26.969      | 74.000 |  |
| 7236.000       | 11.495   | 36.560           | 48.055            | -25.945      | 74.000 |  |
| 9648.000       | 13.807   | 36.500           | 50.306            | -23.694      | 74.000 |  |
|                |  |                  |                   |              |        |  |

# Detector:

- 1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- 3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
- 4. Measurement Level = Reading Level + Correct Factor.
- 5. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.
- 7. The emission levels of other frequencies are very lower than the limit and not show in test report.

| Product :        | 802.11 b/g/n, 2.4G 1T1R, Wireless USB Module |                                 |                    |           |        |  |  |
|------------------|--|---------------------------------|--------------------|-----------|--------|--|--|
| Test Item :      | Harmonic Radiate                             | Harmonic Radiated Emission Data |                    |           |        |  |  |
| Test Site :      | No.3 OATS                                    |                                 |                    |           |        |  |  |
| Test Mode :      | Mode 3: Transmit                             | (802.11n MCS0 <sup>2</sup>      | 7.2Mbps 20M-BW) (2 | 2437 MHz) |        |  |  |
| Frequency        | Correct                                      | Reading                         | Measurement        | Margin    | Limit  |  |  |
|                  | Factor                                       | Level                           | Level              |           |        |  |  |
| MHz              | dB   | dBuV                            | dBuV/m             | dB        | dBuV/m |  |  |
| Horizontal       |  |                                 |                    |           |        |  |  |
| Peak Detector    | :  |                                 |                    |           |        |  |  |
| 4874.000         | 3.038  | 37.330                          | 40.367             | -33.633   | 74.000 |  |  |
| 7311.000         | 11.795                                       | 35.930                          | 47.724             | -26.276   | 74.000 |  |  |
| 9748.000         | 12.635                                       | 36.530                          | 49.165             | -24.835   | 74.000 |  |  |
| Average          |  |                                 |                    |           |        |  |  |
| <b>Detector:</b> |  |                                 |                    |           |        |  |  |
|                  |  |                                 |                    |           |        |  |  |
| Vertical         |  |                                 |                    |           |        |  |  |
| Peak Detector    | :  |                                 |                    |           |        |  |  |
| 4874.000         | 5.812  | 47.340                          | 53.151             | -20.849   | 74.000 |  |  |
| 7311.000         | 12.630                                       | 35.650                          | 48.279             | -25.721   | 74.000 |  |  |
| 9748.000         | 13.126                                       | 36.990                          | 50.116             | -23.884   | 74.000 |  |  |

Detector:

- 1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- 3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
- 4. Measurement Level = Reading Level + Correct Factor.
- 5. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.
- 7. The emission levels of other frequencies are very lower than the limit and not show in test report.

| Product   | : | 802.11 b/g/n, 2.4G 1T1R, Wireless USB Module              |
|-----------|---|---|
| Test Item | : | Harmonic Radiated Emission Data                           |
| Test Site | : | No.3 OATS   |
| Test Mode | : | Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW) (2462 MHz) |

| Frequency        | Correct | Reading | Measurement | Margin  | Limit  |
|------------------|---------|---------|-------------|---------|--------|
|                  | Factor  | Level   | Level       |         |        |
| MHz              | dB      | dBuV    | dBuV/m      | dB      | dBuV/m |
| Horizontal       |         |         |             |         |        |
| Peak Detector:   |         |         |             |         |        |
| 4924.000         | 2.858   | 37.310  | 40.167      | -33.833 | 74.000 |
| 7386.000         | 12.127  | 35.600  | 47.728      | -26.272 | 74.000 |
| 9648.000         | 13.337  | 36.720  | 50.056      | -23.944 | 74.000 |
| Average          |         |         |             |         |        |
| <b>Detector:</b> |         |         |             |         |        |
|                  |         |         |             |         |        |
| Vertical         |         |         |             |         |        |
| Peak Detector:   |         |         |             |         |        |
| 4924.000         | 5.521   | 40.020  | 45.540      | -28.460 | 74.000 |
| 7386.000         | 13.254  | 35.730  | 48.984      | -25.016 | 74.000 |
| 9848.000         | 13.367  | 36.930  | 50.297      | -23.703 | 74.000 |

Detector:

- 1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- 3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
- 4. Measurement Level = Reading Level + Correct Factor.
- 5. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.
- 7. The emission levels of other frequencies are very lower than the limit and not show in test report.



| Product   | : | 802.11 b/g/n, 2.4G 1T1R, Wireless USB Module           |
|-----------|---|--|
| Test Item | : | Harmonic Radiated Emission Data                        |
| Test Site | : | No.3 OATS  |
| Test Mode | : | Mode 4: Transmit (802.11n MCS0 15Mbps 40M-BW)(2422MHz) |

| Frequency        | Correct | Reading | Measurement | Margin  | Limit  |
|------------------|---------|---------|-------------|---------|--------|
|                  | Factor  | Level   | Level       |         |        |
| MHz              | dB      | dBuV    | dBuV/m      | dB      | dBuV/m |
| Horizontal       |         |         |             |         |        |
| Peak Detector:   |         |         |             |         |        |
| 4844.000         | 3.171   | 37.860  | 41.031      | -32.969 | 74.000 |
| 7266.000         | 11.162  | 36.430  | 47.592      | -26.408 | 74.000 |
| 9688.000         | 12.964  | 36.930  | 49.895      | -24.105 | 74.000 |
| Average          |         |         |             |         |        |
| <b>Detector:</b> |         |         |             |         |        |
|                  |         |         |             |         |        |
| Vertical         |         |         |             |         |        |
| Peak Detector:   |         |         |             |         |        |
| 4844.000         | 6.178   | 39.320  | 45.498      | -28.502 | 74.000 |
| 7266.000         | 11.982  | 37.060  | 49.042      | -24.958 | 74.000 |
| 9688.000         | 13.507  | 37.380  | 50.888      | -23.112 | 74.000 |
|                  |         |         |             |         |        |

Detector:

- 1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- 3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
- 4. Measurement Level = Reading Level + Correct Factor.
- 5. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.
- 7. The emission levels of other frequencies are very lower than the limit and not show in test report.

| Product               | : 802.11 b/g/n, 2.4G 1T1R, Wireless USB Module |                  |                   |                |        |  |
|-----------------------|--|------------------|-------------------|----------------|--------|--|
| Test Item             | : Harmonic Radiated Emission Data              |                  |                   |                |        |  |
| Test Site             | : No.3 OA                                      | ATS              |                   |                |        |  |
| Test Mode             | : Mode 4:                                      | Transmit (802.11 | n MCS0 15Mbps 401 | M-BW) (2437 MI | Hz)    |  |
|                       |  |                  |                   |                |        |  |
| Frequency             | Correct  | Reading          | Measurement       | Margin         | Limit  |  |
|                       | Factor   | Level            | Level             |                |        |  |
| MHz                   | dB   | dBuV             | dBuV/m            | dB             | dBuV/m |  |
| Horizontal            |  |                  |                   |                |        |  |
| <b>Peak Detector:</b> |  |                  |                   |                |        |  |
| 4874.000              | 3.038  | 37.800           | 40.837            | -33.163        | 74.000 |  |
| 7311.000              | 11.795   | 35.890           | 47.684            | -26.316        | 74.000 |  |
| 9748.000              | 12.635   | 36.960           | 49.595            | -24.405        | 74.000 |  |
| Average               |  |                  |                   |                |        |  |
| Detector:             |  |                  |                   |                |        |  |
|                       |  |                  |                   |                |        |  |
| Vertical              |  |                  |                   |                |        |  |
| Peak Detector:        |  |                  |                   |                |        |  |
| 4874.000              | 5.812  | 37.410           | 43.221            | -30.779        | 74.000 |  |
| 7311.000              | 12.630   | 35.960           | 48.589            | -25.411        | 74.000 |  |
| 9748.000              | 13.126   | 38.530           | 51.656            | -22.344        | 74.000 |  |

# Detector:

- 1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- 3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
- 4. Measurement Level = Reading Level + Correct Factor.
- 5. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.
- 7. The emission levels of other frequencies are very lower than the limit and not show in test report.

| Product        | : 802.11 b/g/n, 2.4G 1T1R, Wireless USB Module |                  |                   |               |        |  |
|----------------|--|------------------|-------------------|---------------|--------|--|
| Test Item      | : Harmonic Radiated Emission Data              |                  |                   |               |        |  |
| Test Site      | : No.3 OATS                                    |                  |                   |               |        |  |
| Test Mode      | : Mode 4:                                      | Transmit (802.11 | n MCS0 15Mbps 401 | M-BW)(2452 MF | Hz)    |  |
|                |  |                  |                   |               |        |  |
| Frequency      | Correct  | Reading          | Measurement       | Margin        | Limit  |  |
|                | Factor   | Level            | Level             |               |        |  |
| MHz            | dB   | dBuV             | dBuV/m            | dB            | dBuV/m |  |
| Horizontal     |  |                  |                   |               |        |  |
| Peak Detector: |  |                  |                   |               |        |  |
| 4904.000       | 2.914  | 37.450           | 40.365            | -33.635       | 74.000 |  |
| 7356.000       | 11.995   | 36.520           | 48.514            | -25.486       | 74.000 |  |
| 9808.000       | 12.475   | 36.720           | 49.195            | -24.805       | 74.000 |  |
|                |  |                  |                   |               |        |  |
| Average        |  |                  |                   |               |        |  |
| Detector:      |  |                  |                   |               |        |  |
|                |  |                  |                   |               |        |  |
| Vertical       |  |                  |                   |               |        |  |
| Peak Detector: |  |                  |                   |               |        |  |
| 4904.000       | 5.530  | 37.210           | 42.741            | -31.259       | 74.000 |  |
| 7356.000       | 13.005   | 35.780           | 48.784            | -25.216       | 74.000 |  |
| 9808.000       | 12.901   | 37.130           | 50.031            | -23.969       | 74.000 |  |

Detector:

- 1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- 3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
- 4. Measurement Level = Reading Level + Correct Factor.
- 5. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.
- 7. The emission levels of other frequencies are very lower than the limit and not show in test report.

| Product    | : 802.11 b/g/n, 2.4G 1T1R, Wireless USB Module |                    |                   |         |        |  |
|------------|--|--------------------|-------------------|---------|--------|--|
| Test Item  | : General Radiated Emission Data               |                    |                   |         |        |  |
| Test Site  | : No.3 OATS                                    |                    |                   |         |        |  |
| Test Mode  | : Mode 1                                       | : Transmit (802.11 | b 1Mbps)(2437 MHz | z)      |        |  |
|            |  |                    |                   |         |        |  |
| Frequency  | Correct  | Reading            | Measurement       | Margin  | Limit  |  |
|            | Factor   | Level              | Level             |         |        |  |
| MHz        | dB   | dBuV               | dBuV/m            | dB      | dBuV/m |  |
| Horizontal |  |                    |                   |         |        |  |
| 99.840     | -7.471   | 40.878             | 33.407            | -10.093 | 43.500 |  |
| 303.540    | -3.074   | 37.088             | 34.014            | -11.986 | 46.000 |  |
| 406.360    | -2.500   | 35.893             | 33.393            | -12.607 | 46.000 |  |
| 664.380    | 2.062  | 34.311             | 36.373            | -9.627  | 46.000 |  |
| 747.800    | 3.296  | 31.194             | 34.490            | -11.510 | 46.000 |  |
| 1000.000   | 9.119  | 33.395             | 42.514            | -11.486 | 54.000 |  |
|            |  |                    |                   |         |        |  |
| Vertical   |  |                    |                   |         |        |  |
| 53.280     | -6.022   | 33.892             | 27.870            | -12.130 | 40.000 |  |
| 99.840     | -0.021   | 34.755             | 34.734            | -8.766  | 43.500 |  |
| 342.340    | -3.542   | 38.387             | 34.845            | -11.155 | 46.000 |  |
| 710.940    | -0.234   | 32.476             | 32.242            | -13.758 | 46.000 |  |
| 833.160    | 2.263  | 36.170             | 38.433            | -7.567  | 46.000 |  |
| 1000.000   | 4.329  | 43.033             | 47.362            | -6.638  | 54.000 |  |

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- 1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- 3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
- 4. Measurement Level = Reading Level + Correct Factor.
- 5. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.
- 7. The emission levels of other frequencies are very lower than the limit and not show in test report.

| Product    | : 802.11 b/g/n, 2.4G 1T1R, Wireless USB Module |                    |                   |         |        |  |
|------------|--|--------------------|-------------------|---------|--------|--|
| Test Item  | : General Radiated Emission Data               |                    |                   |         |        |  |
| Test Site  | : No.3 OATS                                    |                    |                   |         |        |  |
| Test Mode  | : Mode 2                                       | : Transmit (802.11 | g 6Mbps)(2437 MHz | 2)      |        |  |
|            |  |                    |                   |         |        |  |
| Frequency  | Correct  | Reading            | Measurement       | Margin  | Limit  |  |
|            | Factor   | Level              | Level             |         |        |  |
| MHz        | dB   | dBuV               | dBuV/m            | dB      | dBuV/m |  |
| Horizontal |  |                    |                   |         |        |  |
| 30.000     | 2.120  | 31.790             | 33.910            | -6.090  | 40.000 |  |
| 99.840     | -7.471   | 39.985             | 32.514            | -10.986 | 43.500 |  |
| 303.540    | -3.074   | 37.364             | 34.290            | -11.710 | 46.000 |  |
| 666.320    | 2.031  | 31.954             | 33.986            | -12.014 | 46.000 |  |
| 749.740    | 3.320  | 30.436             | 33.756            | -12.244 | 46.000 |  |
| 996.120    | 7.669  | 36.017             | 43.686            | -10.314 | 54.000 |  |
|            |  |                    |                   |         |        |  |
| Vertical   |  |                    |                   |         |        |  |
| 33.880     | -1.972   | 32.351             | 30.379            | -9.621  | 40.000 |  |
| 97.900     | -1.400   | 37.953             | 36.552            | -6.948  | 43.500 |  |
| 342.340    | -3.542   | 35.443             | 31.901            | -14.099 | 46.000 |  |
| 608.120    | -1.576   | 31.538             | 29.962            | -16.038 | 46.000 |  |
| 807.940    | 3.586  | 26.253             | 29.838            | -16.162 | 46.000 |  |
| 996.120    | 4.019  | 33.555             | 37.574            | -16.426 | 54.000 |  |

- 1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- 3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
- 4. Measurement Level = Reading Level + Correct Factor.
- 5. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.
- 7. The emission levels of other frequencies are very lower than the limit and not show in test report.

| Product<br>Test Item<br>Test Site | <ul> <li>802.11 b/g/n, 2.4G 1T1R, Wireless USB Module</li> <li>General Radiated Emission Data</li> <li>No.3 OATS</li> </ul> |                  |                    |              |        |
|-----------------------------------|---|------------------|--------------------|--------------|--------|
| Test Mode                         | : Mode 3:   | Transmit (802.11 | In MCS0 7.2Mbps 20 | M-BW)(2437 M | Hz)    |
| Frequency                         | Correct   | Reading          | Measurement        | Margin       | Limit  |
|                                   | Factor  | Level            | Level              |              |        |
| MHz                               | dB  | dBuV             | dBuV/m             | dB           | dBuV/m |
| Horizontal                        |   |                  |                    |              |        |
| 43.580                            | -4.496  | 36.353           | 31.857             | -8.143       | 40.000 |
| 99.840                            | -7.471  | 39.535           | 32.064             | -11.436      | 43.500 |
| 303.540                           | -3.074  | 37.352           | 34.278             | -11.722      | 46.000 |
| 344.280                           | -2.591  | 36.116           | 33.526             | -12.474      | 46.000 |
| 507.240                           | 0.759   | 39.322           | 40.081             | -5.919       | 46.000 |
| 996.120                           | 7.669   | 33.079           | 40.748             | -13.252      | 54.000 |
|                                   |   |                  |                    |              |        |
| Vertical                          |   |                  |                    |              |        |
| 86.260                            | -3.908  | 35.793           | 31.885             | -8.115       | 40.000 |
| 196.840                           | -8.766  | 42.850           | 34.084             | -9.416       | 43.500 |
| 344.280                           | -3.171  | 37.045           | 33.875             | -12.125      | 46.000 |
| 507.240                           | -0.471  | 40.941           | 40.470             | -5.530       | 46.000 |
| 749.740                           | 2.510   | 31.550           | 34.060             | -11.940      | 46.000 |
| 1000.000                          | 4.329   | 33.718           | 38.047             | -15.953      | 54.000 |

- 1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- 3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
- 4. Measurement Level = Reading Level + Correct Factor.
- 5. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.
- 7. The emission levels of other frequencies are very lower than the limit and not show in test report.

| Product    | : 802.11 b/g/n, 2.4G 1T1R, Wireless USB Module |                    |                   |               |        |  |
|------------|--|--------------------|-------------------|---------------|--------|--|
| Test Item  | : General Radiated Emission Data               |                    |                   |               |        |  |
| Test Site  | : No.3 OATS                                    |                    |                   |               |        |  |
| Test Mode  | : Mode 4:                                      | : Transmit (802.11 | n MCS0 15Mbps 401 | M-BW)(2437 MF | Hz)    |  |
|            |  | × ×                | Ĩ                 |               | ,      |  |
| Frequency  | Correct  | Reading            | Measurement       | Margin        | Limit  |  |
|            | Factor   | Level              | Level             |               |        |  |
| MHz        | dB   | dBuV               | dBuV/m            | dB            | dBuV/m |  |
| Horizontal |  |                    |                   |               |        |  |
| 43.580     | -4.496   | 36.820             | 32.324            | -7.676        | 40.000 |  |
| 97.900     | -7.650   | 40.488             | 32.837            | -10.663       | 43.500 |  |
| 200.720    | -10.595  | 45.323             | 34.728            | -8.772        | 43.500 |  |
| 346.220    | -2.213   | 36.670             | 34.457            | -11.543       | 46.000 |  |
| 666.320    | 2.031  | 32.574             | 34.606            | -11.394       | 46.000 |  |
| 747.800    | 3.296  | 28.928             | 32.224            | -13.776       | 46.000 |  |
|            |  |                    |                   |               |        |  |
| Vertical   |  |                    |                   |               |        |  |
| 99.840     | -0.021   | 35.267             | 35.246            | -8.254        | 43.500 |  |
| 344.280    | -3.171   | 37.640             | 34.470            | -11.530       | 46.000 |  |
| 530.520    | -0.517   | 33.219             | 32.702            | -13.298       | 46.000 |  |
| 712.880    | -0.631   | 38.612             | 37.981            | -8.019        | 46.000 |  |
| 988.360    | 3.370  | 33.896             | 37.266            | -16.734       | 54.000 |  |
| 99.840     | -0.021   | 35.267             | 35.246            | -8.254        | 43.500 |  |

- 1. All Readings below 1GHz are Quasi-Peak, above 1GHz are performed with peak and/or average measurements as necessary.
- 2. Peak measurements: RBW = 1MHz, VBW = 3 MHz, Sweep: Auto.
- 3. Average measurements: RBW = 1MHz, VBW = 10 Hz, Sweep: Auto.
- 4. Measurement Level = Reading Level + Correct Factor.
- 5. Correct Factor = Antenna factor + Cable loss Amplifier gain.
- 6. The average measurement was not performed when the peak measured data under the limit of average detection.
- 7. The emission levels of other frequencies are very lower than the limit and not show in test report.

### 5. **RF** antenna conducted test

#### 5.1. Test Equipment

|   | Equipment           | Manufacturer | Model No./Serial No.   | Last Cal.  |
|---|---------------------|--------------|------------------------|------------|
|   | Spectrum Analyzer   | R&S          | FSP40 / 100170         | Jun, 2010  |
|   | Spectrum Analyzer   | Agilent      | E4407B / US39440758    | Jun, 2010  |
| Х | Spectrum Analyzer   | Agilent      | N9010A / MY48030495    | Apr., 2010 |
|   | 8-WAY Power Divider | JFW          | 50PD-647 / 526770 0916 | Apr., 2010 |

Note: 1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.

2. The test instruments marked with "X" are used to measure the final test results.

3. The power combiner is used for measure 11n mode.

#### 5.2. Test Setup

#### **RF** antenna Conducted Measurement:



#### 5.3. Limits

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

# 5.4. Test Procedure

The EUT was tested according to DTS test procedure of Mar. 2005 KDB558074 for compliance to FCC 47CFR 15.247 requirements.

Set RBW = 100 kHz, Set VBW> RBW, scan up through 10th harmonic.

# 5.5. Uncertainty

The measurement uncertainty Conducted is defined as  $\pm 1.27$ dB

# 5.6. Test Result of RF antenna conducted test

| Product   | : | 802.11 b/g/n, 2.4G 1T1R, Wireless USB Module |
|-----------|---|--|
| Test Item | : | RF antenna conducted test                    |
| Test Site | : | No.3 OATS                                    |
| Test Mode | : | Mode 1: Transmit (802.11b 1Mbps)             |

### Channel 01 (2412MHz) 30-25GHz

| M     50 Ω     AC     SENSE:INT     ALIGNAUTO     09:41:27 AM Dec 13, 2010       Display Line -11.04 dBm     Input: RF     PN0: Fast     Trig: Free Run     Avg Type: Log-Pwr     TRACE [1 2 3 4 5 6       Input: RF     PN0: Fast     Trig: Free Run     Atten: 26 dB     Mkr1 2.402 GHz       Sector Part     Sector Part     Sector Part  | Display<br>Annotation►               |
|--|--------------------------------------|
| Input: RF PNO: Fast Ing: Free Kun<br>IFGain:Low Atten: 26 dB Mkr1 2.402 GHz  | Annotation►                          |
| 10 dB/div Ref 15.00 dBm 0.502 dBm  | ·,                                   |
|  | Title►                               |
| -5.00  | Graticule                            |
| -25.0<br>-35.0   | Display Line<br>-11.04 dBm<br>in Off |
| -45.0<br>-55.0   |                                      |
| -65.0 Whether White and a straight for the straight for t | System<br>Display∙<br>Settings       |
| Start 30 MHz<br>#Res BW 100 kHz #VBW 1.0 MHz Sweep 2.30 s (1001 pts)   |                                      |



#### Channel 06 (2437MHz) 30-25GHz

#### Channel 11 (2462MHz) 30-25GHz



| Product | : | 802.11 b/g/n, 2.4G 1T1R, W | ireless USB Module |
|---------|---|----------------------------|--------------------|
|---------|---|----------------------------|--------------------|

- Test Item : RF Antenna Conducted Spurious
- Test Site : No.3 OATS
- Test Mode : Mode 2: Transmit (802.11g 6Mbps)

## Channel 01 (2412MHz) 30-25GHz

|                                      |  |                    |                        |                            |           |                          |       | Swept SA     | ım Analyzer                 | ilent Spectru        | D Agi          |
|--------------------------------------|--|--------------------|------------------------|----------------------------|-----------|--------------------------|-------|--------------|-----------------------------|----------------------|----------------|
| Display                              | M Dec 13, 2010<br>E 1 2 3 4 5 6  | 09:44:27 A         | ALIGNAUTO<br>: Log-Pwr | Avg Type                   | NSE:INT   | AC SE                    |       | dBm          | <sup>50 Ω</sup><br>e -21.44 | olay Line            | w<br>Disp      |
| × Annotation≻<br>n                   | Input: RF PNO: Fast Trig: Free Run<br>IFGain:Low Atten: 26 dB<br>0 dB/div Ref 15.00 dBm -1.435 dBm |                    |                        |                            |           |                          |       |              |                             |                      | 10 di          |
| Title>                               |  |                    |                        |                            |           |                          |       |              | 1                           | -                    | 5.00           |
| Graticule                            | -21.44 dBm   |                    |                        |                            |           |                          |       |              |                             |                      | -5.00<br>-15.0 |
| Display Line<br>-21.44 dBm<br>On Off |  |                    |                        |                            |           |                          |       |              |                             |                      | -25.0<br>-35.0 |
| ~                                    | and the line day   | Par Makaligar      | William and William    |                            |           |                          |       |              |                             |                      | -45.0<br>-55.0 |
| System<br>Display▶<br>Settings       |  | lar -              | (                      | in the state of the second | h Herrich | en and the second second | www.w | y Mallington | l have                      | and laborate         | -65.0          |
| lz<br>s)                             | 5.00 GHz<br>1001 pts)  | Stop 2<br>2.30 s ( | Sweep                  |                            |           | 1.0 MHz                  | #VBW  |              | z<br>0 kHz                  | rt 30 MHz<br>s BW 10 | Star<br>#Re    |
|                                      |  |                    | STATUS                 |                            |           |                          |       |              |                             |                      | MSG            |



#### Channel 06 (2437MHz) 30-25GHz

#### Channel 11 (2462MHz) 30-25GHz



- Test Item : RF Antenna Conducted Spurious
- Test Site : No.3 OATS

Test Mode : Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW)

## Channel 01 (2412MHz) 30-25GHz

|   |   |                    |   |          |                       |              |         | - Swept SA    | rum Analyzer      | ilent Spectr       | 🔟 Agi                |
|---|---|--------------------|---|----------|-----------------------|--------------|---------|---------------|-------------------|--------------------|----------------------|
| Display                                     | M Dec 13, 2010  | 09:48:37 A         | ALIGNAUTO<br>: Log-Pwr  | Avg Type |                       | AC SE        | 1       | ) dBm         | 50 Ω<br>1e -21.40 | olay Lin           | w<br>Disp            |
| Annotation                                  | Input: RF PN0: Fast Figs: rree Run<br>IFGain:Low Atten: 26 dB Mkr1 2.402 GHz<br>0 dB/div Ref 15.00 dBm -1.403 dBm |                    |   |          |                       |              |         |               |                   |                    | 10 di                |
| Title►                                      |   |                    |   |          |                       |              |         |               | <b>↓</b> 1        |                    | 5.00                 |
| Graticule<br>On Off                         | -21 40 dBm  |                    |   |          |                       |              |         |               |                   |                    | -5.00<br>-15.0       |
| Display Line<br>-21.40 dBm<br><u>On</u> Off | -21.46 dom  |                    |   |          |                       |              |         |               |                   |                    | -25.0<br>-35.0       |
|   | morente   | M. M.              | ha la   |          |                       |              |         |               |                   |                    | -45.0<br>-55.0       |
| System<br>Display▶<br>Settings              |   | ¥** 00             | ( Internet and the second s | hungen h | والمحمد المعصل والمعط | marry Alakay | unavite | pelinenterity | Juhan             | ondurin            | -65.0                |
|   | 5.00 GHz<br>1001 pts)   | Stop 2<br>2.30 s ( | Sweep   |          |                       | 1.0 MHz      | #VBW    |               | lz<br>00 kHz      | t 30 MH<br>s BW 10 | -/5.0<br>Star<br>#Re |
|   |   | •                  | STATUS  |          |                       |              |         |               |                   |                    | MSG                  |



#### Channel 06 (2437MHz) 30-25GHz

#### Channel 11 (2462MHz) 30-25GHz



| Product : | 802.11 b/g/n, 2.4G 1T1R, Wireless USB Module |  |
|-----------|--|--|
|           | <b>U</b>                                     |  |

- Test Item : RF Antenna Conducted Spurious
- Test Site : No.3 OATS

Test Mode : Mode 4: Transmit (802.11n MCS0 15Mbps 40M-BW)

## Channel 01 (2422MHz) 30-25GHz

| 🎾 Agilent   | Spectrum  | Analyzer - S | owept SA               |       |               |                |               |  |                    |                |             |                                   |
|-------------|---|--------------|------------------------|-------|---------------|----------------|---------------|--|--------------------|----------------|-------------|-----------------------------------|
| ₩<br>Displa | 50 s<br>y Line  | -23.43       | dBm                    | A     |               | NSE:INT        | Avg Type      | ALIGNAUTO<br>: Log-Pwr                   | 10:13:52 A<br>TRAC | M Dec 13, 2010 |             | Display                           |
| 10 dB/di    | Input: RF PNO: Fast Trig: Free Run<br>IFGain:Low Atten: 26 dB<br>Mkr1 2.427 GHz<br>-3.426 dBm |              |                        |       |               |                |               |  |                    |                | Annotation► |                                   |
| 5.00        |   | 1            |                        |       |               |                |               |  |                    |                |             | Title►                            |
| -5.00       |   |              |                        |       |               |                |               |  |                    |                | <u>On</u>   | Graticule<br>Off                  |
| -25.0       |   |              |                        |       |               |                |               |  |                    | -23.43 dBm     | <u>On</u>   | Display Line<br>-23.43 dBm<br>Off |
| -45.0       |   |              |                        |       |               |                |               |  | - aldı             | M. Mar         |             |                                   |
| -65.0 -///  | Annabell  | town wanted  | hard the population of | www.w | h maharmaking | et productions | anthono an an | MAN AN AN AN AND AND AND AND AND AND AND | and and a straight |                |             | System<br>Display▶<br>Settings    |
| Start 3     | 0 MHz<br>3W 100   | kHz          |                        | #VBW  | 1.0 MHz       |                |               | Sweep                                    | Stop 2             | 5.00 GHz       |             |                                   |
| MSG         |   |              |                        |       |               |                |               | STATUS                                   |                    |                | 1           |                                   |





#### Channel 04 (2437MHz) 30-25GHz

#### Channel 07 (2452MHz) 30-25GHz



#### 6. Band Edge

#### 6.1. Test Equipment

#### **RF** Conducted Measurement

The following test equipments are used during the band edge tests:

|   | Equipment           | Manufacturer | Model No./Serial No.   | Last Cal.  |
|---|---------------------|--------------|------------------------|------------|
|   | Spectrum Analyzer   | R&S          | FSP40 / 100170         | Jun, 2010  |
|   | Spectrum Analyzer   | Agilent      | E4407B / US39440758    | Jun, 2010  |
| Х | Spectrum Analyzer   | Agilent      | N9010A / MY48030495    | Apr., 2010 |
|   | 8-WAY Power Divider | JFW          | 50PD-647 / 526770 0916 | Apr., 2010 |

#### Note:

- 1. All equipments are calibrated with traceable calibrations. Each calibration is traceable to the national or international standards.
- 2. The test instruments marked with "X" are used to measure the final test results.
- 3. The power combiner is used for measure 11n mode.

#### **RF Radiated Measurement:**

The following test equipments are used during the band edge tests:

| Test Site |              | Equipment         | Manufacturer    | Model No./Serial No.  | Last Cal.  |
|-----------|--------------|-------------------|-----------------|-----------------------|------------|
| Site # 3  |              | Bilog Antenna     | Schaffner Chase | CBL6112B/2673         | Sep., 2010 |
|           | Х            | Horn Antenna      | Schwarzbeck     | BBHA9120D/D305        | Sep., 2010 |
|           | Horn Antenna |                   | Schwarzbeck     | BBHA9170/208          | Jul., 2010 |
|           | Х            | Pre-Amplifier     | Agilent         | 8447D/2944A09549      | Sep., 2010 |
|           | Х            | Spectrum Analyzer | Agilent         | E4407B / US39440758   | May, 2010  |
|           |              | Test Receiver     | R & S           | ESCS 30/ 825442/018   | Sep., 2010 |
|           | Х            | Coaxial Cable     | QuieTek         | QTK-CABLE/ CAB5       | Feb., 2010 |
|           | X Controller |                   | QuieTek         | QTK-CONTROLLER/ CTRL3 | N/A        |
|           | X            | Coaxial Switch    | Anritsu         | MP59B/6200265729      | N/A        |

Note:

1. All instruments are calibrated every one year.

2. The test instruments marked by "X" are used to measure the final test results.

# 6.2. Test Setup

#### **RF** Conducted Measurement



#### **RF Radiated Measurement:**



#### 6.3. Limits

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 20dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209, whichever is the lesser attenuation.

#### 6.4. Test Procedure

The EUT was setup according to ANSI C63.4, 2003 and tested according to DTS test procedure of Mar. 2005 KDB558074 for compliance to FCC 47CFR 15.247 requirements.

The EUT is placed on a turn table which is 0.8 meter above ground. The turn table is rotated 360 degrees to determine the position of the maximum emission level. The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna is scanned from 1 meter to 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.4:2003 on radiated measurement.

#### 6.5. Uncertainty

- $\pm$  3.9 dB above 1GHz
- ± 3.8 dB below 1GHz

### 6.6. Test Result of Band Edge

| Product   | : | 802.11 b/g/n, 2.4G 1T1R, Wireless USB Module |
|-----------|---|--|
| Test Item | : | Band Edge Data                               |
| Test Site | : | No.3 OATS                                    |
| Test Mode | : | Mode 1: Transmit (802.11b 1Mbps)             |

#### Fundamental Filed Strength

| Antenna    | Frequency | <b>Correction Factor</b> | <b>Reading Level</b> | <b>Emission Level</b> | Detector |
|------------|-----------|--------------------------|----------------------|-----------------------|----------|
| Pole       | [MHz]     | [dB/m]                   | [dBuV]               | [dBuV/m]              |          |
| Horizontal | 2412      | 31.639                   | 71.36                | 102.998               | Peak     |
| Horizontal | 2412      | 31.639                   | 66.36                | 97.998                | Average  |
| Vertical   | 2412      | 30.95                    | 77.37                | 108.319               | Peak     |
| Vertical   | 2412      | 30.95                    | 72.46                | 103.409               | Average  |

Note: 1:Spectrum Analyzer setting:

Peak detector: RBW=1MHz, VBW=1MHz

Average detector: RBW=1MHz, VBW=10Hz

| Band Edge T | est Data |
|-------------|----------|
|-------------|----------|

| Antenna<br>Pole | Test Frequency<br>(MHz) | Fundamental<br>(dBuV/m) | Δ (dB) | Band Edge<br>Field Strength<br>(dBuV/m) | Detector |
|-----------------|-------------------------|-------------------------|--------|---|----------|
| Horizontal      | 2390                    | 102.998                 | 55.47  | 47.528                                  | Peak     |
| Horizontal      | 2390                    | 97.998                  | 63.81  | 34.188                                  | Average  |
| Vertical        | 2390                    | 108.319                 | 55.47  | 52.849                                  | Peak     |
| Vertical        | 2390                    | 103.409                 | 63.81  | 39.599                                  | Average  |

Note:

The Band Edge Field Strength was calculated using the Fundamental and Conducted Band Edge measurements per the Marker-Delta Method with the following formula:

Band Edge field Strength =  $F - \Delta$ 

F = Fundamental field Strength (Peak or Average)

 $\Delta$  = Conducted Band Edge Delta (Peak or Average)

| 🗊 Agilent Spe                     | ctrum Analyze                     | r - Swept SA                |   | a construction of the second |        |          |                        | Ŭ,                  |  |                |
|-----------------------------------|-----------------------------------|-----------------------------|---|--|--------|----------|------------------------|---------------------|--|----------------|
| Warker 1                          | <sup>50 Ω</sup><br><b>2.41390</b> | 0000000 G                   | GHz   | AC SENS  | E:INT  | Avg Type | ALIGNAUTO<br>: Log-Pwr | 04:32:51 P          | MDec 09, 2010<br>E 1 2 3 4 5 6           | Peak Search    |
| 10 dB/div                         | Ref 20.0                          | Input: RF P<br>IFI<br>0 dBm | NO: Fast 🕞<br>Gain:Low                            | Atten: 30 c  | B      |          | Mk                     | r1 2.413<br>11.9    | 3 9 GHz<br>5 dBm                         | Next Peak      |
| 10.0<br>0.00                      |                                   |                             |   |  |        |          |                        |                     |  | Next Right     |
| -20.0<br>-30.0<br>-40.0           |                                   |                             |   |  | 3      | 2        |                        | 5                   | Jana and and and and and and and and and | Next Left      |
| -50.0 browstand<br>-60.0<br>-70.0 | Seguencial holder - Pro           | han an de chamar an         | ing a data se |  |        |          |                        |                     |  | Marker Delta   |
| Center 2.3<br>#Res BW             | 39000 GH;<br>1.0 MHz              | × 2413                      | #VBV  | 11.0 MHz   | FUNC   | ION FUI  | #Sweep                 | Span 1<br>500 ms (' | 00.0 MHz<br>1001 pts)<br>NVALUE          | Mkr→CF         |
| 2 N 1<br>3 N 1<br>4<br>5<br>6     | f                                 | 2.400<br>2.390              | 0 GHz<br>0 GHz                                    | -37.540 dB<br>-43.521 dB   | m<br>m |          |                        |                     |  | Mkr→RefLvl     |
| 8<br>9<br>10<br>11<br>12          |                                   |                             |   |  |        |          |                        |                     |  | More<br>1 of 2 |
| MSG                               |                                   |                             |   |  |        |          | STATUS                 |                     |  |                |

#### Peak Detector of conducted Band Edge Delta

### Average Detector of conducted Band Edge Delta

| 🏴 Agilent Spectrum Analy  | rzer - Swept SA                                   |                                    |   |  |                |
|---|---|------------------------------------|---|--|----------------|
| <mark>.%</mark> 50 Ω<br>Marker 1 2.4141   |   | SENSE:INT<br>Avg Ty<br>a: Free Run | ALIGNAUTO 04:36:17 PM<br>rpe: Log-Pwr TRACE<br>TYPE | MDec 09, 2010<br>E 1 2 3 4 5 6<br>E WWWWWW | ch             |
| 10 dB/div Ref 20  | IFGain:Low At                                     | ien: 30 dB                         |   | 1 GHz NextF<br>3 dBm                       | Peak           |
| 10.0<br>0.00  |   | /                                  |   | Next F                                     | Right          |
| -20.0   |   | 2                                  |   | Next                                       | t Leff         |
| -50.0   |   |                                    |   | Marker                                     | Delta          |
| Center 2.39000 G<br>#Res BW 1.0 MHz<br>MKE MODE THE SCU   | Hz<br>#VBW 10                                     | Hz<br>Y Function                   | Span 10<br>Sweep 7.80 s (1<br>FUNCTION WIDTH        | 00.0 MHz<br>1001 pts)<br>NVALUE            | ⊂→CF           |
| 1         N         1         f           2         N         1         f           3         N         1         f           4         -         -         -           5         -         -         -           6         -         -         -           7         -         -         - | 2.414 1 GHz 4<br>2.400 0 GHz 44<br>2.390 0 GHz 55 | 3.23 dBm<br>5.25 dBm<br>5.58 dBm   |   | Mkr→Re                                     | efLvi          |
| 8         9           10         11           12         12   |   |                                    |   |  | More<br>1 of 2 |
| MSG   |   |                                    | STATUS  |  |                |

# 

| Product   | : | 802.11 b/g/n, 2.4G 1T1R, Wireless USB Module |
|-----------|---|--|
| Test Item | : | Band Edge Data                               |
| Test Site | : | No.3 OATS                                    |
| Test Mode | : | Mode 1: Transmit (802.11b 1Mbps)             |

#### Fundamental Filed Strength

| Antenna    | Frequency | <b>Correction Factor</b> | <b>Reading Level</b> | <b>Emission</b> Level | Detector |
|------------|-----------|--------------------------|----------------------|-----------------------|----------|
| Pole       | [MHz]     | [dB/m]                   | [dBuV]               | [dBuV/m]              |          |
| Horizontal | 2462      | 32.019                   | 71.01                | 103.029               | Peak     |
| Horizontal | 2462      | 32.019                   | 65.88                | 97.899                | Average  |
| Vertical   | 2462      | 31.29                    | 75.02                | 106.31                | Peak     |
| Vertical   | 2462      | 31.29                    | 69.98                | 101.27                | Average  |

Note: 1:Spectrum Analyzer setting:

Peak detector: RBW=1MHz, VBW=1MHz

Average detector: RBW=1MHz, VBW=10Hz

#### Band Edge Test Data

| Antenna<br>Pole | Test Frequency<br>(MHz) | Fundamental<br>(dBuV/m) | Δ (dB) | Band Edge<br>Field Strength<br>(dBuV/m) | Detector   |
|-----------------|-------------------------|-------------------------|--------|---|------------|
| Horizontal      | 2487.1                  | 103.029                 | 50.557 | 52.472                                  | Horizontal |
| Horizontal      | 2483.5                  | 97.899                  | 53.15  | 44.749                                  | Horizontal |
| Vertical        | 2487.1                  | 106.31                  | 50.557 | 55.753                                  | Vertical   |
| Vertical        | 2483.5                  | 101.27                  | 53.15  | 48.12                                   | Vertical   |

Note:

The Band Edge Field Strength was calculated using the Fundamental and Conducted Band Edge measurements per the Marker-Delta Method with the following formula:

Band Edge field Strength = F -  $\Delta$ 

F = Fundamental field Strength (Peak or Average)

 $\Delta$  = Conducted Band Edge Delta (Peak or Average)



| I AP                  | ilent S | pect   | rum /       | Analyzer - 1        | Swept SA        | Det                  | cetor  | 01 0            | ondu      | cteu i     | Dana                 | Dug         | ,e Dei             | ta .                           |               |
|-----------------------|---------|--------|-------------|---------------------|-----------------|----------------------|--------|-----------------|-----------|------------|----------------------|-------------|--------------------|--------------------------------|---------------|
| <mark>ж</mark><br>Mar | ker     | 2      | 50 ຊ<br>2.4 | 871000              | 00000 G         | GHz                  | AC     | SEN             | ISE:INT   | Avg T      | ALIGNA<br>ype: Log-F | iuto<br>Pwr | 04:37:41 P<br>TRAC | MDec 09, 2010<br>E 1 2 3 4 5 6 | Marker        |
|                       |         |        |             | In                  | put: RF P<br>IF | NO: Fast<br>Gain:Low | Att    | g:Free<br>en:30 | Run<br>dB |            |                      |             | DE                 |                                | Select Marker |
| 10 d                  | B/div   |        | Ref         | 20.00 (             | dBm             |                      |        |                 |           |            |                      | Mkr         | 2 2.487<br>-37.0   | 7 1 GHz<br>64 dBm              | 2             |
| Log<br>10.0           |         |        |             |                     | 100             | 21                   |        |                 |           |            |                      |             |                    |                                | Normal        |
| 0.00                  |         |        |             |                     |                 | )                    |        |                 |           |            |                      |             |                    |                                | Norma         |
| -20.0                 |         |        |             |                     |                 |                      |        |                 |           | 2          |                      |             |                    |                                |               |
| -30.0<br>-40.0        |         |        |             | and a second second |                 |                      | V      | 2               | 2-        |            |                      |             |                    |                                | Delta         |
| -50.0                 | reper   | Mander | w.          |                     |                 |                      |        |                 |           | monarbanis | hollowinge in the    | -           | ushther have       | holling in Alasandi            |               |
| -60.0<br>-70.0        |         |        |             |                     |                 |                      |        |                 |           |            |                      |             |                    |                                | Fixed⊳        |
| Cen                   | L       | 2.48   | 835         | 0 GHz               |                 |                      |        |                 |           |            | 0                    |             | Span 1             | 00.0 MHz                       |               |
| #Re                   | s BV    | N 1    | .0 N        | /IHz                |                 | #VI                  | 3W 1.0 | MHz             |           |            | #Swe                 | ep 5        | 00 ms (            | 1001 pts)                      | Off           |
| MKR<br>1              | N       | 1      | f           |                     | 2.463           | 9 GHz                | 12.    | 917 dE          | Bm        | NCTION     | FUNCTION W           | WIDTH       | FUNCTIO            | IN VALUE                       |               |
| 3                     |         | -      |             |                     | 2.407           |                      | ~~     | .04 ub          |           |            | _                    |             |                    |                                | Properties ►  |
| 5<br>6<br>7           |         |        |             |                     |                 |                      |        |                 |           |            |                      |             |                    |                                |               |
| 8                     |         |        |             |                     |                 |                      |        |                 |           |            |                      |             |                    |                                | More          |
| 10<br>11<br>12        |         | _      |             |                     |                 |                      |        |                 |           |            |                      | _           |                    |                                | 1 of 2        |
| MSG                   |         |        |             |                     |                 |                      |        |                 |           |            | S                    | TATUS       |                    |                                |               |

#### Peak Detector of conducted Band Edge Delta

#### Average Detector of conducted Band Edge Delta

| 💴 Agilent Spectrum Analyzer - 🛛                             | Swept SA                          |              |              |                      |                        |                              |                |
|---|-----------------------------------|--------------|--------------|----------------------|------------------------|------------------------------|----------------|
| Marker 2 2.4835000  | 000000 GHz                        | SENSE:INT    | Avg Type: L  | .ign auto<br>.og-Pwr | 04:39:54 PMD<br>TRACE  | ec 09, 2010                  | Marker         |
| In<br>10 dB/div Ref 20.00 (                                 | put: RF PNO: Fast 🖵<br>IFGain:Low | Atten: 30 dB |              | Mkr                  | 2 2.483<br>-43.94      | 5 GHz<br>dBm                 | Select Marker  |
| 10.0<br>0.00  |                                   |              |              |                      |                        |                              | Norma          |
| -20.0<br>-30.0<br>-40.0                                     |                                   | 2            |              |                      |                        |                              | Delta          |
| -50.0   |                                   |              |              | -                    |                        |                              | Fixed▷         |
| Center 2.48350 GHz<br>#Res BW 1.0 MHz                       | #VBW 1                            | 0 Hz         | ICTION FUNCT | Sweep                | Span 100<br>7.80 s (10 | 0.0 MHz<br>001 pts)<br>VALUE | Of             |
| 2 N 1 f<br>3 4<br>5 5<br>7 4                                | 2.483 5 GHz                       | -43.94 dBm   |              |                      |                        |                              | Properties)    |
| 8         9           10         11           12         12 |                                   |              |              |                      |                        |                              | More<br>1 of 2 |
| MSG   |                                   |              |              | STATUS               |                        |                              |                |



| Product   | : | 802.11 b/g/n, 2.4G 1T1R, Wireless USB Module |
|-----------|---|--|
| Test Item | : | Band Edge Data                               |
| Test Site | : | No.3 OATS                                    |
| Test Mode | : | Mode 2: Transmit (802.11g 6Mbps)             |

#### Fundamental Filed Strength

| Antenna    | Frequency | <b>Correction Factor</b> | <b>Reading Level</b> | <b>Emission Level</b> | Detector |
|------------|-----------|--------------------------|----------------------|-----------------------|----------|
| Pole       | [MHz]     | [dB/m]                   | [dBuV]               | [dBuV/m]              |          |
| Horizontal | 2412      | 31.639                   | 68.88                | 100.518               | Peak     |
| Horizontal | 2412      | 31.639                   | 52.84                | 84.478                | Average  |
| Vertical   | 2412      | 30.95                    | 73.61                | 104.559               | Peak     |
| Vertical   | 2412      | 30.95                    | 56.91                | 87.859                | Average  |

Note: 1:Spectrum Analyzer setting:

Peak detector: RBW=1MHz, VBW=1MHz

Average detector: RBW=1MHz, VBW=10Hz

Band Edge Test Data

| Antenna<br>Pole | Test Frequency<br>(MHz) | Fundamental<br>(dBuV/m) | Δ (dB) | Band Edge<br>Field Strength<br>(dBuV/m) | Detector |
|-----------------|-------------------------|-------------------------|--------|---|----------|
| Horizontal      | 2390                    | 100.518                 | 38.83  | 61.688                                  | Peak     |
| Horizontal      | 2390                    | 84.478                  | 40.45  | 44.028                                  | Average  |
| Vertical        | 2390                    | 104.559                 | 38.83  | 65.729                                  | Peak     |
| Vertical        | 2390                    | 87.859                  | 40.45  | 47.409                                  | Average  |

Note:

The Band Edge Field Strength was calculated using the Fundamental and Conducted Band Edge measurements per the Marker-Delta Method with the following formula:

Band Edge field Strength = F -  $\Delta$ 

F = Fundamental field Strength (Peak or Average)

 $\Delta$  = Conducted Band Edge Delta (Peak or Average)



| D Ag               | jilent S  | ipect    | rum .    | Analyzer -            | Swept SA                 |                      |            |                        |          |         |                  |                  | 8          |                                 |                |
|--------------------|-----------|----------|----------|-----------------------|--------------------------|----------------------|------------|------------------------|----------|---------|------------------|------------------|------------|---------------------------------|----------------|
| ı <i>xı</i><br>Mai | rker      | 3        | 50 s     | 900000                | 00000 G                  | Hz                   | AC         | SE                     | NSE:INT  | Avg     | ALIO<br>Type: Lo | GNAUTO<br>og-Pwr | 04:44:35 F | MDec 09, 2010<br>CE 1 2 3 4 5 6 | Marker         |
| _                  |           |          |          | In                    | put: RF P<br>IF          | NO: Fast<br>Gain:Low | , <b>P</b> | Atten: 30              | dB       |         |                  | NA12             | -2 0 20    |                                 | Select Marker  |
| 10 d               | B/div     |          | Ref      | 20.00                 | dBm                      |                      |            |                        | -        |         |                  | IVIK             | -29.       | 27 dBm                          | 3              |
| 10.0               | )         |          | _        |                       |                          |                      | _          |                        |          | عر      | e ~              | 1                |            |                                 | Normal         |
| 0.00               |           |          |          |                       |                          |                      |            |                        |          | 2       |                  |                  | ł          |                                 | Norma          |
| -20.0              |           |          | _        |                       |                          |                      | _          |                        | 3-4      |         |                  |                  | mon        | N I                             |                |
| -30.0              |           |          |          |                       |                          |                      | and        | waln fullion           | - Ala a  |         |                  |                  | 655        | Manner Well                     | Delta          |
| -40.0              | Perot     | en juite | ana an   | La fle and the latera | allow and the range lis. | pharmalyly           | 100m       |                        |          |         |                  |                  |            |                                 |                |
| -60.0              |           |          |          |                       |                          |                      | +          |                        |          |         |                  |                  |            |                                 | Fixed⊳         |
| Car                |           | 2.30     | 200      |                       |                          |                      |            |                        |          |         |                  |                  | Snan 1     | 00.0 MHz                        |                |
| #Re                | es Bl     | N 1      | .0 N     | /IHz                  |                          | #V                   | BW 1       | 1.0 MHz                |          |         | #S               | weep             | 500 ms (   | (1001 pts)                      | Off            |
| MKR<br>1           | MODE<br>N | TRC<br>1 | SCL<br>f |                       | ×<br>2.413               | 2 GHz                |            | Y<br>9.56 d            | Bm       | INCTION | FUNCTI           | ON WIDTH         | FUNCTI     | ON VALUE                        |                |
| 2                  | N<br>N    | 1        | f<br>f   |                       | 2.400<br>2.390           | 0 GHz<br>0 GHz       |            | -15.63 dl<br>-29.27 dl | 3m<br>3m |         |                  |                  |            |                                 | -              |
| 5                  | _         | _        | -        |                       |                          |                      |            |                        |          |         |                  |                  |            |                                 | Properties►    |
| 7                  |           |          |          |                       |                          |                      |            |                        |          |         |                  |                  |            |                                 |                |
| 9<br>10<br>11      |           |          |          |                       |                          |                      |            |                        |          |         |                  |                  |            |                                 | More<br>1 of 2 |
| 12<br>MSC          |           |          |          |                       |                          |                      |            |                        |          |         |                  | STATUS           |            |                                 |                |
|                    |           |          |          |                       |                          |                      |            |                        |          |         |                  | 011100           |            |                                 |                |

#### Peak Detector of conducted Band Edge Delta

### Average Detector of conducted Band Edge Delta

| 🎾 Agilent Spectrum Analyzer   | - Swept SA                                |                                       |              |                       |                     |                                 |                |
|---|---|---------------------------------------|--------------|-----------------------|---------------------|---------------------------------|----------------|
| Marker 1 2.413100   | 0000000 GHz                               | AC SENSE:INT                          | Avg Type:    | ALIGNAUTO<br>Log-Pwr  | 04:45:40 Pl<br>TRAC | MDec 09, 2010<br>E 1 2 3 4 5 6  | Peak Search    |
| 10 dB/div Ref 20.00   | IFGain:Low                                | Atten: 30 dB                          |              | Mk                    | r1 2.413<br>-7.3    | 3 1 GHz<br>36 dBm               | Next Peak      |
| 10.0<br>0.00  |   |                                       |              | <b>●</b> <sup>1</sup> |                     |                                 | Next Right     |
| -20.0<br>-30.0<br>-40.0   |   | 3                                     | 2            |                       |                     |                                 | Next Left      |
| -50.0   |   |                                       |              |                       |                     |                                 | Marker Delta   |
| Center 2.39000 GHz<br>#Res BW 1.0 MHz<br>MKR MODE TRC SCL   | #VB\                                      | N 10 Hz                               | FUNCTION FUN | Sweep                 | Span 1<br>7.80 s (1 | 00.0 MHz<br>1001 pts)<br>NVALUE | Mkr→CF         |
| 1         N         1         f           2         N         1         f           3         N         1         f           4 | 2.413 1 GHz<br>2.400 0 GHz<br>2.390 0 GHz | -7.36 dBm<br>-39.21 dBm<br>-47.81 dBm |              |                       |                     |                                 | Mkr→RefLv      |
| i         i           9         0           10         0           11         0           12         0                          |   |                                       |              |                       |                     |                                 | More<br>1 of 2 |
| MSG   |   |                                       |              | STATUS                |                     |                                 |                |

# QuieTer

| Product   | : | 802.11 b/g/n, 2.4G 1T1R, Wireless USB Module |
|-----------|---|--|
| Test Item | : | Band Edge Data                               |
| Test Site | : | No.3 OATS                                    |
| Test Mode | : | Mode 2: Transmit (802.11g 6Mbps)             |

#### Fundamental Filed Strength

| Antenna    | Frequency | <b>Correction Factor</b> | <b>Reading Level</b> | <b>Emission Level</b> | Detector |
|------------|-----------|--------------------------|----------------------|-----------------------|----------|
| Pole       | [MHz]     | [dB/m]                   | [dBuV]               | [dBuV/m]              |          |
| Horizontal | 2462      | 32.019                   | 66.99                | 99.009                | Peak     |
| Horizontal | 2462      | 32.019                   | 51.44                | 83.459                | Average  |
| Vertical   | 2462      | 31.29                    | 71.98                | 103.27                | Peak     |
| Vertical   | 2462      | 31.29                    | 55.75                | 87.04                 | Average  |

Note: 1:Spectrum Analyzer setting:

Peak detector: RBW=1MHz, VBW=1MHz

Average detector: RBW=1MHz, VBW=10Hz

Band Edge Test Data

| Antenna<br>Pole | Test Frequency<br>(MHz) | Fundamental<br>(dBuV/m) | Δ (dB) | Band Edge<br>Field Strength<br>(dBuV/m) | Detector |
|-----------------|-------------------------|-------------------------|--------|---|----------|
| Horizontal      | 2484.4                  | 99.009                  | 39.79  | 59.219                                  | Peak     |
| Horizontal      | 2483.5                  | 83.459                  | 42.02  | 41.439                                  | Average  |
| Vertical        | 2484.4                  | 103.27                  | 39.79  | 63.48                                   | Peak     |
| Vertical        | 2483.5                  | 87.04                   | 42.02  | 45.02                                   | Average  |

Note:

The Band Edge Field Strength was calculated using the Fundamental and Conducted Band Edge measurements per the Marker-Delta Method with the following formula:

Band Edge field Strength = F -  $\Delta$ 

F = Fundamental field Strength (Peak or Average)

 $\Delta$  = Conducted Band Edge Delta (Peak or Average)

| 💴 Agilent S      | Spectr       | rum Analyze                | r - Swept SA      |                         |             | 2 Q.          |             |                         |                       |                                |                |
|------------------|--------------|----------------------------|-------------------|-------------------------|-------------|---------------|-------------|-------------------------|-----------------------|--------------------------------|----------------|
| ₩<br>Marker      | 2 2          | <sup>50 Ω</sup><br>2.48440 | 0000000 (         | GHz                     | AC SE       | ENSE:INT      | Avg Typ     | ALIGNAUTO<br>e: Log-Pwr | 04:48:04 P<br>TRAC    | MDec 09, 2010<br>E 1 2 3 4 5 6 | Marker         |
|                  |              |                            | Input: RF F<br>IF | PNO: Fast G<br>Gain:Low | Atten: 30   | e Run<br>D dB |             |                         | DI                    |                                | Select Marker  |
| 10 dB/div        | v 1          | Ref 20.0                   | 0 dBm             |                         |             |               |             | Mk                      | r2 2.484<br>-32.0     | 4 4 GHz<br>06 dBm              | 2              |
| 10.0             |              |                            | Q.                | 1                       |             |               |             |                         |                       |                                |                |
| 0.00             |              |                            | 1                 |                         |             |               |             |                         |                       |                                | Normai         |
| -20.0            |              | alabert                    | 1                 | 1                       | MARINA      | -2            |             |                         |                       |                                |                |
| -30.0            | Marriell     | www.w                      |                   |                         | "Www        | March L. B.   |             |                         |                       |                                | Delta          |
| -40.0            |              |                            |                   |                         |             | A MARDINE     | ante minera | who we want have        | and and an of the Inc | all proved of the              |                |
| -60.0            |              | _                          | _                 |                         |             |               |             |                         |                       |                                | Fixed⊳         |
| -70.0            |              |                            |                   |                         |             |               |             |                         |                       |                                |                |
| Center<br>#Res B | 2.48<br>W 1. | 350 GHz<br>.0 MHz          | 2                 | #VB\                    | N 1.0 MHz   | :             |             | #Sweep                  | Span 1<br>500 ms (    | 00.0 MHz<br>1001 pts)          | Off            |
|                  | TRC<br>1     | SCL                        | ×<br>2.460        | 18 GHz                  | Y<br>7 73 c | E FU          | NCTION F    | JNCTION WIDTH           | FUNCTIO               | IN VALUE                       | 01             |
| 2 N<br>3         | 1            | f                          | 2.484             | 4 GHz                   | -32.06 d    | Bm            |             |                         |                       |                                |                |
| 4<br>5           |              |                            |                   |                         |             |               |             |                         |                       |                                | Properties►    |
| 7 8              |              |                            |                   |                         |             |               |             |                         |                       |                                |                |
| 9<br>10          |              |                            |                   | 1                       |             |               | 1           |                         |                       |                                | More<br>1 of 2 |
| 11               |              |                            |                   |                         |             |               |             |                         |                       |                                |                |
| MSG              |              |                            |                   |                         |             |               |             | STATUS                  |                       |                                |                |

#### Peak Detector of conducted Band Edge Delta

### Average Detector of conducted Band Edge Delta

| 💴 Agilent Spectrum Ar                                       | nalyzer - Swept SA                             |                         |                                 |  |                |
|---|--|-------------------------|---------------------------------|--|----------------|
| 50 Ω<br>Marker 1 2.46                                       | 3500000000 GHz                                 | AC SENSE:INT            | ALIGN AUTO<br>Avg Type: Log-Pwr | 04:51:13 PM Dec 09, 2010<br>TRACE 1 2 3 4 5 6<br>TYPE WARAAAAAAA | Peak Search    |
| 10 dB/div Ref :   | Input: RF PNU: Fast<br>IFGain:Low<br>20.00 dBm | Atten: 30 dB            | М                               | kr1 2.463 5 GHz<br>-9.04 dBm                                     | NextPeak       |
| 10.0<br>0.00<br>-10.0                                       | 1  |                         |                                 |  | Next Right     |
| -20.0<br>-30.0<br>-40.0                                     |  | 2                       |                                 |  | Next Left      |
| -50.0   |  |                         |                                 |  | Marker Delta   |
| Center 2.48350<br>#Res BW 1.0 M                             | GHz<br>Hz #VI                                  | BW 10 Hz                | Swee                            | Span 100.0 MHz<br>p 7.80 s (1001 pts)                            | Mkr→CF         |
| 1 N 1 f<br>2 N 1 f<br>3 4<br>5 5<br>6 7                     | 2.463 5 GHz<br>2.483 5 GHz                     | -9.04 dBm<br>-51.06 dBm |                                 |  | Mkr→RefLv      |
| 8         9           10         11           12         12 |  |                         |                                 |  | More<br>1 of 2 |
| MSG   |  |                         | STATU                           | JS   |                |

# QuieTer

| 802.11 b/g/n, 2.4G 1T1R, Wireless USB Module   |
|--|
| Band Edge Data                                 |
| No.3 OATS                                      |
| Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW) |
|  |

#### Fundamental Filed Strength

| Antenna    | Frequency | <b>Correction Factor</b> | <b>Reading Level</b> | <b>Emission Level</b> | Detector |
|------------|-----------|--------------------------|----------------------|-----------------------|----------|
| Pole       | [MHz]     | [dB/m]                   | [dBuV]               | [dBuV/m]              |          |
| Horizontal | 2412      | 31.639                   | 68.74                | 100.378               | Peak     |
| Horizontal | 2412      | 31.639                   | 51.85                | 83.488                | Average  |
| Vertical   | 2412      | 30.95                    | 73.4                 | 104.349               | Peak     |
| Vertical   | 2412      | 30.95                    | 56.52                | 87.469                | Average  |

Note: 1:Spectrum Analyzer setting:

Peak detector: RBW=1MHz, VBW=1MHz

Average detector: RBW=1MHz, VBW=10Hz

Band Edge Test Data

| Antenna<br>Pole | Test Frequency<br>(MHz) | Fundamental<br>(dBuV/m) | Δ (dB) | Band Edge<br>Field Strength<br>(dBuV/m) | Detector |
|-----------------|-------------------------|-------------------------|--------|---|----------|
| Horizontal      | 2390                    | 100.378                 | 35.829 | 64.549                                  | Peak     |
| Horizontal      | 2390                    | 83.488                  | 38.43  | 45.058                                  | Average  |
| Vertical        | 2390                    | 104.349                 | 35.829 | 68.52                                   | Peak     |
| Vertical        | 2390                    | 87.469                  | 38.43  | 49.039                                  | Average  |

Note:

The Band Edge Field Strength was calculated using the Fundamental and Conducted Band Edge measurements per the Marker-Delta Method with the following formula:

Band Edge field Strength =  $F - \Delta$ 

F = Fundamental field Strength (Peak or Average)

 $\Delta$  = Conducted Band Edge Delta (Peak or Average)

| 💴 Agilent Sj | pectrum       | Analyzer - S      | Swept SA          |                        |                        |               |         |                           | 0                 |                                 |               |
|--------------|---------------|-------------------|-------------------|------------------------|------------------------|---------------|---------|---------------------------|-------------------|---------------------------------|---------------|
| w<br>Marker∶ | 50 G<br>3 2.3 | 2<br>900000       | 00000 G           | Hz                     | AC SE                  | NSE:INT       | Avg T   | ALIGNAUTO<br>ype: Log-Pwr | 04:54:28 I<br>TRA | MDec 09, 2010<br>CE 1 2 3 4 5 6 | Marker        |
|              |               | Inj               | out: RF PI<br>IFC | NO: Fast G<br>Gain:Low | Trig: Fre<br>Atten: 30 | e Run<br>) dB |         |                           | IY<br>C           |                                 | Select Marker |
| 10 dB/div    | Rei           | f 20.00 c         | lBm               |                        |                        |               |         | Mk                        | r3 2.39<br>-27.   | 0 0 GHz<br>22 dBm               | 3             |
| 10.0         |               |                   |                   |                        |                        |               |         | <u>1</u>                  |                   |                                 |               |
| 0.00         |               |                   |                   |                        |                        |               | 2       |                           | 1                 |                                 | Normal        |
| -20.0        |               |                   |                   |                        |                        | 3             | X       |                           | Mary Mary         |                                 |               |
| -30.0        |               |                   |                   |                        | 1. Analy Marrie        | monorpher     |         |                           | artill            | a langer and                    | Delta         |
| -40.0        |               |                   | hat apriliance    | an Hot William         | warrand .              |               |         |                           |                   |                                 |               |
| -60.0        |               | - 10 1011 110 101 |                   |                        |                        |               |         |                           |                   |                                 | Fixed         |
| -70.0        |               |                   |                   |                        |                        |               |         |                           |                   |                                 | FINCUP        |
| Center 2     | .3900         | 0 GHz             |                   |                        | N 4 0 BALL-            |               |         | # <b>O</b>                | Span 1            | 00.0 MHz                        |               |
|              | v 1.0 r       |                   | ×                 | #VD\                   | V 1.0 IVIH2            | FI            | INCTION | #Sweep                    | JUU IIIS I        |                                 | Off           |
| 1 N<br>2 N   | 1 f<br>1 f    |                   | 2.415             | 2 GHz<br>0 GHz         | 8.609 d                | Bm<br>Bm      |         |                           |                   |                                 |               |
| 3 N<br>4     | 1 f           |                   | 2.390             | 0 GHz                  | -27.22 d               | Bm            |         |                           |                   |                                 | Properties ►  |
| 5<br>6       |               |                   |                   |                        |                        |               |         |                           |                   |                                 | op or door    |
| 8            |               |                   |                   |                        |                        |               |         |                           |                   |                                 | Mara          |
| 10           |               |                   |                   |                        |                        |               |         |                           |                   |                                 | 1 of 2        |
| 12           |               |                   |                   |                        |                        |               |         |                           |                   |                                 |               |
| MSG          |               |                   |                   |                        |                        |               |         | STATUS                    |                   |                                 |               |

#### Peak Detector of conducted Band Edge Delta

### Average Detector of conducted Band Edge Delta

| 🎾 Agilent Spectrum Anal                                 | yzer - Swept SA   |                       |   |   |
|---|---|-----------------------|---|---|
| 00 Ω<br>Marker 1 2.413                                  | AC<br>300000000 GHz<br>Tria: F                                | SENSE:INT Avg Type    | ALIGNAUTO 04:55:32 P<br>: Log-Pwr TRAC<br>TYP | MDec 09, 2010<br>E 1 2 3 4 5 6<br>E WWWWWWW |
| 10 dB/div Ref 20  | IFGain:Low Atten:   | 30 dB                 | ∎<br>Mkr1 2.413<br>-8.9                       | 3 3 GHz<br>NextPea<br>92 dBm                |
| 10.0<br>0.00  |   |                       | <b>●</b> <sup>1</sup>                         | Next Righ                                   |
| -20.0<br>-30.0<br>-40.0                                 |   | 3                     |   | Next Le                                     |
| -50.0<br>-60.0<br>-70.0                                 |   |                       |   | Marker Delt                                 |
| Center 2.39000 G<br>#Res BW 1.0 MHz<br>MKR MODE TRO SCL | Hz #VBW 10 Hz   | Function Fun          | Span 1<br>Sweep 7.80 s (<br>remon width       | 00.0 MHz<br>1001 pts)<br>™VALUE             |
| 1 N 1 f<br>2 N 1 f<br>3 N 1 f<br>4 5<br>6               | 2.413 3 GHz -8.92<br>2.400 0 GHz -40.39<br>2.390 0 GHz -47.35 | dBm<br>dBm<br>dBm<br> |   | Mkr→RefL'                                   |
| i         i           9                                 |   |                       |   | Mor<br>1 of                                 |
| MSG   |   |                       | STATUS  |   |

| Product   | : | 802.11 b/g/n, 2.4G 1T1R, Wireless USB Module   |
|-----------|---|--|
| Test Item | : | Band Edge Data                                 |
| Test Site | : | No.3 OATS                                      |
| Test Mode | : | Mode 3: Transmit (802.11n MCS0 7.2Mbps 20M-BW) |

#### Fundamental Filed Strength

| Antenna    | Frequency | <b>Correction Factor</b> | <b>Reading Level</b> | <b>Emission Level</b> | Detector |
|------------|-----------|--------------------------|----------------------|-----------------------|----------|
| Pole       | [MHz]     | [dB/m]                   | [dBuV]               | [dBuV/m]              |          |
| Horizontal | 2462      | 32.019                   | 65.94                | 97.959                | Peak     |
| Horizontal | 2462      | 32.019                   | 50.26                | 82.279                | Average  |
| Vertical   | 2462      | 31.29                    | 70.6                 | 101.89                | Peak     |
| Vertical   | 2462      | 31.29                    | 54.04                | 85.33                 | Average  |

Note: 1:Spectrum Analyzer setting:

Peak detector: RBW=1MHz, VBW=1MHz

Average detector: RBW=1MHz, VBW=10Hz

Band Edge Test Data

| Antenna<br>Pole | Test Frequency<br>(MHz) | Fundamental<br>(dBuV/m) | Δ (dB) | Band Edge<br>Field Strength<br>(dBuV/m) | Detector |
|-----------------|-------------------------|-------------------------|--------|---|----------|
| Horizontal      | 2483.5                  | 97.959                  | 38.07  | 59.889                                  | Peak     |
| Horizontal      | 2483.5                  | 82.279                  | 39.39  | 42.889                                  | Average  |
| Vertical        | 2483.5                  | 101.89                  | 38.07  | 63.82                                   | Peak     |
| Vertical        | 2483.5                  | 85.33                   | 39.39  | 45.94                                   | Average  |

Note:

The Band Edge Field Strength was calculated using the Fundamental and Conducted Band Edge measurements per the Marker-Delta Method with the following formula:

Band Edge field Strength =  $F - \Delta$ 

F = Fundamental field Strength (Peak or Average)

 $\Delta$  = Conducted Band Edge Delta (Peak or Average)

| 💴 Agilent S                  | Spectr       | um Analyzer -    | Swept SA          |                        |                   |          |   |                           | <u> </u>           |                                |               |
|------------------------------|--------------|------------------|-------------------|------------------------|-------------------|----------|---|---------------------------|--------------------|--------------------------------|---------------|
| ₩<br>Marker                  | 2 2          | <sup>50 Ω</sup>  | 000000 G          | iHz                    | AC SEI            | NSE:INT  | Avg T   | ALIGNAUTO<br>/pe: Log-Pwr | 04:57:52 P<br>TRAC | MDec 09, 2010<br>E 1 2 3 4 5 6 | Marker        |
|                              |              | In               | put: RF PI<br>IF( | NO: Fast G<br>Gain:Low | Atten: 30         | dB       |   |                           | D                  | PNNNNN                         | Select Marker |
| 10 dB/div                    | / F          | Ref 20.00        | dBm               |                        |                   |          |   | Mk                        | r2 2.48<br>-31.    | 3 5 GHz<br>16 dBm              | 2             |
| 10.0                         |              |                  |                   | 1                      |                   |          |   |                           |                    |                                |               |
| 0.00                         |              | 1                |                   | - week                 | 6                 |          |   |                           |                    |                                | Normai        |
| -20.0                        |              |                  |                   |                        | The second second | 2        |   |                           |                    |                                |               |
| -30.0                        | 100          | all the state    | \$                |                        | "What are         | And I    |   |                           |                    |                                | Delta         |
| -40.0                        |              |                  |                   |                        |                   | March 1  | white | - untransmittener         | n-kalaharran       | emanunor                       |               |
| -60.0                        |              |                  | -                 |                        |                   |          |   |                           |                    |                                | Fixed⊳        |
| -70.0                        |              |                  |                   |                        |                   |          |   |                           |                    |                                |               |
| Center<br>#Res Bi            | 2.48<br>W 1. | 350 GHz<br>0 MHz |                   | #VB۱                   | N 1.0 MHz         |          |   | #Sweep                    | Span 1<br>500 ms ( | 00.0 MHz<br>1001 pts)          | Off           |
|                              | TRC<br>1     | SCL              | ×<br>2.463        | 1 GHz                  | Y<br>6 91 di      | FL<br>3m | NCTION  | FUNCTION WIDTH            | FUNCTIO            | ON VALUE                       | UII UII       |
| 2 N<br>3                     | 1            | f                | 2.483             | 5 GHz                  | -31.16 di         | 3m       |   |                           |                    |                                |               |
| 4 5                          |              |                  |                   |                        |                   |          |   |                           |                    |                                | Properties►   |
| - <del>6</del><br>- 7<br>- 8 |              |                  |                   |                        |                   |          |   |                           |                    |                                |               |
| 9<br>10                      |              |                  |                   |                        |                   |          |   |                           |                    |                                | More          |
| 11<br>12                     |              |                  |                   |                        |                   |          |   |                           |                    |                                | 1012          |
| MSG                          |              |                  |                   |                        |                   |          |   | STATUS                    |                    |                                |               |

#### Peak Detector of conducted Band Edge Delta

### Average Detector of conducted Band Edge Delta

| 💴 Agilent Spectrum Analyze  | er - Swept SA              |                          |                                |   |                |
|---|----------------------------|--------------------------|--------------------------------|---|----------------|
| <mark>02/</mark> 50 Ω<br>Marker 1 2.46350                                   | 00000000 GHz               | AC SENSE:INT             | ALIGNAUTO<br>Avg Type: Log-Pwr | 04:58:58 PM Dec 09, 2010<br>TRACE 1 2 3 4 5 6<br>TYPE WAARAAAAA | Peak Search    |
| 10 dB/div Ref 20.0  | Input: RF PNO: Fast C      | Atten: 30 dB             | Mk                             | r1 2.463 5 GHz<br>-10.88 dBm                                    | Next Peak      |
| 10.0<br>0.00  | 1                          |                          |                                |   | Next Right     |
| -20.0<br>-30.0<br>-40.0   |                            | 2                        |                                |   | Next Left      |
| -50.0   |                            |                          |                                |   | Marker Delta   |
| Center 2.48350 GH<br>#Res BW 1.0 MHz<br>MKR MODE TRO SOL                    | z<br>#VBV                  | / 10 Hz                  | Sweep                          | Span 100.0 MHz<br>7.80 s (1001 pts)<br>FUNCTION VALUE           | Mkr→CF         |
| N         1         f           2         N         1         f           3 | 2.463 5 GHz<br>2.483 5 GHz | -10.88 dBm<br>-50.27 dBm |                                |   | Mkr→RefLv      |
| 8         9           10         11           12         12                 |                            |                          |                                |   | More<br>1 of 2 |
| MSG   |                            |                          | STATUS                         | 3   |                |

| Product   | : | 802.11 b/g/n, 2.4G 1T1R, Wireless USB Module  |
|-----------|---|---|
| Test Item | : | Band Edge Data                                |
| Test Site | : | No.3 OATS                                     |
| Test Mode | : | Mode 4: Transmit (802.11n MCS0 15Mbps 40M-BW) |

#### Fundamental Filed Strength

| Antenna    | Frequency | <b>Correction Factor</b> | <b>Reading Level</b> | <b>Emission Level</b> | Detector |
|------------|-----------|--------------------------|----------------------|-----------------------|----------|
| Pole       | [MHz]     | [dB/m]                   | [dBuV]               | [dBuV/m]              |          |
| Horizontal | 2422      | 31.715                   | 64.46                | 96.175                | Peak     |
| Horizontal | 2422      | 31.715                   | 44.33                | 76.045                | Average  |
| Vertical   | 2422      | 31.017                   | 69.19                | 100.207               | Peak     |
| Vertical   | 2422      | 31.017                   | 47.91                | 78.927                | Average  |

Note: 1:Spectrum Analyzer setting:

Peak detector: RBW=1MHz, VBW=1MHz

Average detector: RBW=1MHz, VBW=10Hz

Band Edge Test Data

| Antenna<br>Pole | Test Frequency<br>(MHz) | Fundamental<br>(dBuV/m) | Δ (dB) | Band Edge<br>Field Strength<br>(dBuV/m) | Detector |
|-----------------|-------------------------|-------------------------|--------|---|----------|
| Horizontal      | 2390                    | 96.175                  | 35.582 | 60.593                                  | Peak     |
| Horizontal      | 2390                    | 76.045                  | 29.18  | 46.865                                  | Average  |
| Vertical        | 2390                    | 100.207                 | 35.582 | 64.625                                  | Peak     |
| Vertical        | 2390                    | 78.927                  | 29.18  | 49.747                                  | Average  |

Note:

The Band Edge Field Strength was calculated using the Fundamental and Conducted Band Edge measurements per the Marker-Delta Method with the following formula:

Band Edge field Strength = F -  $\Delta$ 

F = Fundamental field Strength (Peak or Average)

 $\Delta$  = Conducted Band Edge Delta (Peak or Average)

| D Ag                  | ilent S         | Spect       | rum /        | Analyzer - S  | owept SA          |                      |          |                      | 10           |         |            |   |                    |                       |                |
|-----------------------|-----------------|-------------|--------------|---------------|-------------------|----------------------|----------|----------------------|--------------|---------|------------|---|--------------------|-----------------------|----------------|
| <mark>w</mark><br>Mar | ker             | 3           | 50 ຊ<br>2.3  | 2<br>900000   | 00000 G           | iHz                  | AC       | SE                   | NSE:INT      | Avg     | A<br>Type: | LIGNAUTO<br>Log-Pwr   | 05:39:43 F         | MDec 09, 2010         | Marker         |
|                       |                 |             |              | Ing           | out: RF PI<br>IF( | NO: Fast<br>Gain:Low | <u> </u> | Atten: 30            | e Run<br>)dB |         |            |   | D                  |                       | Select Marker  |
| 10 d                  | B/div           | ,           | Ref          | 20.00 c       | IBm               |                      |          |                      |              |         |            | Mk  | r3 2.39<br>-31.    | 0 0 GHz<br>07 dBm     | 3              |
| 10.0                  |                 |             |              |               |                   |                      |          |                      |              |         |            | <b>1</b>  |                    |                       |                |
| 0.00                  |                 |             |              |               |                   |                      |          |                      |              | 1       |            | - Come - |                    |                       | Normai         |
| -20.0                 |                 |             |              |               |                   |                      |          |                      | 3            | 2       |            |   |                    |                       |                |
| -30.0                 |                 |             |              |               |                   |                      | works    | nice shire you       | hannak       |         |            |   |                    |                       | Delta          |
| -40.0<br>-50.0        | how             | A           | m            | namedicali    | when the second   | and and              |          |                      |              |         |            |   |                    |                       |                |
| -60.0                 | _               |             | _            |               |                   |                      |          |                      |              |         |            |   |                    |                       | Fixed⊳         |
| -70.0                 |                 |             |              |               |                   |                      |          |                      |              |         |            |   |                    |                       |                |
| Cer<br>#Re            | nter :<br>Is Bl | 2.39<br>W 1 | 9000<br>.0 N | 0 GHz<br>/IHz |                   | #VI                  | BW 1     | .0 MHz               |              |         | #          | Sweep   | Span 1<br>500 ms ( | 00.0 MHz<br>1001 pts) | Off            |
| MKR<br>1              | MODE<br>N       | TRC<br>1    | SCL<br>f     |               | ×<br>2 415        | 2 GHz                |          | Y<br>4 512 d         | Bm           | UNCTION | FUNC       | TION WIDTH  | FUNCTI             | ON VALUE              | 0              |
| 2                     | NN              | 1           | f<br>f       |               | 2.400<br>2.390    | 0 GHz<br>0 GHz       |          | -23.65 d<br>-31.07 d | Bm<br>Bm     |         |            |   |                    |                       |                |
| 4 5                   |                 |             |              |               |                   |                      |          |                      |              |         | -          |   |                    |                       | Properties►    |
| 7                     |                 |             |              |               |                   |                      |          |                      |              |         |            |   |                    |                       |                |
| 9<br>10               |                 |             | -            |               |                   |                      |          |                      |              |         |            |   |                    |                       | More<br>1 of 2 |
| 11<br>12              |                 |             |              |               |                   |                      |          |                      |              |         |            |   |                    |                       | 1012           |
| MSG                   |                 |             |              |               |                   |                      |          |                      |              |         |            | STATUS  |                    |                       |                |

#### Peak Detector of conducted Band Edge Delta

### Average Detector of conducted Band Edge Delta

| 🏴 Agilent Spectrum                          | 1 Analyzer - Swept SA         |  |           |  |                |
|---|-------------------------------|--|-----------|--|----------------|
| Marker 1 2.4                                | Ω<br>427100000000 GH          |  | ALIGNAUTO | 05:40:43 PM Dec 09, 2010<br>TRACE 1 2 3 4 5 6<br>TYPE WWWWWW | Peak Search    |
| 10 dB/div Re                                | IF 20.00 dBm                  | ain:Low Atten: 30 dB                               | Mk        | r1 2.427 1 GHz<br>-18.43 dBm                                 | Next Peak      |
| 10.0<br>0.00<br>-10.0                       |                               |  |           | 1  | Next Right     |
| -20.0<br>-30.0<br>-40.0                     |                               | 3  | 2         |  | Next Left      |
| -50.0<br>-60.0<br>-70.0                     |                               |  |           |  | Marker Delta   |
| Center 2.3900<br>#Res BW 1.0                | 00 GHz<br>MHz                 | #VBW 10 Hz   | Sweep     | Span 100.0 MHz<br>7.80 s (1001 pts)<br>FUNCTION VALUE        | Mkr→CF         |
| 1 N 1 f<br>2 N 1 f<br>3 N 1 f<br>4 5<br>6 6 | 2.427 1<br>2.400 0<br>2.390 0 | GHz -18.43 dBm<br>GHz -39.97 dBm<br>GHz -47.61 dBm |           |  | Mkr→RefLvl     |
| 8<br>9<br>10<br>11<br>12                    |                               |  |           |  | More<br>1 of 2 |
| MSG   |                               |  | STATUS    |  |                |

| Product   | : | 802.11 b/g/n, 2.4G 1T1R, Wireless USB Module  |
|-----------|---|---|
| Test Item | : | Band Edge Data                                |
| Test Site | : | No.3 OATS                                     |
| Test Mode | : | Mode 4: Transmit (802.11n MCS0 15Mbps 40M-BW) |

#### Fundamental Filed Strength

| Antenna    | Frequency | Correction Factor Reading Level |        | <b>Emission Level</b> | Detector |
|------------|-----------|---------------------------------|--------|-----------------------|----------|
| Pole       | [MHz]     | [dB/m]                          | [dBuV] | [dBuV/m]              |          |
| Horizontal | 2452      | 31.944                          | 65.33  | 97.274                | Peak     |
| Horizontal | 2452      | 31.944                          | 44.68  | 76.624                | Average  |
| Vertical   | 2452      | 31.222                          | 68.92  | 100.142               | Peak     |
| Vertical   | 2452      | 31.222                          | 47.47  | 78.692                | Average  |

Note: 1:Spectrum Analyzer setting:

Peak detector: RBW=1MHz, VBW=1MHz

Average detector: RBW=1MHz, VBW=10Hz

Band Edge Test Data

| Antenna<br>Pole | Test Frequency<br>(MHz) | Fundamental<br>(dBuV/m) | Δ (dB) | Band Edge<br>Field Strength<br>(dBuV/m) | Detector |
|-----------------|-------------------------|-------------------------|--------|---|----------|
| Horizontal      | 2485                    | 97.274                  | 37.817 | 59.457                                  | Peak     |
| Horizontal      | 2483.5                  | 76.624                  | 34.09  | 42.534                                  | Average  |
| Vertical        | 2485                    | 100.142                 | 37.817 | 62.325                                  | Peak     |
| Vertical        | 2483.5                  | 78.692                  | 34.09  | 44.602                                  | Average  |

Note:

The Band Edge Field Strength was calculated using the Fundamental and Conducted Band Edge measurements per the Marker-Delta Method with the following formula:

Band Edge field Strength = F -  $\Delta$ 

F = Fundamental field Strength (Peak or Average)

 $\Delta$  = Conducted Band Edge Delta (Peak or Average)

| D Agi          | lent S         | pect        | rum .      | Analyzer  | - Swept | SA          |                      |        | a de la compañía de l |              |       |            |            |                                   | 0      |                 |                             |   |                |
|----------------|----------------|-------------|------------|-----------|---------|-------------|----------------------|--------|---|--------------|-------|------------|------------|-----------------------------------|--------|-----------------|-----------------------------|---|----------------|
| ⊯<br>Mar       | ker            | 2           | 50 s       | 85000     | 0000    | 00 G        | Hz                   | A      | C SE  | INSE:INT     |       | Avg T      | /<br>Fype: | Log-Pwr                           | 05:44  | :01 PM<br>TRACE | Dec 09, 2010<br>1 2 3 4 5 6 | • | Marker         |
|                |                |             |            | li        | nput: R | F PI<br>IFC | NO: Fast<br>Gain:Lov | :<br>• | Atten: 30   | e Run<br>)dB |       |            |            |                                   |        | DET             | PNNNNN                      | 5 | elect Marker   |
| 10 dE          | 3/div          |             | Ref        | 20.00     | dBm     | Ľ           |                      |        |   |              |       |            |            | Mł                                | r2 2.4 | 485<br>33.3     | 0 GHz<br>9 dBm              | _ | 2              |
| Log<br>10.0    |                |             | $-\langle$ | <u>)</u>  |         |             |                      | _      |   |              |       |            | _          |                                   |        |                 |                             |   | N              |
| 0.00           | and the second |             |            | and and a |         | and and all | ~                    | 1      |   |              |       |            |            |                                   |        |                 |                             |   | Normai         |
| -20.0          |                |             |            |           | _       |             |                      | Y      |   |              |       |            |            |                                   | -      |                 |                             | F |                |
| -30.0          | -              |             | -          |           | - 55    |             |                      | -      | Manage  | 2 Arm        | me    |            |            |                                   |        | -               |                             |   | Delta          |
| -40.0<br>-50.0 |                |             |            |           |         |             |                      |        |   |              | - 515 | ogen Carle | n when     | all and the starting the starting | ut man | umste           | hard when the second of     | F |                |
| -60.0          | -              |             | +          |           |         |             |                      | -      |   |              |       |            | _          |                                   |        | -               |                             |   | Fixed⊳         |
| -70.0          |                |             |            |           |         |             |                      |        |   |              |       |            |            |                                   |        | - 10            |                             |   |                |
| Cen<br>#Re     | ter 2<br>s BV  | 2.48<br>N 1 | 835<br>10. | /IHz      |         |             | #V                   | вw     | 1.0 MHz   |              |       |            | #          | ∕Sweep                            | 500 m  | n 10<br>1s (1   | 0.0 MHZ<br>001 pts)         |   | Off            |
|                | MODE           | TRC<br>1    | SCL<br>f   |           | ×       | 2.444       | 7 GHz                |        | Y<br>4.427 d  | Bm           | FUNCT | ION        | FUN        | CTION WIDTH                       | FU     | NCTION          | VALUE                       |   |                |
| 2              | N              | 1           | f          |           |         | 2.485       | 0 GHz                |        | -33.39 d  | Bm           |       |            | 1          |                                   |        |                 |                             | F |                |
| 4              |                |             |            |           |         |             |                      |        |   |              |       |            |            |                                   |        |                 | _                           |   | Properties►    |
| 7              |                | _           |            |           |         |             |                      |        |   |              |       |            |            |                                   |        |                 |                             |   |                |
| 9<br>10        |                |             |            |           |         |             |                      |        |   |              |       |            |            |                                   |        |                 | _                           |   | More<br>1 of 2 |
| 12             |                |             |            |           |         |             |                      |        |   |              |       |            |            | _                                 |        |                 |                             | _ |                |
| MSG            |                |             |            |           |         |             |                      |        |   |              |       |            |            | STATU                             | 5      |                 |                             |   |                |

#### Peak Detector of conducted Band Edge Delta

### Average Detector of conducted Band Edge Delta

| Dilent Spec                       | trum Analyzer - Swept               | SA                           |                          |                              |  |                    |
|-----------------------------------|-------------------------------------|------------------------------|--------------------------|------------------------------|--|--------------------|
| w<br>Marker 2                     | <sup>50 Ω</sup> <b>2.4835000000</b> | 00 GHz                       | AC SENSE:INT             | ALIGNAUT<br>Avg Type: Log-Pw | 0 05:45:53 PM Dec 09, 2010<br>r TRACE 1 2 3 4 5 6<br>TYPE Watatatata | Marker             |
| 10 dB/div                         | Ref 20.00 dBm                       | F PNO: Fast (+<br>IFGain:Low | Atten: 30 dB             | N                            | DET P NNNNN<br>Ikr2 2.483 5 GHz<br>-52.69 dBm                        | Select Marker<br>2 |
| 10.0<br>0.00<br>-10.0             | 1                                   |                              |                          |                              |  | Normal             |
| -20.0<br>-30.0<br>-40.0           |                                     |                              | 2                        |                              |  | Delta              |
| -50.0<br>-60.0<br>-70.0           |                                     |                              |                          |                              |  | Fixed⊳             |
| Center 2.4<br>#Res BW             | 8350 GHz<br>1.0 MHz                 | #VBW                         | 10 Hz                    | Swee                         | Span 100.0 MHz<br>ep 7.80 s (1001 pts)<br>TH FUNCTION VALUE          | Off                |
| 1 N 1<br>2 N 1<br>3 4<br>5 6<br>7 | f                                   | 2.446 6 GHZ<br>2.483 5 GHz   | -18.60 dBm<br>-52.69 dBm |                              |  | Properties▶        |
| 8<br>9<br>10<br>11<br>12          |                                     |                              |                          |                              |  | More<br>1 of 2     |
| MSG                               |                                     |                              |                          | STAT                         | rus  |                    |